

Document Title: Steering Maintenance	System,	Function Group: 600	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]				

Steering System, Maintenance

NOTE!

During each service (service or repair in workshop), in addition to the maintenance work specified in the Operator's manual, the following check and maintenance work should be performed:

- Check lines, hoses and screw fittings on the entire system for leaks and damage.
- Check steering cylinder, pump and complete hydraulic steering system for leaks.
- Clean pressure limiting valve in the hydraulic steering unit.
- Test pressure limiting valves.
- Check slip on steering wheel.
- Check steering cylinder for internal leaks.
- Check steering pump for internal leaks.

NOTE!

Damaged components must be replaced!

Check lines and screw fittings

Check all lines, hoses and screw fittings for damage, chafing and firm attachment. Tighten screw fittings where necessary.

Check steering cylinder, pump and complete hydraulic steering system.

Check components for damage, leaks and firm attachment. The steering cylinder piston rods may be coated with a thin film of oil, but no droplets may form.

Document Title: Steering, description	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering, description

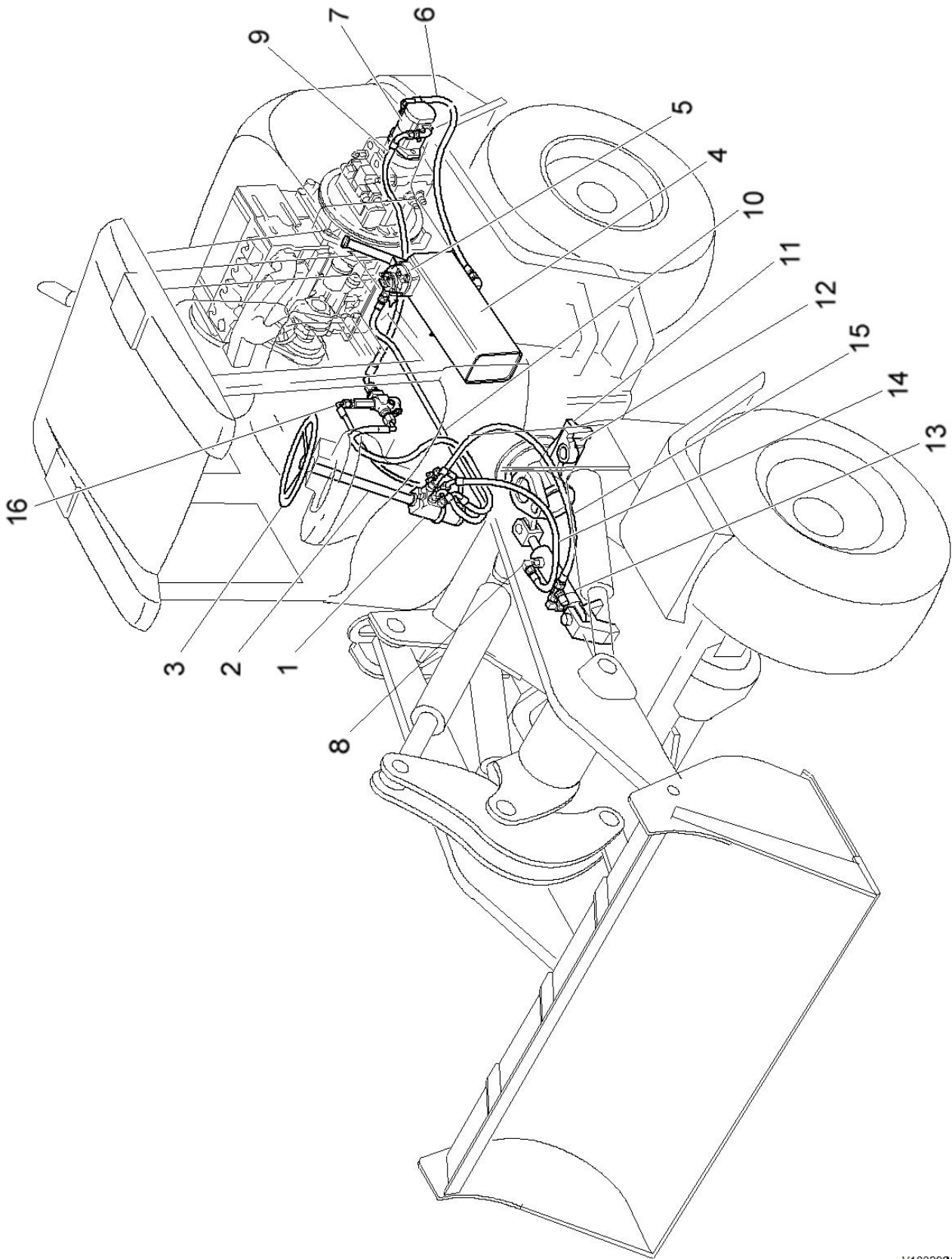
Central hydrostatic bend-swivel steering with damped side swivel.

Steering angle $\pm 40^\circ$

Type of steering pump: gear pump

Document Title: Steering system Sn 183, construction	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering system Sn 183, construction



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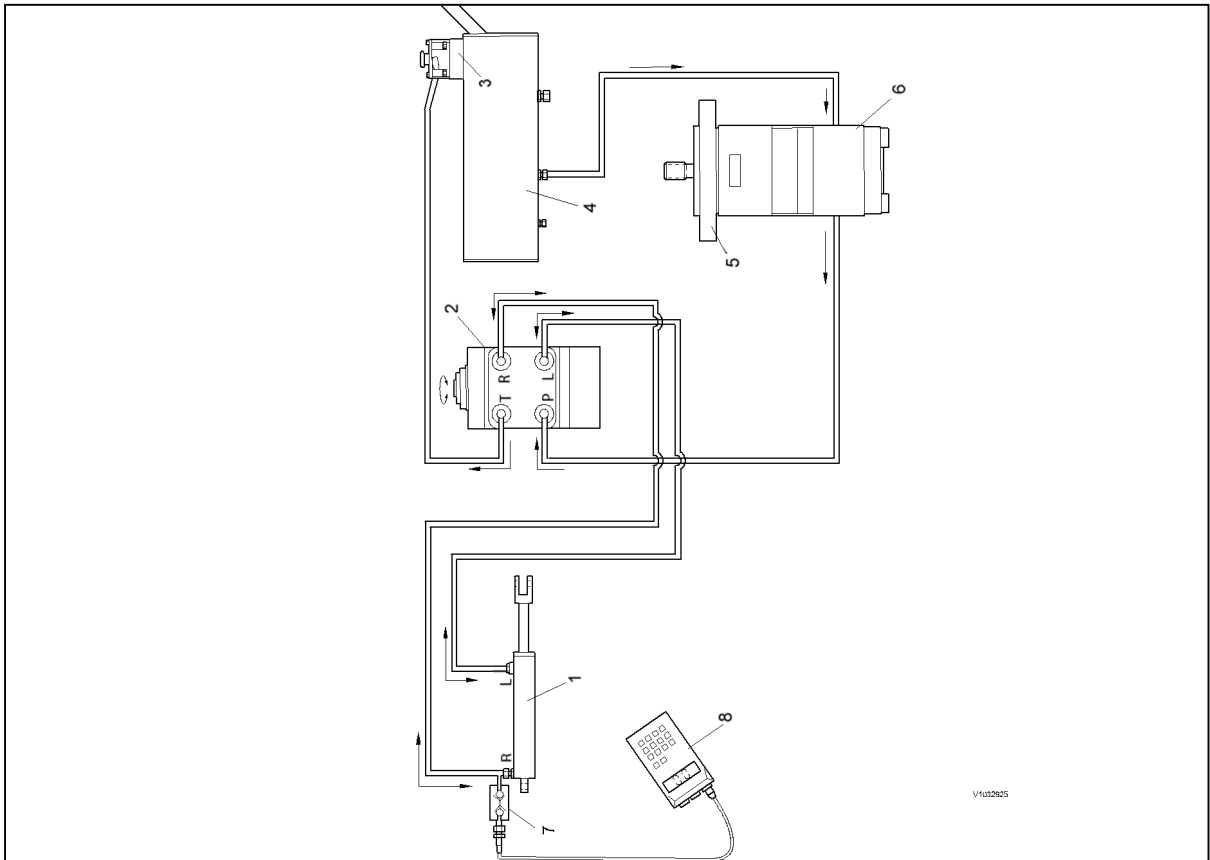
Figure 1
Steering system 183, construction

- 1 Hydraulic steering unit (Orbitrol)
- 2 Steering column
- 3 Steering wheel

- 4 Hydraulic oil tank
- 5 Suction/return filter
- 6 Suction hose
- 7 Gear pump
- 8 Mini-measurement connection
- 9 Pressure hose
- 10 Return hose
- 11 Bend-swivel joint
- 12 Bump stop
- 13 Steering cylinder
- 14 Hose left
- 15 Hose right
- 16 Priority valve

Document Title: Steering system Sn 182, 185, function	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering system Sn 182, 185, function

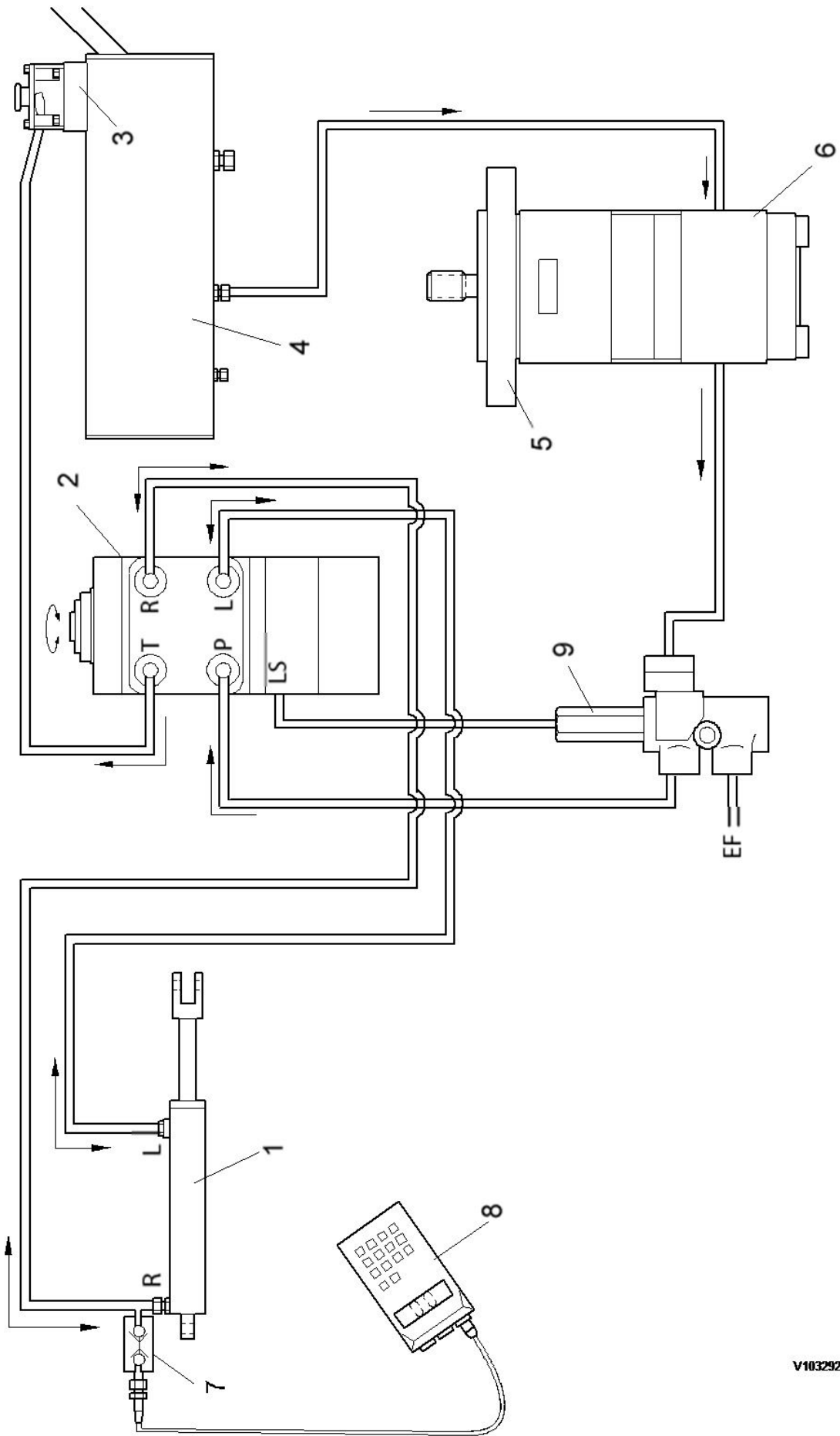


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- 3 Suction/return filter
- 4 Hydraulic oil tank
- 5 Double pump
- 7 Mini-measurement connection
- 8 Pressure tester
- P = Pressure connection, steering pump
- T = Return connection, hydraulic oil tank
- R = Pressure connection, steering cylinder, when turning the steering wheel clockwise
- L = Pressure connection, steering cylinder, when turning the steering wheel counter-clockwise

Document Title: Steering system Sn 183, function	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering system Sn 183, function



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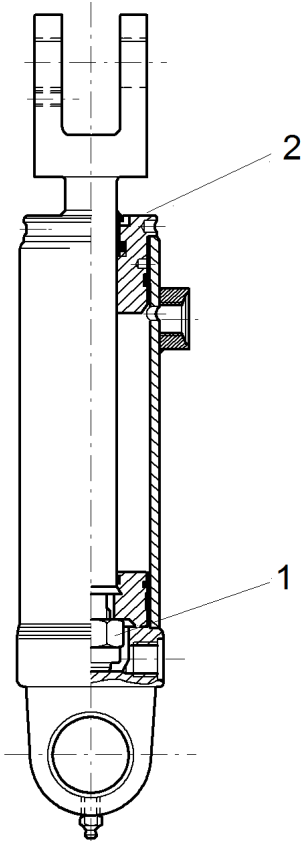
Figure 1

Steering system, function

1	Steering cylinder
2	Hydraulic steering unit (two-stage)
3	Suction/return filter
4	Hydraulic oil tank
5	Double pump
6	Steering pump
7	Mini-measurement connection
8	Pressure tester
9	Priority valve
P =	Pressure connection, steering pump
T =	Return connection, hydraulic oil tank
R =	Pressure connection, steering cylinder
L =	Pressure connection, steering cylinder, when turning the steering wheel counter-clockwise
LS =	LS signal from steering unit
EF =	Pressure connection to hydraulic fan

Document Title: Steering description	Function Group: cylinder, 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering cylinder, description



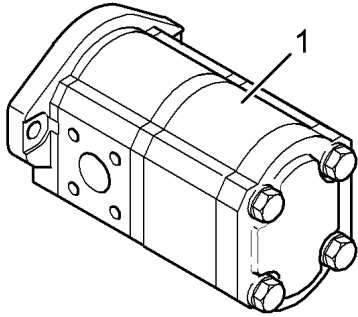
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Figure 1
Steering cylinder, description

- 1 Nut-piston rod
- 2 Piston rod guide

Document Title: Steering pump, description	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering pump, description



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Figure 1
Steering pump

Description	M _A in Nm (in lbf ft)	
1	Fixing bolt	49 (36)

Document Title: Orbitrol, description	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Orbitrol, description

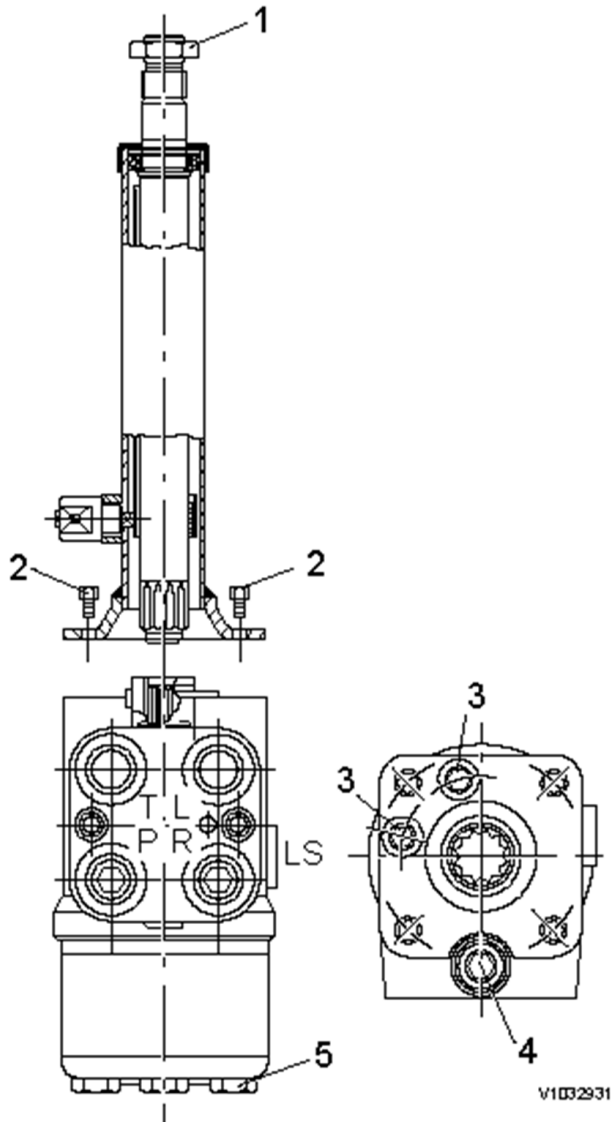


Figure 1
Orbitrol, description

- 1 Fixing nut, steering wheel
- 2 Fixing bolts, steering column
- 3 Plug - shock shaft
- 4 Plug - pressure limiting valve
- 5 Cover bolts

Document Title: Steering troubleshooting and elimination	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering system, troubleshooting and elimination

General

The table below should help operators and maintenance staff determine the possible cause of a malfunction in the steering system before damage occurs. It does not claim to be complete, but serves merely to support troubleshooting and diagnosis. The column "Malfunction/error" contains defective functions or malfunction symptoms which can occur in practice. The column "Possible malfunction cause" lists assemblies, operating media or states which may cause the malfunction.

The malfunction is located or eliminated by testing or changing the components specified in the column "Malfunction elimination".

Malfunction/Error	Possible malfunction cause	Malfunction elimination
The steering wheel is difficult to turn.	Insufficient oil pressure.	Too little oil in the hydraulic oil tank, add oil.
	The pump does not work.	Carry out a function test.
	Pump faulty.	Change pump.
	Pump is worn out.	Change pump.
	The pressure limiting valve stays open, or the setting is too low.	Repair the pressure limiting valve or remove dirt, adjust pressure limiting valve.
Constant corrections with the steering wheel (snaking drive).	Spring force of steering unit too low, spring broken.	Change steering unit.
	Spring in double safety valve broken.	Replace faulty parts.
	Gear worn.	Change steering unit.
	A steering cylinder has seized or the piston seals are worn.	Replace faulty parts.
Steering wheel does not return to neutral, there is a tendency to pull to one side.	Steering column and steering unit are fitted with distortion.	Centre the steering column with the steering unit.
	Insufficient or no play between steering column and steering unit.	Adjust play, if necessary shorten spline pins.
	Inner and outer sliders on steering unit are sticking.	Change steering unit.
The steering wheel continues to turn on its own.	Spring force of steering unit too low, spring broken.	Change steering unit.
	Inner and outer sliders on steering unit are sticking, possibly dirty.	Change steering unit.
Steering wheel play	The propeller shaft is worn or broken.	Change steering unit.
	Spring force of steering unit too low, spring broken.	Change steering unit.
	Work spline on steering column.	Replace steering column, if necessary replace steering unit.
Tyre vibration during steering process.	Air in steering cylinders.	The reason for the air collection must be found and eliminated.
	Mechanical connections are worn (run out).	Replace faulty parts.
The steering wheel can be	No oil in tank.	Add oil and bleed system.

turned continuously without giving any steering movement.	The steering cylinders are worn.	Replace worn parts.
	Worn gear set.	Change steering unit.
	Pressure limiting valve set higher than double safety valves.	Adjust pressure limiting valve to spec. sheet.
The steering wheel is too slow or heavy to move for quick turns.	The steering unit is not getting enough oil, the pump is faulty.	Replace pump, check engine speed, adjust as in data sheet.
	The pressure limiting valve is set too low.	Adjust pressure limiting valve to spec. sheet.
	The pressure limiting valve sticks, dirty.	Clean the valve.
"Kick-back" in steering wheel from the system, jerks from the wheels.	Faults in system.	Please contact Customer Service.
Strong impact in steering wheel to both sides.	Incorrect adjustment of propeller shaft and gear set.	Change steering unit.
When the steering wheel is turned, the steering movement takes place in the opposite direction.	The hydraulic hoses to the steering cylinders are mixed up.	Check hoses and connect correctly.
Hard point at start of turn of steering wheel.	Oil too thick (cold).	Check oil, change if necessary. Run engine until the oil is warm.
Insufficient control force (possibly only on one side).	The pump output is too low.	Check pump, replace if necessary.
	Steering cylinder faulty.	Replace steering cylinder.
Leaks from: input shaft, end cap, gear set or casing, or upper part.	Faulty shaft seal.	Replace shaft seal.
	Loose bolts.	Tighten bolts with the prescribed torque.
	Washers or O-rings are faulty.	Replace faulty washers or O-rings.
Abnormal noise	Suction-return filter in hydraulic oil tank dirty	Replace filter insert.
	Steering pump draws in air.	Eliminate leaks.
	Oil level in hydraulic oil tank too low.	Add hydraulic oil and bleed steering unit.
	Lines chafing.	Route lines properly and attach, or replace.
	Oil loss on hydraulic steering unit.	Replace hydraulic steering unit.
Continued turning and/or catching on rapid steering movements.	Oil level in hydraulic oil tank too low.	Eliminate leak, add hydraulic oil and bleed steering system if necessary.
	Suction-return filter in hydraulic oil tank dirty	Replace filter insert.
Steering wheels moves to left or right on its own.	Return line to hydraulic oil tank dirty.	Change return line, return pressure at 60 °C ≤6 bar (87 psi).
	Suction-return filter in hydraulic oil tank dirty	Replace filter insert.
Steering wheel can be turned further when front and rear parts stop.	Internal leakage in hydraulic steering unit too great.	Check slip on steering wheel, replace steering unit if necessary.
	Internal leakage in steering cylinders too great.	Check internal leakage on cylinders, replace sealing rings or replace steering cylinders if required.

Document Title: Steering system, troubleshooting and elimination	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B, L35B [GB]			

Steering system, troubleshooting and elimination

General

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	The pump does not work.	Carry out a function test.
	Pump faulty.	Change pump.
	Pump is worn out.	Change pump.
	The pressure limiting valve stays open, or the setting is too low.	Repair the pressure limiting valve or remove dirt, adjust pressure limiting valve.
Constant corrections with the steering wheel (snaking drive).	Spring force of steering unit too low, spring broken.	Change steering unit.
	Spring in double safety valve broken.	Replace faulty parts.
	Gear worn.	Change steering unit.
	A steering cylinder has seized or the piston seals are worn.	Replace faulty parts.
Steering wheel does not return to neutral, there is a tendency to pull to one side.	Steering column and steering unit are fitted with distortion.	Centre the steering column with the steering unit.
	Insufficient or no play between steering column and steering unit.	Adjust play, if necessary shorten spline pins.
	Inner and outer sliders on steering unit are sticking.	Change steering unit.
The steering wheel continues to turn on its own.	Spring force of steering unit too low, spring broken.	Change steering unit.
	Inner and outer sliders on steering unit are sticking, possibly dirty.	Change steering unit.
Steering wheel play	The propeller shaft is worn or broken.	Change steering unit.
	Spring force of steering unit too low, spring broken.	Change steering unit.
	Work spline on steering column.	Replace steering column, if necessary replace steering unit.
Tyre vibration during steering process.	Air in steering cylinders.	The reason for the air collection must be found and eliminated.
	Mechanical connections are worn (run out).	Replace faulty parts.
The steering wheel can be	No oil in tank.	Add oil and bleed system.

turned continuously without giving any steering movement.	The steering cylinders are worn.	Replace worn parts.
	Worn gear set.	Change steering unit.
	Pressure limiting valve set higher than double safety valves.	Adjust pressure limiting valve to spec. sheet.
The steering wheel is too slow or heavy to move for quick turns.	The steering unit is not getting enough oil, the pump is faulty.	Replace pump, check engine speed, adjust as in data sheet.
	The pressure limiting valve is set too low.	Adjust pressure limiting valve to spec. sheet.
	The pressure limiting valve sticks, dirty.	Clean the valve.
"Kick-back" in steering wheel from the system, jerks from the wheels.	Faults in system.	Please contact Customer Service.
Strong impact in steering wheel to both sides.	Incorrect adjustment of propeller shaft and gear set.	Change steering unit.
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	Steering cylinder faulty.	Replace steering cylinder.
Leaks from: input shaft, end cap, gear set or casing, or upper part.	Faulty shaft seal.	Replace shaft seal.
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	Oil level in hydraulic oil tank too low.	Add hydraulic oil and bleed steering unit.
	Lines chafing.	Route lines properly and attach, or replace.
	Oil loss on hydraulic steering unit.	Replace hydraulic steering unit.
Continued turning and/or catching on rapid steering movements.	Oil level in hydraulic oil tank too low.	Eliminate leak, add hydraulic oil and bleed steering system if necessary.
	Suction-return filter in hydraulic oil tank dirty	Replace filter insert.
Steering wheels moves to left or right on its own.	Return line to hydraulic oil tank dirty.	Change return line, return pressure at 60 °C ≤6 bar (87 psi).
	Suction-return filter in hydraulic oil tank dirty	Replace filter insert.
Steering wheel can be turned further when front and rear parts stop.	Internal leakage in hydraulic steering unit too great.	Check slip on steering wheel, replace steering unit if necessary.
	Internal leakage in steering cylinders too great.	Check internal leakage on cylinders, replace sealing rings or replace steering cylinders if required.

Document Title: Steering pump, test for internal leak	Function Group: 640	Information Type: Service Information	Date: 2014/3/10
Profile: CWL, L30B [GB]			

Steering pump, test for internal leak

Op nbr

1. Follow safety instructions in section "Safety".

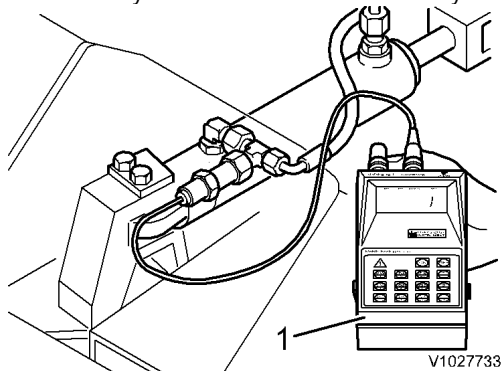


Figure 1

2. Connect pressure tester to mini-measurement connection on steering cylinder.
3. Start engine and bring hydraulic oil to operating temperature of 60 °C (140 F).
4. Install steering joint lock.
5. Turn off engine.
6. Remove return filter insert with filter retainer (open filter cap).
7. Start engine and run at low idle speed.
8. Observe return oil flow to hydraulic oil tank.
9. Move steering to right or left to give a pressure of 150 ±8 bar (110 ±5.9 lbf ft) which remains constant.
10. The return oil flow must remain constant. If it visibly diminishes while the pressure remains the same or decreases, the inner leakage of the pump is too great and the pump must be replaced.

NOTE!

This test is only suitable for field test. An accurate test can only be performed with a pressure flow meter.

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