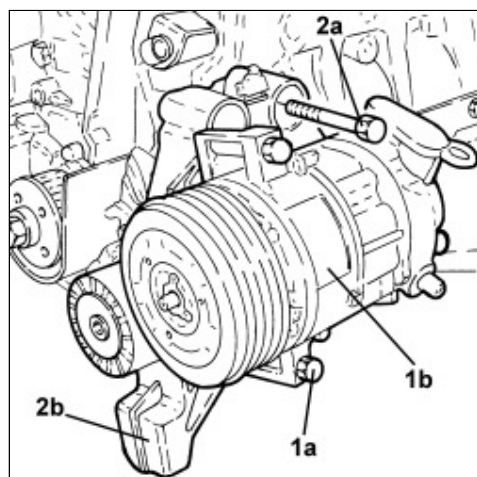
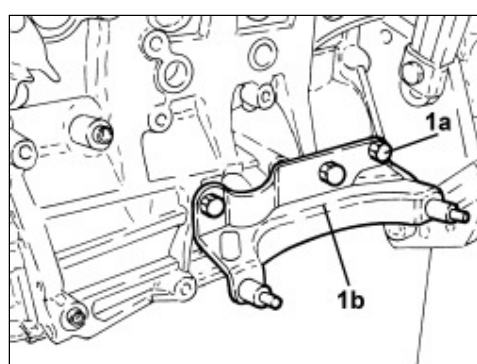


191 - Giulietta 2.0 JTDM ENGINE - DISMANTLING AND REASSEMBLY FOLLOWING OP.1004E10 - WASH AND CHECK DISMANTLED COMPONENTS - REFITTING CYLINDER HEAD AND OIL SUMP - DOES NOT INCLUDE OPERATIONS ON CYLINDER HEAD AND AUXILIARY UNITS 1004E20

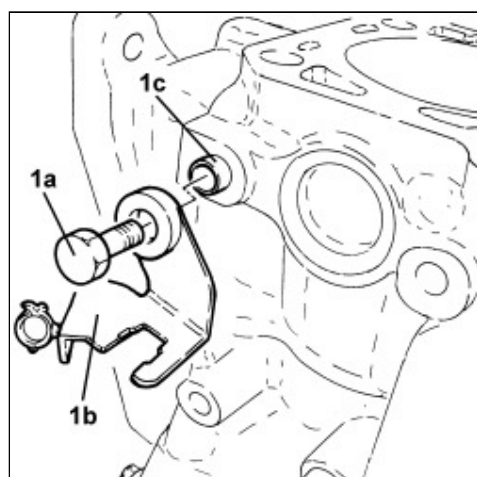


 Removing ([Refitting](#) )

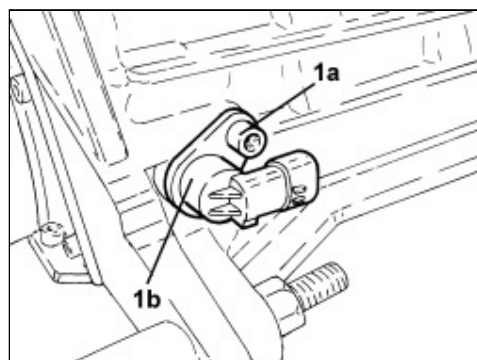
1. Undo the screws (1a) and remove the air conditioning compressor (1b) from the mounting.
2. Undo the screws (2a) and remove the air conditioner compressor mounting (2b).



1. Undo the screws (1a) and remove the catalytic converter-DPF support (1b).

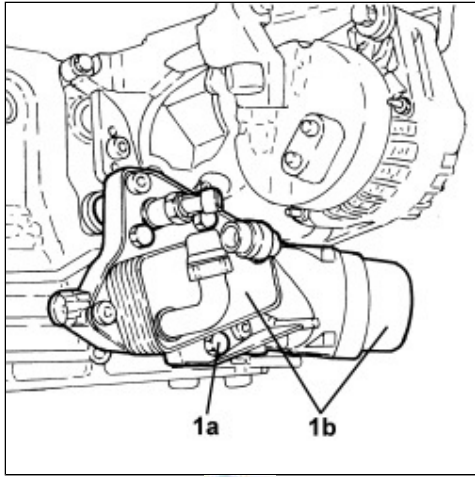


1. Undo the screw (1a), remove the wiring retaining bracket (1b) and the locating bush (1c).

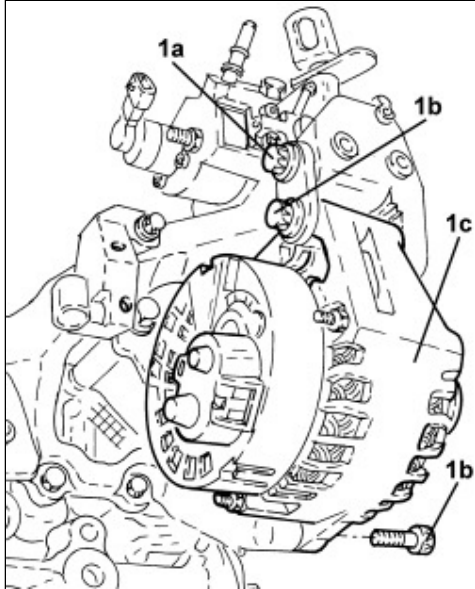


1. Undo the screw (1a) and remove the rpm sensor (1b).

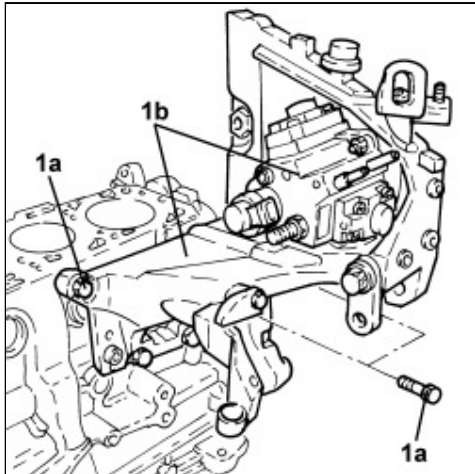
1. Undo the screws (1a) and remove the engine oil filter-heat exchanger mounting (1b).



1. Loosen the screw (1a), undo the screws (1b) and remove the alternator (1c).



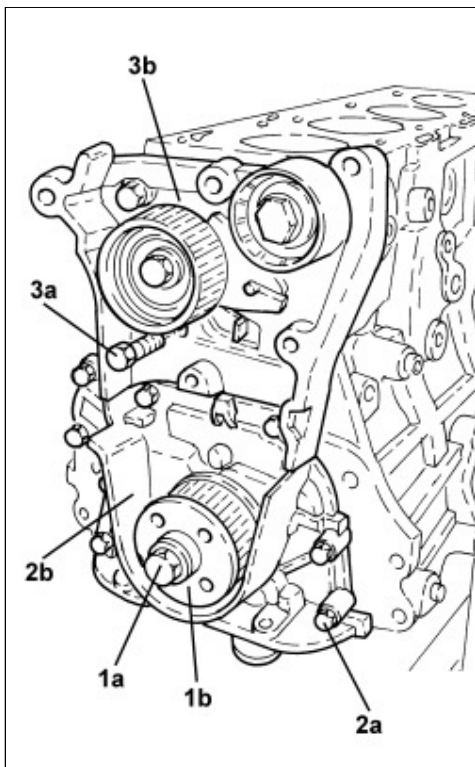
1. Undo the screws (1a) and remove the pressure pump mounting assembly (1b).

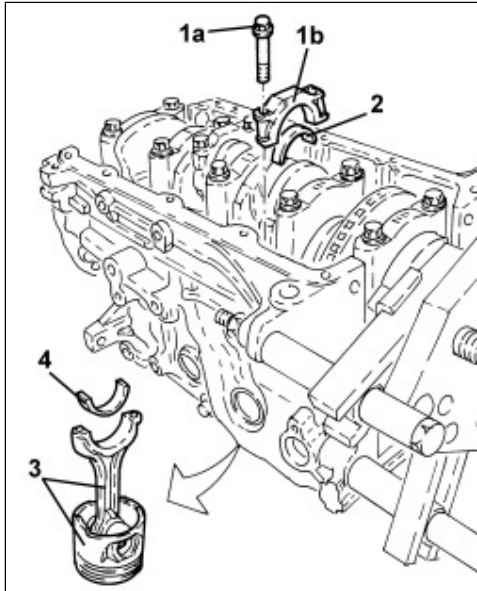


1. Undo the screw (1a) and remove the toothed timing drive pulley (1b), using the flange already fitted on the crankshaft for counter-torque.

2. Undo the screws (2a) and remove the crankshaft oil seal assembly front cover (2b).

3. Undo the screws (3a) and remove the timing drive belt tensioner assembly support (3b).



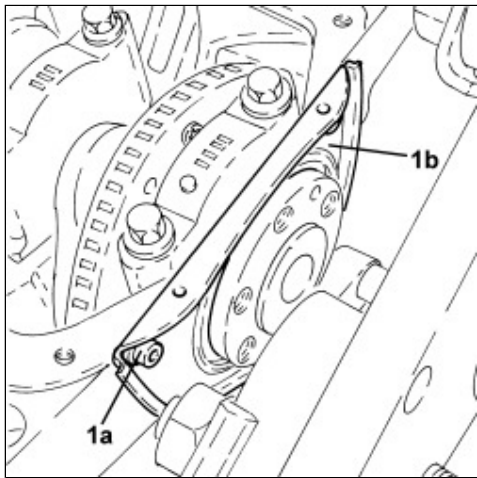


- Rotate the crankshaft using the tool fitted previously until the cylinder concerned is at BDC
- 1. Undo the screws (1a) and remove the connecting rod cap (1b).
- 2. Remove the lower connecting rod half-bearing.
- 3. Remove the connecting rod-piston assembly.
- 4. Remove the upper connecting rod half-bearing.
- Carry out the same operations to remove the pistons and connecting rods for the remaining cylinders.

- Remove the tool.

Tool	Description	Function	Validity
1860815000	Flangia	Rotazione albero motore	2.0 JTDM

1. Undo the screws (1a), then remove the flywheel side oil seal cover (1b).

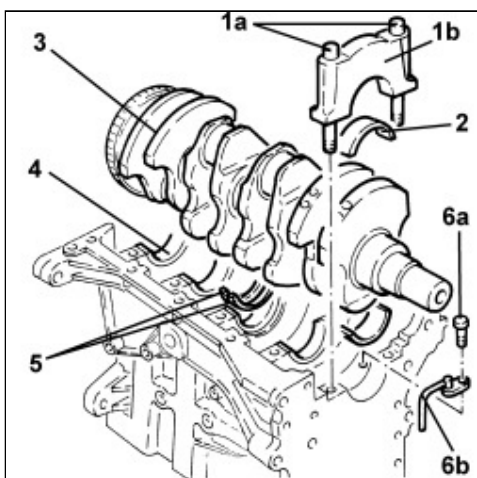


- Check that the crankshaft end float corresponds to the prescribed figures using a magnetic base and dial gauge.

Size	Value	Validity
Crankshaft end float (mm)	0.049 ÷ 0.211	2.0 JTDM

- If the value for the crankshaft end float does not correspond with the prescribed figures, when refitting, regrind the engine block seat and use suitable oversize thrust half-washers.

1. Undo the screws (1a) and remove the connecting rod caps (1b).
2. Remove the lower main half-bearings.
3. Remove the crankshaft.
4. Remove the upper main half-bearings.
5. Remove the thrust half-washers.
6. Undo the screws (6a) and remove the jets (6b) from the engine block.



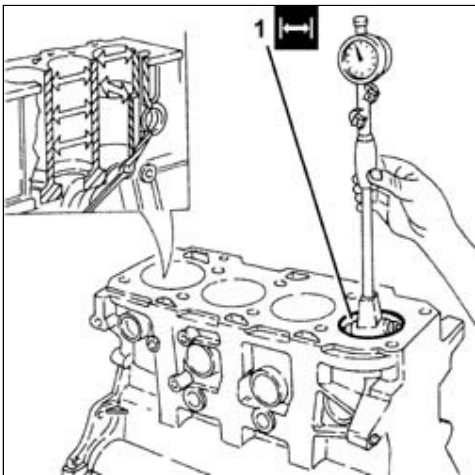


- Remove the engine block from the support tools, then place on a workbench.

[Op. 1028H60 SET OF PISTONS, GUDGEON PINS AND RINGS - REPLACE PISTONS AND CONNECTING RODS AT THE BENCH - INCLUDES ALIGNMENT AND BALANCING](#)

[Op. 1084B18 ENGINE OIL PUMP, REMOVED - CHECK AT THE BENCH](#)

- Drill and remove the water/oil sealing plugs from the engine block to allow for washing the ducts.



Refitting ([Removing](#))

- Wash the dismantled components.
- Fit the water/oil sealing plugs in the engine block using suitable fitting tools.
- Lubricate all the mechanical coupling components with engine oil.
- Check that the cylinder head support surface does not have cracks or surface grooves.
- Check that the flatness of the cylinder head support surface is within the prescribed limits; if this is not the case, regrind the cylinder head support surface.

Size	Value	Validity
Engine cylinder head lower surface flatness (mm)	< 0.1	2.0 JTDM

1. Measure the cylinder liner diameter according to the diagram shown in the figure.

Size	Value	Validity
Cylinder liner inner diameter - Grade A (mm)	83.000 ÷ 83.010	2.0 JTDM
Size	Value	Validity
Cylinder liner inner diameter - Grade B (mm)	83.010 ÷ 83.020	2.0 JTDM
Size	Value	Validity
Cylinder liner inner diameter - Grade C (mm)	83.020 ÷ 83.030	2.0 JTDM

- Check that the taper of the cylinder liners is within the prescribed limits.

Size	Value	Validity
Cylinder liner taper (mm)	< 0.005	2.0 JTDM

- Check that the ovality of the cylinder liners is within the prescribed limits.

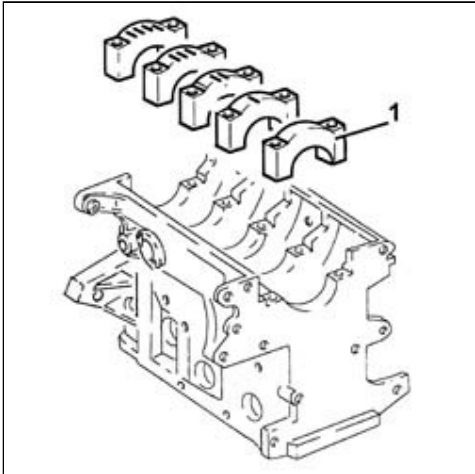
Size	Value	Validity
Cylinder liner ovality (mm)	< 0.05	2.0 JTDM

- If the cylinder liner measurements are not within the prescribed limits, ream the cylinder liners following the prescribed oversizes.

 If reaming, ensure all the liners have the same oversize.

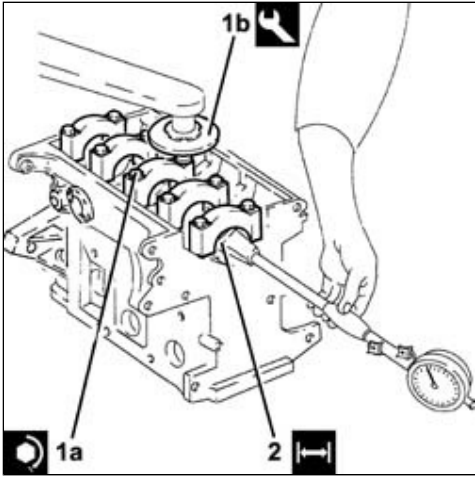
Size	Value	Validity
Cylinder liner inner diameter oversize (mm)	0.1	2.0 JTDM

1. Temporarily fit the bearing caps.



 The bearing caps have progressively numbered references (from zero to four starting from the front of the engine) which define the fitting position.

1. Tighten the bearing cap screws (1a) to the prescribed torque using the angular tightening tool (1b).



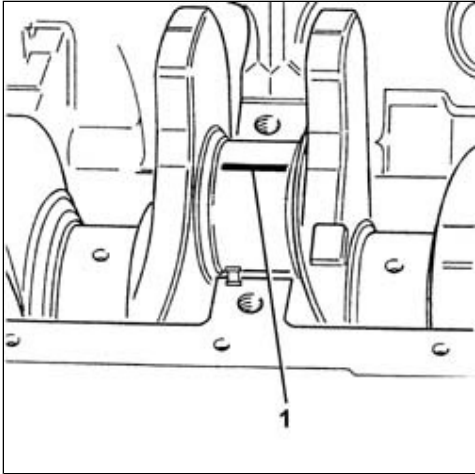
Component	Fastening	Ø	Value (daNm)	Validity
Bearing caps	Screw	M12	$2.3 \div 2.6 + 100^\circ$	2.0 JTDM

2. Check that the diameter of the main journal seats is within specified limits.

Size	Value	Validity
Main journal seat diameter (mm)	$63.705 \div 63.718$	2.0 JTDM

- Check that there are no deposits or blockages in the crankshaft lubrication ducts.

- Check that the diameter of the main journals is within the prescribed limits.



Size	Value	Validity
Main journal diameter - Grade A (mm)	$59.995 \div 60.002$	2.0 JTDM
Size	Value	Validity
Main journal diameter - Grade B (mm)	$59.988 \div 59.995$	2.0 JTDM
Size	Value	Validity
Main journal diameter - Grade C (mm)	$59.981 \div 59.988$	2.0 JTDM

- If the diameter of the main journals is not correct, they should be reground to the prescribed undersize.

Size	Value	Validity
Main journal diameter undersize (mm)	0.127	2.0 JTDM

 Main journal undersizes higher than the value mentioned will adversely affect the structural resistance of the crankshaft (following contact between the tool and rolled connectors). As far as the above is concerned, if the regrounding requires undersizes greater than 0.127 mm, then the crankshaft must be replaced and a new one ordered from the Parts Dept. The half-bearings used for undersizes of more than 0.127 mm should not be ordered from the

Parts Dept. (even if the number is still quoted).

- Check that the diameter of the crankpins is within the prescribed limits.

Size	Value	Validity
Crankpin diameter - Grade A (mm)	50.800 ÷ 50.807	2.0 JTDM
Size	Value	Validity
Crankpin diameter - Grade B (mm)	50.793 ÷ 50.800	2.0 JTDM
Size	Value	Validity
Crankpin diameter - Grade C (mm)	50.786 ÷ 50.793	2.0 JTDM

- If the diameter of the crankpins is not correct, they should be reground to the prescribed undersize.

Size	Value	Validity
Main journal diameter undersize (mm)	0.127	2.0 JTDM

Crankpin undersizes higher than the value mentioned will adversely affect the structural resistance of the crankshaft (following contact between the tool and rolled connectors). As far as the above is concerned, if the regrinding  requires undersizes greater than 0.127 mm, then the crankshaft must be replaced and a new one ordered from the Parts Dept. The half-bearings used for undersizes of more than 0.127 mm should not be ordered from the Parts Dept. (even if the number is still quoted).

- Check the main bearings, noting that the half-bearings should not be adapted. If scoring or signs of binding are noted replace them following the prescribed grade.

Size	Value	Validity
Main journal half-bearings - Grade A (Red) (mm)	1.832 ÷ 1.836	2.0 JTDM
Size	Value	Validity
Main journal half-bearings - Grade B (Blue) (mm)	1.835 ÷ 1.839	2.0 JTDM
Size	Value	Validity
Main journal half-bearings - Grade C (Yellow) (mm)	1.838 ÷ 1.842	2.0 JTDM
Size	Value	Validity
Main journal/crankpin half-bearings oversize - Grade A (brown) (mm)	0.127	2.0 JTDM
Size	Value	Validity
Main journal/crankpin half-bearings oversize - Grade B (green) (mm)	0.127	2.0 JTDM

Size	Value	Validity
Clearance between connecting rod bearings - crankpin bearings (mm)	0.030 ÷ 0.056	2.0 JTDM

- Fit the half-bearings, making sure they are scrupulously clean.

 If the crankshaft has been ground, fit new oversize half-bearings to restore the initial tolerance conditions.

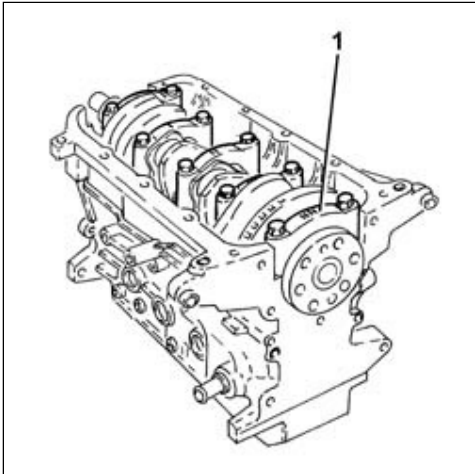
- Fit the crankshaft in the engine block.

1. Fit the calibrated wire (Plastigage) for measuring the main journal clearance.

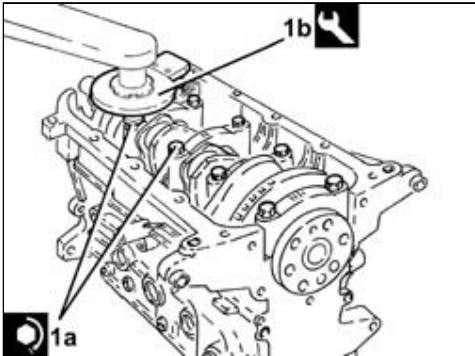
 Check one journal at a time, without moving the crankshaft.

1. Fit the main bearing caps complete with half-bearings.

 The bearing caps have progressively numbered references (from zero to four starting from the front of the engine) which define the fitting position.

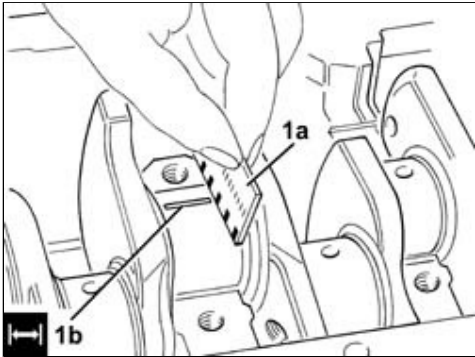


1. Tighten the bearing cap screws (1a) to the prescribed torque using the angular tightening tool (1b).



Component	Fastening	Ø	Value (daNm)	Validity
Bearing caps	Screw	M12	2.3 ÷ 2.6 + 100°	2.0 JTDM

1. Remove the main bearing caps fitted previously and, using a suitable graduated measuring instrument (1a), measure the clearance shown by calibrated wire (1b).

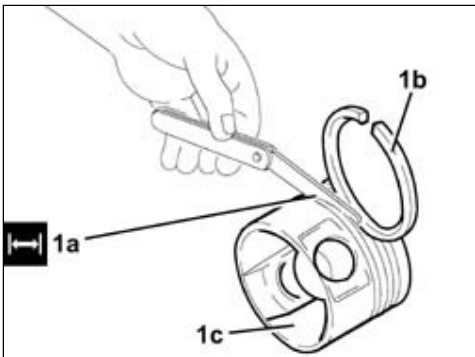


Size	Value	Validity
Clearance between connecting rod bearings - crankpin bearings (mm)	0.030 ÷ 0.056	2.0 JTDM

 If the figure measured is outside of the tolerance, replace the main half-bearings with ones of the correct size and category.

- Measure the clearance for all the bearings, taking care to take the measurements one at a time without moving the crankshaft at any time.

- Check that the small end bush bore diameter is within the prescribed limits; if not, replace the worn connecting rod.



Size	Value	Validity
Small end bush inner diameter (mm)	30.006 ÷ 30.014	2.0 JTDM

- Check that the bore of the piston pin housing in the pistons corresponds to the prescribed figures; if not, replace the piston complete with sealing rings, piston pin and bushes.

Size	Value	Validity
Gudgeon pin outer diameter (mm)	29.985 ÷ 29.990	2.0 JTDM

- Check that the outer diameter of the piston pins is within the prescribed limits; if not, replace the worn piston pins.

Size	Value	Validity
Gudgeon pin outer diameter (mm)	29.975 ÷ 29.980	2.0 JTDM

- Fit the sealing rings in the cylinder liner and check that the opening between the ends is within the prescribed values; if this is not the case, replace the retaining rings.

Size	Value	Validity
Cylinder compression 1st sealing ring gap (mm)	0.20 ÷ 0.35	2.0 JTDM
Size	Value	Validity
Cylinder compression 2nd sealing ring gap (mm)	0.60 ÷ 0.80	2.0 JTDM
Size	Value	Validity
Engine piston oil scraper ring end float (mm)	0.030 ÷ 0.070	2.0 JTDM

- Check that the outer diameter of the pistons corresponds to the prescribed figures; if not, replace the piston complete with sealing rings and piston pin.

Size	Value	Validity
Piston outer diameter -Grade A (mm)	82.930 ÷ 82.940	2.0 JTDM
Size	Value	Validity
Piston outer diameter - Grade B (mm)	82.940 ÷ 82.950	2.0 JTDM
Size	Value	Validity
Piston outer diameter - Grade C (mm)	82.950 ÷ 82.960	2.0 JTDM
Size	Value	Validity
Piston outer diameter oversize (mm)	0.1	2.0 JTDM

 Measure perpendicular to the gudgeon pin axis, 7 mm from the lower edge of the skirt.

- Check that the seats for piston rings in the piston are within the prescribed limits.

Size	Value	Validity
Sealing ring seat in piston - 1st groove (mm)	1.620 ÷ 1.640	2.0 JTDM
Size	Value	Validity

Sealing ring seat in piston - 2nd groove (mm)	1.550 ÷ 1.570	2.0 JTDM
Size	Value	Validity
Sealing ring seat in piston - 3rd groove (mm)	2.020 ÷ 2.040	2.0 JTDM

- Check that the thickness of the sealing rings is within the prescribed limits.

Size	Value	Validity
Cylinder compression 1st sealing ring thickness (mm)	1.470 ÷ 1.495	2.0 JTDM
Size	Value	Validity
Cylinder compression 2nd sealing ring thickness (mm)	1.470 ÷ 1.495	2.0 JTDM
Size	Value	Validity
Engine piston oil scraper ring end float (mm)	0.030 ÷ 0.070	2.0 JTDM

1. Check that the end float (1a) between the first-second ring (1b) and the seats in the piston (1c) corresponds to the prescribed figures.

Size	Value	Validity
Cylinder compression 1st sealing ring end float (mm)	0.125 ÷ 0.170	2.0 JTDM
Size	Value	Validity
Cylinder compression 2nd sealing ring end float (mm)	0.055 ÷ 0.100	2.0 JTDM

- Check that the end float between the oil scraper ring and the housing in the piston corresponds to the prescribed figures.

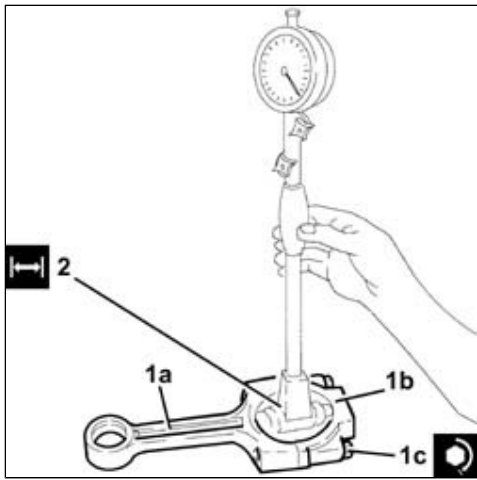
Size	Value	Validity
Engine piston oil scraper ring end float (mm)	0.030 ÷ 0.070	2.0 JTDM

1. Fit the caps (1b) on the connecting rods (1a) and secure them by tightening the screws (1c) to the prescribed torque.

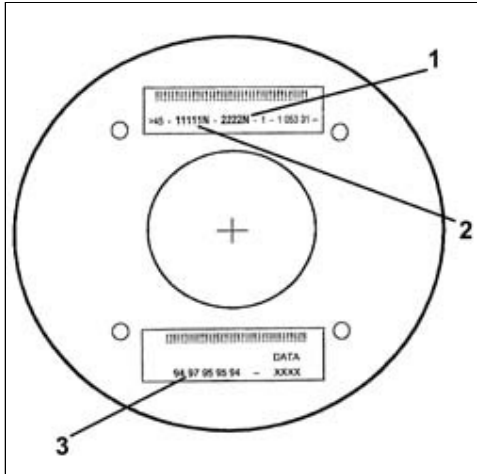
Component	Fastening	Ø	Value (daNm)	Validity
Connecting rod caps	Screw	M9	2.3 ÷ 2.6 + 60°	2.0 JTDM

2. Check that the big end diameter is within the prescribed limits; if not, replace the connecting rods.

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Size	Value	Validity
Big end inner diameter (mm)	53.897 ÷ 53.909	2.0 JTDM



[Op. 1028H60 SET OF PISTONS, GUDGEON PINS AND RINGS - REPLACE PISTONS AND CONNECTING RODS AT THE BENCH - INCLUDES ALIGNMENT AND BALANCING](#)

[Op. 1084B18 ENGINE OIL PUMP, REMOVED - CHECK AT THE BENCH](#)

- Check that there are no signs of seizing on the teeth of the flywheel toothed ring gear; if this is not the case, replace it.
- Replace the engine block on the overhaul stand using the mounting bracket.

Tool	Description	Function	Validity
1871000000	Cavalletto di revisione	Revisione motore	2.0 JTDM
Tool	Description	Function	Validity
1871000000	Staffa	Posizionamento motore su cavalletto di revisione	2.0 JTDM

- Refit the jets in their housings in the engine block and secure them using the screws.
- Refit the thrust half-washers in their seats on the third main bearing.
- The main half-bearings fitted on the crankshaft have been selected for their optimum specific fitting clearance.

 The crankshaft supplied by the Parts Dept. comes without half-bearings and the main journals and crankpins are the normal size; the half-bearings to be fitted must therefore be selected by identifying the class of each main journal and crankpin for the new crankshaft.

- To select main journal half bearings, measure as follows: the numerical code stamped on the toothed wheel; the paint mark, if present, next to the main journals.
- Below is an example of the identification of main journal grades:
 - 1 - Numerical code of crankpin identification: the left number refers to the first timing side bearing; the final "N" is meaningless for 4 cylinder engines.
 - 2 - Numerical code of main journal identification: the first number on the left refers to the first timing side bearing; the final "N" is meaningless for 4 cylinder engines.
 - 3 - Series of numbers (if present), in groups of two digits, which indicate the dimensions (thousandth part) of the main journals: the first two numbers on the left refer to the first journal, timing side.

 Only use the codes that relate to the key; all other codes on the toothed wheel should not be used.

For the identification of the main journal grade, refer to the numerical code for reference 2 in the key.

In the case of the example, the numbers 1111N indicate that all five bearings are Grade A (red) as indicated below.

A further method for identifying the grade of the bearings is to read reference 3 (if present) in the diagram.

In the case of the example, the number 94 (first on the left) corresponds to the dimensions 52.994 for the first timing side bearing which identifies Grade A (red); the same method should be applied for other groups of two digits for the same reference 3 (97 -95 -95 -94).

MAIN JOURNAL IDENTIFICATION

- Main journal grade A (normal), diameter 52.994 - 53.000 mm, RED paint mark, numerical code 1 (94 00)*
- Main journal grade B (normal), diameter 52.982 - 52.994 mm, BLUE paint mark, numerical code 2 (88 94)*
- Main journal grade C (normal), diameter 52.982 - 52.998 mm, YELLOW paint mark, numerical code 3 (82 88)*

Main journal grade D (0.127 mm undersize), diameter 52.867- 52.873 mm, BROWN paint mark, numerical code 6 (67 73)*

Main journal grade E (0.127 mm undersize), diameter 52.861 - 52.867 mm, GREEN paint mark, numerical code 7 (61 67)*

Main journal grade F (0.127 mm undersize), diameter 52.855 - 52.861 mm, BLACK paint mark, numerical code 8 (55 61)*

(*) Last two numbers (thousandth part) of the main journal dimensions.

If using a crankshaft where the maximum undersize for the bearings is 0.127 mm through grindings, the grade should be selected by measuring the diameter of the bearing using the above as a reference.

Having defined the grade and the colour of each new or reground crankshaft bearing, it is necessary to select the bearing pair or thickness; these should be the same colour as the corresponding journal; the pair of half-bearings required can be ordered from the Parts Dept. by quoting the order number.

The above is designed to guarantee the optimum operational clearances for all pins.

Lastly, we wish to point out that, in general, the clearance between the main journal and the half-bearing, produced through the selection method described above, should be min. 0.011 - max; 0.071 mm; this figure can be measured, as part of the final check, using the calibrated wire (Plastigage) following the instructions described below.

- Refit the upper main bearing half-bearings in their seats in the engine block.

- Place the crankshaft in its housing in the engine block.

- Place the bearing caps complete with lower half-bearings in position.

 The bearing caps have progressively numbered references (from zero to four starting from the front of the engine) which define the fitting position.

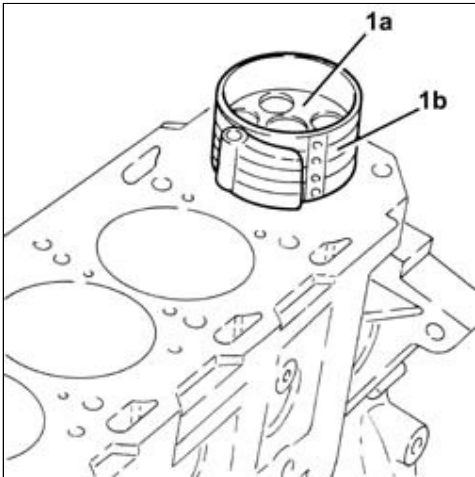
- Tighten the connecting rod cap screws to the prescribed torque using the angular tightening tool.

Component	Fastening	Ø	Value (daNm)	Validity
Bearing caps	Screw	M12	2.3 ÷ 2.6 + 100°	2.0 JTDM

- Fit the tool.

Tool	Description	Function	Validity
1860815000	Flangia	Rotazione albero motore	2.0 JTDM

- Rotate the crankshaft using the tool fitted previously until the cylinder concerned is at BDC



1. Place the piston and connecting rod assembly (1a) in its housing complete with half-bearing, using a suitable tool (1b).

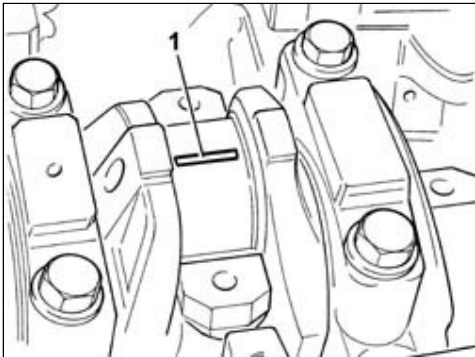
 For the selection of the connecting rod half-bearings, follow the procedure described previously for the main half-bearings according to the grades listed below.

Size	Value	Validity
Crankpin half-bearings - Grade A (red) (mm)	1.528 ÷ 1.532	2.0 JTDM
Size	Value	Validity
Crankpin half-bearings - Grade B (blue) (mm)	1.532 ÷ 1.536	2.0 JTDM
Size	Value	Validity
Crankpin half-bearings - Grade C (yellow) (mm)	1.535 ÷ 1.539	2.0 JTDM

Size	Value	Validity
Main journal/crankpin half-bearings oversize - Grade A (brown) (mm)	0.127	2.0 JTDM
Size	Value	Validity
Main journal/crankpin half-bearings oversize - Grade B (green) (mm)	0.127	2.0 JTDM
Size	Value	Validity
Clearance between connecting rod bearings - crankpin bearings (mm)	0.030 ÷ 0.056	2.0 JTDM
Size	Value	Validity
Main journal/crankpin half-bearing oversize (mm)	0.254	2.0 JTDM

 The piston-connecting rod assemblies should be fitted in the engine block so that the drain on the piston skirt is aligned with the oil jet on the engine block.

- Carry out the same operations to fit the pistons and connecting rods for the remaining cylinders.
- 1. Test the crankpin clearance by applying the calibrated wire (Plastigage) to measure crankpin installation clearance.



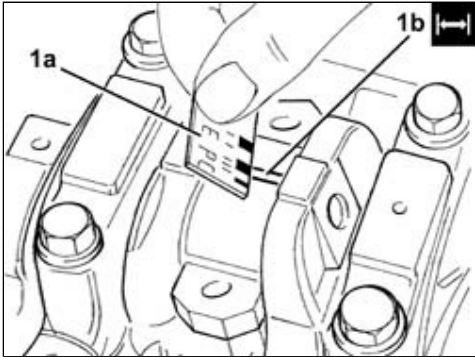
- Place the connecting rod caps complete with half-bearings in their seats.

 Fit the connecting rod caps so that the number stamped on each rod faces toward the same side as the number stamped on the big end (inlet side).

- Tighten the screws to the prescribed torque, using the angular tightening tool.

Component	Fastening	Ø	Value (daNm)	Validity
Connecting rod caps	Screw	M9	2.3 ÷ 2.6 + 60°	2.0 JTDM

- Undo the nuts and remove the connecting rod caps with the half-bearings fitted previously.



- 1. Use an appropriate graduated measuring tool (1a) to measure the clearance indicated by the calibrated wire (1b).

Size	Value	Validity
Clearance between main bearings - crankshaft main journals (mm)	0.031 ÷ 0.051	2.0 JTDM

- If the value measured is not within the prescribed figures, replace the connecting rod bearings.
- Carry out this test on all the crankpins, one at a time, without ever turning the crankshaft.
- Fit the connecting rod cap complete with half-bearing and secure it without tightening the screws.

 Fit the connecting rod caps so that the number stamped on each rod faces toward the same side as the number stamped on the big end (inlet side).

- Tighten the connecting rod cap screws to the prescribed torque using the angular tightening tool.

Component	Fastening	Ø	Value (daNm)	Validity
Connecting rod caps	Screw	M9	2.3 ÷ 2.6 + 60°	2.0 JTDM

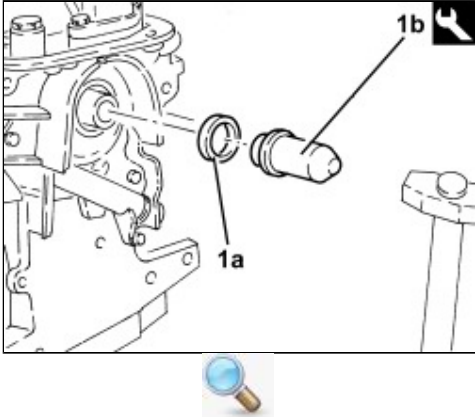
- Remove the tool.

Tool	Description	Function	Validity
1860815000	Flangia	Rotazione albero motore	2.0 JTDM

- Place the crankshaft oil seal front cover in its seat complete with gasket and tighten the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Crankshaft oil seal front cover	Screw	M6	0.8 ÷ 1.0	2.0 JTDM

1. Place the O-ring (1a) in its seat on the crankshaft oil seal front cover using the tool (1b).



Tool	Description	Function	Validity
2000004100	Introduttore	Introduzione paraolio anteriore albero motore	2.0 JTDM

- Replace the engine rpm sensor in its housing and secure it by tightening the screw to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Rpm sensor	Screw	M6	0.8 ÷ 1.0	2.0 JTDM

- Place the timing belt tensioner mounting assembly in position and secure it by tightening the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Timing belt tensioners support	Screw	M10	2.2 ÷ 2.7	2.0 JTDM

- Place the flywheel side cover in its housing and secure it tightening the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Flywheel side oil seal cover	Screw (to be replaced)	M6	0.8 ÷ 1.0	2.0 JTDM

- Apply silicone sealant to the entire perimeter of the engine oil sump.

- Place the oil sump back in its housing.

- Tighten the side screws fixing the oil sump to the prescribed torque using the tool.

Component	Fastening	Ø	Value (daNm)	Validity

Engine oil sump	Side screws	M8	2.2 ÷ 2.7	2.0 JTDM
Tool	Description	Function	Validity	
1860834000	Chiave	Svitare/serrare viti testa cilindri superiore Svitare/serrare viti laterali coppa del basamento	2.0 JTDM	

- Tighten the front and rear screws fixing the oil sump to the prescribed torque using the tool.

Component	Fastening	Ø	Value (daNm)	Validity
Engine oil sump	Timing side and gearbox side screws	M6	0.8 ÷ 1.0	2.0 JTDM
Tool	Description	Function	Validity	
1860833000	Chiave	Svitare/serrare viti coppa del basamento lato distribuzione e lato cambio	2.0 JTDM	

- Fit the tool for the crankshaft rotation, to be used as counter-torque to tighten the toothed drive pulley fixing screw.

Tool	Description	Function	Validity
1860815000	Flangia	Rotazione albero motore	2.0 JTDM

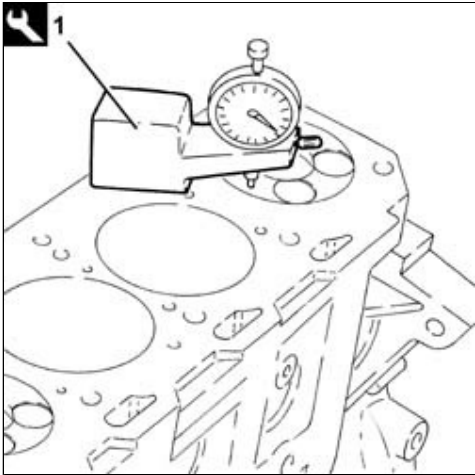
- Position the toothed drive pulley in its housing and secure it by tightening the screw to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Toothed drive pulley	Left hand screw	M16	32.3 ÷ 35.7	2.0 JTDM

- Remove the tool for the crankshaft rotation.

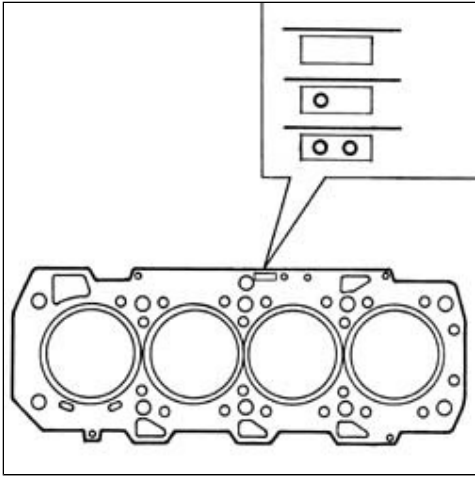
Tool	Description	Function	Validity
1860815000	Flangia	Rotazione albero motore	2.0 JTDM

1. Measure the piston protrusion in two places at 180° on the piston pin axis using the tool and take the average of the two values measured for each piston.



- Select the correct size cylinder head gasket, according to the maximum value of the averages for the protrusion of each individual piston.

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Size	Value	Validity
Cylinder head gasket size with maximum piston projection (mm)	projection $+0.110 \div +0.230$ thickness (no opening) 0.95 ± 0.05	2.0 JTDM
Size	Value	Validity
Cylinder head gasket size with maximum piston projection (mm)	projection $+0.231 \div +0.330$ thickness (one opening) 1.05 ± 0.05	2.0 JTDM
Size	Value	Validity
Cylinder head gasket size with maximum piston projection (mm)	projection $+0.331 \div +0.425$ thickness (two openings) 1.15 ± 0.05	2.0 JTDM

Position the first cylinder at TDC; rotate the crankshaft a further two teeth of the toothed timing drive pulley to lower the pistons, thereby preventing any interference with the valves whilst fitting the cylinder head.

- Position the cylinder head locating bushes on the engine block as shown in the figure.

The locating bushes between the engine block and cylinder head are shorter (12.5 mm) than the bushes between the cylinder head and the camshaft housing. Take great care not to reverse them as this could impair engine operation.

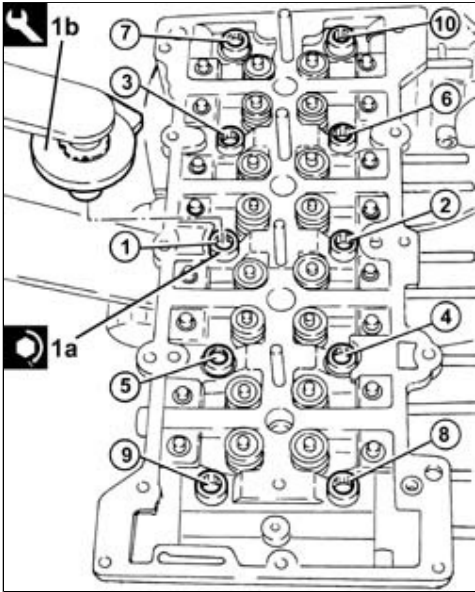
- Fit the new cylinder head gasket selected.

- Position the cylinder head on the engine block.

Do not reuse the cylinder head screws more than four times because they undergo permanent lengthening whenever they are tightened.

Replace the screws if the number of times that the screws have been tightened to the cylinder heads is unknown.

1. Tighten the cylinder head screws (1a) to the prescribed torque using the angular tightening tool (1b).



Component	Fastening	Ø	Value (daNm)	Validity
Cylinder head	Screw	M12	$6.2 \div 6.9 + 90^\circ + 90^\circ + 90^\circ$	2.0 JTDM

Reach the figure of 6.5 daNm by pretightening to 2.0 daNm subsequently increasing by a torque of 4.5 daNm to achieve the rated value of 6.5 daNm

Follow the order shown in the figure for each tightening sequence.

- Refit the heater plugs and tighten them to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Heater plugs	-	M9	$0.7 \div 0.9$	

- Fit the pressure pump mounting complete with pressure pump back in its housing and secure it by tightening the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Pressure pump support - engine block side	Upper screw (pretreated with sealant - to be replaced)	M8 x 1.25 x 110	2.3 ÷ 2.8	2.0 JTDM
Component	Fastening	Ø	Value (daNm)	Validity
Pressure pump support - engine block side	Screw	M8 x 1.25 x 35	2.3 ÷ 2.8	2.0 JTDM
Component	Fastening	Ø	Value (daNm)	Validity
Pressure pump support - cylinder head side	Screw	M8	2.2 ÷ 2.7	2.0 JTDM

- Place the alternator in position and tighten the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Alternator	Screw	M12	6.3 ÷ 7.7	

- Place the engine oil filter-heat exchanger mounting in position complete with new O-rings and tighten the screws.

- Place the locating bush and wiring retaining bracket in position and tighten the screw.

- Place the catalytic converter-DPR assembly mounting in position and tighten the screws.

- Place the air conditioning mounting in its housing and tighten the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Compressor support	Screw	M10	4.5 ÷ 5.5	1.4 Turbo Petrol 1.6 JTDM 2.0 JTDM 1750 Turbo Petrol

- Place the air conditioning in its housing and tighten the screws to the prescribed torque.

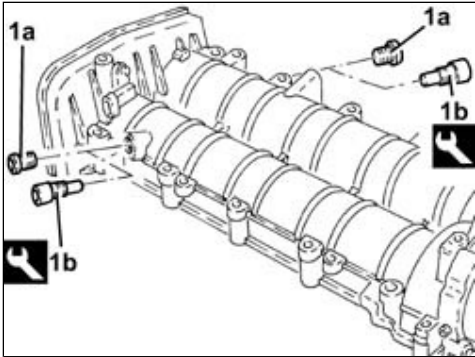
Component	Fastening	Ø	Value (daNm)	Validity
Compressor	Screw	M8	2.3 ÷ 2.7	1.4 Turbo MultiAir 1.4 Turbo Petrol 1.6 JTDM 2.0 JTDM 1750 Turbo Petrol

- Place the coolant supply pipe to the engine oil heat exchanger in position and connect the quick connectors.

- Place the coolant outlet pipe from the engine oil heat exchanger in position and connect the quick connectors.

- Connect the fuel return pipe to the pressure pump, pressure pump side and tighten the band.

1. If not already carried out during cylinder head overhaul, remove the plugs (1a) and fit the camshaft timing adjustment tools (1b) to the camshaft housing.



Check that the tools are correctly fitted in the housings in the camshafts.

Tool	Description	Function	Validity
1870896900	Dime	Messa in fase motore	2.0 JTDM

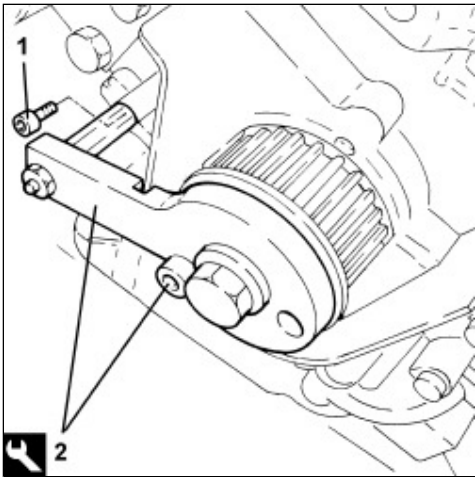
- Remove the timing tool, intake camshaft side, and tighten the plug.
- Place the camshaft housing locating bushes on the cylinder head.

The locating bushes between the cylinder head and the camshaft housing are longer (16.0 mm) than those between the engine block and the cylinder head; take care therefore not to mix them up because this could adversely affect the operation of the engine.

- Place the valve rockers in their housings.
- Place the camshaft housing gasket in position.
- Refit the camshaft housing and secure it by tightening the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Camshaft housing	Screw	M8	2.3 ÷ 2.8	2.0 JTDM

- If this has not already been carried out during the overhauling of the cylinder head, loosen the screw fixing the exhaust side camshaft drive toothed pulley.

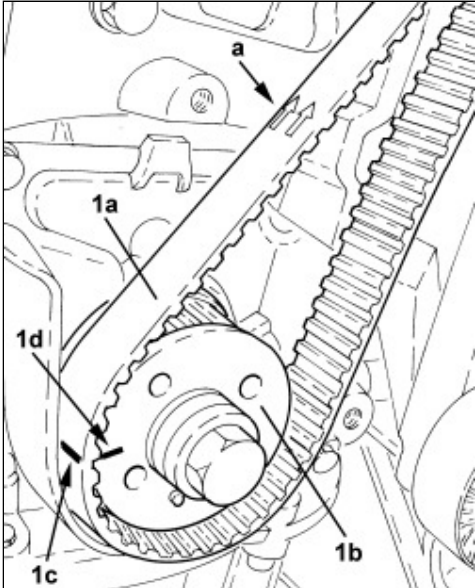


1. Undo the screw securing the engine block front cover shown in the figure.
2. Fit the tool.

The crankshaft must be rotated, with small movements, to allow the locating dowel on the toothed timing drive pulley to be inserted in the opening in the tool.

Tool	Description	Function	Validity
2000003000	Dima	Messa in fase motore	2.0 JTDM

- Remove the crankshaft timing template fitted previously.



1. Fit the toothed timing drive belt (1a) on the drive toothed pulley (1b), taking care to ensure that the yellow reference (1b) on it is aligned with the notch (1d).

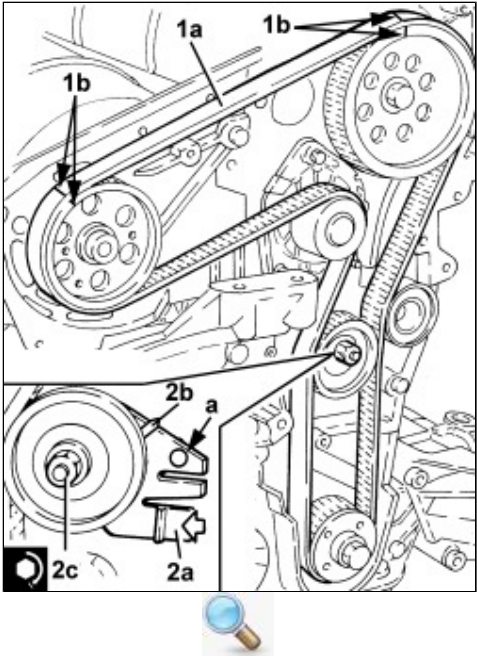
The yellow reference (1c) on the toothed timing belt is next to the two yellow arrows (a).

1. Fit the toothed timing drive belt (1a) completely, taking care to ensure that the yellow references (1b) on it are aligned with the references on the toothed pulleys.

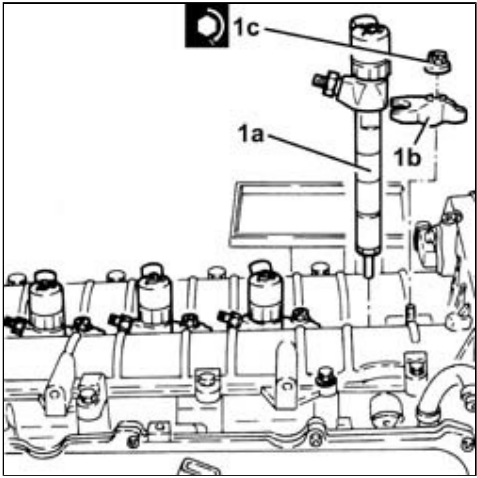
2. Use a screwdriver for leverage in opening (2a) until the reference for the tensioner (2b) is in the maximum tension position. Then tighten the screw (2c) for the tensioner to the prescribed torque in this position.

The opening "a" is the reference for the definitive tensioning of the toothed timing drive belt described below.

Component	Fastening	Ø	Value (daNm)	Validity



Timing control moving tensioner	Screw	M8	2.3 ÷ 2.8	2.0 JTDM
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- Tighten the screw fixing the exhaust side camshaft toothed pulley to the prescribed torque using the tools for counter-torque.

Component	Fastening	Ø	Value (daNm)	Validity
Driven timing toothed pulley	Screw	M12	2.8 ÷ 3.1 + 40°	2.0 JTDM

Tool	Description	Function	Validity
1870815000	Anticoppia	Svitare/serrare vite fissaggio puleggia dentata condotta distribuzione	2.0 JTDM
Tool	Description	Function	Validity
1870836000	Pioli	Svitare/serrare vite fissaggio puleggia dentata condotta distribuzione	2.0 JTDM

- Remove the timing tools.

Tool	Description	Function	Validity
1870896900	Dime	Messa in fase motore	2.0 JTDM

 Remove the exhaust camshaft side template as the inlet side camshaft template has already been removed.

Tool	Description	Function	Validity
2000003000	Dima	Messa in fase motore	2.0 JTDM

- Rotate the crankshaft through two revolutions.

- Loosen the screw retaining the moving timing tensioner.

- Use a screwdriver for leverage on the tensioner arm until the reference for the tensioner is in line with the reference opening and tighten the tensioner screw to the prescribed torque in this position.

Component	Fastening	Ø	Value (daNm)	Validity
Timing control	Screw	M8	2.3 ÷ 2.8	2.0 JTDM

moving tensioner				
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- Recheck the timing by refitting the timing tools.
- Tighten the screw fixing the previously removed engine block front cover.
- Tighten the plugs in the camshaft housing for fitting the exhaust side timing tool.

1. Fit the injectors (1a) in their seats complete with brackets (1b) and tighten the nuts (1c) to the prescribed torque.

 Start the refitting, beginning with the injector for cylinder no. 4 and continue with the injectors for cylinders 3, 2, and 1.

Component	Fastening	Ø	Value (daNm)	Validity
Injector brackets	Nut	M8	2.3 ÷ 2.8	2.0 JTDM

- Connect the brake servo vacuum pipe to the vacuum pump.
- Place the camshaft housing to air chamber connecting bracket in position and tighten the screws.
- Fit the power unit rigid support and tighten the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Timing side power unit rigid support	Screw	M10	5.4 ÷ 6.6	2.0 JTDM

- Fit the timing drive belt protective covers and tighten the screws.
- Position the auxiliary drive belt moving tensioner in its housing and secure it by tightening the screw to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Engine component single belt moving tensioner	Screw	M10	4.5 ÷ 5.5	2.0 JTDM

- Position the auxiliary drive belt fixed tensioner in its housing and secure it by tightening the screw to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Engine component single belt fixed tensioner	Screw	M10	4.5 ÷ 5.5	2.0 JTDM

- Position the service pulley on the crankshaft in its housing and tighten the screws to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Engine component single belt fixed tensioner	Screw	M10	4.5 ÷ 5.5	2.0 JTDM

- Fit the auxiliary drive belt using the automatic tensioner.
- Fit the pipe from the injectors to the fuel recovery manifold and connect to the fuel recovery manifold.
- Connect the pipe from the injectors to the fuel recovery manifold, injector side, pushing it until the clips click into place.
- Place the single fuel manifold pipe in its housing and secure it by tightening the screws to the prescribed torque.

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Component	Fastening	Ø	Value (daNm)	Validity
Single fuel manifold pipe (rail)	Screw	M8	2.3 ÷ 2.8	2.0 JTDM

- Place the pipe from the pressure pump to the fuel manifold back in its housing and secure it by tightening the connectors to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Pipes from pressure pump to fuel manifold - fuel manifold side	Connector	M14	1.8 ÷ 2.0	2.0 JTDM
Component	Fastening	Ø	Value (daNm)	Validity
Pipe from pressure pump to fuel manifold - pressure pump side	Connector	M12	2.2 ÷ 2.4	2.0 JTDM

- Place the pipes from the fuel manifold to the injectors in their housings and secure them by tightening the connectors to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Pipes from pressure pump to fuel manifold - fuel manifold side	Connector	M14	1.8 ÷ 2.0	2.0 JTDM
Component	Fastening	Ø	Value (daNm)	Validity
Pipes from fuel manifold to injectors - injectors side	Connector	M12	2.2 ÷ 2.4	2.0 JTDM

- Refit the oil vapour separator complete with pipes and tighten the screws.

- Tighten the screws fixing the oil vapour pipe to the air chamber and to the camshaft housing.

- Refit the degassing pipe in its housing, connect it to the thermostat and tighten the band.

- Tighten the screw fixing the degassing pipe to the pressure pump mounting.

- Place the new exhaust manifold gasket in its housing.

- Place the turbocharger-exhaust manifold assembly in its housing and secure it by tightening the nuts to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Turbocharger and exhaust manifold assembly - cylinder head side	Nut (to replace)	M8	1.8 ÷ 2.2	1.6 JTDM

- Fit a new O-ring on the connector for the engine oil return pipe from the turbocharger, engine block side.

- Fit a new gasket attaching the retaining tabs to the connector for the engine oil return pipe from the turbocharger, turbocharger side.

- Place the engine oil return pipe from the turbocharger in its housing and tighten the screws to the prescribed torque.

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Component	Fastening	Ø	Value (daNm)	Validity
Engine oil supply pipe to turbocharger	Screw	M10	4.5 ÷ 5.5	1.6 JTDM

- Fit the turbocharger engine oil supply pipe in place complete with new gaskets and tighten the connectors to the prescribed torque.

Component	Fastening	Ø	Value (daNm)	Validity
Engine oil supply pipe to turbocharger - turbocharger side	Connector	M10	1.4 ÷ 1.6	1.6 JTDM
Component	Fastening	Ø	Value (daNm)	Validity
Engine oil supply pipe to turbocharger - cylinder head extension side	Connector	M12	2.2 ÷ 2.7	1.6 JTDM

- Place the catalytic converter-DPF assembly and mounting bracket in position and tighten the nuts.
- Tighten the nut of the collar securing the catalytic converter-DPF to the turbocharger.
- Place the catalytic converter-DPF heat shield back in its housing and tighten the nuts.
- Place the turbocharger heat shield back in its housing and tighten it using the fastenings.
- Attach the electrical connection for the oxygen sensor to the mounting bracket.
- Refit the injector wiring in its seat and connect the electrical connections as described below.
- Connect the electrical connection for the fuel pressure regulator on the pressure pump.
- Connect the electrical connection for the air temperature and pressure sensor.
- Connect the heater plug electrical connections.
- Connect the electrical connection for the fuel pressure sensor.
- Connect the alternator earth lead and tighten the nut.
- Connect the electrical connection for the engine oil pressure switch.
- Connect the electrical connection for the EGR solenoid.
- Connect the electrical connection for the rpm sensor.
- Connect the electrical connection for the engine oil level sensor.
- Tighten the screw fixing the wiring duct to the camshaft housing.
- Connect the electrical connection for the EGR heat exchanger water supply actuator solenoid valve.
- Connect the electrical connection for the engine coolant temperature sensor.
- Connect the electrical connection for the throttle body.
- Connect the electrical connections for the injectors.
- Connect the electrical connection for the timing sensor.
- Tighten the screws securing the injector wiring duct.
- Connect the electrical connection for the turbocharger vane control actuator position sensor.
- Connect the electrical connection for the A/C system compressor engagement electromagnet.
- Tighten the drain plug in the crankcase sump to the prescribed torque.

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Component	Fastening	Ø	Value (daNm)	Validity
Engine oil drain plug	Plug	M14	1.8 ÷ 2.2	2.0 JTDM

 When the refitting of the power unit is completed, refill the engine lubrication system.

[Op. 1004D40 ENGINE - POSITION ON STAND AND REMOVE](#)