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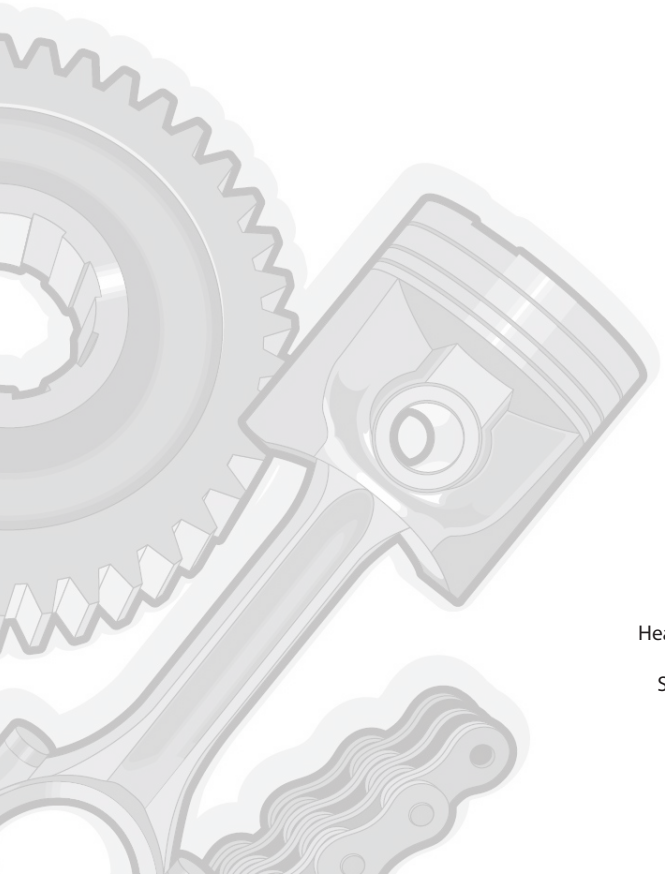

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MT 1033 HL Turbo *Série 1*

FRONT AND REAR TYRES

	DIMENSIONS	PRESSURE	TYRE LOAD		PRESSURE ON THE CONTACT SURFACE HARD GROUND	PRESSURE ON THE CONTACT SURFACE LIGHT GROUND	AREA OF THE CONTACT SURFACE HARD GROUND	AREA OF THE CONTACT SURFACE LIGHT GROUND
STANDARD	**14,9x24 T35 Stabilarge 18PR DUNLOP**	**3,4 Bar**	Front unladen	1700 kg	5,7 kg/cm2	2 kg/cm2	296 cm2	848 cm2
			Front laden	4500 kg	9,3 kg/cm2	3,1 kg/cm2	482 cm2	1450 cm2
			Rear unladen	2200 kg	6,5 kg/cm2	2,2 kg/cm2	340 cm2	990 cm2
			Rear laden	1050 kg	5,1 kg/cm2	1,7 kg/cm2	207 cm2	600 cm2
OPTION	**18-19.5 16PR I224 TL ALLIANCE**	**5 Bar**	Front unladen	1700 kg	kg/cm2	kg/cm2	cm2	cm2
			Front laden	4500 kg	kg/cm2	kg/cm2	cm2	cm2
			Rear unladen	2200 kg	5,6 kg/cm2	2,36 kg/cm2	392 cm2	933 cm2
			Rear laden	1050 kg	kg/cm2	kg/cm2	cm2	cm2
OPTION	**400/70-20 T37 150B TL 14PR DUNLOP**	**3,3 Bar**	Front unladen	1700 kg	7,4 kg/cm2	2,4 kg/cm2	230 cm2	716 cm2
			Front laden	4500 kg	10,5 kg/cm2	3,3 kg/cm2	427 cm2	1360 cm2
			Rear unladen	2200 kg	7,9 kg/cm2	2,5 kg/cm2	280 cm2	870 cm2
			Rear laden	1050 kg	6,6 kg/cm2	2,1 kg/cm2	159 cm2	492 cm2
	440/70-24 T37 147B TL DUNLOP	**2,8 Bar**	Front unladen	1700 kg	6,4 kg/cm2	1,8 kg/cm2	265 cm2	928 cm2
			Front laden	4500 kg	9,4 kg/cm2	2,7 kg/cm2	480 cm2	1656 cm2
			Rear unladen	2200 kg	6,9 kg/cm2	2 kg/cm2	320 cm2	1110 cm2
			Rear laden	1050 kg	5,5 kg/cm2	1,6 kg/cm2	190 cm2	663 cm2
	400/80-24 T37 153B TL DUNLOP	**3,2 Bar**	Front unladen	1700 kg	7,3 kg/cm2	2 kg/cm2	234 cm2	848 cm2
			Front laden	4500 kg	10,2 kg/cm2	2,9 kg/cm2	442 cm2	1550 cm2
			Rear unladen	2200 kg	7,9 kg/cm2	2,2 kg/cm2	280 cm2	1020 cm2
			Rear laden	1050 kg	6,3 kg/cm2	1,8 kg/cm2	166 cm2	597 cm2
OPTION	**15,5/80-24 SGI TL 12PR GOODYEAR**	**4 Bar**	Front unladen	1700 kg	7,9 kg/cm2	2,2 kg/cm2	214 cm2	786 cm2
			Front laden	4500 kg	11,9 kg/cm2	3,3 kg/cm2	377 cm2	1353 cm2
			Rear unladen	2200 kg	8,8 kg/cm2	2,4 kg/cm2	251 cm2	920 cm2
			Rear laden	1050 kg	7,3 kg/cm2	1,9 kg/cm2	144 cm2	546 cm2
	460/70 R24 IT520 TL 150A8 GOODYEAR	**3,3 Bar**	Front unladen	1700 kg	8,4 kg/cm2	2,3 kg/cm2	202 cm2	744 cm2
			Front laden	4500 kg	11,9 kg/cm2	3,1 kg/cm2	377 cm2	1453 cm2
			Rear unladen	2200 kg	9,4 kg/cm2	2,5 kg/cm2	233 cm2	890 cm2
			Rear laden	1050 kg	8,5 kg/cm2	2,2 kg/cm2	123 cm2	468 cm2
	445/70R24 IT510 151G GOODYEAR	**4,1 Bar**	Front unladen	1700 kg	8,5 kg/cm2	2,8 kg/cm2	200 cm2	603 cm2
			Front laden	4500 kg	10 kg/cm2	3,3 kg/cm2	451 cm2	1360 cm2
			Rear unladen	2200 kg	8,8 kg/cm2	2,9 kg/cm2	250 cm2	755 cm2
			Rear laden	1050 kg	7,8 kg/cm2	2,6 kg/cm2	135 cm2	405 cm2
OPTION	**17,5LR24 XM27 TL 145A8 MICHELIN**	**3,5 Bar**	Front unladen	1700 kg	1,6 kg/cm2	1,52 kg/cm2	1038 cm2	1120 cm2
			Front laden	4500 kg	3,3 kg/cm2	2,16 kg/cm2	1363 cm2	2083 cm2
			Rear unladen	2200 kg	2 kg/cm2	1,57 kg/cm2	1090 cm2	1400 cm2
			Rear laden	1050 kg	1,1 kg/cm2	1,06 kg/cm2	953 cm2	991 cm2

HYDRAULIC CIRCUIT

- Type of pump	Gear pump with flow divider
. Capacity	43,8 cm^3
- Lifting, tilting, telescoping, tilting corrector, attachment circuit	
. Max. rating capacity unladen	105 L/mn
. Pressure	270 Bar
- Steering circuit	
. Max. rating capacity unladen	105 L/mn
. Pressure	140 Bar
- Filtration	
. Return	15 Micron
. Suction	125 Micron

12 Cylinder head assembly

24 Auxiliary equipment

Compressors

Power steering pump

Exhauster

25 Special tools

Thread sealant

When setscrews or studs are fitted into holes which are tapped through the cylinder block, a suitable sealant must be used to prevent leakage.

Micro encapsulated anaerobic sealant (M.E.A.S) fasteners have been introduced instead of jointing compounds or other sealants when the fasteners are fitted in through holes into oil or coolant passages. The identification of these fasteners, as supplied, is by a red, blue, or other colour sealant around the fastener threads.

With M.E.A.S. sealed studs, the sealed end must be fitted into the cylinder head / cylinder block etc. Ensure that the threaded holes have a 1,59 mm (0.0625 in) 45° chamfer, to ensure that when the new fasteners are fitted the M.E.A.S. sealant is not removed. If the fasteners have to be removed and fitted again, the threads must be cleaned and a suitable sealant used.

To dismantle and to assemble 12-3

To dismantle

1 Remove the clips from both ends of the rocker shaft. Ensure that the ends of the rocker shaft are not damaged. Release the location screw (A1) for the oil supply connection.

2 Dismantle the assembly and make a note of the position of each component to ensure that they can be assembled more easily.

To assemble

1 Ensure that the oil holes in the rocker shaft and in the rocker levers are not restricted.

2 Lubricate the components with clean engine lubricating oil before assembly. Assemble the components in the correct order (A) with the arrows (A2) on the pedestals in the position shown. Ensure that the location screw (A1) for the oil supply connection is fitted correctly in the rocker shaft. Fit the clips to the ends of the rocker shaft.

To inspect and to correct 12-4

To inspect

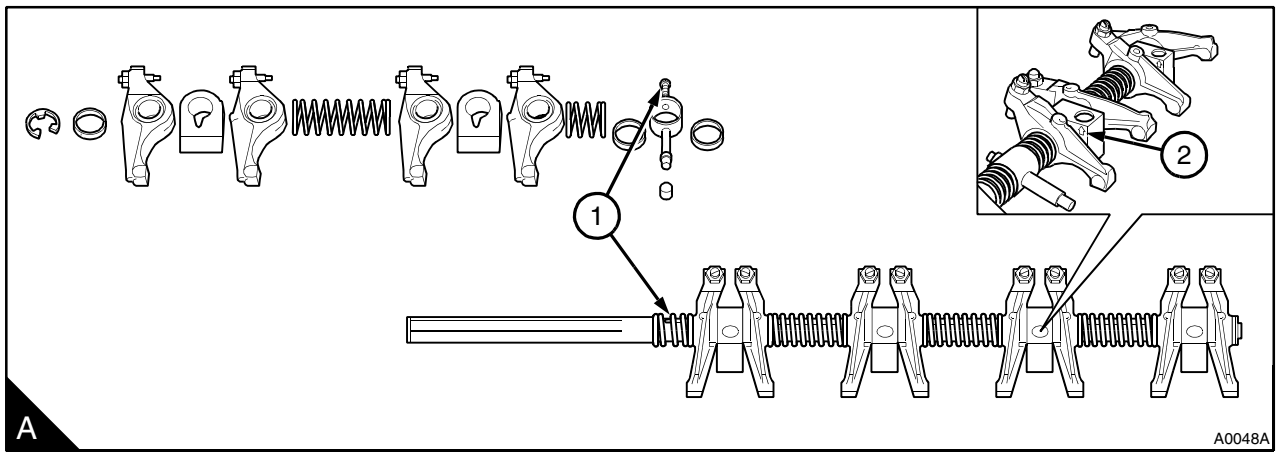
1 Clean and inspect all the components for wear and any other damage. Check the clearance of the rocker levers on the rocker shaft. If the clearance is larger than 0,13 mm (0.005 in), renew the rocker lever bush and/or the rocker shaft.

To correct

1 To renew the rocker lever bush, press out the old bush with a suitable mandrel.

2 Align the lubrication hole of the new bush on the same side as the rocker lever lubrication hole and press the bush into position.

3 Ream the bush in the rocker lever to give a clearance on the rocker shaft of 0,03/0,09 mm (0.001/0.004 in). Clean thoroughly the bush and check that the oil hole is free from debris.



20 For engines fitted with turbochargers: Fit the turbocharger, see operation 18-1.

21 Fit the fuel pipe between the fuel filter and the fuel lift pump.

22 Fit the fuel pipe between the fuel filter and the fuelled starting aid in the induction manifold. Connect the electrical connection to the cold start device.

23 For engines fitted with a boost control device: Fit the boost control pipe between the induction manifold and the top of the fuel injection pump.

24 Fit the electrical connection to the coolant temperature sender unit.

25 Connect the coolant outlet and the hoses for the cab heater. Tighten the clips.

26 Fill the cooling system.

27 Connect the air filter/cleaner.

28 Connect the battery.

29 Eliminate air from the fuel system, , see operation 20-9.

30 Start the engine and run it at low speed. Check that oil flows from the holes in the rocker levers. If the oil flow is correct, fit the rocker cover, see operation 12-1.

Note: It is not necessary to tighten the cylinder head setscrews again with the engine hot or after a limited period in service.

1 Remove the cylinder head assembly, see operation 12-7.

2 Remove the thermostat housing.

3 Inspect the cylinder head for signs of gas or coolant leakage.

4 Remove the valve springs and the valves, see operation 12-8.

5 Clean the face of the cylinder head and the passages for coolant and for lubricating oil. The water jacket can be cleaned with a special solvent which must be used in accordance with the manufacturer's instructions.

6 Test the cylinder head for leaks at the pressure given in the data and dimensions.

7 When the cylinder head is thoroughly clean, check it for cracks. Inspect carefully the areas around the valve seats and around the holes for the atomiser nozzles.

8 The bottom face of the cylinder head can be machined if there is distortion, see paragraph 9; there are deep scratches; or, for engines without valve seat inserts, the valve depths are below the service limit.

9 Use a straight edge and feeler gauges to check the cylinder head for distortion across and along its bottom face, see the data and dimensions. If the distortion is more than the limit given in the data and dimensions, the bottom face can be machined, see the data and dimensions for the surface grade finish of the cylinder head face.

Caution: *Remove only the minimum material and ensure that the thickness of the cylinder head will not be less than 102,48 mm (4.035 in) after the cylinder head has been machined.*

Caution: *After the cylinder head has been machined the valve seats must be corrected to give the correct valve head depth. Work to the minimum limit to allow for later wear.*

10 Check the valve seats for wear and for damage.

11 Before any work is done on the valve seats, new valve guides must be fitted, see operation 12-11.

12 More badly damaged valve seats can be corrected by use of the cutter tool, see operation 12-13, or new inserts can be fitted, see operation 12-14.

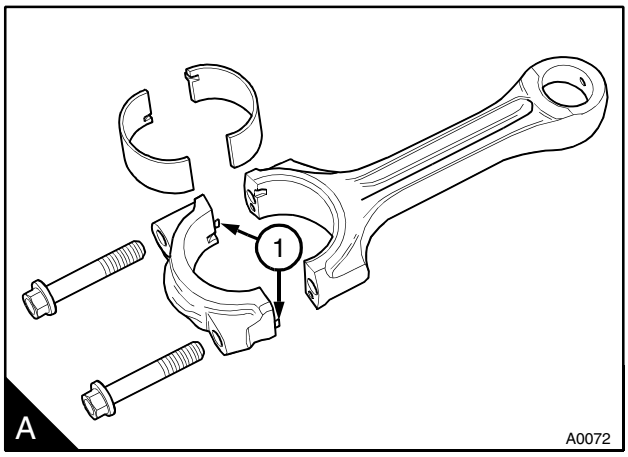
Notes:

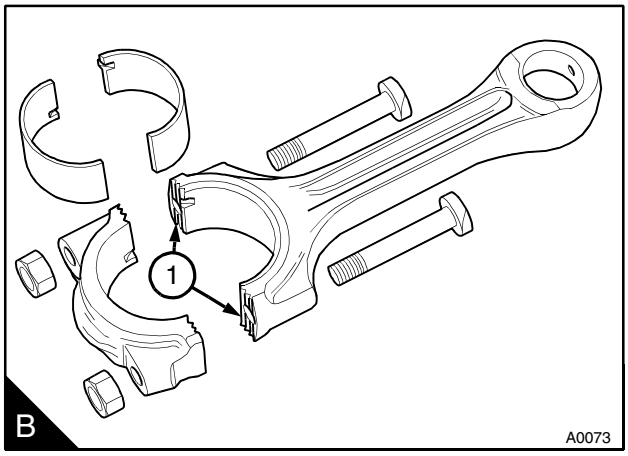
- If the crankshaft or the cylinder block is to be renewed, it may be necessary to change the grade of the connecting rods, see operation 13-10. This will occur if the correct piston height above the cylinder block face cannot be maintained with the original connecting rod assemblies, see operation 13-4.
- Engine types AR and AS do not have cylinder liners fitted and the cylinder bores must be machined oversize to correct a worn cylinder bore. Two oversize pistons and piston rings are available in service 0,5 mm (0.020 in) and 1,00 mm (0.040 in).
- Always use the engine identification number to order new parts.

The connecting rods are machined from "H" section forgings of molybdenum steel. They have wedge shaped small ends.

Location of the bearing cap to the connecting rod is made by dowels (A1) fitted in the bearing cap. The faces of the connecting rods and caps are flat and the caps are retained by two setscrews.

Some engines have bearing caps with serrations (B1) which are used to ensure the correct location of the bearing caps to the connecting rods. These caps are retained by two nuts and bolts.





Piston and piston rings

To inspect 13-8

1 Check the piston for wear and other damage.

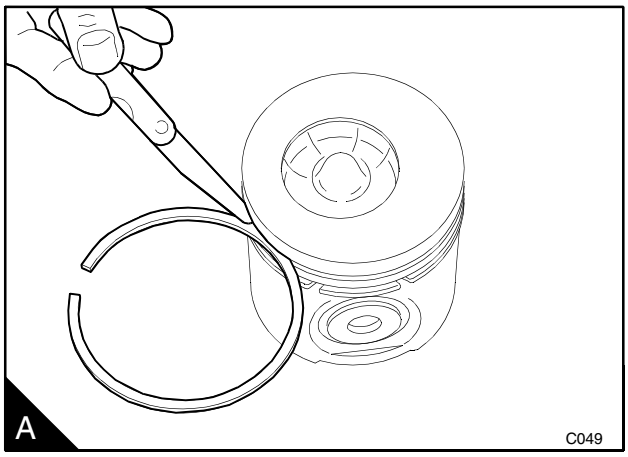
2 Check that the piston rings are free to move in their grooves and that the the rings are not broken.

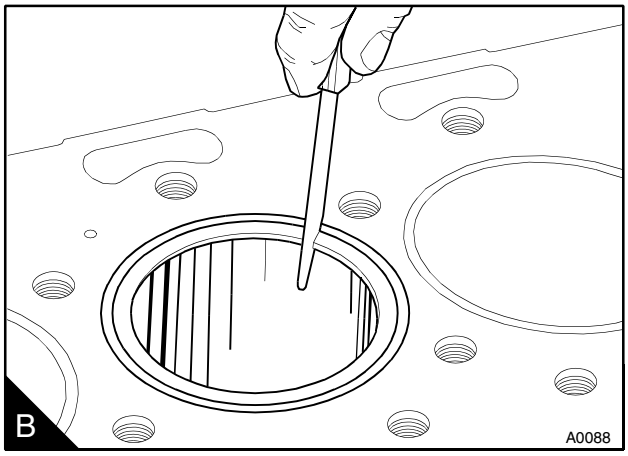
3 Remove the piston rings, see operation 13-5, and clean the piston ring grooves and the piston rings.

4 Fit new piston rings in the grooves and check for wear of the grooves with feeler gauges (A). Compare the piston ring clearance in the groove to that given for new components in the data and dimensions and renew the piston, if necessary.

Note: The pistons have a tapered top groove and the piston ring is wedge shaped (page 71/B); the top piston ring clearance cannot be checked by this method.

5 Clean all carbon from the top of the cylinder liners. Fit each piston ring in the top part of the cylinder liner and measure the ring gap with feeler gauges (B). The coil spring must be fitted to the oil control ring when the gap of this piston ring is measured. The piston ring gaps for new components are given in the data and dimensions.





Rear oil seal assembly

Special tools:

Replacer tool for rear oil seal, PD.145D

Consumable products:

POWERPART Threadlock

POWERPART Silicone rubber sealant

1 Remove the drive components from the rear end of the engine.

2 Remove the flywheel and the flywheel housing, see section 22.

3 Remove the setscrews and the cap screws from the housing and remove the housing and seal assembly.

4 Inspect the seal for wear or for damage to the main lip and renew the seal, if necessary. If there is only a small scratch across the lip, renew the seal.

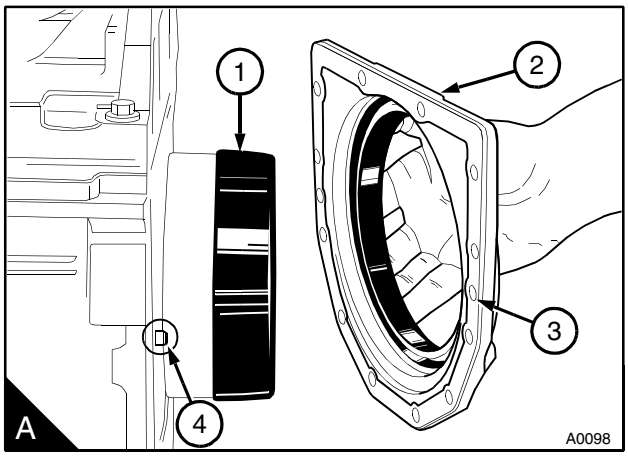
5 Clean the faces of the cylinder block, the oil seal housing and the crankshaft flange.

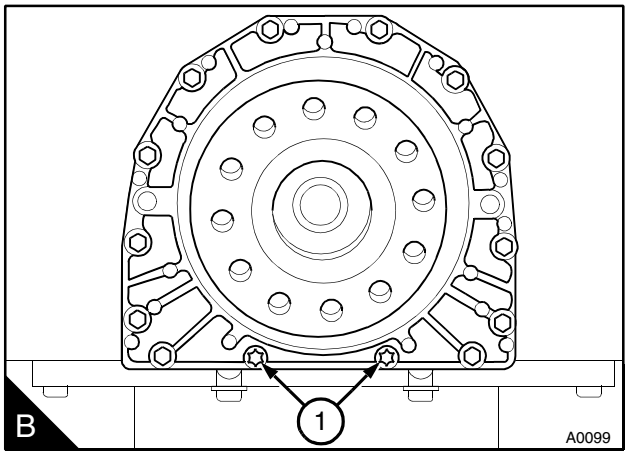
6 Check that the seal and the outer circumference of the crankshaft flange are not damaged. Where a new seal has been fitted, check that it is in the correct position in the housing.

7 Ensure that the two dowels (A4) are fitted in the cylinder block. Put a new joint (A3) in position on the dowels, no jointing compound is necessary.

8 Put the seal replacer tool on the crankshaft flange. Lubricate the crankshaft flange, the main lip of the seal and the seal replacer tool with clean engine lubricating oil. The lubrication of the seal is necessary to prevent damage to the seal when the engine is first started.

9 Put the seal and housing (A2) on the replacer tool (A1) and carefully push the assembly into position on the crankshaft flange and onto the dowels. Remove the tool, fit the setscrews and the torx screws (B1). Tighten the setscrews and the torx screws to 22 Nm (16 lbf ft) 2,2 kgf m.





Check the crankshaft for wear and other damage. The maximum permissible wear and ovality on the crankshaft journals and crank pins is 0,04 mm (0.0016 in).

The main journals and the crank pins of standard size crank shafts can be machined to 0,25mm (0.010 in), 0,50mm (0.020 in) or 0,75 mm (0.030 in) undersize on diameter, see the data and dimensions. Special undersize bearings are available.

If the seal has been used in all of the service positions, the crankshaft palm can be machined to remove the wear marks. Further information can be found in the data and dimensions.

Data and dimensions

Note: This information is given as a guide for personnel engaged on engine overhauls. The dimensions which are shown are those which are mainly used in the factory. The information applies to all engines, unless an engine type code is shown.

Crankshaft

Diameter of main journals:
- Four cylinder engines . . . . . 76,16/76,18 mm (2.998/2.999 in)
- Six cylinder engines. . . . . 76,159/76,190 mm (2.9984/2.9996 in)

Maximum wear and ovality on journals and crank pins . . . . . 0,04 mm (0.0016 in)
Width of front journal . . . . . 36,93/37,69 mm (1.454/1.484 in)
Width of centre journal. . . . . 44,15/44,22 mm (1.738/1.741 in)
Width of all other journals . . . . . 39,24/39,35 mm (1.545/1.549 in)
Diameter of crank pins. . . . . 63,47/63,49 mm (2.499/2.500 in)
Width of crank pins . . . . . 40,35/40,42 mm (1.589/1.591 in)
Diameter of flange . . . . . 133,27/133,37 mm (5.247/5.251 in)
Depth of recess for spigot bearing:
- Four cylinder engines . . . . . 20,22/20,98 mm (0.796/0.826 in)
- Six cylinder engines. . . . . 14,72/15,48 mm (0.579/0.609 in)

Bore of recess for spigot bearing:
- Four cylinder engines . . . . . 46,96/46,99 mm (1.849/1.850 in)
- Six cylinder engines. . . . . 51,97/51,99 mm (2.046/2.047 in)

Crankshaft end-float. . . . . 0,05/0,38 mm (0.002/0.015 in)
Maximum permissible end-float . . . . . 0,51 mm (0.020 in)
Fillet radii of journals and crank pins . . . . . 3,68/3,96 mm (0.145/0.156 in)
Undersize journals and crank pins. . . . . -0,25 mm (-0.010 in); -0,51 mm (-0.020 in); -0,76 mm (-0.030 in).

Crankshaft heat treatment

- Induction hardened . . . . . .Part numbers 3131H024
- Nitrocarburised . . . . . .Part numbers 3131H022, 31315991, 31315995, 31315681
- 60 hour Nitride . . . . . .Part numbers 3131H021

Crankshaft overhaul

Notes:
- Induction hardened crank shafts need not be hardened after they have been machined undersize.
- Nitrocarburised crankshafts must be hardened again each time they are machined. These crankshafts must be nitrocarburised or, if this process is not available, they can be nitrided for 20 hours. If neither process is available a new crankshaft, or Power Exchange crankshaft, must be fitted.
- Crankshafts which have been nitrided for 60 hours can be reground 0,25 mm (0.010 in) without the need to harden them again.
- Check the crankshaft for cracks before and after it is ground. Demagnetise the crankshaft after it has been checked for cracks.
- After the crankshaft has been machined remove any sharp corners from the lubricating oil holes.
- Surface finish and fillet radii must be maintained.

To fit

1 Use the three idler gear setscrews to ensure the correct position of the idler gear hub (A2) with the lubrication hole (A1) at the top. Push the hub into position and remove the setscrews.

2 Lubricate the idler gear bushes with clean engine lubricating oil. Align the timing marks on the idler gear with the marks on the crankshaft and camshaft gears. If necessary, rotate the gear of the fuel injection pump clockwise to align the relevant timing mark with the marks on the idler gear and slide the idler gear into position. Check that all the timing marks are in correct mesh (B), or (C) for engines fitted with a belt driven coolant pump. Fit the plate and the setscrews to the idler gear hub and tighten the setscrews to 44 Nm (33 lbf ft) 4,5 kgf m.

3 For engines that use the idler gear assembly with needle roller bearings - Inspect the components for wear and other damage and renew them as necessary. Lightly lubricate the components with clean lubricating oil before assembly onto the hub. Fit the hub (D8) as shown in , go to paragraph 1. Put the rear spacer (D7) in position on the hub. Put the rear thrust washer (D6) in position on the rear spacer. Put the bearings (D5) in position on the hub in the same position as they were before they were removed. Lightly lubricate the bore and thrust washer faces of the gear (D4) with clean lubricating oil and put the gear in position on the bearings. Put the front spacer (D3) in position on the hub then put the front thrust washer (D2) in position on the spacer. Put the plate (D1) in position. The plate has TOP stamped on the front face as the holes in the plate are not equally spaced. Fit the setscrews and tighten them to 44 Nm (33 lbf ft) 4,5 kgf m).

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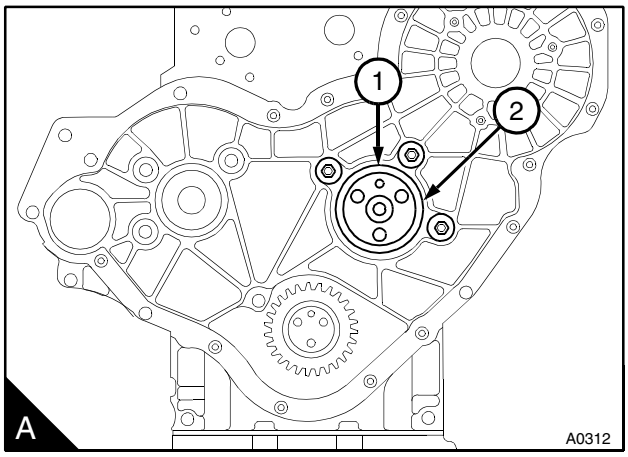
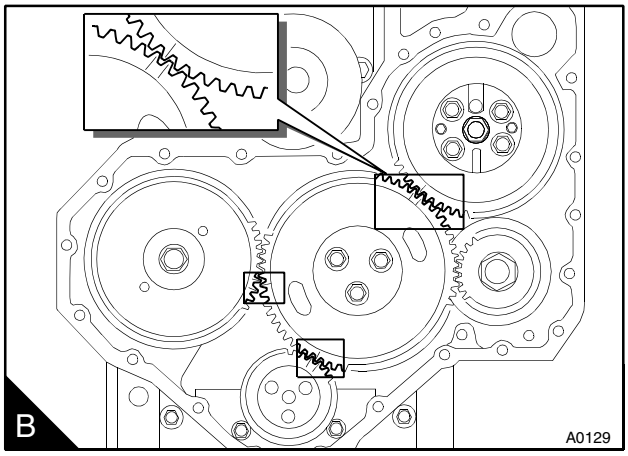
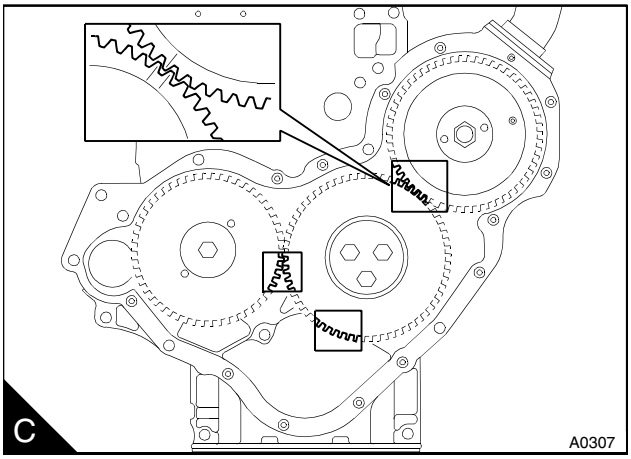
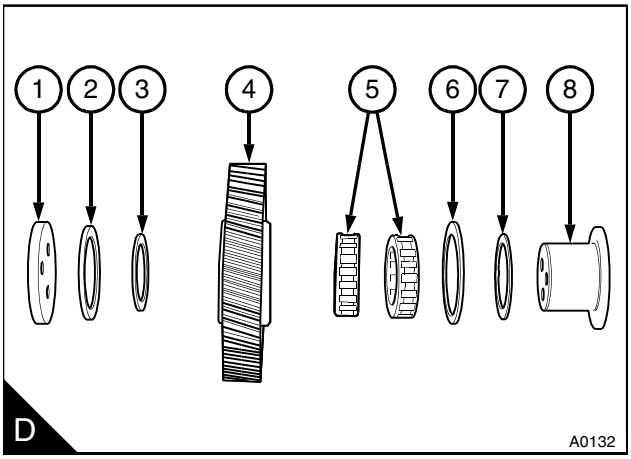








Camshaft and tappets

To remove and to fit 15-10

To remove

1 Before the engine is removed from the vehicle or the machine, drain the lubricating oil and the coolant.

2 Remove the timing case, see operation 15-9.

3 Remove the rocker cover, the rocker assembly and the push rods, see section 12.

4 Remove the fuel lift pump, see operation 20-4.

5 Turn the engine upside down and remove the lubricating oil sump, see operation 19-3.

6 Remove the camshaft thrust washer (B1) and carefully remove the camshaft (A).

7 Remove the tappets.

8 Inspect the camshaft and the tappets for wear and other damage, also inspect the camshaft bush. Renew the components as necessary.

To fit

1 Ensure that all components are clean and are lubricated with clean engine lubricating oil.

2 Fit the tappets in position.

3 Carefully fit the camshaft.

4 Fit the camshaft thrust washer. Ensure that it is fitted correctly on the hollow dowel (B2).

5 Fit the timing case together with a new joint, see operation 15-9.

6 Check that the camshaft end-float is within the limits shown in data and dimensions.

7 Rotate the camshaft until the cam for the fuel lift pump is at the minimum lift position and fit the fuel lift pump, see operation 20-4.

8 Turn the engine to an upright position. Rotate the crankshaft until the keyway in the crankshaft is at the top. Fit the timing gears, see operation 15-4, operation 15-6 and operation 15-7, and ensure that all the timing marks are correctly aligned.

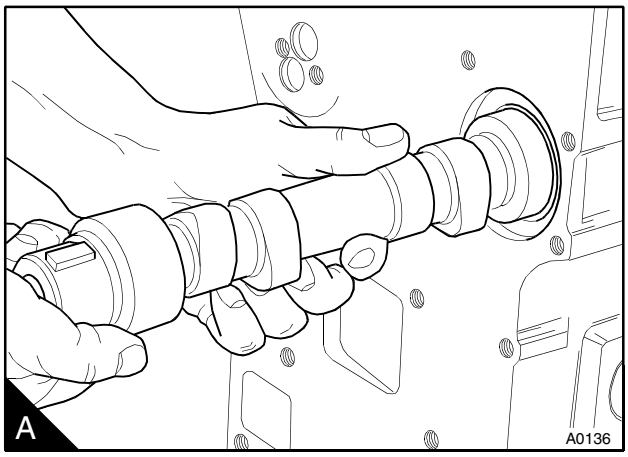
9 Fit the fuel injection pump, see section 20.

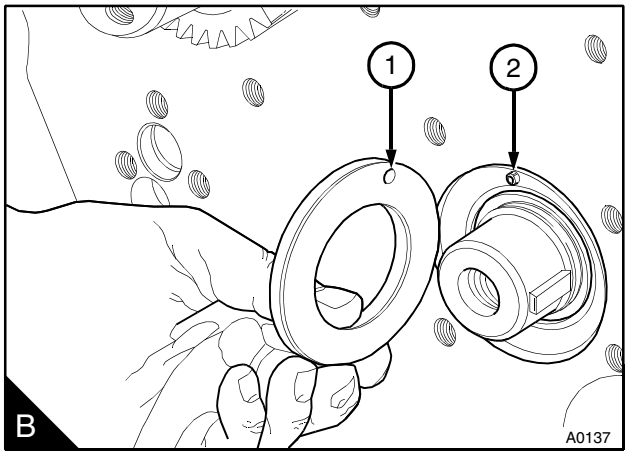
10 Fit the push rods and the rocker assembly, see section 12.

11 Set the valve tip clearances, see operation 12-5.

12 Fit the timing case cover, see operation 15-1 and the lubricating oil sump, see operation 19-3.

13 After the engine has been installed: Fill the cooling system. Fill the lubricating oil sump to the correct level with an approved lubricating oil. Eliminate air from the fuel system, see section 20.





To fit a partially finished liner

The liner is an interference fit in the parent bore. A special tool will be necessary to fit the liners, tool PD.150B can be used. If a liner is a very tight fit it may be necessary to use a hydraulic press.

Caution: *Do not hit a liner with a hammer.*

1 Clean thoroughly the parent bore of the cylinder block with an approved degreasing fluid.

2 Inspect the parent bore for damage and corrosion. Damaged cylinder blocks should be discarded.

3 Clean thoroughly the outer surface of the liner with an approved degreasing fluid.

4 Apply a small amount of engine oil around the top of the parent bore to assist the entry of the liner.

5 Engage the cylinder liner (A5) into the parent bore; ensure that the liner is vertical. Put the adaptor PD.150B-17A (A4) onto the top of the liner with the flame ring in the groove of the adaptor. Put the bearing (A3) into position in the recess in the top of the adaptor with the flat face of the bearing to the bottom of the recess.

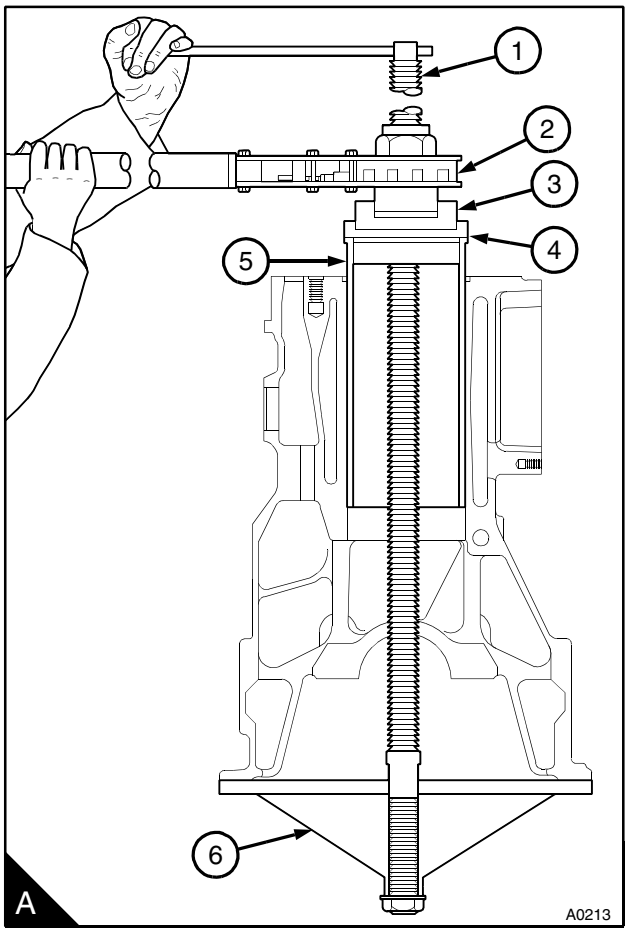
6 Fit the threaded rod (A1) through the bearing, the adaptor and the liner until the handle (A2) is against the recess in the bearing. In this position adjust the threaded rod until the end is below the bottom face of the cylinder block.

7 Fit the adaptor PD.150B/6 (A6) onto the threaded rod; ensure that the flat face of the adaptor is against the bottom face of the cylinder block as shown (A). Fit the washer and the nut; ensure that the threaded rod is in the centre of the liner and tighten the nut onto the adaptor.

8 Lubricate the ratchet of the handle and the threaded rod with Shell Spirax oil or an equivalent oil. Operate the handle and press the liner into the fully fitted position.

9 Remove the tool PD.150B and thoroughly clean the top of the cylinder block.

Continued



1 Fasten a temporary pointer to the timing case cover (or other suitable position) with its tip near to the outer edge of the crankshaft damper or pulley.

2 Loosen the gland nuts that retain the atomisers, see operation 20-3.

3 Remove the rocker cover.

4 Rotate the crankshaft clockwise, from the front, until the push rod for the inlet valve of the rear cylinder just tightens.

5 Rotate the crankshaft a further 1/8 of a turn clockwise. Insert a suitable lever between the rocker lever and the valve spring cap of number 1 inlet valve. Open the inlet valve and put a spacer approximately 5,0 mm (0.2 in) thick between the valve tip and the rocker lever.

6 Slowly rotate the crankshaft counter-clockwise until the piston makes contact with the open valve. Make a temporary mark on the damper or pulley to align accurately with the tip of the pointer.

7 Rotate the crankshaft clockwise one or two degrees and remove the spacer between the valve and the rocker lever. Rotate the crankshaft 1/4 of a turn counter-clockwise. Put the spacer between the valve tip and the rocker lever.

8 Slowly rotate the crankshaft clockwise until the piston makes contact with the open valve. Make another temporary mark on the damper or pulley to align accurately with the tip of the pointer.

9 Make a temporary mark at the centre point between the two marks on the damper or pulley and remove the other two marks. Rotate the crankshaft counter-clockwise 1/8 of a rotate and remove the spacer between the valve and the rocker lever. Slowly rotate the crankshaft clockwise until the mark on the damper or pulley aligns accurately with the tip of the pointer. Number 1 piston is now at TDC on the compression stroke.

1 Set the piston of number 1 cylinder to TDC on the compression stroke, see operation 17-1.

2 Remove the dial test indicator from number 1 inlet valve and fit the valve springs and the rocker lever. Ensure that the fasteners for the rocker shaft pedestals are to the correct torque.

3 Rotate the crankshaft, clockwise from the front, until the inlet valve of the rear cylinder is fully open.

4 Set the valve tip clearance of number 1 cylinder inlet valve to 1,5 mm (0.059 in).

5 Rotate the crankshaft, clockwise from the front, until the push rod of number 1 cylinder inlet valve just tightens. In this position, check if the mark on the crankshaft pulley or damper is within +/- 2 1/2° of the temporary pointer. Use the formula below to find the measurement which is equal to 2 1/2° on the pulley or damper.

$$\frac{C \times P}{360}$$

C = circumference of pulley or damper

P = 2.5 degrees

6 If the timing is more than 2 1/2° out of position, the timing gears are probablely not in correct mesh.

Note: One tooth on the camshaft gear is equivalent to 23 mm (0.9 in) at the circumference of a pulley of 203 mm (8 in) diameter. If a large damper is fitted, one tooth on the camshaft gear is equivalent to 35 mm (1.4 in) at the circumference of a damper of 310 mm (12.2 in) diameter, or 37 mm (1.5 in) at the circumference of a damper of 327 mm (12.8 in) diameter.

7 Rotate the crankshaft, clockwise from the front, until the inlet valve of the rear cylinder is fully open. Set the valve tip clearance of the inlet valve of number 1 cylinder to 0,20 mm (0.008 in).

8 Fit the rocker cover, see operation 12-1.

9 Remove the temporary pointer from the timing case and the timing mark from the pulley or damper.

Turbocharger faults

The chart below is given to assist in the correct diagnosis of turbocharger faults.

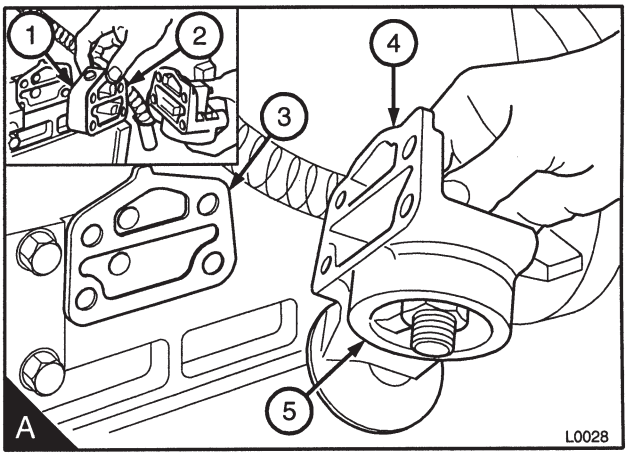
If the inside of the induction manifold is wet, check that there is not a fuel leak from the fuelled starting aid, if there is one fitted, see operation 23-9.

Problems	Possible causes code numbers
Not enough power	1, 4, 5, 6, 7, 8, 9, 10, 11, 18, 20, 21, 22, 25, 26, 27, 28, 34, 35, 36
Black smoke	1, 4, 5, 6, 7, 8, 9, 10, 11, 18, 20, 21, 22, 25, 26, 27, 28, 34, 35, 36
Blue smoke	1, 2, 4, 6, 8, 9, 17, 19, 20, 21, 22, 30, 31, 32, 34
High lubricating oil consumption	2, 8, 15, 17, 19, 20, 28, 29, 31, 32, 34
Too much lubricating oil at turbine end	2, 7, 8, 17, 19, 20, 22, 28, 30, 31, 32
Too much lubricating oil at compressor end	1, 2, 4, 5, 6, 8, 19, 20, 21, 28, 31, 32
Not enough lubrication	8, 12, 14, 15, 16, 23, 24, 29, 32, 33, 37, 38
Lubricating oil in the exhaust manifold	2, 7, 17, 18, 19, 20, 22, 28, 31, 32
Inside of the induction manifold wet	1, 2, 3, 4, 5, 6, 8, 10, 11, 17, 18, 19, 20, 21, 28, 32, 34, 39, 40
Damaged compressor impeller	3, 4, 6, 8, 12, 15, 16, 20, 21, 23, 24, 29, 32, 33, 37, 38
Damaged turbine rotor	7, 8, 12, 13, 14, 15, 16, 18, 20, 22, 23, 24, 25, 27, 29, 32, 33, 37, 38
Rotating assembly does not turn freely	3, 6, 7, 8, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 29, 32, 33, 37, 38
Worn bearings, bearing bores, journals	6, 7, 8, 12, 13, 14, 15, 16, 23, 24, 29, 33, 37, 38
Noise from turbocharger	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 29, 32, 33, 34, 37, 38
Sludge or carbon deposit in bearing housing	2, 11, 13, 14, 15, 17, 18, 24, 29, 33, 37, 38

Filter head

Consumable products

POWERPART nutlock



1 Put a tray under the filter head to contain spilt lubricating oil.

2 Remove the filter canister(s), see operation 19-1.

3 Remove the canister type oil cooler from the filter head, if one is fitted, see operation 21-14.

4 Remove the flexible pipes from the filter head, if they are fitted, see operation 19-12.

5 Release the setscrews and remove the filter head (A) from the cylinder block. Discard the joint (A3).

6 Clean the joint face of the filter head (A4) and the cylinder block.

7 Fit the new joint to the filter head, the joint is fitted dry.

Note: Some engines have an adaptor (A1) between the cylinder block and the filter head. If an adaptor is used, two joints are fitted (A2) and (A3).

Apply POWERPART nutlock to the first three threads of the setscrews and tighten the setscrews.

8 Fit the oil cooler to the filter head. If a canister type oil cooler is fitted, see operation 21-14.

9 Fit the flexible pipes to the filter head, if they are fitted, see operation 19-12.

10 If the oil cooler is integral with the cylinder block, fit a new joint to the flange of the oil cooler pipes. Fit the flange to the filter head and tighten the setscrews.

11 Fit a new filter canister, see operation 19-1.

IMPORTANT :
See chapter 26 - SERVICE BULLETIN Nr 139

Relief valve

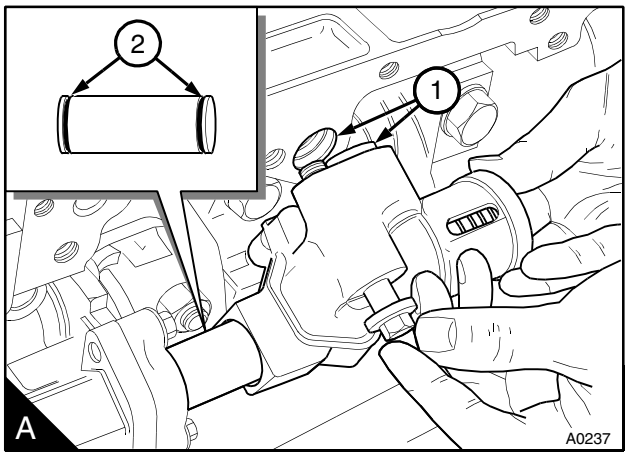
To remove and to fit 19-9

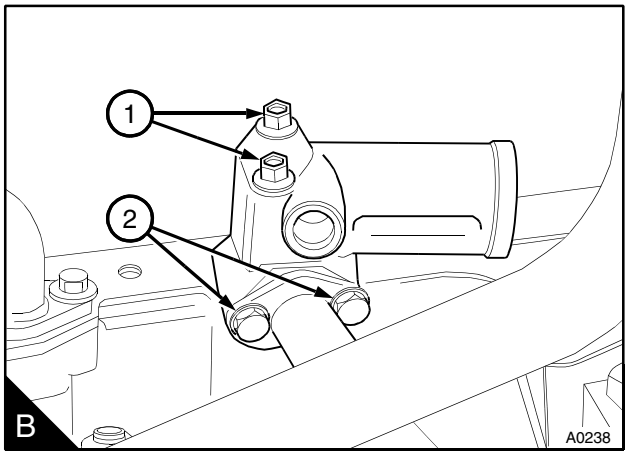
Four cylinder engines that have a balancer unit have a relief valve fitted inside the balancer frame. The relief valve of these engines cannot be removed as an assembly.

1 Drain the lubricating oil and remove the sump, see operation 19-3.

2 For four cylinder engines: Release the setscrew and rotate the relief valve to withdraw the thimble from the cylinder block (A1). Pull the relief valve from the delivery pipe and pull the delivery pipe from the oil pump. Renew the "O" rings (A2). Lightly lubricate the "O" rings with clean engine lubricating oil and push the delivery pipe into the oil pump. Push the relief valve onto the delivery pipe and fit the relief valve to the cylinder block; ensure that the thimble is correctly fitted and tighten the setscrew.

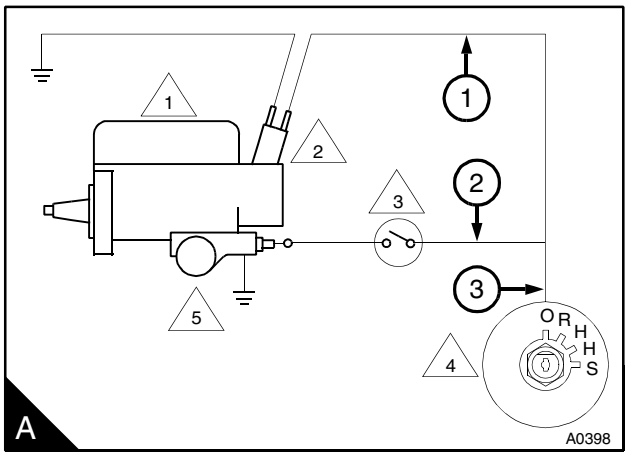
3 For six cylinder engines: Remove the setscrews which fasten the cross flow pipe to the relief valve (B2). The cross flow pipe is only fitted to engines which have the oil filter on the right side of the engine. Remove the flange joint. Release the two setscrews (B1) which fasten the relief valve to the cylinder block and remove the valve. Ensure that the faces of the cross flow pipe and the relief valve are clean. Put the valve in position, complete with a new flange joint. Engage the four setscrews and tighten the flange setscrews and then the valve setscrews.

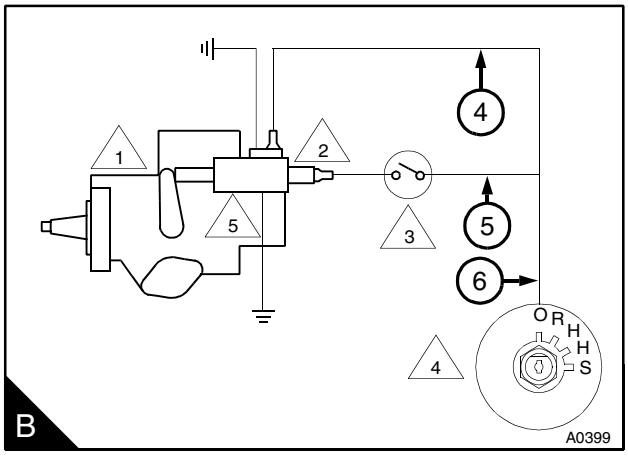


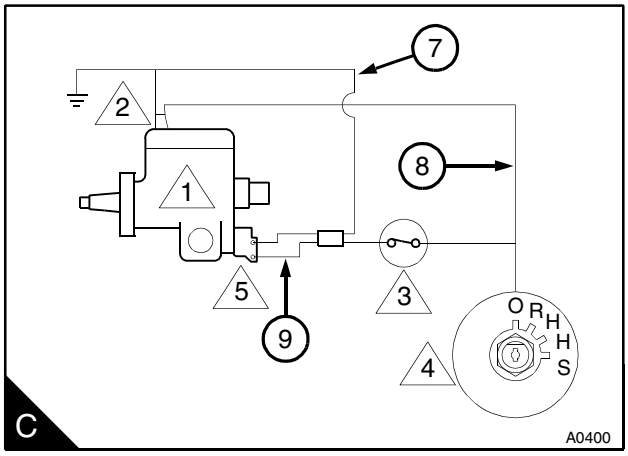


Wiring diagrams for the cold start advance unit fitted to some Lucas DP200 Series, Bosch and Stanadyne fuel injection pumps are shown in the illustrations (A), (B) and (C) respectively. For easy identification the cables are shown in circles on the illustrations.

The amperage of each of the cables is listed in the cable identification table below. The identification numbers for the electrical components on the wiring diagram are shown in triangles. Refer to the component identification list for the relevant wiring diagram to find a component.







Cable identification table

For numbers shown in circles

Cable (Number)	Current (Amperes)
1	3
2	3
3	6
4	3
5	3
6	6
7	3
8	6
9	3

Component identification list

For numbers shown in triangles

Component	Description
1	Fuel injection pump
2	Engine stop solenoid
3	Sender unit
4	Start switch
5	Cold start advance unit

Continued

To dismantle

1 Clean the outside surfaces of the fuel lift pump.

2 Make a mark across the flanges of the two halves of the pump to ensure correct relationship when the pump is assembled.

3 Remove the cover (A1) and the gauze (A2). Release the setscrews and separate the two halves of the pump.

4 Turn the diaphragm assembly (A5) 90° to release the pull rod from the link arm (A8) and remove the diaphragm assembly. Remove the stem seal (A6), the spring seat washer (A7) and the spring (A12) from the pull rod. The diaphragm and pull rod assembly is renewed as an assembly and no service is possible on the diaphragm.

5 The valves (A4) are peened in and can be removed with a suitable lever. Some of the peened metal will have to be removed before the valves can be removed.

6 To remove the link arm: Hold the rocker lever (A11) in a vice and hit the body of the lift pump with a soft face hammer to release the two retainers (A10). Be careful not to damage the joint face of the pump body. Remove the rocker lever, the pin (A9), the link arm and the return spring. Check the components for wear and other damage.

To assemble

1 Thoroughly clean the valve housings. Fit new seat washers (A3) and push the new valves (A4) into position. As the valves are the same, but one valve is fitted in reverse of the other, it is possible to fit the valves upside down. To ensure that the valves are fitted correctly, fit them as shown in A. When the valves are correctly fitted, peen the edge of the valve housings in six places, evenly divided, to keep the valves in position.

2 Fit the rocker lever (A11), pin (A9) and link arm assembly (A8) into the bottom half of the lift pump. Fit the return spring; ensure that the ends of the spring are in their correct location.

3 With a light hammer and a suitable adaptor, fit two new retainers (A10) in their grooves in the casing until they fasten the pin. Peen the open ends of the grooves to fasten the retainers in position.

4 Fit the diaphragm spring (A12) into its location under the diaphragm (A5) and put the spring seat washer (A7) and a new stem seal (A6) into position on the pull rod. Ensure that the small diameter at the top of the seal is on the round section of the pull rod.

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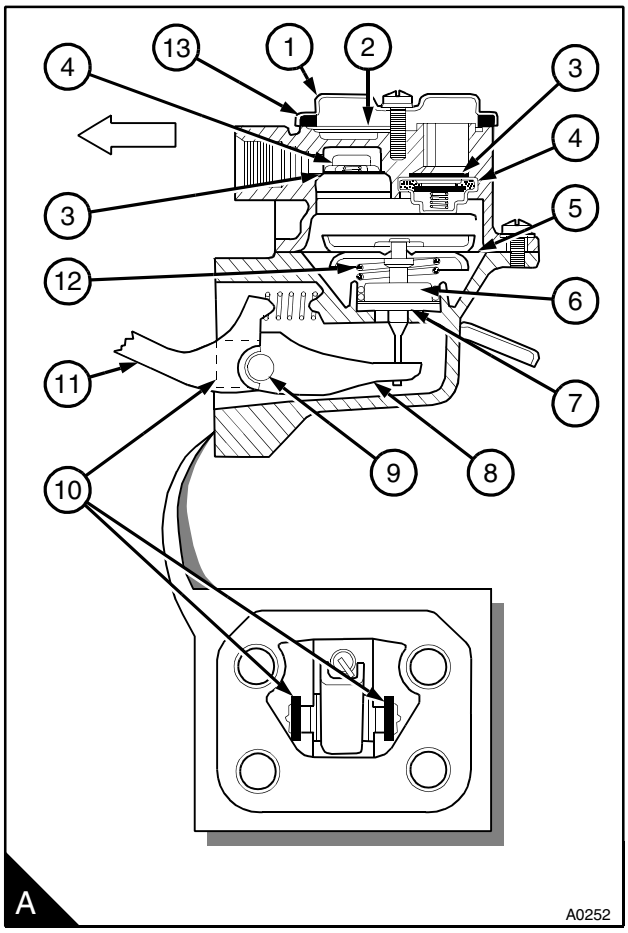


To remove

Before the crankshaft is turned or the pump is fitted, put the spacer (A1) into position under the locking screw (A2) to ensure that the **pump drive shaft is released**.

1 Disconnect the battery before the fuel injection pump is removed from the engine.

2 Set the engine to TDC on the number 1 cylinder on the compression stroke, see operation 17-1 or , see operation 17-2.

3 Remove the gear cover from the cover of the timing case. For gear driven coolant pumps: Remove the coolant pump, see operation 21-3.

4 Insert the timing pin (B1) through the hole (B5) in the fuel pump gear and the slot of the hub (B4). Push the pin fully into the hole (B3) in the body of the fuel pump. If the pin can be fully inserted then the pump timing is correct. There should be no resistance when the pin is inserted.

Caution: *Use a second spanner to prevent movement of the high-pressure outlet when the union nut for each high-pressure pipe is released.*

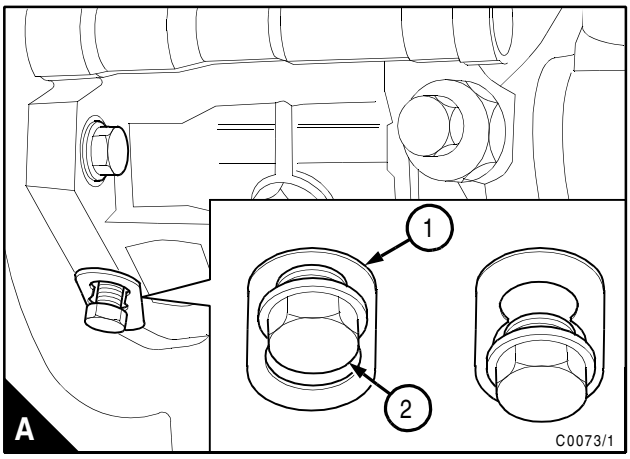
5 Remove the pipes, the cables and the connections for the cold start device and the electrical stop solenoid from the fuel pump.

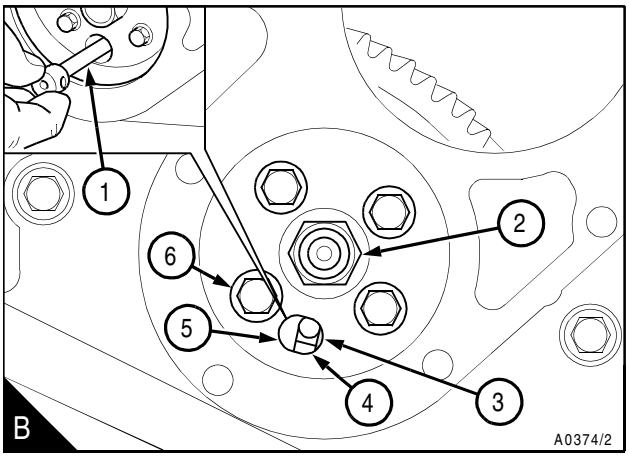
***Cautions*:**

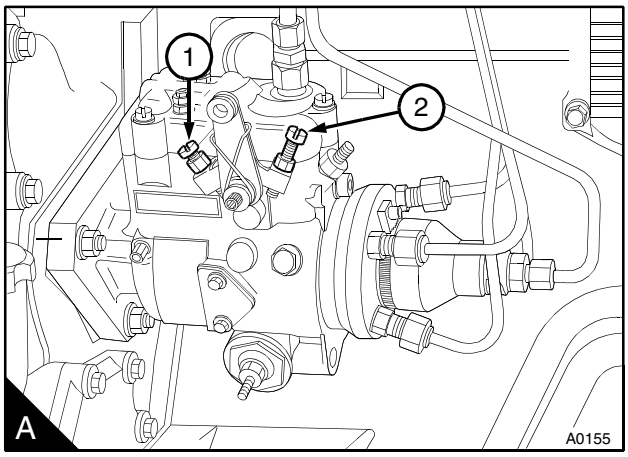
- *Do not rotate the crankshaft when the pump is not on the engine; the loose fuel pump gear may damage the timing case. If it is necessary to rotate the crankshaft, fit the fuel pump temporarily to ensure that the gear is in the correct position. If the fuel pump is fitted temporarily in order to rotate the crankshaft,* ***the locking screw (A2) must be released*** *and a spacer (A1) fitted.*
- *Do not release the nut (B2) from the fuel injection pump. The fuel pump hub is fitted to the shaft in the factory to ensure that the fuel pump is in the correct position for timing. If the hub is removed, the hub will need to be accurately fitted to the pump by use of special equipment available to Perkins distributors.*

6 Remove the four fasteners (B6) and release the fuel pump gear from the hub of the fuel injection pump.

7 Remove the nuts from the flange of the fuel pump and remove the pump.







The engine conforms with USA (EPA/CARB) stage 1 and EEC stage 1 emissions legislation for agricultural and industrial applications.

The idle or maximum speed settings must not be changed by the engine operator, because this can damage the engine or the transmission.

Specialist equipment, which is available at your Perkins distributor, is needed to adjust the idle or maximum speed settings. The warranty of the engine can be affected if the seals on the fuel injection pump are broken during the warranty period by a person who is not approved by Perkins.

1 Operate the engine until it reaches its normal temperature of operation and check the idle speed. If necessary, adjustment can be made by adjustment screw (A1). Release the lock nut and rotate the adjustment screw clockwise to increase the speed, or counter-clockwise to decrease the speed. When the speed is correct, tighten the lock nut. The setting of the idle speed can change for different applications. Normally the correct speed will be given in the manufacturer's handbook for the application. If it is not given, refer to your nearest Perkins distributor.

Caution: *The setting for the maximum no load speed can change for different applications. For the correct maximum no-load speed, check the emissions data plate fitted to the left side of the cylinder block before any adjustment is made to the maximum no load speed.*

2 With the engine at its normal temperature of operation, check the maximum no load speed. A typical maximum no load speed is 2860 rev/min. If necessary, this speed can be adjusted by adjustment screw (A2). Release the lock nut and rotate the adjustment screw counter-clockwise to increase the speed or clockwise to decrease the speed. When the speed is correct, tighten the lock nut and seal the screw.

The person who fits the pump must ensure that the adjustment screw is suitably sealed against interference after it has been set initially.

Coolant pump - belt driven

Special tool:

Gear puller, PD.155C

Consumable products:

POWERPART Retainer (oil tolerant)

To remove

1 Remove the fan, see operation 21-9.

2 Remove the fan belt, see operation 23-3.

3 Drain the coolant system, refer to section 4 of the User's handbook.

4 Disconnect the hose connections to the coolant pump.

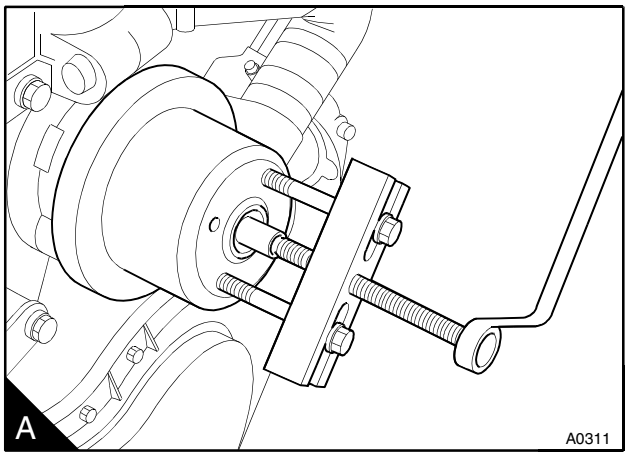
5 Remove the nut, spring washer and plain washer from the pump pulley. It may be necessary to use extractor PD.155C to remove the pulley from the pump shaft (A).

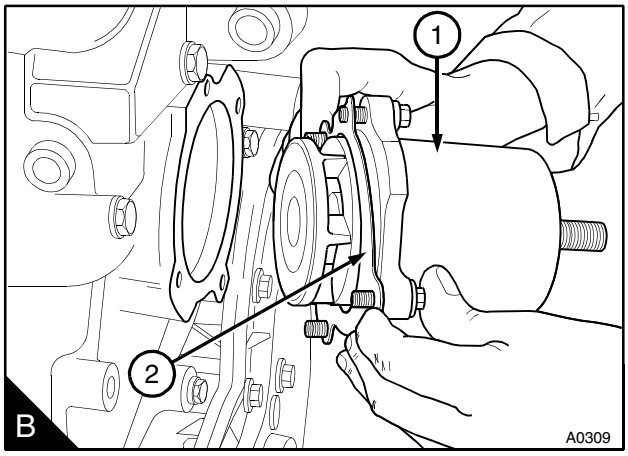
6 If the pump is to be dismantled, remove the key from the keyway of the pump shaft.

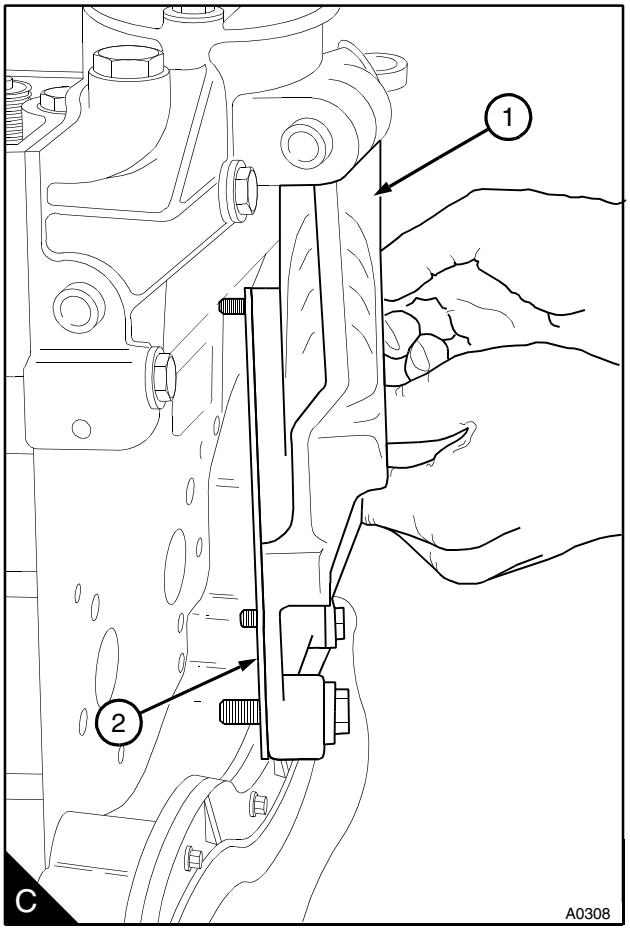
7 Remove the four setscrews which secure the coolant pump to the rear body of the pump.

8 Remove the coolant pump (B1) and discard the joint (B2).

9 If it is necessary to remove the rear body (C1) of the pump from the cylinder block: Remove the setscrew for the alternator adjustment linkage and the spacer. Remove the four other setscrews and remove the rear body from the cylinder block. Discard the joint (C2).







To assemble

Caution: *It is important that all of the components in the kit for the coolant pump are used. The kit includes the latest components which may be of a different design to the original components fitted to the engine.*

1 Clean thoroughly the inside of the pump body especially the bearing bores and the counterbore for the coolant seal. These bores and their chamfers must be clean and free of corrosion.

2 Fit a new circlip (A7) onto the gear end of the shaft (A6). Put the drive gear end of the pump body face down on a suitable press. Put the drive gear (A4) into position in the housing. If the original gear is to be used, POWERPART Retainer (high strength) must be applied to the bore of the gear. fit the shaft into the housing. Ensure that the shaft and gear are aligned. Press the impeller end of the shaft until the gear is against the shoulder of the shaft.

3 Apply a thin layer of POWERPART Retainer (high strength) to the outer surface of the bearing, but keep the retainer away from the ends of the bearing. Put the cover end of the pump body (A1) face down on a suitable press. Press the needle roller bearing (A5) into the bearing housing until the end of the bearing is level with or 0.5 mm (0,020 in) below the top of the housing.

4 Apply a thin layer of POWERPART Retainer (high strength) to the outer surface of the ball bearing (A2), but keep the retainer away from the ends of the bearing. Use a suitable spacer to support the drive gear end of the shaft. Ensure that the drive gear is against face (A3).

5 Use a suitable adaptor to press the new ball bearing onto the shaft until the inner race is in contact the circlip. Ensure that the adaptor is pressed onto the inner race and outer race of the bearing as it enters the bearing housing.

6 Lubricate the ball bearing and the needle roller bearings with clean engine oil.

7 Remove the spacer from the gear end of the shaft and support the body of the pump at the gear end. Continue to press the bearing fully into the end of the bearing housing, fit the second circlip (A8) on to the shaft.

8 Clean all POWERPART Retainer from the ends of the bearings and the drive gear.

9 Fit the new circlip (A9), with the bevel edge towards the oil seal, to retain the bearing and shaft assembly in the body of the pump.

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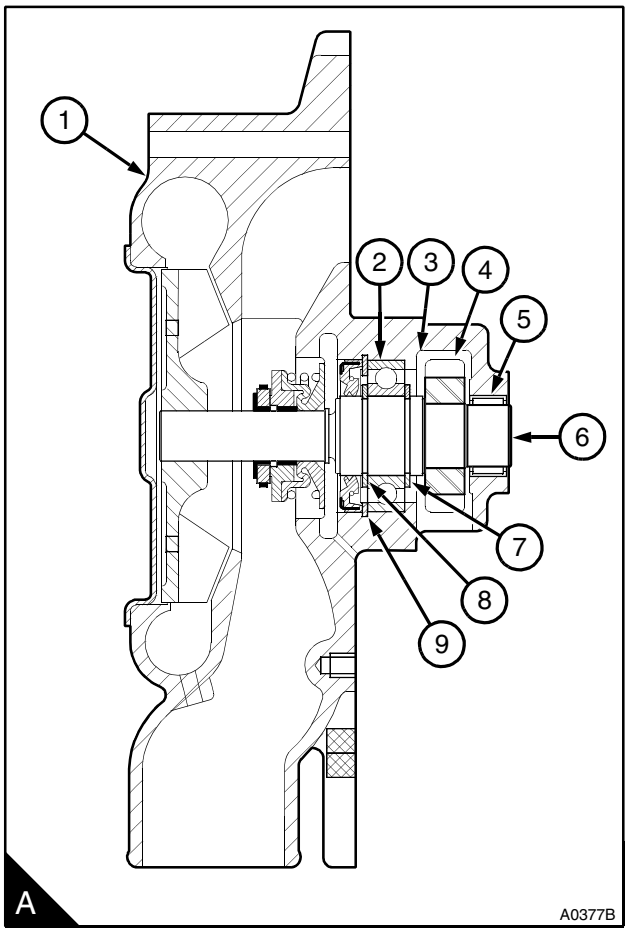


5 Thoroughly clean the flange face of the cover and of the cylinder block.

Note: A liquid joint is used in the factory, this must be removed and a paper joint (A5), part number 3684R012, fitted in its place.

6 If an overhaul of the oil cooler is necessary, see operation 21-18.

To fit

1 If the four studs (A6) have been removed from the cylinder block flange and are to be fitted again, clean the threads in the cylinder block and on the studs. Apply POWERPART studlock, currently Loctite 270, before the studs are fitted to the cylinder block to prevent the leakage of coolant.

2 Put a new paper joint into position on the studs; the joint is fitted dry. Fit the oil cooler assembly (A3) to the cylinder block. Gradually and evenly tighten the fasteners (A2) to 22 Nm (16 lbf ft) 2,2 kgf m.

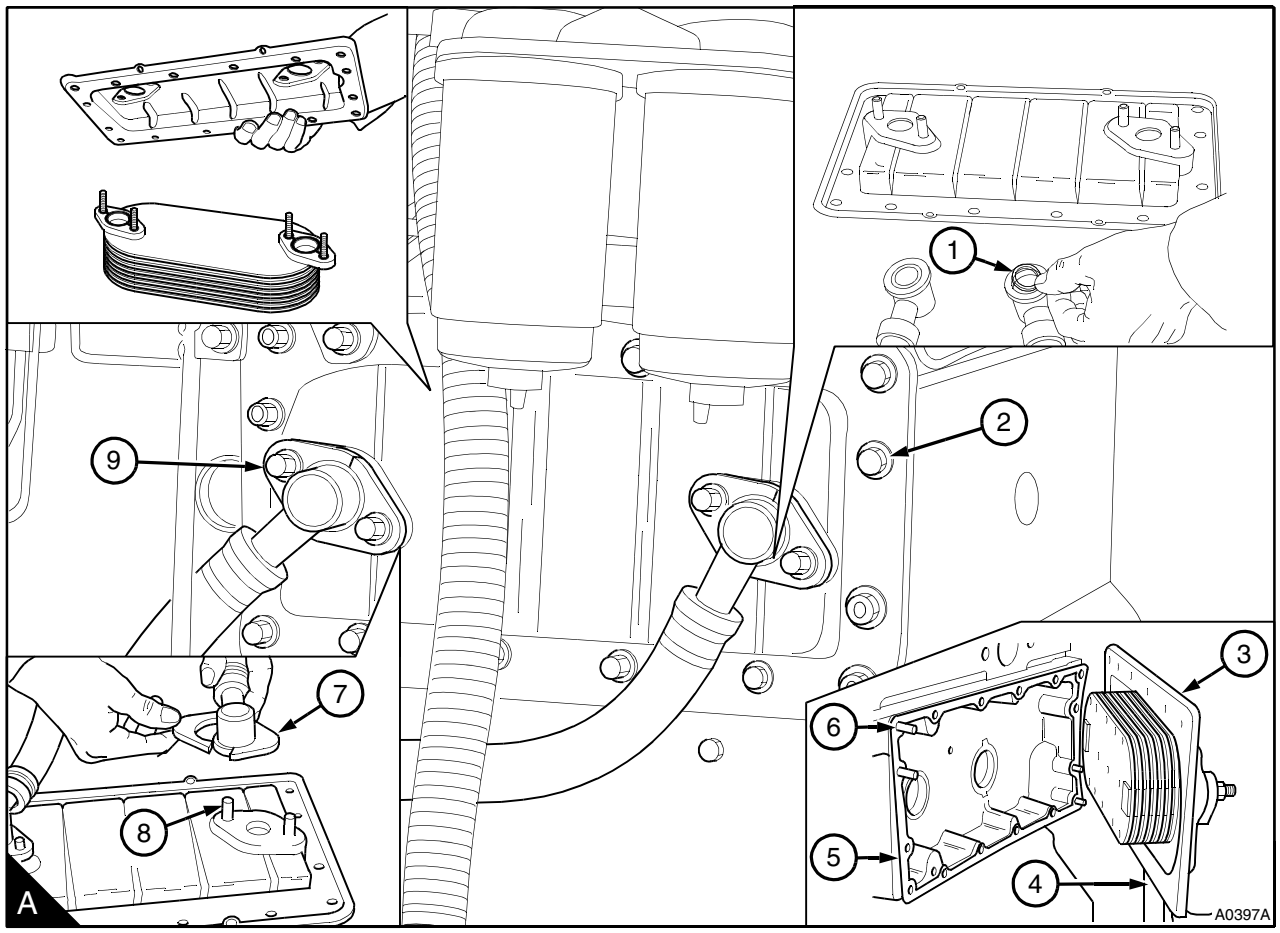
3 Clean the seats for the "O" rings and renew the "O" rings (A1) of the pipe connections.

Caution: *Do not remove the flanges (A7) and nuts (A9) from the studs (A8), before one of the oil pipes is fitted to the cover. This will ensure that the element is held in position on the cover (A3) while the oil pipes are fitted.*

4 Fit the oil pipes to the oil cooler and tighten the nuts to 22 Nm (16 lbf ft) 2,2 kgf m.

5 Fill the cooling system.

6 Operate the engine and check for oil or coolant leakage.



To clean

1 Thoroughly clean the flange face of the top cover and the induction manifold with an approved detergent solution.

Warning! *Do not allow compressed air to contact your skin, if compressed air enters your skin obtain medical help immediately.*

Caution: *Do not clean the tube stack in a caustic solution.*

2 Soak the fins of the tube stack in an approved detergent degreasing fluid. Allow the excess fluid to drain off and dry the fins with low pressure compressed air.

3 Flush the tube stack through the outlet connection, in the opposite direction of coolant flow, with clean water.

4 Thoroughly clean the internal and external surfaces of the intercooler casing, with an approved detergent solution. It is important that the seats for the "O" rings are thoroughly cleaned.

To inspect

1 Check the casing of the intercooler for cracks or distortion, especially the flange faces which must be flat to prevent leakage.

2 Check the tube stack for signs of leakage, cracks, damaged fins or damaged hose connections. If the tube stack is damaged or the tubes are restricted the tubestack must be renewed.

Fault diagnosis

The alternator is designed in such a way that a flow of current (indicated by no light at the warning light or a reading shown on an ammeter) shows that the system is in correct operation. If the system is in correct operation, no open circuit, voltage or current output checks need to be done on the installation unless:

- The warning light does not show when the alternator is stationary and the switch is in the "on" position or it shows a light when the alternator is in operation.
- No charge current is shown on the ammeter.
- The battery is discharged.
- The battery is hotter than normal which is an indication of loss of voltage control.

If one or more of the above symptoms occur, the procedure indicated below should be applied.

1 Ensure that the battery is fully charged.

2 Connect a moving-coil voltmeter of good quality, with a range of 0-50 volts, across the positive and negative terminals of the alternator. If an ammeter is not fitted in the electrical circuit, fit a moving-coil ammeter of good quality, with a range of 0-100 ampere, in the wire between the alternator and the positive terminal of the battery.

3 Turn the warning light switch to the "on" position (main switch on instrument panel); the warning light should be illuminated.

4 Switch on a 10-15 ampere load, for example, lights, fans, etc.

5 Start the engine and operate it at a fast idle speed; either the warning light should be extinguished or the ammeter indicates a small change in the current in relationship to the engine speed.

6 Increase the engine speed for a moment to near maximum speed, when the charge current should be approximately equal to the rating for the alternator, as shown in the data and dimensions.

7 Operate the alternator at approximately half speed (engine speed approximately 1500 rev/min) and remove the electrical load. The voltage should go up to 14 volts for a 12 volt system or 28 volts for a 24 volt system and then remain constant. At the same time the current reading should show a reduction.

Any change in the above data can indicate a fault and the procedure that follows should be used before any components are disconnected. This procedure is not suitable for A127 alternators and, if a fault is found, the alternator should be removed for test by a specialist.

The regulator is a sealed unit and a repair is not possible. If there is a regulator fault, the regulator must be renewed.

Data and dimensions

Note: This information is given as a guide for personnel engaged on engine overhauls. The dimensions which are shown are those which are mainly used in the factory. The information applies to all engines, unless an engine type code is shown.

Electrical equipment

The information which follows is general and can change with specific applications.

Starting aid

Type . . . . . .Electrically operated heater, with a fuel supply
Voltage. . . . . 12V (dropping resistor used on 24V system)
Flow rate of fuel through starting aid . . . . . 3,5/5,9 ml/min

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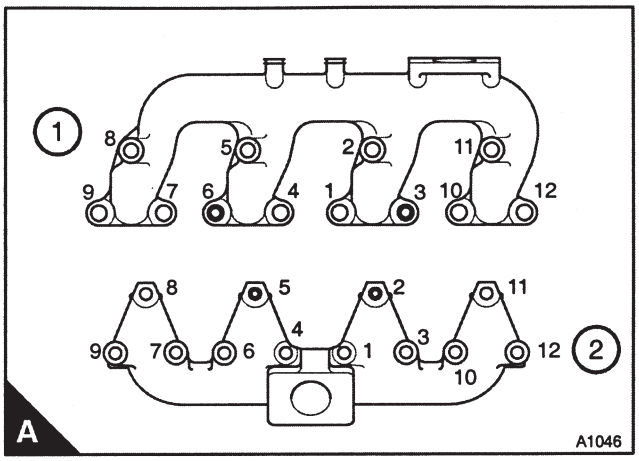
Caution: *Damage to the exhaust manifold can occur if it is not aligned and tightened correctly.*

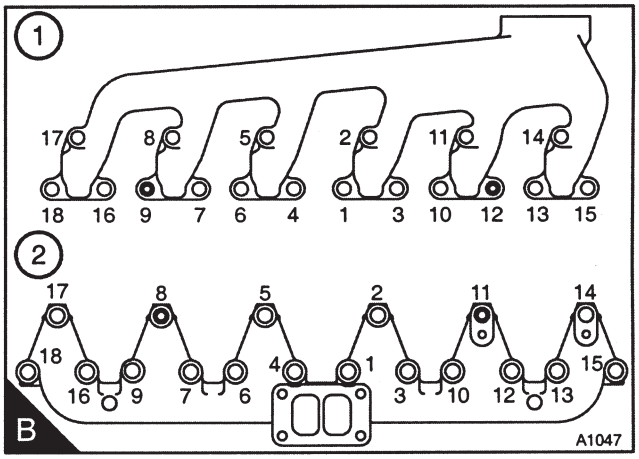
Tightened the manifold setscrews gradually and evenly to 33 Nm (24 lbf ft) 3,4 kgf m in the sequences shown in (A and B). Use the same sequences to tighten the setscrews again to the same torque tension.

Cautions:

- *If a setscrew for the exhaust manifold has become loose or has to be loosened,* ***all*** *of the setscrews must be loosened and then tightened in accordance with the paragraph above. If this is not done the manifold could be damaged when it becomes hot.*
- *Only use the approved setscrews as they are made of a material to withstand high temperatures.*
- *Do not fasten brackets, that are not approved by Perkins, to the exhaust manifold as the manifold could be damaged when it becomes hot.*

End





MAINTENANCE INTERVALS - INTERVALLI DI MANUTENZIONE - WARTUNGSINTERVALLE - INTERVALOS DE MANUTENCIÒN - INTERVALLE DE SERVICE

OPERATION - OPERAZIONE - ARBEITSVORGANG - OPERACION - OPERATION		FREQUENCY - PERIODICITÀ - ZEITABSTAND - FRECUENCIA - PERIODICITE	LUBRICANTS - LUBRIFICANTI - SCHMIERSTOFFE - LUBRICANTES - LUBRIFIANTS
• Check levels: • Controllo livelli: • Ölstandkontrolle: • Control niveles: • Contrôle niveaux:	Differential Differenziale Im differential Diferencial Differentiel	monthly mensile monatlich cada mes mensuel	• SAE85W90 (API GL4 - MIL L-2105) With additives for oil-bath brakes Con additivi per freni a bagno d'olio Mit Zusatzmittel für Bremsen in Ölbad Con aditivos para frenos de baño de aceite Avec adjuvants pour freins en bain d'huile • SAE85W90 (API GL5 - MIL 2105-B) With additives for oil-bath brakes, for units presenting hypoid crown wheel and pinion and /or self-locking differential gear Per esecuzioni con coppia conica ipoide e/o con differenziale autobloccante, con additivi per freni a bagno d'olio Bei Ausführungen mit Kegel- und Telleradpaar und/oder Selbstsperrdifferential, mit Zusatzmitteln für Bremsen in Ölbad Para ejecuciones con par cónico hipoide y/o con diferencial autobloqueante con aditivos para frenos de baño de aceite. Pour exécutions avec couple conique hypoïde et/ou différentiel autobloquant, avec adjuvants pour freins en bain d'huile
	Planetary reduction Riduzione epicicloidale Planetengetrieb Reducción epicicloidal Reduction epicycloidale	every 250 hours ogni 250 ore alle 250 Std. cada 250 horas toutes les 250 heures	
• Oil change: • Cambio olio: • Ölwechsel: • Cambio aceite: • Vidange huile:	Differential Differenziale Im differential Diferencial Differentiel	every 500 hours ✻ ogni 500 ore alle 500 Std. cada 500 horas toutes les 500 heures	
	Planetary reduction Riduzione epicicloidale Planetengetrieb Reducción epicicloidal Reduction epicycloidale	every 1000 hours ✻ ogni 1000 ore alle 1000 Std. cada 1000 horas toutes les 1000 heures	
	Self-locking differential gear Differenziale autobloccante Selbstsperrdifferential Diferencial autobloqueante Differentiel autobloquant	every 500 hours ✻ ❒ ogni 500 ore alle 500 Std. cada 500 horas toutes les 500 heures	

✻ Initially after 100 working hours - Inizialmente dopo 100 ore di lavoro - Erstmals nach 100 Betriebstunden - Al principio, después de 100 horas de trabajo - Initialement après 100 heures de travail

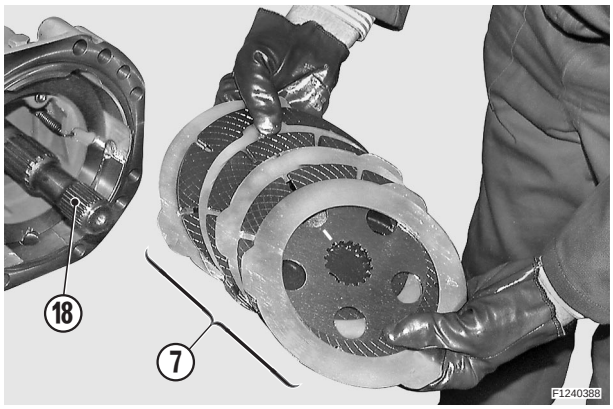
❒ When it starts sounding noisy - Anche ai primi cenni di rumorosità - Auch falls ungewöhnliche Geräusche zu bemerken sind - También al primer indicio de ruido - Même aux premiers signaux de bruit

OPERATION - OPERAZIONE - ARBEITSVORGANG - OPERACION - OPERATION	MEMBER - ORGANO - ELEMENT - ORGANO - ORGANE	CONDITIONS - CONDIZIONI - BEDINGUNG - CONDICIONES - CONDITIONS	FREQUENCY - PERIODICITÀ - ZEITABSTAND - FRECUENCIA - PERIODICITE	LUBRICANTS - LUBRIFICANTI - SCHMIERSTOFFE - LUBRICANTES - LUBRIFIANTS
Greasing Ingrassaggio Schmieren Engrase Graissage	Articulations Snodi Gelenk Rótula Articulations	Normal work Lavori normali Normale Arbeit Trabajos normales Tâches ordinaires	monthly mensile monatlich cada mes mensuel	MOLIKOTE
		Awkward work Lavori gravosi Schwere Arbeit Trabajos pesados Tâches extraordinaires	Weekly Settimanale Wöchentlich Semanal Hebdomadaire	

ADJUSTMENT AND CHECKS - REGISTRAZIONE E CONTROLLI - EINSTELLUNGEN UND KONTROLLEN - AJUSTE Y CONTROLES - REGLAGES ET CONTROLES

UNIT - GRUPPO - AGGREGAT - GRUPO - GROUPE	OPERATION - OPERAZIONE ARBEITSVORGANG - OPERACION - OPERATION	FREQUENCY - PERIODICITÀ - ZEITABSTAND - FRECUENCIA - PERIODICITE	SERVICE BRAKE CIRCUIT - CIRCUITO COMANDO FRENI - BREMSKREISLAUF - CIRCUITO MANDOS FRENOS - CIRCUIT DE COMMANDE DES FREINS
Negative brake Freno negativo Federspeicherbremse Freno negativo Frein négatif	Adjustment Registrazione Einstellen Ajuste Réglage	every 1000 hours ✻ ogni 1000 ore alle 1000 Std. cada 1000 horas toutes les 1000 hours	Only for mineral oil use e.g. Réf. : 490408. Make sure that master cylinder seals are suitable for mineral oil. Usare esclusivamente olio minerale Réf. : 490408. Accertarsi che le guarnizioni del cilindro master siano adatte a questo olio. Nur mineralisches Öl verwenden, z.B.: Réf. : 490408. Achtung: Dichtringe des Hauptbremszylinders müssen für dieses Öl geeignet sein. Usar exclusivamente aceite mineral Réf. : 490408. Asegurarse de que las juntas del cilindro principal son adecuadas para este aceite. Utiliser exclusivement huile minérale Réf. : 490408. Vérifier que les joints du maître-cylindre, soien compatibles avec cette huile.
Service brake Freni di servizio Hilfsbremse Frenos de ejercicio Freins de service	Adjustment Registrazione Einstellen Ajuste Réglage	every 250 hours ogni 250 ore alle 250 Std. cada 250 horas toutes les 250 hours	
Wheel nuts Dadi ruota Radmuttern Tuercas rueda Ecrous de roue	Tightening Serraggio - Festziehen Apriete Serrage	every 10 hours ogni 10 ore alle 10 Std. cada 10 horas toutes les 10 hours	

✻ Initially after 100 working hours - Inizialmente dopo 100 ore di lavoro - Erstmals nach 100 Betriebstunden - Al principio, después de 100 horas de trabajo - Initialement après 100 heures de travail

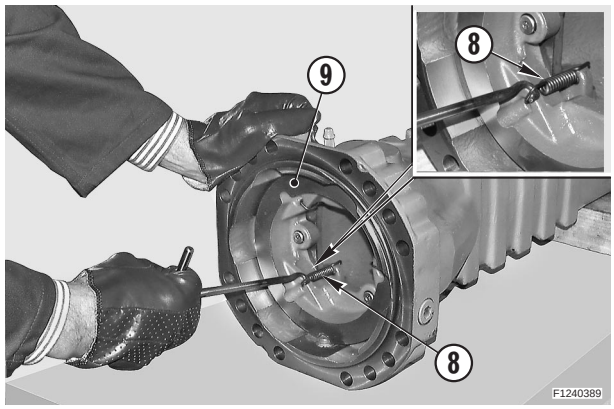


GB a

Remove the braking disks (7) and note down their order of assembly.

NOTE. 1 - If the disks do not need replacing, avoid switching their position.

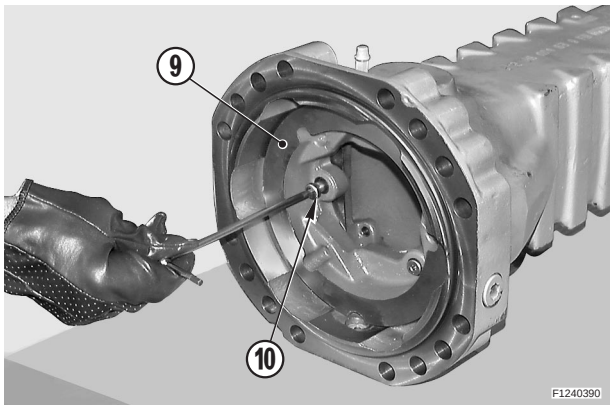
2 - Extract the u-joint (18).



GB b

Remove the reversal springs (8) from the piston (9).

NOTE. If the springs (8) are weak or deformed they must be replaced.

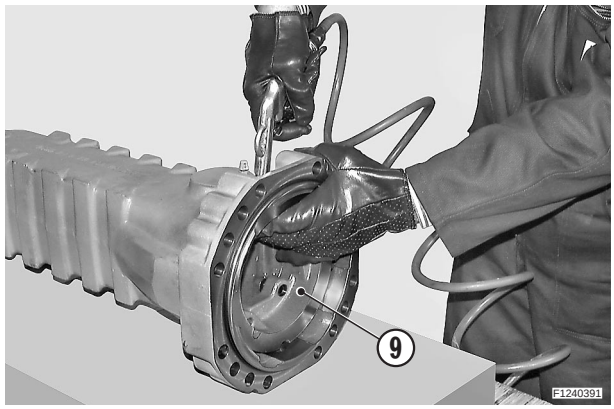


GB c

Remove the pin screws (10) guiding the piston (9).

CAUTION! If the screws are to be replaced, note down the different colours for the different brake gap.

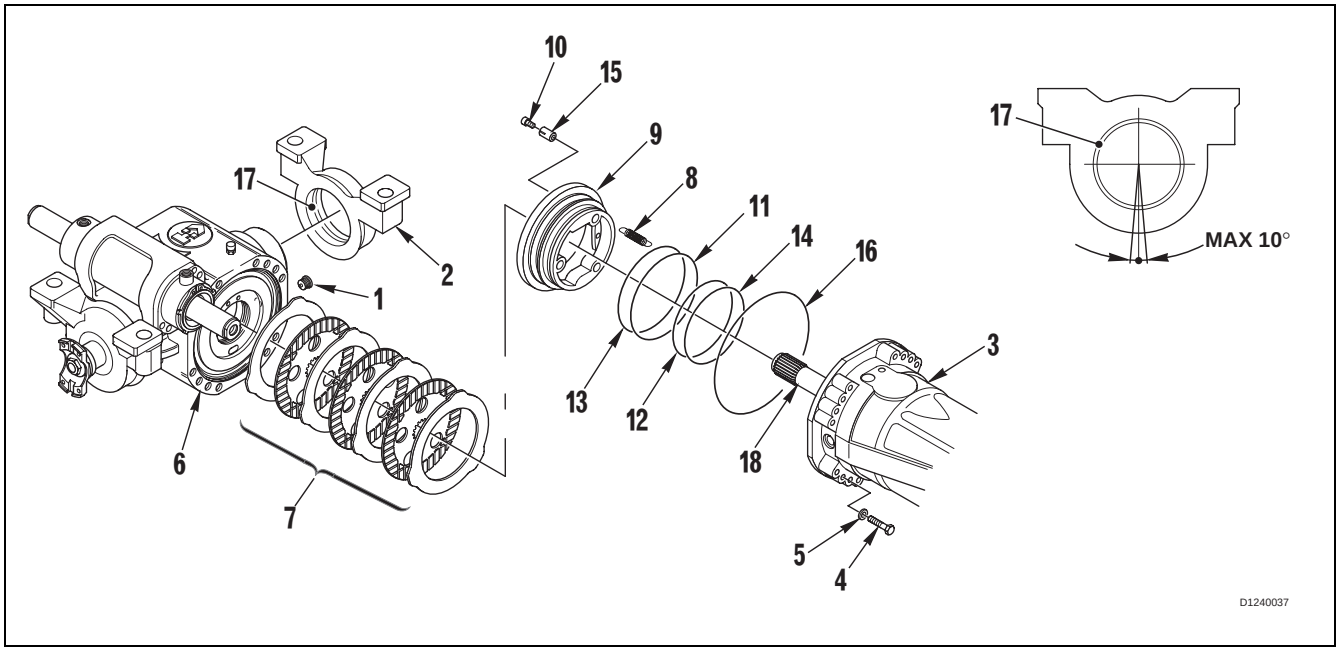
(See «HOW TO ASSEMBLE THE BRAKING UNITS»)

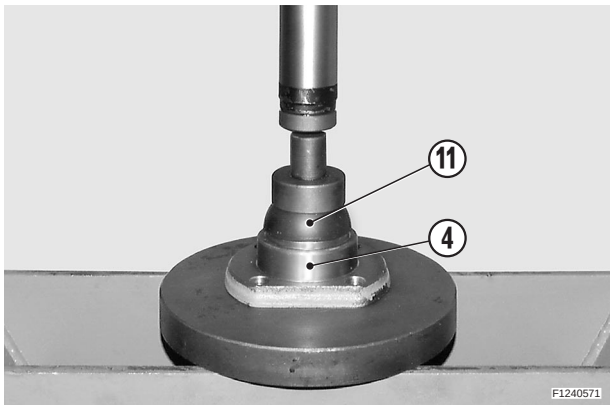


GB d

Slowly introduce compressed air through the connection of the braking circuit in order to extract the entire piston.

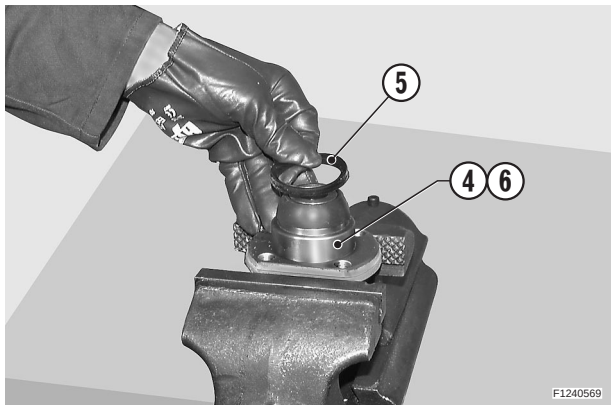
CAUTION! Hold on to the piston as it may be suddenly ejected and damaged.





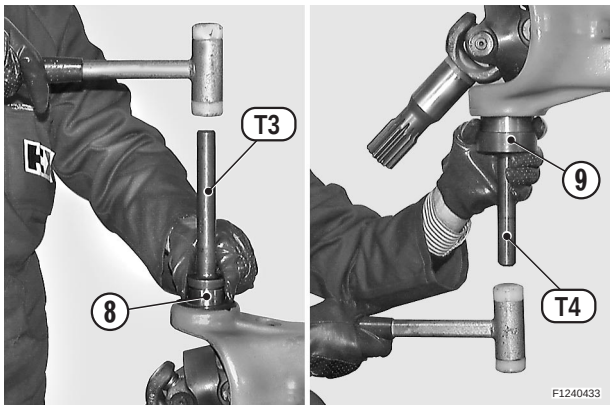
GB a

If the bottom articulation pin (4) has been extracted, position the pin under a press and fit the ball cover (11).



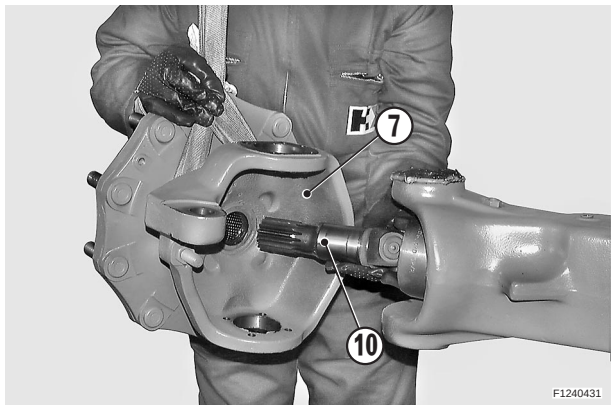
GB b

Fit the front sealing rings (5) onto the articulation pins (4) and (6).
NOTE. Carefully check that the rings are properly oriented (5).



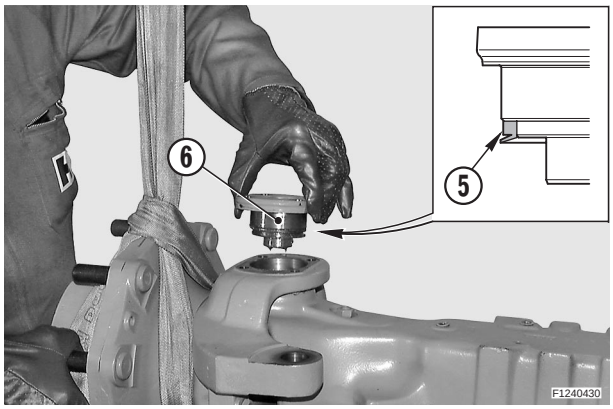
GB c

Lubricate the top bush (8) or the bottom ball bush (9) and fit them into the fulcrum holes of the arm.
Use tools **T3** and **T4**.



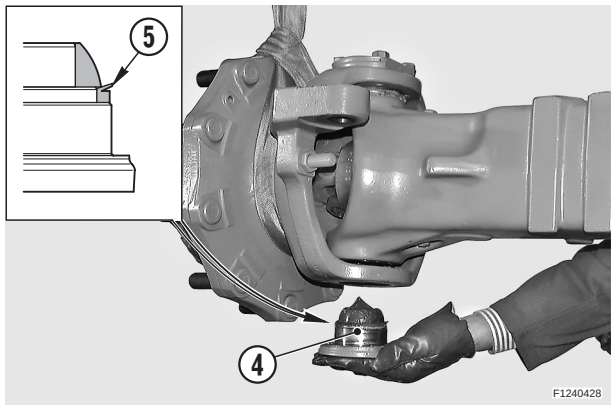
GB d

Lubricate the terminal of the u-joint (10) and install the steering case (7).
Pay due attention not to damage the dust cover rings and the sealing rings.



GB e

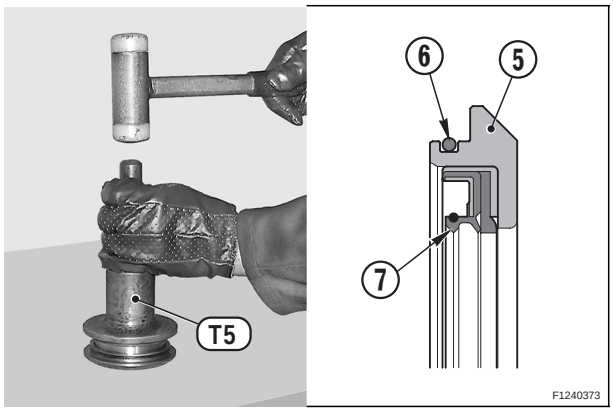
Fit a new seal (5) onto the top articulation pin (6). Lubricate and install the unit in the steering case. Position the screws (3) and lightly tighten.
Check the correct assembly side of the seal (5).



GB f

Fit a new seal (5) onto the bottom articulation pin (4). Lubricate and fit the unit in the sterring case. Position the screws (3) and lightly tighten.
Check for the correct assembly side of the seal (5).

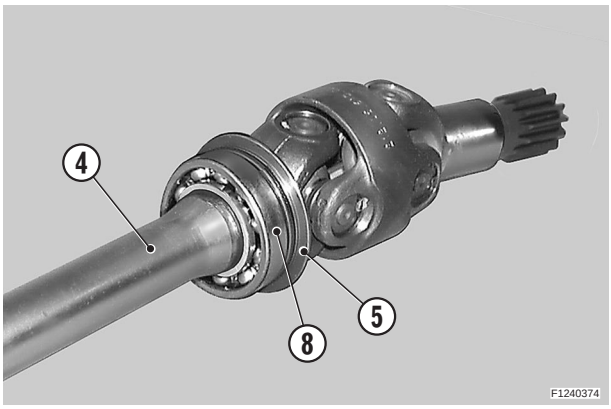
FLANGED VERSION - VERSIONE A FLANGIA - AUSFÜHRUNG MIT FLANSCH - VERSION A BRIDA - VERSION A FLASQUE



GB

a

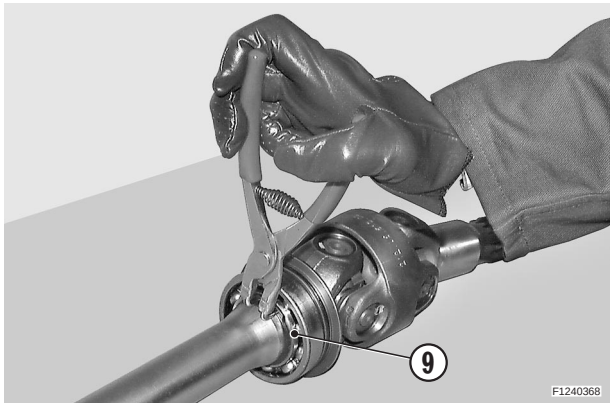
Insert the sealing ring (7) of the shaft in the flange (5), using tool **T5**.
NOTE. Carefully check the assembly side. Also replace the outer O-ring (6).



GB

b

Fit the flange (5) onto the u-joint (4).
Heat the bearing (8) at an approx. temperature of 100° C, fit it on the u-joint and fasten.

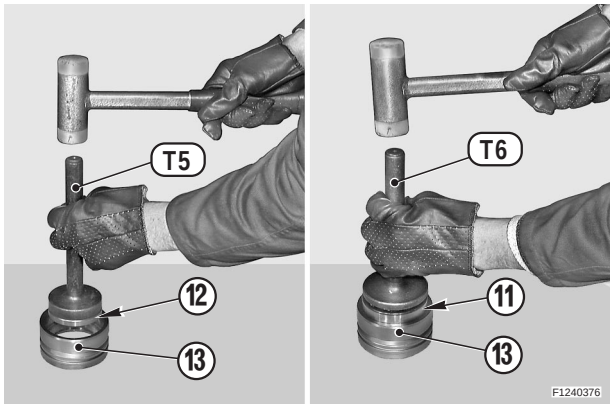


GB

c

Fit the snap ring (9) on the bearing (8).

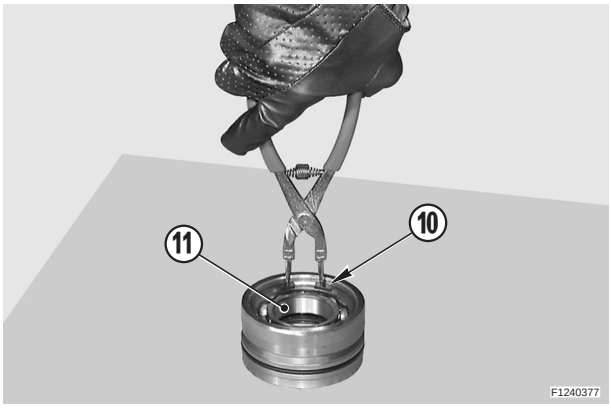
COUPLING VERSION - VERSIONE A MANICOTTO - AUSFÜHRUNG MIT MUFFE - VERSION A MANGUITO - VERSION A MANCHON



GB

e

Using tools **T5** and **T6**, insert the sealing ring (12) and the bearing (11) in the bush (13).
NOTE. Carefully check the assembly side of the seal (12).

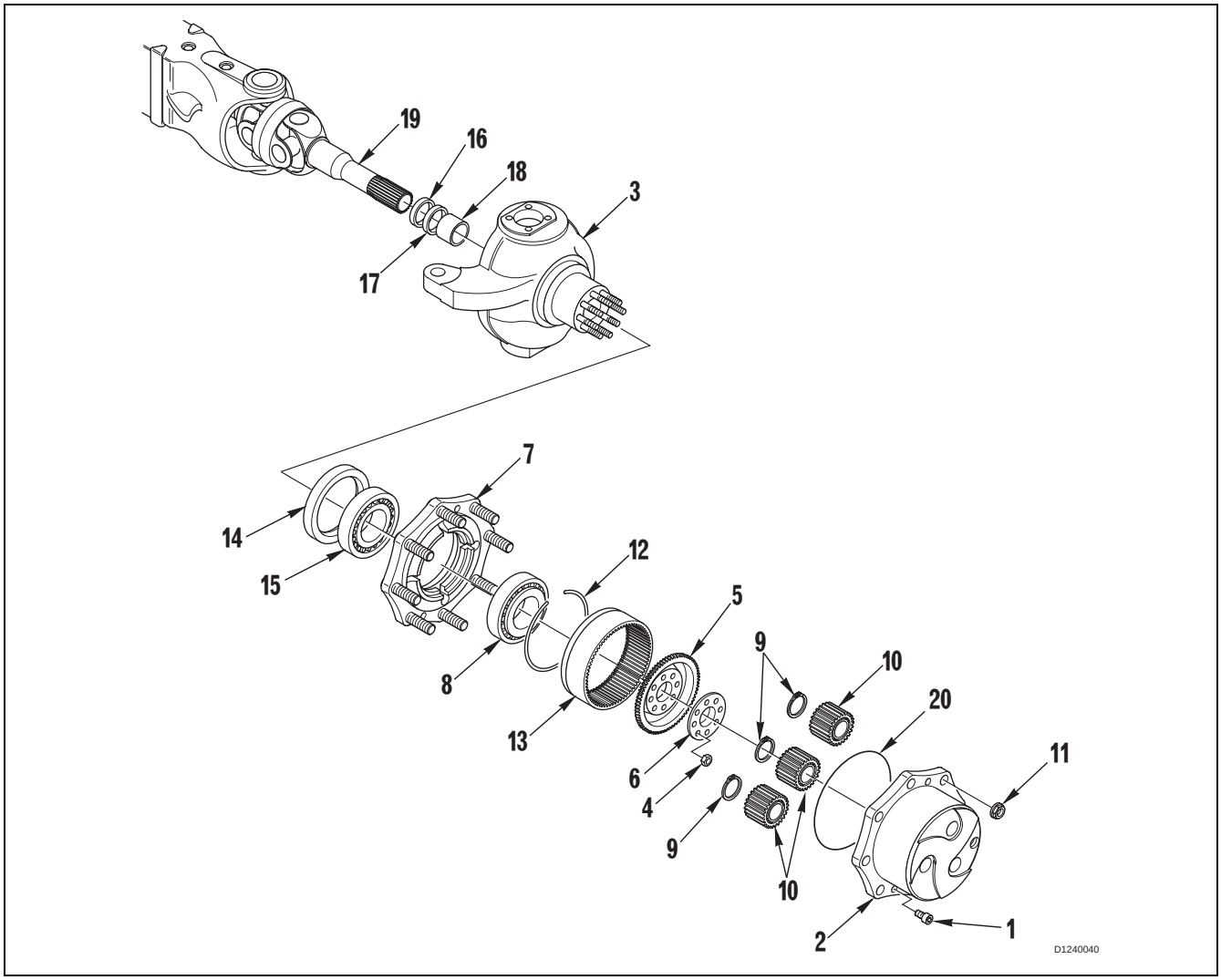


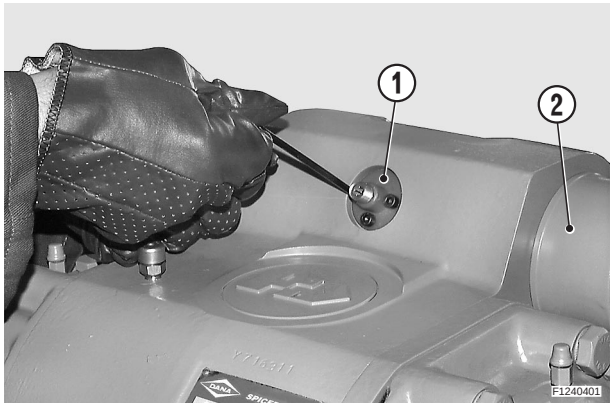
GB

f

Fit the snap ring (10) on the bearing (11).

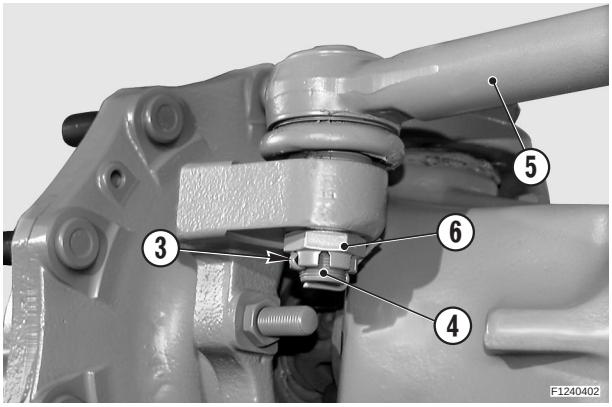
HOW TO DISASSEMBLE THE PLANETARY REDUCTION - SMONTAGGIO RIDUTTORE EPICICLOIDALE - PLANETENGETRIEB ABMONTIEREN - DESMONTAJE REDUCTOR EPICICLOIDAL - DESASSEMBLAGE DU REDUCTEUR EPICYCLOIDAL





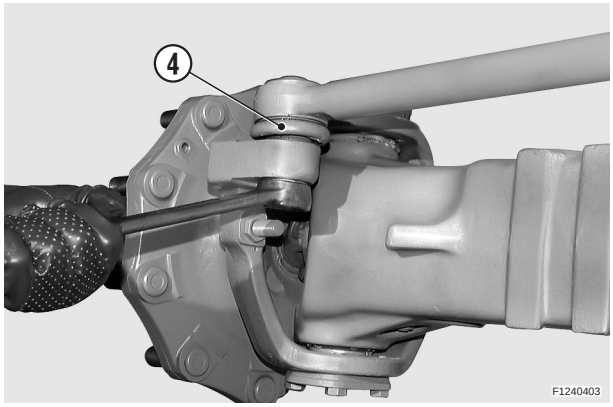
GB a

Remove the centring sensor (1) of the steering piston (2), if supplied.



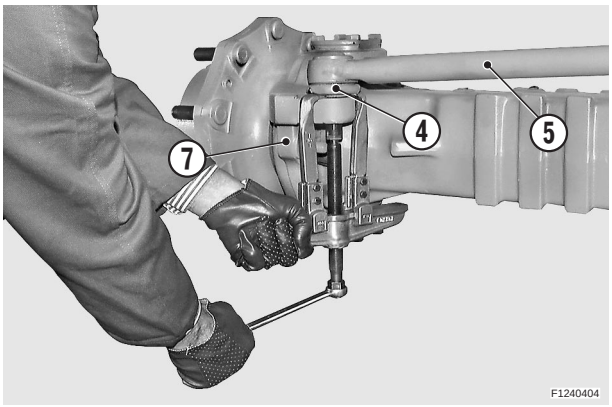
GB b

Remove the safety cotter pins (3) from the articulation pins (4) of the steering bars (5).
CAUTION! Dispose of used cotter pins.



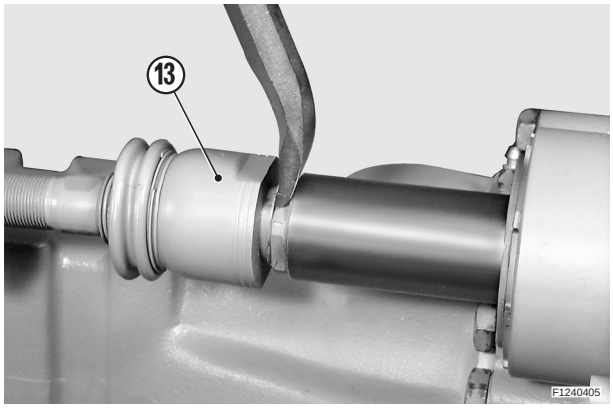
GB c

Remove the castellated nuts (6) that lock the articulation pins (4).



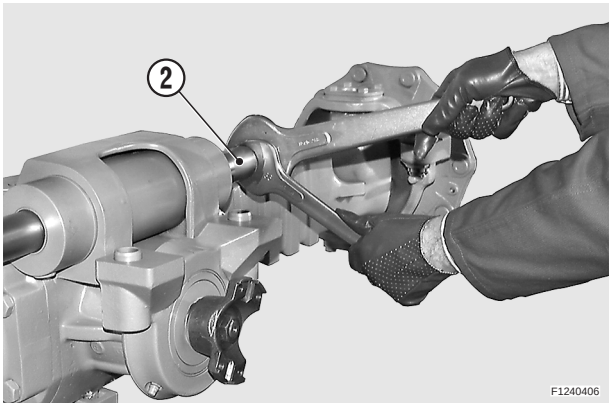
GB d

Disconnect the tapered pins of the articulation (4) from the steering case (7) by means of a puller.



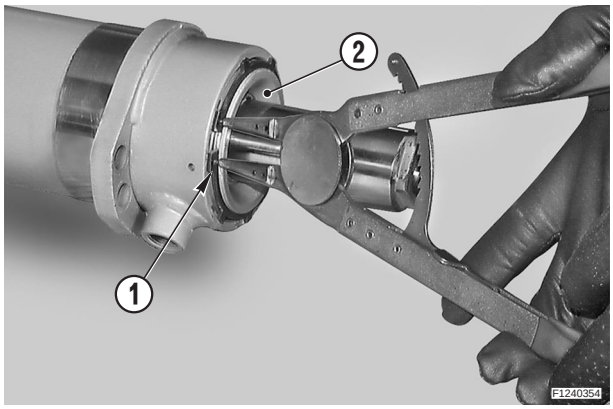
GB e

If the connection of the steering bars includes a safety collar (13), raise the border.



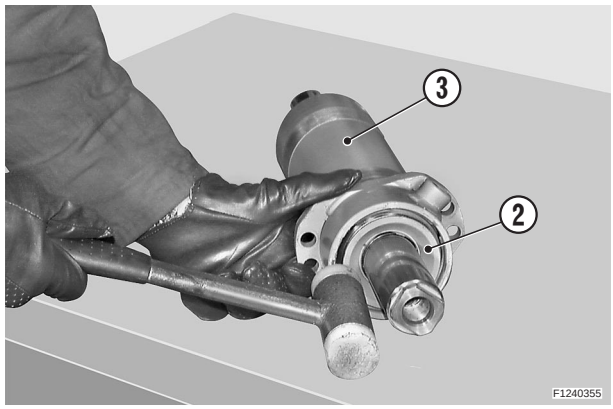
GB f

Disconnect left and right steering bars (5) from the piston (2).



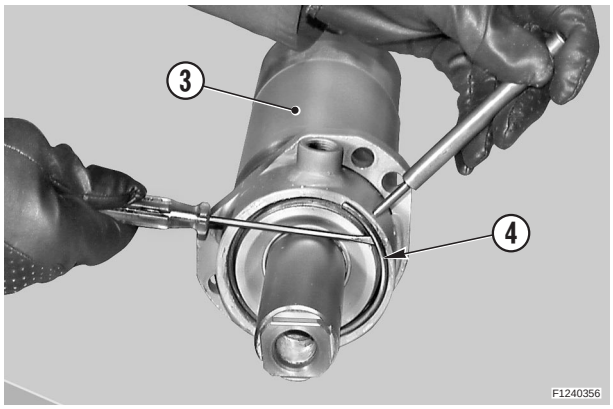
GB a

Remove the snap ring (1) from the cylinder head (2).



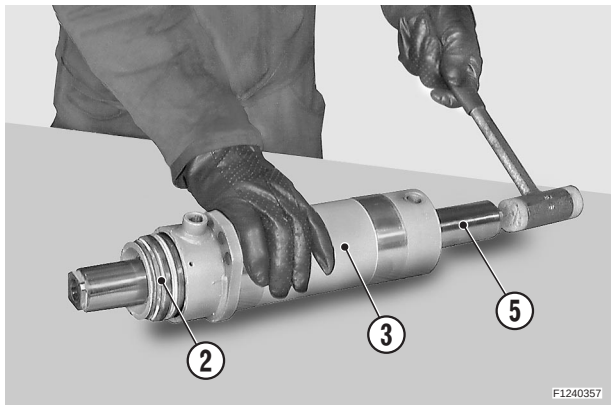
GB b

With the help of a plastic hammer, push the head (2) inside the cylinder (3).
NOTE. The head should line up with the edge of the cylinder.



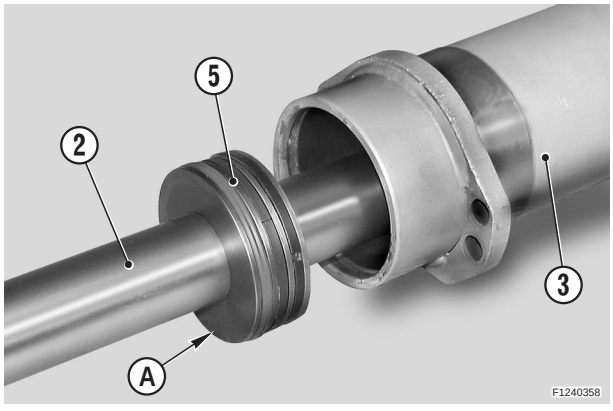
GB c

With the help of a drift, apply pressure to the stop ring (4) that is placed inside the cylinder (3) and extract the ring using a screwdriver.



GB d

Hammer the piston (5) on the rear of the head (2) using a plastic hammer.
Continue hammering until the head (2) is ejected from the cylinder (3).

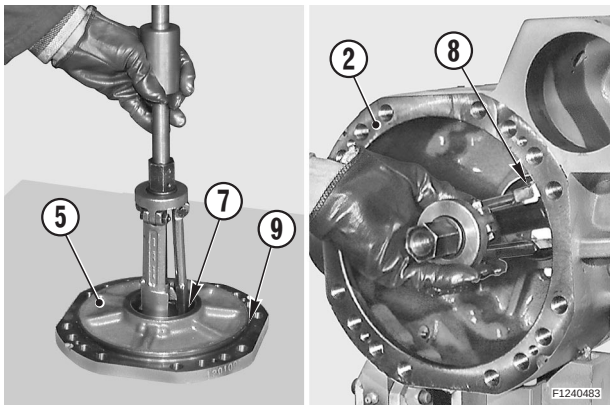


GB e

Disassemble the cylinder unit (3) by extracting first the head (2), then the piston (5).
CAUTION! Note down the assembly side of the piston (5). The bevelled part "**A**" of the piston is oriented towards the head (2).

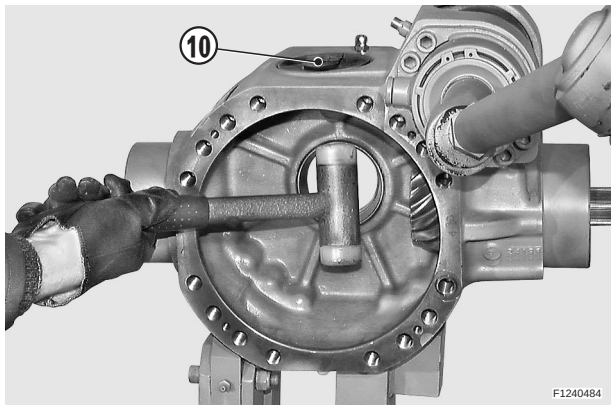
GB f

Remove all seals, anti-extrusion rings and scraper rings from head (2), cylinder (3) and piston (5).
NOTE. 1 - All seals must be replaced every time the unit is disassembled. 2 - Particular attention must be paid not to damage the seats of both seals and piston slide.



GB a

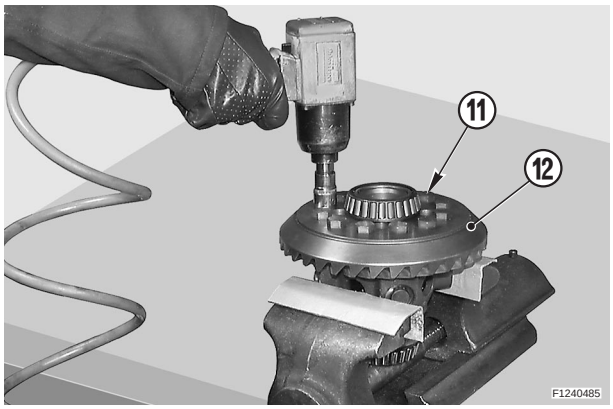
If the bearings need replacing, extract the external thrust blocks of the bearings (7) and (8) from middle cover (5) and central body (2).
NOTE. Accurately check the O-ring (9).



GB b

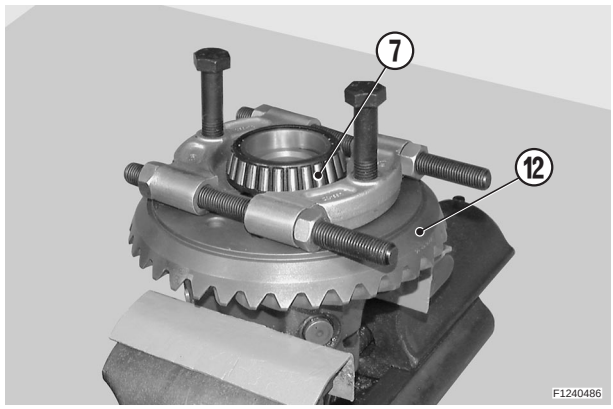
Remove the top plug (10).

DISASSEMBLING - SMONTAGGIO - ZERLEGEN - DESMONTAJE - DESASSEMBLAGE



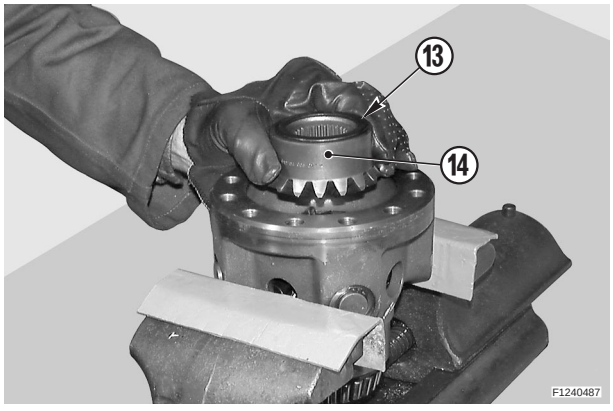
GB c

Remove the fittin screws (11) from the crown (12).



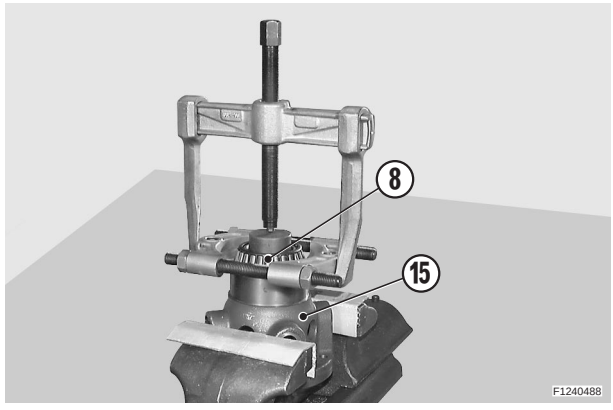
GB d

If the bearing need replacing, extract the bearing (7) and remove the crown (12).



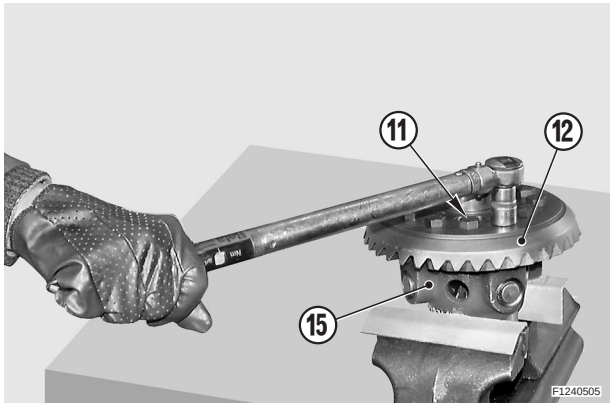
GB e

Remove the shim washer (13) and the planetary gear (14).



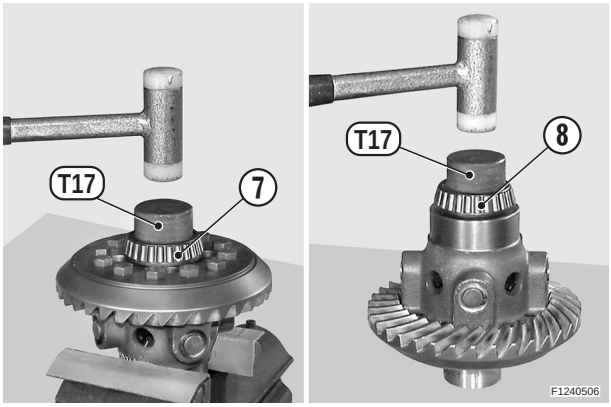
GB f

If the bearing need replacing, extract the bearing (8) from the differential carrier (15).



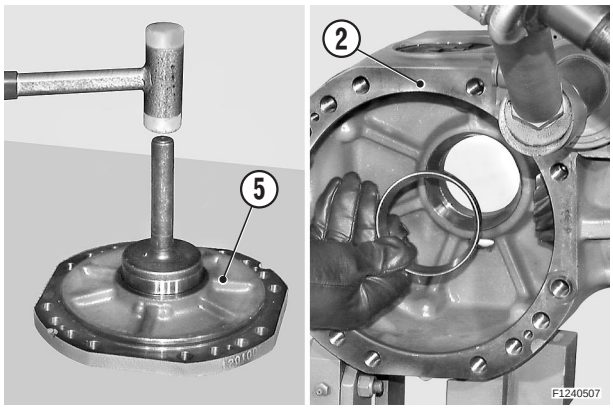
GB a

Position the crown (12) on the differential carrier (15) and lock it with screws (11) applied with Loctite 242.
Torque wrench setting for screws: 128–142 Nm
NOTE. Secure the screws using the cross-tightening method.



GB b

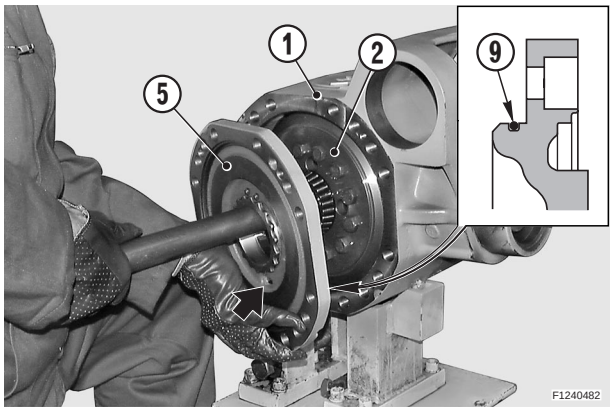
Install the bearings (7) and (8) using tool **T17**.



GB c

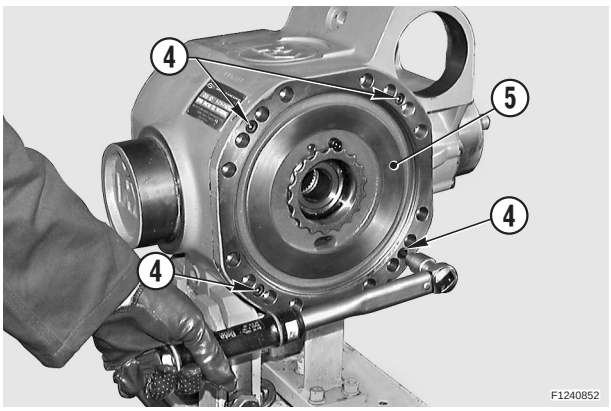
If the bearings are replaced, insert the external thrust blocks in the middle cover (5) and in the central body (2).

INSTALLING - INSTALLAZIONE - INSTALLIEREN - INSTALACION - INSTALLATION



GB e

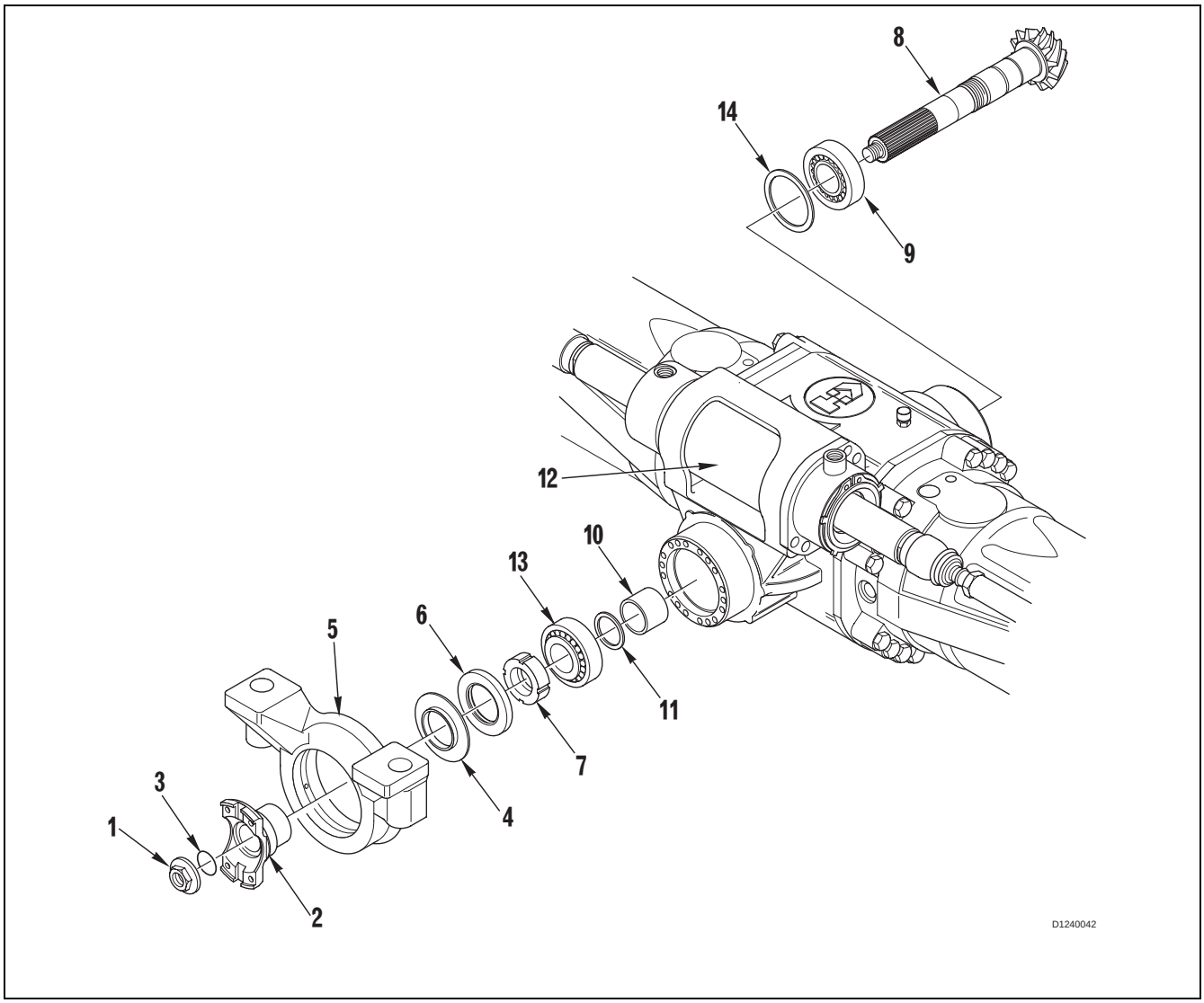
Position the differential unit (6) in the central body (2) with the help of a bar and fit the middle cover (5).
NOTE. Thoroughly check the state of the O-ring (9) and make sure that the cover is fitted with the oil discharge in the lower position.

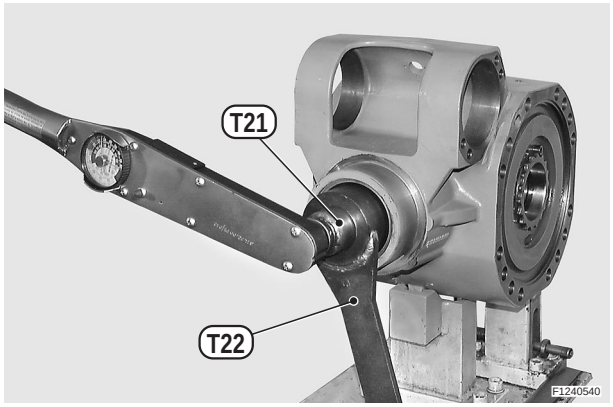


GB f

Lock the middle cover (5) with screws (4).
Torque wrench setting for screw: 23.8–26.2 Nm

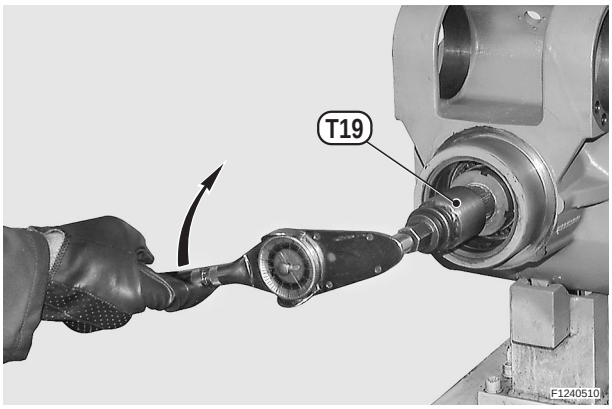
HOW TO REMOVE THE BEVEL PINION - RIMOZIONE PIGNONE CONICO - KEGELRAD ABMONTIEREN - REMOCION PIÑON CONICO - DEPOSE DU PIGNON CONIQUE





GB a

Apply special wrench **T22** to the ring nut (7) and bar-hold **T21** to the pinion (8).
Lock the wrench **T22** and rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 500 Nm.



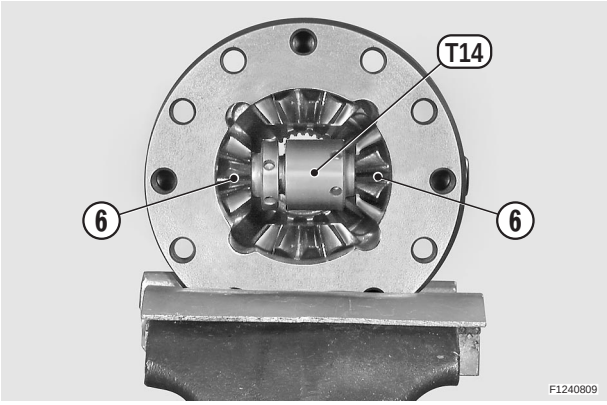
GB b

Apply onto the pinion (8) the bar-hold and with the help of a torque metre, check the torque of the pinion (8).
Torque: 120–170 Ncm

CAUTION! If torque exceeds the maximum value, then the size of shim "**S1**" (11) between the bearing (13) and the distance piece (10) needs to be increased.
If torque does not reach the set value, increase the torque setting of the ring nut (7) in different stages to obtain a maximum value of 570 Nm.

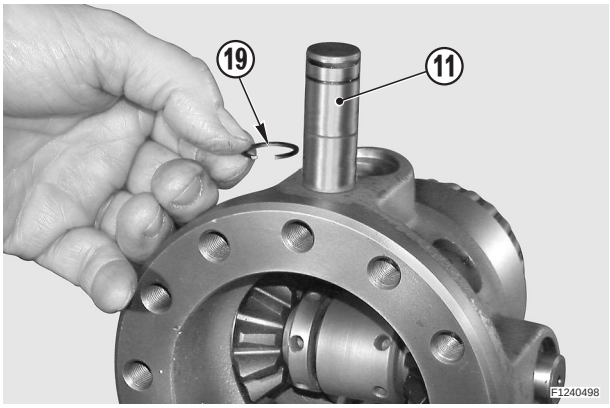
CAUTION! If torque does not reach the minimum value, then the size of shim "**S1**" (11) needs to be reduced.

CAUTION! When calculating the increase or decrease in size of shim "**S1**", bear in mind that a variation of shim (11) of 0.01 mm corresponds to a variation of 60 Ncm in the torque of the pinion (8).



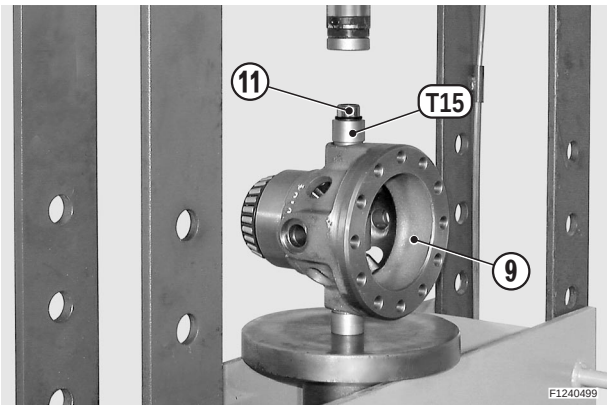
GB a

Lock tool **T14** behind the planet gears (12).
After locking the tool, remove bar **T16C**.



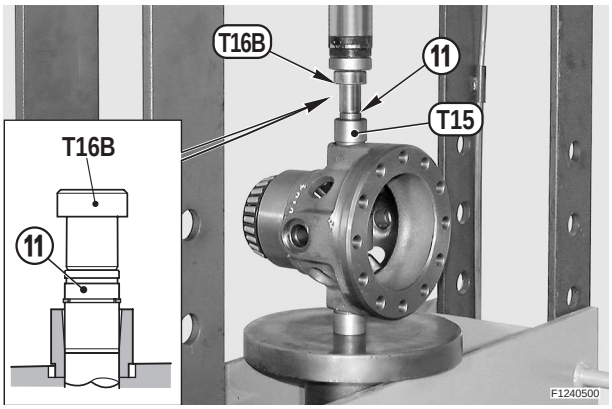
GB b

Fit snap rings (19) onto the pins (11).



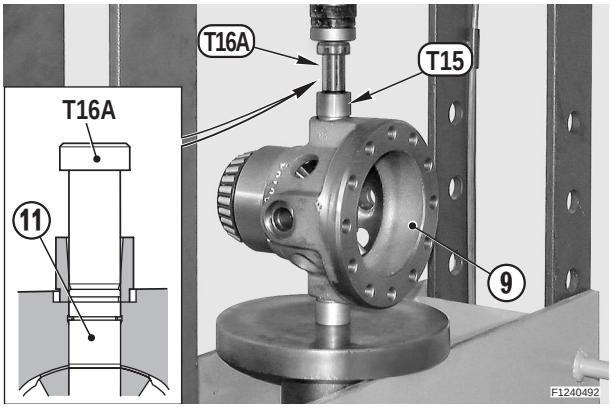
bar GB c

Position the differential unit (9) under the press, position bush **T15** and insert the planet pin (11).



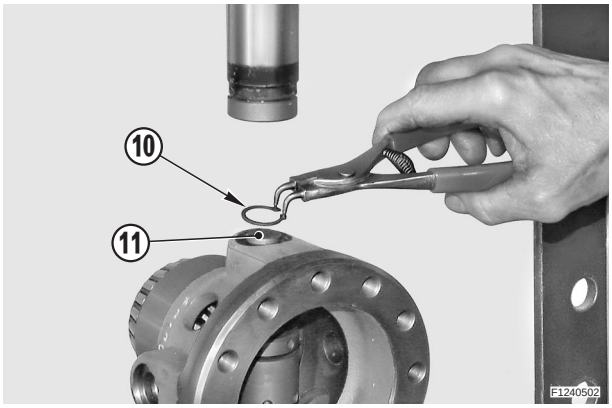
GB d

Place gudgeon **T16B** on top of the planet pin (11).



bar GB e

Press gudgeon **T16B** as far down as it will go.



GB f

Remove gudgeon **T16B**, bush **T15**, and fit the snap ring (10) onto the pin (11).

CAUTION! Make sure that the snap ring centers the seat and positions itself on the differential unit face.
Repeat the operations on the other planet pin and on the other planet unit.

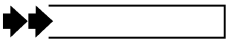
GB

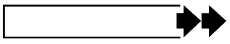
The efficiency and continued operation of mechanical units depend on constant, correct maintenance and also on efficient repair work, should there be a break-down or malfunction. The instructions contained in this manual have been based on a complete overhaul of the unit. However, it is up to the mechanic to decide whether or not it is necessary to assemble only individual components, when partial repair work is needed. The manual provides a quick and sure guide which, with the use of photographs and diagrams illustrating the various phases of the operations, allows accurate work to be performed.
All the information needed for correct disassembly, checks and assembly of each individual component is set out below. In order to remove the differential unit from the vehicle, the manuals provided by the vehicle manufacturer should be consulted. In describing the following operations it is presumed that the unit has already been removed from the vehicle.

IMPORTANT: In order to facilitate work and protect both working surfaces and operators, it is advisable to use proper equipment such as: trestles or supporting benches, plastic or copper hammers, appropriate levers, extractors and specific spanners or wrenches.
Before going on to disassemble the parts and drain the oil, it is best to thoroughly clean the unit, removing any encrusted or accumulated grease.

INTRODUCTORY REMARKS: All the disassembled mechanical units should be thoroughly cleaned with appropriate products and restored or replaced if damage, wear, cracking or seizing have occurred.
In particular, thoroughly check the condition of all moving parts (bearings, gears, crown wheel and pinion, shafts) and sealing parts (O-rings, oil shields) which are subject to major stress and wear. In any case, it is advisable to replace the seals every time a component is overhauled or repaired. During assembly, the sealing rings must be lubricated on the sealing edge. In the case of the crown wheel and pinion, replacement of one component requires the replacement of the other one. During assembly, the prescribed pre-loading, backlash and torque of parts must be maintained.

CLASSIFICATION: This manual classifies units according to part numbers. For a correct interpretation, classification is indicated as follows:


= up to the part number


= from the part number on

When no classification is given, disassembly and assembly operations are the same for all versions.

SPECIFIC EQUIPMENT AND SPARE PARTS: The drawings of all specific tools required for maintenance and repair work can be found at the end of this manual ; spare parts may be ordered either from the vehicle manufacturer or directly from the Service Centers or Authorised Distributors of SPICER CLARK-HURTH.

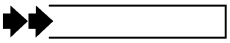
ITA

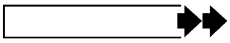
Il rendimento e la continuità degli organi meccanici dipendono oltre che da una costante e corretta manutenzione, anche dal tempestivo intervento, nell'eventualità di guasti o anomalie.
Nel proporre questo manuale si è considerata l'ipotesi di una revisione generale del gruppo ma è il meccanico a valutare la necessità di montare solo i singoli componenti nel caso di riparazione. Il manuale è una guida rapida e sicura che consente interventi precisi, tramite le fotografie ed i disegni prospettici che illustrano le varie fasi delle operazioni. Di seguito sono riportate tutte quelle informazioni ed avvertenze necessarie al corretto disassemblaggio, alle relative verifiche ed all'assemblaggio dei singoli componenti. Per la rimozione del ponte differenziale dal veicolo, è necessario consultare i manuali forniti dal costruttore del veicolo. Nel descrivere le operazioni seguenti, si presuppone che il ponte sia già stato rimosso dal veicolo.

IMPORTANTE: In tutte le operazioni, è consigliabile usare attrezzature idonee quali cavalletti o banchi di sostegno, martelli in plastica o rame, leve appropriate estrattori e chiavi specifiche, al fine di facilitare il lavoro salvaguardando nel contempo le superfici lavorate e la sicurezza degli operatori.
Prima di procedere al disassemblaggio delle parti e scaricare l'olio, è opportuno eseguire un'accurata pulizia del ponte, asportando incrostazioni ed accumuli di grasso.

PREMESSA: Tutti gli organi meccanici smontati, devono essere accuratamente puliti con prodotti appropriati, quindi ripristinati o sostituiti nel caso presentino danni, usura, incrinature, grippaggi, ecc. In particolare, verificare l'integrità di tutte quelle parti in movimento (cuscinetti, ingranaggi, coppia conica, alberi) e di tenuta (anelli OR, paraolio), soggette a maggiori sollecitazioni ed usura. È consigliabile, comunque, la sostituzione degli organi di tenuta ogni qualvolta si proceda alla revisione o riparazione dei componenti. Al momento del montaggio, gli anelli di tenuta devono essere lubrificati sui bordi di tenuta. Nel caso della coppia conica, la sostituzione di uno dei suoi ingranaggi comporta anche la sostituzione dell'altro. In fase di montaggio sono da rispettare scrupolosamente i giochi, i precarichi e le coppie prescritte.

VALIDITÀ: Il manuale fornisce le validità dei gruppi sotto forma di matricola. Al fine di una corretta interpretazione, le validità sono indicate come:


= fino alla matricola


= dalla matricola

Se non sono indicate validità, le operazioni di smontaggio ed assemblaggio sono comuni a tutte le versioni.

MANUTENZIONE E RIPARAZIONE: Al fine di facilitare interventi sui gruppi ponte differenziali e cambi di velocità la SPICER CLARK-HURTH, ha ritenuto opportuno compilare queste istruzioni di manutenzione e riparazione. I disegni delle attrezzature specifiche eventualmente necessarie per l'esecuzione di interventi di manutenzione e riparazione possono essere acquistati direttamente presso il costruttore; i ricambi possono essere ordinati tramite il costruttore della macchina o direttamente presso la SPICER CLARK-HURTH.

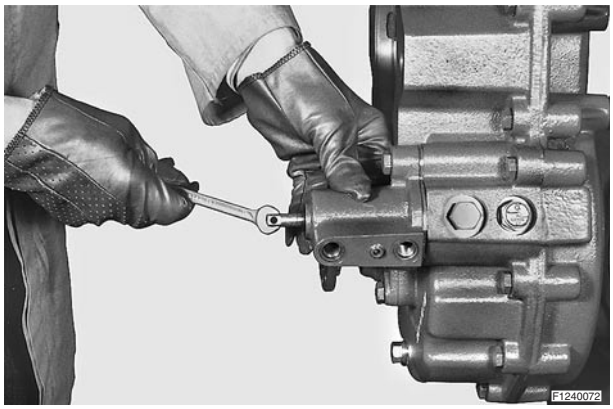
D

Die Leistung und Lebensdauer der mechanischen Teile hängt nicht nur von einer ständigen und richtig durchgeführten Wartung sondern auch von einem sofortigen Eingriff im Störungsfall ab. Um dieses Handbuch zu erstellen sind wir von einer allgemeinen Überprüfung der Einheit ausgegangen, doch entscheidet der Mechaniker ob die einzelnen Teile bei Reparaturen montiert werden müssen oder nicht. Das Handbuch ist schnell und einfach nachzuschlagen und ermöglicht es anhand der Abbildungen und der Zeichnungen, die die verschiedenen Vorgänge darstellen, gezielt einzugreifen. Nachstehend sind alle Informationen und Hinweise aufgeführt, die zur Zerlegung, Prüfung und Montage der Einzelteile nötig sind. Um die Differentialachse des Fahrzeugs abzumontieren, lesen Sie bitte die Anweisungen in den Handbüchern des Fahrzeugherstellers. Die nachstehenden Beschreibungen gehen davon aus, daß die Fahrzeugachse schon abmontiert worden ist.

WICHTIG: Um die Arbeit zu erleichtern und gleichzeitig die verarbeiteten Flächen zu schützen und die Sicherheit der Arbeiter zu gewährleisten, empfehlen wir geeignete Werkzeuge wie Böcke, Tisch, Gummi- oder Kupferhammer, geeignete Auszieher und Schlüssel zu verwenden.
Bevor mit der Zerlegung der Teile begonnen und das Öl abgelassen wird, muß die Achse sorgfältig gereinigt und Verkrustungen und Fettablagen abgetragen werden.

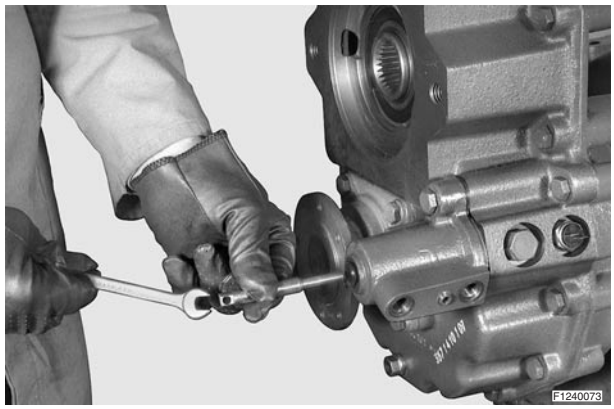
VORAUSSETZUNG: Alle abmontierten mechanischen Teile müssen sorgfältig mit geeigneten Reinigungsmitteln gereinigt oder, wenn beschädigt, verschleißt, gerissen, festgefressen usw. ausgewechselt werden. Insbesondere muß der einwandfreie Zustand aller beweglichen Teile (Lager, Zahnräder, Kegelradpaare, Wellen) und der Dichtungen (O-Ringe, Ölabdichtungen), die am meisten beansprucht werden und verschleißen, kontrolliert werden. Wir empfehlen auf jeden Fall die Abdichtungselemente immer auszuwechseln, wenn eine Überholung oder eine Reparatur der Teile vorgenommen wird. Bei

REMOVAL OF HYDRAULIC GEAR CONTROL - RIMOZIONE COMANDO IDRAULICO - HYDRAULISCHER GANGSCHALTUNG ENFERNEN - REMOCION MANDO MARCHA HIDRAULICO - DEPLACEMENT DE LA COMMANDE DE VITESSES HYDRAULIQUE



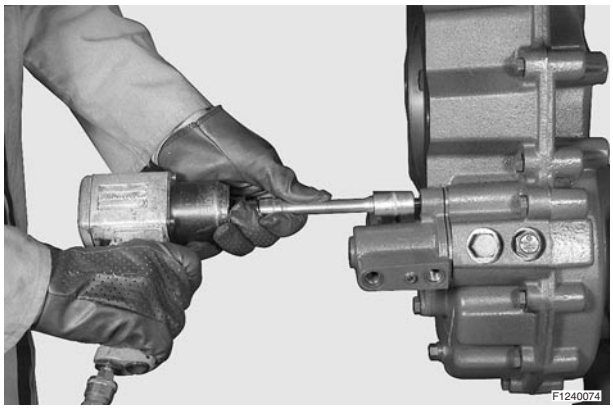
GB a

Remove the gear control rod.



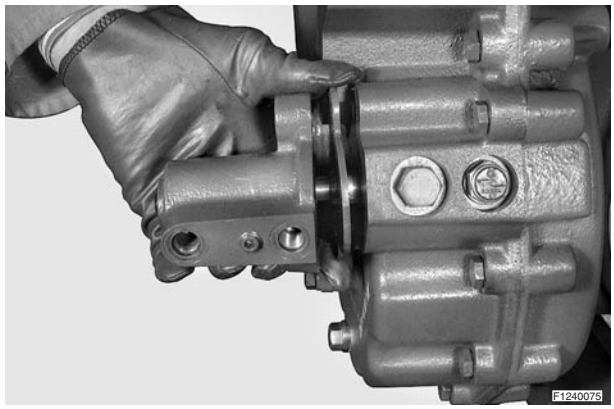
GB b

Pull out the control rod.



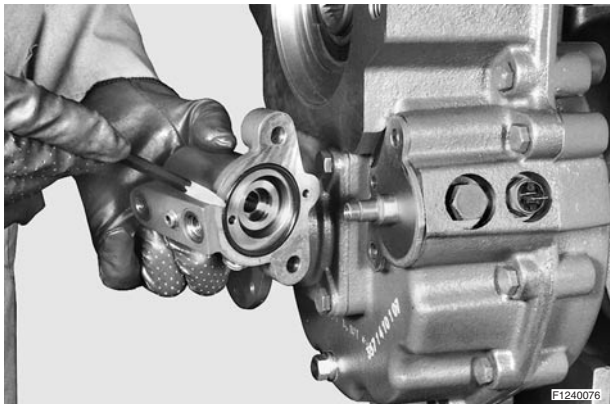
GB c

Remove screws on the gear control cylinder.



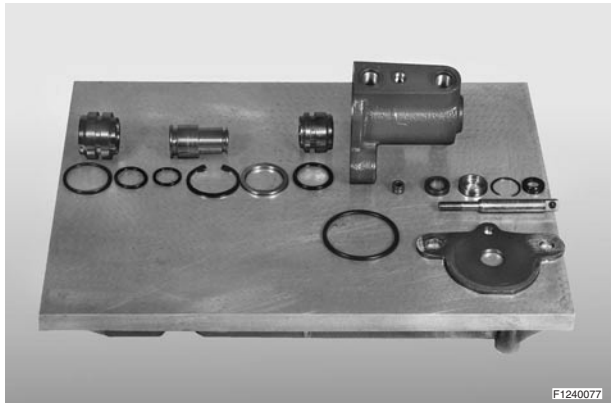
GB d

Remove the gear control cylinder.



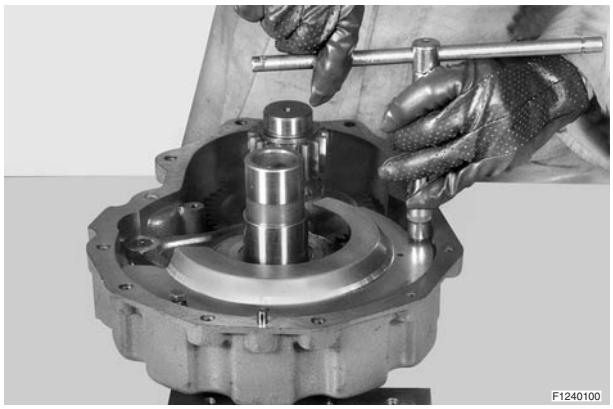
GB e

Pull out the gear control cylinder.
Pay attention to the position of the O-rings. Remove the protection plate.



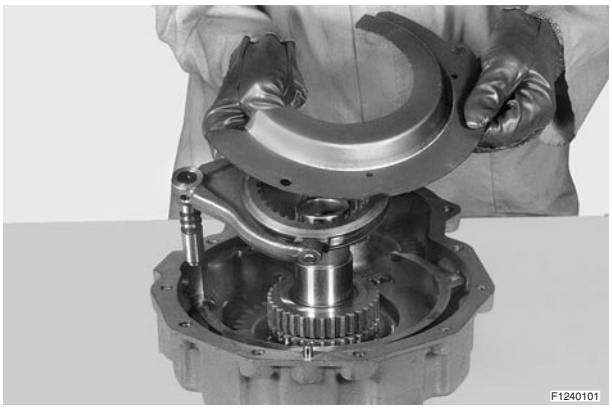
GB f

Re-assembly arrangement of gear control cylinder parts.



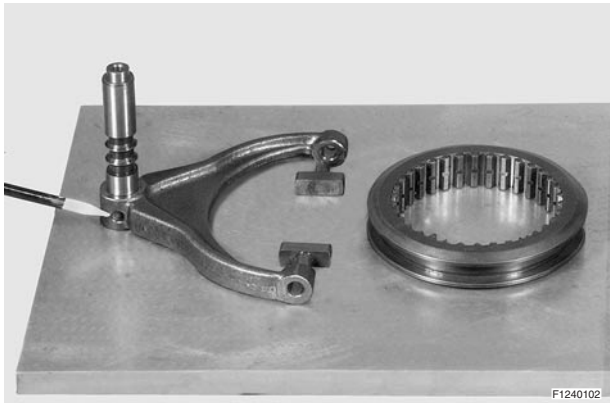
GB a

Remove the check screws from the flow regulator plate.



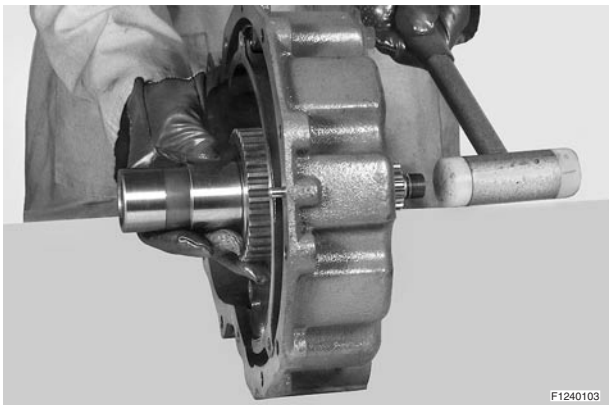
GB b

Remove the plate and pull out coupling and fork at the same time.



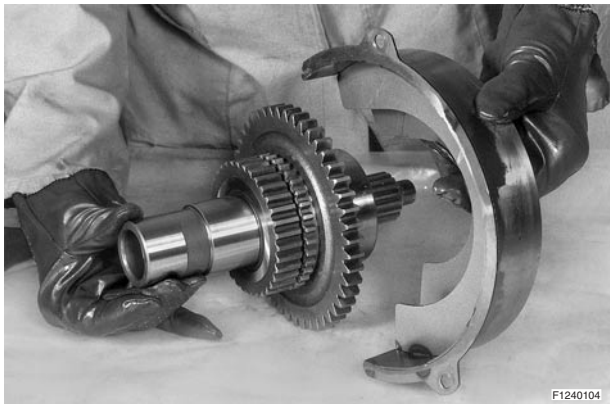
GB c

Check: sliding blocks, pin, and sliding coupling.
Replace if worn.



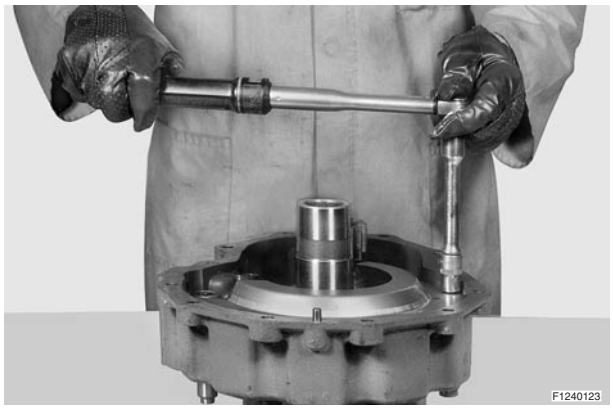
GB d

Remove the lower shaft.



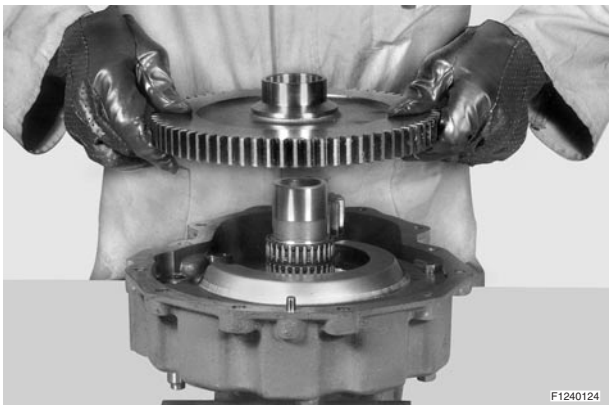
GB e

Remove the entire shaft and the flow regulator plate.



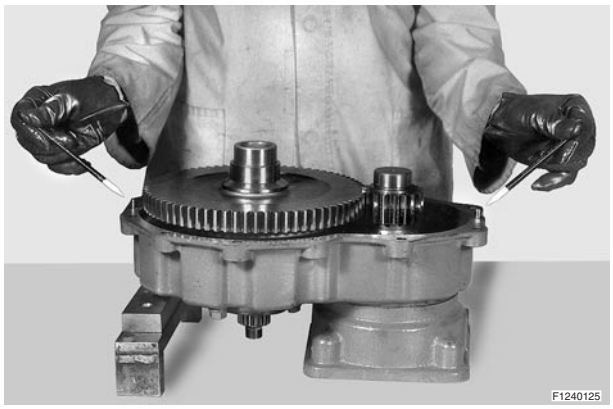
GB a

Tighten screws using a torque wrench setting of 25–26 Nm.



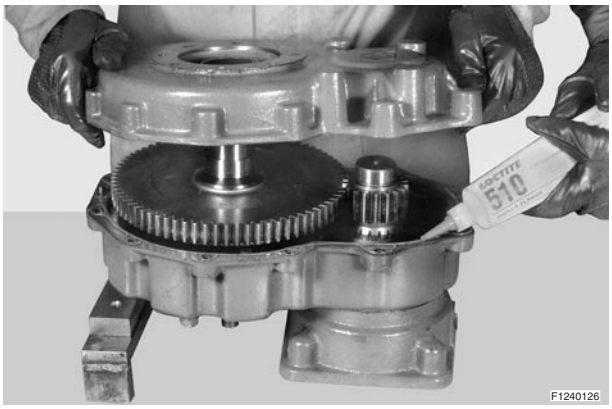
GB b

Re-assemble needle bearings, gear and distance piece.



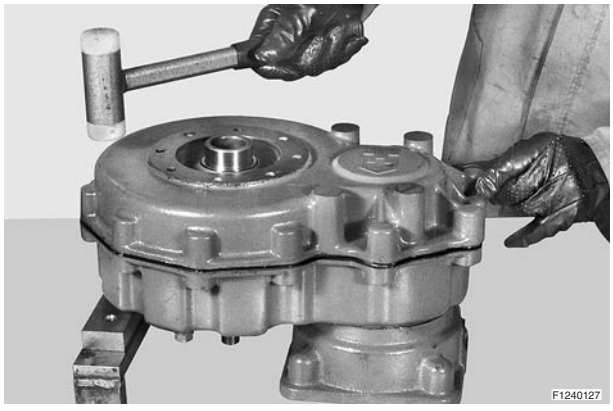
GB c

Check the insertion of pins.



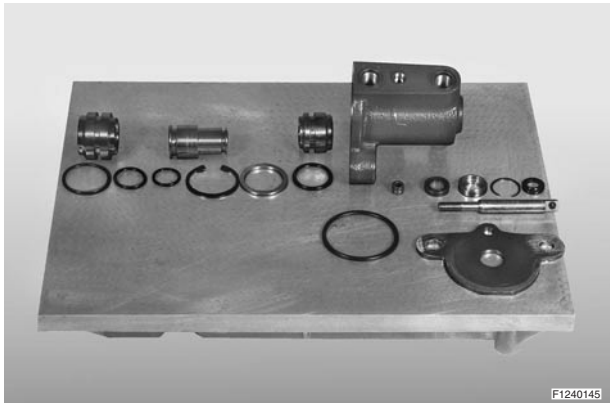
GB d

Spread LOCTITE 510 on the surface and assemble the cover.



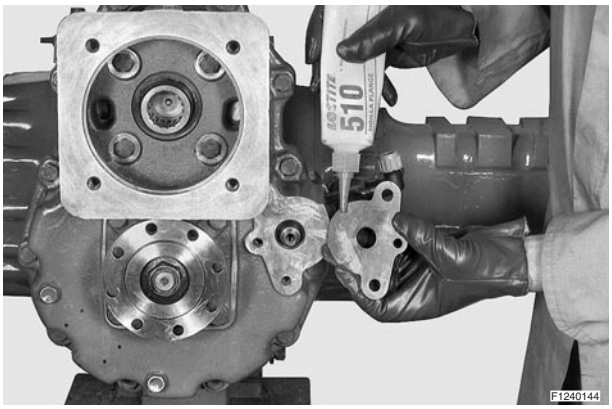
GB e

Fasten the cover.



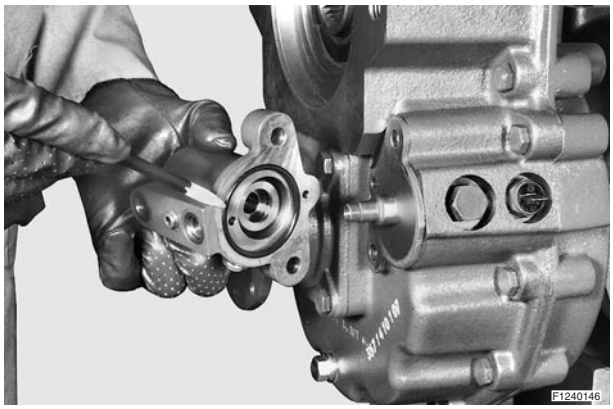
GB a

Re-assemble all the parts of the gear control cylinder, according to their arrangement.



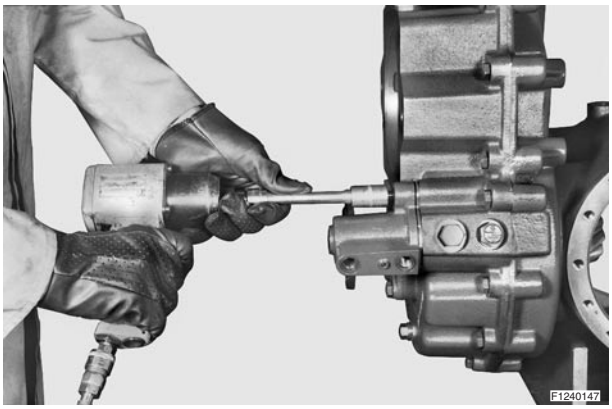
GB b

Re-fix the protection plate after applying LOCTITE 510 on it.



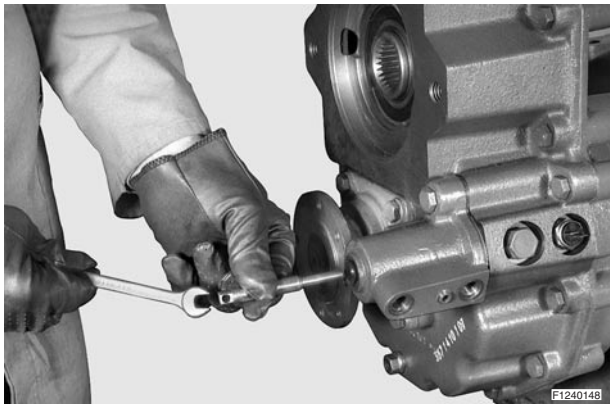
GB c

Re-fit the gear control cylinder into place with its O-ring.



GB d

Re-fit screws and screw down.



GB e

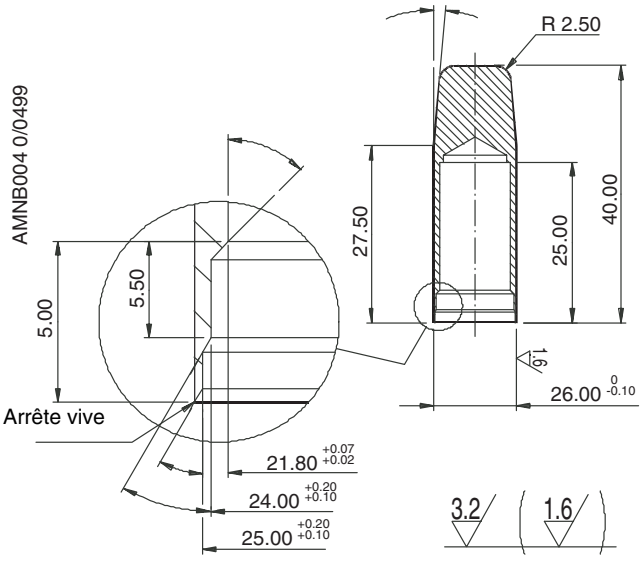
Re-introduce the gear control rod after applying LOCTITE 242 on it.

General Recommendations

Make sure the components have not been damaged in transport. Always work in a clean environment. Clean all parts (except seals) with a solvent and blow clean, dry air through them before reassembly. Be careful not to damage the seals. Avoid negligence or any other deterioration of machined surfaces. The parts must be assembled without resistance which would indicate incorrect assembly or the parts assembled are not exactly correctly positioned with respect to each other. If hand pressure is inadequate to place a part fully in position, use a rubber mallet. Never use a metal head!! Make sure that the torque settings used for the screws match the values given in the appropriate tables.

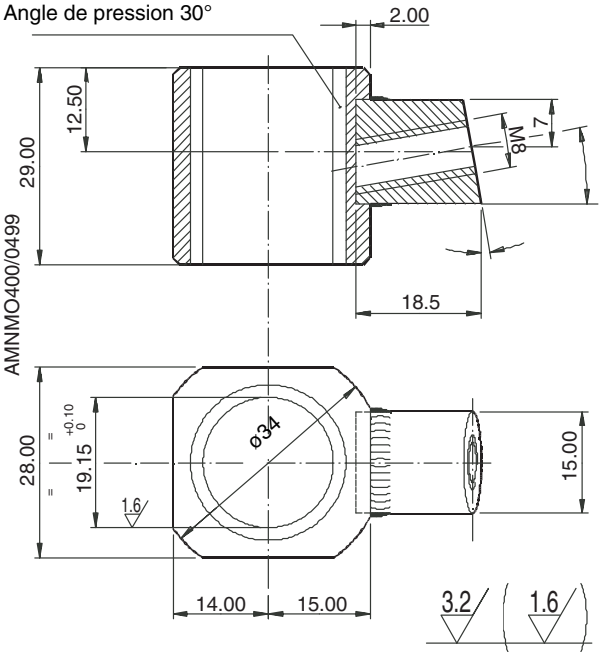
List of tools:

Vice
Special tool for installing the shaft seal
Vertical press
Tool for protecting the shaft seal on assembly of the front flange
Special tool for the rotation test on the pump after assembly
Torque wrench
Oil and grease
Emery cloth



Special tool for installing the shaft seal

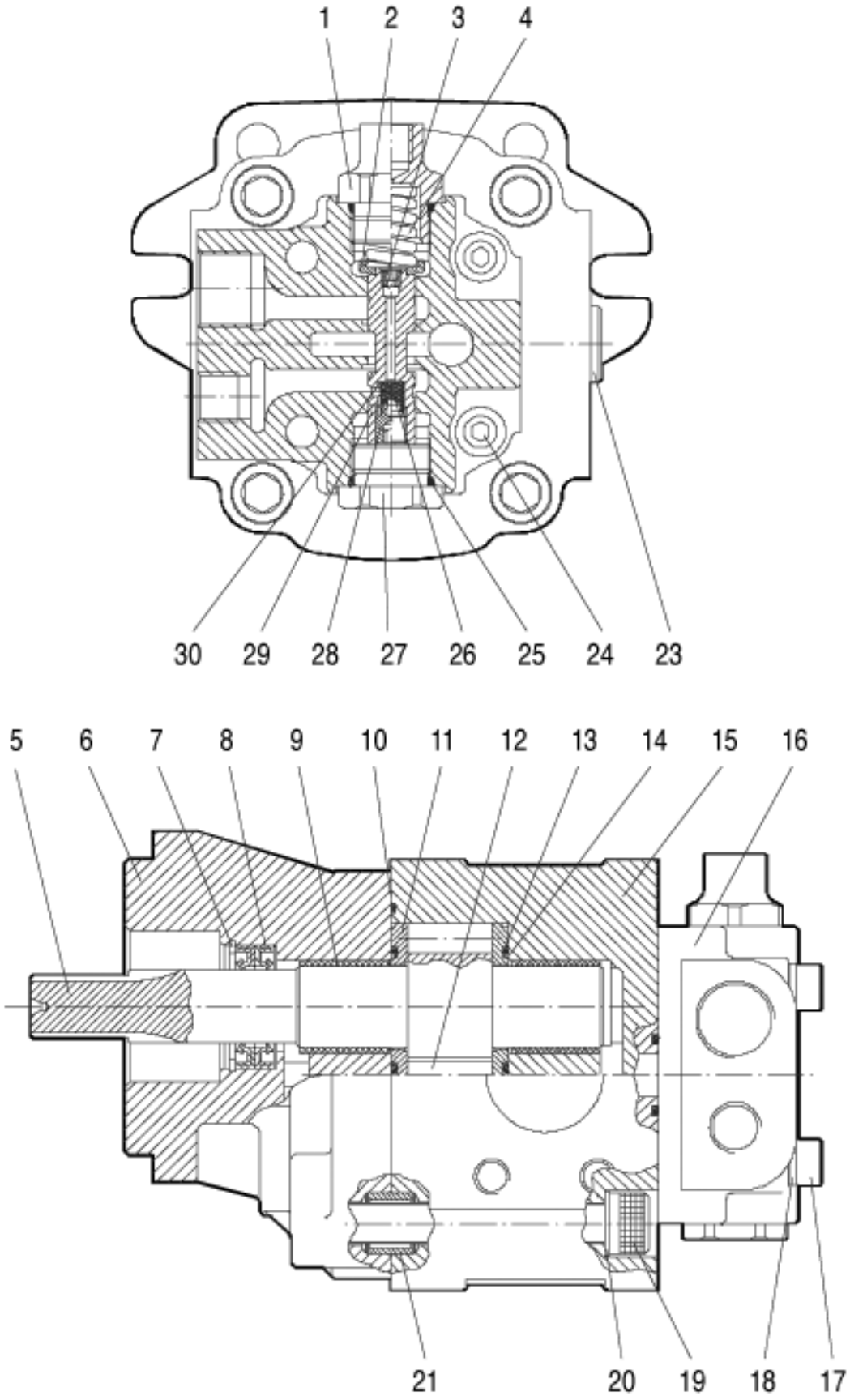
ANSI B92.1 classe 1
13 Dents - 16/32 D.P.
Fond plat - Centrage sur flancs
Angle de pression 30°



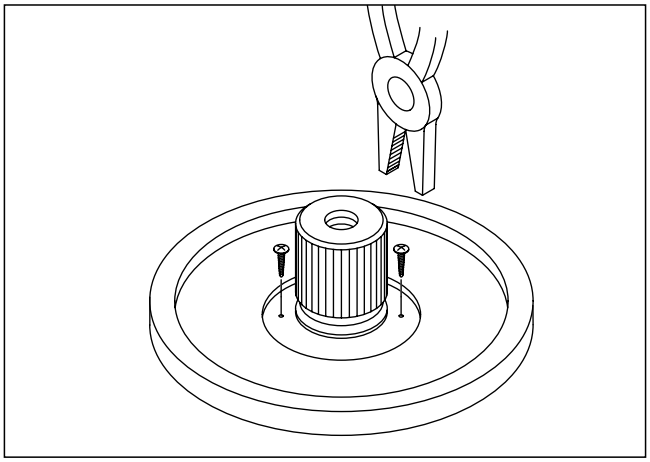
Special tool for the rotation test on the pump after assembly

THIS CATALOGUE		REPLACES		UPDATES	
Code	Edition	Code	Edition	New	Changes
KP 04 MNT	05/1999				

PUMP (details)



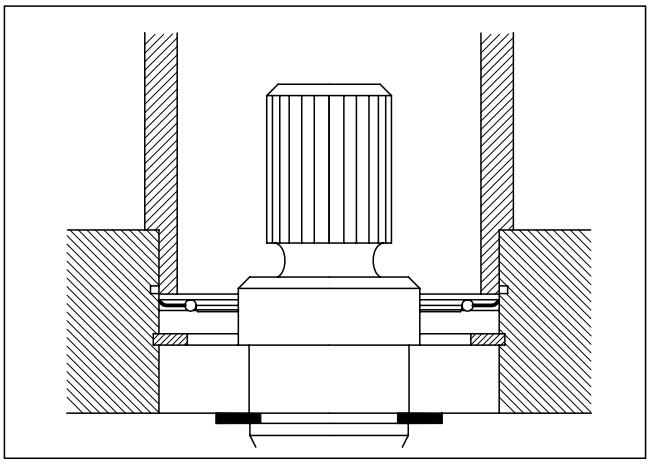
- Tighten the metal screws in the dishes on the shaft seal.
- Remove the shaft seal by pulling on the screws with pliers.



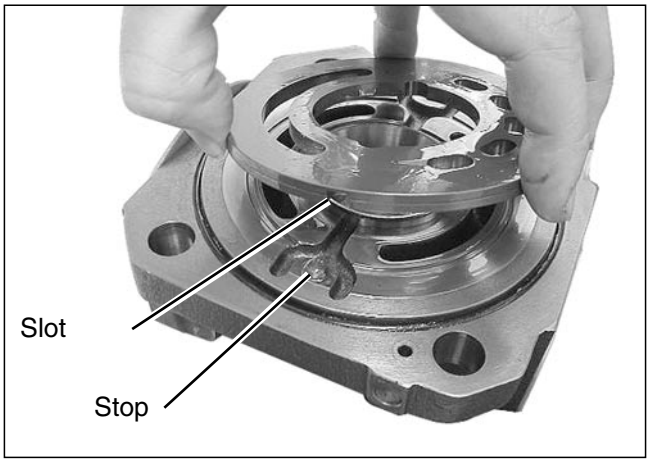
2 - REMOUNTING

- Repeat the operations in reverse order, taking the following information into account:

- Put a new shaft seal in position using a spacer.
- Refit the retaining rings.

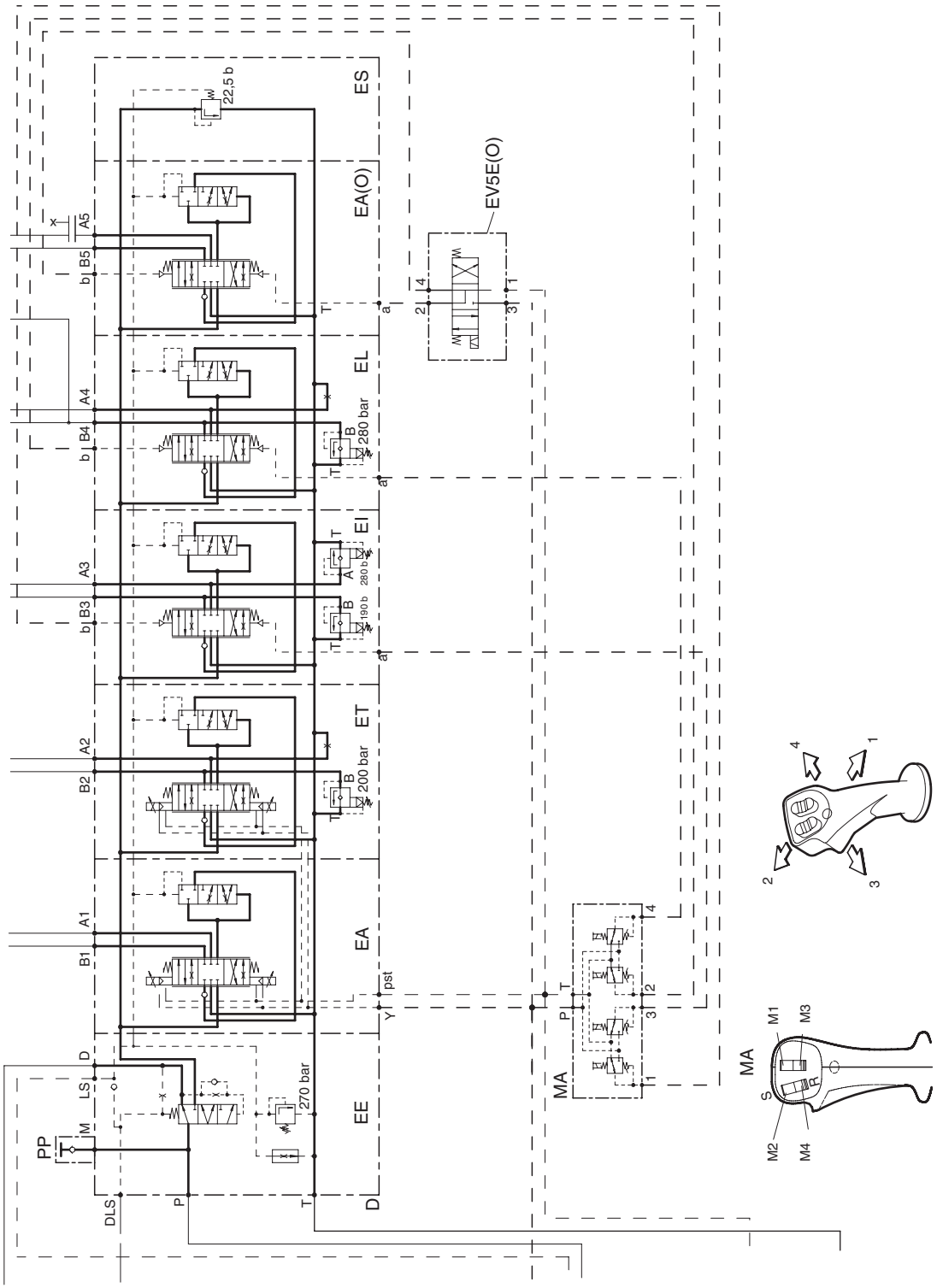


- Make sure the slide-face is correctly positioned (notch) with respect to the cylinder head (lug).

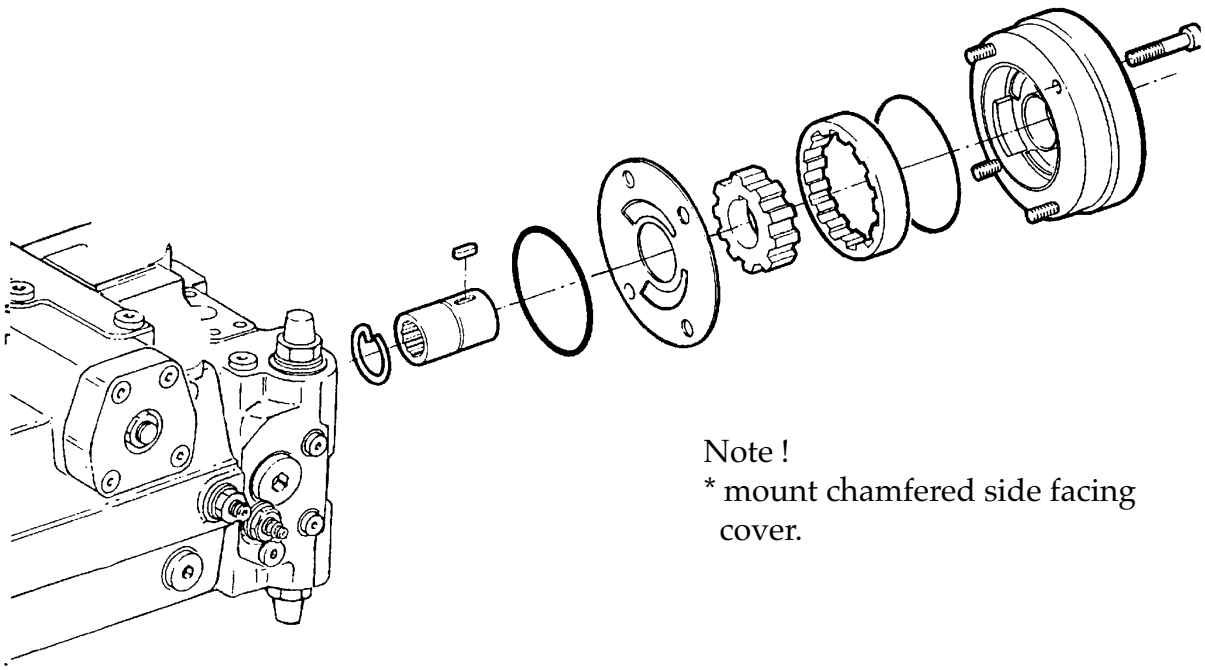


- Position the cylinder head seal carefully.

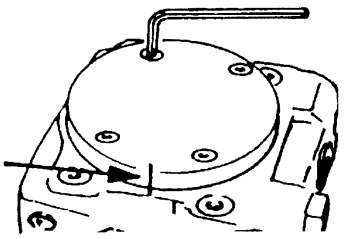
HYDRAULIC DIAGRAM MLT 740 H LSU Turbo Série 1



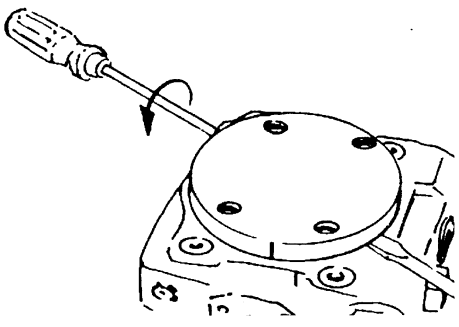
Sealing of the boost pump



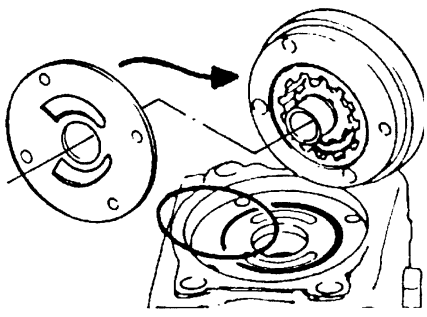
Note !
* mount chamfered side facing cover.



Mark position,
remove fixing screws.

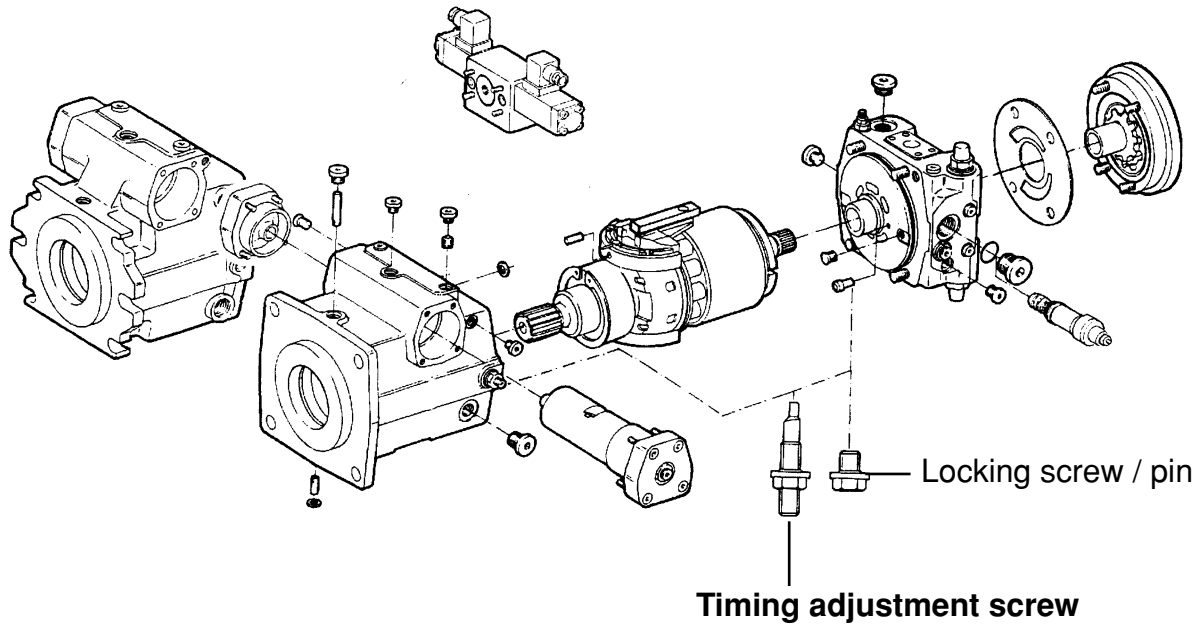


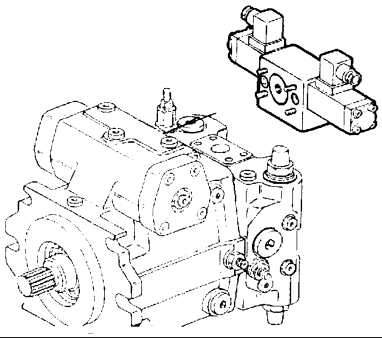
Pry-off cover.



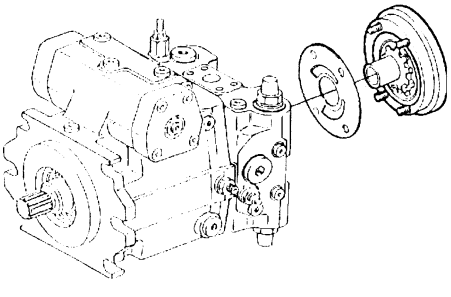
Check :
O-ring, groove, gliding surface, connection plate.

Démontage de la pompe



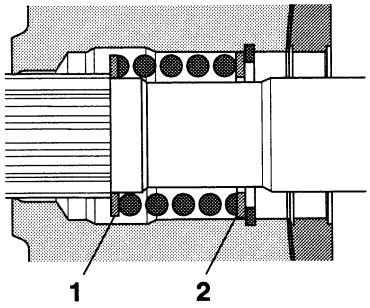


Remove control device.

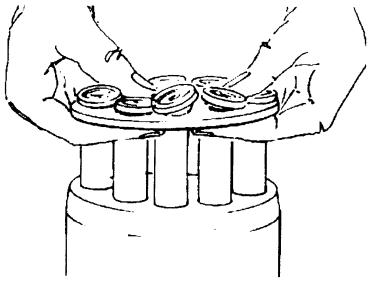


Remove auxiliary pump.
Note :
Mark assembly position previously.

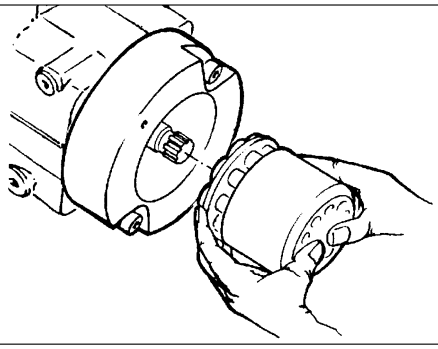
Installation of the rotary group



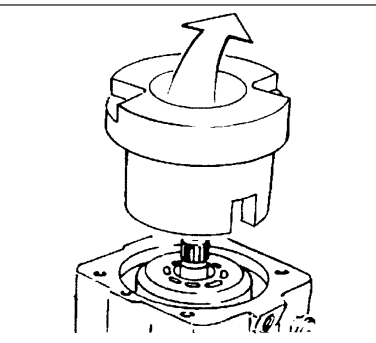
Disc 1, 2



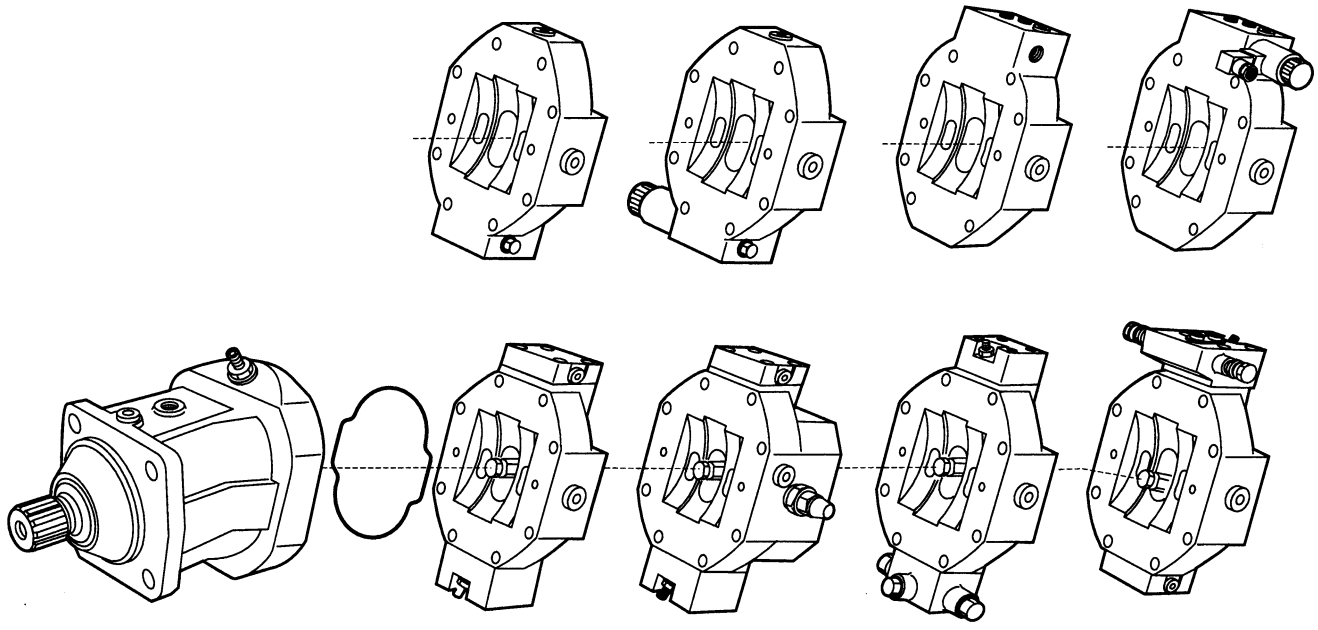
Assemble piston with retaining plate.
Note :
Oil piston and piston pad.



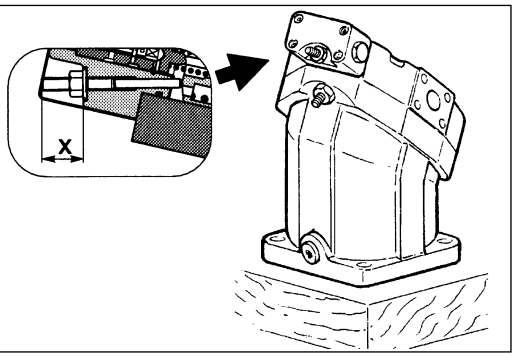
Assemble cylinder completely.



Remove assembly device.



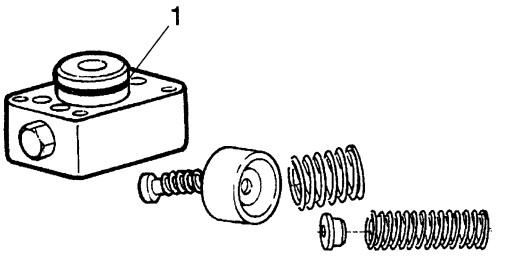
24



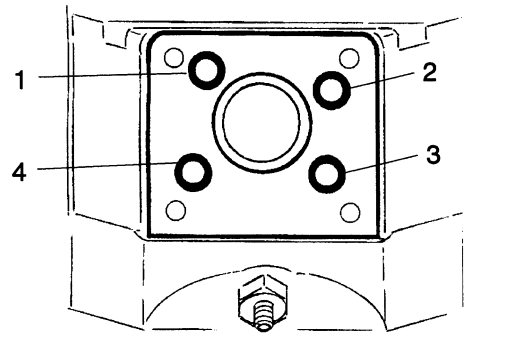
25 Example : A6VM…Control - **différential piston**.

Disassembly position : Remove cover Pos. 2.

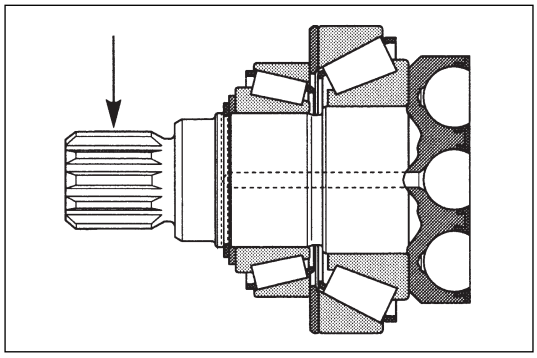
Attention ! Spring load.
Dimension X : Note dimension (begin of regulation).



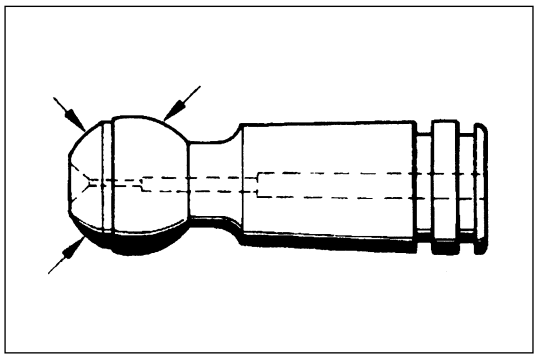
26 1. Check of O-ring.



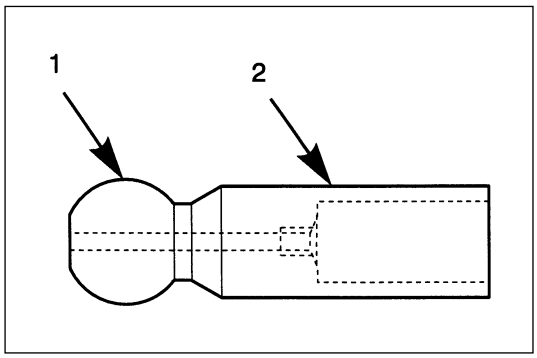
27 1. High pressure - small control piston side
2. Control pressure
3. High pressure - check valve
4. High pressure - check valve



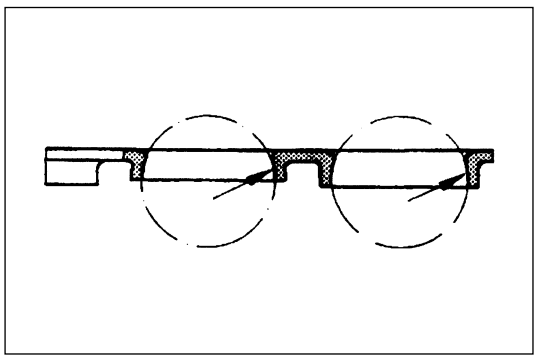
45 Free of corrosion, erosion or fretting, no damage to splines or keyways.



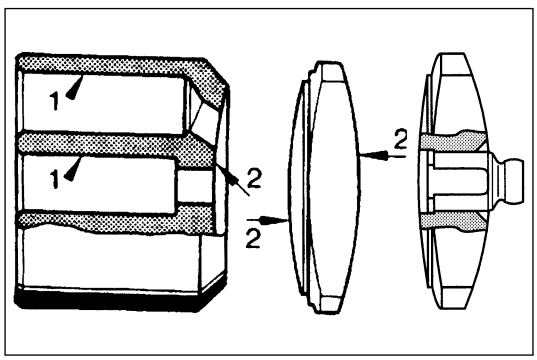
46 Pistons
No scoring and no pittings.



47 Center pin
No scoring and no pittings.



48 Retaining plate
No scoring and no evidence of wear.



49 1. Bores free of scoring, no evidence of wear.
2. Faces smooth and even, free of cracks and scoring.

<u>Characteristics of serial 63</u> in comparison with 60 :

- Crankcase in a single part (suppression of the seal support cover).
- Bearing held by retaining rings "Length reduced by approximately 11 %".
- Retainer spring of the rotor (instead of Belleville washers) increased operating safety.
- Additional sweep port at the front of the bearings.
- Cylinder head O-ring joint (instead of the gasket)
- Control piston in two parts, without seal, reinforced section, quicker tilting time, less hysteresis.
- Exchange valve (sweep) integrated into the lower cover.

<u>Scavenging rates</u>

size	28	55	80	107	160	200	250	355	500	1000
Scavenging rate (L/mn)	3,5	3,5	5	8	10	10	10	16	20	25

PILOT CIRCUIT

The pilot circuit is drawn from the booster circuit via the control cartridge.
On leaving the control cartridge, the control flow passes through a 1.8 to 2 mm dia. jet to feed the PS outlet at the same time as the DR valve.
The jet is located behind a plug in the pump connection plate near to the MB pressure connection port. Its role is to prevent saturation through the TH 7 valves and the DR valve. If the jet is blocked, there is no pilot pressure to the circuit.

The pilot flow through the hydraulic hoses is directed towards two TH 7 valves, then towards the front/rear drive solenoid valve.

• ROLE OF THE TH 7 VALVE ON THE BRAKE

This second valve is activated by the brake pedal on the clearance stroke to cut off the pilot pressure when the brakes are activated. This provides hydrostatic braking before the brake discs come into action.

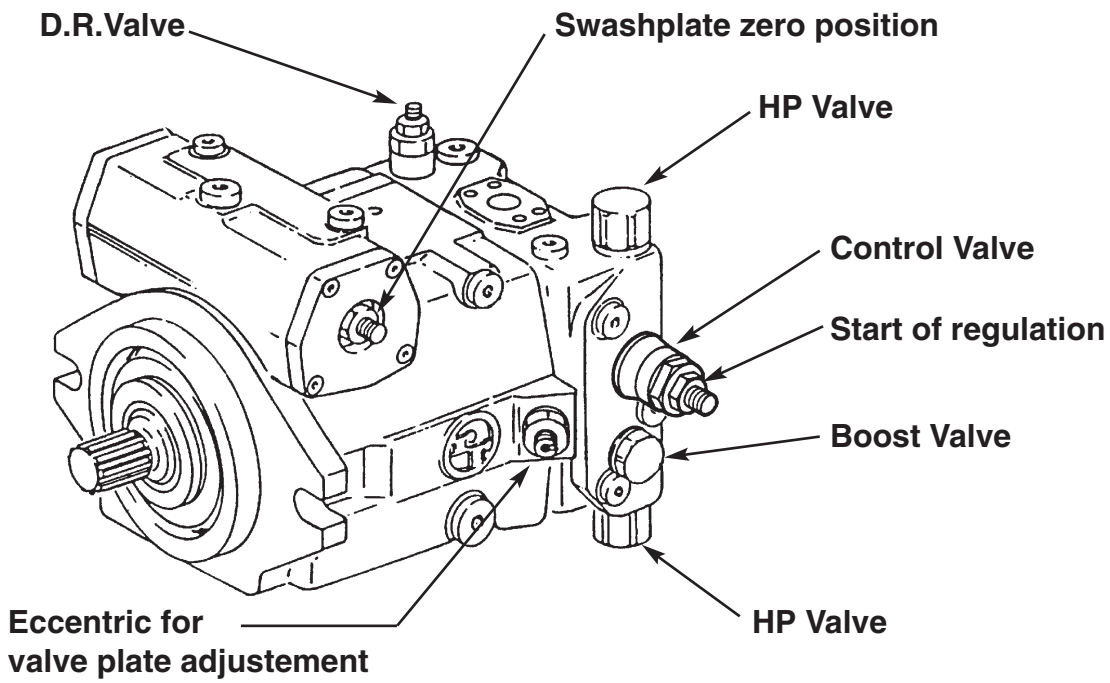
This TH 7 valve also allows the operator to reduce or keep the same travel speed when approaching the loading site if he wishes to increase the IC engine to a much higher speed with the accelerator in order to achieve high lifting speed (increased delivery from main pump).

• FORWARD DRIVE /NEUTRAL /REVERSE DRIVE SOLENOID VALVE

Its function is to direct the pilot flow from one side or another of the control cylinder of the pump in order to pilot the pump towards the forward or rear drive. Contrary to the A 4 V series, the pumps in the A 4 VG series are not equipped with a pilot jet at X1 and X2 but the slide valve of the forward/rear drive solenoid valve is fitted with stepping slots.

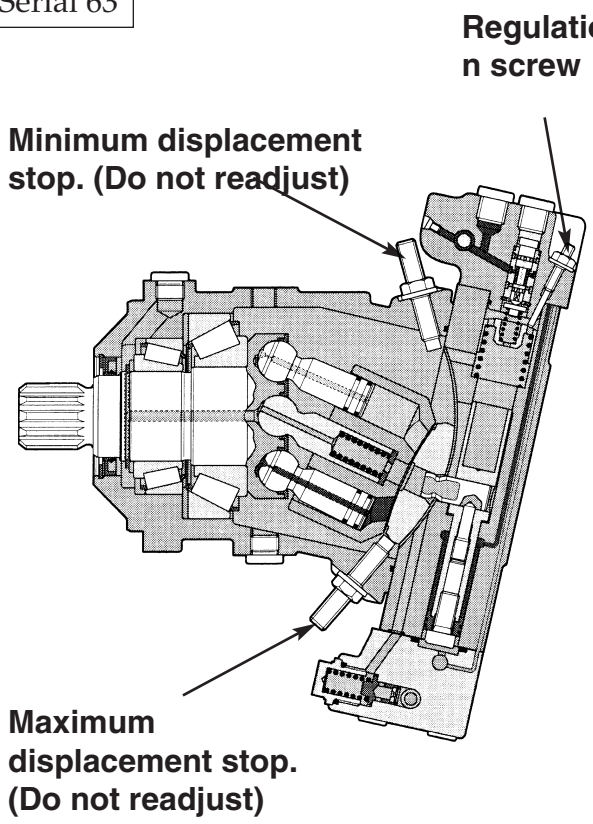
The return port located in the centre of the solenoid valve is equipped with a 0.8 mm dia. time delay jet acting on the forward/rear drive reversal movement.

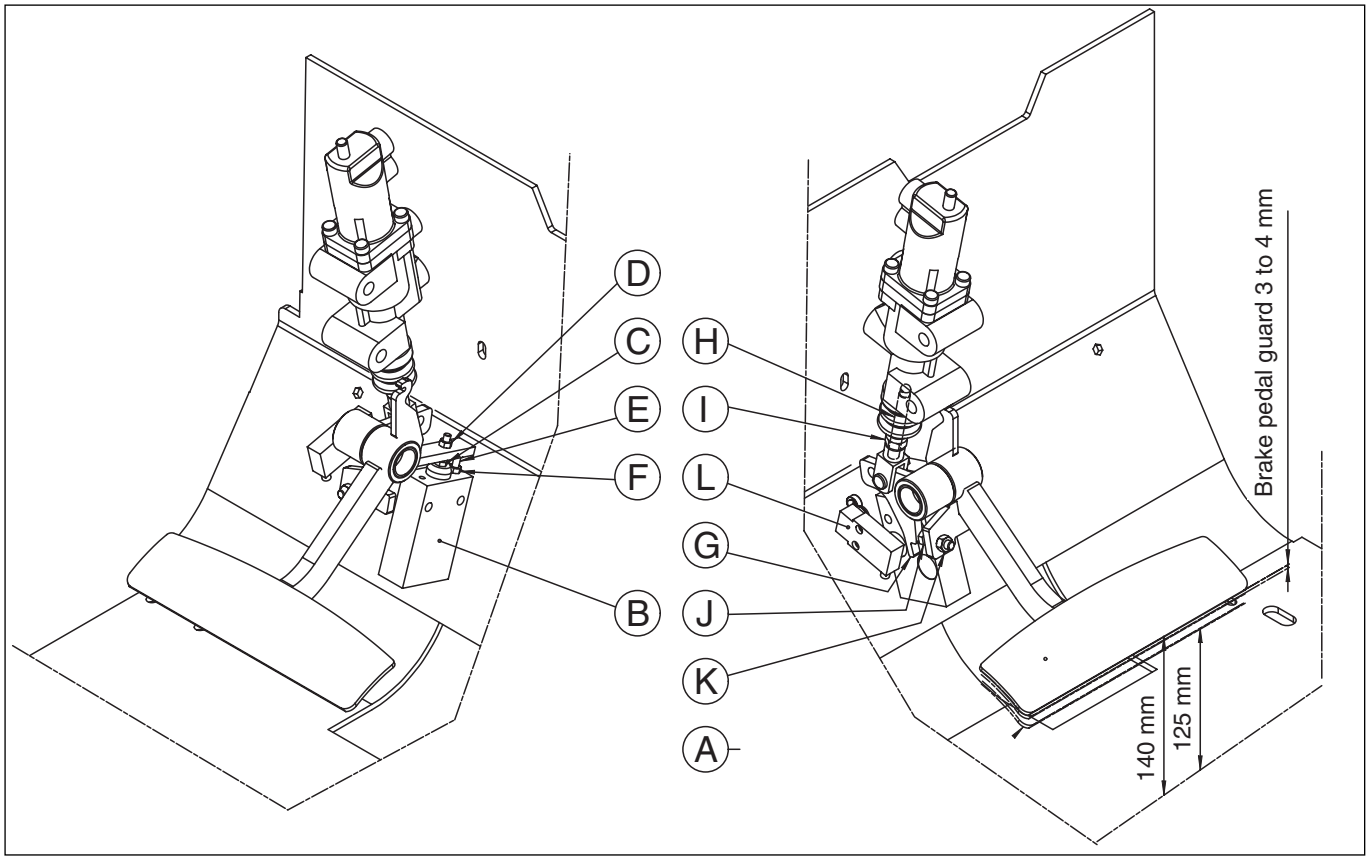
PUMP A 4 VG



MOTOR A 6 VM

Serial 63





ADJUSTMENT PROCEDURE

A) TH7 AND BRAKE PEDAL

- Set the height of the brake pedal (without pedal cover) (Mark A) on the cab floor (without mat) (dimension 140 mm).
- Set the TH7 (Mark B) using screw C.
- Tighten the locknut (Mark D).
- Check the TH7 protection screw (Mark E) adjustment and locknut tightness (Mark F).
- Set the connecting rod (Mark G) in contact with the pedal support and adjust the master cylinder by turning the button (Mark H).
- Tighten the locknut (Mark I).
- Adjust the brake pedal guard (Mark A) (3 to 4 mm play) using the connecting rod (Mark G) drive screw (Mark J).
- Tighten the locknut (Mark K).

B) TRANSMISSION CUT-OFF CONTACT

- Pedal at rest (contacting the TH7 screw Mark C)
- Adjust the position of the contactor (Mark L) so as to trigger the transmission cut-off when the pedal is 125 mm above the cab floor (see diagram).