



Group index

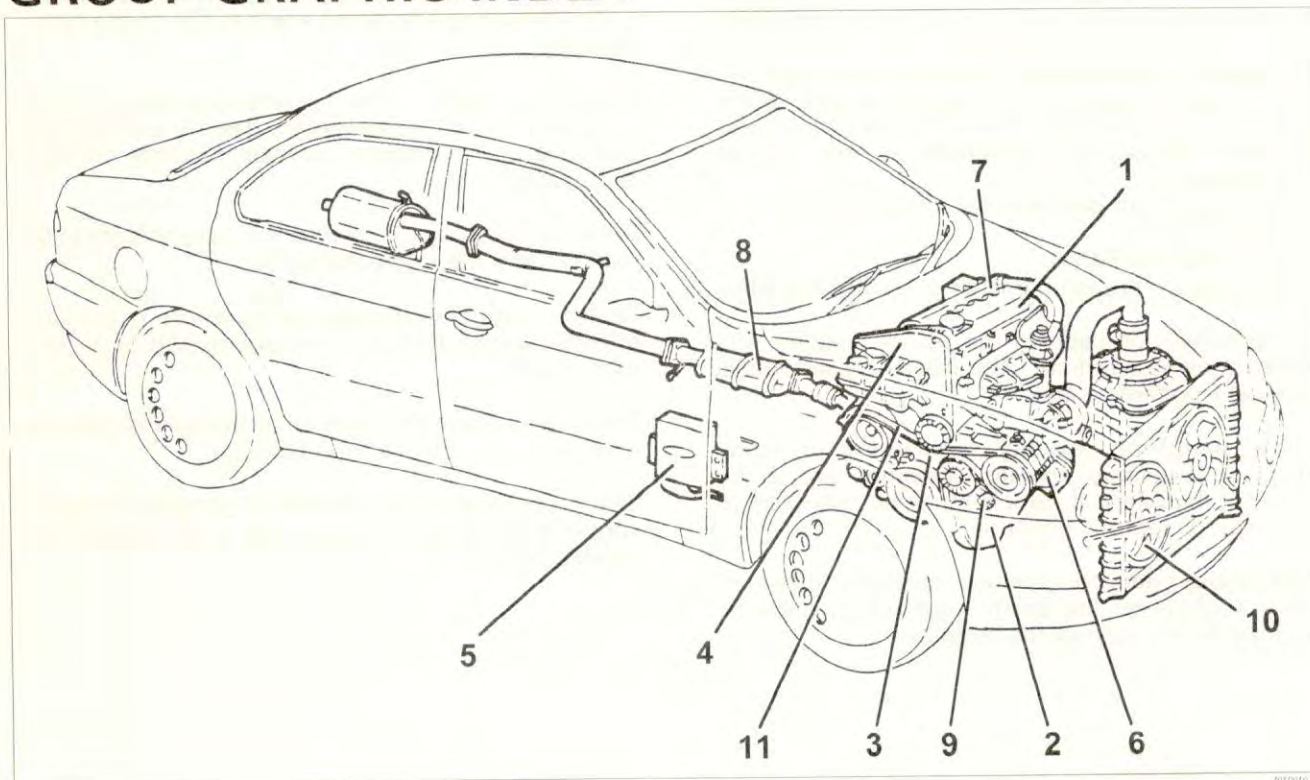
- GROUP GRAPHIC INDEX
- WARNING

- WARNING

Sub-groups index

<i>Sbgrp.</i>	<i>Description</i>	<i>Validity</i>
1004	ENGINE AND POWER UNIT	AR32302
1016	CYLINDER HEAD/S	AR32302
1020	CRANK CASE SUMP AND COVERS	AR32302
1024	CRANK SHAFT AND FLYWHEEL	AR32302
1028	CONNECTING RODS AND PISTONS	AR32302
1036	TIMING SYSTEM	AR32302
1060	DIESEL INJECTION SYSTEM	AR32302
1084	ENGINE LUBRICATION	AR32302

GROUP GRAPHIC INDEX



<i>Ref.</i>	<i>Description</i>	<i>Sbgrp.</i>
1	ENGINE AND POWER UNIT	1004
(2)	POWER UNIT MOUNTS	1008
-	CYLINDER HEAD/S	1016
3	CRANK CASE SUMP AND COVERS	1020
(4)	TIMING SYSTEM	1032
-	CRANK SHAFT AND FLYWHEEL	1024



<i>Ref.</i>	<i>Description</i>	<i>Sbgrp.</i>
-	CONNECTING RODS AND PISTONS	1028
-	TIMING SYSTEM	1036
5	DIESEL INJECTION SYSTEM	1060
(6)	TURBO CHARGING SYSTEM	1064
(7)	INLET AND EXHAUST MANIFOLDS	1072
(8)	EMISSION CONTROL SYSTEM	1080
9	ENGINE LUBRICATION	1084
(10)	ENGINE COOLING	1088
(11)	ENGINE COMPONENT MISCELLANEOUS DRIVES	1092

AR32302

WARNING

All operations must be performed with the greatest attention and care to avoid any injury to personell.

The engine compartment contains many moving parts, high temperature components and cables under tension. Carefully follow the following rules whenever performing operations in the engine compartment:

- Turn engine off and wait for it to cool down
- Don't smoke
- Don't use free flames
- Make sure a fire extinguisher is readily available.

During certain procedureds the use of specific Alfa Romeo tools is required. The use of these tools is essential to operate safely.

Follow workshop security regulations in force. Wherever necessary specific warnings are to be found in the Manual which must be followed to avoid any dangerous situation.

When using chemical products carefully follow all advice written on the safety card which must be supplied to the user by the supplier.

AR32302

WARNING

All operations must be performed with the utmost attention and care to avoid any damage to the components .

To unblock tightly adhering parts strike gently using an alluminium or led hammer if dealing with ferrous materials; use a wooden or resin hammer on light alloy parts .

When dismantling check that any parts that must be marked bear the reference marks.

During assembly lubricate parts, where necessary, to avoid engagements or seizings during early running stages.

During assembly the respect of tightening torques and regulation data is fundamental.

Whenever assembling substitute gaskets, oil seals, spring washers, self blocking nuts and any part that appears worn.



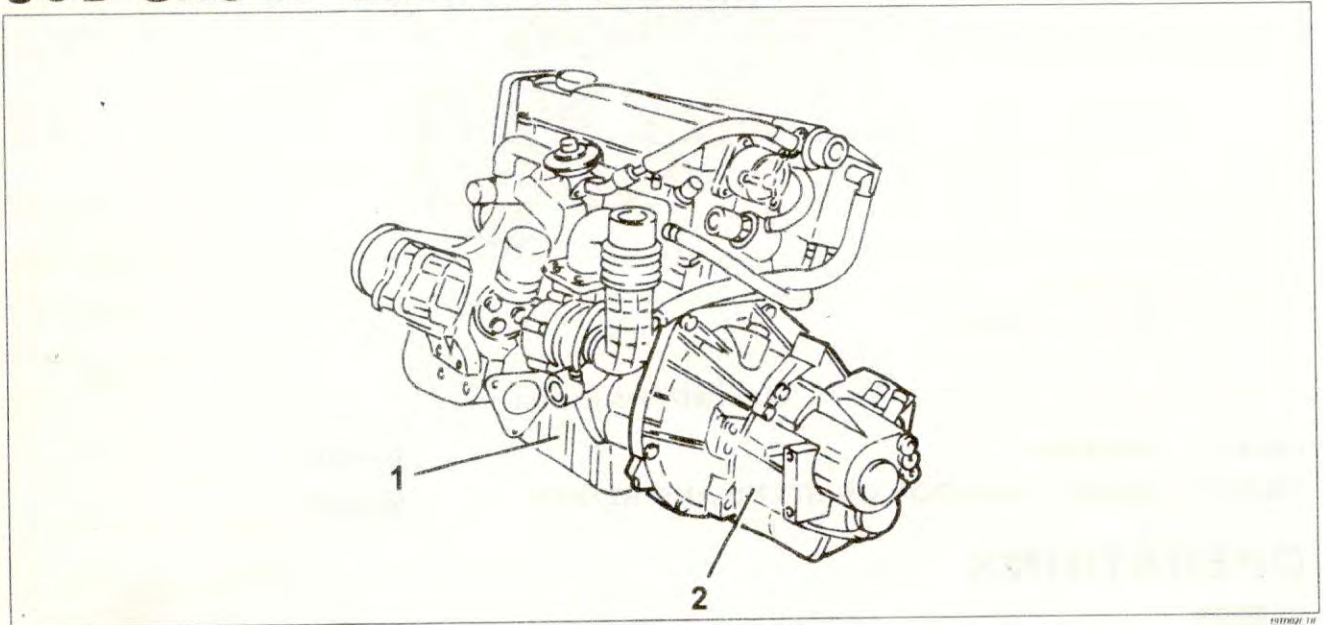
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1004D	REMOVE ENGINE AND WASH	AR32302
1004E	ENGINE ASSEMBLY INSPECTION AND REPAIRS	AR32302

SUB-GROUP GRAPHIC INDEX



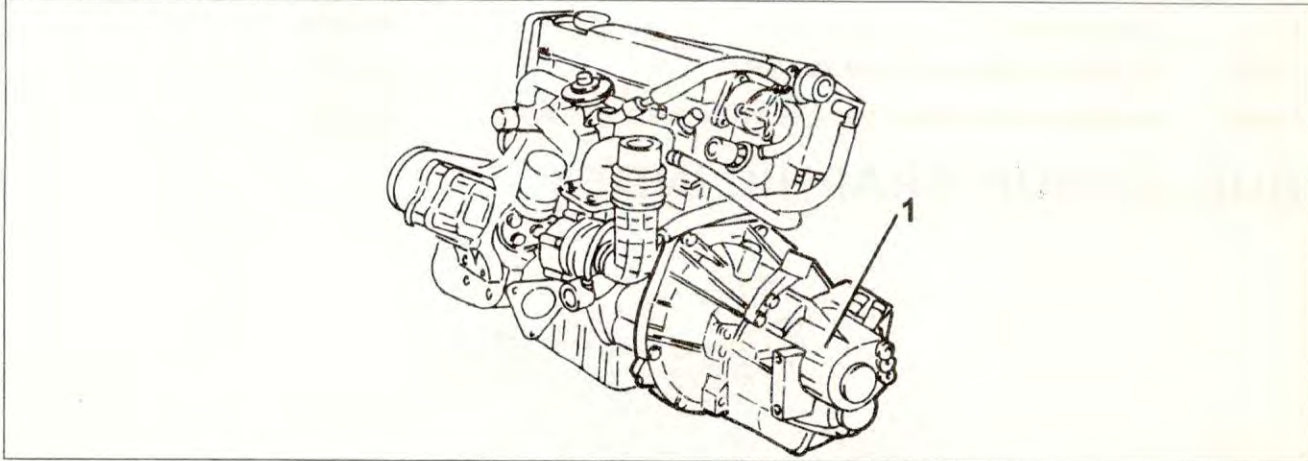
<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
(1)	POWER UNIT ASSEMBLY	1004B
2	REMOVE ENGINE AND WASH	1004D



AR32302

1004D - REMOVE ENGINE AND WASH

VIEW OF ASSEMBLY



Ref.	Description
1	MANUAL GEARBOX

Operations index

Code	Operation	Validity
1004D40	ENGINE - POSITION ON STAND AND REMOVE	AR32302

OPERATIONS

AR32302

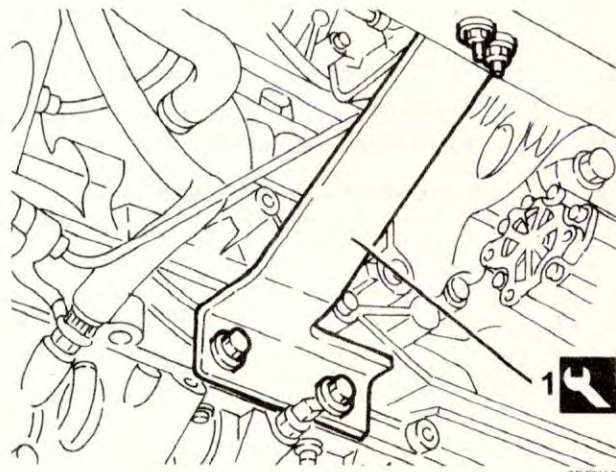
1004D40 - ENGINE - POSITION ON STAND AND REMOVE

AR32302

- Sling and sustain engine, using an hydraulic A-frame with appropriate chains.
 - Assemble engine on overhaul stand, using appropriate commercial tools.
1. Use of the engine supporting tool on the overhauling stand is possible.



Description	Code
1 Rods	1.861.001.139



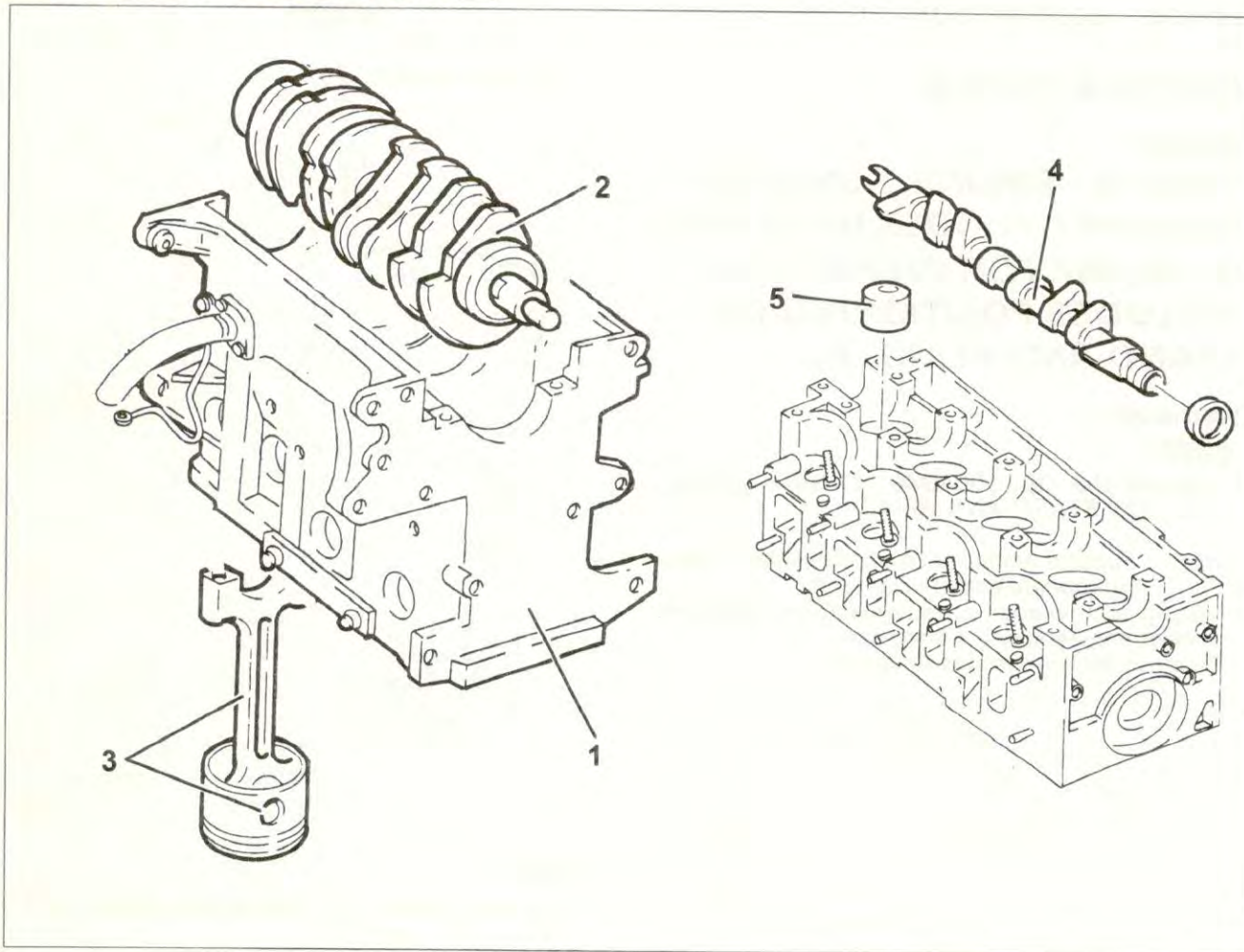
AR32302

- Free engine of sling.
- Sling and sustain engine, using an hydraulic A-frame with appropriate chains.
- Unscrew catches and remove engine complete with support tools.
- Unscrew catches and remove support tools from engine, then put them away.

AR32302

1004E - ENGINE ASSEMBLY INSPECTION AND REPAIRS

VIEW OF ASSEMBLY



Ref.	Description
(1)	CRANKCASE AND COMPONENTS
(2)	CRANKSHAFT
(3)	CON RODS AND PISTONS (3 CYLINDERS)
(4)	CAMSHAFT IN CRANKCASE
(5)	TAPPETS AND ROCKER CARRIER
(6)	WATER PUMP AND THERMOSTAT

Operations index

Code	Operation	Validity
1004E10	ENGINE, REMOVED - REMOVE CYLINDER HEAD AND OIL SUMP FOR INSPECTION - INCLUDES POSITIONING ON STAND AND REMOVAL	AR32302



Code	Operation	Validity
1004E20	ENGINE - DISMANTLE AND RE-BUILD FOLLOWING OPERATION 1004E10 - WASH AND CHECK DISMANTLED PARTS - RE-FIT CYLINDER HEAD AND OIL SUMP - DOES NOT INCLUDE REPAIRS TO CYLINDER HEAD AND AUXILIARY UNIT	AR32302
1004E42	COMPRESSOR	AR32302

OPERATIONS

AR32302

1004E10 - ENGINE, REMOVED - REMOVE CYLINDER HEAD AND OIL SUMP FOR INSPECTION - INCLUDES POSITIONING ON STAND AND REMOVAL

Removal

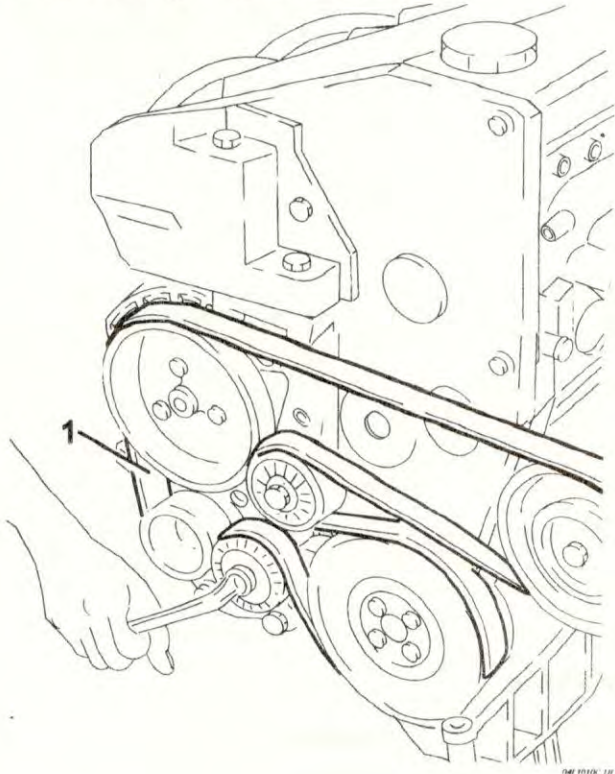
AR32302

- Follow the Op. 1004D40 ENGINE - POSITION ON STAND AND REMOVE

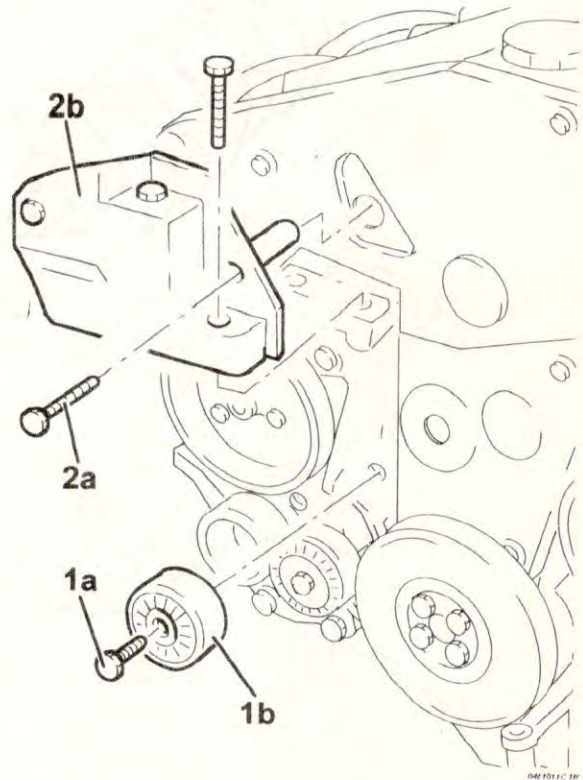
Note: Support engine with overhaul stand using appropriate commercial tools.

- Acting with wrench on automatic belt tensioner loosen engine systems drive belt.

1. Remove engine systems drive belt.



drive rod bracket (2b).

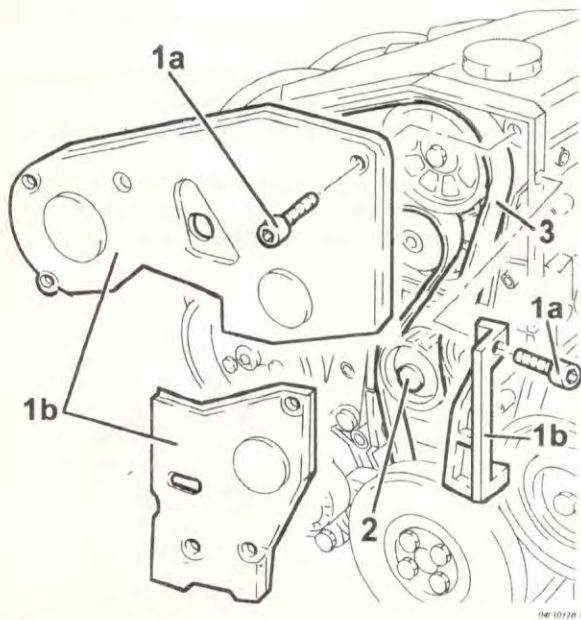


AR32302

1. Unscrew screws (1a) and remove timing control belt timing cases (1b).
2. Loosen timing belt tensioner nut.
3. Remove timing belt.

AR32302

1. Unscrew screw (1a) and remove engine systems drive belt guide pulley (1b).
2. Unscrew screws (2a) and remove powerplant



AR32302

- Unscrew screws and remove whole oil level control stem.
- 1. Unscrew pressure pump support lateral screws.
- 2. Disconnect pressure pump inlet pipe to manifold link (2a), pressure pump side, with tool (2b).



Description

Code

2b Wrench 1.870.671.000

- 3. Loosen pressure pump inlet pipe to manifold link (3a), manifold pump side, with tool (3b).

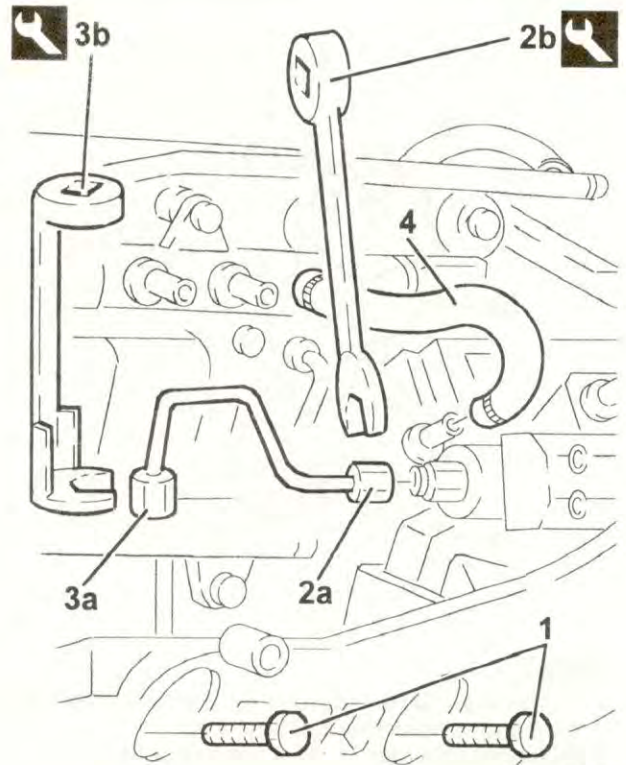


Description

Code

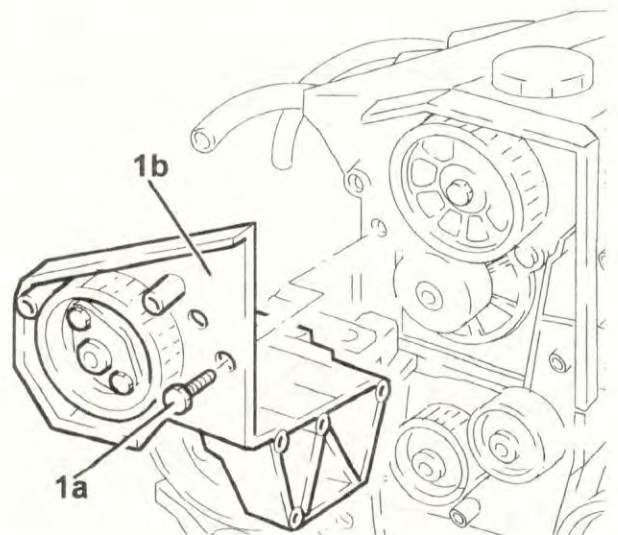
3b Wrench 1.870.672.000

- 4. Disconnect pressure pump to fuel return rigid pipe connecting pipe, rigid pipe side.



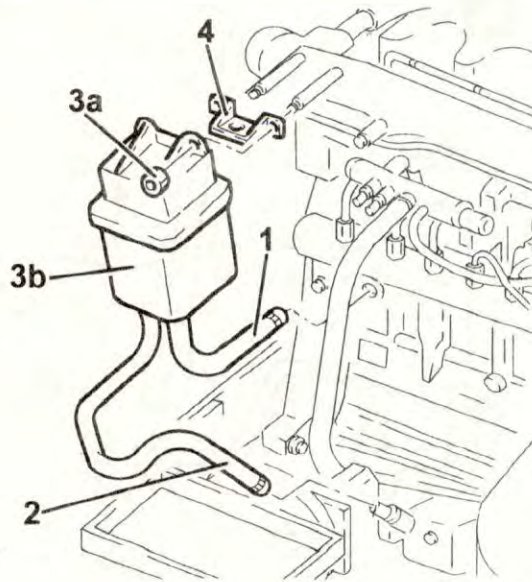
AR32302

- 1. Unscrew remaining front screws (1a) and remove support complete with pressure pump (1b).



AR32302

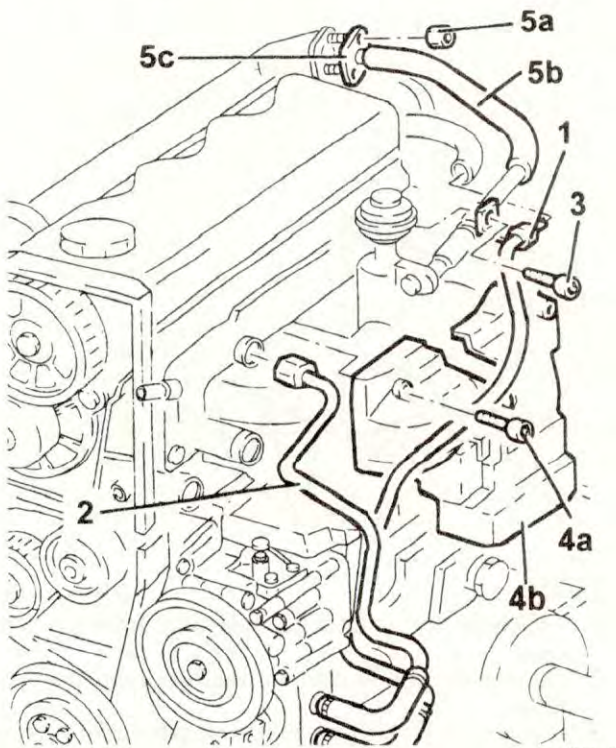
- 1. Disconnect oil vapour recover pipe from cylinder block.
- 2. Disconnect condensed oil recover pipe from oil sump.
- 3. Unscrew nuts (3a) and remove whole oil vapour separator (3b).
- 4. Remove bracket.



DAI 10119-10

AR32302

1. Disconnect water transfer pipe to water/oil heat exchanger from thermostatic cup.
2. Disconnect water/oil heat exchanger water outlet pipe from manifold.
3. Unscrew water/oil heat exchanger water inlet pipe screw.
4. Unscrew screws (4a) and remove turbocharger heatshield (4b).
5. Unscrew nuts (5a) and disconnect exhaust gas blow-by pipe (5b) complete with gasket (5c).

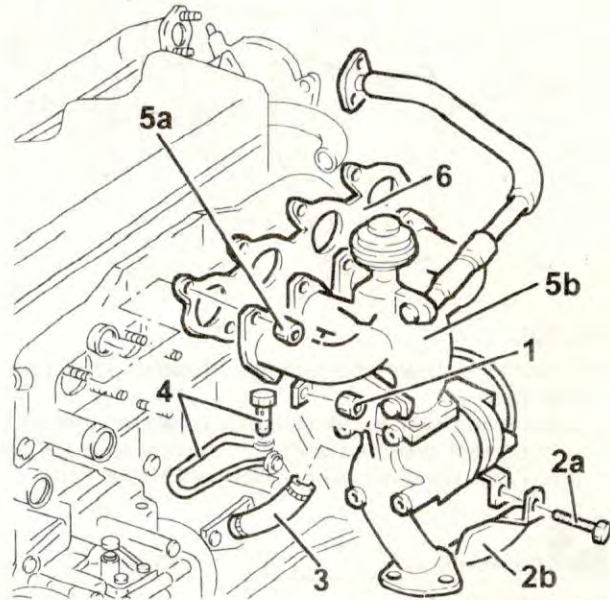


DAI 10119-10

AR32302

- Unscrew exhaust gas blow-by pipe bracket

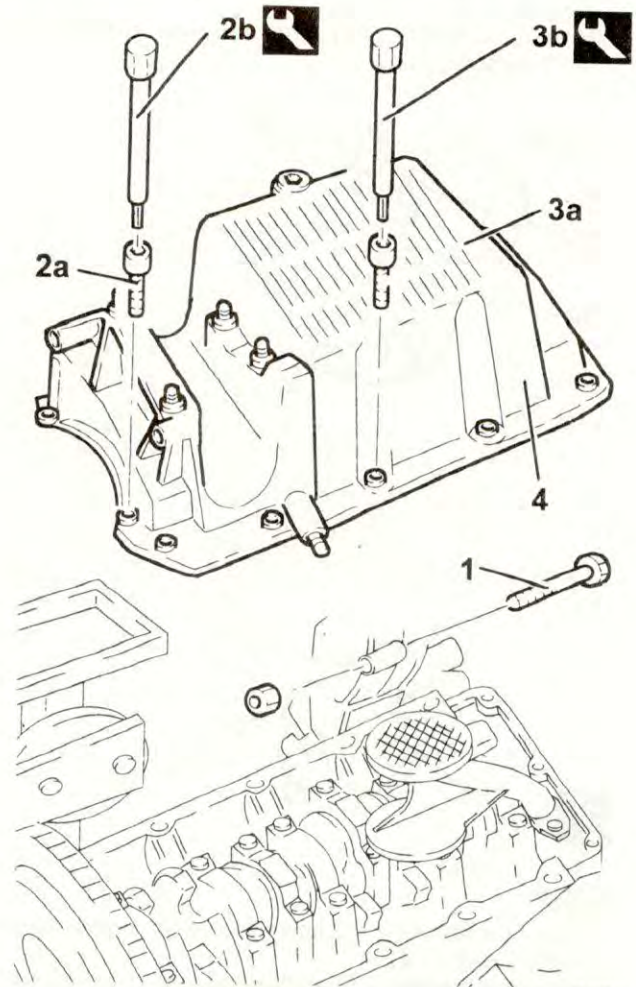
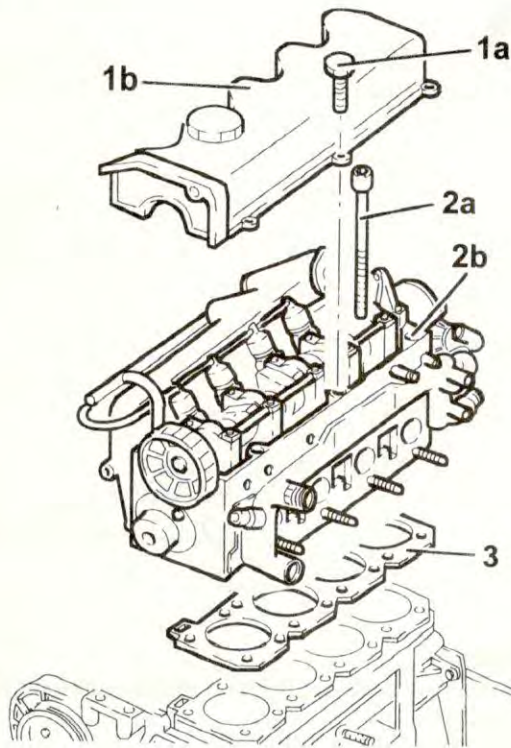
- screw.
1. Unscrew cylinder block exhaust manifold bracket nut.
 2. Unscrew screws (2a) and remove turbocharger to oil sump oil return pipe protection (2b).
 3. Disconnect oil sump oil return pipe from turbocharger.
 4. Disconnect oil inlet pipe from turbocharger.
 5. Unscrew nuts (5a) and remove exhaust manifold (5b) complete with turbocharger and E.G.R. valve.
 6. Remove seal.



DAI 10119-10

AR32302

1. Unscrew screws (1a) and remove tappet cover (1b) complete with seal.
2. Unscrew screws (2a) and remove whole cylinder head (2b).
3. Remove cylinder head seal.



AR32302

- Rotate engine by 180° on overhaul stand.
- 1. Unscrew oil sump to intermediate shaft support link bolt.
- 2. Unscrew front and rear oil sump screws (2a) with tool (2b).



Description	Code
2b Wrench	1.822.144.000

- 3. Unscrew lateral oil sump screws (3a) with tool (3b).



Description	Code
3b Wrench	1.822.145.000

- 4. Remove oil sump.

Note: Gently strike oil sump with resin hammer to unblock it, then move it with a screwdriver acting as a lever on appropriate cylinder block side projections.

AR32302

1004E20 - ENGINE - DISMANTLE AND RE-BUILD FOLLOWING OPERATION 1004E10 - WASH AND CHECK DISMANTLED PARTS - RE-FIT CYLINDER HEAD AND OIL SUMP - DOES NOT INCLUDE REPAIRS TO CYLINDER HEAD AND AUXILIARY UNIT

Disassembly

AR32302

- Rotate cylinder block by 180° on overhaul base-ment.
- 1. Unscrew bolts (1a) and remove alternator (1b).



Description	Connector
1b Alternator	A10

- 2. Unscrew screws (2a) and remove rear alternator

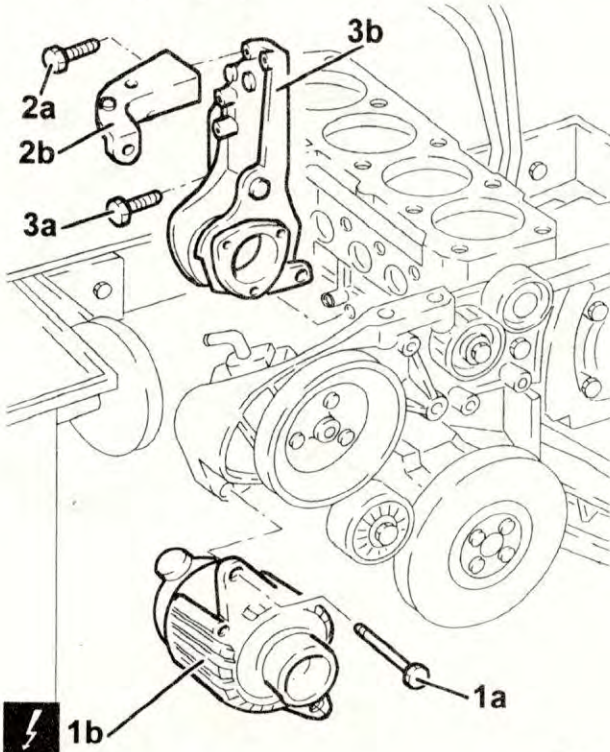
BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

1004

AR32302

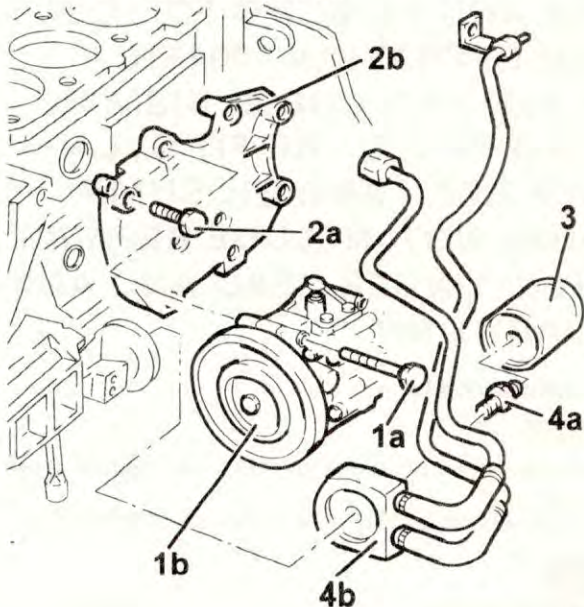


- support bracket (2b).
3. Extract screws (3a) and remove intermediate shaft support (3b).



AR32302

1. Unscrew screws (1a) and remove air-conditioner compressor (1b).
2. Unscrew screws (2a) and remove air-conditioner compressor support (2b).
3. Remove oil filter.
4. Unscrew pin (4a) and remove heat exchanger (4b) complete with pipes.



AR32302

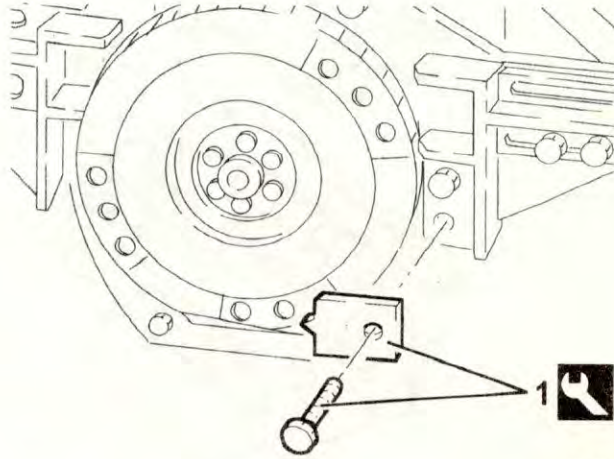
1. Assemble tool.



Description

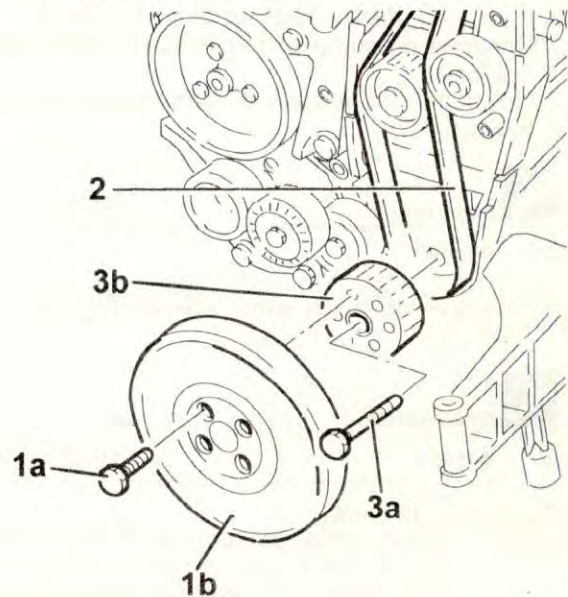
Code

- | | | |
|---|---------------|---------------|
| 1 | Countertorque | 1.820.624.000 |
|---|---------------|---------------|



AR32302

1. Unscrew screws (1a) and remove crankshaft pulley (1b).
2. Remove timing belt.
3. Unscrew screw (left-handed) (3a) and remove driving toothed pulley (3b).



AR32302

1. Unscrew screws (1a) and remove flywheel (1b).
2. Remove tool.



Description

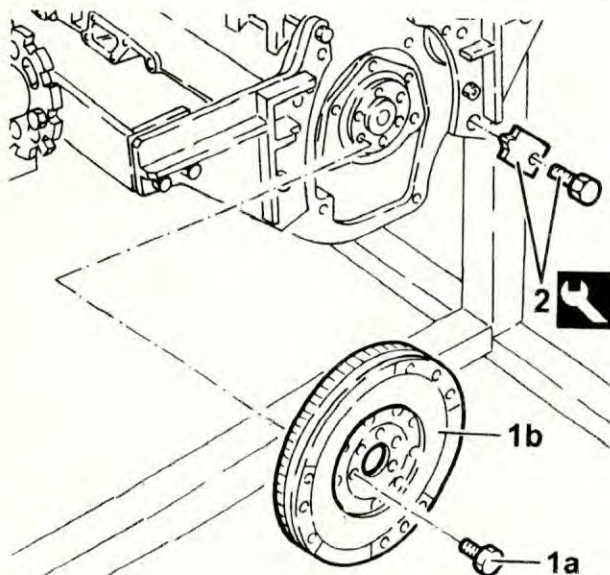
Code

- | | | |
|---|---------------|---------------|
| 2 | Countertorque | 1.820.624.000 |
|---|---------------|---------------|

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

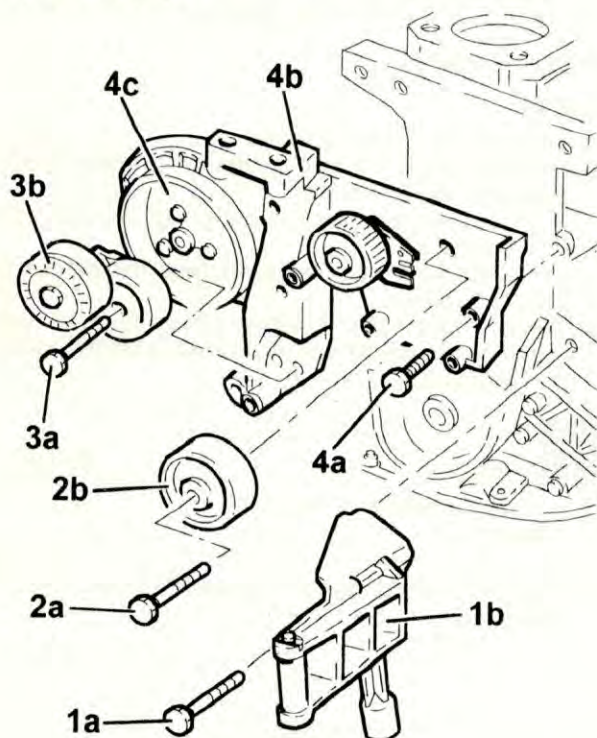
AR32302

1004



AR32302

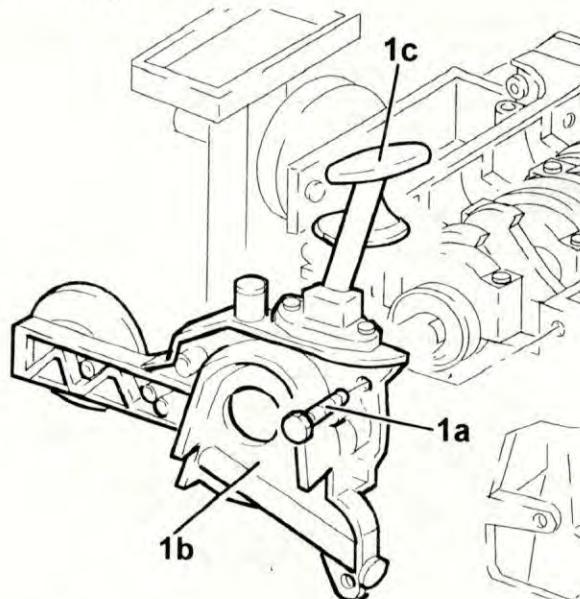
1. Unscrew screws (1a) and remove powerplant support, timing side (1b).
2. Unscrew screw (2a) and remove timing control fixed tensioner (2b).
3. Unscrew screw (3a) and remove auxiliary systems control belt automatic belt tensioner (3b).
4. Unscrew screws (4a) and remove support (4b) complete with hydrodrive pump (4c) and timing belt tensioner.



AR32302

1. Unscrew screws (1a) and remove front cylinder block cover together with oil pump (1b) com-

- plete with inlet vent (1c).
- Remove gasket.



AR32302

- Assemble tool.



Description

Code

- | | |
|----------|---------------|
| - Flange | 1.820.618.000 |
|----------|---------------|

- Rotate cylinder block by 180° on overhaul stand.
- 1. Unscrew screws (1a) and remove conrod cap (1b).
- 2. Remove lower conrod halfbearing.
- 3. Remove conrod-piston assembly.
- 4. Remove upper conrod halfbearing.
- Operate likewise to remove pistons and conrods from other cylinders.
- Remove tool.



Description

Code

- | | |
|----------|---------------|
| - Flange | 1.820.618.000 |
|----------|---------------|

5. Unscrew screws (5a) and remove rear cylinder block cover (5b) together with oil seal ring.
- Check crankshaft endplay falls within tolerance values, using a magnetic base with comparator.



Measure

Value

- | | |
|-------------------|---------------|
| - Axial play (mm) | 0.049 - 0.211 |
|-------------------|---------------|

- If endplay does not fall within tolerance values, rectify seat on cylinder block during assembly and use appropriately large half rings.
- 6. Unscrew screws (6a) and remove main caps (6b).
- 7. Remove lower main halfbearings.
- 8. Remove crankshaft.
- 9. Unscrew screws (9a) and remove crankshaft

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

1004

AR32302

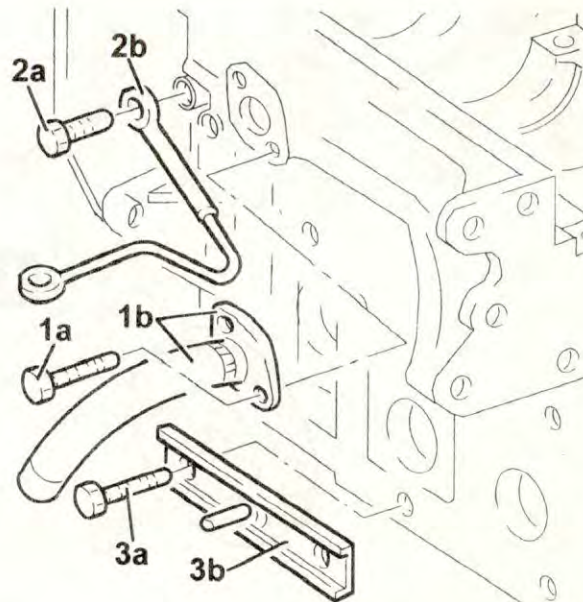
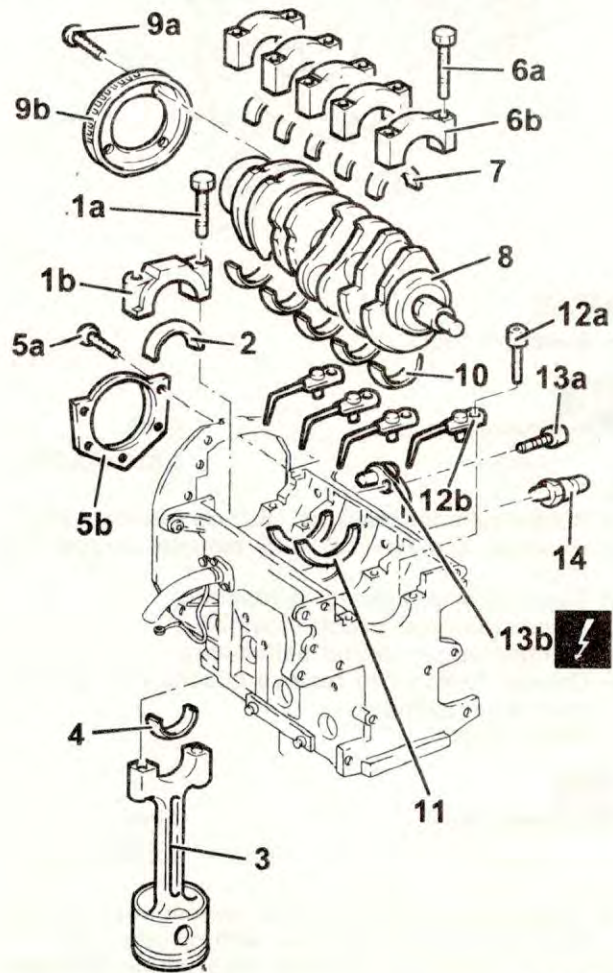


- phonic wheel (9b).
- 10. Remove upper main halfbearings.
- 11. Remove half rings.
- 12. Unscrew screws (12a) and remove castings (12b) from cylinder block.
- 13. Unscrew screw (13a) and remove R.P.M. and phase sensor (13b).



Description	Connector
13 Rpm sensor b	K46

- 14. Remove engine oil minimum pressure light.



AR32302

- Rotate cylinder block by 90° on overhaul stand.
- Unscrew screws and remove cylinder block from support bracket, then place it on appropriate work table.
- Unscrew screws and remove flywheel protection.
- **Follow the Op. 1028H60 PISTON, PIN SET - REPLACE**
- Unscrew screws and remove oil pump inlet vent.
- **Follow the Op. 1084B18 ENGINE OIL PUMP, REMOVED - CHECK AT BENCH**

Reassembly

AR32302

- Wash components removed.
- Assemble water/oil seal plugs on cylinder block, using appropriate tools.
- Lubricate all mechanical coupling components with engine oil.
- Check cylinder head support face for cracks or superficial lines.
- Check cylinder head support face flatness falls within tolerance values, if it doesn't rectify cylinder head support face.



Measure	Value
- Cylinder head face flatness (mm)	0.1

AR32302

1. Unscrew screws (1a) and remove flange (1b) complete with oil return to oil sump from turbo-charger pipe.
2. Unscrew link (2a) and remove oil transfer to turbo-charger pipe (2b).
3. Unscrew screws (3a) and remove turbocharger support bracket (3b).

1. Measure cylinder barrel diameters following illustrated table.

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

AR32302

1004



Measure

		Value
1	Cylinder liner diameter (mm)	Class A 82.000 - 82.010
		Class B 82.010 - 82.020
	-	Class C 82.020 - 82.030

- Check cylinder barrel taper ratios fall within tolerance values.



Measure

	Value
- Cylinder barrel taper (mm)	0.005

- Check cylinder barrel ovality falls within tolerance value.



Measure

	Value
- Cylinder liner ovality (mm)	0.05

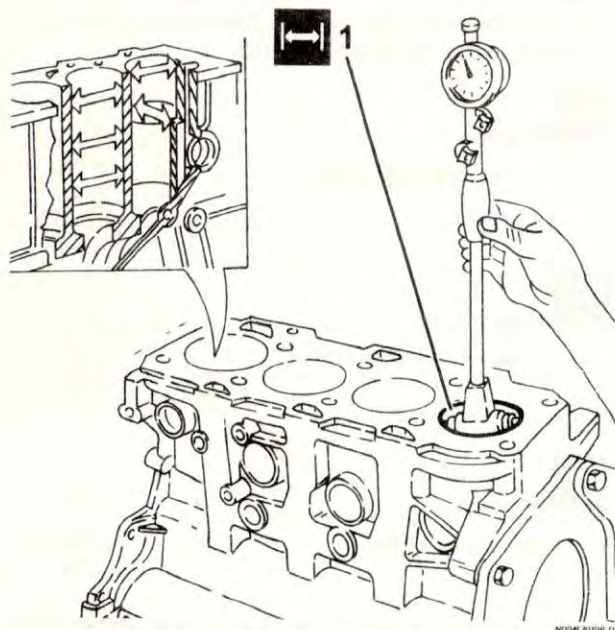
- If cylinder barrel diameter does not fall within tolerance values, ream cylinder barrel following prescribed oversizing values.

Note: When reaming, all barrels must be oversized by same amount.



Measure

	Value
- Cylinder liner uprating (mm)	0.1

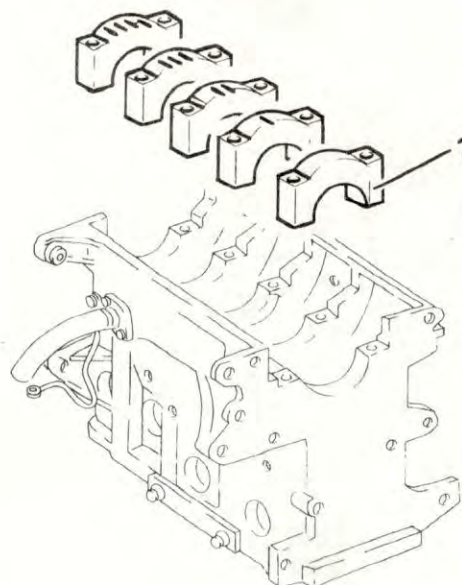


AR32302

1. Assemble main caps.

Note: Main caps bear progressive chips (from nil to four starting from engine front side)

which indicate position during assembly.



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AR32302

1. Tighten main caps screws (1a) at the prescribed torque, using tool (1b) to tighten at an angle.



Mounting

	Component	Ø	Value (daNm)
1A	Screw	FRONT RUBBER MOUNTS	M12 2.4 - 2.6 + 100°



Description

	Description	Code
1b	Goniometer	1.860.942.000

2. Check main pin holes diameter falls within tolerance values.



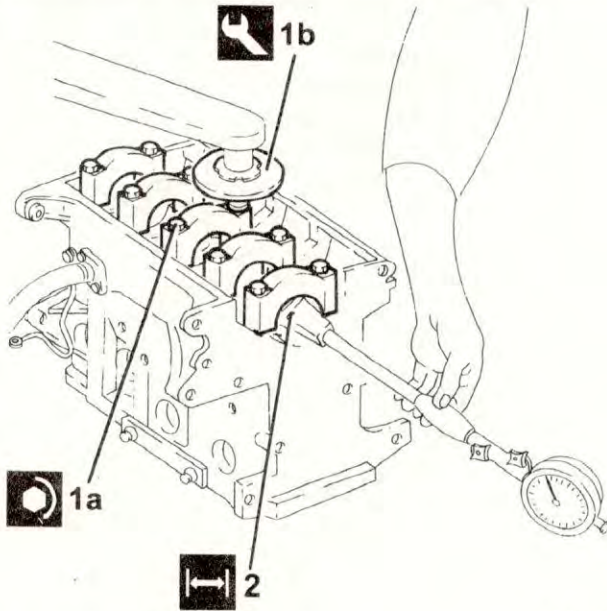
Measure

	Value
- Main journal seat diameter (mm)	63.691 - 63.732

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

1004

AR32302



AR32302

- Check crankshaft lubrication channels are free.
- Check main pins diameter falls within tolerance values.

Measure	Value
- Main journal diameter (mm)	Class A 59.982 - 59.988
	Class B 59.988 - 59.994
	Class C 59.994 - 60.000

- If main pins diameter does not fall within tolerance values, rectify it following prescribed undersizing.

Measure	Value
- Main journal undersizing (mm)	0.127

- Check conrod pins diameter falls within tolerance values.

Measure	Value
- Connecting rod journal diameter (mm)	Class A 50.799 - 50.805
	Class B 50.793 - 50.799
	Class C 50.787 - 50.793

- If conrod pins diameter does not fall within tolerance values, rectify it following prescribed undersizing.

Measure	Value
- Pivot undersizing (mm)	0.127

- Check conrod small end bushes internal diameter falls within tolerance values, if it doesn't substitute worn conrod small end bush (op. ref. **1028H58** CONNECTING ROD SMALL END BUSH - REPLACE).

Measure	Value
- Inner diameter (mm)	26.006 - 26.012

- Check piston bushes internal diameter falls within tolerance values, if it doesn't substitute whole piston complete with piston rings, pin and bushes.

Measure	Value
- Piston bush inner diameter (mm)	25.999 - 26.004

- Check piston pins external diameter falls within tolerance values, if it doesn't, substitute worn piston pin..

Measure	Value
- Outer diameter (mm)	25.982 - 25.988

- Insert piston rings into cylinder barrel and check ring end light falls within tolerance values, if it doesn't substitute piston ring.

Measure	Value
- 1° seal ring light (mm)	0.25 - 0.40

Measure	Value
- 2° seal ring light (mm)	0.25 - 0.50

Measure	Value
- Oil ring gap (mm)	0.25 - 0.50

- Check external piston diameter falls within tolerance values, if it doesn't substitute whole piston complete with piston rings and pin.

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

AR32302

1004



Measure	Value
- Outer diameter (mm)	Class A 81.783 - 81.797
	Class B 81.793 - 81.807
	Class C 81.803 - 81.817

Note: Note at a right angle with pin axis, at 8 mm from lower skirt.

1. Check endplay (1a) between 2nd ring (1b) and its piston seat (1c) falls within tolerance values.

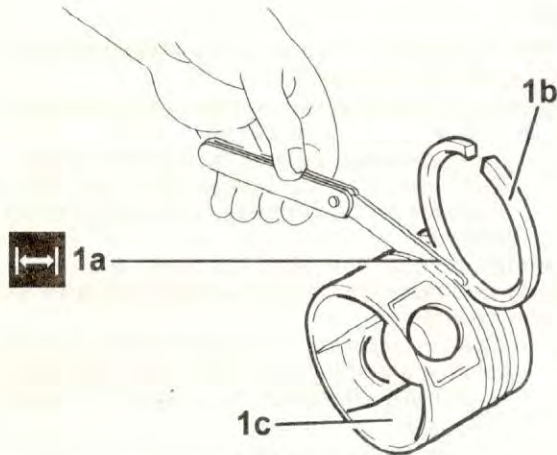


Measure	Value
- Axial play (mm)	0.002 - 0.006

- Check endplay between scraper ring and its piston seat falls within tolerance values.



Measure	Value
- Axial play (mm)	0.030 - 0.065



AR32302

1. Assemble conrod caps (1b) on conrods (1a) and fasten them with their screws (1c) at the prescribed torque.

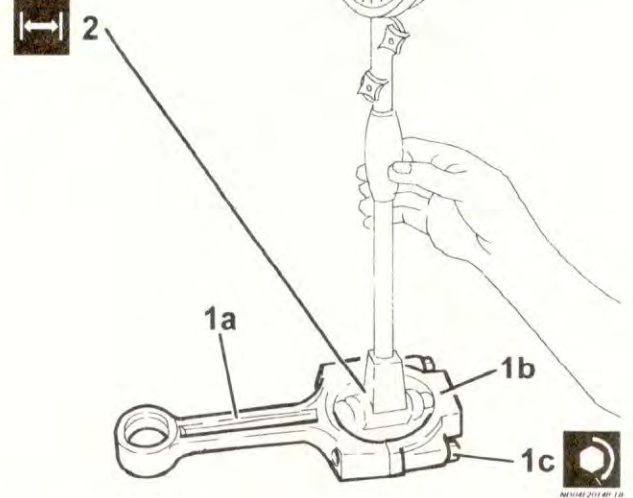


Mounting	Component	∅	Value (daNm)
- Screw	Connecting rod caps	M9	2.4 - 2.6 + 60°

2. Check conrod big end diameter falls within tolerance values, if it doesn't substitute conrod.



Measure	Value
- Connecting rod big end diameter (mm)	53.883 - 53.923



AR32302

- Complete with Op. 1028H60 PISTON, PIN SET - REPLACE
- Complete with Op. 1084B18 ENGINE OIL PUMP, REMOVED - CHECK AT BENCH
- Assemble inlet vent and fasten it with its screws.
- Check flywheel toothed crown is free of engagement marks, if it isn't substitute it.
- Assemble flywheel protection on cylinder block and fasten it with its screws.
- Assemble cylinder block on overhaul table and fasten it with its screws.
- Assemble turbocharger support bracket and fasten it with its screws.
- Assemble oil transfer to turbocharger pipe and fasten its link.
- Assemble flange complete with oil return to oil sump from turbocharger pipe and fasten it with its screws.
- Assemble engine oil minimum pressure light and tighten it at the prescribed torque.



Mounting	Component	∅	Value (daNm)
- -	OIL PRES-SURE W/L	-	1.9 - 2.3

- Assemble R.P.M. and phase sensor and fasten it with its screw.



Description	Connector
- Rpm sensor	K46

- Assemble castings onto cylinder block and fasten

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

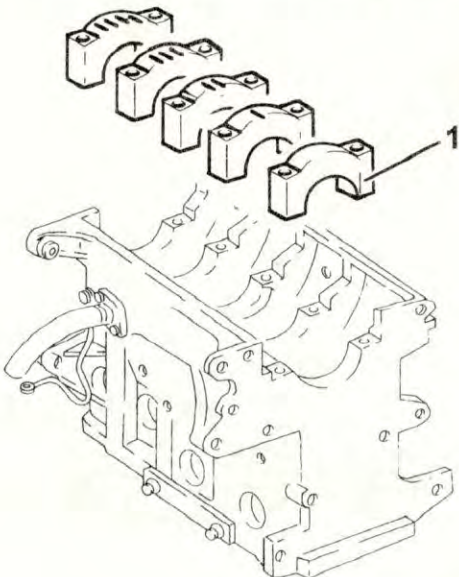
1004

AR32302



- them with their screws.
- Assemble crankshaft phonic wheel and fasten it with its screws.
- Assemble crankshaft onto cylinder block.
- Assemble half rings on 3rd main bearing.
- 1. Assemble main caps complete with halfbearings.

Note: *Main caps bear progressive chips (from nil to four starting from engine front side) which indicate position during assembly.*



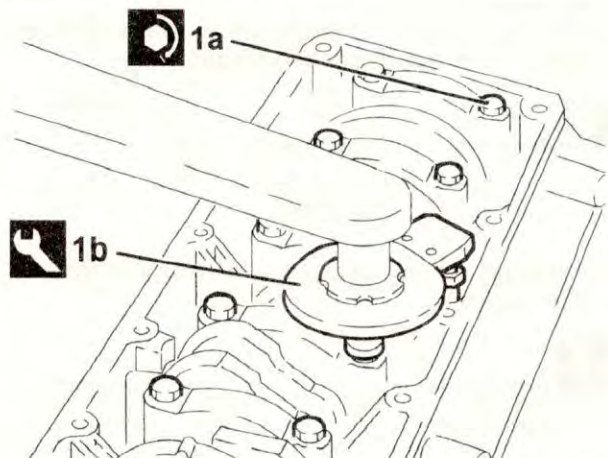
MEV201142 1/11

AR32302

1. Tighten main caps screws (1a) at the prescribed torque using tool (1b) to tighten at an angle.

Mounting	Component	Ø	Value (daNm)
- Screw	FRONT RUB-BER MOUNTS	M12	2.4 - 2.6 + 100°

Description	Code
1b Goniometer	1.860.942.000



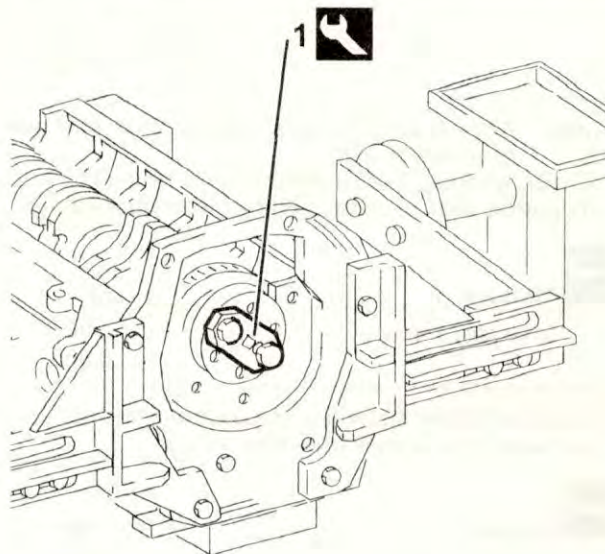
MEV201141 1/11

AR32302

1. Assemble tool.



Description	Code
1 Flange	1.820.618.000



IMV 201126 1/11

AR32302

- Rotate crankshaft with previously assembled tool till cylinder has reached B.D.C.

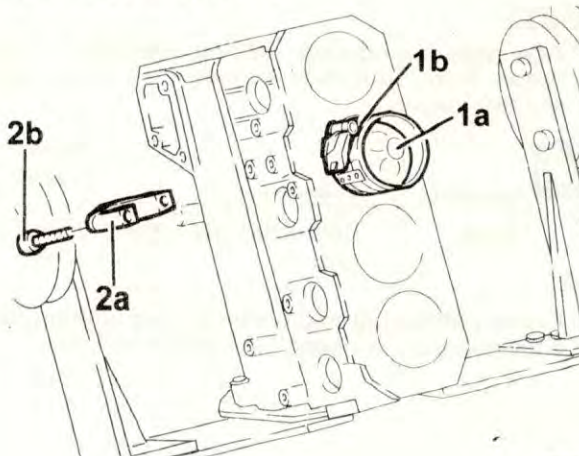
1. Assemble conrod-piston assembly (1a) complete with halfbearing using tool (1b).

Note: *Conrod-piston assemblies must be assembled into cylinder block so that blast chamber on piston head is turned towards inlet side.*

2. Assemble conrod cap (2a) complete with half-bearing and fasten it with its screws (2b) without tightening them.

Note: *Conrod caps must be assembled so that number stamped on them is on same side as number stamped on conrod big end (inlet side).*

- Operate likewise to assemble conrods and pistons into other cylinders.



IMV 201126 1/11


BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

AR32302

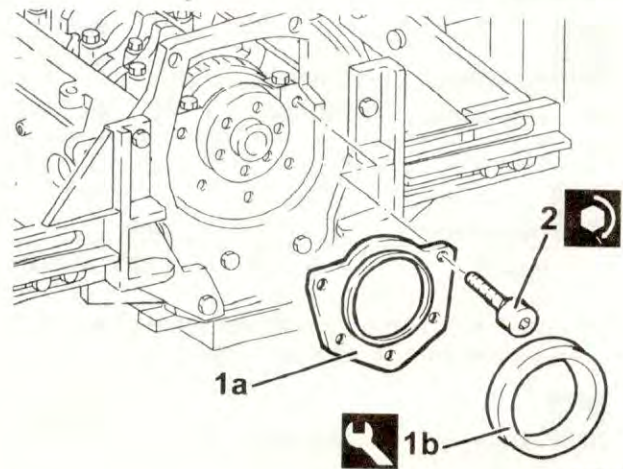
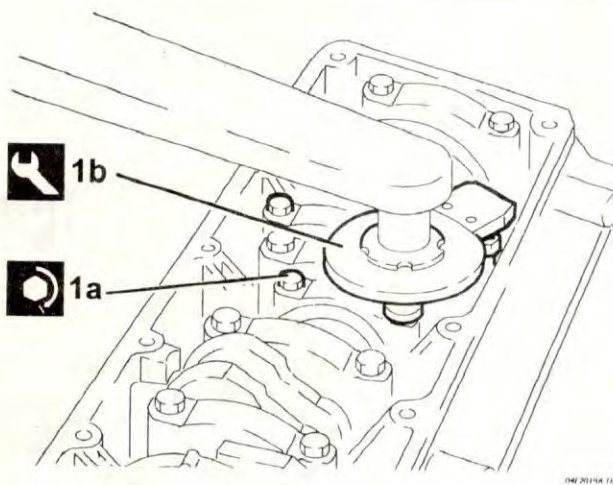
1004

AR32302

1. Tighten conrod caps screws (1a) at the prescribed torque, using tool (1b) to tighten at an angle.

 Mounting	Component	Ø	Value (daNm)
1a Screw	Connecting rod caps	M9	2.4 - 2.6 + 60°

 Description	Code
1b Goniometer	1.860.942.000



AR32302

1. Assemble front cylinder block cover together with oil pump (1a) complete with inlet vent (1b).
2. Tighten front cylinder block cover screws at the prescribed torque.

 Mounting	Component	Ø	Value (daNm)
- Screw	CRANKSHAFT FRONT COVER	M6	0.8 - 1.0

AR32302

- Remove tool.

 Description	Code
- Flange	1.820.618.000

1. Assemble rear cylinder block cover (1a) together with oil seal ring, using tool (1b).

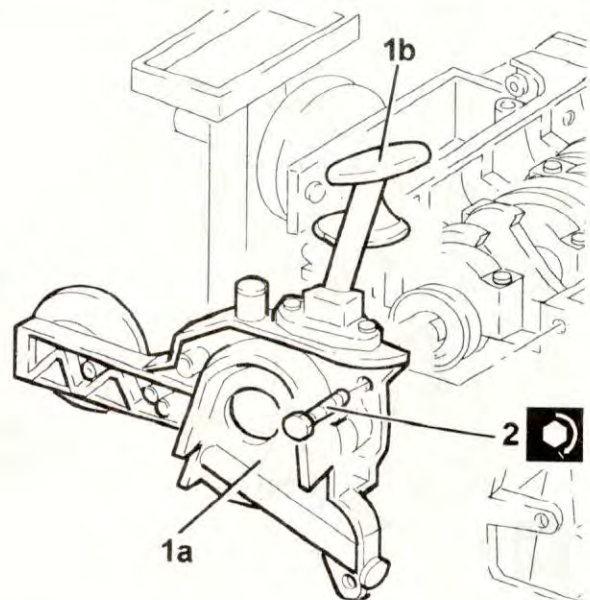
 Description	Code
- Taker-in	1.820.619.000

2. Tighten rear cylinder block cover screws at the prescribed torque.

 Mounting	Component	Ø	Value (daNm)
- Screw	FLYWHEEL SIDE COVER	M6	0.8 - 1.0


- Remove tool.

 Description	Code
- Taker-in	1.820.619.000



AR32302

- Apply sealing compound on whole oil sump perimeter.

 Type	Component	Description	Q.ty.
- Silicone sealant	OIL SUMP	-	-


1. Assemble oil sump.
2. Tighten oil sump lateral screws (2a) at the prescribed torque with tool (2b).

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

1004


AR32302




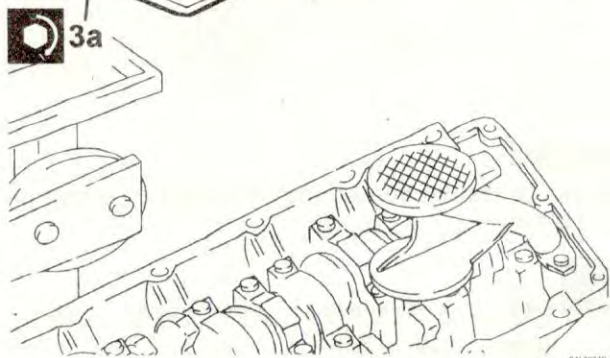
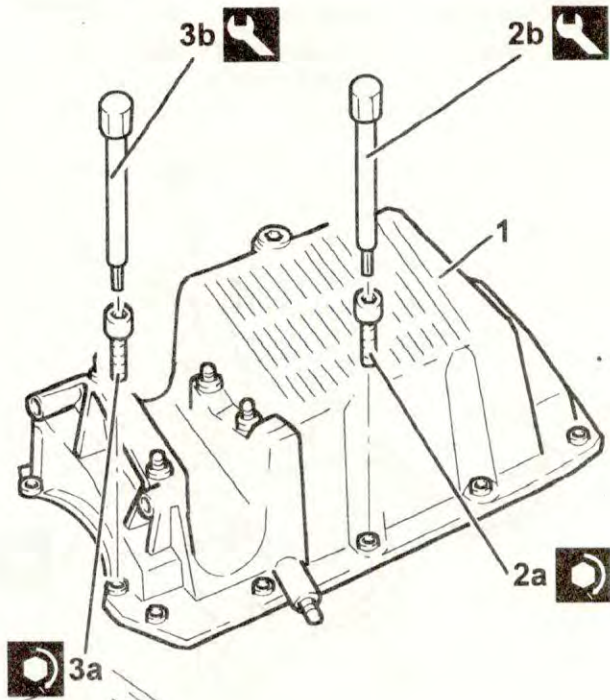
	<i>Mounting</i>	<i>Component</i>	\emptyset	Value (daNm)
2a	Side screws	OIL SUMP	M8	2.1 - 2.6

	<i>Description</i>	<i>Code</i>
2b	Wrench	1.822.145.000

3. Tighten oil sump front and rear screws (3a) at the prescribed torque with tool (3b).

	<i>Mounting</i>	<i>Component</i>	\emptyset	Value (daNm)
3a	Front and rear screws	OIL SUMP	M6	0.7 - 0.9

	<i>Description</i>	<i>Code</i>
3b	Wrench	1.822.144.000



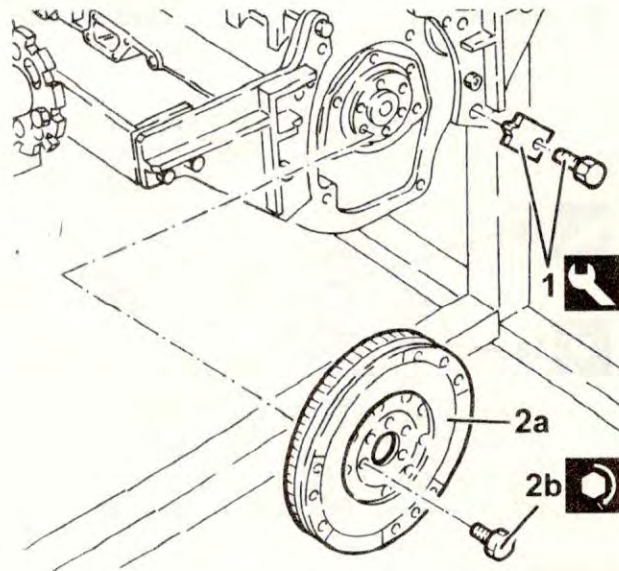
AR32302

- Rotate engine by 180° on overhaul stand.
1. Assemble tool.

	<i>Description</i>	<i>Code</i>
1	Countertorque	1.820.624.000

2. Assemble flywheel (2a) and tighten its screws (2b) at the prescribed torque.

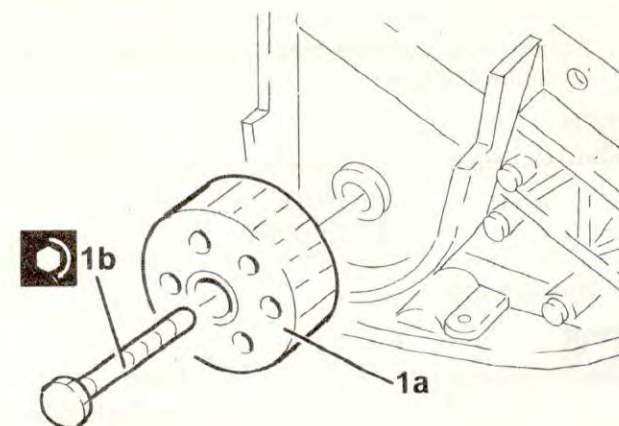
	<i>Mounting</i>	<i>Component</i>	\emptyset	Value (daNm)
2b	Screw	FLYWHEEL	M12	13.6 - 16.8



AR32302

1. Assemble driving toothed pulley (1a) and tighten its screw (left-handed) (1b) at the prescribed torque.

	<i>Mounting</i>	<i>Component</i>	\emptyset	Value (daNm)
1b	Screw	TOOTHED DRIVE PULLEY	M16	30.6 - 37.8



04/2024A 10

BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

1004



AR32302

AR32302

- Remove tool.



Description	Code
- Countertorque	1.820.624.000

- Assemble oil transfer to turbocharger pipe onto cylinder block.
- Assemble hydrodrive pump complete with support bracket.
- Assemble timing control fixed tensioner and fasten it with its screws.
- Assemble timing side powerplant support.
- Assemble auxiliary systems belt automatic belt tensioner and fasten it with its screw.
- Assemble heat exchanger complete with pipes and fasten it with its pin.
- Assemble oil filter.
- Assemble air-conditioner compressor support and fasten it with its screws.
- Assemble air-conditioner compressor and fasten it with its screws without tightening them.
- Assemble intermediate shaft support and fasten it with its screws.
- Assemble intermediate shaft support to cylinder block link bolt.
- Assemble rear alternator support bracket and fasten it with its screws without tightening them.
- Assemble alternator and fasten it with its bolts.

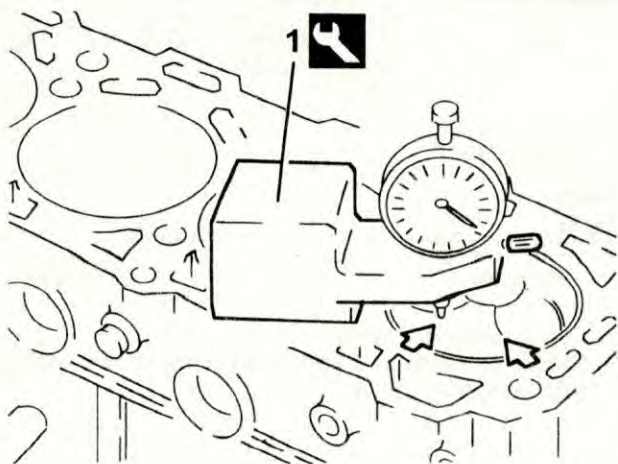


Description	Connector
- Alternator	A10

- Tighten rear alternator support bracket screws.
 - Assemble support complete with pressure pump and fasten it with its lateral screws without tightening them.
- Note piston protrusion at two opposite points, on pin axis with tool and calculate average of the two values for each piston.



Description	Code
1 Comparater mount	1.820.253.000



AR32302

- Choose cylinder head seal, considering highest piston protrusion average.



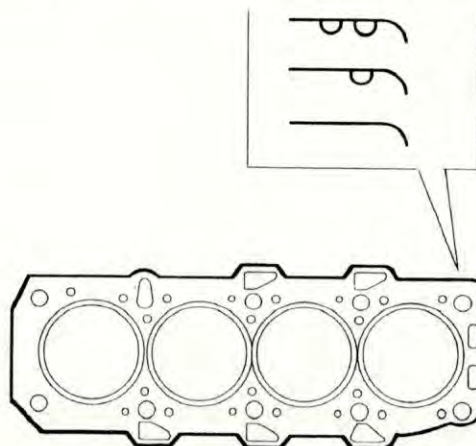
Measure	Value
- Piston maximum average projection thickness (mm)	0.795 - 0.881
Seal thickness no notches (mm)	1.55 - 1.65



Measure	Value
- Piston maximum average projection thickness (mm)	0.881 - 0.967
Gasket thickness (mm)	1.65 - 1.75



Measure	Value
- Piston maximum average projection thickness (mm)	0.967 - 1.055
Seal thickness two notches (mm)	1.75 - 1.85



AR32302

- Place cylinder head centering bushes on cylinder block.
- Assemble chosen cylinder head seal.

Note: Cylinder head seal is of ASTADUR type. The material it's made of undergoes a polymerization process during engine operation, therefore becoming considerably harder.

To make sure seal polymerization process takes place it is necessary to:

- keep seal sealed in its wrapping till assembly;
 - avoid lubrication or accidental spilling of oil on seal and contact surfaces.
 - Place cylinder head on cylinder block.
- Tighten cylinder head screws (1a) at the prescribed torque using tool (1b) to tighten at an


BENCH REPAIR PROCEDURES ENGINE AND POWER UNIT

1004

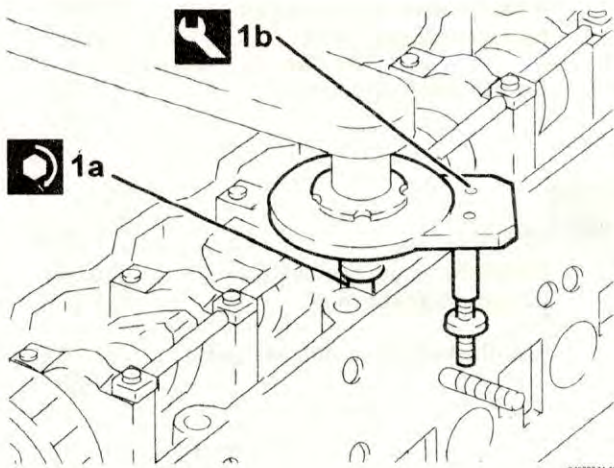
AR32302



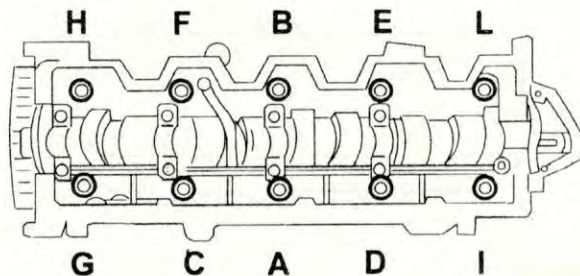
angle.
For each tightening sequence follow illustrated sequence.

				Value (daNm)
Mounting	Component	Ø		
1a	Screw	CYLINDER HEAD	M10	6.5 + 90° + 90° + 90°

		
Description		Code
1b	Goniometer	1.860.942.000



AR32302



04/2015A 16

AR32302

- Assemble tappet cover complete with seal and fasten it with its screws at the prescribed torque.


				Value (daNm)
Mounting	Component	Ø		
-	Screw	CAM COVER	M6	0.8 - 1.0

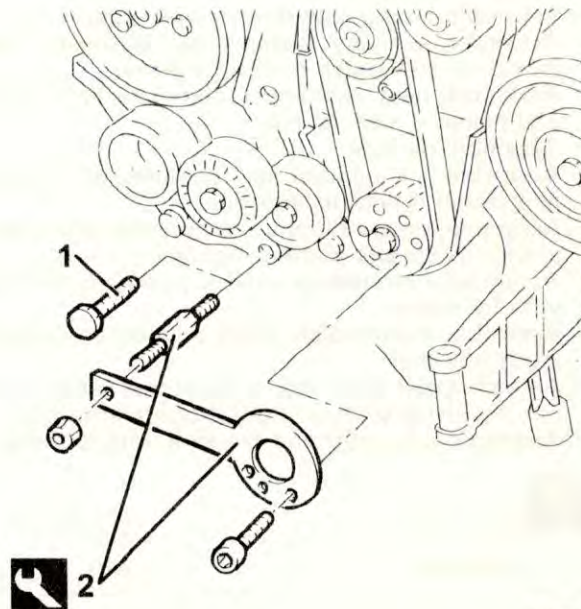
- Assemble front pressure pump support screws and tighten them together with rear screws pre-

viously assembled.

1. Remove indicated oil pump screw.
- Provisionally assemble timing control toothed belt on driving pulley.
2. Assemble tool.

Note: Gently rotate crankshaft, to insert centering dowel on timing control toothed belt driving pulley, using hole on tool.


		
Description		Code
2	Template	1.860.905.000



04/2015A 16

AR32302

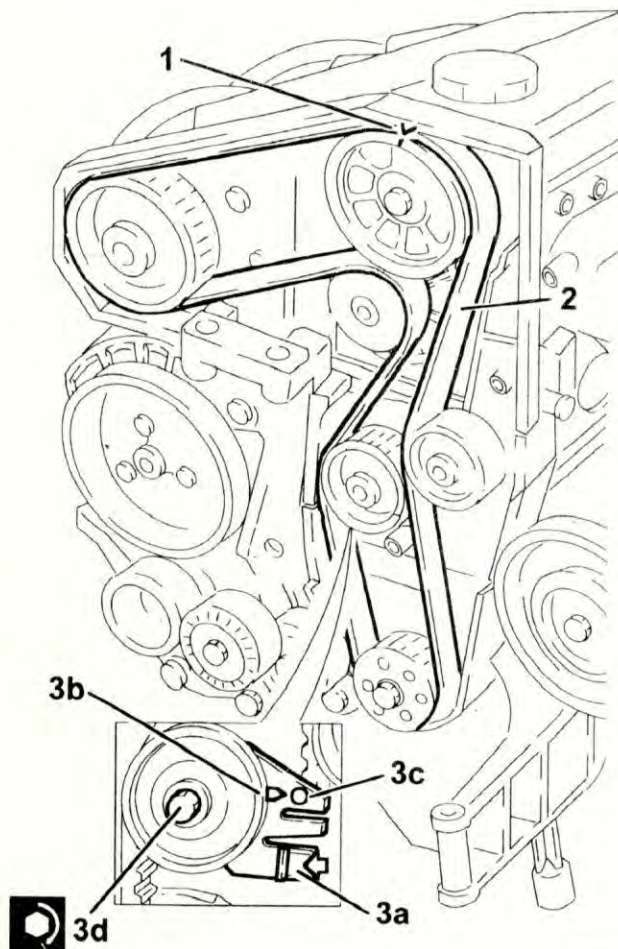
1. Rotate driven toothed pulley till phasing marks coincide.
2. Fully assemble timing control toothed belt.
3. Acting with screwdriver as a lever (3a) move tensioner mark (3b) to reference hole (3c) and tighten belt tensioner nut at the prescribed torque (3d).

				Value (daNm)
Mounting	Component	Ø		
-	Nut	MOBILE TIMING TENSIONER	M10	4.2 - 5.2

- Remove tool.

		
Description		Code
-	Template	1.860.905.000

- Turn crankshaft twice.
- Check phasing and tensioning marks on timing belt tensioner again.



AR32302

- Assemble timing control timing cases and fasten them with their screws.
- Assemble powerplant driving rod bracket.
- Assemble crankshaft pulley and fasten it with its screws.
- Assemble exhaust manifold seal.
- Assemble exhaust manifold complete with turbocharger and E.G.R. valve and fasten it with its nuts at the prescribed torque.

Mounting	Component	Ø	Value (daNm)
- Nut	EXHAUST MANIFOLD/S	M8	2.1 - 2.6

- Connect oil inlet to turbocharger.
- Connect oil sump oil return pipe to turbocharger.
- Assemble assemble turbocharger to oil sump return pipe protection and fasten it with its screws.
- Tighten exhaust manifold bracket nut to cylinder block.
- Assemble seal.
- Connect exhaust gas blow-by pipe and fasten it with its screws.
- Tighten gas blow-by pipe bracket screw.
- Assemble turbocharger heatshield and fasten it with its screws.
- Connect heat exchanger water outlet pipe link to

manifold.

- Tighten heat exchanger water outlet pipe screw.
- Connect water transfer to heat exchanger pipe.
- Assemble bracket.
- Assemble oil vapour separator complete with bracket and fasten it with its nuts.
- Connect oil sump condensed oil return pipe.
- Connect vapour recover pipe to cylinder block.
- Connect fuel inlet pipe to pressure pump.
- Tighten electroinjector side links at the prescribed torque with tool.

Mounting	Component	Ø	Value (daNm)
- Union pipe	FUEL MANIFOLD LINE TO INJECTORS	M12	1.9 - 2.3

Description	Code
- Wrench	1.870.672.000

- Tighten fuel manifold pipes to electroinjectors links, manifold side, at the prescribed torque with tool.

Mounting	Component	Ø	Value (daNm)
- Union pipe	FUEL MANIFOLD LINE TO INJECTORS	M14	Manifold side 2.6 - 3.2

Description	Code
- Wrench	1.870.671.000

- Assemble whole oil level stem and fasten it with its screws.
- Assemble engine systems drive belt guide pulley and fasten it with its screw.
- Acting with a wrench on automatic belt tensioner, assemble engine systems drive belt.
- **Complete with Op. 1004D40 ENGINE - POSITION ON STAND AND REMOVE**

AR32302

1004E42 - COMPRESSOR

AR32302

- Refer to op.. 1004E10 ENGINE, REMOVED - REMOVE CYLINDER HEAD AND OIL SUMP FOR INSPECTION - INCLUDES POSITIONING ON STAND AND REMOVAL
- Refer to op.. 1016E10 SINGLE CYLINDER HEAD, REMOVED - OVERHAUL
- Refer to op.. 1004E20 ENGINE - DISMANTLE AND RE-BUILD FOLLOWING OPERATION 1004E10 - WASH AND CHECK DISMANTLED PARTS - RE-FIT CYLINDER HEAD AND OIL SUMP - DOES NOT INCLUDE REPAIRS TO CYLINDER HEAD AND AUXILIARY UNIT



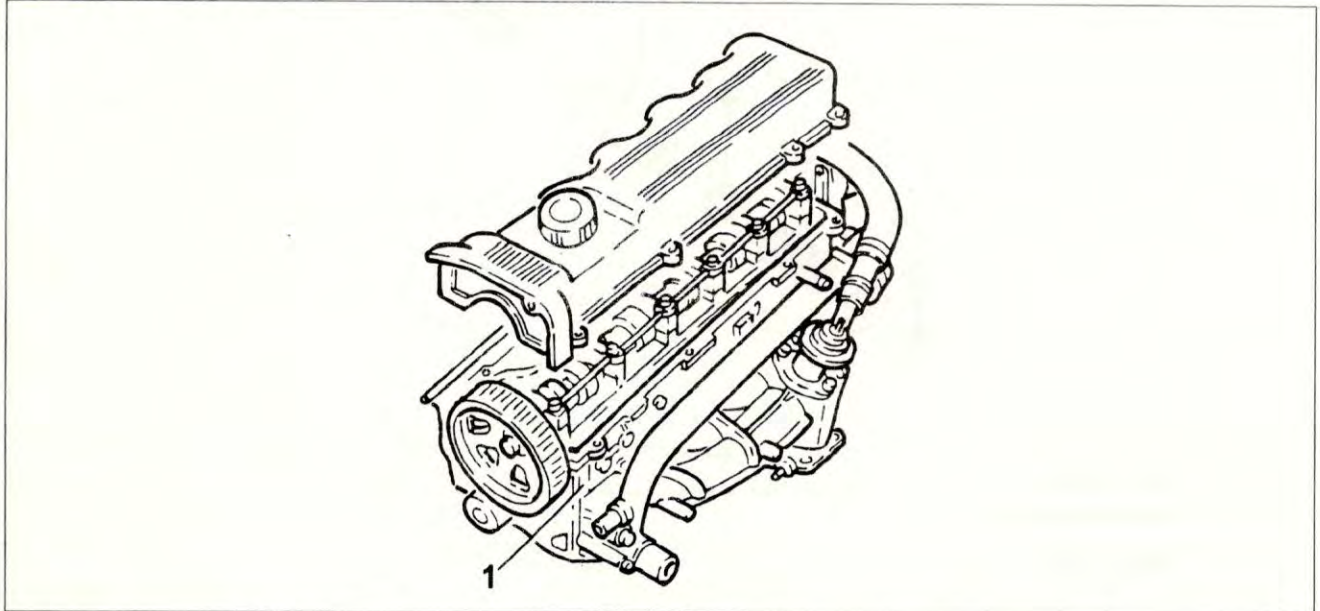
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1016E	CYLINDER HEAD/S - VARIOUS OPERATIONS	AR32302

SUB-GROUP GRAPHIC INDEX

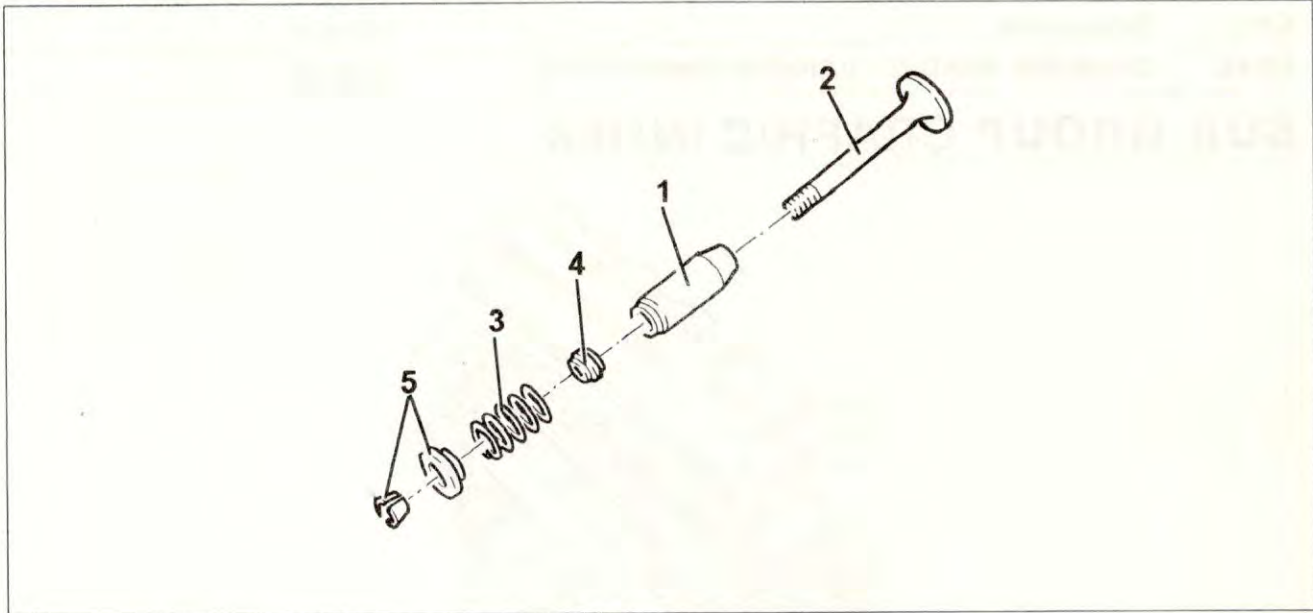


<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	CYLINDER HEAD/S - VARIOUS OPERATIONS	1016E



AR32302

1016E - CYLINDER HEAD/S - VARIOUS OPERATIONS
VIEW OF ASSEMBLY



Ref.	Description
(1)	VALVE GUIDES
(2)	VALVE (ALL)
(3)	VALVE SPRINGS
(4)	VALVE CAPS
(5)	VALVE SEATS

Operations index

Code	Operation	Validity
1016E10	SINGLE CYLINDER HEAD, REMOVED - OVERHAUL	AR32302

OPERATIONS

AR32302

1016E10 - SINGLE CYLINDER HEAD, REMOVED - OVERHAUL

Disassembly

AR32302

1. Place tool in vice.

Description	Code
1 Mount	1.820.012.000

2. Assemble tool.

Description	Code
2 Mount	1.820.258.000

3. Assemble tool.

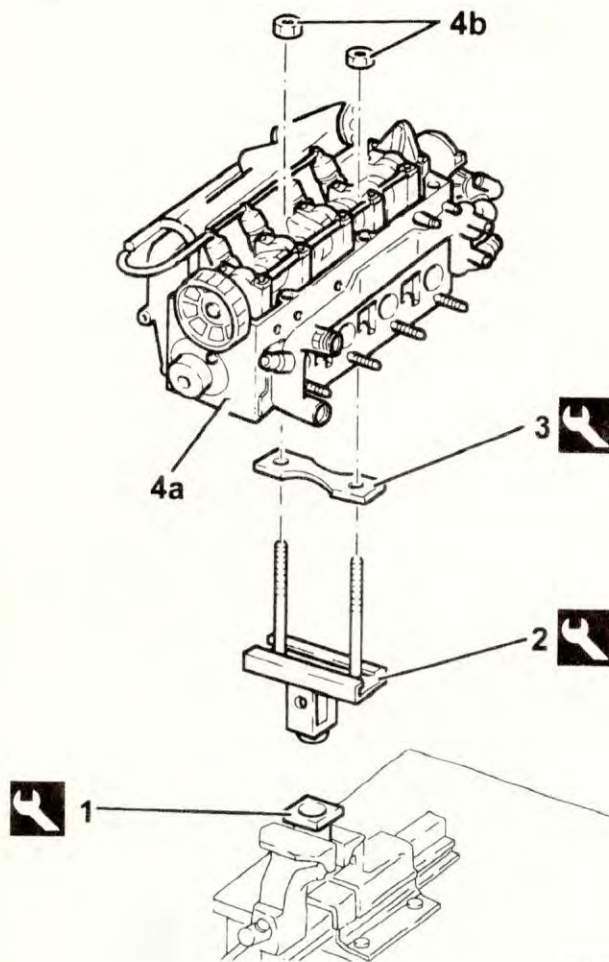
Description	Code
3 Shim	1.820.267.000

4. Place cilinder head (4a) on supporting tools and fasten it with itse screws (4b).

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302

1016



AR32302

1. Loosen fuel manifold to electroinjectors piping manifold side links (1a) with tool (1b).



Description

Code

1b Wrench 1.870.671.000

2. Unscrew fuel manifold to electroinjectors piping manifold side links (2a) with tool (2b).



Description

Code

2b Wrench 1.870.672.000

3. Unscrew nuts (3a) and remove fuel distribution manifold (3b) complete with piping and fuel pressure sensor (3c).



Description

Connector

3c Fuel pressure sensor K83

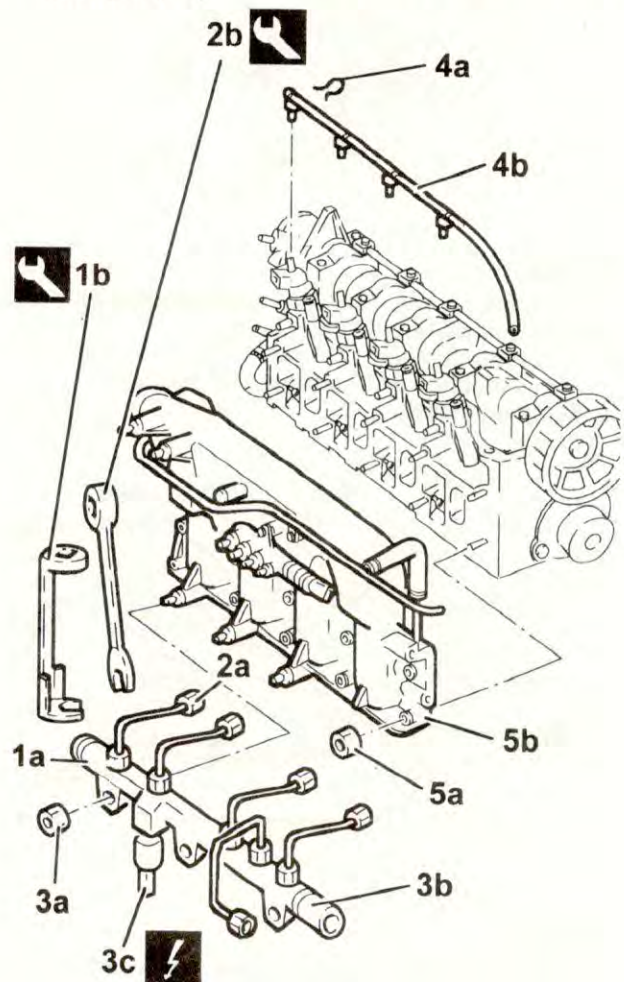
4. Remove catches (4a) and dismantle fuel return pipe to lubricate electroinjectors (4b).
- Unscrew nuts and disconnect preheating glow plugs alimentazione cabling.



Description

Connector

- Preheating glow plugs A40
- Disconnect surge and plant disaerazione tank cooling fluid return pipe from thermostat.
5. Unscrew nuts (5a) and remove whole air inlet manifold (5b).



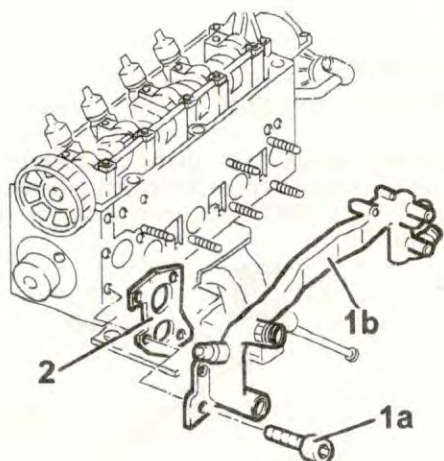
AR32302

- Disconnect thermostat to water manifold side pump return manifold mandata pipe .
1. Unscrew screws (1a) and remove water pump fluid inlet rigid pipe (1b).
 2. Remove gasket.

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

1016

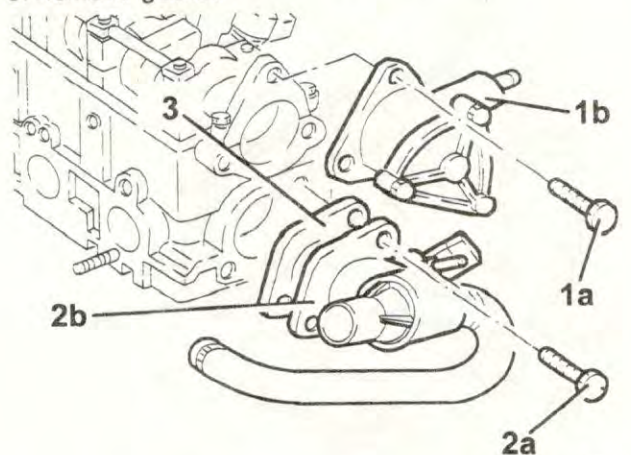
AR32302



10E1031A 1/0

AR32302

1. Unscrew screws (1a) and remove vacuum pump (1b) complete with the O-ring.
2. Unscrew screws (2a) and remove thermostat (2b) complete with piping and sensors.
3. Remove gasket.



10E1032A 1/0

AR32302

1. Unscrew driven toothed pulley screws (1a) using tools (1b).



Description	Code
1b Countertorque mount	1.822.146.000



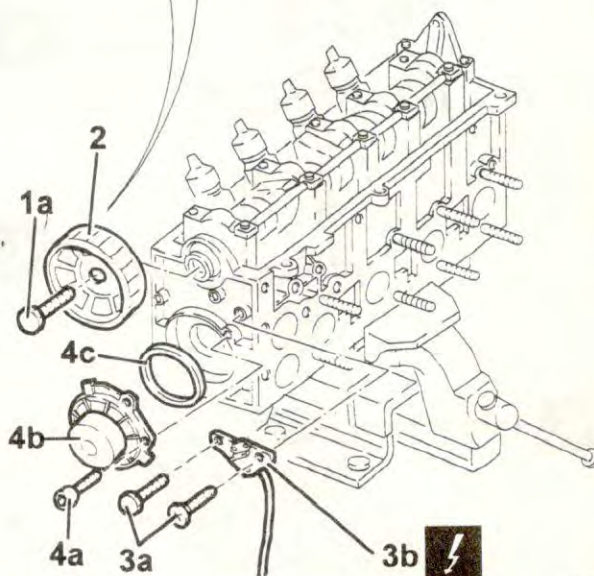
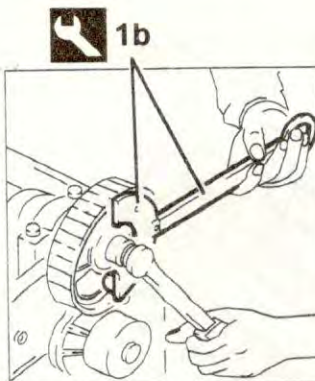
Description	Code
1b Countertorque	1.822.156.000

2. Remove driven toothed pulley.
3. Unscrew screws (3a) and remove phase sensor (3b).



Description	Connector
3b Phase sensor	K47

4. Unscrew screws (4a) and remove water pump (4b) complete with the O-ring (4c).



10E1033D 1/0

AR32302

1. Unscrew screws (1a) and remove electroinjector brackets (1b).
2. Remove electroinjectors (2a) complete with gaskets (2b).



Description	Connector
2a Electric injector	N70

3. Remove electroinjector brackets support pads.
4. Remove preheating glow plugs.

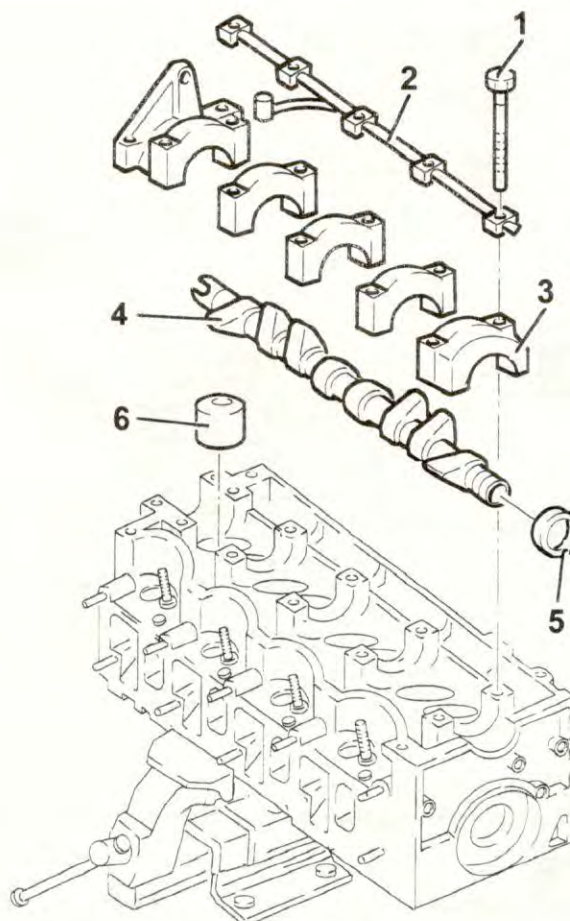
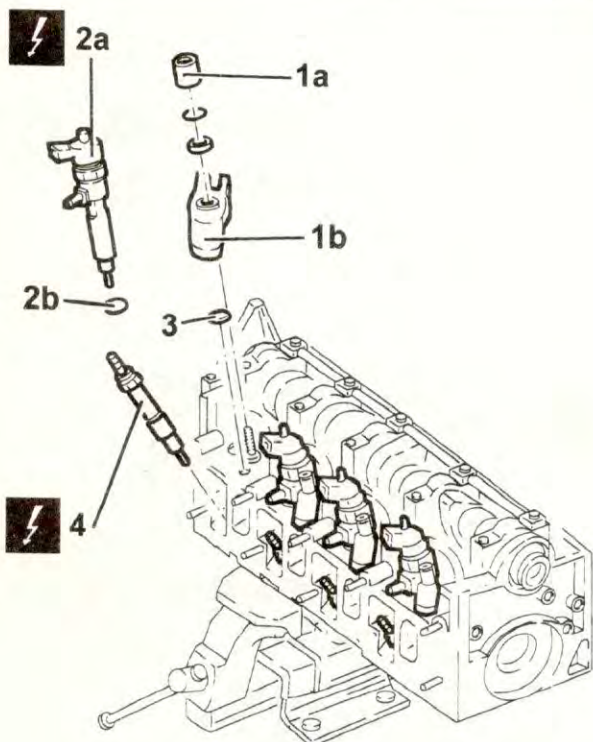


Description	Connector
4 Preheating glow plugs	A40

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302

1016



AR32302

- Check camshaft endplay falls within boundary values.



Measure

Value

-	Axial play (mm)	0.100 - 0.230
---	-----------------	------------------

- In case camshaft endplay does not fall within boundary values substitute worn parts during cylinder head assembly.

1. Unscrew camshaft caps screws.
2. Remove camshaft support lubrication piping.
3. Remove camshaft caps.
4. Remove camshaft.
5. Remove front camshaft oil seal.
6. Remove cups complete with valve clearance regulation pads.

AR32302

- Remove cylinder head from supporting tools.
 - Insert an idoneus wooden tablet between supporting tools and cylinder head to sustain valves.
 - Place cylinder head on supporting tools and fasten it with its nuts.
1. Remove cotter (1a) using tools (1b), (1c) and (1d).



Description

Code

1B	Mount	1.820.257.000
----	-------	---------------



Description

Code

1c	Lever	1.821.058.000
----	-------	---------------



Description

Code

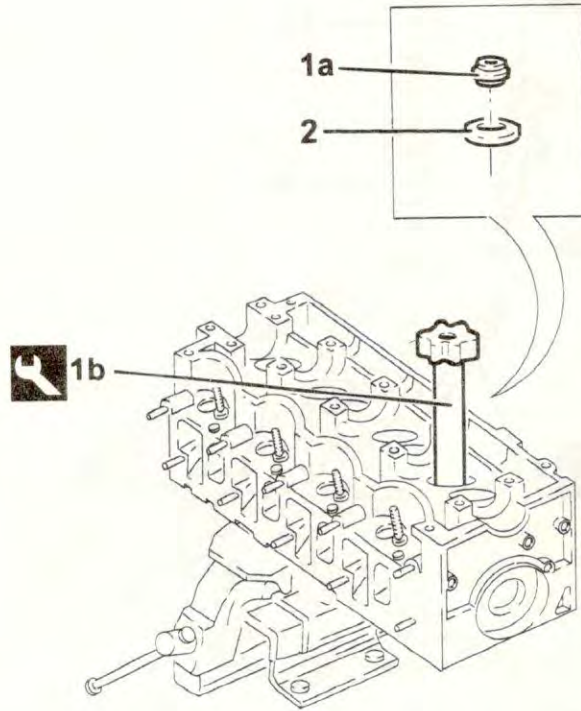
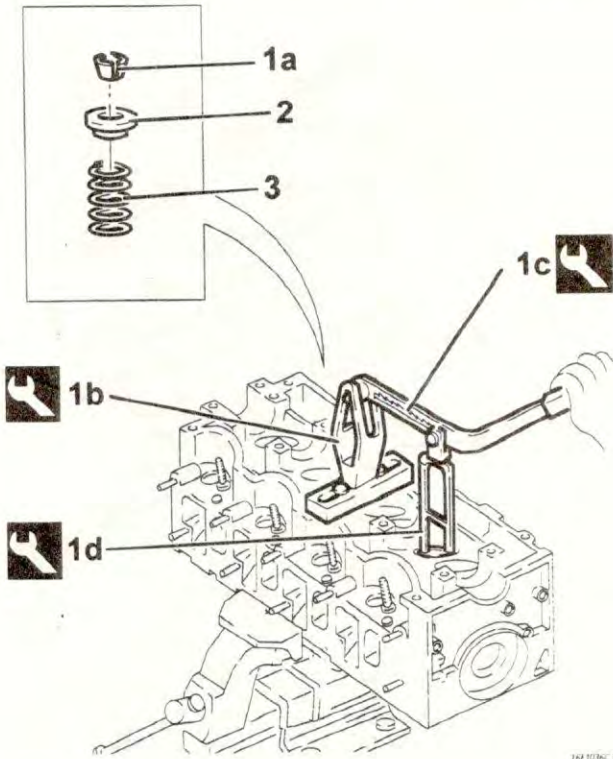
1d	Rack	1.821.205.000
----	------	---------------

2. Remove top valve pad.
3. Remove valve spring.

BENCH REPAIR PROCEDURES
CYLINDER HEAD/S

1016

AR32302



AR32302

1. Remove valve guide oil seal (1a) with tool (1b).



Description

Code

1b Extractor

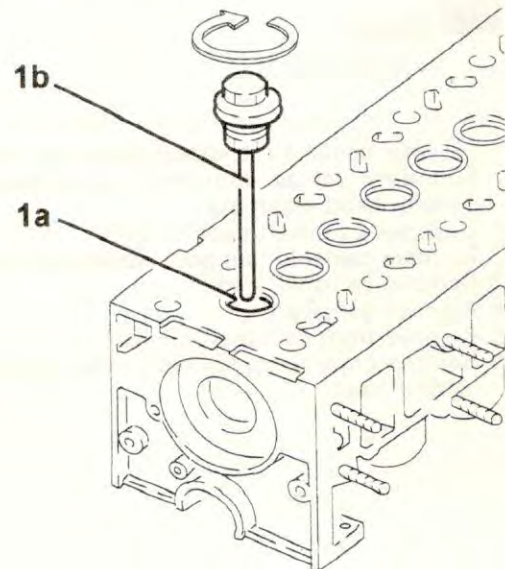
1.821.208.000

2. Remove lower valve pad.

- Operate likewise on other valves.
- Remove cilinder head from supporting tools and recover valves.

AR32302

- Place cilinder head on worktable.
- 1. Thread proper extraction tool (1b) on valve seat (1a).



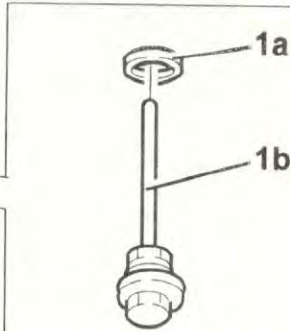
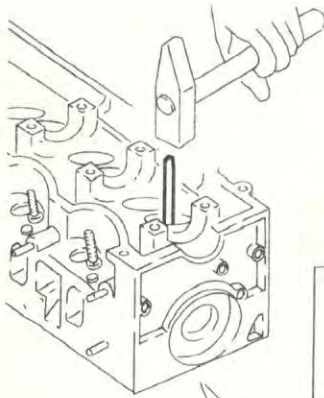
AR32302

- Turn cilinder head upside-down on worktable.
- 1. Remove valve seat (1a) with extraction tool (1b).
- Operate likewise on other valve seats.

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302

1016

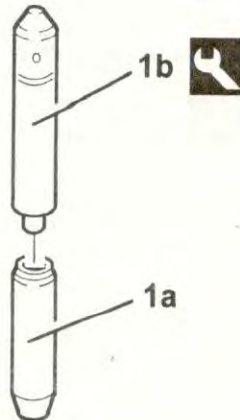
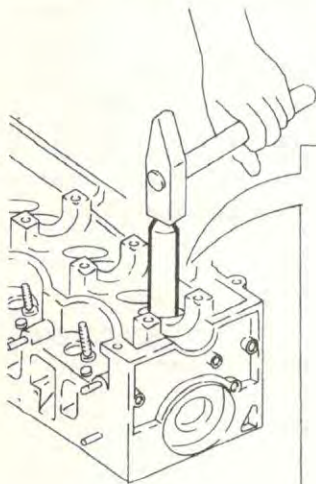


AR32302

1. Remove valve guides (1a) with tool (1b).



Description	Code
1b Extractor	1.821.053.000



Reassembly

AR32302

- Clear lower cylinder head side of old gasket residuals.
- Check flatness of lower cylinder head side falls within boundary values.

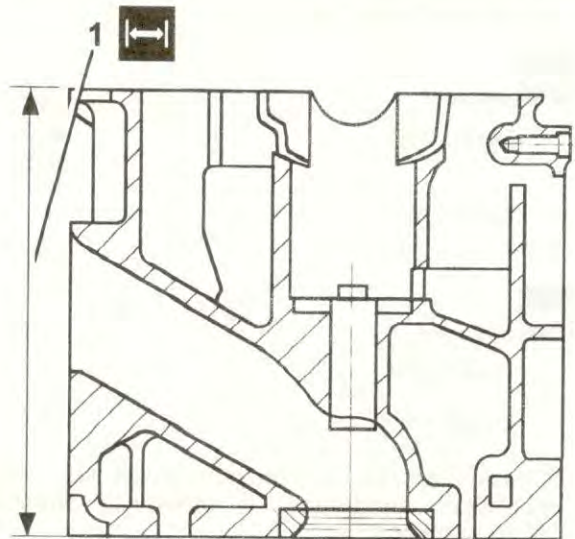


Measure	Value
- Lower levelling (mm)	0.1

1. In case lower cylinder head side flatness does not fall within boundary values, rectify lower cylinder head side without exceeding the minimum required height.



Measure	Value
1 Minimum admitted height (mm)	141.00 0.15



AR32302

- Check valves don't show lines or engagement signs.
- Check valve stem diameter falls within boundary values; if otherwise substitute worn valves.



Measure	Value
- Stem diameter (mm)	7.974 - 7.992

- Check external cup diameter falls within boundary values; if otherwise substitute worn parts.



Measure	Value
- Outer diameter (mm)	36.975 - 36.995


- Check cup seat diameter falls within boundary values; if otherwise substitute cylinder head.

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

1016

AR32302





 Measure	Value
- Bowl seat diameter (mm)	37.000 - 37.025

- Check free spring length falls within boundary values.


 Measure	Value
- Free length (mm)	53.9

- Using a dynamometer check characteristic spring values fall within boundary values; if otherwise substitute ielded parts.


 Measure	Value
- Load (daN)	36.7 - 39.6
Length (mm)	36

 Measure	Value
- Load (daN)	56 - 61
Length (mm)	26.5


- Check diameter of camshaft pivots falls within boundary conditions; if otherwise substitute worn camshaft.

 Measure	Value
- journal diameter (mm)	26.000 - 26.015

- Check nominal lift of camshaft camme falls within boundary values; if otherwise substitute worn camshaft.

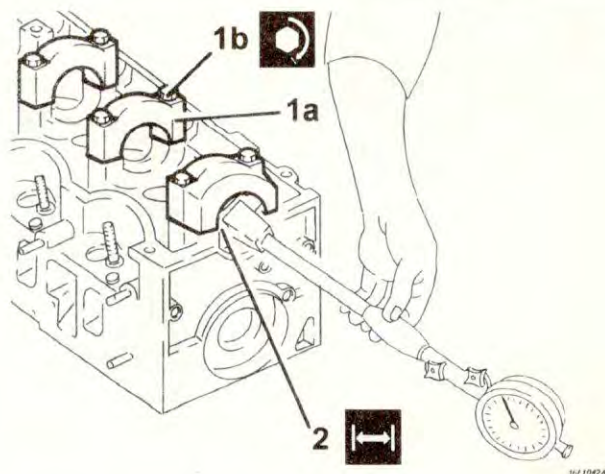
 Measure	Value
- Cam rated lift (mm)	8.5

1. Assemble camshaftcaps (1a) on cilinder head and tighten its screws (1b) at the prescribed torque.

 Mounting	Component	Ø	Value (daNm)
- Screw	Camshaft caps	M7	1.3 - 1.6


2. Check diameter of camshaft supports falls within boundary values; if otherwise substitute cilinder head.

 Measure	Value
2 Diameter (mm)	26.045 - 26.070



AR32302

- Check external diameter of valve guides to be assembled falls within boundary values.

 Measure	Value
- Outer diameter (mm)	14.010 - 14.030
Upratings (mm)	0.05, 0.10, 0.25

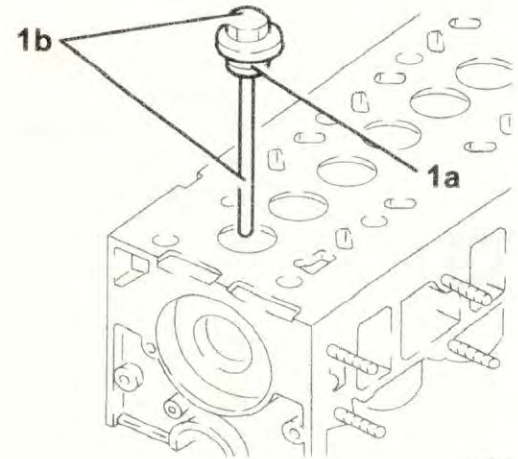
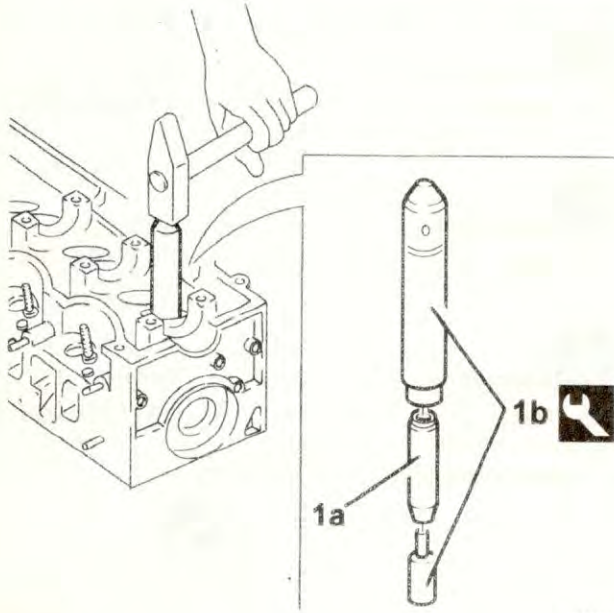
1. Assemble valve guides (1a) with tool (1b).

 Description	Code
1b Taker-in	1.821.254.000

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302

1016



AR32302

- Bore internal diameter of valve guides at the prescribed value.



Measure

Value

- Inner diameter (mm) 8.022 - 8.040

- Check external diameter of valve guides to be assembled falls within boundary values.



Measure

Value

- Intake outside diameter (mm) 36.135 - 36.150



Measure

Value

- Exhaust outside diameter (mm) 35.142 - 35.157

1. Assemble valve guides (1a) with proper tools (1b).

AR32302

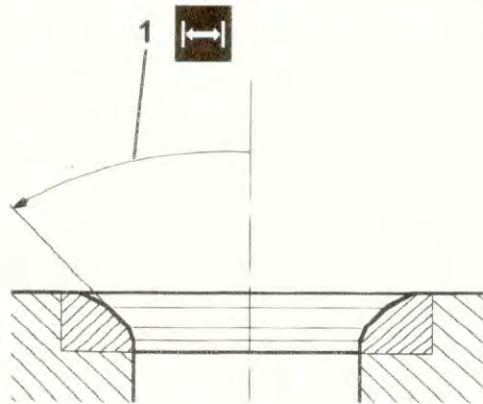
1. Rectify valve guides at the prescribed height.



Measure

Value

- | | | |
|---|-----------------------|---------|
| 1 | Ring valve angle (mm) | 90° 20' |
|---|-----------------------|---------|



AR32302

- Grind valve guides with appropriate tools.
- Provisionally assemble valves.

1. Verificare che l'incassamento delle valvole dal piano della testa cilindri rientri nei valori prescritti, con l'attrezzo munito di comparatore.



Measure

Value

- | | | |
|---|---|-----------|
| 1 | Enclosing from cylinder head surface (mm) | 0.1 - 0.5 |
|---|---|-----------|



Description

Code

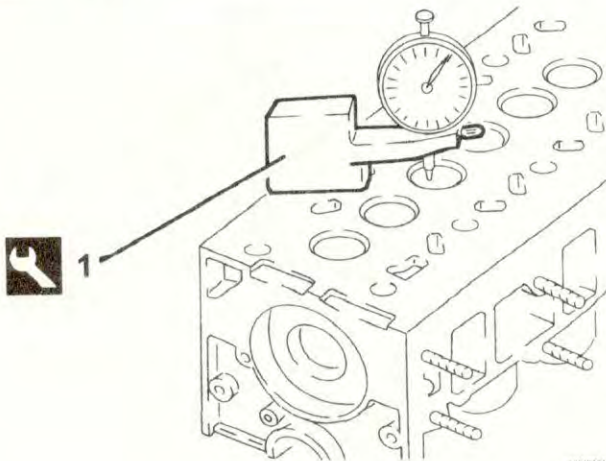
- | | | |
|---|------------------|---------------|
| 1 | Comparator mount | 1.820.503.000 |
|---|------------------|---------------|

- Nel caso l'incassamento delle valvole dal piano testa cilindri non rientri nei valori prescritti, rettificare nuovamente le sedi valvole.

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

1016

AR32302

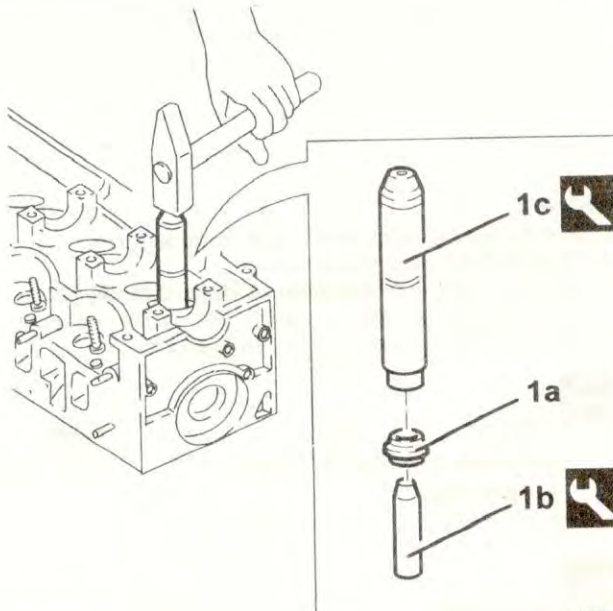


AR32302

- Insert an idoneus wooden tablet between supporting tools and cilinder head to sustain valves.
 - Assemble cilinder head complete with valves on supporting tools and fasten it with its screws.
 - Assemble lower pad.
1. Assemble valve guide oil seals (1a) using tools (1b) and (1c).

Description	Code
1b Clamp	1.860.814.001

Description	Code
1c Taker-in	1.821.178.000



AR32302

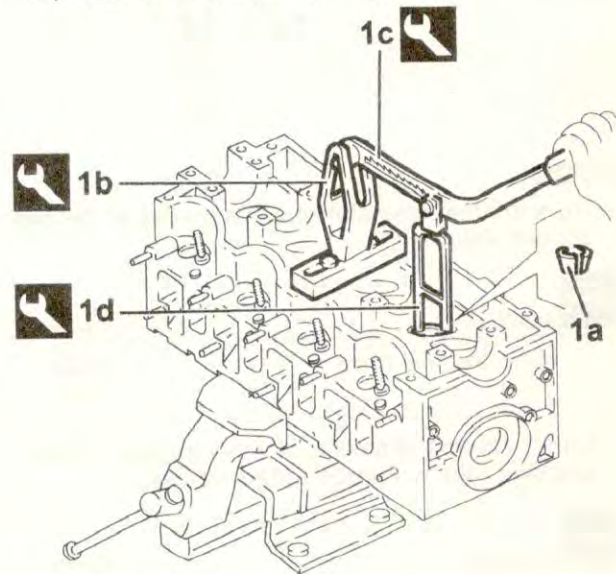
- Assemble valve spring.
 - Assemble top valve pad.
1. Assemble cotters (1a) using tools (1b), (1c) and (1d).

Description	Code
1b Mount	1.820.257.000

Description	Code
1c Lever	1.821.058.000

Description	Code
1d Rack	1.821.205.000

- Operate likewise on other valves.



AR32302

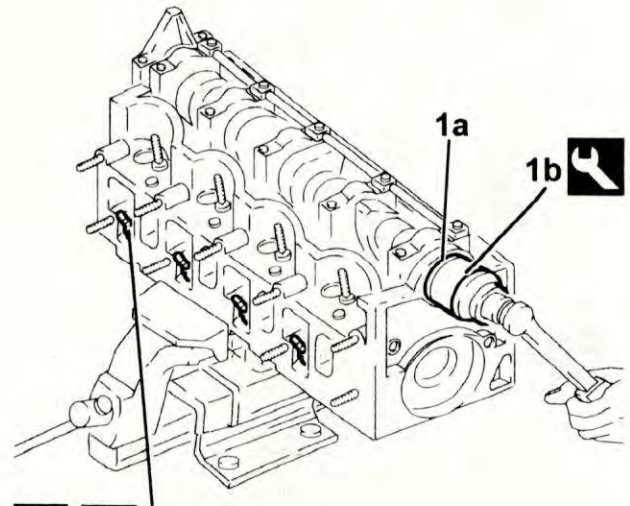
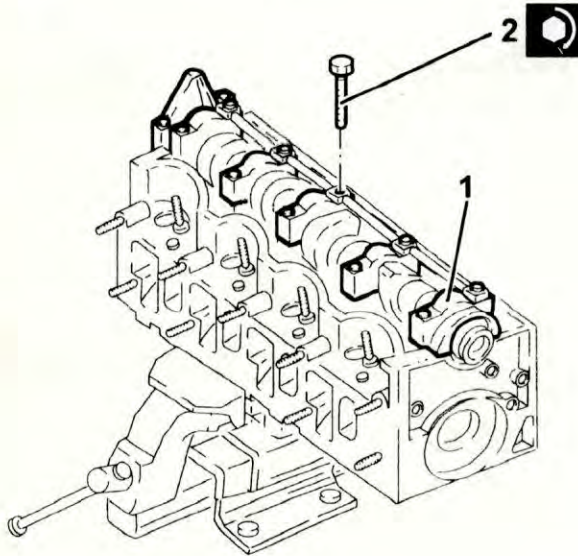
- Remove cilinder head from supporting tools.
 - Remove from supporting tools the wooden valve support tablet.
 - Assemble cilinder head on supporting tools.
 - Assemble cups complete with valve clearance regulation tablets.
 - Assemble camshaft.
1. Assemble camshaft caps.
- Assemble camshaft pivots lubrication piping.
2. Tighten camshaft caps screws at the prescribed torque.

Mounting	Component	Ø	Value (daNm)
2	Screw	Camshaft caps	M7 1.3 - 1.6

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302

1016



AR32302

1. Assemble front camshaft oil seal (1a) with tool (1b).



Description	Code
1b Taker-in	1.821.228.000

2. Assemble preheating glow plugs and tighten them at the prescribed torque.



Description	Connector
2 Preheating glow plugs	A40



Mounting	Component	∅	Value (daNm)
2	GLOW PLUGS	M12	1.3 - 1.6

AR32302

1. Assemble electroinjector brackets support pads.
2. Assemble electroinjectors (2a) complete with gasket (2b).



Description	Connector
2a Electric injector	N70

3. Assemble electroinjector brackets (3a) and tighten its screws (3b) at the prescribed torque.



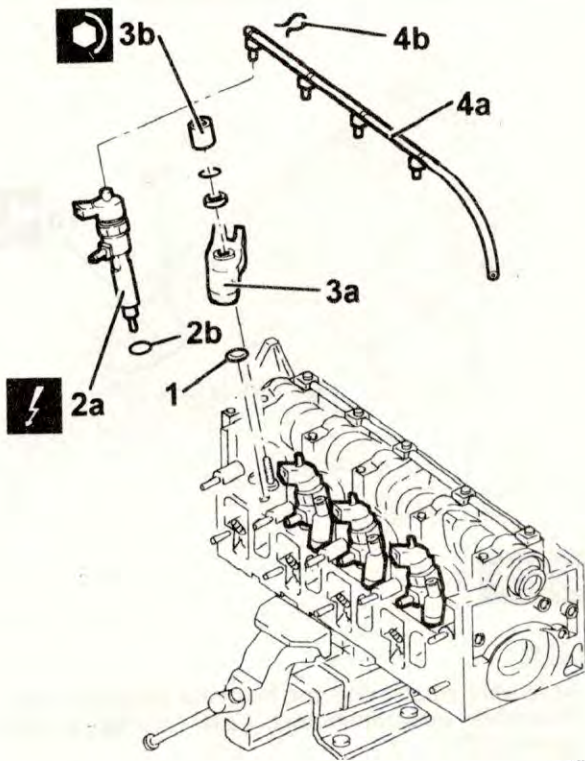
Mounting	Component	∅	Value (daNm)
3b Nut	ELETTROINIE- ETTORI (DIE- SEL)	M8	2.6 - 3.2

4. Assemble electroinjector lubrication fuel return pipe (4a) and fix it with its catches (4b).

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

1016

AR32302

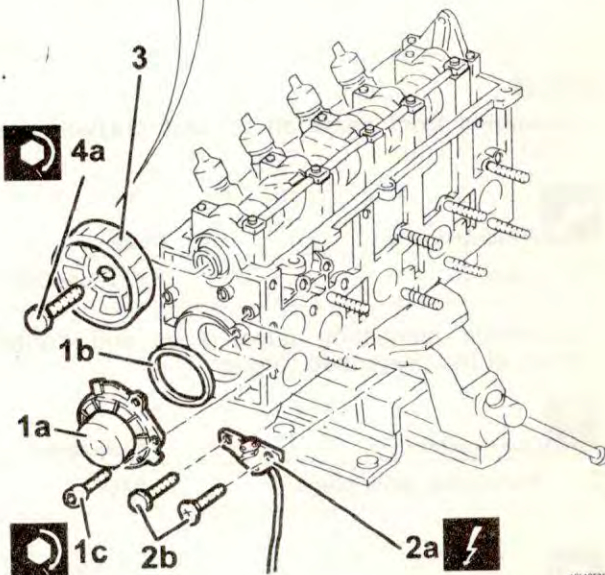
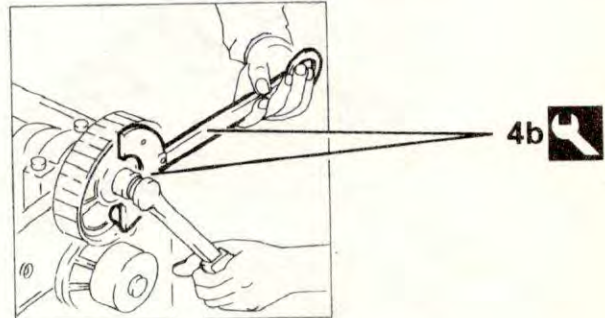


Description

Code

4b Countertorque

1.822.156.000



AR32302

1. Assemble water pump (1a) complete with a new O-Ring (1b) and tighten its screws (1c) at the prescribed torque.



Mounting

Component

Ø

Value
(daNm)

1c	Screw	COOLANT PUMP	M8	2.1 - 2.6
----	-------	--------------	----	-----------

2. Assemble phase sensor (2a) and tighten its screws (2b).



Description

Connector

2a	Phase sensor	K47
----	--------------	-----

3. Assemble driven toothed pulley.

4. Tighten driven toothed pulley screw (4a) at the prescribed torque, using tools (4b).



Mounting

Component

Ø

Value
(daNm)

4a	Screw	TIMING DUCT PULLEY	M12	10.2 - 12.6
----	-------	--------------------	-----	-------------



Description

Code

4b	Countertorque mount	1.822.146.000
----	---------------------	---------------

AR32302

- Check valve clearance, when valves are closed, falls within boundary values; if otherwise substitute valve clearance regulation pads operating as follows.



Measure

Value

-	Play with valves in the closed position - intake (mm)	0.25 - 0.35
---	---	-------------



Measure

Value

-	Play with valves in the closed position - exhaust (mm)	0.30 - 0.40
---	--	-------------

1. Lower punteria in esame using tool.

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302

1016



Description

Code

- | | | |
|-------------------|-------|---------------|
| 1 | Lever | 1.820.262.000 |
| 2. Assemble tool. | | |



Description

Code

- | | | |
|---|-------|---------------|
| 2 | Lever | 1.860.724.001 |
|---|-------|---------------|

- Sfilare l'attrezzo.



Description

Code

- | | | |
|---|-------|---------------|
| - | Lever | 1.820.262.000 |
|---|-------|---------------|

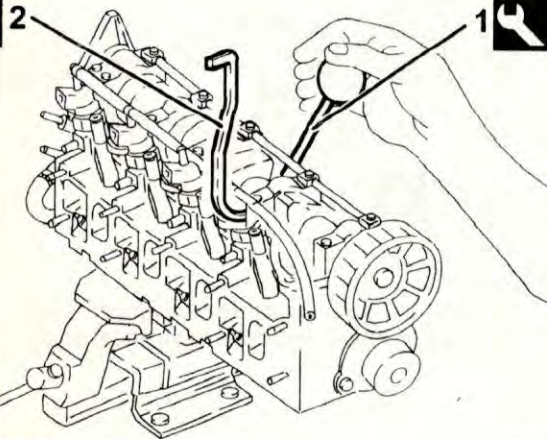
- Extract valve clearance regulation tablet and substitute with a new one of required thickness.
- Remove tool..



Description

Code

- | | | |
|---|-------|---------------|
| - | Lever | 1.860.724.001 |
|---|-------|---------------|



AR32302

- Assemble gasket.
- Assemble thermostat (2a) complete with piping and sensors and its screws (2b) at the prescribed torque.



Mounting

Component

Ø

Value (daNm)

- | | | | | |
|---|-------|------------|----|-----------|
| - | Screw | THERMOSTAT | M8 | 2.1 - 2.6 |
|---|-------|------------|----|-----------|

- Assemble vacuum pump (3a) complete with O-ring and its screws (3b) at the prescribed torque.



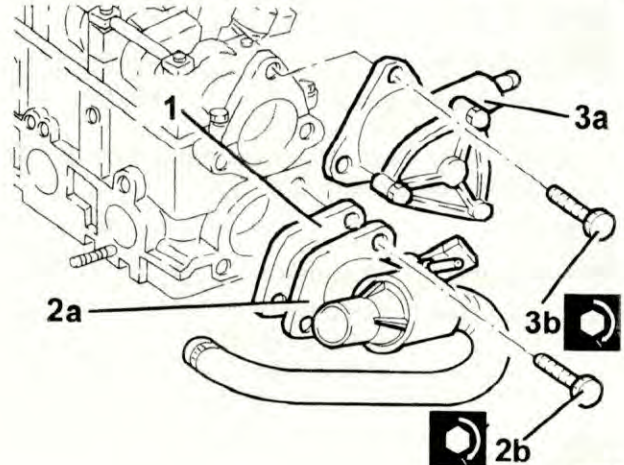
Mounting

Component

Ø

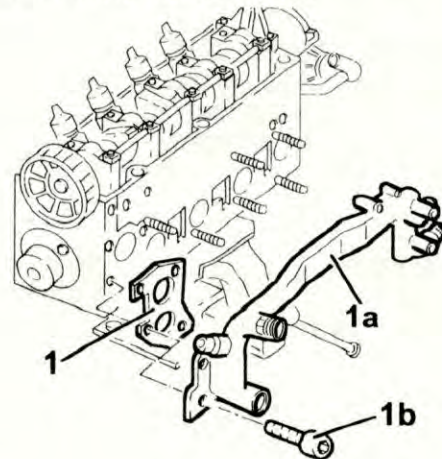
Value (daNm)

- | | | | | |
|----|-------|-------------------------|----|-----------|
| 3b | Screw | BRAKE SERVO VACUUM PUMP | M8 | 2.1 - 2.6 |
|----|-------|-------------------------|----|-----------|



AR32302

- Assemble gasket.
 - Assemble water pump fluid inlet rigid pipe (1a) and tighten its screws (1b).
- Connect thermostat to water manifold side pump return manifold mandata pipe.



AR32302

- Assemble whole air inlet manifold (1a) and tighten its screws (1b).
- Connect surge and system dehydrating cooling fluid return pipe to thermostat.
- Assemble preheating spark plugs feed wiring harness and fasten it with its screws.



Description

Connector

- | | | |
|---|-----------------------|-----|
| - | Preheating glow plugs | A40 |
|---|-----------------------|-----|

- Connect electroinjector lubrication fuel return pipe (2a) to fuel manifold and fasten it with its catches (2b).

- Assemble fuel distribution manifold (3a) complete with pipes and fuel pressure sensor and tighten its nuts (3b).

BENCH REPAIR PROCEDURES CYLINDER HEAD/S

AR32302



1016



Description	Connector
- Fuel pressure sensor	K83

4. Tighten links (4a), electroinjectors side at the prescribed torque with tool (4b).



Mounting	Component	Ø	Value (daNm)
4a	Union pipe	FUEL MANI-FOLD LINE TO INJECTORS	M12 1.9 - 2.3



Description	Code
4b Wrench	1.870.672.000

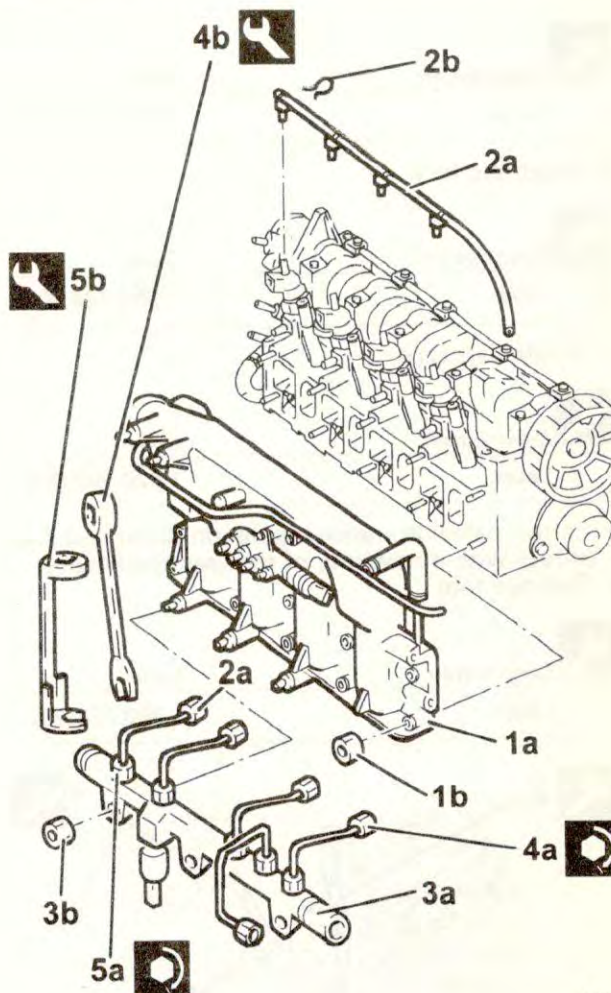
5. Tighten electroinjector fuel manifold pipes links (5a), manifold side at the prescribed torque with tool (5b).



Mounting	Component	Ø	Value (daNm)
5a	Union pipe	FUEL MANI-FOLD LINE TO INJECTORS	M14 Manifold side 2.6 - 3.2



Description	Code
5b Wrench	1.870.671.000



101 10960 10

AR32302

- Remove cylinder head from support tools.
- Remove cylinder head from support tools.



BENCH REPAIR PROCEDURES CRANK CASE SUMP AND COVERS

AR32302

1020

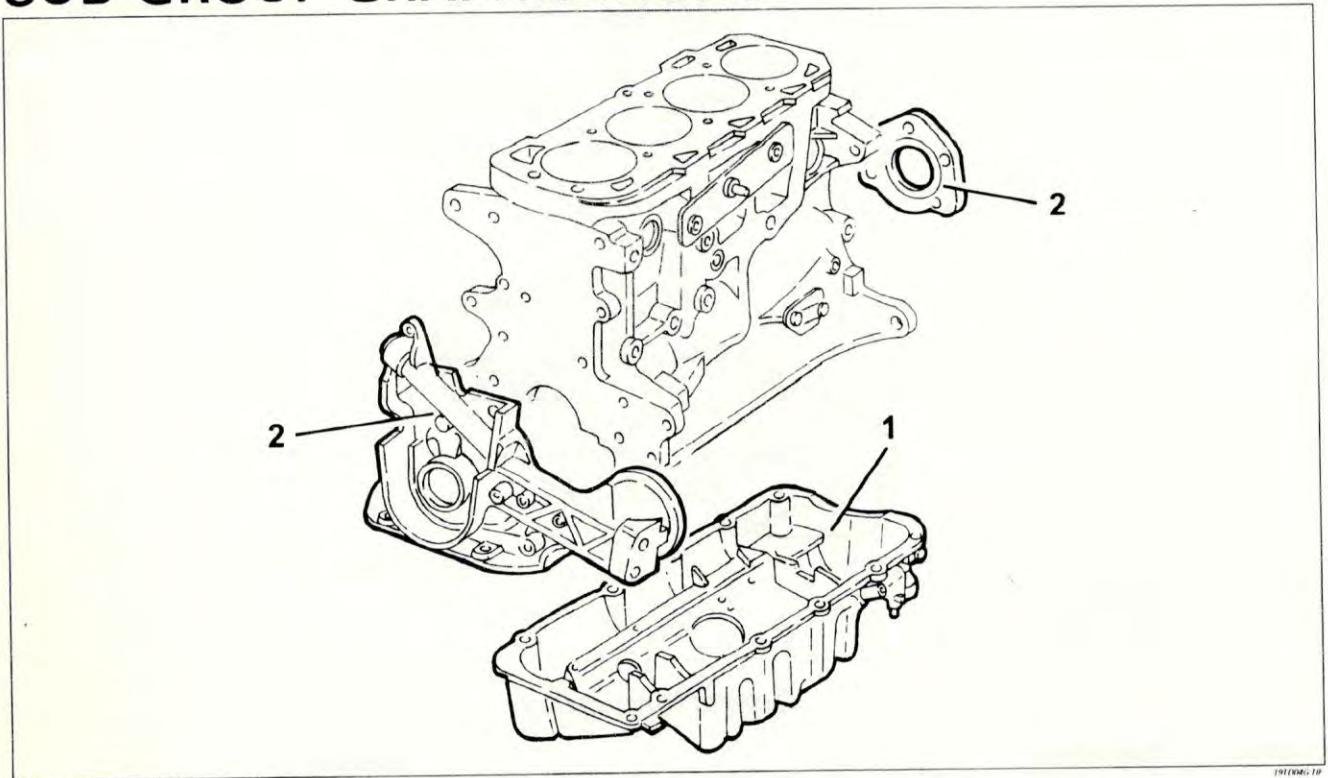
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1020A	CRANK CASE OIL SUMP	AR32302
1020D	OIL SEALS ON CRANK SHAFT	AR32302

SUB-GROUP GRAPHIC INDEX

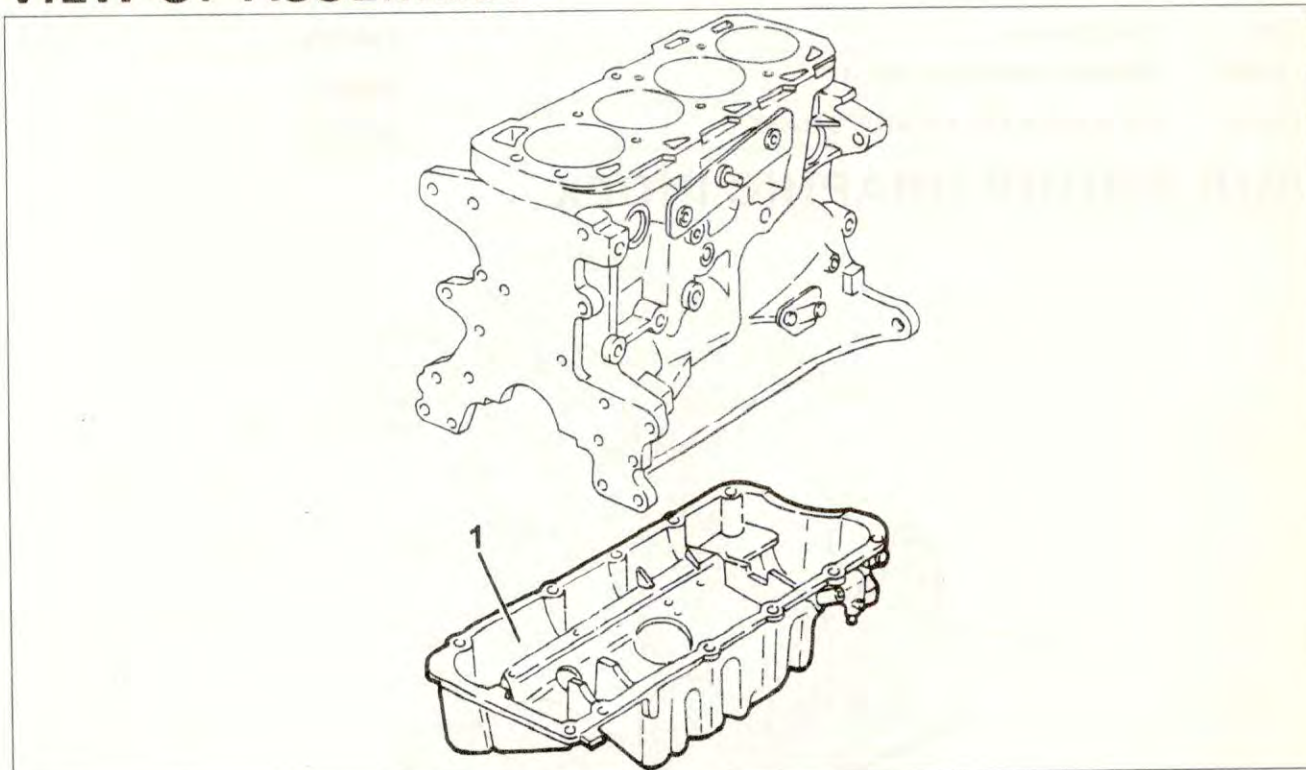


<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	CRANK CASE OIL SUMP	1020A
2	OIL SEALS ON CRANK SHAFT	1020D



AR32302

1020A - CRANK CASE OIL SUMP VIEW OF ASSEMBLY



Ref.	Description
(1)	OIL SUMP

Operations index

Code	Operation	Validity
1020A46	OIL SUMP BULKHEAD - R R	AR32302

OPERATIONS

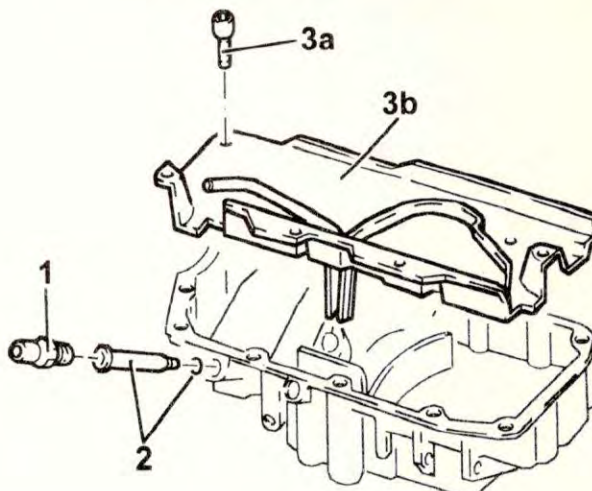
AR32302

1020A46 - OIL SUMP BULKHEAD - R R

Removal

AR32302

1. Remove oil sump condensed oil return pipe coupling.
2. Remove oil sump condensed oil return pipe internal coupling complete with O-ring.
3. Unscrew bolts (3a) and remove oil sump anti-wash baffle (3b).



**BENCH REPAIR PROCEDURES
CRANK CASE SUMP AND COVERS**

1020



AR32302

Installation

AR32302

- Assemble anti-wash baffle and fasten it with its bolts at the prescribed torque.



Mounting

Component

Ø

Value
(daNm)

	<i>Mounting</i>	<i>Component</i>	<i>Ø</i>	Value (daNm)
-	Screw	OIL BULK HEAD	M6	0.5 - 0.6

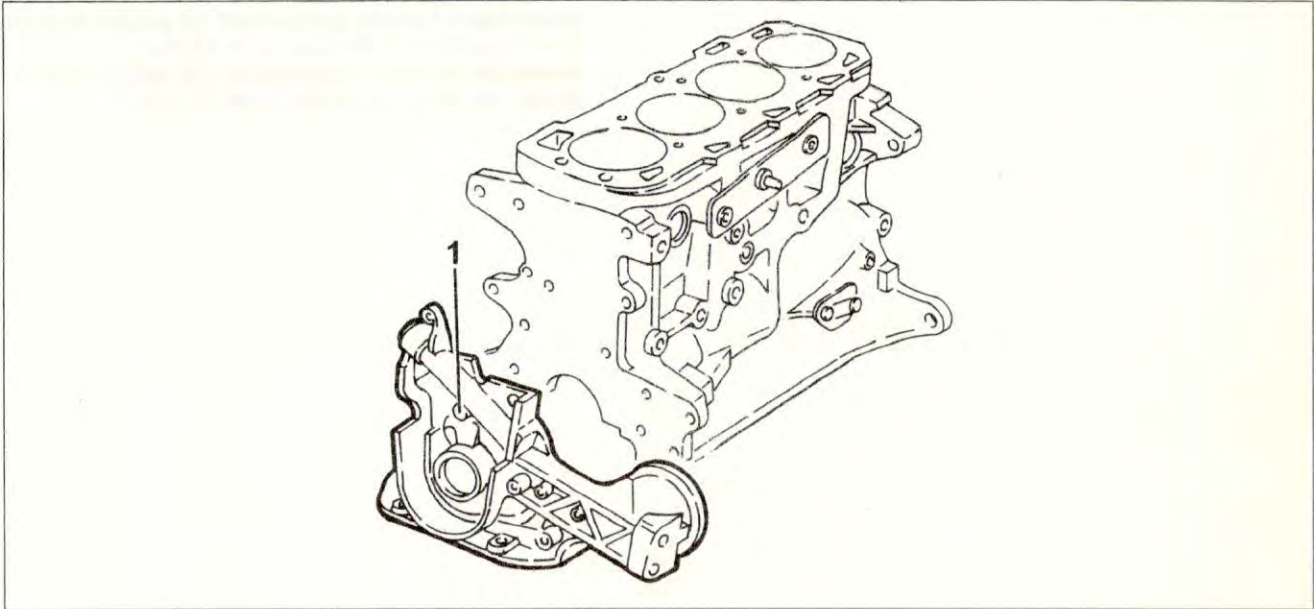
- Assemble oil sump condensed oil return pipe internal coupling complete with O-ring.
- Assemble oil sump condensed oil return pipe internal coupling complete with O-ring.



AR32302

1020D - OIL SEALS ON CRANK SHAFT

VIEW OF ASSEMBLY



Ref.	Description
(1)	CRANKSHAFT FRONT COVER

Operations index

Code	Operation	Validity
1020D17	ENGIND FRONT COVER - R R	AR32302

OPERATIONS

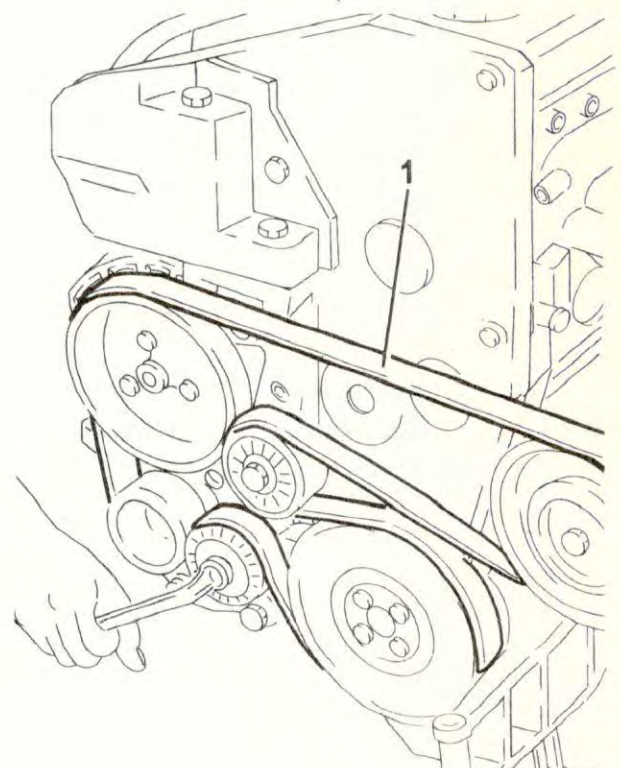
AR32302

1020D17 - ENGIND FRONT COVER - R R

Removal

AR32302

- Acting with a wrench on automatic belt tensioner loosen engine systems belt.
- 1. Remove engine systems belt.



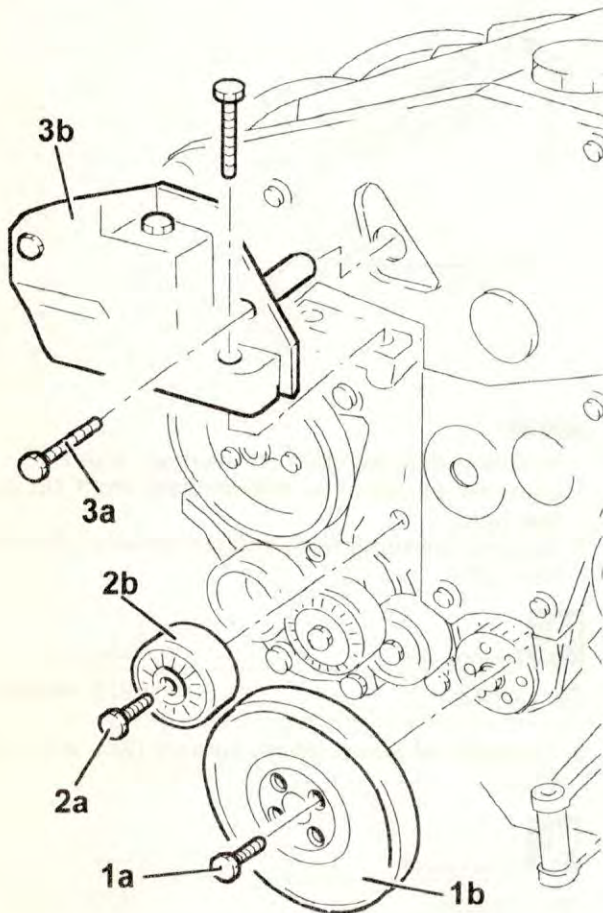
BENCH REPAIR PROCEDURES CRANK CASE SUMP AND COVERS

AR32302

1020

AR32302

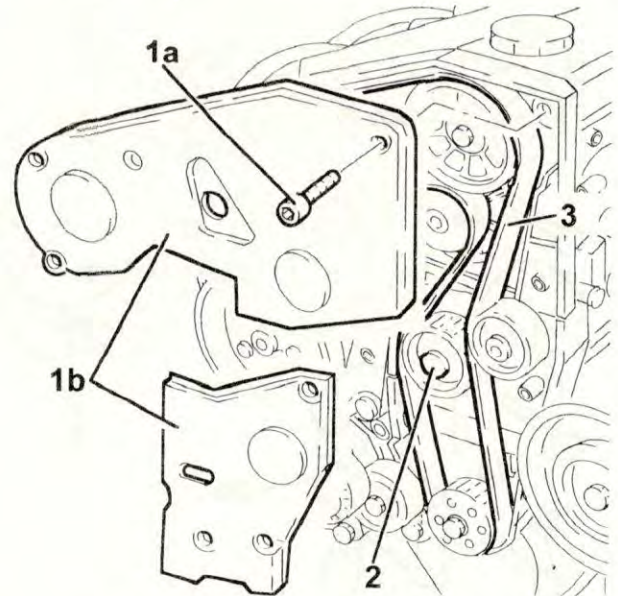
1. Unscrew screws (1a) and remove crankshaft pulley (1b).
2. Unscrew screw (2a) and remove engine systems belt guide pulley (2b).
3. Unscrew screws (3a) and remove powerplant drive rod bracket (3b).



14014100 110

AR32302

1. Unscrew screws (1a) and remove timing control belt timing case (1b).
2. Loosen timing belt tightener nut.
3. Remove timing control toothed belt.



14014100 110

AR32302

1. Assemble tool.

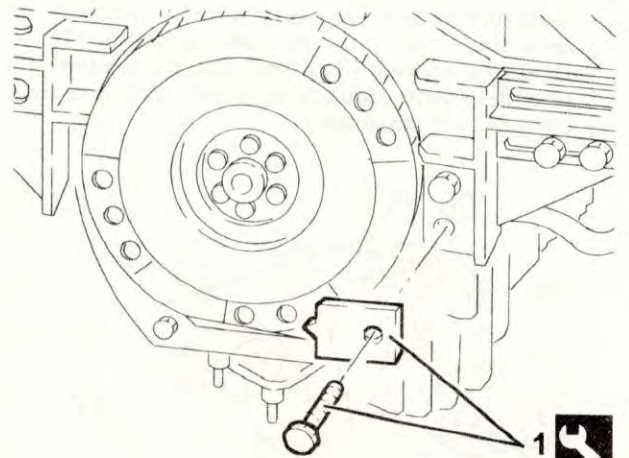


Description

Code

1 Countertorque

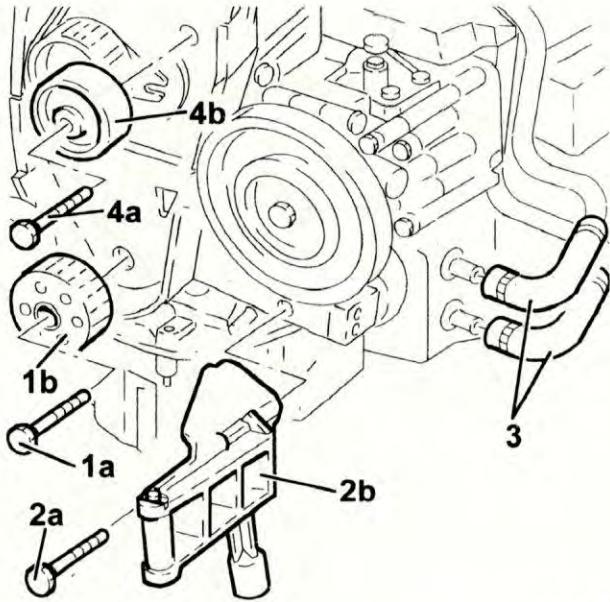
1 820 624 000



14014100 110

AR32302

1. Unscrew screw (left-handed) (1a) and remove driving toothed pulley (1b).
2. Unscrew screws (2a) and remove powerplant support, timing side (2b).
3. Disconnect inlet and outlet water pipes from water-oil heat exchanger.
4. Unscrew screw (4a) and remove timing control fixed tensioner (4b).



0401200 10

AR32302

1. Unscrew bolts (1a) and remove alternator (1b).



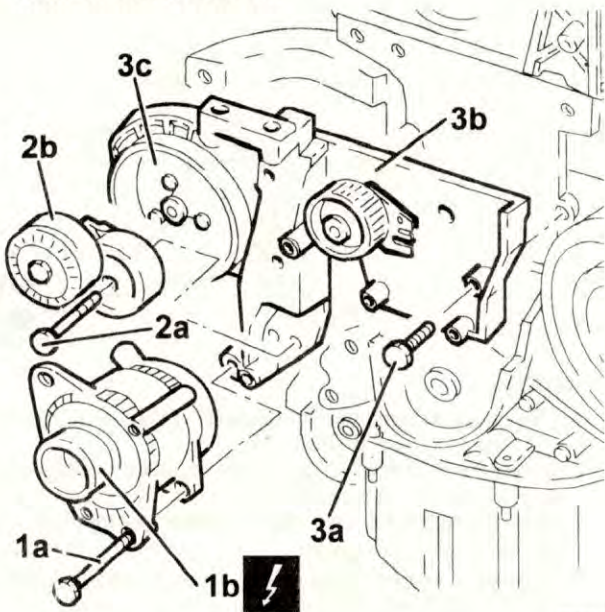
Description

Connector

1b Alternator

A10

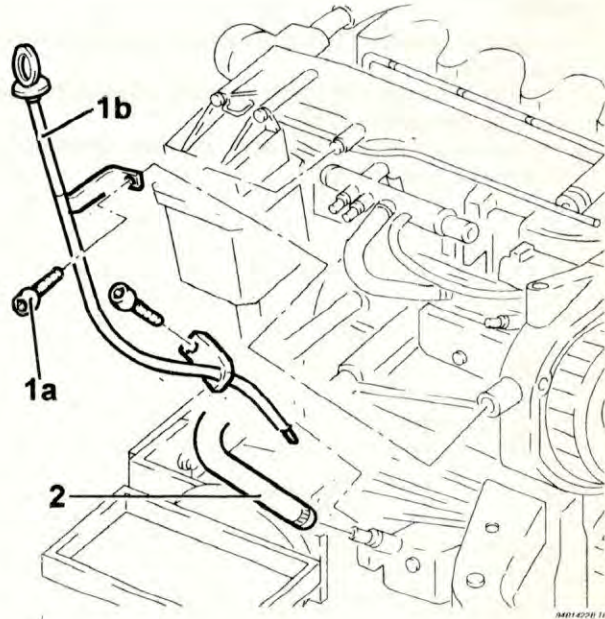
2. Unscrew screw (2a) and remove auxiliary systems drive belt automatic belt tensioner (2b).
3. Unscrew screws (3a) and remove support (3b) complete with hydrodrive pump (3c) and timing control belt tensioner.



04014210 10

AR32302

1. Unscrew screws (1a) and remove whole oil level control stem (1b).
2. Disconnect oil sump condensed oil return pipe.



04014200 10

AR32302

- Rotate engine by 180° on overhaul stand.
1. Unscrew oil sump to intermediate shaft support link bolt.
 2. Unscrew oil sump front and rear screws (2a) with tool (2b).



Description

Code

2b Wrench

1.822.144.000

3. Unscrew oil sump lateral screws (3a) with tool (3b).



Description

Code

3b Wrench

1.822.145.000

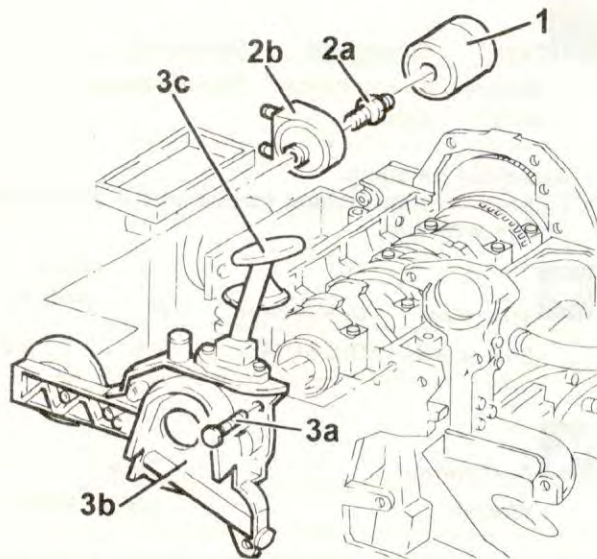
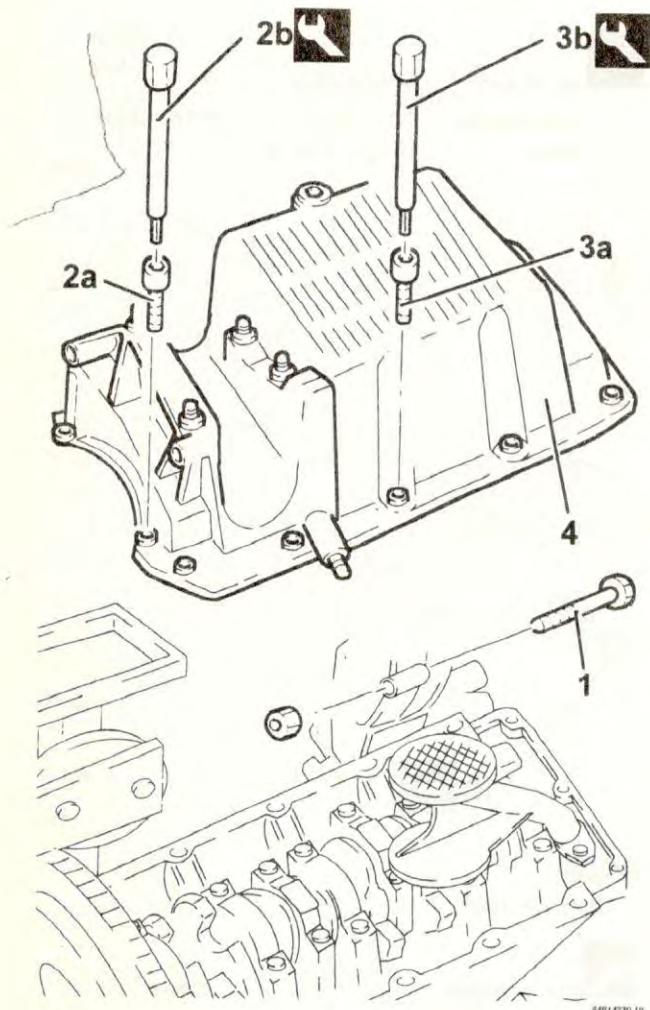
4. Remove oil sump.

Note: Gently strike oil sump with resin hammer to unblock it, then move it with a screwdriver acting as a lever in the appropriate projections on oil sump side.

BENCH REPAIR PROCEDURES CRANK CASE SUMP AND COVERS

AR32302

1020



Installation

AR32302

1. Assemble new front crankshaft seal (1a) with tool (1b).



Description

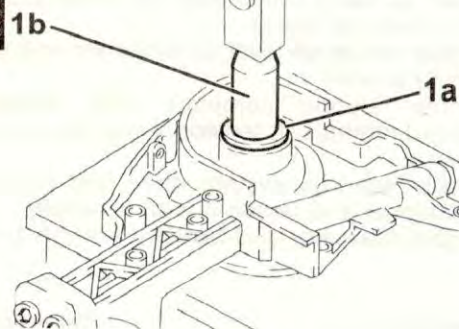
Code

1b Taker-in

1.821.247.000

AR32302

1. Remove oil filter.
 2. Extract pin (2a) and remove water-oil heat exchanger (2b).
 3. Unscrew screws (3a) and remove front cylinder block cover together with oil pump (3b) complete with inlet vent (3c).
- Remove front crankshaft oil seal.



AR32302

- Assemble front cylinder block cover together with oil pump, complete with inlet vent and tighten its screws at the prescribed torque.



Mounting

Component

Ø

Value
(daNm)

-	Screw	CRANKSHAFT FRONT COVER	M6	0.8 - 1.0
---	-------	------------------------	----	-----------

- Assemble water-oil heat exchanger and fasten it with its pin.
- Assemble oil filter.
- Apply sealing compound on whole oil sump pe-



rimeter.

Type	Component	Description	Q.ty.
- Silicone sealant	Air conditioner circuit	Silicone sealant	-

- Assemble oil sump.
- Tighten oil sump lateral screws at the prescribed torque with tool.

Mounting	Component	∅	Value (daNm)
- Side screws	OIL SUMP	M8	2.1 - 2.6

Description	Code
- Wrench	1.822.145.000

- Tighten oil sump front and rear screws at the prescribed torque with tool.

Mounting	Component	∅	Value (daNm)
- Front and rear screws	OIL SUMP	M6	0.7 - 0.9

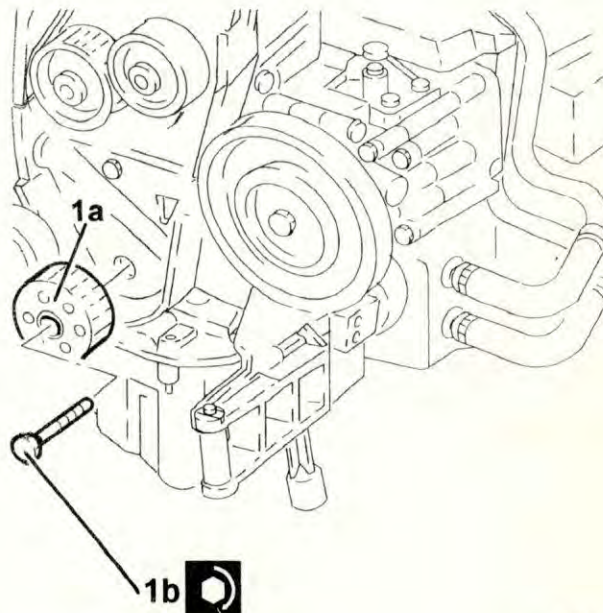
Description	Code
- Wrench	1.822.144.000

- Tighten oil sump to intermediate shaft link bolt.
- Rotate engine by 180° on overhaul stand.
- Connect oil sump condensed oil return pipe and fasten it with its clamp.
- Assemble whole oil level control stem and fasten it with its screws.
- Assemble support complete with hydrodrive pump and timing belt tensioner and fasten it with its screws.
- Assemble auxiliary system drive belt automatic belt tensioner and fasten it with its screw.
- Assemble alternator and fasten it with its bolts.

Description	Connector
- Alternator	A10

- Assemble timing control fixed tensioner and fasten it with its screw.
 - Connect water-oil heat exchanger water inlet and outlet pipes and fasten them with their clamps.
 - Assemble powerplant support, timing side and fasten it with its screws.
1. Assemble driving toothed pulley (1a) and tighten its screw (left-handed) (1b) at the prescribed torque.

Mounting	Component	∅	Value (daNm)
- Left-handed screw	TOOTHED DRIVE PULLEY	M16	30.6 - 37.8



AR32302

- Remove tool.

Description	Code
- Countertorque	1.820.624.000

1. Remove indicated oil pump screw.
- Provisionally assemble timing control toothed belt on driving pulley alone.
2. Assemble tool.

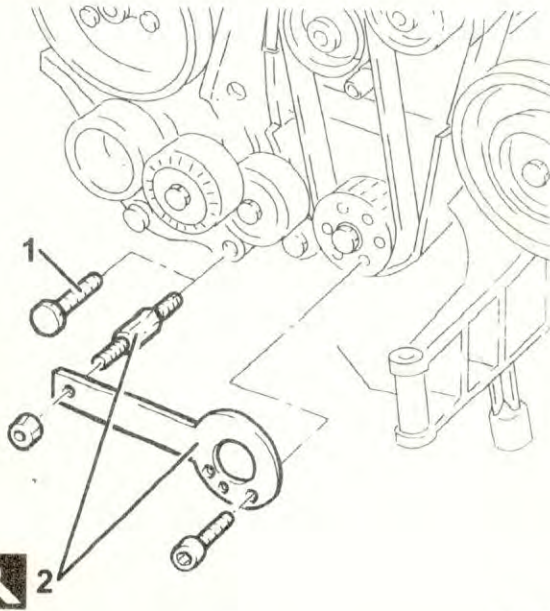
Note: Gently rotate crankshaft to allow insertion of centering dowel on toothed timing belt driving pulley, with hole on tool.

Description	Code
2 Template	1.860.905.000

BENCH REPAIR PROCEDURES CRANK CASE SUMP AND COVERS

AR32302

1020



AR32302

1. Rotate driven toothed pulley till phase marks coincide.
2. Fully assemble timing control toothed belt.
3. Using a screwdriver as a lever in hole (3a) move tensioner mark (3b) to reference hole (3c) and tighten belt tensioner nut (3d) at the prescribed torque.



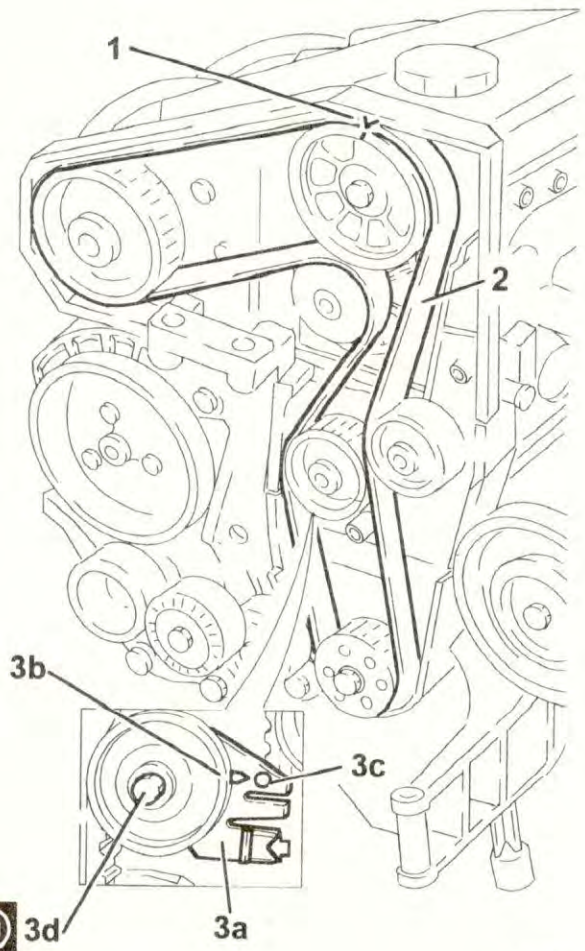
Mounting	Component	Ø	Value (daNm)
3d Nut	MOBILE TIMING TENSIONER	M10	4.2 - 5.2

- Remove tool.



Description	Code
- Template	1.860.905.000

- Turn crankshaft twice.
- Check again phasing marks, and timing belt tensioner tensioning reference marks.



AR32302

- Assemble timing control belt timing cases and fasten them with their screws.
- Assemble powerplant drive rod bracket and fasten it with its screws.
- Assemble engine systems belt guide pulley and fasten it with its screw.
- Assemble crankshaft pulley.
- Assemble engine systems drive pulley acting with a wrench on automatic belt tensioner.

1020

BENCH REPAIR PROCEDURES CRANK CASE SUMP AND COVERS

AR32302





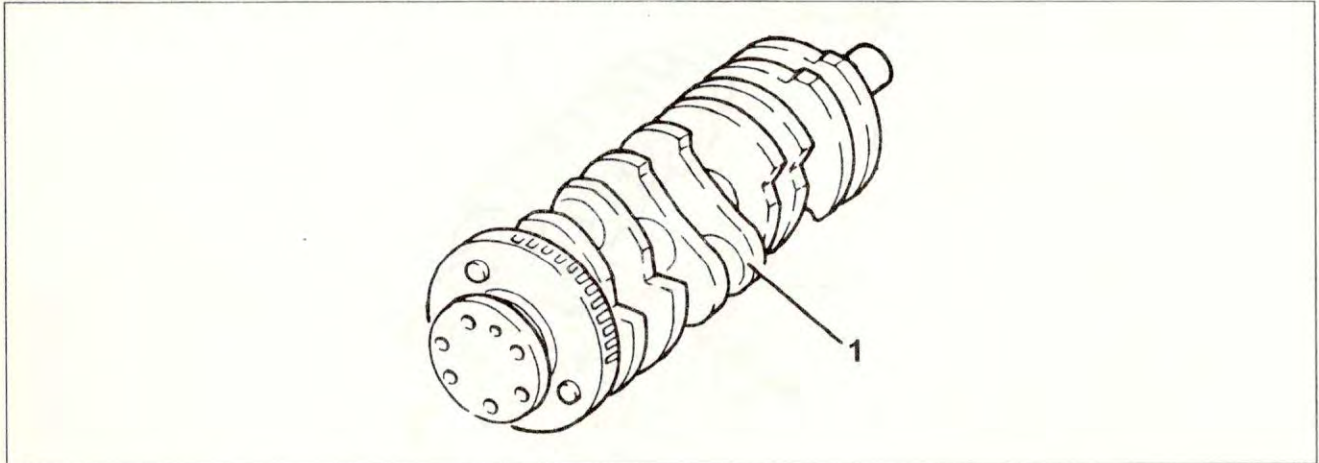
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1024A	CRANK SHAFT	AR32302

SUB-GROUP GRAPHIC INDEX



<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	CRANK SHAFT	1024A

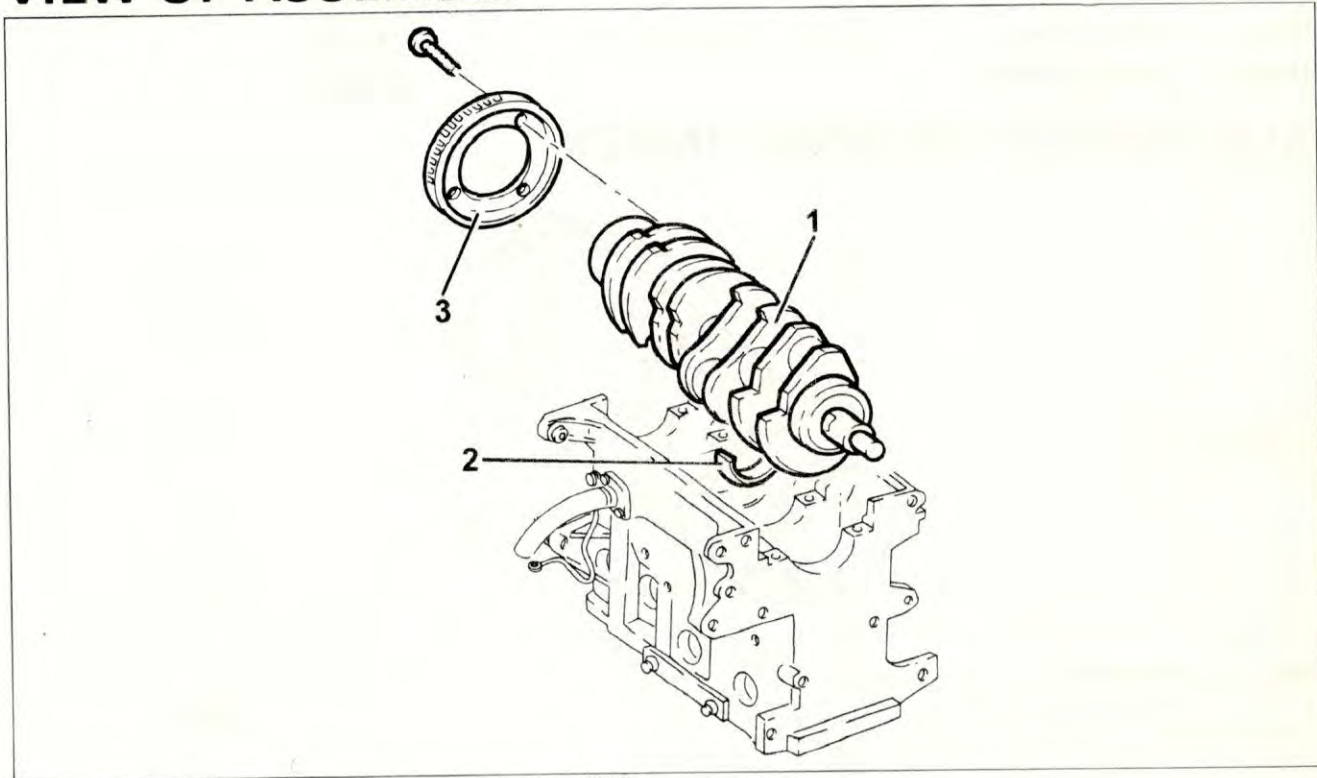


1024

AR32302

AR32302

1024A - CRANK SHAFT VIEW OF ASSEMBLY



Ref.	Description
(1)	CRANKSHAFT
(2)	MAIN BEARINGS
(3)	PHONIC WHEEL ON CRANKSHAFT

Operations index

Code	Operation	Validity
1024A10	CRANK SHAFT - R + R WITH ENGINE REMOVED - CHECK MAIN AND CONNECTING ROD BEARING AND REPLACE IF NECESSARY	AR32302

OPERATIONS

AR32302

1024A10 - CRANK SHAFT - R + R WITH ENGINE REMOVED - CHECK MAIN AND CONNECTING ROD BEARING AND REPLACE IF NECESSARY

Removal

AR32302

- Follow the Op. 1020D17 ENGINE FRONT

COVER - R R
1. Assemble tool.



Description

Code

1 Countertorque 1.820.624.000

2. Unscrew screws (2a) and remove flywheel (2b).
- Remove tool.



Description

Code

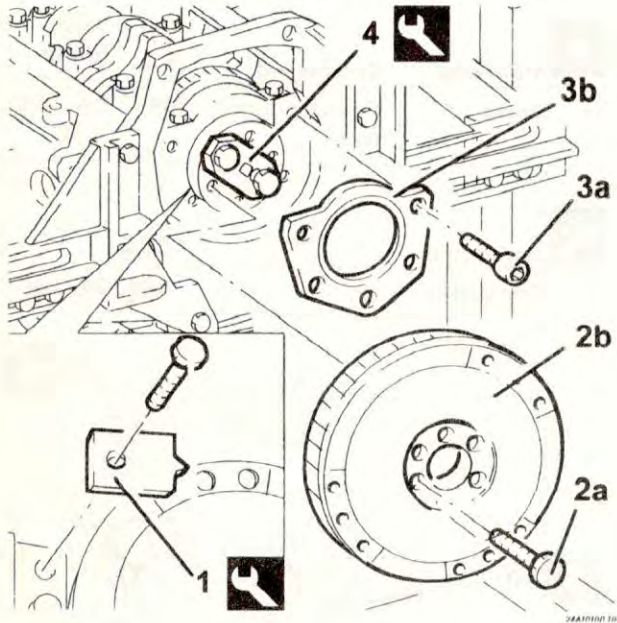
- Countertorque 1.820.624.000

3. Unscrew screws (3a) and remove rear cylinder

block cover (3b) together with oil seal ring.
4. Assemble tool.

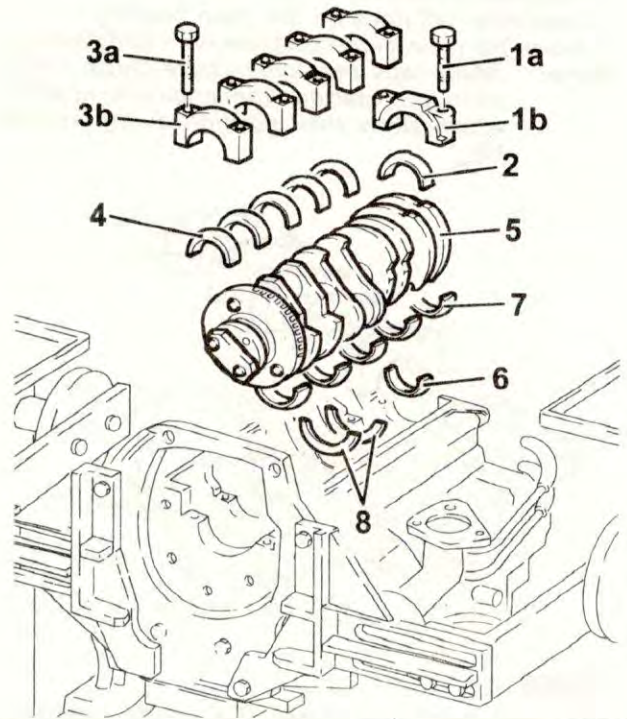


Description	Code
4 Flange	1.820.618.000



AR32302

- Rotate crankshaft with assembled tool till 1st and 4th cylinder pistons have reached B.D.C.
- 1. Unscrew screws (1a) and remove 1st and 4th cylinder conrod caps (1b).
- 2. Remove 1st and 4th lower conrod halfbearings.
- Operate likewise to remove conrod caps and halfbearings on 2nd and 3rd cylinder.
- 3. Unscrew screws (3a) and remove main bearing caps (3b).
- 4. Remove lower main halfbearings.
- 5. Remove crankshaft.
- 6. Remove upper conrod halfbearings.
- 7. Remove upper main halfbearings.
- 8. Remove half rings from 3rd main bearing.



Installation

AR32302

- Check main and conrod halfbearings conditions and substitute where necessary.
- Check main halfbearings thickness falls within tolerance values, if they don't substitute them.



Measure	Value
Main half bearing thickness (mm)	Class 1.836 -
	A 1.840
	Class 1.839 -
B 1.843	Class 1.842 -
	C 1.846

- Check conrod halfbearings thickness falls within tolerance values, if they don't substitute them.

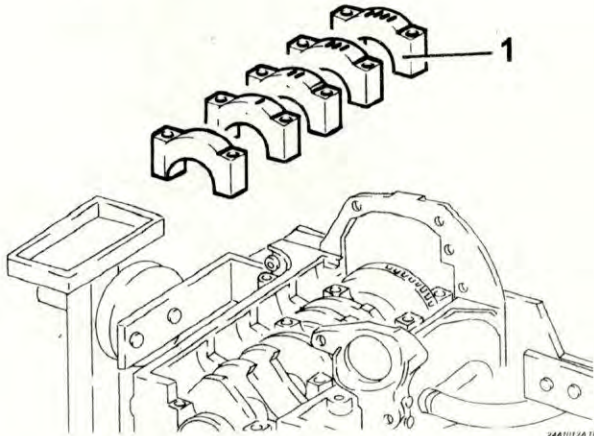


Measure	Value
Big end half bearing thickness (mm)	Class 1.527 -
	A 1.531
	Class 1.530 -
B 1.534	Class 1.533 -
	C 1.537

- Assemble upper main halfbearings on cylinder block.
- Assemble upper conrod halfbearings on conrod



- big end.
 - Assemble crankshaft on cylinder block.
 - Assemble half rings on 3rd main bearing.
 - 1. Assemble main caps complete with halfbearings.
- Note:** *Main caps bear progressive chips (from nil to four, starting from engine front side), which show their position during assembly.*

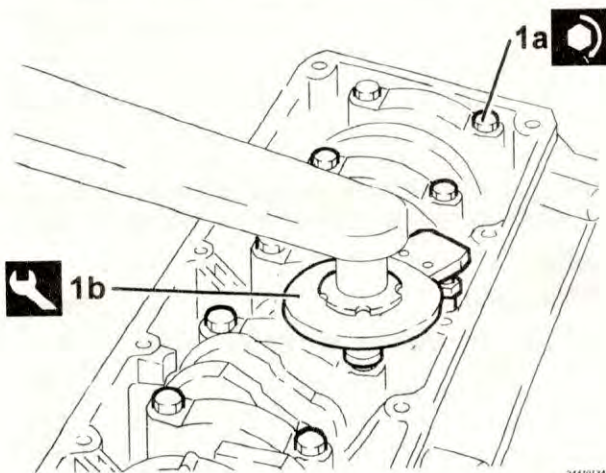


AR32302

1. Tighten main caps screws (1a) at the prescribed torque, using tool (1b) to tighten at an angle.

Mounting	Component	Ø	Value (daNm)
1a	Screw	MAIN BEARING CAPS	M12 2.4 - 2.6 + 100°

Description	Code	
1b	Goniometer	1.860.942.000



AR32302

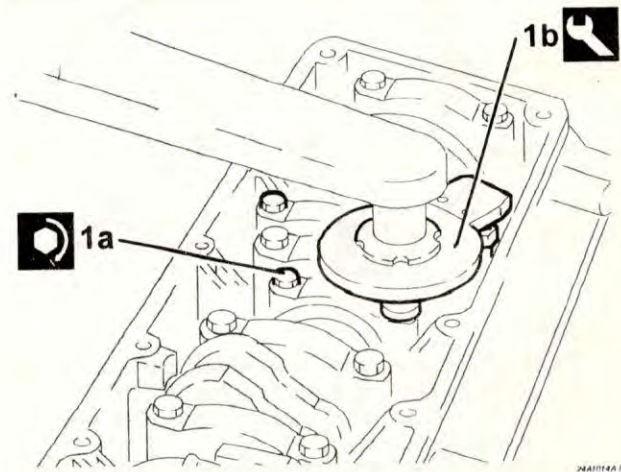
- Rotate crankshaft with previously assembled tool till 1st and 4th cylinder reach B.D.C.
 - Assemble 1st and 4th cylinder conrod caps complete with halfbearings and fasten them with their screws without tightening.
- Note:** *Conrod caps must be assembled so that*

the number stamped on them is on the same side as that stamped on conrod big end (inlet side).

- Operate likewise to assemble 2nd and 3rd cylinder conrod caps.
- 1. Tighten conrod caps screws (1a) at the prescribed torque, using tool (1b) to tighten at an angle.

Mounting	Component	Ø	Value (daNm)
1a	Screw	Connecting rod caps	M9 2.4 - 2.6 + 60°

Description	Code	
1b	Goniometer	1.860.942.000



AR32302

- Remove tool.

Description	Code	
-	Flange	1.820.618.000

1. Assemble rear cylinder block cover (1a) together with oil seal ring, using tool (1b).

Description	Code	
1b	Taker-in	1.820.619.000

2. Tighten rear cylinder block cover screws at the prescribed torque.

Mounting	Component	Ø	Value (daNm)
2	Screw	FLYWHEEL SIDE COVER	M6 0.8 - 1.0

- Remove tool.

BENCH REPAIR PROCEDURES CRANK SHAFT AND FLYWHEEL

AR32302

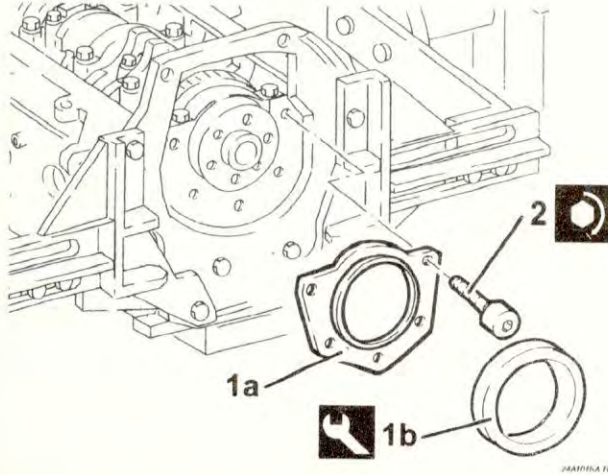
1024



Description

Code

- Taker-in 1.820.619.000



AR32302

- Assemble tool.



Description

Code

- Countertorque 1.820.624.000

- Assemble flywheel and tighten its screws at the prescribed torque.



Mounting

Component

\emptyset

*Value
(daNm)*

Mounting	Component	\emptyset	Value (daNm)
- Screw	FLYWHEEL	M12	13.6 - 16.8

- Remove tool.



Description

Code

- Countertorque 1.820.624.000

- Complete with Op. 1020D17 ENGIND
FRONT COVER - R R

1024

BENCH REPAIR PROCEDURES
CRANK SHAFT AND FLYWHEEL

AR32302





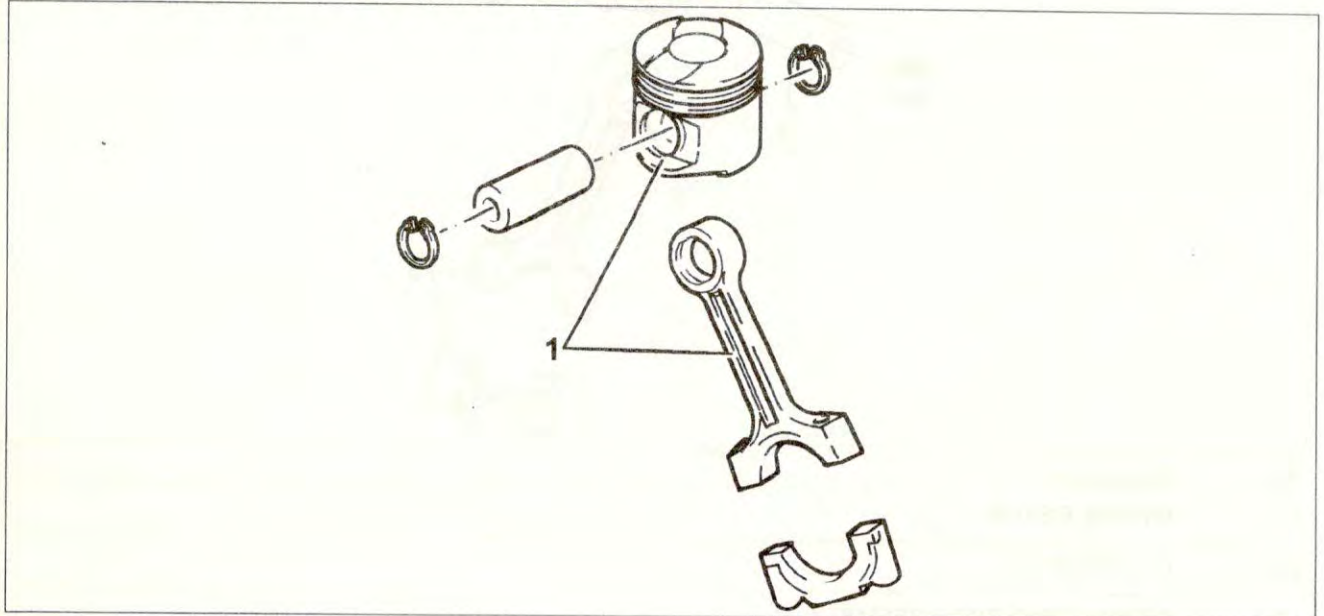
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1028H	CONNECTING RODS AND PISTONS	AR32302

SUB-GROUP GRAPHIC INDEX



<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	CONNECTING RODS AND PISTONS	1028H



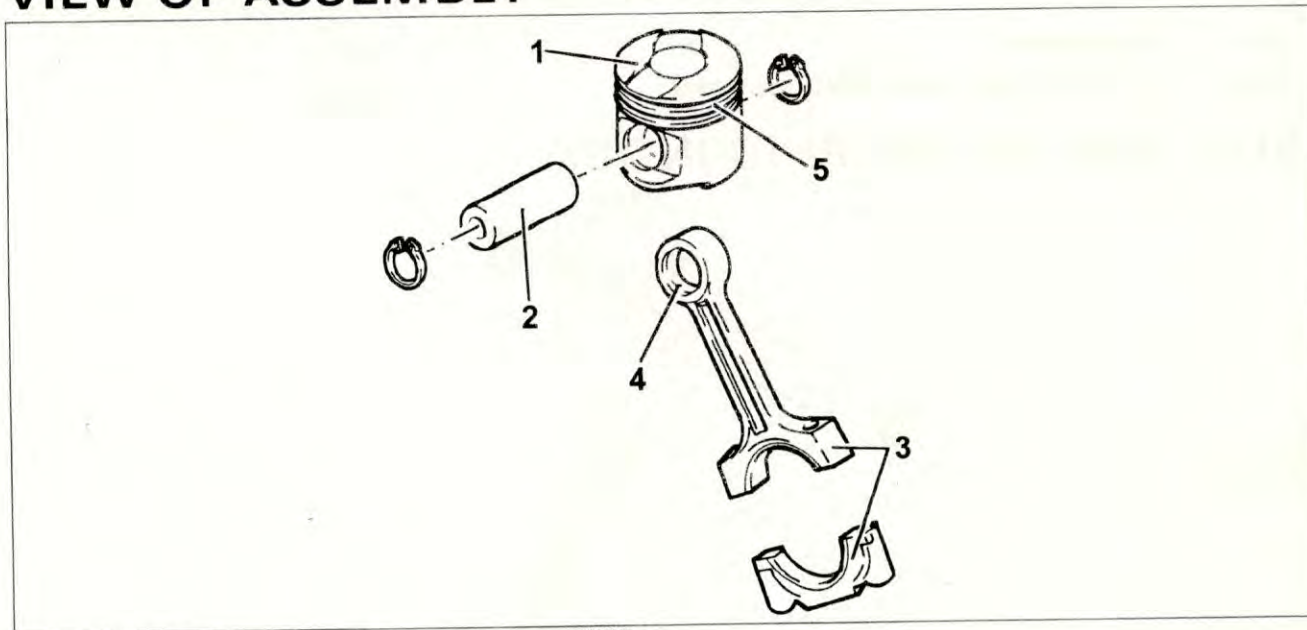
1028

AR32302

AR32302

1028H - CONNECTING RODS AND PISTONS

VIEW OF ASSEMBLY



Ref.	Description
(1)	ENGINE PISTON
(2)	GUDGEON PIN
(3)	CONNECTING ROD ASSEMBLY
(4)	SMALL END BUSH
(5)	PISTON RING SET

Operations index

Code	Operation	Validity
1028H14	PISTON CONNECTING ROD SET - R R	AR32302
1028H54	PISTON/CYLINDER LINER - R R	AR32302
1028H58	CONNECTING ROD SMALL END BUSH - REPLACE	AR32302
1028H60	PISTON, PIN SET - REPLACE	AR32302

OPERATIONS

AR32302

1028H14 - PISTON CONNECTING ROD SET - R R

Removal

AR32302

1. Unscrew oil sump to intermediate shaft support link bolt.
2. Unscrew oil sump front and rear screws (2a) with tool (2b).



Description

Code

2b Wrench 1.822.144.000

3. Unscrew oil sump lateral screws (3a) with tool (3b).



Description

Code

3b Wrench 1.822.145.000

4. Remove oil sump.

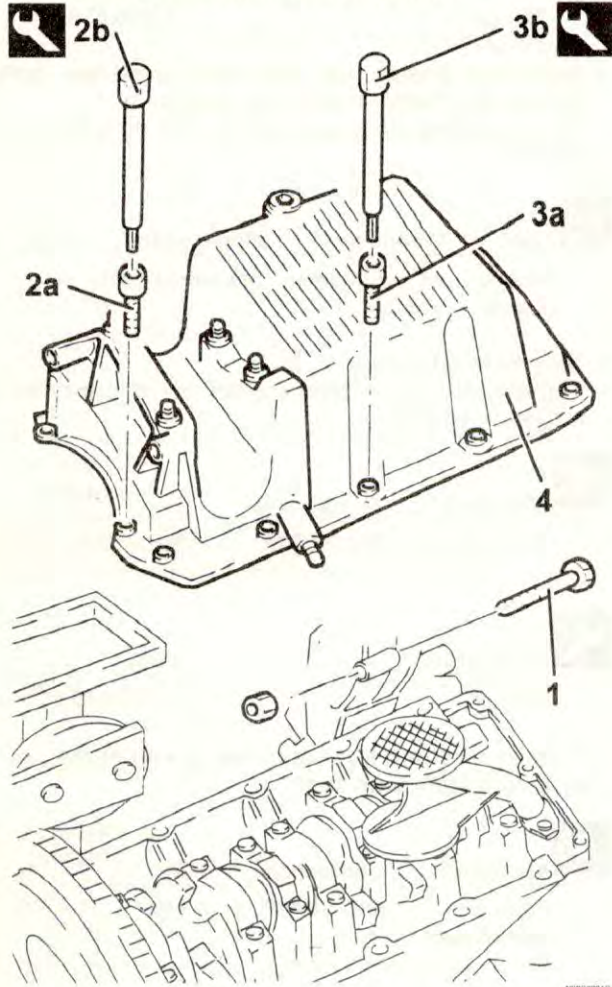
Note: Gently strike oil sump with resin hammer

BENCH REPAIR PROCEDURES CONNECTING RODS AND PISTONS

AR32302

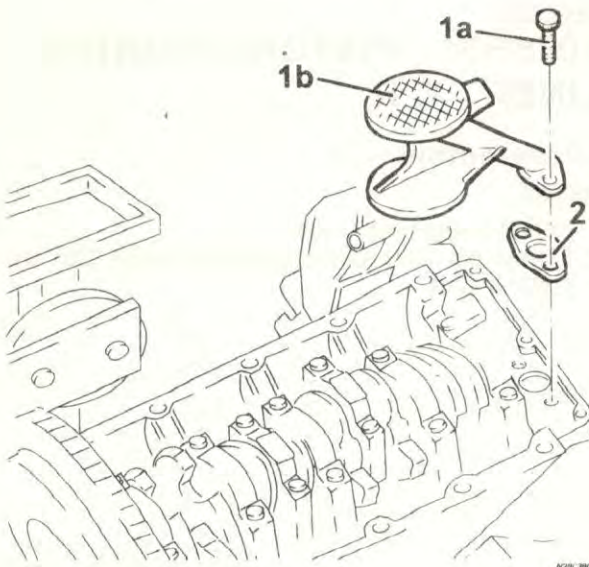
1028

to unblock it, then move it with a screw-driver acting as a lever in the appropriate projections on oil sump side.



AR32302

1. Extract screws (1a) and remove engine oil inlet vent (1b).
2. Remove gasket.



AR32302

1. Assemble tool and rotate crankshaft till cylinder has reached B.D.C.

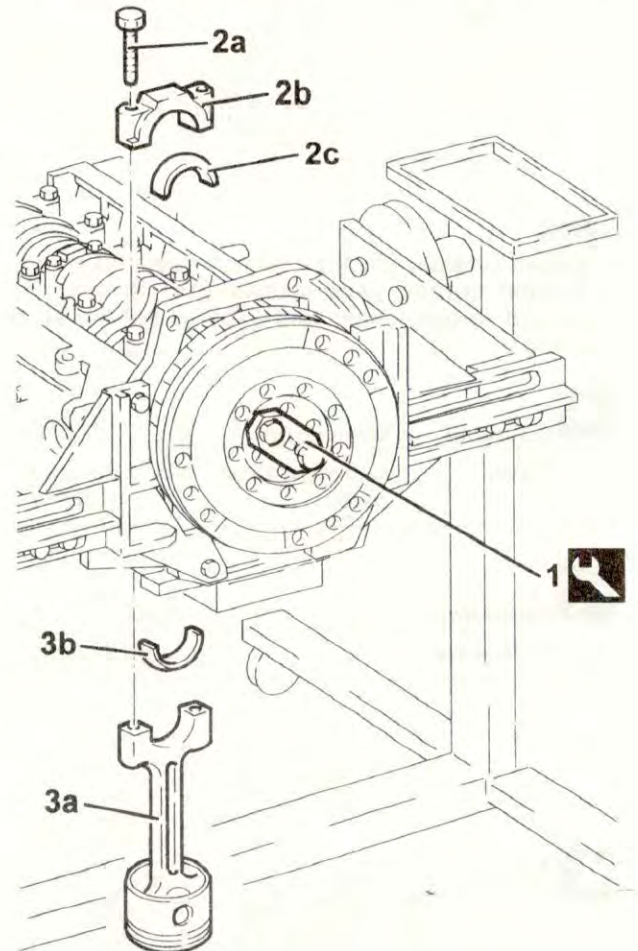


Description

Code

1	Flange	1.820.618.000
---	--------	---------------

2. Extract screws (2a) and remove conrod cap (2b) complete with halfbearing (2c).
 3. Remove conrod-piston assembly (3a) complete with halfbearing (3b).
- Operate likewise to remove pistons and conrods of remaining cylinders.



Installation

AR32302

- Rotate cylinder block by 90° on overhaul stand.
 - Rotate crankshaft with previously assembled tool till cylinder has reached B.D.C.
1. Assemble conrod-piston assembly (1a) complete with halfbearing using tool (1b).
- Note:** Conrod-piston assemblies must be assembled into cylinder block so that blast chamber on piston head is turned towards the inlet side.
2. Assemble conrod cap (2a) complete with halfbearing and fasten it with its screws (2b) without tightening them.
- Note:** Conrod caps must be assembled so that

BENCH REPAIR PROCEDURES CONNECTING RODS AND PISTONS

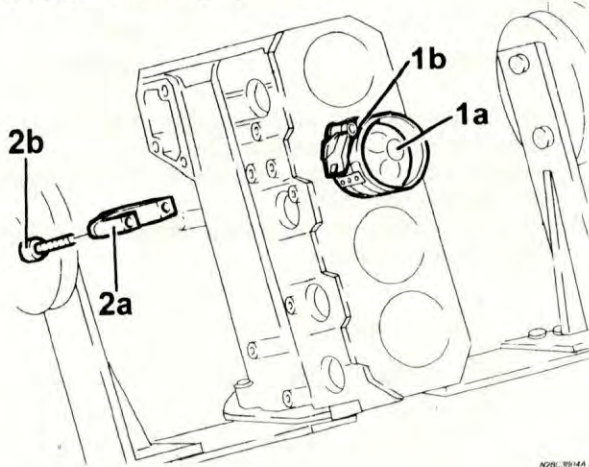
1028

AR32302



the number stamped on them is on the same side as that stamped on conrod big end (inlet side).

- Operate likewise to assemble pistons and conrods in remaining cylinders.



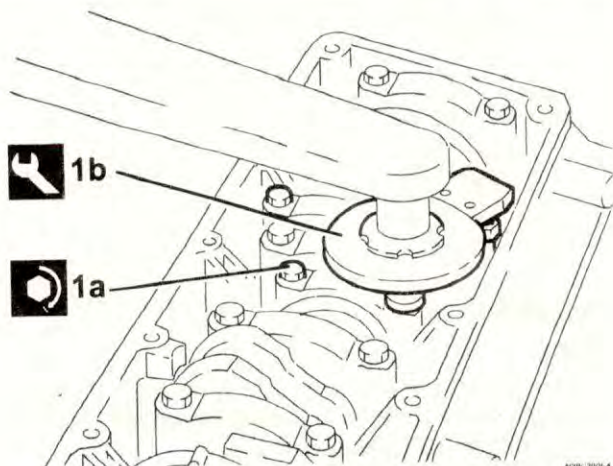
NOB-1014A 1/1

AR32302

- Rotate cylinder block by 90° on overhaul stand.
- 1. Tighten conrod caps screws (1a) at the prescribed torque, using tool (1b) to tighten at an angle.

Mounting	Component	Ø	Value (daNm)
1a	Screw Connecting rod caps	M9	2.4 - 2.6 + 60°

Description	Code
1b Goniometer	1.860.942.000



NOB-1014A 1/1

AR32302

- Remove tool.

Description	Code
- Flange	1.820.618.000

- Assemble engine oil inlet vent complete with gasket and fasten it with its screws.
- Apply sealing compound on whole oil sump perimeter.

Type	Component	Description	Q. ty.
- Silicone sealant	Air conditioner circuit	Silicone sealant	-

- Assemble oil sump.
- Tighten oil sump lateral screws at the prescribed torque with tool.

Mounting	Component	Ø	Value (daNm)
- Side screws	OIL SUMP	M8	2.1 - 2.6

Description	Code
- Wrench	1.822.145.000

- Tighten oil sump front and rear screws at the prescribed torque with tool.

Mounting	Component	Ø	Value (daNm)
- Front and rear screws	OIL SUMP	M6	0.7 - 0.9

Description	Code
- Wrench	1.822.144.000

- Tighten oil sump to intermediate shaft link bolt.

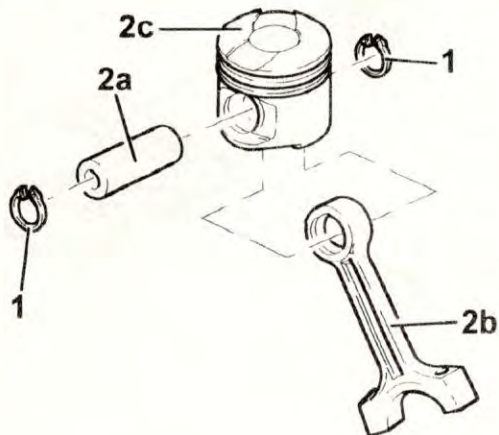
AR32302

1028H54 - PISTON/CYLINDER LINER - R R

Disassembly

AR32302

1. Remove retaining rings.
2. Extract pin (2a) and separate conrods (2b) from pistons (2c).

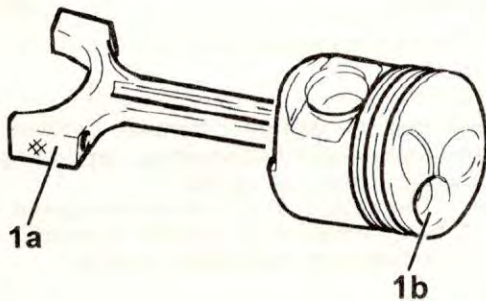


29C3001A 1/1

Reassembly

AR32302

1. Join conrods to relative pistons so that the number stamped on conrod head (1a) is oriented towards combustion chamber (1b) on the piston head.
- Insert pins and fasten them with retaining rings.



29C3002A 1/1

AR32302

1028H58 - CONNECTING ROD SMALL END BUSH - REPLACE

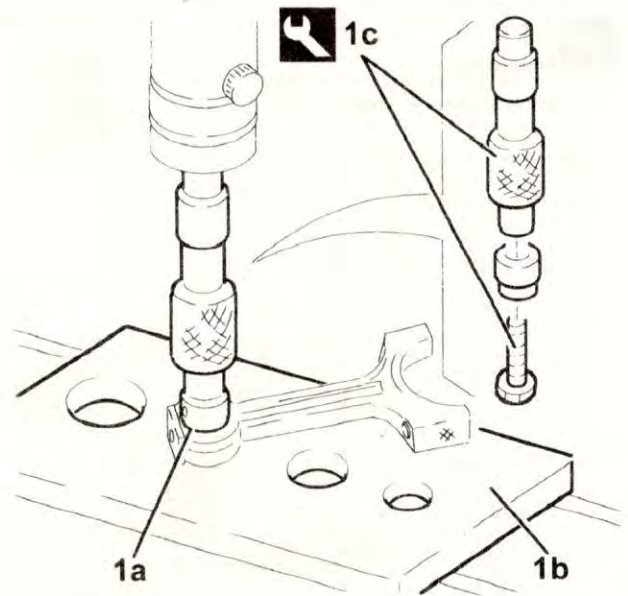
Disassembly

AR32302

1. Remove bearing (1a) from conrod small end with an hydraulic press, an appropriate plate (1b) and tool (1c) assembled as illustrated.



Description	Code
1c Extractor/Taker-in	1.860.821.001



29C3001B 1/1

Reassembly

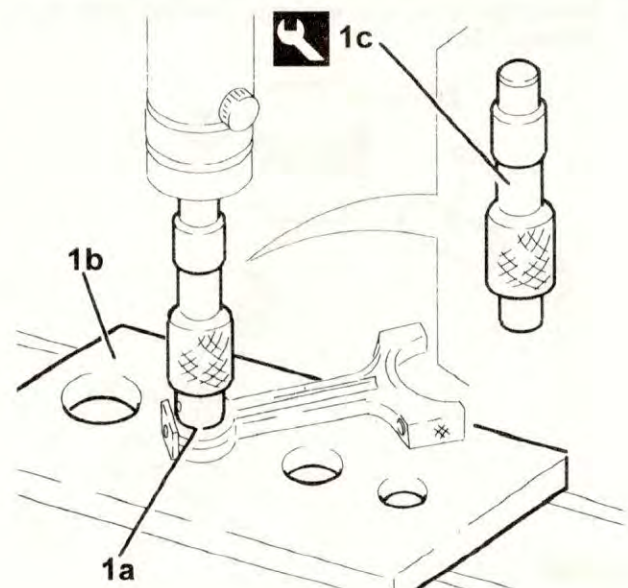
AR32302

1. Assemble a new bearing (1a) into conrod small end with an hydraulic press, an appropriate plate (1b) and tool (1c) assembled as illustrated.

Note: The bearing must be assembled into the conrod small end so that the lubrication hole in the bearing and the lubrication hole in the small end are aligned.



Description	Code
1c Extractor/Taker-in	1.860.821.001



29C3002B 1/1

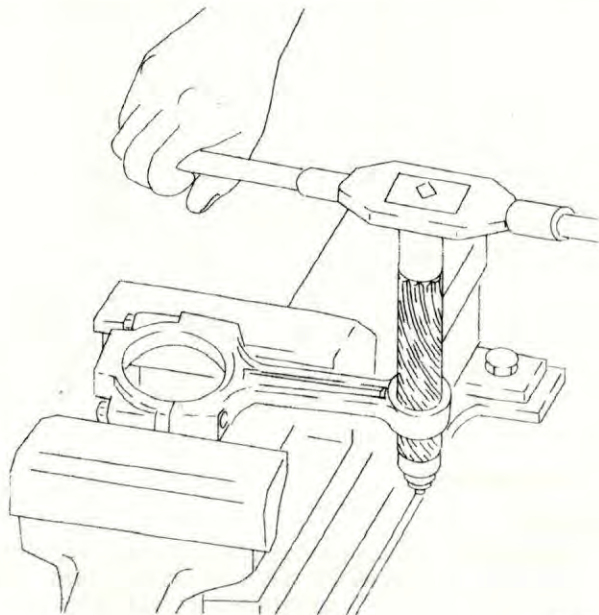
AR32302

- Ream internal diameter of the conrod small end bearing.



Measure

Measure	Value
- Inner diameter (mm)	26.006 - 26.012

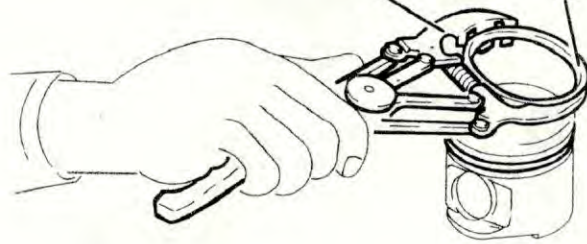


200-14014F 10



1b

1a



200-4002A 10

Reassembly

AR32302

- Check conrod squareness with appropriate tooling, substitute deformed conrods.
- Check that the weight difference between pistons falls within tolerance values.

Note: *The arrows in the illustration point to the areas where it is possible to remove material in order to balance weight.*



Measure

Measure	Value
- Difference in weight of pistons (g)	5

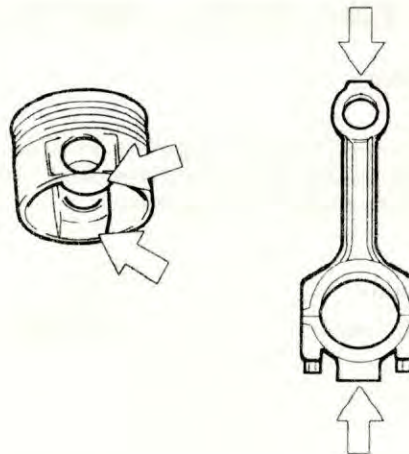
- Check that the weight difference between conrods complete with halfbearings, caps and screws falls within tolerance values.

Note: *The arrows in the illustration point to the areas where it is possible to remove material in order to balance weight.*



Measure

Measure	Value
- Difference in weight between rods (g)	2.5



200-4002A 10

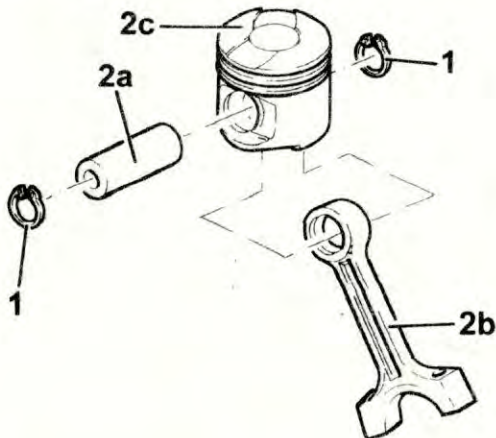
AR32302

1028H60 - PISTON, PIN SET - REPLACE

Disassembly

AR32302

1. Remove retaining rings.
2. Extract pin (2a) and separate conrods (2b) from pistons (2c).



200-4002A 10

AR32302

1. Remove piston rings (1a) from pistons with tool (1b).

AR32302

- Assemble piston rings on pistons with appropri-

BENCH REPAIR PROCEDURES CONNECTING RODS AND PISTONS

1028



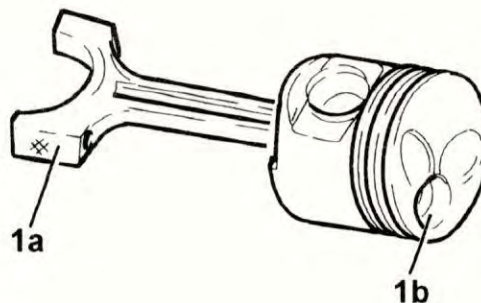
AR32302

ate tools.



Description	Code
- Extractor/Taker-in	1.860.183.000

1. Join conrods to relative pistons so that the number stamped on conrod head (1a) is oriented towards combustion chamber (1b) on the piston head.
- Insert pins and fasten them with their retaining rings.



28-249144 1/1

1028

**BENCH REPAIR PROCEDURES
CONNECTING RODS AND PISTONS**

AR32302





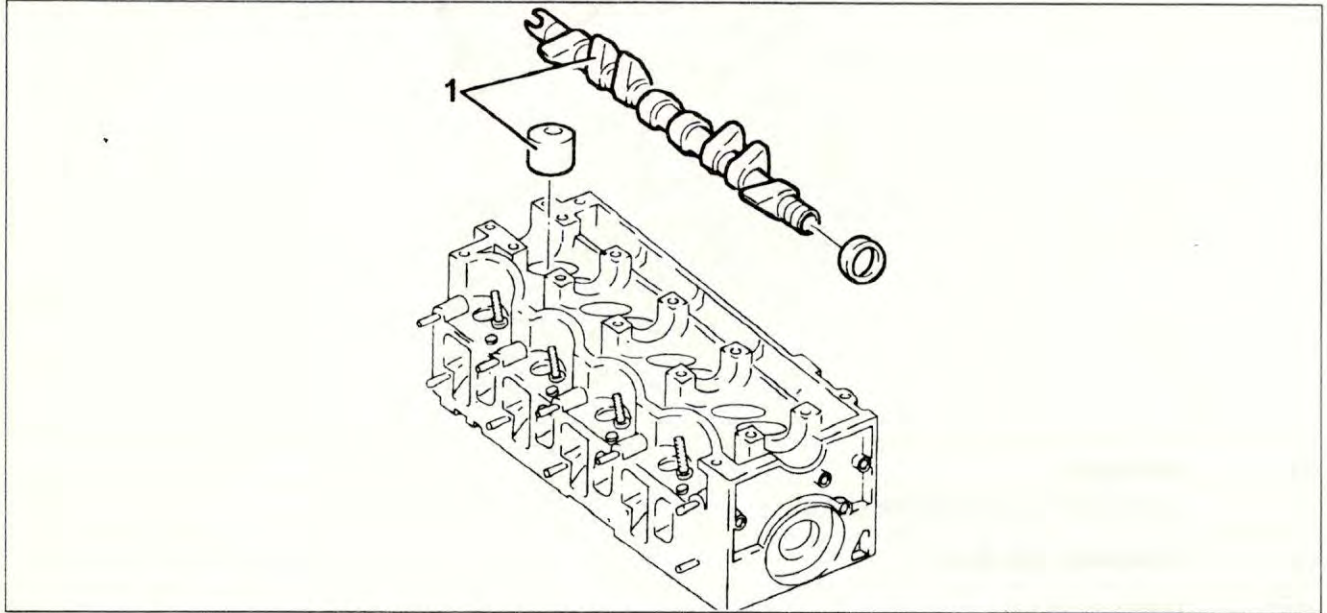
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1036B	OVERHEAD CAMSHAFT	AR32302

SUB-GROUP GRAPHIC INDEX



<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	OVERHEAD CAMSHAFT	1036B

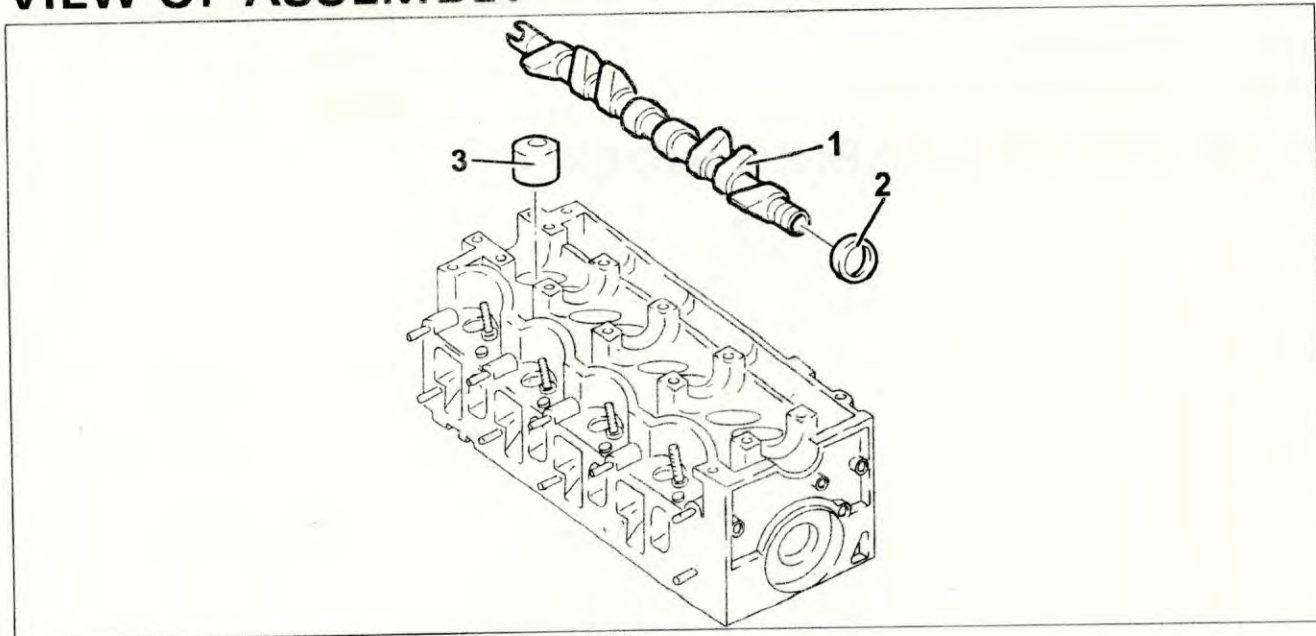


1036

AR32302

AR32302

1036B - OVERHEAD CAMSHAFT VIEW OF ASSEMBLY



Ref.	Description
(1)	CAMSHAFT (1) CYLINDER HEAD (1)
(2)	CAMSHAFT OIL SEAL
(3)	TAPPET CASES

Operations index

Code	Operation	Validity
1036B14	OVERHEAD CAMSHAFT - R R ON VEHICLE - WITH CYLINDER HEAD REMOVED	AR32302

OPERATIONS

AR32302

1036B14 - OVERHEAD CAMSHAFT - R R ON VEHICLE - WITH CYLINDER HEAD REMOVED

Removal

AR32302

1. Place tool in vice.

	Description	Code
1	Mount	1.820.012.000

2. Assemble tool.

	Description	Code
2	Mount	1.820.258.000

3. Assemble tool.

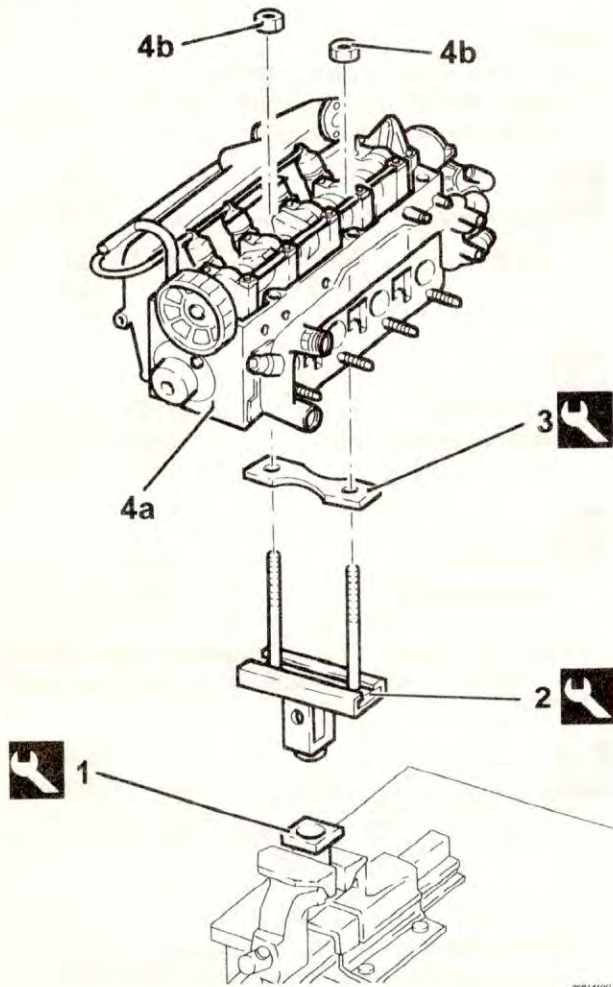
	Description	Code
3	Shim	1.820.267.000

4. Place cilinder head (4a) on supporting tools and fasten with relative nuts (4b).

BENCH REPAIR PROCEDURES TIMING SYSTEM

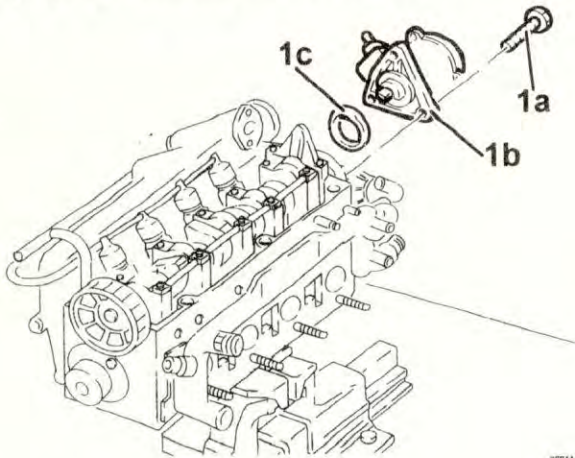
AR32302

1036



AR32302

1. Unscrew screws (1a) and remove vacuum pump (1b) together with the O-ring (1c).



AR32302

1. Unscrew screw (1a) of driven toothed pulley using tools (1b).

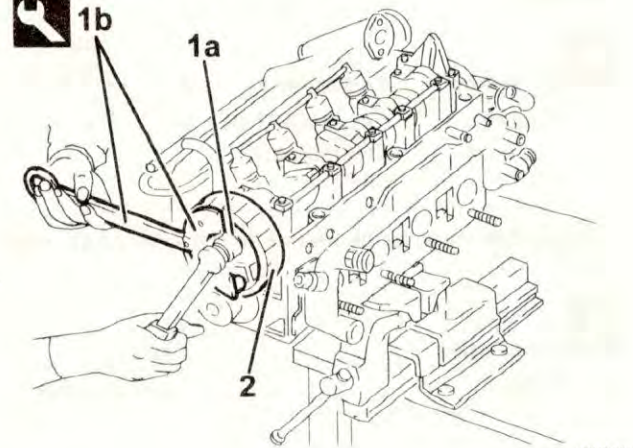


Description	Code
1b Countertorque mount	1.822.146.000



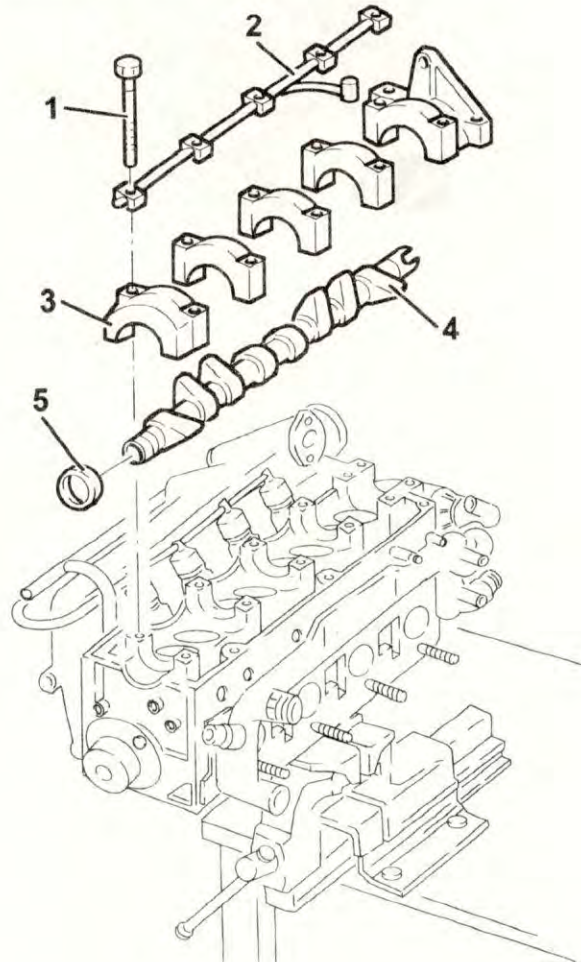
Description	Code
1b Countertorque	1.822.156.000

2. Remove driven toothed pulley.



AR32302

1. Unscrew camshaft caps screws.
2. Remove camshaft support lubrication piping.
3. Remove camshaft caps.
4. Remove camshaft.
5. Remove front camshaft oil seal.



BENCH REPAIR PROCEDURES TIMING SYSTEM

1036


AR32302



Installation

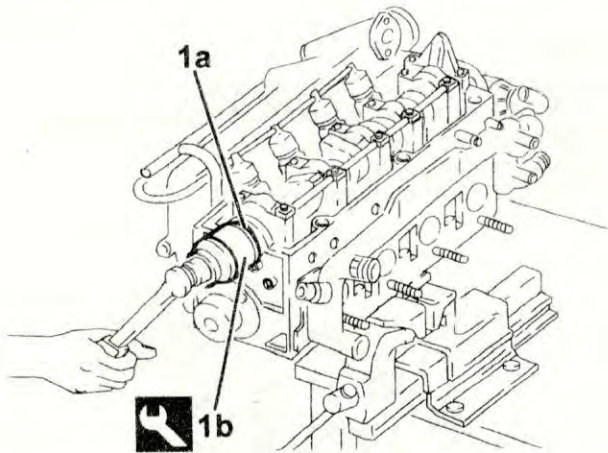
AR32302

- Assemble camshaft.
- Assemble camshaft caps.
- Assemble camshaft support lubrication piping.
- Tighten camshaft caps screws at the prescribed torque.

 Mounting	Component	Ø	Value (daNm)
- Screw	CAMSHAFT IN CRANKCASE CAPS	M7	1.3 - 1.6


1. Assemble new front camshaft oil seal (1a) with tool (1b).


 Description	Code
1b Taker-in	1.821.228.000



AR32302


- Assemble driven toothed pulley.
- Tighten driven toothed pulley screw at the prescribed torque, using tools.

 Mounting	Component	Ø	Value (daNm)
- Screw	TIMING DUCT PULLEY	M12	10.2 - 12.6

 Description	Code
- Countertorque mount	1.822.146.000

 Description	Code
- Countertorque	1.822.156.000

- Assemble vacuum pump together with O-ring and fasten it with its screws at the prescribed torque.

 Mounting	Component	Ø	Value (daNm)
- Screw	BRAKE SERVO VACUUM PUMP	M8	2.1 - 2.6

- Remove cilinder head from supporting tools.
- Remove cilinder head supporting tools from vice and pack them.



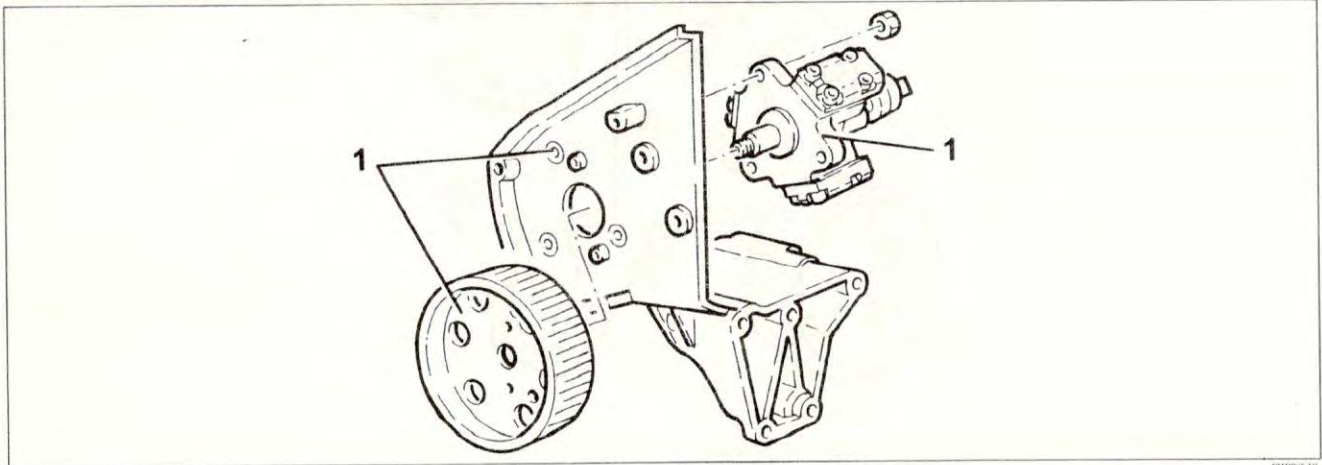
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1060E	DIESEL PRESSURE PUMP	AR32302

SUB-GROUP GRAPHIC INDEX



<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	DIESEL PRESSURE PUMP	1060E

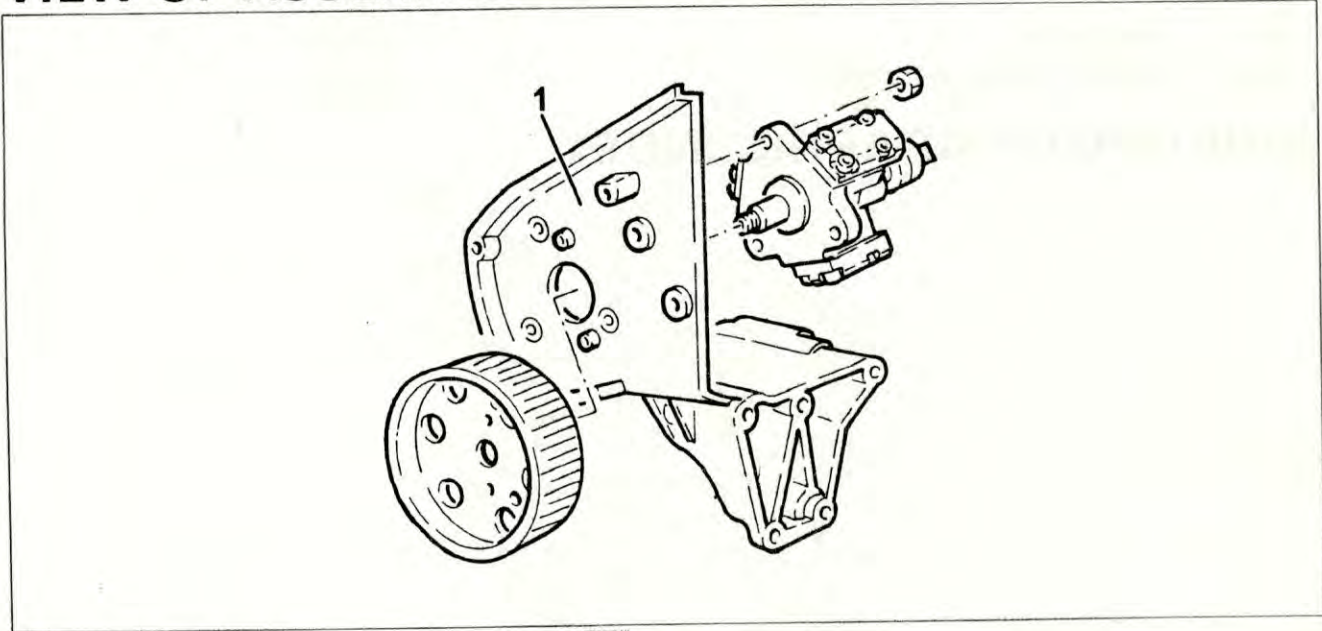


1060

AR32302

AR32302

1060E - DIESEL PRESSURE PUMP VIEW OF ASSEMBLY



Ref.	Description
(1)	INJECTION PRESSURE PUMP MOUNT

Operations index

Code	Operation	Validity
1060E42	SUPPLEMENTARY PRESSURE PUMP - DISMANTLE	AR32302

OPERATIONS

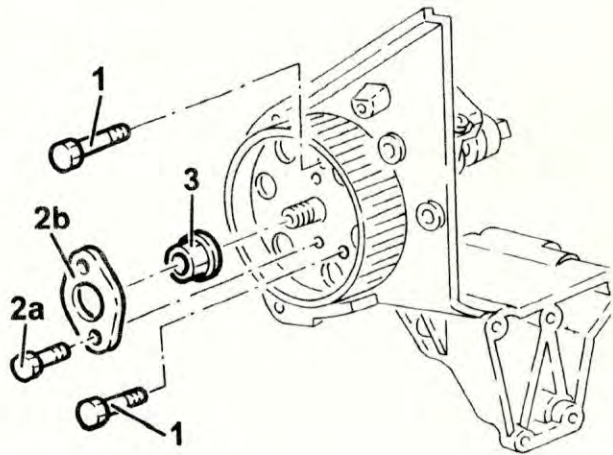
AR32302

1060E42 - SUPPLEMENTARY PRESSURE PUMP - DISMAN- TLE

Disassembly

AR32302

- Place pressure pump support in a vise fitted with protective shoes.
- 1. Stop pressure pump drive pulley rotation with two screws.
- 2. Unscrew screws (2a) and remove safety flange (2b).
- 3. Unscrew pressure pump drive pulley nut.
- Unscrew the two screws previously fitted to stop the pressure pump drive pulley rotation.



AR32302

1. Remove pressure pump drive pulley (1a) with tool (1b).



Description	Code
1b Extractor	1.860.954.002
2. Unscrew nuts (2a) and remove pressure pump	

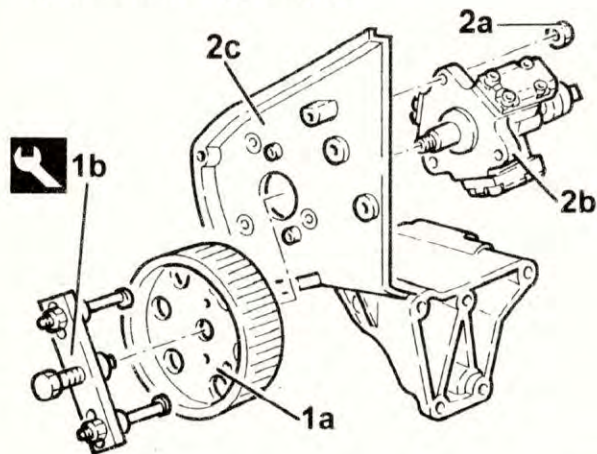
BENCH REPAIR PROCEDURES DIESEL INJECTION SYSTEM

1060



AR32302

(2b) from its support (2c).



Reassembly

AR32302

- Assemble pressure pump on its support and fasten it with its nuts.
- Assemble pressure pump drive pulley.
- Tighten pressure pump drive pulley nut at the prescribed torque.



Mounting	Component	Ø	Value (daNm)
- Nut	PRESSURE PUMP CONTROL PULLEY	M14	4.2 - 5.2

- Assemble safety flange and tighten its screws.
- Unscrew the two screws previously fitted to stop the pressure pump drive pulley rotation.

1094002A TV

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**BENCH REPAIR PROCEDURES
DIESEL INJECTION SYSTEM**

AR32302





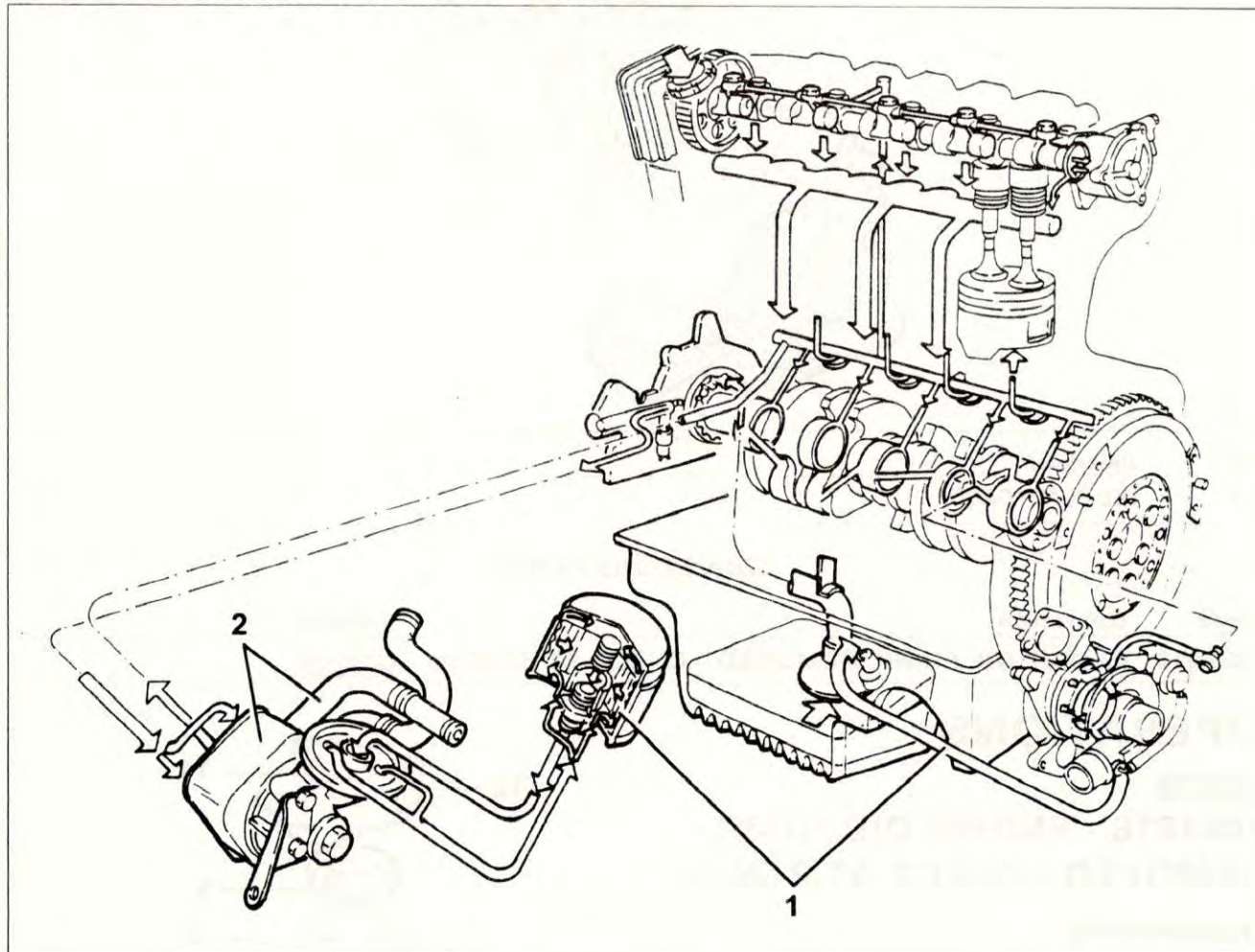
Sub-group index

- SUB-GROUP GRAPHIC INDEX

Assembly drawings index

<i>Cmp</i>	<i>Description</i>	<i>Validity</i>
1084B	ENGINE OIL LUBRICATION CIRCUIT	AR32302

SUB-GROUP GRAPHIC INDEX

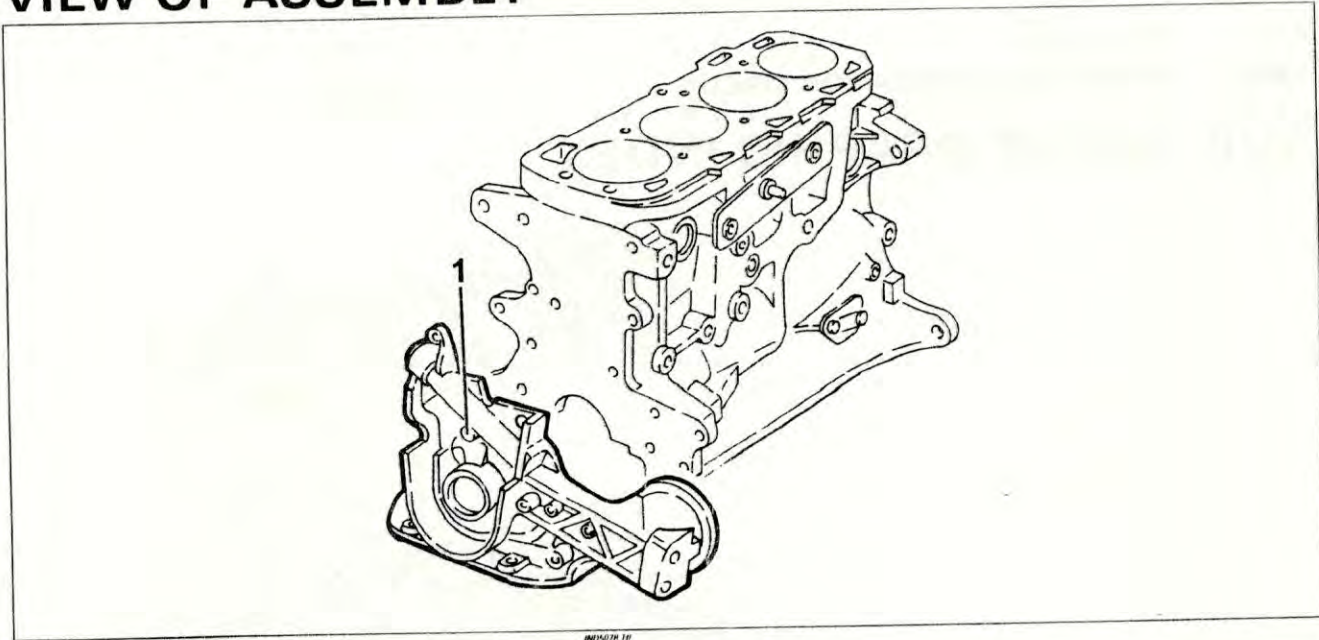


<i>Ref.</i>	<i>Description</i>	<i>Cmp</i>
1	ENGINE OIL LUBRICATION CIRCUIT	1084B
(2)	ENGINE OIL COOLING CIRCUIT	1084C



AR32302

1084B - ENGINE OIL LUBRICATION CIRCUIT VIEW OF ASSEMBLY



Ref.	Description
(1)	OIL PUMP CASE

Operations index

Code	Operation	Validity
1084B18	ENGINE OIL PUMP, REMOVED - CHECK AT BENCH	AR32302

OPERATIONS

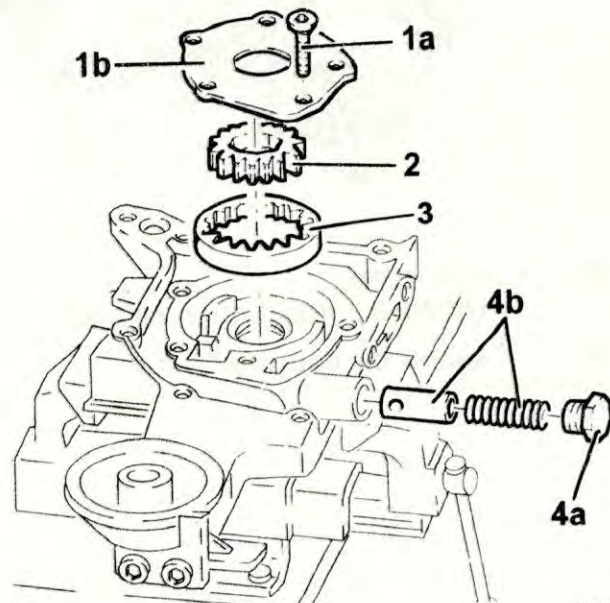
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1084B18 - ENGINE OIL PUMP, REMOVED - CHECK AT BENCH

Disassembly

AR32302

1. Unscrew screws (1a) and remove oil pump cover (1b).
 2. Remove driving gear.
 3. Remove driven gear.
 4. Unscrew cap (4a) and remove oil pressure limiting valve (4b).
- Remove front crankshaft oil seal. ↯



Reassembly

AR32302

- Check radial play between pump casing and driven gear falls within prescribed values, if else sub-

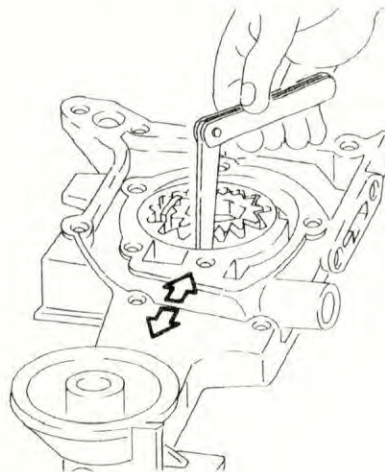
AR32302



stitute the whole oil pump.



Measure	Value
- Radial play between pump body and duct gear (mm)	0.080 - 0.186



AR32302

- Check oil pressure limiting valve spring height falls within prescribed values, if else substitute spring.



Measure	Value
- Control load (daN)	11.73 - 12.51
Height (mm)	35

1. Assemble a new front crankshaft oil seal (1a) with tool (1b).



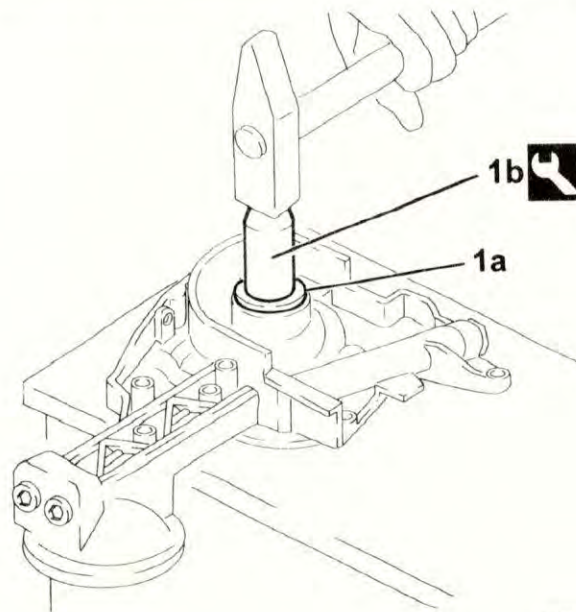
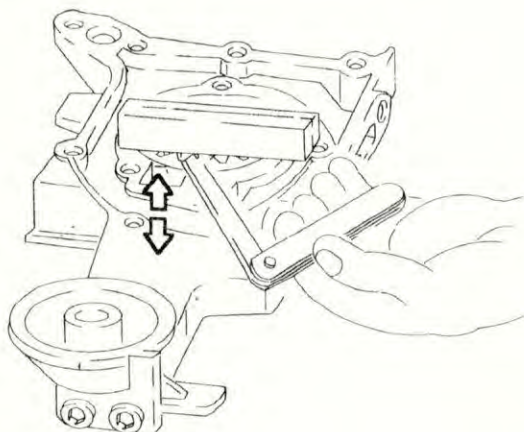
Description	Code
1b Taker-in	1.821.247.000

AR32302

- Check end play between pump cover resting face and gear upper side falls within prescribed values, if else substitute the whole oil pump.



Measure	Value
- End play between face and pump cover (mm)	0.025 - 0.070



AR32302

- Assemble oil pressure limiting valve and tighten its cap.
- Assemble driven gear.
- Assemble driving gear.
- Assemble oil pump cover and tighten its screws.

Note: Manually rotate gears to check they turn without blocking.

