

RENAULT

Technical Note 6027A

FXX, and F4P or F4R

F4 - 4-cylinder petrol engine

Clio II - Mégane - Mégane II - Laguna - Laguna II - Avantime -
Espace II - Espace IV - Vel Satis - Trafic

Sub-section concerned: 10A

This note cancels and replaces Technical Note 3783A

F4 - 4-cylinder petrol engine

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General information

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

I - UNITS OF MEASUREMENT

- All dimensions are expressed in millimetres (mm) (unless stated otherwise).
- Tightening torques are expressed in decaNewtonmetres (daNm) (reminder: 10 Nm = 1.02 m/kg)
- Pressures are expressed in bar (reminder: 1 bar = 1000 00 Pa).

II - TOLERANCES

Tightening torques given without a tolerance must be accurate to within:

- in degrees ($\pm 6^\circ$),
- in daNm ($\pm 10\%$).

Cleanliness instructions

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

I - RISKS RELATING TO CONTAMINATION

The injection system is very sensitive to contamination. The risks caused by contamination are:

- damage to or destruction of the injection system,
- a component seizing,
- a component not being properly sealed.

All After Sales operations must be performed under very clean conditions. This means that no impurities (particles of only a few microns) should have penetrated the system during dismantling.

The cleanliness principle must be applied from the filter to the injectors.

Which substances cause contamination?

- metal or plastic chips,
- paint,
- cardboard, brush, paper, clothing and cloth fibres,
- foreign bodies such as hair,
- ambient air,
- etc.

WARNING

Cleaning the engine using a high pressure washer is prohibited because of the risk of damaging connections. In addition, moisture may collect in the connectors and create electrical connection faults.

II - ADVICE TO BE FOLLOWED BEFORE ANY OPERATION

WARNING

Before carrying out any work on the high pressure injection system, protect:

- the accessories and timing belts,
- the electrical accessories (starter, alternator, electric power assisted steering pump),
- the flywheel surface, to prevent any substance from running onto the clutch friction plate.

Ensure that you have caps for the unions to be opened (set of caps available from the Parts Department). The caps are single-use. After use, they must be discarded

(once used they are soiled and cleaning is not sufficient to make them reusable). Unused caps must be discarded.

Ensure that you have hermetically re-sealable plastic bags for storing removed parts. Stored parts will therefore be less subject to the risk of impurities. The bags can only be used once; they must be thrown away after one use.

Equip yourself with lint free wipes (wipe part reference **77 11 211 707**). Using a conventional cloth or paper is not permitted. They are not lint-free and could contaminate the fuel circuit. Each cloth can only be used once.

Use fresh cleaning agent for each operation (used cleaning agent is contaminated). Pour it into a clean receptacle.

For each operation, use a clean brush in good condition (the brush must not shed its bristles).

Use a brush and cleaning agent to clean the unions to be opened.

Blow compressed air over the cleaned parts (tools, workbench, and the injection system parts, unions and sections). Check that no bristles remain.

Wash your hands before and during the operation if necessary.

When wearing leather protective gloves cover them with latex gloves to prevent contamination.

III - INSTRUCTIONS TO BE FOLLOWED DURING THE OPERATION

As soon as the circuit is open, all openings must be capped to prevent impurities from entering the system. The plugs to be used are available from the Parts Department. The caps must under no circumstances be reused.

Close the hermetically sealed bag, even if it has to be reopened shortly afterwards. Ambient air carries contamination.

All components of the injection system that are removed must be stored in a hermetically sealed plastic bag once the plugs have been inserted.

Using a brush, cleaning agent, air gun, sponge or normal cloth is strictly prohibited once the circuit has been opened. These items could allow impurities into the system.

When replacing a component with a new one, it must not be removed from its packaging until it is to be fitted on the vehicle.

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

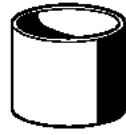
IV - INSTRUCTIONS FOR FITTING THE PLUGS

Part no. 77 01 208 229



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	A	B	C	D	E	F	G	H	I
DCI →									
	X	X	X	X	X	X	X	X	X
	5	4	6	7	8	1	7	1	1

J	K	L	M
			
X	X	X	X
1	1	1	1

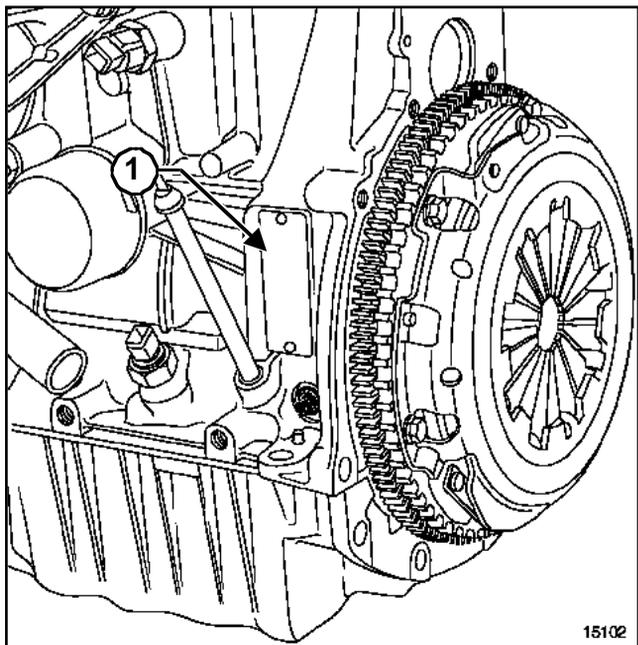
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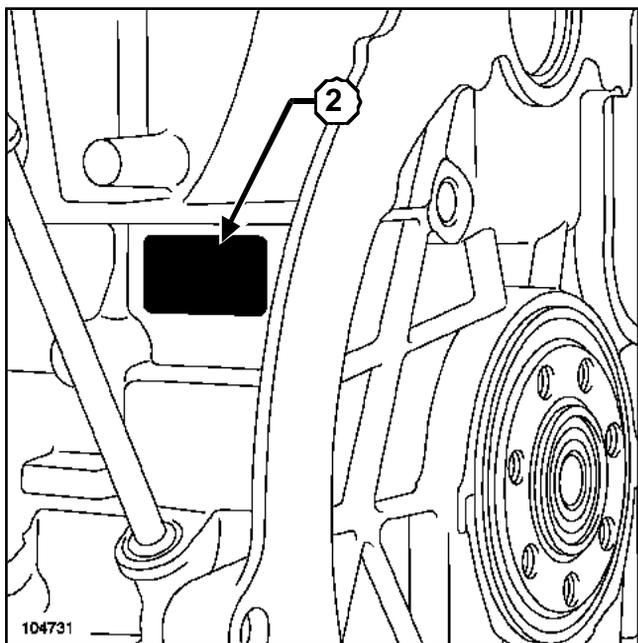
Engine identification

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I - ENGINE IDENTIFICATION



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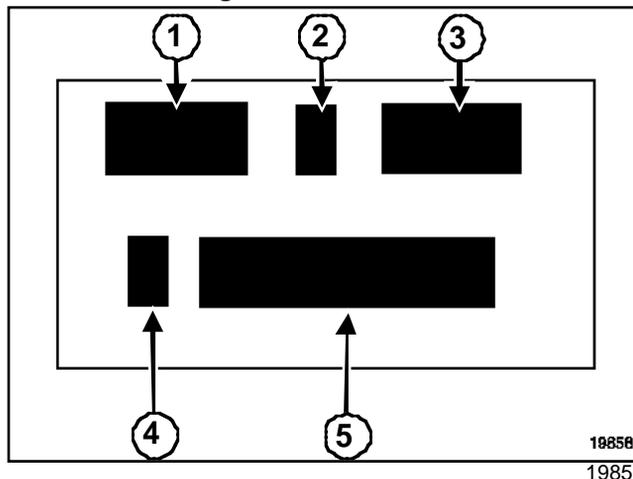
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The engine identification is on the cylinder block between the oil gauge and the engine flywheel.

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

The markings may be written vertically (1) or horizontally (2).

Details of markings



The markings include:

- 1: the engine type
- 2: the engine approval letter
- 3: the engine suffix
- 4: the engine assembly factory
- 5: the engine production number

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II - ENGINE SPECIFICATION TABLES

Vehicle	After-Sales Type:	Engine type	Engine suffix	Cubic capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio
MEGANE	XA1A XA1R XA12	F4P	720	1783	82.7	83	9.8:1
	XA1A XA1M XA12		722				
	XA1D XA1B XA1L	F4R	740, 741	1998	82.7	93	9.8:1
	XA0C XA1S XA13		744				
	XA0C XAID XA1S XA13		746, 747				
CLIO II	CBOM	F4R	730	1998	82.7	93	11.2 : 1
	CB1C CB1S CB15		732				
	CB1G CB1N CB1S CB1T CB15		736				
	CB2P CB20 CB21 CB22		738				

Engine identification

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Vehicle	After-Sales Type:	Engine type	Engine suffix	Cubic capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio
ESPACE III	JE0L	F4R	700, 701	1998	82.7	93	9.8:1
	JE0N						
	JE00						
	JE02						
TRAFIC	XL0A	F4R	720	1998	82.7	93	9.8:1
	XLOG						
LAGUNA	X563	F4P	760	1783	82.7	83	9.8:1
	X564						
	X56Y						
	X56P	F4R	780	1998	82.7	93	9.8:1
X56A							

ENGINE AND LOWER ENGINE ASSEMBLY

Engine identification

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F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Vehicle	After-Sales Type:	Engine type	Engine suffix	Cubic capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio	
LAGUNA II	XG0B XG0C XG0J XG0V	F4P	770	1783	82.7	83	9.8:1	
	XG0J XG06		771 775					
	XG0M		772					
	XG0B XG0C XG0J XG0M XG0V		774					
	XG0K XG0W XG00	F4R	712, 713	1998	82.7	93	9.8:1	
	XGOK XGOP		714 715					
	XG0S XG1L XG1M XG03	F4R Turbo	764 765	1998	82.7	93	9.5:1	
	XGOZ		786 787					
	AVANTIME	DE0U DE0V	F4R Turbo	760,761	1998	82.7	93	9.5:1
	VELSATIS	BJOK BJOP	F4R Turbo	762, 763	1998	82.7	93	9.5:1
BJOW		766 767						

ENGINE AND LOWER ENGINE ASSEMBLY

Engine identification

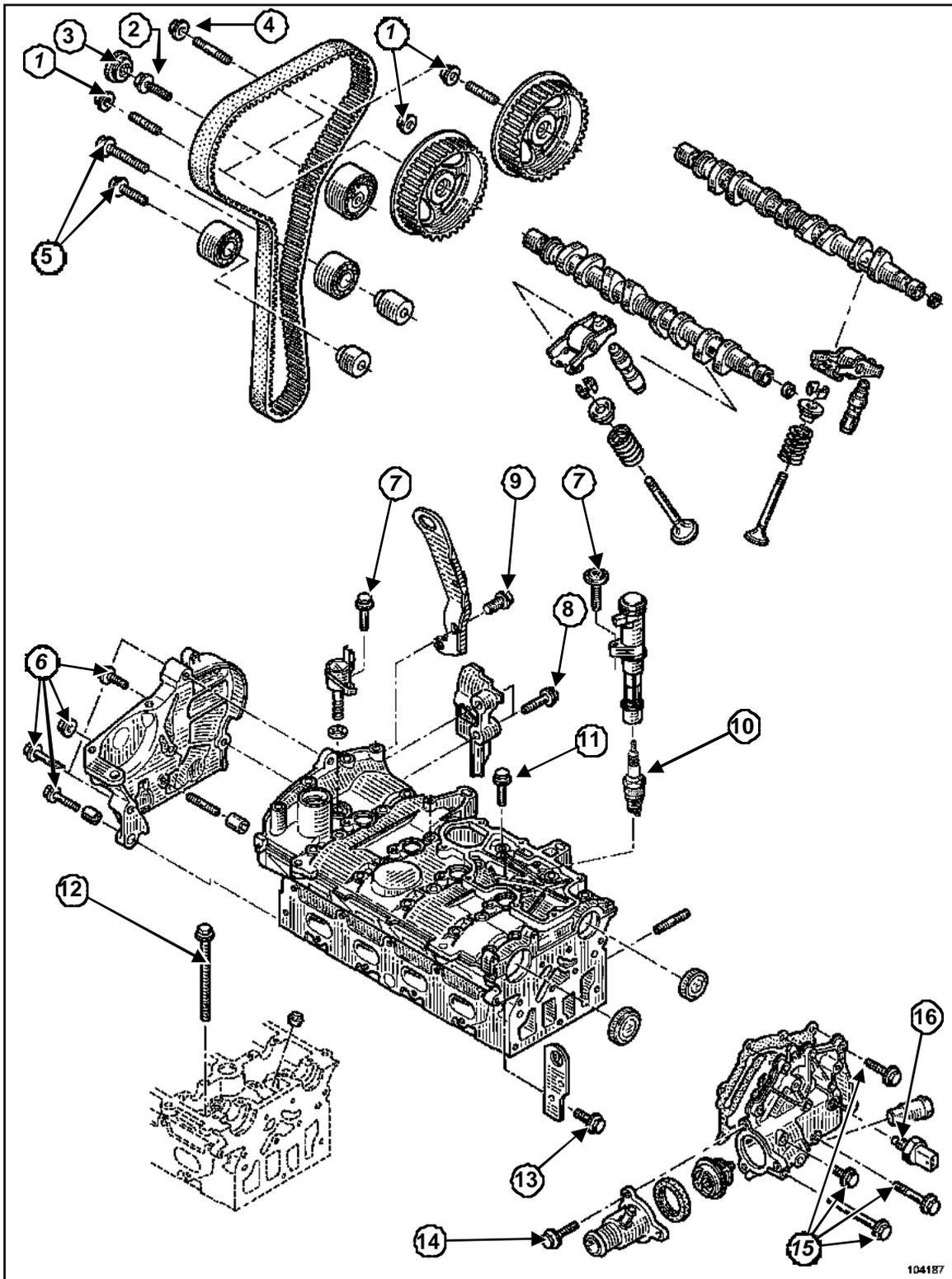
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F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Vehicle	After-Sales Type:	Engine type	Engine suffix	Cubic capacity (cc)	Bore (mm)	Stroke (mm)	Compression ratio
ESPACE IV	JK0K JK0L	F4R	790	1998	82.7	93	9.8:1
	JK09		792				
	JKOB JKOD	F4R Turbo	794	1998	82.7	93	9.5:1
	JK0B JK0D JK0N		795				
	JKOA		796 797				
MEGANE II	XM0U XM05 XM1M XM1N	F4R	770, 771	1998	82.7	93	9.8:1
	XMOM XM11 XM1L	F4R Turbo	774	1998	82.7	93	9/1
	XMOW	F4R Turbo	776	1998	82.7	93	9.5:1

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



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Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

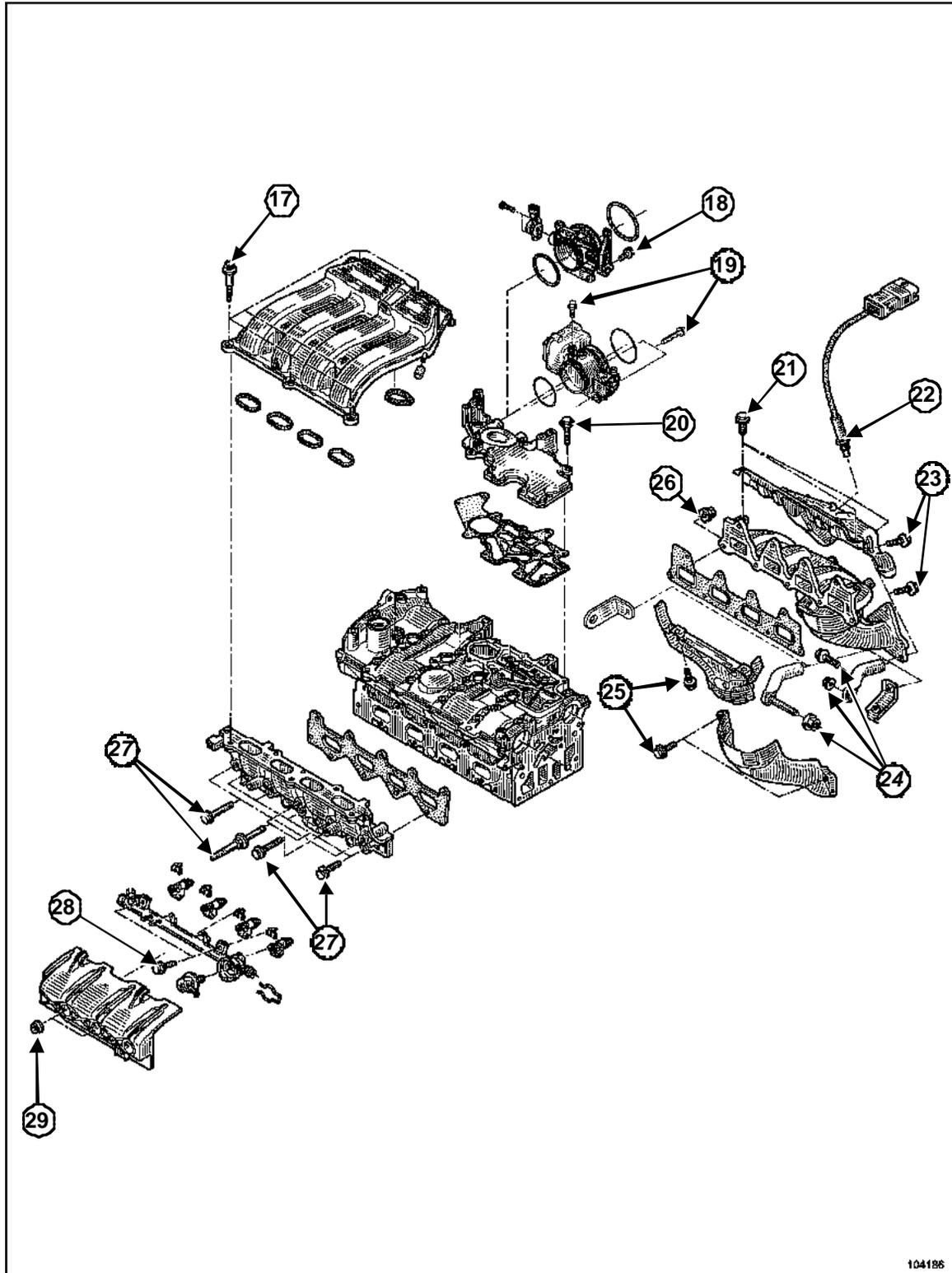
Upper engine

Tightening torques in Nm and/or in °		
1	Camshaft pulley nut	30 + 86° ± 6°
2	Hollow bolt of the inlet camshaft dephaser.	100
3	Blanking bolt	25
4	Timing tensioner nut	28
5	Timing pulley nut	50
6	Upper timing cover nuts and bolts	bolt: 38 M8 bolt: 18
7	Ignition coil bolts	15 (Non-threaded hole) 12 (Pre-threaded hole)
8	Intermediate bracket bolt	18
9	Lifting eye bolt (timing end)	28
10	Spark plugs	25 to 30
11	Rocker cover bolt	see tightening procedure
12	Cylinder head bolts	see tightening procedure
13	Lifting eye bolt (hitching end)	9
14	Coolant outlet unit cover bolt	10
15	Coolant outlet unit bolt	10; see order of tightening
16	Coolant temperature sensor	33

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 740 or 741 or 744 or 780 or 790 or 792



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Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P 261, 720, 722, 770, 771, 772, 774, 775 and F4R 700, 701, 702, 712, 713, 714, 715, 720, 740, 741, 744, 746, 747, 750, 780, 790, 792 Inlet and exhaust manifolds.

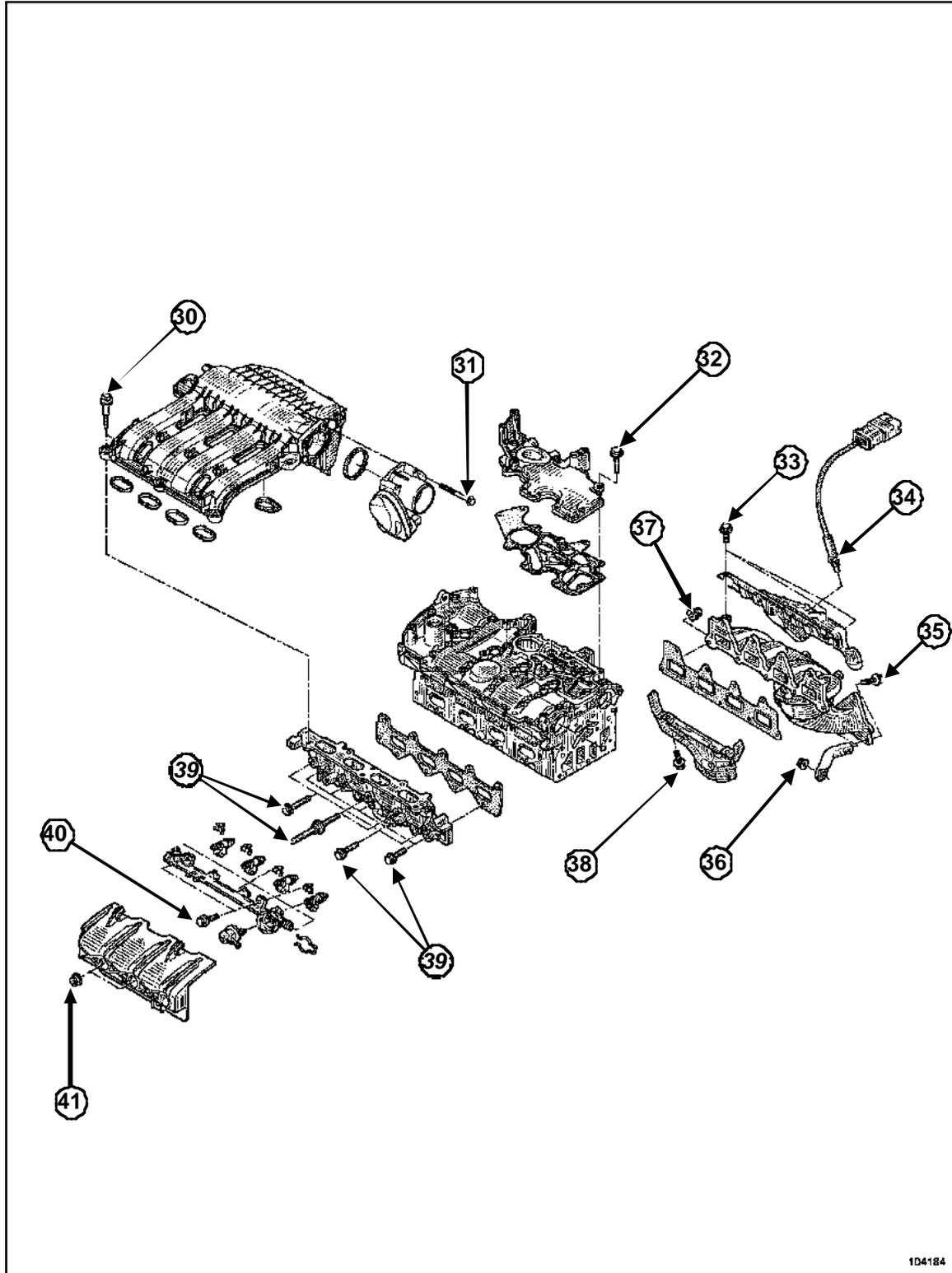
Tightening torques in Nm and/or in °		
Mark 17	Inlet manifold bolts	9
Mark 18	Mechanical throttle valve bolts	15 (Non-threaded hole) 12 (Pre-threaded hole)
Mark 19	Motorised throttle valve bolt	9
Mark 20	Water separator bolt	see tightening procedure
Mark 21	Upper heat shield bolt	10
Mark 22	Oxygen sensor	45
Mark 23	Exhaust manifold / strut bolt	8
Mark 24	Strut / gearbox bolt or nut	21
Mark 25	Lower heat shield bolt	10
Mark 26	Exhaust manifold nut	18; see order of tightening
Mark 27	Injector holder shim bolt	21
Mark 28	Injector rail bolt	9
Mark 29	Injector rail protector nut	25



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R, and 771



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Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R 770, 771 exhaust and inlet manifolds

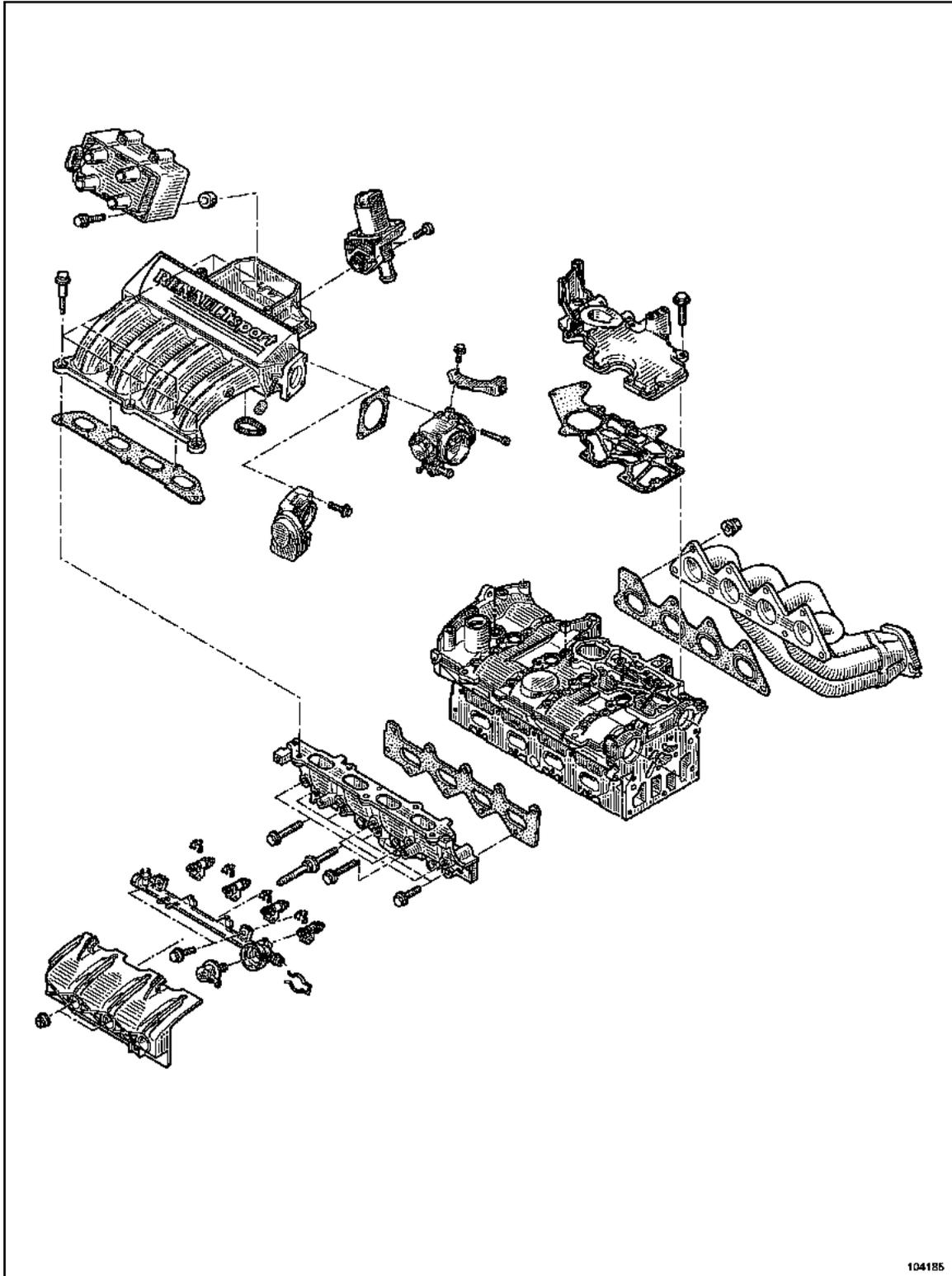
Tightening torques in Nm and/or in °		
Mark 30	Inlet manifold bolts	9
Mark 31	Motorised throttle valve bolt	10
Mark 32	Water separator bolt	see tightening procedure
Mark 33	Upper heat shield bolt	10
Mark 34	Oxygen sensor	45
Mark 35	Exhaust manifold / strut bolt	8
Mark 36	Strut / gearbox nut	21
Mark 37	Exhaust manifold nut	18; see order of tightening
Mark 38	Lower heat shield bolt	10
Mark 39	Inlet shim bolt	21
Mark 40	Injector rail bolt	9
Mark 41	Injector rail protector nut	25



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R, and 732 or 736 or 738



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Tightening torque

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F4R 730, 732, 736 and 738 inlet and exhaust manifolds

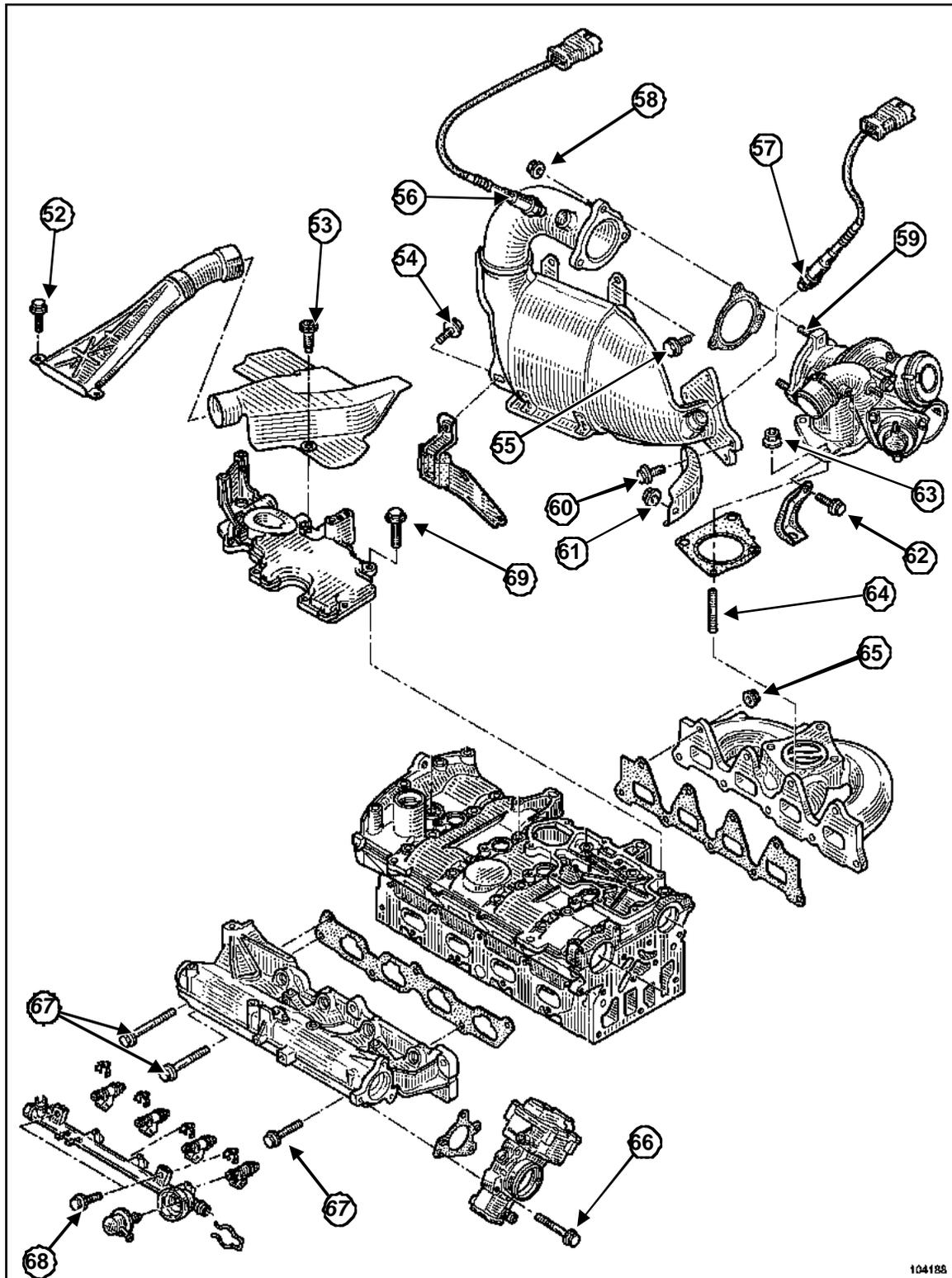
Tightening torques in Nm and/or in °		
Mark 42	Ignition coil bolts	11
Mark 43	Additional air actuator bolt	10
Mark 44	Inlet manifold bolts	11
		10 (F4R 738)
Mark 45	Retaining bracket / throttle valve bolt	9
Mark 46	throttle valve bolt	11 (F4R 730, 732)
		10 (F4R 736, 738)
Mark 47	Water separator bolt	see tightening procedure
Mark 48	Exhaust manifold nut	18; see order of tightening
Mark 49	Inlet shim bolt	21
Mark 50	Injector rail bolt	9
Mark 51	Injector rail protector nut	25



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R, and 760 or 761 or 762 or 763 or 764 or 766 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



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Tightening torque

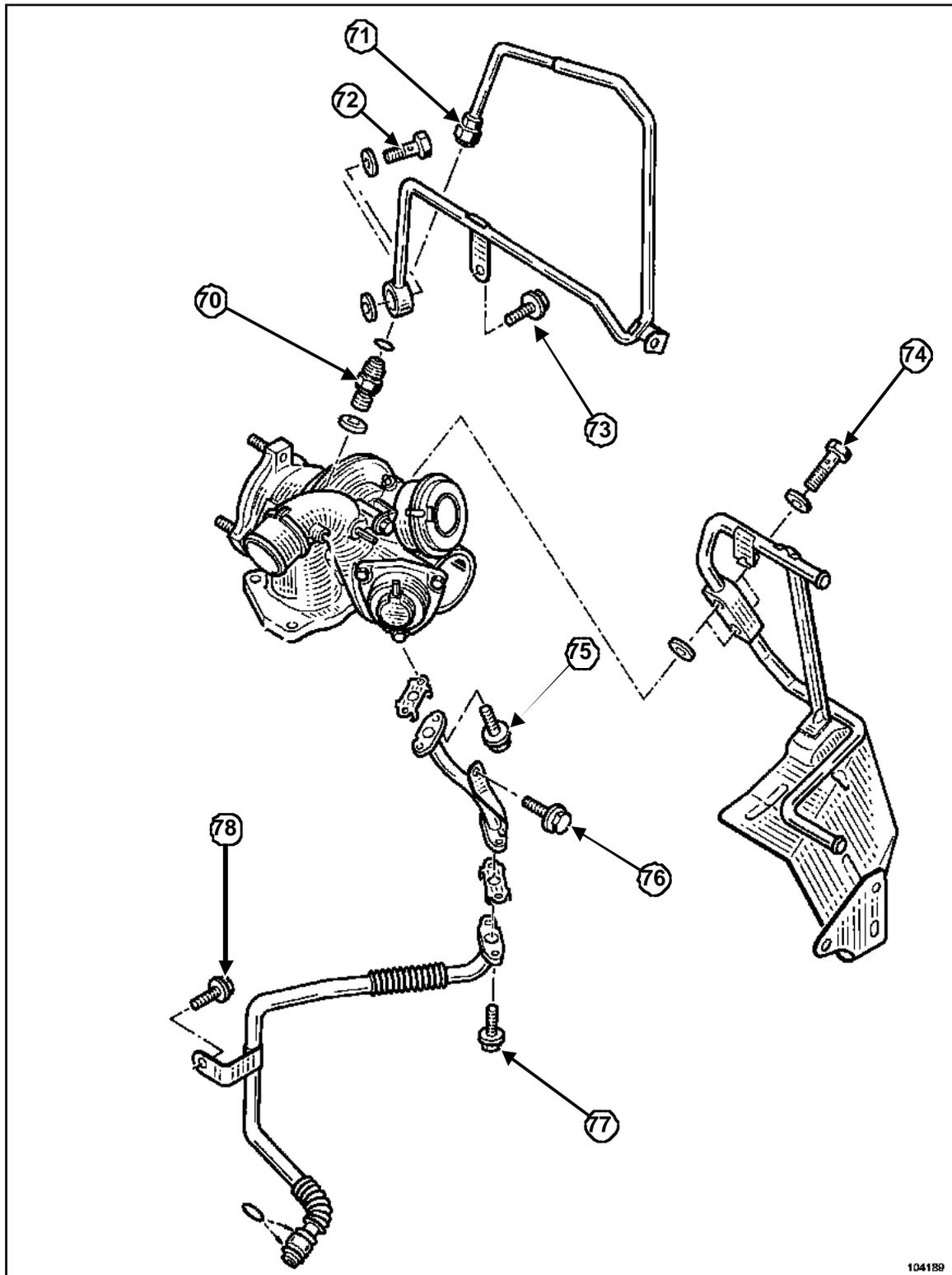
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F4R Turbo 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 786, 787, 794, 795, 796, and 797 inlet and exhaust manifolds.

Tightening torques in Nm and/or in °		
Mark 52	Turbocharger air duct bolt	8.5
Mark 53	Turbocharger heat shield bolt	10 (Non-threaded hole) 7 (Pre-threaded hole)
Mark 54	Upstream catalytic converter / strut bolt	9
Mark 55	Exhaust manifold / upper bracket bolt	9
Mark 56	Upstream oxygen sensor	34
Mark 57	Downstream oxygen sensor	34
Mark 58	Turbocharger / catalytic converter nut	40
Mark 59	Turbocharger / catalytic converter stud	9
Mark 60	Downstream strut / catalytic converter bolt	9
Mark 61	Downstream strut / gearbox nut	21
Mark 62	Strut / turbocharger bolt	9
Mark 63a	Lower turbocharger / exhaust manifold nut	15 + 75° ± 6°
Mark 63b	Turbocharger / exhaust manifold upper nut	10 + 35° ± 6°
Mark 64	Exhaust manifold / turbocharger stud	5 ± 1
Mark 65	Exhaust manifold nut	20; see order of tightening
Mark 66	throttle valve bolt	10
Mark 67	Inlet manifold bolts	21
Mark 68	Injector rail bolt	9
Mark 69	Water separator bolt	see tightening procedure

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



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Tightening torque

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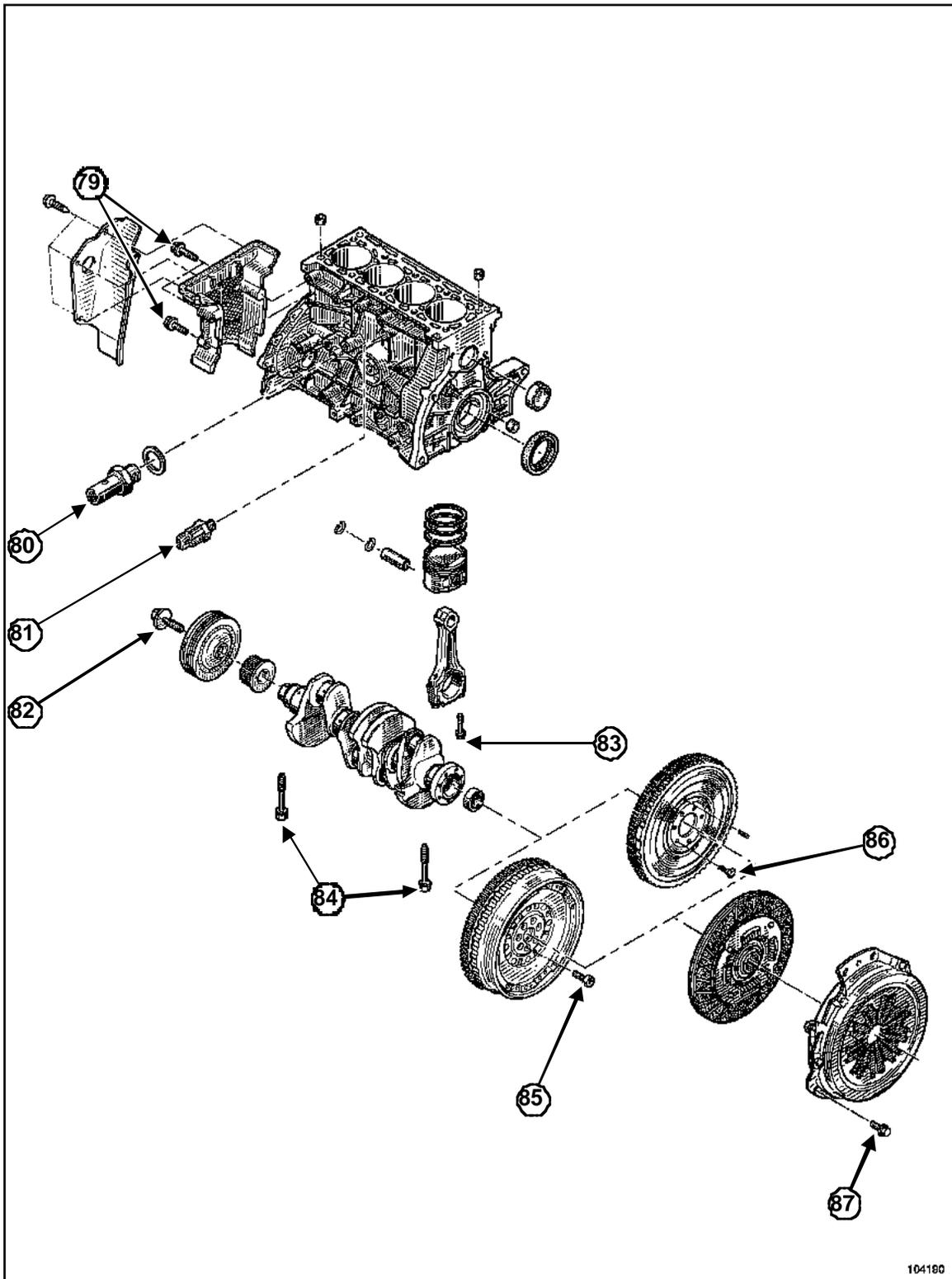
Turbocharger, oil and coolant pipes

Tightening torques in Nm and/or in °		
Mark 70	End piece	32
Mark 71	Oil supply pipe / end piece union	25
Mark 72	Oil supply pipe / cylinder block hollow bolt	45
Mark 73	Pipe / cylinder block mounting bolt	21
Mark 74	Cooling circuit pipes / turbocharger hollow bolt	pre-tightened to 12 tightened to 27
Mark 75	Oil return pipes / turbocharger bolt	12
Mark 76	Pipes / coolant outlet unit bolts	10
Mark 77	Oil return small pipe / oil return large pipe bolt	8
Mark 78	Pipe / cylinder block mounting bolt	21



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



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Tightening torque

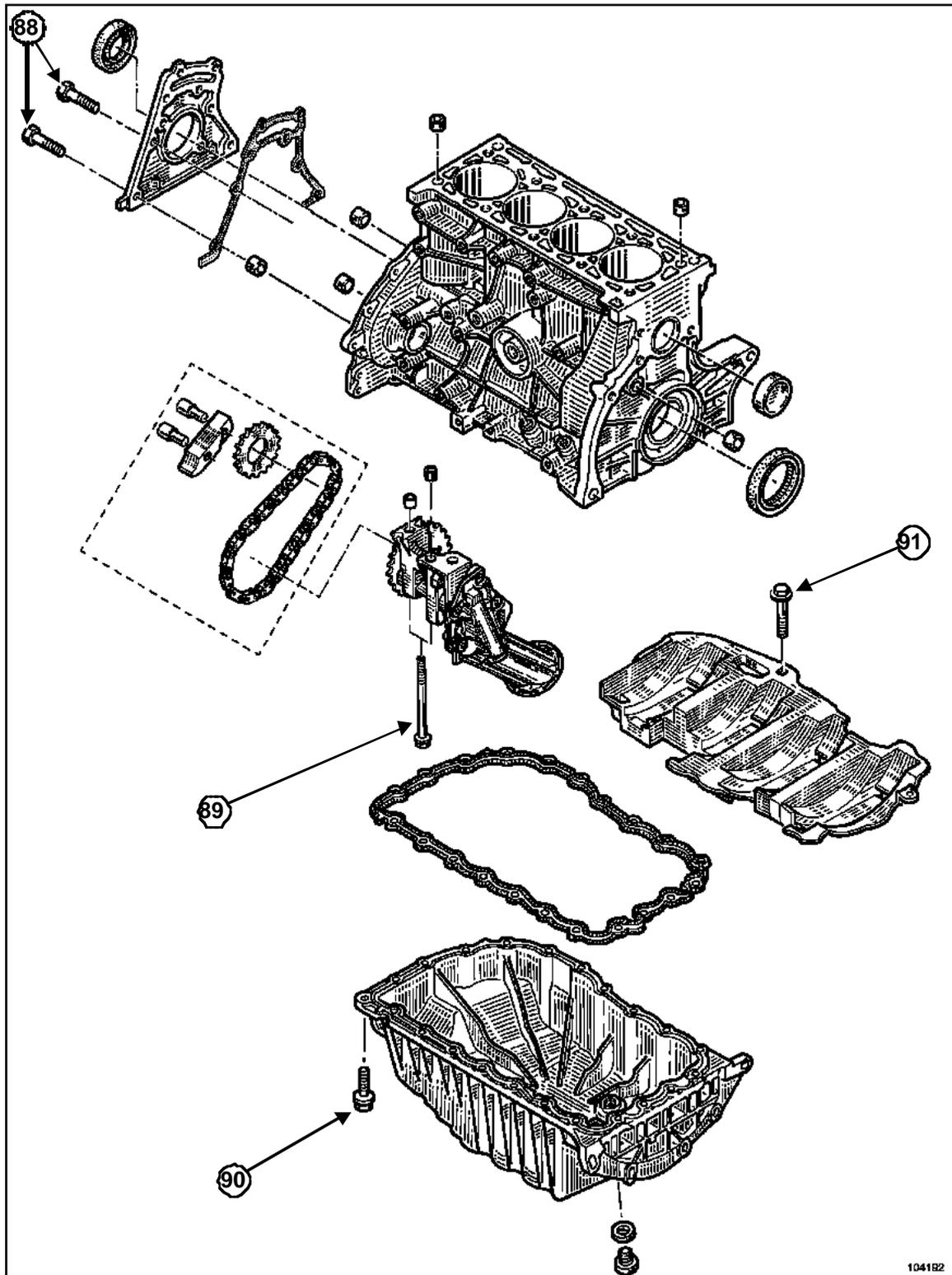
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Rotating parts

Tightening torques in Nm and/or in °		
Mark 79	Lower timing cover bolt	M8 bolt: 18 M6 bolt: 10
Mark 80	Pinking sensor	30
Mark 81	Oil pressure sensor	20
Mark 82	Crankshaft accessories pulley bolt	40 + 110°
Mark 83	Con rod cap bolts	20 + 40° ± 6°
Mark 84	Crankshaft bearing cap bolts	20 + 62° ± 4°
Mark 85	Shock absorber double flywheel engine flywheel bolt	18 to 22 + 50° ± 6°
Mark 86	Single engine flywheel bolt	50 to 55
Mark 87	Clutch pressure plate bolt	M6 bolt: 13 to 16 M7 bolt: 18 to 22 M8 bolt: 23 to 26

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104182

104192

Tightening torque

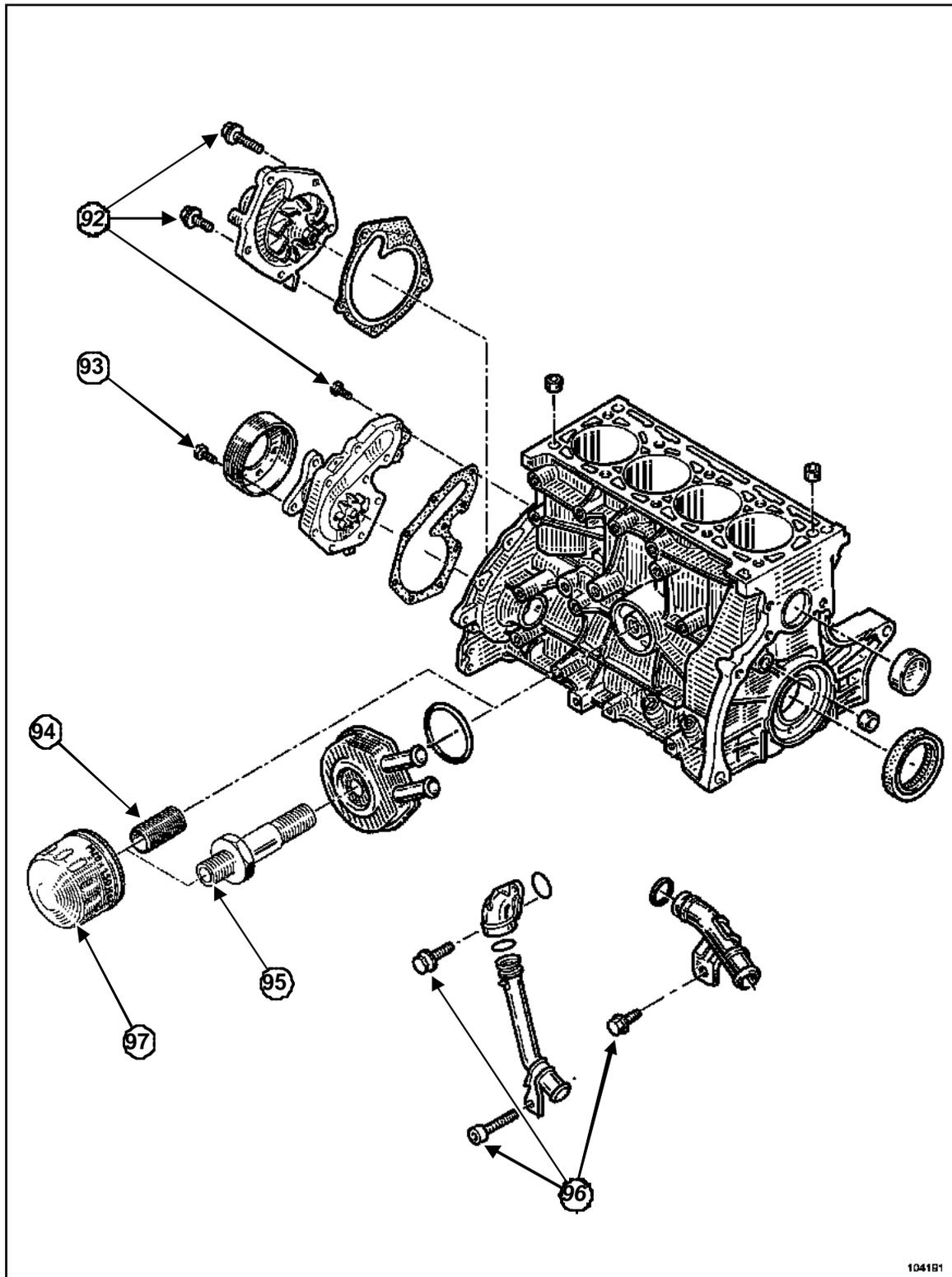
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Sump

Tightening torques in Nm and/or in °		
Mark 88	Closure panel bolt	15
Mark 89	Oil pump bolts	24
Mark 90	Sump bolt	see tightening procedure
Mark 91	Oil splash plate bolts	24 ± 2

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



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104191

ENGINE AND LOWER ENGINE ASSEMBLY

Tightening torque

10A

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

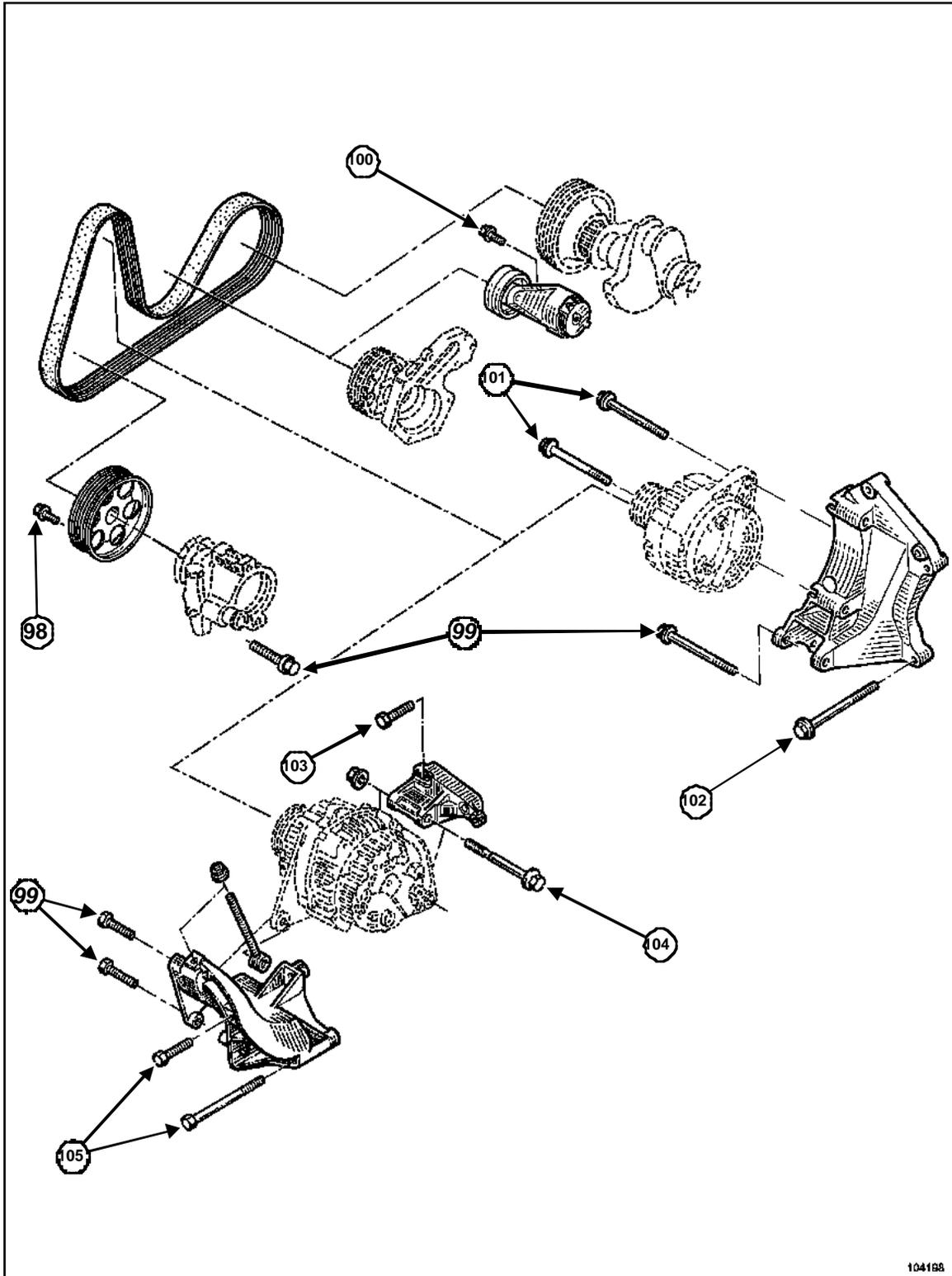
|

Tightening torques in Nm and/or in °		
Mark 92	Water pump bolts	17
Mark 93	Water pump pulley bolt	20
Mark 94	Oil filter teat (without modine)	10 to 20
Mark 95	Oil filter teat (with modine)	55 to 60
Mark 96	Coolant inlet pipe bolt	9
Mark 97	Oil filter	10 to 14

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 720 or 722 or 760 – F4R, and 736 or 741 or 744 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104198

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ENGINE AND LOWER ENGINE ASSEMBLY

10A

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Accessories* on F4P 720,722,760 (without air conditioning) and F4R 700, 701,702, 736, 740, 741, 742, 743, 744, 746, 747, 780 (without air conditioning) / Accessories on F4R 720 (without air conditioning).**

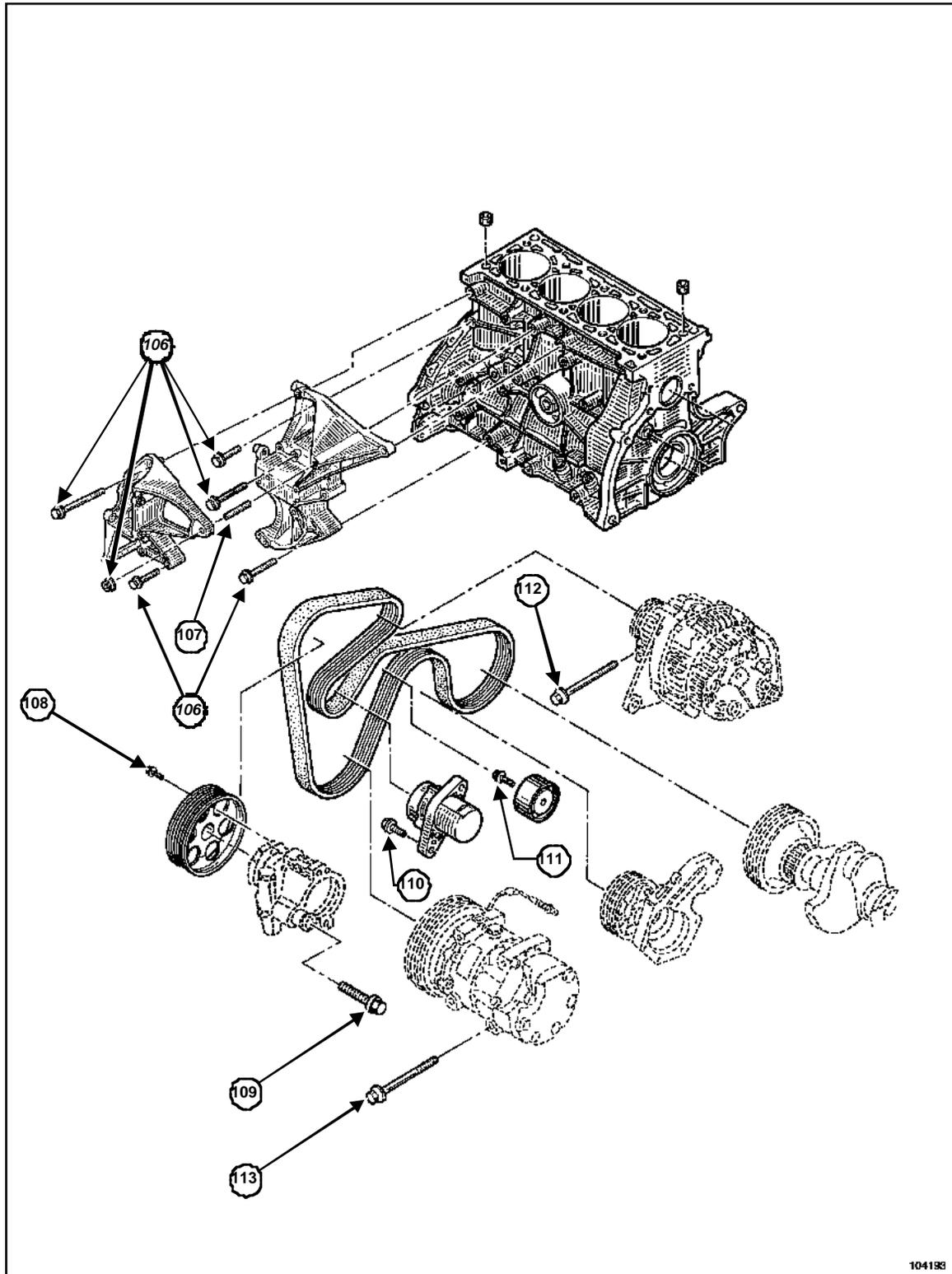
Tightening torques in Nm and/or in °		
Mark 98	Power assisted steering pump pulley bolt	10
Mark 99	Power assisted steering pump / alternator bolt	25
Mark 100	Tensioner bolt**	50
Mark 101	Alternator bolt**	25
Mark 102	Accessories mounting bolt**	44
Mark 103	Alternator mounting bolt*	44
Mark 104	Alternator bolt*	44
Mark 105	Power assisted steering bolt*	44



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 720 or 722 or 760 – F4R, and 740 or 741 or 744 or 780



104193

104193

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P 720, 722, 760 (with air conditioning) / F4R 700, 701, 740, 741, 744, 746, 747, 780 (with air conditioning) accessories

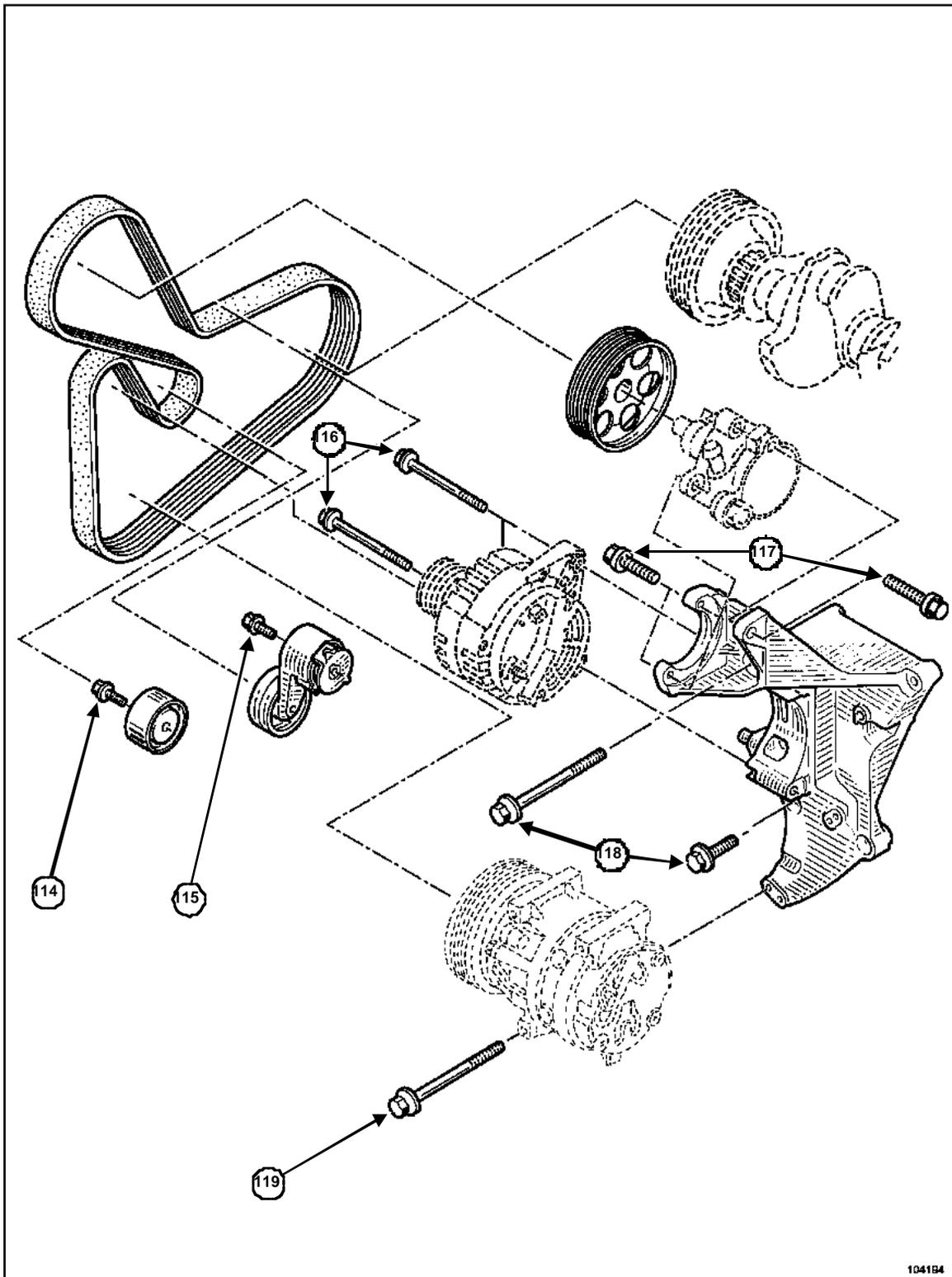
Tightening torques in Nm and/or in °		
Mark 106	Accessories mounting nut and bolt	44
Mark 107	Accessories mounting stud	10
Mark 108	Power assisted steering pump pulley bolt	10
Mark 109	Power assisted steering pump bolts	25
Mark 110	Tension wheel bolt	21
Mark 111	Tensioner wheel bolt	21
Mark 112	Alternator bolt	25
Mark 113	Compressor bolt	25



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 261 or 770 or 772 or 774 or 775 – F4R, and 712 or 714 or 715 or 766 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104194

104194

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Accessories on F4P 261, 770, 771, 772, 774, 775 (with air conditioning) / F4R 712, 713, 714, 715, 720, 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 784, 786, 787, 790, 792, 794, 795, 796, 797 (with air conditioning and power steering pump)

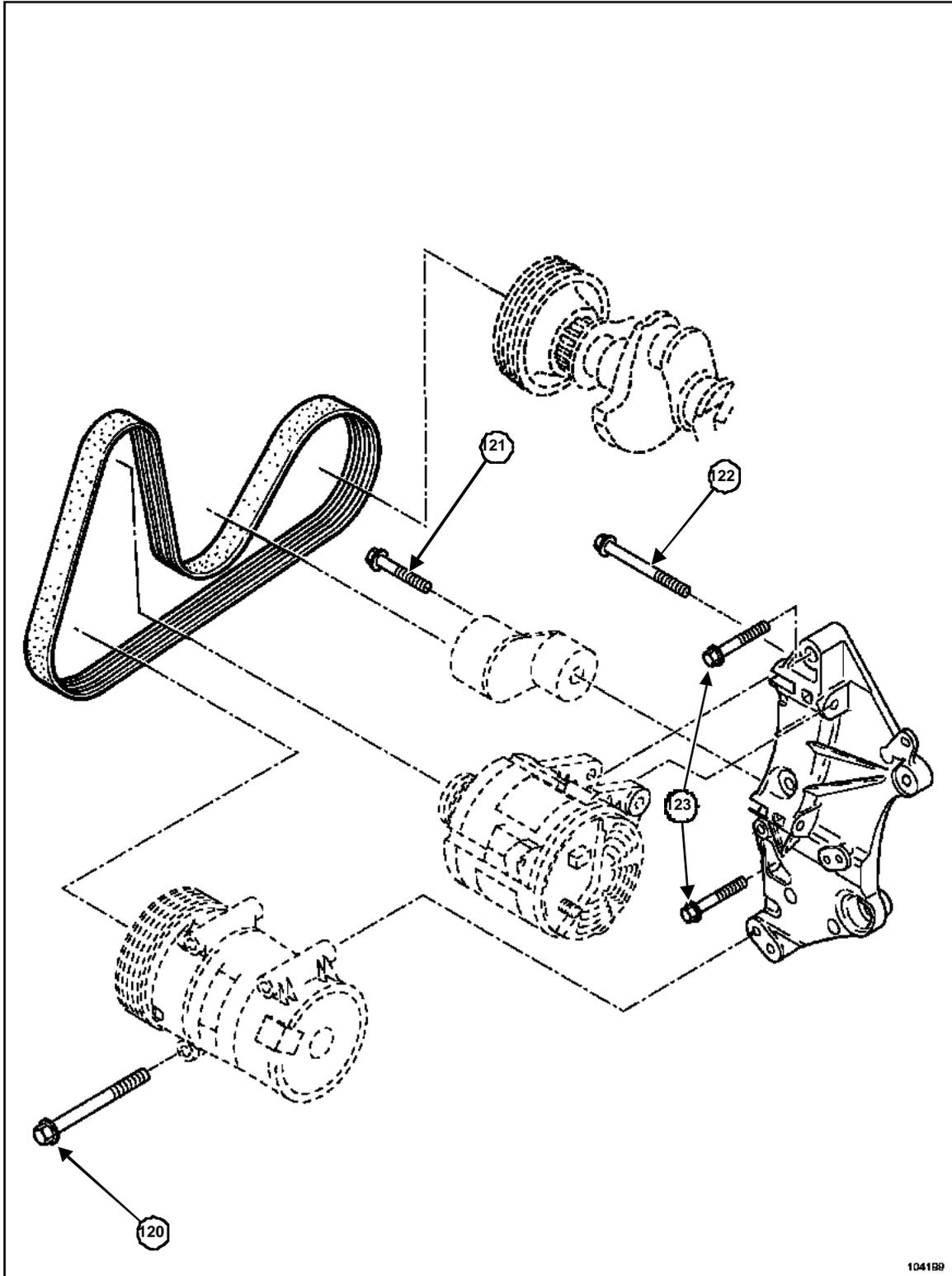
Tightening torques in Nm and/or in °		
Mark 114	Tensioner wheel bolt	21
Mark 115	Tension wheel bolt	50
Mark 116	Alternator bolt	25
Mark 117	Power assisted steering pump bolts	25
Mark 118	Accessories mounting bolt	44
Mark 119	Compressor bolt	25



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R, and 771 or 774 or 776



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104199

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R 770, 771, 774, 776 (with air conditioning) accessories

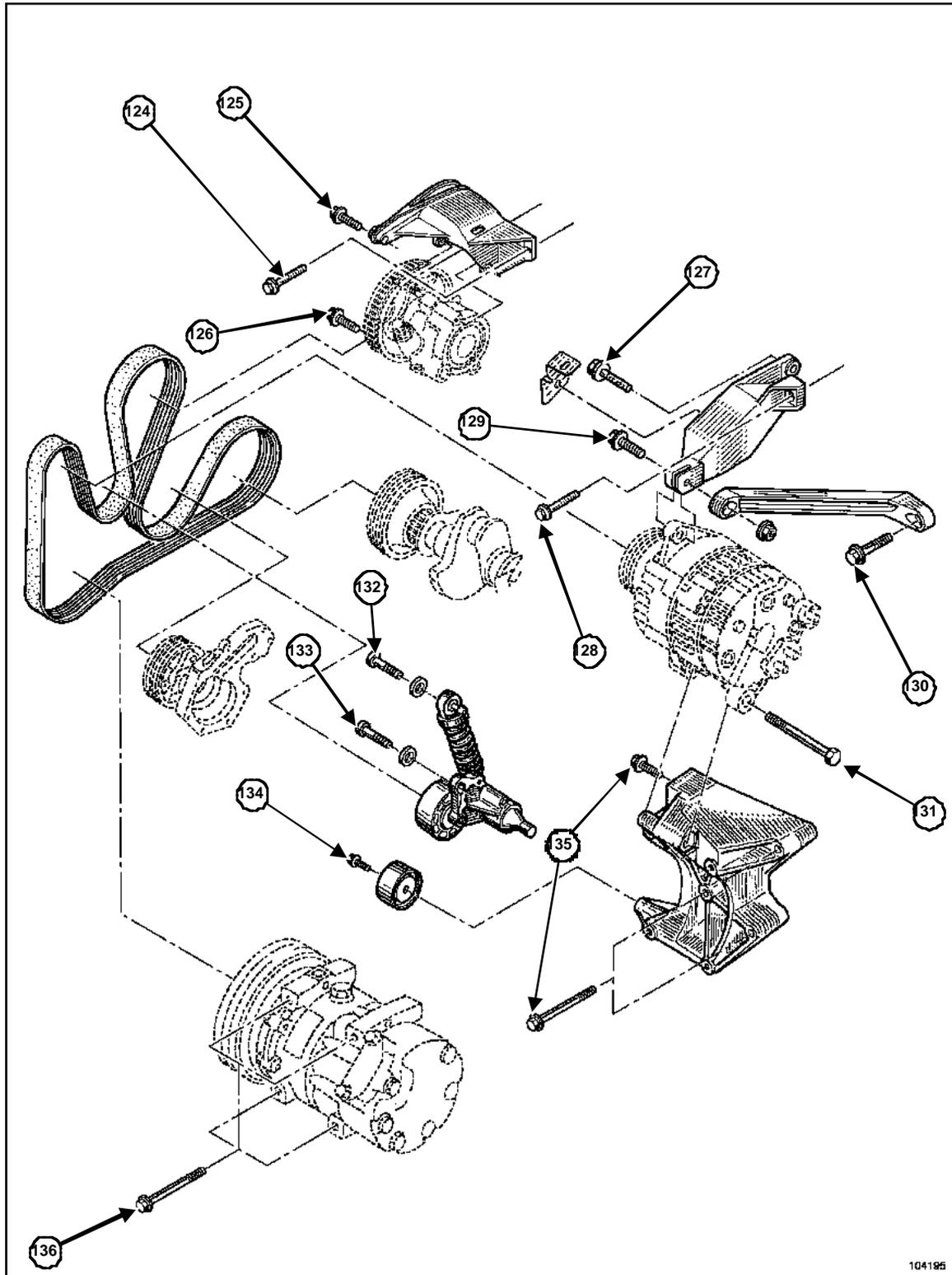
Tightening torques in Nm and/or in °		
Mark 120	Compressor bolt	25
Mark 121	Tension wheel bolt	50
Mark 122	Alternator bolt	25
Mark 123	Accessories mounting bolt	44



Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R, and 736 or 738



104185

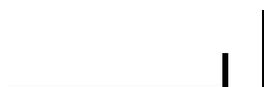
104195

Tightening torque

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 714 or 715 or 732 or 736 or 738 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 766 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R 730, 732, 736 and 738 (with air conditioning) accessories

Tightening torques in Nm and/or in °		
Mark 124	Power assisted steering pump support bolts	62
Mark 125	Power assisted steering pump bolts	32
Mark 126	Power assisted steering pump pulley bolt	10
Mark 127	Alternator tie-rod / engine bolt	62
Mark 128	Alternator tie-rod / engine bolt	32
Mark 129	Alternator / alternator tie-rod / strut bolt	32
Mark 130	Strut / engine bolt	62
Mark 131	Alternator / accessories mounting bolt	62
Mark 132	Tensioner upper bolt	22
Mark 133	Tensioner lower bolt	57
Mark 134	Tensioner wheel bolt	32
Mark 135	Accessories mounting bolt	62
Mark 136	Compressor bolt	32



Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1335	Tool for removing valve stem seals
Mot. 1511	Tool for fitting valve stem seals

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.

CYLINDER HEAD

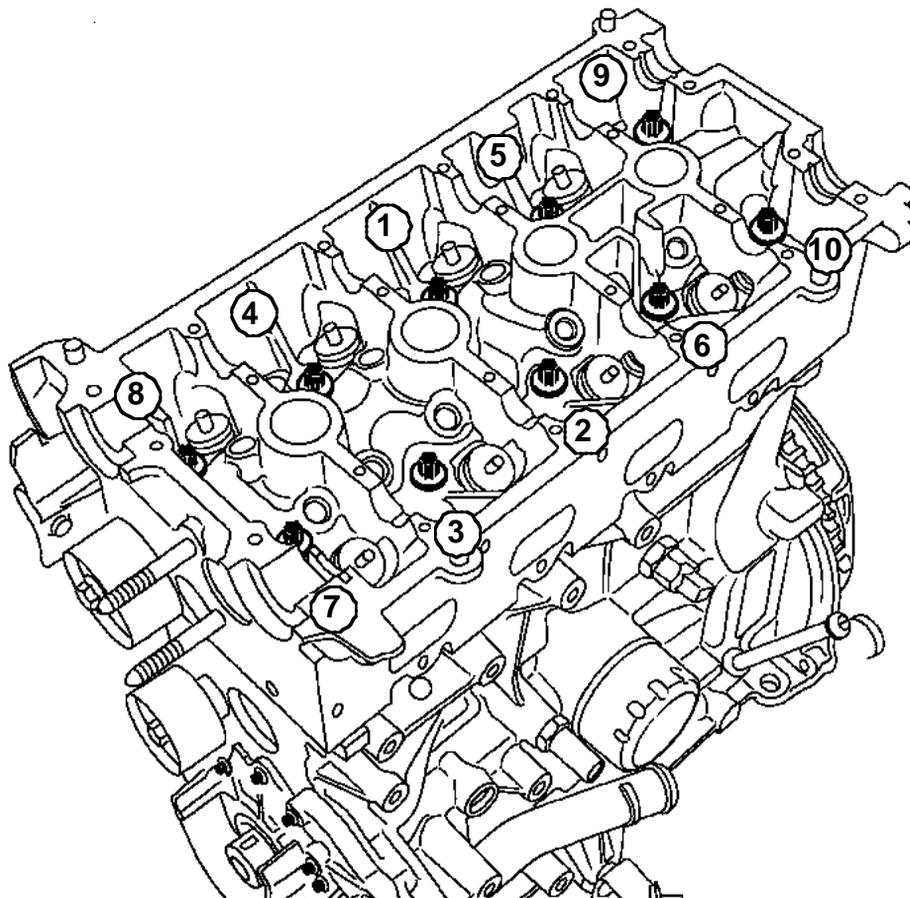
1 - Cylinder head tightening procedure

WARNING

Reuse the bolts if the length under the head does not exceed **118.5 mm** (otherwise replace all the bolts).

WARNING

Do not oil the new bolts. The bolts must be oiled if reused.



15153-1
15153-1

Follow this procedure:

- Torque tighten in order the **cylinder head mounting bolts (20 Nm)** in the correct order.

- Check that all the bolts are correctly tightened to **20 Nm**.

- Angle-tighten the **cylinder head mounting bolts (100° ± 6°)** the first time, in the correct order.

Upper engine: Specifications

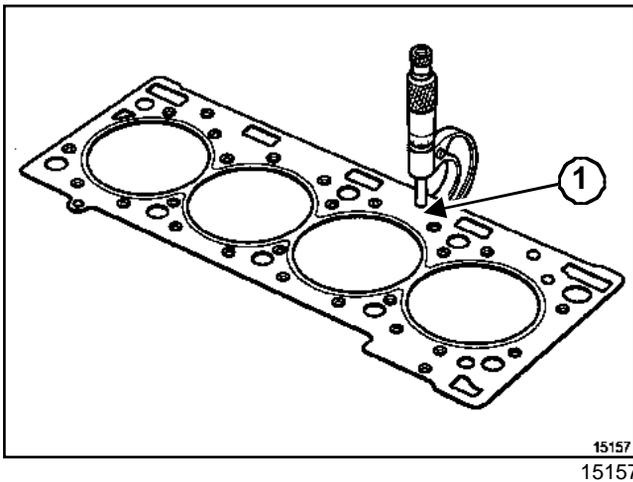
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

- Angle-tighten the **cylinder head mounting bolts** ($100^\circ \pm 6^\circ$.) $100^\circ \pm 6^\circ$ the second time, in the correct order.

WARNING

Do not re-tighten the cylinder head bolts after applying this procedure.

2 - Cylinder head gasket



The thickness of the cylinder head gasket is measured at (1):

- gasket thickness when tightened: 0.65 ± 0.02 mm.

3 - Ignition

The firing order is 1-3-4-2

Note: Cylinder N°1 is at the flywheel end.

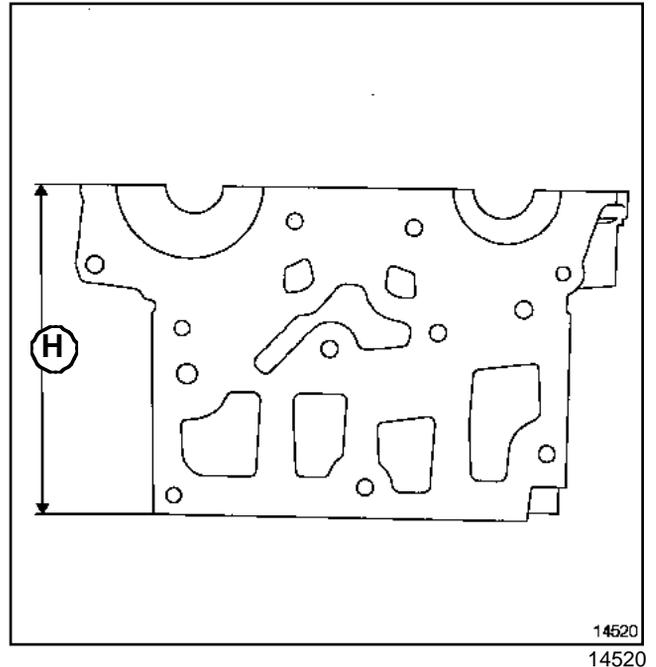
Spark plug gaps

F4 engine suffix	Gap (mm)
F4P 261, 720, 722, 760, 770, 771, 772, 774, 775	0.90 ± 0.05
F4R 700, 701, 712, 713, 714, 715, 740, 741, 744, 746, 747, 770, 771, 780, 790, 792	
F4R 730, 732, 736, 738	$1^0_{-0.1}$

F4 engine suffix	Gap (mm)
F4R 720, 760, 794, 795 (Champion RC8PYCB spark plugs only)	0.75 ± 0.05
F4R 276, 720, 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 786, 787, 794, 795, 796, 797	$0.90^0_{-0.1}$

Spark plug tightening torque: **25 to 30 Nm.**

4 - Cylinder head



Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Engine suffix	Cylinder head height H (mm)	Cylinder head chamber Volume (cm ³)
F4R 760, 761, 762, 763, 764, 765, 767, 770, 771, 774, 776, 786, 787, 794, 795, 796, 797	138.4	44.4 ± 0.9
F4P 261, 720, 722, 760, 770, 771, 772, 774, 775 F4R 276, 700, 701, 712, 713, 714, 715, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790, 792	138.15	41.4 ± 0.9

Maximum gasket face bow:

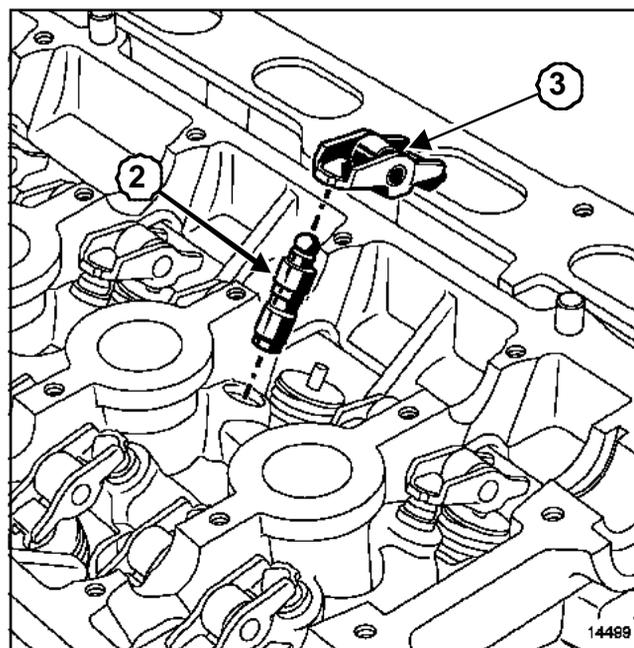
- cylinder head: **0.05 mm**.
- cylinder block: **0.03 mm**

Test the cylinder head for possible cracks with the cylinder head test kit (see Garage equipment catalogue).

WARNING

No adjustment is permitted.

5 - Hydraulic tappets



F4 engines are fitted with hydraulic tappets (2) and roller valve rockers (3) which are the same for the inlet and the exhaust.

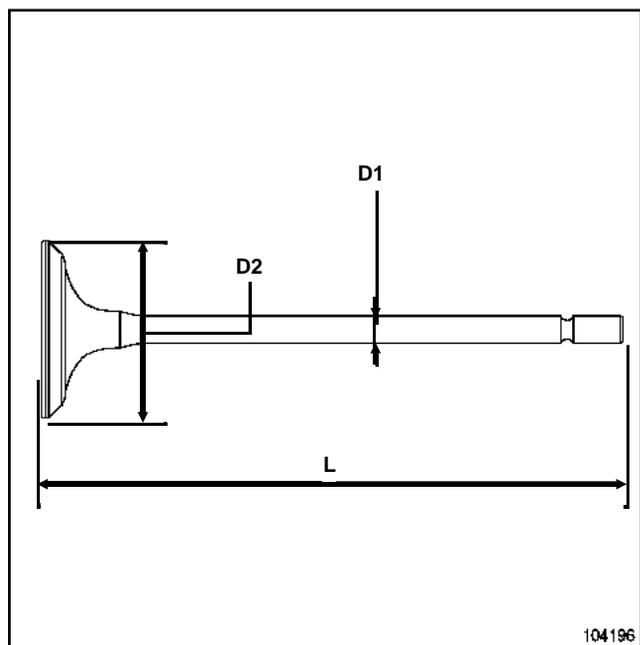
On these engines the valve clearance cannot be adjusted.

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

6 - Valves

a - Valve dimensions



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104196

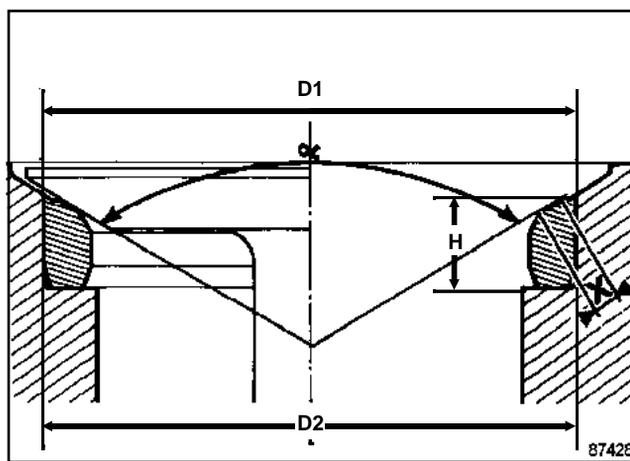
	Inlet	Exhaust
D1 Stem diameter (mm)	5.471 ± 0.009	5.447 ± 0.009
D2 Head diameter (mm)	33.5 ± 0.12	29 ± 0.12
L Total length (mm)	110.08 ± 0.15	106.87 ± 0.15
Face angle (°)	90	90

b - Valve lift (mm)

Engine suffix	Inlet	Exhaust
F4P 722/ 760	9.21	8.86
F4P 720 F4R 720, 722, 760	9.21	7.19
F4P 261, 770, 771, 772, 774, 775	8.56	6.97

Engine suffix	Inlet	Exhaust
F4R 700, 701, 740, 741, 742, 743, 744, 746, 747, 780	10.01	10.01
F4R 712, 713, 714, 715, 790, 792	10	8.34
F4R 730, 732, 736, 738	11	10
F4R 770, 771, 780, 790, 792,	10.01	7.19
F4R 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 784, 786, 787, 794, 795, 796, 797	9.33	9.25

7 - Valve seats



87428
87428

	Inlet	Exhaust
Face angle α (°)	89°	89°
Seat width X (mm)	1.3 ^{+1.4}₀	1.4 ^{+1.3}₀
Seat height H (mm)	4.65 ± 0.05	

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

	Inlet	Exhaust
External diameter of seat D1 (mm)	34.542 ± 0.008	30.042 ± 0.006
Internal diameter of seat insert D2 (mm)	$34.4^{+0.02}_0$	$29.9^{+0.02}_0$

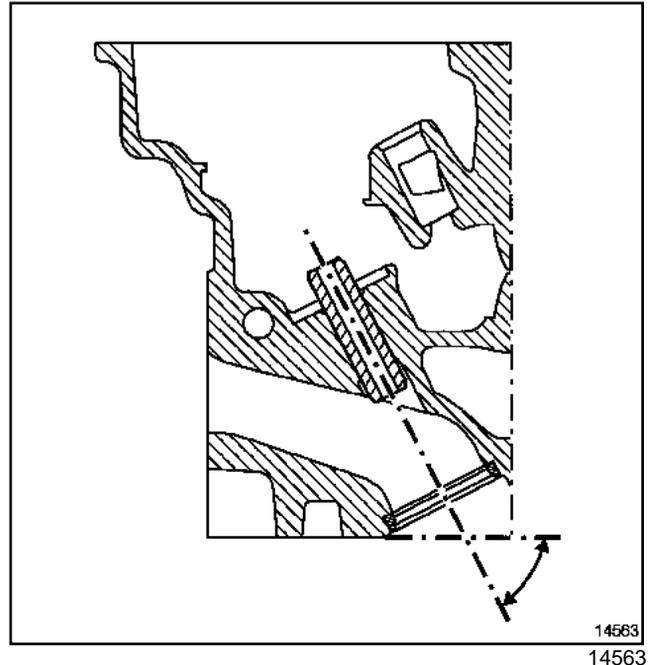
8 - Valve guides

a - Valve guide dimensions

	Inlet and Exhaust
Guide length (mm)	40.5 ± 0.15
Guide external diameter (mm)	$11^{+0.068}_{+0.05}$
Guide internal diameter (mm)	$5^{+0.075}_0$ (not machined) $5.5^{0.018}_0$ (machined*)
Internal diameter of seat insert (mm)	$11^{+0.004}_0$

* The dimension is measured with the guide fitted to the cylinder head.

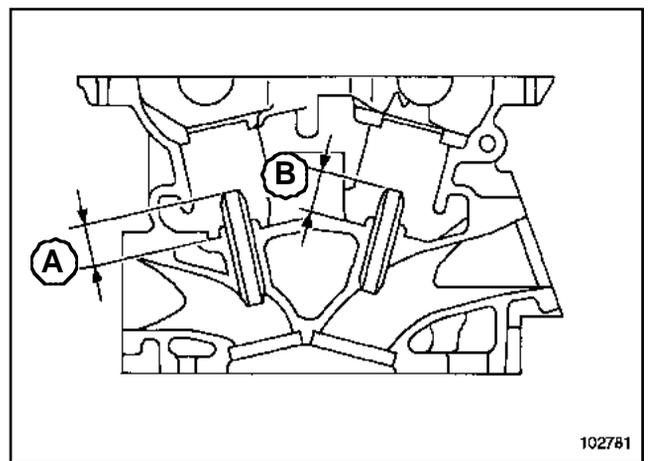
b - Guide angles



Inlet: $63^{\circ}30'$

Exhaust: 66°

c - Guide positions



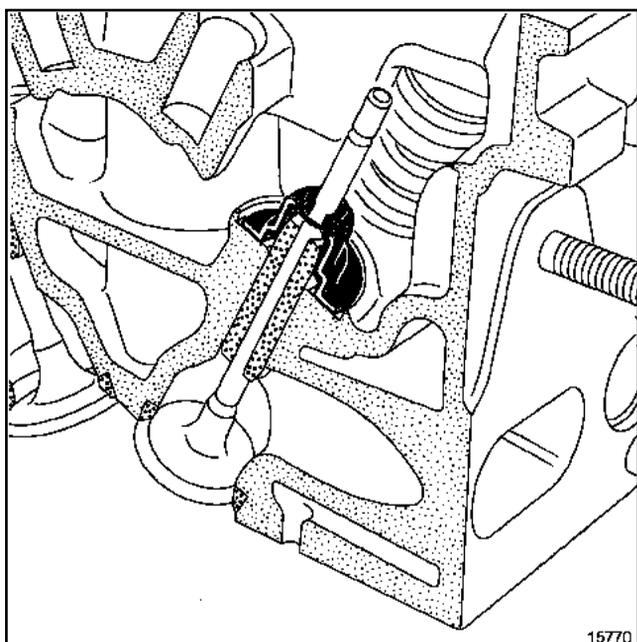
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Upper engine: Specifications

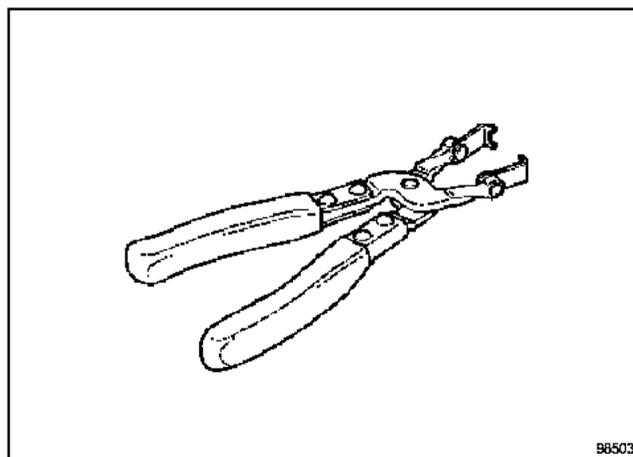
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

	Inlet Length (mm)	A	Exhaust Length (mm)	B
F4R 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 786, 787, 794, 795, 796, 797	12 ± 0.15		10.2 ± 0.15	
F4P 261, 720, 722, 760, 770, 771, 772, 774, 775	12 ± 0.15		11 ± 0.15	
F4R 276 700, 701, 712, 713, 714, 715, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790, 792				

9 - Valve stem seals

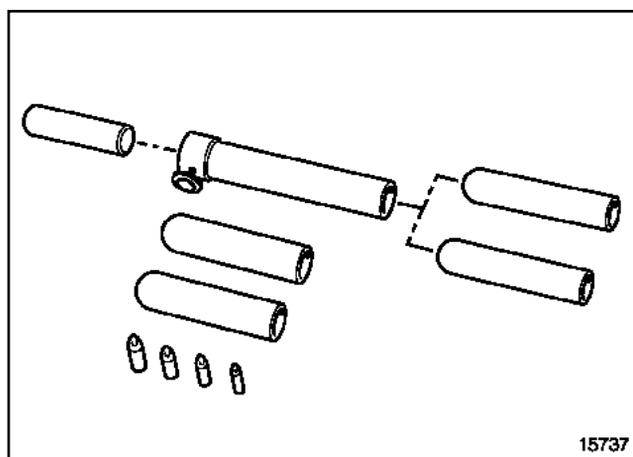


The valve stem seals are mounted on the lower valve spring thrust washers.



Remove the valve stem seals (**Mot. 1335**).

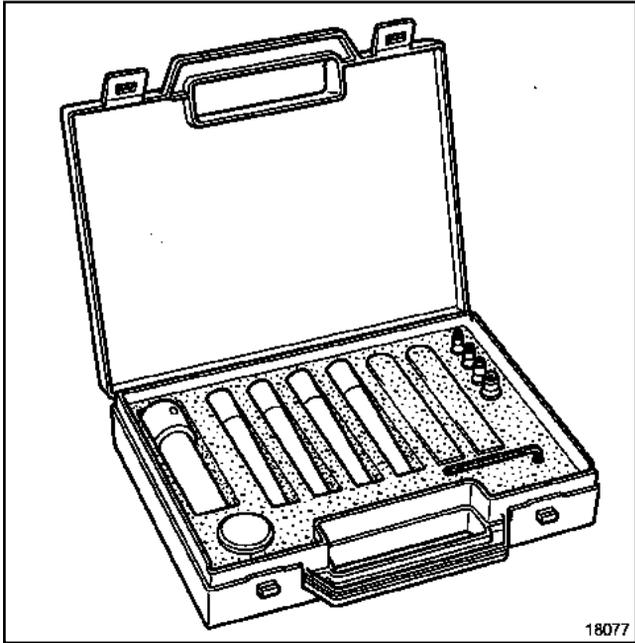
It is imperative to fit the valve stem seals using these tools:



- (**Mot. 1511**) kit.

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



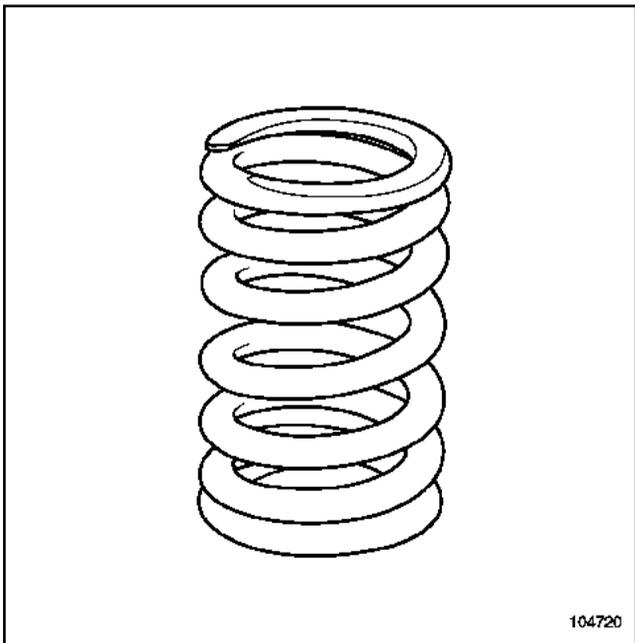
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- or other suitable equipment.

WARNING

Do not lubricate the valve stem seals before fitting them.

10 - Valve springs



104720

104720

Technical specifications (mm)	F4 (except F4R 730, 732, 736, 738)	F4R 730, 732, 736, 738
Free length	41.3	43.57
Length under load:		
- 190 N		
- 590 N	34.5	-
- 270 N	24.5	-
- 650 N	-	34.5
	-	23.5
Length with coils touching	23.2	22
Internal diameter	18.8	
External diameter	27	
Wire section type	oval	

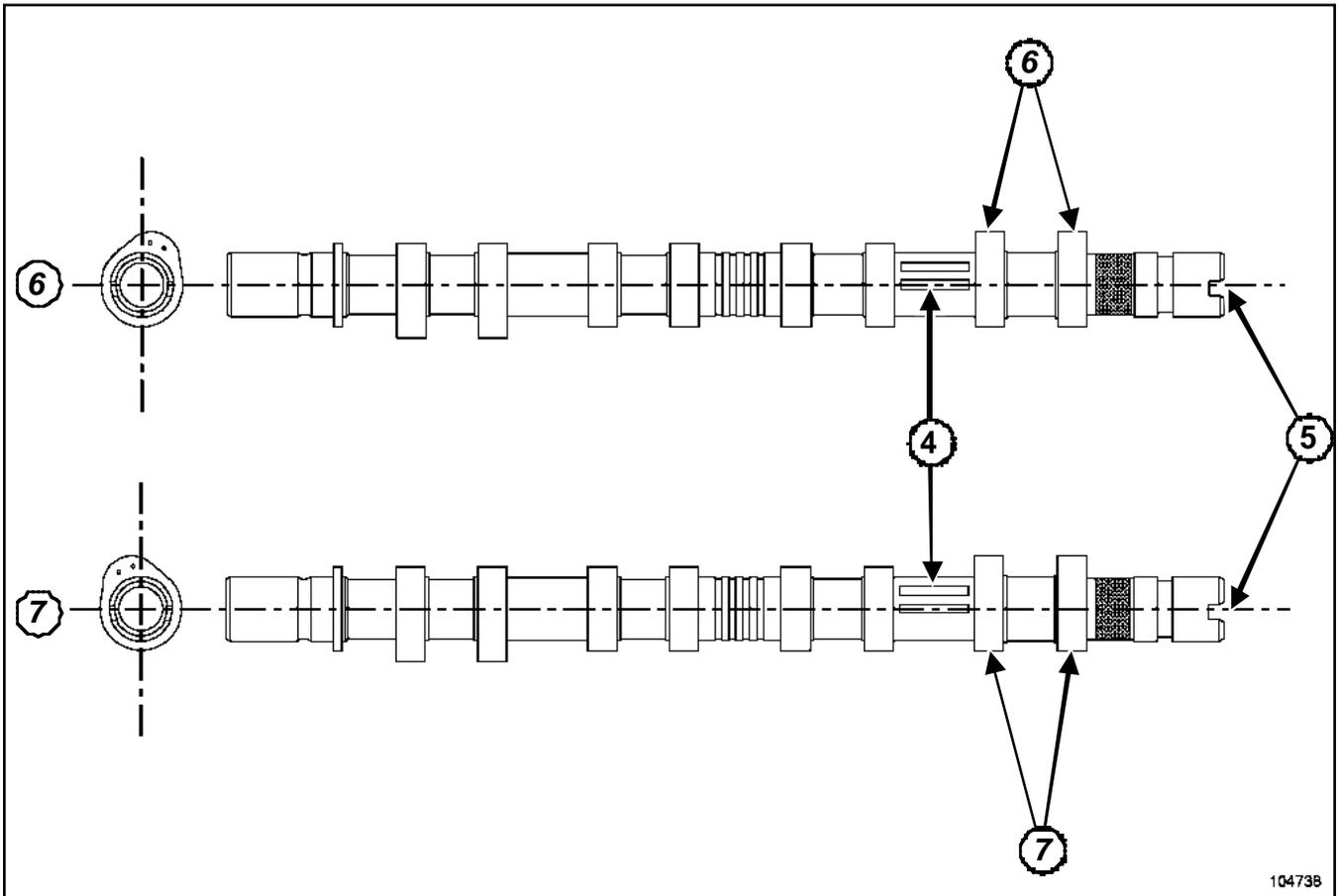
11 - Camshaft

a - Identification

Camshafts can be identified in 3 ways:

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104738

104738

1) Either by horizontal or vertical markings at (4) .

Details of markings:

F4R	E	668 104 14 22
A	B	C

- Mark A refers to the engine type
- Mark B refers to the camshaft identification:

A = Inlet

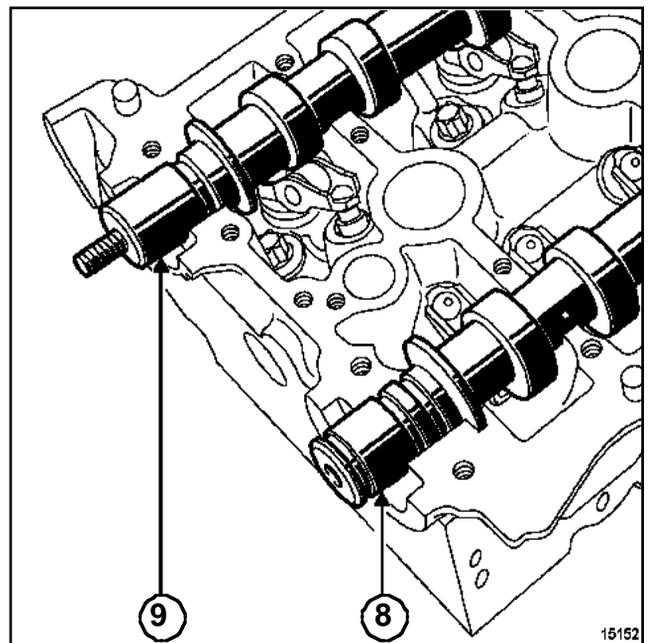
E = Exhaust

- Mark C is for the supplier's use only.

2) Or by positioning the offset grooves (5) horizontally below the centre-line:

- the inlet cams of cylinder N°1 (6) point to the right,
- the outlet cams of cylinder N°1 (7) point to the left.

3) Or by the inlet camshaft dephaser configuration.



15152

15152

(8) : inlet camshaft.

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

(9) : exhaust camshaft,

b - Longitudinal play (mm)

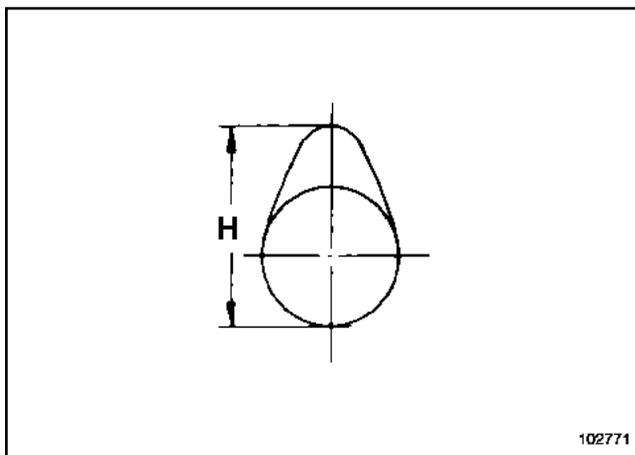
Inlet and outlet **0.08 to 0.178 mm**

c - Bearing play (mm)

Number of bearings: 6

Flywheel end		
	Diameters of the journals on the camshaft (mm)	Diameters of the bearings in the cylinder head and rocker cover (mm)
1	$25^0_{-0.03}$	$25^{+0.061}_{+0.04}$
2	$25^0_{-0.021}$	
3		
4		
5		
6	$28^0_{-0.021}$	$28^{+0.061}_{+0.04}$
Timing end		

d - Cam height H (mm)



102771

102771

Height H (mm)	Inlet	Exhaust
F4P 722/ 760	40.616 ± 0.03	40.437 ± 0.03
F4P 720 F4R 276, 720	40.616 ± 0.03	39.589 ± 0.03
F4P 261, 770, 771, 772, 774, 775	40.282 ± 0.03	39.474 ± 0.03
F4R 700/ 701/ 740/ 741/ 744/ 746/ 747/ 780	41.024 ± 0.03	41.027 ± 0.03
F4R 712, 713, 714, 715, 790, 792	41.024 ± 0.03	40.171 ± 0.03
F4R 730, 732, 736	41.531 ± 0.03	41.019 ± 0.03
F4R 770, 771	41.024 ± 0.03	39.589 ± 0.03
F4R 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 786, 787, 794, 795, 796, 797	40.677 ± 0.03	40.637 ± 0.03

e - Timing graphs (degrees °) (non verifiable)

– F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing for a lift of **0.7 mm** (zero clearance).

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

	Inlet		Exhaust	
	Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*	-10°	-6°	-	-
Inlet closing retardation	50°	46°	-	-
Exhaust opening advance	-	-	37°	33°
Exhaust closing advance**	-	-	-7°	-3°

F4R, and 701 or 712 or 713 or 714 or 715 or 740 or 741 or 744 or 746 or 747 or 790 or 792

Timing diagram (non verifiable) for engines fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

		Inlet		Exhaust	
		Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Dephaser not active	Inlet opening retardation*	-10°	-14°	-	-
	Inlet closing retardation	40°	44°	-	-
Dephaser active	Before top dead centre	6°	2°	-	-
	Inlet closing retardation	24°	28°	-	-
	Exhaust opening advance	-	-	24°	20°
	Exhaust closing advance**	-	-	-4°	0°

F4P, and 261 or 770 or 771 or 772

Timing diagram (non verifiable) for engines fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

		Inlet		Exhaust	
		Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Dephaser not active	Inlet opening retardation*	-14°	-18°	-	-
	Inlet closing retardation	31°	35°	-	-
Dephaser active	Before top dead centre*	2°	-2°	-	-
	Inlet closing retardation	15°	19°	-	-
	Exhaust opening advance	-	-	17°	13°
	Exhaust closing advance**	-	-	-8°	-4°

F4P, and 774

Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

	Inlet		Exhaust	
	Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*	-14°	-18°	-	-
Inlet closing retardation	31°	35°	-	-
Exhaust opening advance	-	-	17°	13°
Exhaust closing advance**	-	-	-8°	-4°

F4R, and 770 or 771

Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

	Inlet		Exhaust	
	Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*	-10°	-14°	-	-
Inlet closing retardation	40°	44°	-	-
Exhaust opening advance	-	-	17°	13°
Exhaust closing advance**	-	-	-4°	0°

F4P, and 720 – F4R, and 276 or 720

Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

	Inlet		Exhaust	
	Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*	-6°	-10°	-	-
Inlet closing retardation	23°	27°	-	-
Exhaust opening advance	-	-	17°	13°
Exhaust closing advance**	-	-	-4°	0°

F4R, and 790

Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

	Inlet		Exhaust	
	Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*	-10°	-14°	-	-
Inlet closing retardation	40°	44°	-	-
Exhaust opening advance	-	-	24°	20°
Exhaust closing advance**	-	-	-4°	0°

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Timing diagram (non verifiable) for engines fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

F4R, and 730 or 732 or 736 or 738

736 CB1T/CB1N

		Inlet		Exhaust	
		Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Dephaser not active	Inlet opening retardation*	-7°	-11°	-	-
	Inlet closing retardation	61°	65°	-	-
Dephaser active	Before top dead centre	9°	5°	-	-
	Inlet closing retardation	45°	49°	-	-
	Exhaust opening advance	-	-	41°	37°
	Exhaust closing retard	-	-	4°	8°

Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

F4R, and 736

736 CB15

		Inlet		Exhaust	
		Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*		-7°	-11°	-	-
Inlet closing retardation		61°	65°	-	-
Exhaust opening advance		-	-	41°	37°
Exhaust closing retard		-	-	4°	8°

Upper engine: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 722 or 760

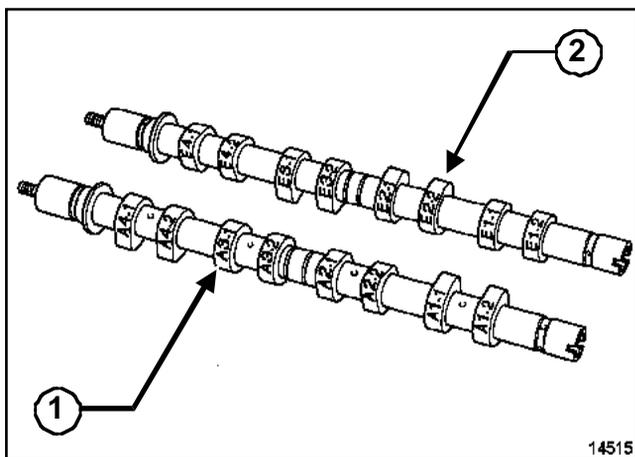
Timing diagram (non verifiable) for engines not fitted with an inlet camshaft dephaser. Theoretical timing adjustment for 0.7 mm lift (zero play).

	Inlet		Exhaust	
	Cam lobe 1	Cam lobe 2	Cam lobe 1	Cam lobe 2
Inlet opening retardation*	-6°	-10°	-	-
Inlet closing retardation	23°	27°	-	-
Exhaust opening advance	-	-	19°	15°
Exhaust closing advance**	-	-	-4°	0°

Note:

*If the inlet opening retardation is negative, the valves open after top dead centre.

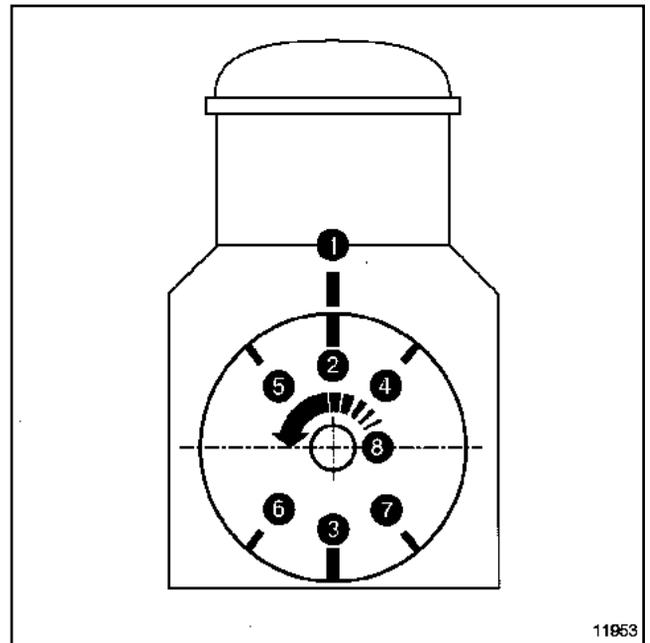
If the exhaust closing advance is negative, the valves open before top dead centre.



14515
14515

(1): A3 - 1 = No. 3 cylinder inlet and cam lobe n°1.

(2): E2 - 2 = No. 2 cylinder exhaust and cam lobe n°2.



11953
11953

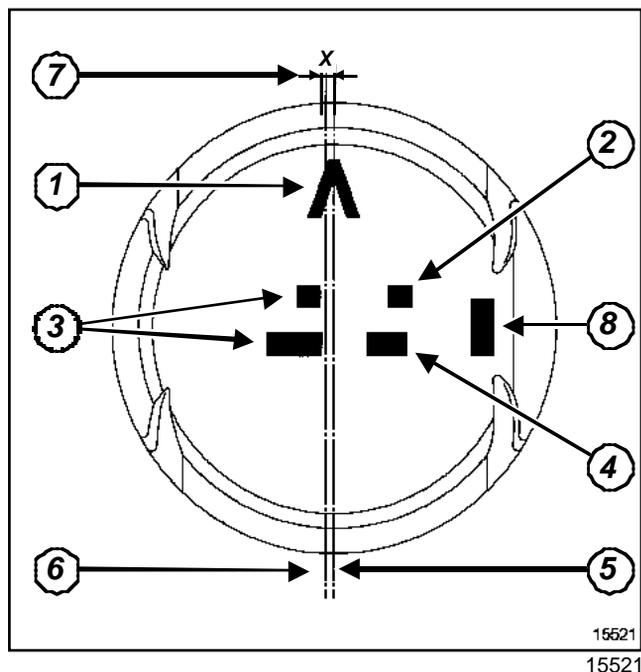
- 1 Cylinder block TDC fixed mark
- 2 Flywheel TDC mobile mark
- 3 Flywheel Bottom Dead Centre mobile mark
- 4 Inlet Opening Retard
- 5 Exhaust Closing Advance
- 6 Inlet Closing Retard
- 7 Exhaust Opening Advance
- 8 Direction of rotation of the crankshaft

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 1492	Tool for fitting con rod bearings
Mot. 1493	Crankshaft bearing bush centring tool (F engines)

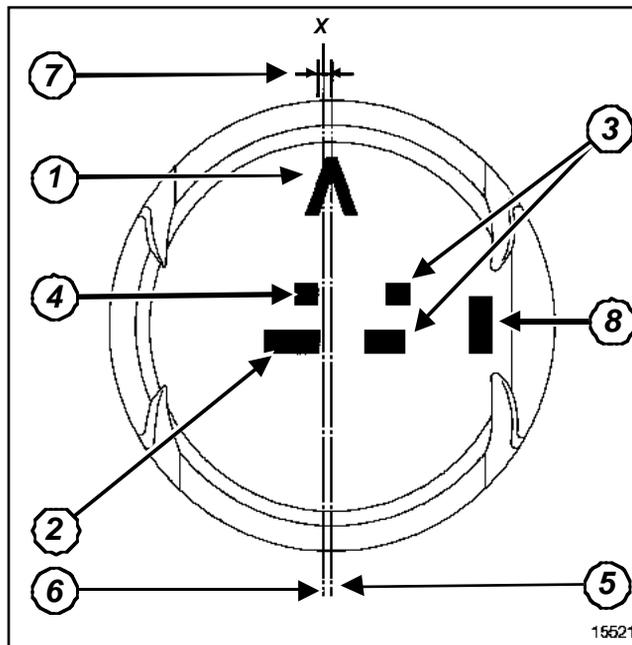
I - PISTONS

1 - Piston markings



15521
15521

F4R 774



15521
15521

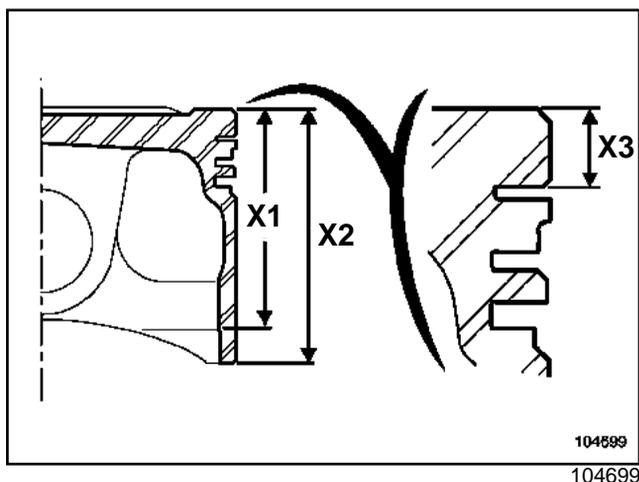
- (1) Direction of piston Δ engine flywheel end
- (2) Piston category (2 - 3) or (B - C)
- (3) Used by the supplier only
- (4) Used by the supplier only
- (5) Piston axis of symmetry
- (6) Gudgeon pin hole shaft
- (7) Offset between gudgeon pin hole (6) and piston axis of symmetry (5) is **0.8 mm**
- (8) Engine suffix

Marking at (8)	Engine suffix
1.8	F4P 261, 720, 722, 760, 770, 771, 772, 774, 775
2.0	F4R 276, 700, 701, 712, 713, 720, 740, 741, 744, 746, 747, 780, 790)
770	F4R 770, 771, 714, 715, 792
No marking	F4R 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 786, 787, 794, 795, 796, 797
S	F4R 730, 732, 736, 738

Engine peripherals: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

2 - Piston dimensions



The diameter must be measured at X1:

Point (X1) (mm)	Engine suffix
43.8 ± 0.01	F4P 261, 720, 722, 760, 770, 771, 772, 774, 775 F4R 276, 700, 701, 712, 713, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790, 792
44 ± 0.01	F4R 714, 715, 760, 761, 763, 764, 765, 766, 767, 770, 771, 774, 776, 786, 787, 794, 795, 796, 797

Categories and nominal diameters of the pistons

Category reference on the piston	Nominal piston diameter (mm)		
	F4P 261, 720, 722, 760, 770, 771, 772, 774, 775	F4R 730, 732, 736, 738, 760, 761, 762, 763, 764, 765, 766, 767, 776, 786, 787, 794, 795, 796, 797	F4R 774
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 exclusive

Engine peripherals: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Total height of pistons X2

Point (mm)	(X2)	Engine suffix
56.8		F4P 261, 720, 722, 760, 770, 771, 772, 774, 775 F4R 276, 700, 701, 712, 713, 720, 730, 732, 736, 738, 740, 741, 744, 746, 747, 780, 790
57		F4R 714, 715, 760, 761, 762, 763, 764, 765, 766, 767, 770, 771, 774, 776, 786, 787, 792, 794, 795, 796, 797

Point X3, piston land / heat dam land

Point (mm)	(X3)	Engine suffix
6 ± 0.1		F4P 720, 722, 760, 770, 771, 772, 774 F4R 276, 700, 701, 712, 713, 714, 715, 720, 740, 741, 744, 746, 747, 770, 771, 780, 790
6.6 ± 0.1		F4R 730, 732, 736, 738
5 ± 0.1		F4R 760, 761, 762, 763, 764, 765, 766, 767, 774, 776, 786, 787, 794, 795, 796, 797

Piston chamber volume

Volume (cm ³)	Engine suffix
3.04 ± 0.4	F4R 730, 732, 736, 738
3.68 ± 0.4	F4P 261, 720, 722, 760, 770, 771, 772, 774, 775
8.11 ± 0.4	F4R 714, 715, 770, 771, 792
9.64 ± 0.4	F4R 276, 700, 701, 712, 713, 720, 740, 741, 744, 746, 747, 774, 780, 790
10.4 ± 0.4	F4R 760, 791, 792, 763, 764, 765, 766, 767, 776, 786, 787, 794, 795, 796, 797

3 - Measuring the gudgeon pin

The gudgeon pin is fitted in the con rod in such a way that it is still able to rotate.

Length: **60.7 to 61 mm**

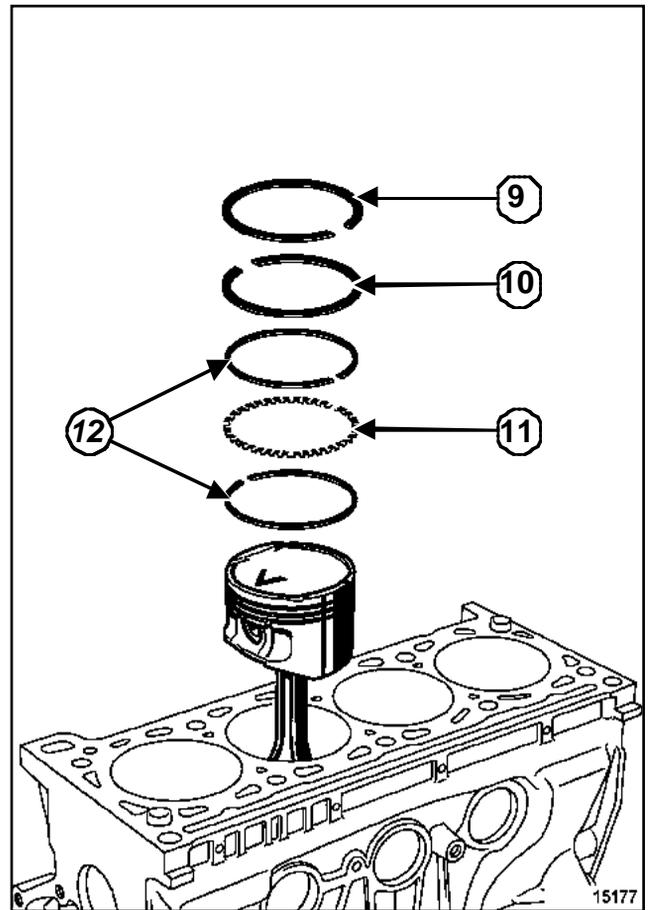
External diameter: **20.995 to 21 mm**

Internal diameter: **12.6 mm (max)**

Grease the gudgeon pin when this is fitted.

II - PISTON RINGS

1 - Thickness (mm)



Three piston rings

(9) Compression ring: **1.175 to 1.190**,

(10) Sealing ring: **1.470 to 1.495**,

Scraper, comprising three parts: **1.87 to 2.0**

- a circlip piston ring (11)

- two steel rings (12)

Engine peripherals: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

2 - Clearance at the gap

PISTON RING	End gap (mm)
Compression	0.20 to 0.35 F4 series (excluding F4R 730, 732, 736 and 738) 0.15 to 0.25 F4R 730, 732, 736, 738
Sealing	0.40 to 0.60
Scraper	0.25 to 0.75

III - CON RODS

WARNING

To prevent any cracking in the con rods, do not use a sharp point or an etching tool to mark the con rod caps in relation to their con rods.

Use an indelible marker pen.

The maximum difference in weight for the same engine must be **6 grams**.

Con rod measurements

Big end lateral play (mm): **0.22 to 0.40**

Big end diametrical play (mm): **0.020 to 0.070**

Centreline distance between big end and small end (mm):

- F4P: **149.5 ± 0.035**

- F4R: **144 ± 0.035**

	F4P	F4R
Big end diameter (with bearing shells) (mm)	48.035 ⁰ / _{0.019}	48.044 ± 0.009
Big end diameter (without bearing shells) (mm)	51.587 ⁰ / _{0.019}	51.596 ± 0.009
Small end diameter (with bearing) (mm)	23 ⁰ / _{-0.021}	23.010 ± 0.010

IV - CRANKSHAFT

1 - Crankshaft measurements

Number of bearings: **5**

Crankshaft lateral play (mm): **0.067 to 0.252**

Crankshaft diametrical play (mm): **0.040 to 0.075**

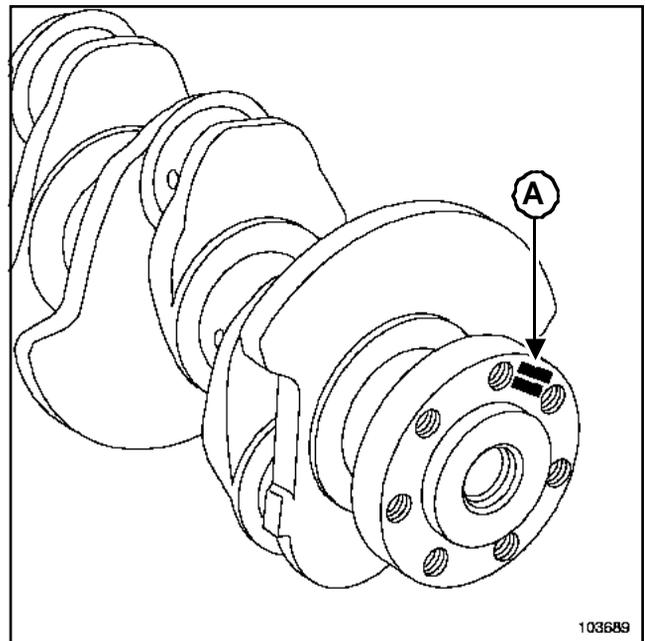
2 - Bushing diameter (2 categories)

Two types

a - First type of marking by paint spot on crankshaft

Paint mark	BLUE	RED
Nominal bushing diameter (mm)	54.785 inclusive to 54.795 exclusive	54.795 inclusive to 54.805 exclusive

b - Second type of marking by etching on the crankshaft



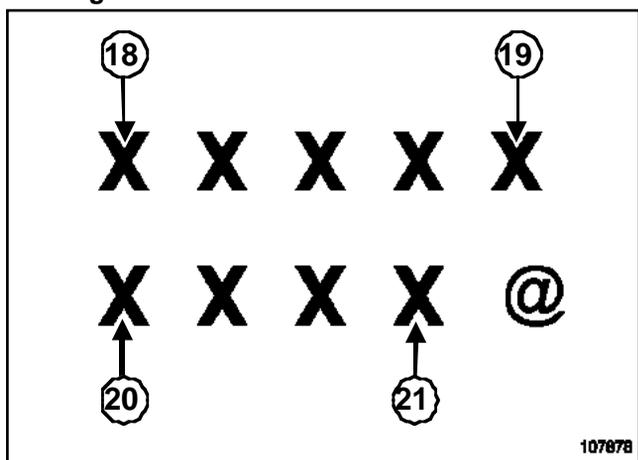
103689

103689

Engine peripherals: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Marking « A » in detail



- (18) : diameter category of journal N°1, flywheel end
 (19) : diameter category of journal N°5, timing end
 (20) : diameter category of crankpin N°1, flywheel end
 (21) : diameter category of crankpin N°4, timing end.

Marks etched on the cranks-haft	1	0
Nominal bushing diameter (mm)	54.785 inclusive to 54.795 exclusive	54.795 inclusive to 54.805 exclusive

3 -

Crankpin diameter (1 category)

Nominal crankpin diameter (mm)	$48^{+0.02}_0$
--------------------------------	----------------

Crankshaft travel:

- For the F4P engine **83 mm**
- For the F4R engine **93 mm**

V - CYLINDER BLOCK

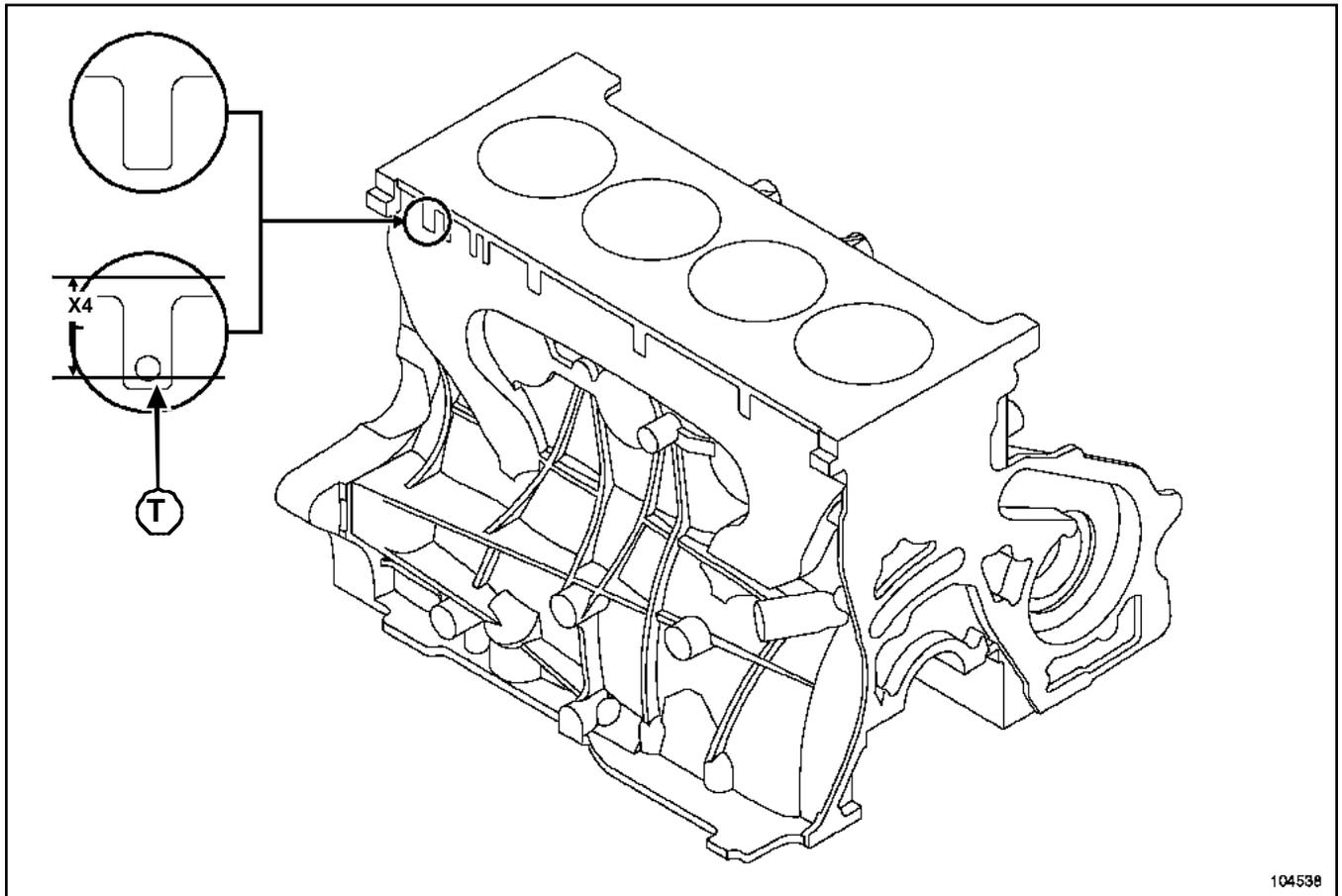
Identifying the cylinder barrel diameter

WARNING

It is essential to observe the matching of the pistons and cylinder barrel diameters.

Engine peripherals: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104538

104538

The presence or absence of holes (T) and their position in relation to the gasket face of the cylinder block are factors used to identify the original nominal dimension of the barrel and consequently the diameters of the corresponding pistons.

Engine peripherals: Specifications

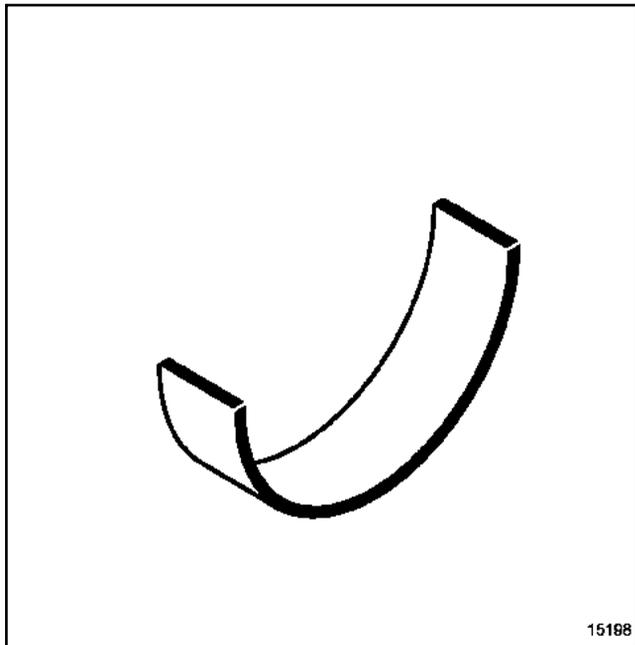
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Matching the piston category to the cylinder block

Point (X4) of holes (T) on the cylinder block	Class marking	Barrel diameter (mm)	Nominal piston diameter (mm)		
			F4P 261, 720, 722, 760, 770, 771, 772, 774, 775	F4R 730, 732, 736, 738, 760, 761, 762, 763, 764, 765, 766, 767, 776, 786, 787, 794, 795, 796, 797	F4R 774
Without hole and (X4) = 13 mm	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
(X4) = 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 exclusive

VI - BEARING SHELLS

1 - con rod bearing shells

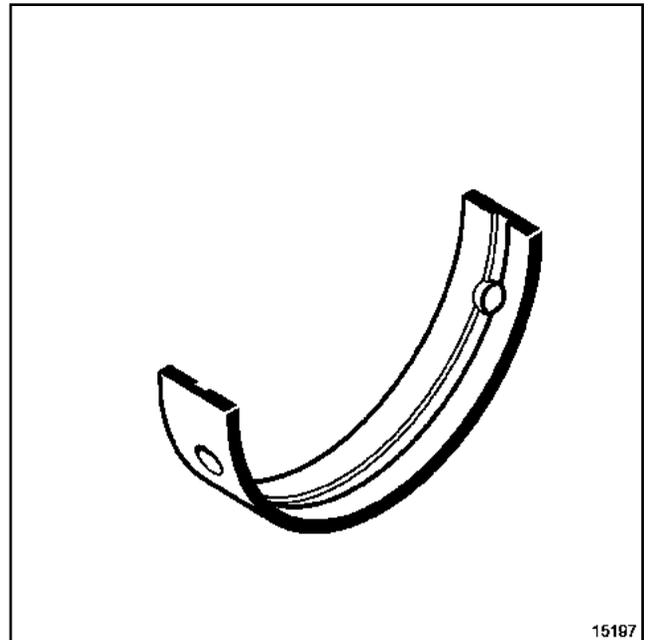


The con rods are fitted with bearing shells without a locator notch.

1 category, thickness (mm): 1.776 ± 0.003 .

The bearing shells are fitted using tool (Mot. 1492).

2 - Crankshaft bearing shells



The crankshaft is fitted with bearing shells without a locator notch.

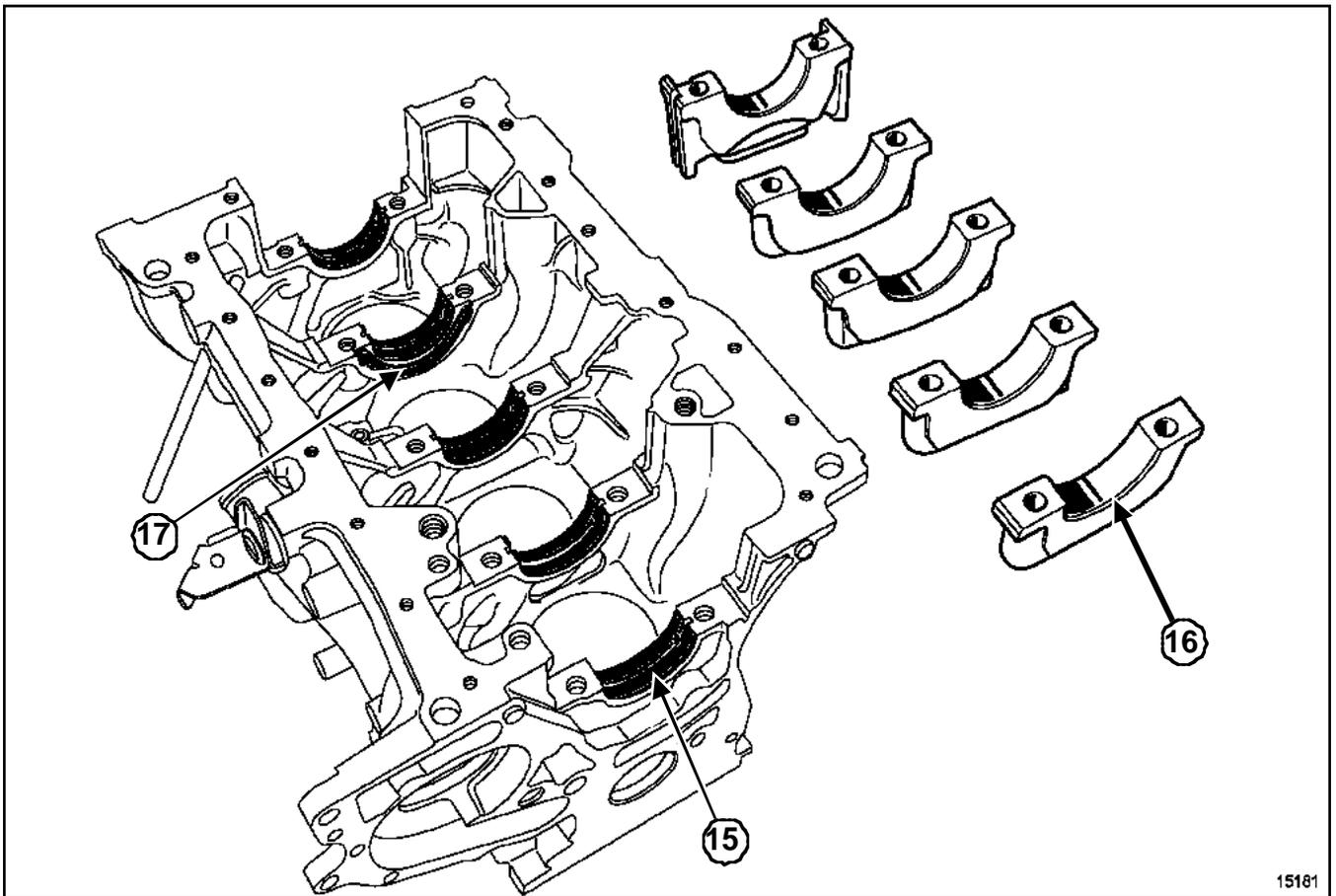
There are two categories of bearing shell, each of which are identified by a blob of paint underneath the bearing shell.

Engine peripherals: Specifications

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Paint mark	BLUE	RED
Bearing shell thickness (mm)	1.944 to 1.950	1.939 to 1.945

Direction of fitting:



15181

15181

- on the cylinder block, fit grooved bearing shells (15) on all the bearings,

- fit bearing shells without grooves (16) on all the bearing caps.

The crankshaft bearing shells are fitted using tool (Mot. 1493)

3 - Lateral shims

The shims are fitted on bearing no. 2 in (17).

There are four categories of shim; thickness (mm):

- Original: **2.30 to 2.35**
- After-Sales: **2.35 to 2.40**
- After-Sales: **2.40 to 2.45**

- After-Sales: **2.45 to 2.50**

WARNING

Do not oil between the cylinder block mating faces and the lateral shims.

The faces on the side of the crankshaft are grooved.

ENGINE AND LOWER ENGINE ASSEMBLY

Consumables

10A

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

CONSUMABLES

Type	Quantity	Component concerned	Part no.
DECAPJOINT	Coat	Cleaning gasket faces	77 01 405 952
RHODORSEAL 5661	Coat	Crankshaft bearing cap.	77 01 404 452
LOCTITE 518	Coat	Cylinder head cover Separator	77 01 421 162
LOCTITE FRENETAN- CHE	1 - 2 drops	-	77 01 394 070
Fluoride grease	Bead	Ignition coil	82 00 168 855

Parts to be replaced systematically

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

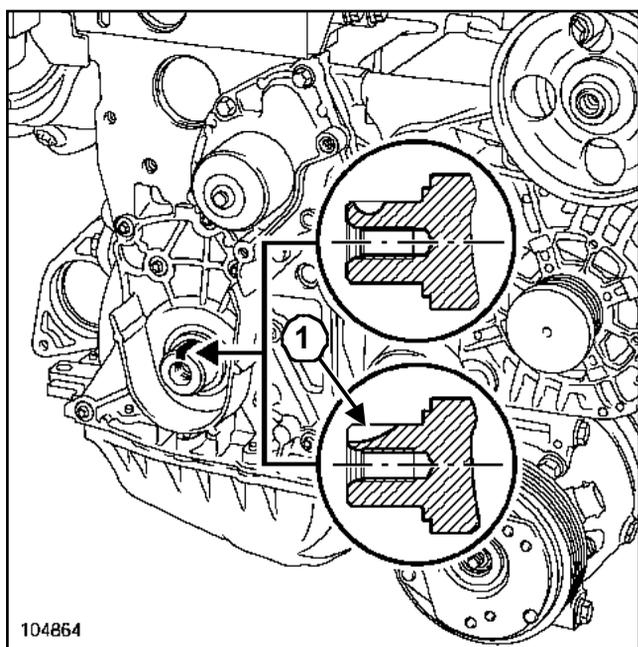
PARTS TO AUTOMATICALLY REPLACE AFTER REPAIRING THE ENGINE

- all seals,
- thermostat,
- cooling system hoses if they are damaged,
- plugs on the end of the cylinder head (flywheel end),
- oil filter,
- piston skirt cooling jets,
- valve guides,
- oil separator bolts (F4R 730,732,736,738),
- engine flywheel bolts,
- crankshaft bearing cap bolts,
- con-rod cap bolts.

Timing panel:

- camshaft pulley nuts,
- inlet camshaft dephaser bolt,
- tension wheel,
- new pulley(s),
- belt.

- crankshaft accessories pulley,
- crankshaft accessories pulley bolt.



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- crankshaft sprocket by **sprocket with integrated key** (in the case of a crankshaft fitted with a straight keyway **(1)**).
- accessories belt,

Special notes

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Equipment required

offset thread repair kit

I - ENGINE CLEANING

Protect the various accessories to prevent them being splashed by water and cleaning products.

Do not allow water to enter the air intake pipes.

II - FITTING RELIEVED THREADS

The threaded holes in all the engine parts (except for the cylinder head cover) can be repaired using the equipment in the **offset thread repair kit**.

III - CLEANING ENGINE PARTS**WARNING**

It is imperative not to knock the parts when cleaning them.

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

STANDARD EXCHANGE ENGINE

1 - Preparation of the old engine for return

Clean the engine.

Drain the oil and coolant from the old engine.

Secure the old engine to the stand and in the same conditions as the standard exchange engine:

- fit the plastic plugs and covers,
- fit the cardboard cover over the whole assembly.

2 - Parts to leave on the old engine

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

- the dipstick,
- the oil filter,
- the oil cooler (if turbocharged F4R),
- the oil level sensor,
- the oil pressure switch,
- the pinking sensor,
- the spark plugs,
- the rocker cover,
- the coolant inlet pipe,
- the water pump,
- the coolant outlet unit,
- the entire timing face (crankshaft sprocket, belt, tensioner, wheel(s), pulley(s), camshaft sprockets
- the timing gear cases,
- the crankshaft accessories pulley,
- the clutch pressure plate and disc,
- the engine flywheel or the starter plate.

3 - Parts to remove from the old engine

Parts to remember to remove from the old engine:

- all the coolant circuit pipes,
- the inlet camshaft dephaser solenoid valve,
- the ignition coils,
- the inlet distributor,
- the injector holder shim,
- the exhaust manifold,

- the turbocharger,
- the primary catalytic converter (turbocharged F4R),
- the oxygen sensors,
- the accessories (alternator, air conditioning compressor, power assisted steering pump),
- the accessories multifunction supports.
- the engine lifting eyes (if there is a difference between those on the standard replacement engine and the worn engine).

WARNING

The overhauled engine has only one litre of oil, so remember to top it up.

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

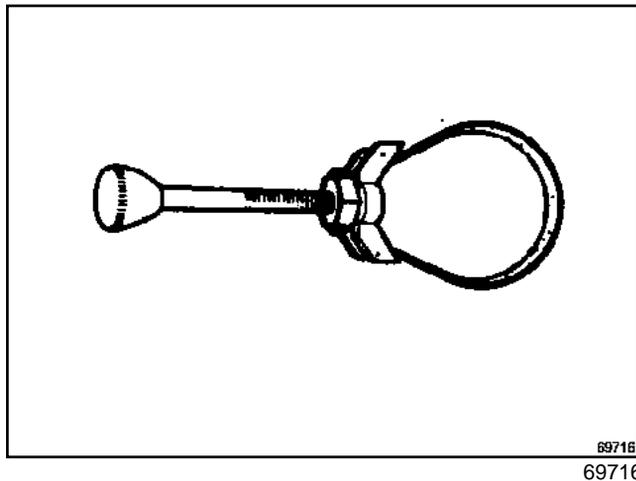
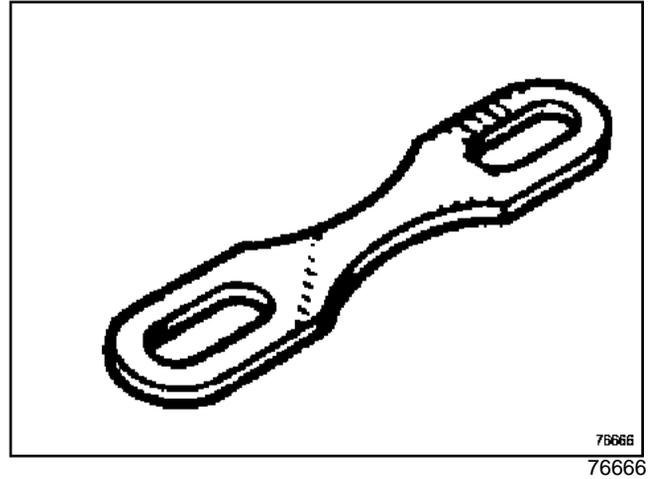
Special tooling required	
Mot. 445	Universal strap wrench for oil filter
Mot. 588	Liner retaining strap
Mot. 591-02	Magnetised indexed flexible arm for cylinder head tightening angular wrench
Mot. 591-04	Cylinder head tightening angular wrench (1/2" drive)
Mot. 792-03	Engine support plate for Desvil engine stand
Mot. 799-01	Tool for locking sprockets on toothed timing belt
Mot. 990-03	Timing gear end crankshaft seal fitting tool
Mot. 991-01	Flywheel end crankshaft seal fitting tool (F engines)
Mot. 995	Set of 2 pins adaptable to engine support plate Mot.792-03
Mot. 1054	TDC setting pin
Mot. 1329	76 mm diameter Oil filter cover
Mot. 1335	Tool for removing valve stem seals
Mot. 1423	Tool for removing silicon-coated crankshaft bearing caps
Mot. 1485	Tool for removing piston coolers
Mot. 1485-01	Tool for removing piston coolers
Mot. 1487	Tool for refitting camshaft covers (57 mm diameter)

Special tooling required	
Mot. 1488	Tool for refitting camshaft covers (43 mm diameter)
Mot. 1492	Tool for fitting con rod bearings
Mot. 1493	Crankshaft bearing bush centring tool (F engines)
Mot. 1495	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key
Mot. 1495-01	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key
Mot. 1496	Tool for setting the camshaft
Mot. 1502	Tool for removing valve stem collets
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1509	Camshaft sprocket locking tool
Mot. 1509-01	Mot. tool adaptation kit1509
Mot. 1511	Tool for fitting valve stem seals
Mot. 1512	Tool for fitting camshaft seals (28 x 47 mm)
Mot. 1513	Tool for refitting camshaft dephaser solenoid valve lip seal
Mot. 1516	Piston cooler fitting tool (oriented at 5°)
Mot. 1517	Tool for fitting inlet camshaft seal
Mot. 1573	Cylinder head support

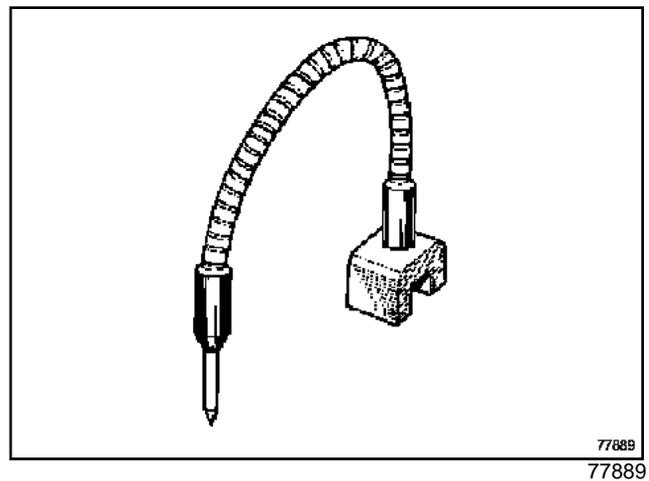
Special tooling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 1677	Flywheel locking tool (F engines)
Mot. 1715	Belt tension setting tool (frequency meter)
Emb. 880	Clutch fork pin extractors
Emb. 1604	Clutch compression tool for refitting the play adjustment system
Emb. 1518	Set of clutch disc centring mandrels



Procedure part number	Parts Department Number	Description
(Mot. 588)	00 00 058 800	Liner retaining strap

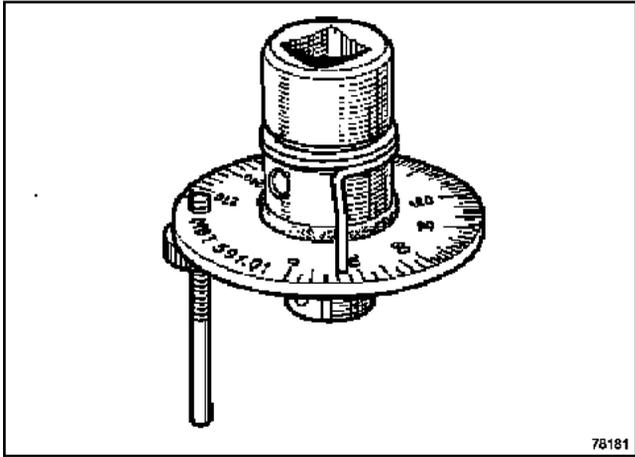


Procedure part number	Parts Department Number	Description
(Mot. 445)	00 00 044 500	Universal strap wrench for oil filter

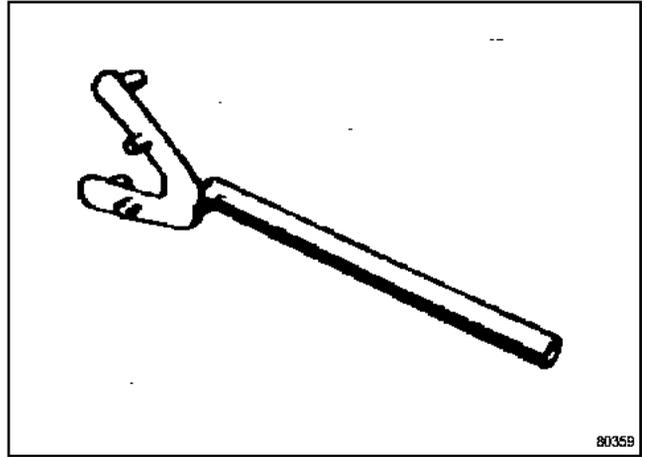
Procedure part number	Parts Department Number	Description
(Mot. 591-02)	00 00 059 102	Magnetised indexed flexible arm for cylinder head tightening angular wrench

Special tooling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



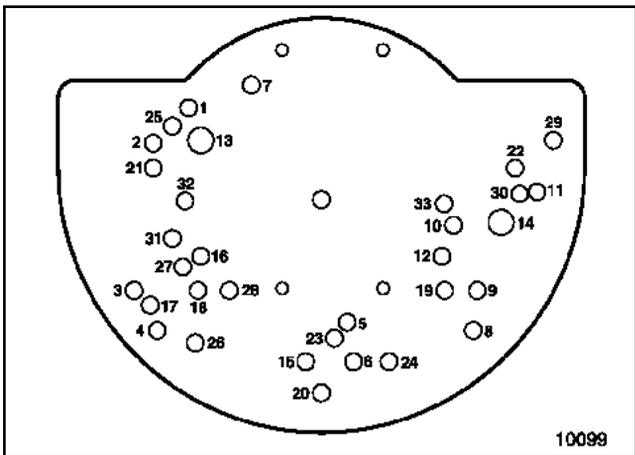
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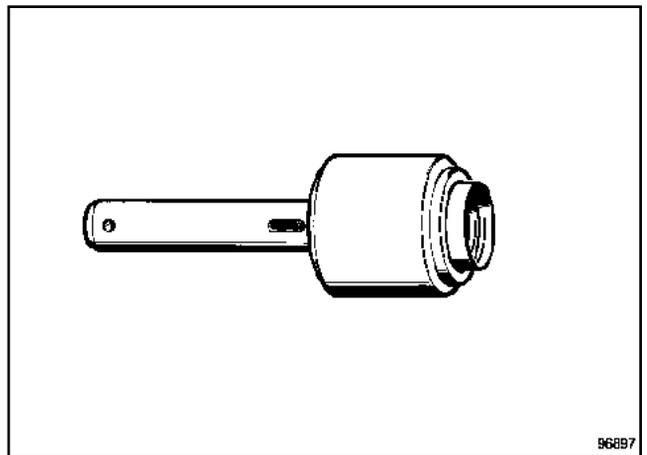
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Procedure part number	Parts Department Number	Description
(Mot. 591-04)	00 00 059 104	Cylinder head tightening angular wrench (1/2" drive)

Procedure part number	Parts Department Number	Description
(Mot. 799-01)	00 00 079 901	Tool for locking sprockets on toothed timing belt



10099
10099

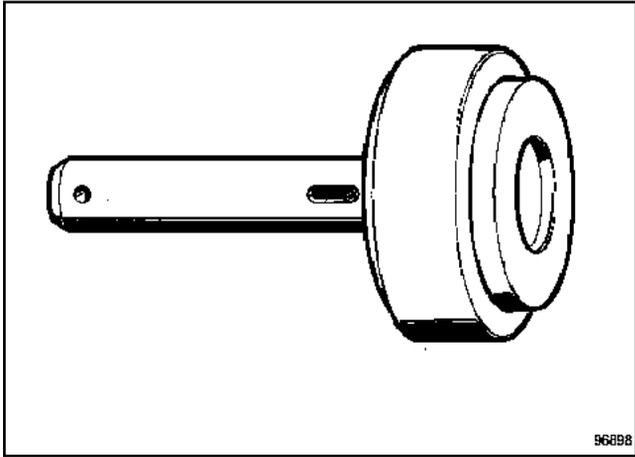


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96897

Procedure part number	Parts Department Number	Description
(Mot. 792-03)	00 00 079 203	Engine support plate for Desvil engine stand (with studs from A to W)

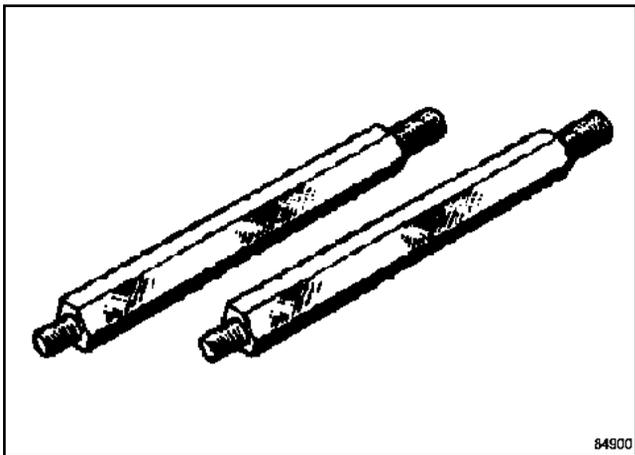
Procedure part number	Parts Department Number	Description
(Mot. 990-03)	00 00 099 003	Timing end crankshaft seal fitting tool

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



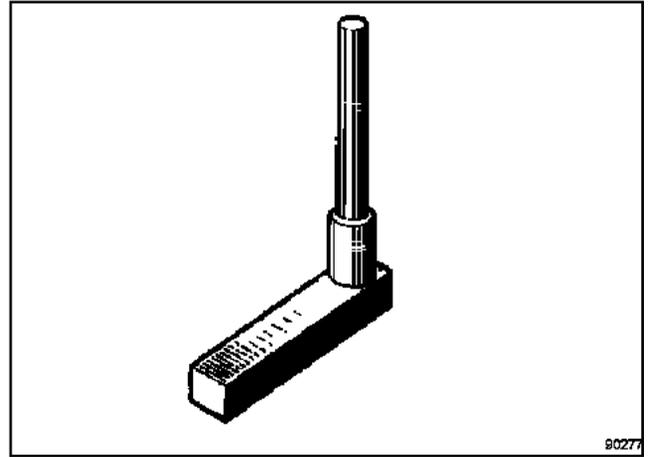
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Procedure part number	Parts Department Number	Description
(Mot. 991-01)	00 00 099 101	Flywheel end crankshaft seal fitting tool (85 x 105 x 8 seal)



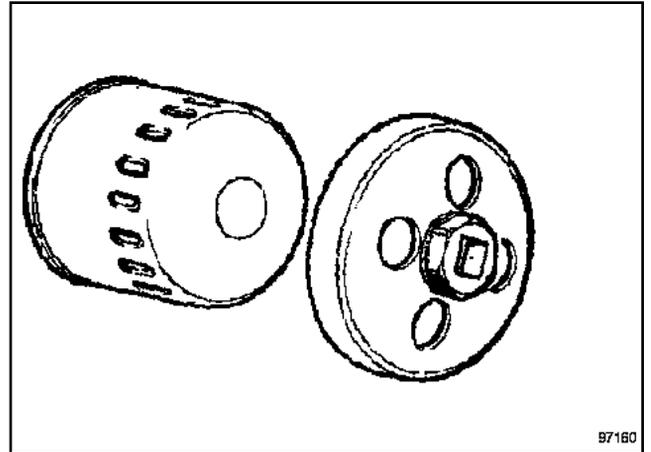
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84900

Procedure part number	Parts Department Number	Description
(Mot. 995)	00 00 099 500	Set of two adaptable engine mounting plate pins (Mot. 792-03)



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90277

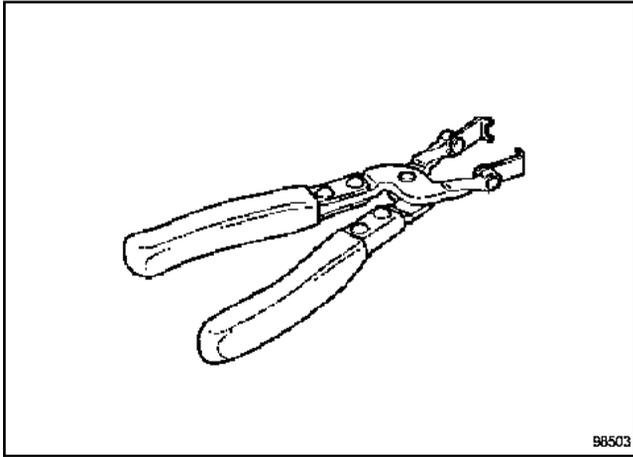
Procedure part number	Parts Department Number	Description
(Mot. 1054)	00 00 105 400	TDC setting pin



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97160

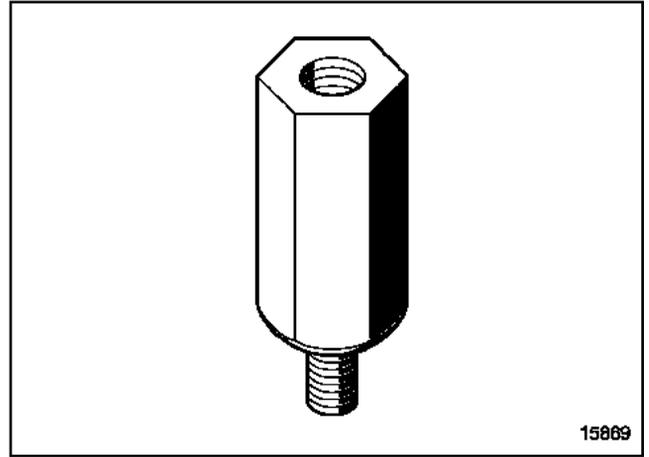
Procedure part number	Parts Department Number	Description
(Mot. 1329)	00 00 132 900	Oil filter cover (76 mm diameter)

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



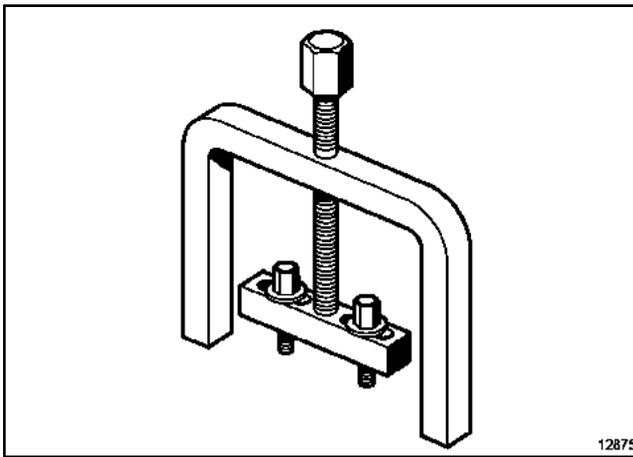
98503
98503

Procedure part number	Parts Department Number	Description
(Mot. 1335)	00 00 133 500	Tool for removing valve stem seals



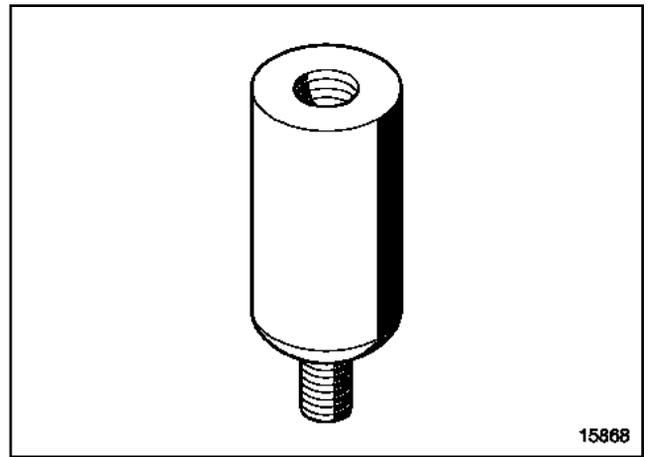
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15869

Procedure part number	Parts Department Number	Description
(Mot. 1485)	00 00 148 500	Tool for removing piston coolers



12875
12875

Procedure part number	Parts Department Number	Description
(Mot. 1423)	00 00 142 300	Tool for removing silicon-coated crankshaft bearing caps

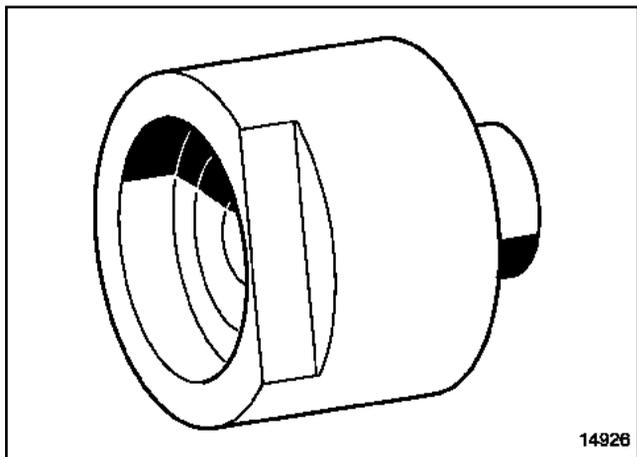


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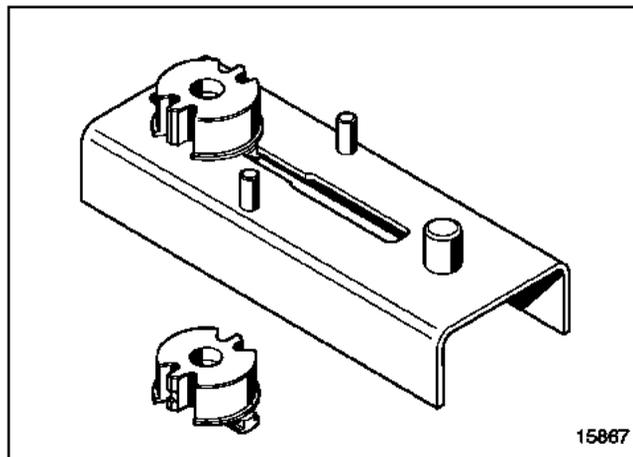
Procedure part number	Parts Department Number	Description
(Mot. 1485-01)	00 00 148 501	Tool for removing piston coolers

Special tooling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



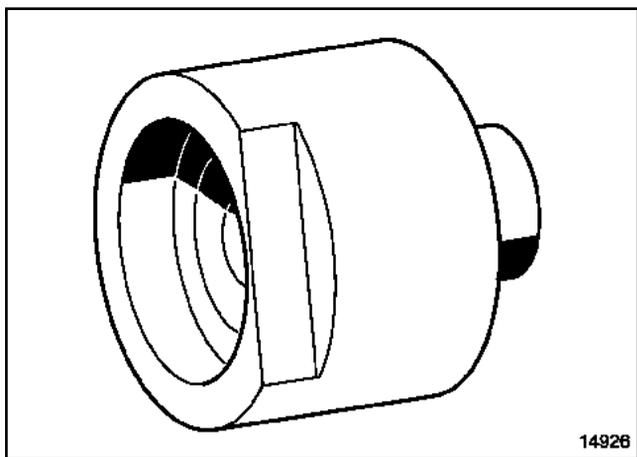
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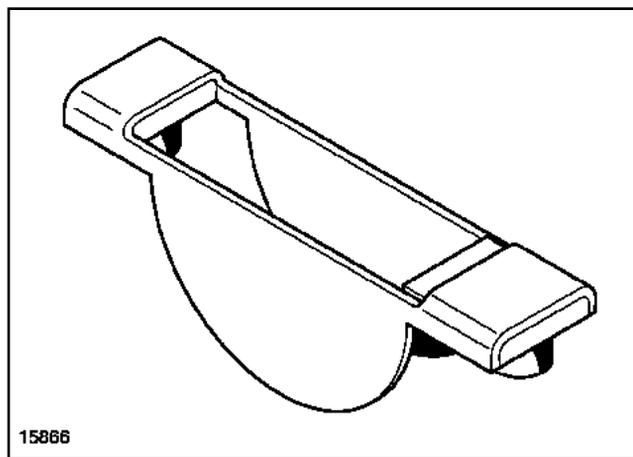
15867
15867

Procedure part number	Parts Department Number	Description
(Mot. 1487)	00 00 148 700	Tool for refitting camshaft covers (57 mm diameter)

Procedure part number	Parts Department Number	Description
(Mot. 1492)	00 00 149 200	Tool for fitting con rod bearing shells



14926
14926



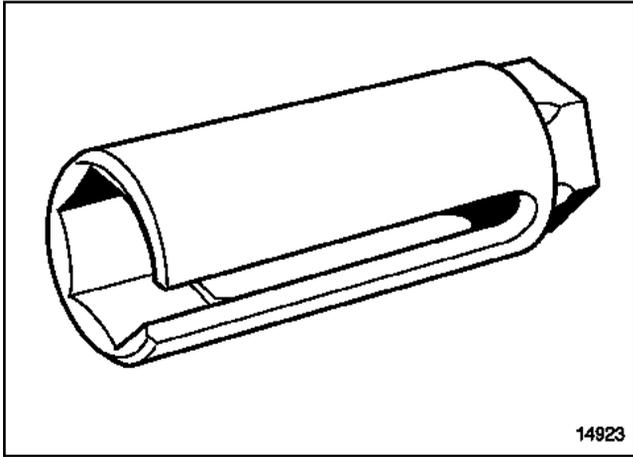
15866
15866

Procedure part number	Parts Department Number	Description
(Mot. 1488)	00 00 148 800	Tool for refitting camshaft covers (43 mm diameter)

Procedure part number	Parts Department Number	Description
(Mot. 1493)	00 00 149 300	Crankshaft bearing centring tool

Special tooling

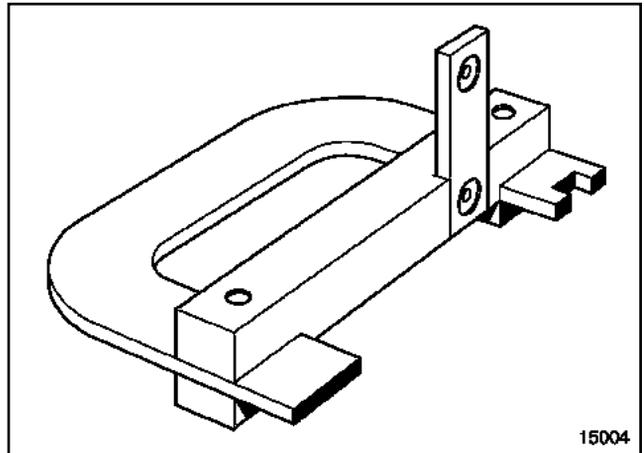
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



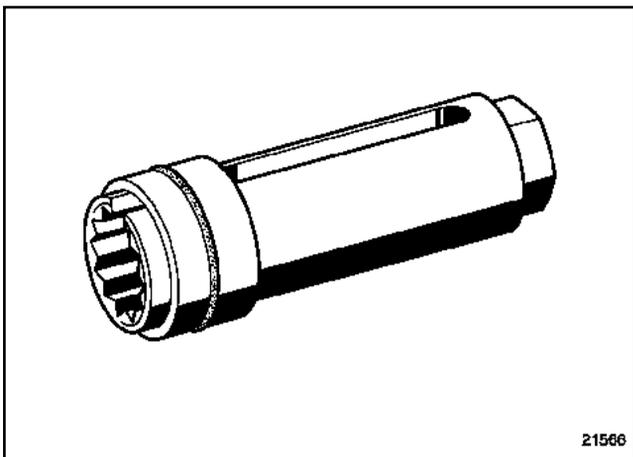
14923
14923

Procedure part number	Parts Department Number	Description
(Mot. 1495-01)	00 00 149 501	24 mm socket for removing / refitting oxygen sensor. 1/2" square drive with 24 mm hexagon bolt socket

Procedure part number	Parts Department Number	Description
(Mot. 1495)	00 00 149 500	22 mm socket for removing / refitting oxygen sensor. 1/2" square drive with 24 mm hexagon bolt socket

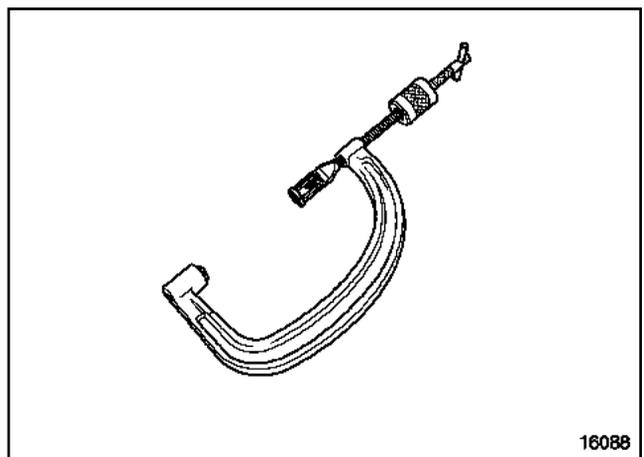


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15004



21566
21566

Procedure part number	Parts Department Number	Description
(Mot. 1496)	00 00 149 600	Tool for setting the camshaft

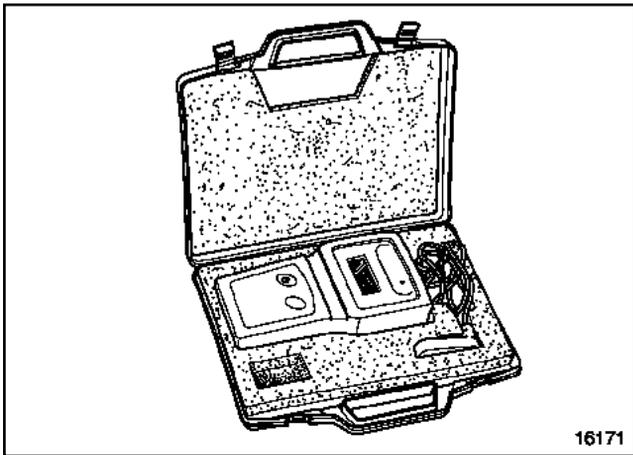


16088
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Special tooling

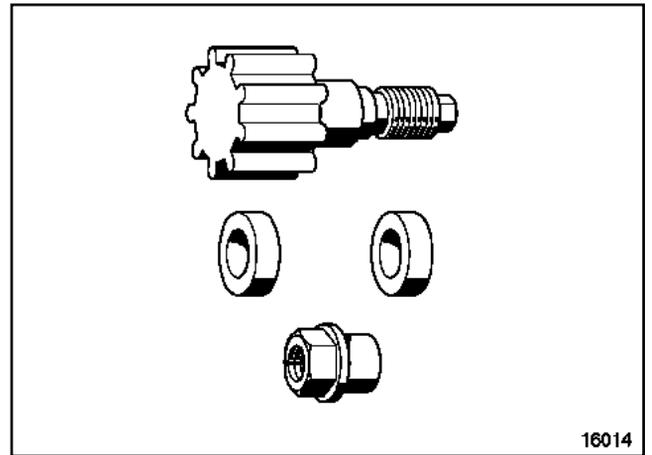
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Procedure part number	Parts Department Number	Description
(Mot. 1502)	00 00 150 200	Tool for removing valve stem cotters



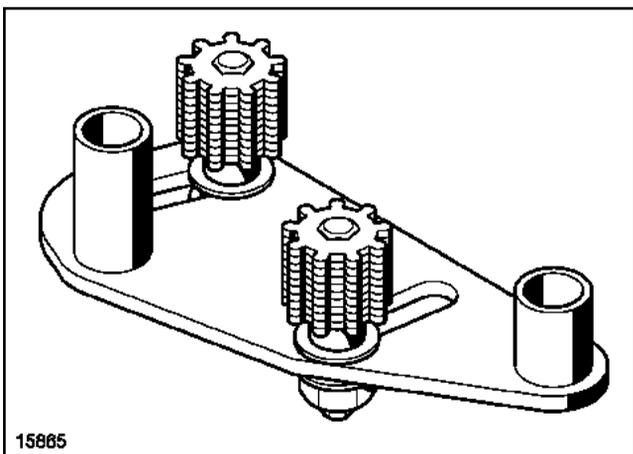
16171
16171

Procedure part number	Parts Department Number	Description
(Mot. 1509)	00 00 150 900	Tool for locking the camshaft pulleys



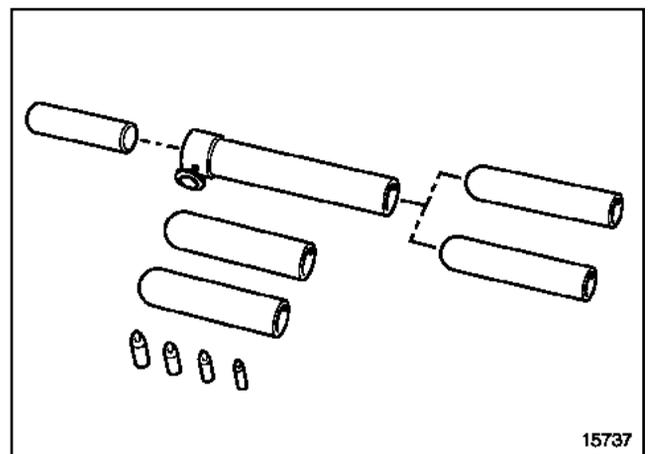
16014
16014

Procedure part number	Parts Department Number	Description
(Mot. 1505)	00 00 150 500	Belt tension setting tool (frequency meter)



15865

Procedure part number	Parts Department Number	Description
(Mot. 1509-01)	00 00 150 901	Tool adapter kit (Mot. 1509)

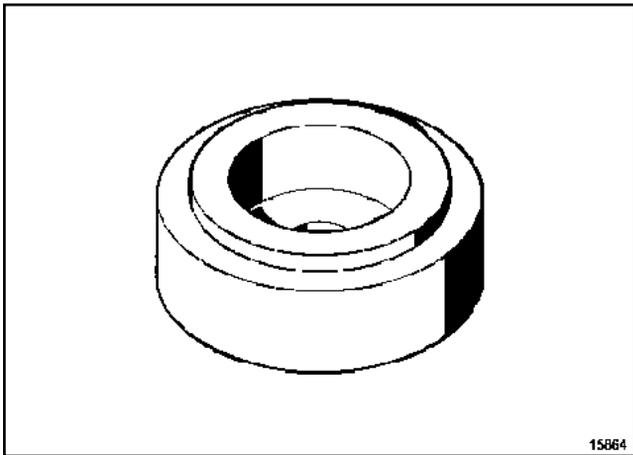


15737
15737

Special tooling

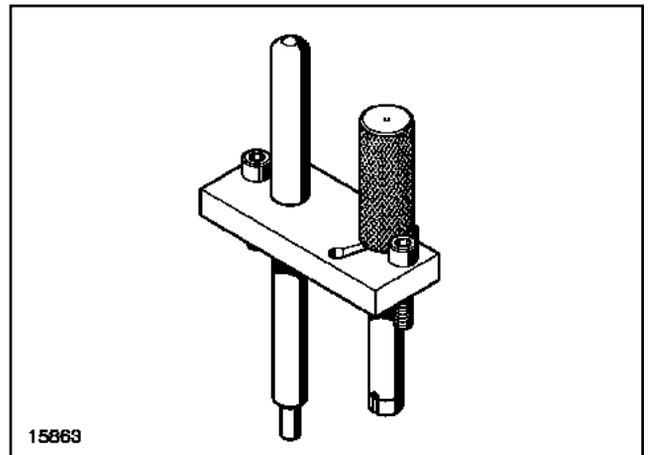
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Procedure part number	Parts Department Number	Description
(Mot. 1511)	00 00 151 100	Tool for fitting valve stem seals



15864
15864

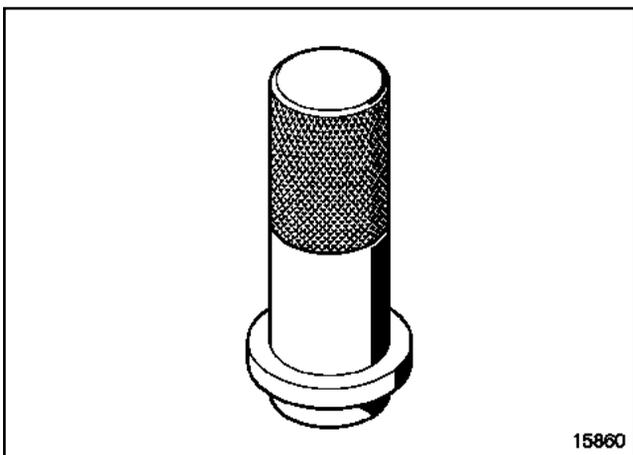
Procedure part number	Parts Department Number	Description
(Mot. 1513)	00 00 151 300	Tool for refitting the camshaft dephaser solenoid valve lip seal



15863

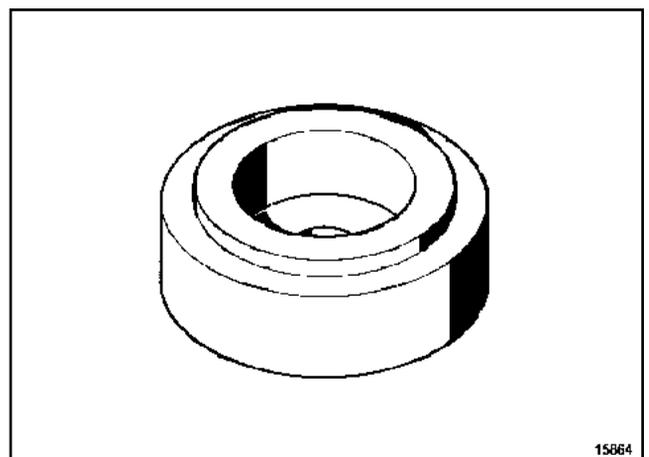
15863

Procedure part number	Parts Department Number	Description
(Mot. 1512)	00 00 151 200	Tool for fitting camshaft seals (28 x 47 mm)



15860
15860

Procedure part number	Parts Department Number	Description
(Mot. 1516)	00 00 151 600	Piston base cooler fitting tool (in position 5°)

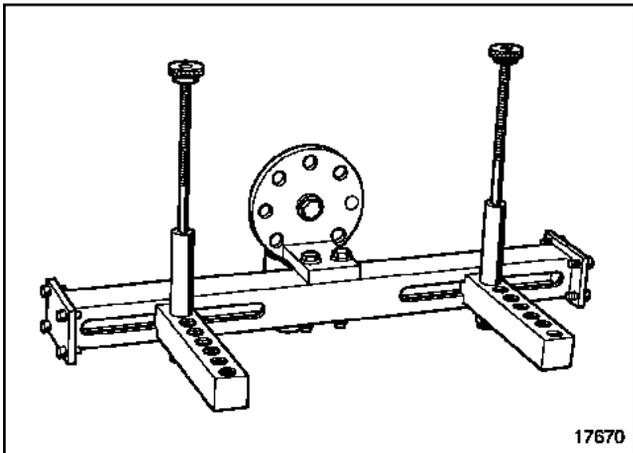


15864
15864

Special tooling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

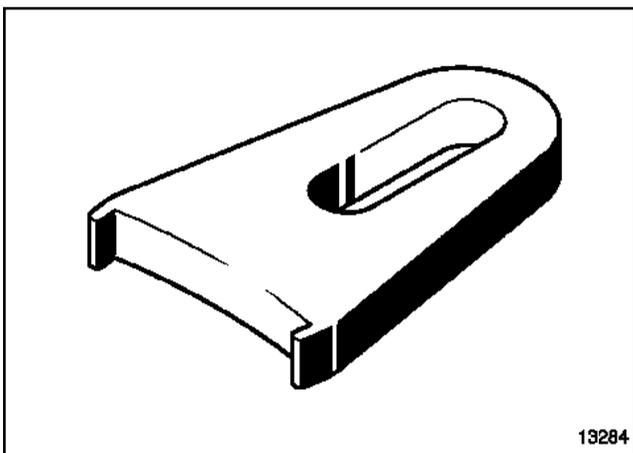
Procedure part number	Parts Department Number	Description
(Mot. 1517)	00 00 151 700	Tool for fitting inlet camshaft seal



17670

17670

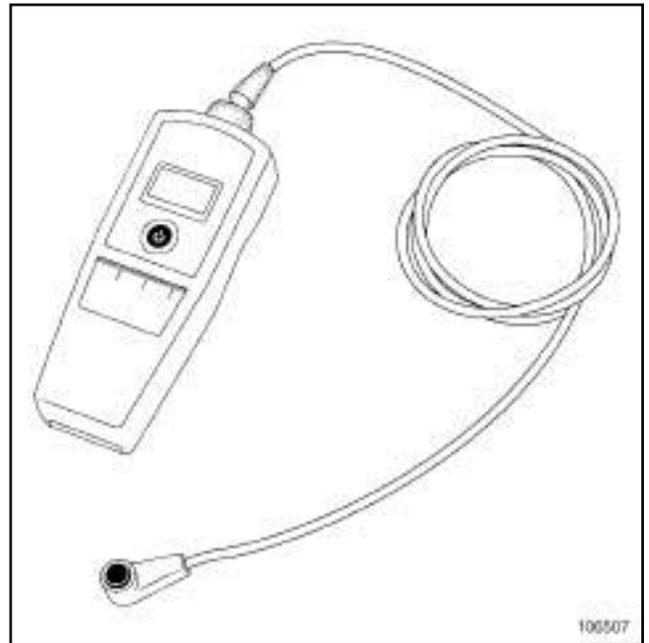
Procedure part number	Parts Department Number	Description
(Mot. 1573)	00 00 157 300	Cylinder head support



13284

13284

Procedure part number	Parts Department Number	Description
(Mot. 1677)	00 00 167 700	Engine flywheel immobilising tool.

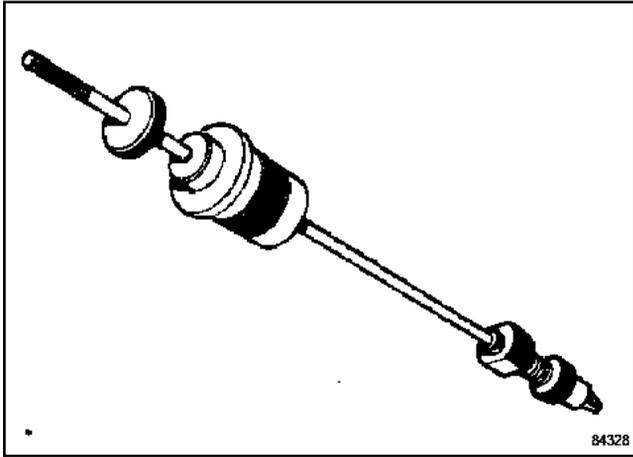


106507

106507

Procedure part number	Parts Department Number	Description
(Mot. 1715)	77 11 381 715	Belt tension setting tool (frequency meter)

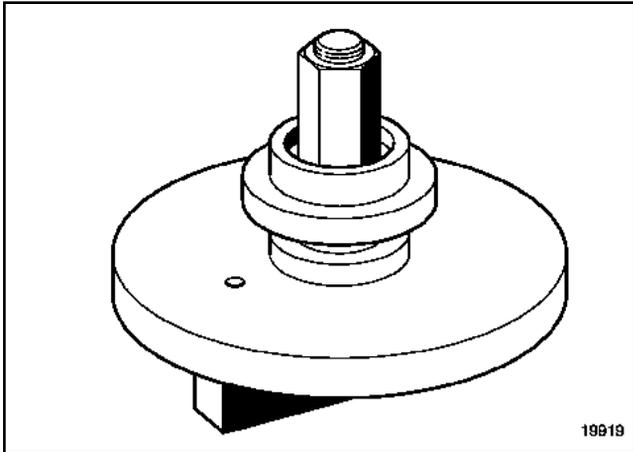
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



84328
84328

Procedure part number	Parts Department Number	Description
(Emb. 1518)	00 00 151 800	Set of clutch plate centring mandrels

Procedure part number	Parts Department Number	Description
(Emb. 880)	00 00 088 000	Large slide hammer



19919
19919

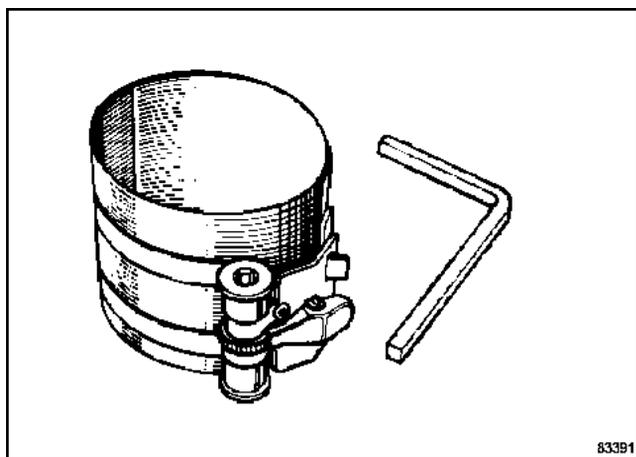
Procedure part number	Parts Department Number	Description
(Emb. 1604)	00 00 160 400	Clutch compression tool for reaming the adjustment system

Equipment

F4P, and 720 or 722 or 760 or 770 or 771 or 772 or 774 – F4R, and 700 or 701 or 712 or 713 or 720 or 730 or 732 or 736 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 770 or 771 or 780 or 790 or 794 or 795

Equipment required
piston ring compressor
cylinder head testing tool
angular wrench
low torque wrench
standard 1/2" (12.7 mm) square 22 mm long socket
standard 1/2" (12.7 mm) square drive 8/12/14 female torx socket
tweezers
offset thread repair kit
kit for fitting valve stem seals
component support

THE TOOLS AVAILABLE ARE:



83391
83391

- The **piston ring compressor**,

- The **cylinder head testing tool**,

- The **angular wrench**,

- The **low torque wrench**,

- The **standard 1/2" (12.7 mm) square 22 mm long socket** for removing the oil pressure sensor,

- The **standard 1/2" (12.7 mm) square drive 8/12/14 female torx socket**,

- The **tweezers** for removing / refitting the valve stem cotters,

- The **offset thread repair kit**,

- The **kit for fitting valve stem seals**,

- The **component support**.

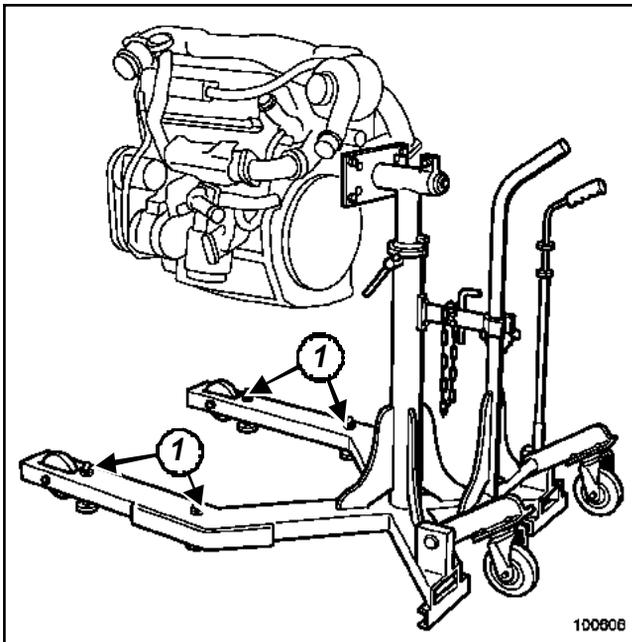
Engine: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Special tooling required

Mot. 1495	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key
Mot. 1495-01	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key
Mot. 995	Set of 2 pins adaptable to engine support plate Mot.792-03
Mot. 792-03	Engine support plate for Desvil engine stand

I - PREPARING THE ENGINE TO BE PLACED ON THE STAND

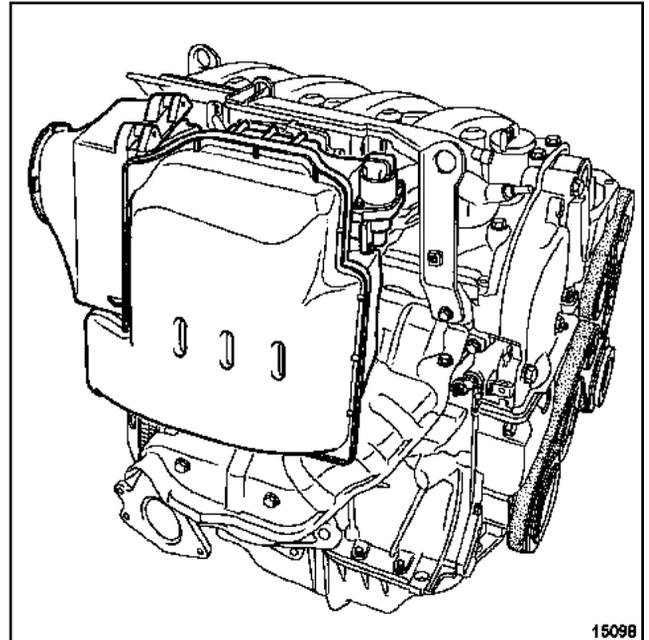


IMPORTANT

In order to work on the engine in complete safety, it is essential to have the new stand, or have the old stand modified by the manufacturer. When the engine is on the stand, it is essential to fit mounting pads (1).

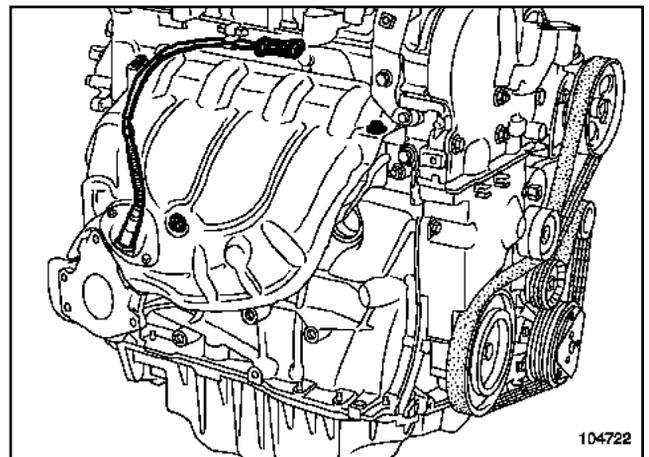
Remove the engine wiring harness.

Drain the engine oil.



15098
15098

Remove the air filter unit, if fitted.



104722
104722

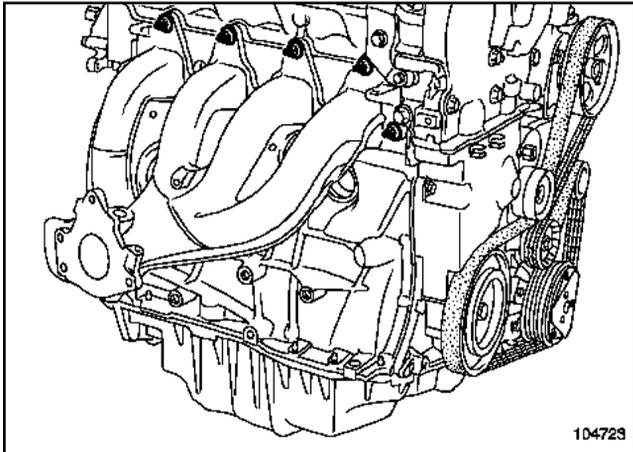
Remove:

- the oxygen sensor using tool (**Mot. 1495**) or tool (**Mot. 1495-01**),

- the upper heat shield.

Engine: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



104723

- Remove the exhaust manifold nuts.
- Remove the exhaust manifold.

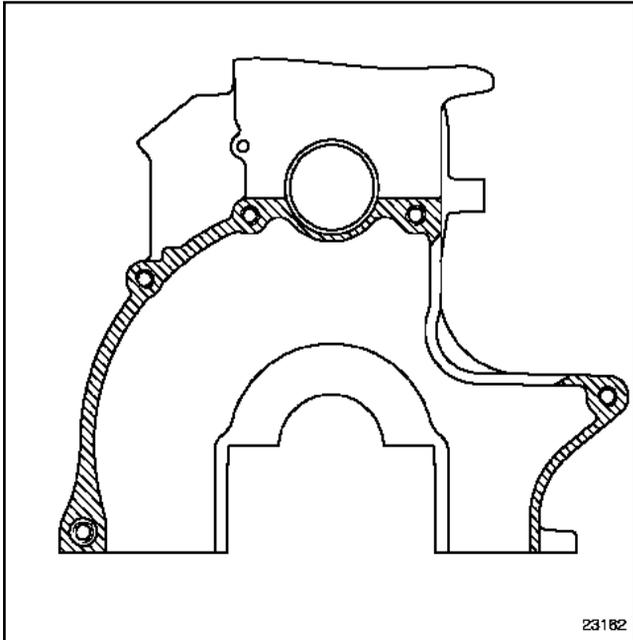
II - MODIFICATION TO THE CYLINDER BLOCK

- To optimise the acoustics, a change has been made to the cylinder block mating face.

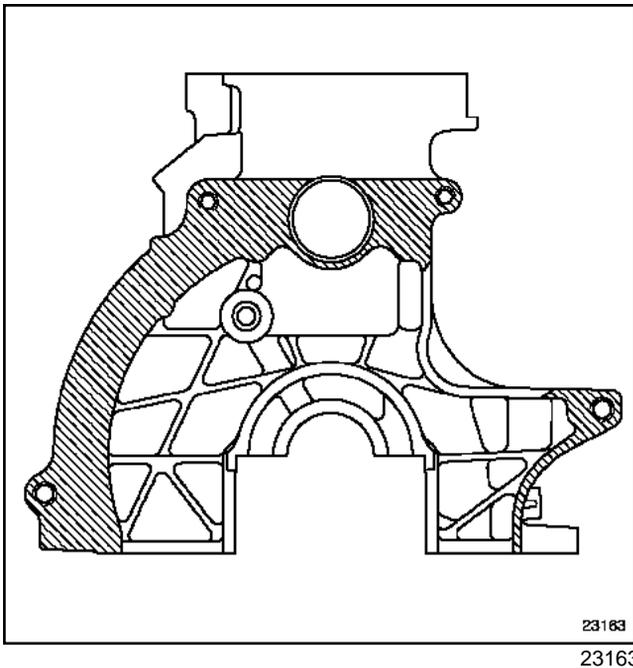
Engine: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Conventional cylinder block with a small mating face

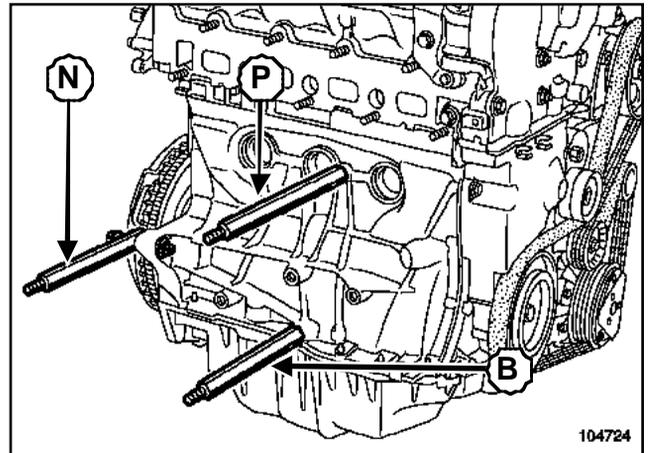


New cylinder block with a large mating face



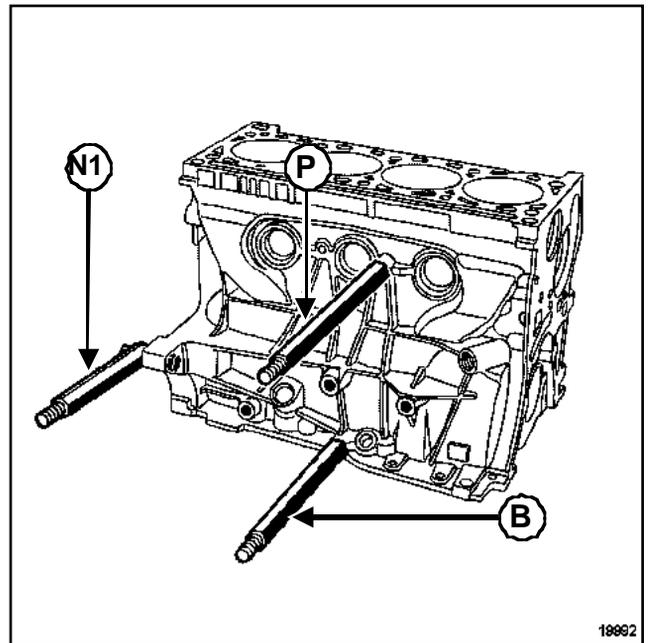
Conventional cylinder block with a small mating

face



- Fit on the cylinder block the pins (N), (P) and (B) of tool (Mot. 995) corresponding to holes (12, 25 and 26) on the mounting plate (Mot. 792-03).

New cylinder block with a large mating face

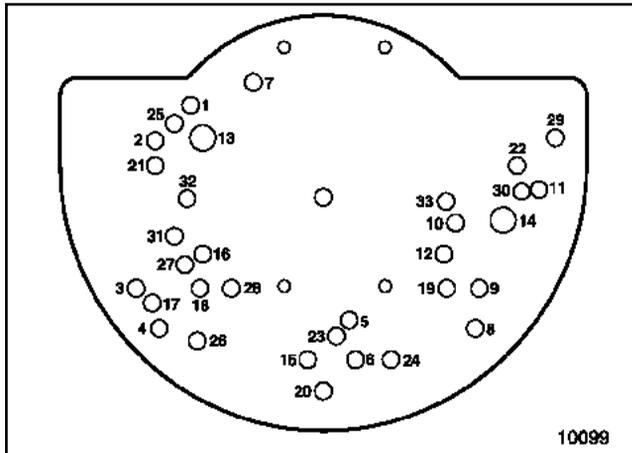


- Attach the pins (P) and (B) from tool (Mot. 995) and pin (N1) from tool on the cylinder block corresponding to holes (12, 25 and 26) on the mounting plate (Mot. 792-03).

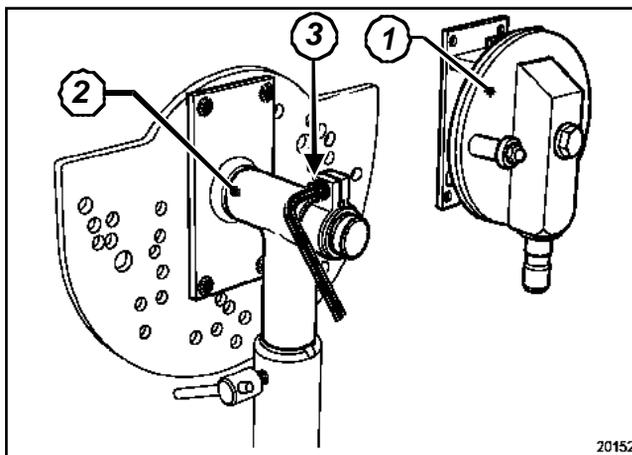
Engine: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Engine stand plate



10099



20152

20152

❑ Modification of the **DESVIL** engine stand head used in engine repair: replacement of head **TS 126** (1) with head **TS 127** (2).

- ❑ Special features of this new head
 - rotation axle permanently lubricated,
 - variable locking of the head.

❑

WARNING

The clamping bolt (3) must be fully undone to release the head when there is no longer an engine resting on the stand.

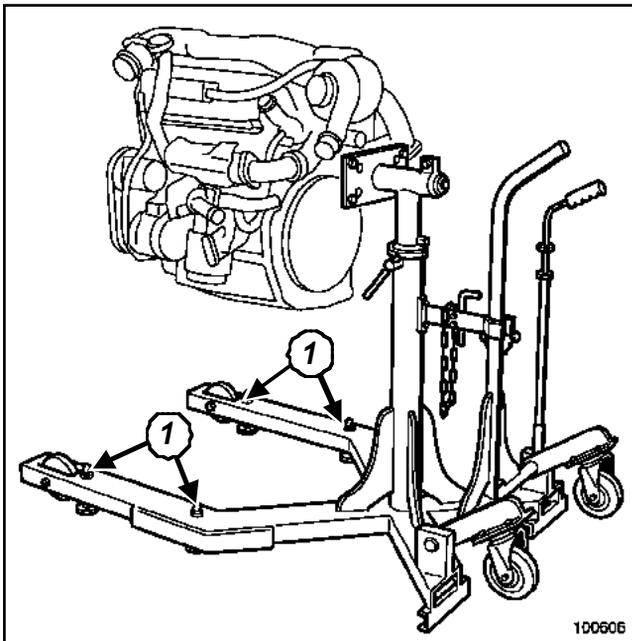
Engine: Dismantling

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1495	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key
Mot. 995	Set of 2 pins adaptable to engine support plate Mot.792-03
Mot. 792-03	Engine support plate for Desvil engine stand

PREPARING THE ENGINE TO BE PLACED ON THE STAND



100606

❑

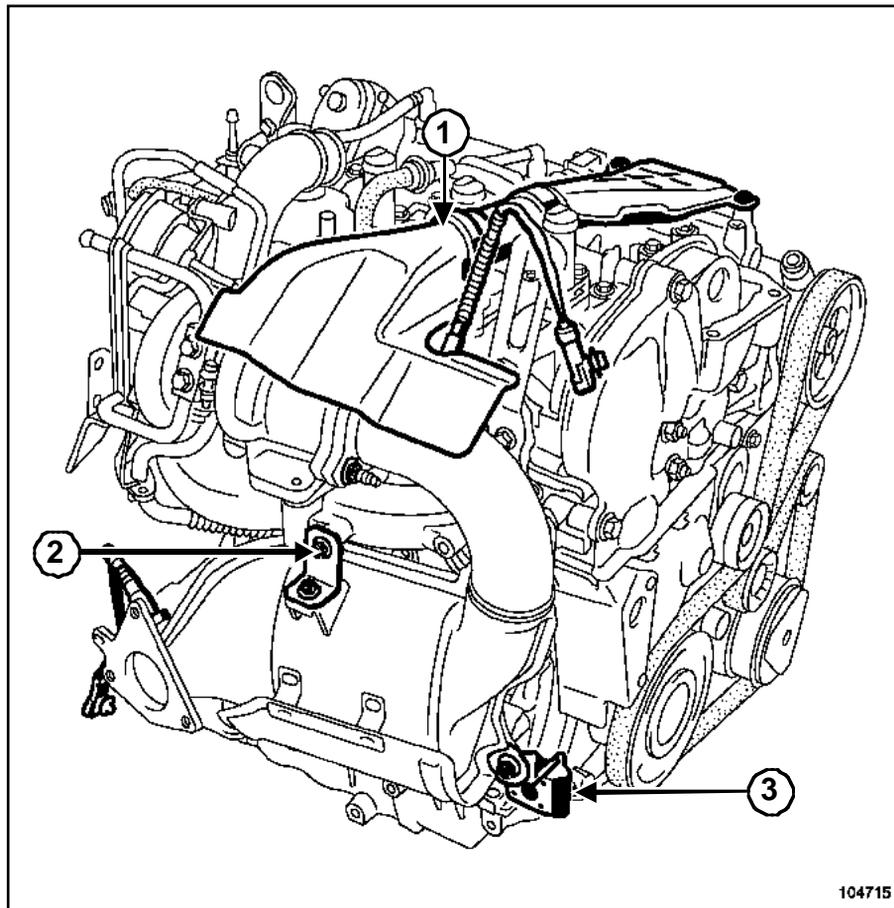
IMPORTANT

In order to work on the engine in complete safety, it is essential to have the new stand, or have the old stand modified by the manufacturer. When the engine is on the stand, it is essential to fit mounting pads (1).

- ❑ Remove the engine wiring harness.
- ❑ Drain the engine oil.

Engine: Dismantling

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



104715

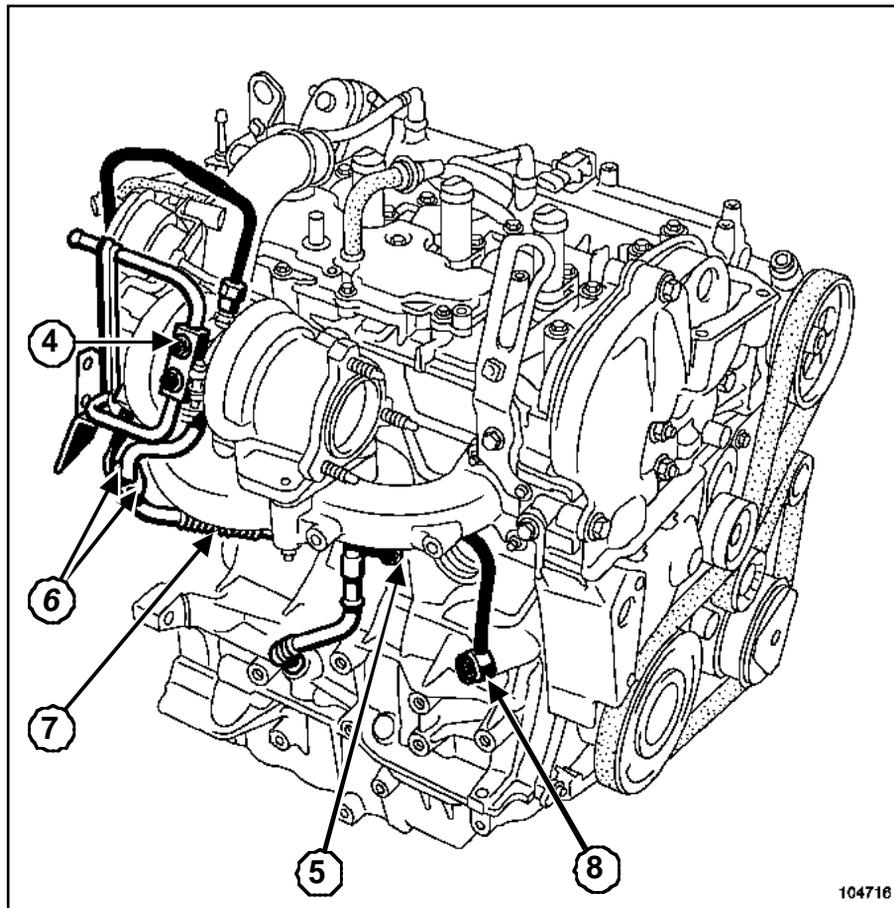
104715

□ Remove:

- the turbocharger air pipe/heat shield (1) assembly,
- both oxygen sensors using tool (**Mot. 1495**),
- the upper bracket bolt (2) on the exhaust manifold,
- both upstream strut bolts (3) on the cylinder block,
- the three primary catalytic converter mounting nuts and the primary catalytic converter and remove it.

Engine: Dismantling

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



104716

104716

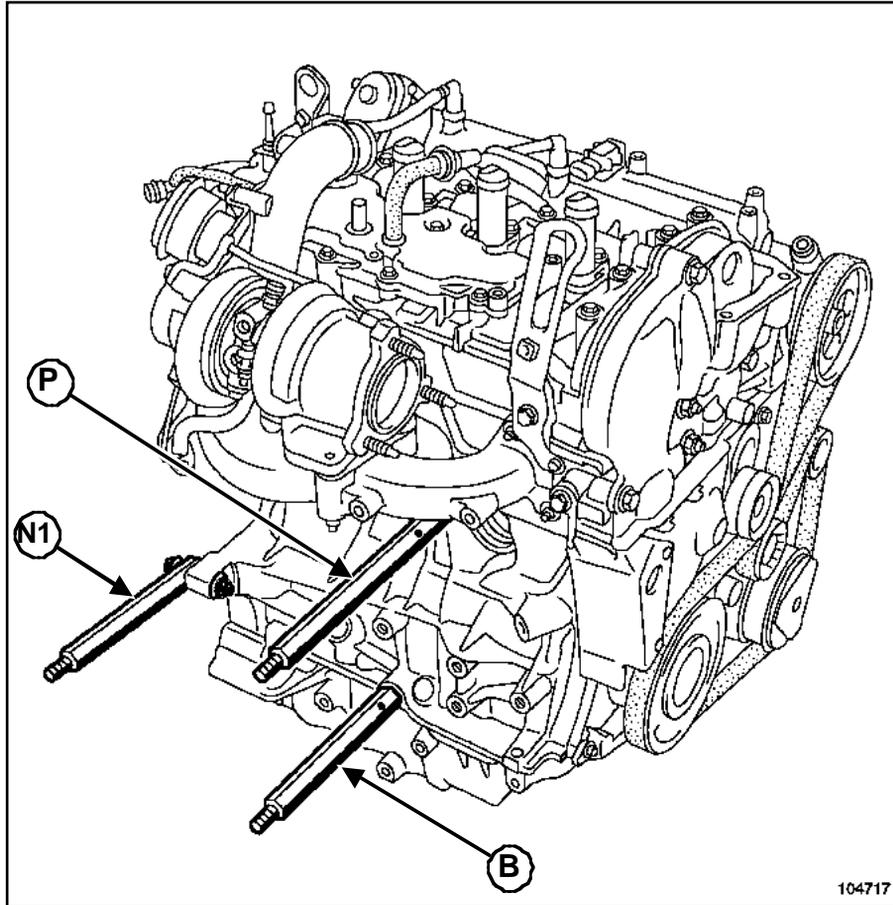
□ Remove:

- the turbocharger cooling pipes (4),
- the mounting bolt (5) from the cylinder block pipes,
- the two bolts (6) connecting the two oil return pipes,
- the long oil return pipe (7),
- the oil supply pipe (8).

Engine: Dismantling

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Cylinder block with a large mating face



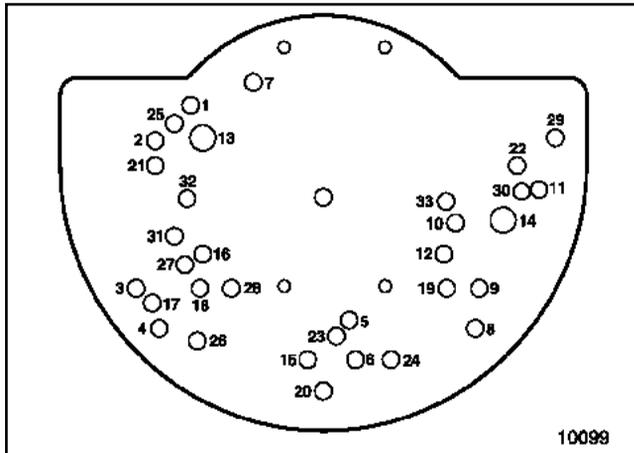
104717

- Attach the pins (**P**) and (**B**) from tool (**Mot. 995**) and pin (**N1**) from tool on the cylinder block corresponding to holes (**12, 25 and 26**) on the mounting plate (**Mot. 792-03**).

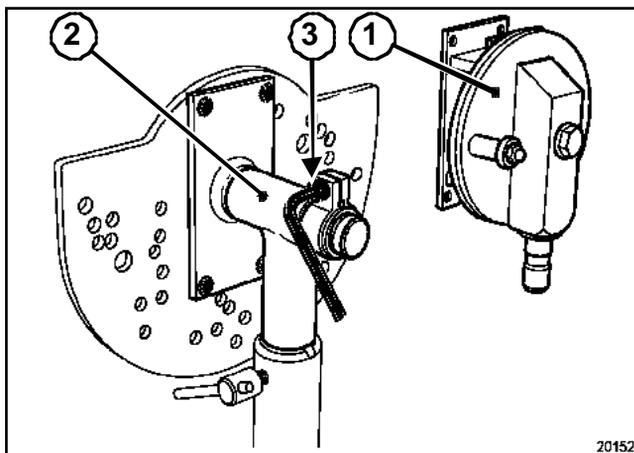
Engine: Dismantling

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Engine stand plate



10099



20152

- Modification of the **DESVIL** engine stand head used in engine repair: replacement of head **TS 126 (1)** with head **TS 127 (2)**.
- Special features of this new head
 - rotation axle permanently lubricated,
 - variable locking of the head.
-

WARNING

The clamping bolt (3) must be fully undone to release the head when there is no longer an engine resting on the stand.

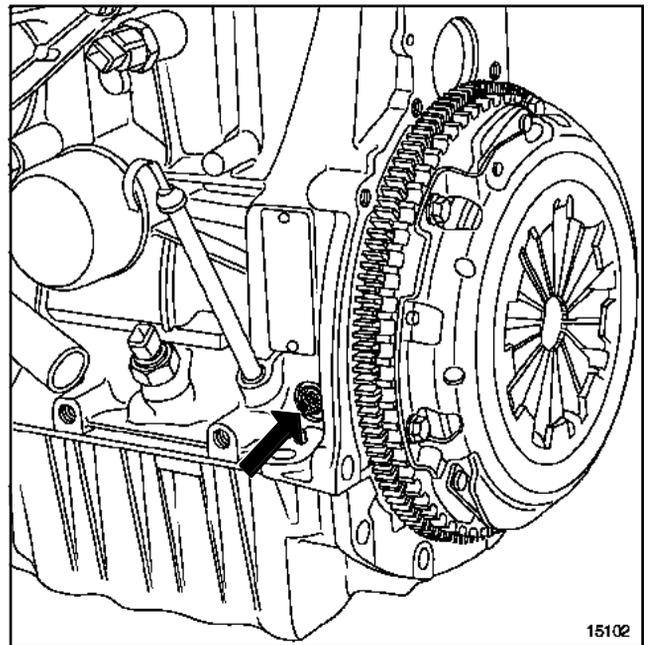
Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

Special tooling required	
Mot. 1054	TDC setting pin
Mot. 1677	Flywheel locking tool (F engines)
Mot. 1509	Camshaft sprocket locking tool
Mot. 1509-01	Mot. tool adaptation kit1509
Mot. 1573	Cylinder head support

Equipment required
roller-type stud removal tool

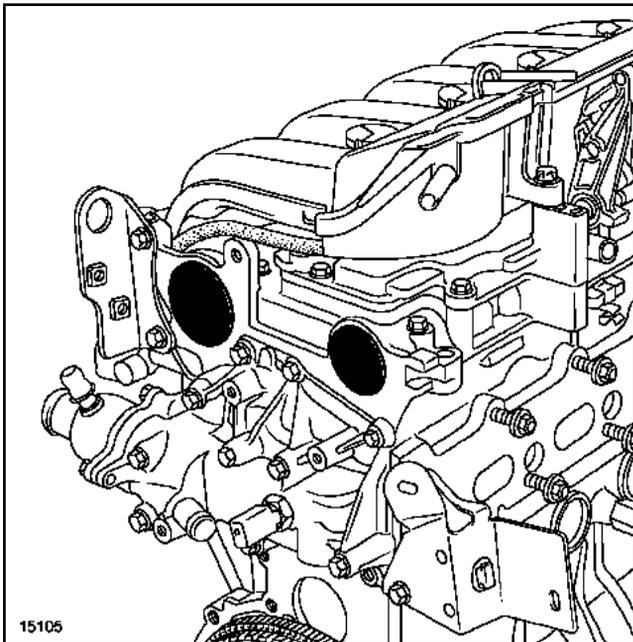
Tightening torques 	
cog nuts	80 Nm



15102
15102

- Remove the Top Dead Centre pin plug.

REMOVING THE TIMING BELT



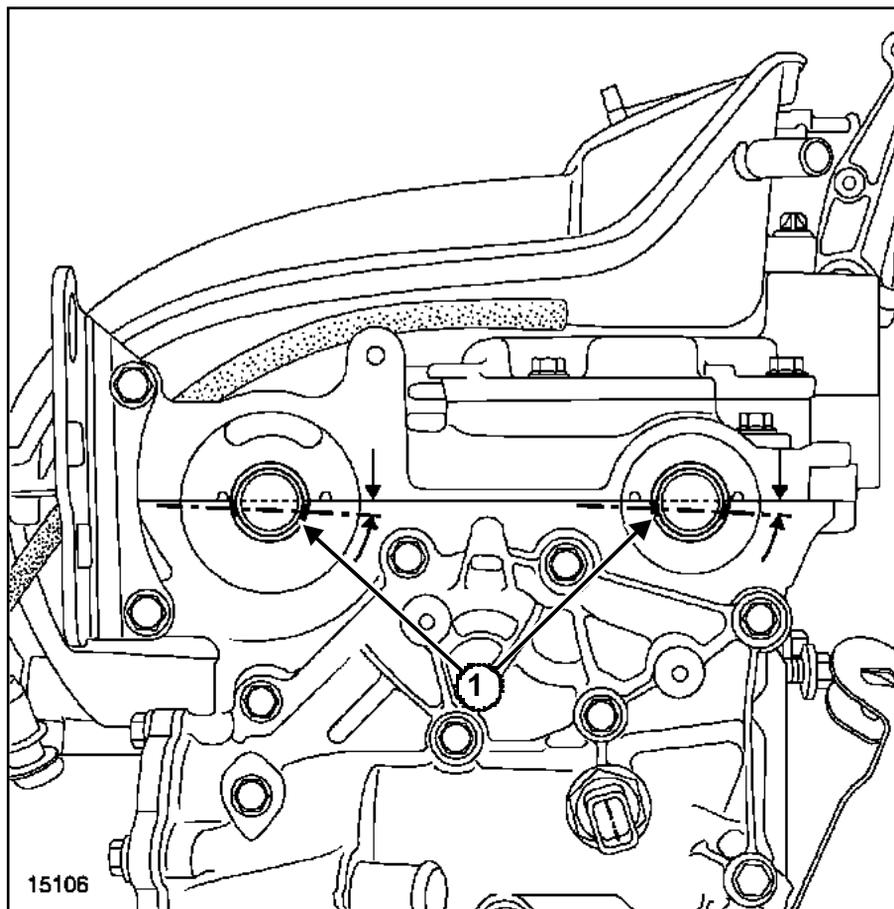
15105

15105

- Make a hole with a screwdriver in the middle of the sealing plugs on the ends of the camshafts.
- Remove the camshaft end sealing plugs.

Timing - cylinder head: Removal

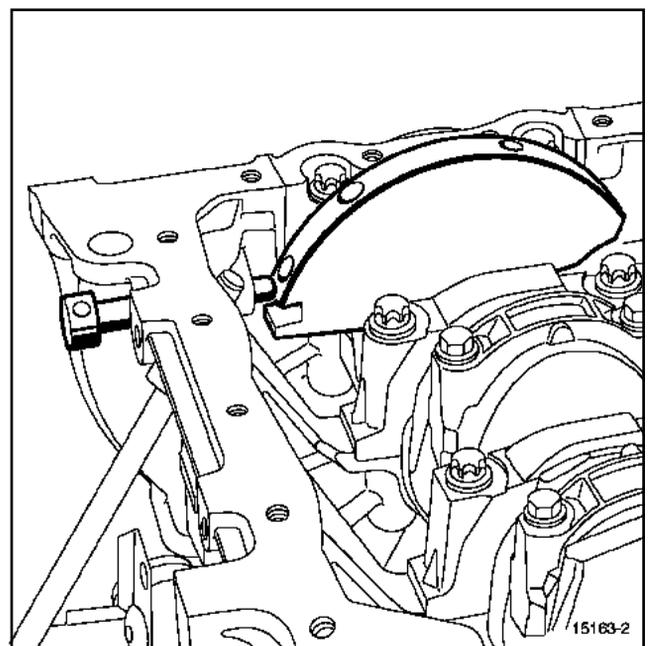
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



15106

15106

- Turn the engine over clockwise (timing end) so that the camshaft grooves are offset below the centreline in an almost horizontal position as shown in the drawing above.



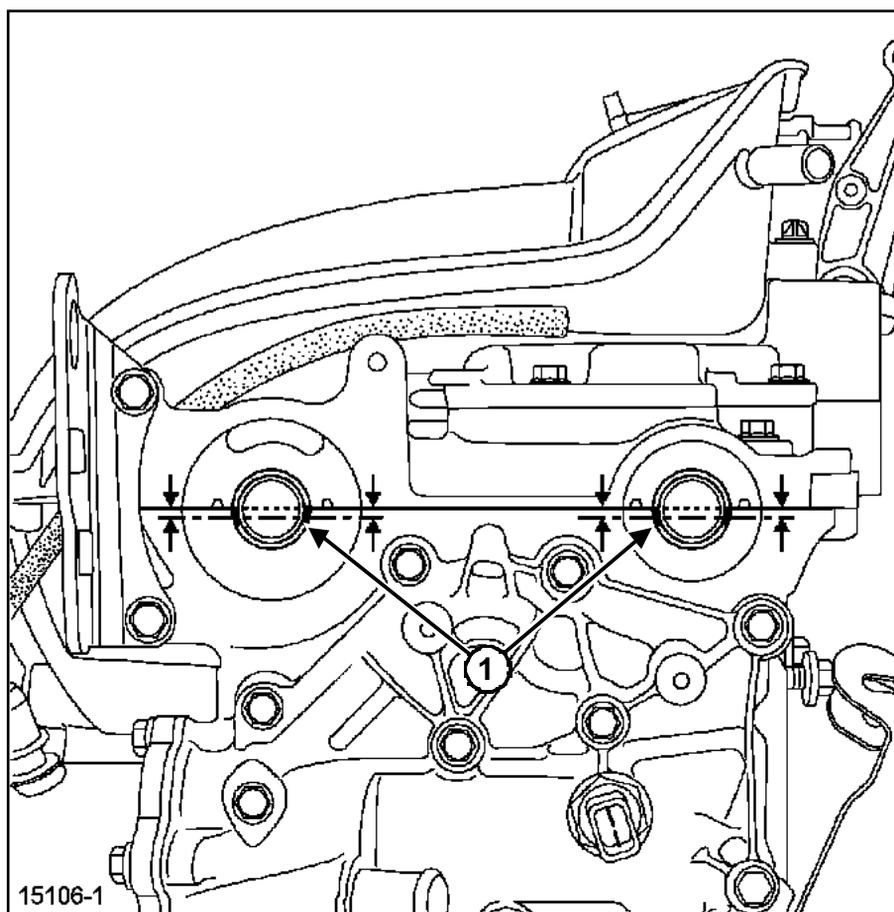
15163-2

15163-2

- Insert the TDC setting pin so that it is located between the balancing hole and the crankshaft timing groove.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



15106-1

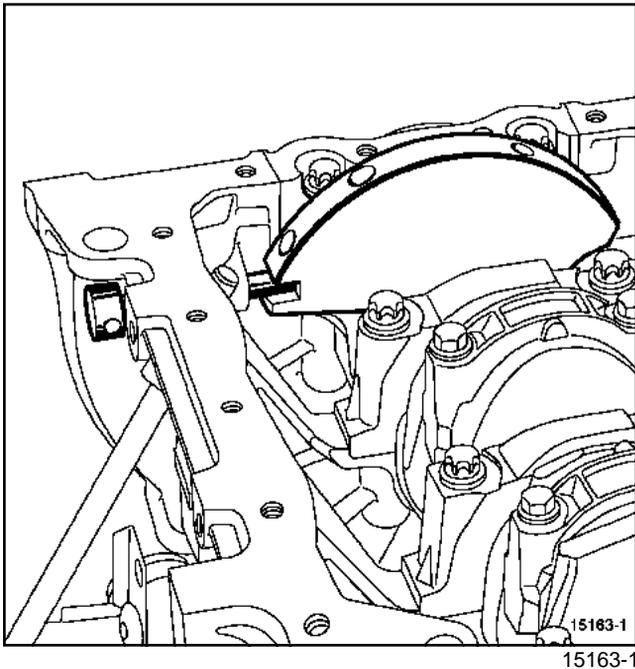
- Rotate the engine slightly in the same direction, inserting the **(Mot. 1054)** pin, until the setting point is reached.

At the setting point the camshaft grooves (1) must be horizontal and offset below the centre-line as illustrated.

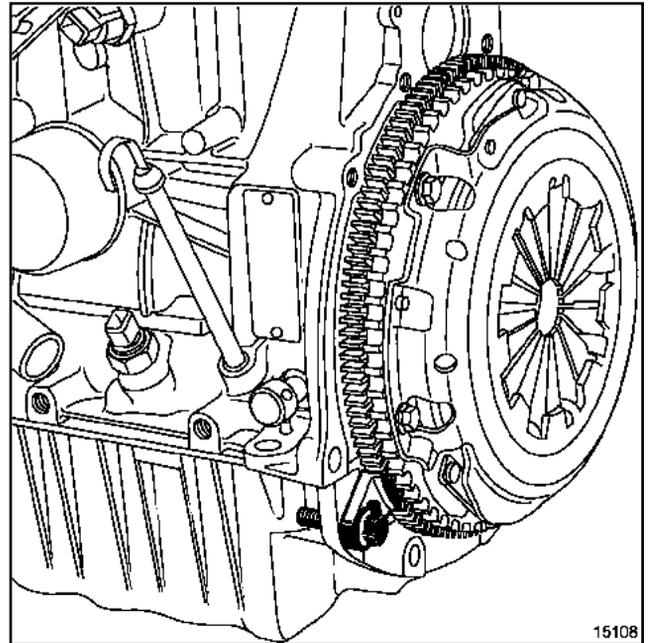
Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

Correct position



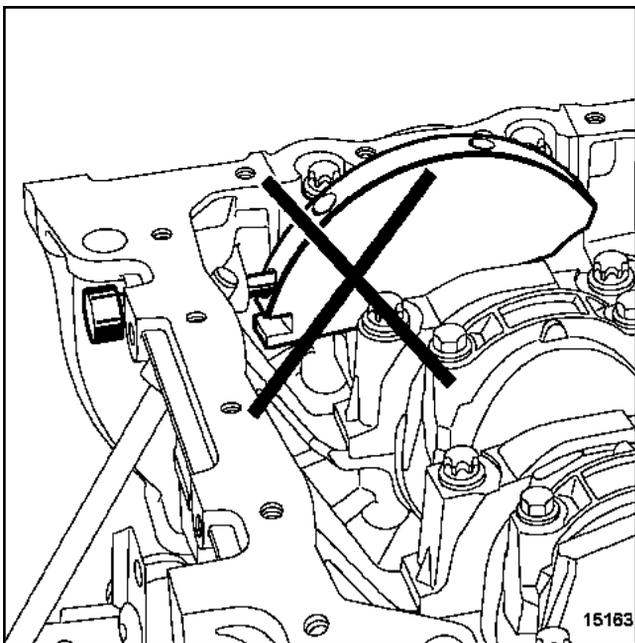
15163-1



15108

15108

Incorrect position



15163

15163

- Lock the engine flywheel with the **(Mot. 1677)** tool.
- Remove the pin **(Mot. 1054)**.

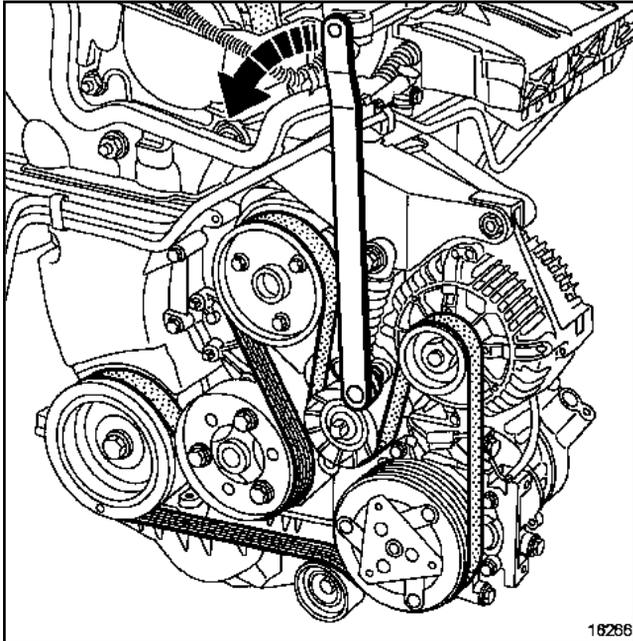
- The pin is in the balancing hole.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

F4R, and 730 or 732 or 736 or 738

With air conditioning



- Turn the tensioner with a **12.7 mm** ratchet square drive in the direction of the arrow.

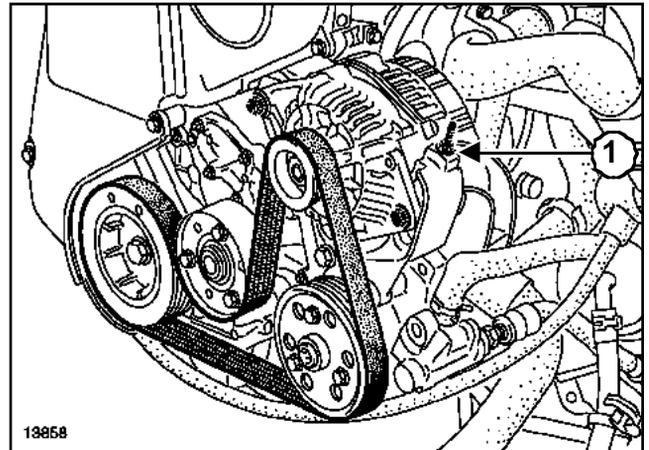
IMPORTANT

- Wear gloves during this operation
- Be aware of the travel of the tool caused by the rotation of the tensioner wheel.

- Remove the accessories belt.
- Remove:
 - the crankshaft accessories pulley mounting bolt,
 - the crankshaft accessories pulley.

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 720 or 730 or 732 or 736 or 736 or 738 or 740 or 740 or 741 or 741 or 744 or 744 or 746 or 746 or 747 or 780

Without air conditioning



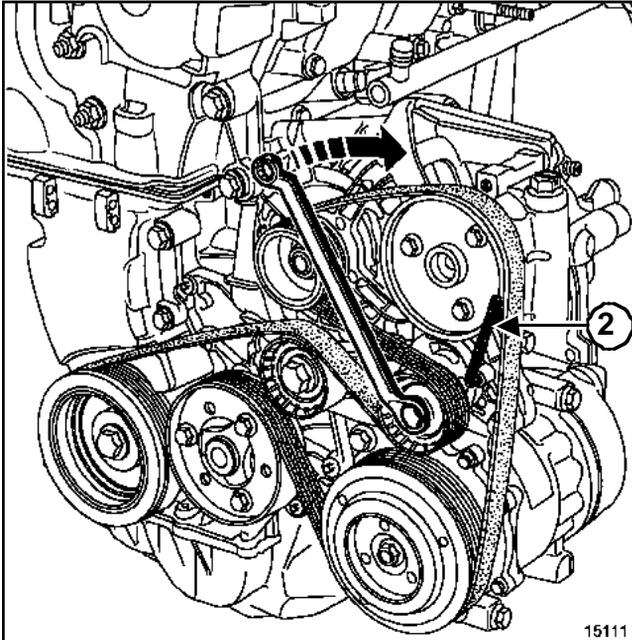
- Loosen:
 - the alternator mounting bolts,
 - the nut (1) until the accessories belt can be removed.
- Remove:
 - the crankshaft accessories pulley mounting bolt,
 - the crankshaft accessories pulley.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

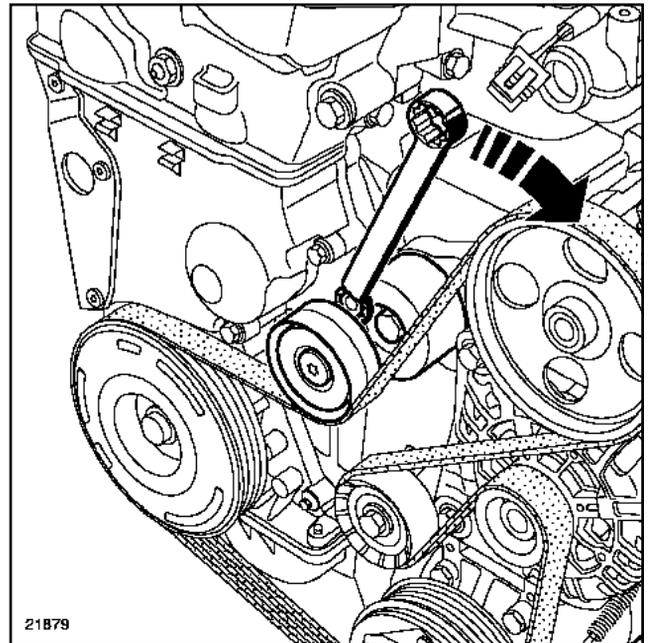
F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 740 or 741 or 744 or 746 or 747 or 780

With air conditioning



- Rotate the tensioner using a key in the direction of the arrow.
- Lock the tensioner with a **6 mm** Allen key (**2**).
- Remove:
 - the accessories belt,
 - the crankshaft accessories pulley mounting bolt,
 - the crankshaft accessories pulley.

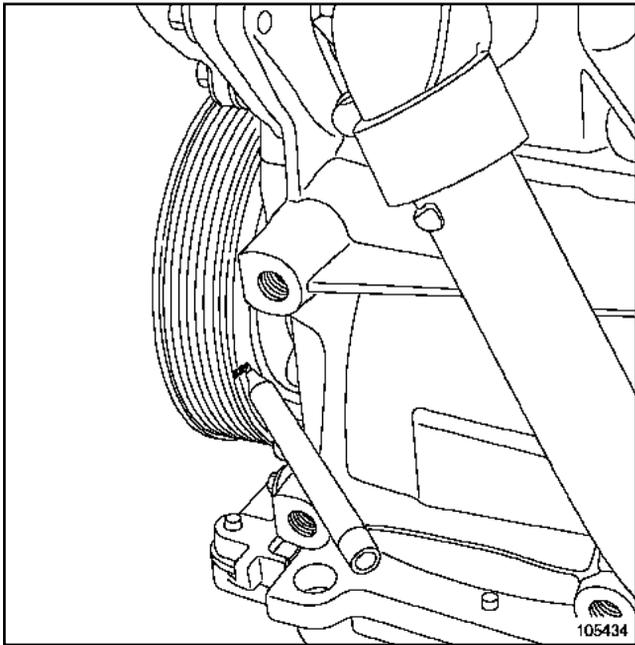
F4P, and 261 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 713 or 714 or 715 or 720 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 797



- Rotate the tensioner using a key in the direction of the arrow.
- Remove the accessories belt.

Timing - cylinder head: Removal

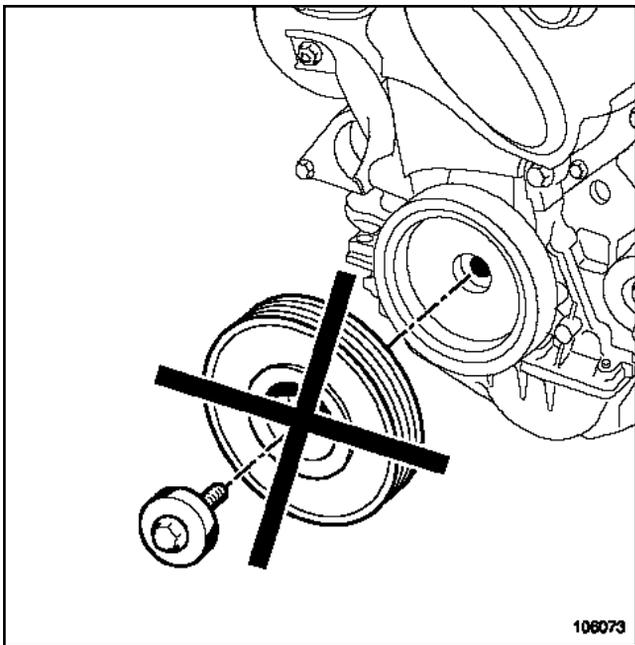
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



105434

Remove:

- the anti-vibration pulley bolt,
- the anti-vibration pulley.



106073

WARNING

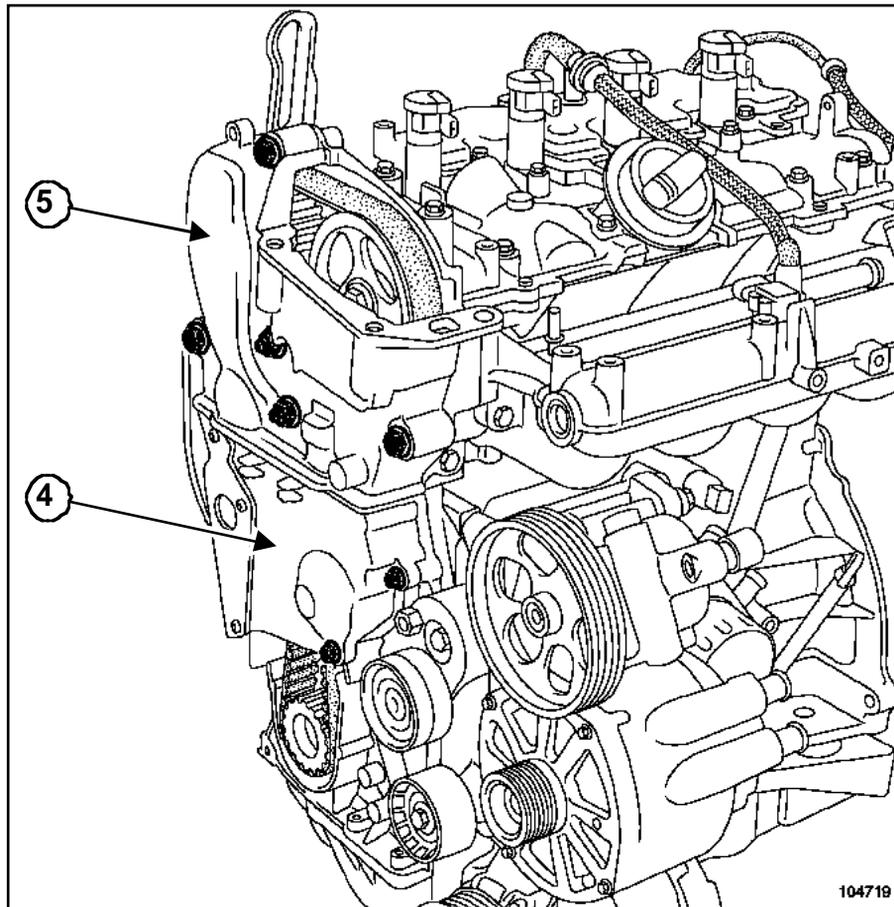
The anti-vibration pulley is composed of two parts and has been balanced to reduce inertia.

It is imperative to make a mark to indicate the correct position before removing the mounting bolt.

It is forbidden to take the anti-vibration pulley apart.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

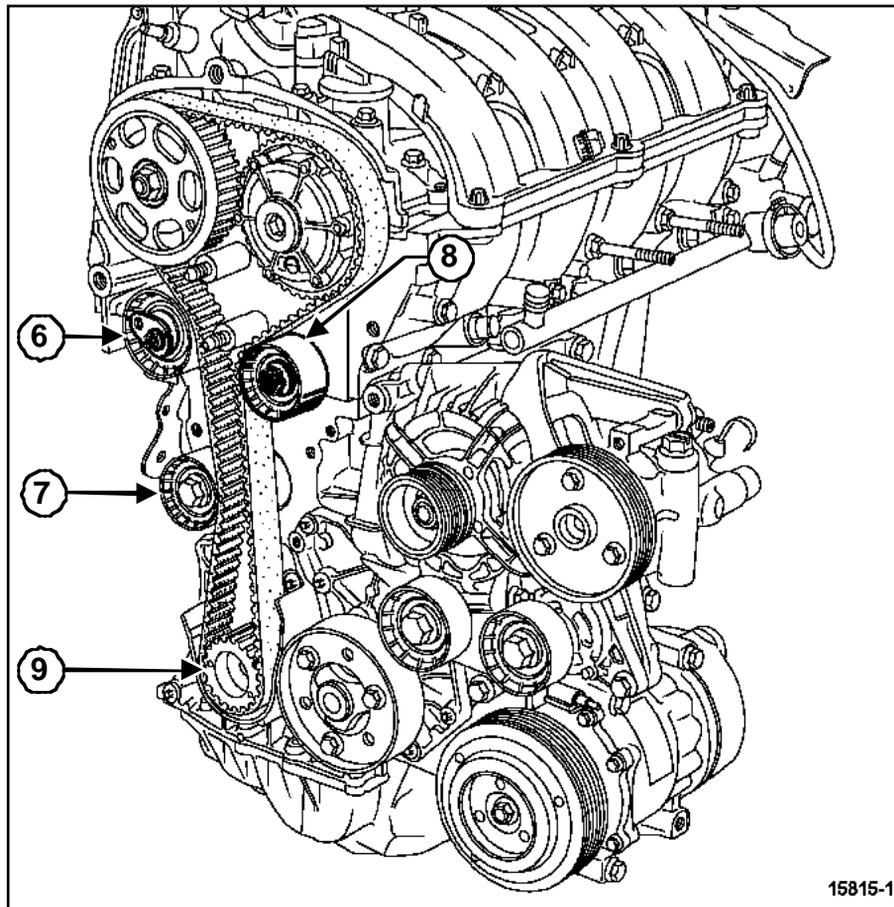


❑ Remove:

- the lower timing cover(4),
- the upper timing cover(5).

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



15815-1

15815-1

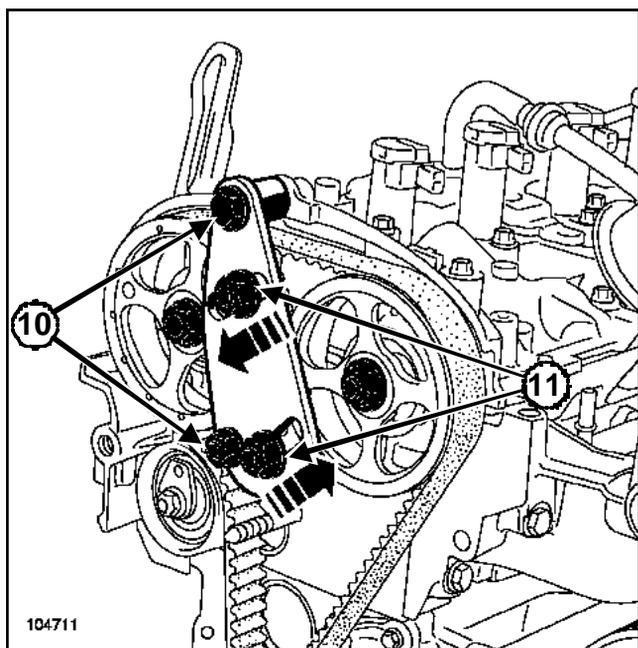
- ❑ Unscrew the tension wheel nut (6).
- ❑ Remove:
 - the idler pulley (7),
 - the tension wheel (6),
 - the pulley (8) (only on engines with a coolant pump driven by the accessories belt),
 - the timing belt taking care not to let the crankshaft timing pinion fall out,
 - the crankshaft sprocket(9).

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

REMOVING THE CYLINDER HEAD

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 797



104711

- Fit tool (**Mot. 1509**).
- Tighten the bolt and the collar nut (**10**).
- Offer up the toothed pinion nuts against the camshaft pulleys.
- Torque tighten the **cog nuts (80 Nm)(11)**.
- Remove the camshaft sprocket nuts,

WARNING

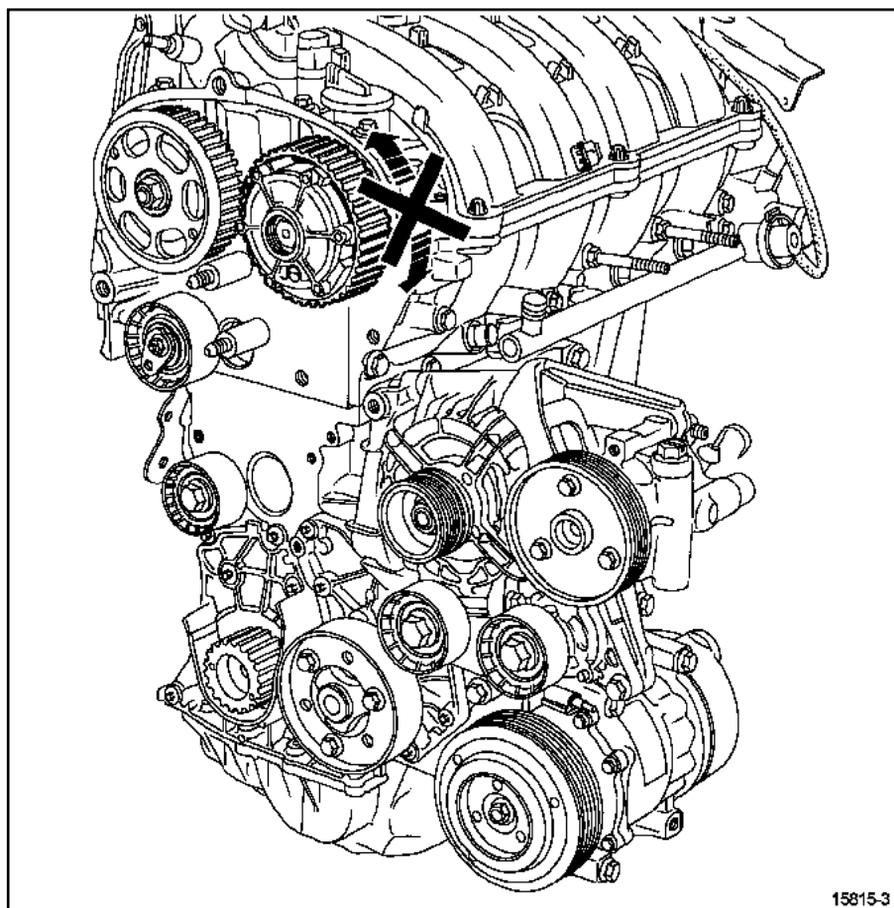
It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

- Remove the camshaft pulleys.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

F4P, and 261 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15815-3

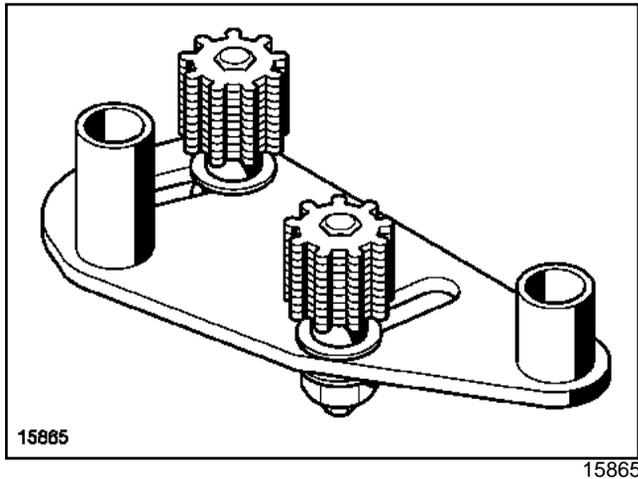
15815-3

- ❑ Check that the inlet camshaft phase angle controller ring is correctly locked (the ring does not rotate to the left or to the right).
- ❑ Loosen the exhaust camshaft sprocket and the inlet camshaft phase angle controller, using the following procedure.
- ❑ This operation requires the use of tool (**Mot. 1509-01**) with tool (**Mot. 1509**).

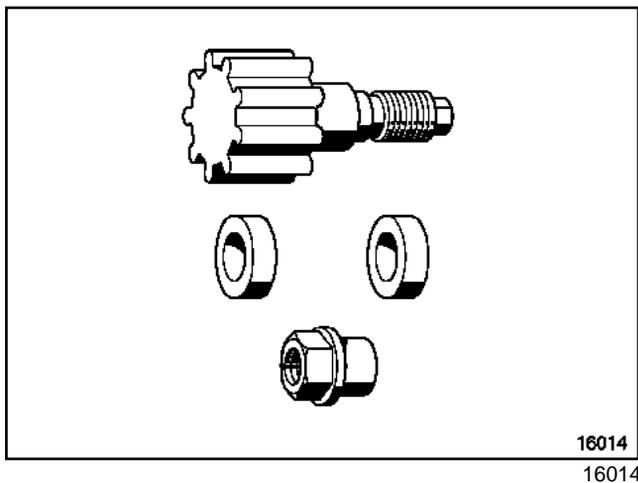
Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

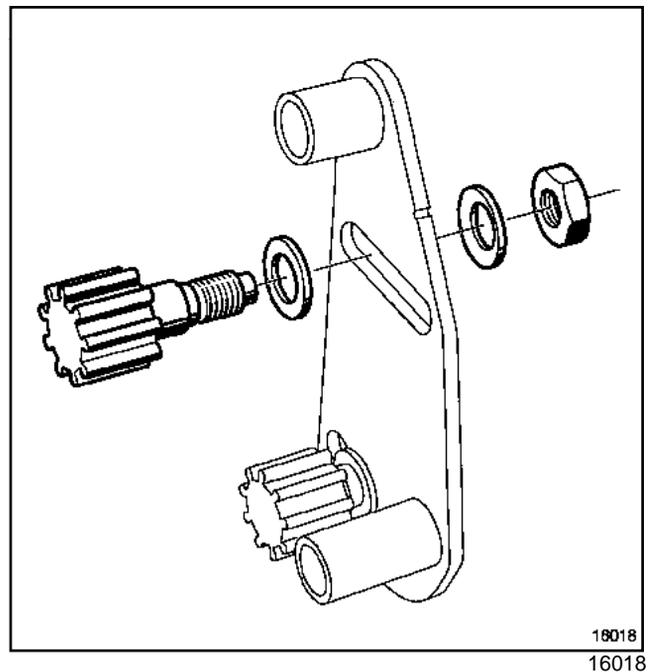
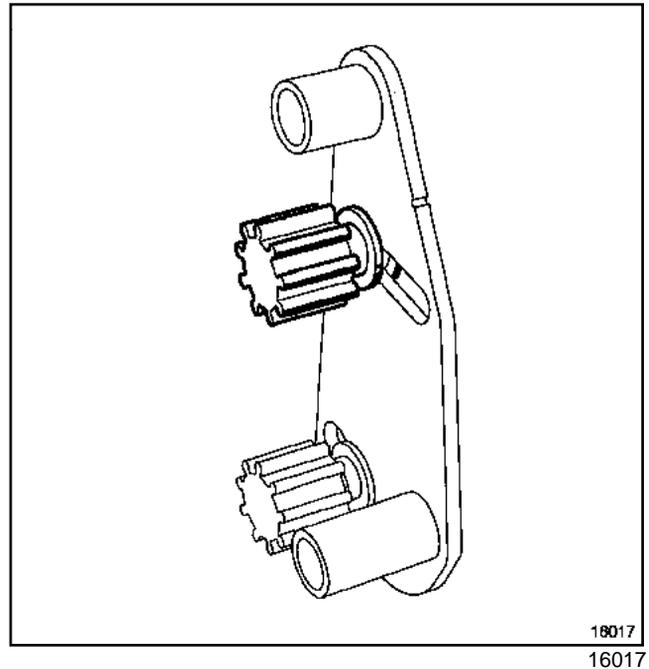
Mot. 1509 tool



Mot. 1509-01 tool



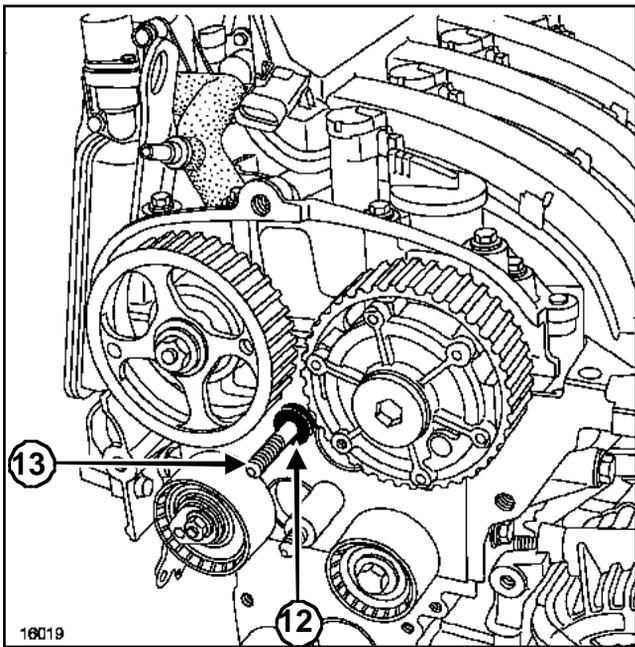
Preparation of Mot. 1509



- Remove the upper cog from the bracket(**Mot. 1509**).
- Fit the cog from tool (**Mot. 1509-01**) in its place, reusing the two washers and the nut from tool (**Mot. 1509**).

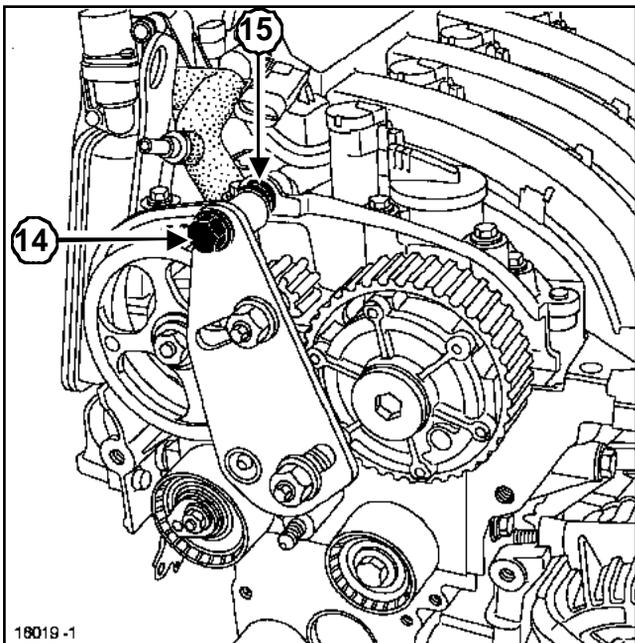
Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



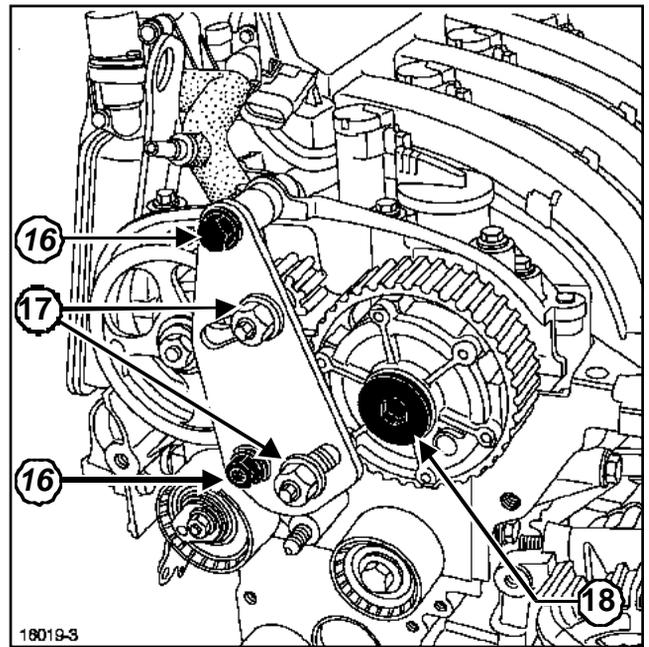
16019

- ❑ Fit the spacer (12) from tool (Mot. 1509-01) on the stud (13).



16019-1

- ❑ Fit the top bolt (14) while positioning the spacer (15) of tool (Mot. 1509-01) between the tool and the cylinder head cover (do not tighten the bolt).



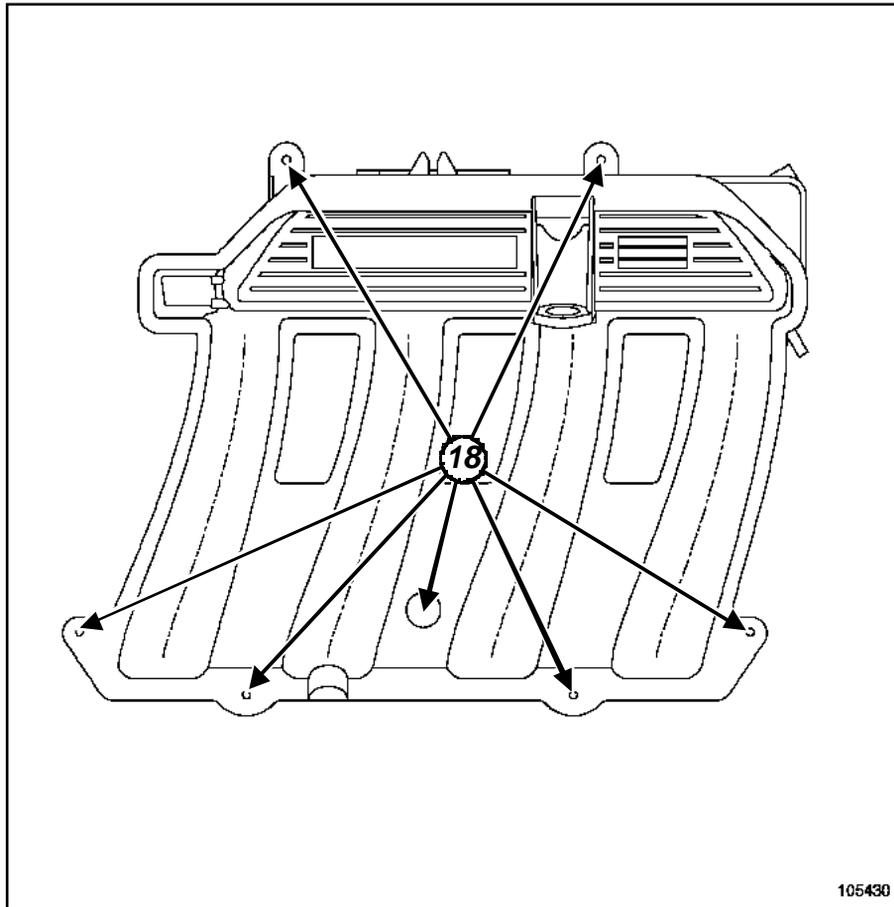
16019-3

- ❑ Tighten the bolt and the collar nut (16).
- ❑ Offer up the toothed pinion nuts against the camshaft pulleys.
- ❑ Torque tighten the cog nuts 80 Nm (17).
- ❑ Remove:
 - the inlet camshaft dephaser blanking cover (18),
 - the inlet camshaft dephaser mounting bolt,
 - the exhaust camshaft sprocket nut,
 - the camshaft sprockets.

Timing - cylinder head: Removal

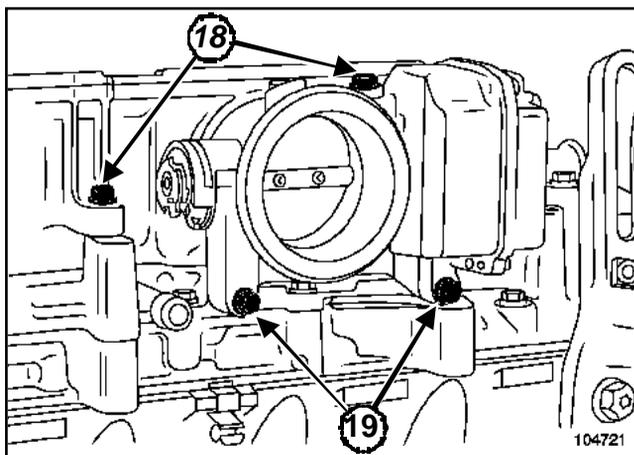
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



105430

105430



104721

104721

- the inlet manifold mounting bolts (18),
- the throttle valve mounting bolts (19).

□ Remove:

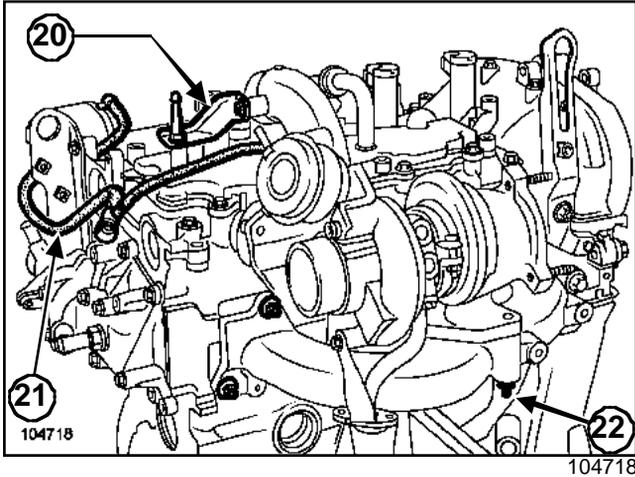
- the two engine lifting rings,

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

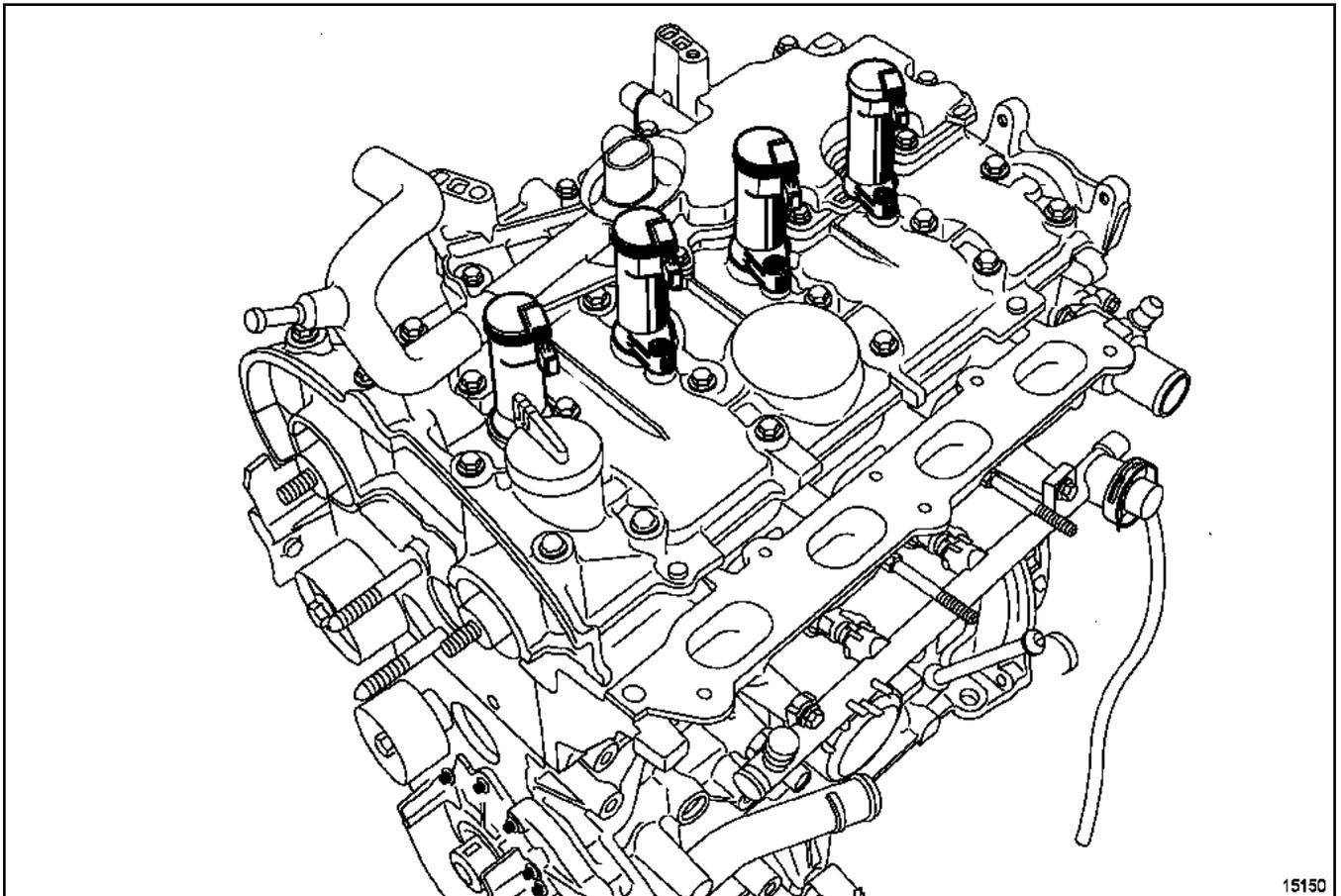
F4R, and 760 or 761 or 762 or 763 or 764 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 797

- the brake servo pipe(21),
- the turbocharger mounting nuts (22),
- the turbocharger.



□ Remove:

- the turbocharger strut (20),



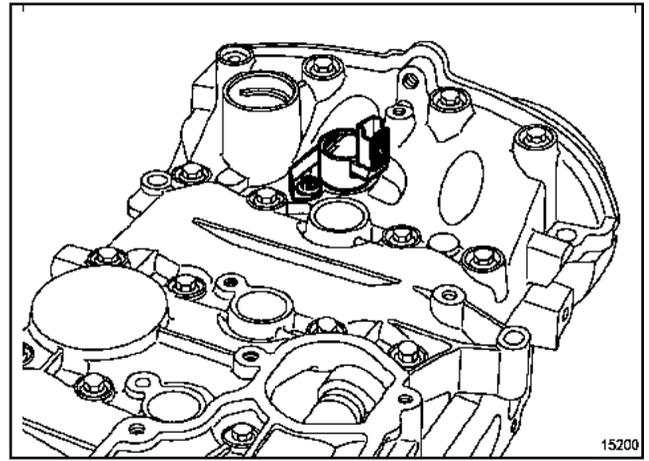
□ Remove:

- the ignition coils,

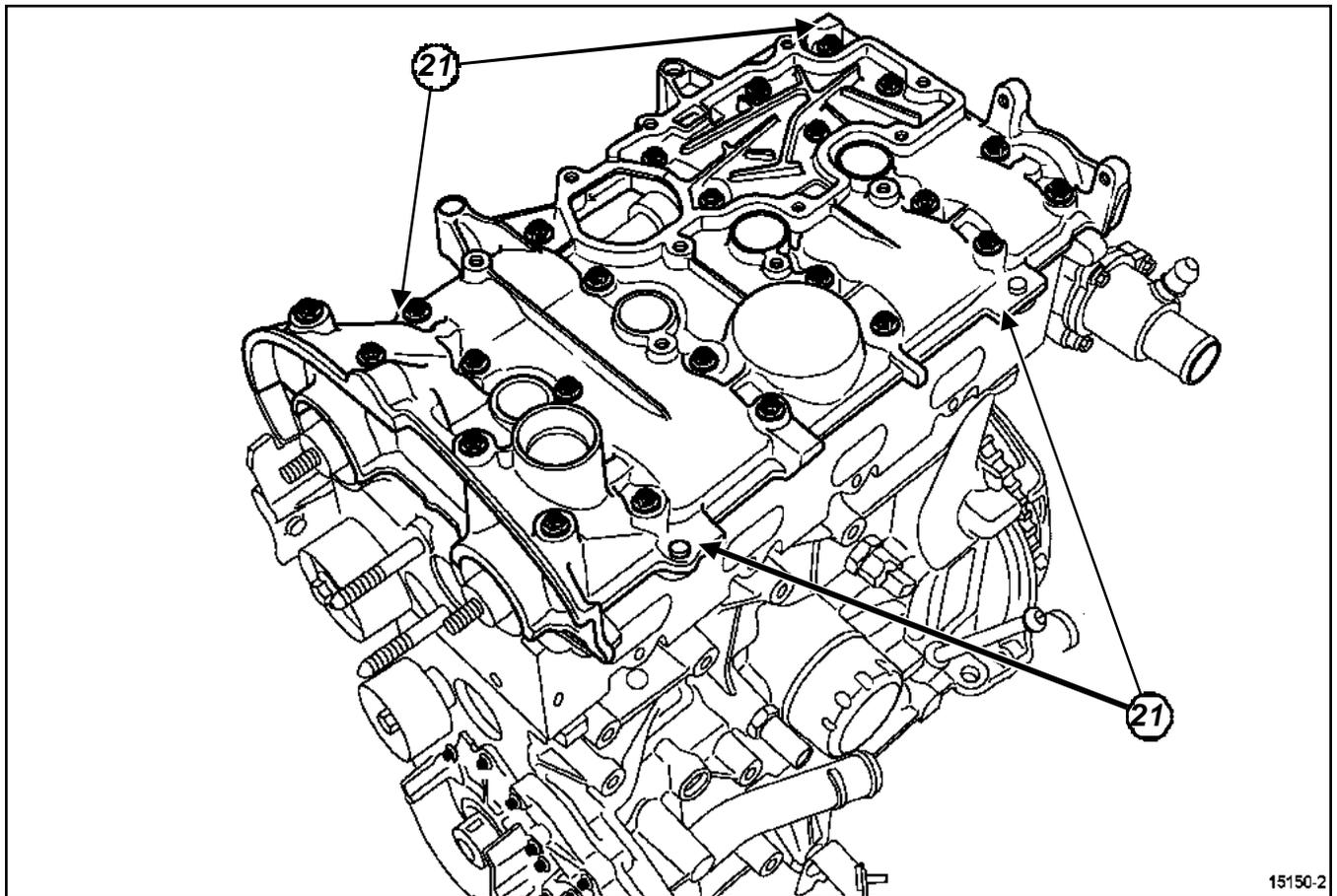
Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

- the oil vapour rebreather pipe,
- the oil separator.



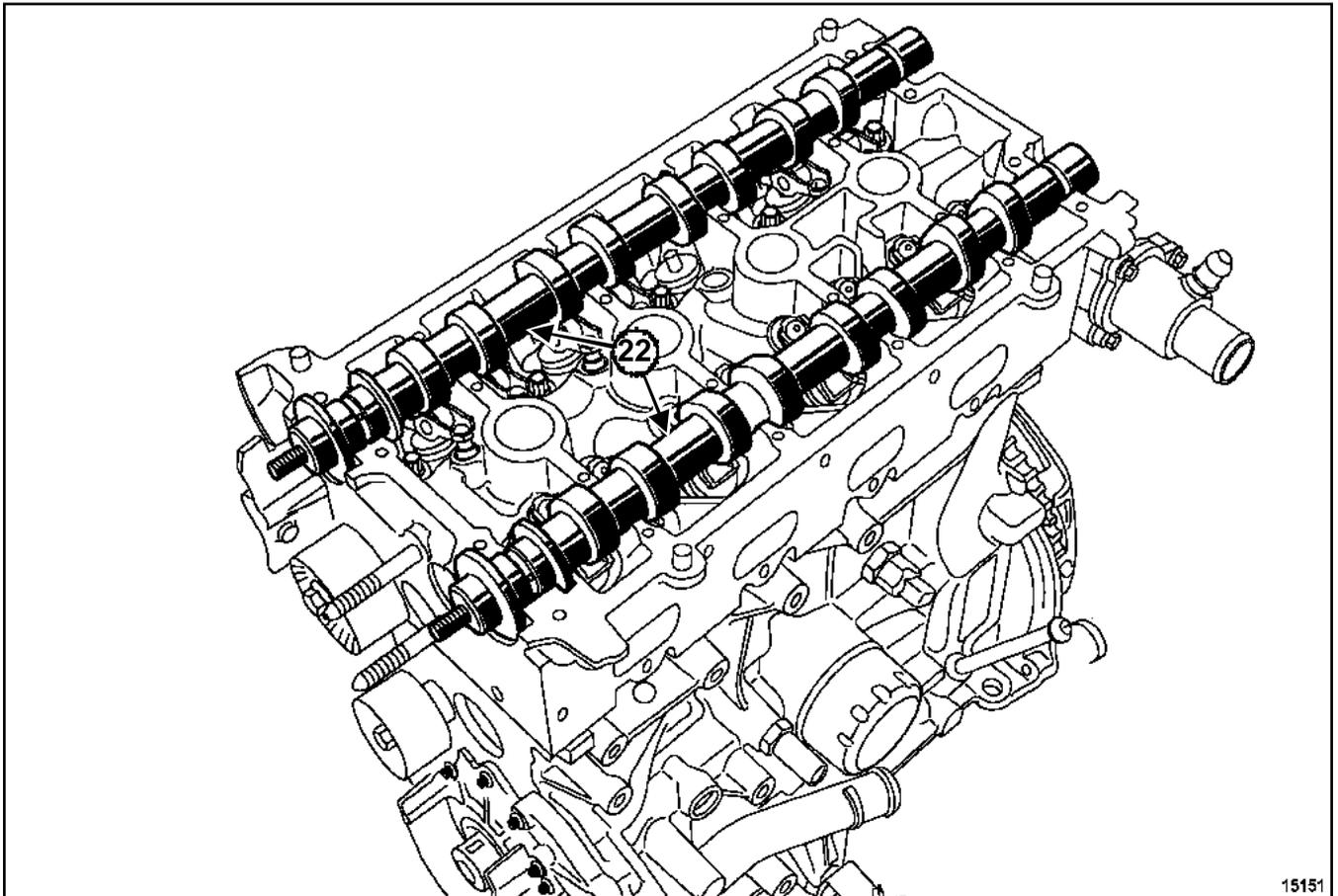
- Remove the dephaser solenoid valve (if fitted).



- Remove the cylinder head cover bolts.
- Detach the cylinder head cover vertically by tapping the lugs (21) with a copper hammer.
- Remove the camshaft seals.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



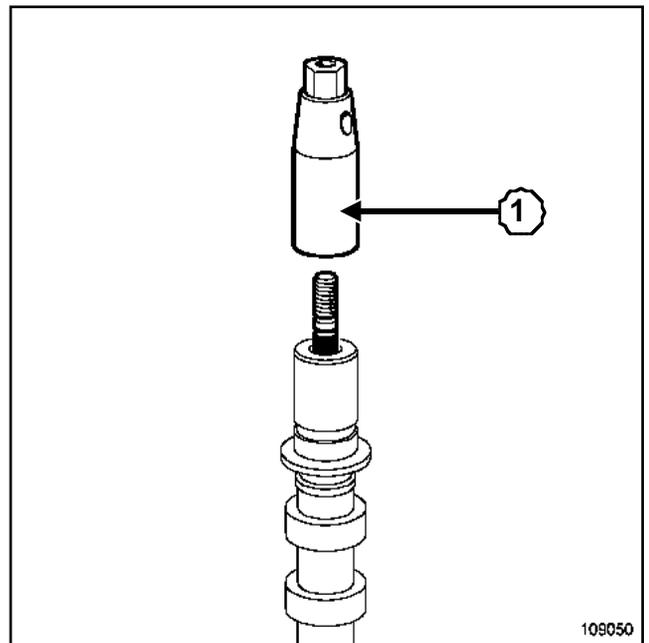
15151

15151

- Mark the inlet and outlet camshafts (if they are not stamped) with an indelible marker at (22) and not on the bearings.

REMOVING THE CAMSHAFT STUDS

- Place the camshaft in a vice fitted with **aluminium jaw plates**.



109050

109050

- Remove the stud using tool **roller-type stud removal tool(1)**.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

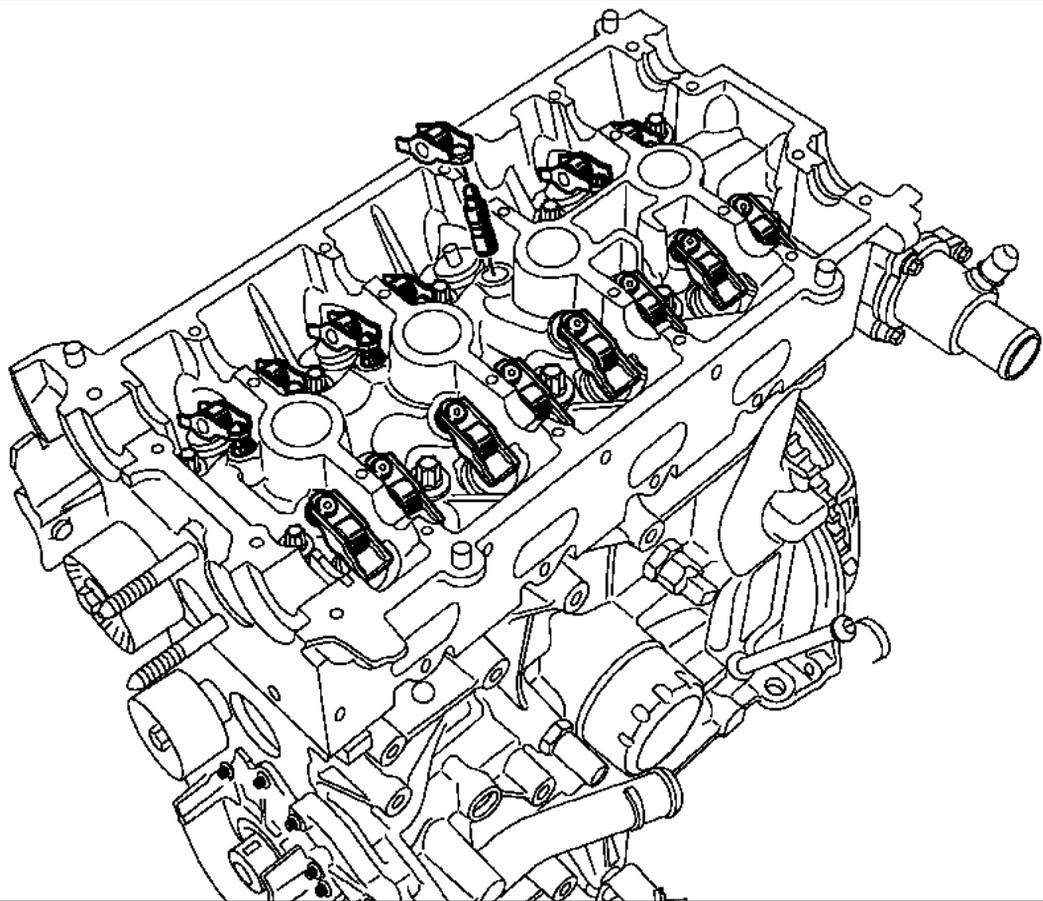
Clean the camshaft thread



WARNING

Clean the threaded hole of the camshaft carefully to prevent foreign bodies from entering the latter.

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



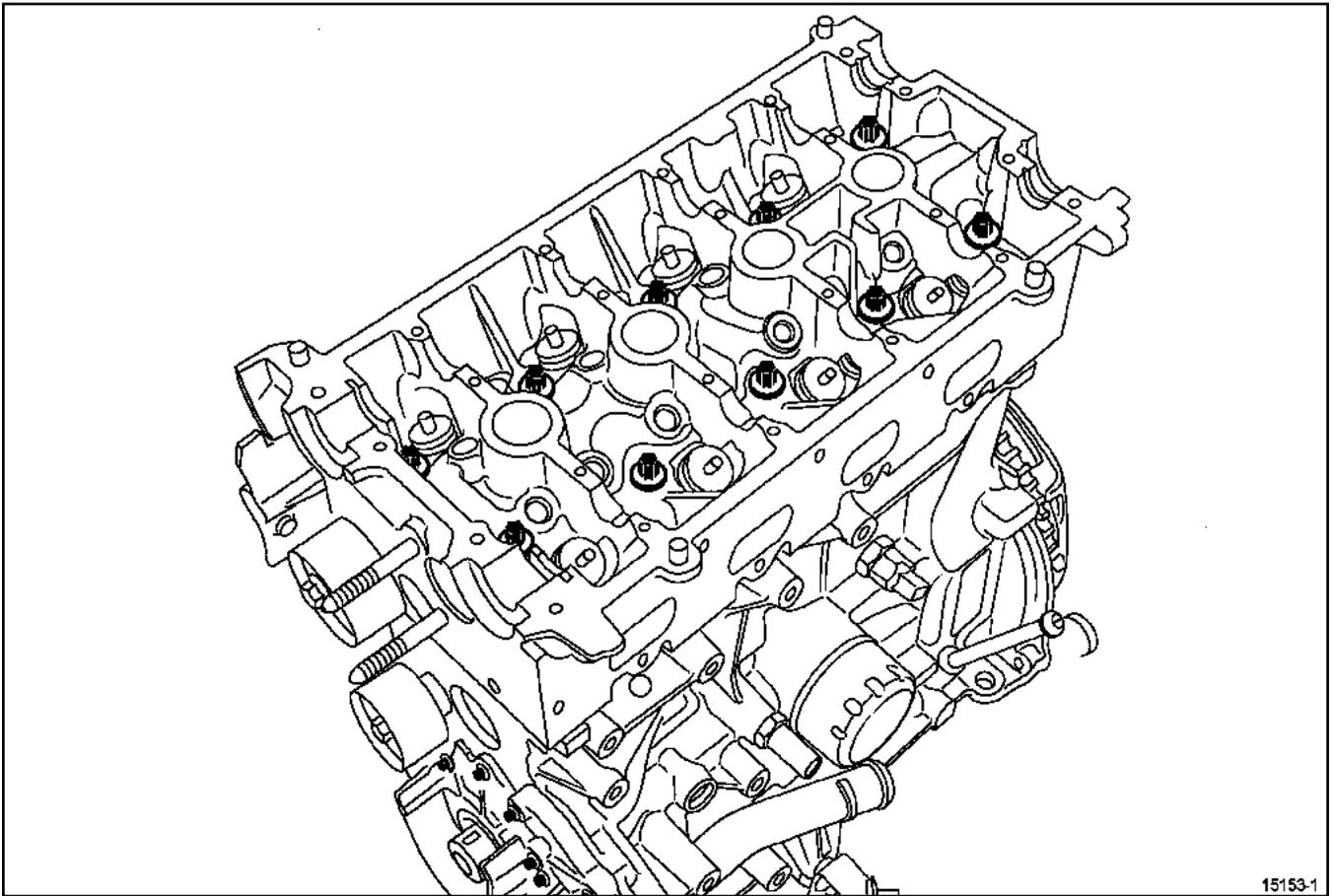
15153

15153

- Remove the valve rockers and the hydraulic tappets.
- Stand the hydraulic tappets up vertically to prevent the oil running out.

Timing - cylinder head: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



15153-1

15153-1

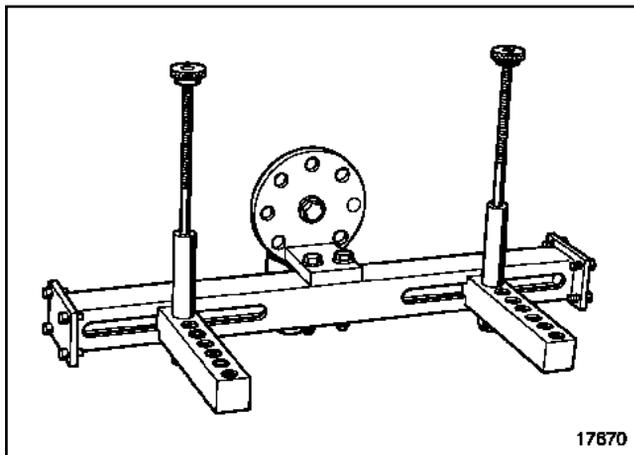
- Remove:
 - the cylinder head bolts,
 - the cylinder head.
- Put the cylinder head on tool (**Mot. 1573**).
- Remove the cylinder head gasket.

Stripping the cylinder head

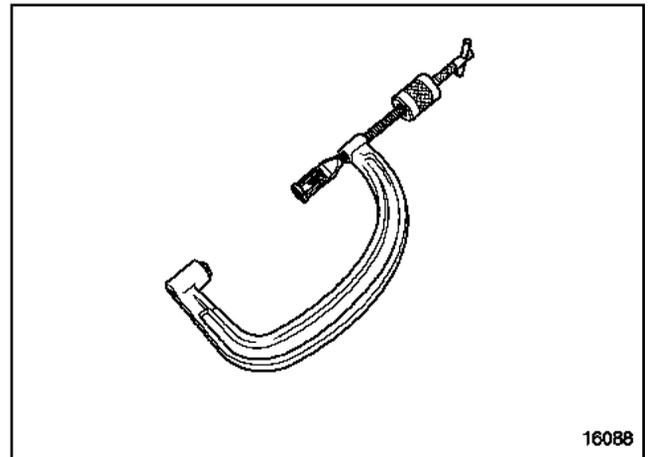
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 1573	Cylinder head support
Mot. 1502	Tool for removing valve stem collets
Mot. 1335	Tool for removing valve stem seals

STRIPPING THE CYLINDER HEAD



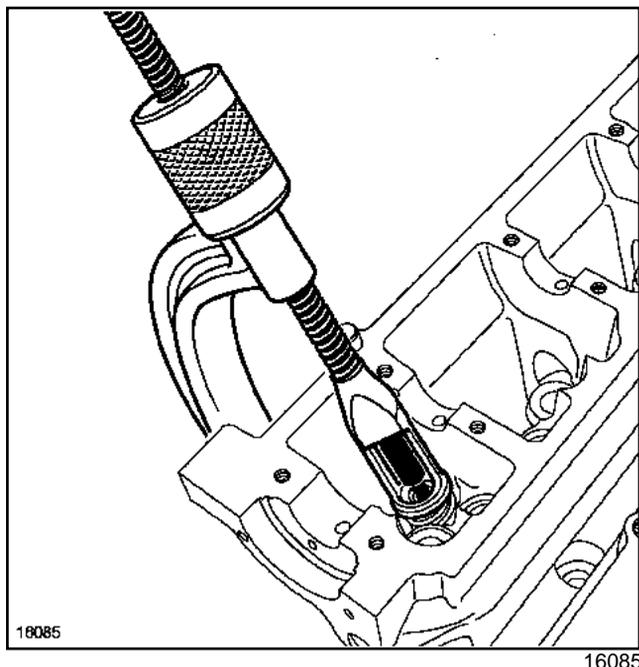
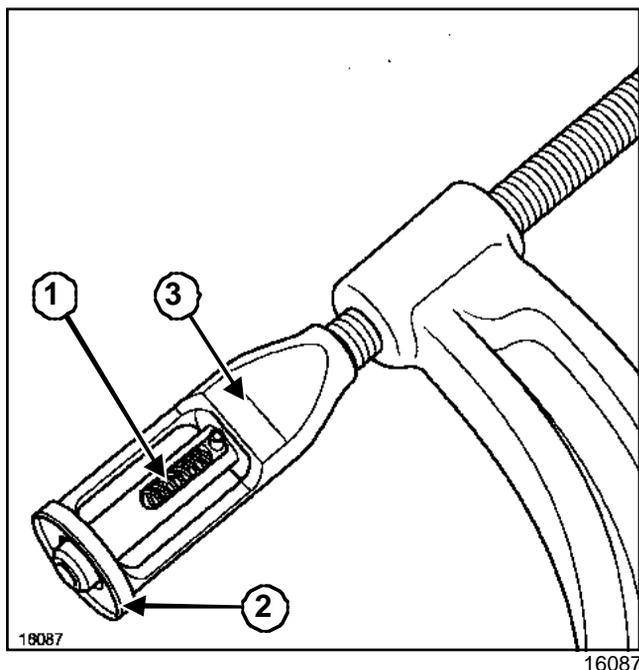
- Fit the cylinder head fitted on tool (**Mot. 1573**).
- Remove:
 - the coolant outlet unit,
 - the injector rail with its four injectors (if necessary),
 - the inlet shim,
 - the exhaust manifold (for turbocharged F4R)



- Compress the valve springs using the correct tool (**Mot. 1502**).

Stripping the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

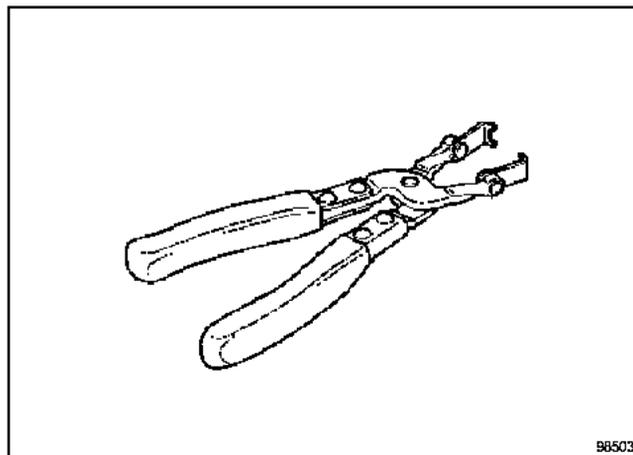


- To compress the valve springs correctly, it is essential that the piston (1) of tool (Mot. 1502) is centered on the valve stem.

The upper cup of the spring should enter the housing (2) of the socket (3) of tool (Mot. 1502).

- Remove:
 - the keys,
 - the upper cups,

- the springs,
- the valves.



- Remove the valve stem seals using tool (Mot. 1335).
- Remove the plugs.

Upper engine: Cleaning

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

CLEANING THE CYLINDER HEAD

**IMPORTANT**

- Do not scratch the aluminium sealing surfaces
- Wear goggles.
- Wear gloves during this operation
- Clean the sealing surfaces with DECAPJOINT compound to dissolve off any parts of the seal that are still attached.
- 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 on to the paintwork.
- Clean the cylinder head carefully to prevent foreign bodies from entering the oilways.
- Failure to follow this advice could lead to blocking of the various oil channels, resulting in rapid destruction of the engine.

**Note:**

If the hydraulic tappets are to be reused, do not empty them or clean them.

**WARNING**

When cleaning the parts, they must not be knocked against each other so as not to damage their mating faces and therefore their fit, which will damage the engine.

Upper engine: Checking

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

Mot. 588

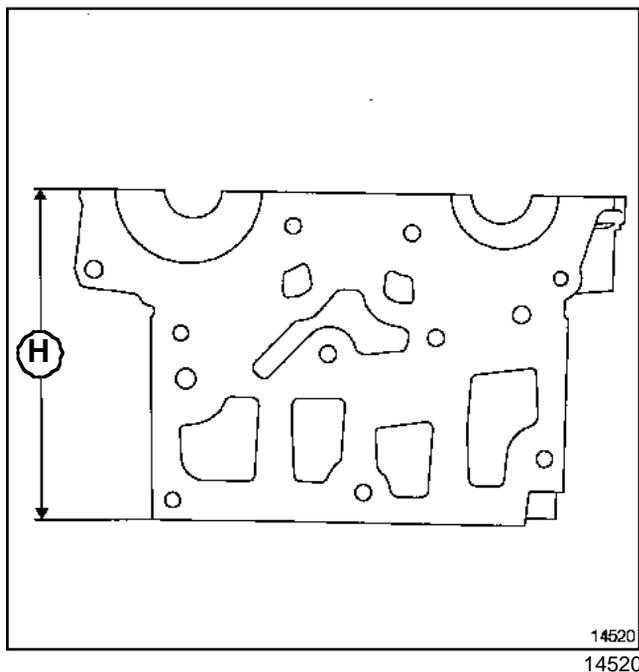
Liner retaining strap

Equipment required

cylinder head testing tool

CYLINDER HEAD CHECKS

I - CHECK HEIGHT OF CYLINDER HEAD



14520
14520

- (H): cylinder head height.

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 780 or 790 or 792

- The height (**H**) of the cylinder head measures: **138.15 mm**

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

- The height (**H**) of the cylinder head measures: **138.4 mm**

II - CHECKING THE CYLINDER HEAD GASKET FACE

- Use a cylinder head adjuster and set of shims to check the seal face bow.

Maximum distortion: **0.05 mm**

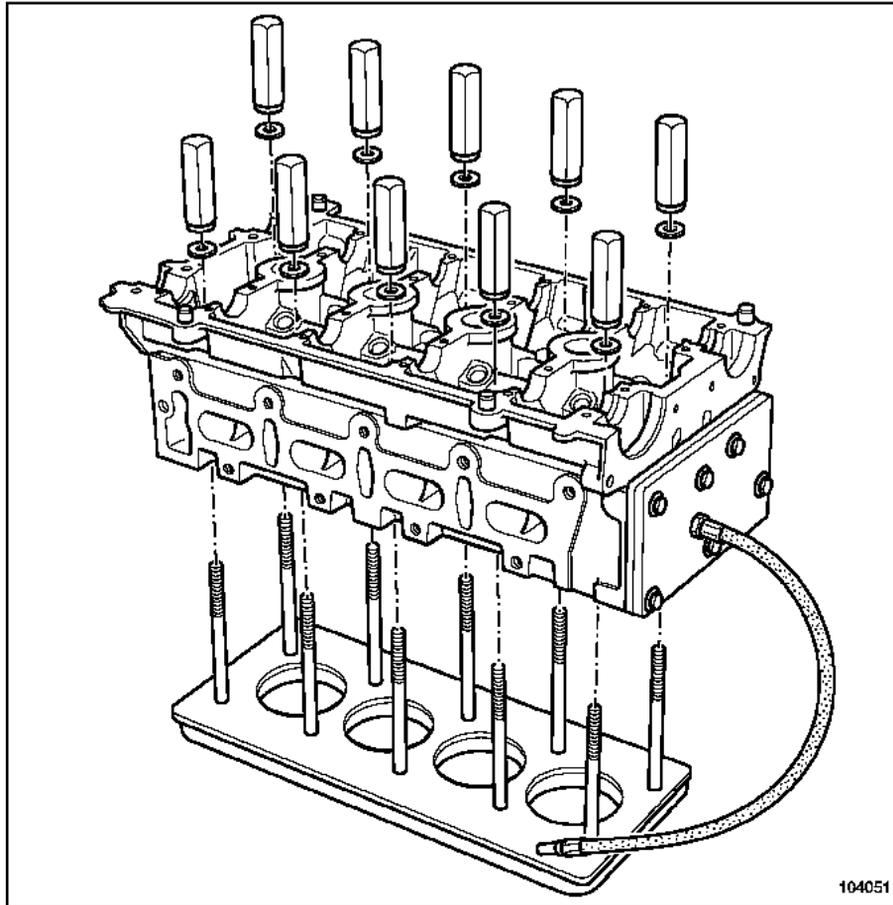
WARNING

No grinding is allowed.

Upper engine: Checking

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

III - CHECKING THE CYLINDER HEAD SEAL



104051

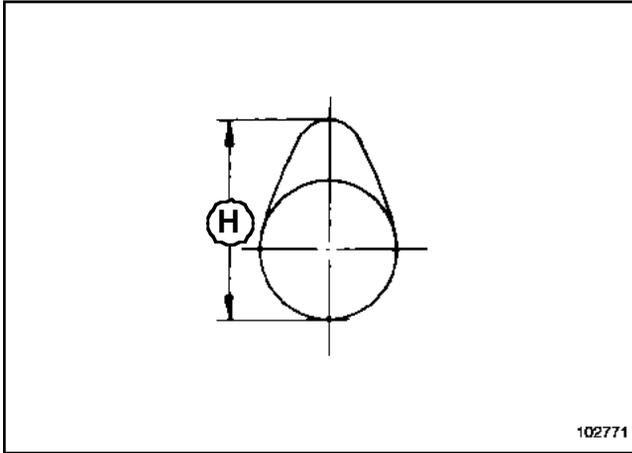
104051

- Test the cylinder head for any cracks using the **cylinder head testing tool** (see garage equipment catalogue).
- See **NT 2781E** for how to use the heating tank.

Upper engine: Checking

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

IV - CAM HEIGHT CHECKS



102771
102771

F4P 722,760:

- Intake: **40.616 ± 0.03 mm**
- Exhaust: **40.437 ± 0.03 mm**

F4P 720 - F4R 720 :

- Intake: **40.616 ± 0.03 mm**
- Exhaust: **39.589 ± 0.03 mm**

F4P 261,770,771,772,774,775:

- Intake **40.282 ± 0.03 mm**
- Exhaust: **39.474 ± 0.03 mm**

F4R 700,701,740,741,744,746,747,780:

- Intake: **41.024 ± 0.03 mm**
- Exhaust: **41.027 ± 0.03 mm**

F4R 712,713,714,715,790,792:

- Intake: **41.024 ± 0.03 mm**
- Exhaust: **40.171 ± 0.03 mm**

F4R 730,732,736,738:

- Intake: **41.024 ± 0.03 mm**
- Exhaust: **41.019 ± 0.03 mm**

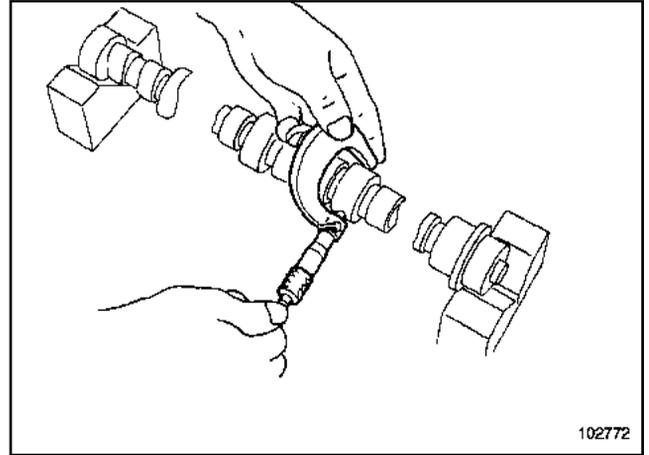
F4R 770,771:

- Intake: **41.024 ± 0.03 mm**
- Exhaust: **39.589 ± 0.03 mm**

F4R Turbo 760,761,762,763,764,765,766,767,774,776,786,787,794,795,796,797:

- Intake: **40.677 ± 0.03 mm**
- Exhaust: **40.637 ± 0.03 mm**

V - CHECK THE CAMSHAFT BEARING DIAMETERS

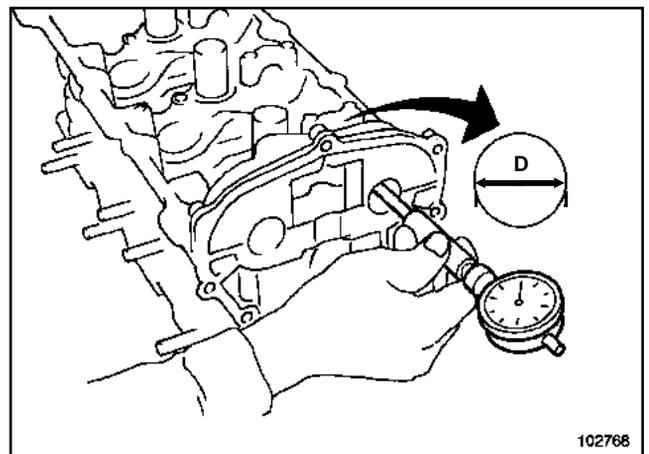


102772
102772

Measure the diameter of each camshaft bearing.

Camshaft bearing diameters:

- bearing n°1 : **25⁰_{-0.03} mm**,
- bearings n°2, 3, 4, 5 and 6: **25⁰_{-0.021} mm**,
- bearing n°6: **28⁰_{-0.021} mm**.



102768
102768

Measure the inner diameter of each camshaft bearing on the cylinder head.

Camshaft bearing inner diameter:

- bearings n°1, 2, 3, 4 and 5: **25^{+0.061}_{+0.04} mm**,
- bearing n°6: **28^{+0.061}_{+0.04} mm**.

Upper engine: Checking

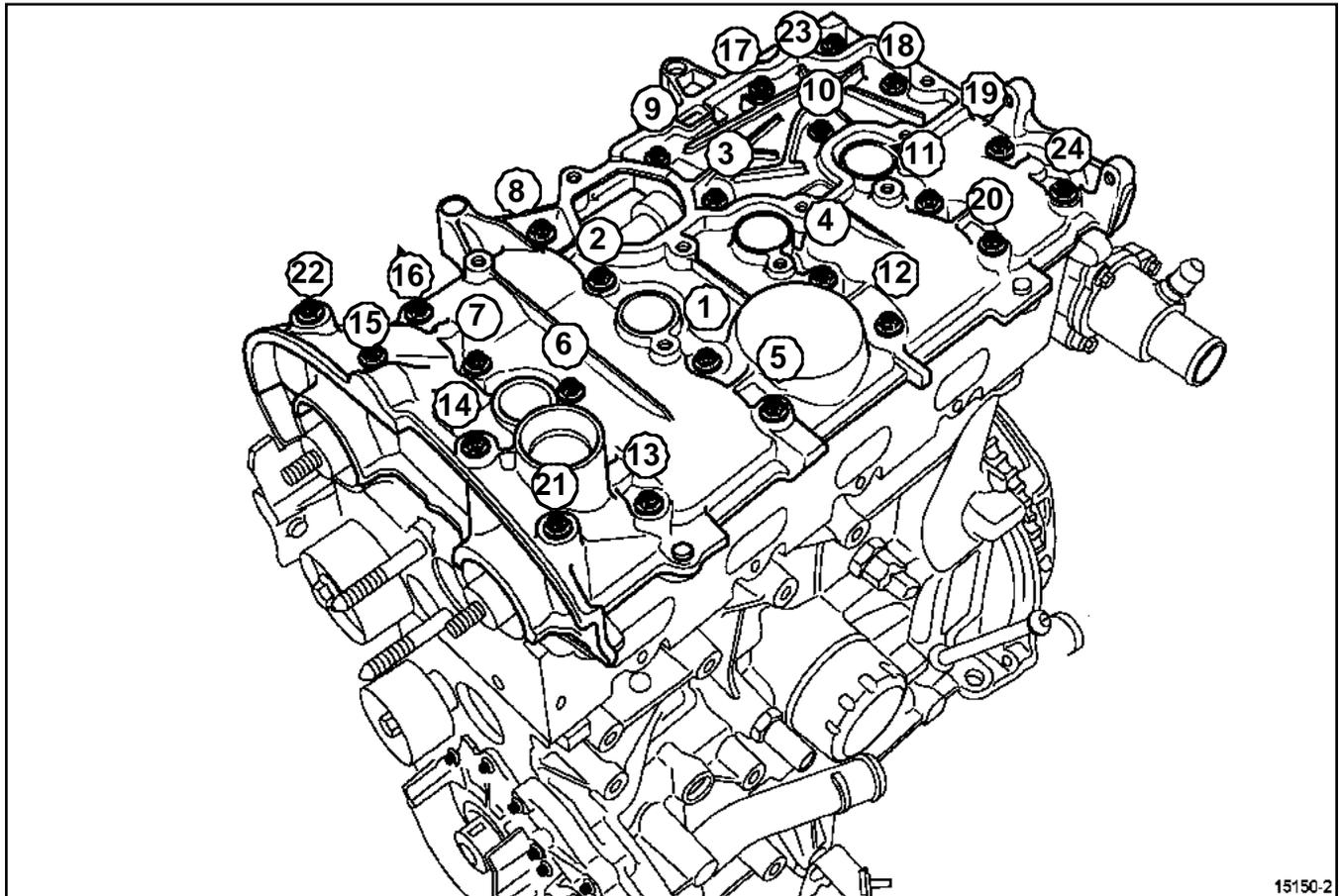
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

VI - CHECKING CAMSHAFT END PLAY

Refit:

- the camshafts, positioning them correctly (see **10 A, engine and peripherals, engine peripherals: specifications** for camshaft identification)

- the cylinder head cover, following the tightening procedure.



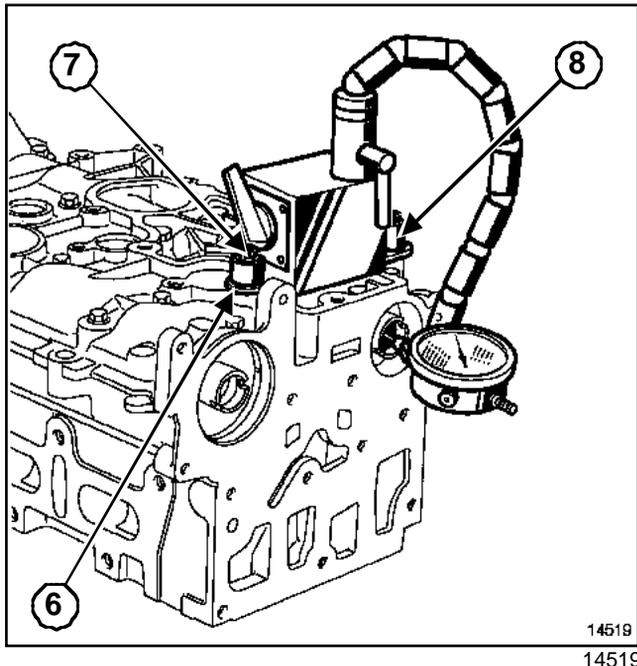
15150-2

15150-2

- Operation N°1: Torque tighten bolts **22-23-20-138 Nm**
- Operation N°2: torque tighten bolts **1 to 12 then 14 to 19 and 21-24** 12 Nm
- Operation N°3: torque tighten bolts **22-23-20-13** 12 Nm

Upper engine: Checking

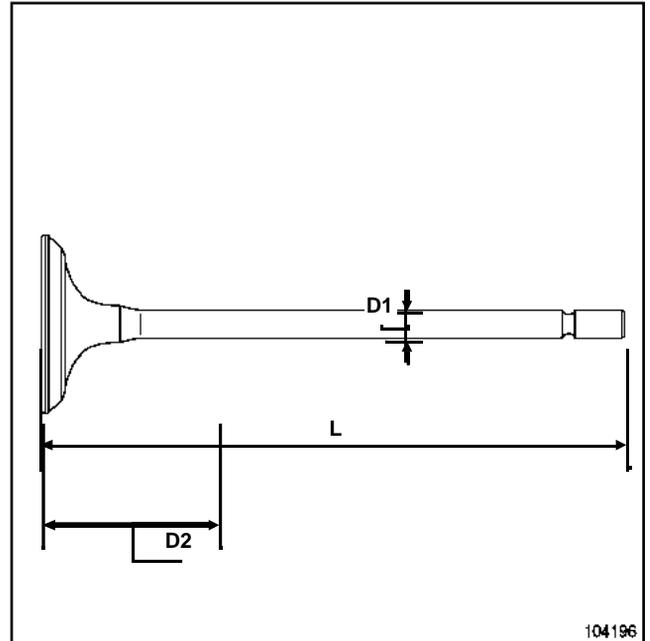
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



14519
14519

- ❑ Attach the magnetic stand on the cylinder head cover using tool (Mot. 588)(6) with two oil separator bolts (7) and two spacers (8) with the following dimensions:
 - external diameter **18 mm**,
 - internal diameter **9 mm**,
 - height **15 mm**.
- ❑ Check the end play, which must be between **0.08 and 0.178 mm**.
- ❑ Remove:
 - the rocker cover,
 - the camshafts.

VII - CHECKING THE VALVES



104196
104196

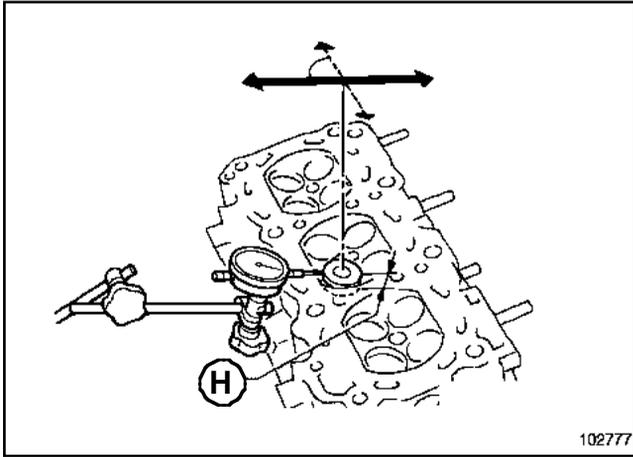
- ❑ Diameter of valve stem **D1** is:
 - Intake: **5.471 ± 0.009 mm**,
 - Exhaust: **5.447 ± 0.009 mm**.
- ❑ Diameter of valve head **D2** is:
 - Inlet: **33.5 ± 0.12 mm**,
 - Exhaust: **29 ± 0.12 mm**.
- ❑ Valve length **L** is:
 - Intake: **110.08 ± 0.15 mm**,
 - Exhaust: **106.87 ± 0.15 mm**.
- ❑ The face angle is:
 - Inlet: **90°**,
 - Exhaust: **90°**.

VIII - CHECKING THE CLEARANCE BETWEEN THE VALVE AND THE GUIDE

- ❑ The clearance between the valve and the guide can be checked in two different ways.

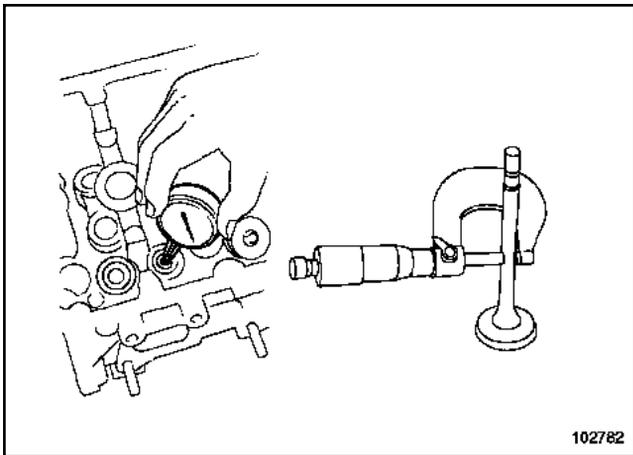
Upper engine: Checking

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



102777
102777

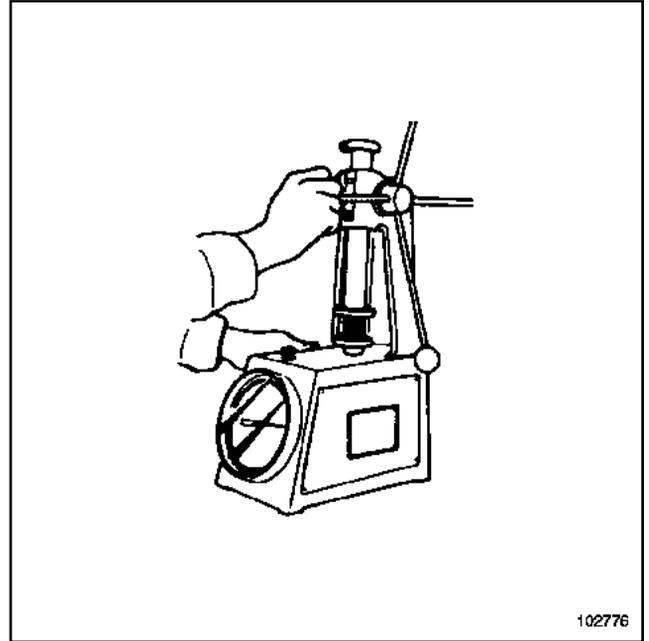
- ❑ Make the valve head protrude by (H)25 mm, then, using a dial gauge, measure in the direction of the arrows, keeping the angle at 90° in relation to the camshaft axis. The clearance between the valve and the guide is equal to half the measured value.



102782
102782

- ❑ Or by measuring the diameter of the valve stem and the internal diameter of the valve guide.
- ❑ Clearance between the valve and the guide is:
 - Intake: **0.020 to 0.056 mm**,
 - Exhaust: **0.044 to 0.080 mm**,

IX - CHECKING THE VALVE SPRINGS



102776
102776

- ❑ Checking the calibration of the springs.
- ❑ Length under load:
 - F4P, F4R engines (except F4R 730,732,736,738)
 - 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**,
 - F4R 730,732,736,738 engines
 - 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**,
- ❑ Free length:
 - F4P, F4R engines (except F4R 730,732,736 and 738): **41.3 mm**,
 - F4R 730,732,736 and 738 engines: **43.57 mm**.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1511	Tool for fitting valve stem seals
Mot. 1502	Tool for removing valve stem collets

Equipment required

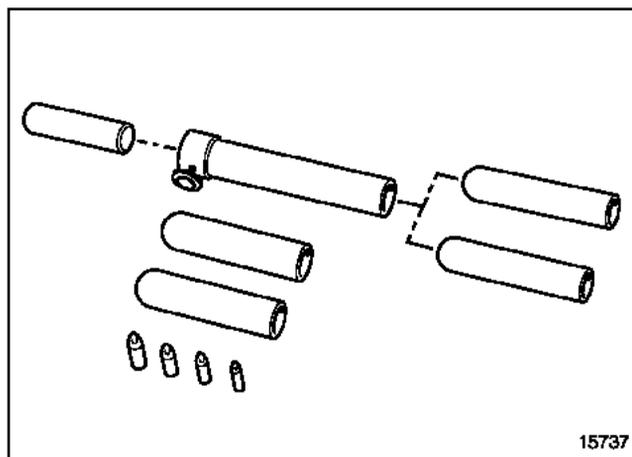
kit for fitting valve stem seals

Tightening torques

coolant outlet unit bolts	13 Nm
degassing bolt	10 Nm
coolant temperature sensor	33 Nm
inlet manifold gasket bolts	21 Nm
F4R Turbo inlet gasket bolts	21 Nm
F4R Turbo exhaust manifold nuts	20 Nm
injection rail bolts	9 Nm
injection rail protector nuts	25 Nm

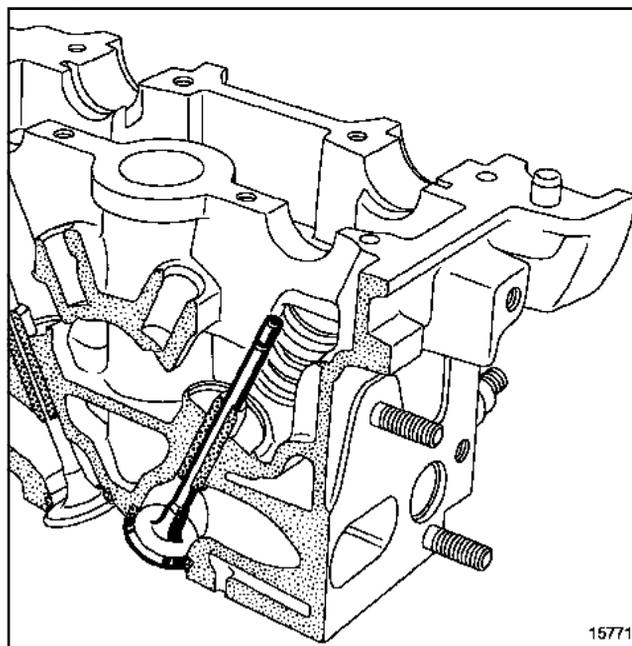
REASSEMBLING THE CYLINDER HEAD

- Lubricate the inside of the valve guide.



- It is essential to fit the valve stem seals using tool (Mot. 1511) or using the kit for fitting valve stem seals.

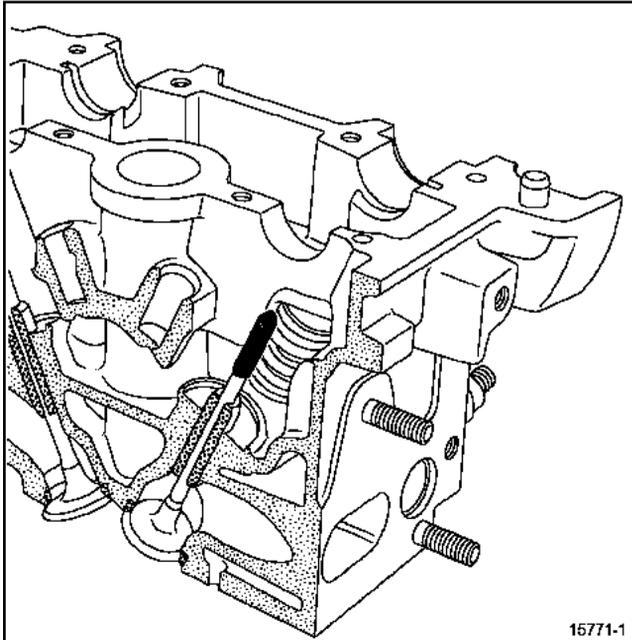
Fitting the valve stem seals



- Place the valve in the cylinder head.

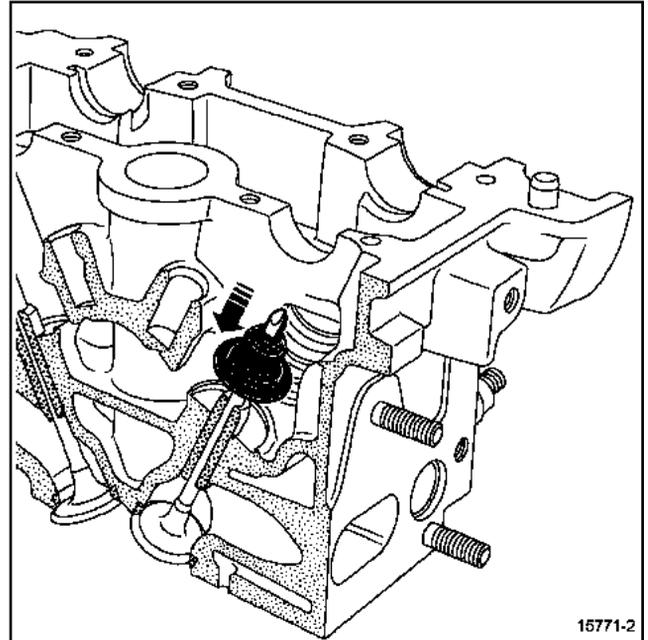
Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



15771-1
15771-1

- Place the barrel of tool (**Mot. 1511**) over the valve stem (the internal diameter of the barrel must be identical to the diameter of the valve stem).



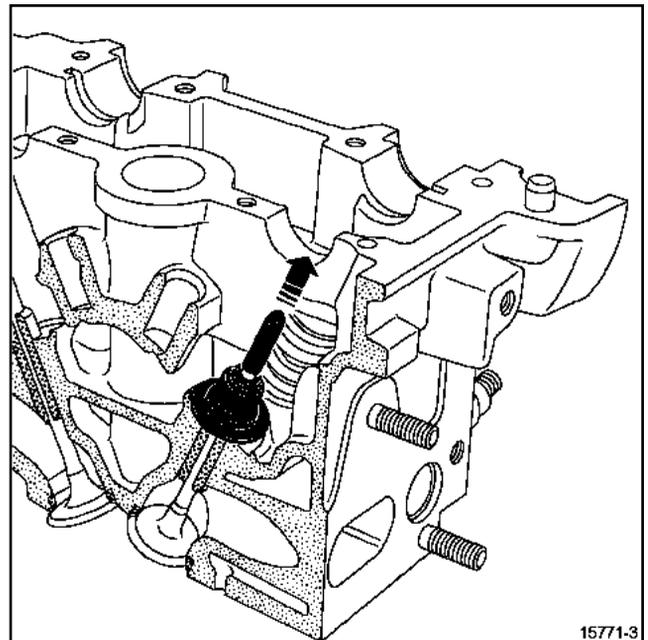
15771-2
15771-2

- Keep the valve pressed against its seat.

WARNING

Do not lubricate the valve stem seals before fitting them.

- Fit the valve stem seal on the barrel.

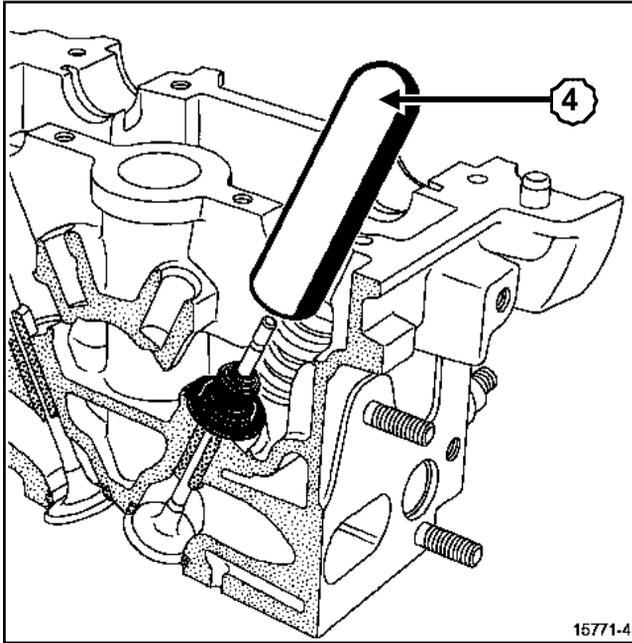


15771-3
15771-3

- Push the valve stem seal past the tool barrel, then withdraw the barrel.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

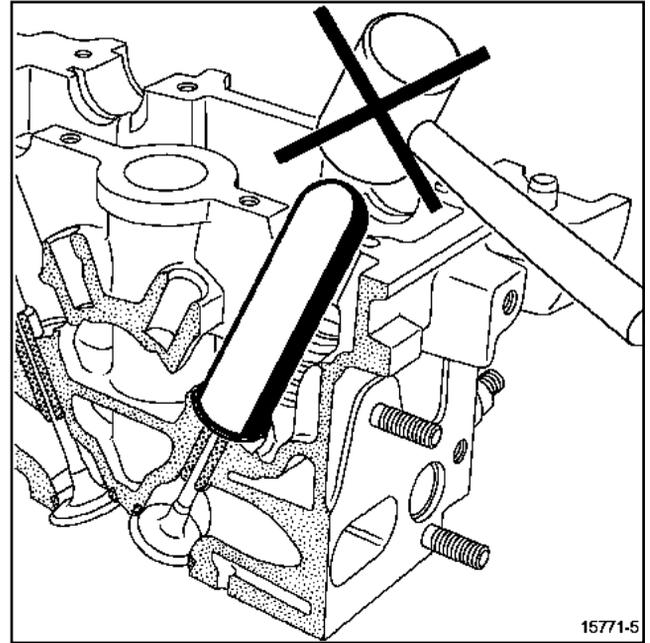


- Place the pushrod(4) over the valve stem seal.

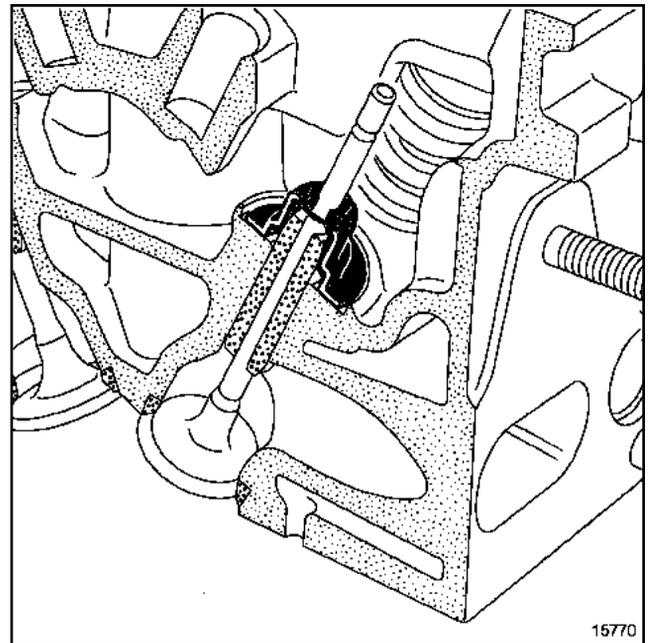
Note:

The internal diameter of the pushrod must be identical to the diameter of the valve stem.

- In addition, the base of the pushrod must make contact with the part of the valve stem seal which operates as the lower thrust washer for the valve spring.



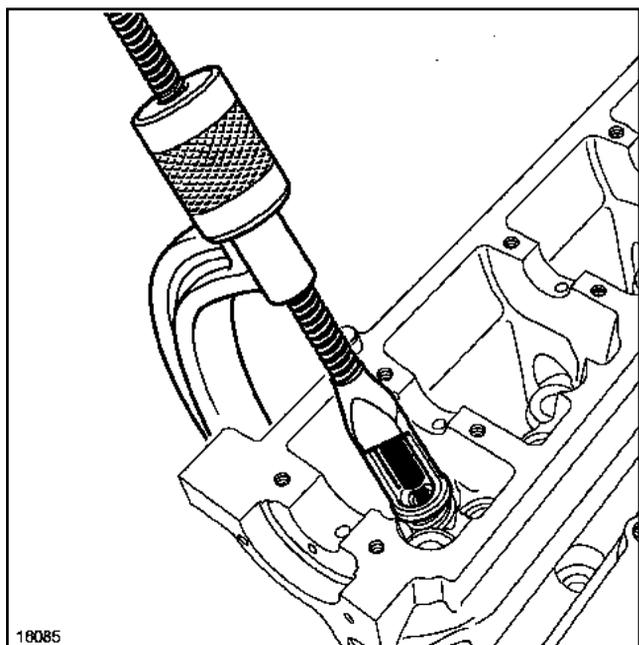
- Push home the valve stem seal by gently striking the top of the pushrod with the palm of the hand, until the valve stem seal makes contact with the cylinder head.



- Repeat these operations for all the valves.
- Mount:
 - the springs,
 - the upper cups.

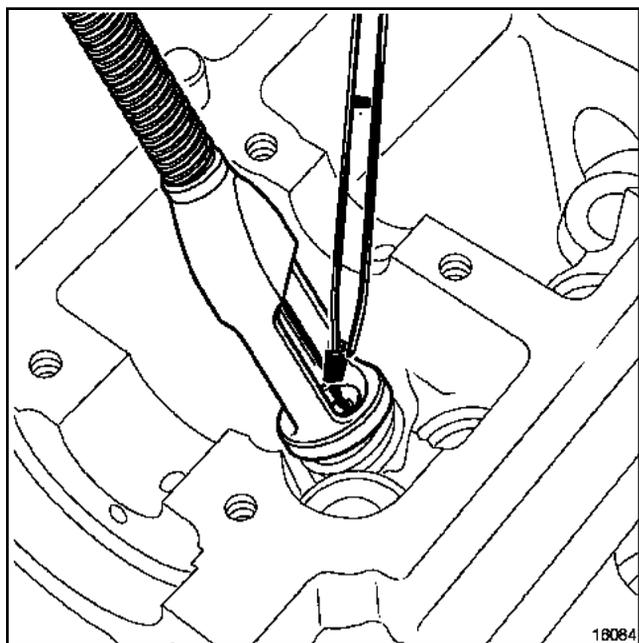
Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



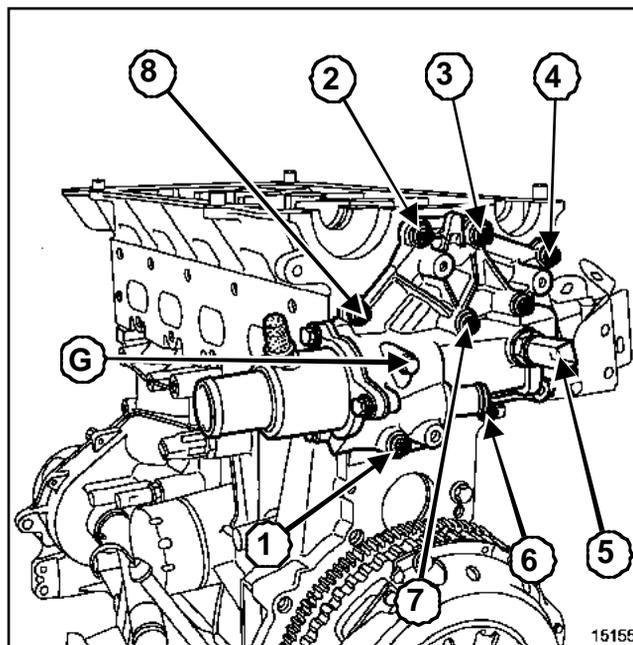
16085

- Compress the springs using tool (**Mot. 1502**).



16084

- Refit the cotters using tweezers.

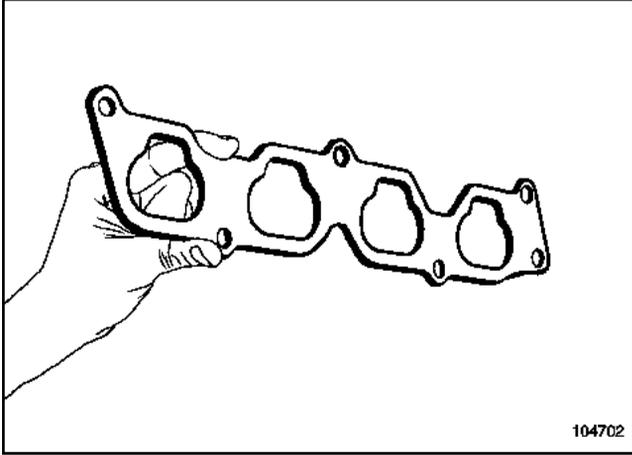


15155

- Refit the coolant outlet unit with a new gasket.
- Tighten to torque and in order the **coolant outlet unit bolts (13 Nm)**.
- Seal the degassing bolt (**G**) et and the coolant temperature sensor with LOCTITE FRENATANCHE.
- Tighten to torque:
 - the **degassing bolt (10 Nm)**.
 - the **coolant temperature sensor (33 Nm)**.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104702

- Refit a new inlet shim seal.

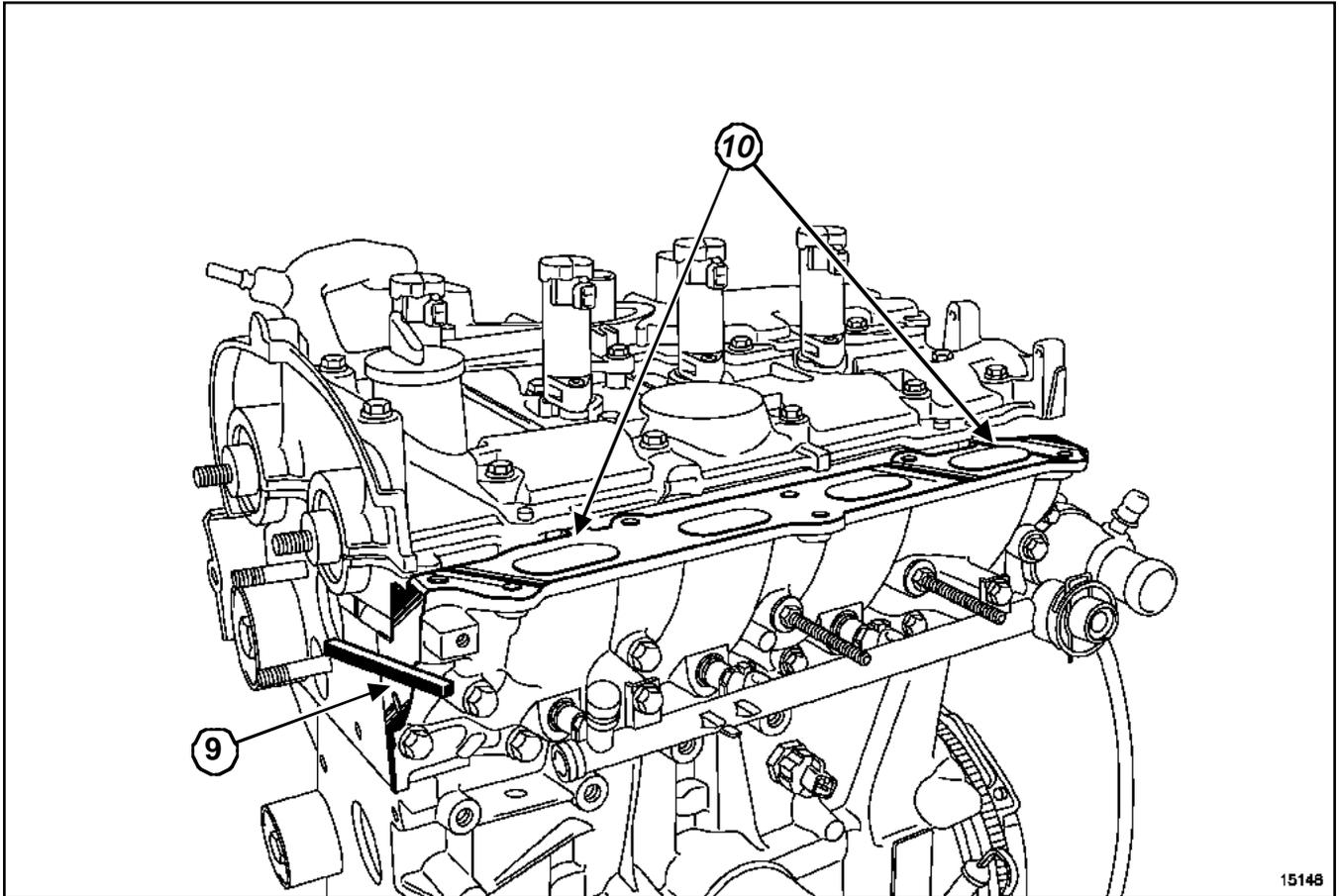
WARNING

Hold the new seals by the stops, not the mating faces, to prevent damage to the seal.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 261 or 720 or 760 or 770 or 771 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

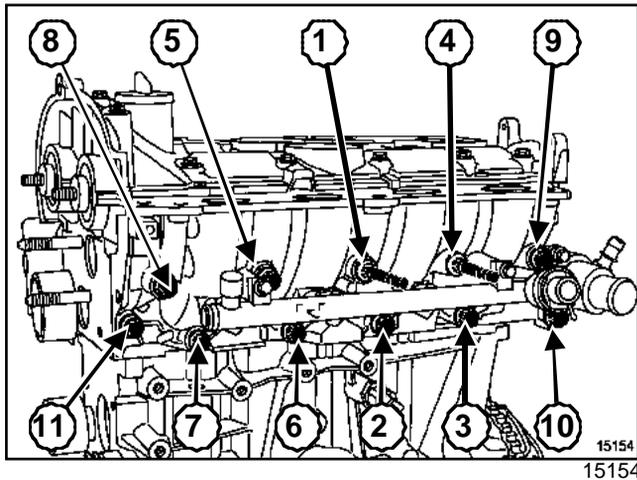


Note: before tightening the inlet shim, check:

- the alignment (9) between the inlet shim and the cylinder head,
- the inlet shim tabs (10) are in contact with those on the cylinder head cover.

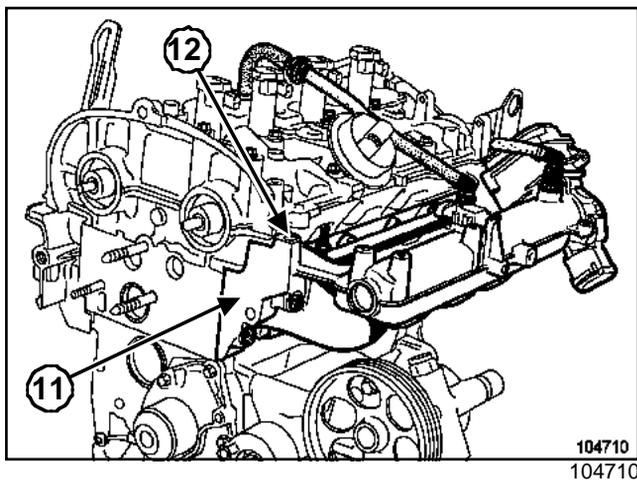
Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Tighten to torque and in order the **inlet manifold gasket bolts (21 Nm)** in the correct order.

F4R, and 760 or 761 or 762 or 763 or 764 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



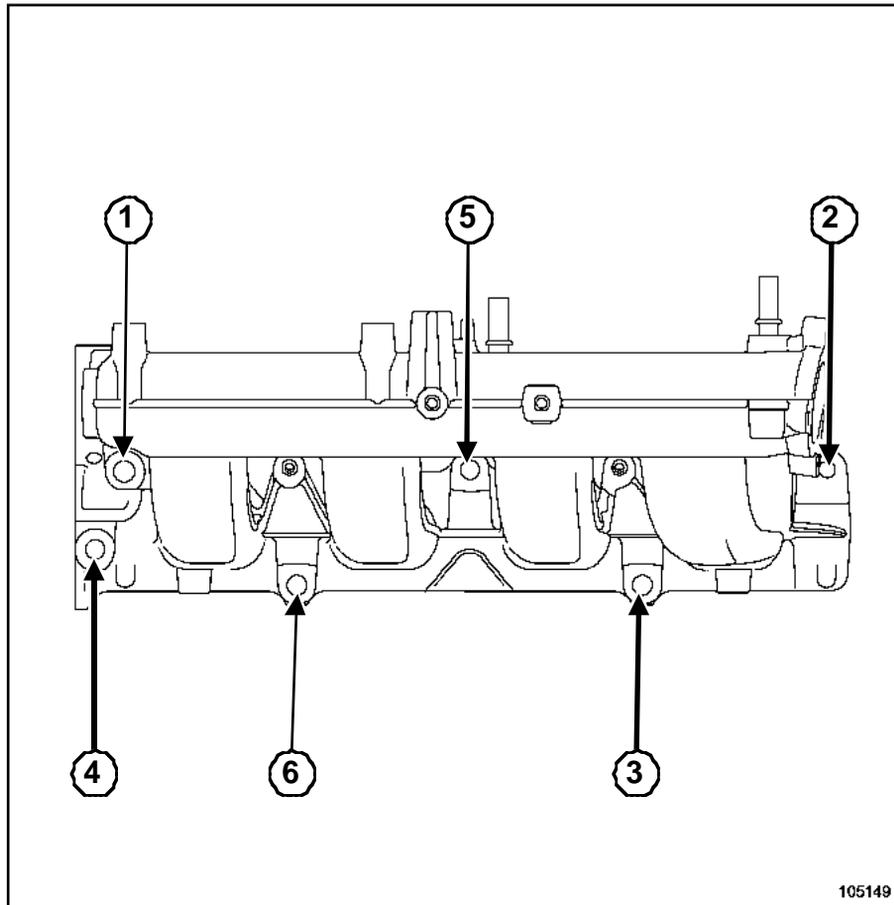
-

Note: before tightening the inlet shim, check:

- the alignment (11) between the inlet shim and the cylinder head,
- that the inlet shim tab (12) is in contact with the cylinder head cover.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

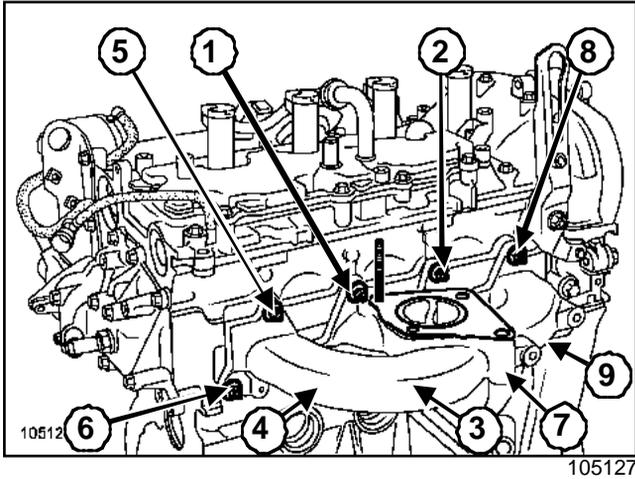


105149

- Torque tighten in order the **F4R Turbo inlet gasket bolts (21 Nm)** in the correct order.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



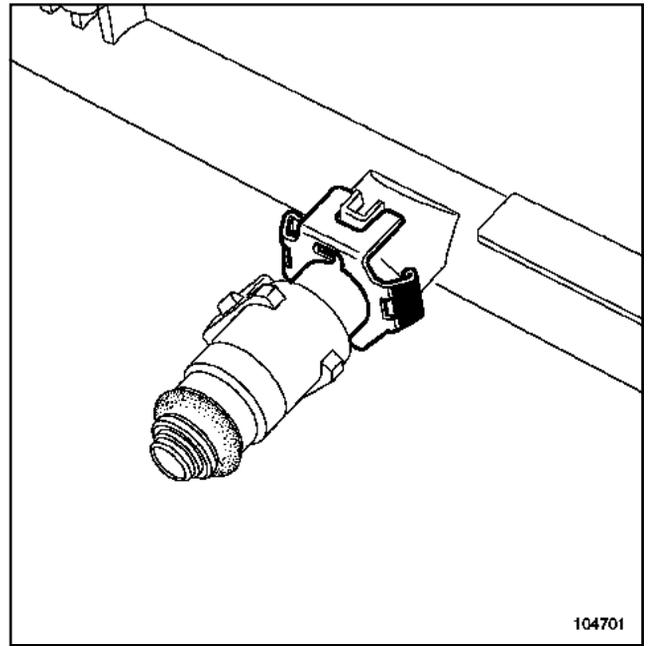
- Refit a new exhaust manifold seal.

WARNING

Hold the new seals by the stops, not the mating faces, to prevent damage to the seal.

- Torque tighten in order the **F4R Turbo exhaust manifold nuts (20 Nm)** in the correct order.

F4P, and 261 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 713 or 714 or 715 or 720 or 746 or 747 or 770 or 771 or 790 or 792

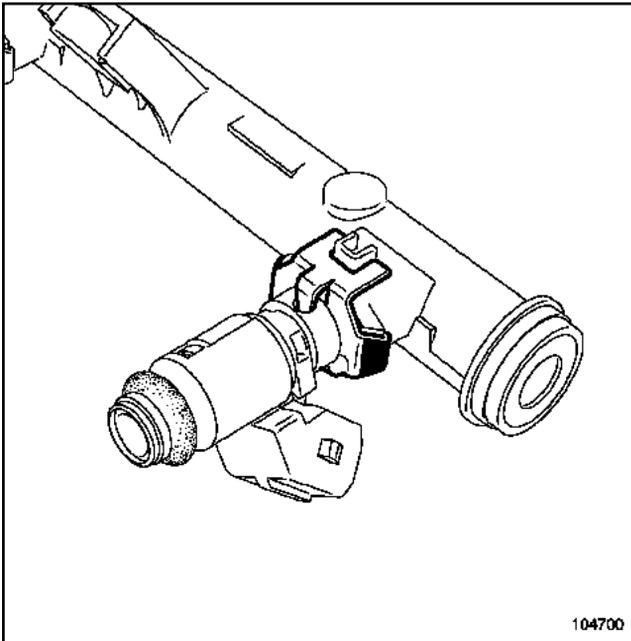


- Fit the injectors with new seals.

Rebuilding the cylinder head

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 730 or 732 or 736 or 740 or 741 or 744 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 780 or 786 or 787 or 794 or 795 or 796 or 797



104700

- Fit the injectors, with new seals and new retaining clips.
- Lightly grease the O-rings.
- Refit the prepared injector rail.
- Torque tighten in order the **injection rail bolts (9 Nm)**
- Refit the injector rail protector (if fitted).
- Torque tighten in order the **injection rail protector nuts (25 Nm)**.

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

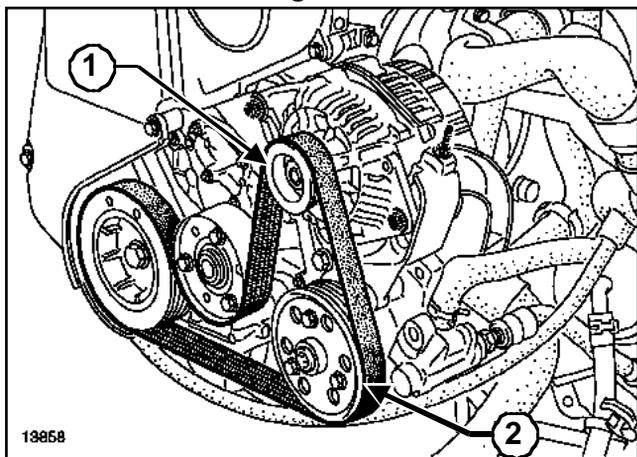
Mot. 1677

Flywheel locking tool
(F engines)

REMOVING THE LOWER ENGINE

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 780

Without air conditioning

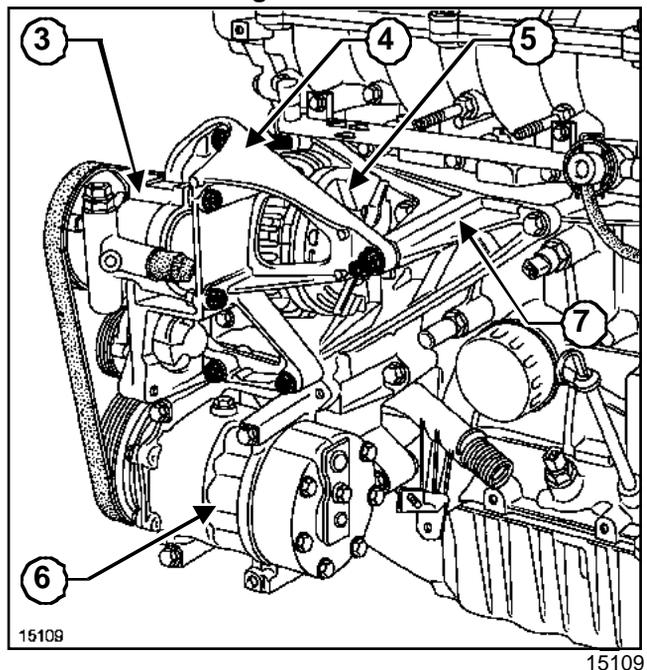


Remove:

- the alternator (1),
- the power steering pump (2).

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 740 or 741 or 744 or 746 or 747 or 780

With air conditioning



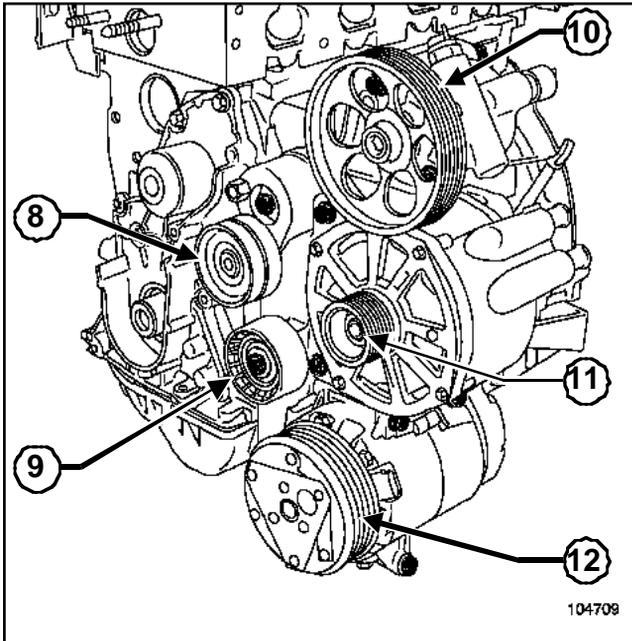
Remove in the following order:

- the power steering pump (3),
- the power steering pump mounting (4),
- the alternator (5),
- the air conditioning compressor (6),
- the accessories mounting (7).

Cylinder block: Dismantling

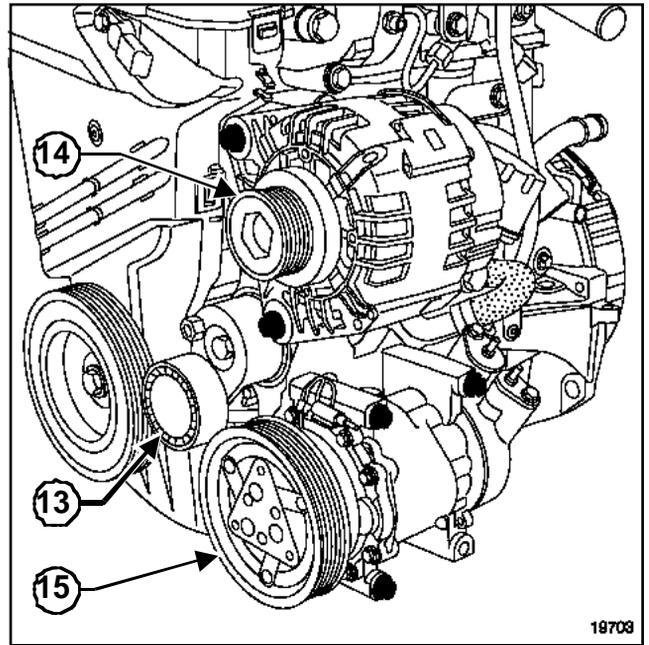
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 770 or 771 or 772 or 774 or 775 – F4R, and 712 or 713 or 714 or 715 or 720 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Remove in the following order:
 - the tension wheel (8),
 - the idler pulley (9),
 - the power steering pump (10),
 - the alternator (11),
 - the air conditioning compressor (12),
 - the accessories mounting.

F4R, and 770 or 771 or 774 or 776



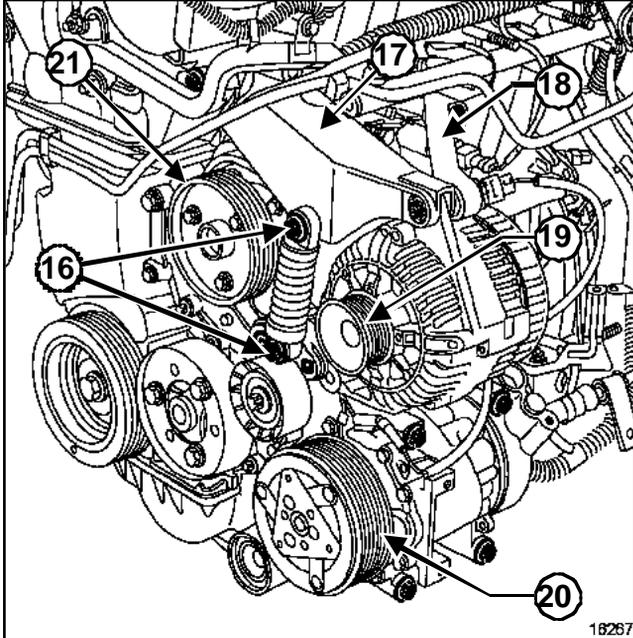
- Remove in the following order:
 - the tension wheel (13),
 - the alternator (14),
 - the air conditioning compressor (15),
 - the accessories mounting.

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

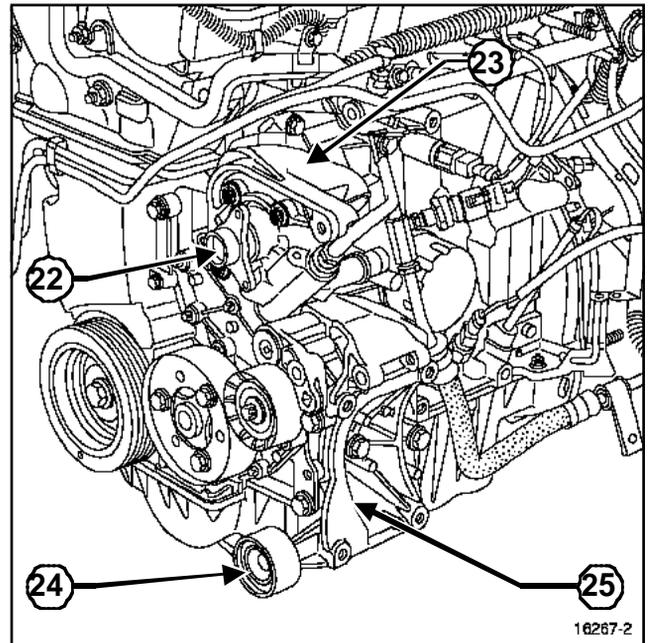
F4R, and 730 or 732 or 736 or 738

With air conditioning



16267
16267

- ❑ Remove in the following order:
 - the tension wheel (by removing the two bolts (16)),
 - the tie-rod (17),
 - the bracket (18),
 - the alternator (19),
 - the air conditioning compressor (20),
 - the power steering pump pulley (21).

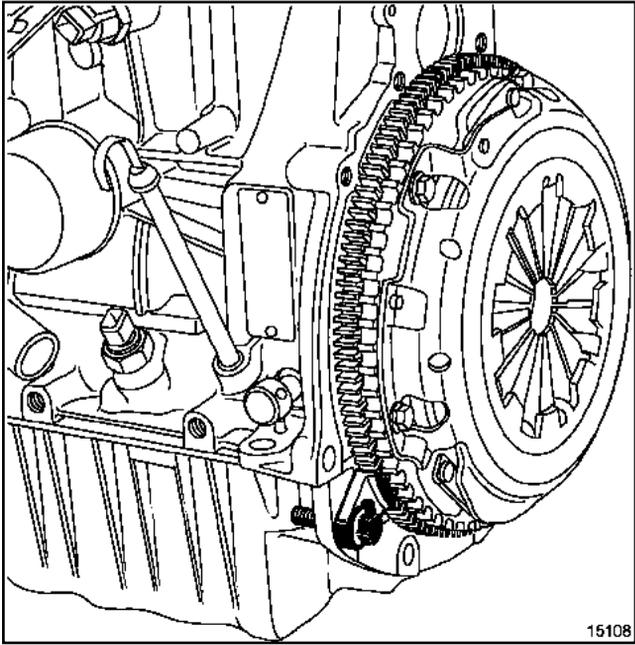


16267-2
16267-2

- ❑ Remove in the following order:
 - the power steering pump (22),
 - the power steering pump mounting (23),
 - the idler pulley (24),
 - the air conditioning compressor mounting (25).

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

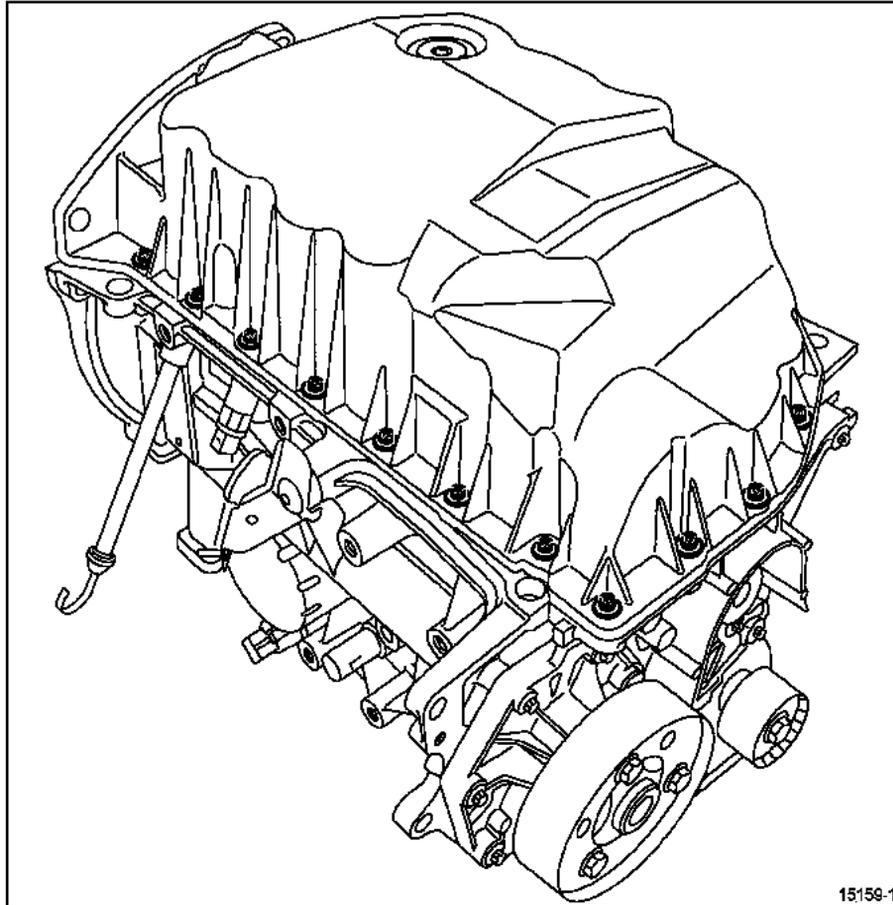


15108
15108

- Immobilise the flywheel using tool (**Mot. 1677**).
- Remove:
 - the clutch pressure plate,
 - the clutch plate (note the direction of fitting),
 - the flywheel.

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



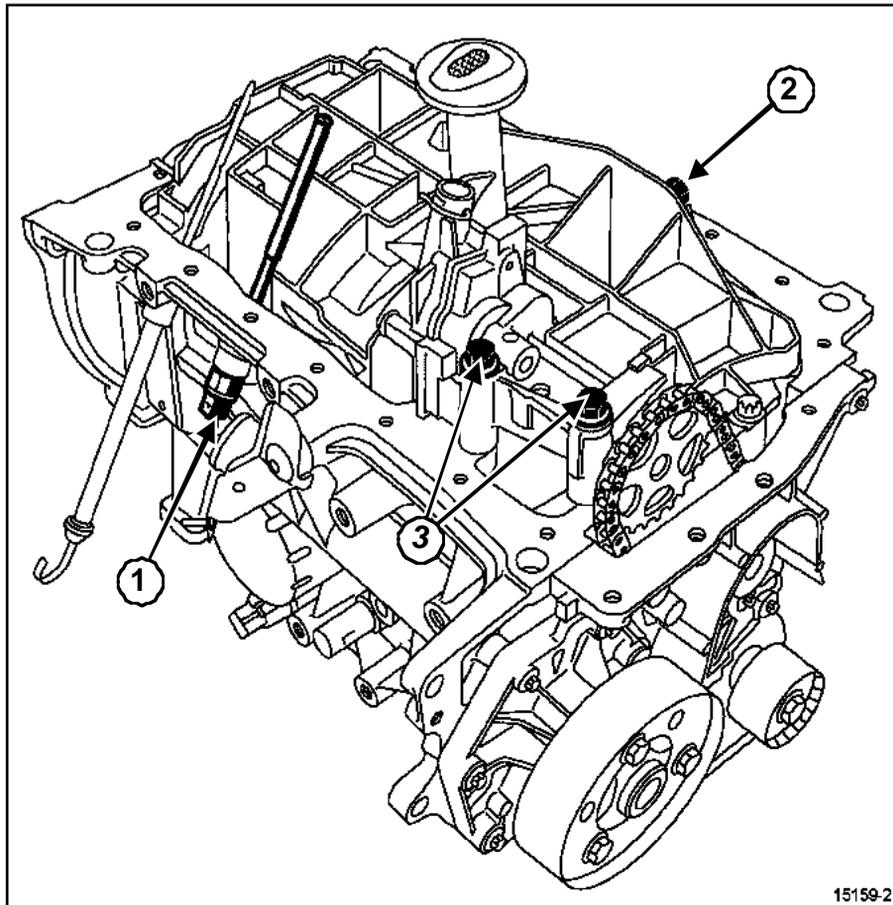
15159-1
15159-1

- Remove the oil sump.

|

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



15159-2
15159-2

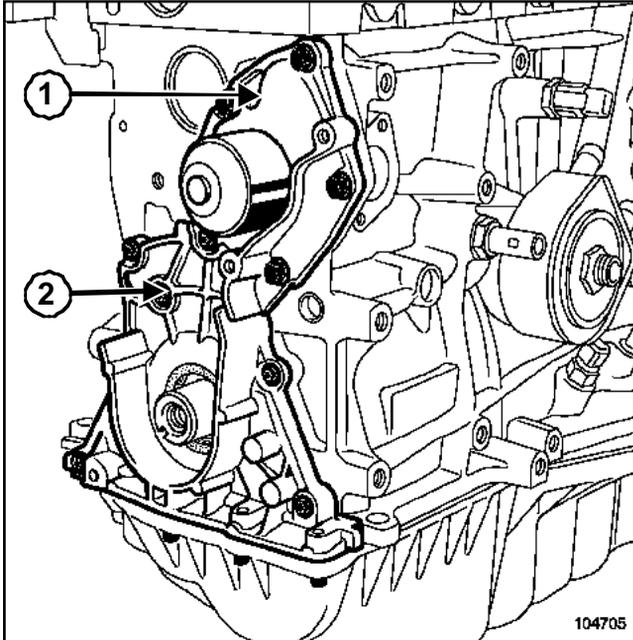
 Remove:

- the dipstick,
- the oil level sensor (1),
- the oil splash plate bolt (2),
- the oil splash plate ,
- oil pump bolts (3),
- the oil pump,

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

For engines fitted with a water pump driven by the timing belt.

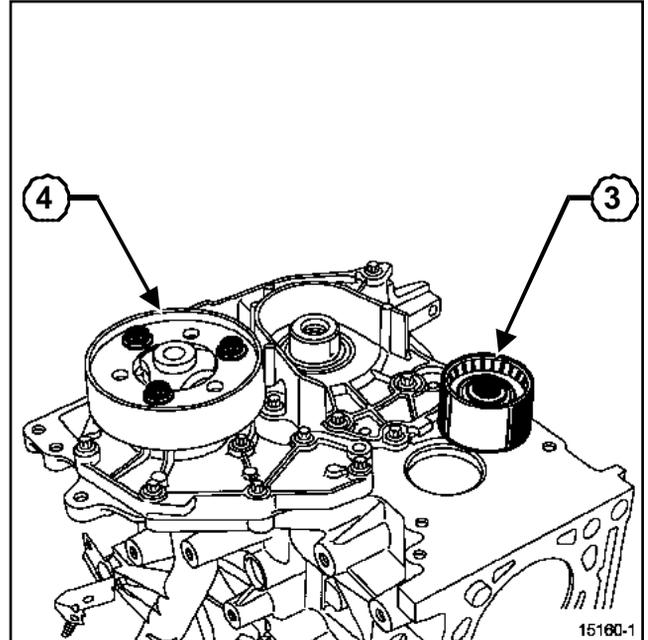


104705
104705

□ Remove:

- the water pump (1),
- the crankshaft closure panel (2).

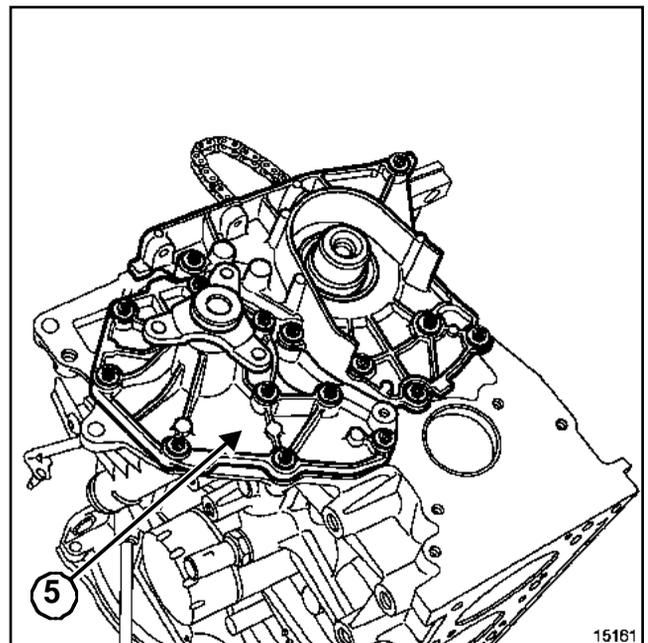
For engines fitted with a water pump driven by the accessories belt.



15160-1
15160-1

□ Remove:

- the idler pulley (3),
- the water pump pulley (4).



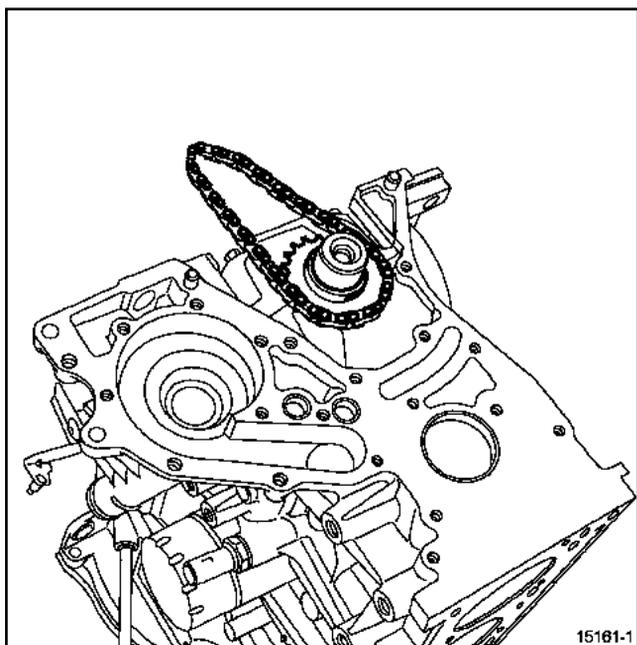
15161
15161

□ Remove:

- the crankshaft closure panel ,
- the water pump (5).

Cylinder block: Dismantling

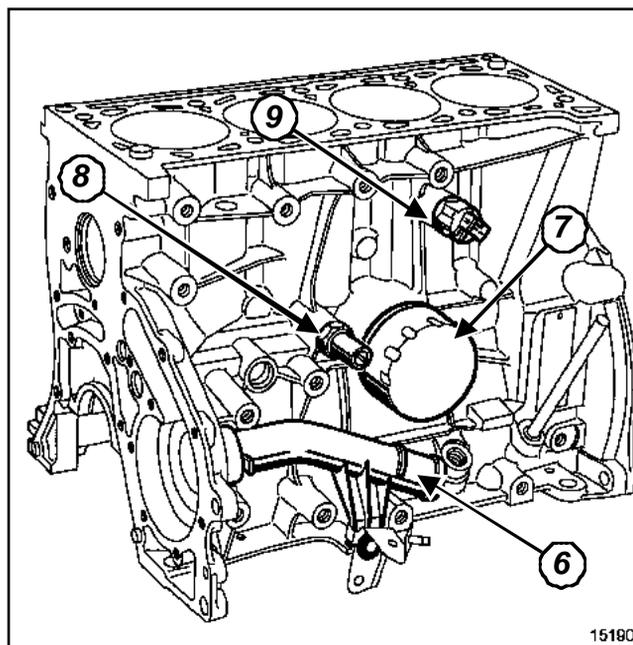
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



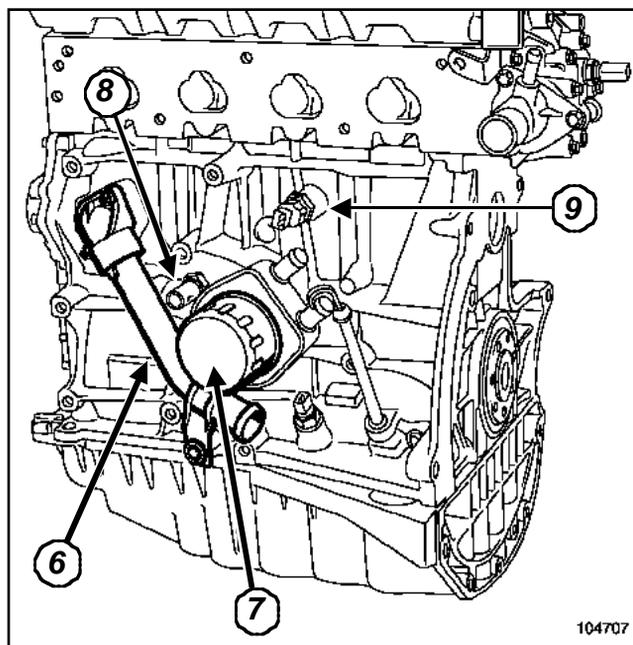
15161-1
15161-1

□ Remove:

- the oil pump chain,
- the drive sprocket.



15180
15190



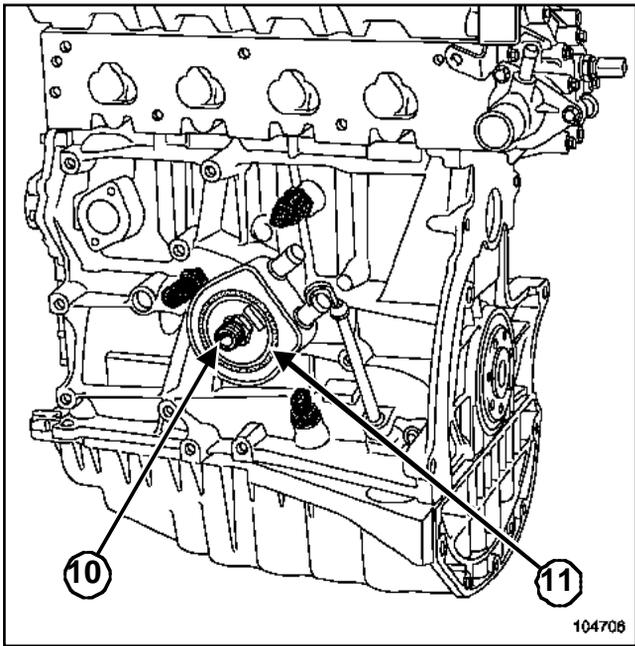
104707
104707

□ Remove:

- the coolant inlet hose (6),
- the oil filter (7),
- the oil pressure sensor (8),
- pinking sensor (9).

Cylinder block: Dismantling

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



104706

104706

❑ Remove:

- the threaded oil filter connector (10) (if fitted),
- the oil cooler (11) (if fitted).

Running gear:Removal

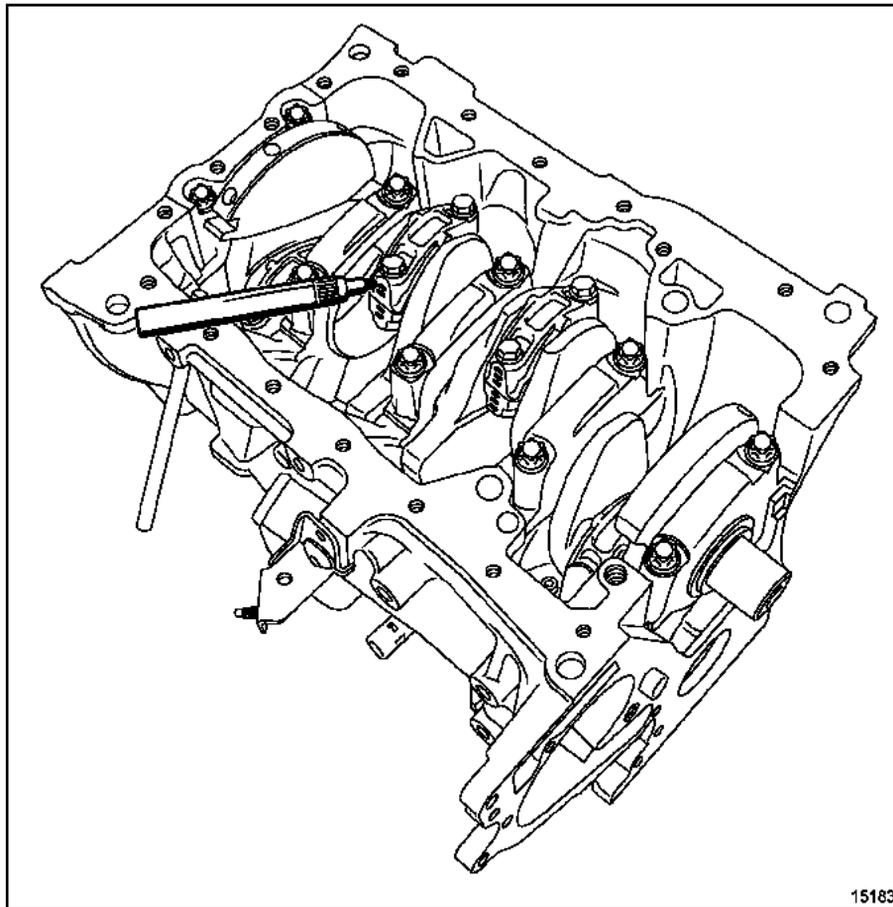
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 784 or 786 or 790 or 791 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1423

Tool for removing silicon-coated crankshaft bearing caps

REMOVAL



15183

15183



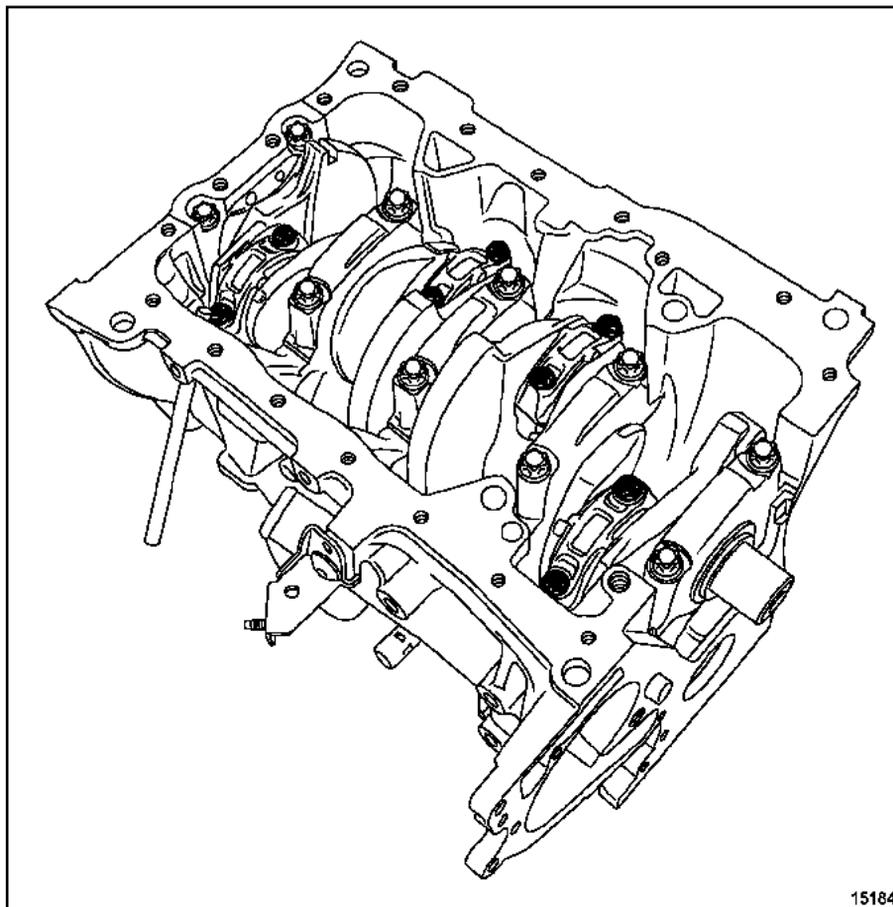
WARNING

Do not use a sharp instrument to mark the big end caps in relation to their con rods, to avoid starting a crack in the rod.

Use an indelible marker pen.

Running gear:Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 784 or 786 or 790 or 791 or 794 or 795 or 796 or 797



15184

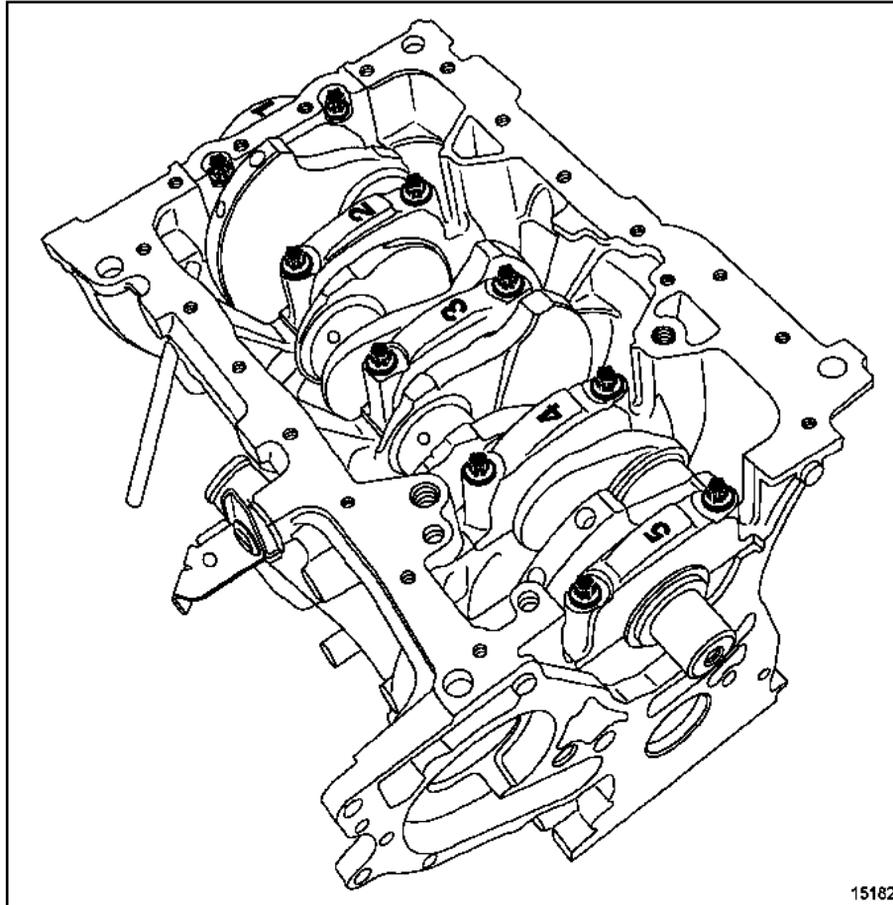
15184

Remove:

- the con rod caps,
- the con rod/piston assemblies.

Running gear:Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 784 or 786 or 790 or 791 or 794 or 795 or 796 or 797



15182

15182



Note:

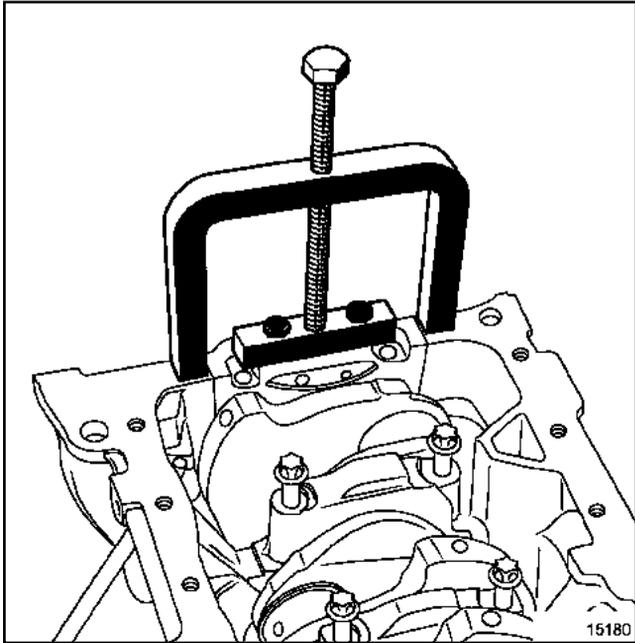
- the crankshaft main bearing caps are numbered from 1 to 5.

Note:

- number 1 is at the flywheel end.

Running gear:Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 784 or 786 or 790 or 791 or 794 or 795 or 796 or 797



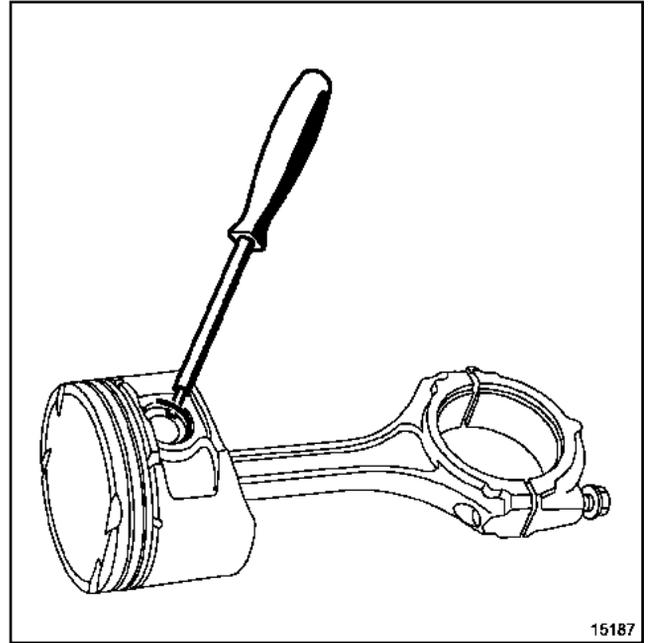
- Remove:
 - the crankshaft bearing caps,
 - bearing cap no. 1 using tool (**Mot. 1423**),
 - the crankshaft.

WARNING

It is essential to mark the position of the crankshaft bearing shells, as the category may be different for each bearing.

EXTRACTING THE GUDGEON PINS

- Remove the piston rings using piston ring pliers.



- Remove the circlips using a screwdriver.
- Extract the gudgeon pins.
- Remove the con rod bearing shells.

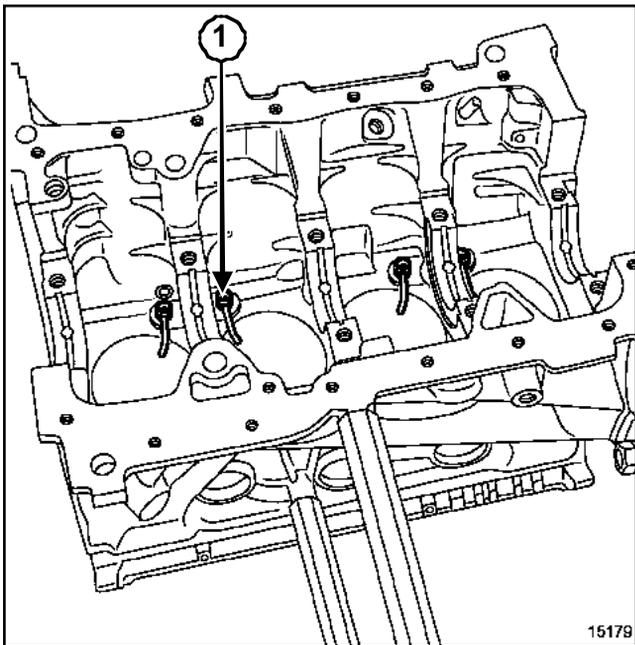
Piston base cooling jet: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1485	Tool for removing piston coolers
Mot. 1485-01	Tool for removing piston coolers

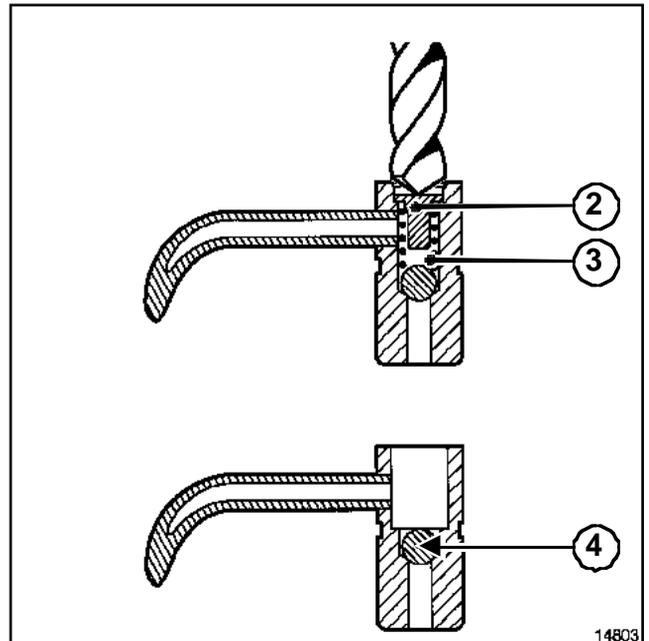
REMOVAL



15179

15179

- Drill the piston skirt cooling jets (1) using a 7 mm diameter drill bit.



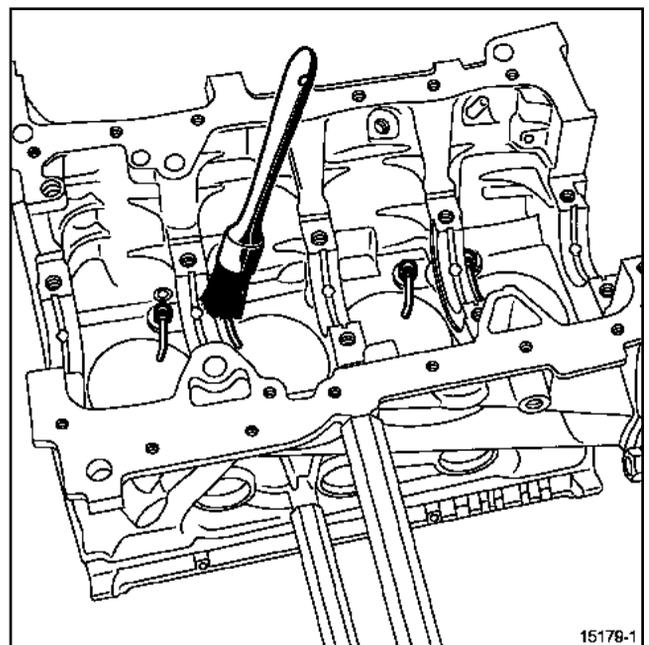
14803

14803

- Remove the spring stop (2) and the spring (3).

WARNING

To prevent swarf falling into the oil circuit, do not remove the ball (4).



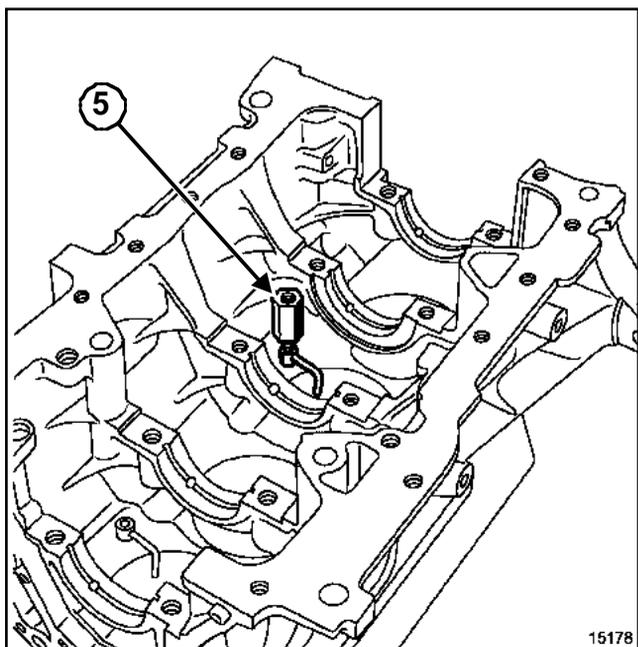
15178-1

15179-1

- Remove the swarf with a brush.

Piston base cooling jet: Removal

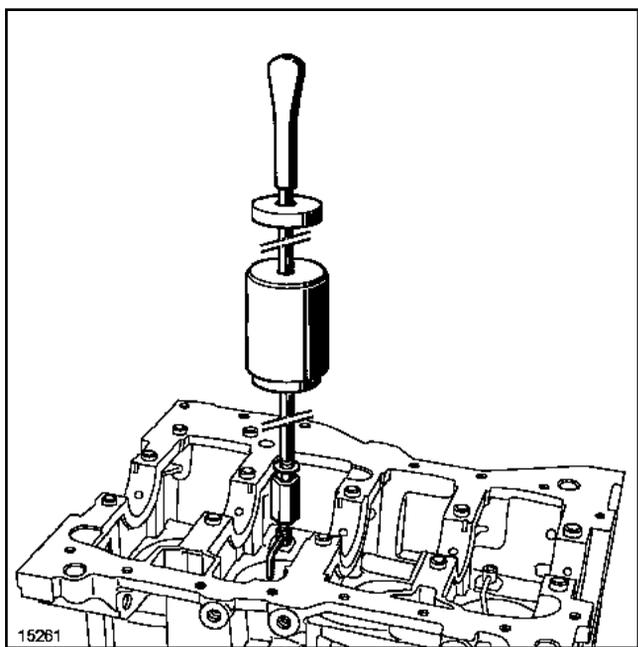
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



15178

15178

- Screw tool (Mot. 1485) or tool (Mot. 1485-01)(5) into the cooling jets with a 6 mm Allen key that slides inside the tool.



15261

15261

- Screw the slide hammer onto tool (Mot. 1485) or tool (Mot. 1485-01).
- Remove the cooling jets.

Lower engine: Cleaning

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

CLEANING THE ENGINE AND PERIPHERALS Clean:

- the cylinder block,
- the crankshaft,
- the oil sump,
- the crankshaft closure panel,
- the crankshaft bearing caps.

WARNING

- When cleaning parts, it is essential to not knock the parts against each other, or their mating faces may be damaged and therefore their settings may be disrupted, which could damage the engine.

- Failure to observe this advice could rapidly destroy the engine.

IMPORTANT

- Do not scratch the aluminium sealing surfaces.
- Wear goggles.
- Wear gloves during the operation.
- Clean the sealing surfaces with DECAPJOINT compound to dissolve any parts of the gasket that are still attached.
- 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 on to the paintwork.
- Clean the cylinder head carefully to prevent foreign matter entering the oil galleries.
- Failure to follow this advice could lead to blocking of the various oil galleries, resulting in rapid destruction of the engine.

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

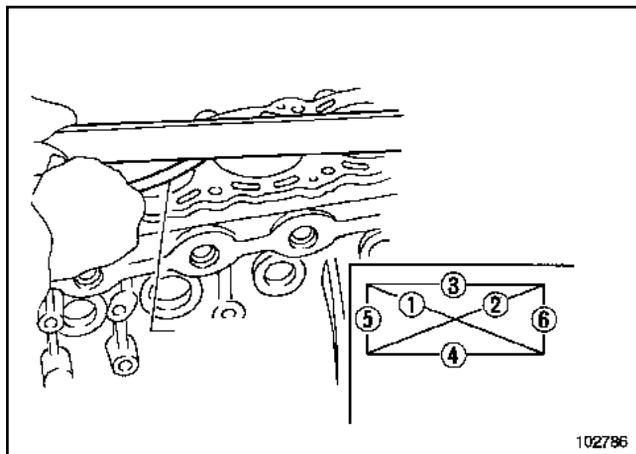
Mot. 1493 Crankshaft bearing bush centring tool (F engines)

Tightening torques

crankshaft bearing cap bolts **20 Nm + 62° ± 4°**

I - CYLINDER BLOCK CHECK

1 - Checking the cylinder block surface



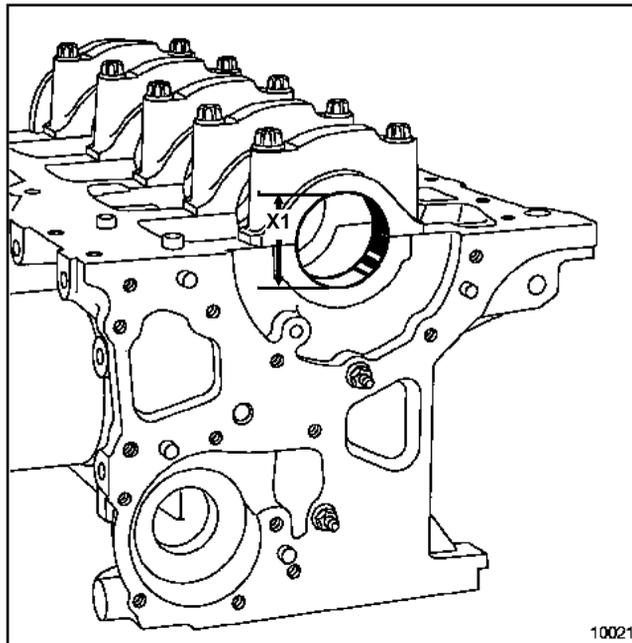
102786
102786

- Check using a cylinder head ruler and a set of shims that the gasket face bow does not exceed **0.03 mm**.

WARNING

No regrinding of the cylinder block is authorised.

2 - Measuring the diameter of the crankshaft bearings on the cylinder block



10021
10021

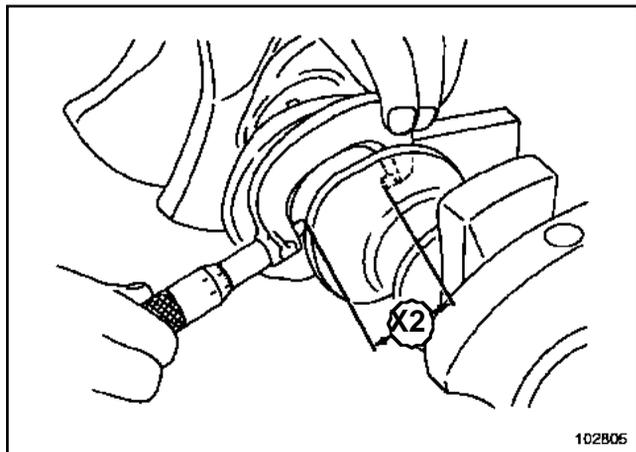
- Refit the crankshaft bearing caps, fitting cap no. **1** at the flywheel end.
- Tighten to torque and angle the **crankshaft bearing cap bolts (20 Nm + 62° ± 4°)**.
- Measure the internal diameter of the crankshaft bearings **X1** which must be from **58.731 to 58.750 mm**.
- Remove the crankshaft bearing caps.

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

II - CHECKING THE CRANKSHAFT

1 - Measuring the journal diameters



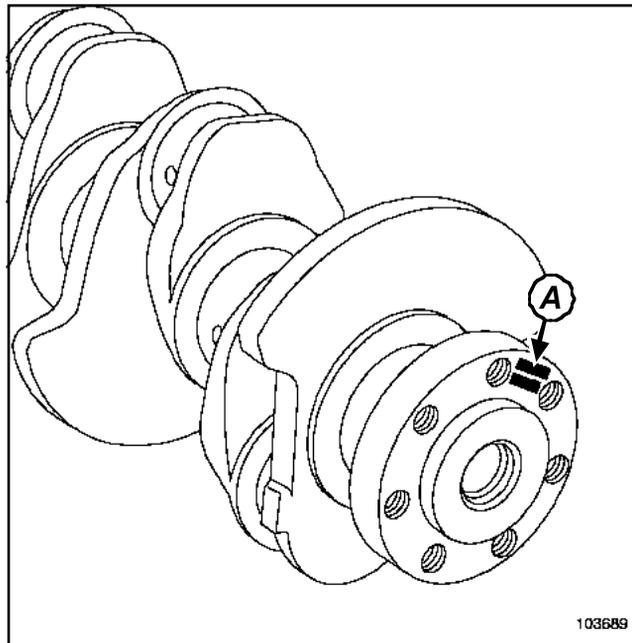
102805
102805

- ❑ There are 2 main bearing journal diameter classes (X2) identified either by a spot of paint or by a mark etched on the crankshaft.

a - Identification by a paint spot on the crankshaft

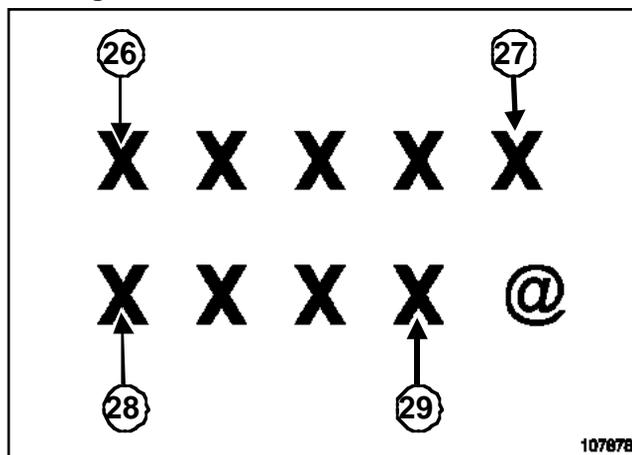
- ❑
 - BLUE spot: the main journal diameter is **54.785 inclusive to 54.795 exclusive**
 - RED spot: the main journal diameter is **54.795 inclusive to 54.805 exclusive**

b - Identification by a mark etched on the crankshaft



103689
103689

Marking « A » in detail



107878
107878

- ❑ (26) : diameter class of journal no. 1, flywheel end
- (27) : diameter class of journal no. 5, timing end
- (28) : diameter class of crankpin no. 1, flywheel end
- (29) : diameter class of crankpin no. 4, timing end

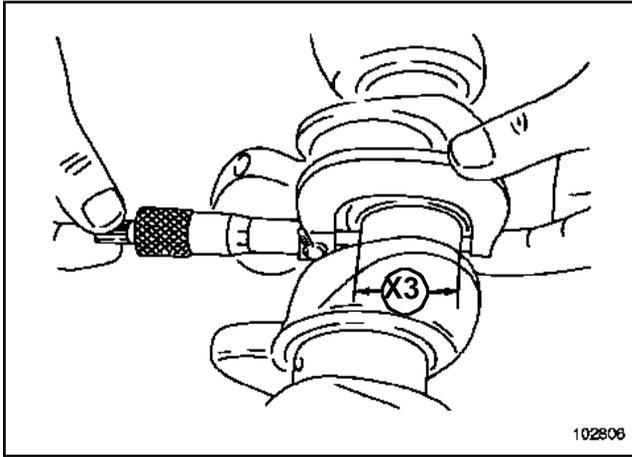
Marks etched on the crankshaft **1** : the main journal diameter is **54.785 inclusive to 54.795 exclusive**

Marks etched on the crankshaft **0**: the main bearing journal diameter is **54.795 inclusive to 54.805 exclusive**

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

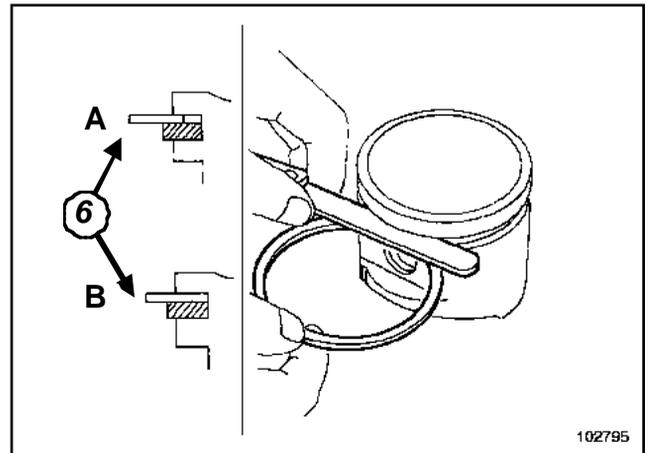
2 - Measuring the crankpin diameter



- There is 1 main bearing journal diameter class (**X3**) identified by marks etched on the crankshaft.
- The crankpin diameter (**X3**) must be **48 to 48.020 mm**.

III - CHECKING THE PISTONS AND PISTON RINGS

1 - Checking the clearance between the piston grooves and piston rings

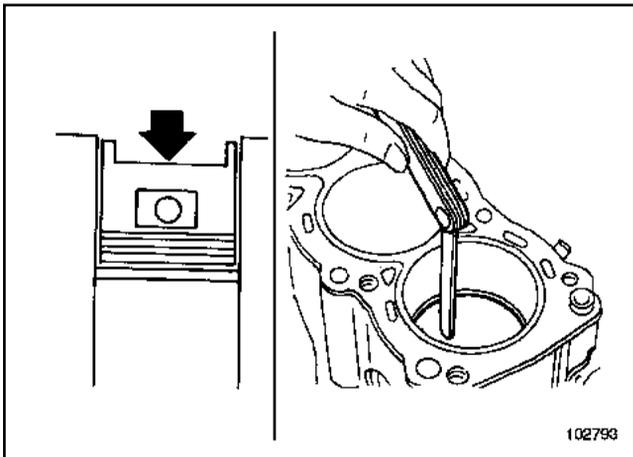


- Measure the clearance between the piston grooves and piston rings using a set of shims (**6**).
 - (**A**): Set of shims incorrectly positioned,
 - (**B**): Set of shims correctly positioned.
- For the compression ring, the clearance must be **0.04 to 0.075 mm**.
- For the sealing ring, the clearance must be **0.025 to 0.07 mm**.
- For the oil scraper ring, the clearance must be **0.01 to 0.16 mm**.
- If the clearance is not within tolerance, replace the piston/gudgeon pin assembly, or the piston rings.

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

2 - Checking the piston ring end gap



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102793

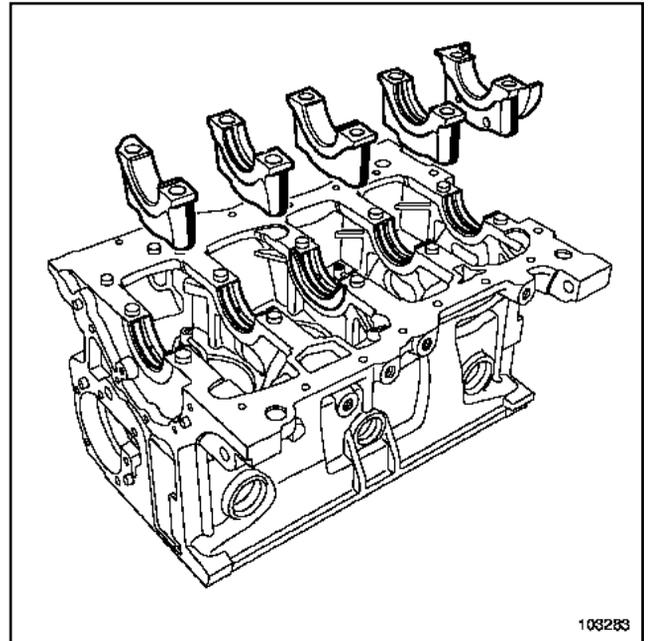
- Insert the piston ring (7) in the cylinder.
- Push the piston ring (7) to the centre of the cylinder using the piston (8).
- Measure the piston ring end gap using a set of shims (9).
- Compression ring end gap:
 - F4P, F4R (except F4R 730,732,736,738): the gap should be **0.20 to 0.35 mm**,
 - F4R 730,732,736,738: the gap should be **0.15 to 0.25 mm**.
- The sealing ring end gap must be **0.40 to 0.60 mm**.
- The oil scraper ring end gap should be **0.25 to 0.75 mm**.

IV - IDENTIFYING THE CRANKSHAFT BEARING SHELLS

1 - Identifying the crankshaft bearing shells

- To identify the main bearing shells, see **10A Engine and peripherals, Engine peripherals: Technical specifications**.

2 - Direction of fitting for crankshaft bearing shells

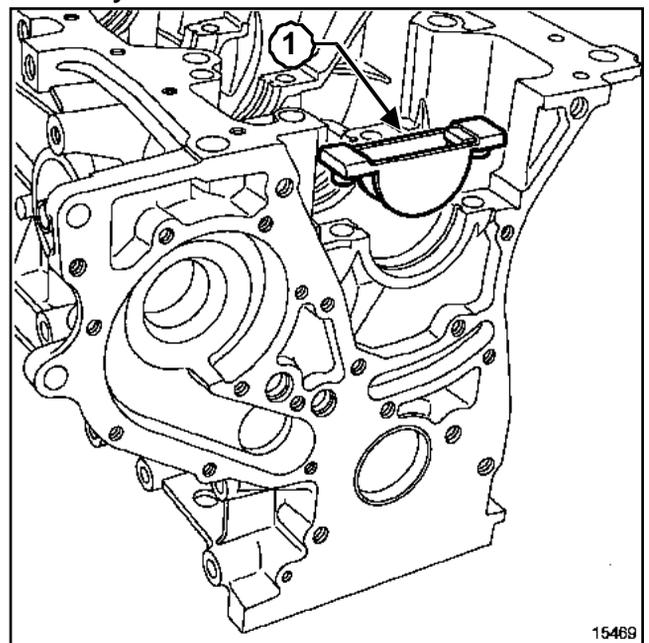


103283
103283

- Fit the grooved bearing shells on all the cylinder block bearings.
- Mount the non grooved bearing shells on all the bearing caps.

3 - Fitting the bearing shells on the cylinder block

On the cylinder block

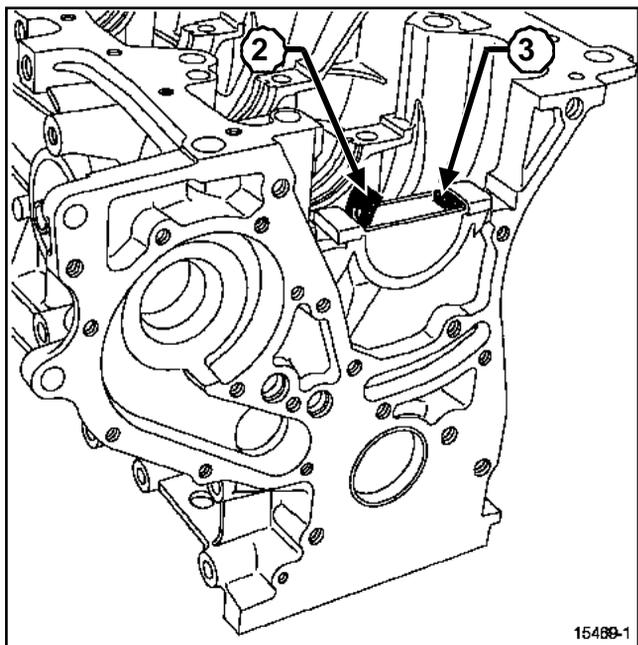


15469
15469

- Mount tool (**Mot. 1493**)(1) on the cylinder block.

Lower engine: Check

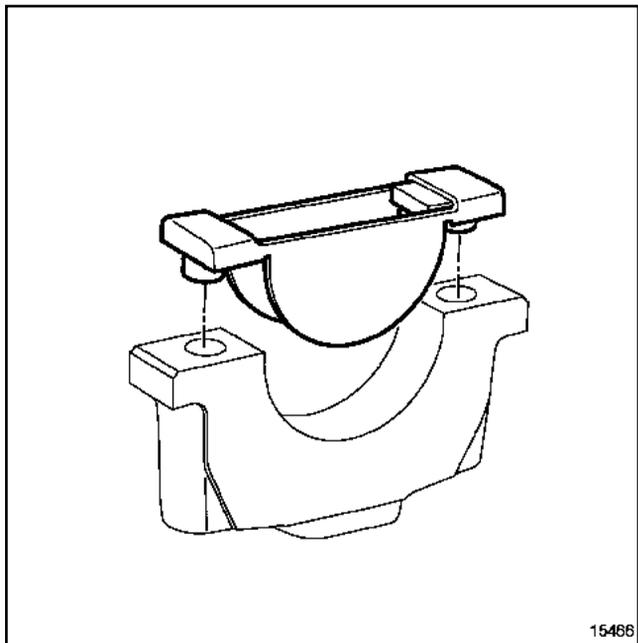
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797



15489-1
15469-1

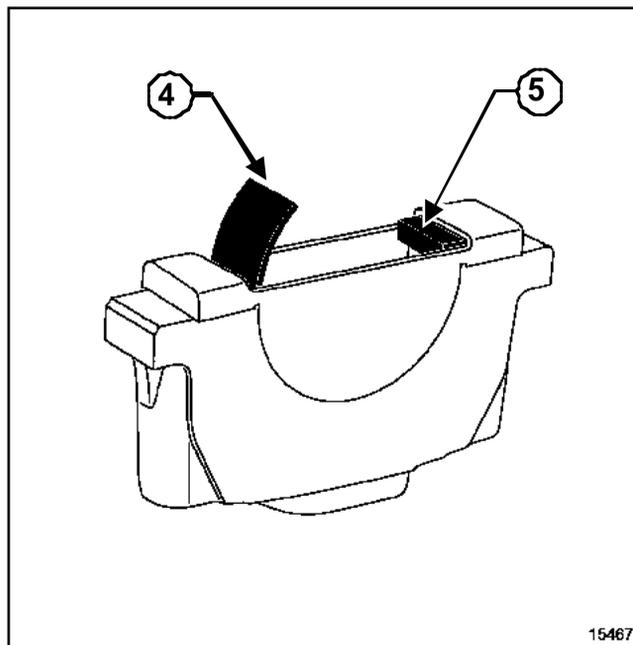
- Place the grooved bearing shell in tool **(Mot. 1493)**.
- Press on the end (2) until the bearing shell comes up against the **(Mot. 1493)** tool end stop (3).

4 - Fitting the bearing shells onto the bearing caps



15488
15466

- Fit tool **(Mot. 1493)** in place on the bearing.



15467
15467

- Place the non-grooved bearing shell in tool **(Mot. 1493)**.
- Press on the end (4) until the bearing shell comes up against the **(Mot. 1493)** tool end stop (5).

V - CHECKING THE MAIN BEARING PLAY

-

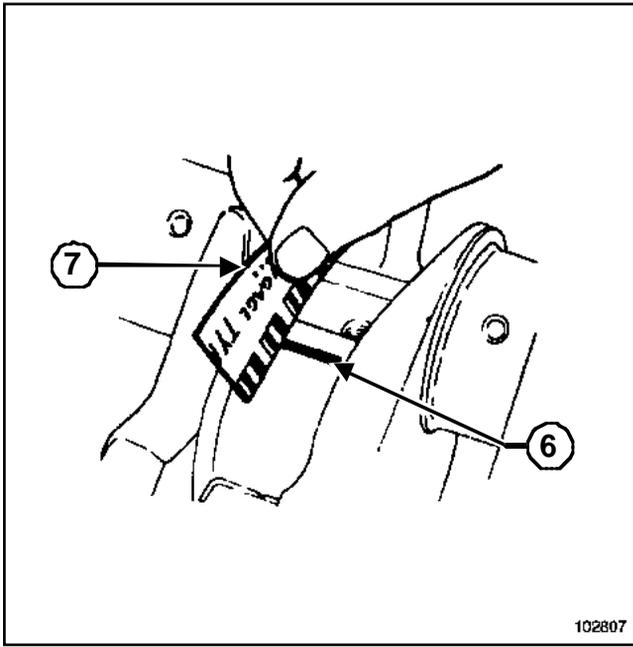
Note:

Never turn the crankshaft during the operation.

- Remove any oil on the crankshaft bushings and crankshaft bearings.
- Refit:
 - the main bearing shells (see : **10A: Engine and peripherals, Moving parts: Refitting**)
 - the crankshaft,
 - the crankshaft bearing side shims **no. 2** (grooves on the crankshaft side).

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

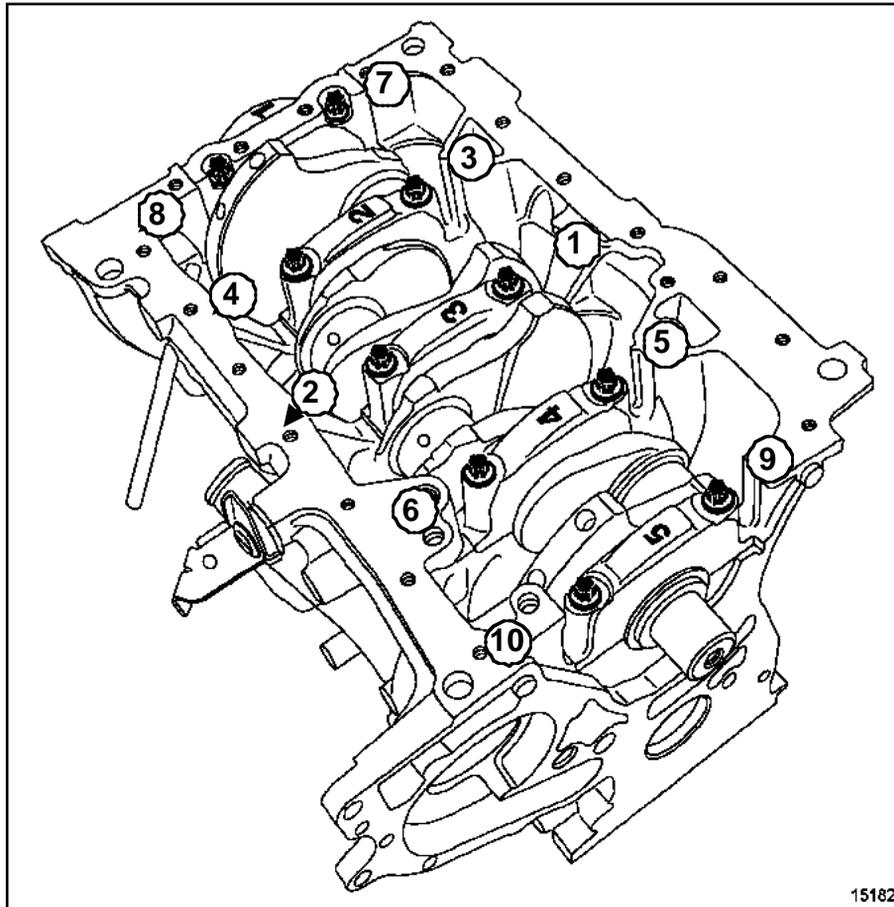


102807

- Cut bits of wire (6) to measure the clearance.
- Insert the wire into the axis of the crankshaft journals (avoiding the bearing lubrication holes).

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797



15182
15182

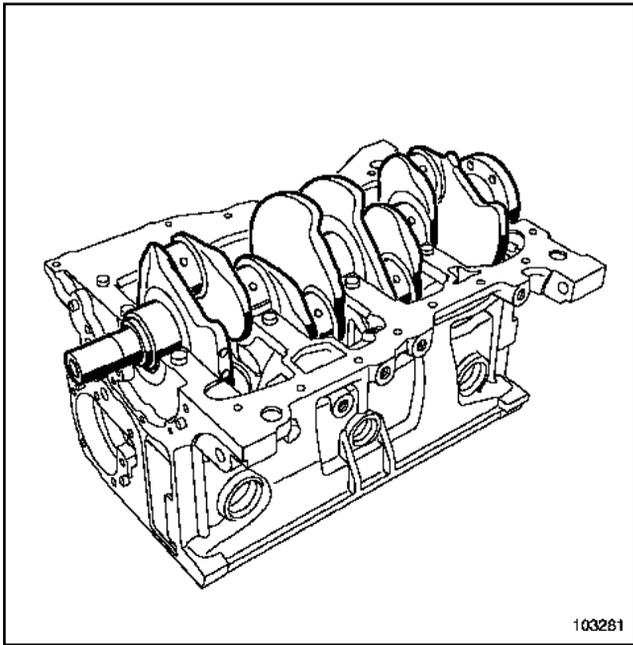
- Refit the main bearing caps placing cap **no. 1** on the engine flywheel end.
- Tighten to torque and angle in order the **crankshaft bearing cap bolts (20 Nm + 62° ± 4°)**.
- Remove the crankshaft bearing caps and the crankshaft.
- Measure the flattening of the play measuring wire using the wrapping paper **(7)**.
- Check the amount of play, which should be **0.040 to 0.075 mm**.
- Clean off of any remaining parts of the measuring wire on the crankshaft and bearing shells.

VI - CHECKING THE CRANKSHAFT LATERAL CLEARANCE

- Oil the crankshaft bearings (only the surface that comes into contact with the crankshaft).

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

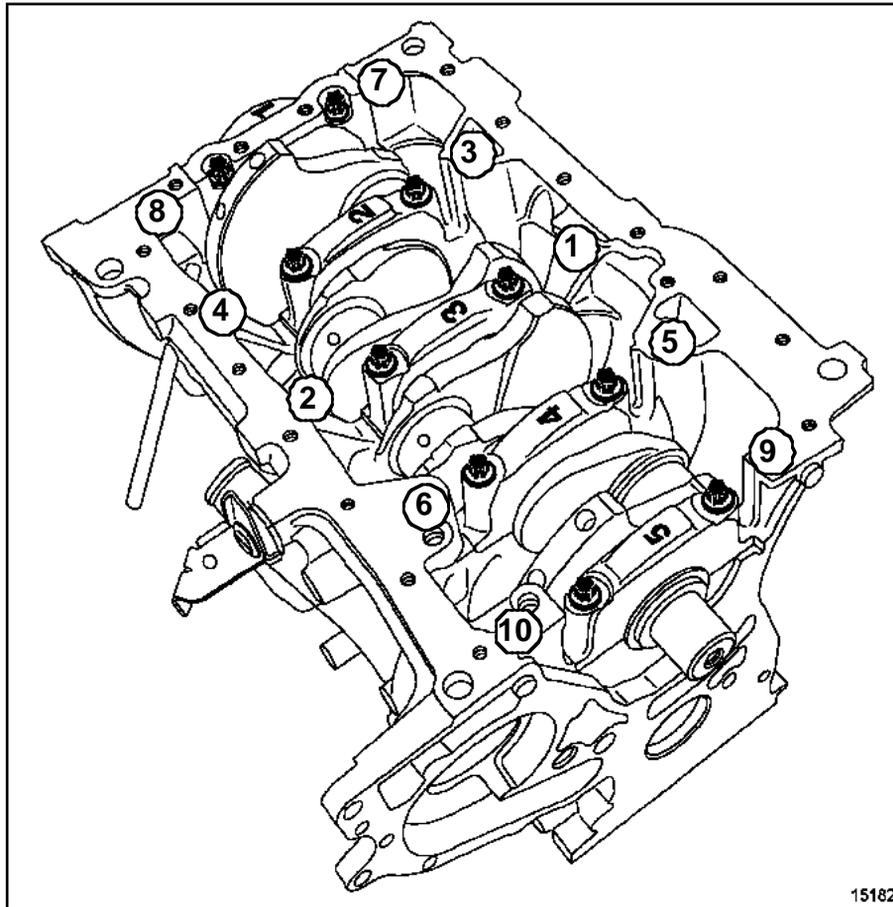


103281
103281

- Refit the crankshaft.
- Check that the crankshaft side shims are present on bearing **no. 2** (grooves on the crankshaft side).

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797

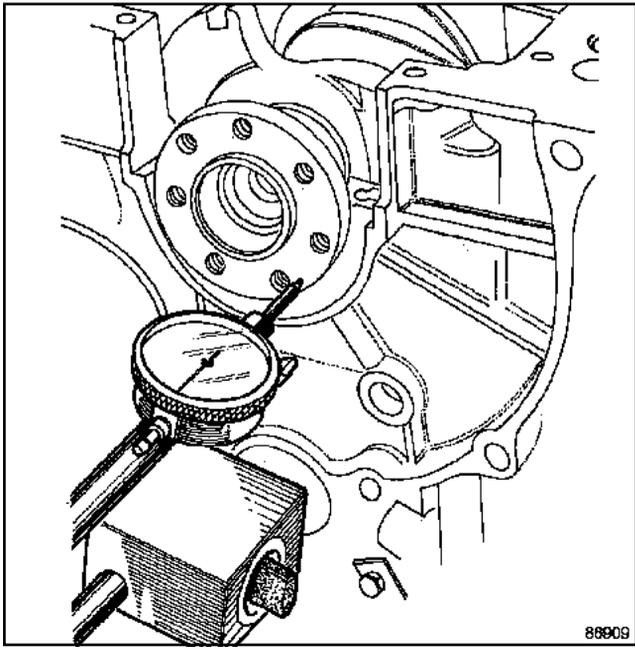


15182
15182

- Lubricate the journals with engine oil.
- Replace the main bearing cap bolts with new ones
- Refit the crankshaft bearing caps, except for bearing **no. 1** at the flywheel end.
They are numbered from **1 to 5**.
- Screw down the crankshaft bearing, tightening the two mounting bolts alternately.
- Tighten to torque and angle the **main bearing cap bolts (20 Nm + 62° ± 4°)**.

Lower engine: Check

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 780 or 790 or 792 or 794 or 795 or 796 or 797



86909

- Check the crankshaft side play
It must be between **0.07 and 0.23 mm**.
- Check that the crankshaft turns freely, with no hard point.

VII - CHECKING BIG END SIDE PLAY

- For checking the big end side play, see **10A, Engine and peripherals, Moving parts: refitting** .

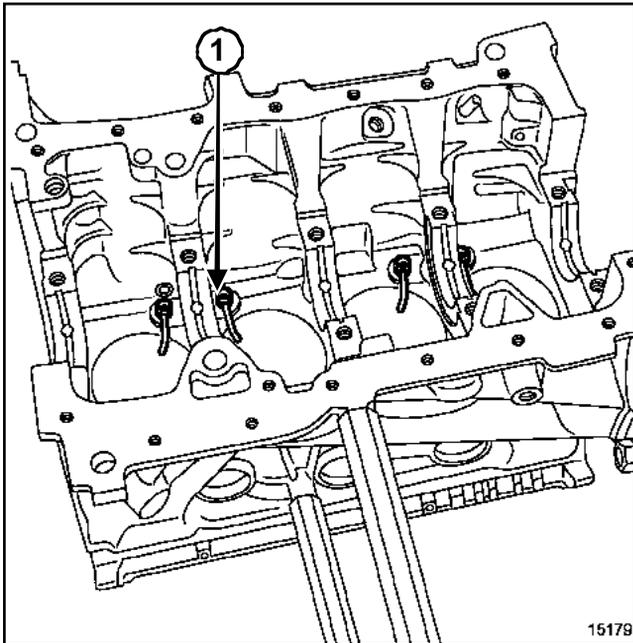
Piston base cooling jet: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1485	Tool for removing piston coolers
Mot. 1485-01	Tool for removing piston coolers

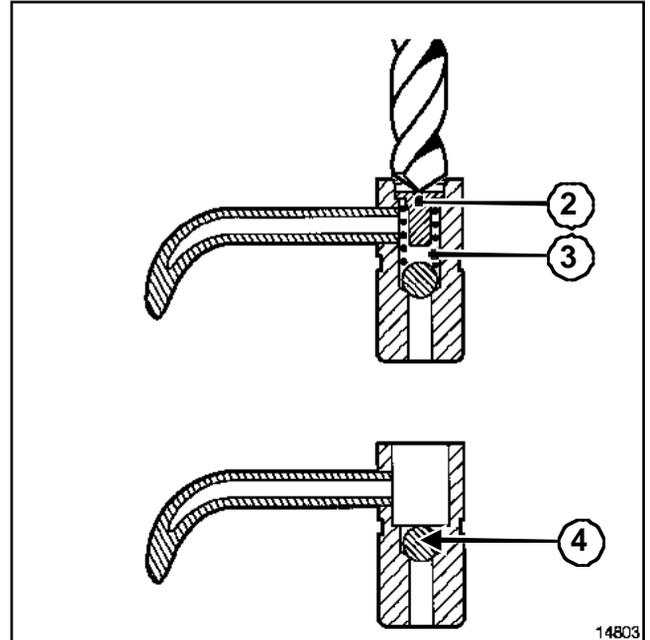
REMOVAL



15179

15179

- Drill the piston skirt cooling jets (1) using a 7 mm diameter drill bit.



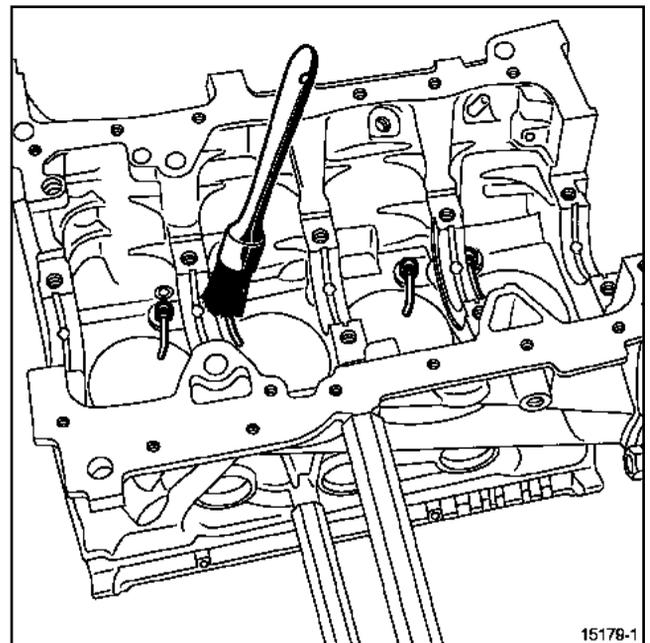
14803

14803

- Remove the spring stop (2) and the spring (3).

WARNING

To prevent swarf falling into the oil circuit, do not remove the ball (4).



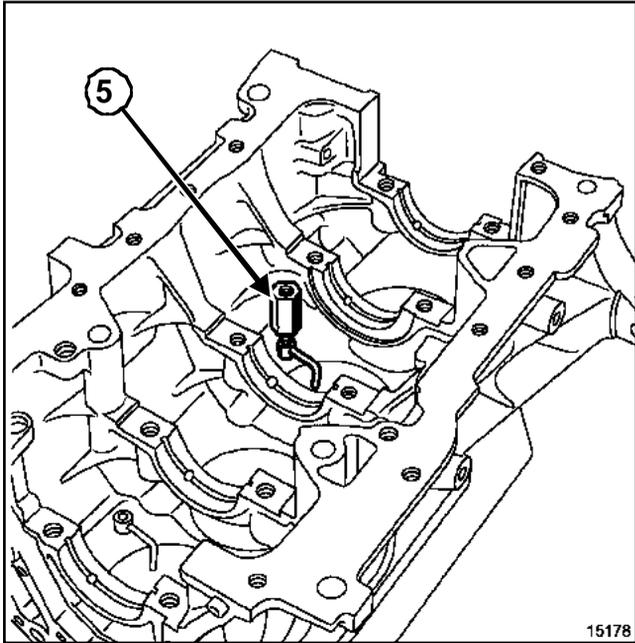
15178-1

15179-1

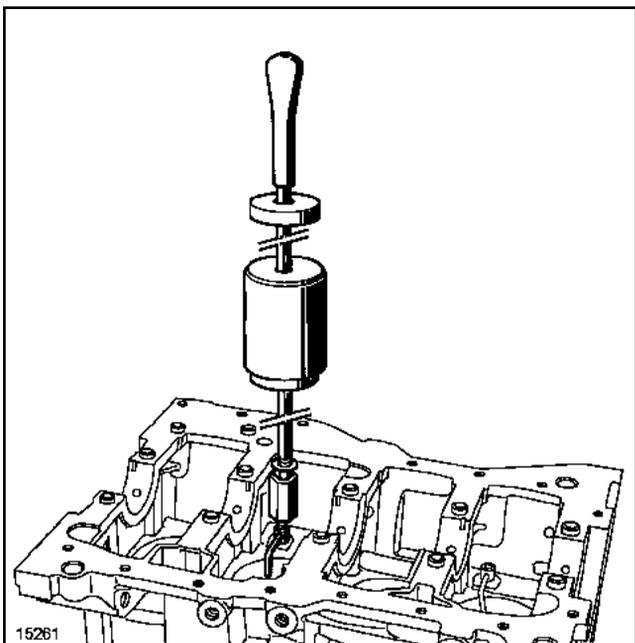
- Remove the swarf with a brush.

Piston base cooling jet: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Screw tool (Mot. 1485) or tool (Mot. 1485-01)(5) into the cooling jets with a 6 mm Allen key that slides inside the tool.



- Screw the slide hammer onto tool (Mot. 1485) or tool (Mot. 1485-01).
- Remove the cooling jets.

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required

Mot. 1493 Crankshaft bearing bush centring tool (F engines)

Mot. 1492 Tool for fitting con rod bearings

Equipment required

piston ring compressor

Tightening torques

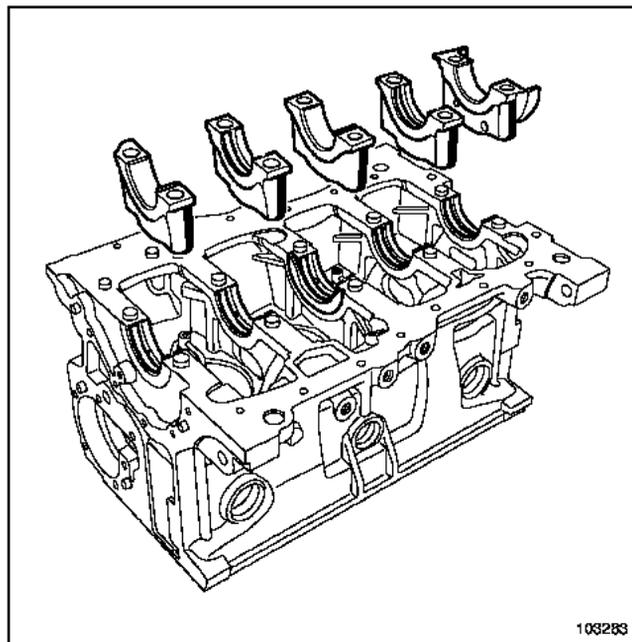
big end cap bolts **20 Nm + 40° ± 6°**

I - REFITTING MAIN BEARING SHELLS

1 - Identifying the crankshaft bearing shells

- To identify the correct bearing shells (see **Engine peripherals: Technical specifications**).

2 - Direction of fitting for crankshaft bearing shells



103283

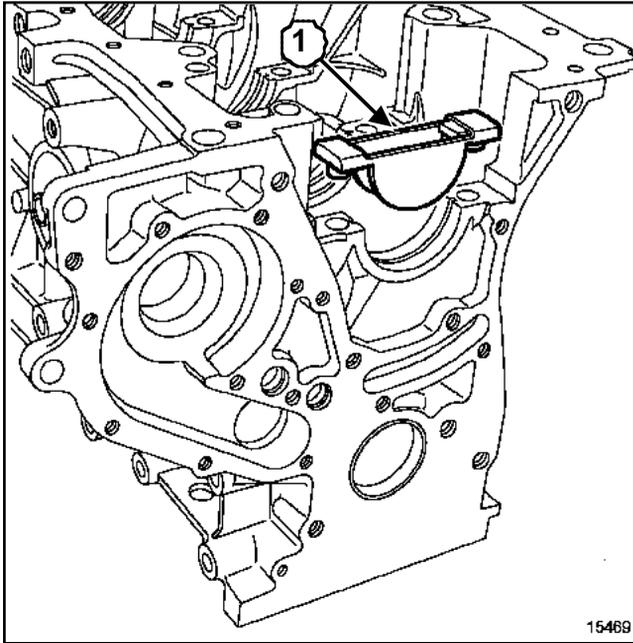
- Fit the grooved bearing shells on all the cylinder block bearings.
- Fit bearing shells without grooves in all the bearing caps.

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

3 - Fitting the bearing shells on the cylinder block

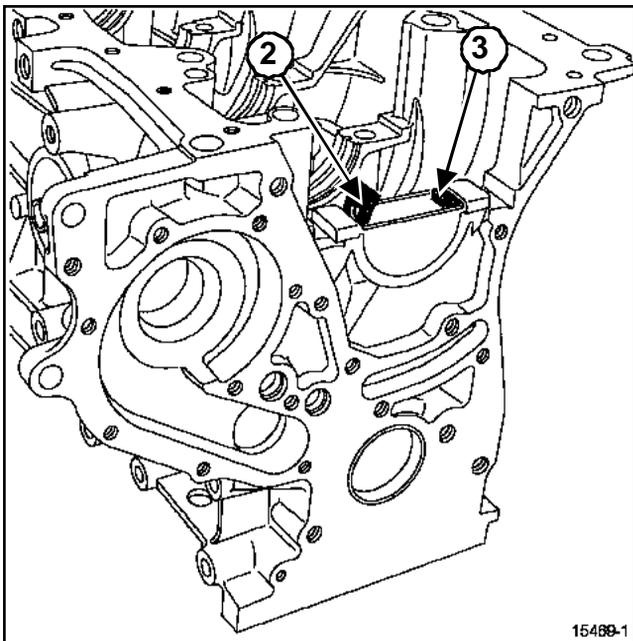
On the cylinder block



15469

15469

- Fit tool (**Mot. 1493**) at (1) on the cylinder block.

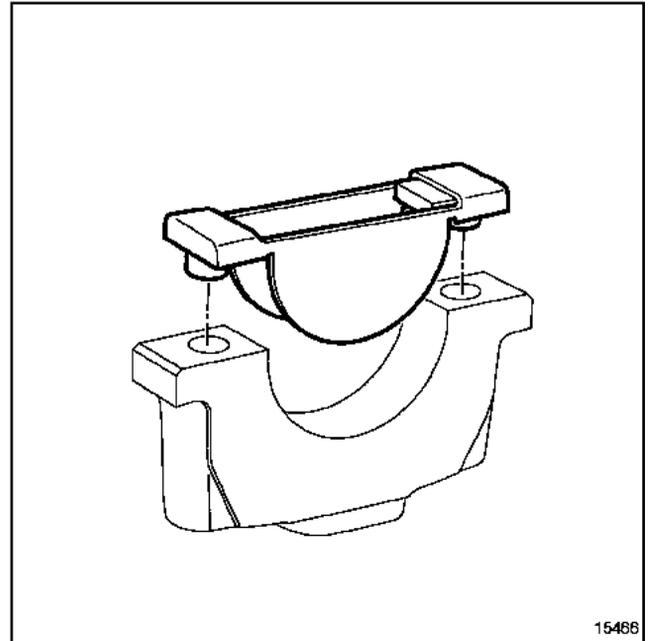


15469-1

15469-1

- Place the grooved bearing shell in tool (**Mot. 1493**).
- Press at (2) until the bearing shell reaches the end of tool (**Mot. 1493**) at (3).

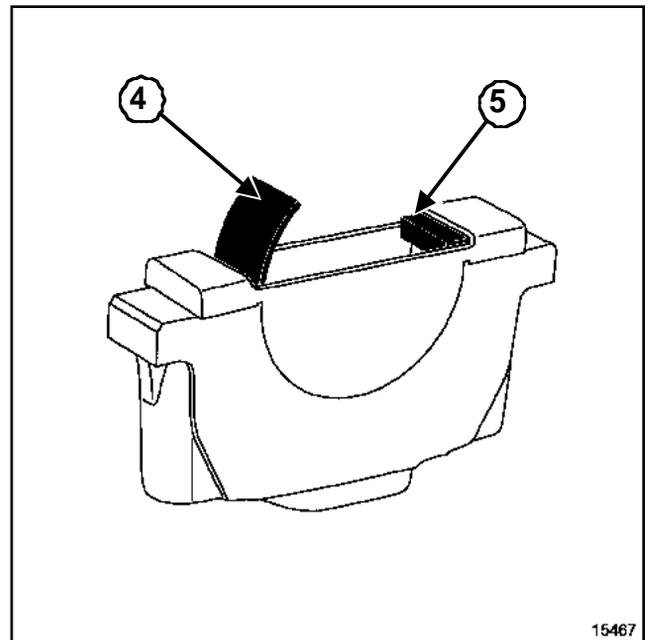
4 - Fitting the bearing shells onto the bearing caps



15466

15466

- Fit tool (**Mot. 1493**) in place on the bearing.



15467

15467

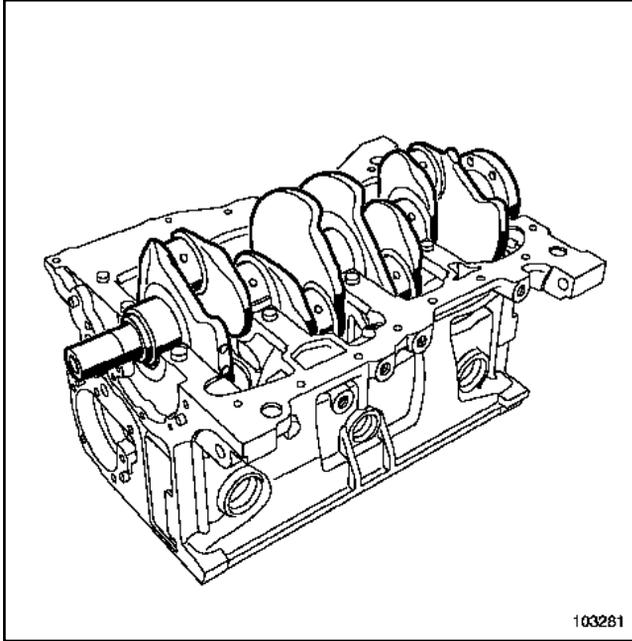
- Place the non-grooved bearing shell in tool (**Mot. 1493**).
- Press at (4) until the bearing shell reaches the end of tool (**Mot. 1493**) at (5).

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

II - REFITTING THE CRANKSHAFT

- Oil the crankshaft bearings (only the surface that comes into contact with the crankshaft).

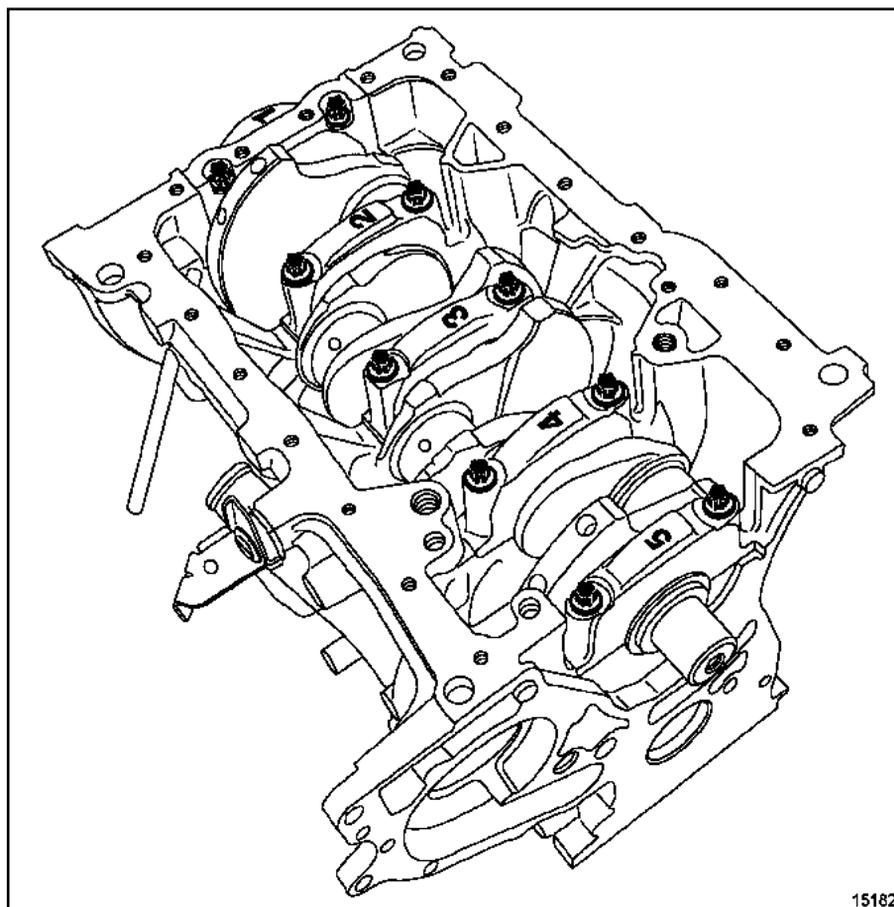


103281

- Refit:
 - the crankshaft,
 - the crankshaft bearing side shims **no. 2** (grooves on the crankshaft side).

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



15182

15182

- Replace the main bearing cap mounting bolts with new ones
- Refit the crankshaft bearing caps, except for bearing **no. 1** at the flywheel end.
They are numbered from **1 to 5**.
- Screw down the crankshaft bearing, tightening the two mounting bolts alternately.
- Tighten to torque and angle the **crankshaft bearing cap bolts (20 Nm + 62° ± 4°)**.

III - FITTING BEARING NO. 1 WITH SILICONE INJECTION

-

WARNING

The material must be injected within approximately **5 min** to avoid the mixture polymerizing in the syringe.

WARNING

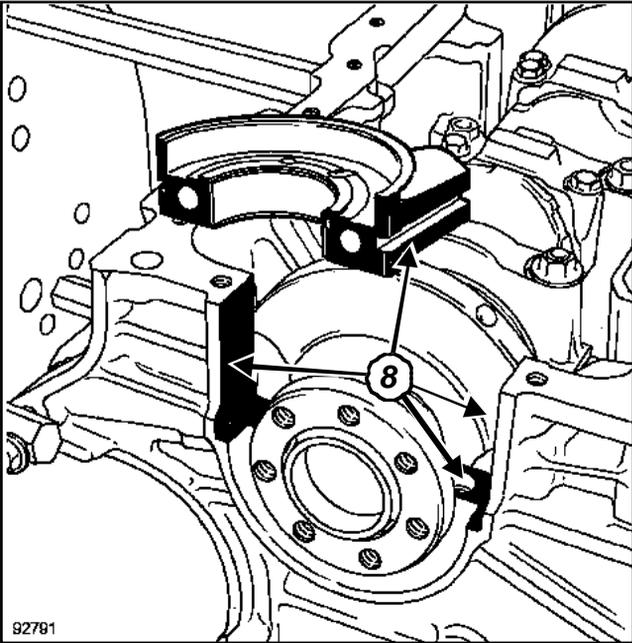
The gasket faces on the cylinder block and bearing cap **no. 1** must be clean, dry and free from grease (avoid finger marks).

Note:

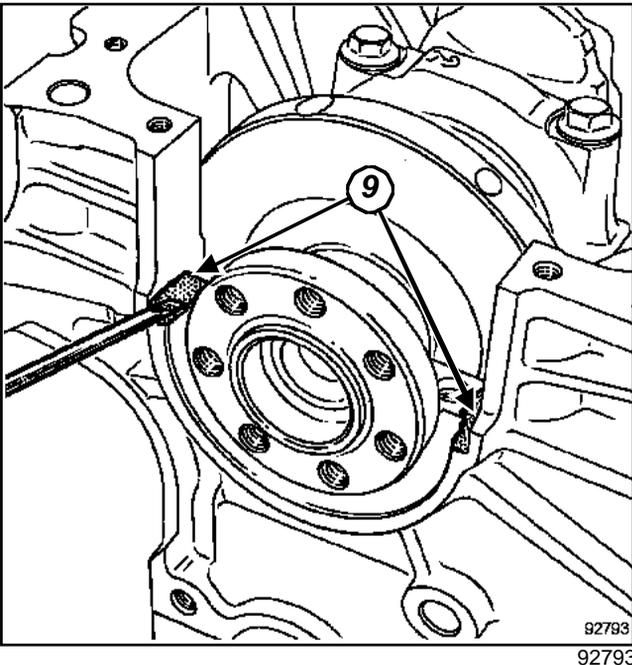
Applying excess sealant could cause it to be squeezed out when parts are tightened. The sealing compound/fluid mixture can cause damage to certain components (engine, radiator, etc.).

Running gear Refitting

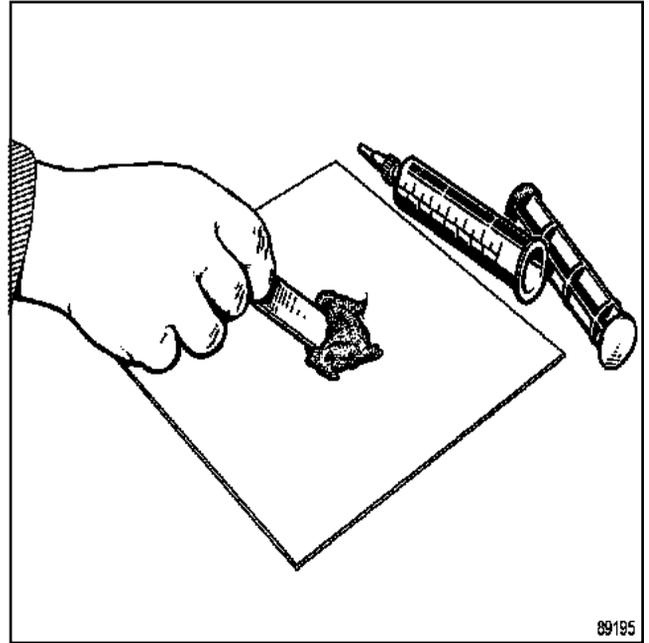
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



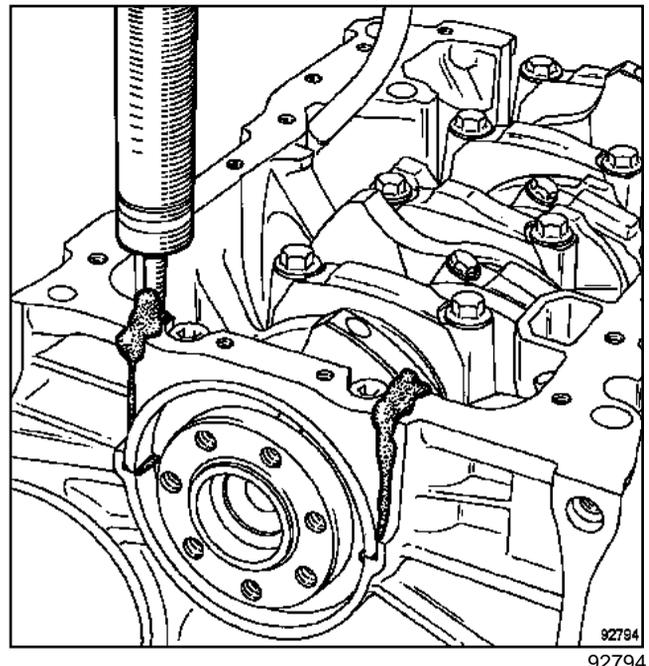
- Degrease the cylinder block and crankshaft bearing cap mating surfaces (8) very thoroughly using a cloth soaked in cleaning solvent.
- Allow to dry.



- Coat the lower mating faces on the cylinder block with a thin layer at (9) of RHODORSEAL 5661.
- Fit crankshaft bearing cap no. 1 and tighten to torque and angle the bolts ($20 \text{ Nm} + 62^\circ \pm 4^\circ$).



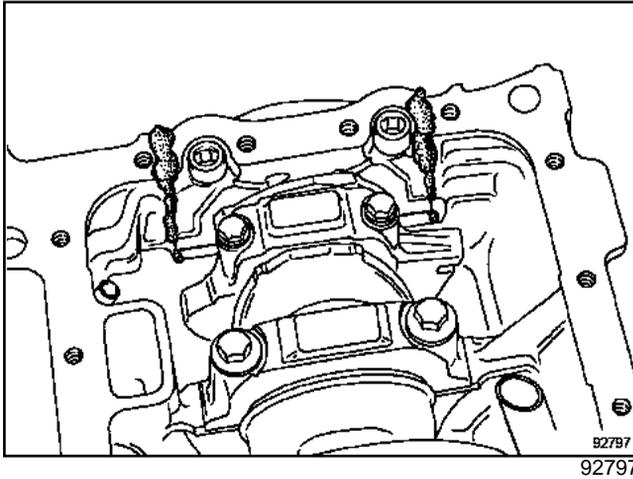
- Mix 45 ml of RHODORSEAL 5661 (approximately half of a 100 g tube) with half of the tube of hardener, using the mixing stick to obtain a uniform, slightly pink mixture.



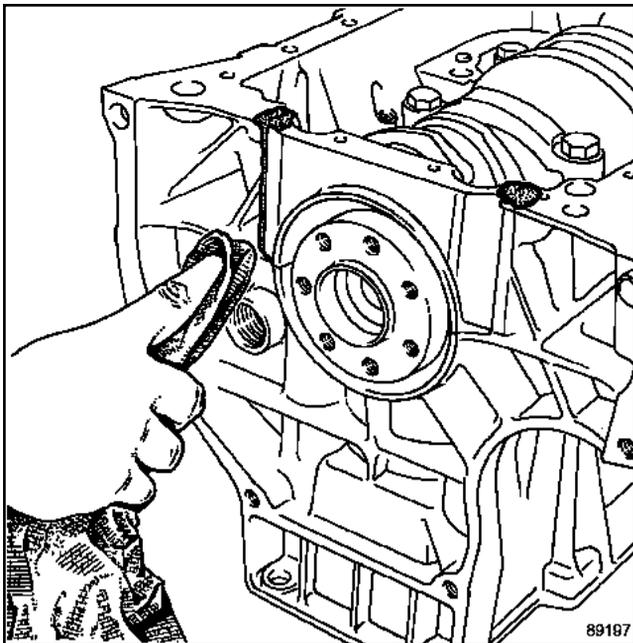
- Put the mixture into the syringe with the help of the mixing stick.
- Inject into the crankshaft bearing cap grooves.

Running gear Refitting

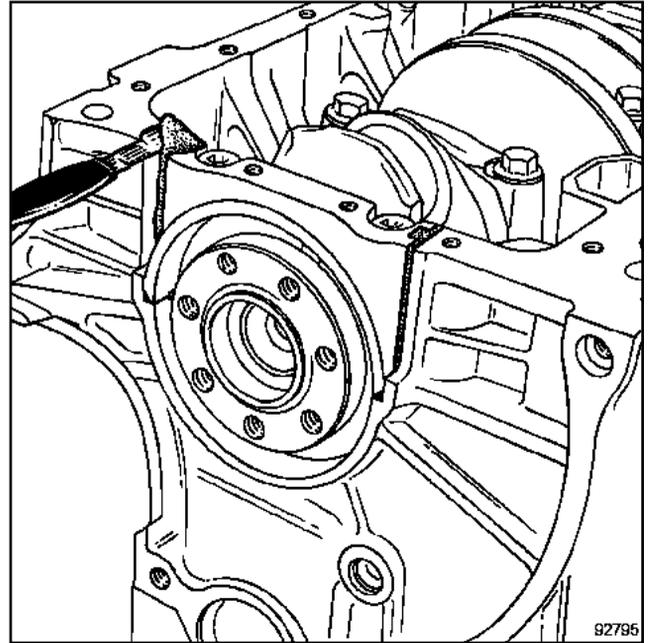
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Allow the mixture to run out slightly on either side of the crankshaft bearing cap grooves to be sure that the injected mixture has totally filled the sealing grooves.

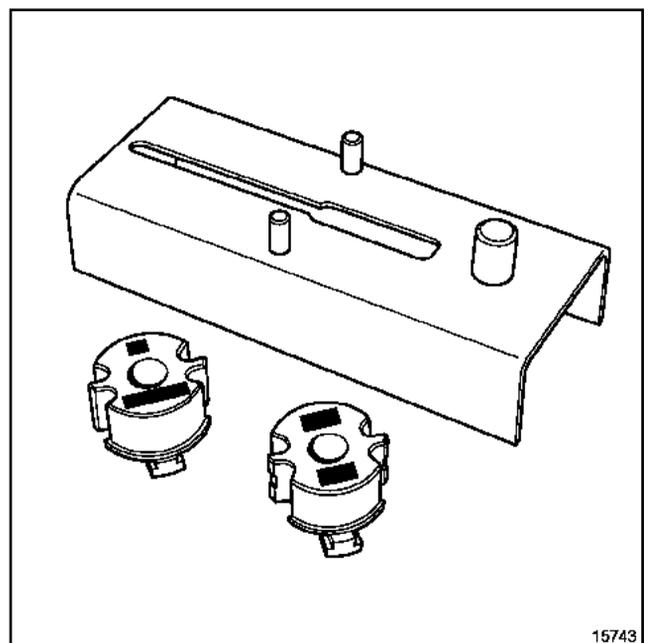


- Use a cloth to wipe off the excess mixture, both inside and outside the cylinder block.



- 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.

IV - FITTING THE CON ROD BEARING SHELLS

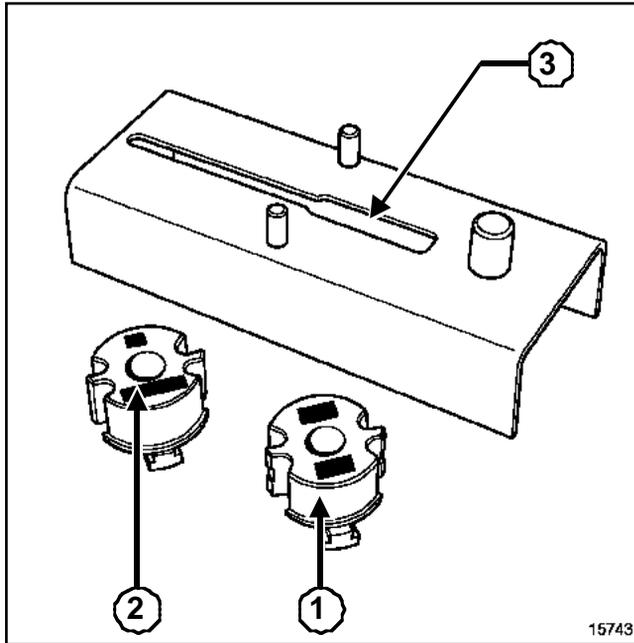


- The bearing shells are fitted using tool (**Mot. 1492**).

Running gear Refitting

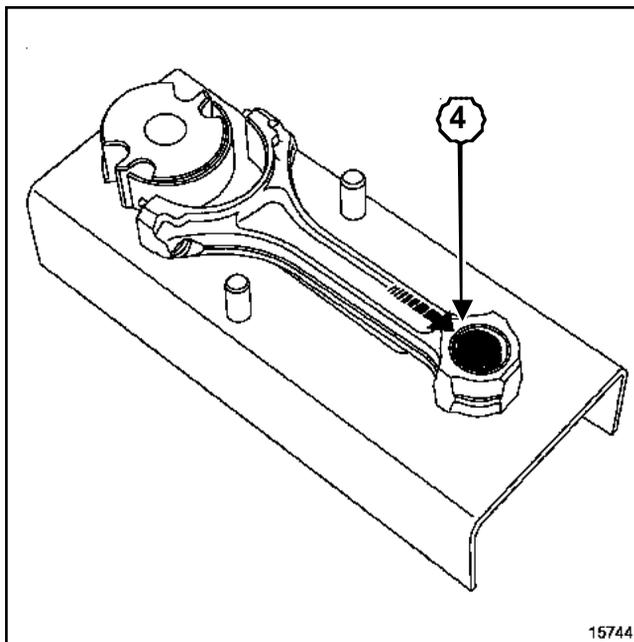
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

On the con rod body



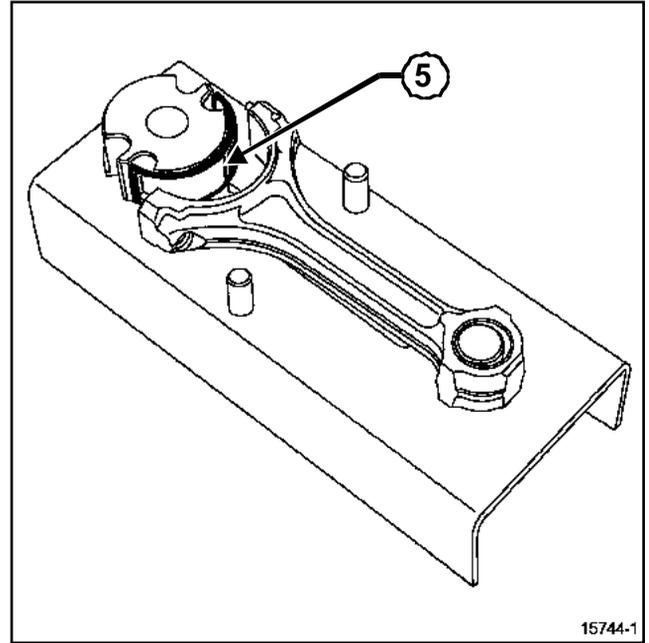
15743
15743

- Select the bearing shell support (1) corresponding to the engine (engine type marking (2) on the support).
- Slide the bearing shell support into the groove (3) of the base.



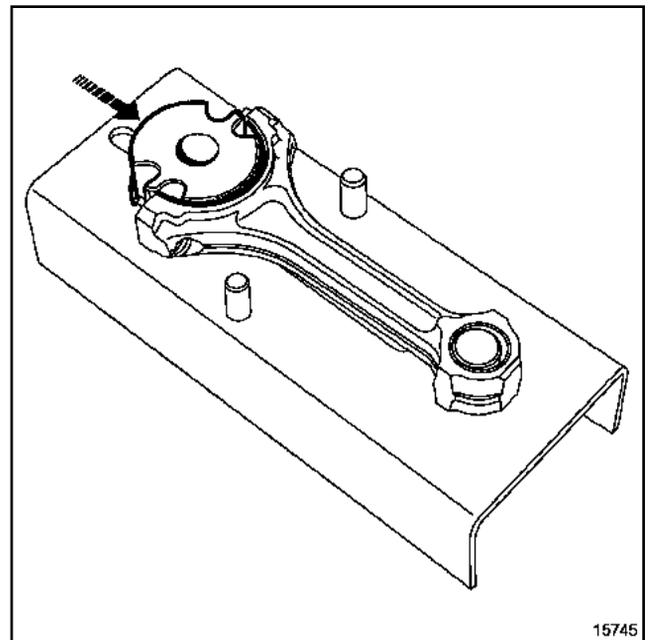
15744
15744

- Place the con rod on the stand.
- Check that the lower part (4) of the little end is in contact with the centring pin.



15744-1
15744-1

- Place the main bearing shell (5) on the main bearing shell holder.



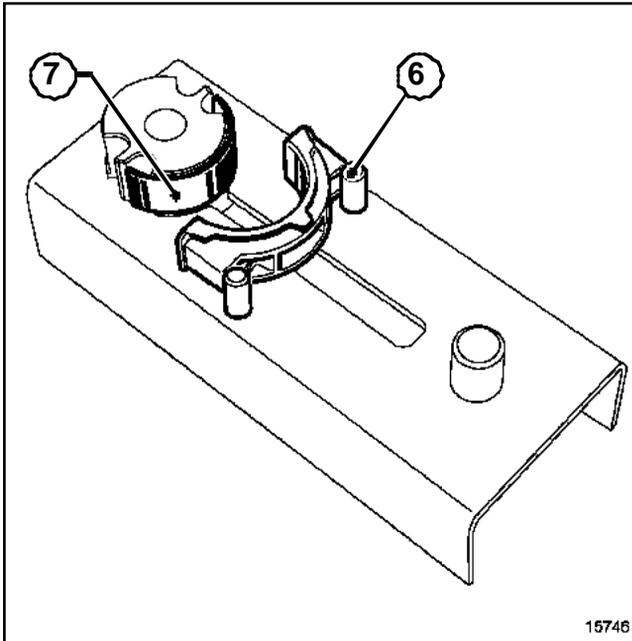
15745
15745

- Push on the bearing shell holder (in the direction of the arrow) until the shell is hard up against the body of the connecting rod.
- Withdraw the shell holder and repeat the operation for the other connecting rods.

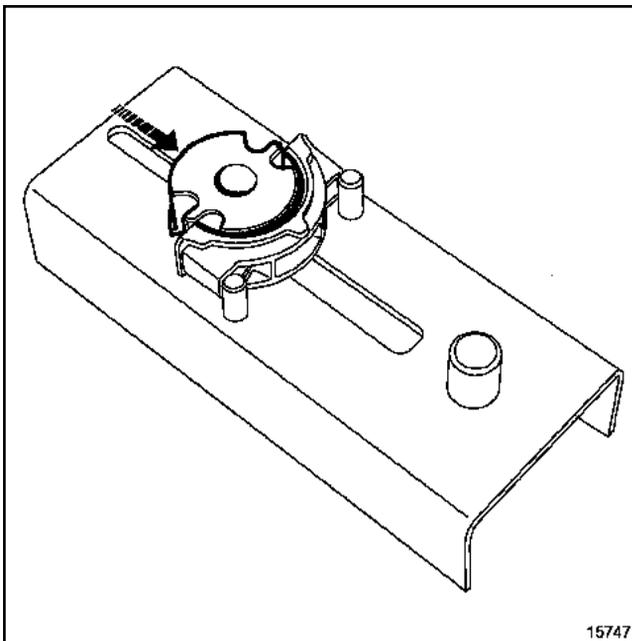
Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

On the con rod cap



- Press the con rod cap against the base pins (6).
- Mount the bearing shell (7) on the bearing shell support.

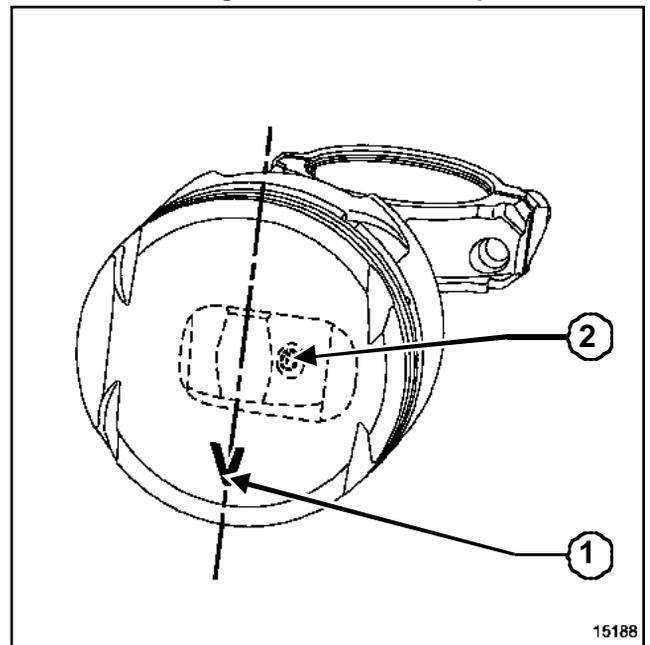


- Push the bearing shell support (in the direction of the arrow) until it comes to the end of the con rod cap.

V - CON ROD / PISTON ASSEMBLY

- If a piston must be replaced, check the piston class with that of the barrel in the cylinder block.
See table in **Engine peripherals: Technical specifications**.
- If a piston is reused, check the matching of the piston/con rod marks made by the operator during disassembly.
- The pistons are marked with a Λ at 1 stamped on their crowns to indicate the flywheel side.
- Lubricate the gudgeon pin with engine oil.

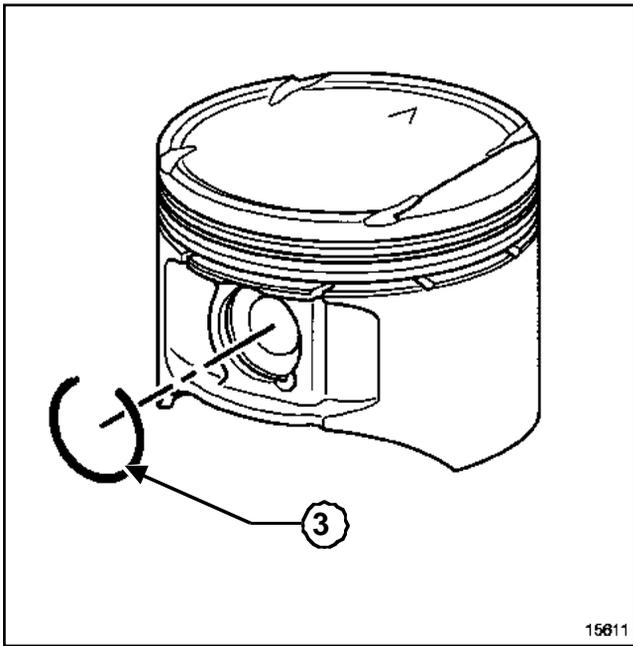
Direction of fitting for con rod on the piston



- Put the Λ (1) downwards with the little end oil hole (2) to the right of the vertical axis.

Running gear Refitting

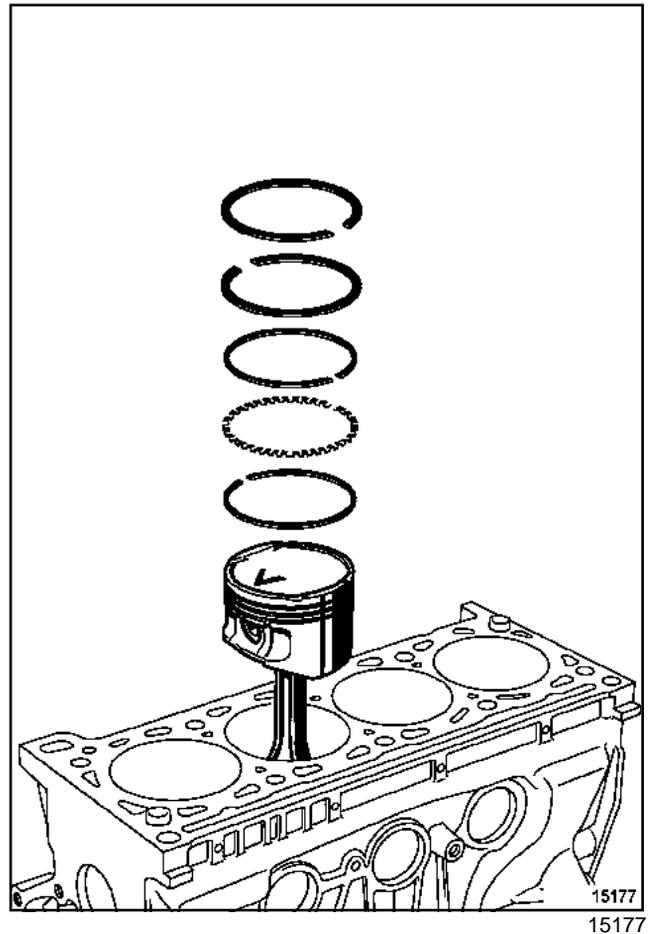
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Position the stop ring gap (3) at the top, at $\pm 45^\circ$ to the vertical axis of the piston.

VI - FITTING THE PISTON RINGS

- The piston rings, set to their original settings, must be free within their grooves.
- Observe the direction of fitting for piston rings, with the **TOP** marking upwards.



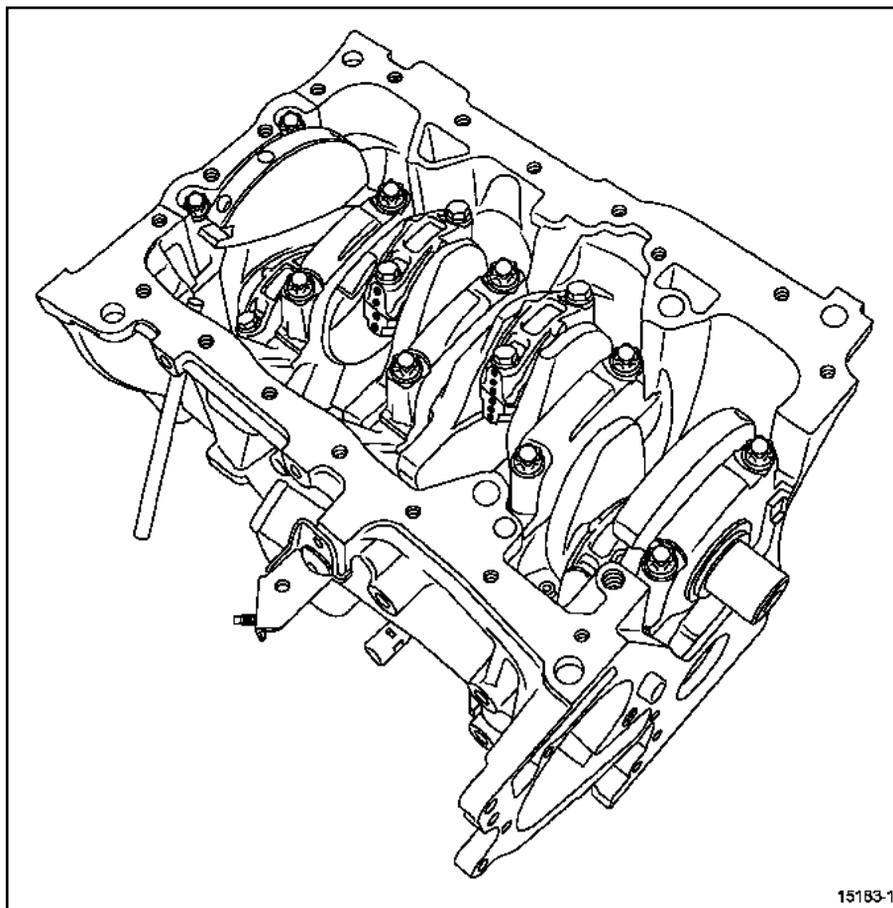
- Arrange the compression ring, sealing ring and oil scraper ring in the correct order and stagger the end gaps at intervals of 120° .
- Arrange the oil scraper ring components (rail/spring expander/rail) in the correct order and stagger the end gaps at intervals of 120° .

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

VII - PISTON/CON ROD ASSEMBLY

- Before fitting, oil:
 - the cylinder barrel,
 - the piston rings,
 - the piston skirt.
- Position the crankpin at Bottom Dead Centre to avoid hitting the crankpin with the big end.
- Refit the piston/con rod assemblies using the **piston ring compressor** having first verified:
 - the matching of piston with the cylinder barrel (no. 1, flywheel end).
 - the piston/con rod orientation; **Λ** marking, flywheel end.



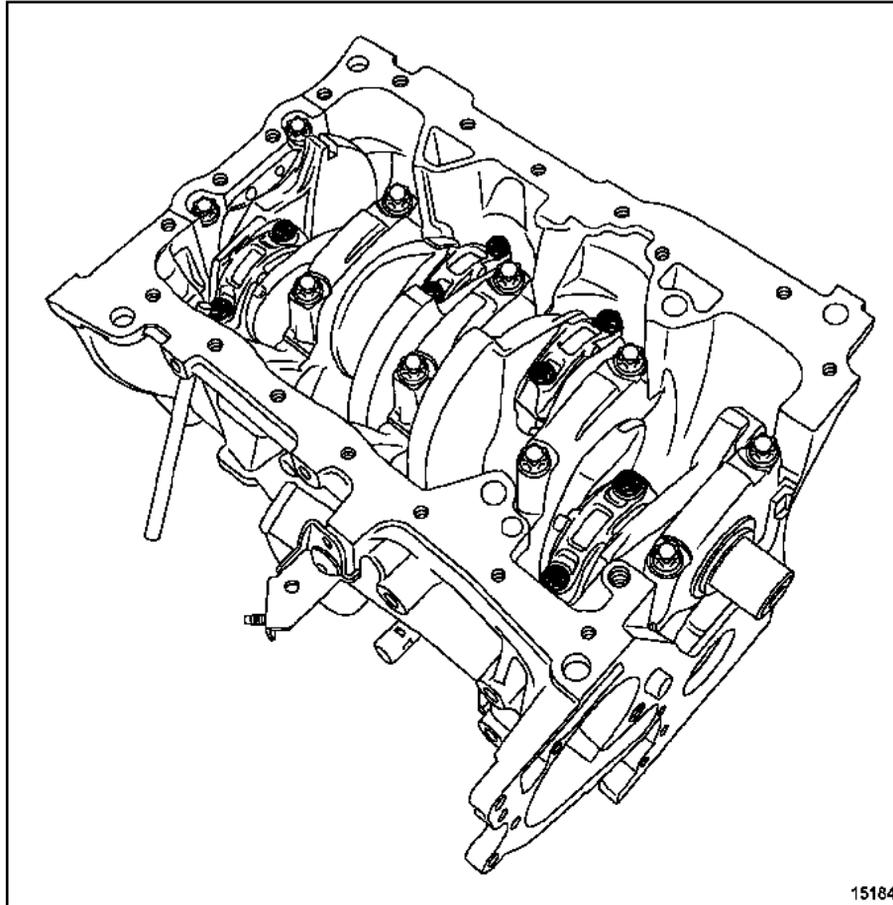
15183-1

15183-1

- Oil the crankpins.
- Fit the con rods onto the crankshaft crankpins.
- Fit the con rod caps, in accordance with the matching carried out by the operator at the time of dismantling.

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



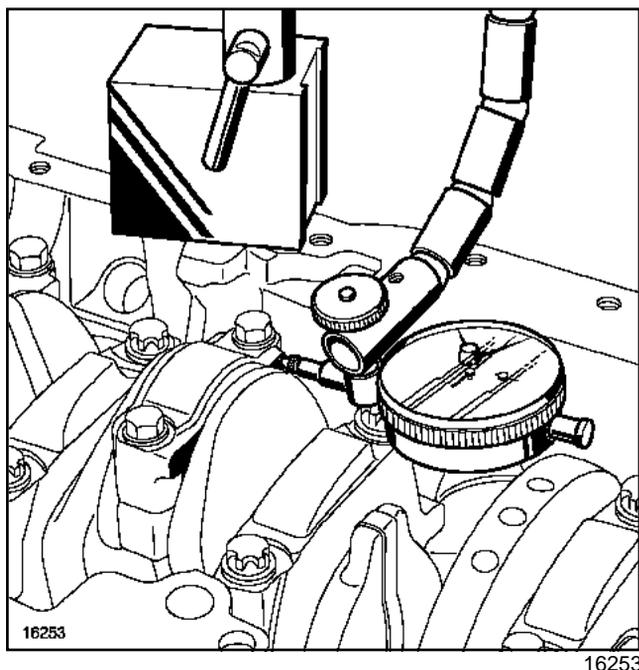
15184

15184

- Fit new con rod cap mounting bolts.
- Screw down the con rod cap, tightening the two mounting bolts alternately.
- Tighten to torque and angle the **big end cap bolts** ($20 \text{ Nm} + 40^\circ \pm 6^\circ$).

Running gear Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Check the big end lateral play.

It must be between **0.22** and **0.40** mm.

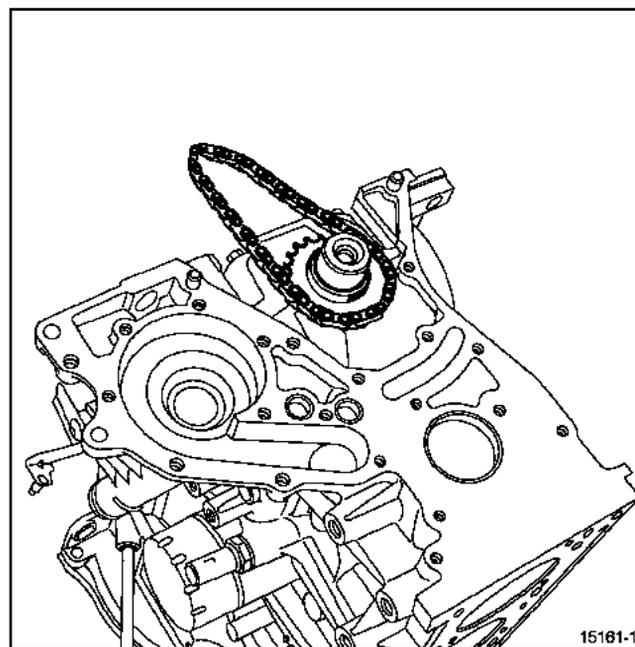
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 991-01	Flywheel end crankshaft seal fitting tool (F engines)
Mot. 990-03	Timing gear end crankshaft seal fitting tool
Mot. 1677	Flywheel locking tool (F engines)
Emb. 1604	Clutch compression tool for refitting the play adjustment system
Emb. 1518	Set of clutch disc centring mandrels

Tightening torques 	
closure panel bolts	15 Nm
water pump bolts	17 Nm
water pump pulley bolts	20 Nm
pulley bolt	50 Nm
oil splash plate bolt	24 Nm
oil pump bolts	24 Nm
oil level sensor	16 to 24 Nm
threaded oil filter connector (with oil cooler)	55 to 60 Nm
threaded oil filter connector (without oil cooler)	10 to 20 Nm
pinking sensor	20 Nm
oil pressure sensor	30 Nm
oil filter	10 to 14 Nm
coolant inlet hose mounting bolts	9 Nm
single flywheel bolts	50 to 55 Nm

Tightening torques 	
Dual mass flywheel bolts	18 to 22 Nm + 50° ± 6°
M6 clutch pressure plate bolts	15 Nm ± 10%
M7 bolts	20 Nm ± 10%
M8 clutch pressure plate bolts	25 Nm ± 10%

REASSEMBLING

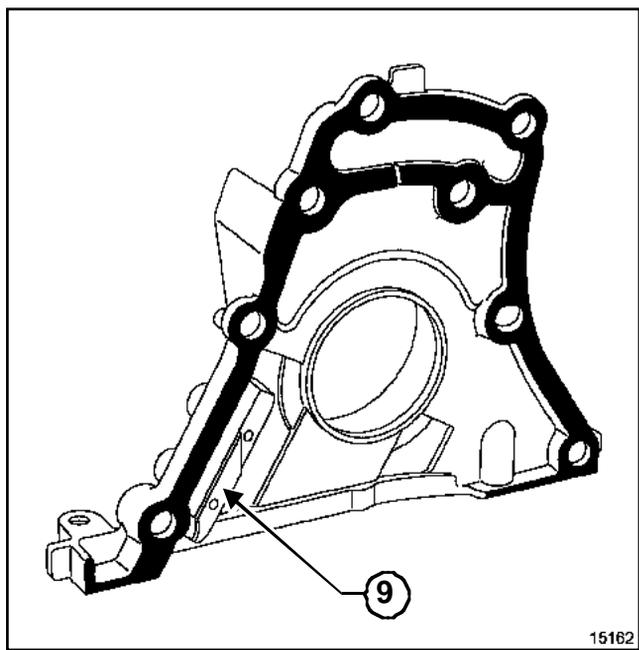


Refit:

- the oil pump drive sprocket,
- the oil pump chain.

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

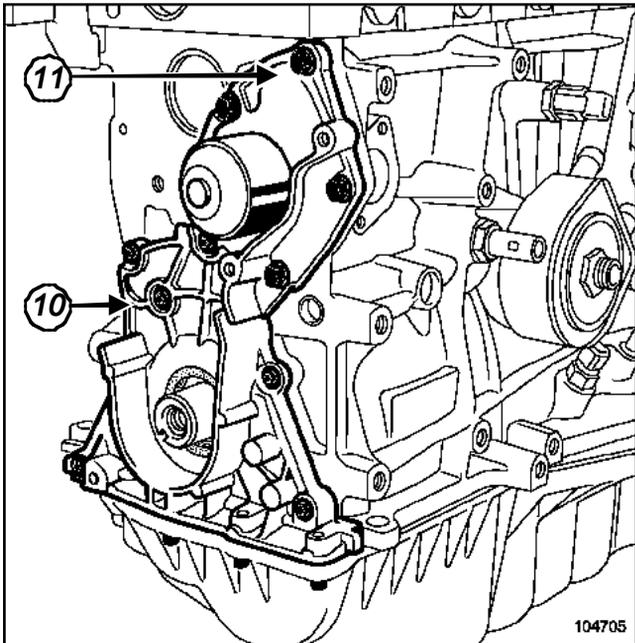


- Check the presence of the timing chain glide shoe (9).

Cylinder block: Refitting

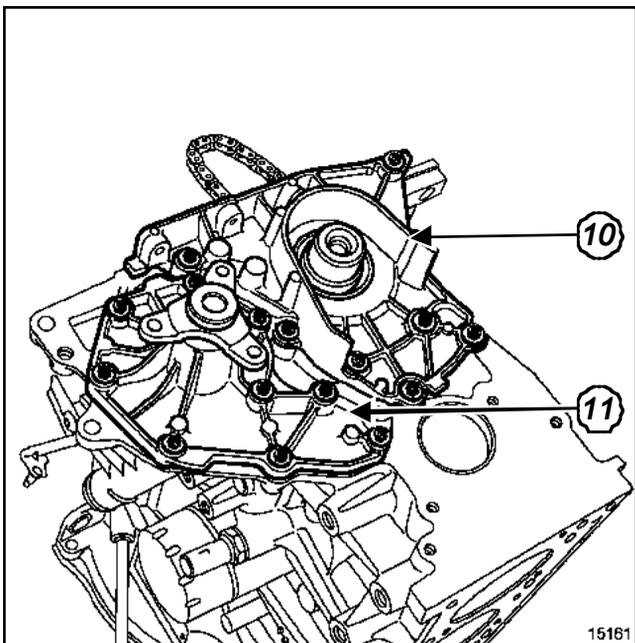
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

For engines fitted with a water pump driven by the timing belt.



104705
104705

For engines fitted with a water pump driven by the accessories belt.



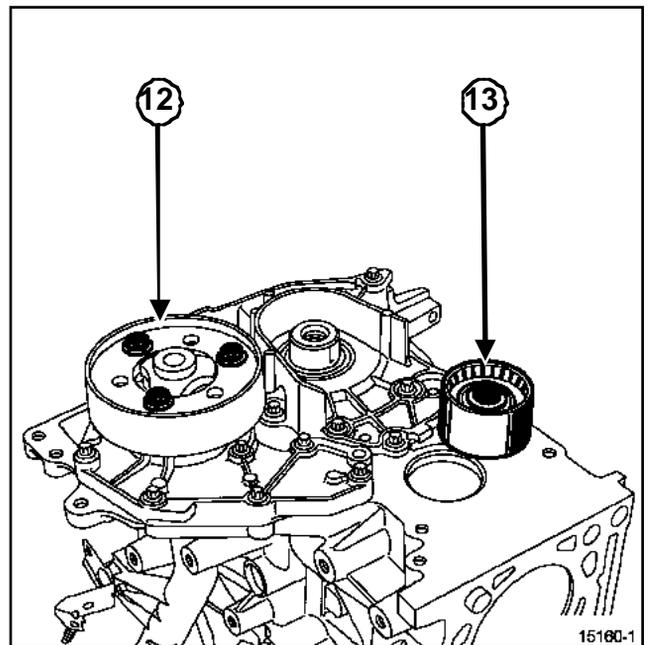
15161
15161

- Refit the closure panel (10), with a new gasket.

Note:

This type of seal sticks out from the closure panel. Never cut it, because the two projecting tabs provide sealing when the lower cover is fitted.

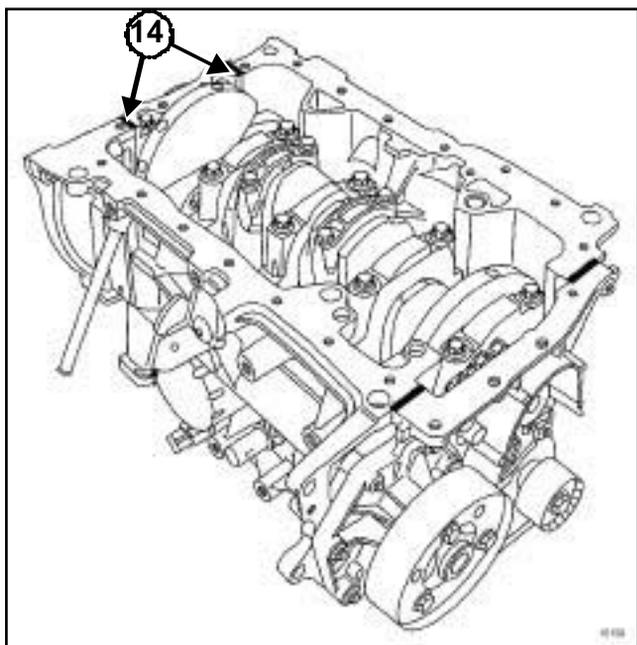
- Tighten to torque the **closure panel bolts (15 Nm)**.
- Refit the water pump (11), with a new gasket.
- Tighten to torque the **water pump bolts (17 Nm)**.



15160-1
15160-1

- Refit the water pump pulley (12).
- Tighten to torque the **water pump pulley bolts (20 Nm)**.
- Refit the pulley (13).
- Tighten to torque the **pulley bolt (50 Nm)**.

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

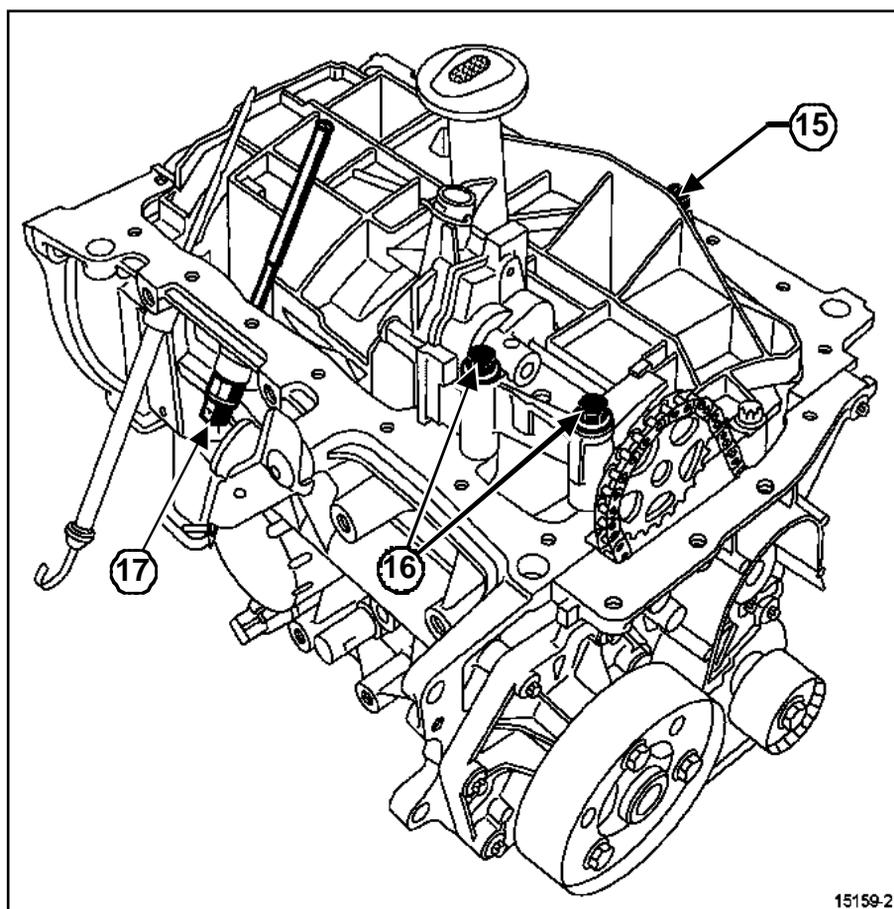


15159

- Put a drop of RHODORSEAL 5661 at (14) (on each side of bearing no. 1).

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



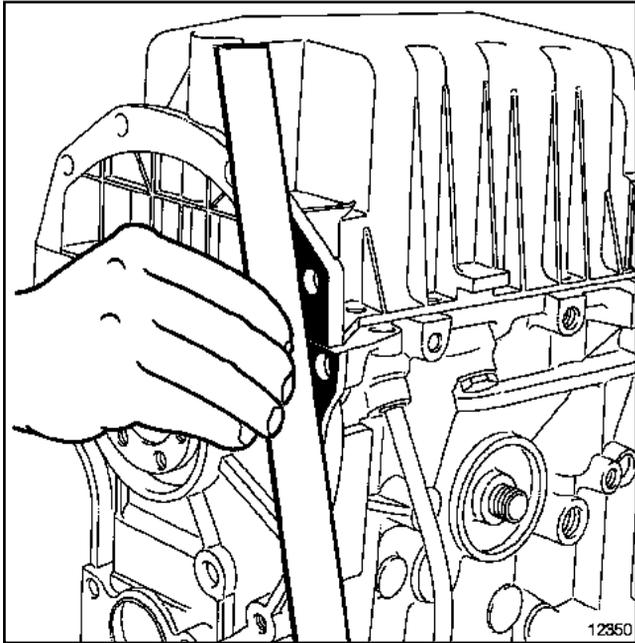
15159-2

15159-2

- Refit the oil splash plate.
- Tighten to torque the **oil splash plate bolt (24 Nm)(15)**.
- Refit the oil pump.
- Tighten to torque the **oil pump bolts (24 Nm)(16)**.
- Tighten to torque the **oil level sensor (16 to 24 Nm)(17)**.

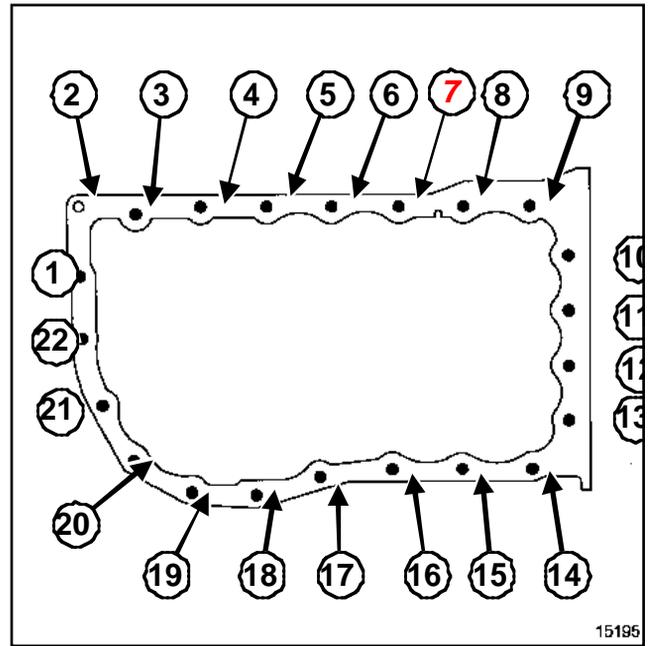
Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



12350

- ❑ Align the cylinder block and the sump carefully at the flywheel end to prevent the clutch housing being distorted when assembled to the gearbox.



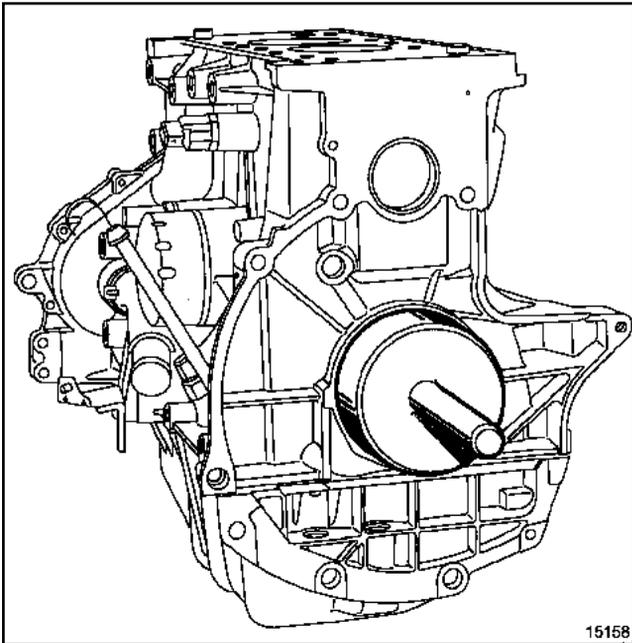
15195

- ❑ Refit the oil sump fitted with a new gasket, following the correct tightening procedure:
- ❑ Phase 1:
Tighten to torque and in order the following bolts (8)-(15)-(4)-(19)-(11)-(12) to (18 Nm).
- ❑ Phase 2:
Tighten to torque and in order the following bolts (10)-(13)-(9)-(14)-(8)-(15)-(7)-(16)-(6)-(17)-(5)-(18)-(3)-(20)-(2)-(21)-(1)-(22)(15 Nm).

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

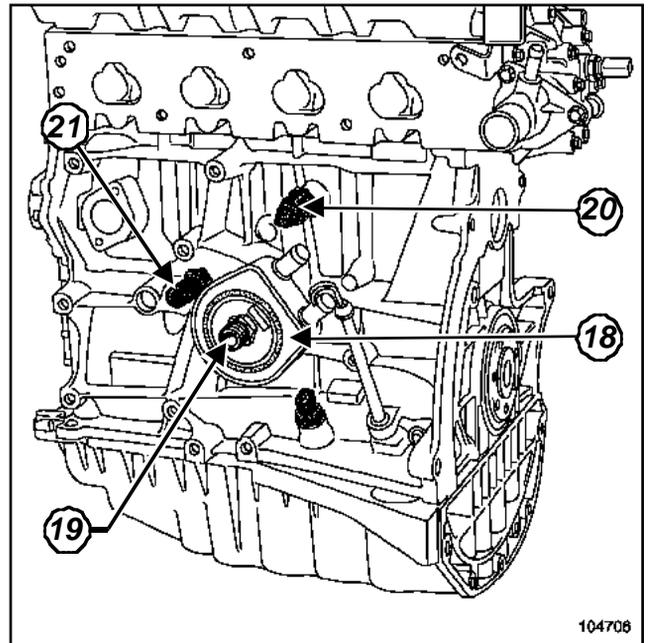
Fitting the crankshaft seals



15158

15158

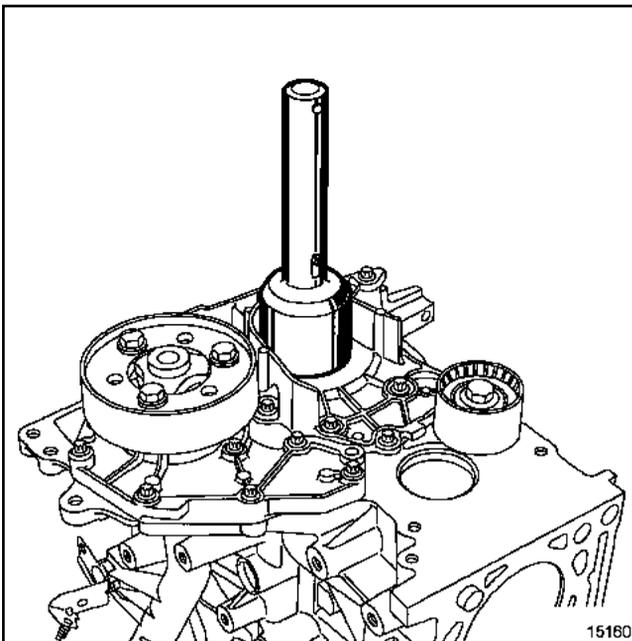
- Fit the seal on the flywheel end using tool (**Mot. 991-01**).



104706

104706

- Refit the oil cooler (**18**) (if fitted).
- Tighten to torque:
 - the threaded oil filter connector (with oil cooler) (**55 to 60 Nm**)(19),
 - the threaded oil filter connector (without oil cooler) (**10 to 20 Nm**),
 - the pink sensor (**20 Nm**)(20),
 - the oil pressure sensor (**30 Nm**)(21).



15180

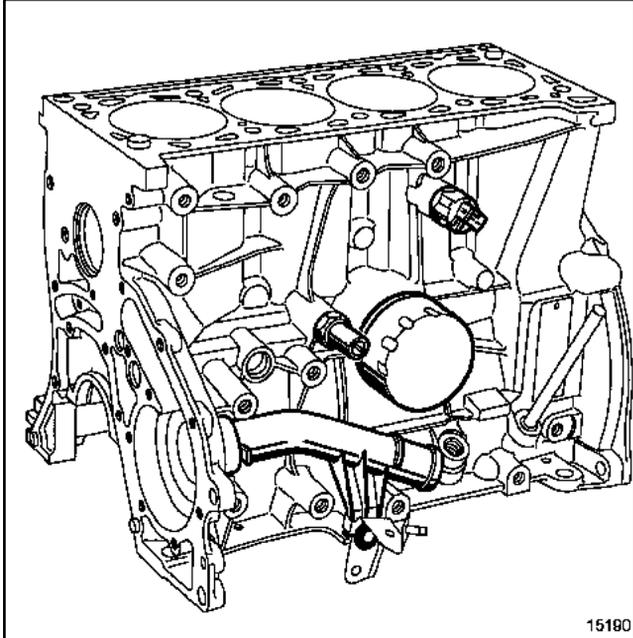
15160

- Fit the seal on the timing end using tool (**Mot. 990-03**).

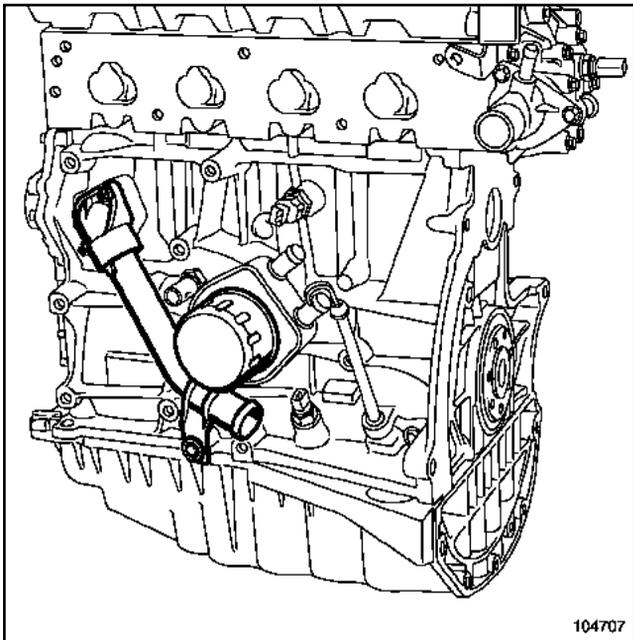
Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

For engines fitted with a water pump driven by the accessories belt.

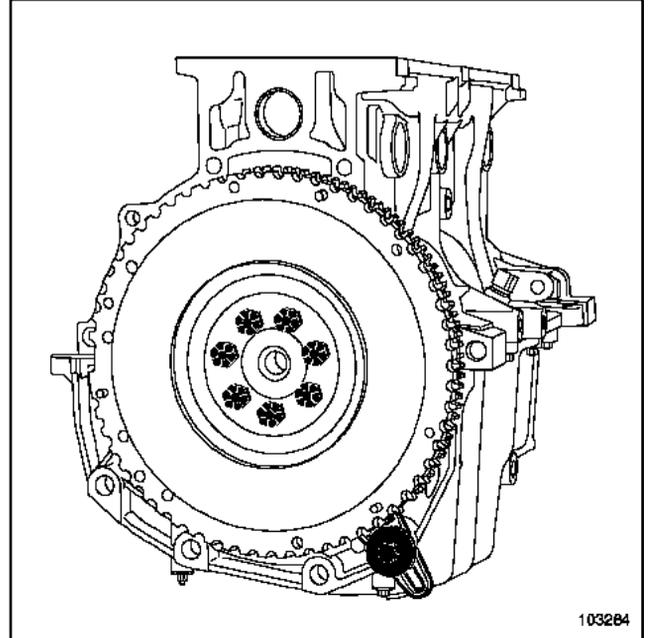


For engines fitted with a water pump driven by the timing belt.



- Fit a new oil filter.
- Tighten to torque the **oil filter (10 to 14 Nm)**
- Refit the coolant inlet hose, with a new seal.
- Torque tighten the **coolant inlet hose mounting bolts (9 Nm)**.

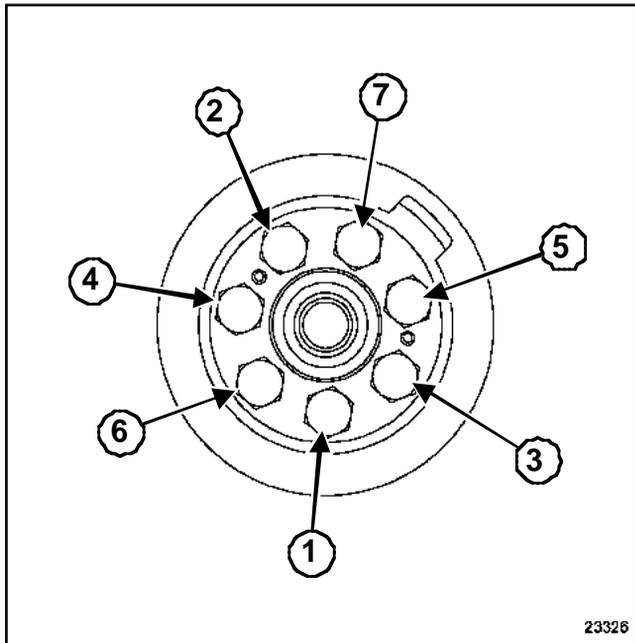
REFITTING THE FLYWHEEL



- Replace the flywheel mounting bolts.
- Screw in the bolts until they touch, then fit the flywheel blocking tool (**Mot. 1677**).

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

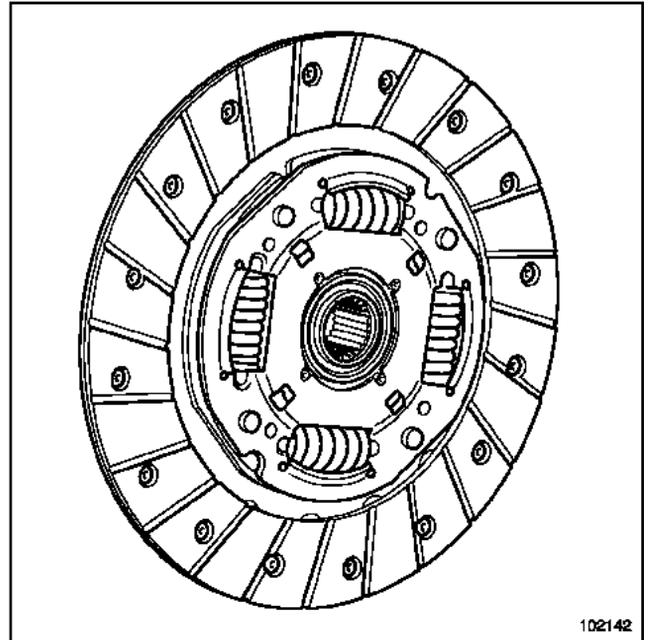


23326

23326

- Tighten to torque the flywheel mounting bolts in the correct order.
- single flywheel bolts (50 to 55 Nm)**
- Dual mass flywheel bolts (18 to 22 Nm + 50° ± 6°)**
- Degrease the face of the flywheel plate.

F4P, and 720 or 760 or 770 or 771 or 772 or 774 – F4R, and 276 or 700 or 712 or 714 or 720 or 730 or 732 or 736 or 738 or 740 or 744 or 746 or 780

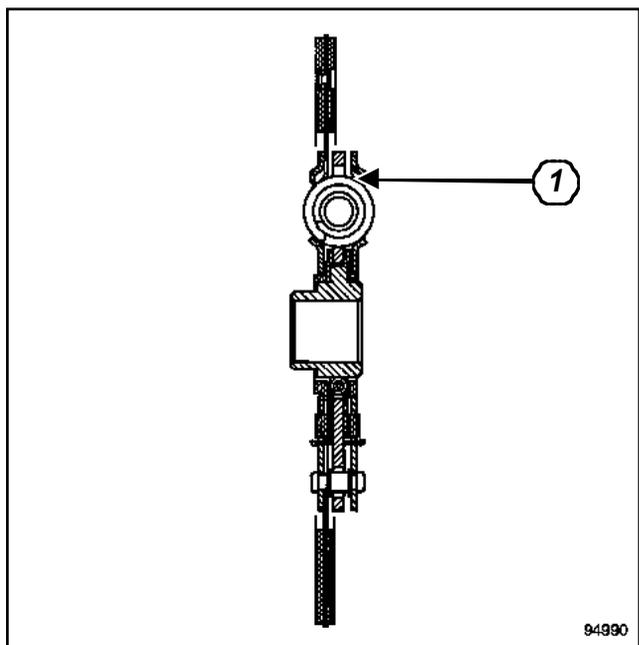


102142

102142

- Single flywheel engines are fitted with a spring clutch plate.

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



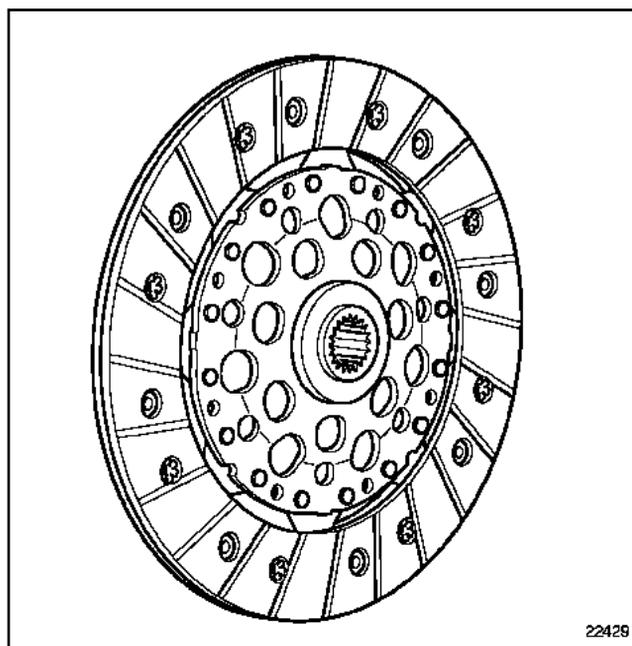
94990

94990

- Offer up the clutch plate.

The marking on the plate (1) is on the manual gear-box side.

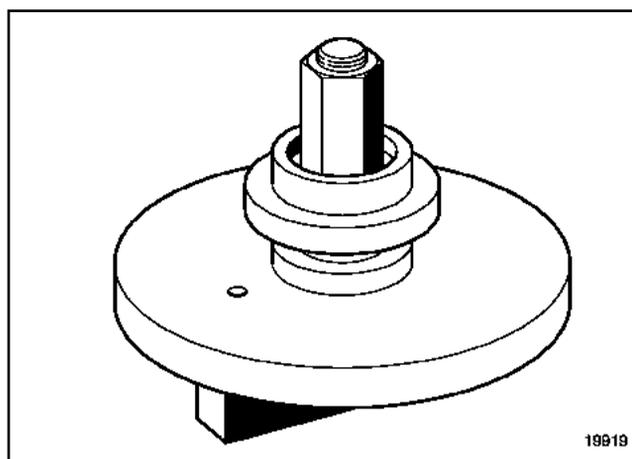
F4R, and 760 or 762 or 764 or 770 or 774 or 776 or 786 or 790 or 792 or 794 or 796



22429

22429

- A clutch plate without springs is fitted to engines which have a dual-mass flywheel.



19919

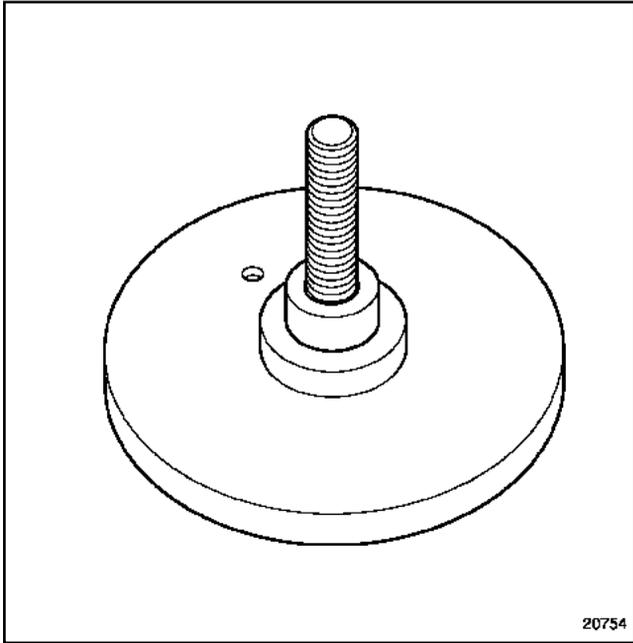
19919

-

Note:

Compress the clutch plate for clutches with automatic play compensation using tool (**Emb. 1604**).

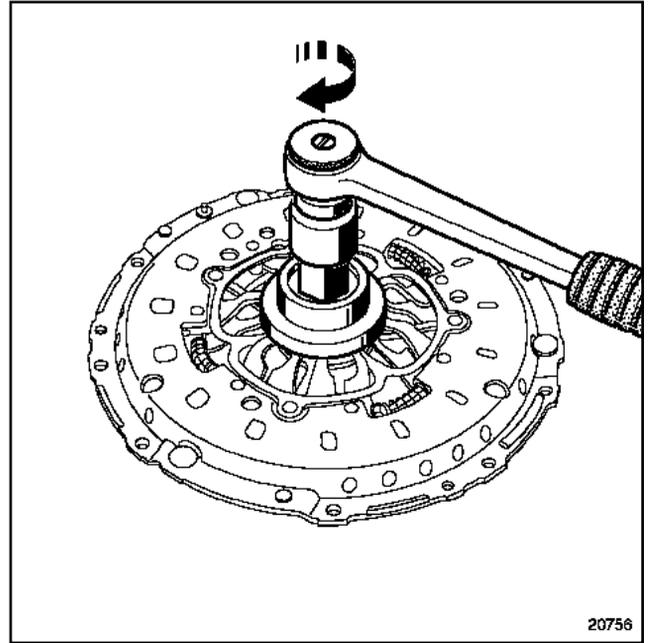
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



20754

20754

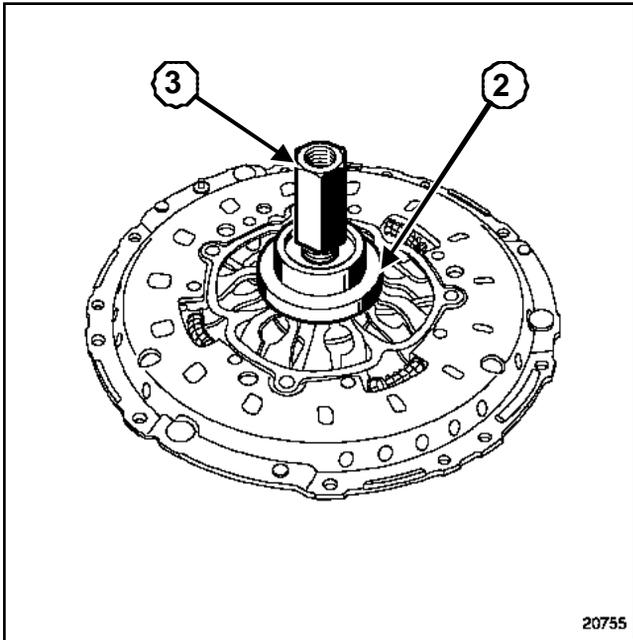
- Place the base of the tool (**Emb. 1604**) in a vice.



20756

20756

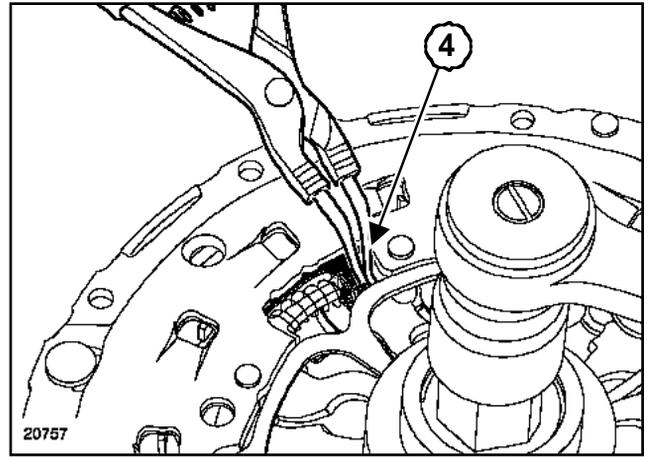
- Screw up the nut (**3**) until it is tight.



20755

20755

- Mount the pressure plate on the base, then fit the ball thrust bearing (**2**) and the nut (**3**).



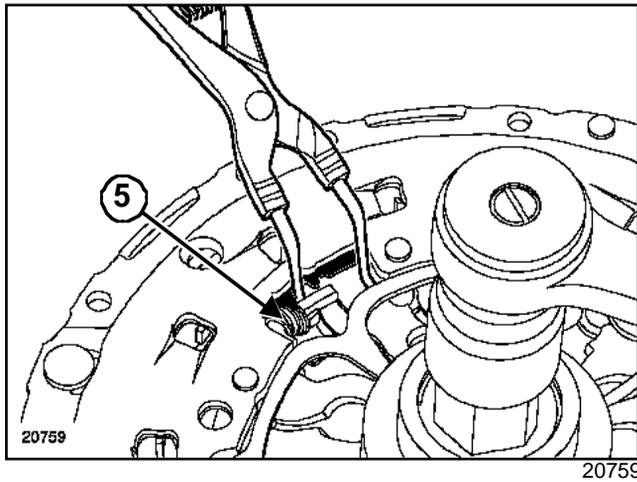
20757

20757

- Insert the circlip pliers at (**4**).

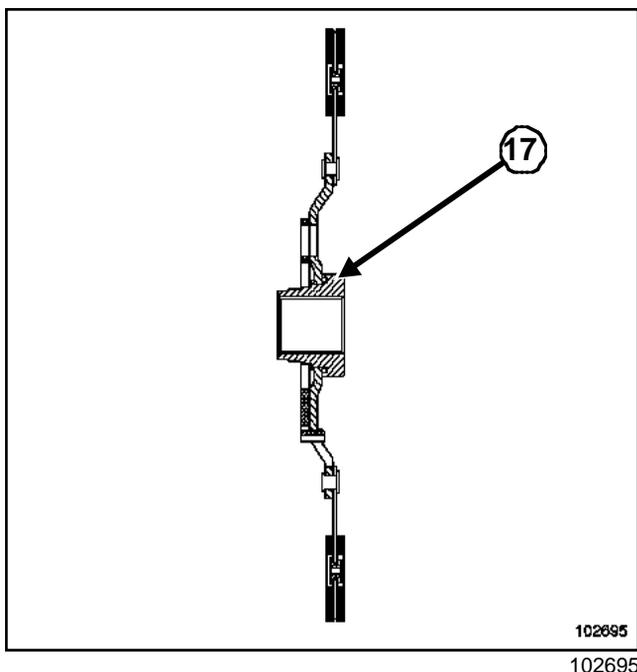
Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



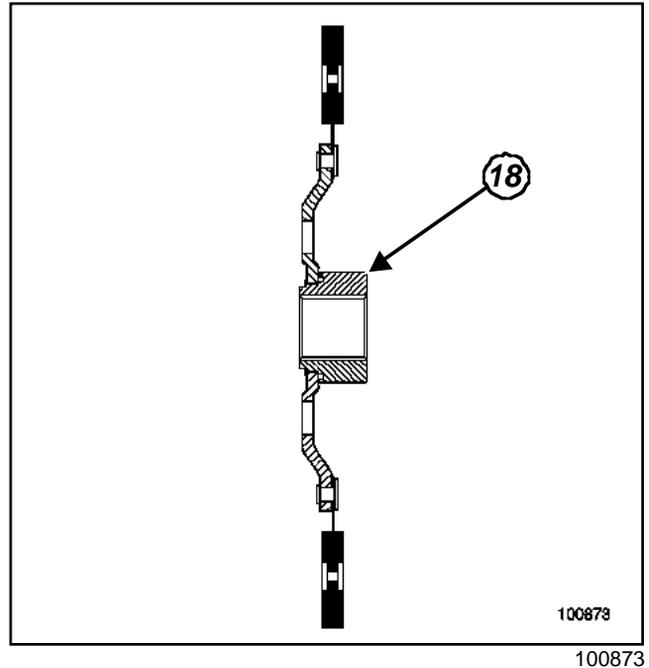
- Compress the springs (5).
- Undo the nut (3) completely (springs compressed).
- Remove the pressure plate from the base (checking that the springs (5) are fully compressed).

F4R, and 770



- Position the clutch plate.
- The larger hub diameter (17) is on the manual gear-box side.

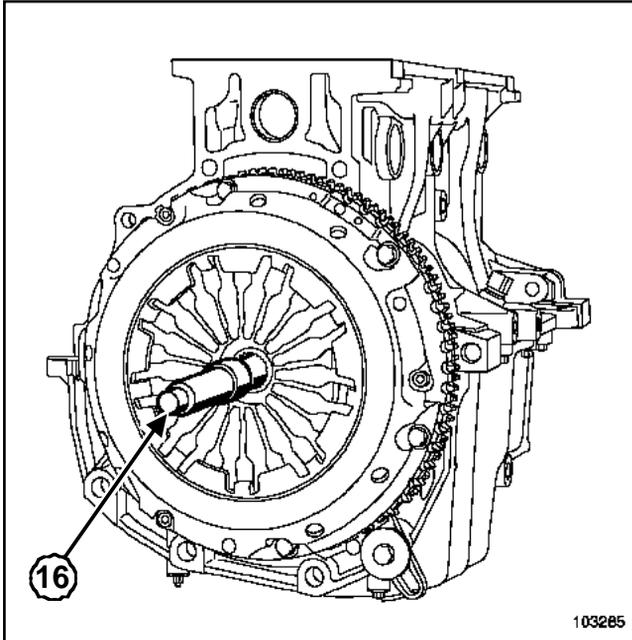
F4R, and 760 or 762 or 764 or 774 or 776 or 786 or 790 or 792 or 794 or 796



- Position the clutch plate.
- The larger hub diameter (18) is on the manual gear-box side.

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



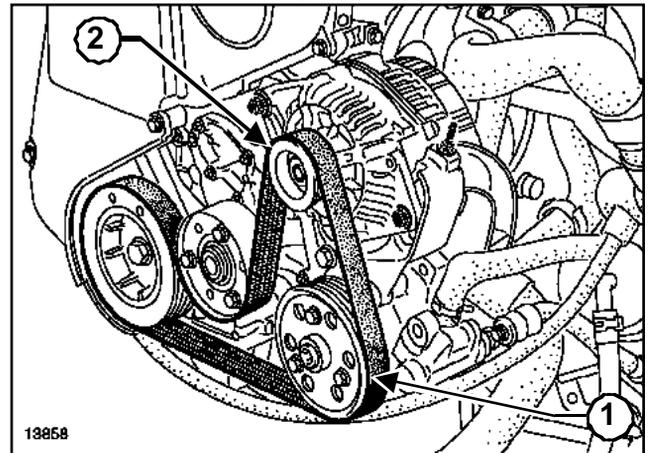
103285

- Centre the clutch plate on the flywheel using the centring tool (16)(Emb. 1518).
- Refit the clutch pressure plate on the flywheel.
- Tighten the clutch pressure plate mounting bolts gradually.
- Check the bolt diameter so as to apply the correct tightening torque.
- M6 clutch pressure plate bolts (15 Nm ± 10%)**
- M7 bolts (20 Nm ± 10%)**
- M8 clutch pressure plate bolts (25 Nm ± 10%)**

REFITTING THE ACCESSORIES AND ACCESSORIES MOUNTINGS

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 720 or 730 or 732 or 736 or 738 or 741 or 744 or 746 or 747 or 780

Without air conditioning



13858

- Refit:
 - the power steering pump (1),
 - the alternator (2).
-

Note:

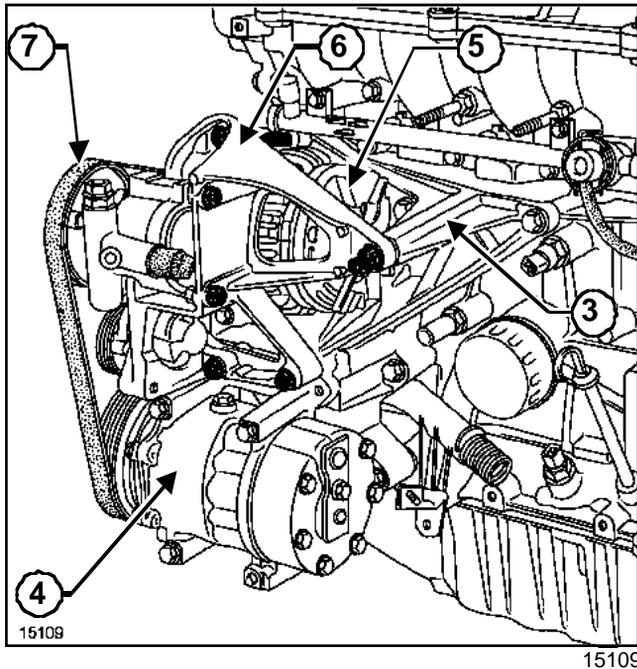
For accessories mounting bolt tightening torque values, see 10A, Engine and peripherals, Tightening torques.

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 740 or 741 or 744 or 746 or 747 or 780

With air conditioning

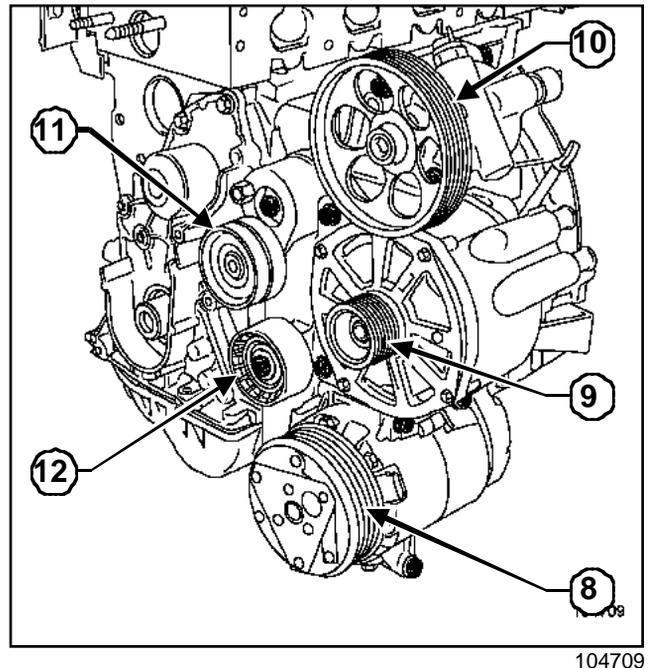


- Refit in the following order:
 - the accessories mounting (3),
 - the air conditioning compressor (4),
 - the alternator (5),
 - the power steering pump mounting (6),
 - the power steering pump (7).

Note:

For accessories mounting bolt tightening torque values, see **10A, Engine and peripherals, Tightening torques.**

F4P, and 770 or 771 or 772 or 774 or 775 – F4R, and 712 or 713 or 713 or 714 or 715 or 720 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



- Refit in the following order:
 - the accessories mounting,
 - the air conditioning compressor (8),
 - the alternator (9),
 - the power steering pump (10),
 - the tension wheel (11),
 - the idler pulley (12).

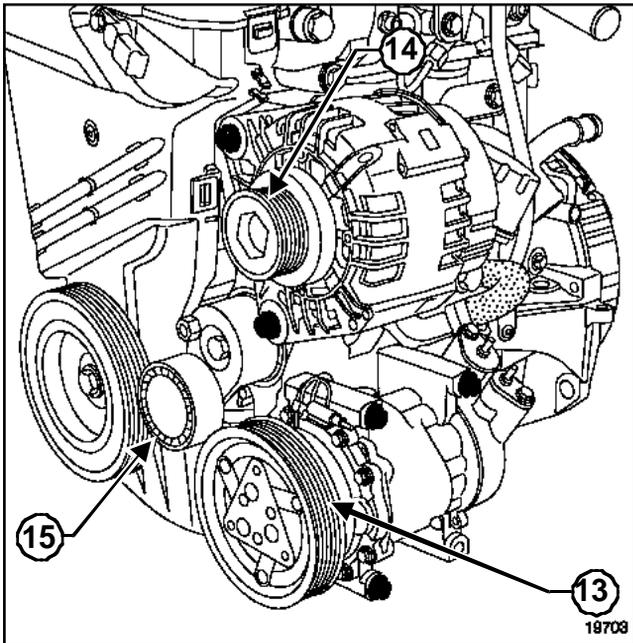
Note:

For accessories mounting bolt tightening torque values, see **10A, Engine and peripherals, Tightening torques.**

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797

F4R, and 714 or 715 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



19703

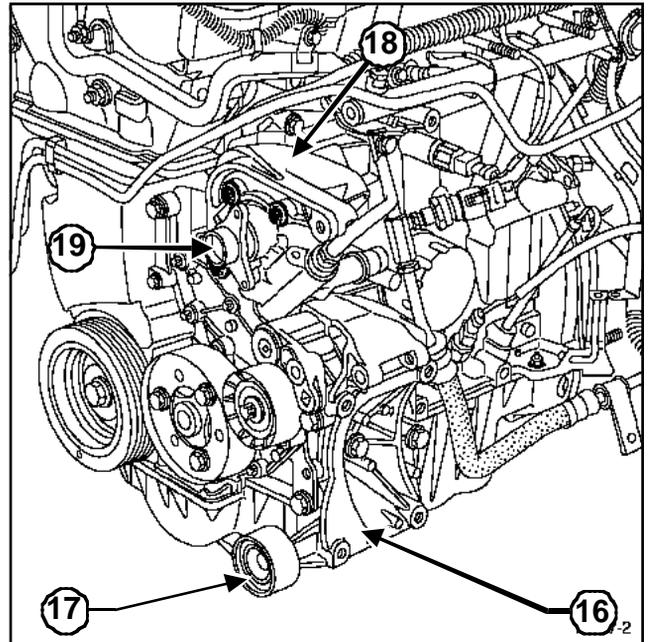
- Refit in the following order:
 - the accessories mounting,
 - the air conditioning compressor (13),
 - the alternator (14),
 - the tension wheel (15).

□

Note:

For accessories mounting bolt tightening torque values, see **10A, Engine and peripherals, Tightening torques.**

F4R, and 730 or 732 or 736 or 738

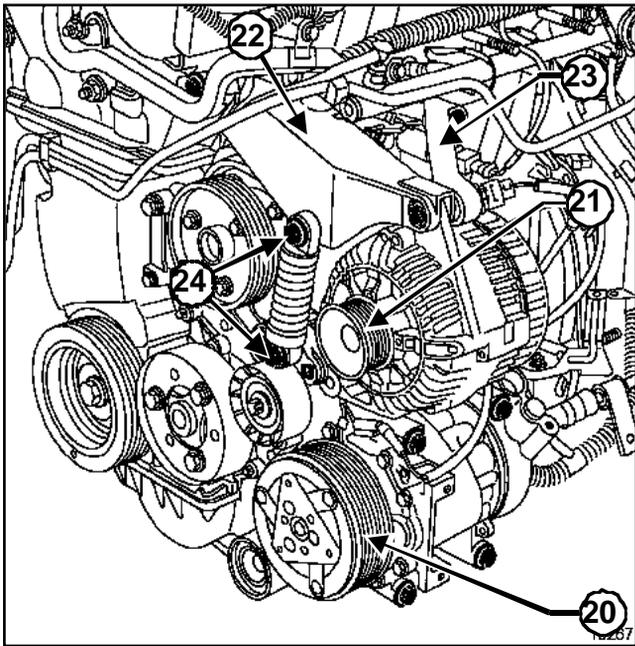


16267-2

- Refit in the following order:
 - the air conditioning compressor bracket (16),
 - the idler pulley (17),
 - the power steering pump mounting (18),
 - the power steering pump (19).

Cylinder block: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 796 or 797



16267

Refit in the following order:

- the air conditioning compressor (20),
- the alternator (21),
- the alternator tie-rod (20) and the strut (23),
- the tension wheel (two bolts (22)).

Note:

For accessories mounting bolt tightening torque values, see **10A, Engine and peripherals, Tightening torques**.

Refit:

- the crankshaft accessories pulley,
- the accessories belt.

Note:

(See **Timing - Cylinder head: Refitting**).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Special tooling required	
Mot. 1517	Tool for fitting inlet camshaft seal
Mot. 1512	Tool for fitting camshaft seals (28 x 47 mm)
Mot. 1513	Tool for refitting camshaft dephaser solenoid valve lip seal
Mot. 799-01	Tool for locking sprockets on toothed timing belt
Mot. 1496	Tool for setting the camshaft
Mot. 1054	TDC setting pin
Mot. 1677	Flywheel locking tool (F engines)
Mot. 1509	Camshaft sprocket locking tool
Mot. 1509-01	Mot. tool adaptation kit1509
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1715	Belt tension setting tool (frequency meter)
Mot. 1487	Tool for refitting camshaft covers (57 mm diameter)
Mot. 1488	Tool for refitting camshaft covers (43 mm diameter)
Equipment required	
roller-type stud removal tool	

Tightening torques 	
oil separator bolts	15 Nm if the holes are not threaded
oil separator bolts	10 Nm if the holes are pre-threaded
ignition coil bolts	15 Nm if the holes are not threaded
ignition coil bolts	12 Nm if the holes are pre-threaded
lifting ring bolt (timing end)	28 Nm
lifting ring bolts (flywheel end)	9 Nm
inlet manifold mounting bolts	9 Nm
mechanical throttle valve bolts	15 Nm if the holes are not threaded
mechanical throttle valve bolts	12 Nm if the holes are pre-threaded
motorised throttle valve bolts	9 Nm
inlet manifold bolts (F4R 730,732,736,738)	11 Nm
throttle valve bolts (F4R 730,732)	11 Nm
motorised throttle valve bolts (F4R 736,738)	10 Nm
inlet manifold bolts	11 Nm
motorised throttle valve bolts	9 Nm
pulley bolts	50 Nm
tension wheel nut	28 Nm

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Tightening torques 	
crankshaft accessories pulley bolt	40 Nm + 110°
inlet camshaft dephaser mounting bolt	100 Nm
exhaust camshaft pulley nut	30 Nm + 86° ± 6°
inlet camshaft dephaser blanking cover	25 Nm
M10 alternator mounting bolt	44 Nm
M8 alternator mounting bolt	25 Nm
anti-vibration pulley bolt with washer	40 Nm + 110°
anti-vibration pulley bolt without washer	20 Nm + 115°
M6 lower timing cover bolts	8 Nm
M8 lower timing cover bolts	20 Nm
M8 upper timing cover bolts	18 Nm
M10 upper timing cover bolts	38 Nm

F4 engines fitted with inlet camshaft dephaser.

REFITTING THE CYLINDER HEAD

- Check that the pistons are correctly positioned in mid-stroke.
- Degrease the cylinder head and cylinder block combustion surfaces.
- Check for the presence of the two centring dowels.
- Fit:
 - the cylinder head gasket,
 - the cylinder head.

WARNING

- Reuse the bolts if the length under the bolt head does not exceed **118.5 mm** (otherwise replace all the bolts).

WARNING

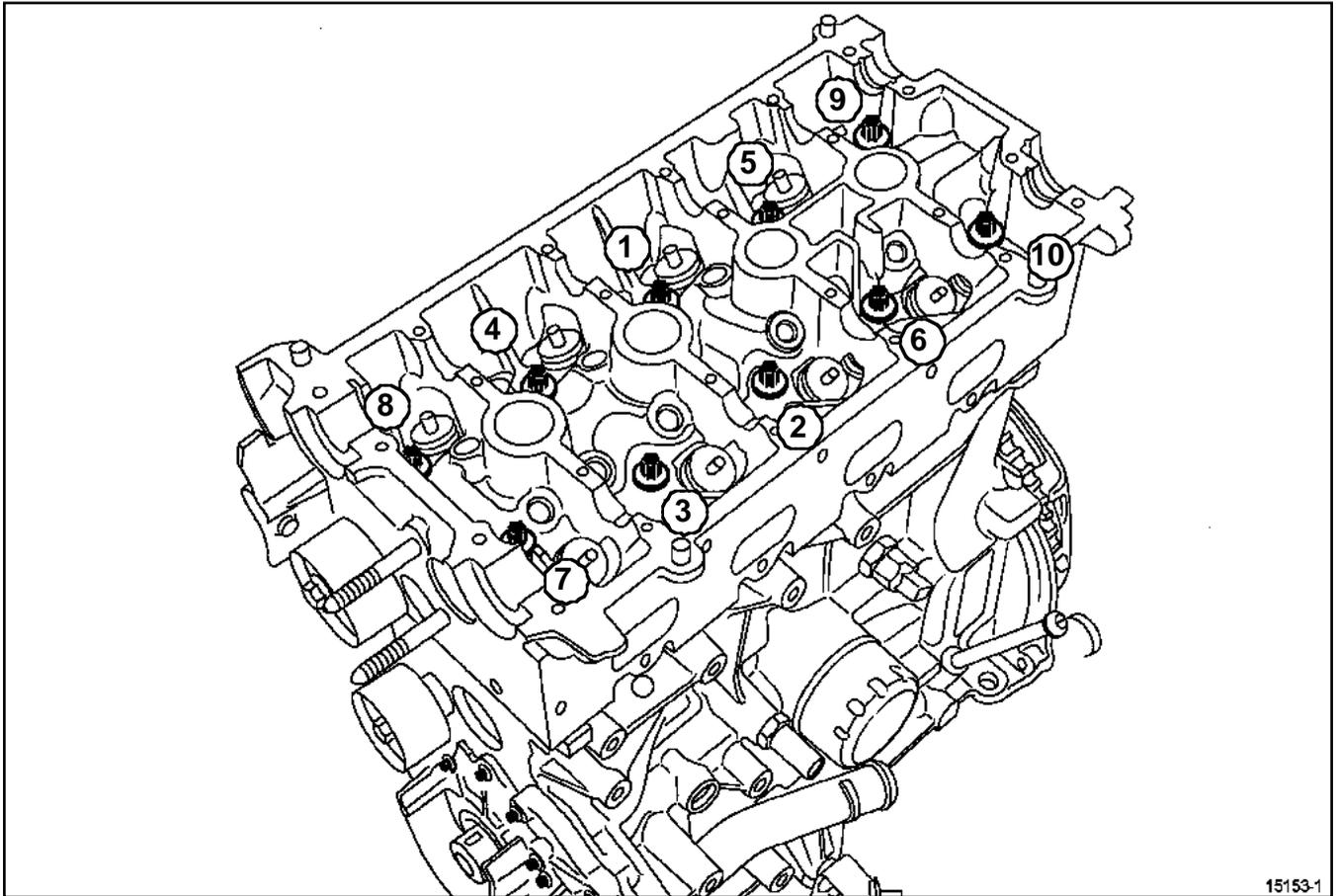
- To ensure that the bolts are correctly tightened, use a syringe to remove any oil that may be in the cylinder head mounting holes.

WARNING

- Do not oil the new bolts. The bolts must be oiled if reused.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15153-1

15153-1

Follow this procedure:

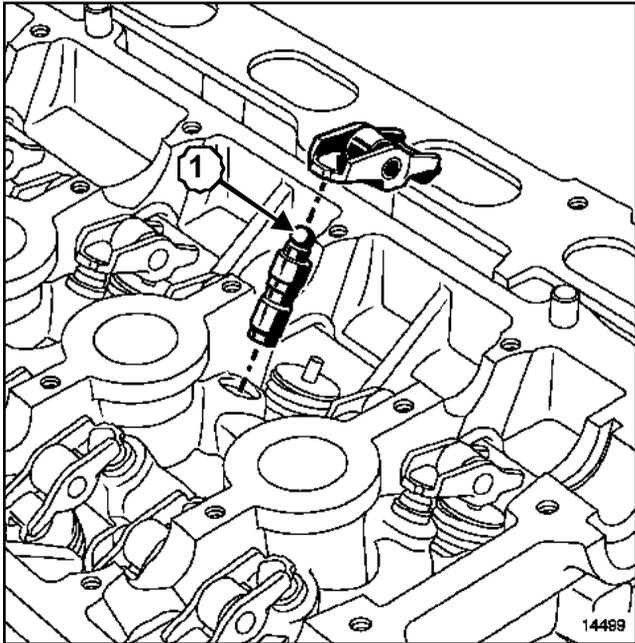
- Tighten to torque and in order the cylinder head bolts **20 Nm**.
- Check that all bolts are correctly tightened to **20 Nm**.
- Tighten to angle the first time (bolt by bolt) by **100° ± 6°**.
- Tighten to angle a second time (bolt by bolt) by **100° ± 6°**.

WARNING

Do not re-tighten the cylinder head bolts after applying this procedure.

- After a certain amount of time, a hydraulic tappet may drain out and in that case it must be reprimed.

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- To check whether it needs repriming, press the top of each tappet (1) 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.

REFITTING THE CAMSHAFT DOWEL

1 - Cleaning the camshaft thread

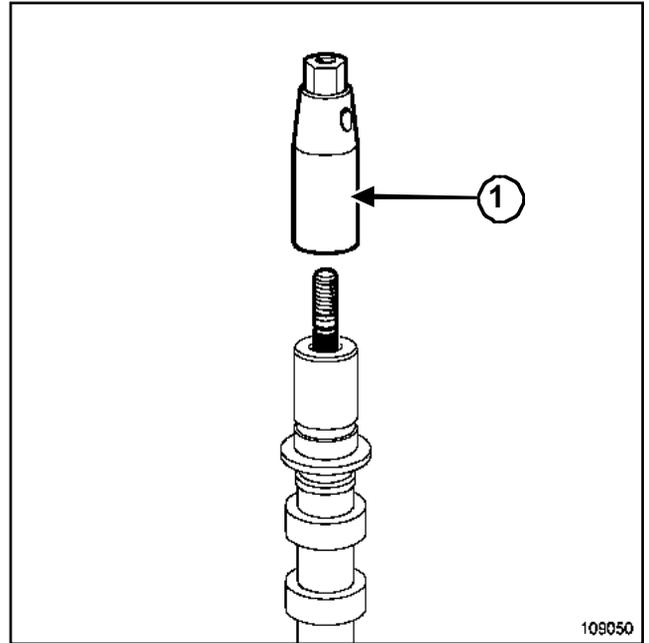
WARNING

Clean the threaded hole of the camshaft carefully to prevent foreign bodies from entering the latter.

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

2 - Refitting

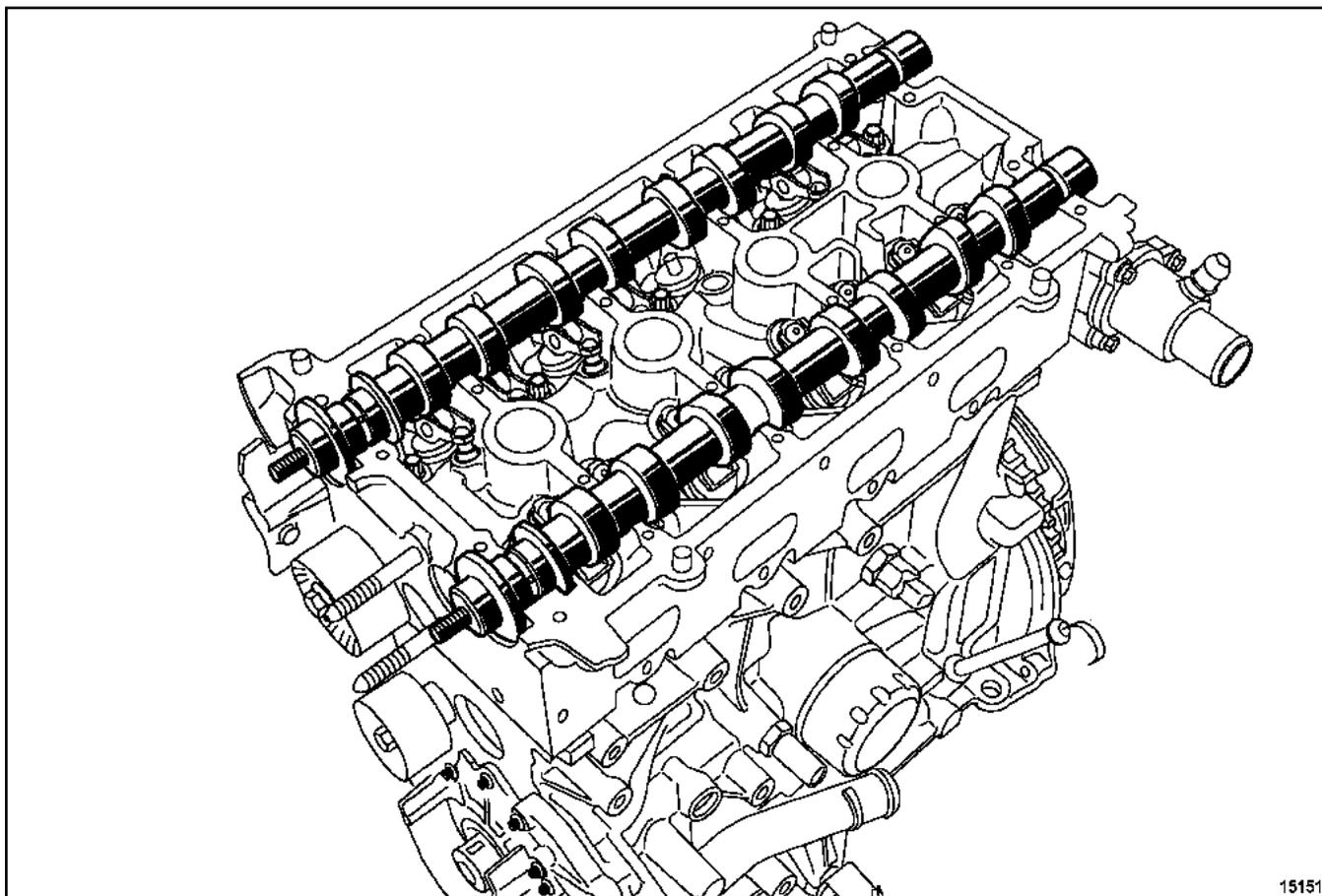
- Place the camshaft in a vice fitted with **aluminium jaw plates**.



- Fit the new camshaft dowel (pre-coated section (2) camshaft end)
- Tighten to torque the **camshaft dowel (8 Nm)** using a **roller-type stud removal tool(1)**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15151

15151

- Oil the camshaft bearings.

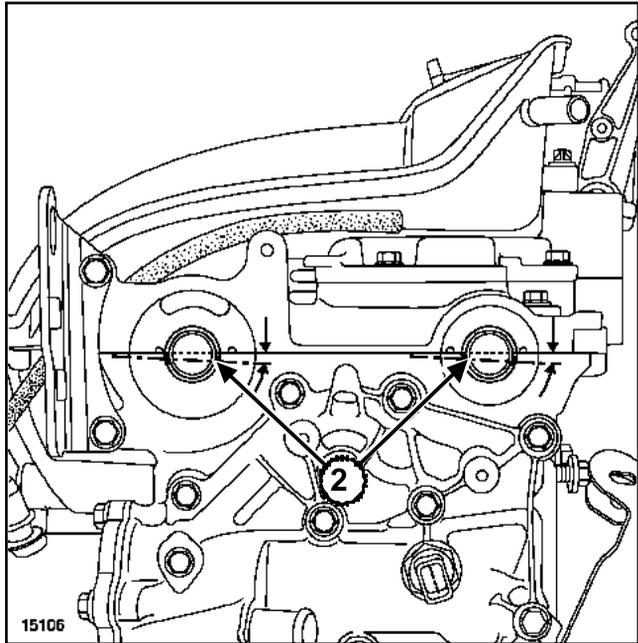
WARNING

Do not put oil on the gasket face of the rocker cover.

- Refit the camshafts, positioning them correctly (see **10A, Engine and peripherals, Engine peripherals: Characteristics for camshaft identification**).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15106

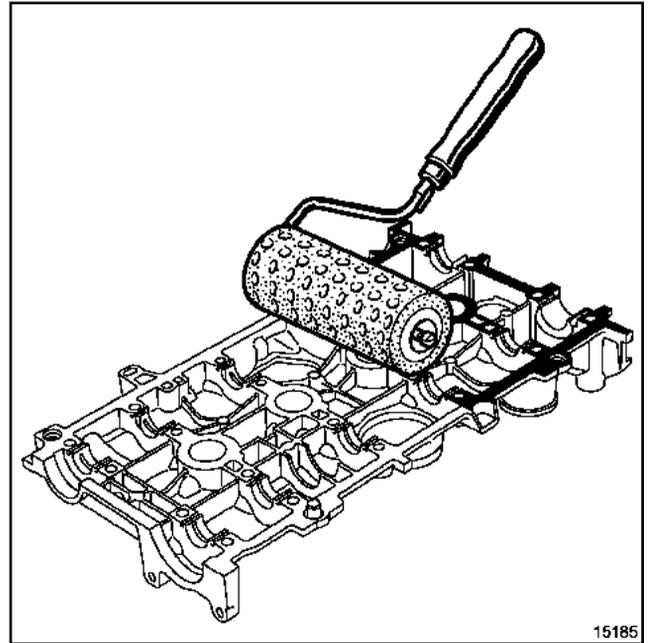
- Position the offset grooves (2) horizontally below the centre-line.

Note:

Gasket 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. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.)



15185
15185

- Apply Loctite 518 with a stipple roller to the rocker cover gasket face until it is a reddish colour.

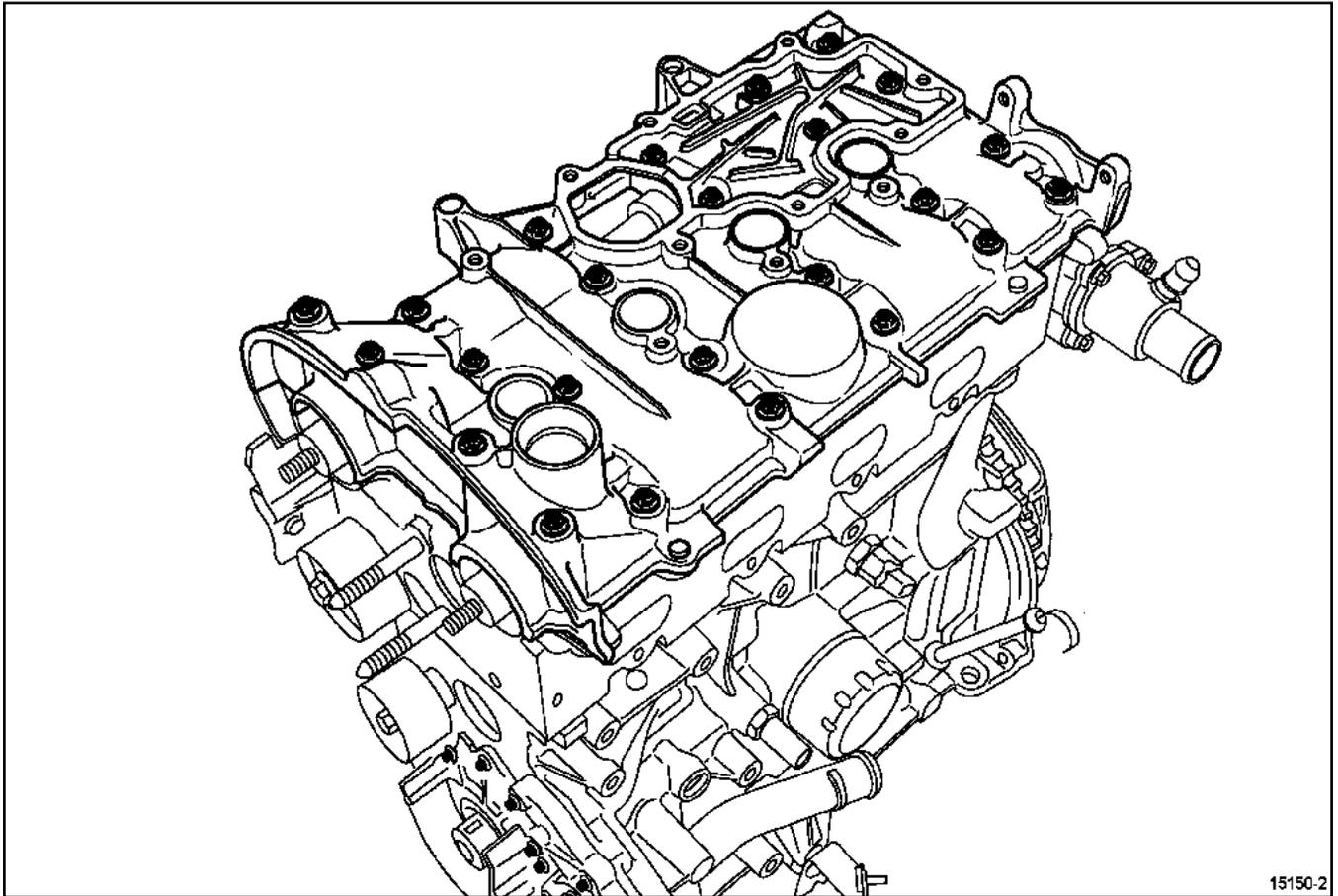
WARNING

Use a cloth to remove any Loctite 518 (3) from the six rocker cover bearings.

- Refit the rocker cover, following the correct tightening procedure:

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15150-2

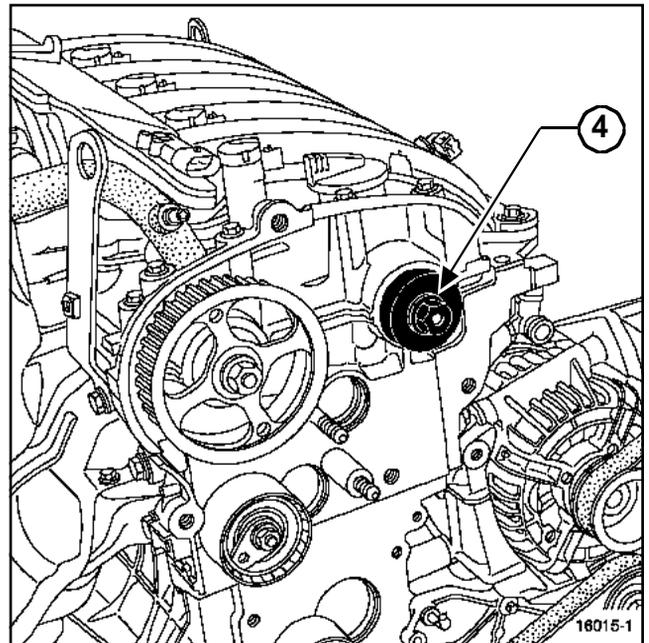
15150-2



Note: Do not put sealing compound under the head or on the thread of the bolts.

- ❑ Operation no. 1: tighten to torque **bolts 22-23-20-13 (8 Nm)**.
- ❑ Operation no. 2: Tighten to torque **bolts 1 to 12 then 14 to 19 and 21-24 (12 Nm)**.
- ❑ Operation no. 3: Tighten to torque **bolts 22-23-20-13 (12 Nm)**.

Fitting camshaft seals



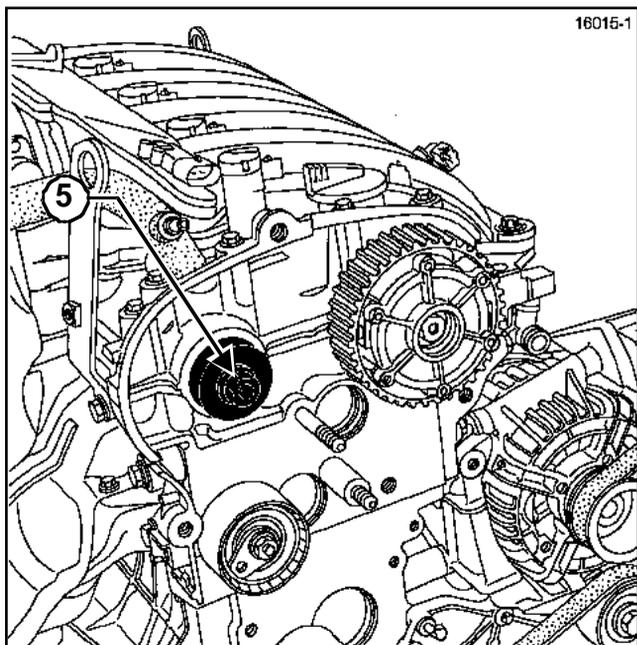
16015-1

16015

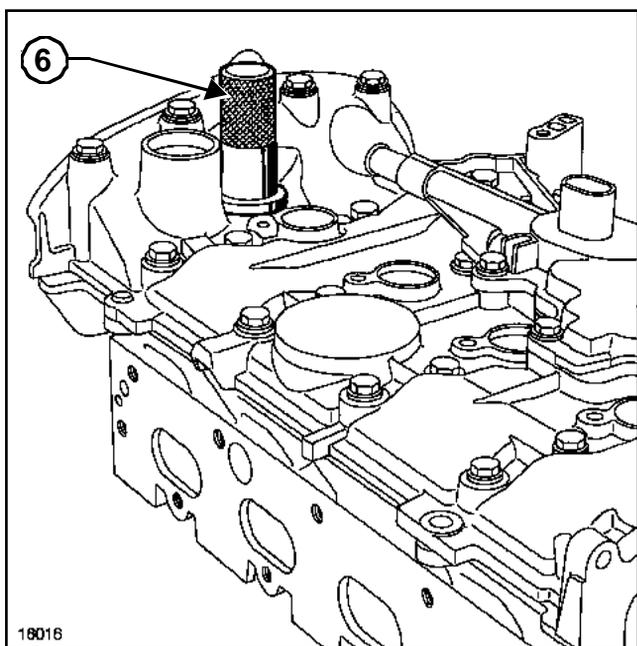
- ❑ Fit the inlet camshaft dephaser seal with tool (**Mot. 1517**), using the old bolt (**4**).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- ❑ Fit the exhaust camshaft seal with tool (Mot. 1512), using the old nut (5).



- ❑ Fit the solenoid valve seal with tool (Mot. 1513)(6).

❑

WARNING

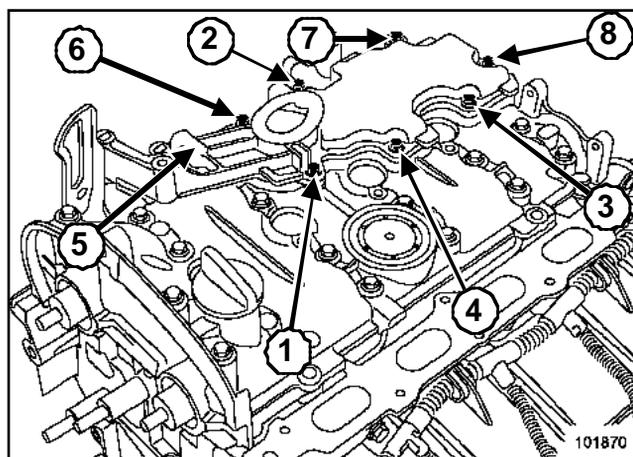
On F4R 730, 732, 736 and 738 engines, the mounting bolts must be replaced every time the oil separator is removed.

❑

Note: Gasket faces must be clean, dry and free from grease (avoid finger marks).

- ❑ Refit the oil separator, with a new gasket.

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 780 or 790 or 792



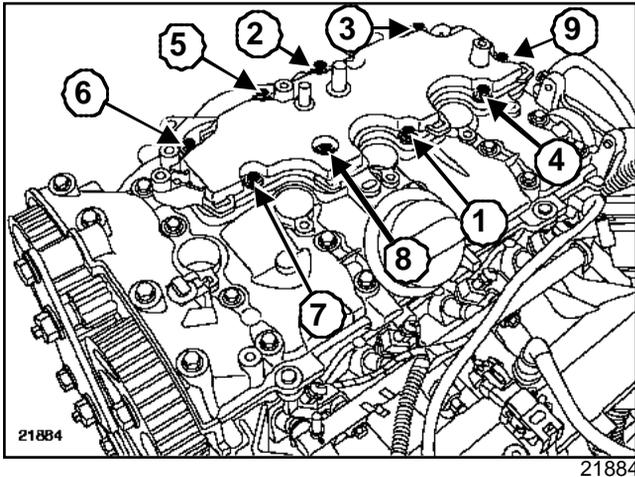
- ❑ Tighten to torque and in order:

- the oil separator bolts (15 Nm if the holes are not threaded).
- the oil separator bolts (10 Nm if the holes are pre-threaded).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

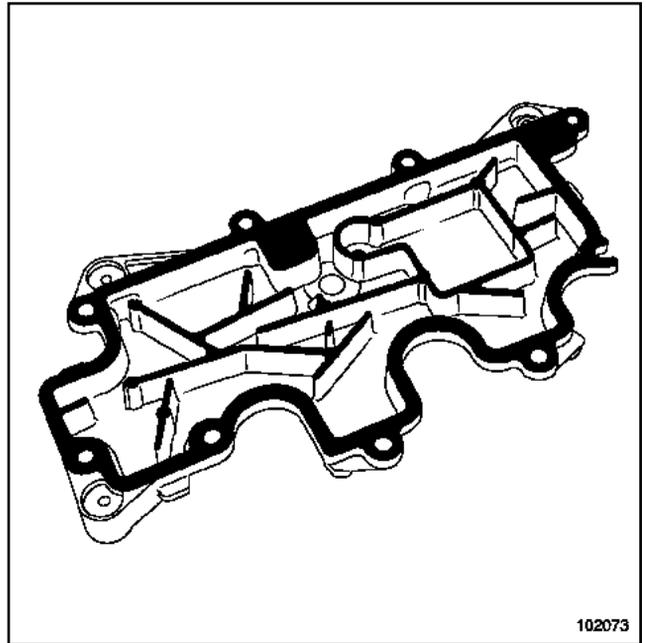
F4R, and 738



Tighten to torque and in order:

- the oil separator bolts to 15 Nm if the holes are not threaded,
- the oil separator bolts to 10 Nm if the holes are pre-threaded,

F4R, and 770 or 771



102073

102073

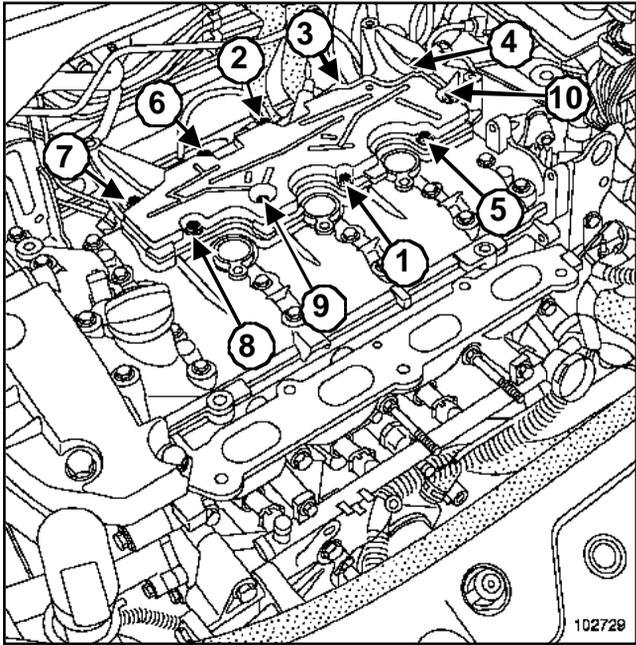
Note:

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 LOCTITE 518 using a stipple roller to the gasket face of the oil separator until it turns reddish in colour.
- Refit the oil separator.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



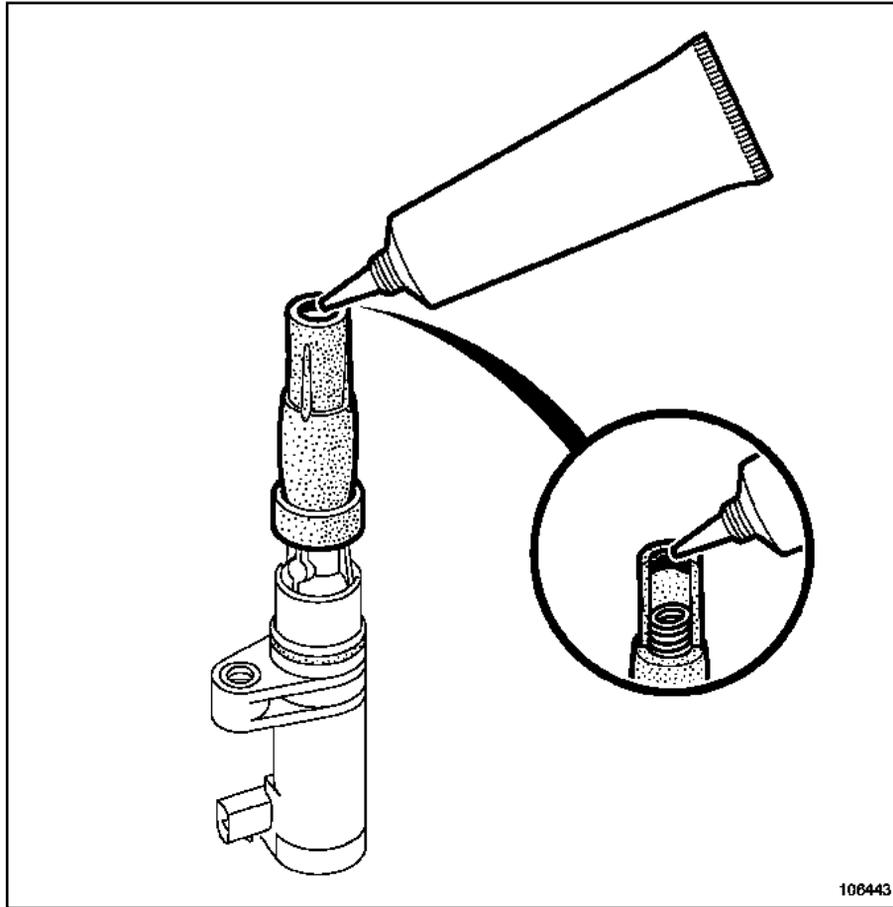
102729

□ Tighten to torque and in order:

- the oil separator bolts to 15 Nm if the holes are not threaded,
- the oil separator bolts to 10 Nm if the holes are pre-threaded,

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



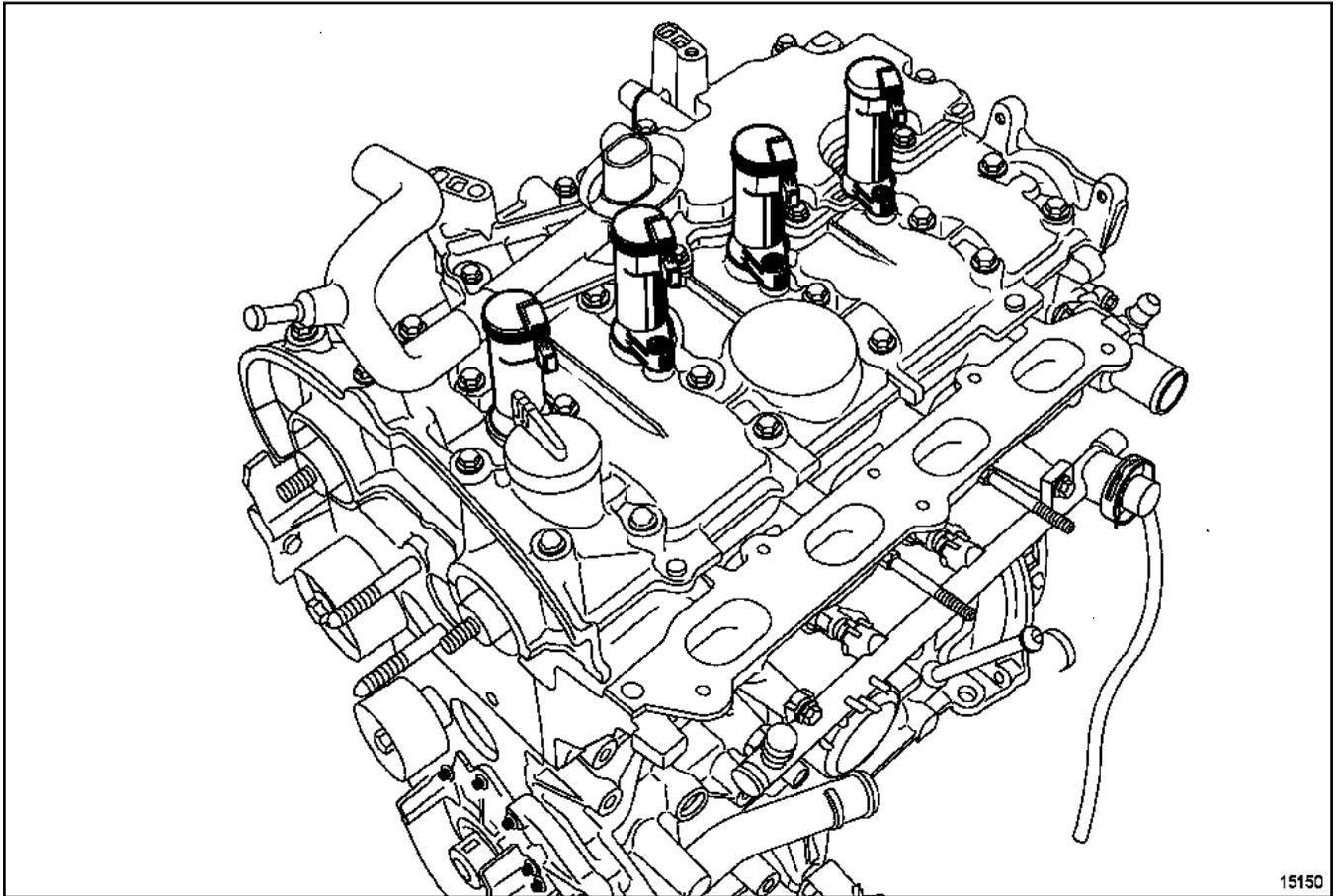
106443

106443

- Apply a bead of fluorinated grease to the ignition coil openings to improve sealing.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15150

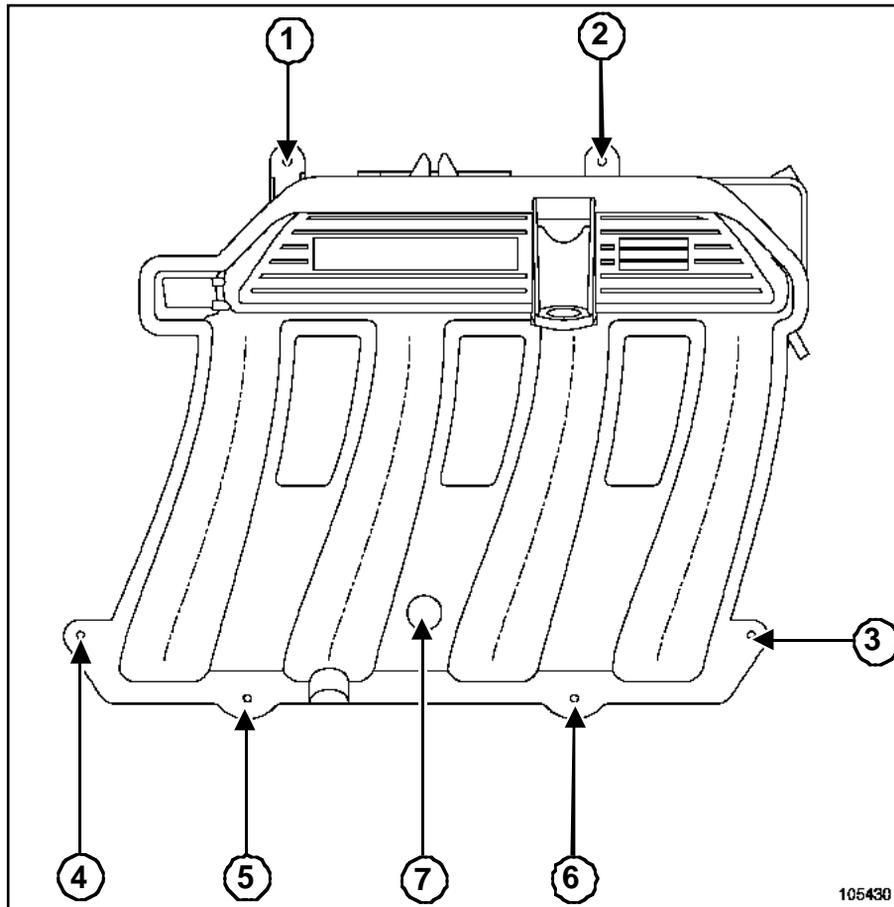
15150

- Refit the ignition coils.
- Tighten to torque the **ignition coil bolts (15 Nm if the holes are not threaded)**
Tighten to torque the **ignition coil bolts (12 Nm if the holes are pre-threaded)**
- Refit the engine lifting eyes.
- Tighten to torque the **lifting ring bolt (timing end) (28 Nm)**
Tighten to torque the two **lifting ring bolts (flywheel end) (9 Nm)**

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4R, and 700 or 701 or 740 or 741 or 744 or 780



105430

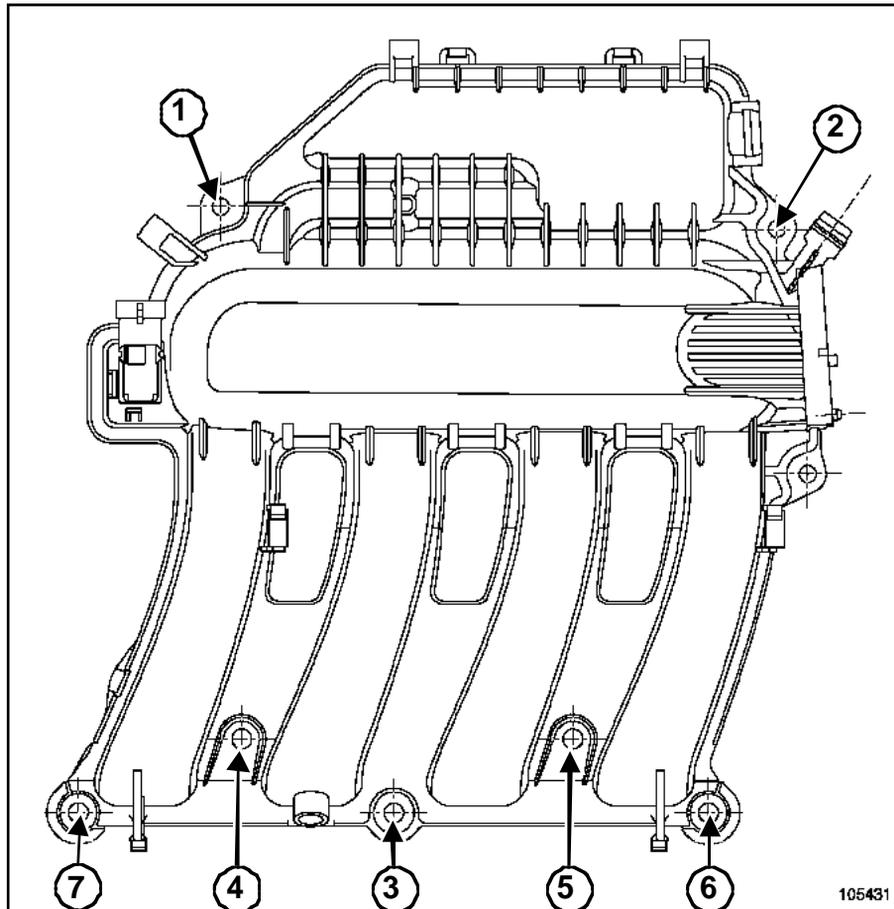
105430

- Refit the inlet manifold, with its new seals.
- Tighten to torque and in order the **inlet manifold mounting bolts (9 Nm)**
- Refit the mechanical throttle valve, with new gas-kets.
- Tighten to torque:
 - the two **mechanical throttle valve bolts (15 Nm if the holes are not threaded).**
 - the two **mechanical throttle valve bolts (12 Nm if the holes are pre-threaded).**

Timing - cylinder head: Refitting

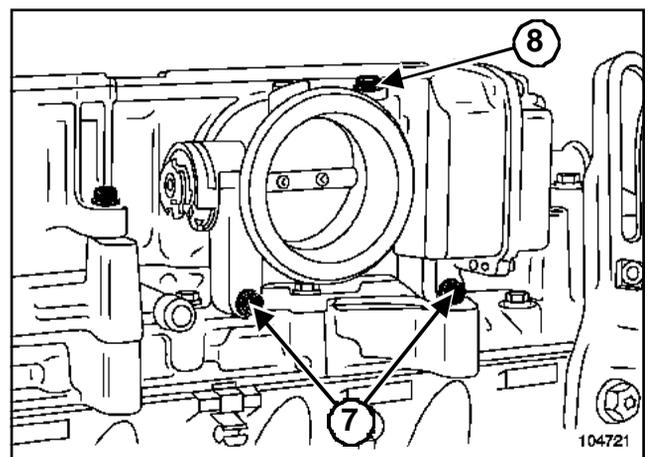
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 712 or 713 or 714 or 715 or 746 or 747 or 770 or 771 or 790 or 792



105431
105431

- Refit the inlet manifold, with its new seals.
- Tighten to torque and in order **inlet manifold bolts (11 Nm)**.



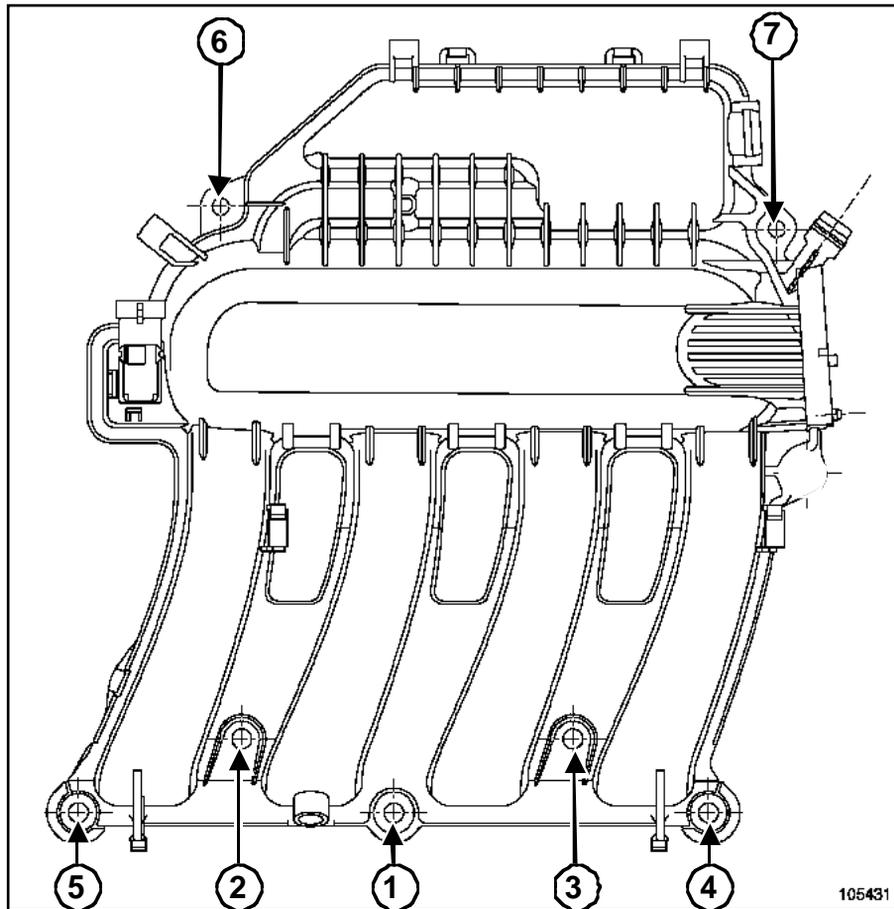
104721

- Tighten to torque and in order the three **motorised throttle valve bolts (9 Nm)(7) and (8)**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4R, and 730 or 732 or 736 or 738



105431

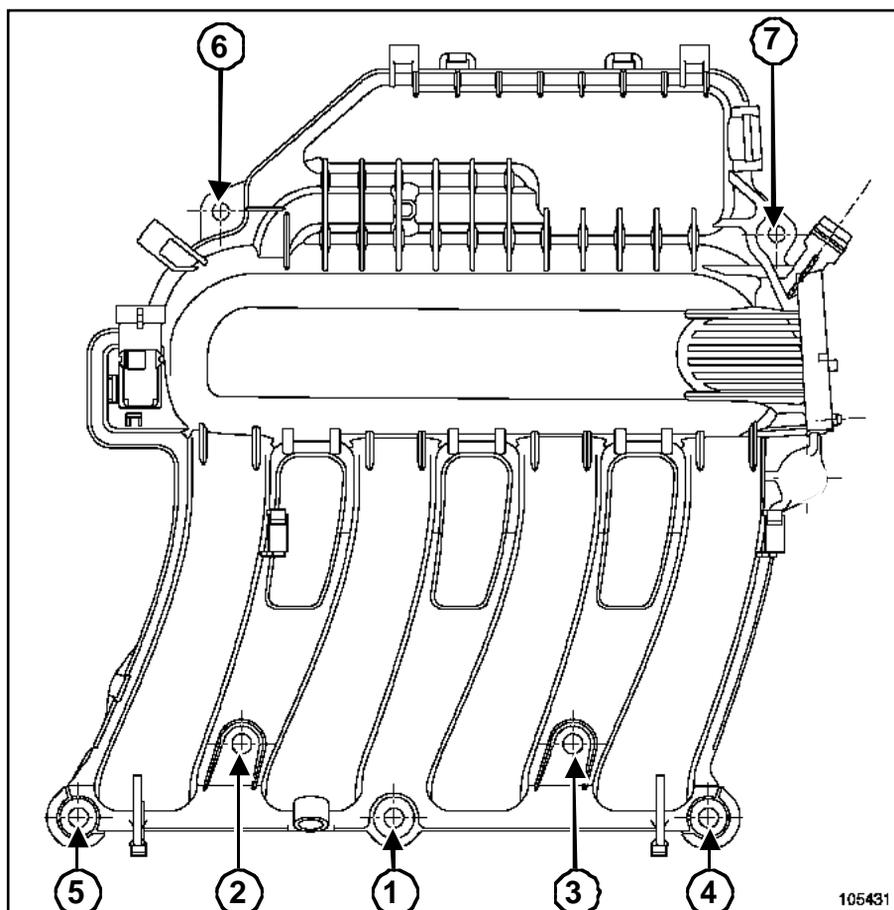
105431

- Refit the inlet manifold, with its new seals.
- Tighten to torque and in order the **inlet manifold bolts (F4R 730,732,736,738) (11 Nm)**.
- Refit the throttle valve, with new gaskets.
- Tighten to torque and in order:
 - the four **throttle valve bolts (F4R 730,732) (11 Nm)**.
 - the four **motorised throttle valve bolts (F4R 736, 738) (10 Nm)**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4R, and 770 or 771



105431

105431

- ❑ Refit the inlet manifold, with its new gaskets.
- ❑ Tighten to torque and in order
 - the **inlet manifold bolts** (11 Nm),
 - the four **motorised throttle valve bolts** (9 Nm).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

REFITTING THE TIMING BELT

**WARNING**

The following parts must be replaced with new ones when they are removed:

- the belt (timing and accessories),
- the camshaft pulley mountings,
- the crankshaft accessories pulley bolt.

WARNING

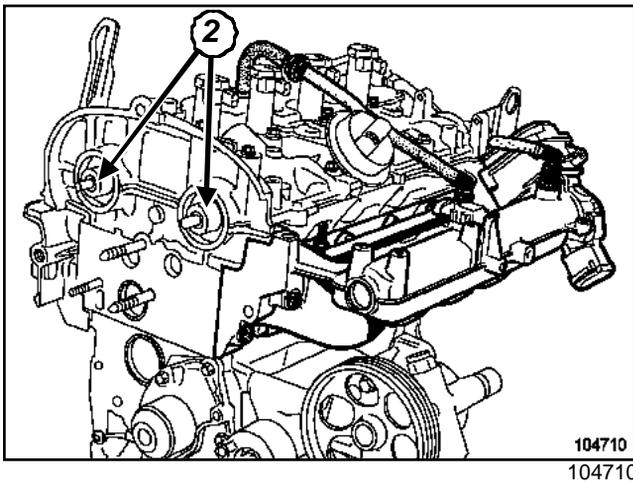
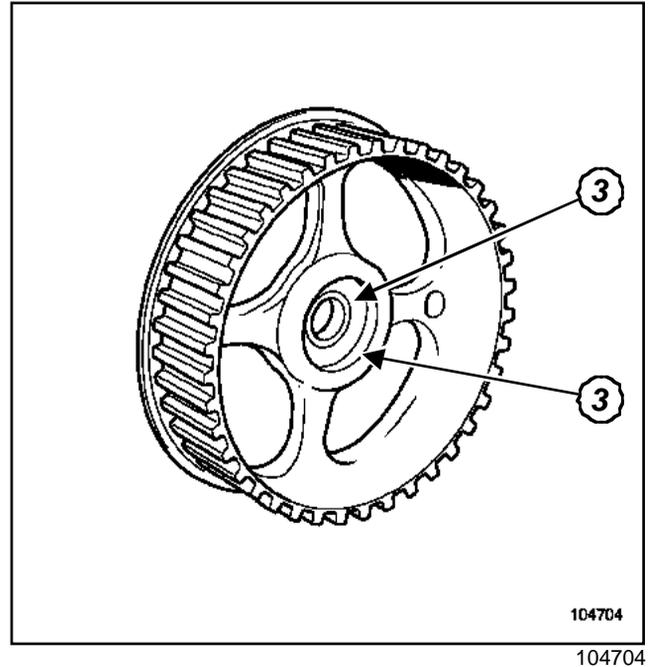
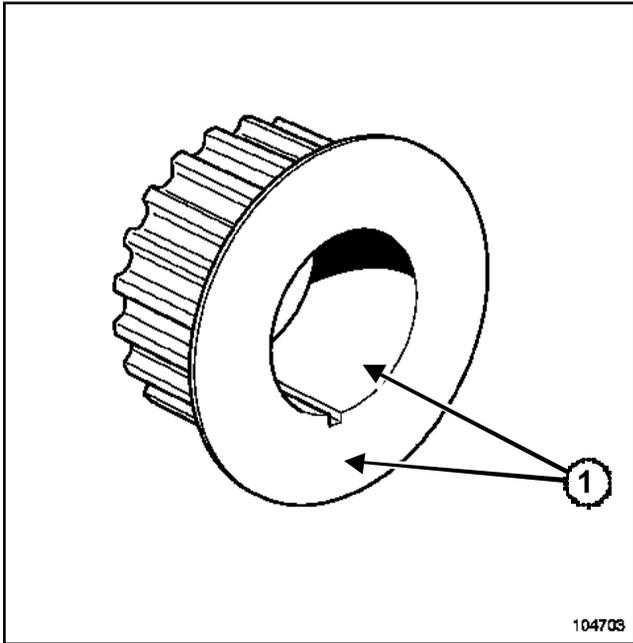
When replacing the timing belt, it is imperative to replace the tension wheel and pulley(s) with new ones.

WARNING

When replacing the accessories belt as specified by the manufacturer, the tension wheel, pulley and anti-vibration pulley (composed of two parts) must be replaced.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



WARNING

Be sure to degrease:

- the end of the crankshaft (timing end),
- the timing sprocket bore and contact surfaces at (1),
- the contact surfaces of the crankshaft accessories pulley.
- the camshaft ends (timing end) (2).
- the bores and contact surfaces of the camshaft pulleys (3).

This is to avoid slippage between:

- the timing,
- the crankshaft,
- the camshaft sprockets.

This slippage leads to engine damage.

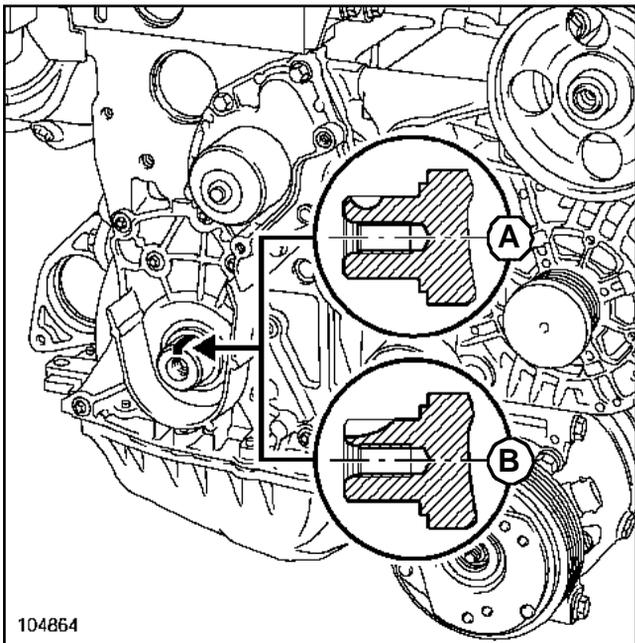
WARNING

Never rotate the engine against its direction of operation.

- Refit the crankshaft sprocket.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

**WARNING**

The timing adjustment procedure depends on the **type of keying** on the end of the crankshaft.

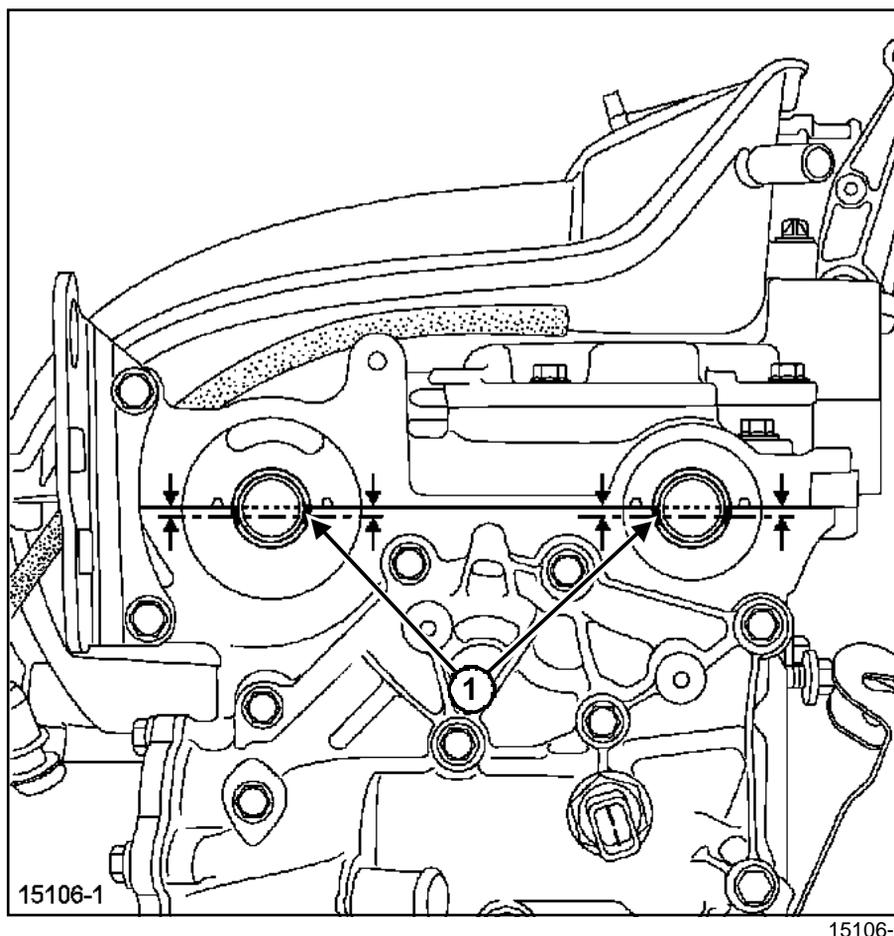
- For keying type **(A)**, fit a sprocket without a key on the crankshaft (see METHOD WITHOUT KEYING).
- For keying type **(B)**, replace the original sprocket with a sprocket with integral key (see METHOD WITH KEYING).

TIMING ADJUSTMENT WITH KEYLESS SPROCKET

- Refit the degreased camshaft pulleys with the old nuts.
- Tighten to torque the old nuts (**15 Nm max.**) using tool (**Mot. 799-01**).

Timing - cylinder head: Refitting

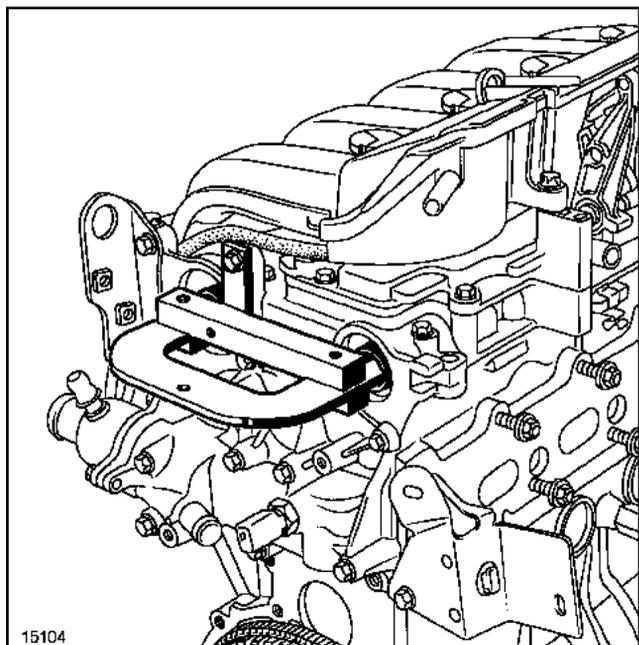
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- Position the offset grooves (1) horizontally below the centre-line as shown above by turning the camshafts using tool (Mot. 799-01).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

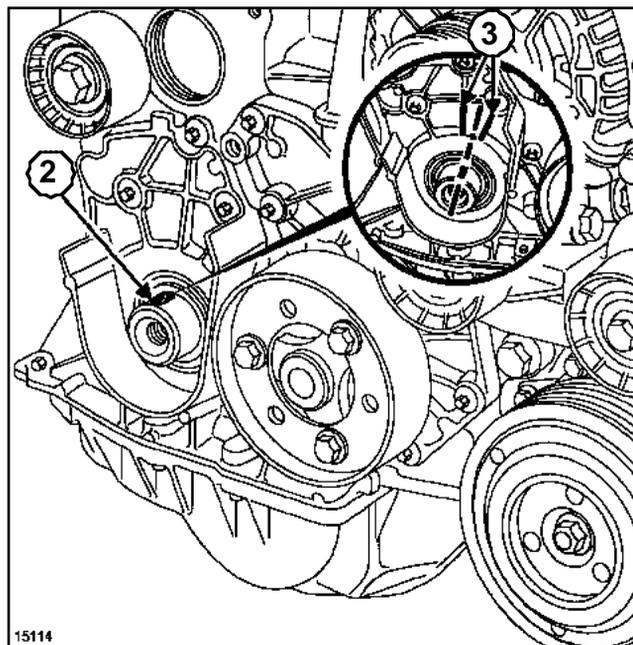


- Position tool (**Mot. 1496**), attaching it to the ends of the camshafts.
- Remove the old camshaft pulley nuts using tool (**Mot. 799-01**).

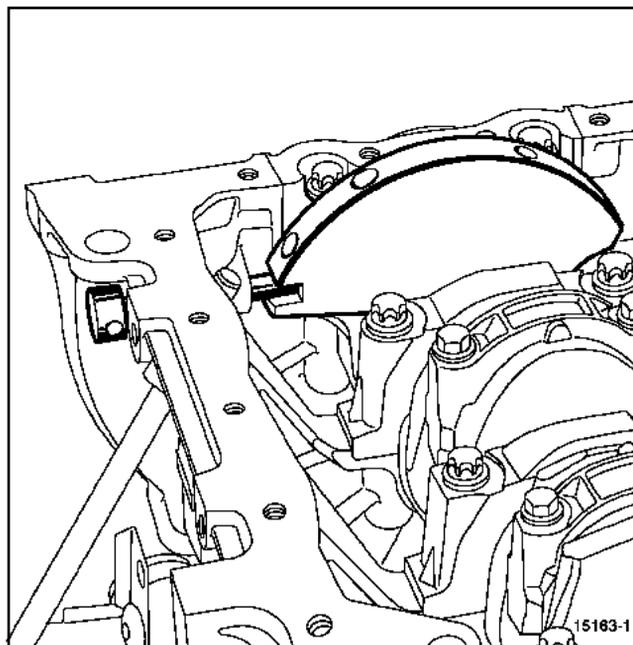
WARNING

It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

- Fit new nuts on the pulleys without tightening them (**0.5 to 1 mm** play between nut and pulley) (the pulleys can turn freely).



Correct position



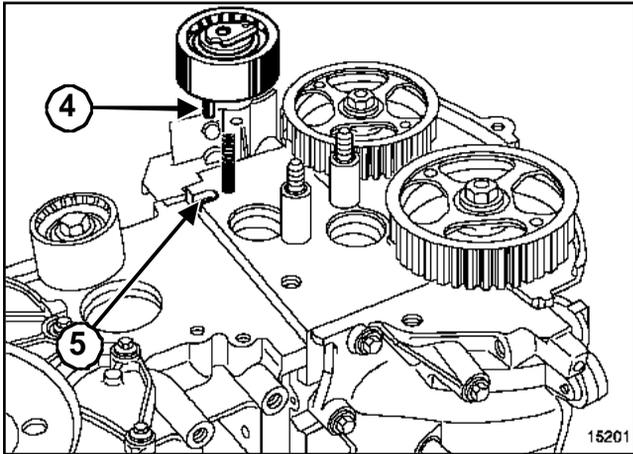
WARNING

Check that the crankshaft is correctly blocked.

The crankshaft groove (**2**) must be between the two ribs (**3**).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

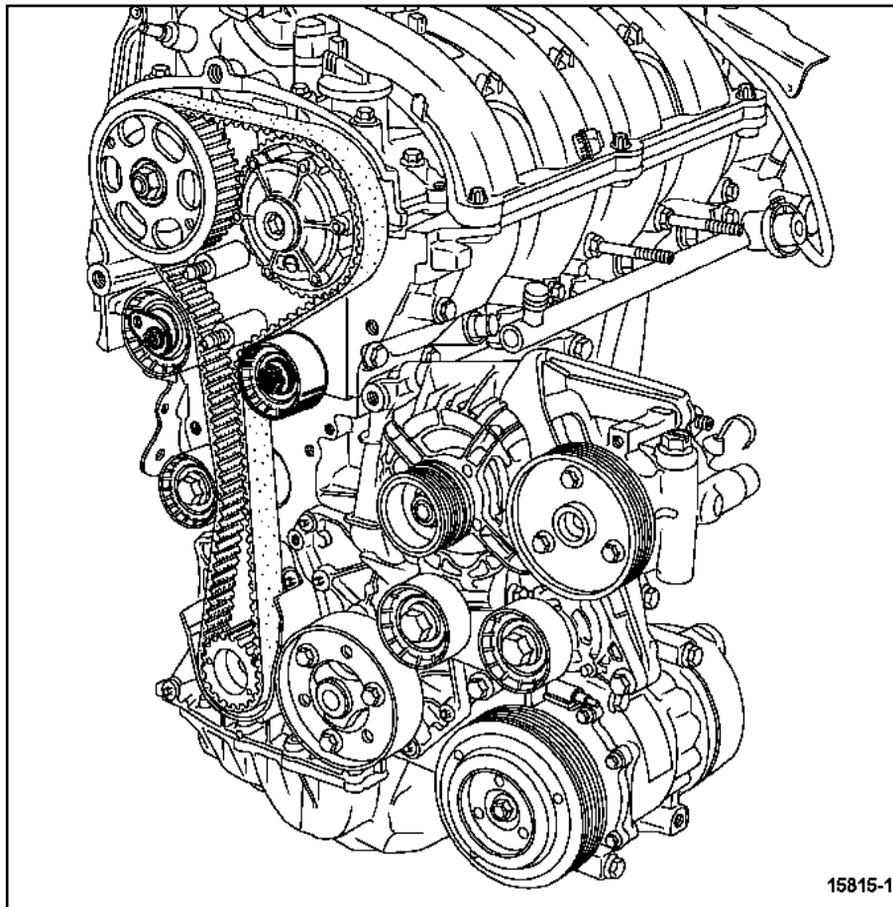


15201

Fit:

- a new tension wheel, positioning the tension wheel lug (4) correctly in the groove (5),

- a keyless crankshaft sprocket.



15815-1

15815-1

Fit:

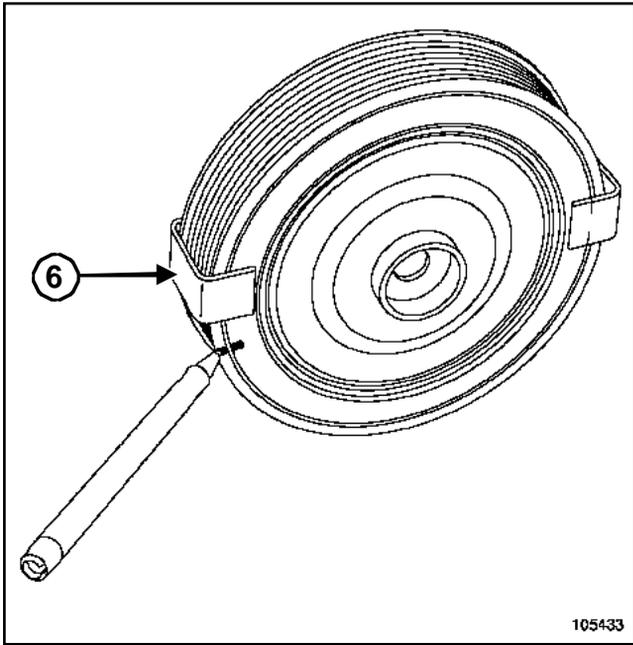
- a new belt,
- new pulley(s).

Tighten to torque the pulley bolts (50 Nm).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4P, and 261 or 770 or 771 or 772 or 774 or 775 – F4R, and 712 or 713



105433

WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

Mark it before refitting it to prevent an error.

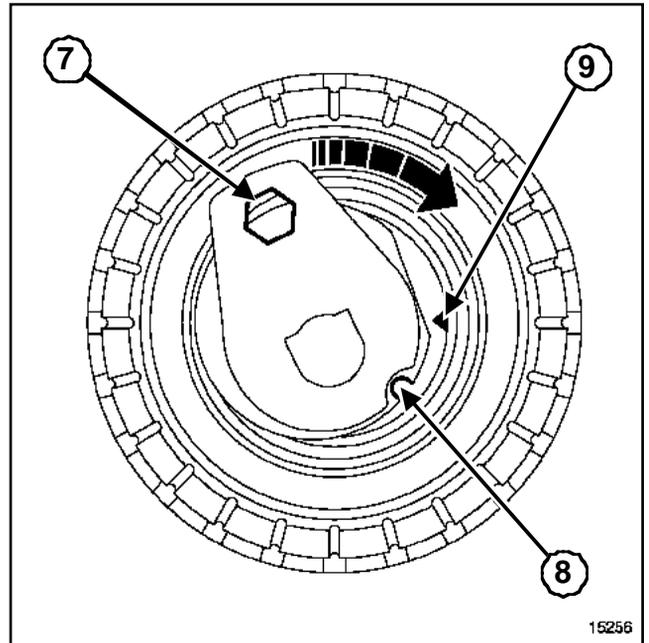
It is forbidden to take the anti-vibration pulley apart.

- Refit the new anti-vibration pulley with its clamp .
- Pre-tighten the new bolt of the anti-vibration pulley (without locking the bolt, play of **2 to 3 mm** between bolt and pulley).

F4R, and 700 or 701 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

- Fit a new crankshaft accessories pulley.
- Pre-tighten the new crankshaft accessories pulley bolt (without locking the bolt, **2 to 3 mm** play between bolt and pulley).

Belt tension



15256

15256

- Check that there is still **0.5 to 1 mm** play between the camshaft pulleys and nuts.

Note: Do not rotate the tension wheel anti-clockwise.

- Align the pulley marks (8) and (9) using a **6 mm** Allen key in (7).

- Tighten to torque the tension wheel nut (**7 Nm**).

Note: make sure that the camshaft nuts do not touch their respective pulleys. In addition, from time to time, press the camshaft pulleys against the camshafts.

- Rotate the timing system through six revolutions by the exhaust camshaft pulley, using tool (**Mot. 799-01**).

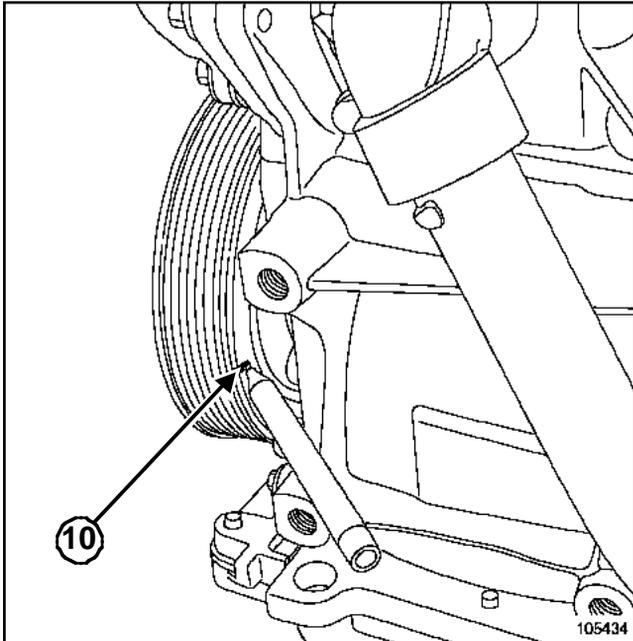
- Align marks (8) and (9) if necessary, unscrewing the tension wheel nut by up to one turn while holding it in position with a **6 mm** Allen key in (7).

Finally tighten the **tension wheel nut (28 Nm)**.

Timing - cylinder head: Refitting

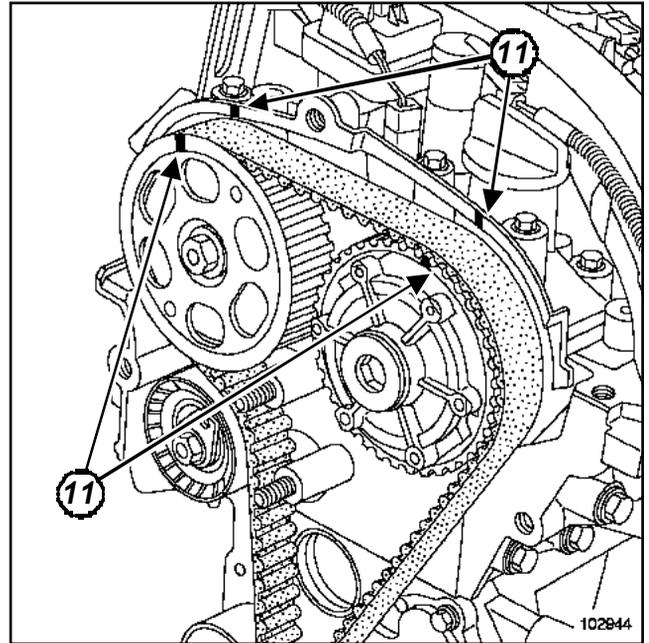
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4P, and 261 or 770 or 771 or 772 or 774 or 775 –
F4R, and 712 or 713



- Before tightening the anti-vibration pulley (if fitted), check the alignment of the two parts(10).

- Tighten to torque the **crankshaft accessories pulley bolt (20 Nm)** (TDC setting pin still in position in the crankshaft).



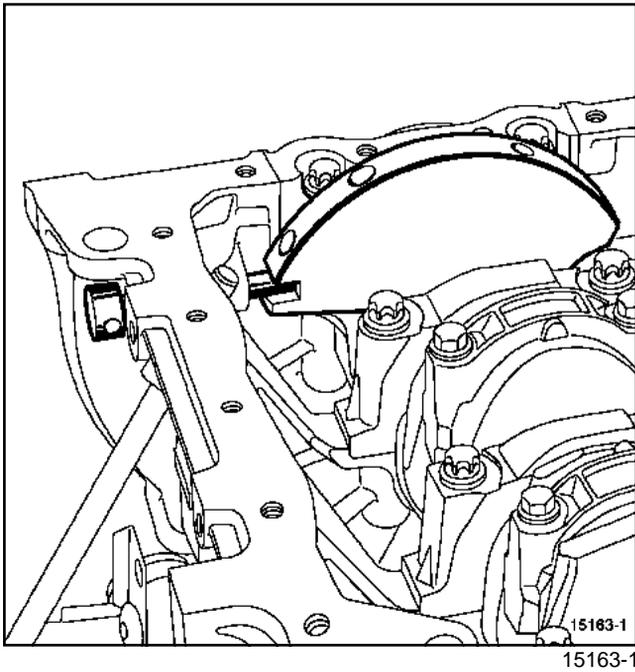
15108

- Use a pencil to make marks (11) on the camshaft pulleys and the rocker cover.
- Remove the TDC setting pin (**Mot. 1054**).
- Immobilise the flywheel using tool (**Mot. 1677**).
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.
- Remove the flywheel blocking tool (**Mot. 1677**).

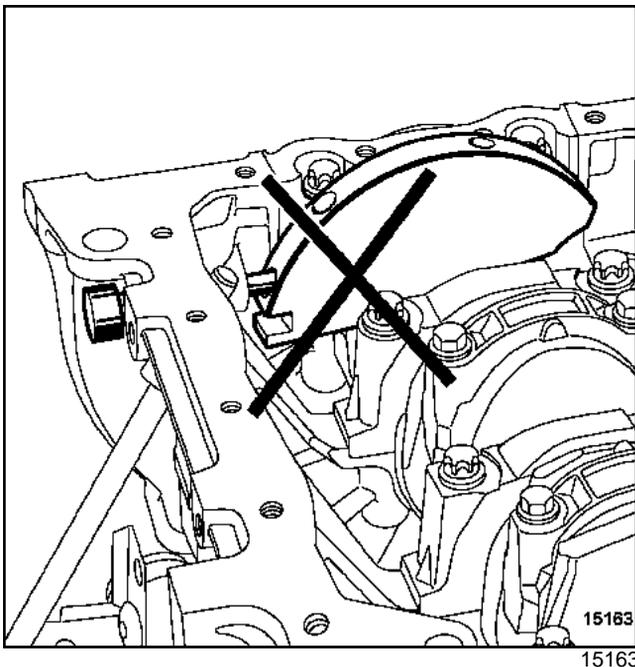
Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

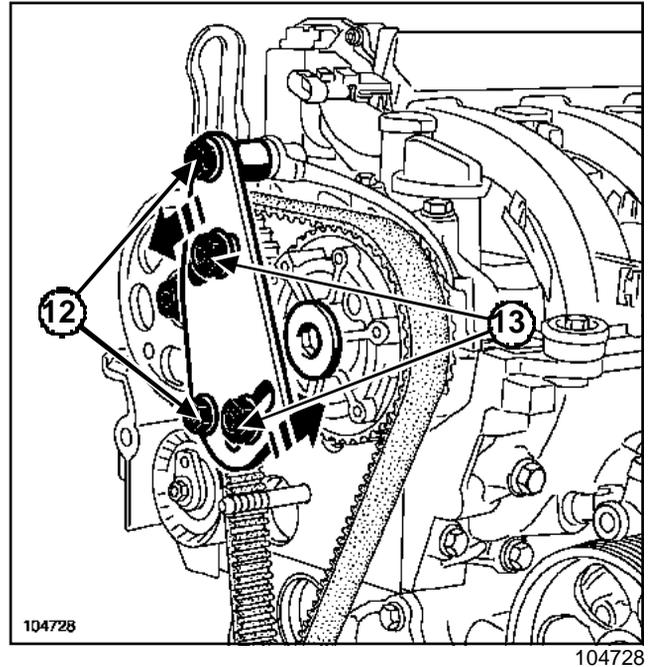
Correct position



Incorrect position



- Block the crankshaft, referring to the marks made previously to align the camshaft pulleys with the rocker cover; the marks must be in line. Then you can be sure that the pin is in fact in the correct hole and not in the crankshaft balancing hole.

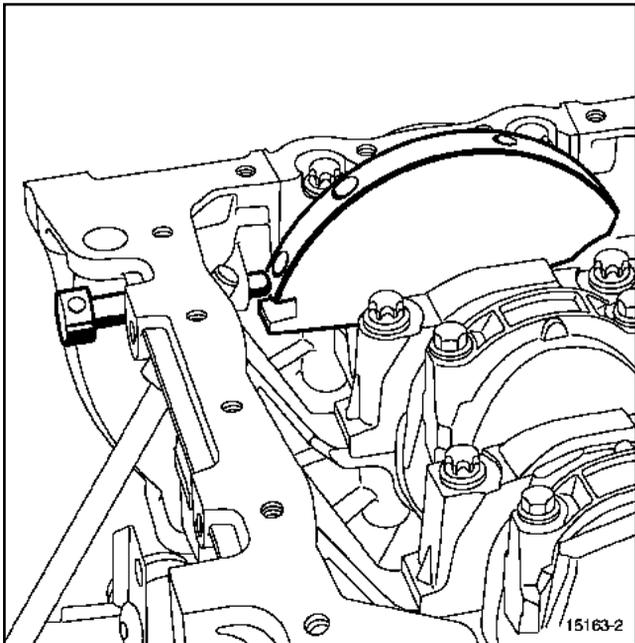


- Fit tool (**Mot. 1509**) with tool kit (**Mot. 1509-01**) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (12).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque
 - the toothed pinion nuts (80 Nm)(13),
 - the inlet camshaft dephaser mounting bolt (30 Nm),
 - the exhaust camshaft pulley nut (30 Nm).
- Remove the camshaft adjustment tool (**Mot. 1496**).
- Tighten to torque the inlet camshaft dephaser mounting bolt (100 Nm)
- Tighten to angle the exhaust camshaft pulley nut (30 Nm + 86° ± 6°)
- Tighten to torque the inlet camshaft dephaser blanking cover (25 Nm)
- Remove the tools:
 - TDC setting pin (**Mot. 1054**),
 - Camshaft pulley immobilising tool (**Mot. 1509**) and (**Mot. 1509-01**).
- Rotate the crankshaft clockwise through two revolutions (timing end).

Timing - cylinder head: Refitting

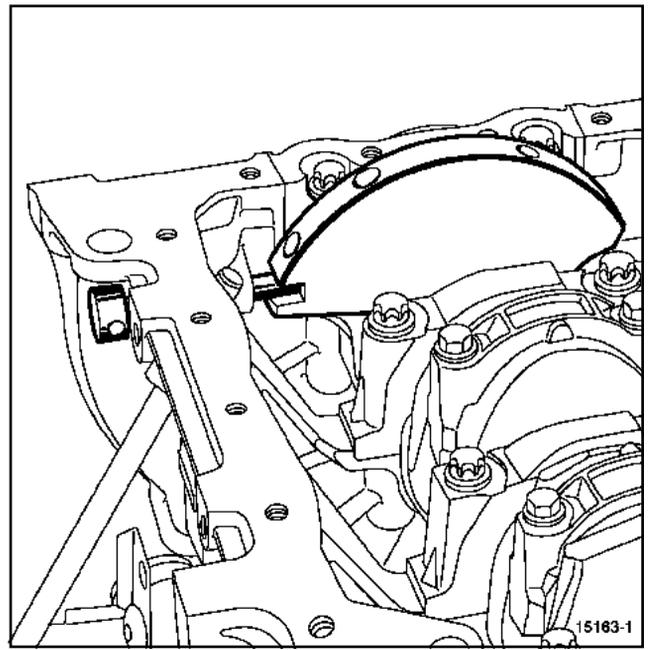
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Checking the tension



15163-2

- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the crankshaft TDC setting pin (**Mot. 1054**) (so that it is between the balancing hole and the timing hole).



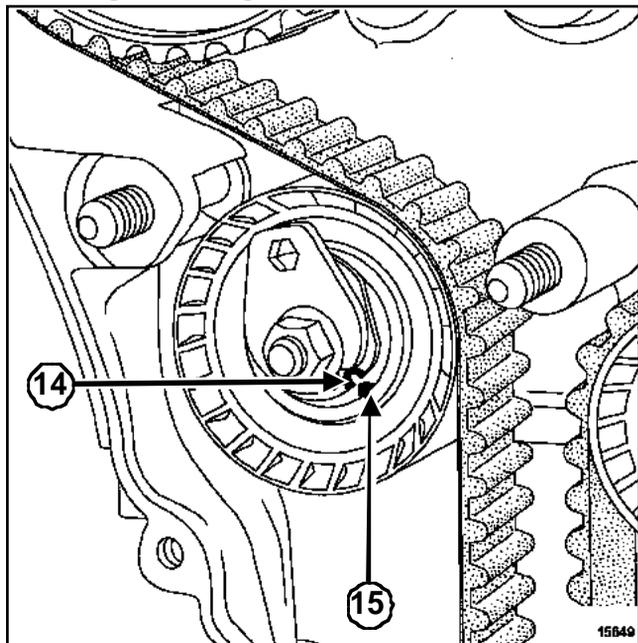
15163-1

- Lock the timing at its adjustment point.
- Remove the TDC setting pin (**Mot. 1054**).
- Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure.
- Loosen the tension wheel nut by up to one turn, holding it with a **6 mm** Allen key.
- Align the tension wheel marks.
- Tighten the nut finally to a torque of **28 Nm**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Checking the timing

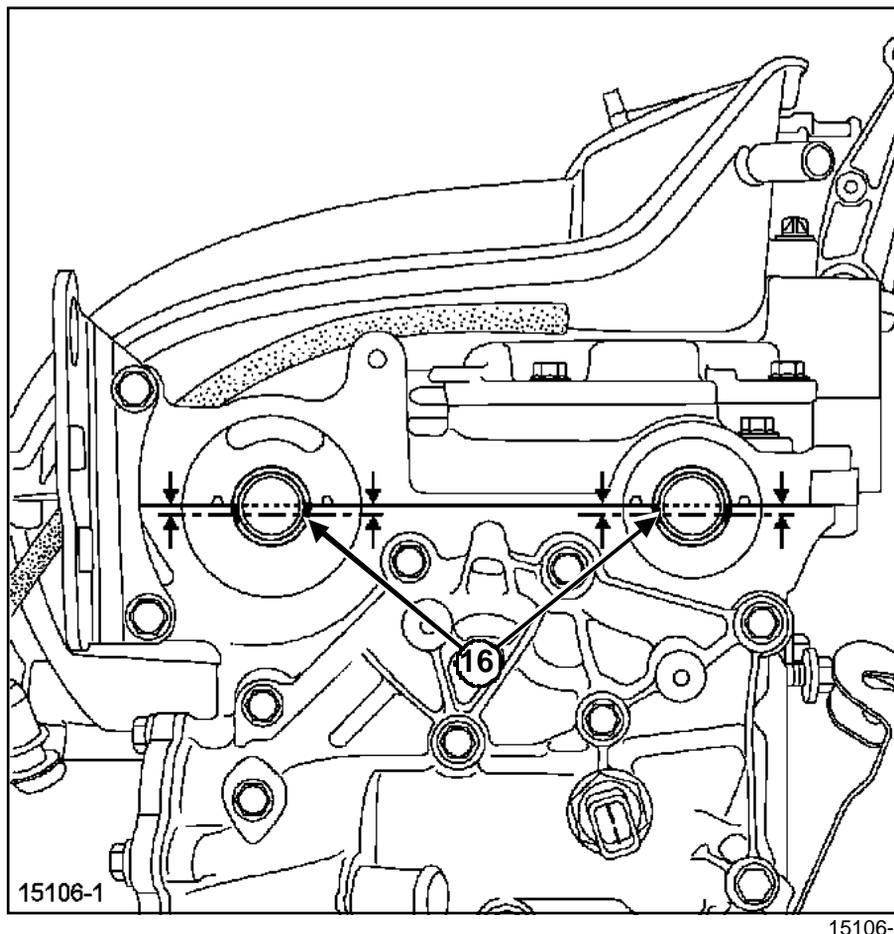


15649

- Rotate the crankshaft clockwise through two revolutions (timing end).
- Check that the tension wheel marks (14) and (15) are in the correct position before checking the timing adjustment.
- Insert the TDC setting pin (**Mot. 1054**) (check that the marks made by the operator on the camshaft pulleys are aligned).

Timing - cylinder head: Refitting

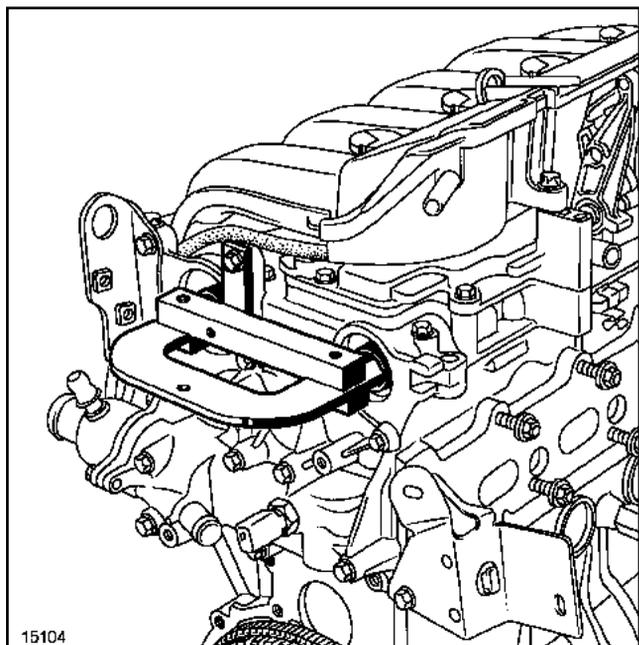
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- ❑ The offset grooves (16) must be horizontal and below the centre-line.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



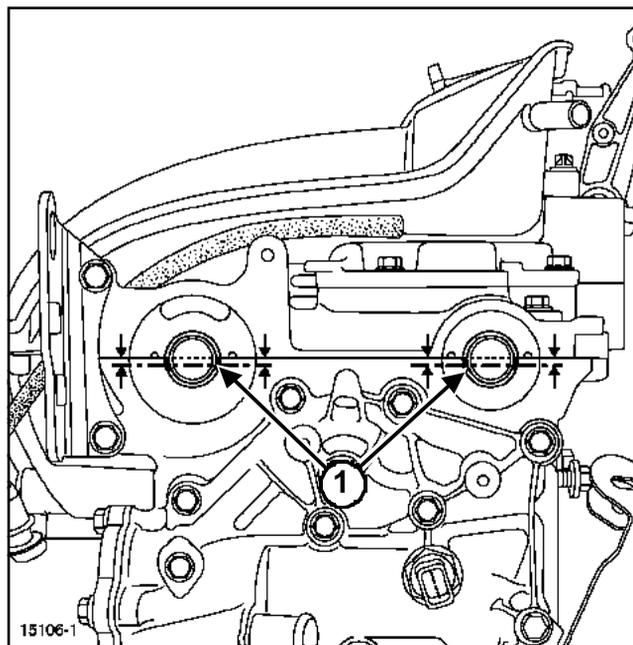
15104

- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

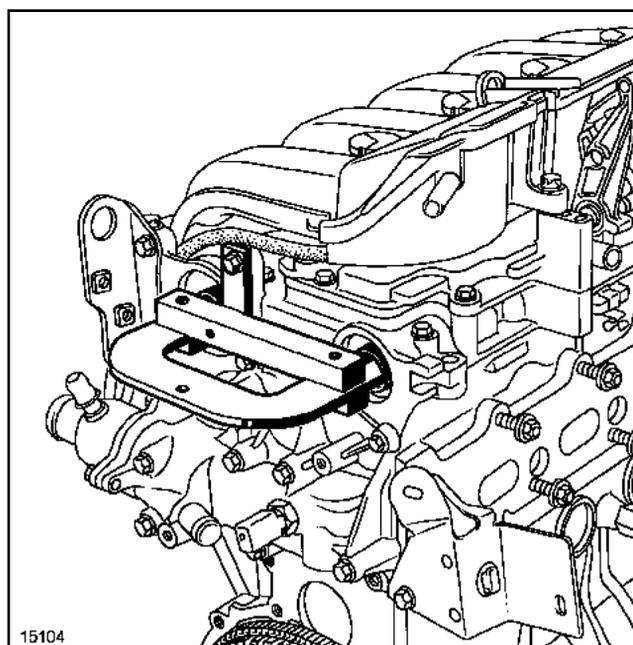
TIMING ADJUSTMENT WITH SPROCKET WITH INTEGRAL KEY

- Refit the degreased camshaft pulleys with the old nuts.
- Tighten to torque the old nuts (**15 Nm max.**) using tool (**Mot. 799-01**).



15106-1

- Position the offset grooves (1) horizontally below the centre-line by turning the camshafts using tool (**Mot. 799-01**).

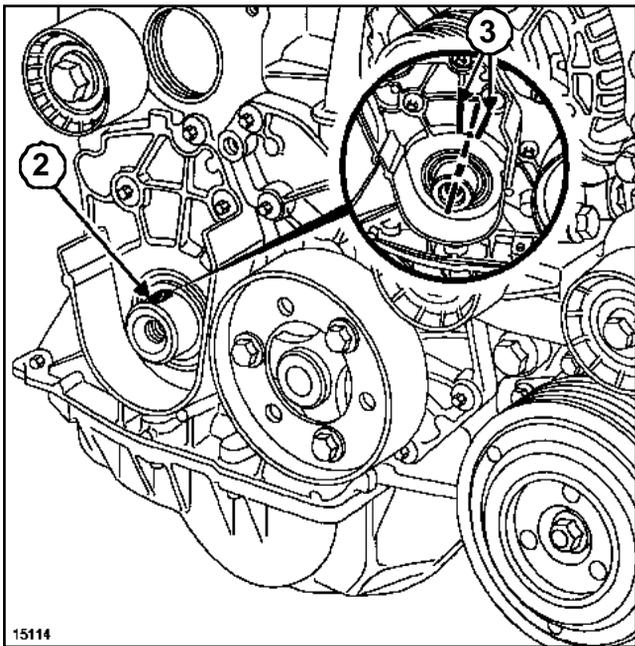


15104

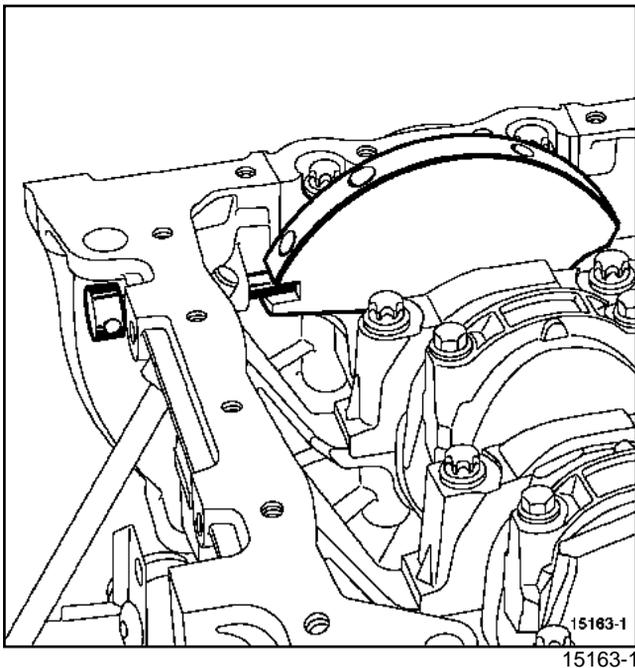
- Position tool (**Mot. 1496**), attaching it to the ends of the camshafts.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



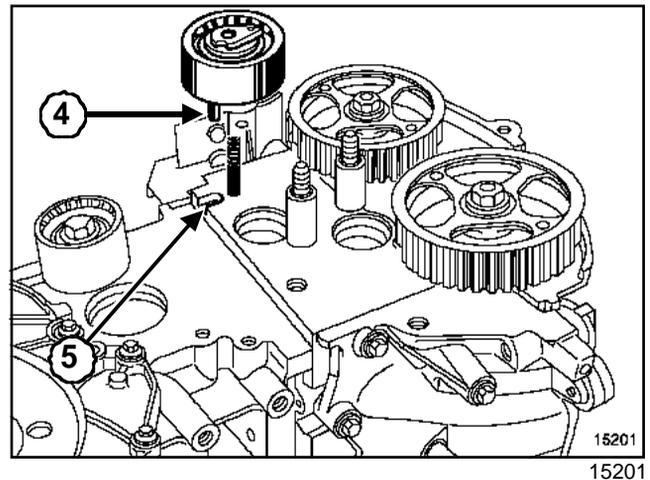
Correct position



WARNING

Check that the crankshaft is correctly blocked.

The crankshaft groove (2) must be between the two ribs (3).

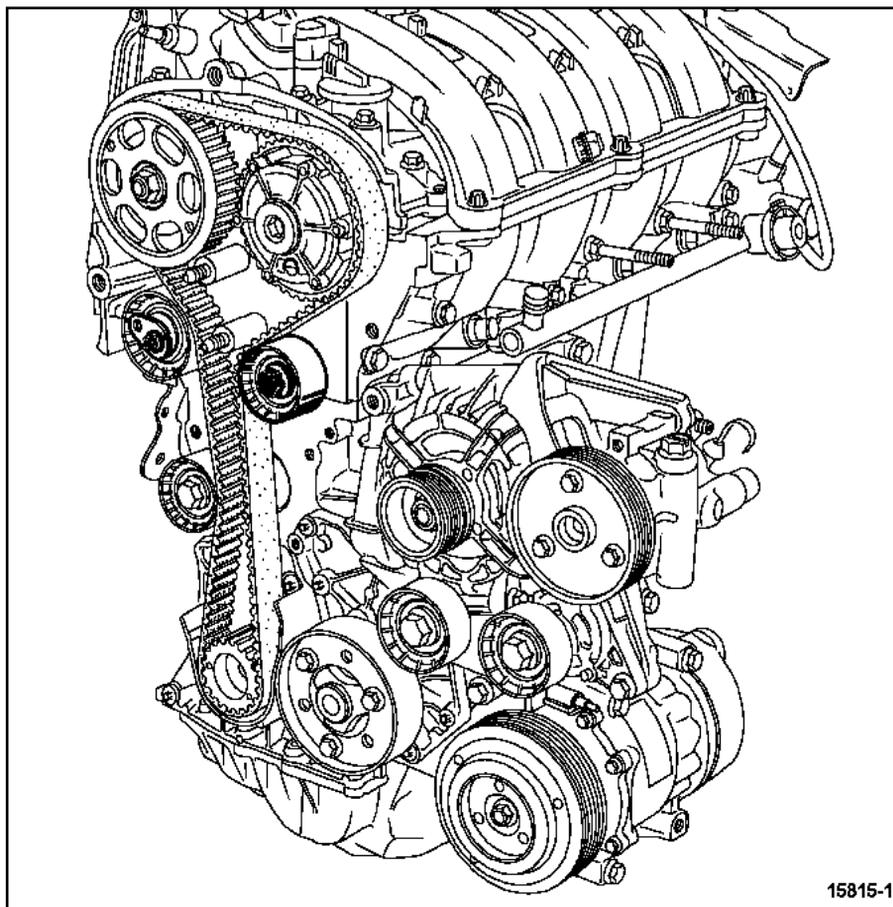


□ Refit:

- a new tension wheel, positioning the tension wheel lug (4) correctly in the groove (5).
- the **crankshaft sprocket with integrated key**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15815-1

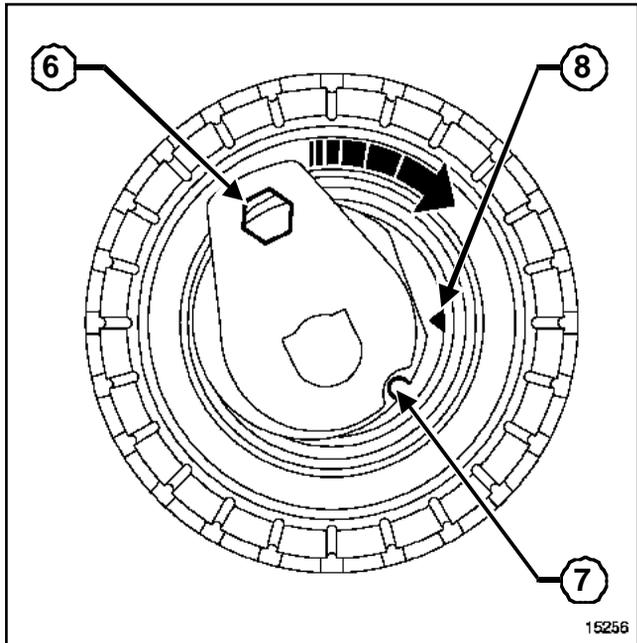
15815-1

- Refit:
 - a new belt,
 - new pulley(s).
- Tighten to torque the **pulley bolts (50 Nm)**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

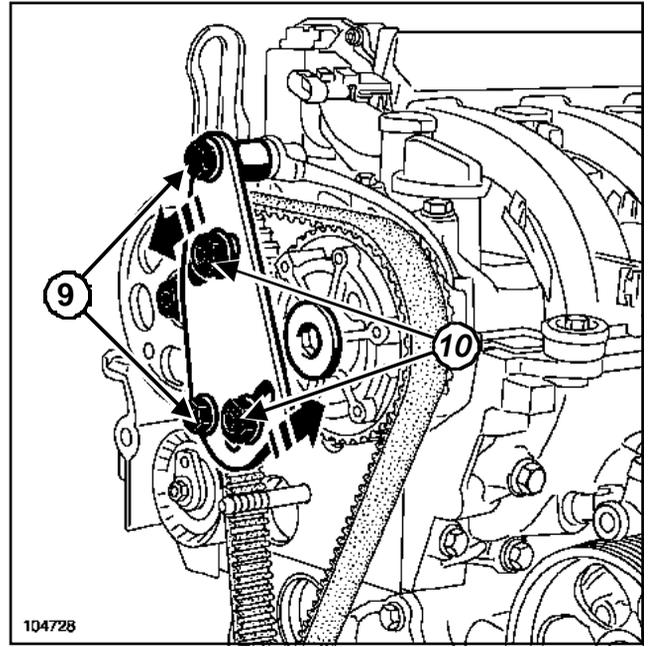
Belt tension



□

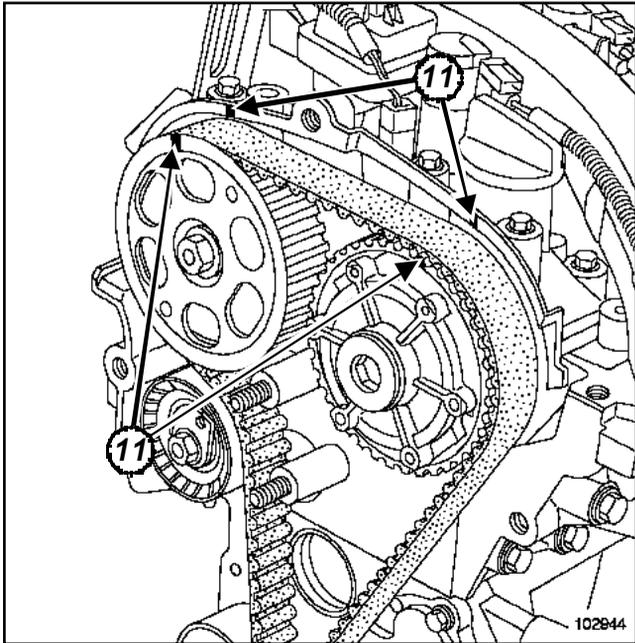
Note: Do not rotate the tension wheel anti-clockwise.

- Align the tension wheel marks (7) and (8) using a 6 mm Allen key at (6).
- Tighten to torque the **tension wheel nut (7 Nm)**.



- Fit tool (**Mot. 1509**) with tool kit (**Mot. 1509-01**) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (9).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque:
 - the **toothed pinion nuts (80 Nm)(10)**,
 - the **old inlet camshaft dephaser mounting bolt (30 Nm)**,
 - the **old exhaust camshaft pulley nut (30 Nm)**.

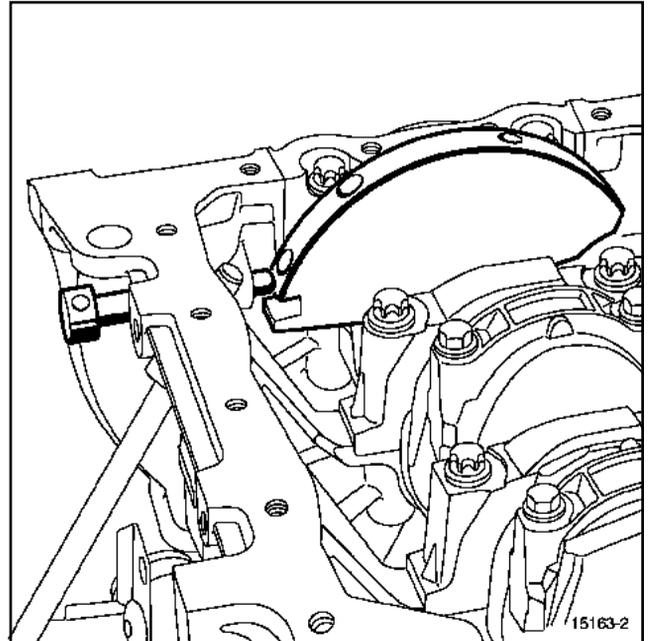
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



102944

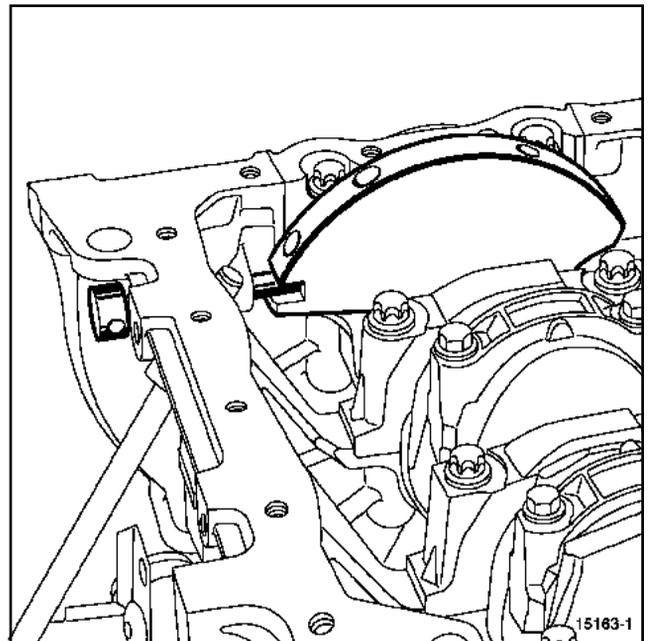
- Use a pencil to make marks on the camshaft pulleys and the rocker cover.
- Remove the tools:
 - TDC setting pin (**Mot. 1054**),
 - Camshaft setting tool (**Mot. 1496**),
 - Camshaft pulley immobilising tools (**Mot. 1509** and **Mot. 1509-01**).
- Rotate the crankshaft clockwise through two revolutions (timing end).

Checking the tension



15163-2

- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the TDC setting pin (it will then be between the balancing hole and the timing adjustment hole).

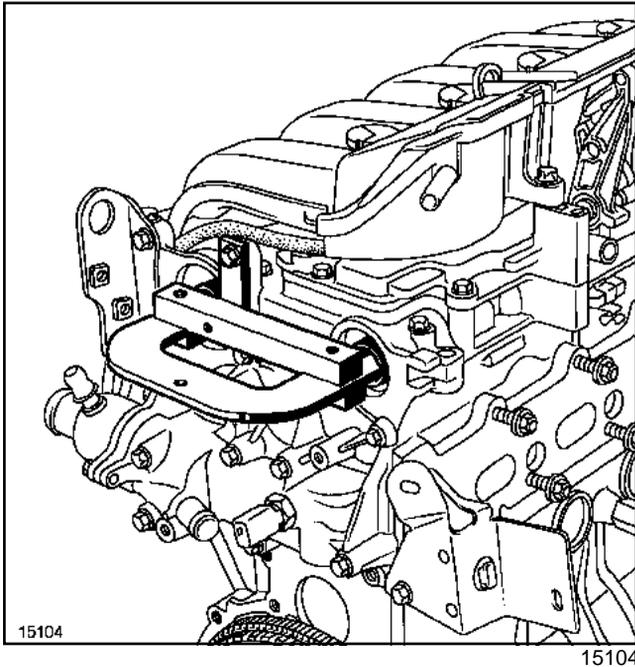


15163-1

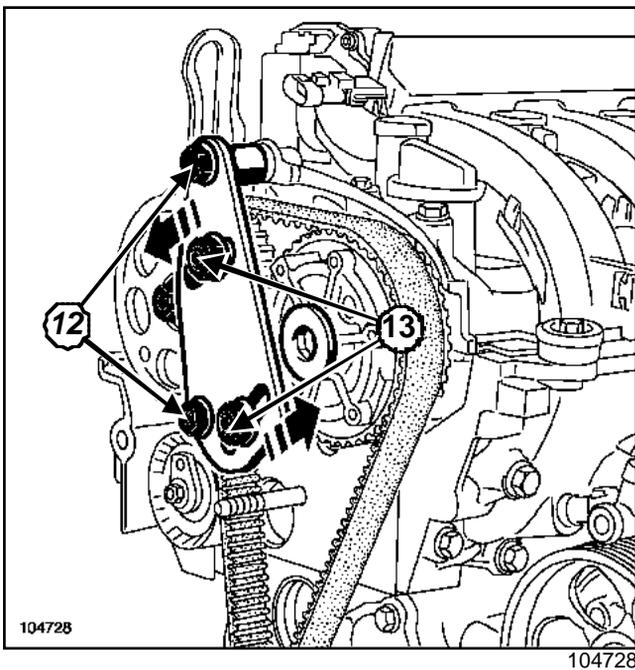
- Bring the timing to its adjustment point.
- Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure as follows:

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



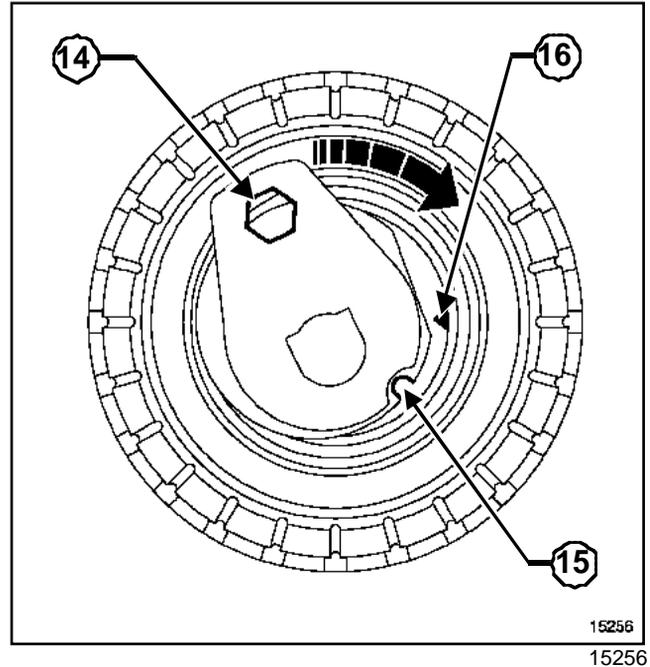
- Fit camshaft adjustment tool (**Mot. 1496**).



- Fit tool (**Mot. 1509**) with tool kit (**Mot. 1509-01**) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (**12**).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the **toothed pinion nuts (80 Nm)(13)**.
- Loosen:
 - the old inlet camshaft dephaser mounting bolt,

- the old exhaust camshaft pulley nut.

- Remove the camshaft pulley locking tool (**Mot. 1509**) and (**Mot. 1509-01**).

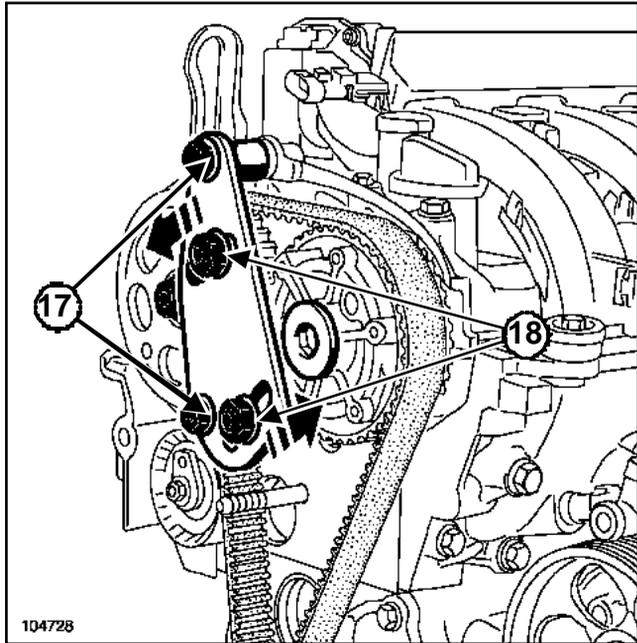


- Align marks (**15**) and (**16**) by unscrewing the tension wheel nut by up to one turn while maintaining its position with a **6 mm** Allen key in (**14**).

Tighten the nut **on the tension wheel finally to 28 Nm**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



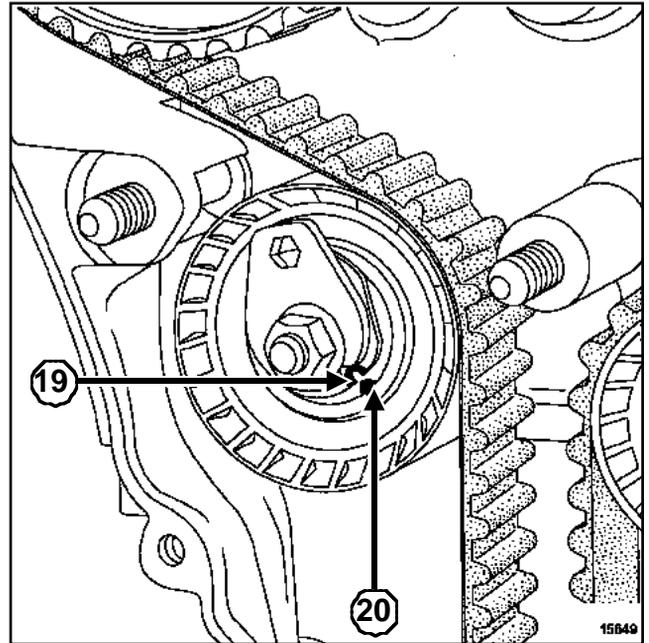
- Fit tool (Mot. 1509) with tool kit (Mot. 1509-01) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (17).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the **toothed pinion nuts (80 Nm)(18)**.
- Remove:
 - the old inlet camshaft dephaser bolt,
 - the old exhaust camshaft pulley nut.

WARNING

It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

- Fit new fastenings on the camshaft pulleys.
- Tighten to torque
 - the **inlet camshaft dephaser mounting bolt (30 Nm)**,
 - the **exhaust camshaft pulley nut (30 Nm)**.
- Remove the camshaft adjustment tool (Mot. 1496).
- Tighten to torque the **inlet camshaft dephaser mounting bolt (100 Nm)**.
- Tighten to angle the **exhaust camshaft pulley nut ($86^\circ \pm 6^\circ$)**.
- Tighten to torque the **inlet camshaft dephaser blanking cover (25 Nm)**.

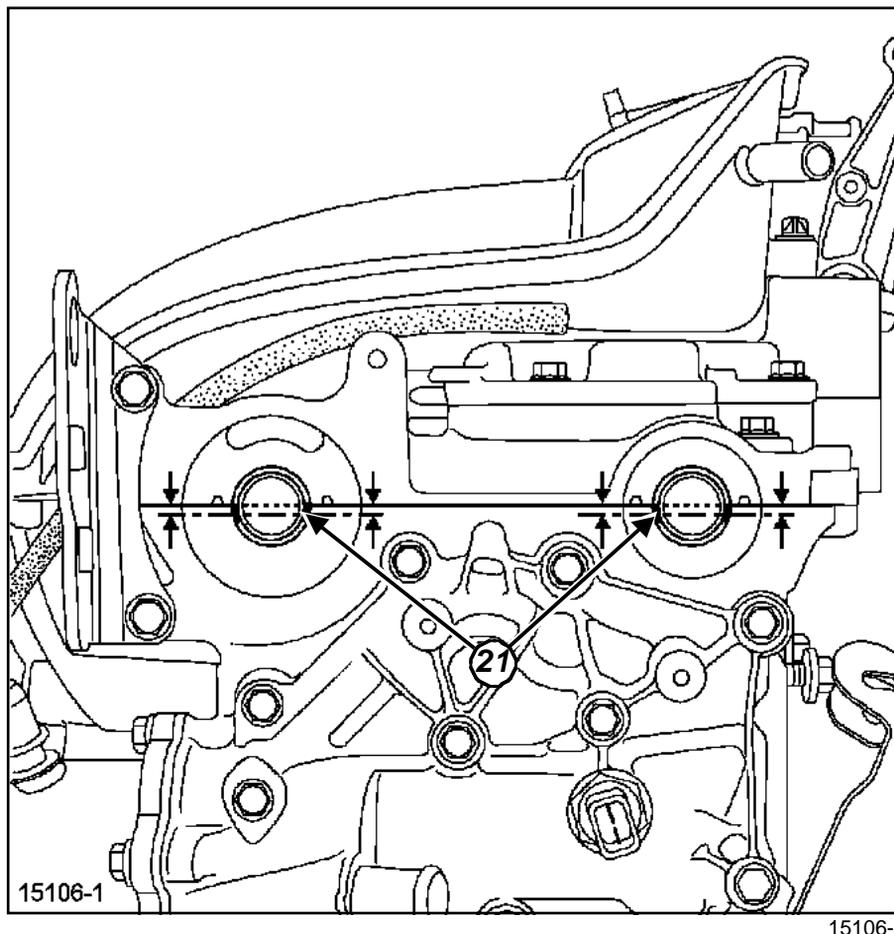
- Remove both the following tools:
 - TDC setting pin (Mot. 1054),
 - Camshaft pulley immobilising tool (Mot. 1509).
- Rotate the crankshaft clockwise through two revolutions (timing end).



- Check that the tension wheel marks (19) and (20) are in the correct position before checking the timing adjustment.
- Insert the TDC setting pin (Mot. 1054) (check that the marks made by the operator on the camshaft pulleys are aligned).

Timing - cylinder head: Refitting

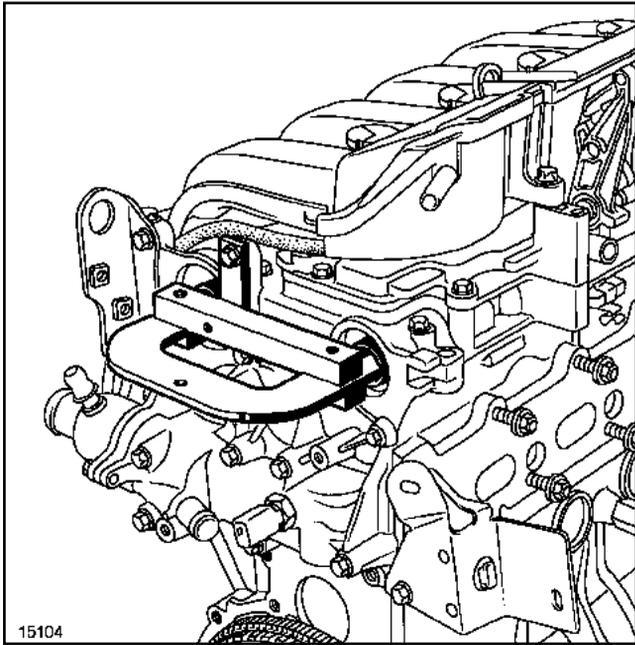
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- ❑ The offset grooves (21) must be horizontal and below the centre-line.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15104

15104

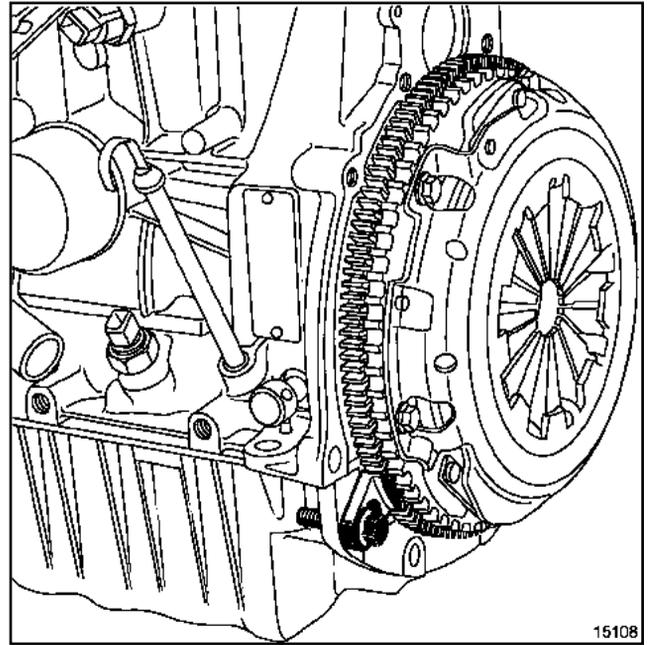
- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

REFITTING THE CRANKSHAFT ACCESSORIES PULLEY AND ACCESSORIES BELT

WARNING

When the accessories belt is replaced in accordance with the manufacturer's instructions, the belt, tensioner, pulley and anti-vibration pulley (two-part) must be replaced with new ones.



15108

15108

- Remove the TDC setting pin (**Mot. 1054**).
- Apply a drop of RHODORSEAL 5661 to the TDC setting pin plug.
- Refit the TDC setting pin plug.
- Immobilise the flywheel using tool (**Mot. 1677**).

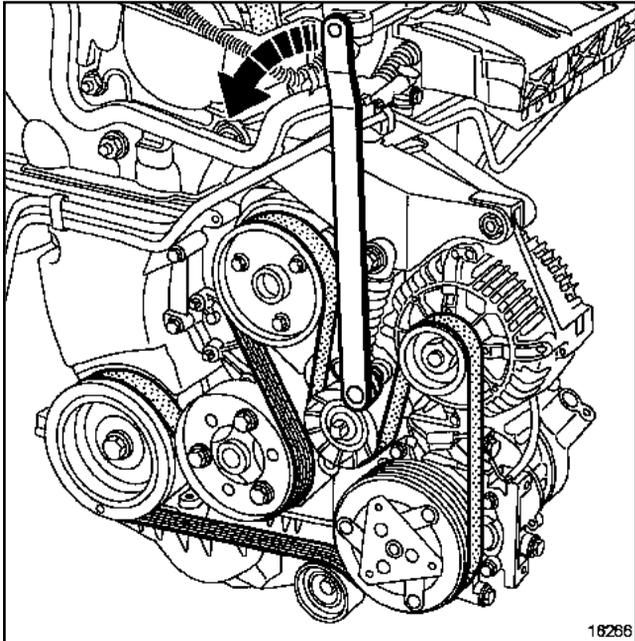
F4R, and 730 or 732 or 736

- Fit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

With air conditioning



- Turn the tensioner with a **12.7 mm** ratchet square drive in the direction of the arrow.
- Fit a new accessories belt.

IMPORTANT

- Wear gloves during the operation.

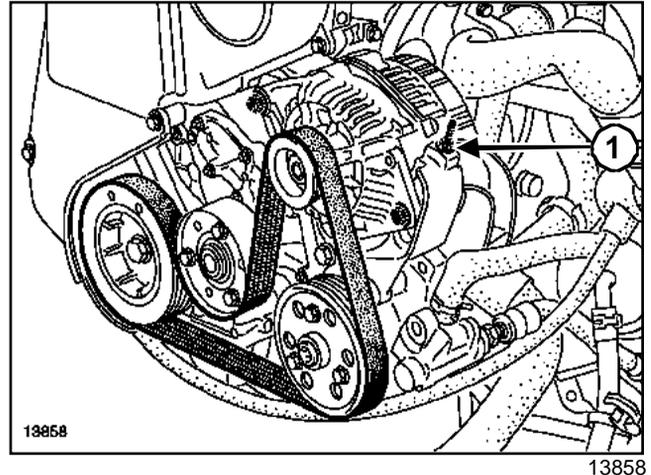
IMPORTANT

- Be aware of the travel of the tool caused by the rotation of the tensioner wheel.

F4R, and 700 or 701 or 736 or 738

- Fit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

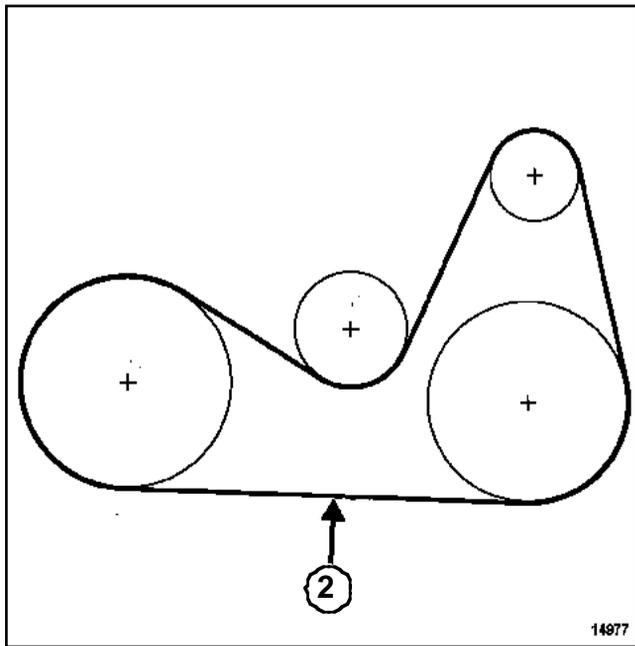
Without air conditioning



- Loosen the alternator mounting bolts.
- Fit a new accessories belt.
- Tension the accessories belt by tightening nut **(1)** on the alternator mounting.

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



□

Note:

- A: Crankshaft
- T: Water pump
- C: Alternator
- B: Power assisted steering pump
- : tension measurement point

- Check the accessories belt tension using belt tension tester (**Mot. 1505**) or (**Mot. 1715**).
- Belt tension (in Hz): **183 Hz ± 9**
- Tighten to torque the alternator mounting bolts:
 - **M10 alternator mounting bolt (44 Nm)**
 - **M8 alternator mounting bolt (25 Nm)**
-

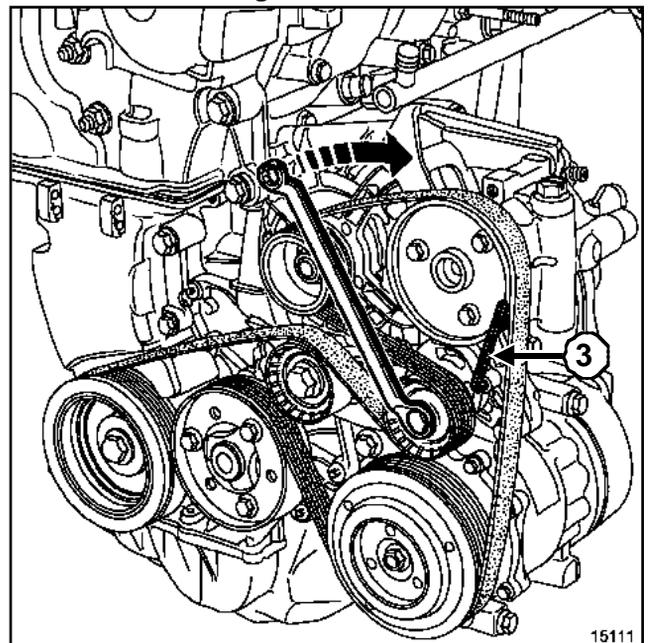
F4R, and 700 or 701 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

□ Fit:

- a new crankshaft accessories pulley,
- a new crankshaft accessories pulley bolt.

□ Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

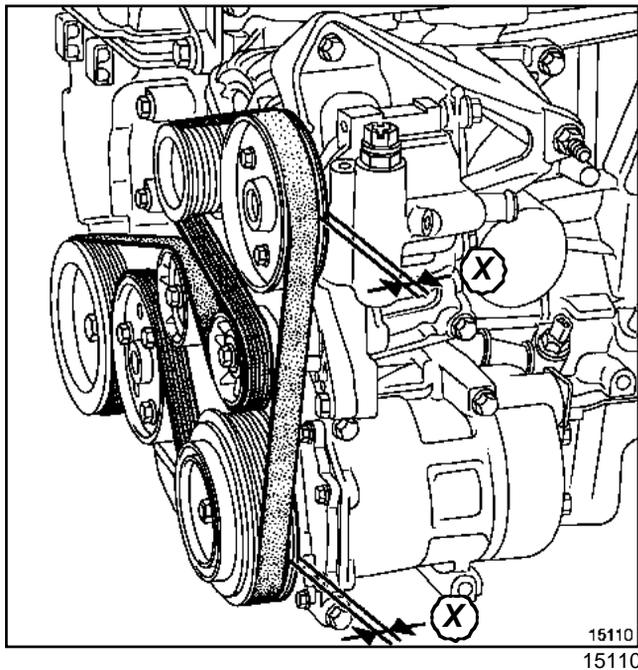
With air conditioning



- Rotate the tensioner in the direction of the arrow using a spanner.
- Lock the tensioner with a **6 mm Allen key (3)**.
- Fit a new accessories belt.

Timing - cylinder head: Refitting

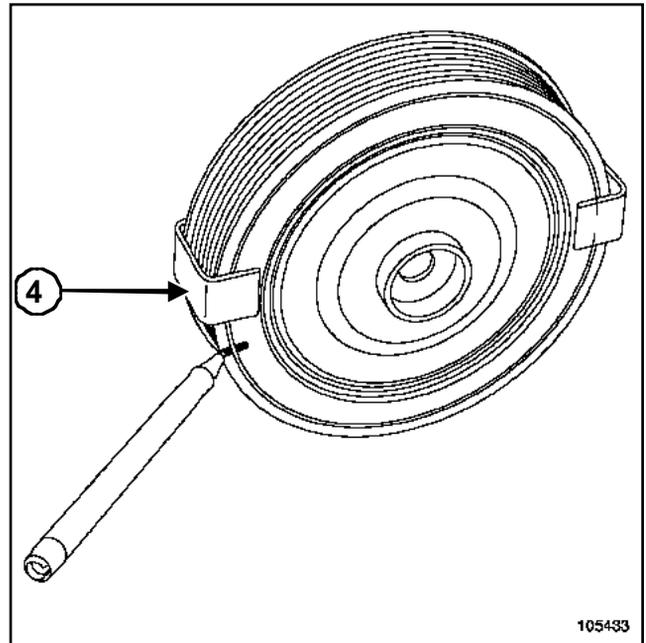
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



WARNING

When fitting the belt it is imperative to check that the groove ((X)) on the inner edge of the pulleys remains free.

F4P, and 261 or 770 or 771 or 772 or 774 or 775 – F4R, and 712 or 713



WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

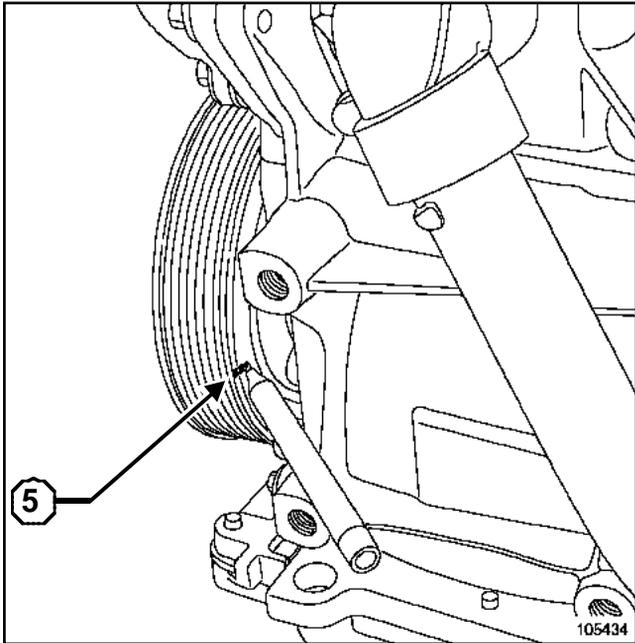
Mark it before refitting it to prevent an error.

It is forbidden to take the anti-vibration pulley apart.

- Refit the new anti-vibration pulley with its clamp (4).

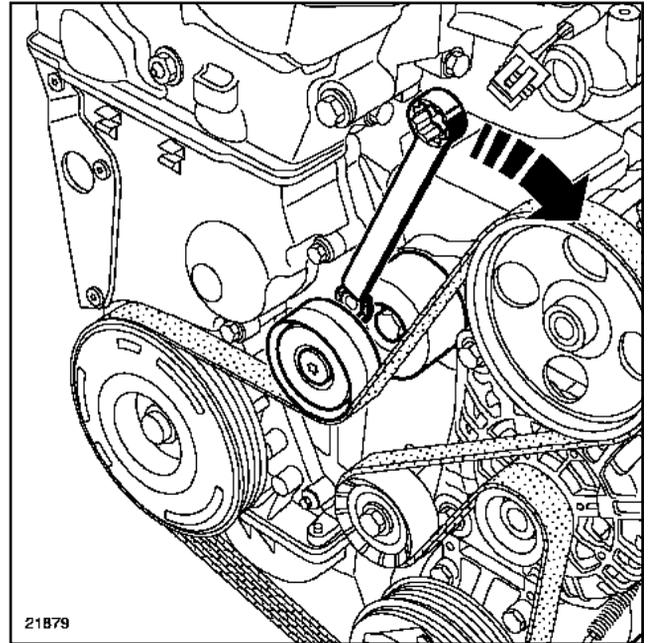
Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



105434

- Fit a new anti-vibration pulley bolt.
- Before tightening the anti-vibration pulley, check the alignment of the two parts(5)
- Tighten to torque and angle the anti-vibration pulley bolt
 - anti-vibration pulley bolt with washer (40 Nm + 110°)
 - anti-vibration pulley bolt without washer (20 Nm + 115°)

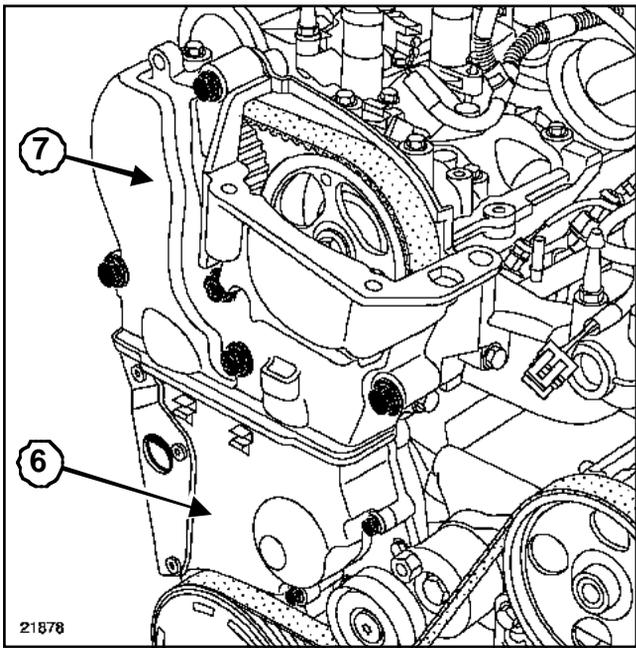


21879

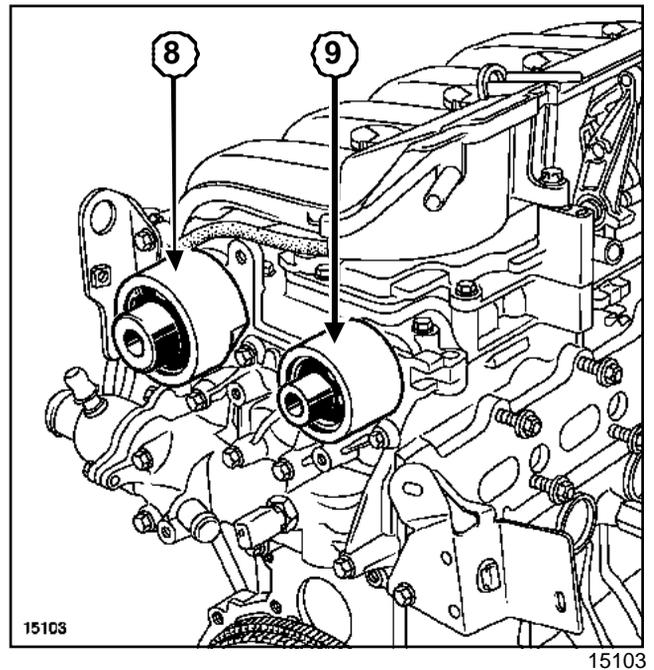
- Rotate the tensioner in the direction of the arrow using a spanner.
- Fit a new accessories belt.
- Remove the flywheel locking tool (Mot. 1677).

Timing - cylinder head: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- Tighten to torque the lower timing cover mounting bolts (6):
 - M6 lower timing cover bolts (8 Nm),
 - M8 lower timing cover bolts (20 Nm).
- Tighten to torque the upper timing cover mounting bolts (7):
 - M8 upper timing cover bolts (18 Nm).
 - M10 upper timing cover bolts (38 Nm).



- Refit new sealing plugs:
 - for the inlet camshaft, using tool (Mot. 1487)(8),
 - for the exhaust camshaft, using tool (Mot. 1488)(9).

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 1512	Tool for fitting camshaft seals (28 x 47 mm)
Mot. 799-01	Tool for locking sprockets on toothed timing belt
Mot. 1496	Tool for setting the camshaft
Mot. 1054	TDC setting pin
Mot. 1677	Flywheel locking tool (F engines)
Mot. 1509	Camshaft sprocket locking tool
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1715	Belt tension setting tool (frequency meter)
Mot. 1487	Tool for refitting camshaft covers (57 mm diameter)
Mot. 1488	Tool for refitting camshaft covers (43 mm diameter)

Equipment required
roller-type stud removal tool

Tightening torques 	
oil separator bolts	15 Nm if the holes are not threaded
oil separator bolts	10 Nm if the holes are pre-threaded
ignition coil bolts	15 Nm if the holes are not threaded
ignition coil bolts	12 Nm if the holes are pre-threaded

Tightening torques 	
lifting ring bolt (timing end)	28 Nm
lifting ring bolts (flywheel end)	9 Nm
inlet manifold mounting bolts	9 Nm
mechanical throttle valve bolts	15 Nm if holes not threaded
mechanical throttle valve bolts	12 Nm if holes pre-threaded
motorised throttle valve bolts	9 Nm
motorised throttle valve bolts (F4R 770, 771 and Turbo)	9 Nm
turbocharger mounting studs	5 Nm ± 1
lower turbocharger mounting nuts	15 Nm + 75° ± 6°
upper turbocharger mounting nut	10 Nm + 35° ± 6°
turbocharger/strut bolt	9 Nm
separator/strut bolt	12 Nm
turbocharger/oil return pipe bolts	12 Nm
turbocharger/pipe mounting bolts	10 Nm
pulley bolts	50 Nm
tension wheel nut	28 Nm
crankshaft accessories pulley bolt	40 Nm + 110°
toothed pinion nuts	80 Nm
inlet camshaft pulley nut	30 Nm + 86° ± 6°
exhaust camshaft pulley nut	30 Nm + 86° ± 6°

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Tightening torques 	
M10 alternator mounting bolt	44 Nm
M8 alternator mounting bolt	25 Nm
anti-vibration pulley bolt with washer	40 Nm + 110°
anti-vibration pulley bolt without washer	20 Nm + 115°
M6 lower timing cover bolts	8 Nm
M8 lower timing cover bolts	20 Nm
M8 upper timing cover bolts	18 Nm
M10 upper timing cover bolts	38 Nm

F4 engines with camshafts without dephasers.

REFITTING THE CYLINDER HEAD

- Check that the pistons are correctly positioned in mid-stroke.
- Degrease the cylinder head and cylinder block combustion surfaces.
- Check for the presence of the two centring dowels.
- Refit:
 - the cylinder head gasket,
 - the cylinder head.

WARNING

- Reuse the bolts if the length under the bolt head does not exceed **118.5 mm** (otherwise replace all the bolts).

WARNING

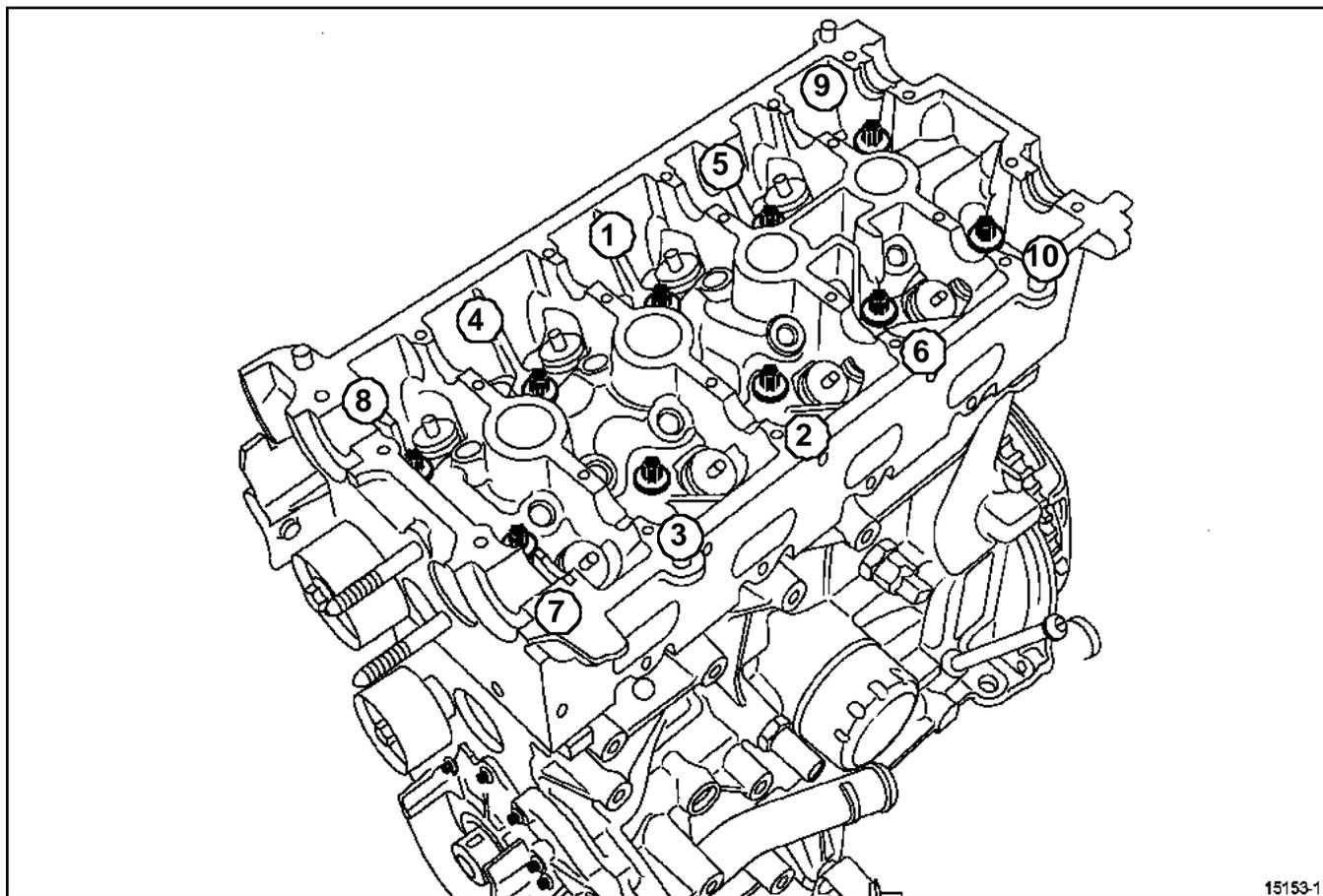
- To ensure that the bolts are correctly tightened, use a syringe to remove any oil that may be in the cylinder head mounting holes.

WARNING

- Do not oil the new bolts. The bolts must be oiled if reused.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15153-1

15153-1

Follow this procedure:

- Tighten to torque and in order the **cylinder head bolts 20 Nm**.
- Check that all the bolts are correctly tightened to **20 Nm**.
- Tighten to angle the first time (bolt by bolt) by **100° ± 6°**.
- Tighten to angle a second time (bolt by bolt) by **100° ± 6°**.

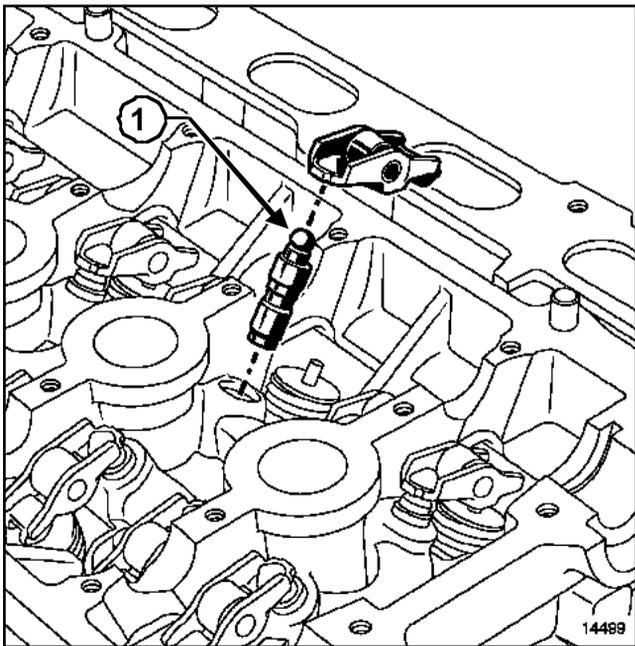
WARNING

Do not re-tighten the cylinder head bolts after applying this procedure.

- After a certain amount of time, a hydraulic tappet may drain out and in that case it must be refilled.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- To check whether it needs repriming, press the top of each tappet (1) 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.

REFITTING THE CAMSHAFT DOWEL

1 - Cleaning the camshaft thread

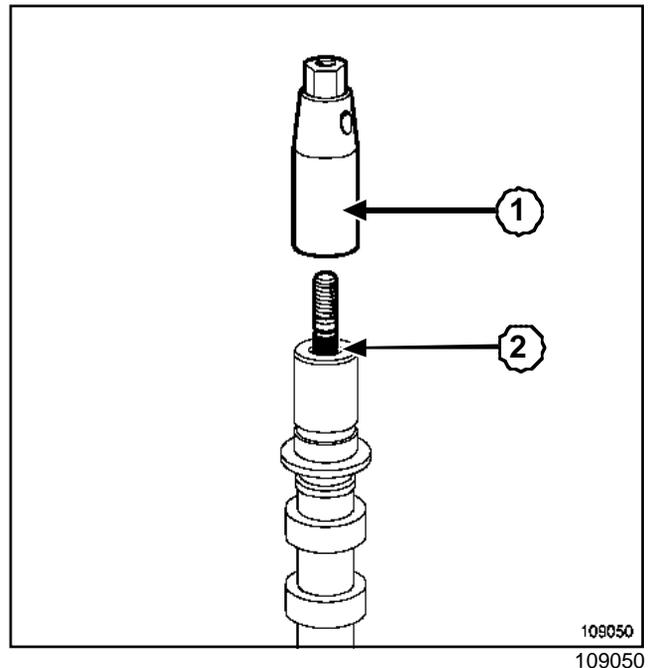
WARNING

Clean the threaded hole of the camshaft carefully to prevent foreign bodies from entering the latter.

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

2 - Refitting the dowel

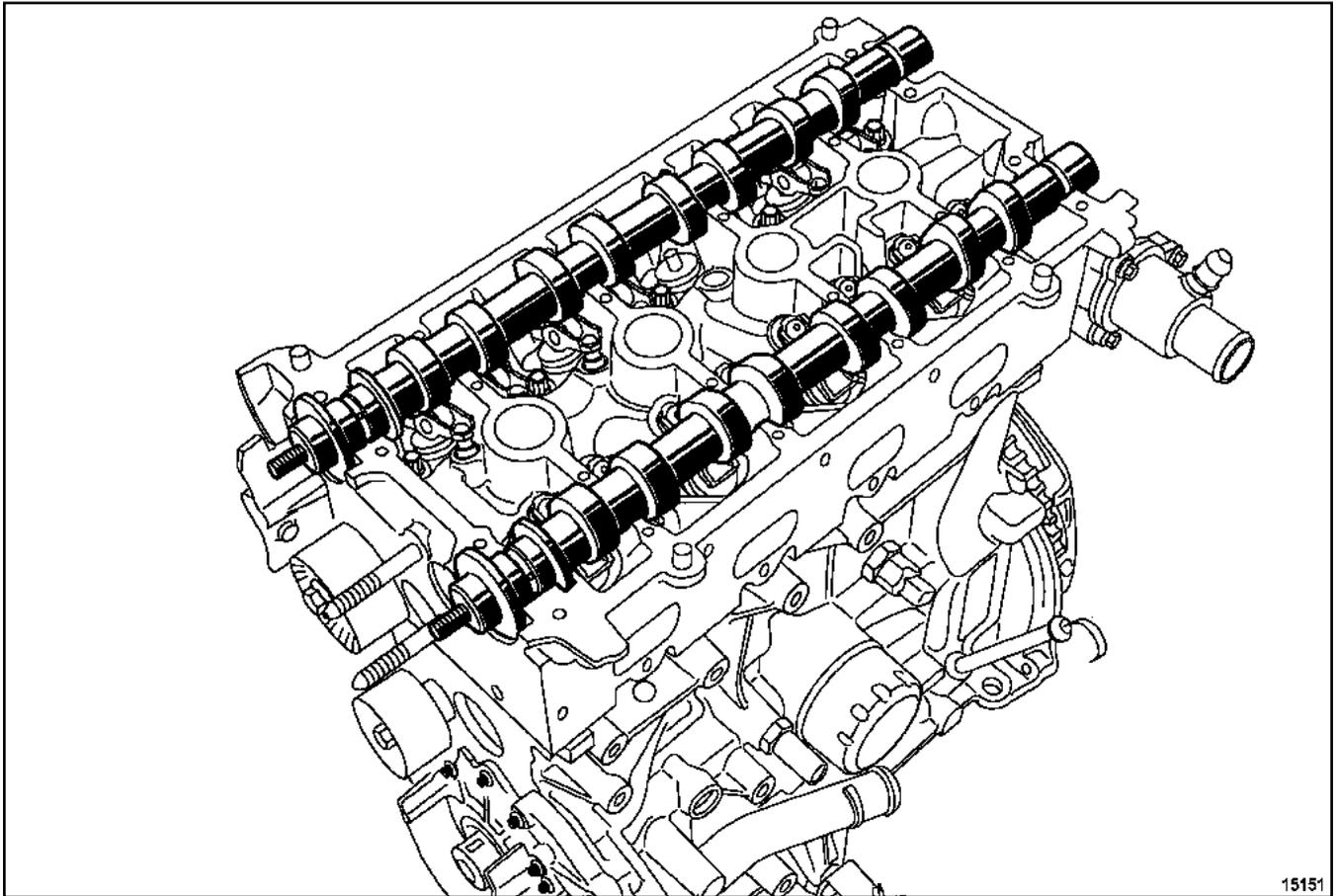
- Place the camshaft in a vice fitted with **aluminium jaw plates**.



- Fit the new camshaft dowel (pre-coated section (2) camshaft end)
- Tighten to torque the **camshaft dowel (8 Nm)** using a **roller-type stud removal tool(1)**.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15151

15151

- Oil the camshaft bearings.

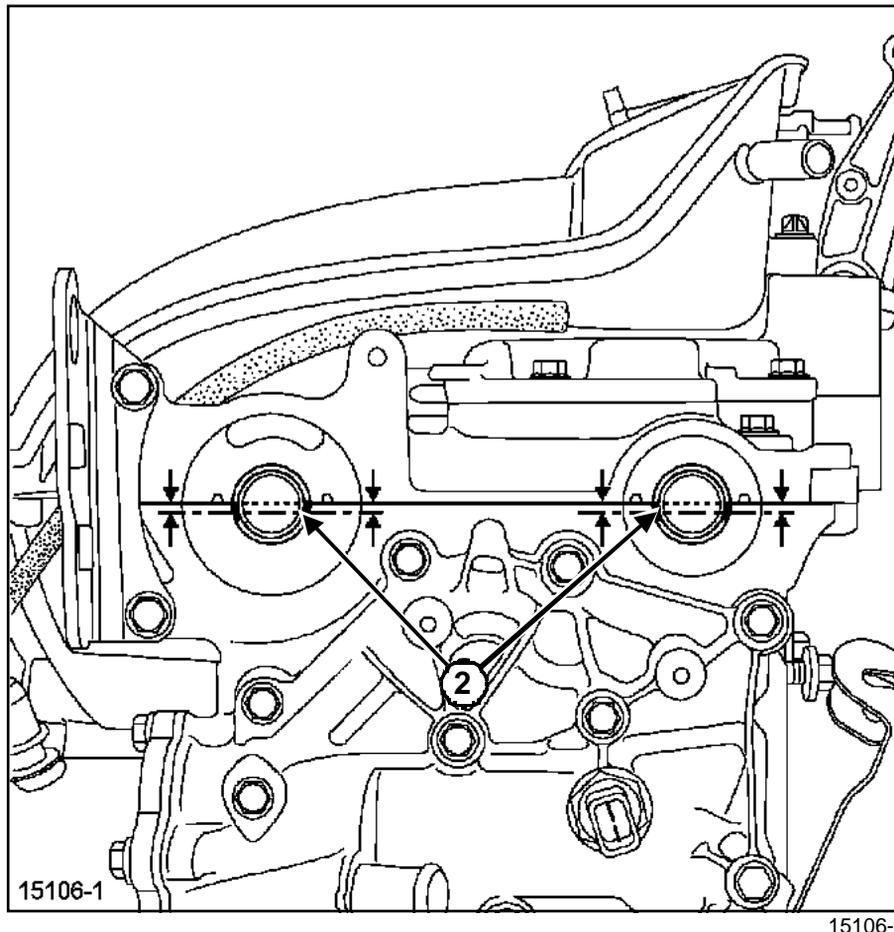
WARNING

Do not oil the gasket face of the rocker cover.

- Refit the camshafts, positioning them correctly (see section 10A, Engine peripherals: characteristics for camshaft identification).

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15106-1

- Position the offset grooves (2) horizontally below the centre-line.

□

Note:

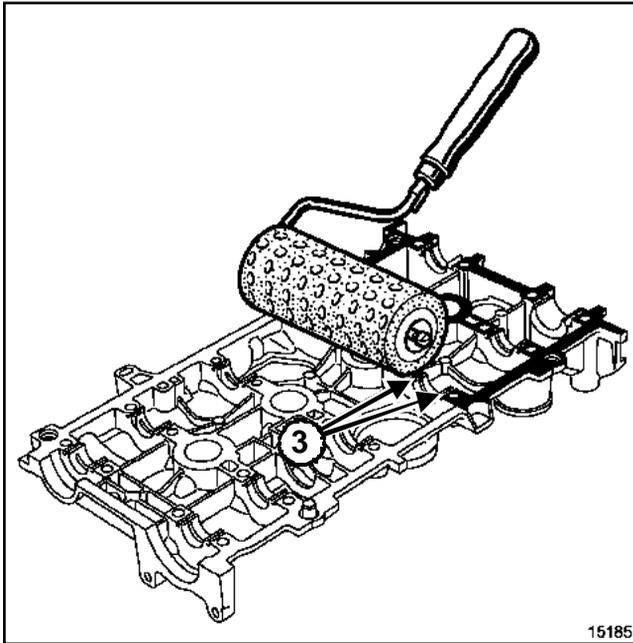
Gasket faces must be clean, dry and free from grease (avoid finger marks).

Note:

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

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- ❑ Apply LOCTITE 518 to the gasket face of the rocker cover with a stipple roller until it turns reddish in colour.

❑

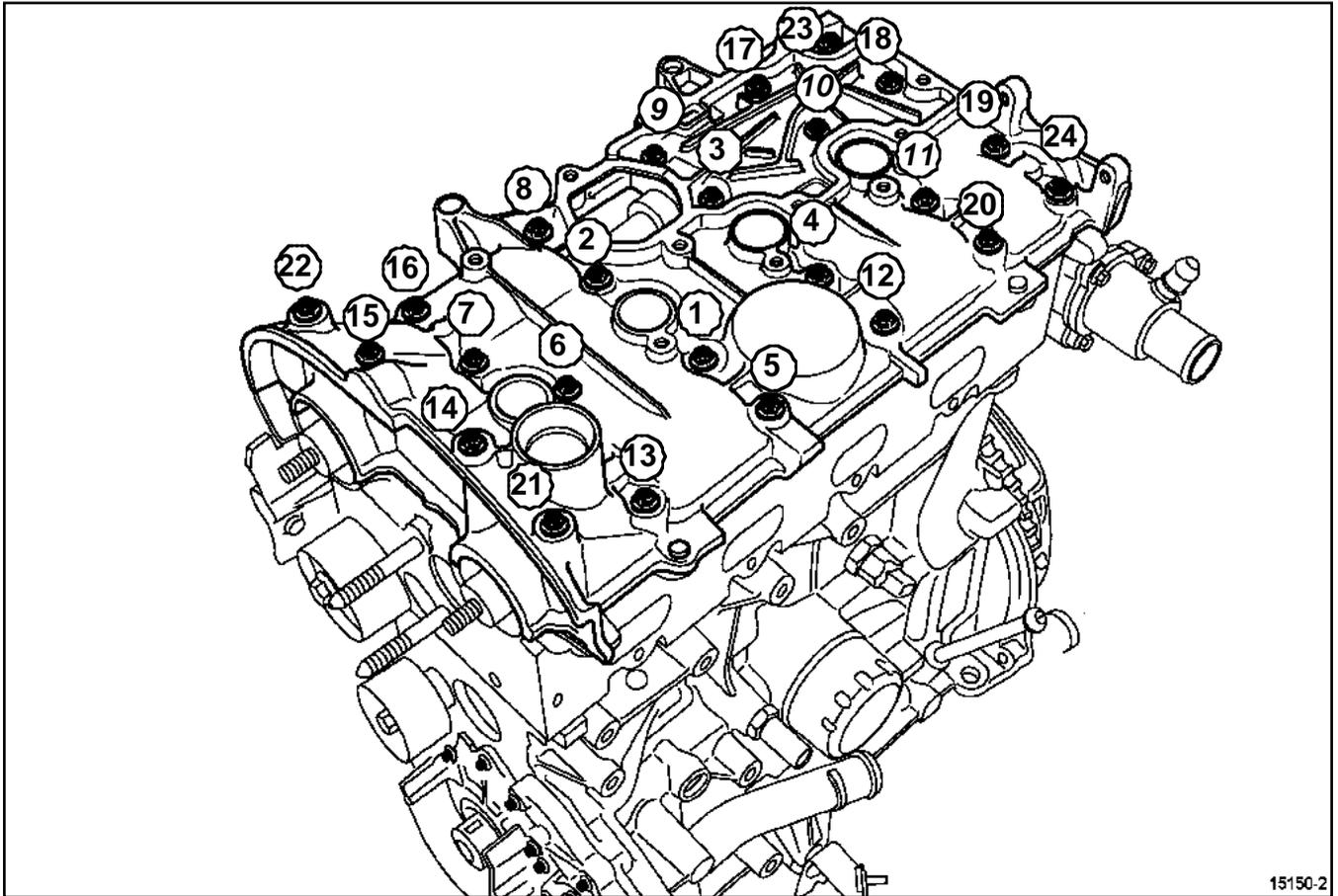
WARNING

Use a cloth to remove any LOCTITE 518 from the six rocker cover bearings (3).

- ❑ Refit the rocker cover, following the correct tightening procedure:

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15150-2

15150-2

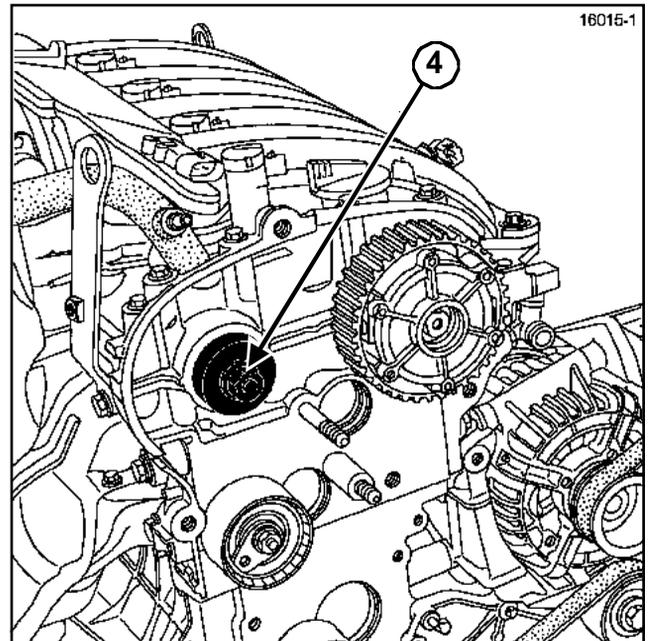


Note:

Do not put sealing compound under the head or on the thread of the bolts.

- Operation no. 1: tighten bolts 22-23-20-13 to **8 Nm**
- Operation no. 2: tighten bolts 1 to 12 then 14 to 19 and 21-24 to **12 Nm**
- Operation no. 3: tighten bolts 22-23-20-13 to **12 Nm**

Fitting camshaft seals



16015-1

16015-1

- Fit the camshaft seal with tool (**Mot. 1512**), using the old nut (**4**).

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

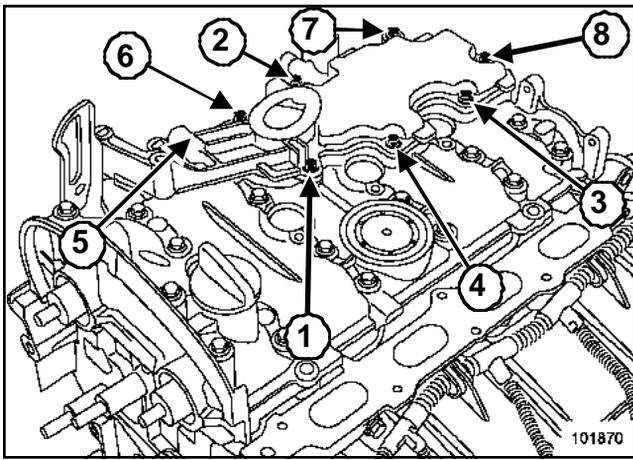
F4P, and 720 or 760 – F4R, and 276 or 720

□

Note:

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

□ Refit the oil separator, with a new gasket.



101870
101870

□ Tighten to torque and in order:

- the **oil separator bolts (15 Nm if the holes are not threaded).**

- the **oil separator bolts (10 Nm if the holes are pre-threaded).**

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

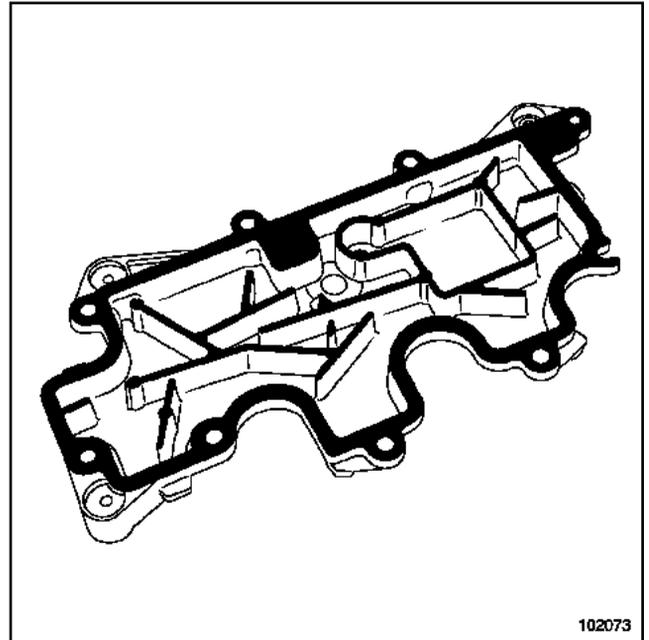
□

Note:

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

Note:

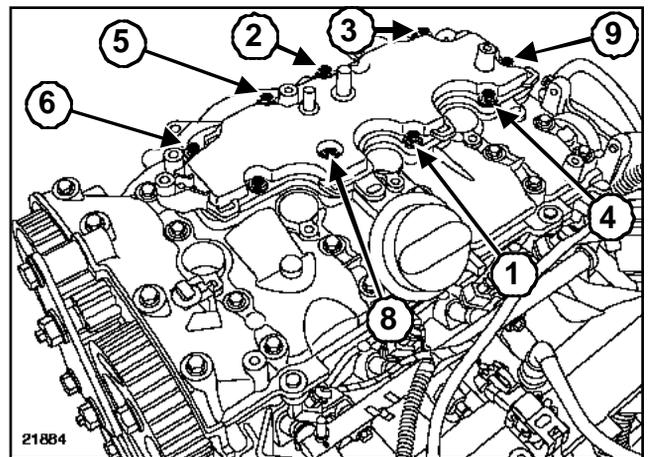
Applying excess sealant could cause it to be squeezed out when parts are tightened. A mixture of sealant and fluid could damage certain components (engine, radiator, etc.)



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102073

□ Apply LOCTITE 518 using a stipple roller to the gasket face of the oil separator until it turns reddish in colour.

□ Refit the oil separator.



21884

21884

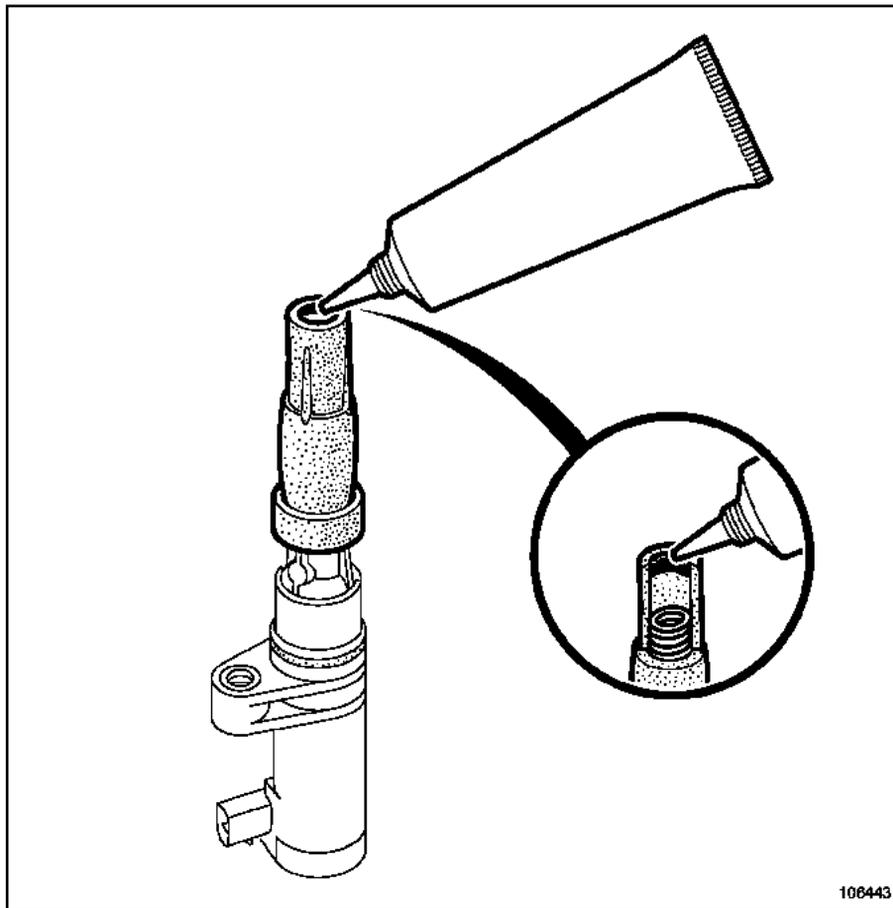
□ Tighten to torque and in order:

- the **oil separator bolts (15 Nm) if the holes are not threaded,**

- the **oil separator bolts (10 Nm) if the holes are pre-threaded.**

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



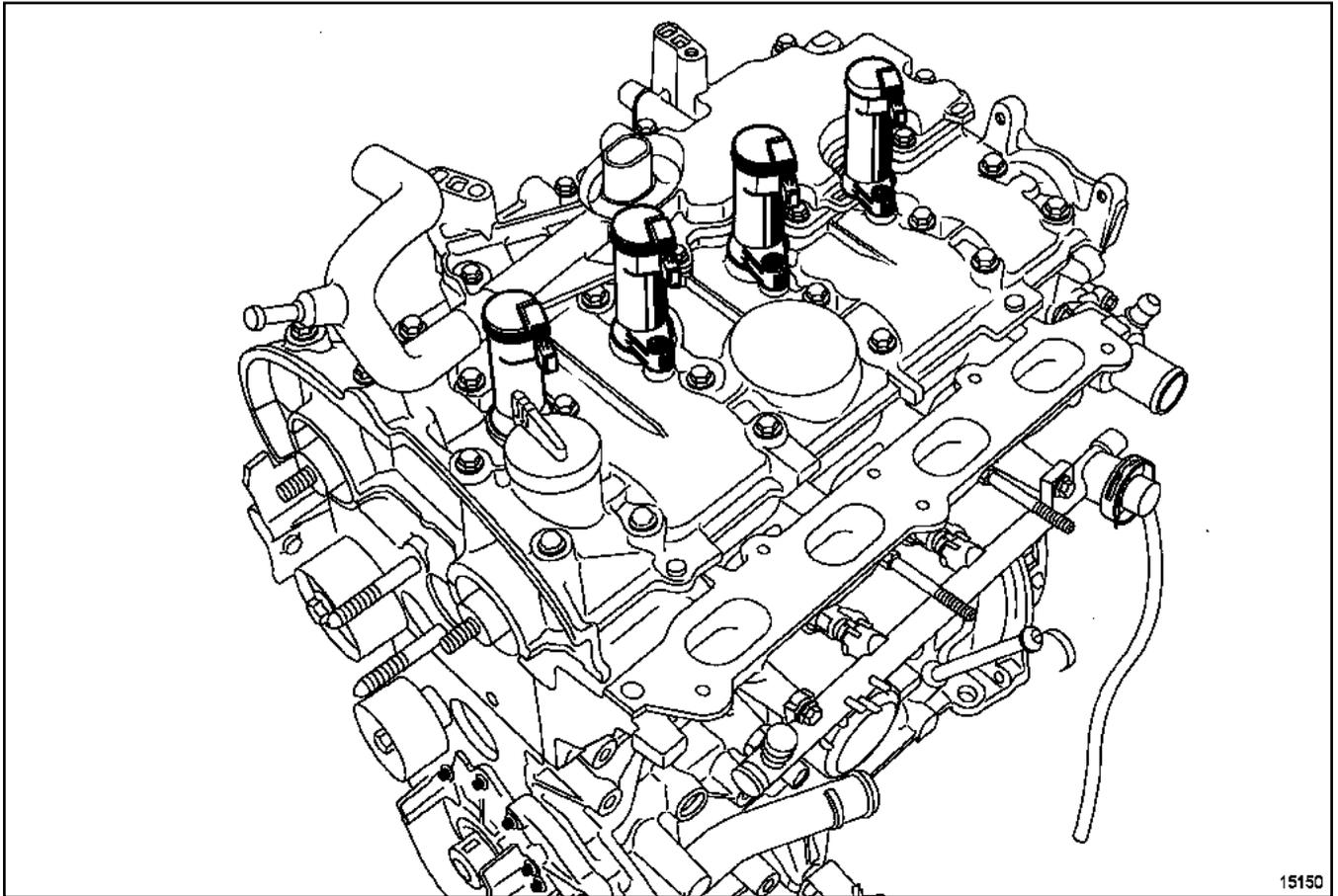
106443

106443

- Apply a bead of fluorinated grease to the ignition coil openings to improve sealing.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15150

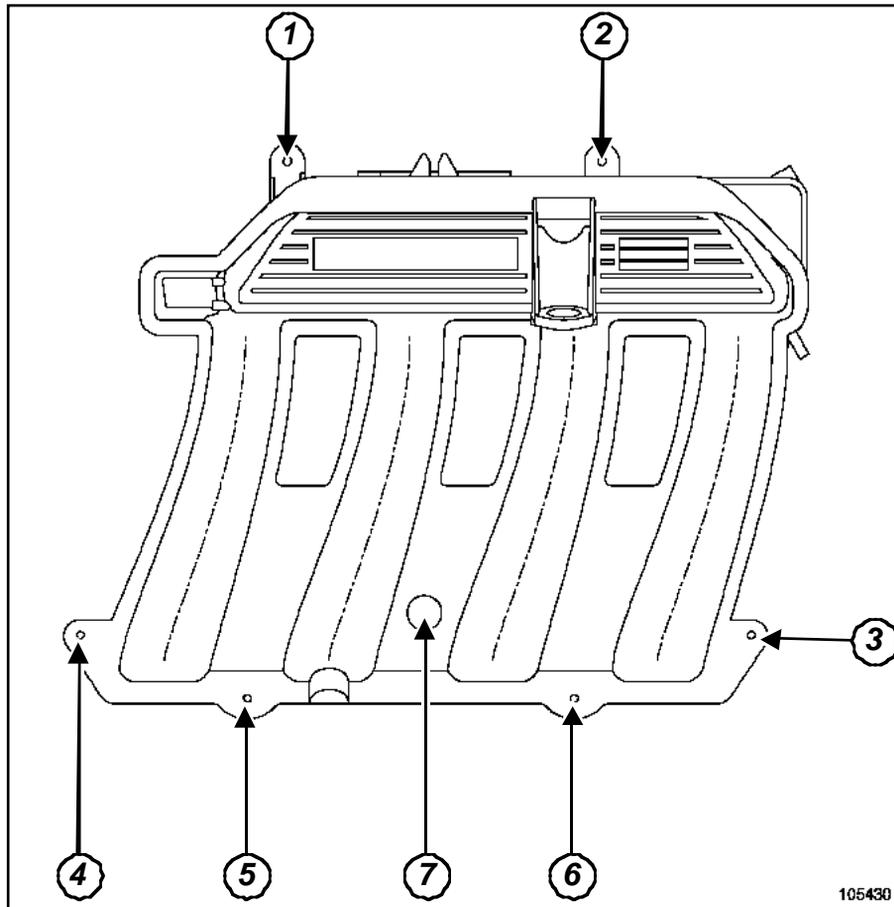
15150

- Refit the ignition coils.
- Tighten to torque the **ignition coil bolts (15 Nm if the holes are not threaded)**.
Tighten to torque the **ignition coil bolts (12 Nm if the holes are pre-threaded)**.
- Refit the engine lifting eyes.
- Tighten to torque the **lifting ring bolt (timing end) (28 Nm)**.
Tighten to torque the two **lifting ring bolts (flywheel end) (9 Nm)**.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4P, and 722 or 760



105430

105430

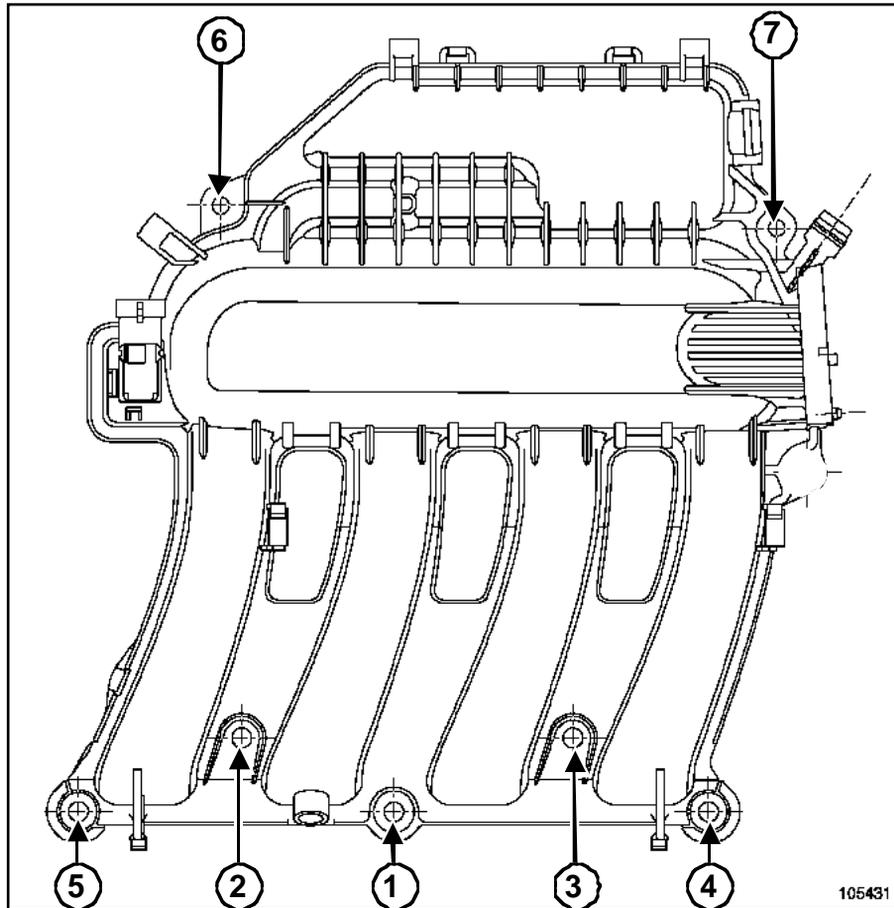
- Refit the inlet manifold, with its new gaskets.
- Tighten to torque and in order the **inlet manifold mounting bolts (9 Nm)**
- Refit the mechanical throttle valve, with new gaskets.
- Tighten to torque the two **mechanical throttle valve bolts (15 Nm if holes not threaded).**

Tighten to torque the two **mechanical throttle valve bolts (12 Nm if holes pre-threaded).**

Timing - cylinder head: Refitting

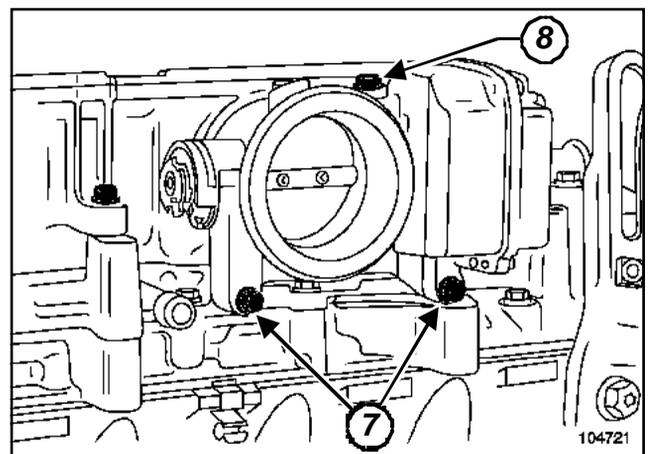
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4P, and 720 – F4R, and 720



105431
105431

- ❑ Refit the inlet manifold, with its new gaskets.
- ❑ Tighten to torque and in order the **inlet manifold mounting bolts 9 Nm**



104721
104721

- ❑ Refit the motorised throttle valve, with new seals.
- ❑ Tighten to torque the three **motorised throttle valve bolts (9 Nm)(7) and (8)**.

Timing - cylinder head: Refitting

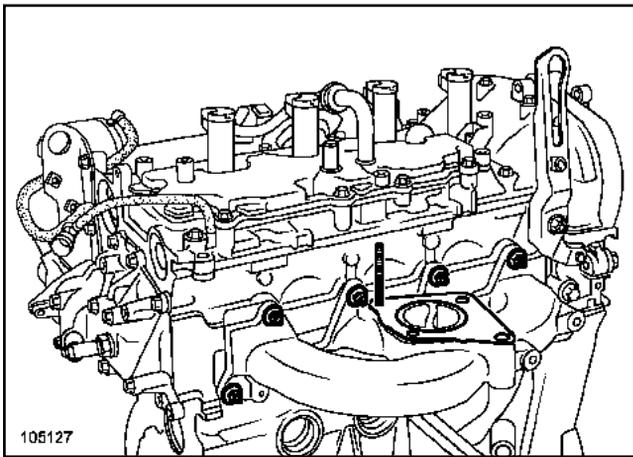
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4R, and 760 or 761 or 762 or 763 or 764 or 794 or 795

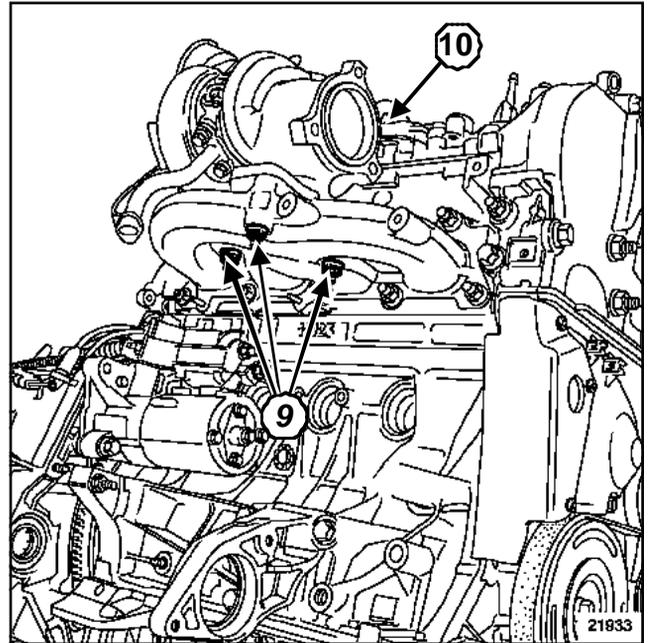
- Refit the motorised throttle valve, with a new seal.
- Tighten to torque the **motorised throttle valve bolts (F4R 770, 771 and Turbo) (9 Nm)**.
-

WARNING

Replace all the turbocharger studs and mounting nuts as well as the seals.



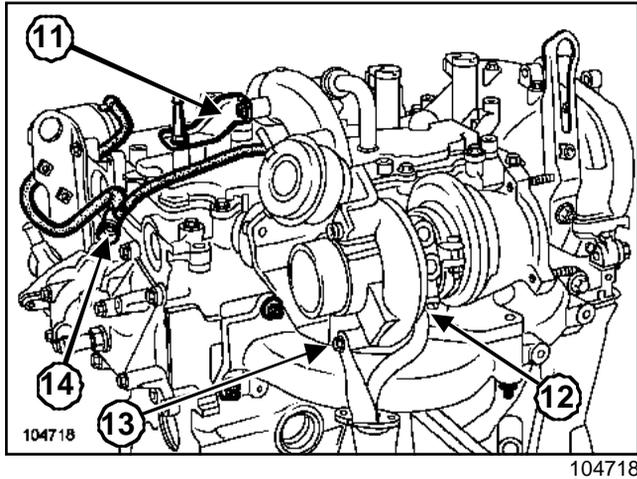
- Fit a new turbocharger gasket.
- Refit:
 - a stud on the exhaust manifold,
 - three studs on the turbocharger.
- Tighten to torque the **turbocharger mounting studs (5 Nm ± 1)**



- Refit the turbocharger .
- Tighten to torque and angle:
 - the three **lower turbocharger mounting nuts (15 Nm + 75° ± 6°)(9)**,
 - the **upper turbocharger mounting nut (10 Nm + 35° ± 6°)(10)**.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Refit the turbocharger strut (11).
- Tighten to torque the **turbocharger/strut bolt (9 Nm)**
Tighten to torque the **separator/strut bolt (12 Nm)**
- Refit the oil return pipe.
- Tighten to torque the two **turbocharger/oil return pipe bolts (12 Nm)(12)**.
Tighten to torque the **turbocharger/pipe mounting bolts (10 Nm)(13)**.
- Refit the brake servo hose (14).

REFITTING THE TIMING BELT

WARNING

The following parts must be replaced with new ones when they are removed:

- the belt (timing and accessories),
- the camshaft pulley mountings,
- the crankshaft accessories pulley bolt.

WARNING

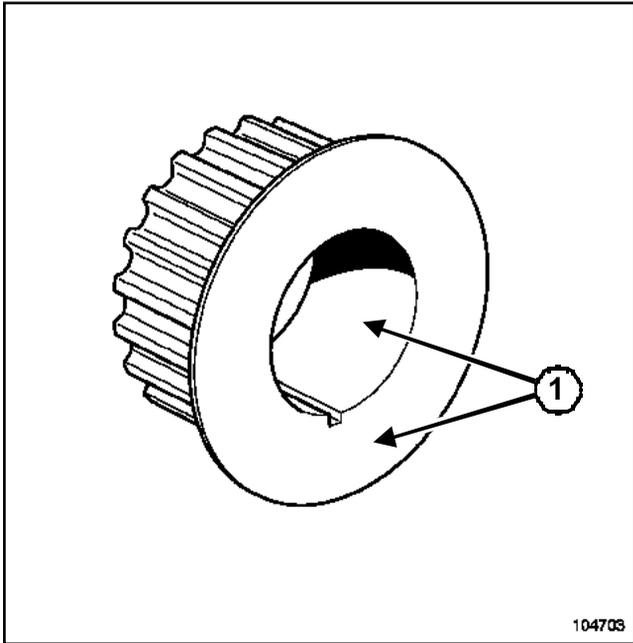
When replacing the timing belt, it is imperative to replace the tension wheel and pulley(s) with new ones.

WARNING

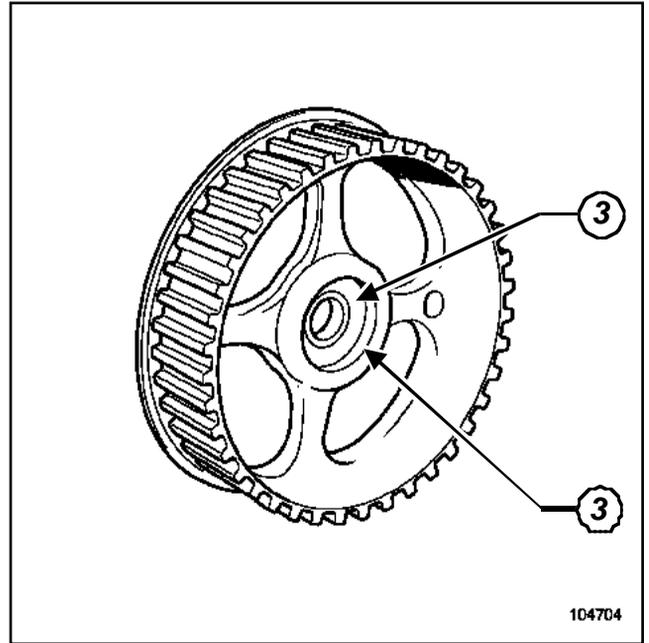
When replacing the accessories belt, it is essential to change the tension wheel, the pulley and the anti-vibration pulley (composed of two parts).

Timing - cylinder head: Refitting

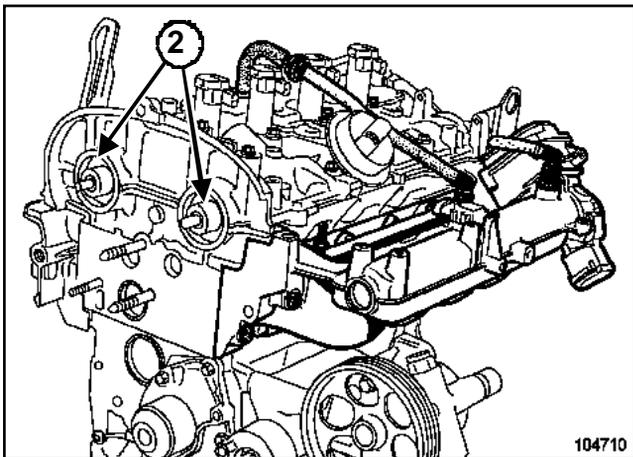
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



104703



104704



104710



WARNING

Be sure to degrease:

- the end of the crankshaft (timing end),
- the timing sprocket bore and bearing faces(1),
- the contact surfaces of the crankshaft accessories pulley.
- the camshaft ends (timing end)(2).
- the bores and contact surfaces of the camshaft pulleys(3).

This is to avoid slippage between:

- the timing,
- the crankshaft,
- the camshaft sprockets.

This slippage leads to engine damage.

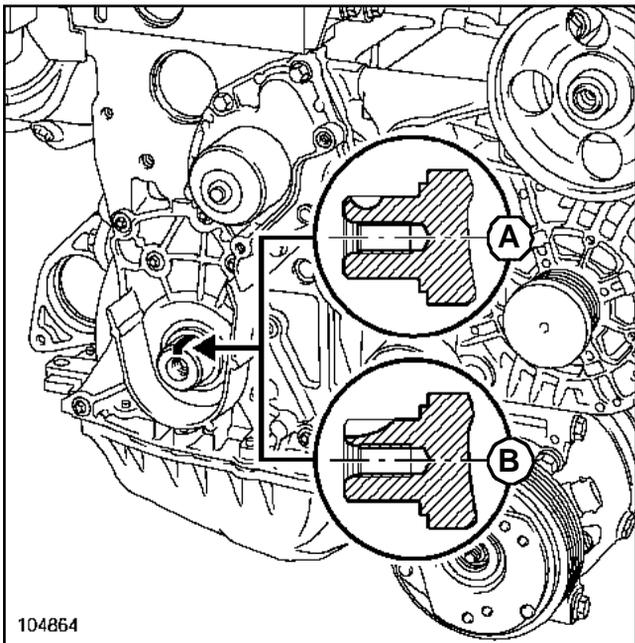
WARNING

Never rotate the engine against its direction of operation.

- Refit the crankshaft sprocket.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

**WARNING**

The timing adjustment procedure depends on the **type of keying** on the end of the crankshaft.

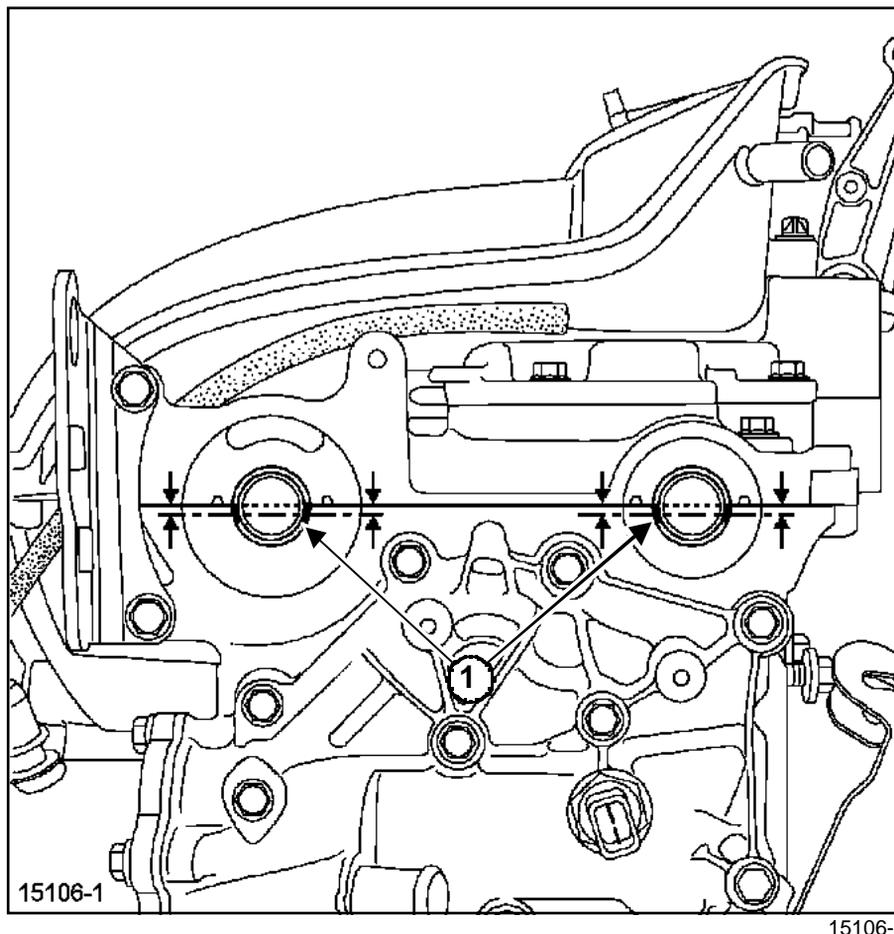
- For keying type **(A)**, fit a sprocket without a key on the crankshaft (see METHOD WITHOUT KEYING).
- For keying type **(B)**, replace the original sprocket with a sprocket with integral key (see METHOD WITH KEYING).

TIMING ADJUSTMENT WITH KEYLESS SPROCKET

- Refit the degreased camshaft pulleys with their old nuts.
- Tighten to torque the old nuts to **(15 Nm maximum)** using the tool.

Timing - cylinder head: Refitting

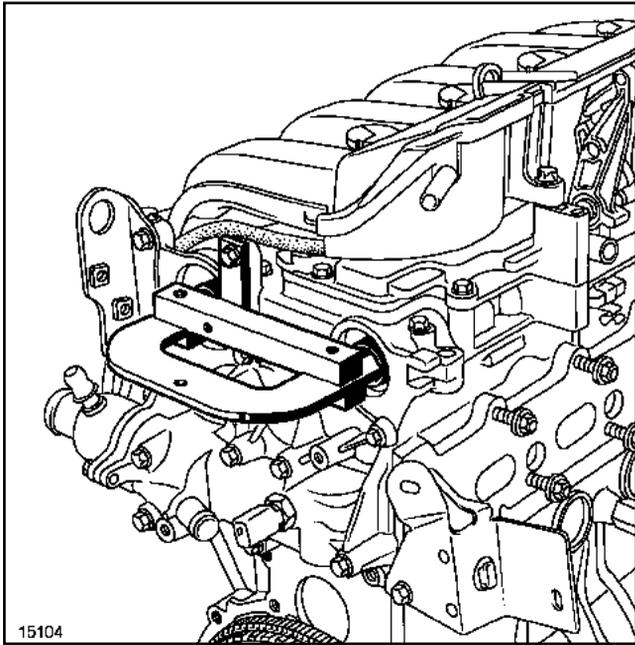
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Position the offset grooves (1) horizontally below the centreline as shown above by turning the camshafts with tool (**Mot. 799-01**).

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

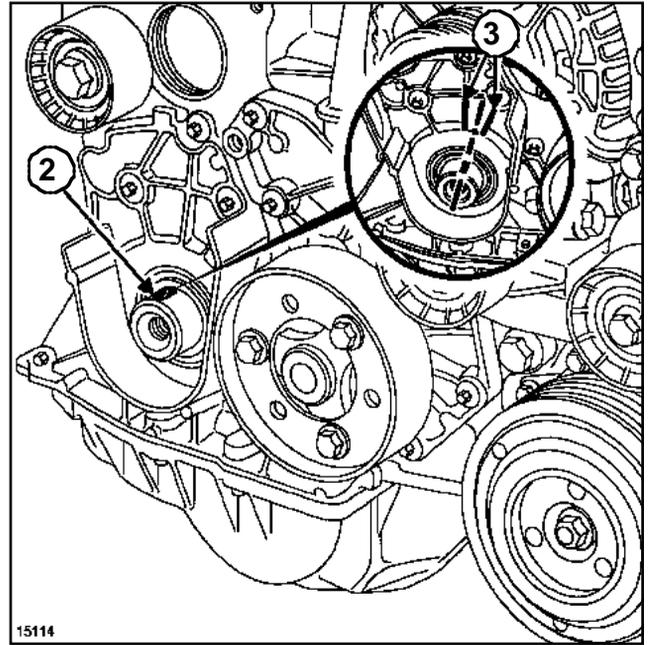


- Position tool (**Mot. 1496**), attaching it to the ends of the camshafts.
- Remove the old camshaft pulley nuts using tool (**Mot. 799-01**).

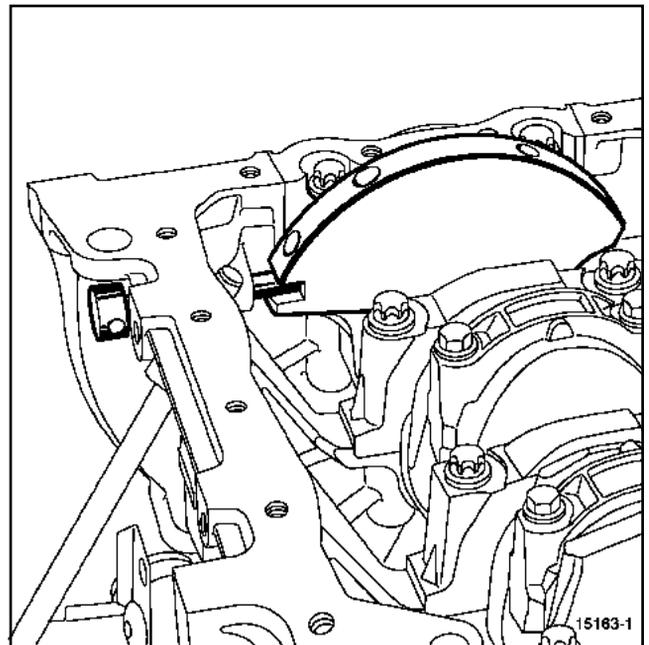
WARNING

It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

- Fit new nuts on the pulleys without tightening them (**0.5 to 1 mm** play between nut and pulley: the pulleys can turn freely).



Correct position



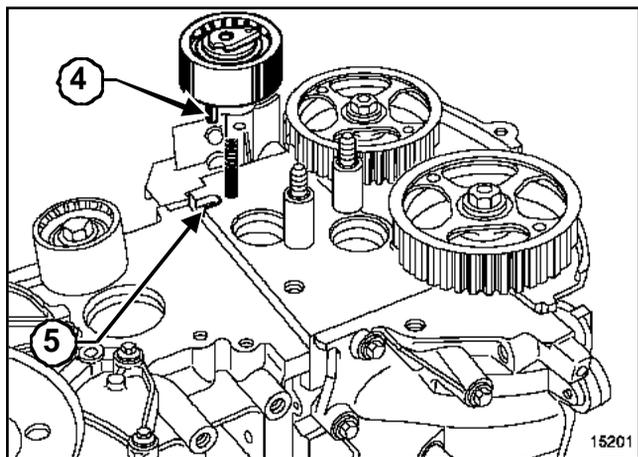
WARNING

Check that the crankshaft is correctly blocked.

The crankshaft groove (**2**) must be between the two ribs (**3**).

Timing - cylinder head: Refitting

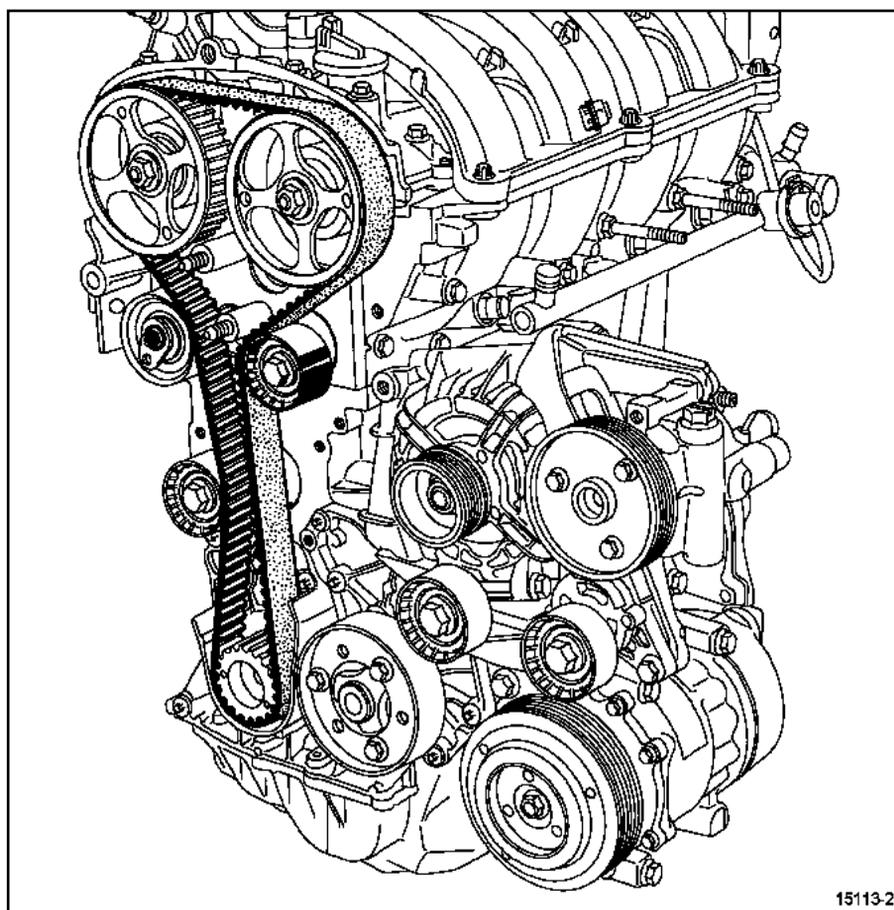
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- a keyless crankshaft sprocket.

Refit:

- a new tension wheel, positioning the tension wheel lug (4) correctly in the groove (5),



15113-2

Refit:

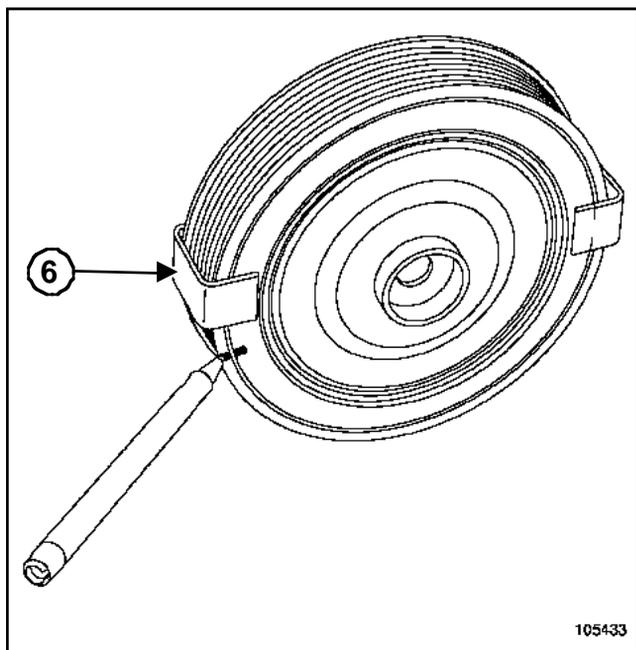
- a new belt,
- new pulley(s).

Tighten to torque the pulley bolts (50 Nm).

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4R, and 720 or 760 or 761 or 762 or 763 or 764 or 765



WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

Mark it before refitting it to prevent an error.

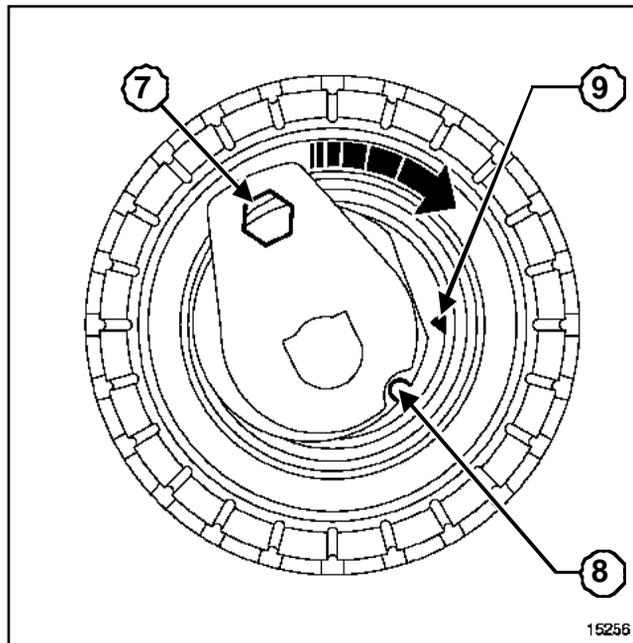
It is forbidden to take the anti-vibration pulley apart.

- Refit the new anti-vibration pulley with its clamp (6).
- Pre-tighten the new bolt of the anti-vibration pulley (without locking the bolt, play of **2 to 3 mm** between bolt and pulley).

F4P, and 720 or 722 or 760 – F4R, and 794 or 795

- Fit a new crankshaft accessories pulley.
- Pre-tighten the new crankshaft accessories pulley (without locking the bolt, play of **2 to 3 mm** between bolt and pulley).

Belt tension



- Check that there is still **0.5 to 1 mm** play between the camshaft pulleys and nuts.

Note:

Do not rotate the tension wheel anti-clockwise.

- Align the tension wheel marks (8) and (9) using a **6 mm** Allen key at (7).
- Tighten to torque the tension wheel nut to **7 Nm**.

Note:

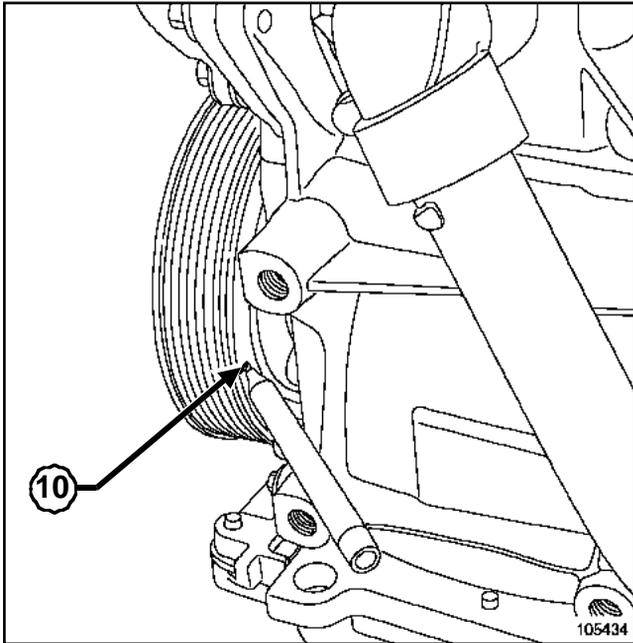
Make sure that the camshaft nuts do not touch their respective pulleys. In addition, from time to time, press the camshaft pulleys against the camshafts.

- Rotate the timing system through six revolutions by the exhaust camshaft pulley, using tool (Mot. 799-01).
- Align marks (8) and (9) if necessary, unscrewing the tension wheel nut by up to one turn while holding it in position with a **6 mm** Allen key in (7).

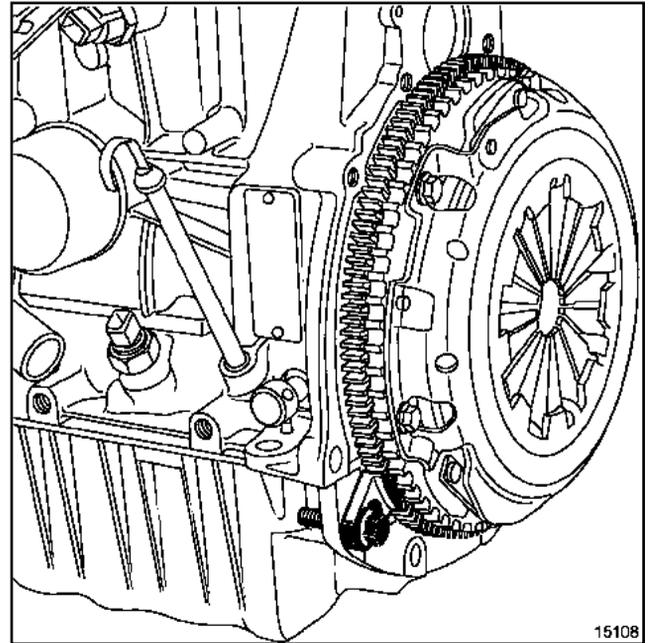
Finally tighten the **tension wheel nut (28 Nm)**.

Timing - cylinder head: Refitting

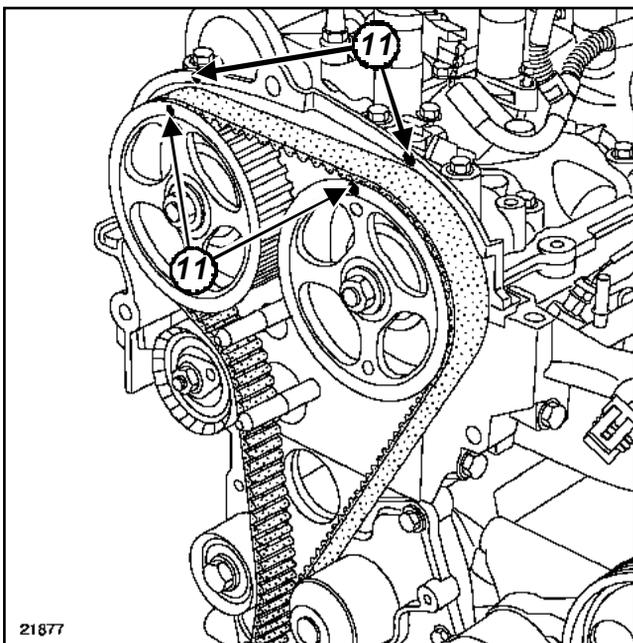
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Before tightening the anti-vibration pulley (if fitted), check the alignment of the two parts(10).
- Tighten to torque the **crankshaft accessories pulley bolt (20 Nm)** (TDC setting pin still in position in the crankshaft).



- Remove the TDC setting pin (**Mot. 1054**).
- Immobilise the flywheel using tool (**Mot. 1677**).
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.
- Remove the flywheel blocking tool (**Mot. 1677**).

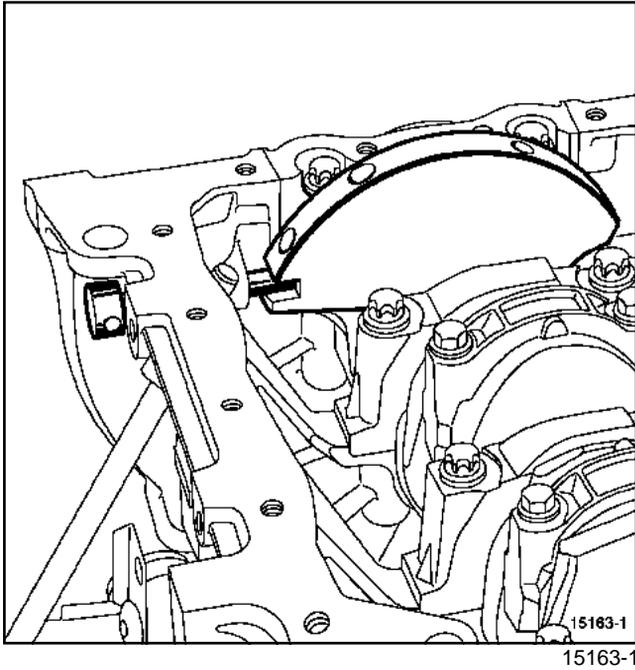


- Use a pencil to make marks (11) on the camshaft pulleys and the rocker cover.

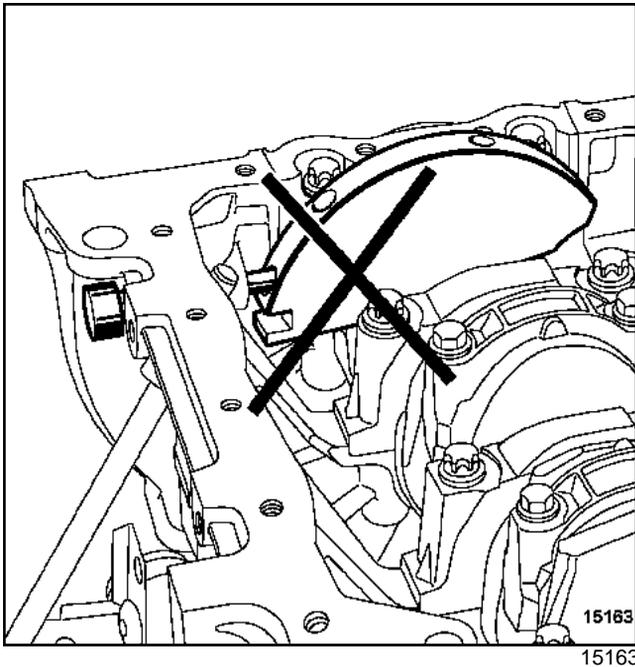
Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

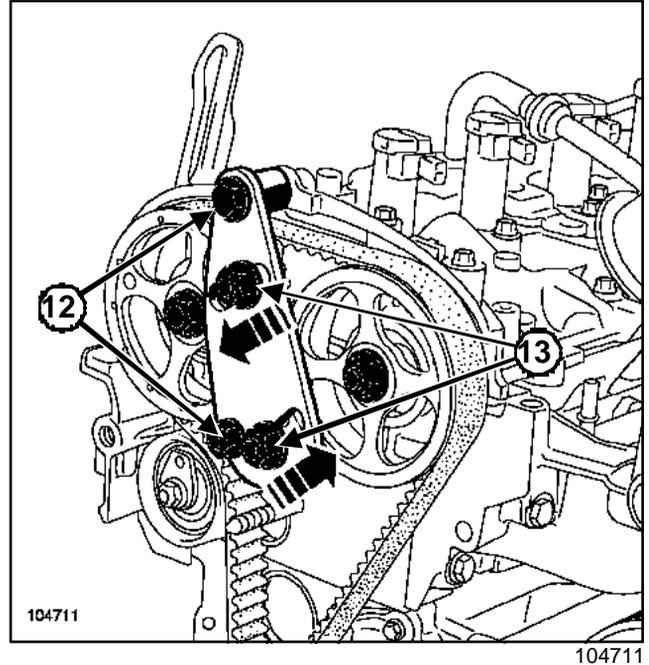
Correct position



Incorrect position



- ❑ Immobilise the crankshaft, using the marks made previously on the camshaft pulleys and the rocker cover. The marks must be aligned to be sure that the pin is in the timing hole correctly and not in the crankshaft balancing hole.

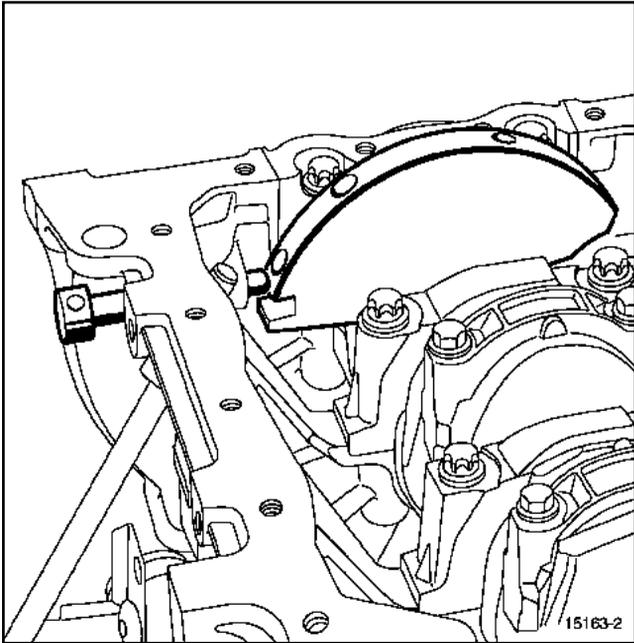


- ❑ Fit camshaft pulley locking tool (**Mot. 1509**).
- ❑ Tighten the bolt and the collar nut (**12**).
- ❑ Bring the toothed pinion nuts into contact with the camshaft pulleys.
- ❑ Tighten to torque the **toothed pinion nuts (80 Nm)(13)**.
- ❑ Tighten to torque the **inlet camshaft pulley nut (30 Nm)**.
- ❑ Tighten to torque the **exhaust camshaft pulley nut (30 Nm)**.
- ❑ Remove the camshaft adjustment tool (**Mot. 1496**).
- ❑ Tighten to torque and angle the **inlet camshaft pulley nut (30 Nm + 86° ± 6°)**
- ❑ Tighten to torque and angle the **exhaust camshaft pulley nut (30 Nm + 86° ± 6°)**
- ❑ Remove the tools:
 - TDC setting pin (**Mot. 1054**),
 - Camshaft pulley immobilising tool (**Mot. 1509**).
- ❑ Rotate the crankshaft clockwise through two revolutions (timing end).

Timing - cylinder head: Refitting

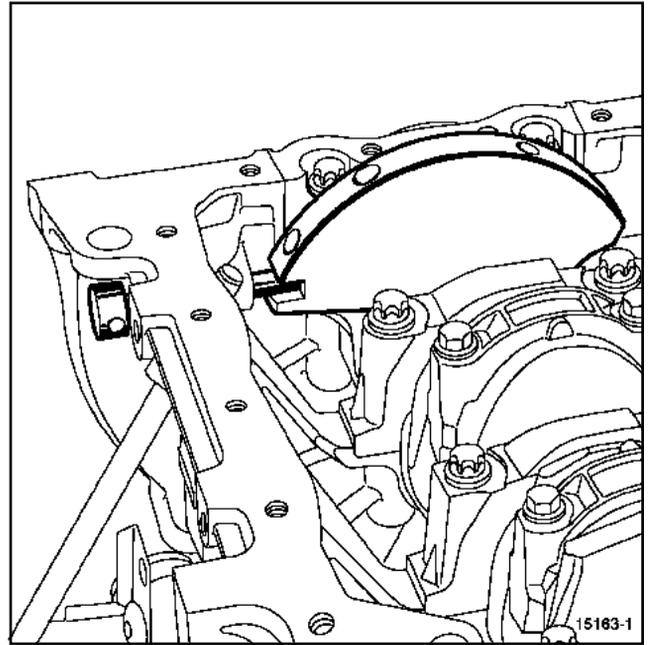
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Checking the tension



15163-2

- Before completing two turns (i.e. half a tooth before the alignment of the marks made previously by the operator) insert the TDC setting pin (**Mot. 1054**) (it will then be between the balancing hole and the timing adjustment hole).



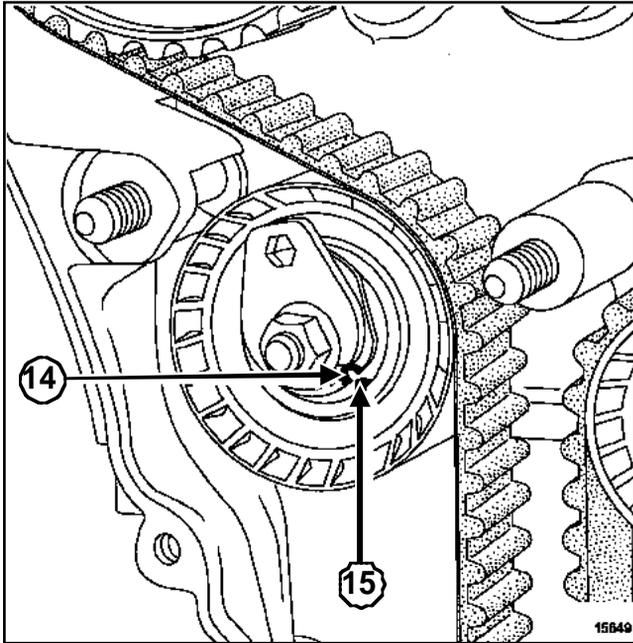
15163-1

- Lock the timing at its adjustment point.
- Remove the TDC setting pin (**Mot. 1054**).
- Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure.
- Loosen the tension wheel nut by up to one turn, holding it with a **6 mm** Allen key.
- Align the tension wheel marks.
- Tighten the nut finally to a torque of **28 Nm**.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Checking the timing

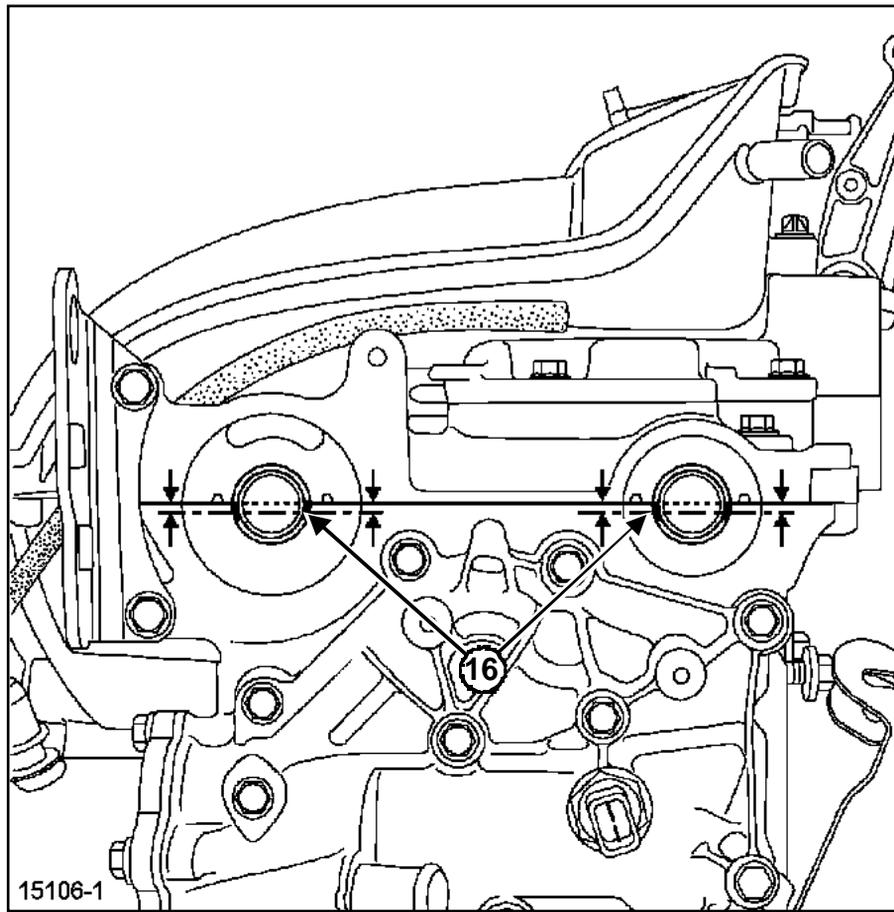


15649

- Rotate the crankshaft clockwise through two revolutions (timing end).
- Check that the tension wheel marks (14) and (15) are in the correct position before checking the timing adjustment.
- Insert the TDC setting pin (**Mot. 1054**) (check that the marks made by the operator on the camshaft pulleys are aligned).

Timing - cylinder head: Refitting

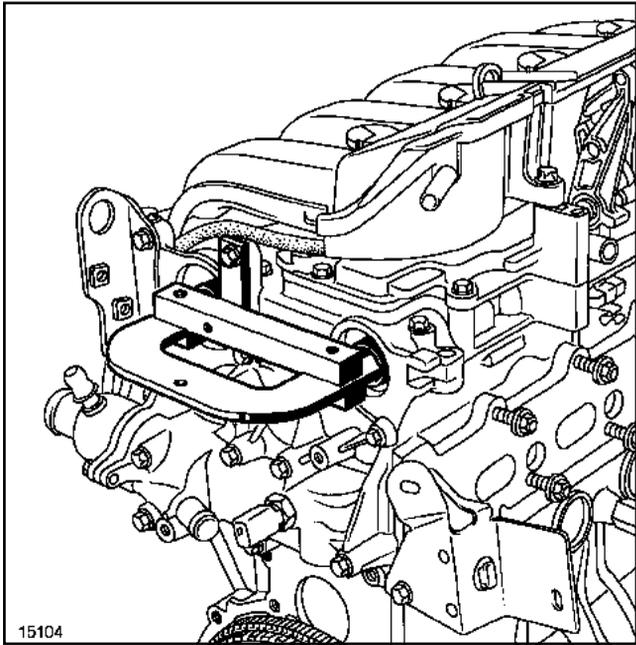
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Position the offset grooves (16) horizontally below the centre-line.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

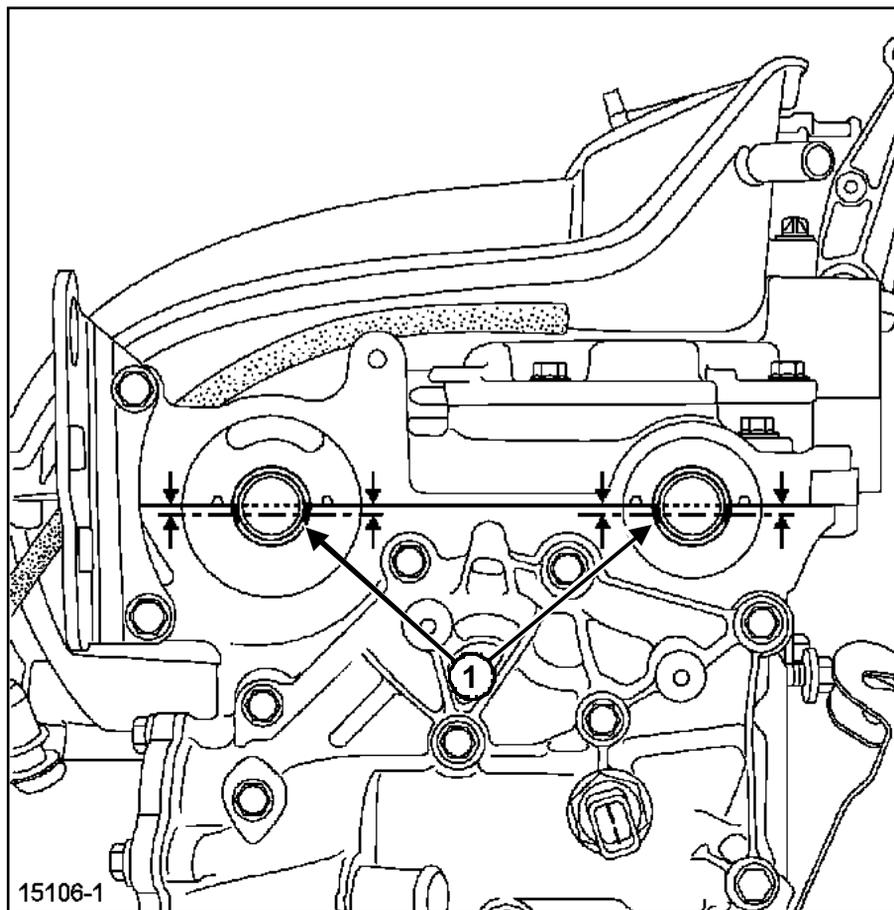
If the tool cannot be fitted, readjust the timing and the tension.

TIMING ADJUSTMENT WITH SPROCKET WITH INTEGRAL KEY

- Refit the degreased camshaft pulleys with their old nuts.
- Tighten to torque the old nuts (**15 Nm max.**) using tool (**Mot. 799-01**).

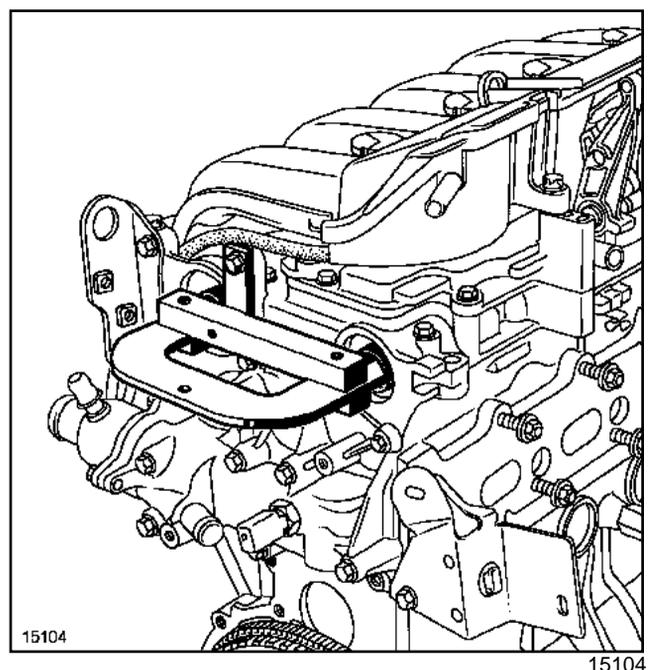
Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15106-1

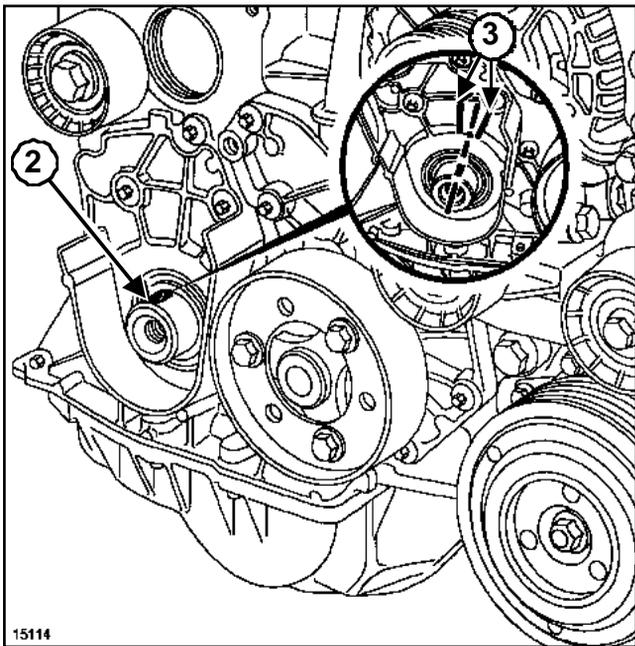
- Position the offset grooves (1) horizontally below the centreline as shown by rotating the camshafts using tool (Mot. 799-01).



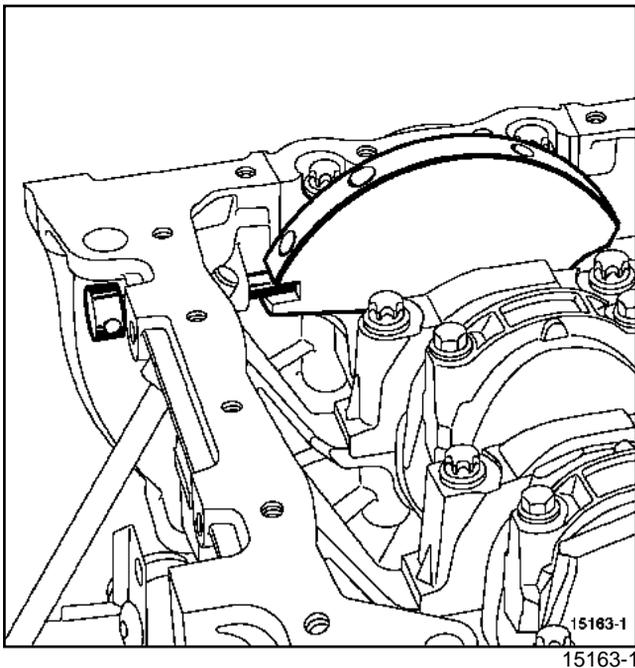
- Position tool (Mot. 1496), attaching it to the ends of the camshafts.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



Correct position

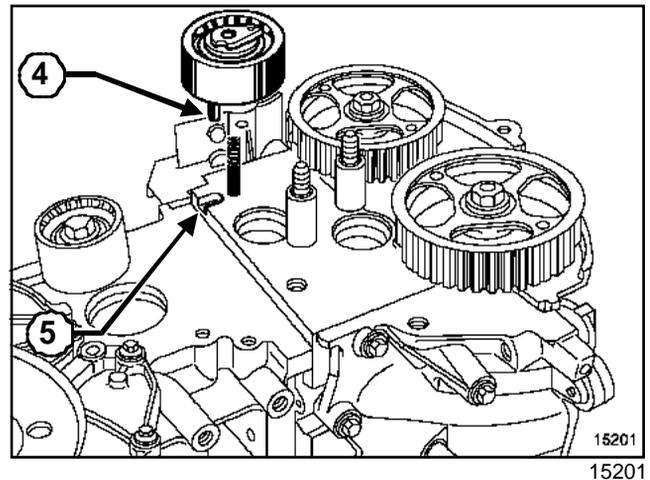


□

WARNING

Check that the crankshaft is correctly blocked.

The crankshaft groove (2) must be between the two ribs (3).

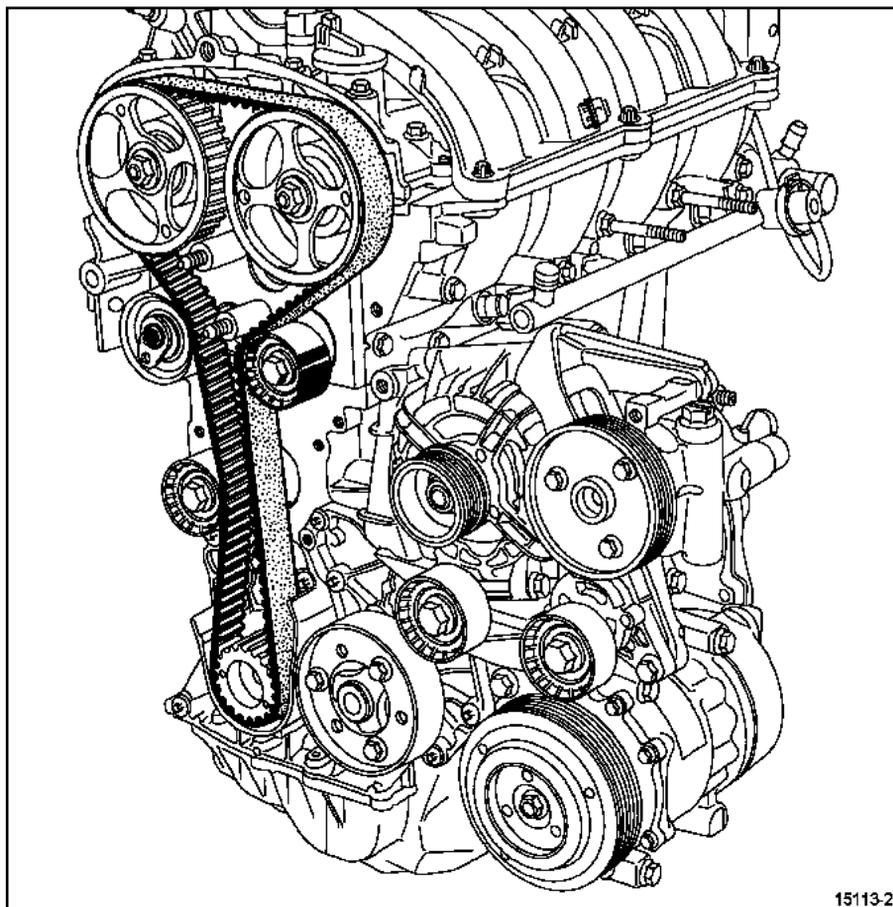


□ Refit:

- a new tension wheel, positioning the tension wheel lug (4) correctly in the groove (5),
- the **crankshaft sprocket with integrated key**.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15113-2

15113-2

Fit:

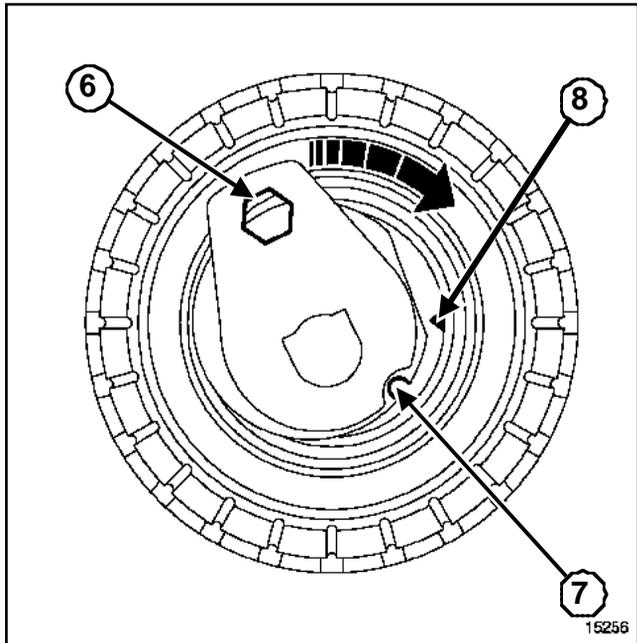
- a new belt,
- new pulley(s).

Tighten to torque the **pulley bolts (50 Nm)**.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Belt tension

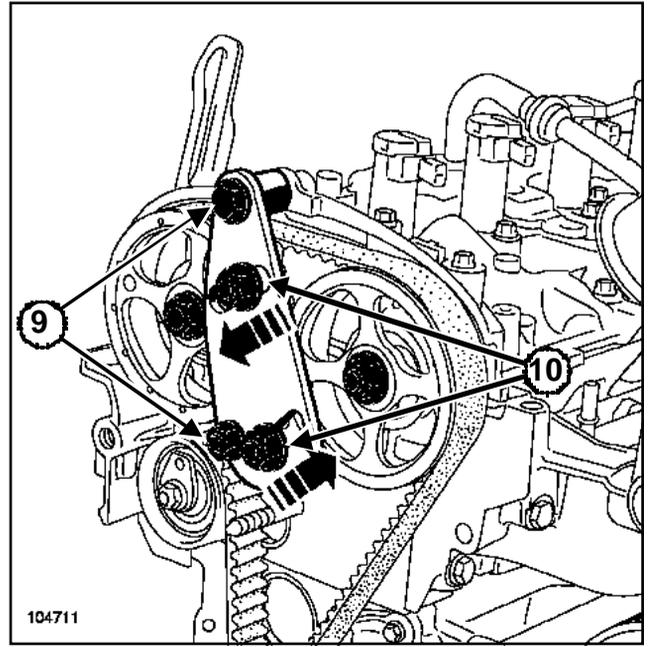


□

Note:

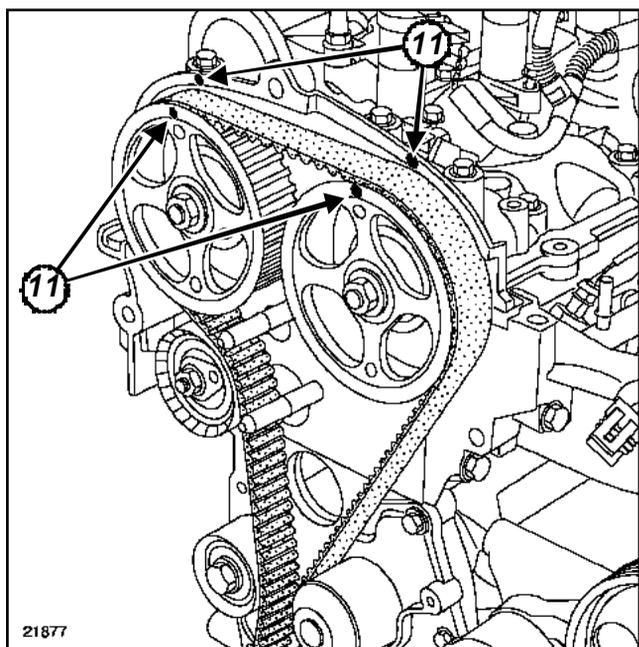
Do not rotate the tension wheel anti-clockwise.

- Align the tension wheel marks (7) and (8) using a 6 mm Allen key at (6).
- Tighten to torque the tension wheel nut (7 Nm).



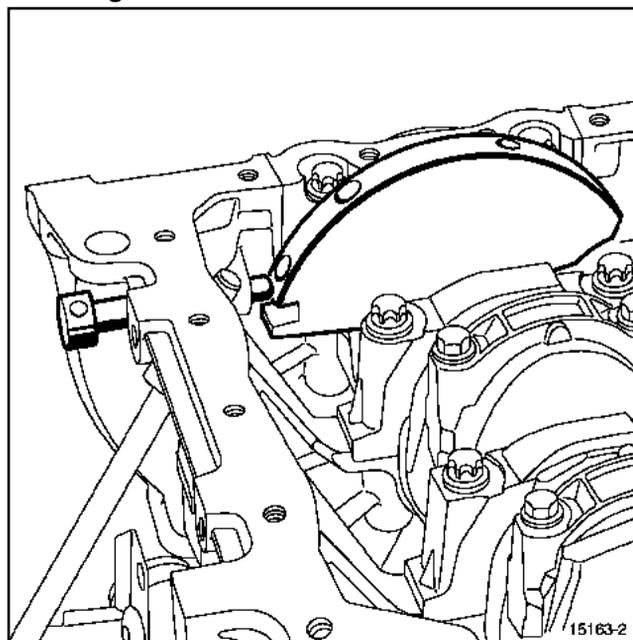
- Fit camshaft pulley locking tool (Mot. 1509).
- Tighten the bolt and the collar nut (9).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the toothed pinion nuts (80 Nm)(10).
- Tighten to torque the old inlet camshaft pulley nut (30 Nm).
- Tighten to torque the old exhaust camshaft pulley nut (30 Nm).

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

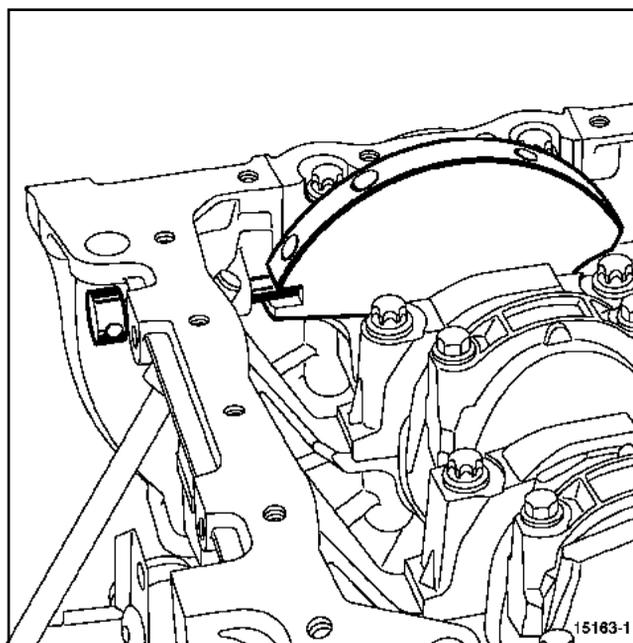


- ❑ Use a pencil to make marks (11) on the camshaft pulleys and the rocker cover.
- ❑ Remove the tools:
 - TDC setting pin (Mot. 1054)
 - Camshaft setting tool (Mot. 1496)
 - Tool for locking the camshaft pulleys (Mot. 1509)
- ❑ Rotate the crankshaft clockwise through two revolutions (timing end).

Checking the tension



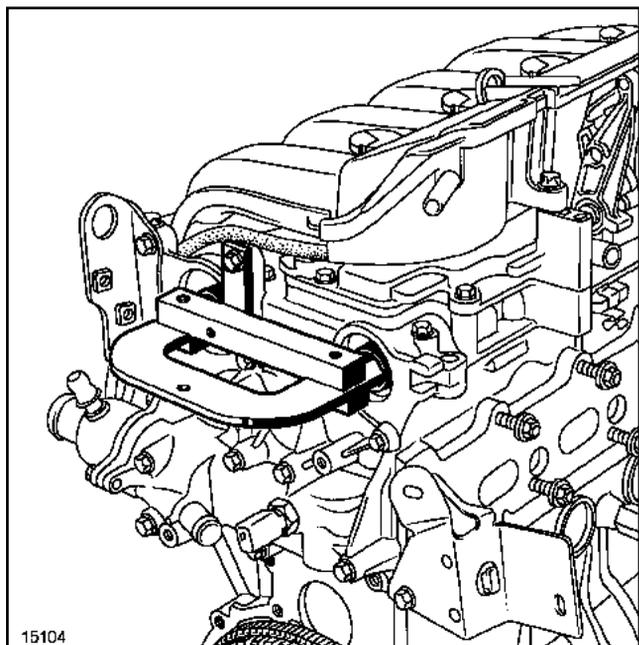
- ❑ Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the crankshaft TDC setting pin (Mot. 1054) (so that it is between the balancing hole and the timing hole).



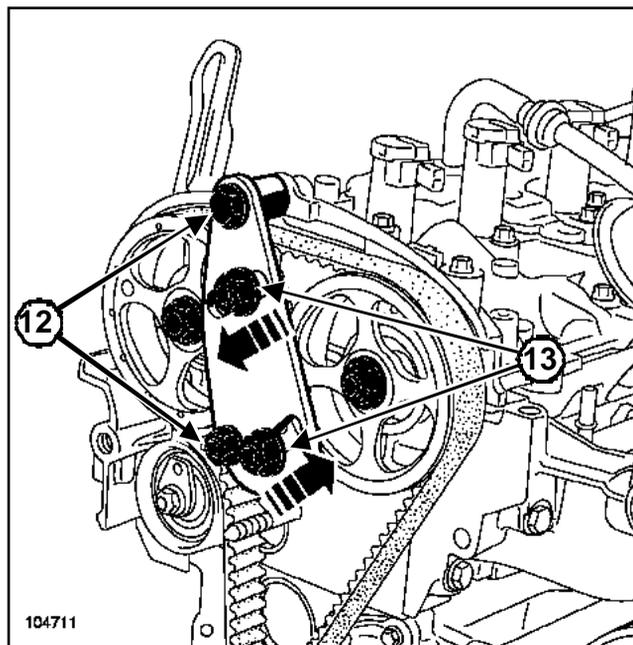
- ❑ Lock the timing at its adjustment point.
- ❑ Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure as follows:

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Fit camshaft adjustment tool (**Mot. 1496**).



- Fit the camshaft pulley immobilising tool (**Mot. 1509**).
- Tighten the bolt and the collar nut (**12**).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten the **toothed pinion nuts to 80 Nm(13)**.
- Loosen:
 - the old inlet camshaft pulley nut,
 - the old exhaust camshaft pulley nut.

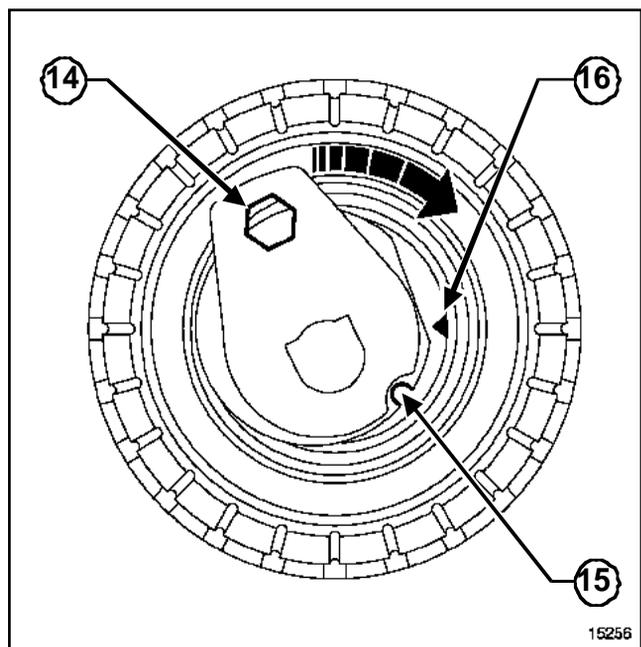
WARNING

It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

- Remove the camshaft pulley locking tool (**Mot. 1509**).

Timing - cylinder head: Refitting

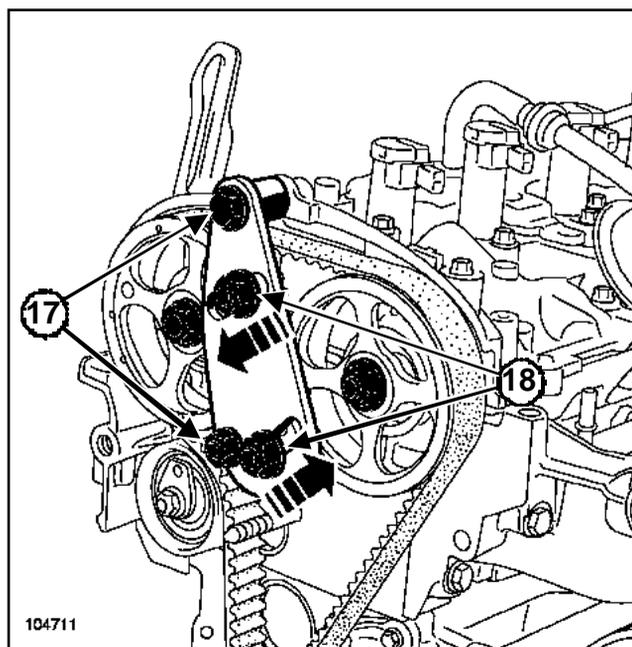
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15256

- ❑ Align marks (15) and (16) by unscrewing the tension wheel nut by up to one turn while maintaining its position with a 6 mm Allen key in (14).

Tighten the nut **on the tension wheel finally to 28 Nm.**



104711

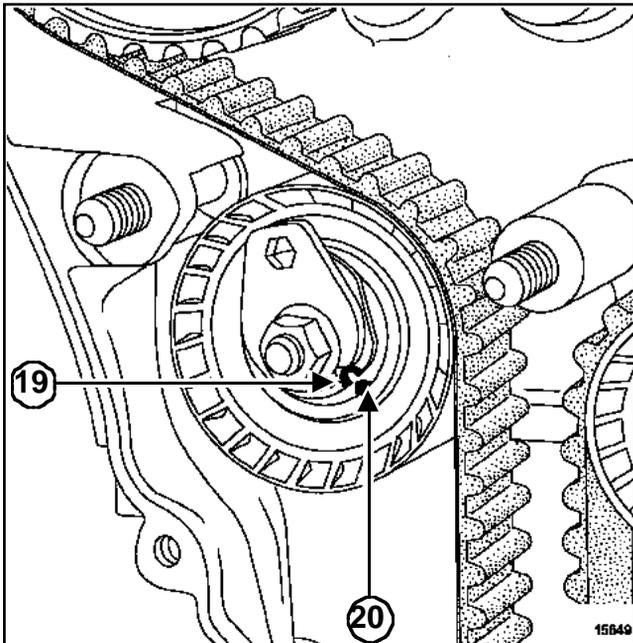
104711

- ❑ Fit camshaft pulley locking tool (**Mot. 1509**).
- ❑ Tighten the bolt and the collar nut (17).
- ❑ Bring the toothed pinion nuts into contact with the camshaft pulleys.
- ❑ Tighten the **toothed pinion nuts to 80 Nm(18)**.
- ❑ Remove:
 - the old inlet camshaft pulley nut,
 - the old exhaust camshaft pulley nut.
- ❑ Refit the new nuts to the camshaft pulleys
- ❑ Tighten to torque the **inlet camshaft pulley nut to 30 Nm.**
- ❑ Tighten to torque the **exhaust camshaft pulley nut to 30 Nm.**
- ❑ Remove the camshaft adjustment tool (**Mot. 1496**).
- ❑ Tighten **the inlet camshaft pulley nut to an angle of $86^\circ \pm 6^\circ$**
- ❑ Angle tighten the **exhaust camshaft pulley nut by $86^\circ \pm 6^\circ$**
- ❑ Remove the tools:
 - TDC setting pin(**Mot. 1054**)
 - Tool for locking the camshaft pulleys(**Mot. 1509**)
- ❑ Rotate the crankshaft clockwise through two revolutions (timing end).

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Checking the timing

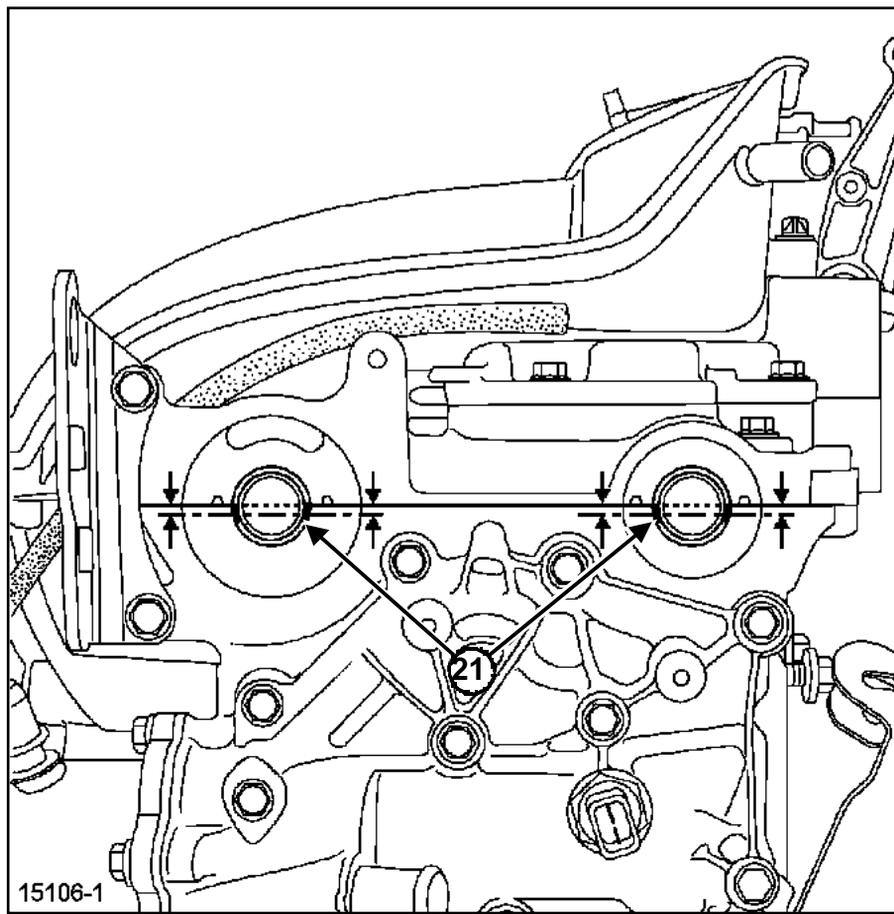


15649

- Check that the tension wheel marks (19) and (20) are in the correct position before checking the timing adjustment.
- Insert the TDC setting pin (**Mot. 1054**) (check that the marks made by the operator on the camshaft pulleys are aligned).

Timing - cylinder head: Refitting

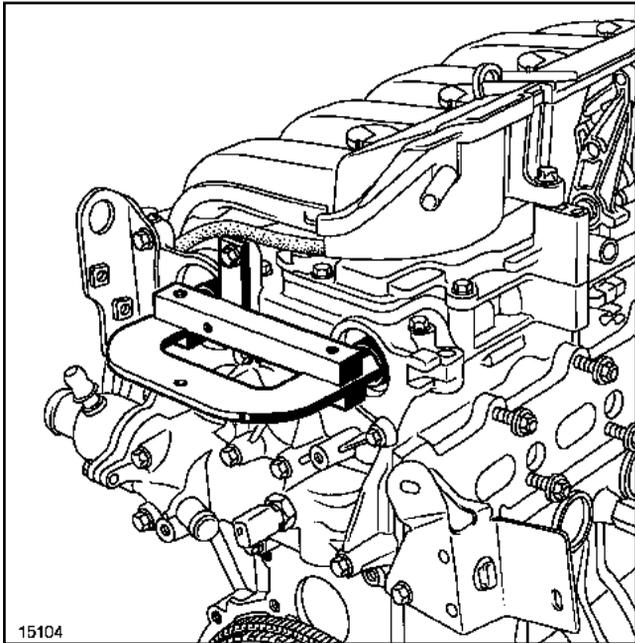
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- ❑ The offset grooves (21) must be horizontal and below the centre-line.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



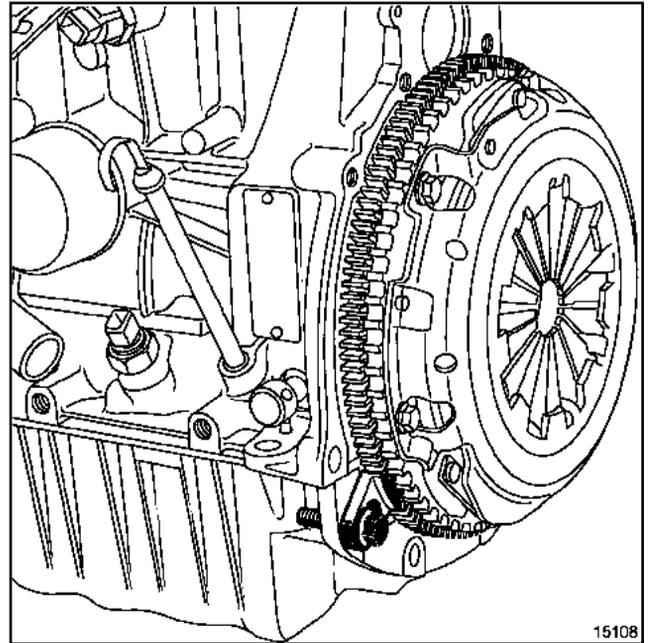
- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

REFITTING THE CRANKSHAFT ACCESSORIES PULLEY AND ACCESSORIES BELT

WARNING

When the accessories belt is replaced in accordance with the manufacturer's instructions, the belt, tensioner, pulley and anti-vibration pulley (two-part) must be replaced with new ones.



- Remove the TDC setting pin (**Mot. 1054**).
- Apply a drop of RHODORSEAL 5661 to the TDC setting pin plug.
- Refit the TDC setting pin plug.
- Immobilise the flywheel using tool (**Mot. 1677**).

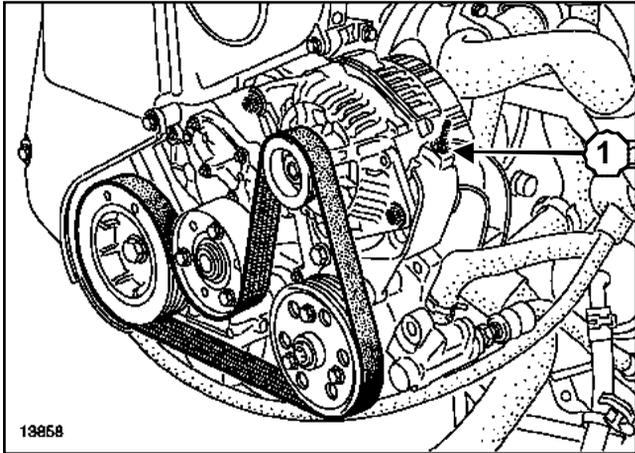
F4P, and 760

- Fit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

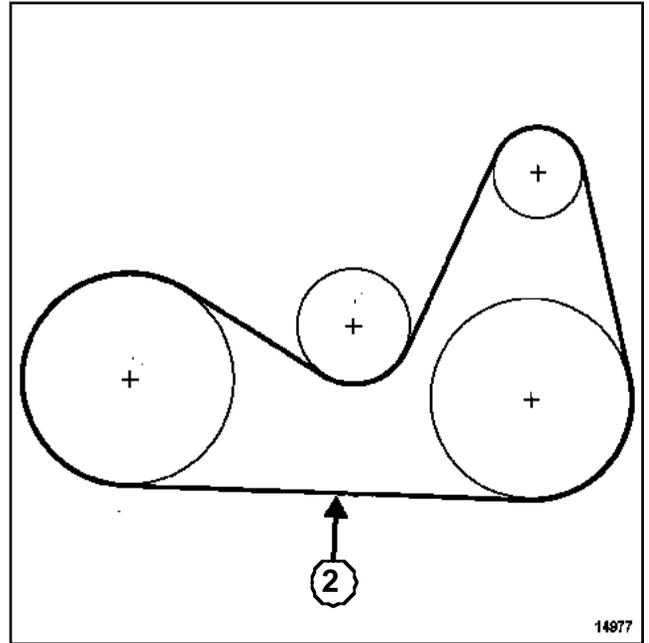
Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Without air conditioning



- Loosen the alternator mounting bolts.
- Fit a new accessories belt.
- Tension the accessories belt by tightening the alternator bracket nut (1).



Note:

- A: Crankshaft
- T: Water pump
- C: Alternator
- B: Power assisted steering pump
- (2): tension measurement point

- Check the accessories belt tension using belt tension tester (Mot. 1505) or (Mot. 1715).
- Belt tension (in Hz): **183 Hz ± 9**
- Tighten the alternator mountings to torque:
 - **M10 alternator mounting bolt (44 Nm)**
 - **M8 alternator mounting bolt (25 Nm)**
- Turn the crankshaft through two revolutions and check that the measurement is within the fitting tension tolerance, if not readjust it.

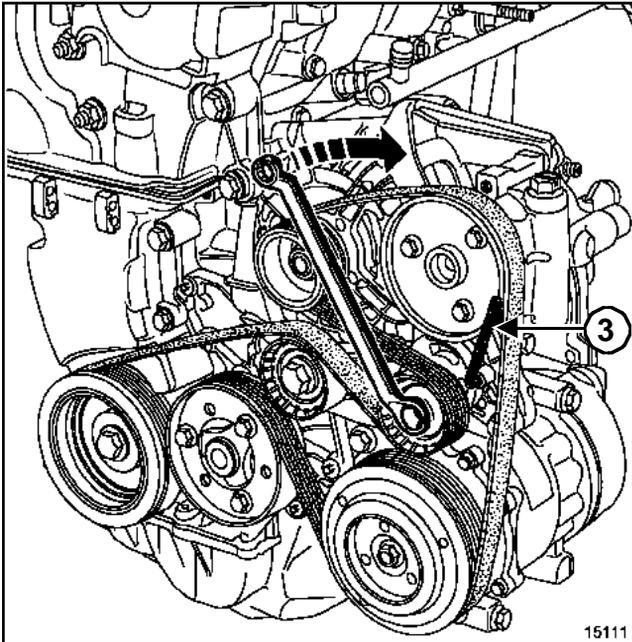
Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

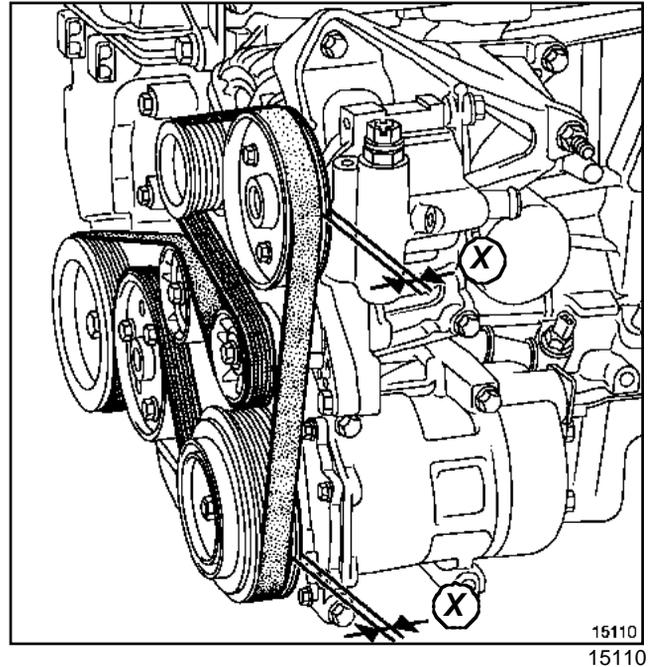
F4P, and 720 or 722 or 760

- ❑ Fit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- ❑ Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

With air conditioning



- ❑ Rotate the tensioner in the direction of the arrow using a spanner.
- ❑ Lock the tensioner with a **6 mm** Allen key (**3**).
- ❑ Fit a new accessories belt.



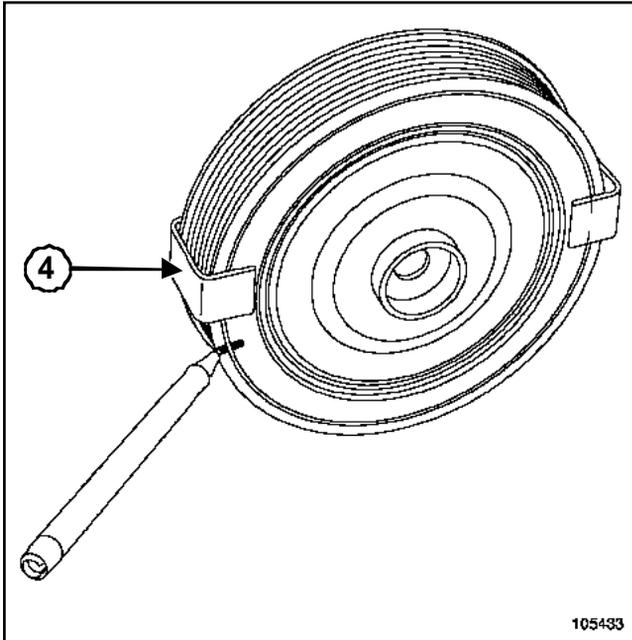
WARNING

When fitting the belt it is imperative to check that the tooth (indicated by (X)) on the inside of the pulleys remains uncovered.

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4R, and 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



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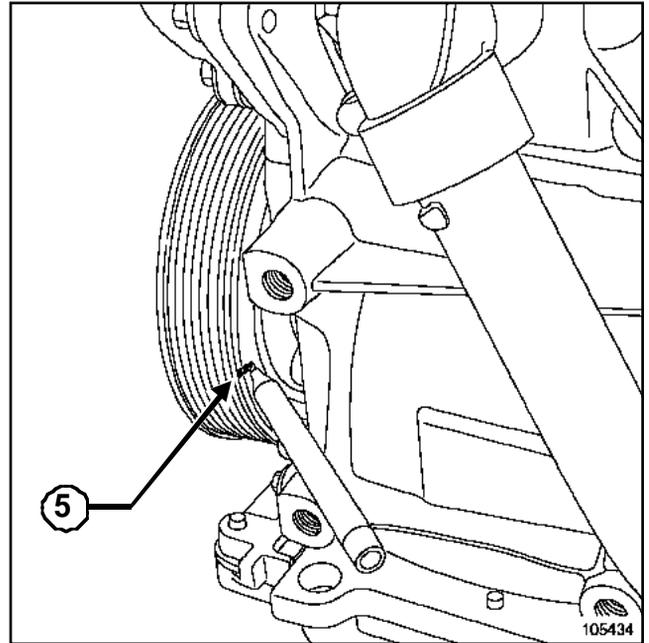
WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

Mark it before refitting it to prevent an error.

It is forbidden to take the anti-vibration pulley apart.

- Refit the new anti-vibration pulley with its clamp (4).

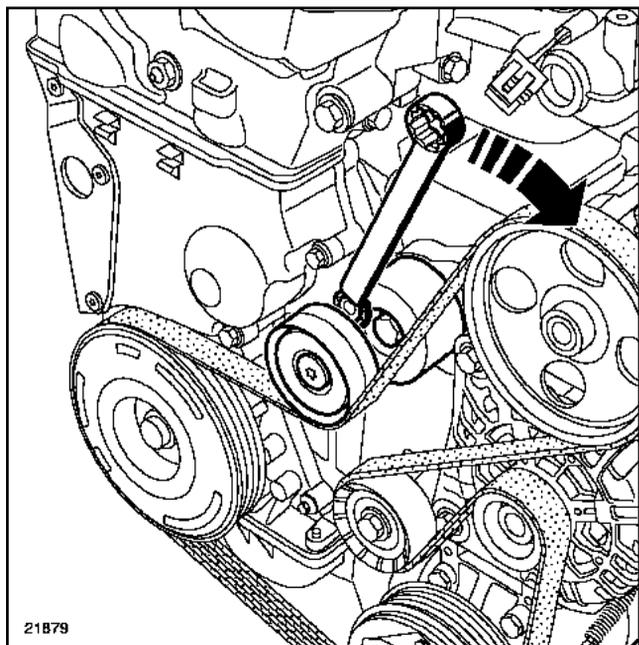


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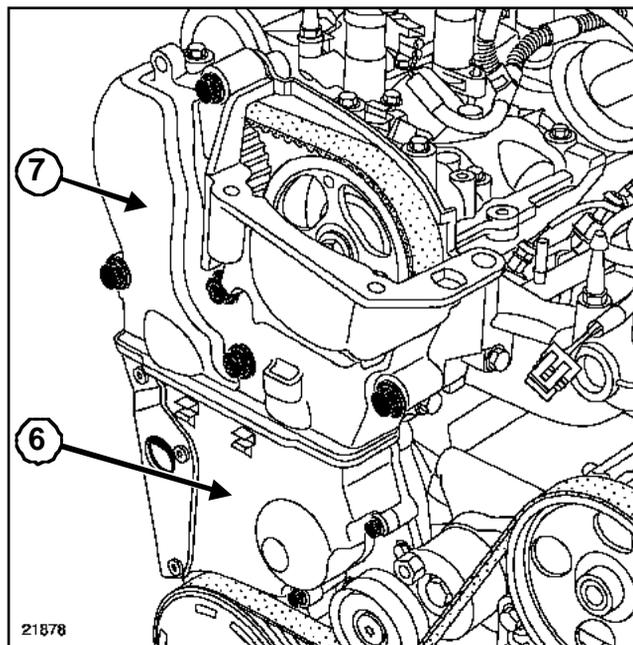
- Fit a new anti-vibration pulley bolt.
- Before tightening the anti-vibration pulley, check the alignment of the two parts(5).
- Tighten to torque and angle the anti-vibration pulley bolt
 - anti-vibration pulley bolt with washer (40 Nm + 110°)
 - anti-vibration pulley bolt without washer (20 Nm + 115°)

Timing - cylinder head: Refitting

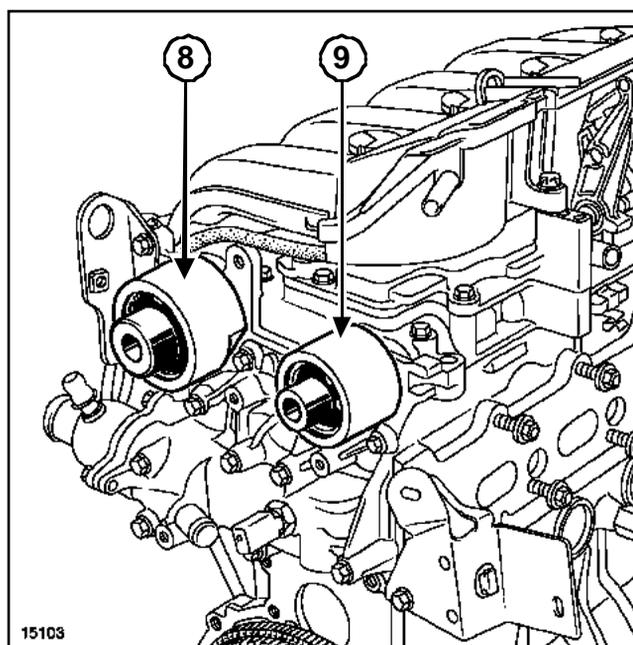
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Rotate the tensioner in the direction of the arrow using a spanner.
 - Fit a new accessories belt.
-
- Remove the flywheel locking tool (**Mot. 1677**).



- Tighten the lower timing cover bolts (6):
 - **M6 lower timing cover bolts (8 Nm)**,
 - **M8 lower timing cover bolts (20 Nm)**.
- Tighten the upper timing cover mounting bolts (7):
 - **M8 upper timing cover bolts (18 Nm)**,
 - **M10 upper timing cover bolts (38 Nm)**.



- Refit new sealing plugs:
 - on the inlet camshaft using tool (**Mot. 1487**) at (8),

Timing - cylinder head: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

-for the exhaust camshaft, using tool **(Mot. 1488)(9)**.

Engine: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

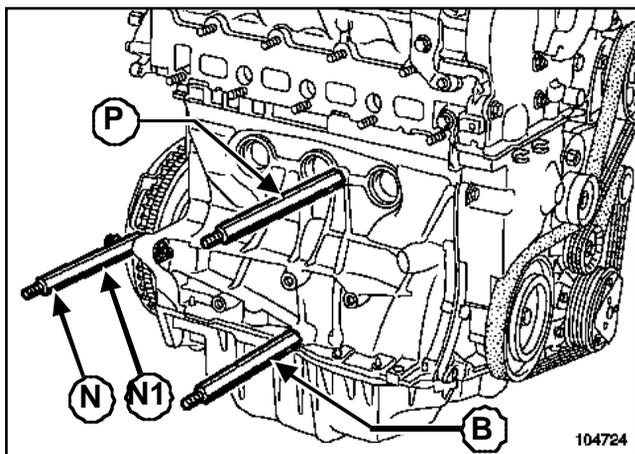
Special tooling required

Mot. 792-03	Engine support plate for Desvil engine stand
Mot. 995	Set of 2 pins adaptable to engine support plate Mot.792-03
Mot. 1495	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key
Mot. 1495-01	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key

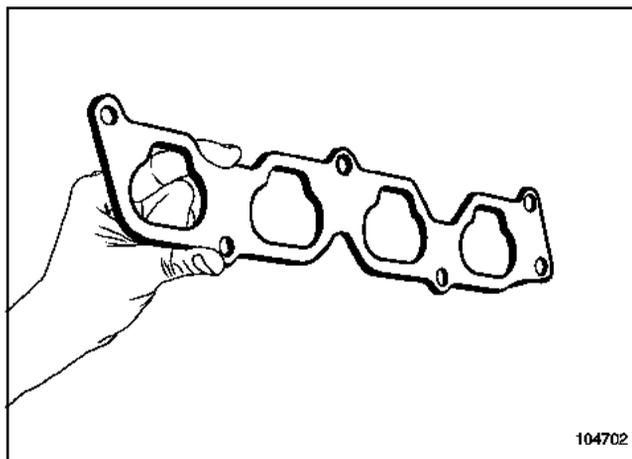
Tightening torques

lower heat shield bolts	10 Nm
exhaust manifold bolts	18 Nm
upper heat shield bolts	100 Nm
oxygen sensor	45 Nm
air filter unit bolts	9 Nm

- Remove the engine from the support tool (**Mot. 792-03**).



- Remove pins (N), (P) and (B) from tool (**Mot. 995**) or pin (N1) from tool.

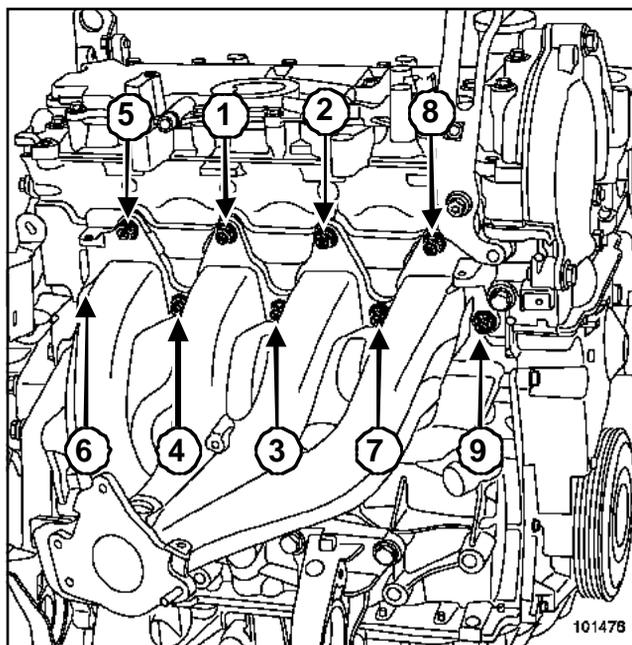


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- Fit a new exhaust manifold gasket

WARNING

Hold the new gaskets by the sides, not the mating faces, to prevent deterioration of the sealing effect.

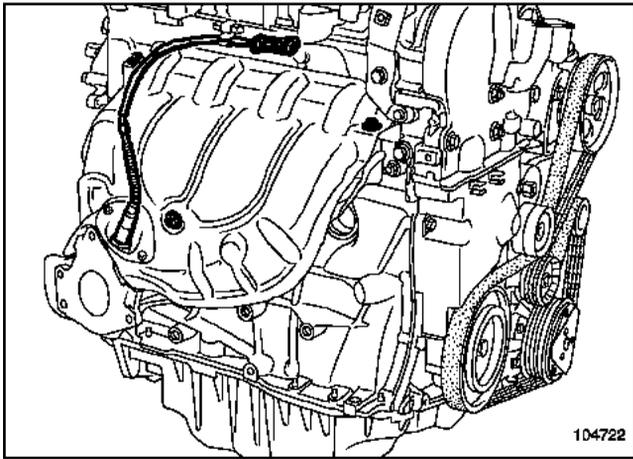


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- Refit the lower heat shield (if fitted) to the exhaust manifold.
- Tighten to torque the **lower heat shield bolts (10 Nm)**.
- Tighten to torque and in order the **exhaust manifold bolts (18 Nm)**.

Engine: Refitting

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



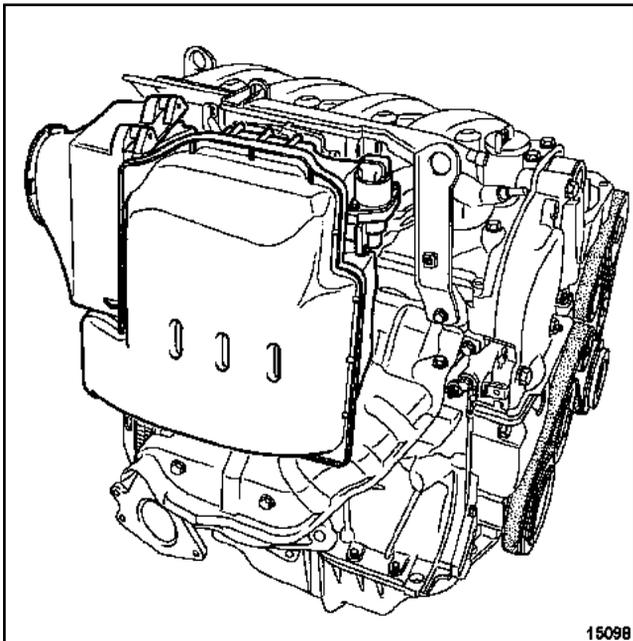
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Tighten to torque:

- the **upper heat shield bolts (100 Nm)**,
- the **oxygen sensor (45 Nm)** using tool (**Mot. 1495**) or tool (**Mot. 1495-01**).

WARNING

Check that the upper heat shield is firmly between the oxygen sensor and the manifold (to prevent leaks, which could damage the oxygen sensor connections).



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- Refit the air filter unit, if fitted.
- tighten to torque the **air filter unit bolts (9 Nm)**.

Engine: Refitting

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 792-03	Engine support plate for Desvil engine stand
Mot. 995	Set of 2 pins adaptable to engine support plate Mot.792-03
Mot. 1495	22 mm oxygen sensor removal / refitting socket - 1/2" square drive and a 24 mm Allen key

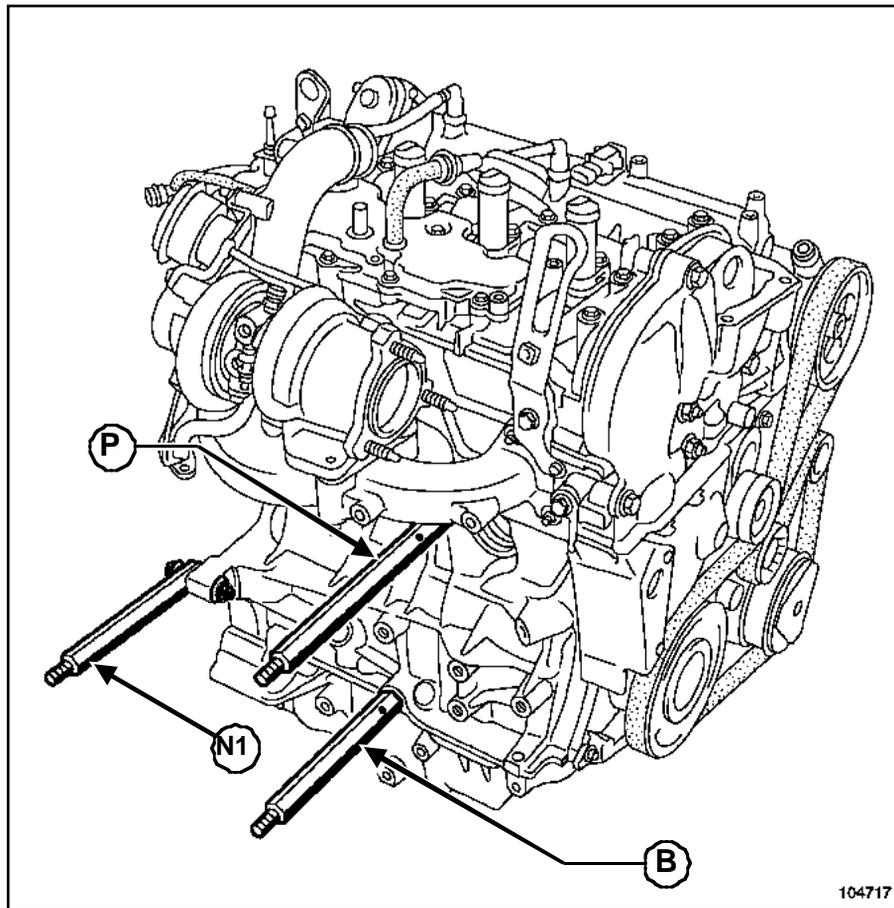
Tightening torques 	
heat shield bolts	7 Nm (pre-threaded hole)
air duct bolts	8.5 Nm

Remove the engine from the support tool (**Mot. 792-03**).

Tightening torques 	
turbocharger oil supply union	32 Nm
oil supply pipe hollow bolt	45 Nm
oil supply pipe union	25 Nm
oil return pipe connecting bolts	8 Nm
pipe mounting bolts on the cylinder block	21 Nm
turbocharger cooling pipe hollow bolts	pre-tighten to 12 Nm, then tighten to 27 Nm
coolant outlet unit pipe mounting bolts	10 Nm
turbocharger/primary catalytic converter dowels	9 Nm
upstream strut bolts on the cylinder block	38 Nm
catalytic converter bolt on the upstream strut	9 Nm
upper bracket bolts	9 Nm
primary catalytic converter nuts	40 Nm
oxygen sensors	34 Nm
heat shield bolts	10 Nm (non-threaded hole)

Engine: Refitting

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



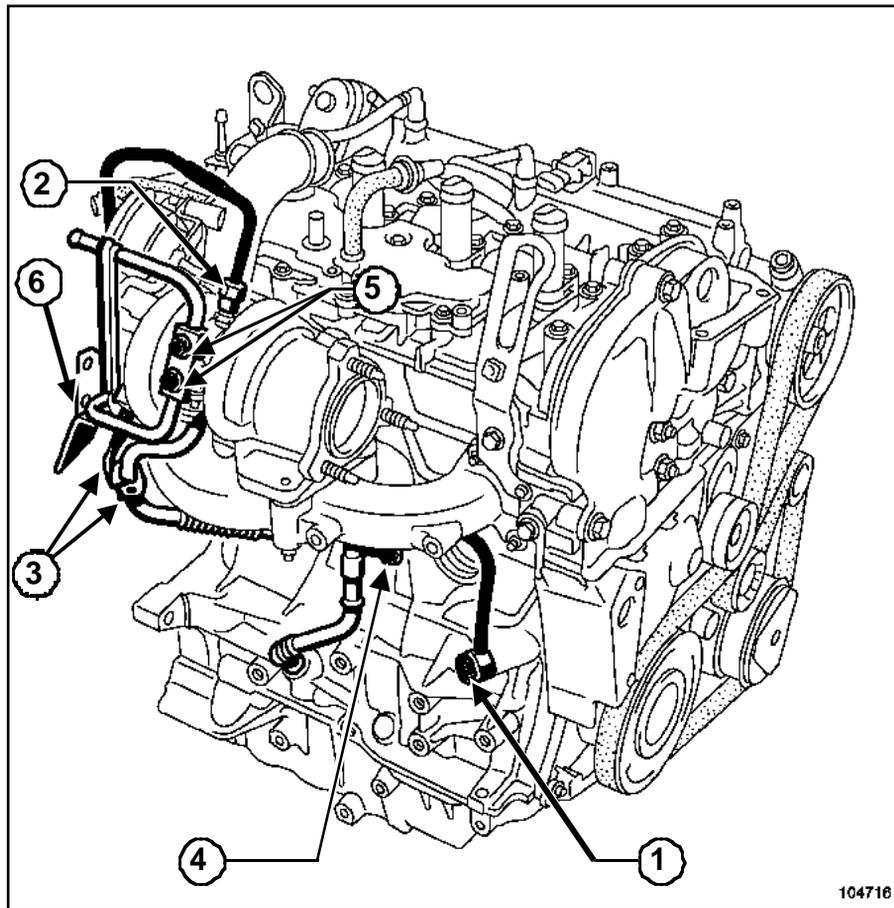
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- Remove pins (P) and (B) from tool (Mot. 995) and pin (N1) from tool .

Engine: Refitting

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



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WARNING

Replace all the primary catalytic converter dowels and mounting nuts and the gaskets.

- Refit a new oil supply piece to the turbocharger (if the turbocharger was replaced).
- Tighten to torque the **turbocharger oil supply union (32 Nm)**.
- Refit the oil supply pipe.
- Screw in completely:
 - the hollow bolt on the cylinder block at (1),
 - the oil supply pipe union at (2).
- Tighten to torque:
 - the **oil supply pipe hollow bolt (45 Nm)(1)**,
 - the **oil supply pipe union (25 Nm)(2)**,
- Refit the oil return pipe with new gaskets.
- Lubricate the two new O-rings with engine oil.
- Fit the oil return pipe in the cylinder block down to the stop.

Tighten to torque:

- both **oil return pipe connecting bolts (8 Nm)(3)**,
- the **pipe mounting bolts on the cylinder block (21 Nm)(4)**,

Refit the turbocharger cooling pipe.

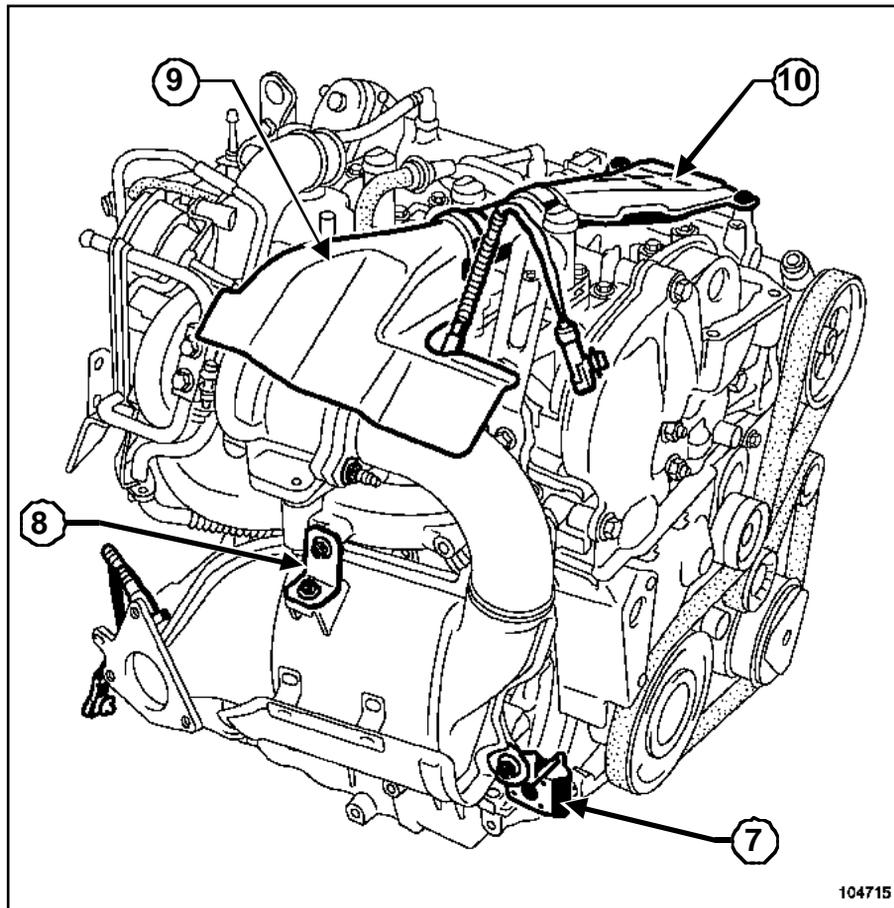
Tighten to torque:

- the **turbocharger cooling pipe hollow bolts (pre-tighten to 12 Nm, then tighten to 27 Nm)(5)**,
- the **coolant outlet unit pipe mounting bolts (10 Nm)(6)**.

Replace the turbocharger/primary catalytic converter dowels.

Tighten to torque the **turbocharger/primary catalytic converter dowels (9 Nm)**.

F4R, and 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



104715

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- Refit the upstream strut (7).
 - Tighten to torque both **upstream strut bolts on the cylinder block (38 Nm)** at (7).
 - Refit the primary catalytic converter with a new gasket.
 - Pre-tighten:
 - the catalytic converter bolt on the upstream strut at (7),
 - the upper bracket bolt at (8),
 - the primary catalytic converter nuts.
 - tighten to torque and in the following order:
 - the **catalytic converter bolt on the upstream strut (9 Nm)**(7),
 - the **upper bracket bolts (9 Nm)**(8),
 - the **primary catalytic converter nuts (40 Nm)**
 - Refit both oxygen sensors.
 - Tighten to torque both **oxygen sensors (34 Nm)** using tool (**Mot. 1495**).
 - Refit the heat shield (9).
- Tighten to torque:
 - the **heat shield bolts (10 Nm (non-threaded hole))**
 - the **heat shield bolts (7 Nm (pre-threaded hole))**
 - Refit the air duct (10).
 - Tighten to torque the **air duct bolts (8.5 Nm)**.

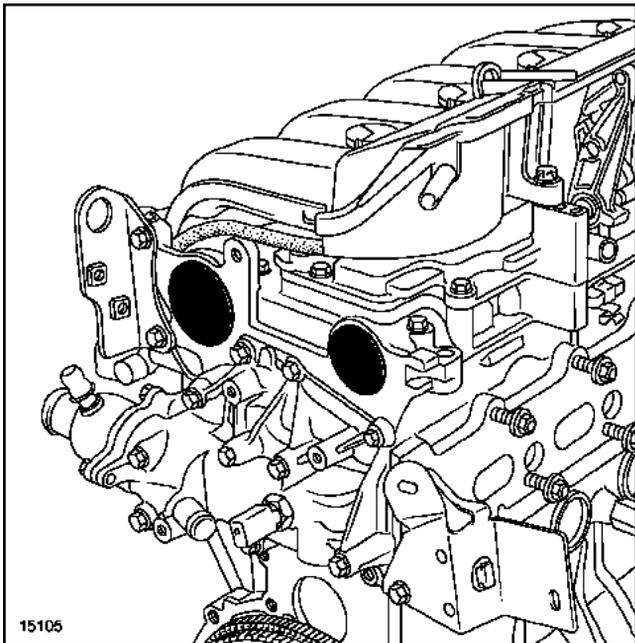
Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

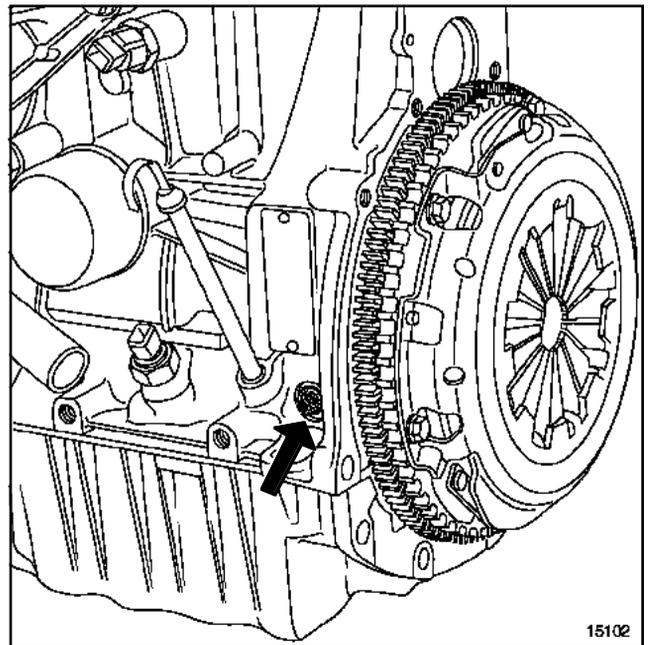
Special tooling required

Mot. 1054	TDC setting pin
Mot. 1677	Flywheel locking tool (F engines)

REMOVING THE TIMING BELT



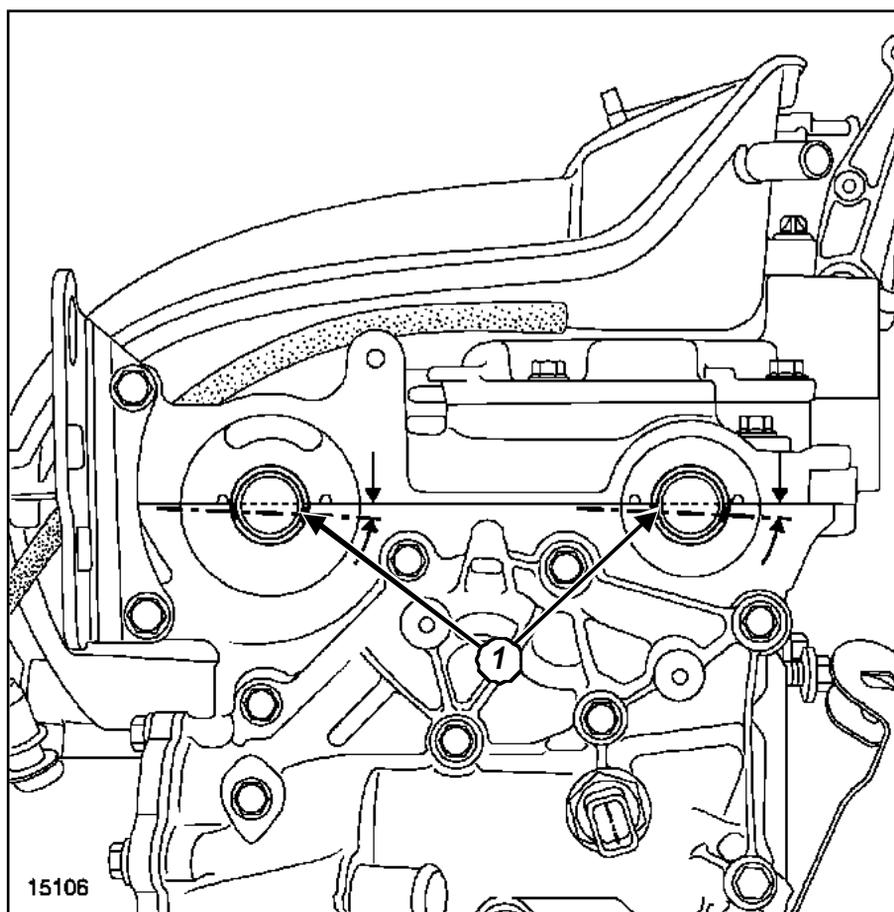
- Use a screwdriver to make a hole in the middle of the sealing plugs on the ends of the camshafts.
- Remove the camshaft end sealing plugs.



- Remove the TDC setting pin plug.

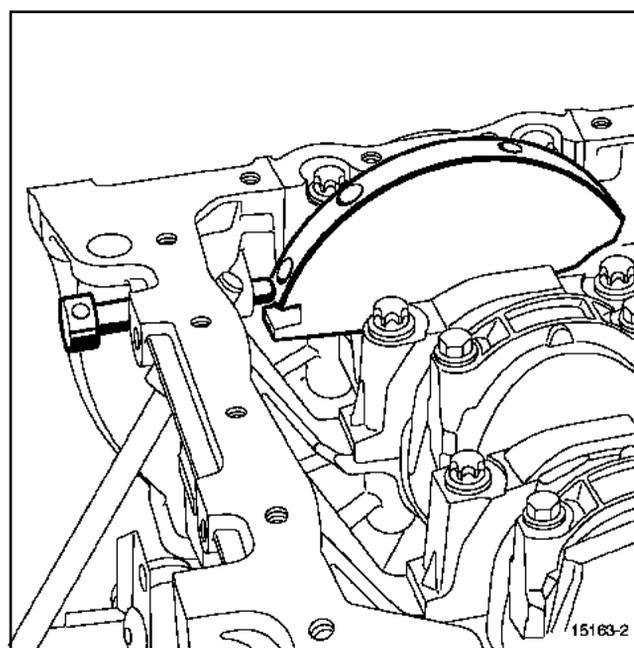
Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



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- Rotate the engine clockwise (timing end) so that the camshaft grooves are offset below the centreline in an almost horizontal position as shown in the drawing above.

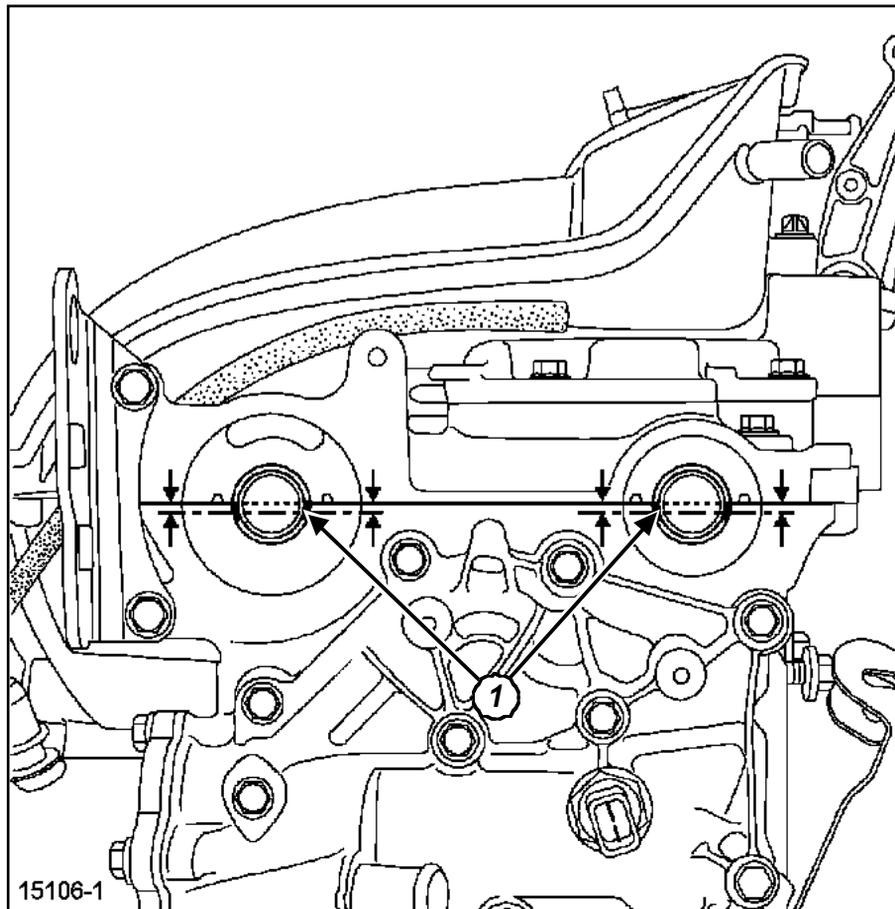


15163-2

- Insert the TDC setting pin so that it is between the balancing hole and the crankshaft timing adjustment groove.

Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



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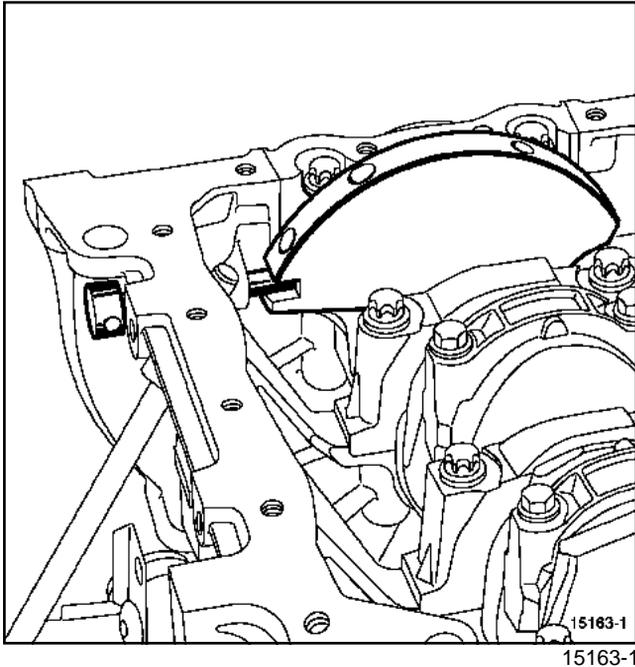
- Rotate the engine slightly in the same direction, inserting the (**Mot. 1054**) pin, until the timing adjustment point is reached.

At the timing adjustment point, the camshaft grooves (1) must be horizontal and offset below the centreline as illustrated.

Timing belt: Removal

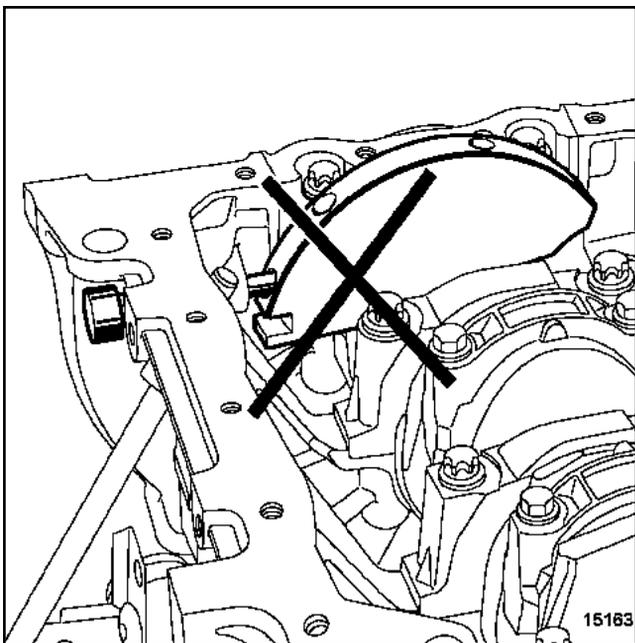
F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

Correct position



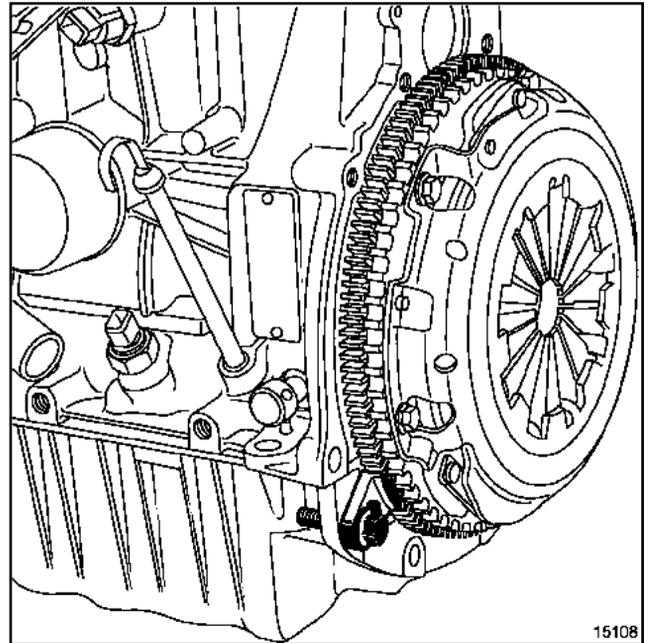
15163-1

Incorrect position



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- The pin is in the balancing hole.



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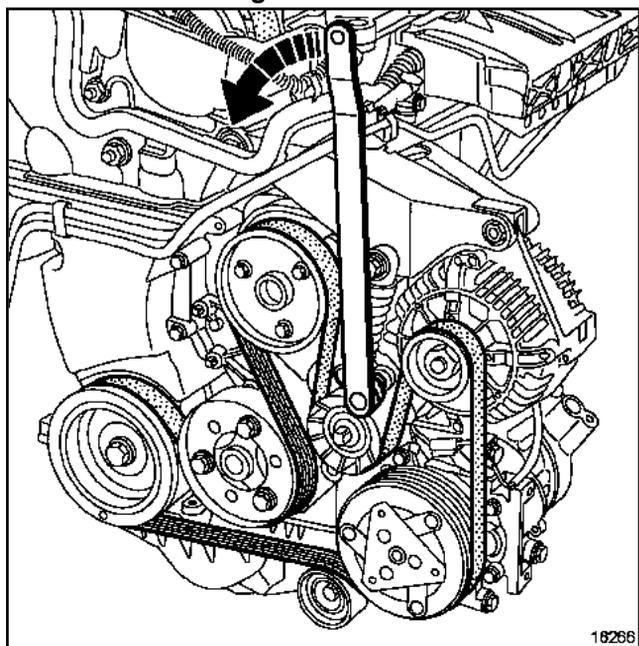
- Lock the flywheel with the tool (**Mot. 1677**).
- Remove the pin (**Mot. 1054**).

Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

F4R, and 730 or 732 or 736 or 738

With air conditioning



- Pivot the tensioner in the direction of the arrow using a **12.7 mm** ratchet square drive.

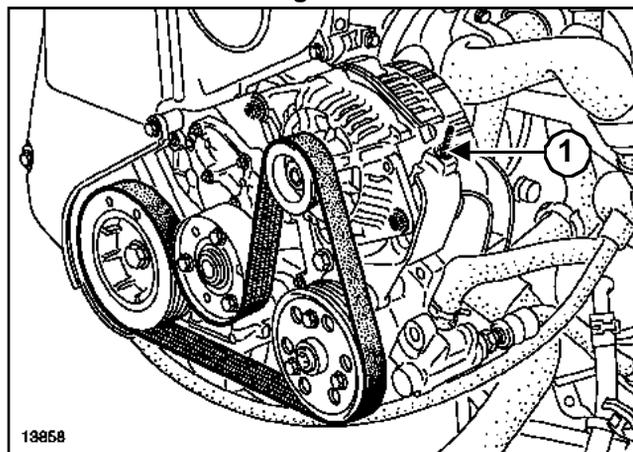
IMPORTANT

- Wear gloves during this operation
- Beware of travel of the tool caused by the rotation of the tensioner wheel.

- Remove the accessories belt.
- Remove:
 - the crankshaft accessories pulley mounting bolt,
 - the crankshaft accessories pulley.

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 720 or 730 or 732 or 736 or 736 or 738 or 740 or 740 or 741 or 741 or 744 or 744 or 746 or 746 or 747 or 780

Without air conditioning



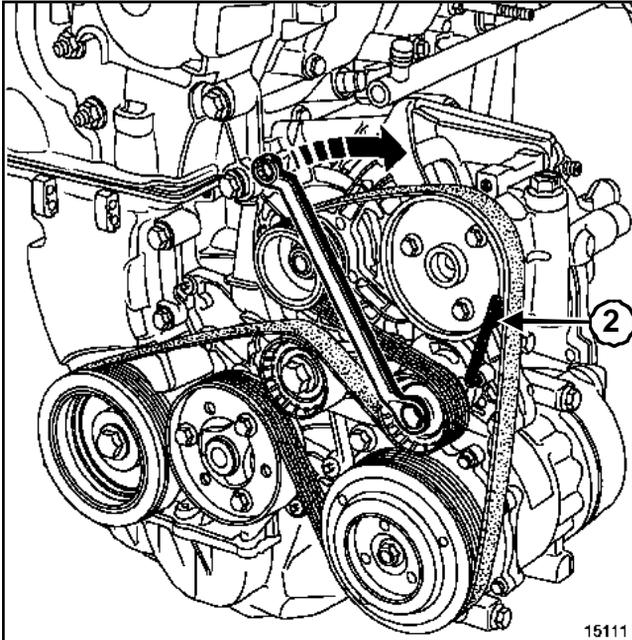
- Loosen:
 - the alternator mounting bolts,
 - the nut (1) until the accessories belt can be removed.
- Remove:
 - the crankshaft accessories pulley mounting bolt,
 - the crankshaft accessories pulley.

Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797

F4P, and 720 or 722 or 760 – F4R, and 700 or 701 or 740 or 741 or 744 or 746 or 747 or 780

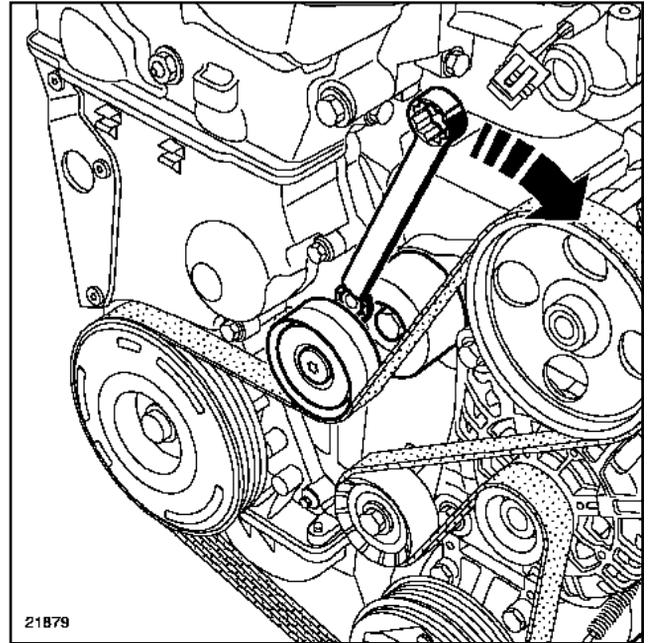
With air conditioning



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- Pivot the tensioner in the direction of the arrow using a spanner.
- Lock the tensioner with a **6 mm** Allen key (**2**).
- Remove the accessories belt.
- Remove:
 - the crankshaft accessories pulley mounting bolt,
 - the crankshaft accessories pulley.

F4P, and 261 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 712 or 713 or 714 or 715 or 720 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 786 or 787 or 790 or 792 or 794 or 795 or 797



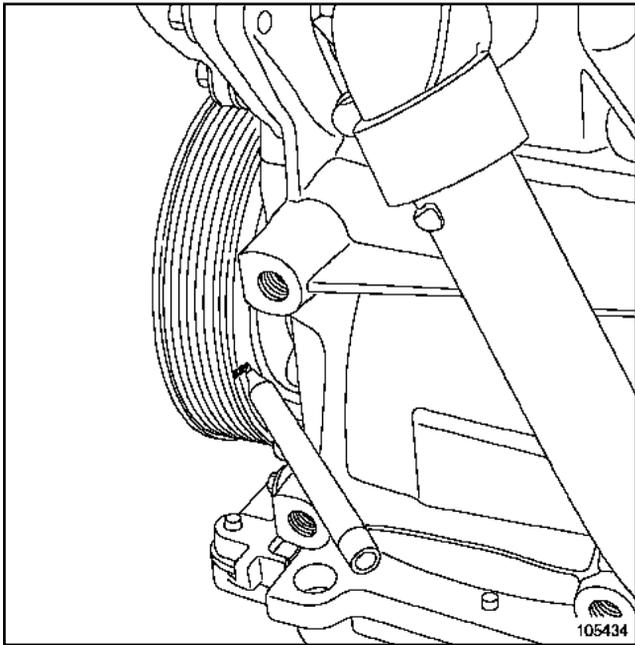
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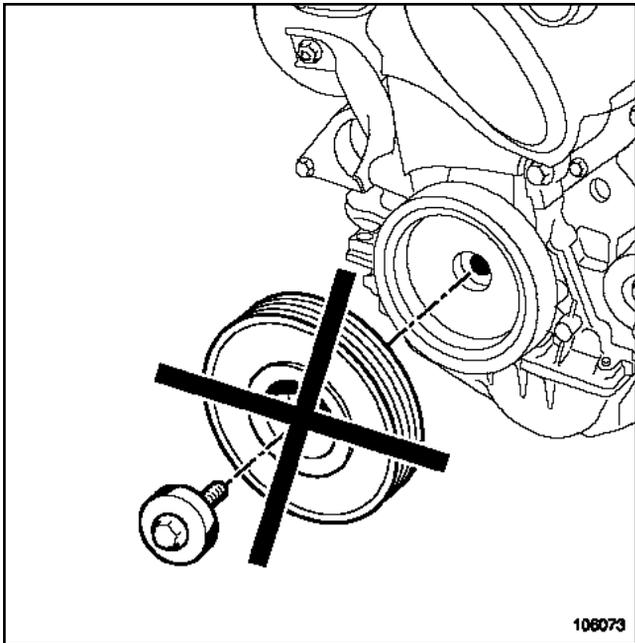
- Pivot the tensioner in the direction of the arrow using a spanner.
- Remove the accessories belt.

Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



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 Remove:

- the anti-vibration pulley mounting bolt,
- the anti-vibration pulley.

WARNING

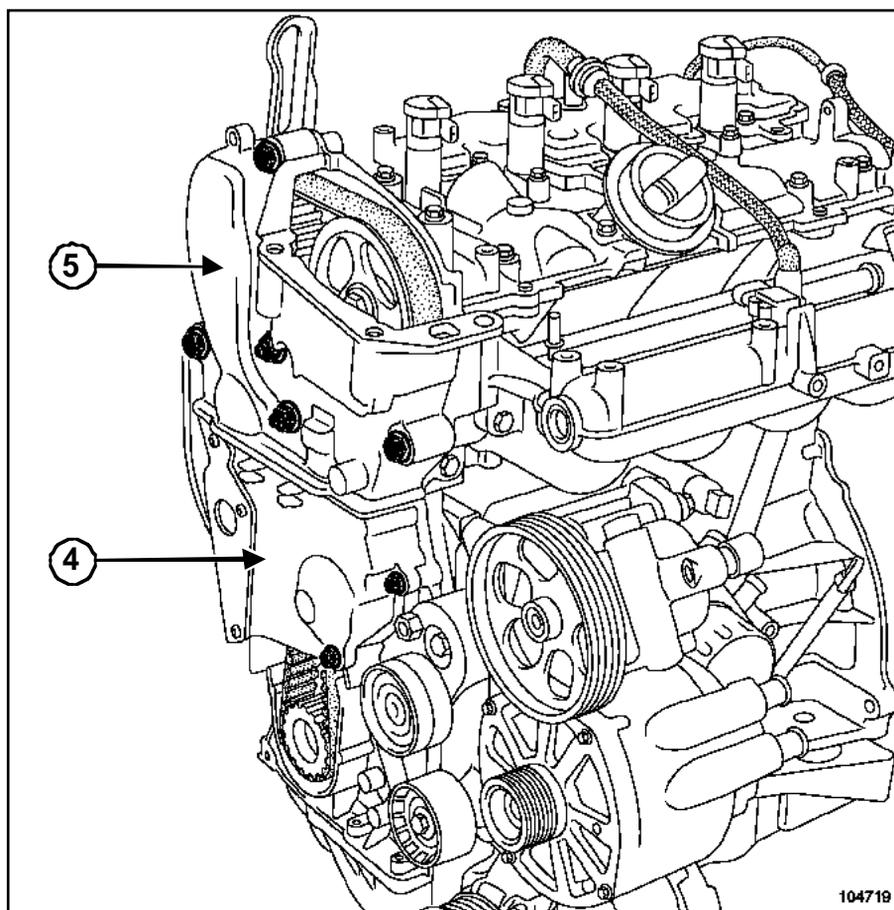
The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

It is imperative to make a mark to indicate the correct position before removing the mounting bolt.

It is forbidden to take the anti-vibration pulley apart.

Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



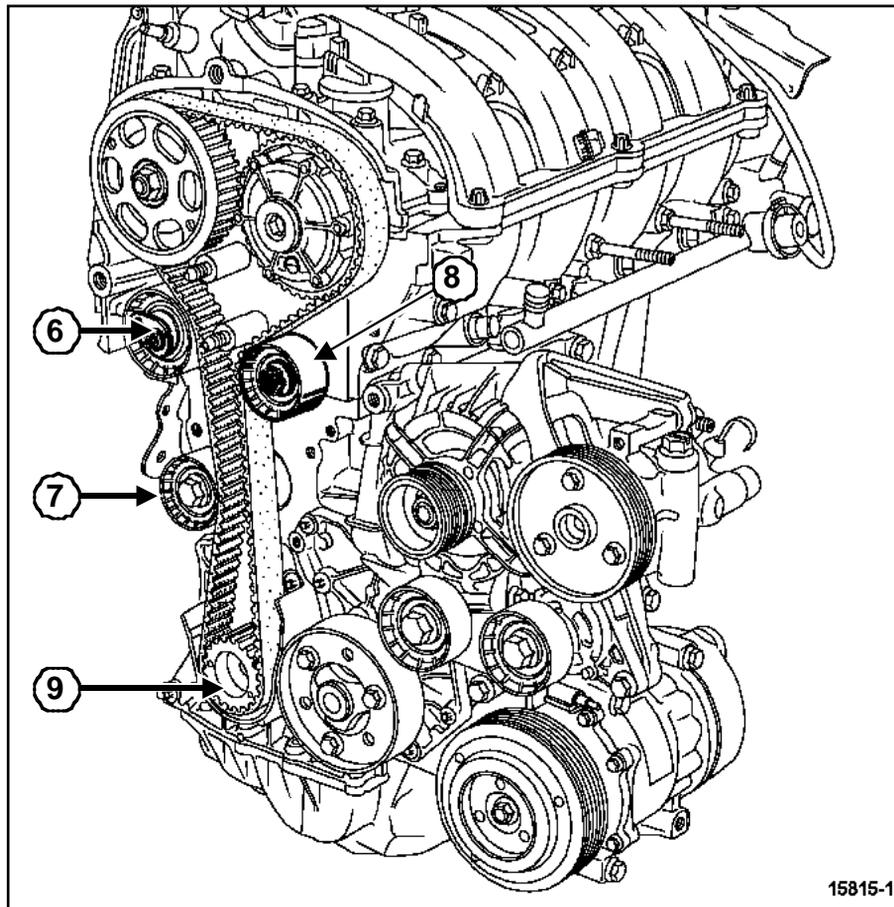
104719

□ Remove:

- the lower timing cover (4),
- the upper timing cover (5).

Timing belt: Removal

F4P, and 261 or 720 or 722 or 760 or 770 or 771 or 772 or 774 or 775 – F4R, and 276 or 700 or 701 or 712 or 713 or 714 or 715 or 720 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 760 or 761 or 762 or 763 or 764 or 766 or 767 or 770 or 771 or 774 or 776 or 780 or 786 or 787 or 790 or 792 or 794 or 795 or 797



15815-1

15815-1

- ❑ Unscrew the tension wheel nut (6).
- ❑ Remove:
 - the pulley(7),
 - the tension wheel(6),
 - the pulley (8) (only on engines with a coolant pump driven by the accessories belt),
 - the timing belt taking care not to let the crankshaft timing sprocket fall off,
 - the crankshaft sprocket(9).

Timing belts: Refitting

There are three distinct tension procedures that must be observed, according to the engine family.

Some engines require:

- a pretensioning torque to be applied (using the special tooling for the engine type) to the belt section to be measured to compensate for all the belt play.
- a **pre-stress T1** slightly greater than the **final fitting tension T2** to be applied.

The purpose of these two operations is to stabilise the belt's internal voltage, to make a reliable tension measurement.

WARNING

Replace any removed belt.

WARNING

When replacing the timing belt specified by the manufacturer, the belt, tension wheel and pulley(s) must be replaced.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Special tooling required	
Mot. 799-01	Tool for locking sprockets on toothed timing belt
Mot. 1496	Tool for setting the camshaft
Mot. 1054	TDC setting pin
Mot. 1677	Flywheel locking tool (F engines)
Mot. 1509	Camshaft sprocket locking tool
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1715	Belt tension setting tool (frequency meter)
Mot. 1487	Tool for refitting camshaft covers (57 mm diameter)
Mot. 1488	Tool for refitting camshaft covers (43 mm diameter)

Equipment required
roller-type stud removal tool

Tightening torques 	
pulley bolts	50 Nm
crankshaft accessories pulley bolt	40 Nm + 110°
toothed pinion nuts	80 Nm
camshaft dowel	8 Nm
M10 alternator mounting bolt	44 Nm
M8 alternator mounting bolt	25 Nm
M6 lower timing cover bolts	8 Nm
M8 lower timing cover bolts	20 Nm

Tightening torques 	
M8 upper timing cover bolts	18 Nm
M10 upper timing cover bolts	38 Nm

This section concerns F4 engines equipped with a **camshaft without dephaser**.

REFITTING THE TIMING BELT



WARNING

The following parts must be replaced with new ones when they are removed:

- the belt (timing and accessories),
- the camshaft pulley fastenings,
- the crankshaft accessories pulley bolt.

WARNING

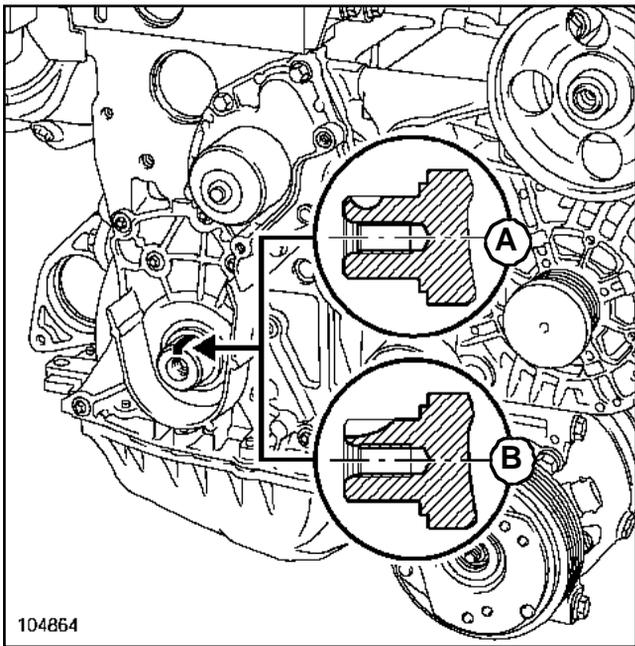
When the timing belt is replaced in accordance with the manufacturer's instructions, the belt, tension wheel and pulley(s) must be replaced with new ones.

WARNING

When the accessories belt is replaced in accordance with the manufacturer's instructions, the belt, tensioner, pulley and anti-vibration pulley (two-part) must be replaced with new ones.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

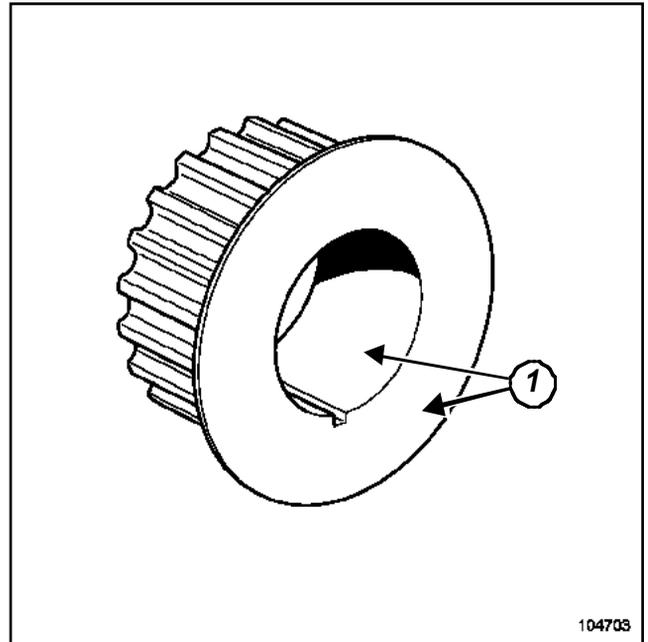


WARNING

The timing adjustment procedure depends on the **type of keying** on the end of the crankshaft.

- For keying type **(A)** fit a sprocket without a key on the crankshaft (see METHOD WITHOUT KEYING).
- For keying type **(B)**, replace the original sprocket with a sprocket with integral key (see METHOD WITH KEYING).

TIMING ADJUSTMENT WITH KEYLESS SPROCKET



WARNING

Be sure to degrease:

- the end of the crankshaft (timing end),
- the timing sprocket bore and contact surfaces at **(1)**,
- the contact surfaces of the crankshaft accessories pulley.

to prevent slippage between the timing gear and the crankshaft.

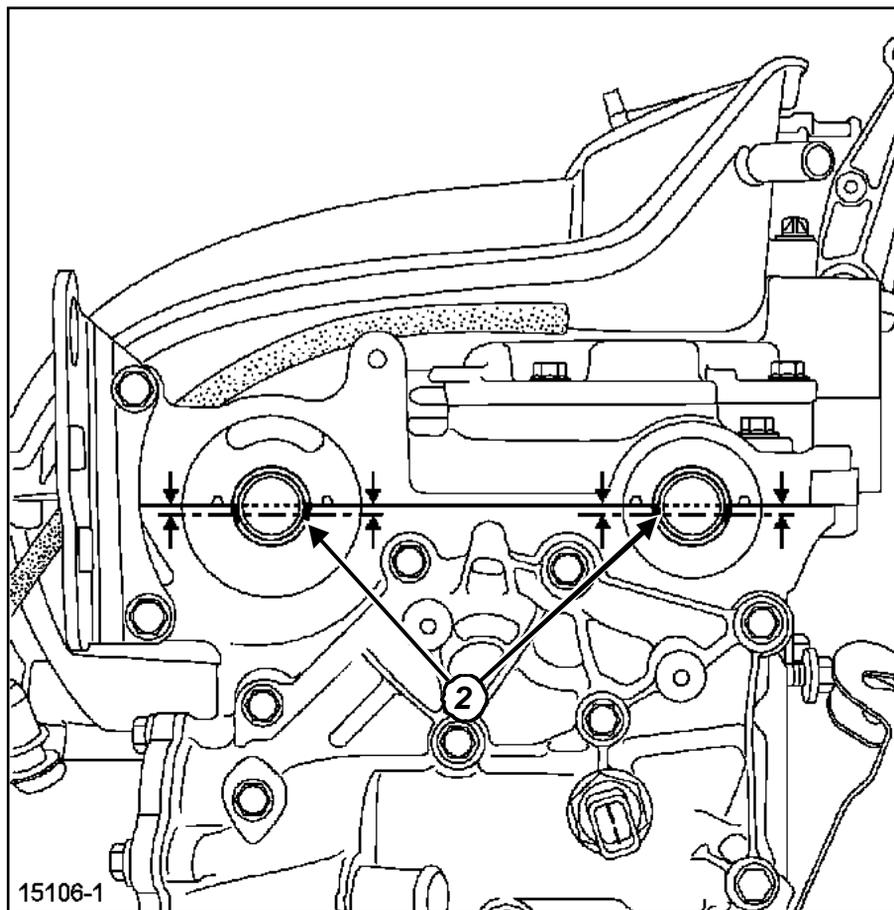
This slippage leads to engine damage.

WARNING

Never rotate the engine against its direction of operation.

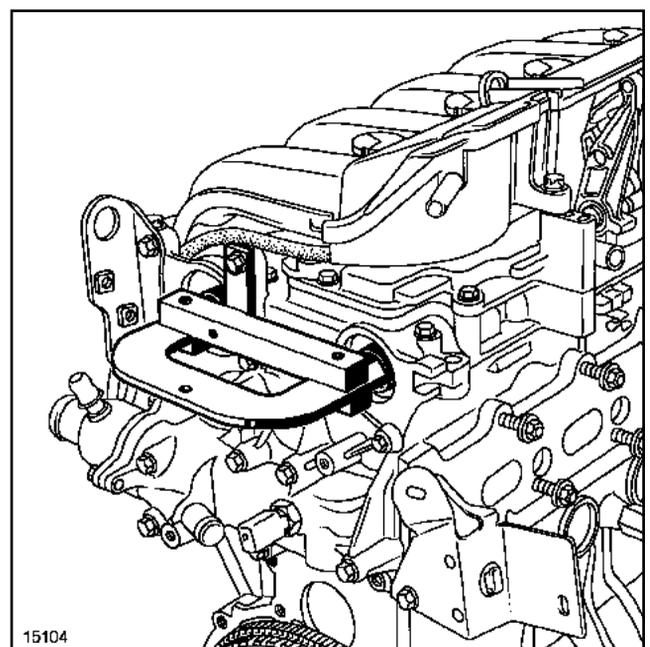
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15106-1

- Position the offset grooves (2) horizontally below the centre-line as shown above by turning the camshafts using tool (Mot. 799-01).

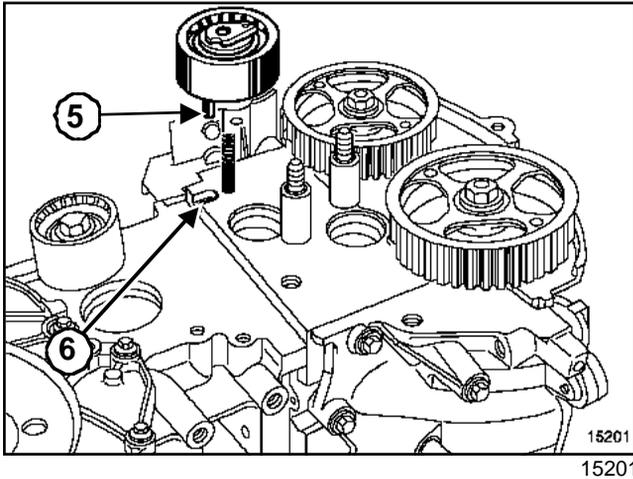


15104

- Position the tool (Mot. 1496), attaching it to the end of the camshaft.

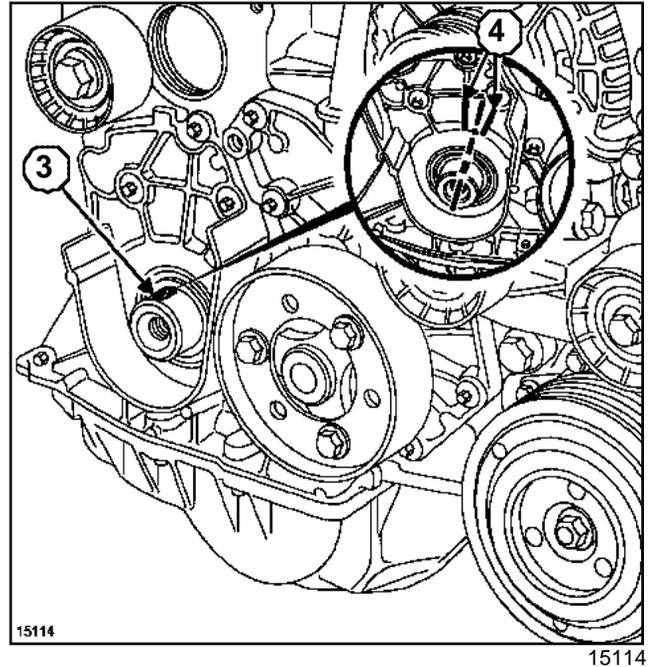
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

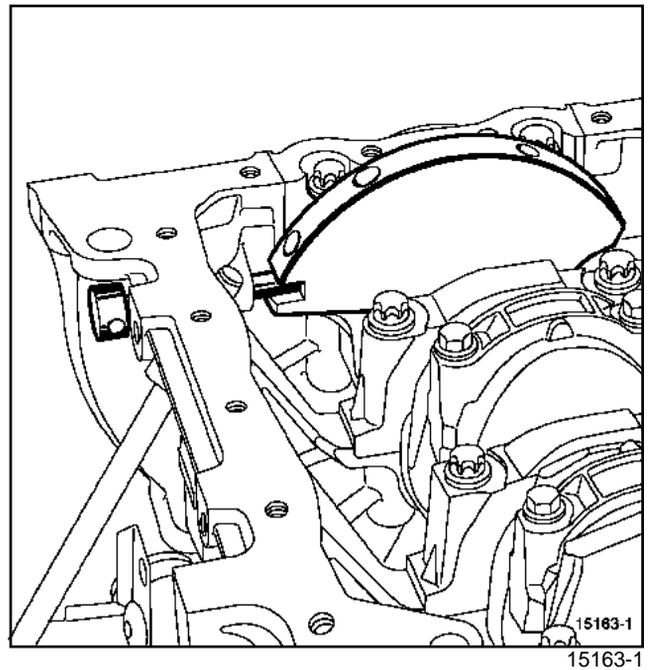


□ Refit:

- a new tension wheel, positioning the tension wheel lug (5) correctly in the groove (6),
- the **keyless crankshaft sprocket**.



Correct position



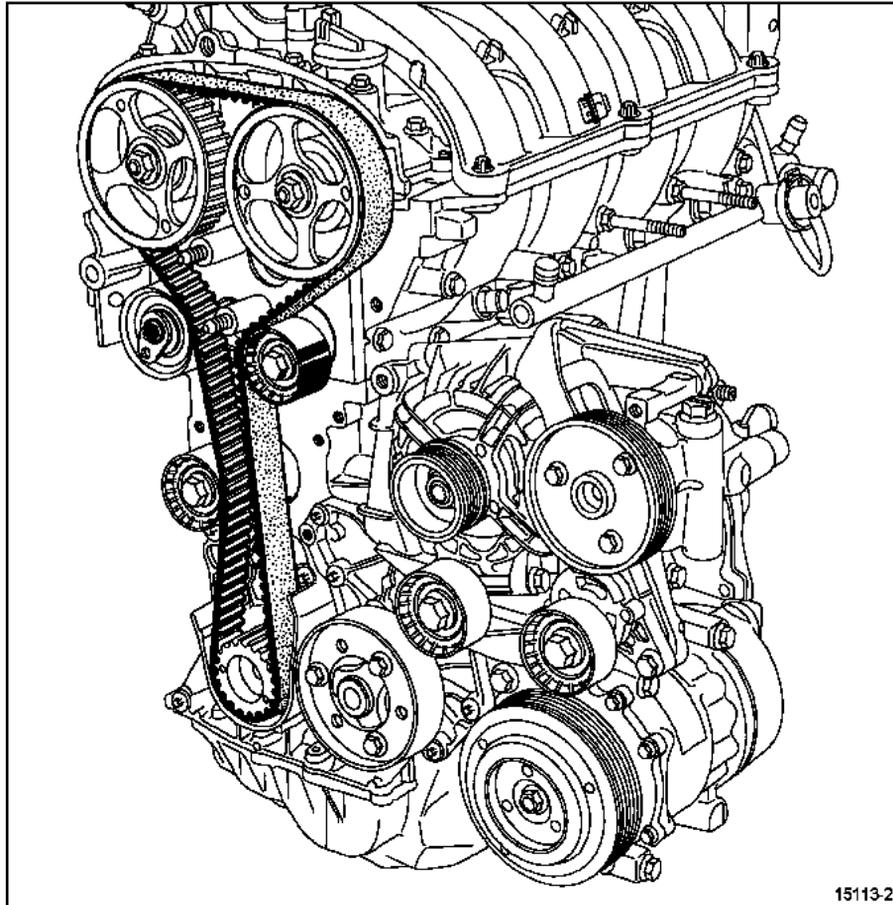
□

WARNING

Check that the crankshaft is correctly blocked.
The crankshaft groove (3) must be between the two ribs (4).

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



15113-2

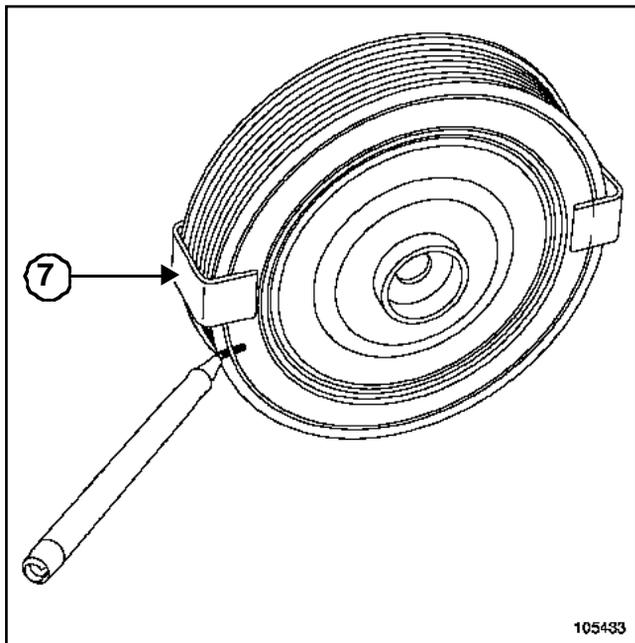
15113-2

- Fit:
 - a new belt,
 - new pulley(s).
- Tighten to torque the **pulley bolts (50 Nm)**.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4R, and 720 or 760 or 761 or 762 or 763 or 764



105433
105433

❑

WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

Mark it before refitting it to prevent an error.

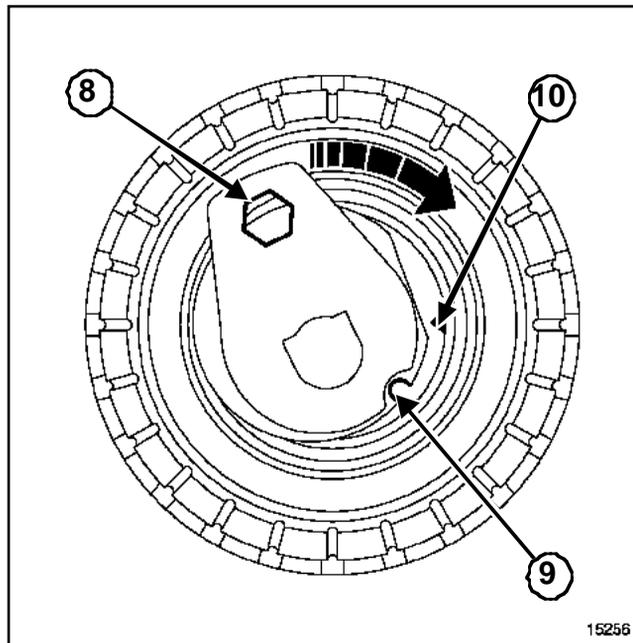
It is forbidden to take the anti-vibration pulley apart.

- ❑ Refit the new anti-vibration pulley with its clamp (7).
- ❑ Pre-tighten the new bolt of the anti-vibration pulley (without locking the bolt, play of **2 to 3 mm** between bolt and pulley).

F4P, and 720 or 722 or 760 – F4R, and 794 or 795

- ❑ Fit a new crankshaft accessories pulley.
- ❑ Pre-tighten the new crankshaft accessories pulley (without locking the bolt, play of **2 to 3 mm** between bolt and pulley).

Belt tension



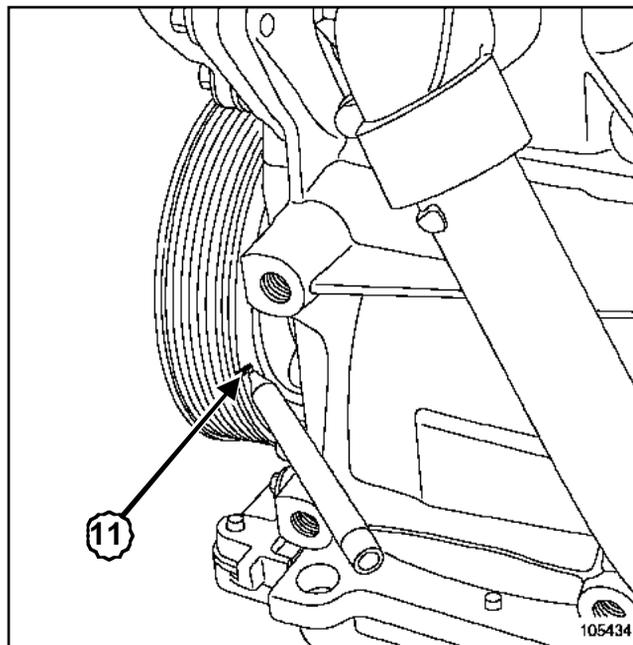
15256
15256

❑

Note:

Do not rotate the tension wheel anti-clockwise.

- ❑ Align the tension wheel marks (9) and (10) using a **6 mm** Allen key at (8).
- ❑ Tighten to torque the tension wheel nut **7 Nm**.



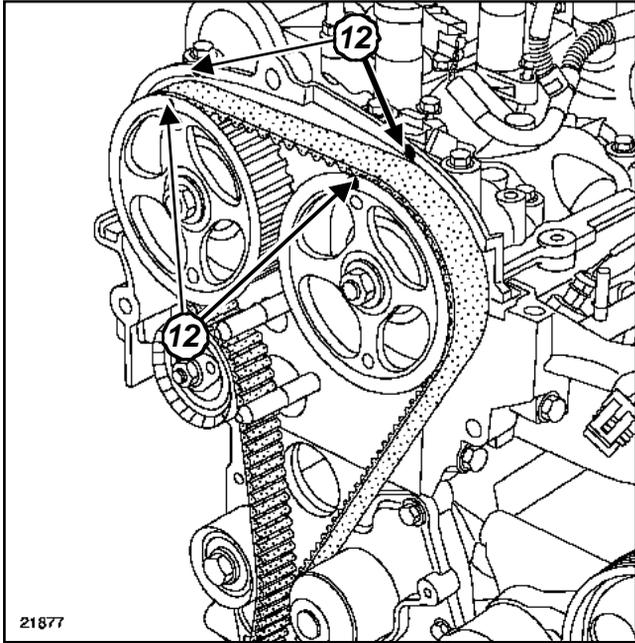
105434
105434

- ❑ Before tightening the anti-vibration pulley (if fitted), check the alignment (11) of the two parts.

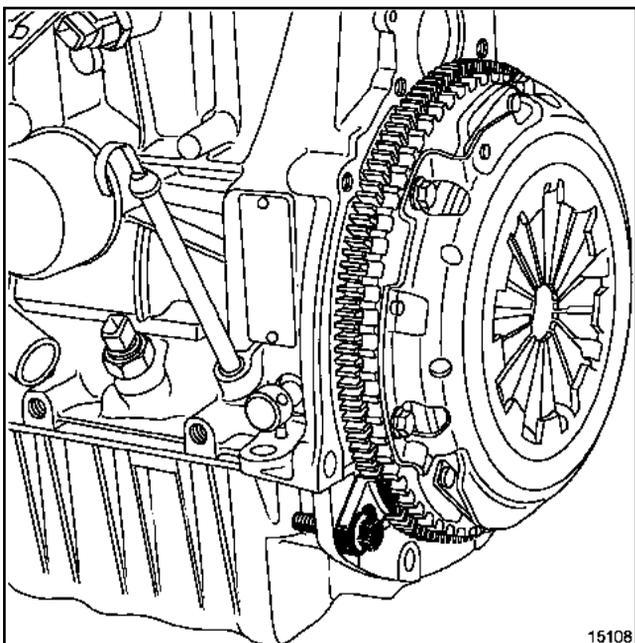
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

- ❑ Tighten the crankshaft accessories pulley bolt to a torque of **20 Nm** (TDC setting pin still in position in the crankshaft).



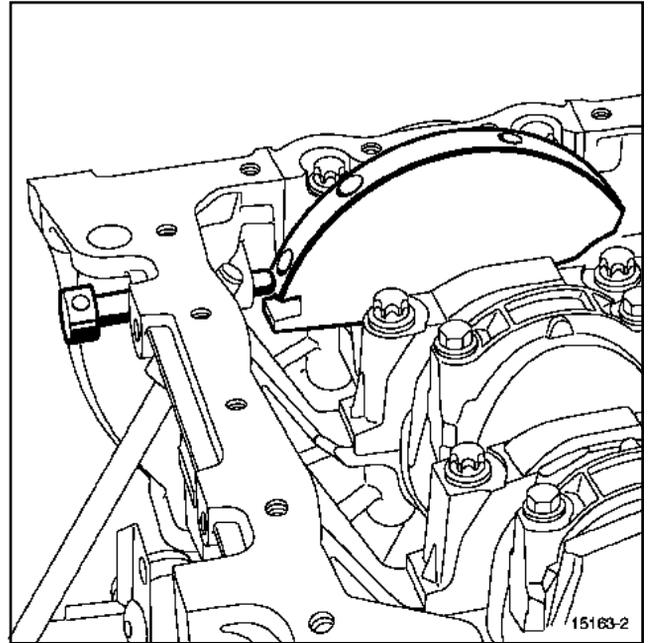
- ❑ Use a pencil to make marks (**12**) on the camshaft pulleys and the rocker cover.



- ❑ Remove the TDC setting pin (**Mot. 1054**).
- ❑ Immobilise the flywheel using tool (**Mot. 1677**).
- ❑ Tighten to torque and angle the **crankshaft accessories pulley bolt** (**40 Nm + 110°**).
- ❑ Remove the flywheel locking tool (**Mot. 1677**).

- ❑ Rotate the crankshaft clockwise through two revolutions (timing end).

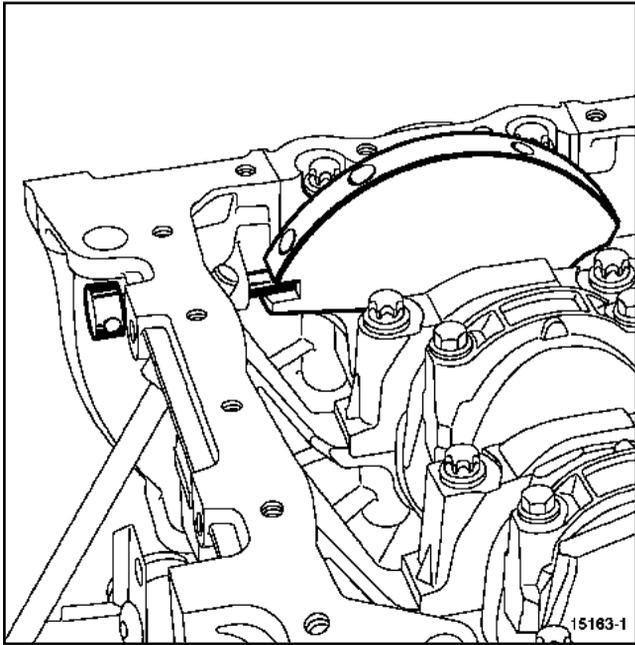
Checking the tension



- ❑ Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the crankshaft TDC setting pin (**Mot. 1054**) (so that it is between the balancing hole and the timing hole).

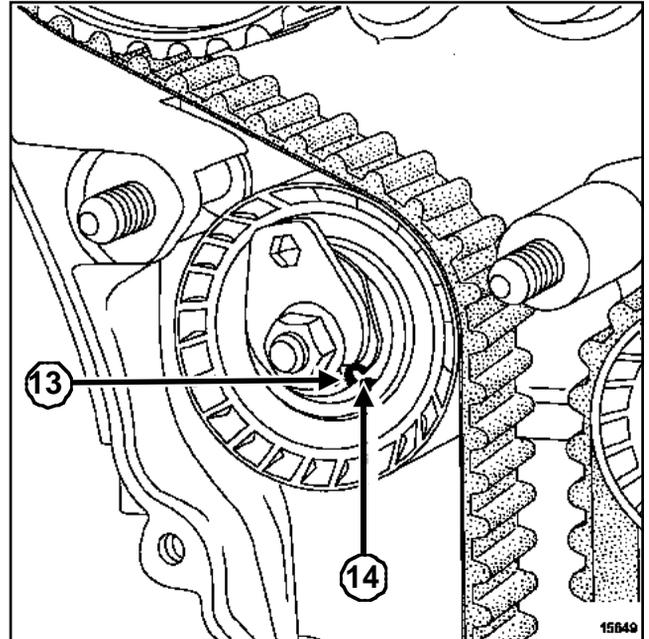
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Lock the timing at its adjustment point.
- Remove the TDC setting pin (**Mot. 1054**).
- Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure.
- Loosen the tension wheel nut by up to one turn, holding it with a **6 mm** Allen key.
- Align the tension wheel marks.
- Tighten the nut finally to a torque of **28 Nm**.
- Rotate the crankshaft clockwise through two revolutions (timing end).

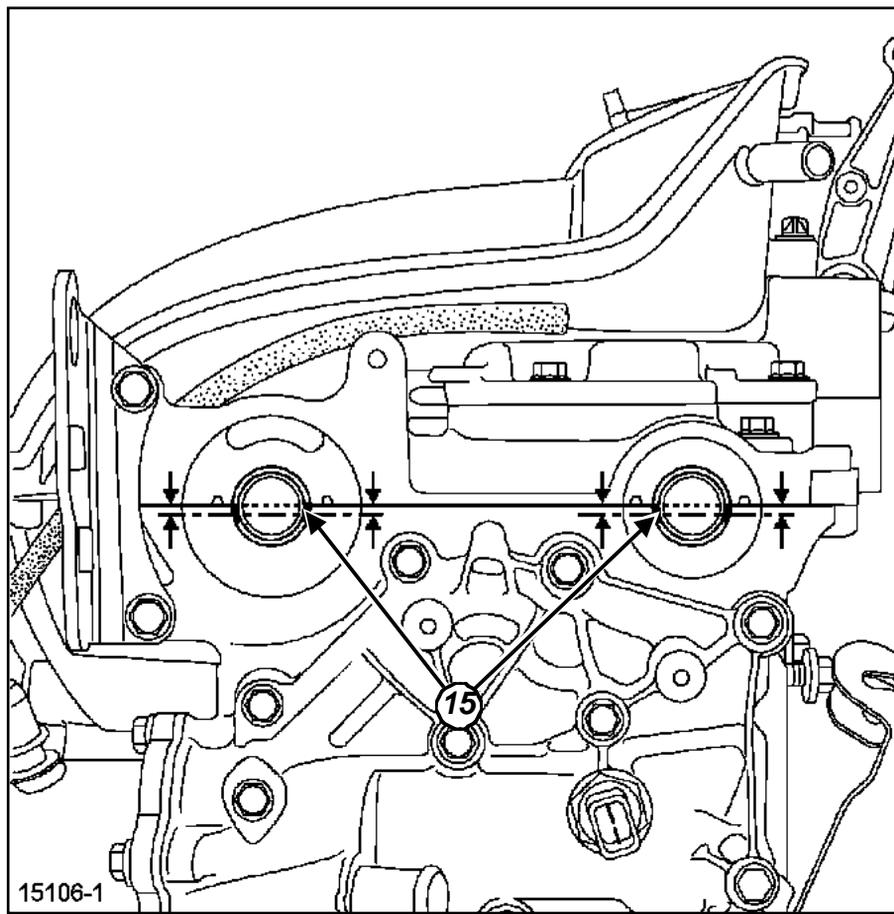
Checking the timing



- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the crankshaft TDC setting pin (**Mot. 1054**) (so that it is between the balancing hole and the timing hole).
- Ensure that the tensioner wheel marks (**13**) and (**14**) are in the correct position before checking the timing.

Timing belts: Refitting

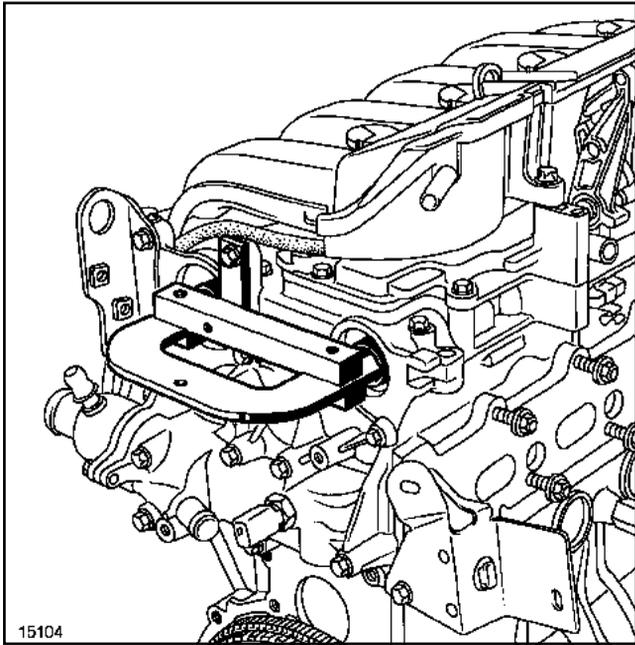
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- The off centre grooves (15) should be facing horizontally downwards.

Timing belts: Refitting

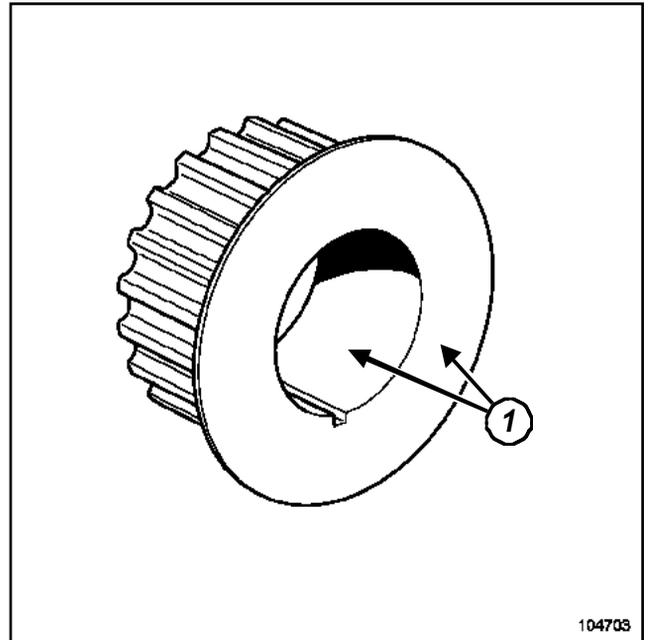
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

TIMING ADJUSTMENT WITH SPROCKET WITH INTEGRAL KEY



-

WARNING

Be sure to degrease:

- the end of the crankshaft (timing end),
- the timing sprocket bore and contact surfaces at (1),
- the contact surfaces of the crankshaft accessories pulley.

to prevent slippage between the timing gear and the crankshaft.

This slippage leads to engine damage.

WARNING

Never rotate the engine against its direction of operation.

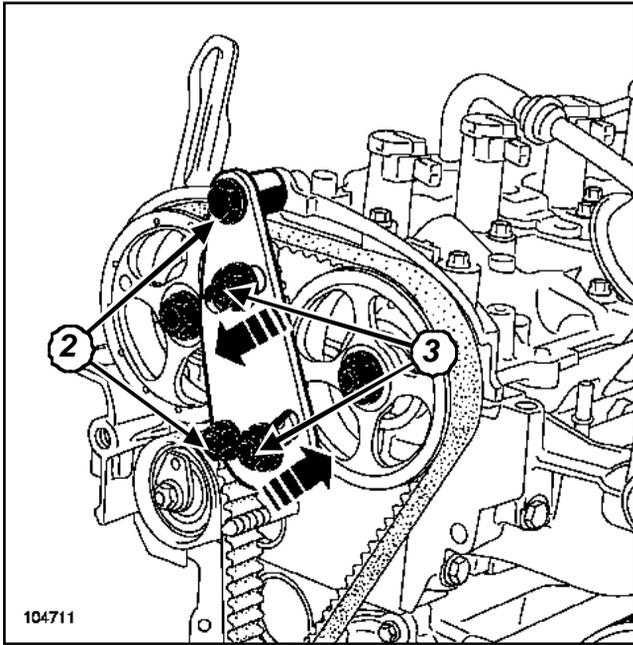
-

WARNING

In this case, the old camshaft pulley nuts must be removed in order to correctly set the belt tension.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- ❑ Fit tool (**Mot. 1509**);
- ❑ Tighten the bolt and the collar nut (2).
- ❑ Bring the toothed pinion nuts into contact with the camshaft pulleys.
- ❑ Tighten to torque the **toothed pinion nuts (80 Nm)(3)**.
- ❑ Remove:
 - the camshaft pulley nuts,
 - the camshaft pulleys.

❑ CAMSHAFT DOWEL REPLACEMENT

WARNING

It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

❑ 1 - Removing the dowel

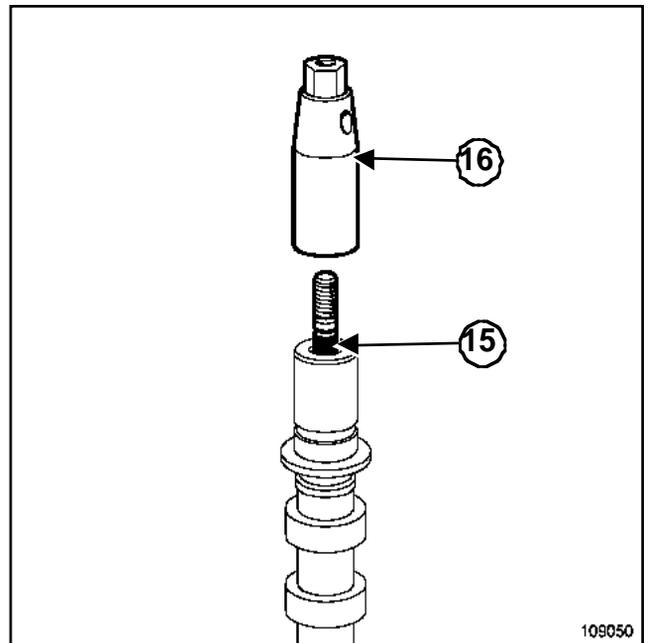
Remove the dowel using tool **roller-type stud removal tool**.

❑ 2 - Cleaning the camshaft thread

WARNING

Clean the threaded hole of the camshaft carefully to prevent foreign bodies from entering the latter.

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



❑ 3 - Refitting the dowel

Refit the new camshaft dowel (pre-coated section (15) on the camshaft side).

Tighten to torque the **camshaft dowel (8 Nm)** using tool **roller-type stud removal tool(16)**.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

□

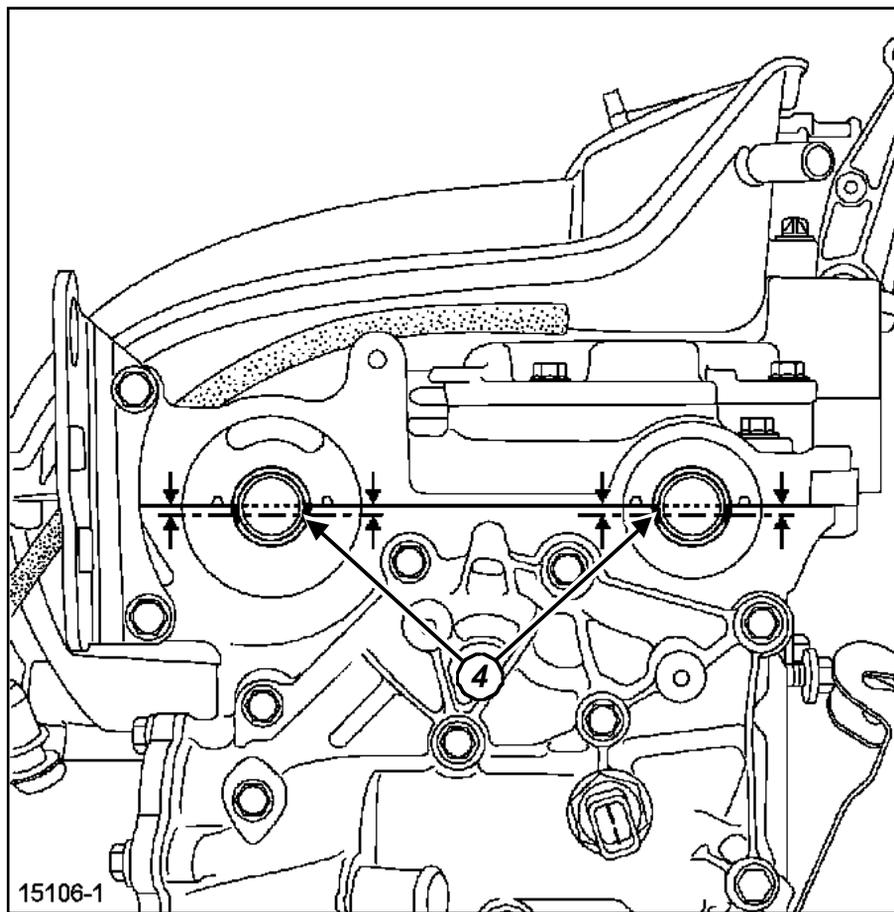
WARNING

When replacing the timing belt, it is essential to replace:

- the crankshaft accessories pulley,
- the tension wheel and idler pulley,
- the accessories and timing belts,
- the crankshaft sprocket (if it is not fitted with the integrated key).

□ Refit the degreased camshaft pulleys with their old nuts.

□ Tighten to torque the old nuts to **15 Nm maximum** using tool **(Mot. 799-01)**.

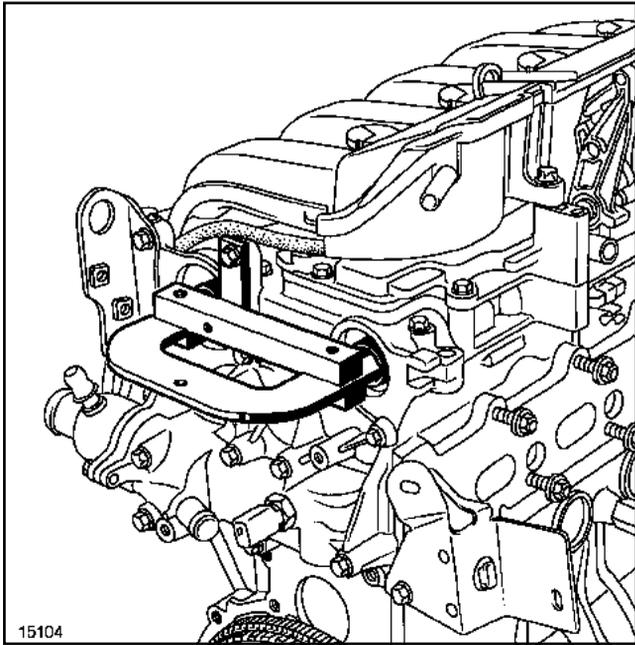


15106-1

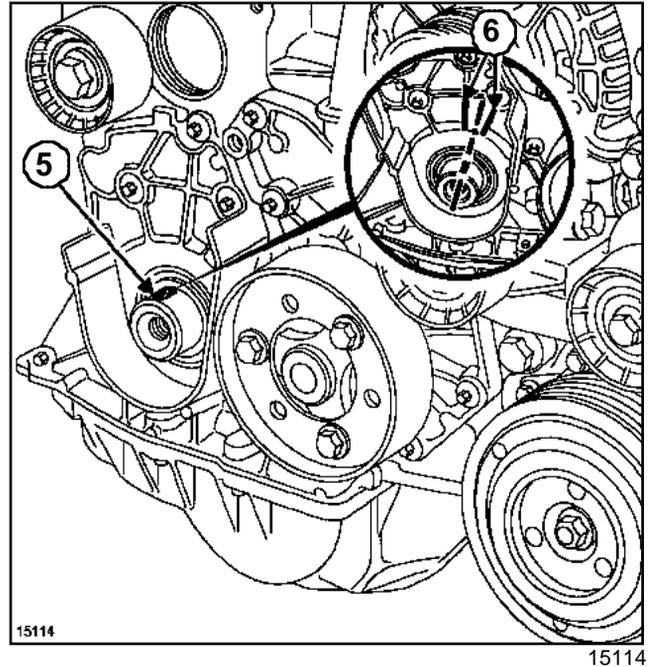
□ Position the off-centre grooves (4) horizontally downwards as shown above by rotating the camshafts using tool **(Mot. 799-01)**.

Timing belts: Refitting

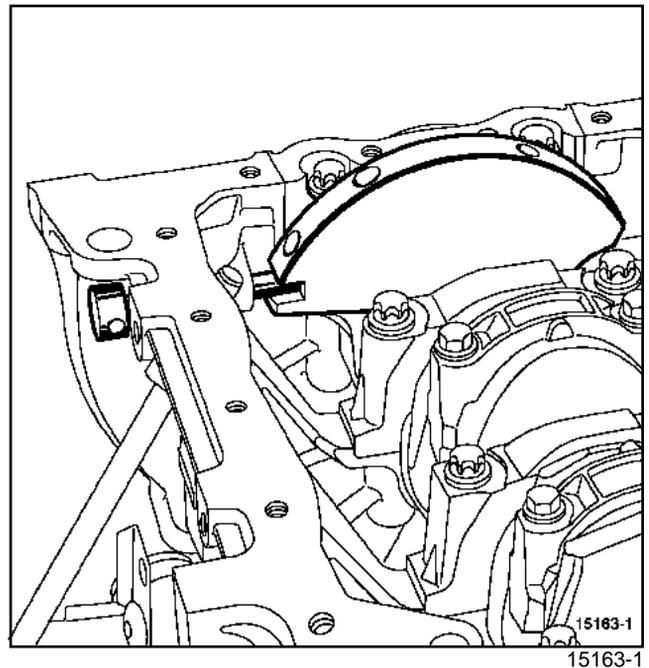
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- Position tool (**Mot. 1496**), attaching it to the ends of the camshafts.
- Loosen the camshaft pulley nuts.



Correct position

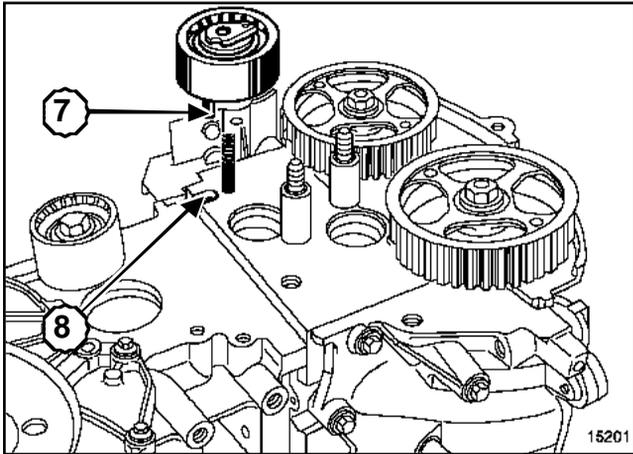
**WARNING**

Check that the crankshaft is correctly blocked.

The crankshaft groove (5) must be between the two ribs (6).

Timing belts: Refitting

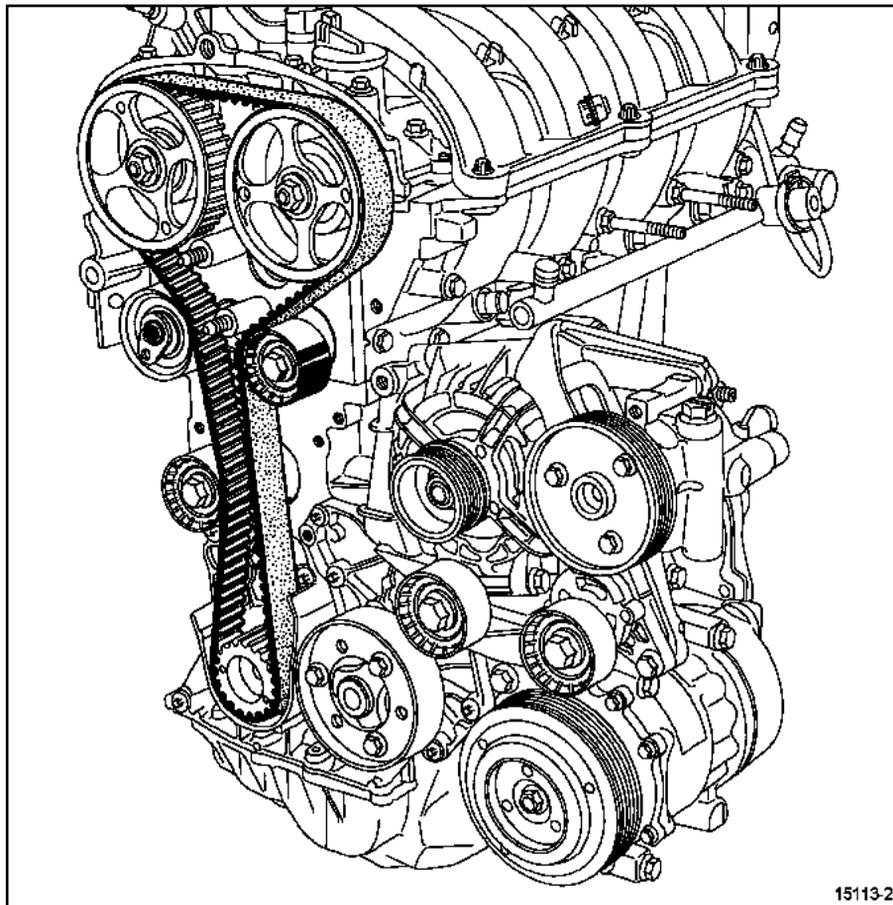
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- the crankshaft sprocket with integrated key.

Refit:

- a new tension wheel, positioning the tension wheel lug (7) correctly in the groove (8),



Fit:

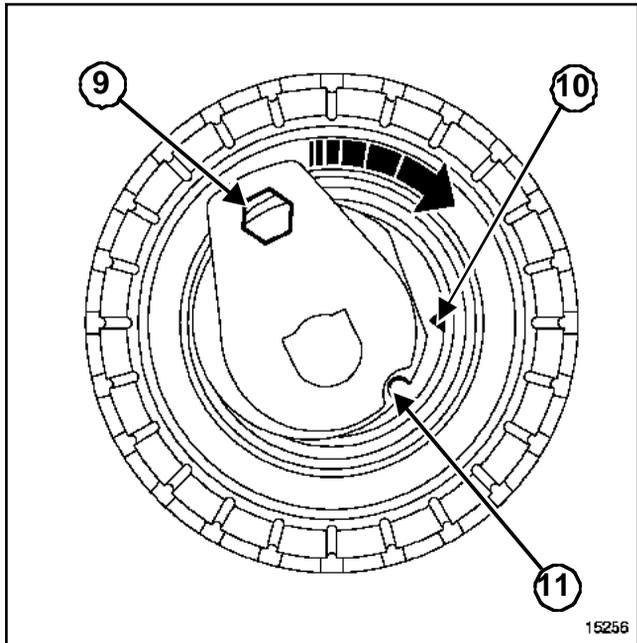
- a new belt,
- new pulley(s).

Tighten to torque the pulley bolts (50 Nm).

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Belt tension



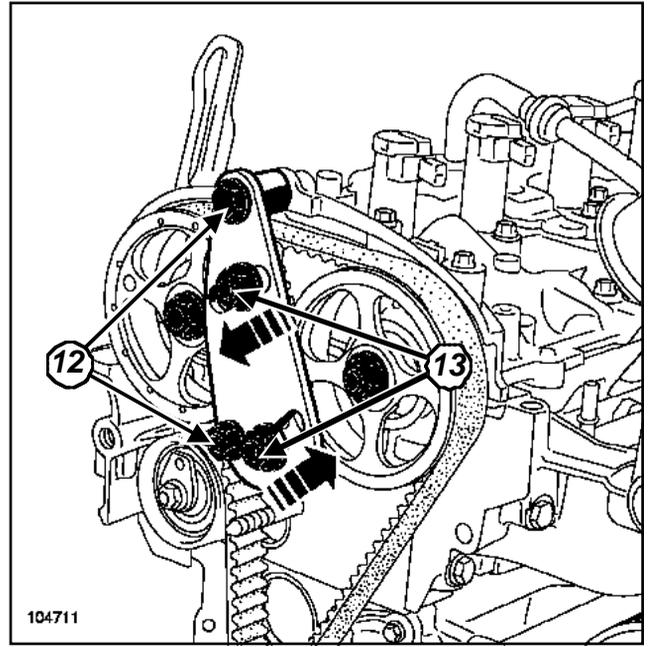
15256
15256

□

Note:

Do not rotate the tension wheel anti-clockwise.

- Align the tension wheel marks (11) and (10) using a 6 mm Allen key at (9).
- Tighten to torque the tension wheel nut 7 Nm.



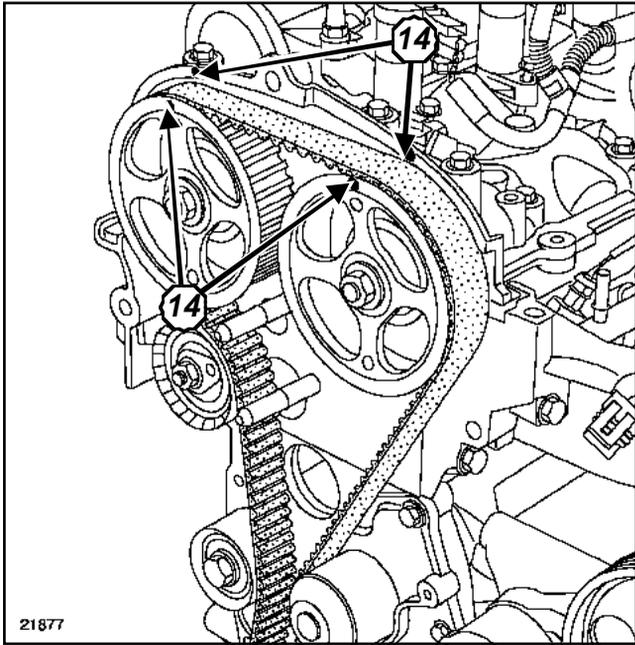
104711

104711

- Fit camshaft pulley locking tool (Mot. 1509).
- Tighten the bolt and the collar nut (12).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque:
 - the toothed pinion nuts (80 Nm)(13),
 - the old inlet camshaft pulley nut (30 Nm),
 - the old exhaust camshaft pulley nut (30 Nm).

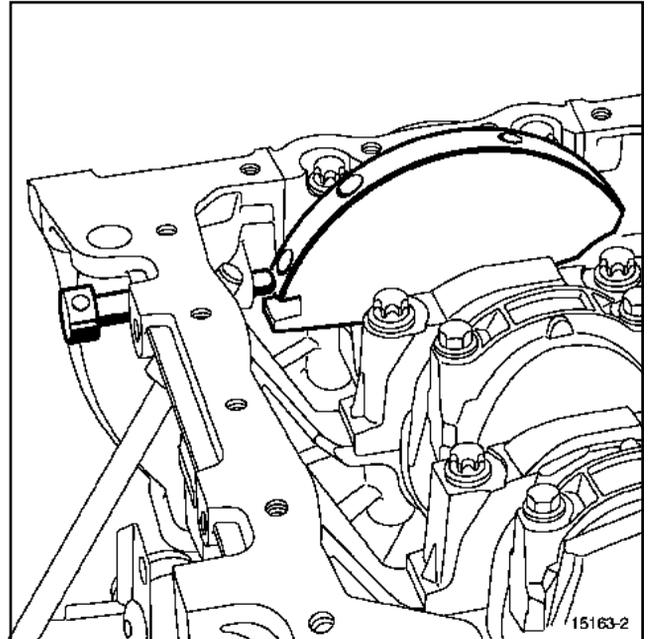
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

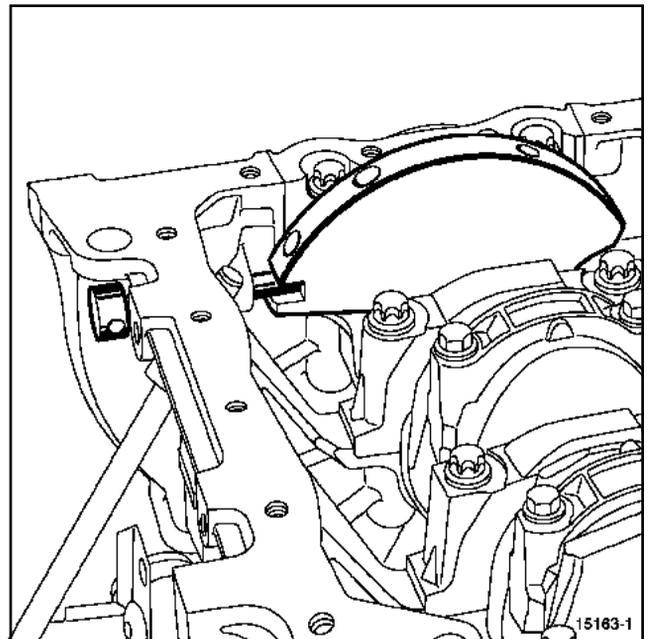


- Use a pencil to make marks (14) on the camshaft pulleys and the rocker cover.
- Remove the tools:
 - TDC setting pin (**Mot. 1054**)
 - Camshaft setting tool (**Mot. 1496**)
 - Tool for locking camshaft pulleys (**Mot. 1509**)
- Rotate the crankshaft clockwise through two revolutions (timing end).

Checking the tension



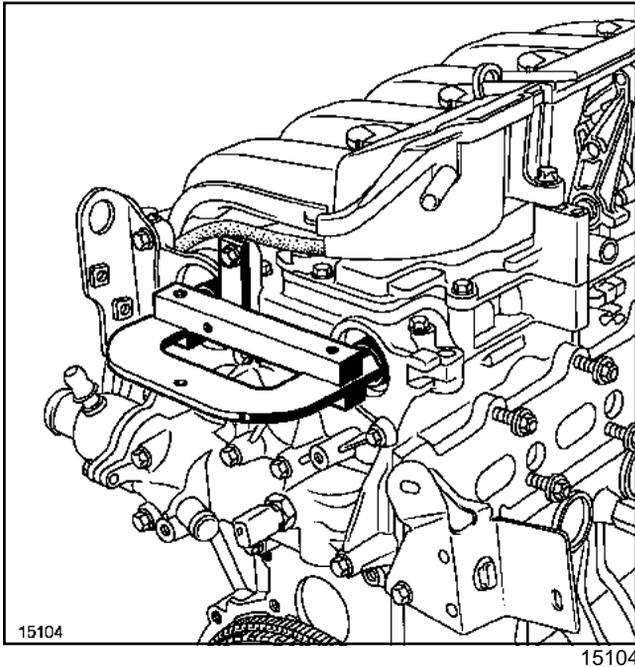
- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the crankshaft TDC setting pin (**Mot. 1054**) (so that it is between the balancing hole and the timing hole).



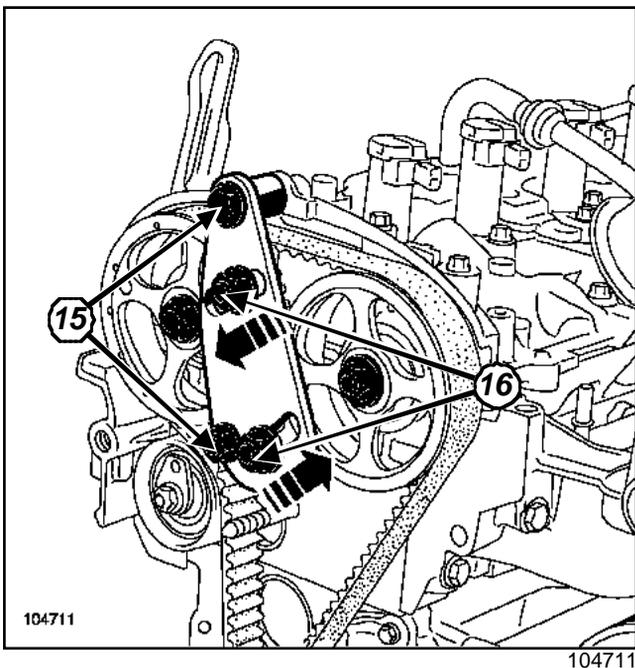
- Lock the timing at its adjustment point.
- Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure as follows:

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



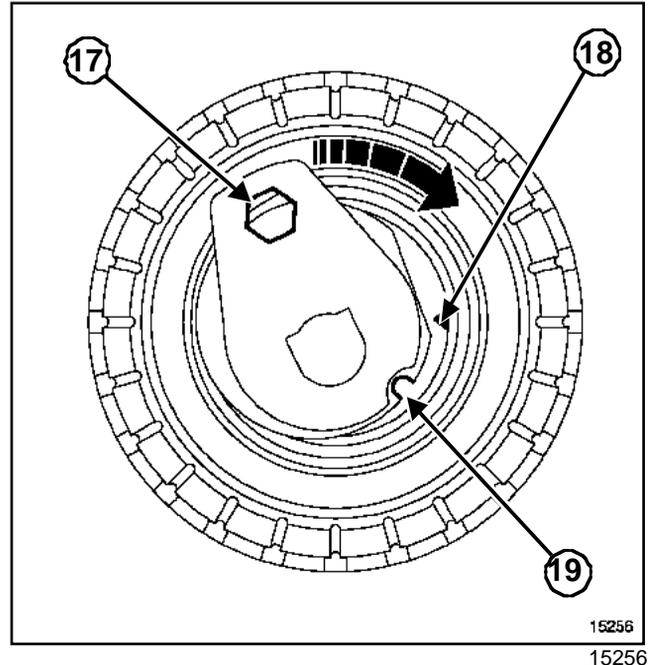
- Fit camshaft setting tool (**Mot. 1496**).



- Fit the camshaft pulley immobilising tool (**Mot. 1509**).
- Tighten the bolt and the collar nut (**15**).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the **toothed pinion nuts (80 Nm)(16)**.
- Loosen:
 - the old inlet camshaft pulley nut,

- the old exhaust camshaft pulley nut.

- Remove the camshaft pulley locking tool (**Mot. 1509**).

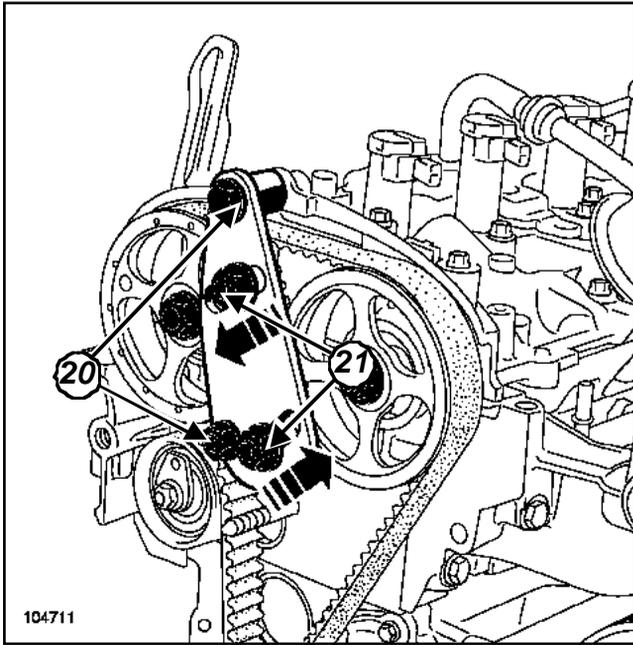


- Align marks (**19**) and (**18**) by loosening the tensioner nut by one turn, holding it with a **6 mm** Allen key at (**17**).

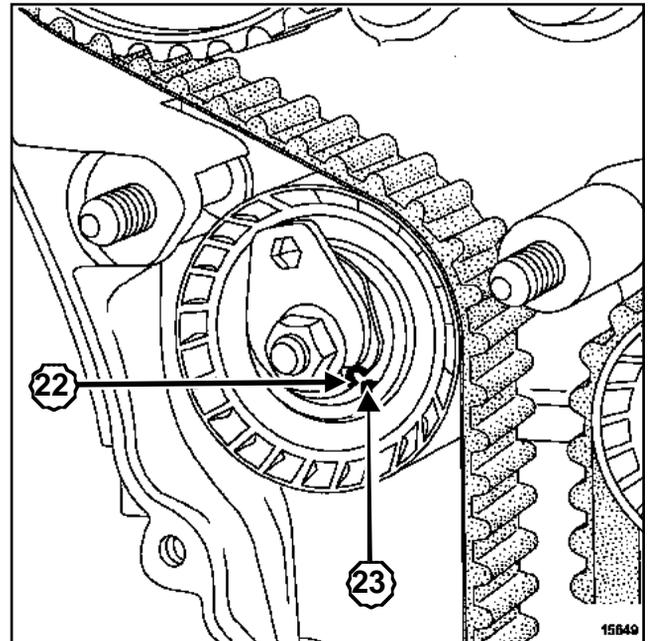
Tighten **the tension wheel nut finally to 28 Nm**.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



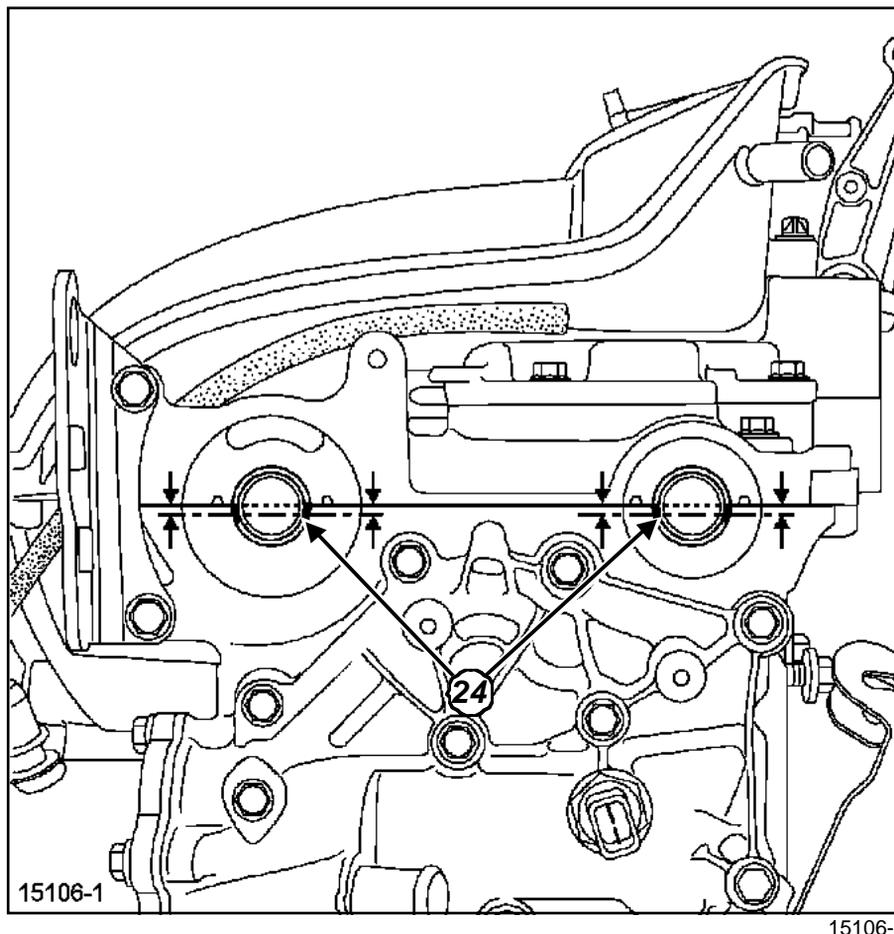
- Fit the camshaft pulley immobilising tool (**Mot. 1509**).
- Tighten the bolt and the collar nut (20).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten the **toothed pinion nuts to 80 Nm(21)**.
- Remove:
 - the old inlet camshaft pulley nut,
 - the old exhaust camshaft pulley nut.
- Fit the new nuts to the camshaft pulleys
- Tighten to torque
 - **the inlet camshaft pulley nut (30 Nm),**
 - **the exhaust camshaft pulley nut (30 Nm).**
- Remove the camshaft adjustment tool (**Mot. 1496**).
- **the inlet camshaft pulley nut ($86^\circ \pm 6^\circ$),**
 - **the exhaust camshaft pulley nut ($86^\circ \pm 6^\circ$).**
- Remove the tools:
 - TDC setting pin(**Mot. 1054**)
 - Tool for locking camshaft pulleys (**Mot. 1509**)
- Rotate the crankshaft clockwise through two revolutions (timing end).



- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the crankshaft TDC setting pin (**Mot. 1054**) (so that it is between the balancing hole and the timing hole).
- Check that the tensioner wheel marks (22) and (23) are in the correct position before checking the timing.

Timing belts: Refitting

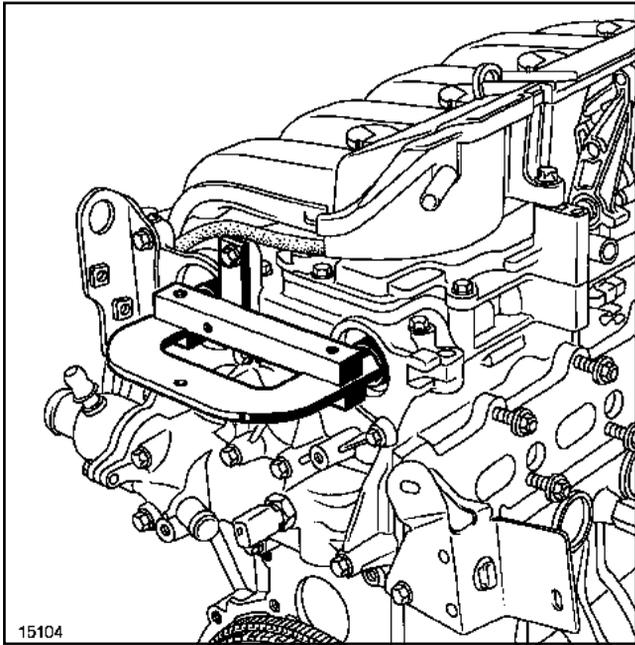
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



- The off centre grooves (24) should be facing horizontally downwards.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797



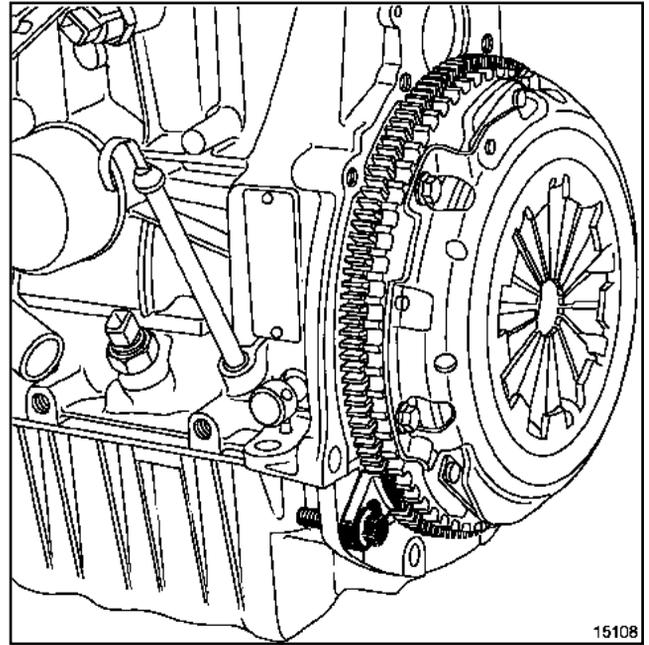
- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

REFITTING THE CRANKSHAFT ACCESSORIES PULLEY AND ACCESSORIES BELT

WARNING

When the accessories belt is replaced in accordance with the manufacturer's instructions, the belt, tensioner, pulley and anti-vibration pulley (two-part) must be replaced with new ones.



- Remove the TDC setting pin (**Mot. 1054**).
- Apply a drop of RHODORSEAL 5661 to the TDC setting pin cap.
- Refit the TDC setting pin plug.
- Immobilise the flywheel using tool (**Mot. 1677**).

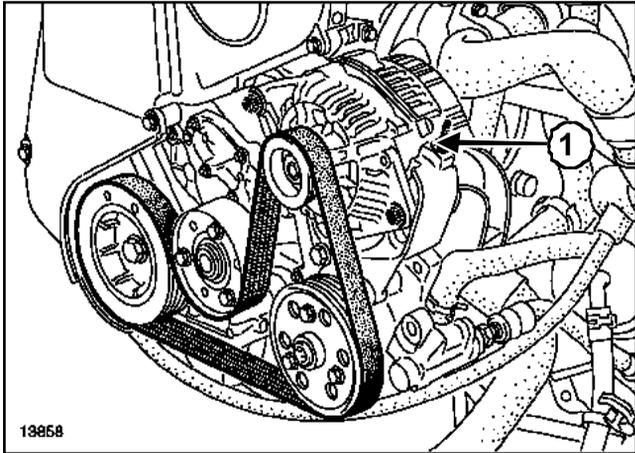
F4P, and 760

- Fit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

Timing belts: Refitting

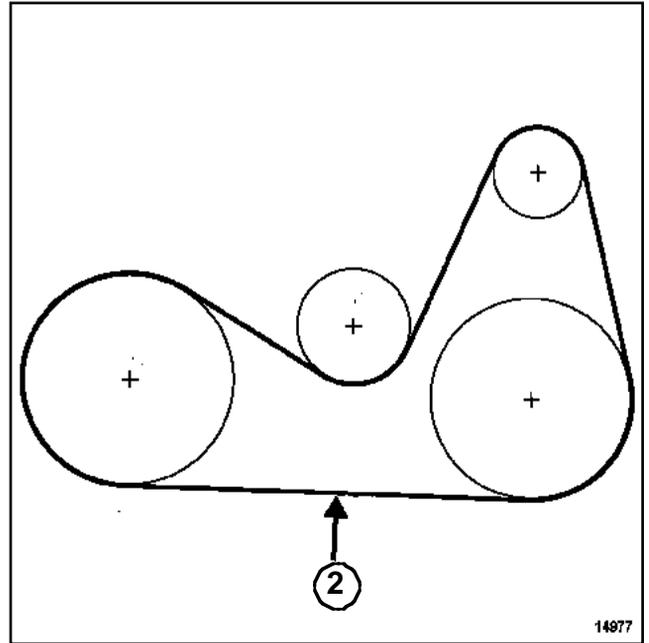
F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

Without air conditioning



13858

- Loosen the alternator mounting bolts.
- Fit a new accessories belt.
- Tension the accessories belt by tightening nut (1) on the alternator mounting.



14977

14977



Note:

- A: Crankshaft
- T: Water pump
- C: Alternator
- B: Power assisted steering pump
- (2): tension measurement point

- Check the accessories belt tension using belt tension tester (Mot. 1505) or (Mot. 1715).
- Belt tension (in Hz): **183 Hz ± 9**
- Tighten to torque the alternator mounting bolts:
 - **M10 alternator mounting bolt (44 Nm)**
 - **M8 alternator mounting bolt (25 Nm)**
- Turn the crankshaft through two revolutions and check that the measurement is within the fitting tension tolerance, if not readjust it.

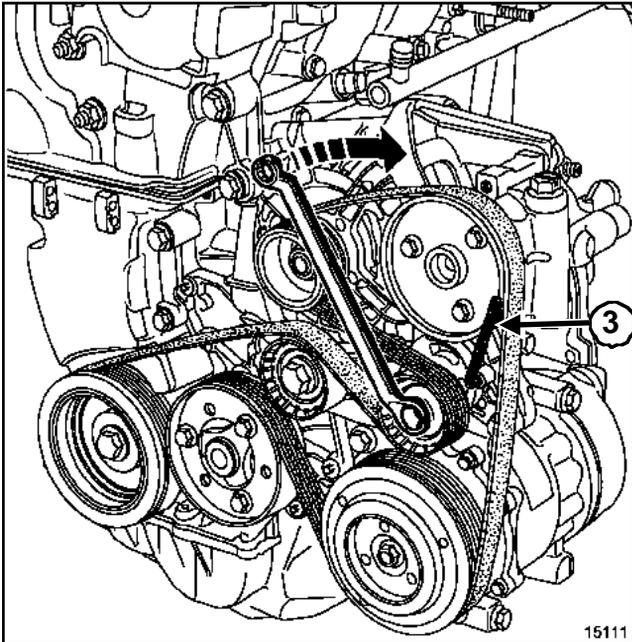
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4P, and 720 or 722 or 760

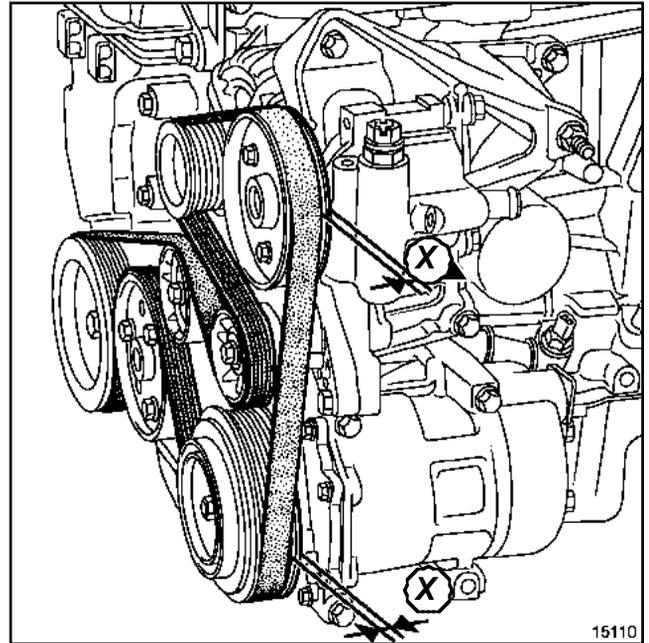
- Fit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

With air conditioning



15111
15111

- Rotate the tensioner in the direction of the arrow using a spanner.
- Lock the tensioner with a **6 mm** Allen key (**3**).
- Fit a new accessories belt.



15110
15110

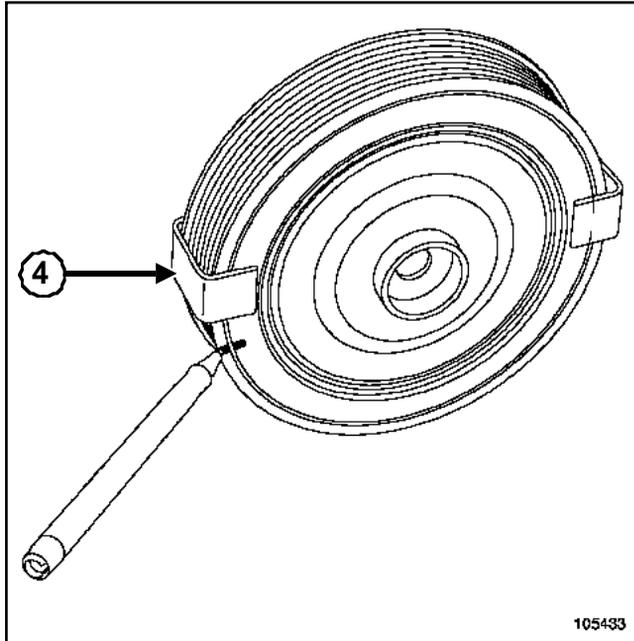
WARNING

When fitting the belt, it is essential to check that the groove (which corresponds to (X)) on the inside of the pulleys remains free.

Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

F4R, and 720 or 760 or 761 or 762 or 763 or 764 or 794 or 795



105433
105433

□

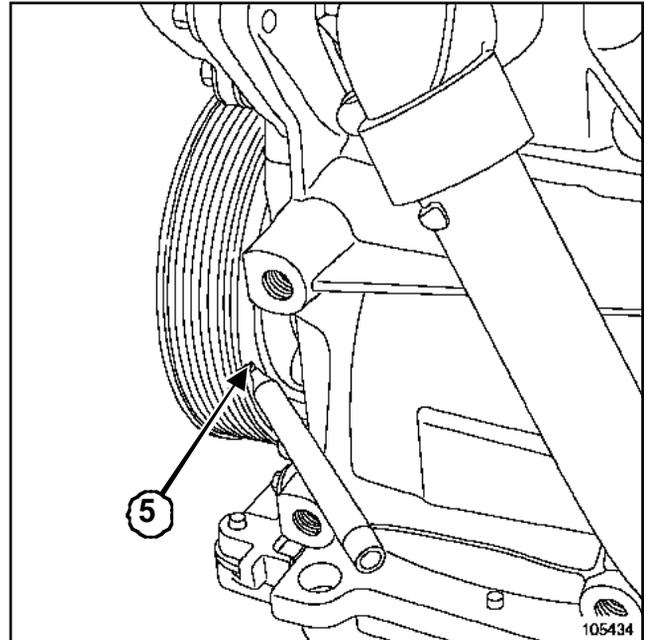
WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

Mark it before refitting it to prevent an error.

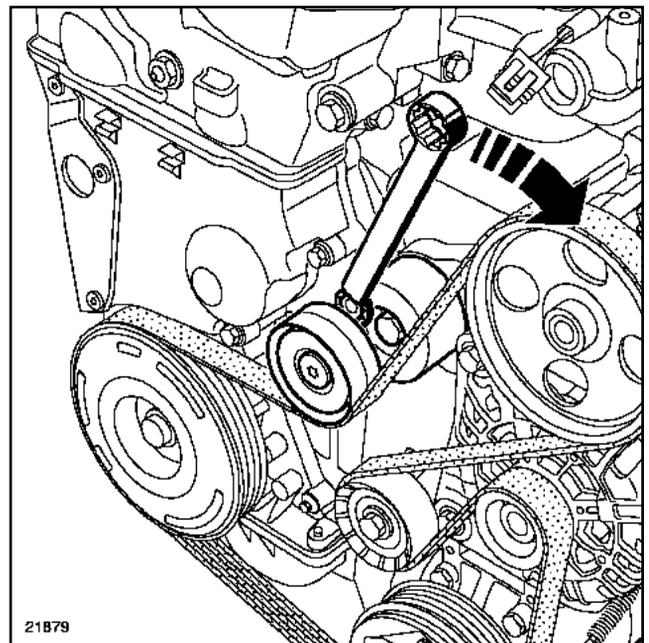
It is forbidden to take the anti-vibration pulley apart.

- Refit the new anti-vibration pulley with its clamp (4).



105434
105434

- Fit a new anti-vibration pulley bolt.
- Before tightening the anti-vibration pulley, check the alignment (5) of the two parts.
- Tighten to torque and angle the **anti-vibration pulley bolt (40 Nm + 110°)**.



21879

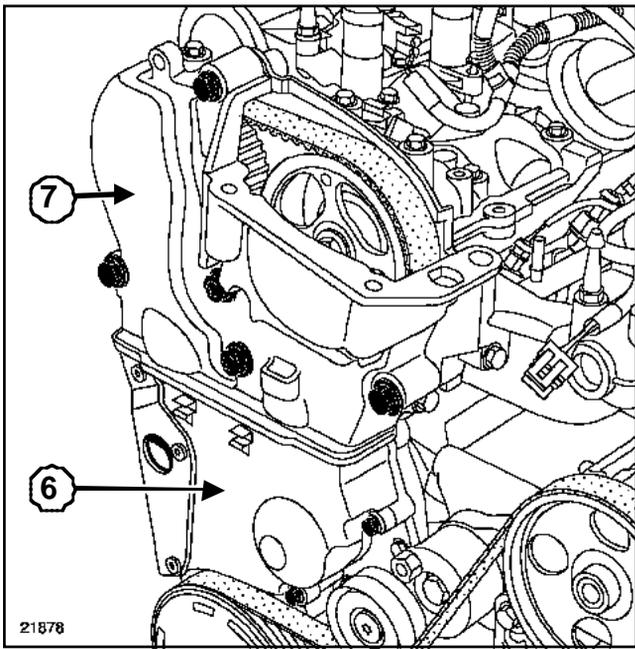
21879

- Rotate the tensioner in the direction of the arrow using a spanner.
- Fit a new accessories belt.

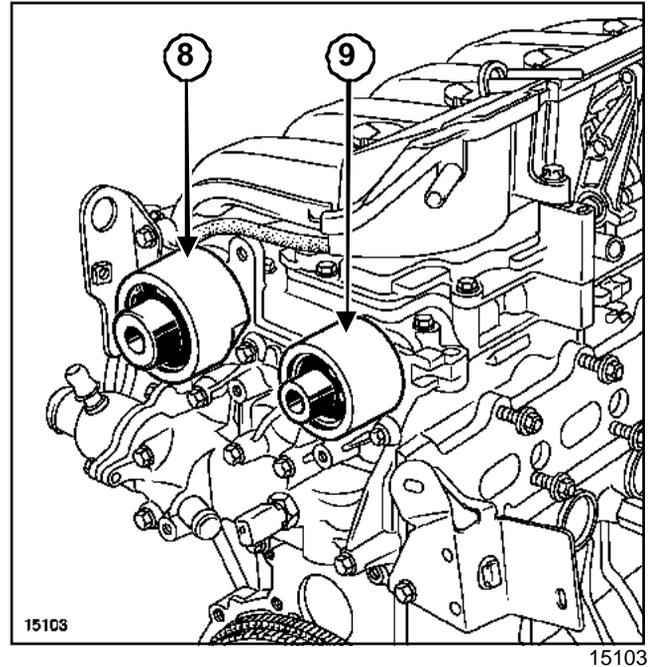
Timing belts: Refitting

F4P, and 720 or 722 or 760 – F4R, and 276 or 720 or 760 or 761 or 762 or 763 or 764 or 765 or 766 or 767 or 774 or 776 or 786 or 787 or 794 or 795 or 796 or 797

- ❑ Remove the flywheel locking tool (**Mot. 1677**)



- ❑ Tighten to torque the lower timing cover mounting bolts at (6):
 - **M6 lower timing cover bolts (8 Nm),**
 - **M8 lower timing cover bolts (20 Nm).**
- ❑ Tighten to torque the upper timing cover mounting bolts at (7):
 - **M8 upper timing cover bolts (18 Nm).**
 - **M10 upper timing cover bolts (38 Nm).**



- ❑ Fit new sealing plugs:
 - on the inlet camshaft using tool (**Mot. 1487**) at (8),
 - on the exhaust camshaft using tool (**Mot. 1488**) at (9).

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Special tooling required	
Mot. 799-01	Tool for locking sprockets on toothed timing belt
Mot. 1496	Tool for setting the camshaft
Mot. 1054	TDC setting pin
Mot. 1677	Flywheel locking tool (F engines)
Mot. 1509-01	Mot. tool adaptation kit1509
Mot. 1509	Camshaft sprocket locking tool
Mot. 1505	Belt tension setting tool (frequency meter)
Mot. 1715	Belt tension setting tool (frequency meter)
Mot. 1487	Tool for refitting camshaft covers (57 mm diameter)
Mot. 1488	Tool for refitting camshaft covers (43 mm diameter)

Equipment required

roller-type stud removal tool

Tightening torques 	
pulley bolts	50 Nm
crankshaft accessories pulley bolt	40 Nm + 110°
camshaft dowel	8 Nm
M10 alternator mounting bolt	44 Nm
M8 alternator mounting bolt	25 Nm
M6 lower timing cover bolts	8 Nm

Tightening torques

M8 lower timing cover bolts	20 Nm
M8 upper timing cover bolts	18 Nm
M10 upper timing cover bolts	38 Nm

This section refers to F4 engines fitted with **the inlet camshaft dephaser**.

REFITTING THE TIMING BELT

□

WARNING

The following parts must be replaced with new ones when they are removed:

- the belt (timing and accessories),
- the camshaft pulley mountings,
- the crankshaft accessories pulley bolt.

WARNING

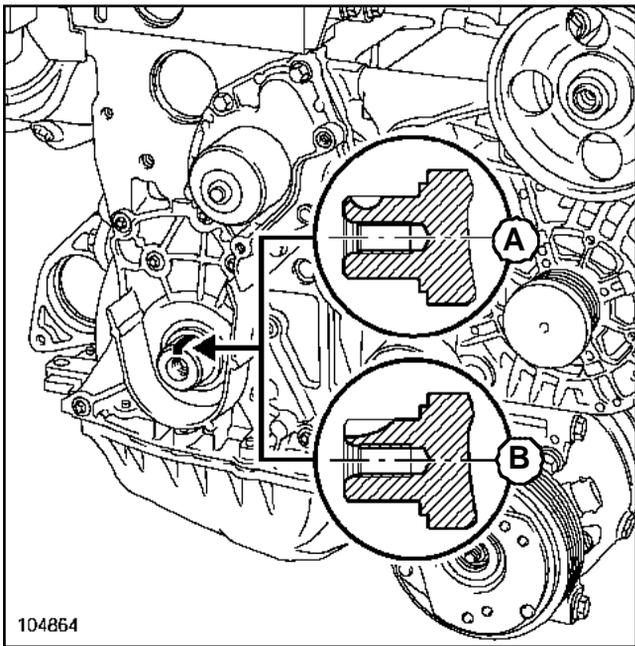
When the timing belt is replaced in accordance with the manufacturer's instructions, the belt, tension wheel and pulley(s) must be replaced with new ones.

WARNING

When the accessories belt is replaced in accordance with the manufacturer's instructions, the belt, tensioner, pulley and anti-vibration pulley (two-part) must be replaced with new ones.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

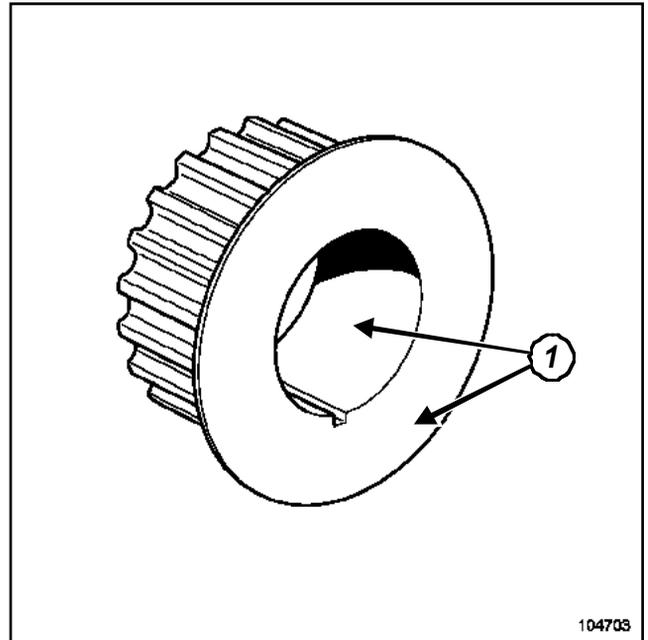


WARNING

The timing adjustment procedure depends on the **type of keying** on the end of the crankshaft.

- For keying type **(A)** fit a sprocket without a key on the crankshaft (see METHOD WITHOUT KEYING).
- For keying type **(B)**, replace the original sprocket with a sprocket with integral key (see METHOD WITH KEYING).

TIMING ADJUSTMENT WITH KEYLESS SPROCKET



WARNING

Be sure to degrease:

- the end of the crankshaft (timing end),
- the timing sprocket bore and contact surfaces at **(1)**,
- the contact surfaces of the crankshaft accessories pulley.

to prevent slippage between the timing gear and the crankshaft.

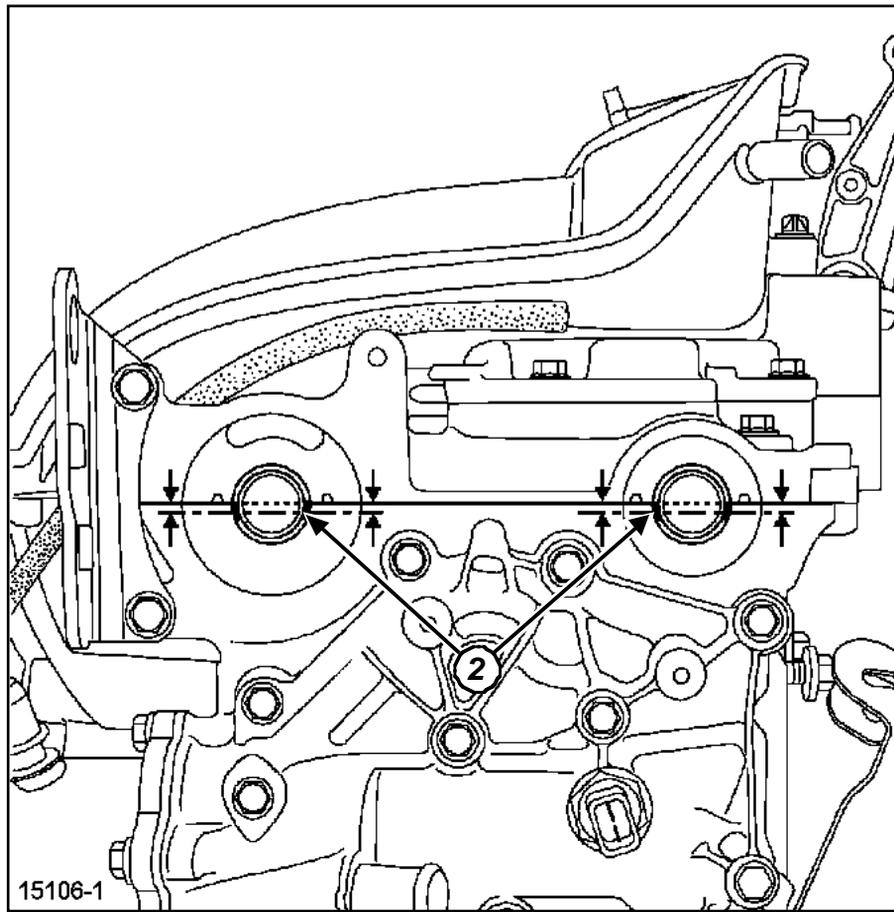
This slippage leads to engine damage.

WARNING

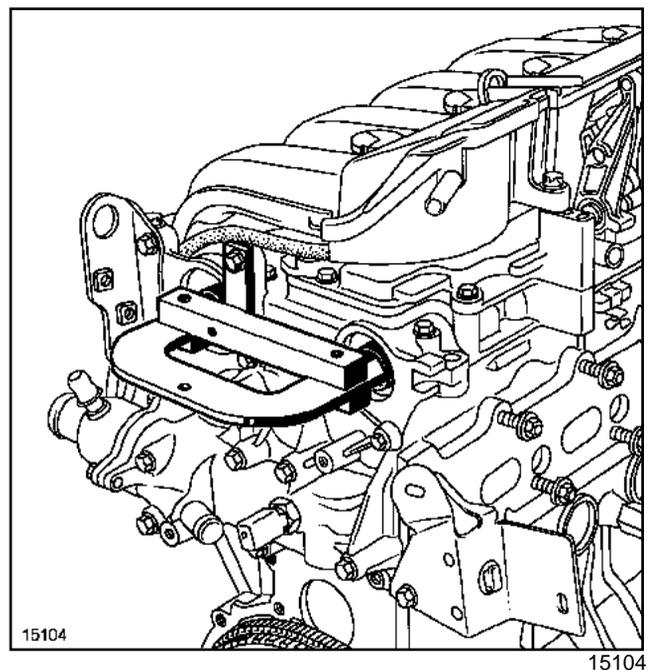
Never rotate the engine against its direction of operation.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



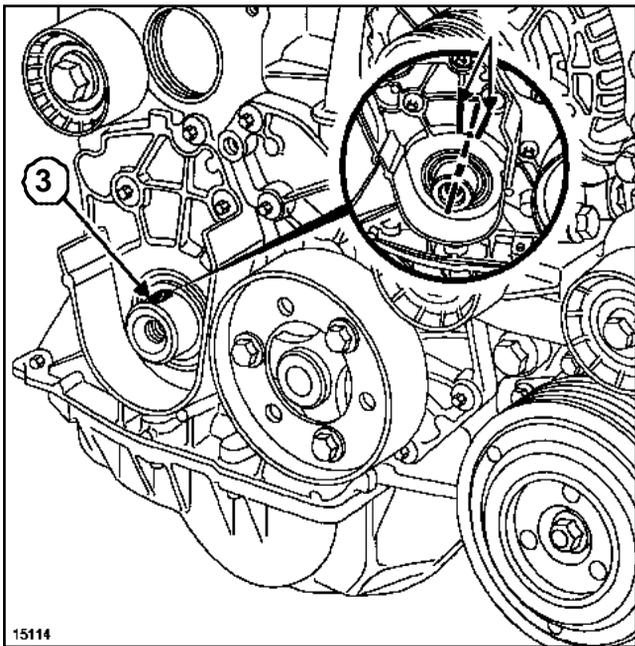
- Position the offset grooves (2) horizontally below the centre-line as shown above by turning the camshafts using tool (Mot. 799-01).



- Position tool (Mot. 1496), attaching it to the ends of the camshafts.

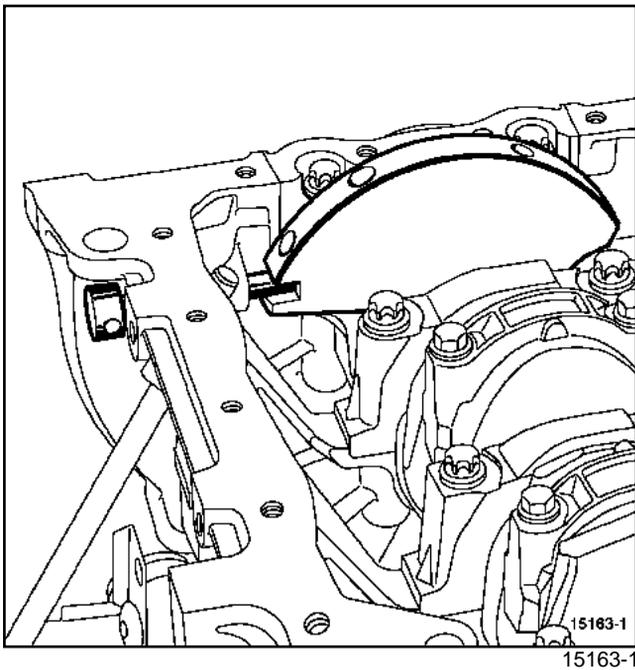
Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15114

Correct position



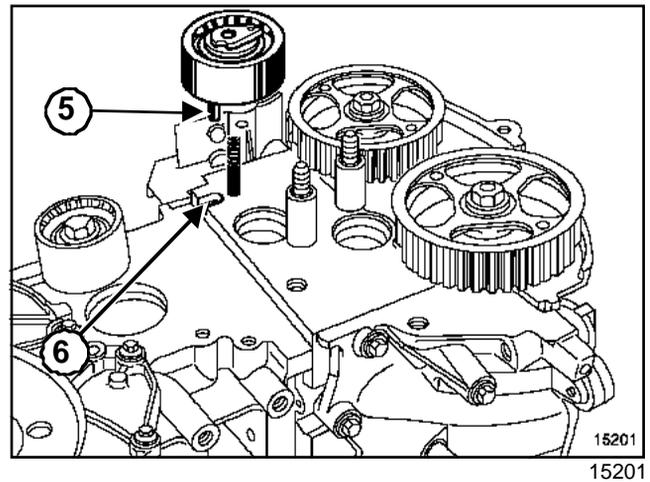
15163-1



WARNING

Check that the crankshaft is correctly blocked.

The crankshaft groove (3) must be between the two ribs (4).



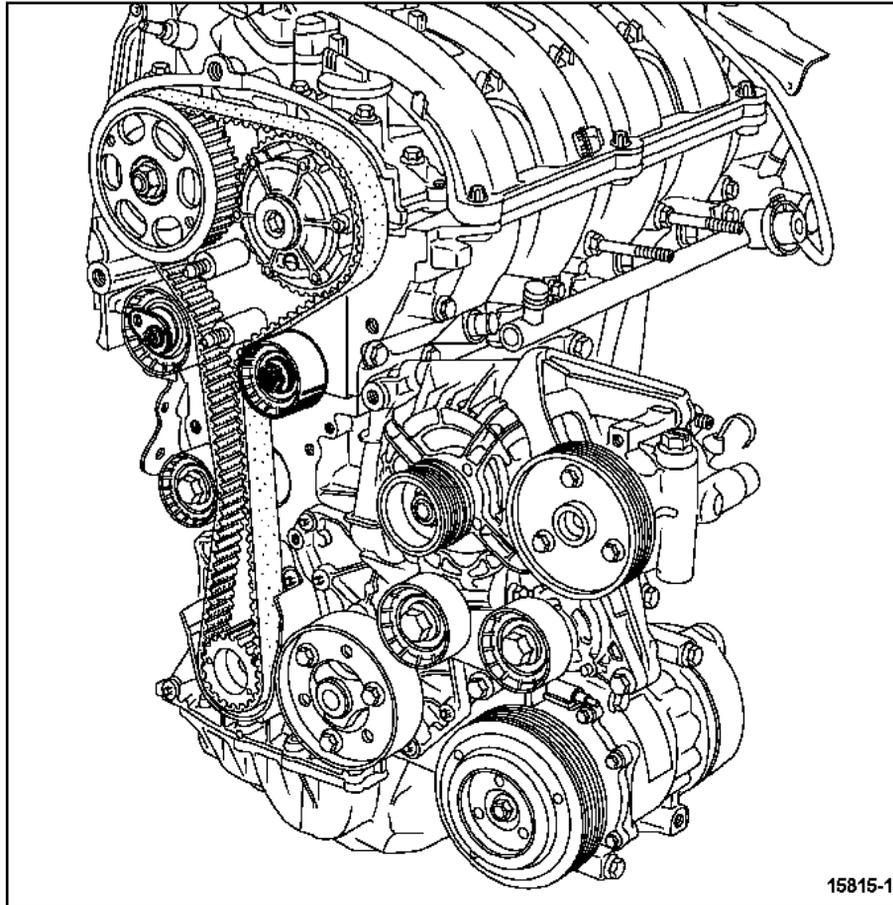
15201

□ Refit:

- a new tension wheel, positioning the tension wheel lug (5) correctly in the groove (6),
- the **keyless crankshaft sprocket**.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15815-1

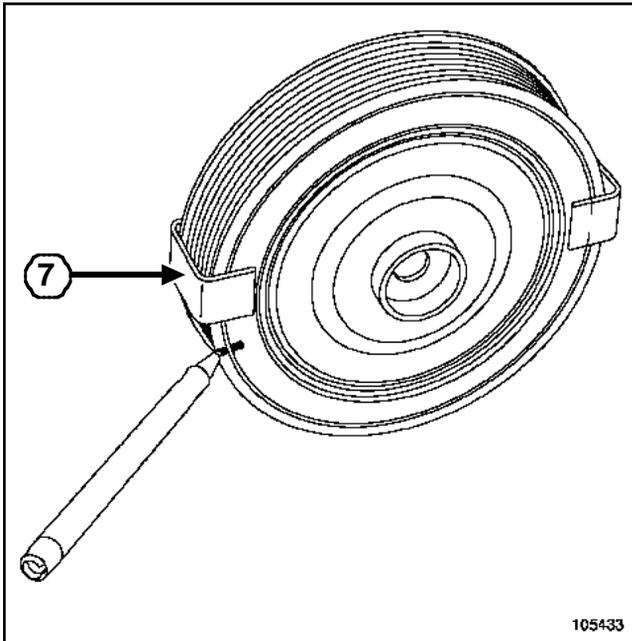
15815-1

- Fit:
 - a new belt,
 - new pulley(s).
- Tighten to torque the **pulley bolts (50 Nm)**.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4P, and 770 or 771 or 772 – F4R, and 712 or 713



105433
105433

WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

Mark it before refitting it to prevent an error.

It is forbidden to take the anti-vibration pulley apart.

Refit the new anti-vibration pulley with its clamp (7).

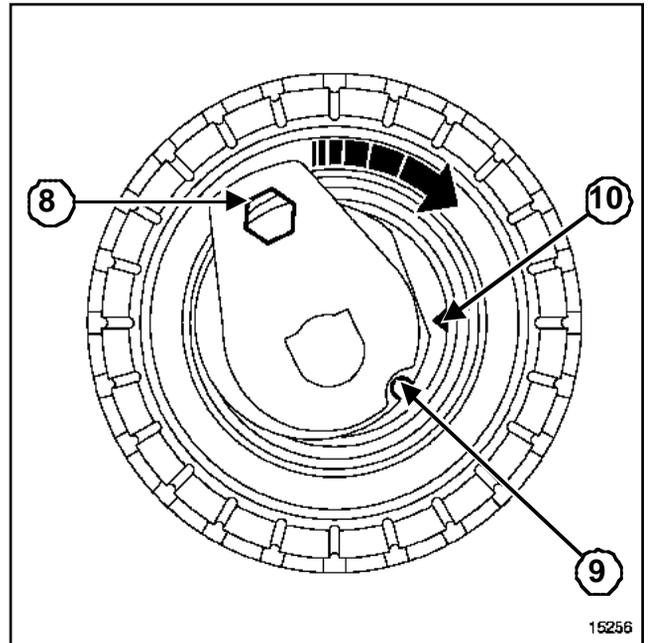
Pre-tighten the new bolt of the anti-vibration pulley (without locking the bolt, play of **2 to 3 mm** between bolt and pulley).

F4R, and 700 or 701 or 730 or 732 or 736 or 740 or 741 or 744 or 746 or 747 or 780

Fit a new crankshaft accessories pulley.

Pre-tighten the new crankshaft accessories pulley bolt (without locking the bolt, **2 to 3 mm** play between bolt and pulley).

Belt tension



15256
15256

Note:

Do not rotate the tension wheel anti-clockwise.

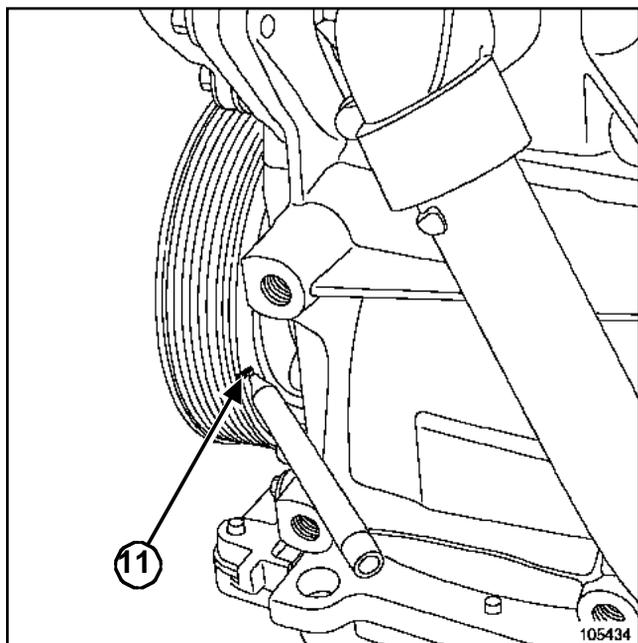
Align the tension wheel marks (9) and (10) using a **6 mm** Allen key in (8).

Tighten to torque the tension wheel nut (**70 Nm**).

Timing belts: Refitting

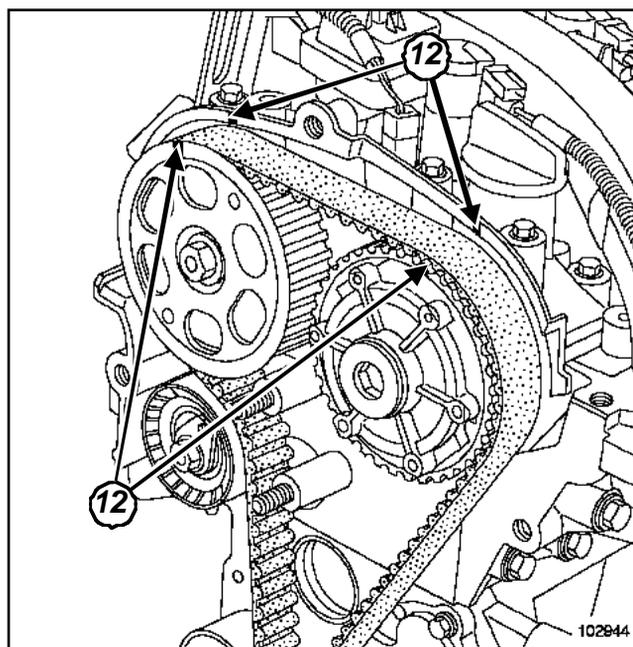
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

F4P, and 770 or 771 or 772 – F4R, and 712 or 713



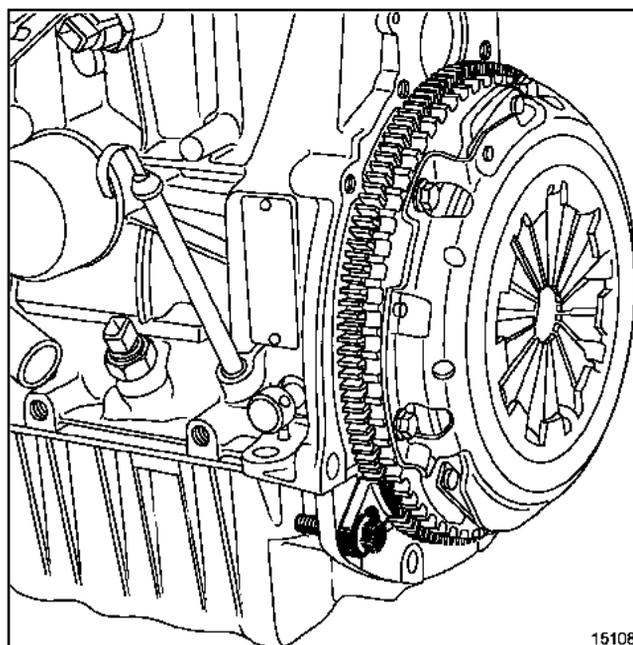
- ❑ Before tightening the anti-vibration pulley (if fitted), check the alignment (11) of the two sections.

- ❑ Tighten to torque the crankshaft accessories pulley bolt (**20 Nm**) (TDC setting pin still in position in the crankshaft).



15108

- ❑ Use a pencil to make marks (12) on the camshaft pulleys and the rocker cover.



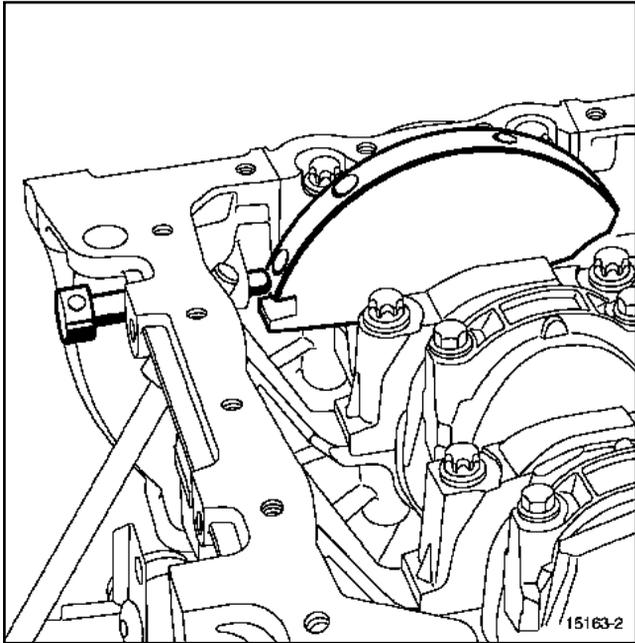
15108
15108

- ❑ Remove the TDC setting pin (**Mot. 1054**).
- ❑ Immobilise the flywheel using tool (**Mot. 1677**).
- ❑ Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.
- ❑ Remove the flywheel blocking tool (**Mot. 1677**).
- ❑ Rotate the crankshaft clockwise through two revolutions (timing end).

Timing belts: Refitting

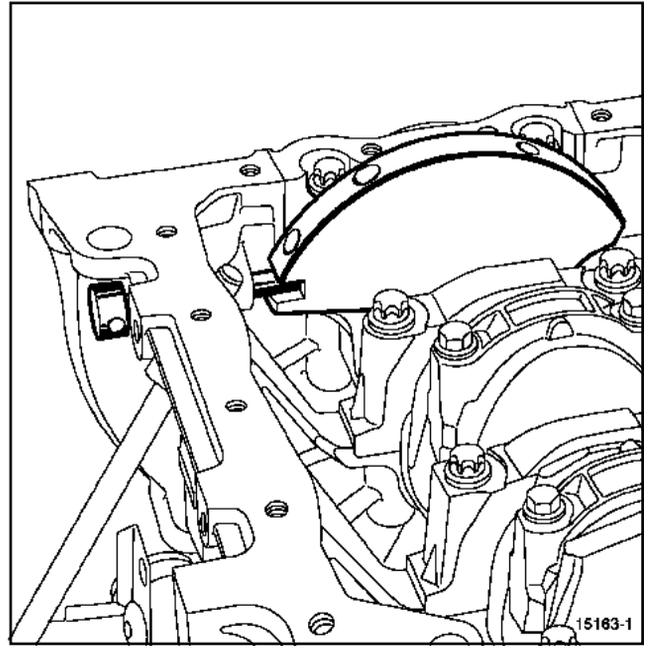
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Checking the tension



15163-2

- ❑ Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the TDC setting pin (**Mot. 1054**) (it will then be between the balancing hole and the timing adjustment hole).



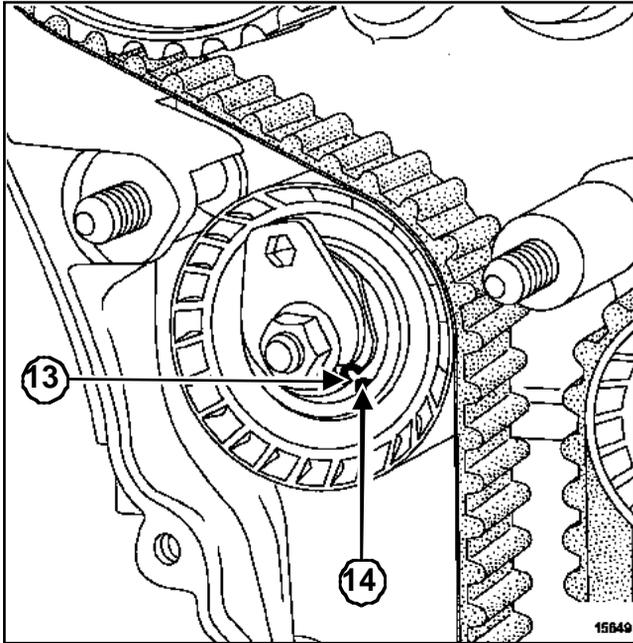
15163-1

- ❑ Lock the timing at its adjustment point.
- ❑ Remove the TDC setting pin (**Mot. 1054**).
- ❑ Check that the tension wheel marks are correctly aligned; if not, readjust the tension.
- ❑ Loosen the tension wheel nut by up to one turn, holding it with a **6 mm** Allen key.
- ❑ Align the tension wheel marks.
- ❑ Tighten the nut finally to a torque of **28 Nm**.
- ❑ Rotate the crankshaft clockwise through two revolutions (timing end).

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Checking the timing

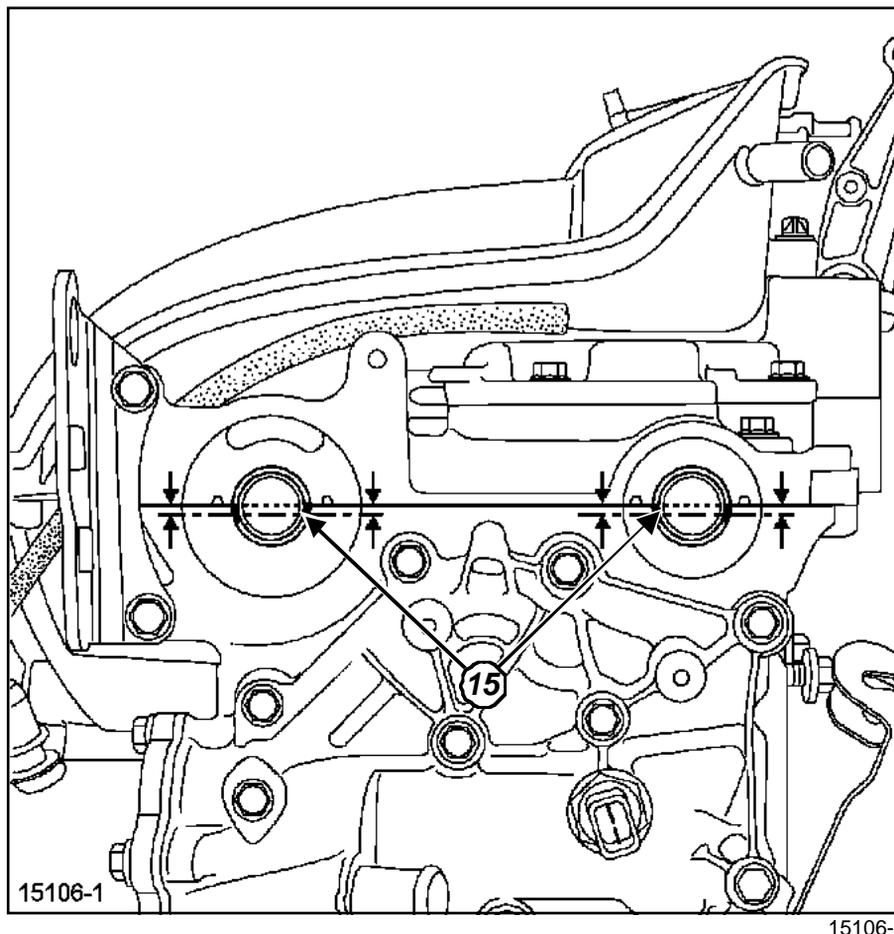


15649

- ❑ Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the TDC setting pin (**Mot. 1054**) (it will then be between the balancing hole and the timing adjustment hole).
- ❑ Check that the tension wheel marks (13) and (14) are in the correct position before checking the timing adjustment.

Timing belts: Refitting

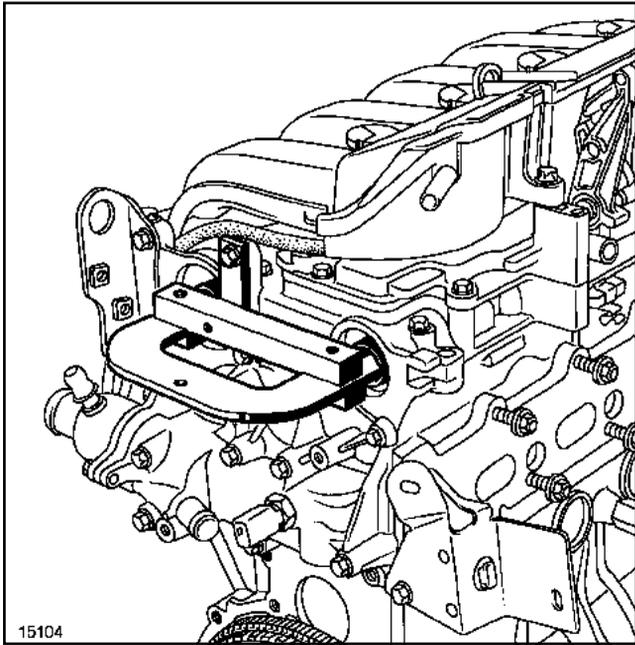
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- The off centre grooves (15) should be facing horizontally downwards.

Timing belts: Refitting

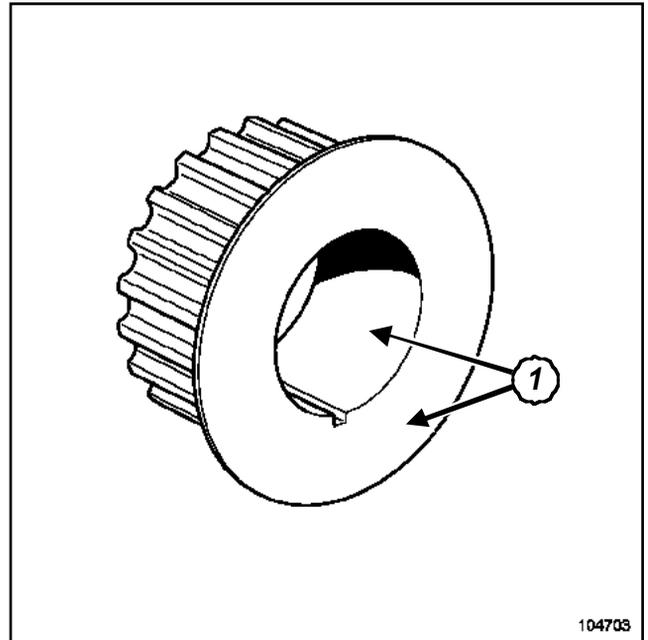
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

TIMING ADJUSTMENT WITH SPROCKET WITH INTEGRAL KEY



-

WARNING

Be sure to degrease:

- the end of the crankshaft (timing end),
- the timing sprocket bore and contact surfaces at (1),
- the contact surfaces of the crankshaft accessories pulley.

to prevent slippage between the timing gear and the crankshaft.

This slippage leads to engine damage.

WARNING

Never rotate the engine against its direction of operation.

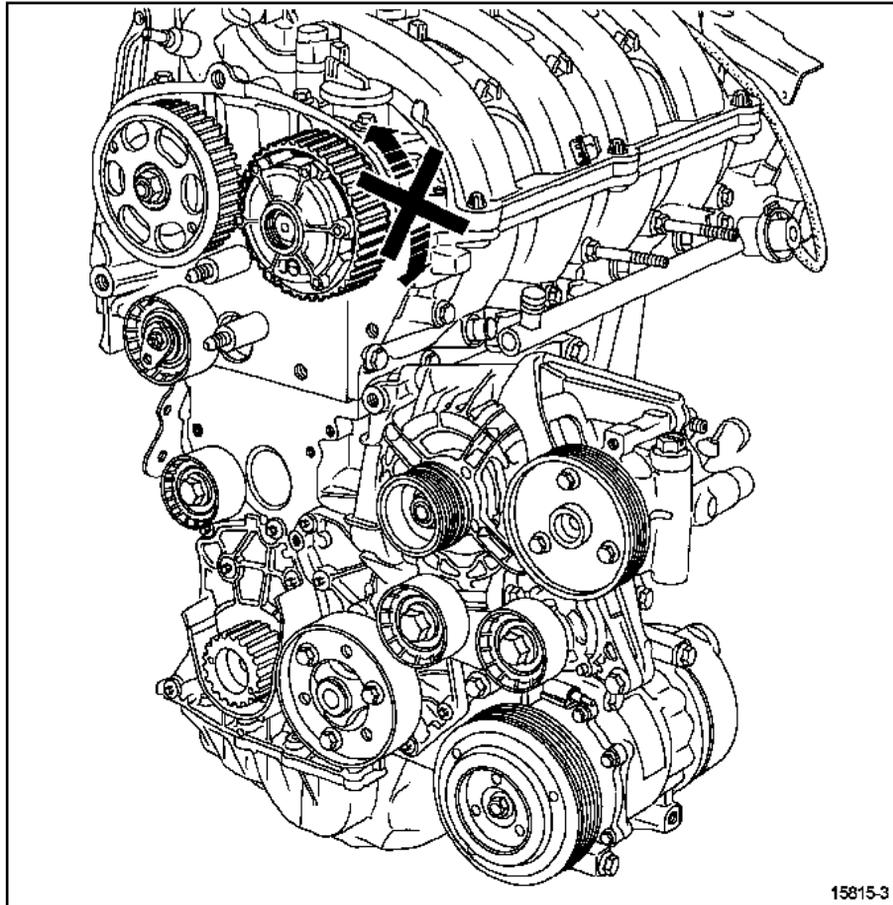
-

WARNING

In this case, the old camshaft pulley nuts must be removed in order to correctly set the belt tension.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



15815-3

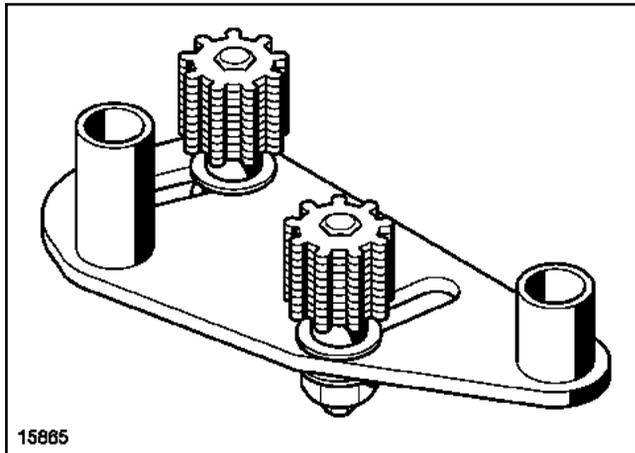
15815-3

- ❑ Check that the inlet camshaft phase angle controller ring is correctly locked (the ring does not rotate to the left or to the right).
- ❑ Loosen the exhaust camshaft pulley and the inlet camshaft phase angle controller, using the following procedure.
- ❑ This operation requires the use of tool (**Mot. 1509-01**) in addition to (**Mot. 1509**).

Timing belts: Refitting

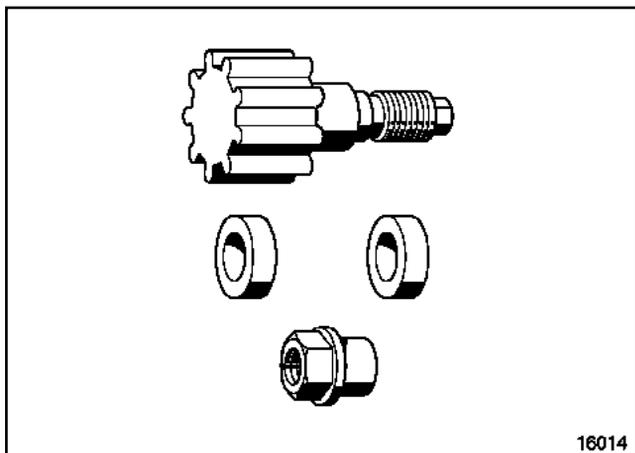
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Tool Mot. 1509



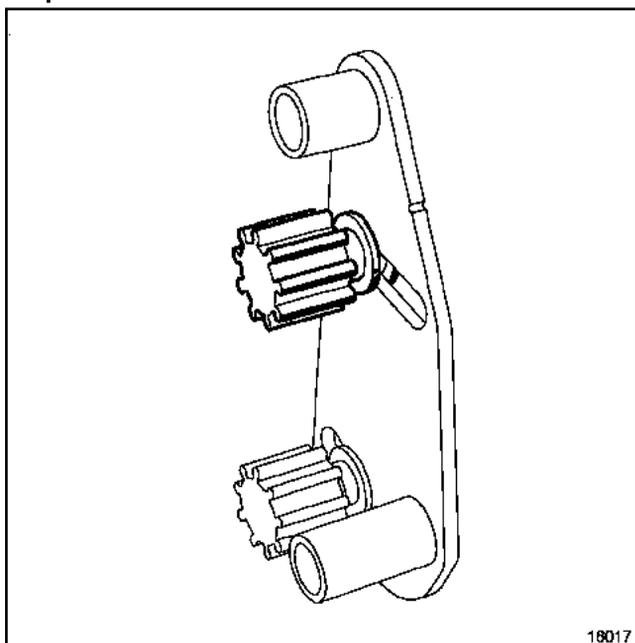
15865

Tool Mot. 1509-01

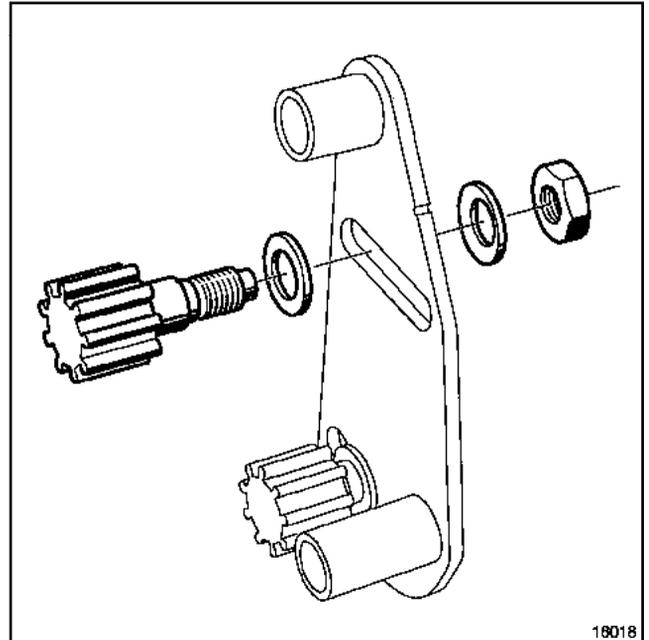


16014

Preparation of Mot. 1509

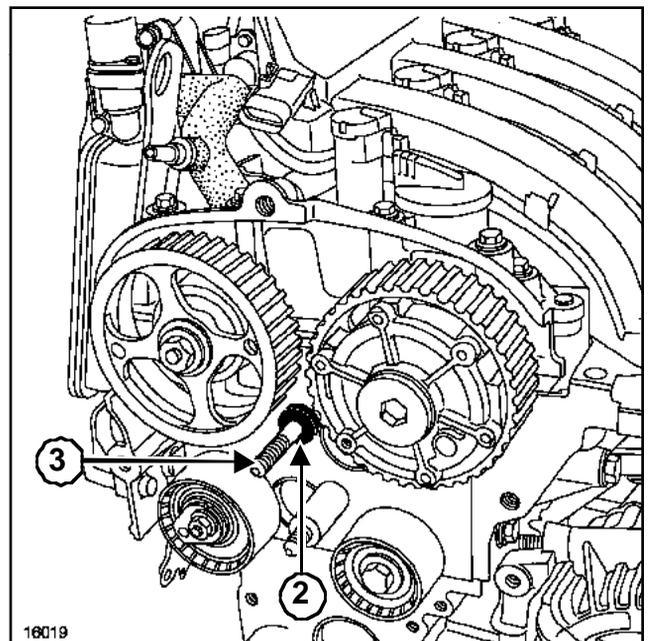


16017



16018

- Remove the upper sprocket from the bracket (**Mot. 1509**).
- Fit the tool sprocket (**Mot. 1509-01**) in its place, reusing the two washers and the nut from (**Mot. 1509**).

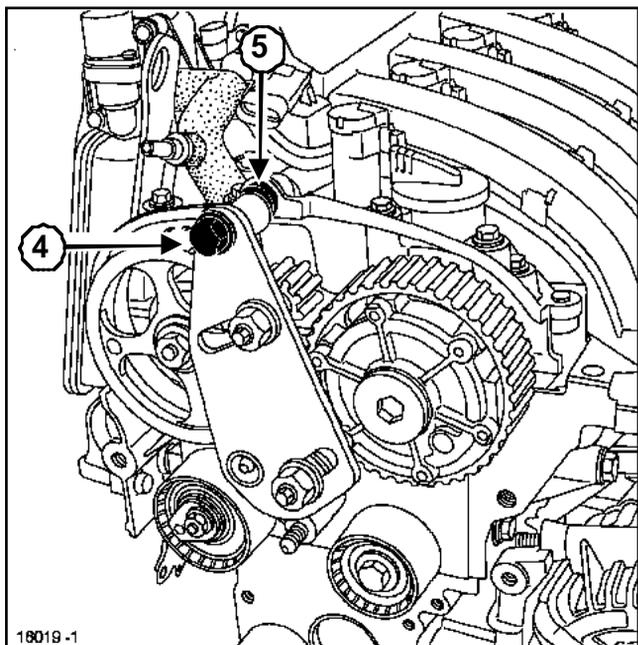


16019

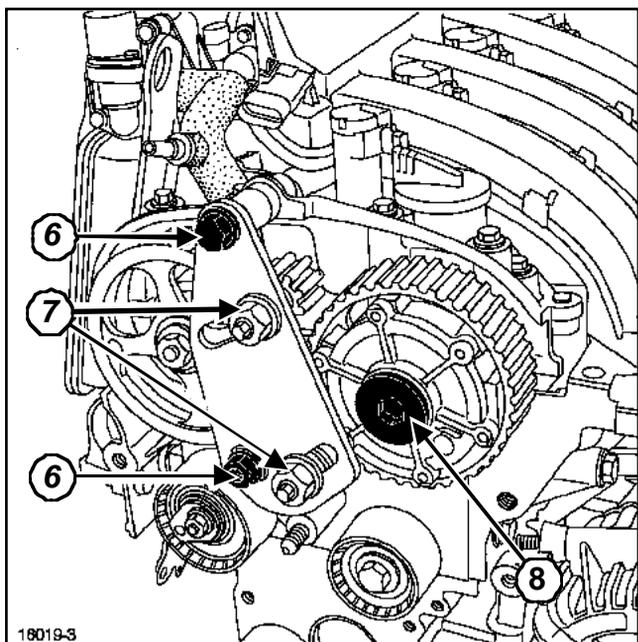
- Fit the spacer (2) from tool (**Mot. 1509-01**) on the dowel (3).

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- Fit the top bolt (4) while positioning the spacer (5) of tool (Mot. 1509-01) between the tool and the rocker cover (do not tighten the bolt).



- Tighten the bolt and the collar nut (6).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the **toothed pinion nuts (80 Nm)(7)**.
- Remove:
 - the inlet camshaft dephaser blanking cover (8),

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

REPLACEMENT OF A CAMSHAFT DOWEL

WARNING

It is essential to replace the camshaft dowel if it comes loose at the same time as the nut.

1 - Removing the dowel

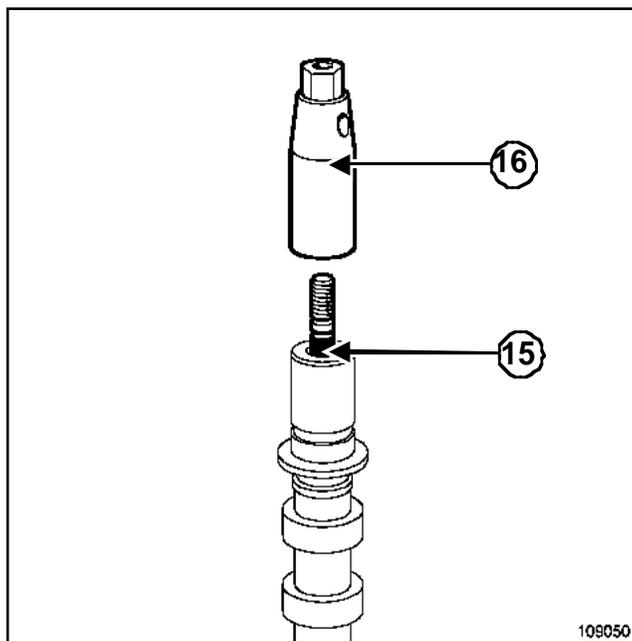
Remove the dowel using tool **roller-type stud removal tool**.

2 - Cleaning the camshaft thread

WARNING

Clean the threaded hole of the camshaft carefully to prevent foreign bodies from entering the latter.

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



3 - Refitting the dowel

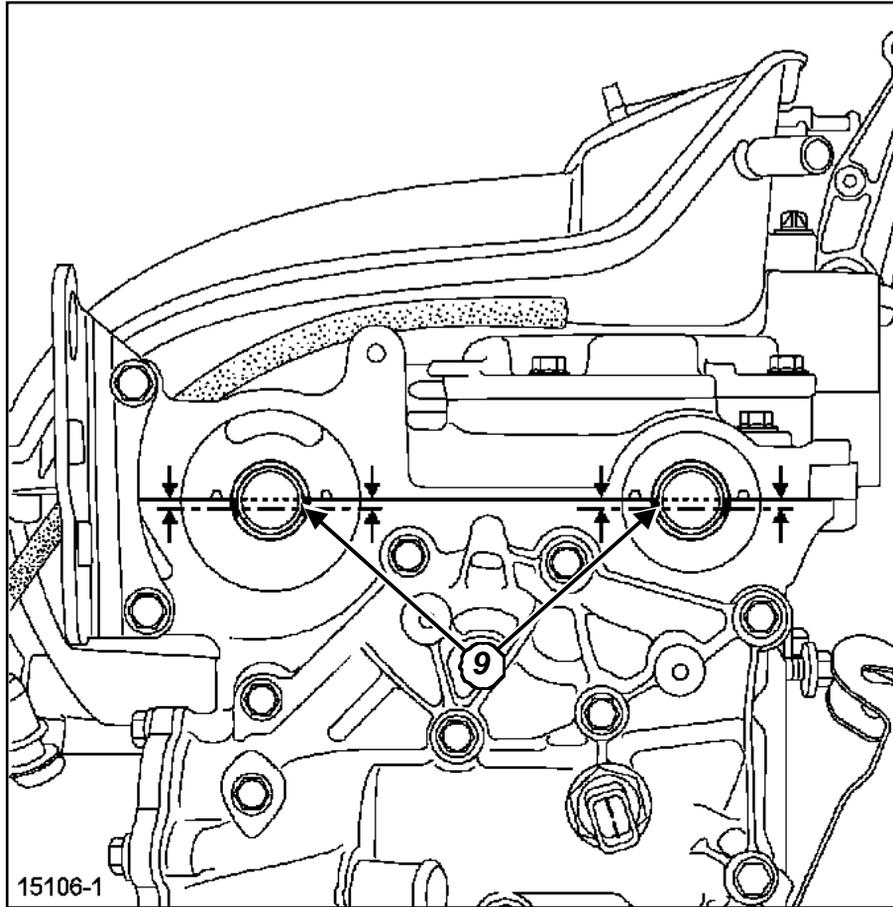
Fit the new camshaft dowel (pre-coated section (15) on the camshaft side).

Tighten to torque the **camshaft dowel (8 Nm)** using tool **roller-type stud removal tool(16)**.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

- Refit the degreased camshaft pulleys with the old nuts.
- Tighten to torque the old nuts (**15 Nm max.**) using tool (**Mot. 799-01**).

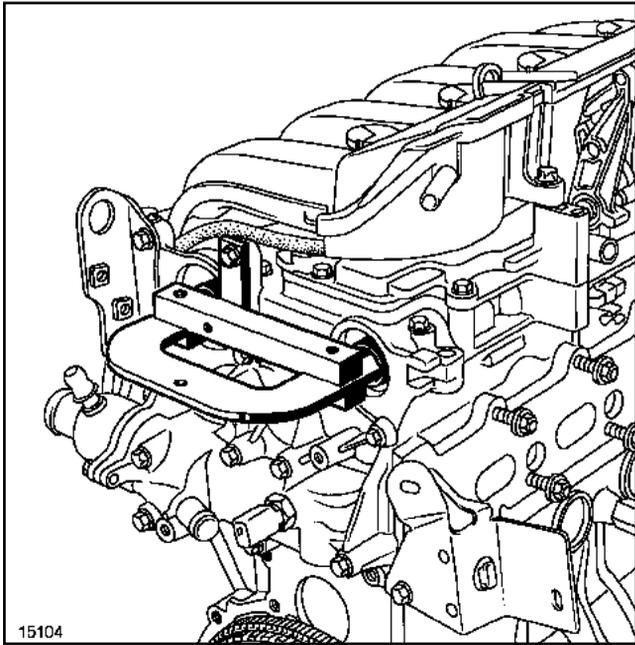


15106-1

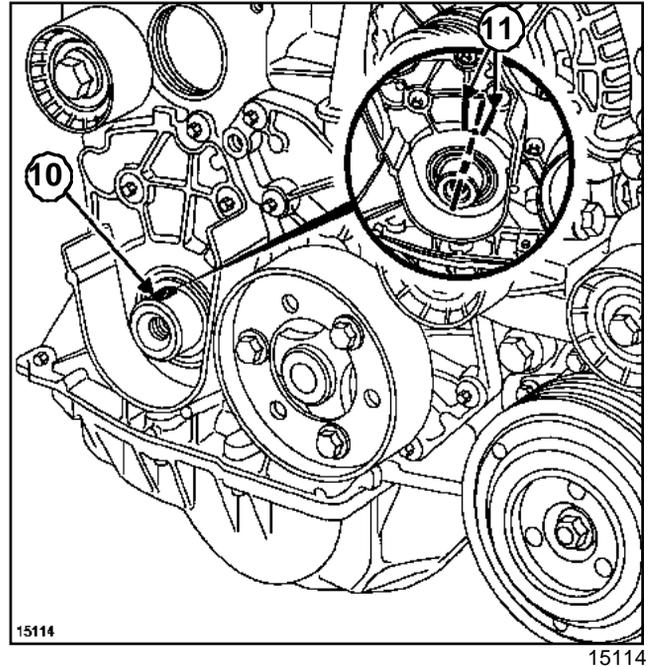
- Position the offset grooves (9) horizontally below the centre-line by turning the camshafts using tool (**Mot. 799-01**).

Timing belts: Refitting

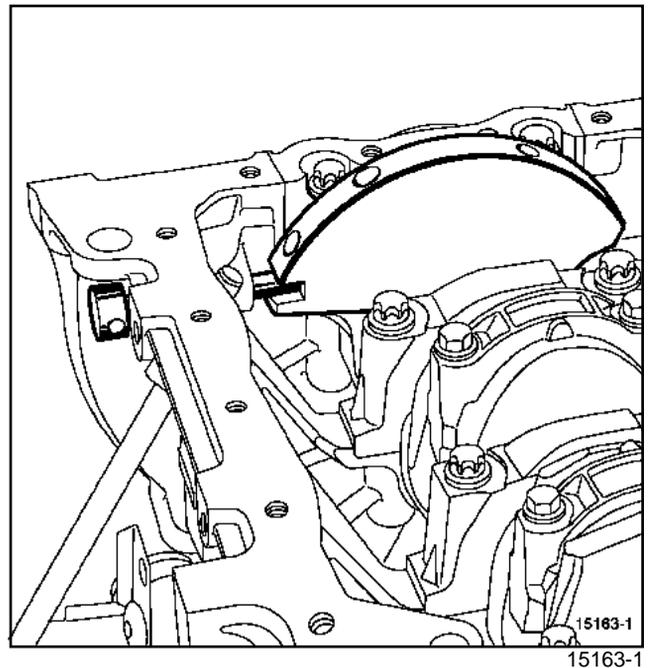
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- Position tool (**Mot. 1496**), attaching it to the ends of the camshafts.
- Loosen:
 - the exhaust camshaft pulley nut,
 - the bolt of the inlet camshaft phase angle controller.



Correct position



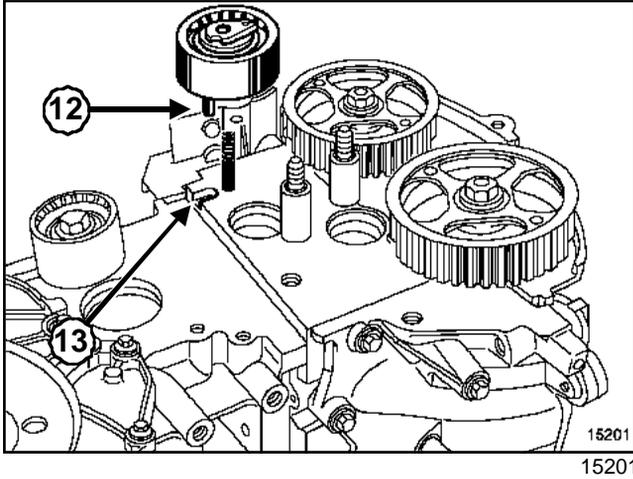
WARNING

Check that the crankshaft is correctly blocked.

The crankshaft groove (10) must be between the two ribs (11).

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

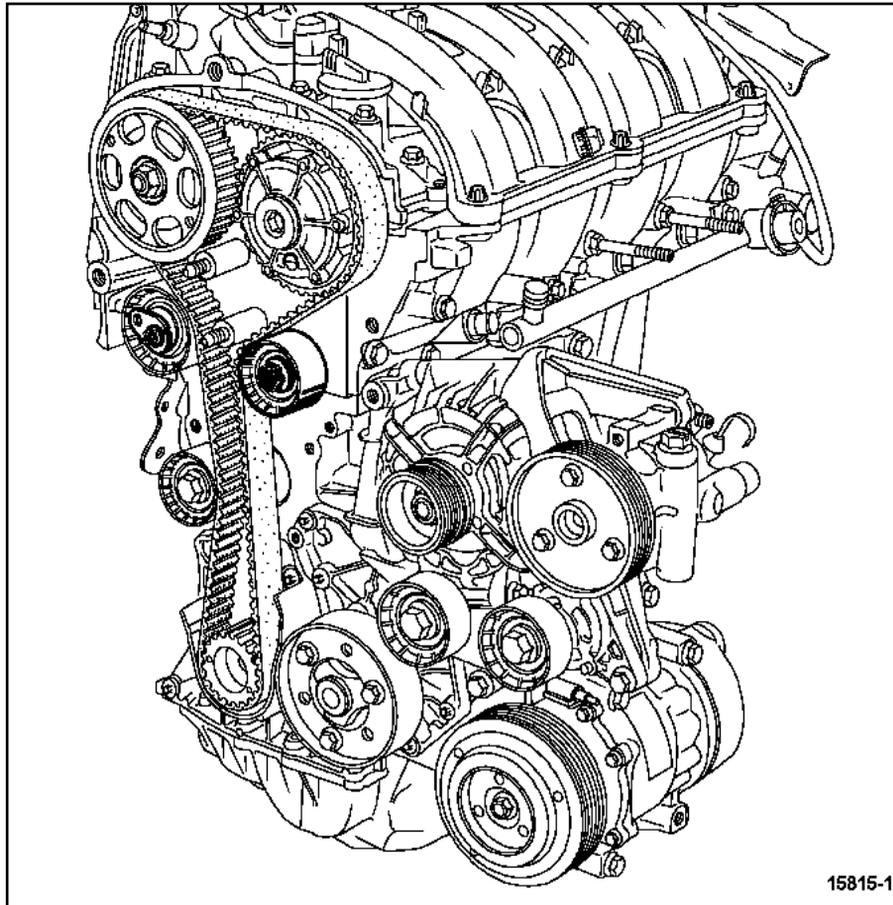


15201
15201

Refit:

- a new tension wheel, positioning the tension wheel lug (12) correctly in the groove (13).

- the crankshaft sprocket with integrated key.



15815-1

15815-1

Refit:

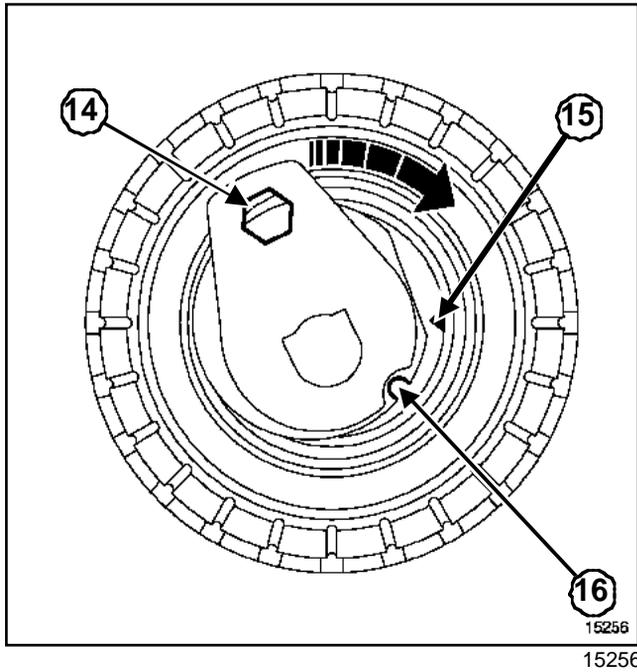
- a new belt,
- new pulley(s).

Tighten to torque the pulley bolts (50 Nm).

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

Belt tension

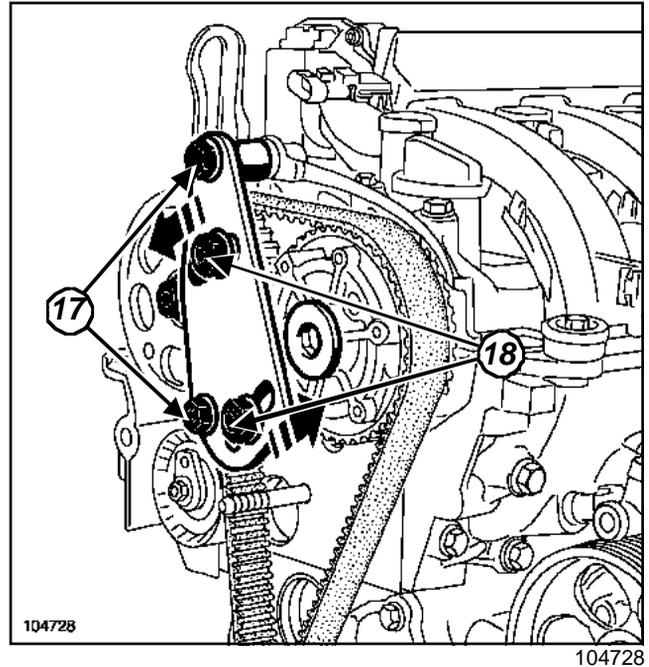


□

Note:

Do not rotate the tension wheel anti-clockwise.

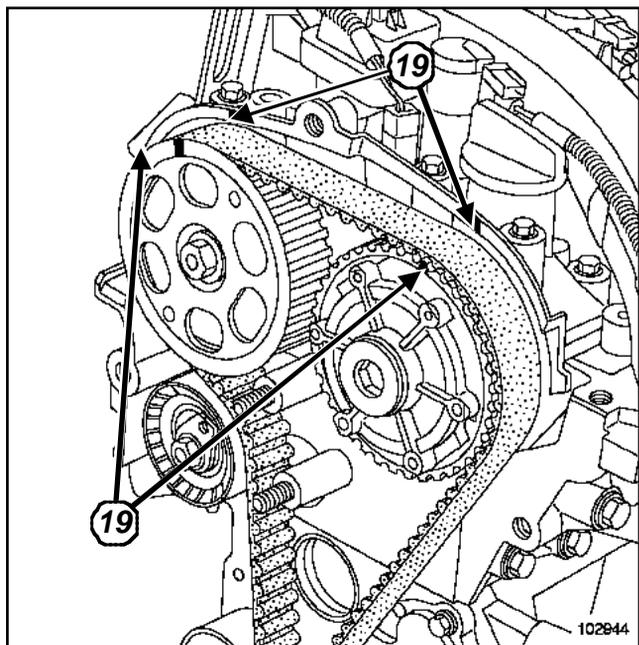
- Align the tension wheel marks (16) and (15) using a 6 mm Allen key in (14).
- Tighten to torque the tension wheel nut (7 Nm).



- Fit the tool (Mot. 1509) with tool kit (Mot. 1509-01) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (17).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque
 - the toothed pinion nuts (80 Nm)(18),
 - the old inlet camshaft dephaser mounting bolt (30 Nm) ,
 - the old exhaust camshaft pulley nut (30 Nm).

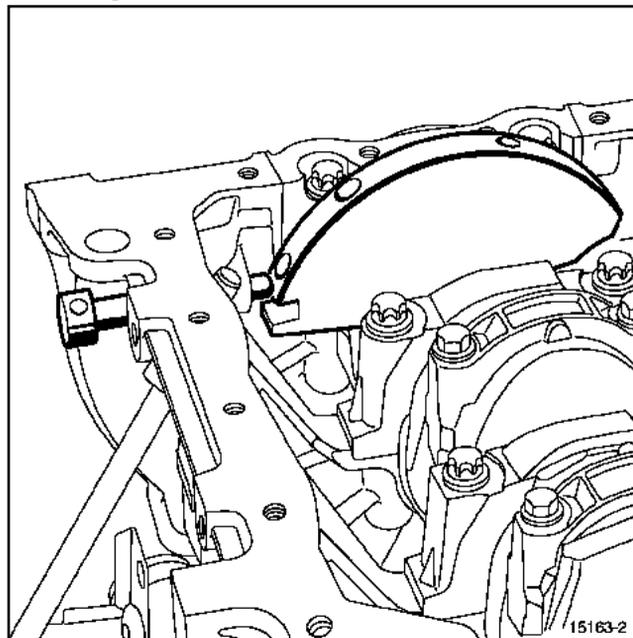
Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

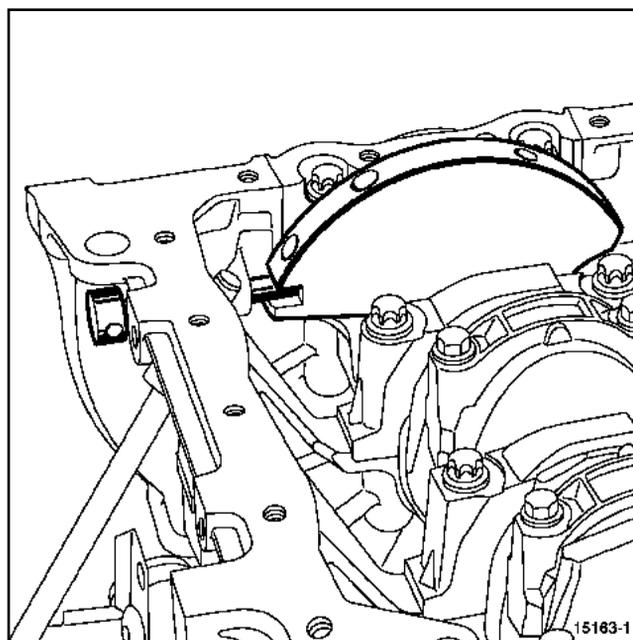


- Use a pencil to make marks (19) on the camshaft pulleys and the rocker cover.
- Remove the tools:
 - TDC setting pin (Mot. 1054),
 - Camshaft setting tool (Mot. 1496),
 - Camshaft pulley immobilising tools (Mot. 1509) and (Mot. 1509-01).
- Rotate the crankshaft clockwise through two revolutions (timing end).

Checking the tension



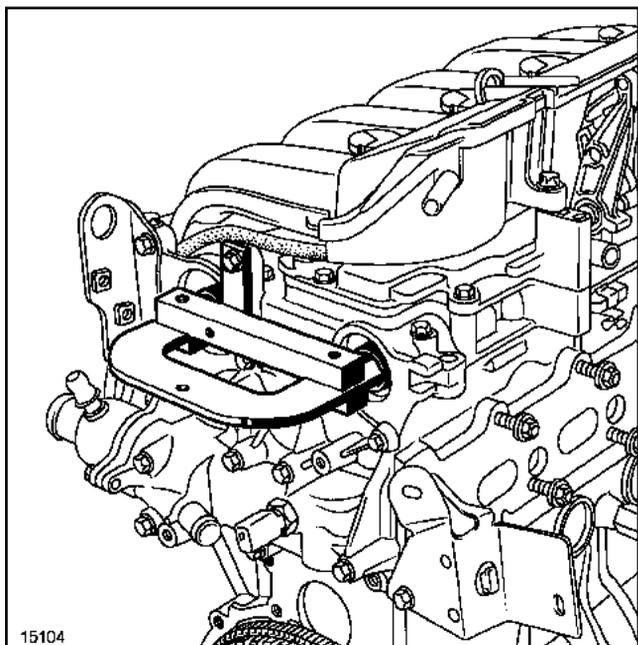
- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the TDC setting pin (it will then be between the balancing hole and the timing adjustment hole).



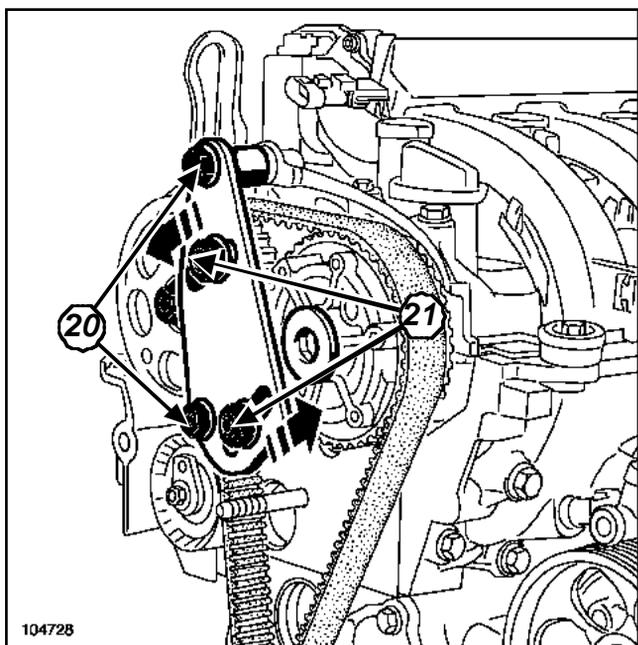
- Bring the timing to its adjustment point.
- Check that the tension wheel marks are correctly aligned, otherwise repeat the tensioning procedure as follows:

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



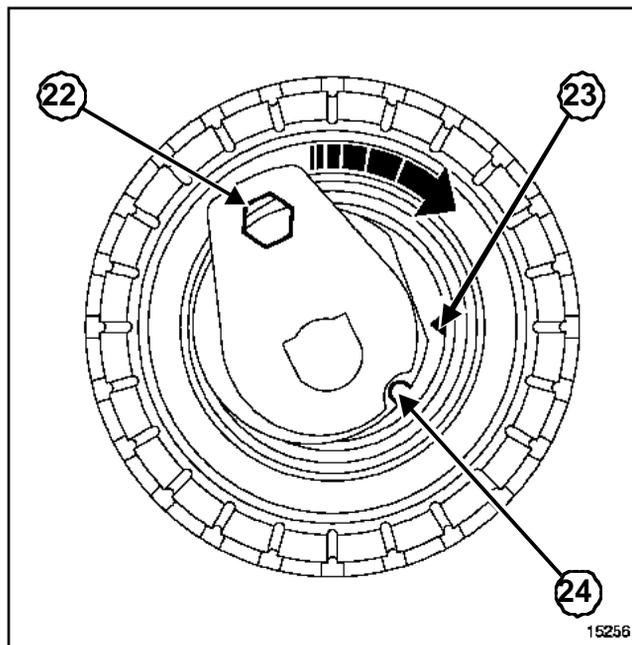
- Fit camshaft adjustment tool (**Mot. 1496**).



- Fit tool (**Mot. 1509**) with tool kit (**Mot. 1509-01**) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (**20**).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the **toothed pinion nuts (80 Nm)(21)**.
- Loosen:
 - the old inlet camshaft dephaser mounting bolt,

- the old exhaust camshaft pulley nut.

- Remove the camshaft pulley locking tool (**Mot. 1509**) and (**Mot. 1509-01**).

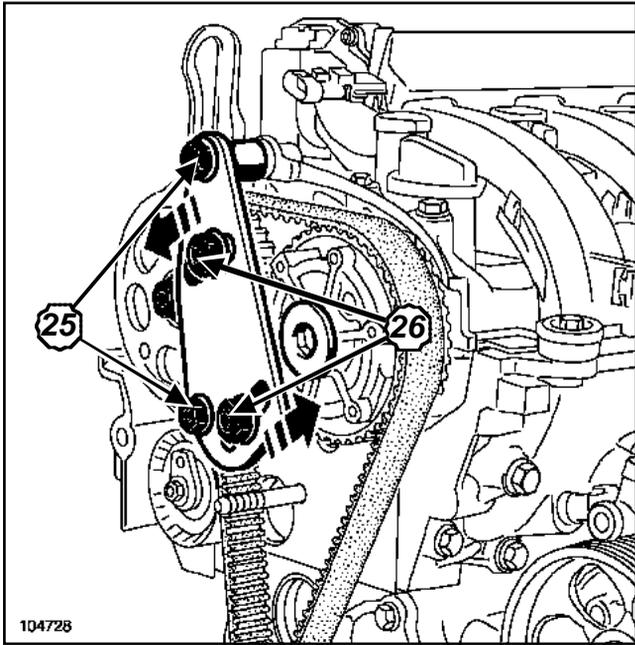


- Align marks (**24**) and (**23**) by unscrewing the tension wheel nut by up to one turn while maintaining its position with a **6 mm** Allen key at (**22**).

Tighten the nut on the **tension wheel finally to 28 Nm**.

Timing belts: Refitting

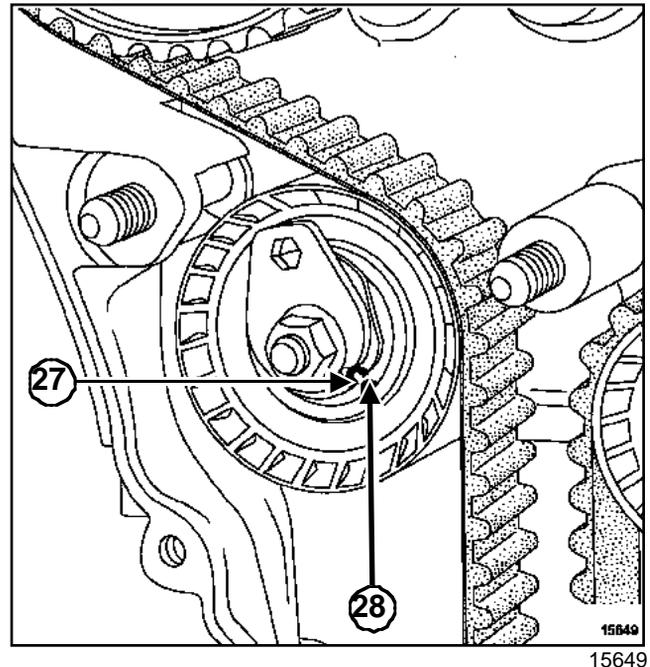
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- Fit tool (Mot. 1509) with tool kit (Mot. 1509-01) to immobilise the camshaft pulleys.
- Tighten the bolt and the collar nut (25).
- Bring the toothed pinion nuts into contact with the camshaft pulleys.
- Tighten to torque the **toothed pinion nuts (8 Nm)(26)**.
- Remove:
 - the old inlet camshaft dephaser bolt,
 - the old exhaust camshaft pulley nut.
- Fit new fastenings for the camshaft pulleys.
- Tighten to torque:
 - the **inlet camshaft dephaser mounting bolt (30 Nm)**,
 - the **exhaust camshaft pulley nut (30 Nm)**.
- Remove the camshaft adjustment tool (Mot. 1496).
- Tighten to torque the **inlet camshaft dephaser mounting bolt (100 Nm)**.
- Tighten to angle the **exhaust camshaft pulley nut ($86^\circ \pm 6^\circ$)**.
- Tighten to torque the **inlet camshaft dephaser blanking cover (25 Nm)**.

- Remove both the following tools:
 - TDC setting pin (Mot. 1054),
 - Camshaft pulley immobilising tool (Mot. 1509).
- Rotate the crankshaft clockwise through two revolutions (timing end).

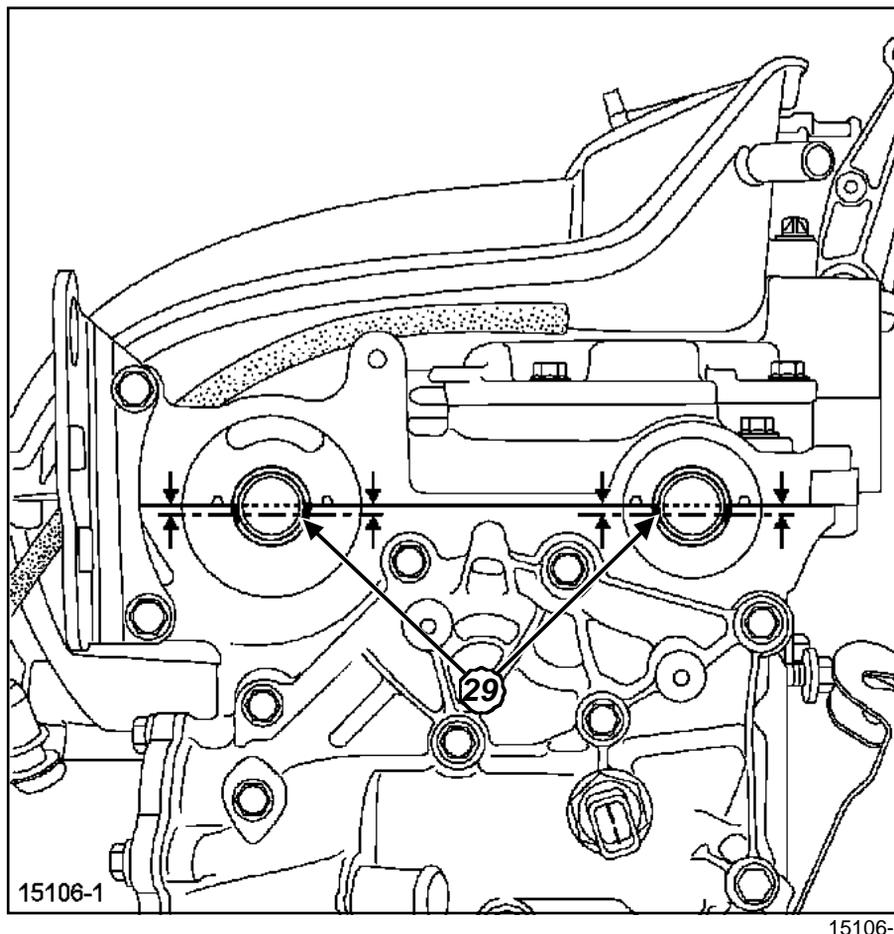
Checking the timing



- Before completing two turns (i.e. half a tooth before alignment of the marks made previously by the operator), insert the TDC setting pin (it will then be between the balancing hole and the timing adjustment hole).
- Ensure that the tensioner wheel marks (27) and (28) are in the correct position before checking the timing.

Timing belts: Refitting

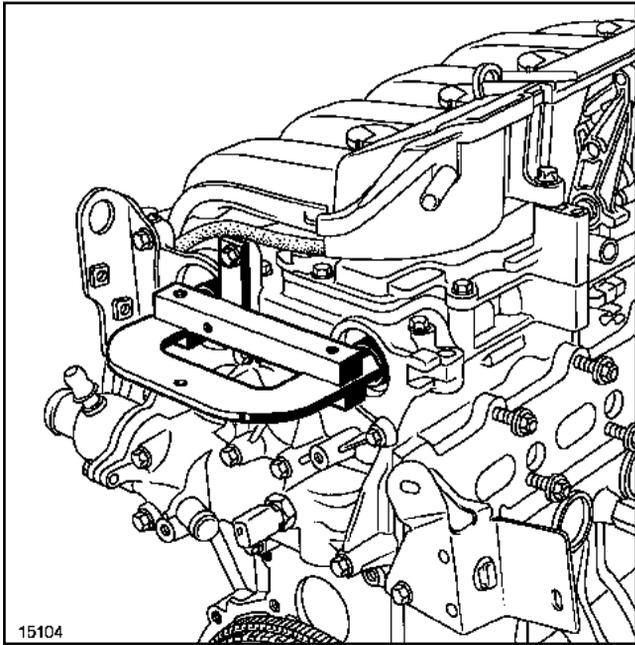
F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



- The off centre grooves (29) should be facing horizontally downwards.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



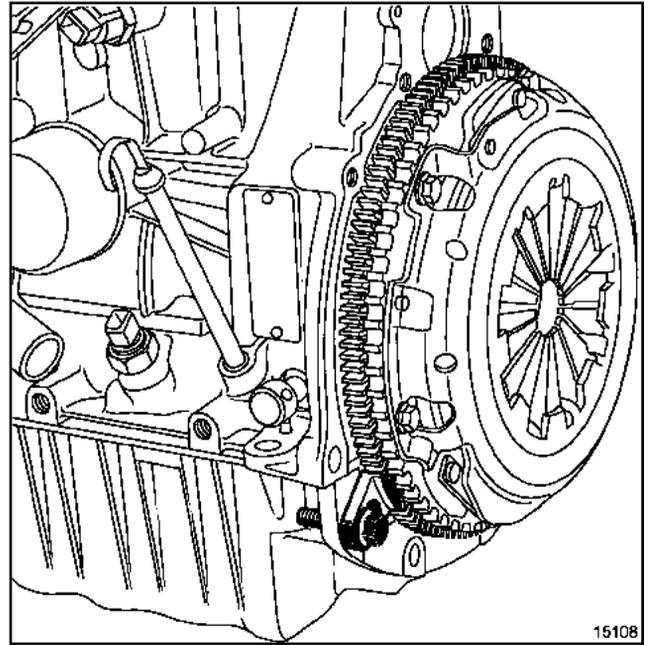
- Fit camshaft adjustment tool (**Mot. 1496**) without forcing it.

If the tool cannot be fitted, readjust the timing and the tension.

REFITTING THE CRANKSHAFT ACCESSORIES PULLEY AND ACCESSORIES BELT

WARNING

When the accessories belt is replaced in accordance with the manufacturer's instructions, the belt, tensioner, pulley and anti-vibration pulley (two-part) must be replaced with new ones.



- Remove the TDC setting pin (**Mot. 1054**).
- Apply a drop of RHODORSEAL 5661 to the TDC setting pin cap.
- Refit the TDC setting pin plug.
- Immobilise the flywheel using tool (**Mot. 1677**).

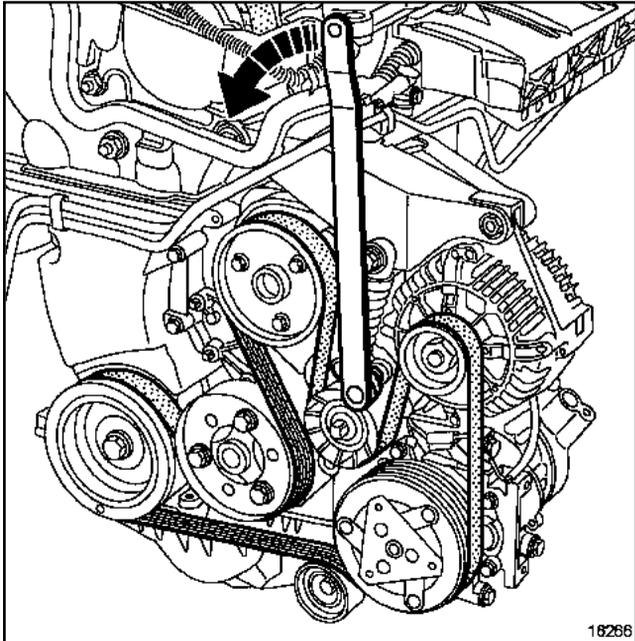
F4R, and 730 or 732 or 736

- Refit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

With air conditioning



- Turn the tensioner with a **12.7 mm** ratchet square drive in the direction of the arrow.
- Fit a new accessories belt.

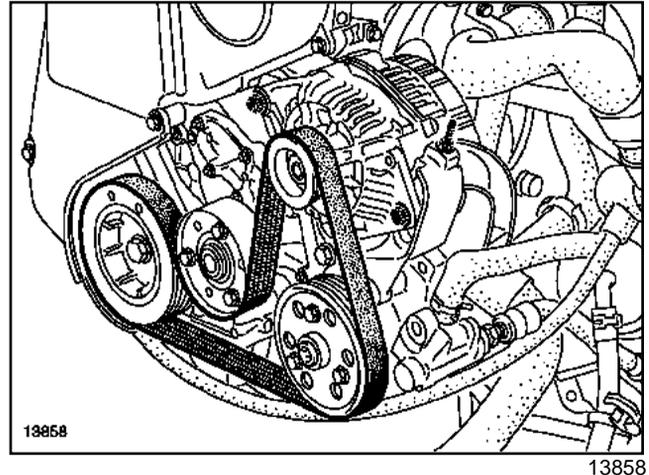
IMPORTANT

- Wear gloves during the operation.

IMPORTANT

- Be aware of the travel of the tool caused by the rotation of the tensioner wheel.

Without air conditioning



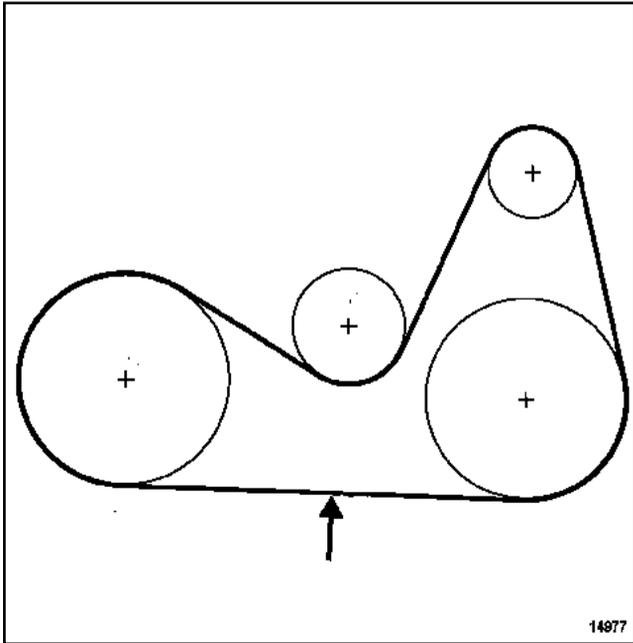
- Loosen the alternator mounting bolts.
- Fit a new accessories belt.
- Tension the accessories belt by tightening nut **(1)** on the alternator mounting.

F4R, and 700 or 701 or 736

- Refit:
 - a new crankshaft accessories pulley,
 - a new crankshaft accessories pulley bolt.
- Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



□

Note:

- A: Crankshaft
- T: Water pump
- C: Alternator
- B: Power assisted steering pump
- (2): tension measurement point

- Check the accessories belt tension using belt tension tester (**Mot. 1505**) or (**Mot. 1715**).
- Belt tension (in Hz): **183 Hz ± 9**
- Tighten to torque the alternator mounting bolts:
 - **M10 alternator mounting bolt (44 Nm)**
 - **M8 alternator mounting bolt (25 Nm)**
- Turn the crankshaft through two revolutions and check that the measurement is within the fitting tension tolerance, if not readjust it.

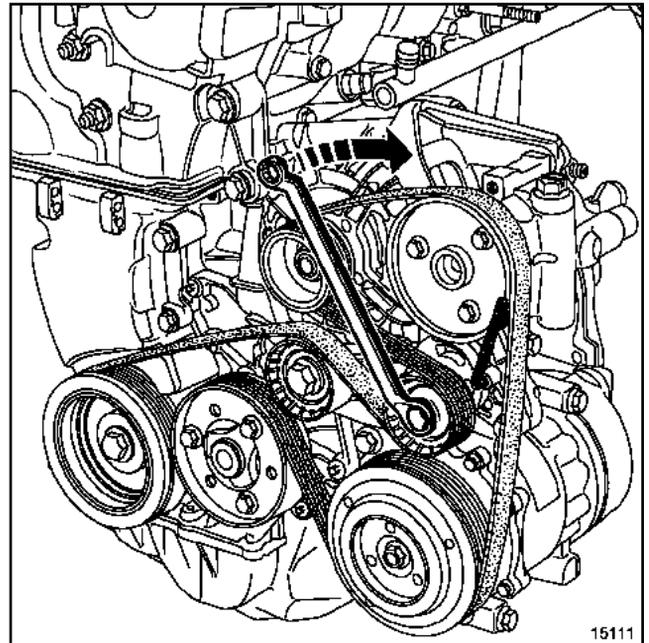
F4R, and 700 or 701 or 740 or 741 or 744 or 746 or 747 or 780

□ Fit:

- a new crankshaft accessories pulley,
- a new crankshaft accessories pulley bolt.

□ Tighten to torque and angle the **crankshaft accessories pulley bolt (40 Nm + 110°)**.

With air conditioning

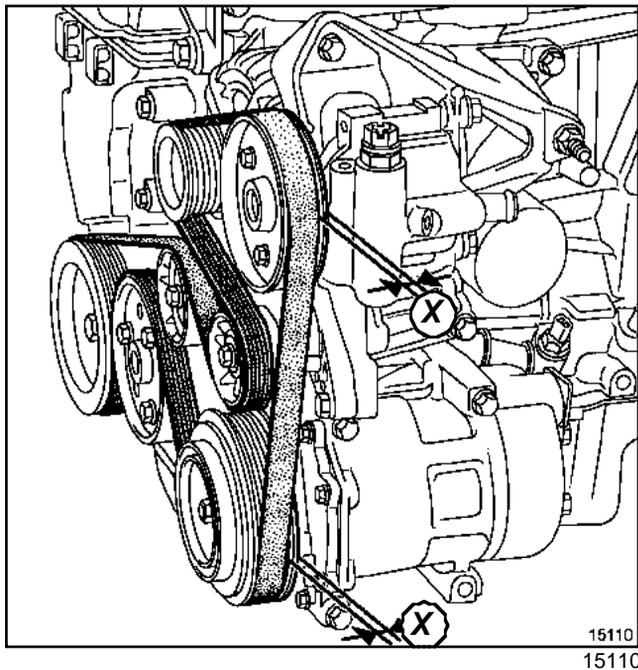


15111

- Rotate the tensioner in the direction of the arrow using a spanner.
- Lock the tensioner with a **6 mm Allen key (3)**.
- Fit a new accessories belt.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

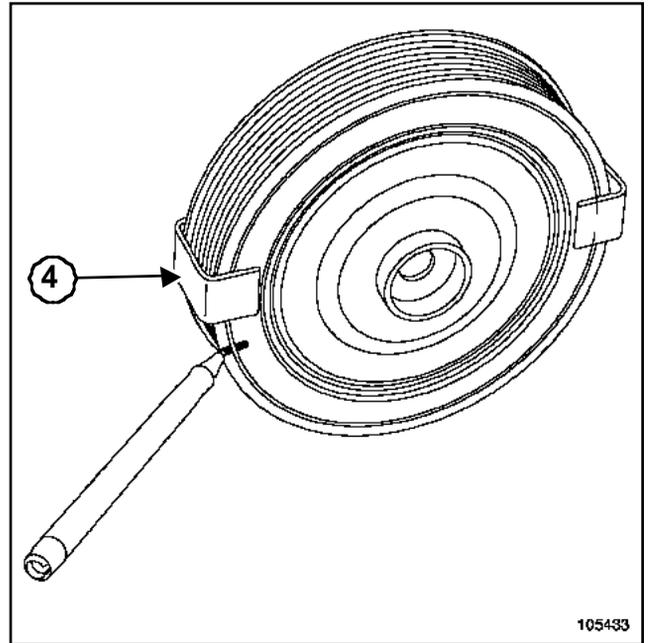


□

WARNING

When fitting the belt it is imperative to check that the tooth (indicated by (X)) on the inside of the pulleys remains free.

F4P, and 770 or 771 or 772 – F4R, and 712 or 713



□

WARNING

The anti-vibration pulley is in two parts and has been balanced to reduce inertia.

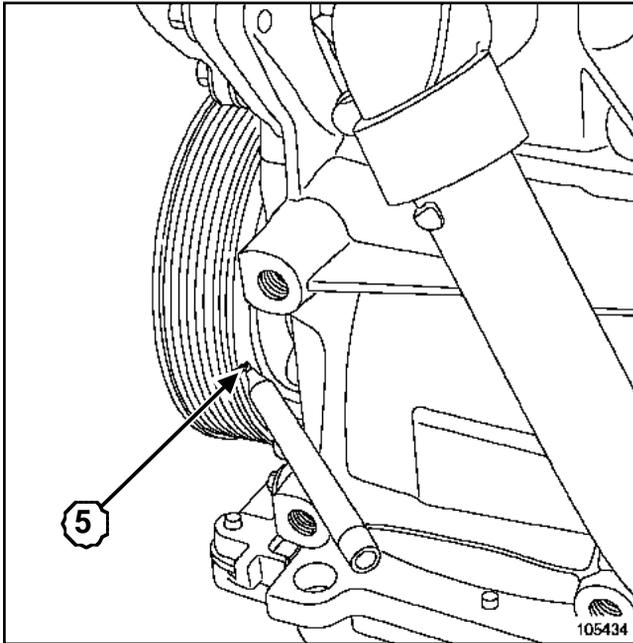
Mark it before refitting it to prevent an error.

It is forbidden to take the anti-vibration pulley apart.

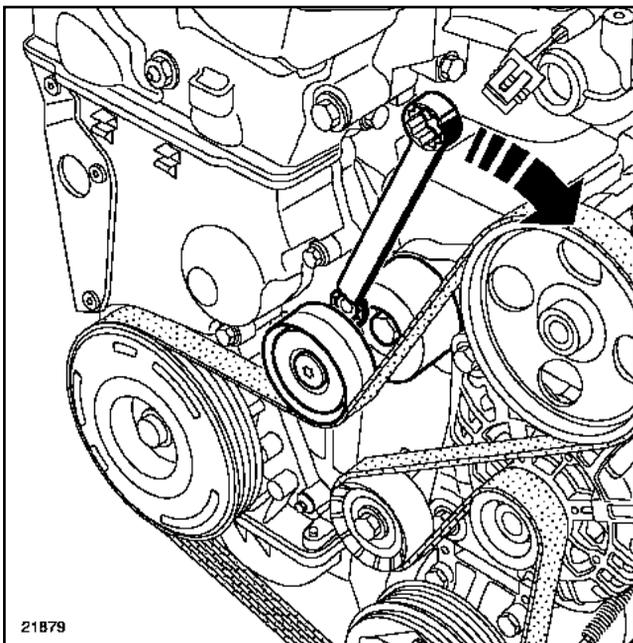
□ Refit the new anti-vibration pulley with its clamp (4).

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792

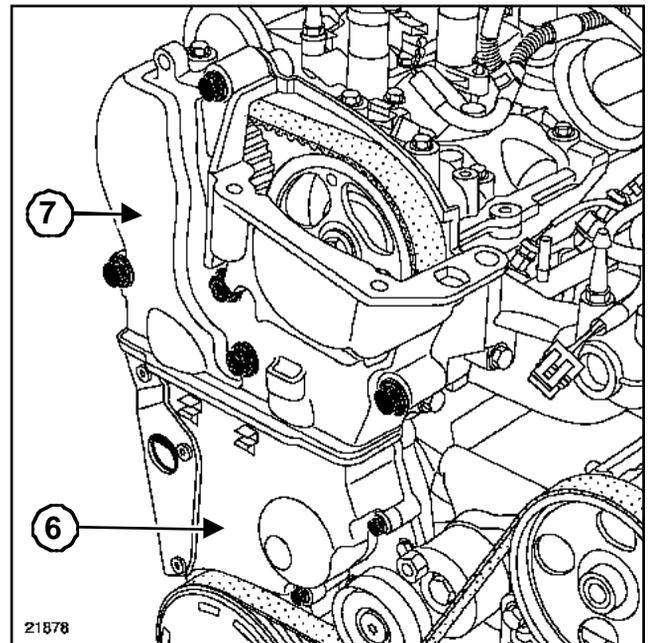


- Fit a new anti-vibration pulley bolt.
- Before tightening the anti-vibration pulley, check the alignment of the two parts(5)
- Tighten to torque and angle the **anti-vibration pulley bolt (40 Nm + 110°)**.



- Rotate the tensioner in the direction of the arrow using a spanner.
- Fit a new accessories belt.

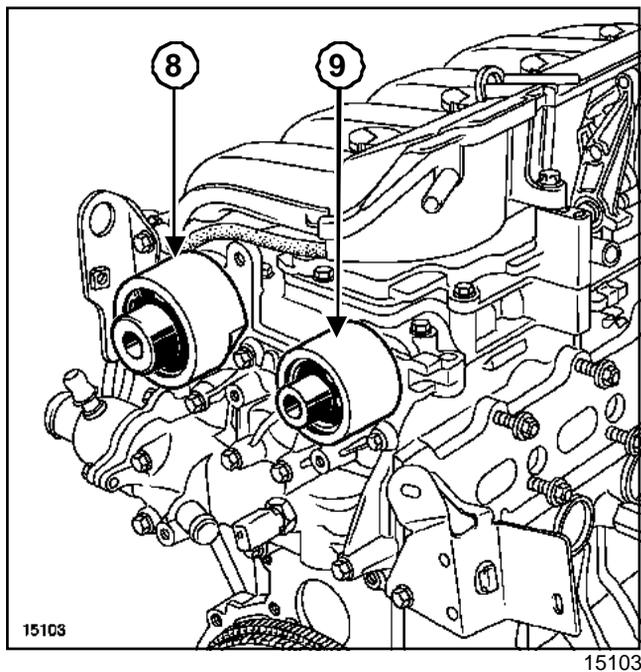
- Remove the flywheel locking tool (**Mot. 1677**).



- Tighten to torque the lower timing cover mounting bolts (6):
 - **M6 lower timing cover bolts (8 Nm)**,
 - **M8 lower timing cover bolts (20 Nm)**.
- Tighten to torque the upper timing cover mounting bolts (7):
 - **M8 upper timing cover bolts (18 Nm)**,
 - **M10 upper timing cover bolts (38 Nm)**.

Timing belts: Refitting

F4P, and 261 or 770 or 771 or 772 or 773 or 774 or 775 – F4R, and 700 or 701 or 712 or 713 or 714 or 715 or 730 or 732 or 736 or 738 or 740 or 741 or 744 or 746 or 747 or 770 or 771 or 780 or 790 or 792



Fit new sealing plugs:

- on the inlet camshaft using tool (**Mot. 1487**) at (8),
- for the exhaust camshaft, using tool (**Mot. 1488**)(9).