

FRONT AXLE STEERING CYLINDER (Four wheel drive axle) Removal-Refitting

⚠ WARNING ⚠

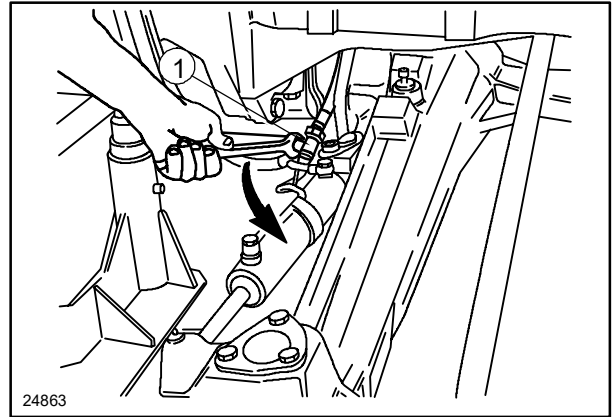
Handle all parts with great care. Do not put your hands or fingers between one part and another. Wear the recommended safety clothing such as goggles, gloves and safety boots.

To remove the front axle steering cylinder, proceed as follows:

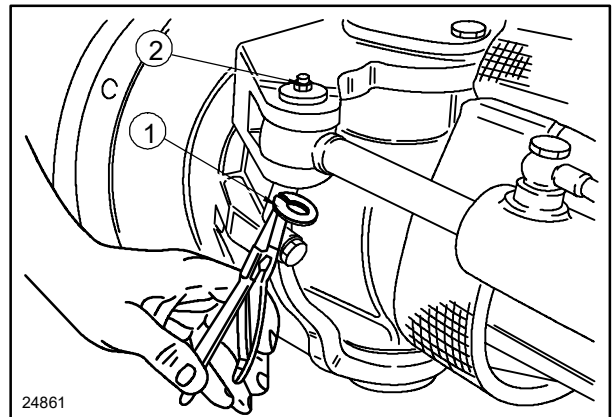
1. Disconnect the negative cable from the battery.
2. Unscrew the unions securing the delivery and return hoses to the steering cylinder.
3. Remove the snap ring (1) and remove the cylinder rod articulation pin (2) connected to the stub axle housing.
4. Remove the retaining screw and extract the pin (1) securing the steering cylinder to the axle. Remove the steering cylinder.

NOTE: Should you want to remove both steering cylinders complete with supply pipes, omit step 3 described above and carry out steps 2 and 4 for the other cylinder too.

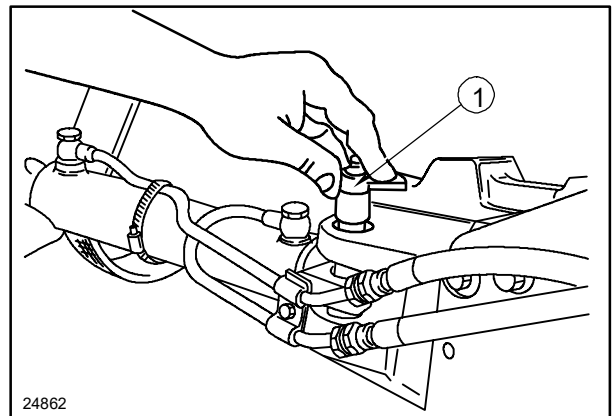
5. Remove the two actuator cylinders complete with supply pipes.



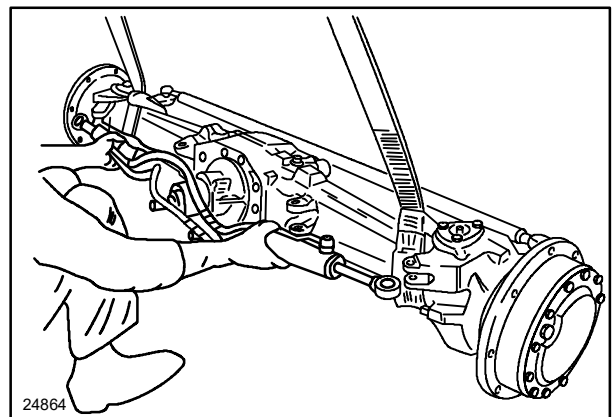
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FRONT AXLE STEERING CYLINDER **(Two wheel drive axle) (Op. 41 216 20)** **Removal-Refitting**



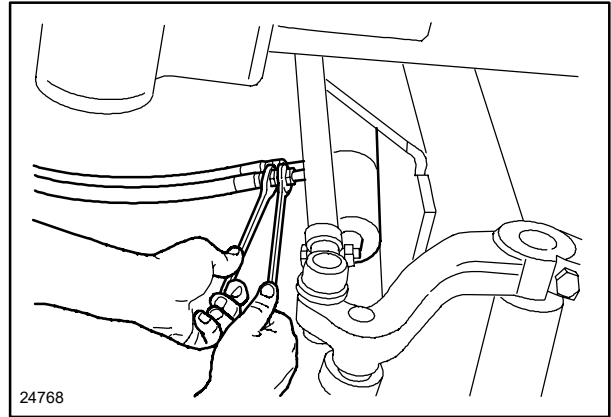
WARNING



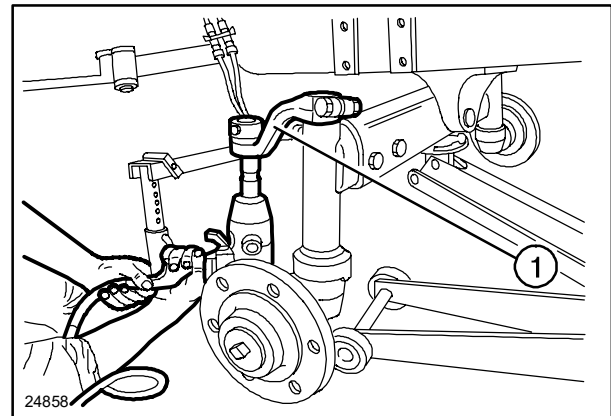
Handle all parts with great care. Do not put your hands or fingers between one part and another. Wear the recommended safety clothing such as goggles, gloves and safety boots.

To remove the front axle steering cylinder, proceed as follows:

1. Remove the exhaust pipe, lift the hood and disconnect the negative cable from the battery.
2. Unscrew the unions securing the oil delivery and return hoses (1) to the cylinder (2).
3. Remove the nut securing the cylinder rod ball end to the steering arm (1).

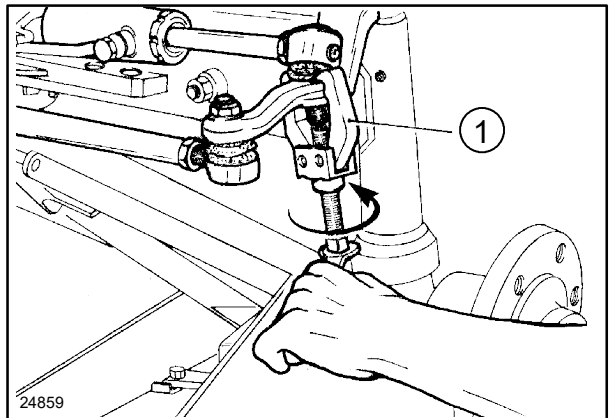


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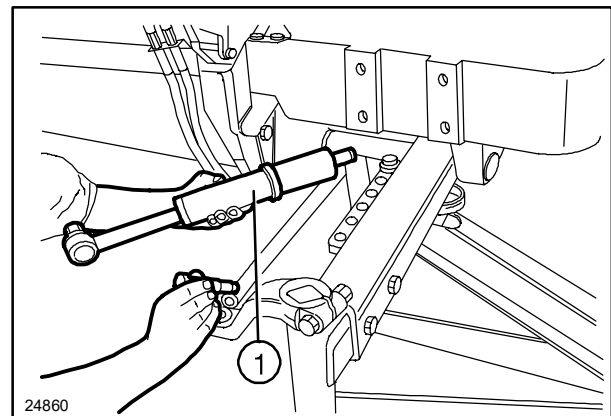
74

4. Using a suitable puller (1), separate the cylinder rod ball end from the steering arm.



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5. Remove the pin securing the steering cylinder (1) to the axle and remove the cylinder.
6. To refit the steering cylinder, follow the removal procedure in reverse order.



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5. Remove the supports (4 and 6) and the gears (5) from the rear cover (8) and the pump body (3).

6. Remove the seals (2) and the anti-extrusion rings. Once the parts are removed, proceed as follows:

7. Check that the gear contact surfaces are flat and perpendicular to their supports. Interpose a thin layer of carbon black. Small rough spots can be removed using extremely fine and adequately lubricated abrasive paper.

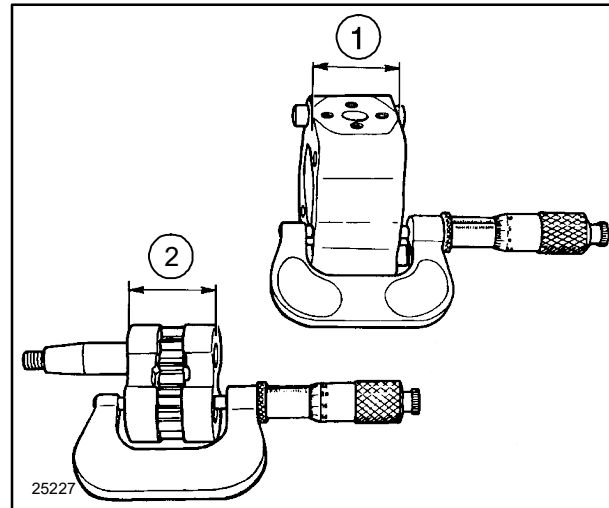
8. Check that the axial play of the gear-support unit in the pump body is 0.100 - 0.180 mm (0.0039 - 0.0189 in.). The distance (Fig 72, 2) must be 0.100 - 0.180 mm (0.0039 - 0.0189 in.) smaller than the distance (Fig 72, 1). If necessary, true the flat surfaces involved using lubricated abrasive paper to remove extremely small quantities of material.

9. Clean all constituent parts thoroughly.

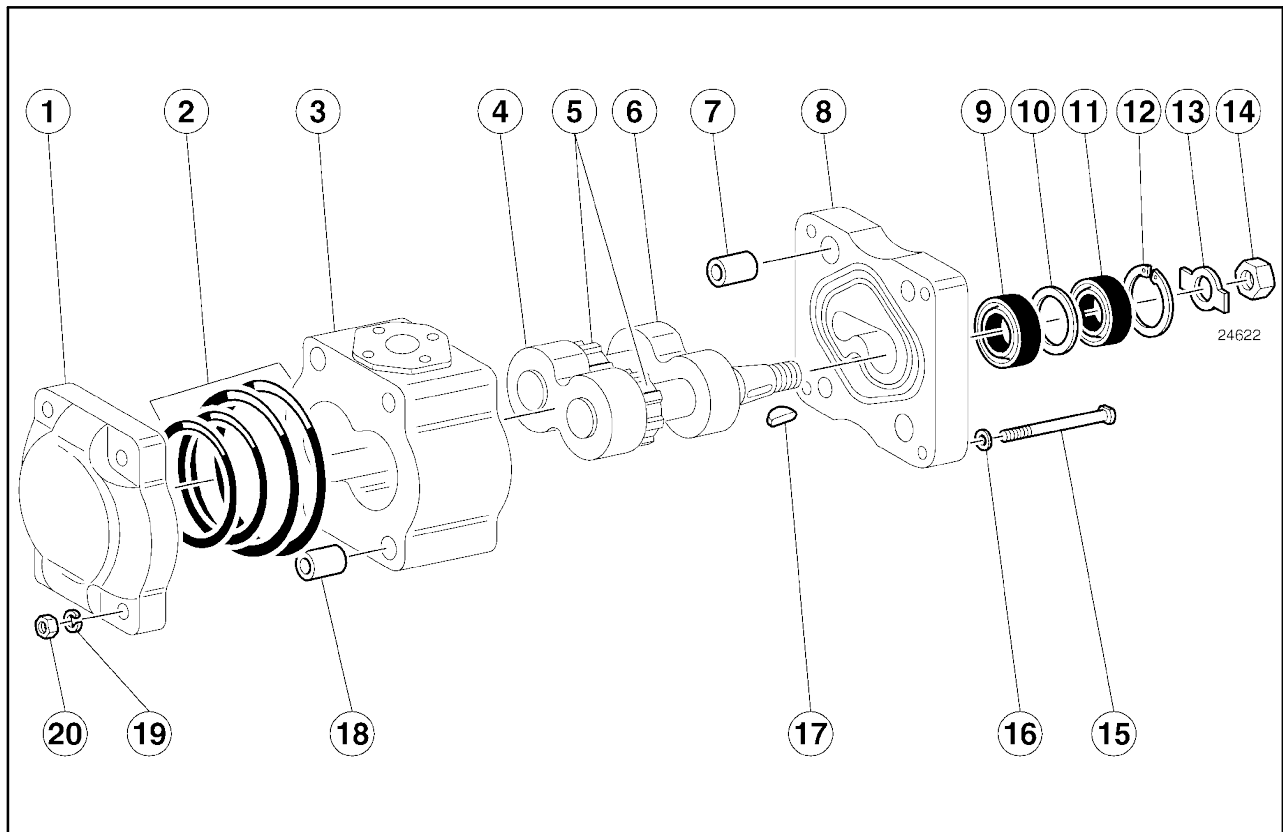
10. Replace the seals (2, 9 and 11).

11. Lubricate the parts with the same oil as the system. Refit the pump, referring to fig. 71 and proceeding as follows:

12. refit, performing operations 6 to 1 in reverse order;- always ensure the maximum cleanliness to prevent foreign matter from entering, as this could damage the pump;- fit together previously marked parts (3, 4, 5 and 6, fig. 71); see op. page 45 to refit them in their original position;- mount the gear supports (4 and 6 fig. 71) in the pump body; orient them with the fittings on the external circumference matched up with the discharge pipes and the front faces with lubrication millings in contact with the gears;- fit the plastic anti-extrusion rings on the seals (2, fig. 71);- mount the seals (9 and 11, fig. 71) on the control side cover (8) complete with spacer (10); orient them so that the cavity is between the seal lips on the opposite side from this spacer; lastly fill this cavity with **AKCELA MULTI - PURPOSE GREASE** grease. Install the pump on the tractor. Fill the suction pipe and the pump housing with **AKCELA NEXPLORE** oil in order to facilitate priming and prevent the risk of seizure during initial operation.



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Hydrostatic steering oil pump components

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Hydrostatic steering oil pump components

- | | |
|-----------------------------------|-------------------------|
| 1. Front cover | 11. Driving shaft seal. |
| 2. Cover seals | 12. Snap ring |
| 3. Pump body | 13. Safety washer |
| 4. Gear support | 14. Nut |
| 5. Driven and driving gear shafts | 15. Bolt |
| 6. Gear support | 16. Washer |
| 7. Bushing | 17. Key |
| 8. Control side cover | 18. Bushing |
| 9. Driving shaft seal | 19. Safety washer |
| 10. Spacer | 20. Nut |

Proceed as follows:

1. Remove the cover fastening nuts (20), then the bolts (15) and the safety washers.
2. Remove the nut (14) that fastens the sleeve to the pump driving shaft and the safety washer.
3. Remove the front cover (8), the snap ring (12) and the seals (9 and 11).
4. Mark parts 3, 4, 5 and 6 to enable them to be remounted in the same position if they are in good condition.

B - CHECKING RETURN TO NEUTRAL POSITION

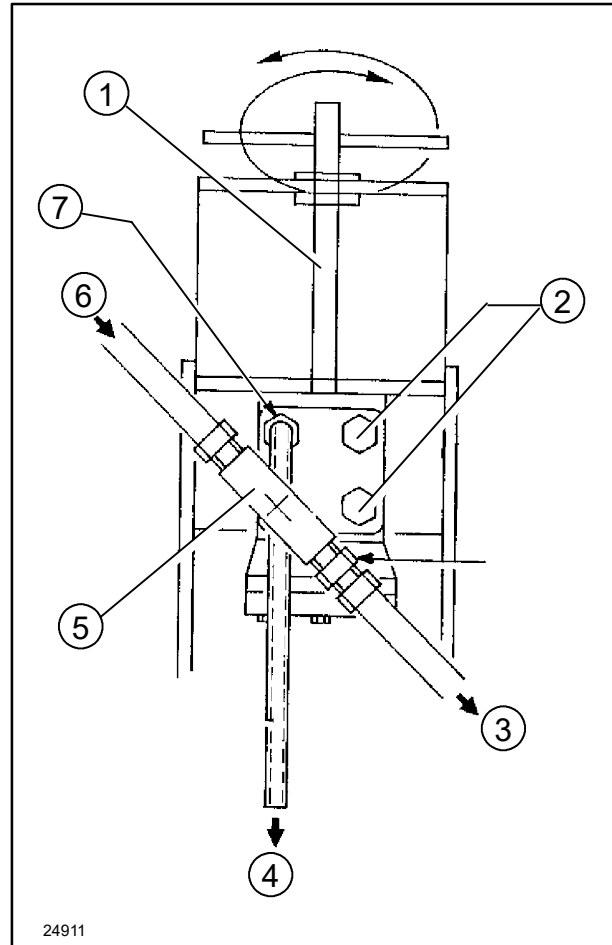
In the same test conditions as **A**, check that the valve automatically returns to neutral position when the control shaft (1) is released after each simulated steering movement.

C - CHECKING SEAL EFFICIENCY

In the same test conditions as **A**, hold the valve in steering position with the control shaft (1) for about three minutes and check the seals for leaks.

D - SETTING THE PRESSURE RELIEF VALVE

1. Make the connections as shown in figure (68) and complete the circuit as in figure (69).
2. Using the control shaft (1), simulate a steering cycle (to right or left) so as to interrupt the oil flow to the outlet.
3. Gradually increase the pressure in the circuit by turning the handwheel (5) fig. 68, and check on the pressure gauge that the pressure relief valve (22, fig. 2) cuts in at the pressure shown on page 1. If not, increase or reduce the pressure relief valve setting by tightening or slackening the adjuster screw.



1. Splined control shaft
2. Plug G 1/2"
3. To throttle
4. Outlet
5. Three-way coupling G 1/2"
6. From delivery line
7. Outlet coupling G 1/2"

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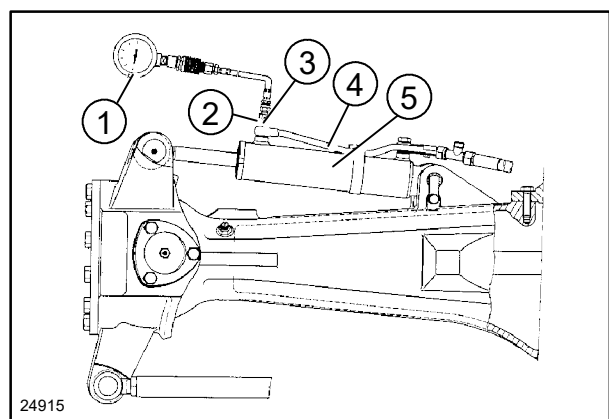
CHECKING THE HYDROSTATIC STEERING PRESSURE RELIEF VALVE WITH STEERING CONTROL VALVE INSTALLED ON TRACTOR.

Proceed as follows:

1. Start the engine and run until the oil temperature reaches approx. 50°C (122°F).
2. Switch off the engine and unscrew the oil delivery pipe union (4) on the hydraulic cylinder (5).
3. Fit union (2) in place of union (4), and connect the pressure gauge (1) with a 0 - 21.3350 psi scale by way of union (3).
4. Start the engine again, bring the speed up to medium rpm, and apply full-steering lock to bring the hydraulic cylinder to the stroke-end position.

In this condition, the pressure relief valve (22, fig. 2) should open and the pressure gauge should indicate the value given on page 1.

5. If the pressure gauge reading deviates significantly from the prescribed value, adjust the valve opening pressure by way of the adjuster screw.

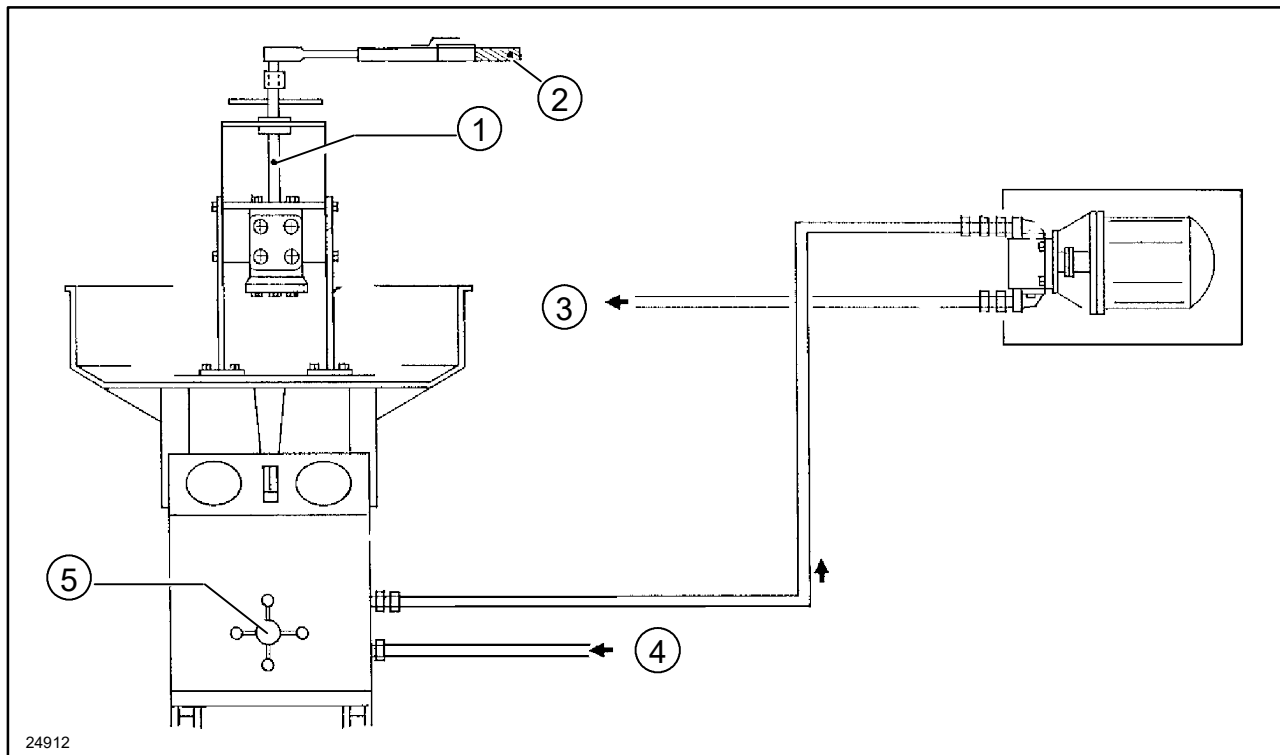


1. Pressure gauge (supplied in kit **380000240**)
2. Union **380000618** (supplied in kit **380000240**) to be fitted in place of original union
3. Union **380000613** (supplied in kit **380000240**)
4. Hydraulic cylinder oil feed pipe
5. Hydraulic cylinder.

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HYDROSTATIC STEERING CONTROL VALVE**Bench testing (Op. 41 204 38)****Test conditions.**

Oil type IDRAULICAR AP51
 Oil viscosity SAE 20 W
 Oil temperature 60°C (140°F)
 Hydraulic pump capacity litres/min 12
 (gall. imp/min 2.64)
 Speed of electric motor rpm 1450



Installation diagram of equipment for testing the rotary valve, seals and for setting the pressure relief valve.

68

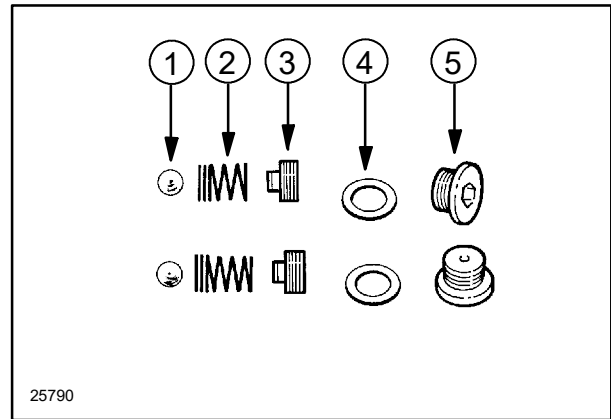
- | | |
|--------------------------|----------------------------------|
| 1. Splined control shaft | 4. Restriction |
| 2. Torque wrench | 5. Pressure adjustment handwheel |
| 3. Delivery line | |

A - CHECKING ROTARY VALVE WEAR

1. Make the connections shown in fig. 68 and complete the circuit as in fig. 69. Using the splined control shaft (1), hold the steering control valve in steering position (right or left).
2. Using the handwheel (5), increase the circuit pressure to as near as possible the pressure relief valve cracking pressure (page 1) without the valve actually opening.
3. Using a torque wrench (2), apply a torque of approx. 34 Nm (25.8147 ft lb) to the control shaft (1), and check that the rotary valve takes more than 10 seconds to complete one full rotation. If it takes less than 10 seconds, change the rotary valve (4, fig. 2) and the sleeve .

Cylinder safety valves components (order of assembly)

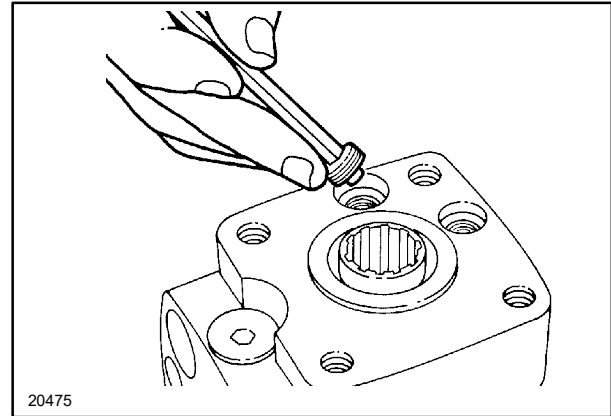
1. Cylinder safety valve ball.
2. Pressure spring.
3. Setting adjuster screw.
4. Seal.
5. Plug.



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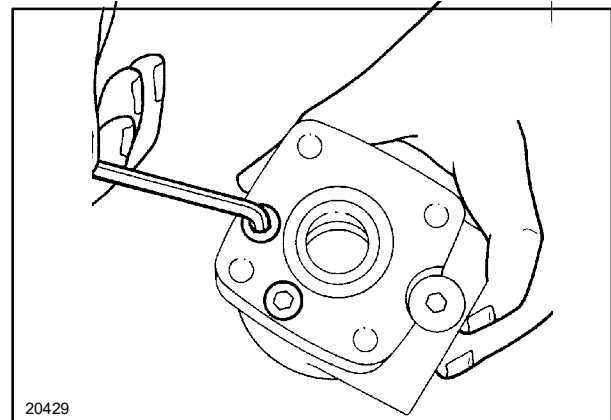
55. Insert the springs (2, fig. 69) in the cylinder safety valve seats.
56. Using a 6 mm Allen wrench, tighten the two cylinder safety valve setting adjuster bolts (3, fig. 69).

NOTE: Setting should be carried out on the workbench or on the tractor to the values shown in the table on page 1.



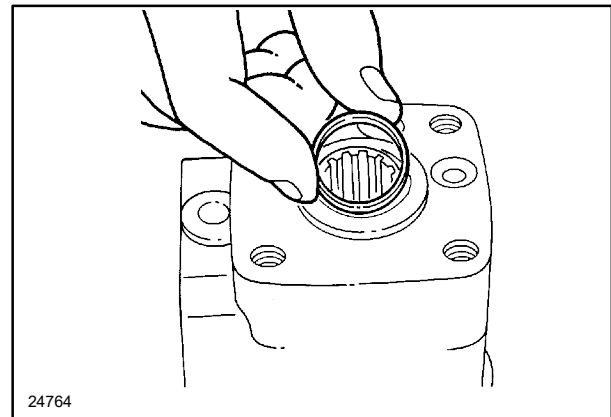
65

57. Tighten the two plugs (5, fig. 69) and the relative seals (4) using a 6 mm Allen wrench. Once setting is completed, tighten to the prescribed torque value of 30 Nm (22.1269 ft lb).



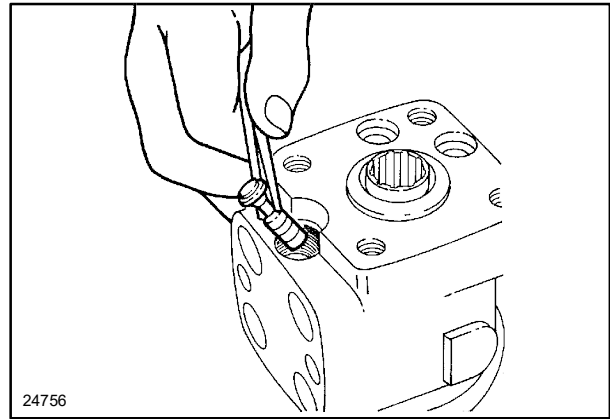
66

58. When the unit has been assembled, insert the dust seal in the seat in the control valve body.



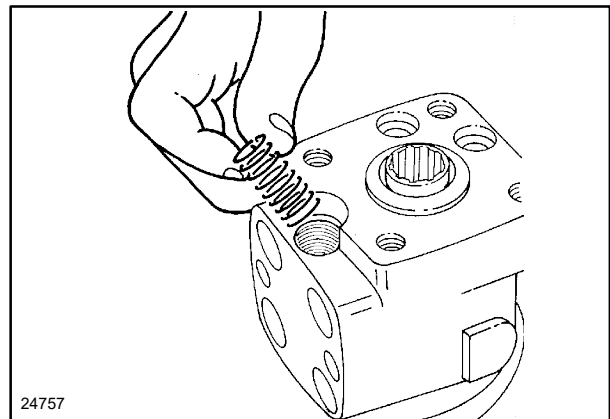
67

50. Turn over the control valve body and insert the pressure relief valve piston in the seat, as indicated in the drawing. See fig. 34 for component assembly order.



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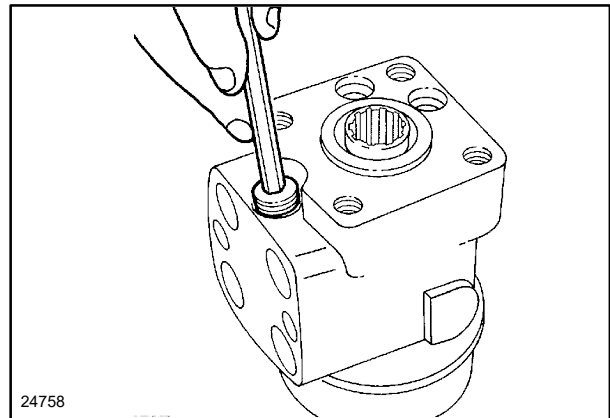
51. Insert the pressure relief valve spring.



61

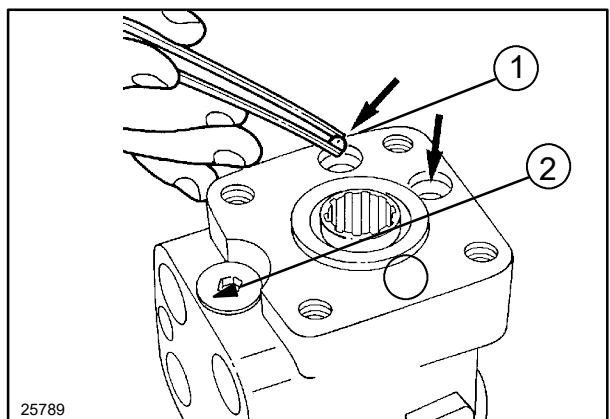
52. Using an 8 mm Allen wrench, insert the pressure relief valve setting screw.

NOTE: Setting should be carried out on the workbench or on the tractor to the values shown in the table on page 1.



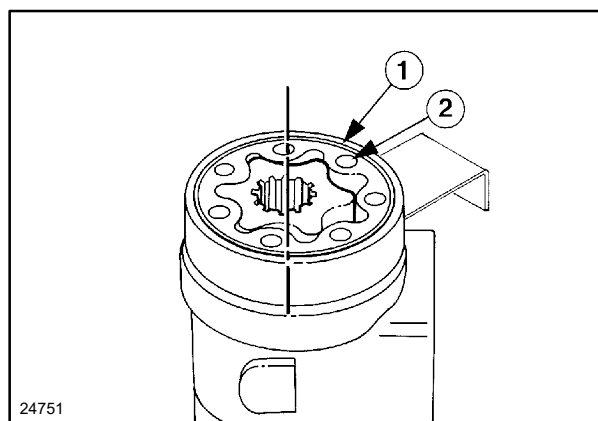
62

53. Tighten the plug (2), with the associated seal, using an 8 mm Allen wrench. Tighten to the prescribed torque value 40 - 60 Nm (29.5025 - 44.2537 ft lb), after having carried out the setting on the workbench or on the tractor.
54. Insert the balls (1) into the two cylinder safety valve seats, indicated by the arrows. See fig. 64 component assembly order.



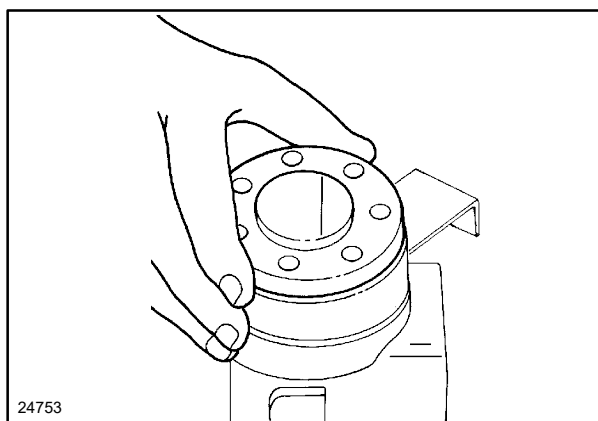
63

46. Lubricate the two O-ring seals (1) with hydraulic oil and insert them in the rotor fixed ring seat. Fix in position by aligning the retaining holes (2) with those on the thrust washer.



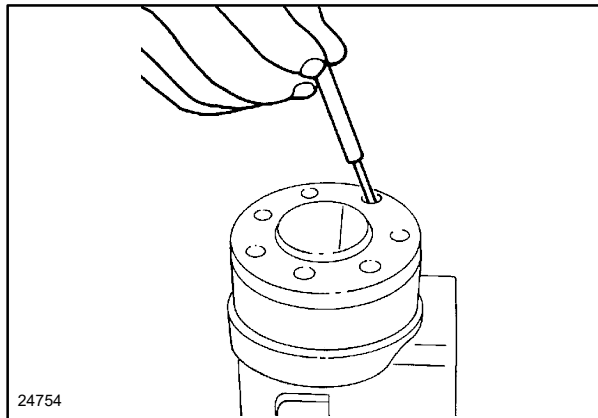
56

47. Fit the cover, aligning the retaining holes with those on the rotor fixed ring.



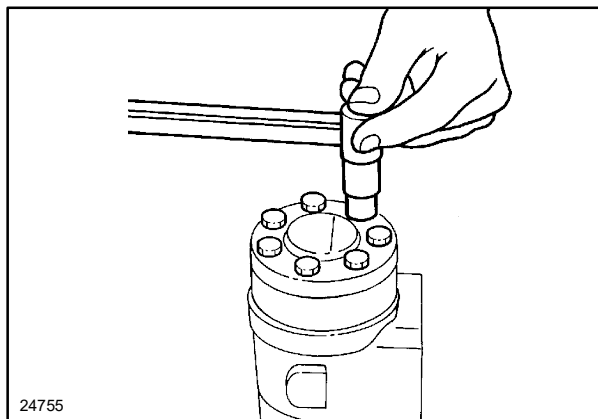
57

48. Remove retaining tool **380000307** and fit the special screw and washer in the non-return valve seat, shown in the drawing.



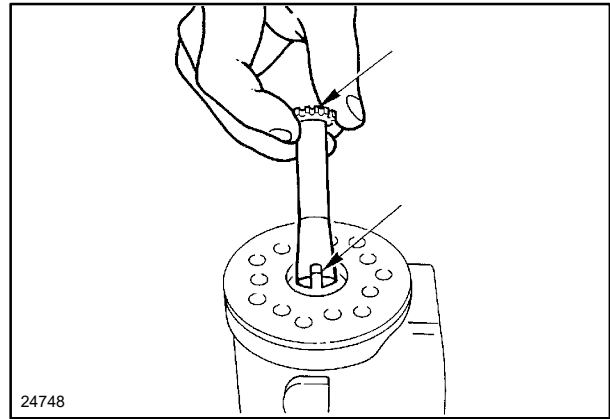
58

49. Fit the other six cover retaining bolts with the washers and tighten in diagonal sequence to the torque setting value shown in the table on page 3.



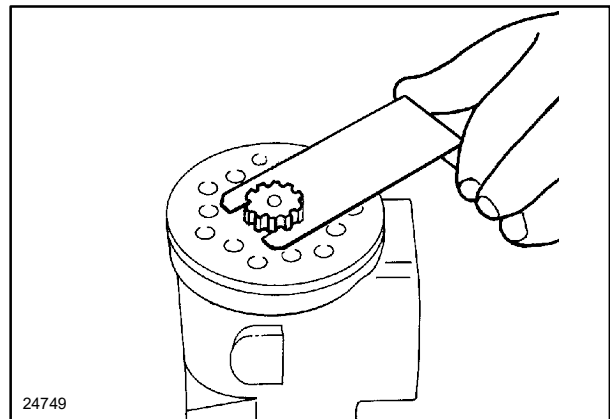
59

43. Make a reference mark on the upper part of the teeth (1), in line with the seat (2), to indicate the exact position of the valve-to-sleeve trim pin.



53

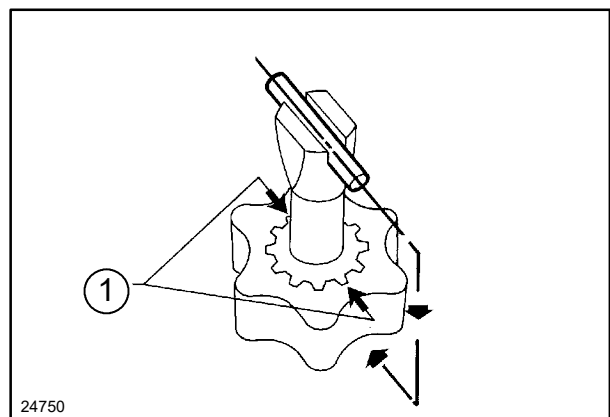
44. Fit the rotor drive shaft into the control valve body. Insert tool **380000307** for retaining and centring the rotor drive shaft, between the rotor drive shaft and the thrust washer. Rotate the shaft so as to facilitate coupling between the seat (2) fig. 53 and the trim pin installed in the sleeve.



54

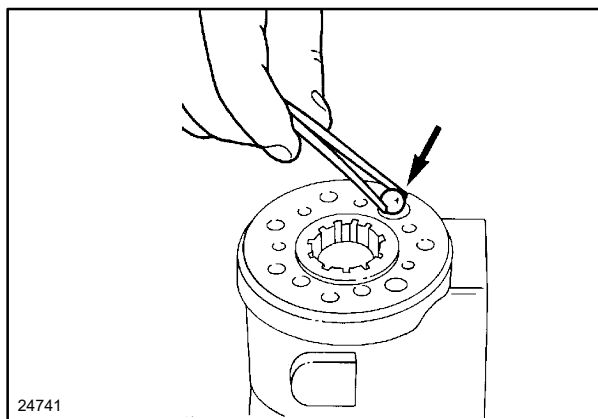
45. To refit the rotor, proceed as follows:

- a) each time the hydrostatic steering is disassembled, turn the rotor over so as to limit wear to the splined coupling;
- b) in the drawing below, the rotor shaft has been removed in order to show the phasing between the rotor, rotor drive shaft and the trim pin;
- c) fit the rotor on the drive shaft, remembering that phasing is obtained by aligning the teeth (1), on the trim pin axis plane (shown in fig. 53) with the centre line of one of the recesses between the lobes of the rotor.



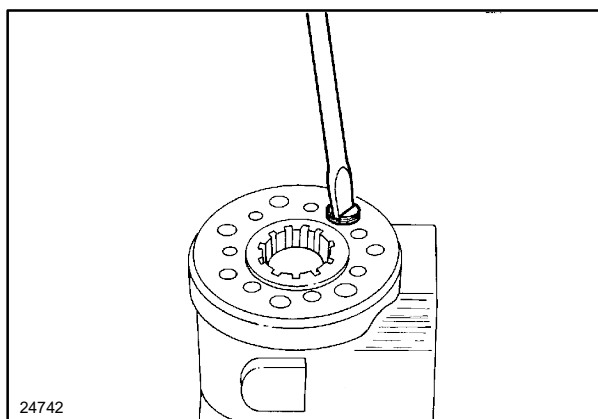
55

39. Rotate the control valve body and insert the non-return valve ball into the seat indicated by the arrow.



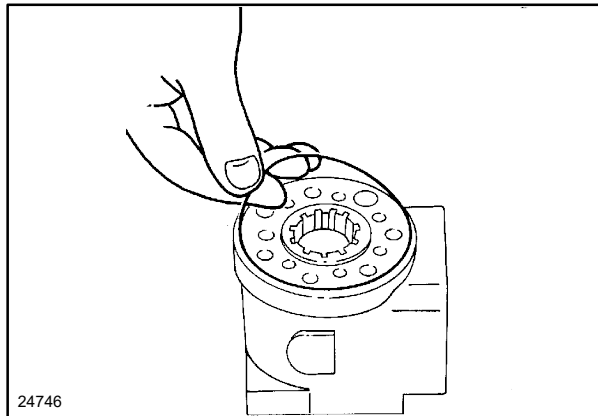
49

40. Screw the threaded plug into the non-return valve seat until the upper surface is below the coupling surface of the control valve body.



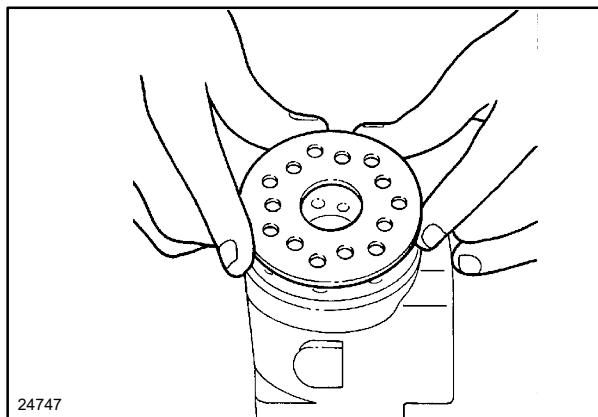
50

41. Lubricate the O-ring seal and insert into the seat on the control valve body.



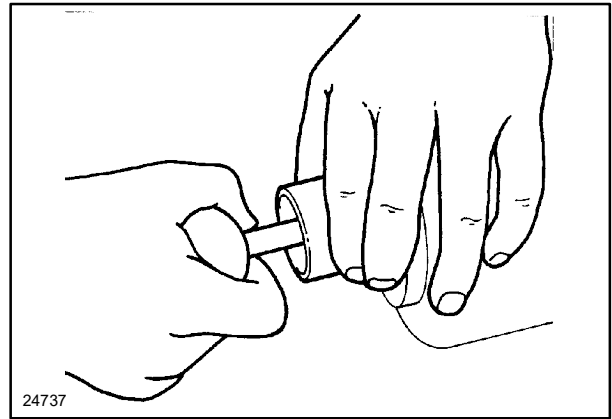
51

42. Fit the thrust washer, so that the holes coincide with the holes in the control valve body.



52

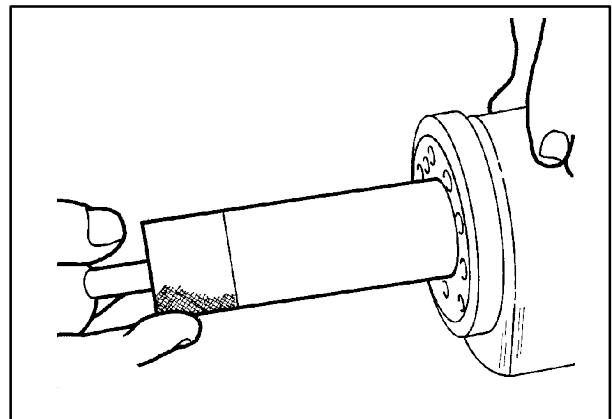
35. Holding the external bushing in position manually, press fully down, whilst simultaneously rotating the drift, in order to facilitate the entry of the O-ring seal in the control valve body seat.



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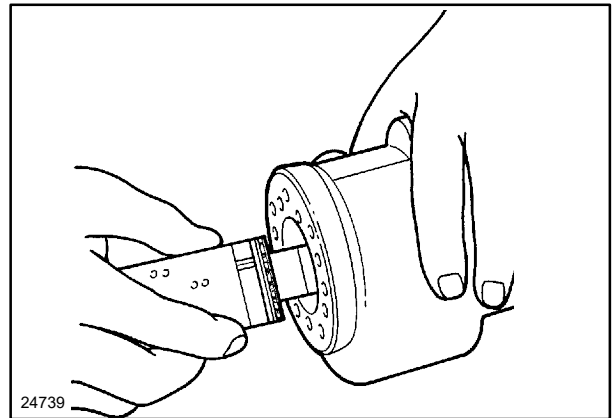
36. Extract the components of tool **380000305** (external bushing and drift).

NOTE: The support head of the support and seal rings remains on the control valve body (see fig. 43).



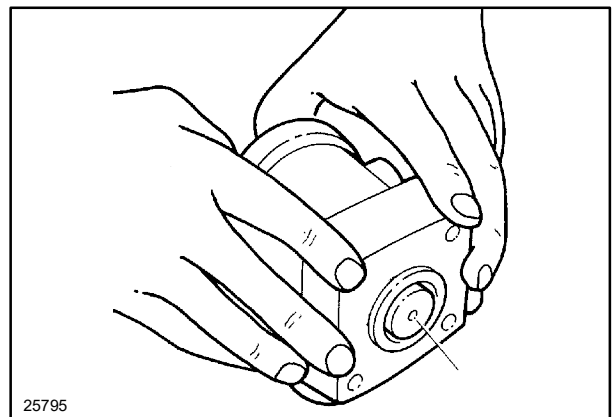
46

37. Insert the parts that were previously fitted in operations 26 – 31 on the control valve body. Hold the sleeve-to-rotor drive shaft trim pin in a horizontal position, to prevent it from slipping out and jamming in the slots inside the control valve body.



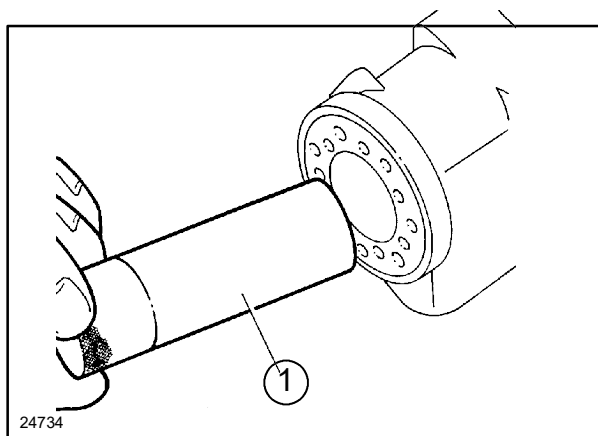
47

38. Press the rotary valve so as to bring the thrust bearing into contact with the control valve body. This operation simultaneously expels the head (1) of tool **380000305**, inserting the rings (1) and (2) fig 43 into the seat of the control valve body (see operation 33).



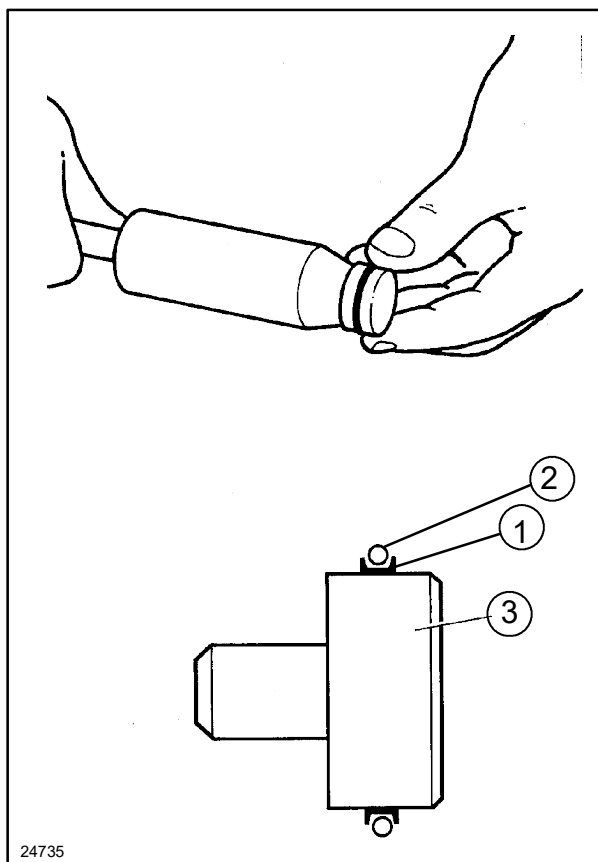
48

32. Position the control valve body so that the housing seat on the rotary valve sleeve is positioned horizontally, then insert the guide bushing (1) of tool **380000305**.



42

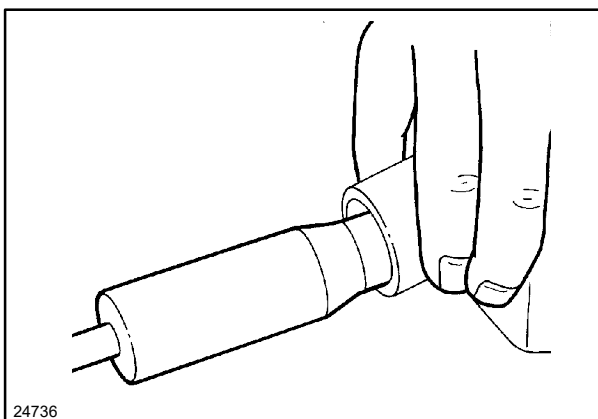
33. Lubricate the support ring (1) and O-ring seal (2) with hydraulic oil and fit them on the head (3) of the tool **380000305**, as shown in the drawing.



43

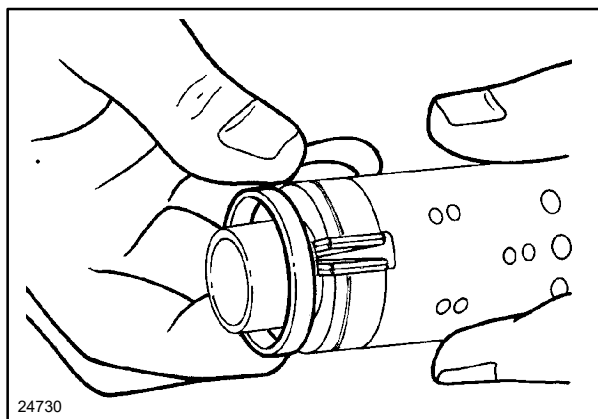
**Support head for support and seal rings
(part of tool 380000305)**

34. Insert the complete drift in the guide bushing previously installed.



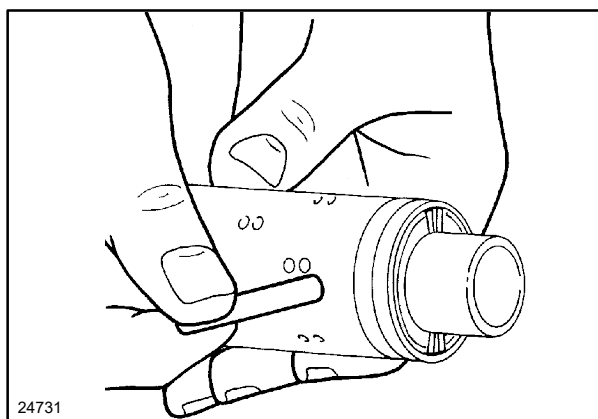
44

29. Fit the **neutral** position spring retaining ring on the valve seat sleeve, remembering that the ring must rotate freely without being impeded by the springs.



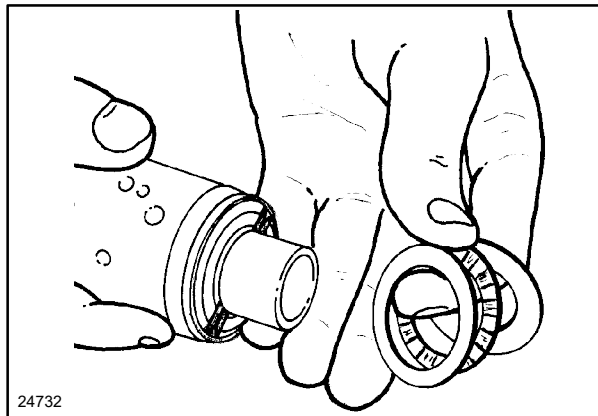
38

30. Insert the sleeve-rotor drive shaft trim pin.



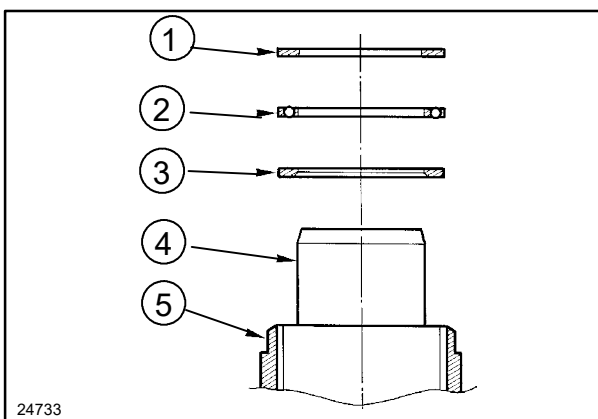
39

31. Fit the thrust bearing, following the order indicated in fig. 41.



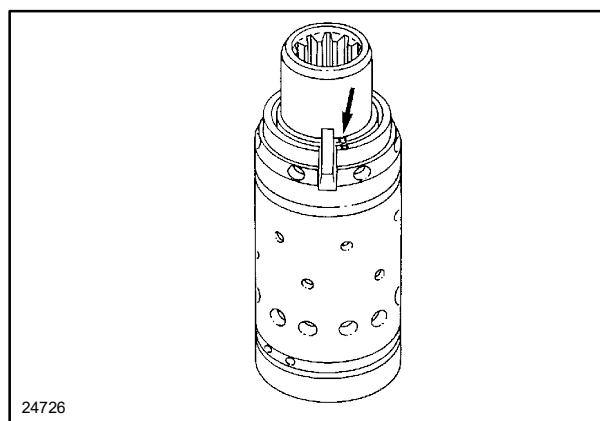
40

1. Bearing external ring.
2. Thrust bearing.
3. Bearing internal ring with bevel facing contact surface of part (5).
4. Rotary valve.
5. Rotary valve seat sleeve.



41

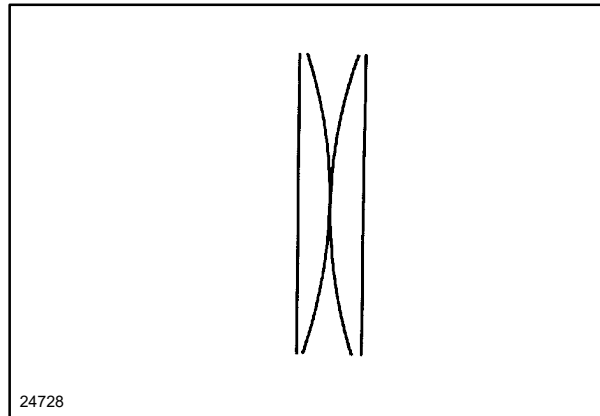
22. Thoroughly clean all control valve component parts.
23. Replace the washers and seals.
24. Carefully check all mechanical parts, replacing components that show signs of wear.
25. Before refitting, lubricate the components with hydraulic oil.
26. Re-fit the rotary valve on the sleeve, checking that the reference marks indicated in the drawing coincide.



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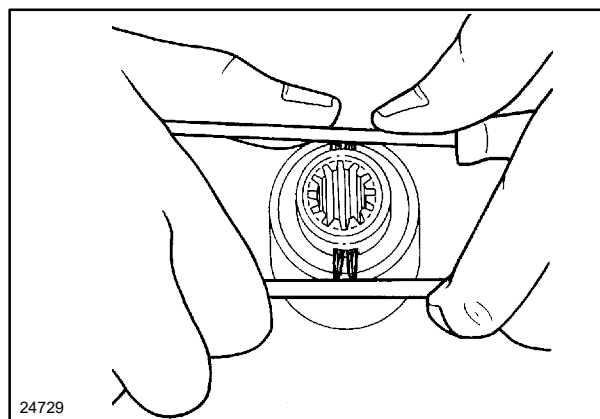
27. Use tool **380000306** to insert the flat and curved springs (12) fig. 2.
(Diagram for fitting springs (12) fig. 2 **neutral** position for OSPC 80 ON-150N 1058 hydrostatic steering).



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28. After inserting the springs in the seat, align and centre (as shown in the drawing).

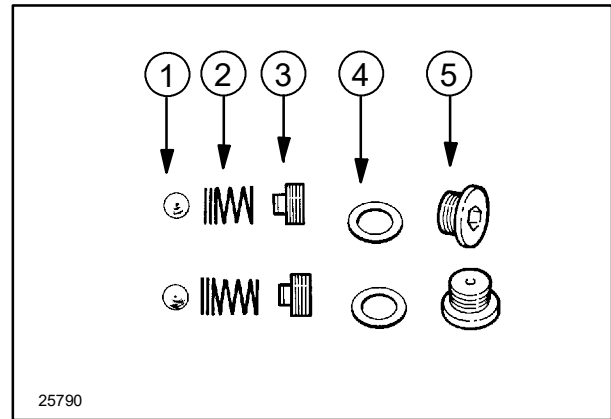


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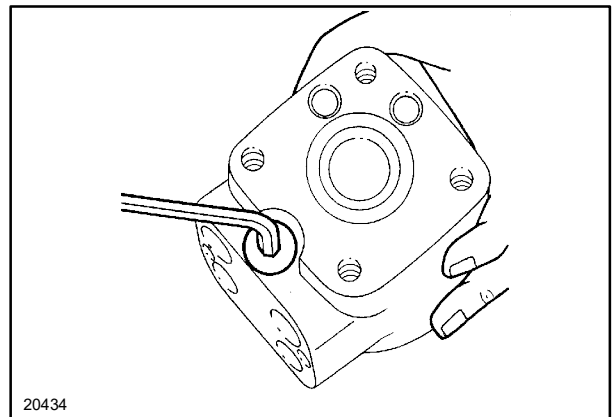
Cylinder safety valves components (order of disassembly-assembly).

1. Cylinder safety valve ball.
2. Pressure spring.
3. Setting adjuster screw.
4. Seal.
5. Plug.



31

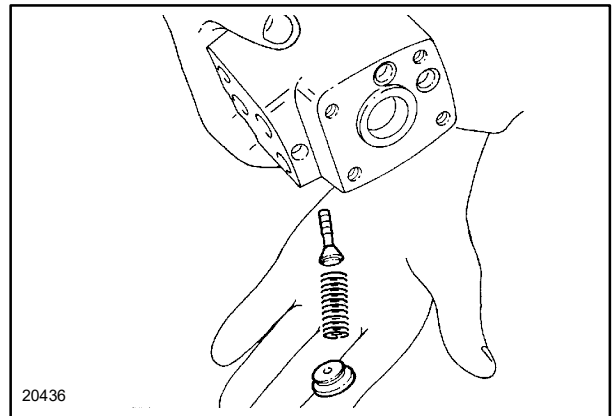
19. Using a 6 mm Allen wrench, remove the threaded plug on the pressure relief valve and extract the seal.



32

20. Remove the pressure relief valve adjuster screw.

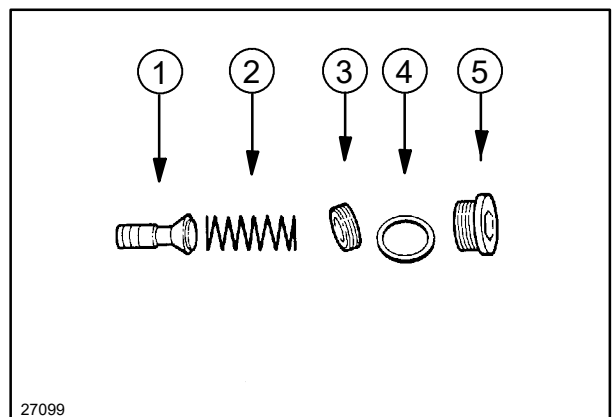
21. Turn the control valve body over and complete disassembly by extracting the spring and the pressure relief valve piston.



33

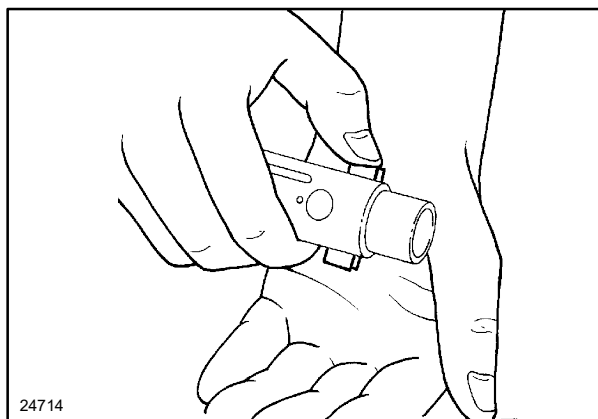
Pressure relief valve components (order of assembly).

1. Pressure relief valve.
2. Pressure spring.
3. Setting adjuster screw.
4. Seal.
5. Plug.



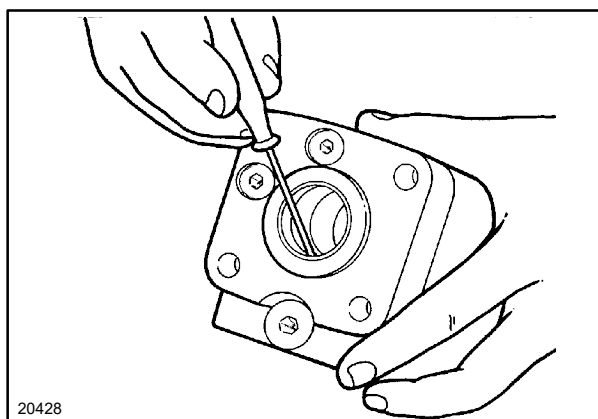
34

14. Remove the **neutral** position springs, extracting them from their seats.



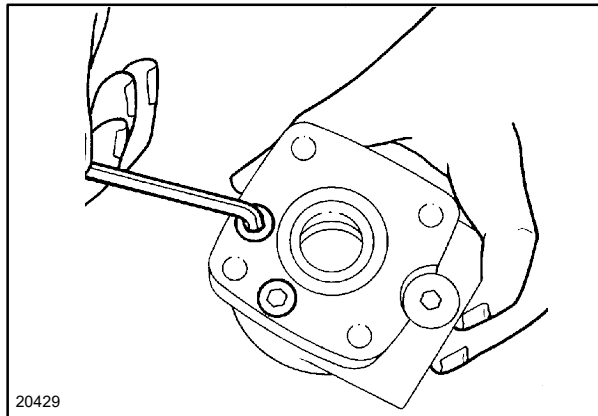
27

15. Remove the dust seal and the O-ring seal from their seats in the control valve body.



28

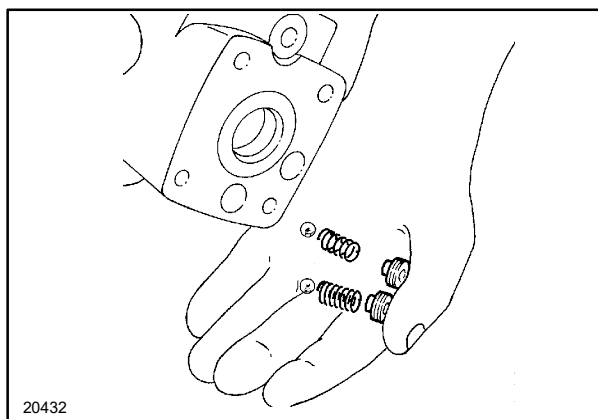
16. Using a 6 mm Allen wrench, remove the threaded plugs from the two cylinder safety valves and extract the seals.



29

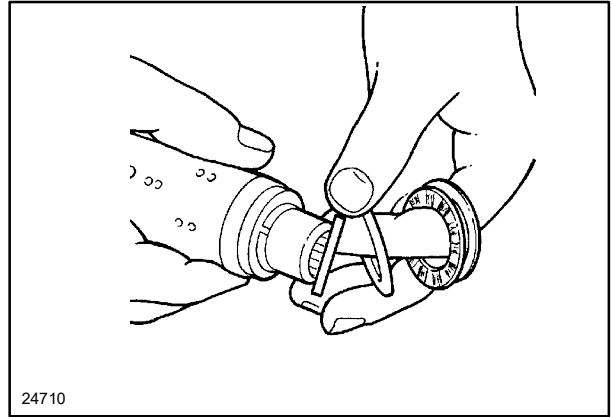
17. Using a 6 mm Allen wrench, remove the setting adjuster screws from the cylinder safety valves. See also fig. 31.

18. Turn the control valve body over and extract the balls, the springs and the spring guides from the two cylinder safety valves.



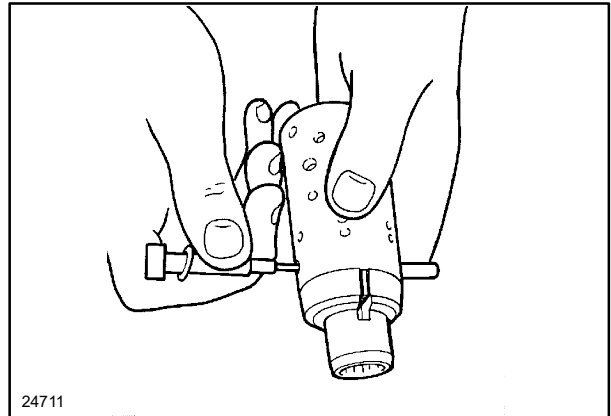
30

11. Extract the thrust bearing from the rotary valve, complete with the two external rings. Remove the spring retaining ring from the valve seat sleeve.



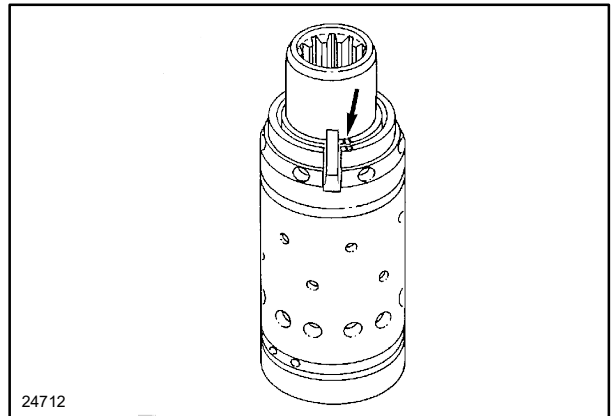
23

12. Extract the valve-sleeve trim pin.



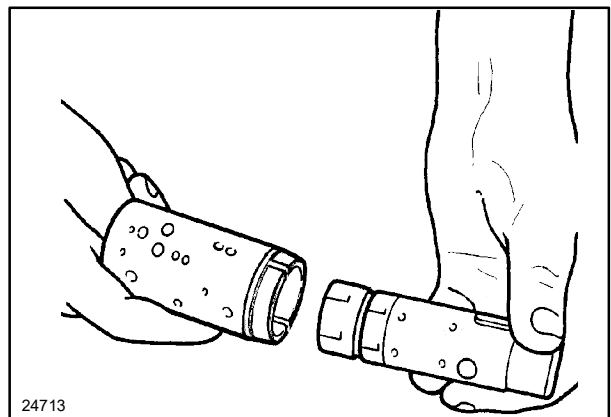
24

WARNING: On assembly, two reference marks (arrowed) were made on the rotary valve and the sleeve, corresponding to the neutral position maintained by the springs. Before removing the springs, check that the marks are clearly visible. If not clear, make new reference marks.



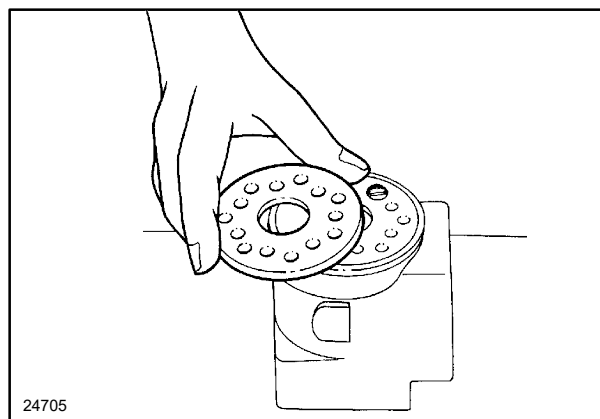
25

13. Extract the rotary valve from the valve seat sleeve.



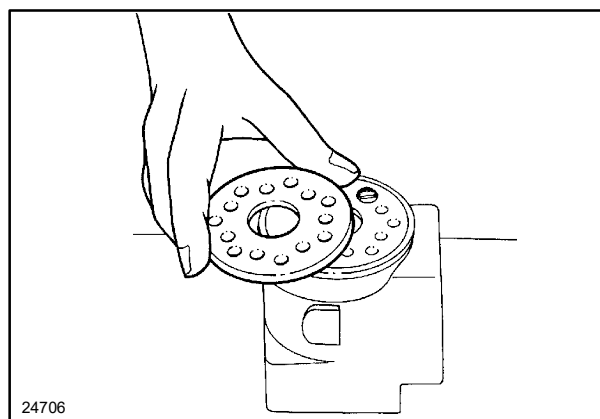
26

6. Extract the thrust washer.



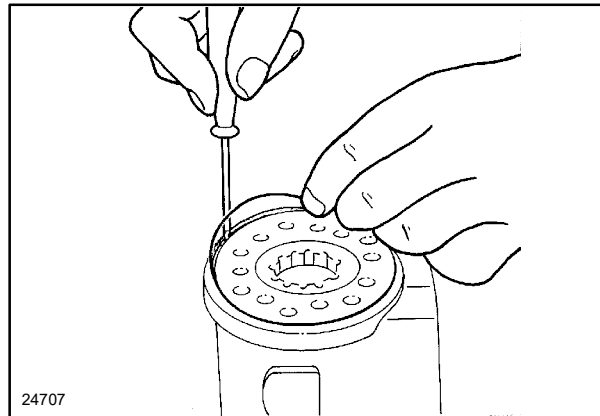
19

7. Remove the threaded plug on the non-return valve seat.



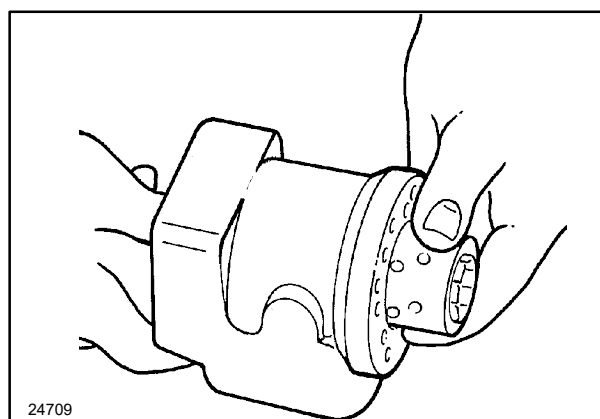
20

8. Extract the O-ring seal from the control valve body.



21

9. Position the control valve body and the rotor drive shaft so that the sleeve-control shaft trim pin is in a horizontal position.
10. Push the rotary valve inwards, so that the valve, the valve seat sleeve and the thrust bearing can be extracted from the control valve body.

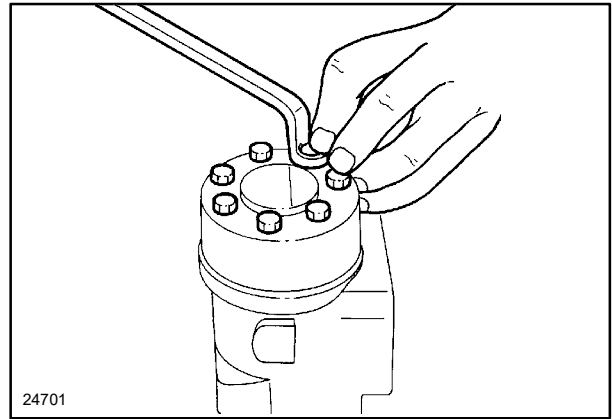


22

HYDROSTATIC STEERING CONTROL VALVE Disassembly-Assembly on the bench (Op. 41 204 34)

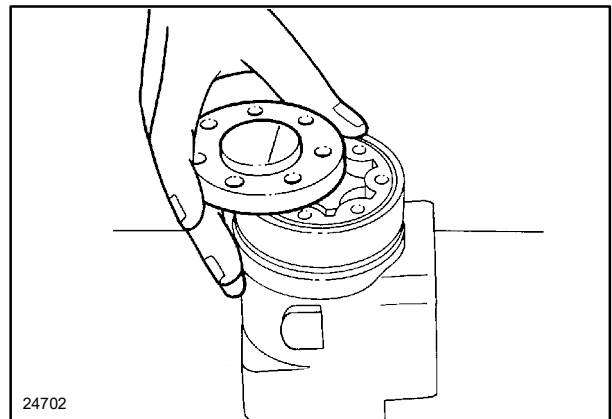
To disassemble the hydrostatic steering control valve, proceed as follows:

1. Remove the control valve cover retaining bolts.



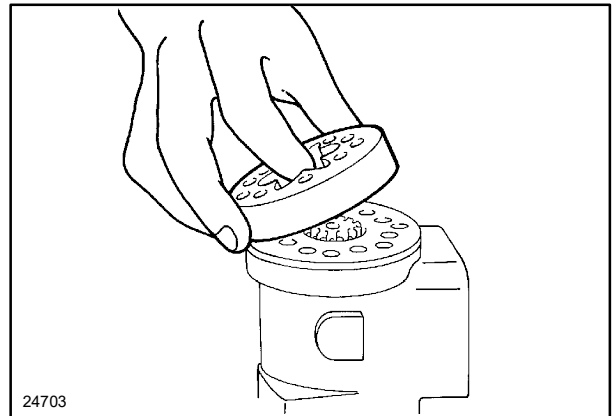
15

2. Remove the cover by sliding to one side.



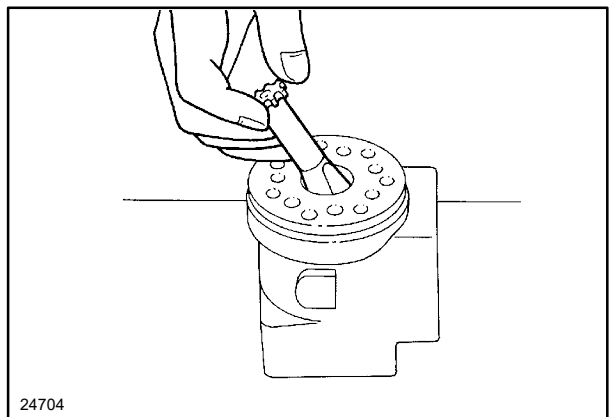
16

3. Remove the rotor fixed ring, the rotor and the inner spacer.
4. Remove the two O-ring seals on the rotor fixed ring.



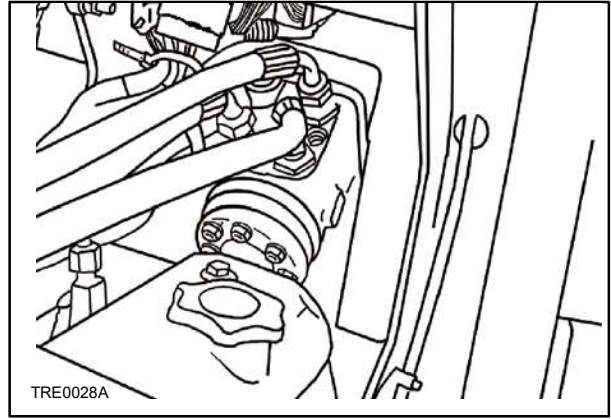
17

5. Extract the rotor drive shaft



18

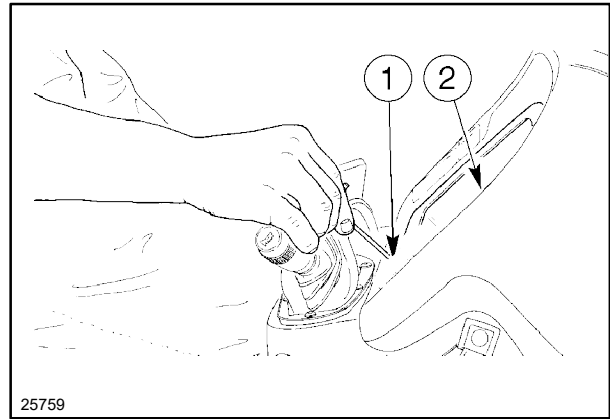
10. Remove the hydrostatic steering unit support bolts and take of the hydrostatic steering unit.



14

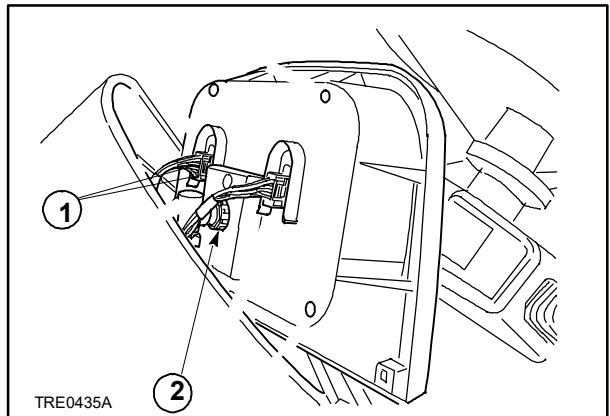
- To refit the control valve, proceed as follows:
- Refit the hydrostatic steering unit
- Refit the complete rear hood.
- Secure the rear hood with the screws previously removed.
- Reconnect the electrical leads and reconnect the the tachometer cable.
- Re-install the four screws securing the instrument panel.
- Re-install the hand throttle and steering wheel. Secure the wheel with the central retaining nut.
- Reconnect the oil pipes to the hydrostatic steering control valve unit.
- Fill the the steering system with oil.
- Reconnect the negative cable to the battery and close the hood.

6. Remove the four securing screws (1) from the instrument panel (2).



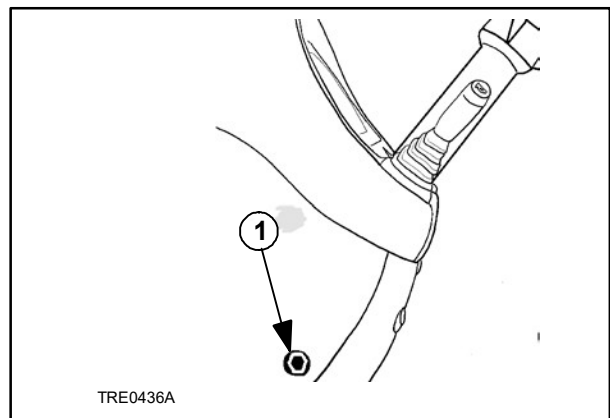
10

7. Disconnect the electrical leads (1) from the rear of the instrument panel. Unscrew the tachometer cable (2). Remove the instrument panel and store in a safe place.



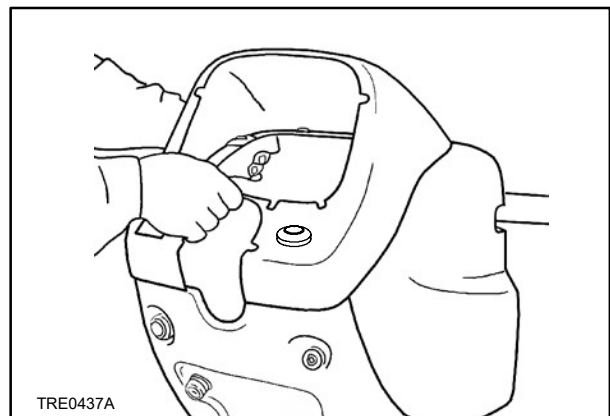
11

8. Unscrew the rear hood screws (1).



12

9. Take off the complete rear hood.



13

HYDROSTATIC STEERING CONTROL VALVE Removal-Refitting (Op. 41 204 30)



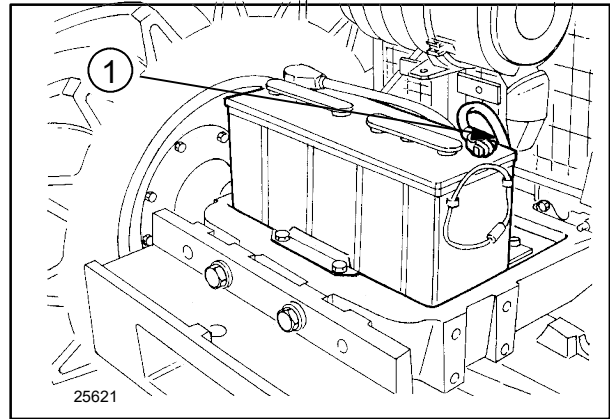
WARNING



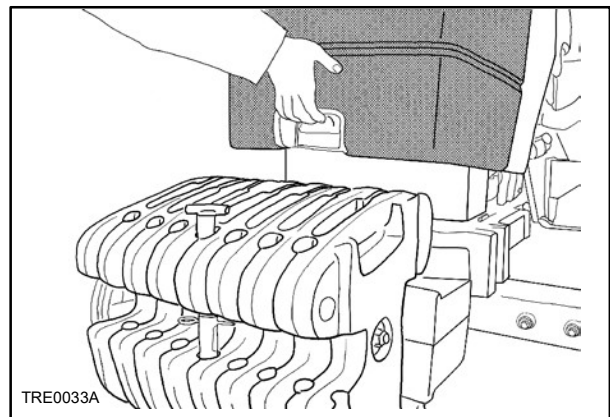
Handle all parts with great care. Do not put your hands or fingers between one part and another. Wear the recommended safety clothing such as goggles, gloves and safety boots.

To remove the hydrostatic steering control valve, proceed as follows:

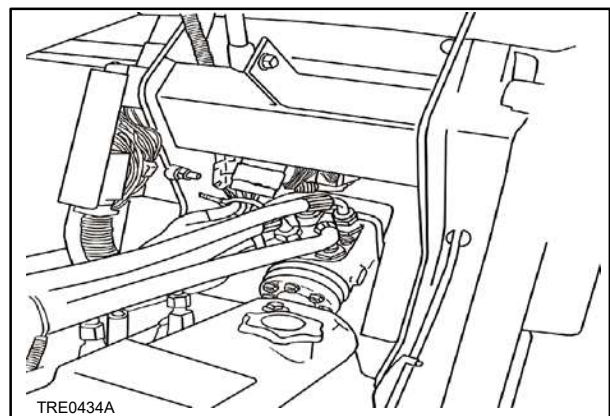
1. Disconnect the negative cable (1) from the battery.
2. Drain the oil from the steering system.
3. To access the engine the hood must be opened.
4. Disconnect the oil pipes from the hydrostatic steering control valve unit (1).
5. Remove the steering wheel (1) retaining nut and remove the steering wheel and hand throttle lever.



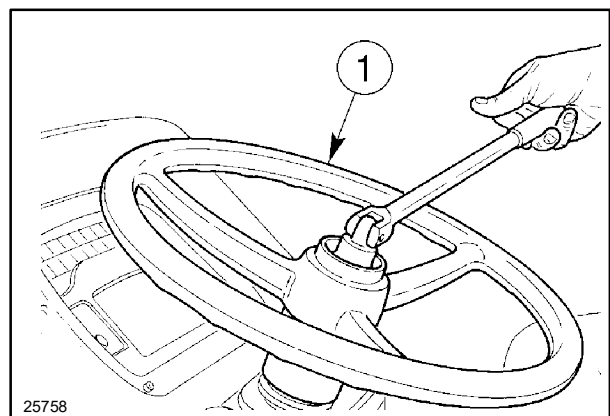
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7



8



9

HYDROSTATIC STEERING FAULT DIAGNOSIS

Refer to fig. 2 for component identification

(continuation)

Problem	Possible causes	Corrective action
Steering wheel jolts, steering uncontrollable, wheels steering in the opposite direction to the desired direction.	1. Incorrect synchronization of hydrostatic steering. 2. Hoses to cylinder reversed.	Synchronize correctly. Correct the connections.
The wheels do not maintain the desired alignment and continual correction with the steering wheel is necessary.	1. Hydraulic cylinder piston seal worn. 2. Reflux valve (2) damaged or held open by foreign bodies. 3. Mechanical wear of control valve.	Renew the seal. Eliminate the foreign bodies and clean the filter or renew the control valve. Renew the control valve.
Neutral phase of hydrostatic steering unobtainable. During manual control, operation is normal. When stopping manual control, the steering wheel moves on its own or remains stationary, but steering continues slowly in the direction first turned (motoring), so the steering wheel must be continually corrected.	1. Leaf springs (11) for returning sleeve (4) to neutral position broken or fatigued. 2. Sleeve and rotary valve (4) blocked in delivery position by foreign bodies. 3. Crushing of sleeve (4) on rotary valve due to excessive pressure.	Renew the pack of leaf springs. Eliminate the foreign bodies and clean the filter. Check the setting of the pressure relief valve (22).
Front wheel vibration (shimmy).	1. Air pockets in the hydraulic cylinder. 2. Wear of mechanical joints of steering tie rods. 3. Reflux valve (2) damaged or held open by foreign bodies.	Bleed the air and eliminate the causes of possible infiltration. Renew the worn parts. Remove the foreign bodies and clean the filter or renew the control valve.
Difficulty in steering in general, or in one direction.	1. Insufficient pressure. 2. Excessive leakage inside the control valve.	Check the hydraulic pump and the setting of the pressure relief valve (22). Renew the control valve.

TOOLS

WARNING: The operations described in this section must be performed only with the **ESSENTIAL** equipment marked with (X).

To operate safely and achieve best results, while saving time and effort, essential equipment must be used in conjunction with the special tools recommended below, and tools which you must make yourself and for which you will find the design in this manual.

List of special tools necessary for the various operations described in this section.

- X 380000307** Hyd. steering rotor retaining lever.
- X 380000223** Steering wheel extractor.
- X 380000240** Universal pressure checking kit.
- X 380000305** Tool for fitting hydrostatic steering toroidal seal.
- 380000306** Plug for fitting hydrostatic steering rotary valve return springs.

HYDROSTATIC STEERING FAULT DIAGNOSIS

Refer to fig. 2 for component identification

Problem	Possible causes	Corrective action
Oil leaking from hydrostatic steering unit: a. Control side. b. Cover side.	13. O-ring seal defective (7).	Renew the seal and the stop ring using special tool 380000836 .
Steering wheel excessively stiff	14. Screws (13) not sufficiently tight.	Tighten the screws to the prescribed torque (24–36 Nm, 17.7015–26.5522 ft lb).
	15. Sealing washers (15) or O-rings (17) defective.	Renew the washers and seals.
	1. Hydraulic pump inefficient.	Repair the pump.
	2. Check valve (5) held open by foreign bodies or open due to absence of ball.	Eliminate foreign bodies and clean the filter; put a new ball into the seat (if missing).
	3. Pressure relief valve (22) incorrectly set.	Reset the valve.
Excessive play of steering wheel	4. Pressure relief valve (22) jammed or held open by foreign bodies.	Eliminate foreign bodies and clean the filter.
	5. Steering column has become stiff on its bushing due to rusting, seizing, etc.	Eliminate the causes.
	1. Excessive play between the steering column and the coupling with the rotary valve (4).	Renew the worn parts.
	2. Excessive play in the coupling between shaft (21) and trim pin (12).	Renew the worn parts.
	3. Excessive play in the splined coupling between the shaft (21) and the rotor (18).	Renew the worn parts.
The steering wheel turns normally, but steering is: a. Slow. b. No steering.	4. Combination of excessive play as described above.	Renew the most worn parts.
	5. Leaf springs (11) broken or fatigued.	Renew the springs.
	1. Inadequate seal of control cylinder.	Renew the seal.
	2. Cylinder rod broken.	Renew the damaged part.
	3. Rotor control shaft (21) or pin (12) broken.	Renew the damaged part.
With the engine stopped, the steering wheel can be turned without turning the wheels.	1. Excessive wear between rotor and fixed ring (18).	Renew the worn parts.
	2. Check valve damaged.	Renew the control valve.

(continued)

Steering to the right (fig. 5)

When you turn the steering wheel clockwise, the springs (11) fig. 2 deform, allowing the valve (12) fig. 4 to rotate in relation to the sleeve (11).

In this state, the following takes place:

- de-synchronisation of the internal ducts with parts (11) and (12) fig. 4, which were aligned in the neutral phase, resulting in interruption of the flow of oil to the outlet.
- alignment with the same number of internal ducts connected moment by moment with the rotor compartments at intake from the pump (7) fig. 4 and in the delivery line to the steering cylinders (2), thus allowing the wheels to be steered to the right.

Steering to the left

When you turn the steering wheel anticlockwise, the grooves inside parts (11) and (12) fig. 4 and the delivery lines to the steering cylinders are reversed, thus allowing the wheels to be steered to the left.

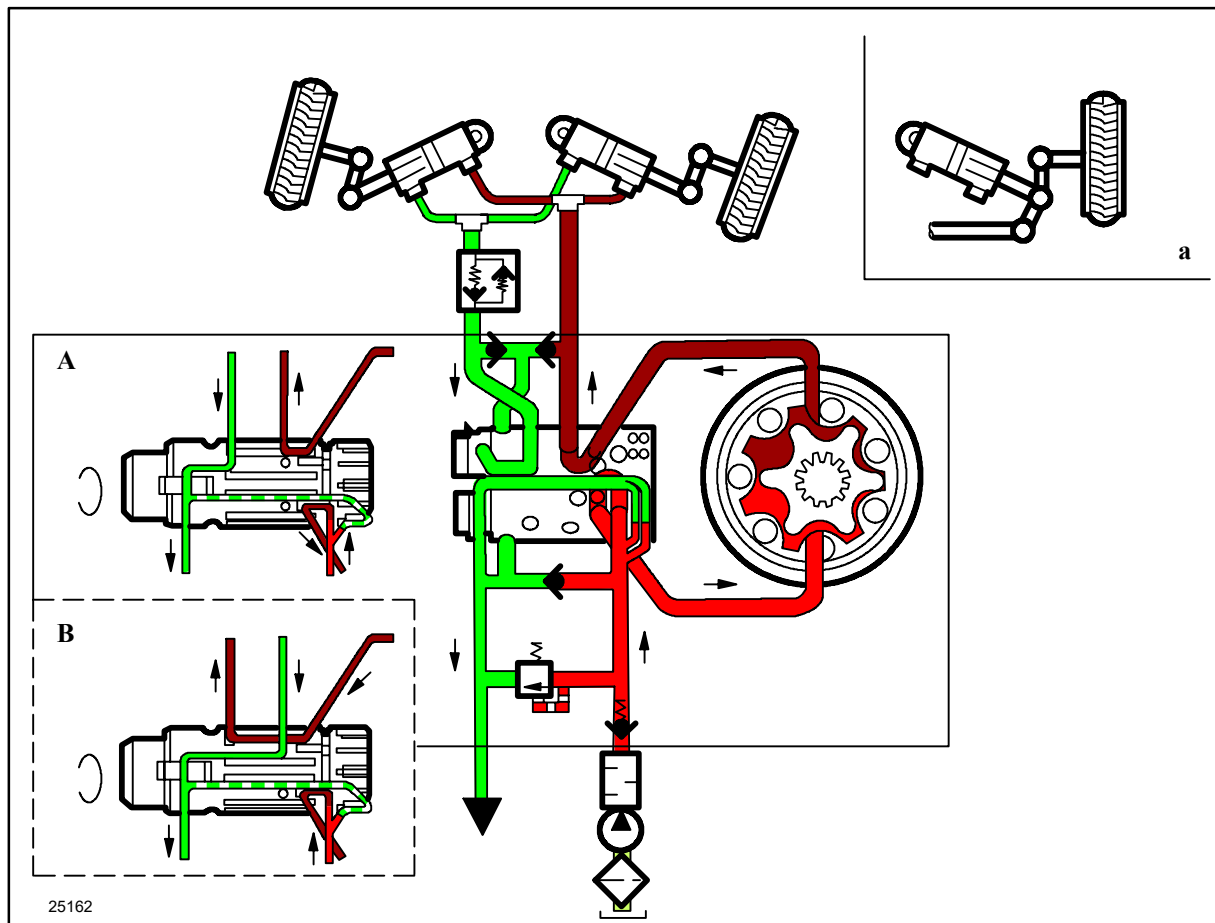
Steering to the right manually

If there is a fault or loss of oil pressure at the hydrostatic steering pump, steering can also be performed manually.

When you turn the steering wheel clockwise, the rotor inside the hydrostatic steering control valve (3) fig. 4 performs the function of a hand pump, sending oil to the control cylinder rod side (2), thus allowing the wheels to be steered to the right manually.

Steering to the left manually

When you turn the steering wheel anticlockwise, you act upon the rotor inside the hydrostatic steering control valve which, by operating as a hand pump as previously described, sends oil to the control cylinder piston side, thus allowing the wheels to be steered to the left manually.



5

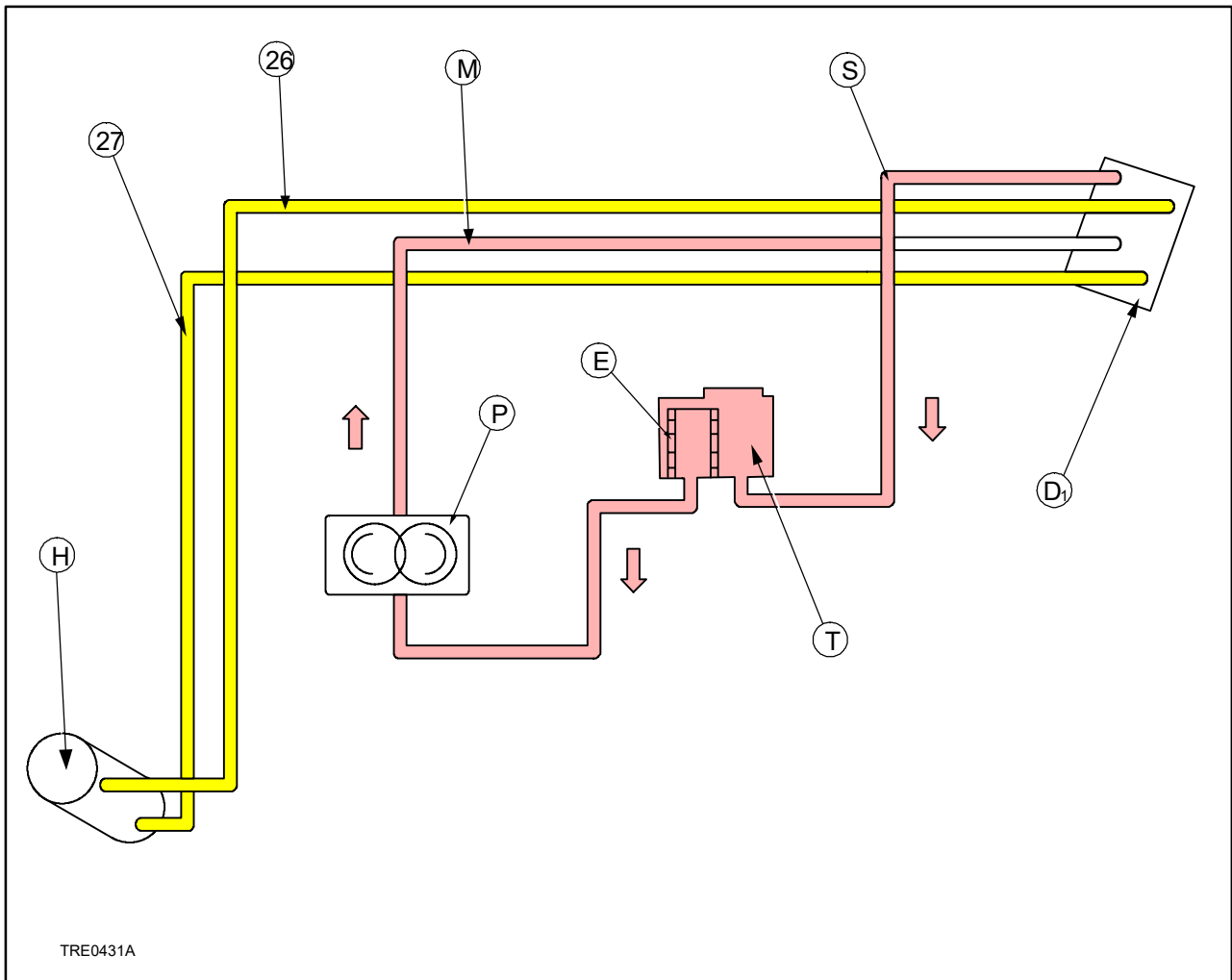
Diagram showing operation of the hydrostatic steering

a 2WD models

A Steering to the right

B Steering to the left

- Oil in intake line
- Oil in delivery line from pump
- Oil in delivery line to hydraulic cylinder
- Oil returning to reservoir



3

General hydraulic diagram

H ---- Power steering cylinder

D1 --- Hydrostatic steering control valve

E ---- Filter

T ---- Oil tank

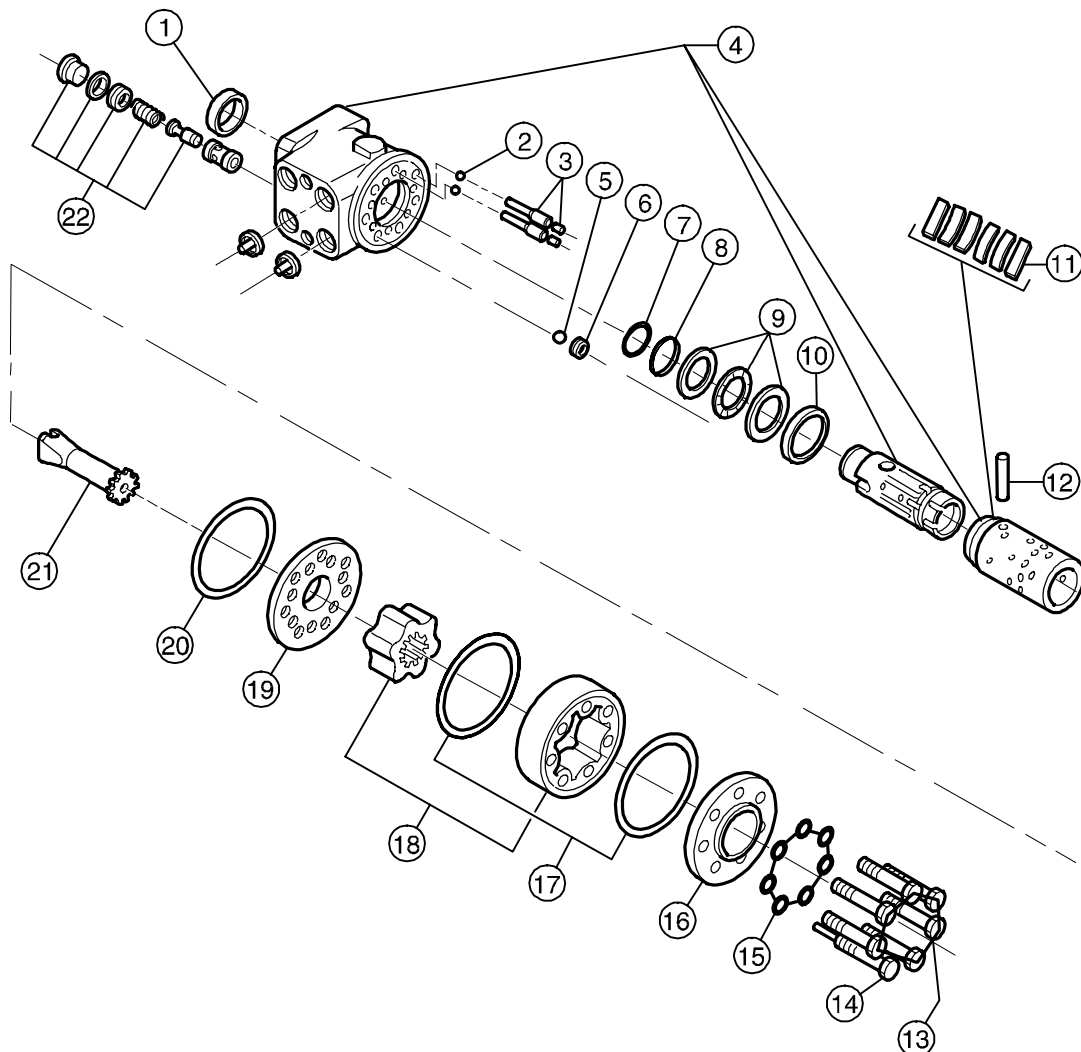
P ---- Pump

26 Oil in intake line

27 Oil in delivery line from pump

M - Oil delivery to control valve

S - Oil at lubrication pressure

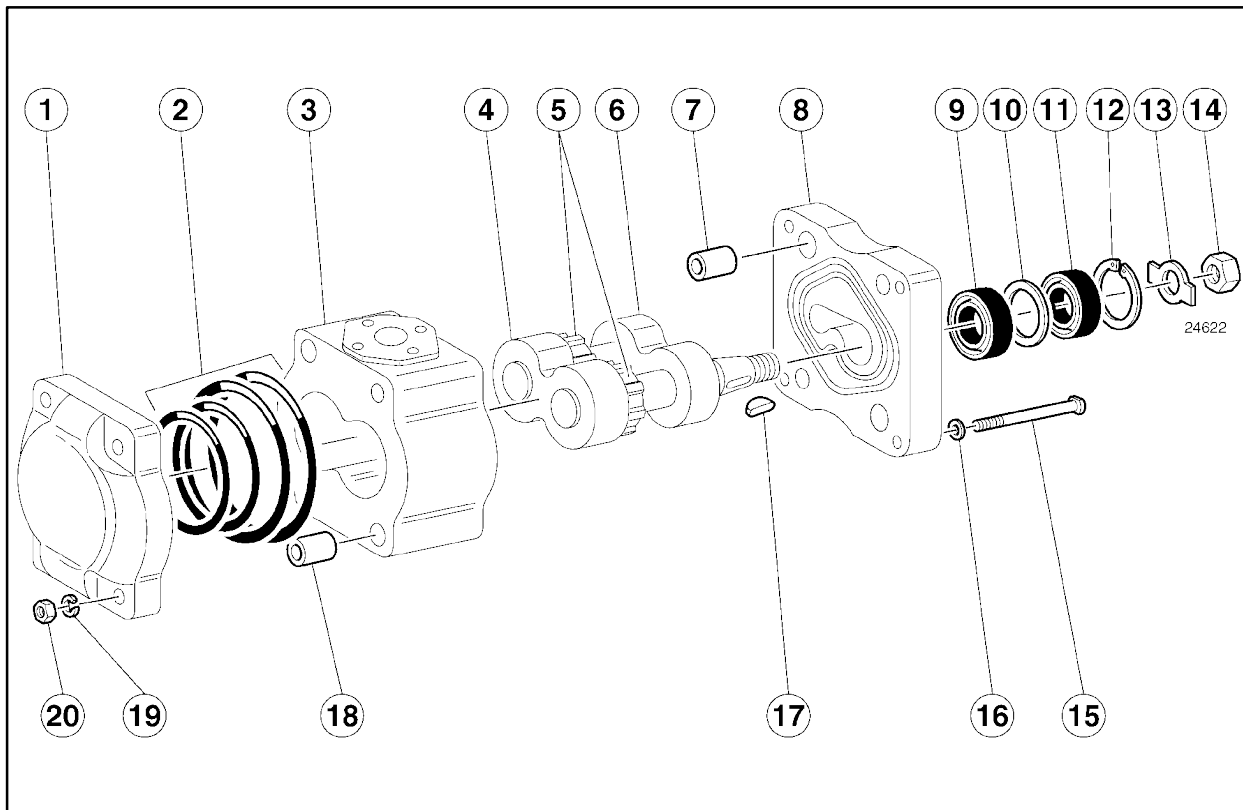


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Hydrostatic steering - Control valve components

2

- | | |
|--|--|
| 1. Dust seal | 12. Rotor control shaft - sleeve trim pin |
| 2. Reflux valve balls | 13. Cover fixing screws |
| 3. Reflux valve pins | 14. Check valve seat screw |
| 4. Control valve body, rotary valve and rotary valve seat sleeve | 15. Washers |
| 5. Check valve ball | 16. Cover |
| 6. Threaded plug of check valve | 17. O-rings |
| 7. O-ring seal | 18. Rotor and fixed ring for rotor |
| 8. Support ring for O-ring (7) | 19. Thrust washer |
| 9. Thrust bearing components | 20. O-ring |
| 10. Retaining ring for springs (11) | 21. Rotor control shaft |
| 11. Springs for returning sleeve to neutral position | 22. Pressure relief valve complete with spring |



1

Hydrostatic steering - Oil pump components

- | | |
|-----------------------------------|------------------------|
| 1. Front cover | 11. Driving shaft seal |
| 2. Cover seals | 12. Snap ring |
| 3. Pump body | 13. Lock washer |
| 4. Gear support | 14. Nut |
| 5. Driven and driving gear shafts | 15. Bolt |
| 6. Gear support | 16. Washer |
| 7. Bushing | 17. Key |
| 8. Control side cover | 18. Bushing. |
| 9. Driving shaft seal | 19. Safety washer |
| 10. Spacer | 20. Nut. |

TORQUE SETTINGS

PART	Thread	Torque setting	
		Nm	ft lb
Bolt fixing hydrostatic steering to tractor	3/8"-16 UNC	44	32.4527
Bolt fixing cover to hydrostatic steering housing (13, fig. 2)	M 8 x 1	34	25.0771
	M 8 x 1*	29	21.3893
Hydrostatic steering control pump fixing bolt	M 6 x 1	8	5.9005
Nut for bolt fixing cover to pump housing (20, fig. 1)	M 10 x 1,25	39	28.7649
Nut for securing thrust sleeve to pump drive shaft (14, fig. 1))	7/16 in -20UNF-2B	28	20.6517
Nut, power cylinder pivot pin	M 18 x 1.5	294	216.8433
Nut, power cylinder piston rod to steering arm	M 14 x 1.5	147	108.4216
Nut, piston to rod			
-WEBER cylinder	M 16 x 1.5	83	61.2177
-SIMA cylinder	M 16 x 1.5	98	72.2811
-ERBER cylinder	M 16 x 1.5	98	72.2811
Capscrew, control valve support	M 16 x 1.5	147	108.4216
Capscrew, LVP safety valve block to body	-	64	47.2040

* ORSTA

MAIN SPECIFICATIONS OF HYDRAULIC PUMP C25

Pump	
Type	gear type with oil suction from transmission casing behind timing gear cover
Location	
Model	C 25
Construction	BOSCH
Operating system	governed by timing gears
Direction of rotation (as seen from drive side)	clockwise
Engine speed to pump speed ratio	1:0.931
Maximum speed of rotation (with engine at maximum power) rev/min	2328
Corresponding rated output l/min (in. ³ /min)	26.4 (1611.03)
Bench output at 1450 rev/min and pressure of 153 bar (156 kg/cm ²):	
- for new or reconditioned pump l/min (in. ³ /min)	15.3 (933.66)
- for worn pump l/min (in. ³ /min)	10.7 (652.95)
- test oil temperature °C (°F)	55 - 65 (131 - 149)
- test oil viscosity	SAE 20
Diameter of driven and driving gear shafts mm (in.)	17,400 - 17,418 (0.6850-0.6857)
Internal diameter of seats in supports mm (in.)	17,450 - 17,475 (0.6870-0.6880)
Clearance between gear shafts and their seats mm (in.)	0,032 - 0,075 (0.0013-0.0030)
- maximum permitted wear clearance mm (in.)	0,1 (0.0039)
Radial clearance of gears in pump body mm (in.)	0,020 - 0,064 (0.0008-0.0025)
Maximum wear on pump body, suction side, at position of gears mm (in.)	0,1 (0.0039)
Cylinder	
Type	Double acting, located behind front axle
Construction	WEBER or SIMA or ERBER
Cylinder bore diameter	48 mm (1.89 in)
Piston rod diameter	22 mm (0.866 in)
Maximum piston stroke	
WEBER or ERBER	215 mm (8.464 in)
SIMA	214 mm (8.425 in)
Maximum piston stroke	
WEBER or ERBER	200 mm (7.874 in)
SIMA	194 mm (7.638 in)

SECTION 41 - STEERING**Chapter 1****CONTENTS**

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41 216 20	Steering cylinder (two-wheel drive axle) - Removal-Refitting	32
	Steering cylinder (four wheel drive axle) - Removal-Refitting	33

PRINCIPAL DATA

HYDROSTATIC STEERING	
Type Hydraulic circuit Oil filter	independent hydrostatic control, feed by hydraulic pump metal cartridge, built into oil reservoir
Control valve	
Make Type	DANFOSS OR ORSTA rotary valve controlled directly from the steering column; the steering continues to function even if the pump is non-functional
Outfit code: - DANFOSS - ORSTA	OSPC 100 LAG-B 100-LVP16-2
Pressure relief valve setting (22) fig. 2 - 2WD models - 4WD models	100 bar (1450.37 psi) 125 bar (1812.96 psi)