Document Title: **Steering system, description**	Function Group: **600**	Information Type: **Service Information**	Date: **2014/3/8 0**
Profile: **CWL, L25F [GB]**			

Steering system, description

The machine has a hydrostatic articulated rocking steering with a double-action steering cylinder.

The steering pump is a double gear pump. Pump part 1 supplies the working hydraulics and pump part 2 the steering hydraulics. The double pump is flanged to the through drive on the hydrostatic pump.

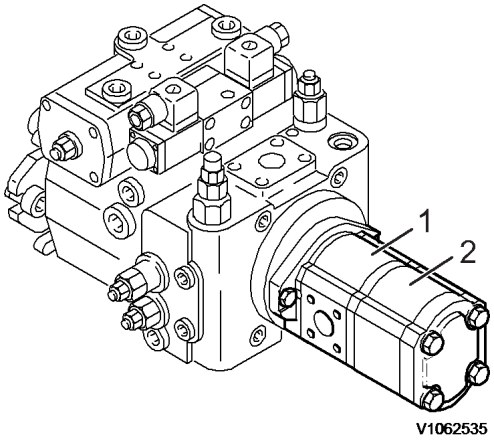


Figure 1

The steering valve has a primary pressure limiter and two secondary pressure limiters with anti-cavitation function.

The emergency steering function allows steering on failure of the steering pump, e.g. as necessary during towing. In this case, the driver must activate the rotor in the steering valve via the steering wheel to generate the oil pressure necessary for steering movement. For this a substantially higher actuation force must be applied to the steering wheel.

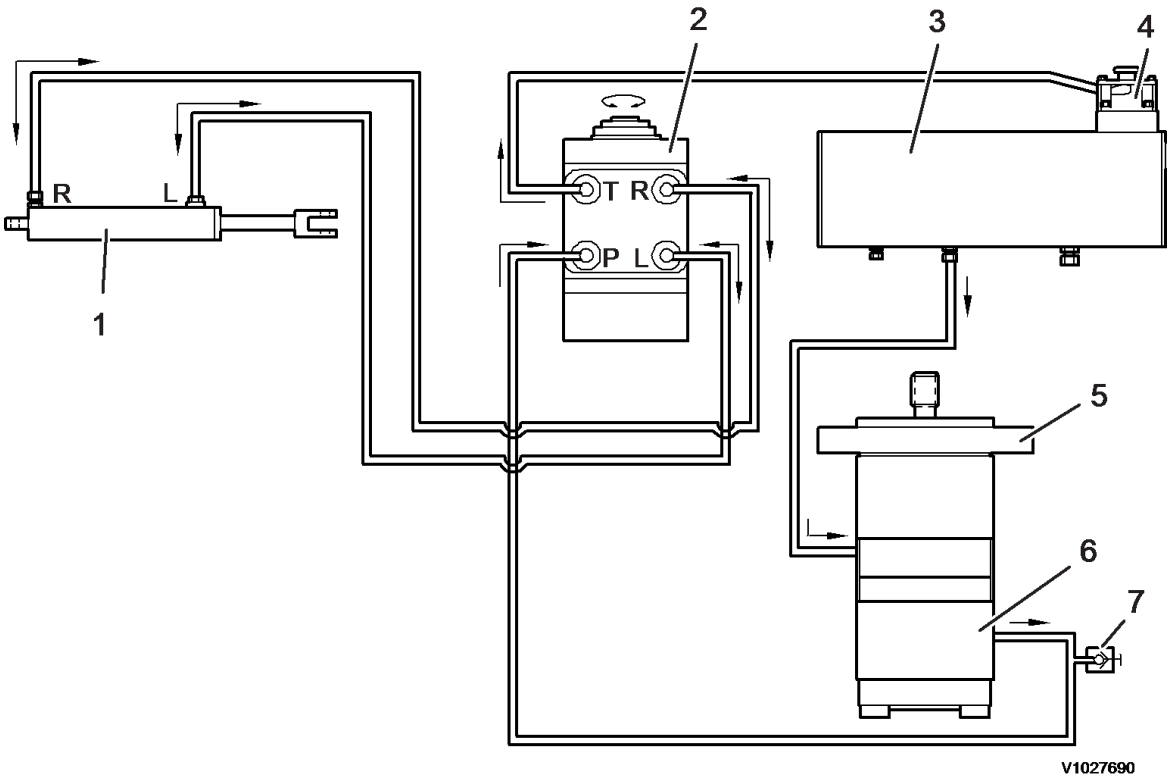


Figure 2
Steering system, principle diagram

1. Steering cylinder
2. Steering unit
3. Hydraulic oil tank
4. Suction and return filter
5. Double gear pump
6. Steering pump
7. Measuring port

Document Title: **Troubleshooting and actions to fix problems**	Function Group: **640**	Information Type: **Service Information**	Date: **2014/3/8 0**
Profile: **CWL, L25F [GB]**			

Troubleshooting and actions to fix problems

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".

Troubleshooting chart

Malfunction/error	Possible 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.	Check function.
	Defective pump.	Change pump.
	Pump is worn out.	Change pump.
	The pressure limiting valve stays open, or the setting is too low.	Clean or adjust pressure limiting valve.
Constant corrections with the steering wheel (snaking drive).	Spring force of steering valve too low, spring broken.	Change steering valve.
	Spring in double safety valve broken.	Replace faulty parts.
	Gear set worn.	Change steering valve.
	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 valve are fitted with distortion.	Centre the steering column with the steering valve.
	Insufficient or no play between steering column and steering valve.	Adjust play, if necessary shorten spline pins.
	Inner and outer sliders on steering valve are sticking.	Change steering valve.
The steering wheel continues to turn on its own.	Spring force of steering valve too low, spring broken.	Change steering valve.
	Inner and outer sliders sticking, possibly soiled.	Change steering valve.
Steering wheel play	The propeller shaft is worn or broken.	Change steering valve.
	Spring force of steering valve too low, spring broken.	Change steering valve.
	Work spline on steering column.	Replace steering column, if necessary replace steering valve.
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 turned continuously without giving any steering movement.	No oil in tank.	Add oil and bleed system.
	The steering cylinders are worn.	Replace steering cylinder.
	Worn gear set.	Change steering valve.
	Pressure limiter valve set higher than secondary limiter.	Adjust pressure limiter valve, see 645 Steering system, checking and adjusting working pressure .
The steering wheel is too slow or heavy to move for quick turns.	The steering valve is not getting enough oil, the pump is faulty.	Replace pump, check engine speed, adjust, see data sheet 030 Engine, specification.
	The pressure limiting valve is set too low.	Adjust pressure limiter valve, see 645 Steering system, checking and adjusting working pressure .
	The pressure limiting valve sticks, soiled.	Clean the valve.
Strong impact in steering wheel to both sides.	Incorrect adjustment of propeller shaft and gear set.	Change steering valve.
When the steering wheel is turned, the steering movement takes place in the opposite direction.	The hydraulic hoses on the steering cylinder are wrongly connected.	Check connections 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 screws. Tightening torque, see 030 Steering, tightening torques.
	Washers or O-rings are faulty.	Replace faulty washers or O-rings.
Abnormal noise.	Suction-return filter in hydraulic oil tank dirty.	Change filter insert, see 173 Hydraulic oil filter, changing.
	Steering pump draws in air.	Eliminate leaks.
	Oil level in hydraulic oil tank too low.	Add hydraulic oil and bleed steering circuit.
	Lines chafing.	Route lines properly and attach, or replace.
	Oil loss at steering valve	Change steering valve.
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 circuit if necessary.
Steering wheel turns itself to the right or left.	Steering valve sticking.	Change steering valve.
Steering wheels moves to left or right on one side.	Suction-return filter in hydraulic oil tank dirty.	Replace filter insert.
	Return line to hydraulic oil tank crushed.	Change return oil line, return pressure at 60 °C ≤ 6 bar.
Steering wheel can be turned further when front and rear parts stop.	Internal leak at steering valve	Change steering valve.
	Internal leakage in steering cylinders too great.	Replace seal ring or change steering cylinder.

VOLVO
Construction Equipment

Service Information

Document Title:	Function Group:	Information Type:	Date:
Hydraulic diagram, steering	**640**	**Service Information**	**2014/3/8 0**
Profile: **CWL, L25F [GB]**			

Hydraulic diagram, steering

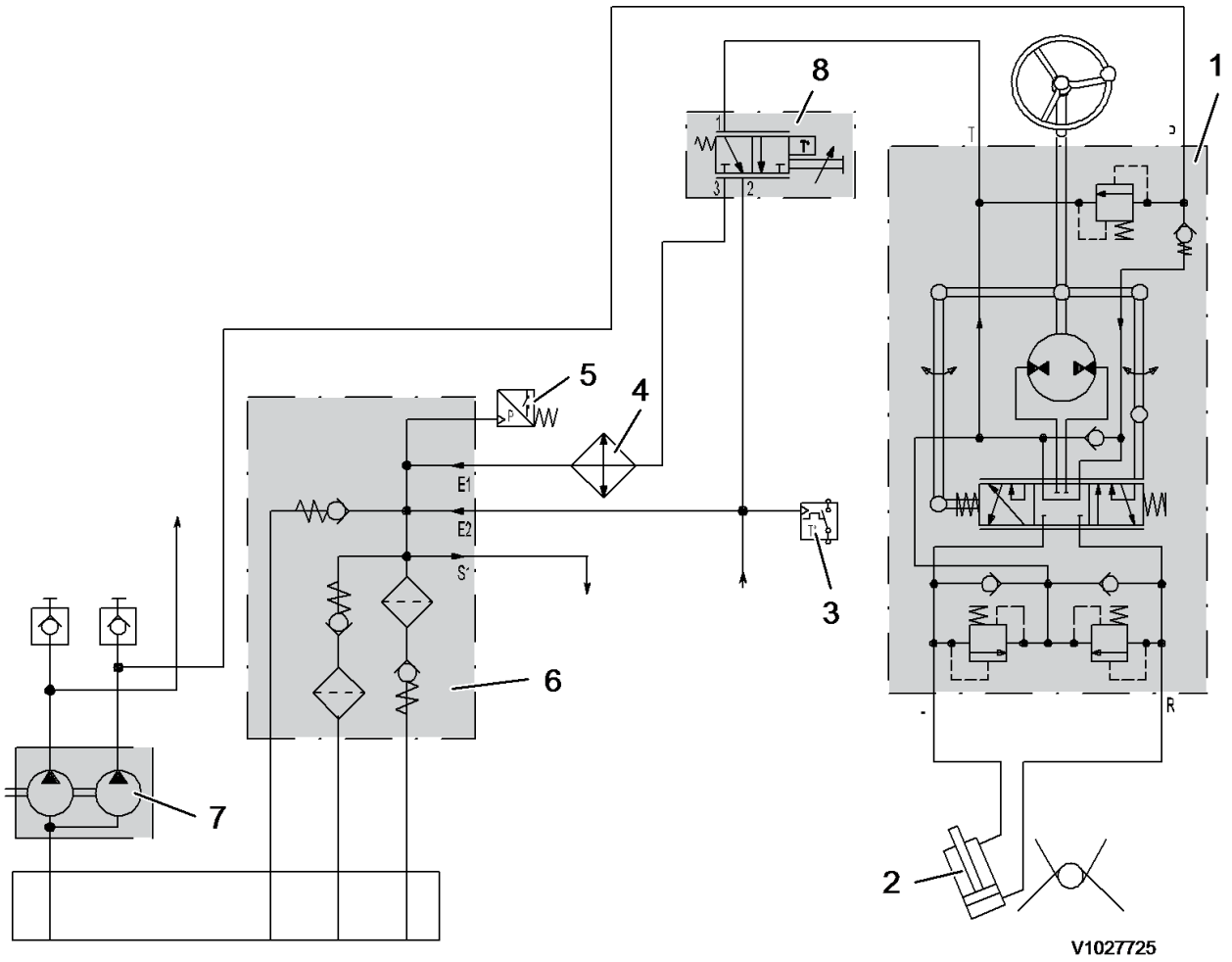


Figure 1
Hydraulic diagram, steering system

1. Steering valve
2. Steering cylinder
3. Hydraulic oil thermostat (SE-B17)
4. Hydraulic oil cooler
5. Control switch, hydraulic oil filter (SE-B13)
6. Suction and return filter
7. Steering pump
8. Thermostat

Hydraulic diagram, steering valve

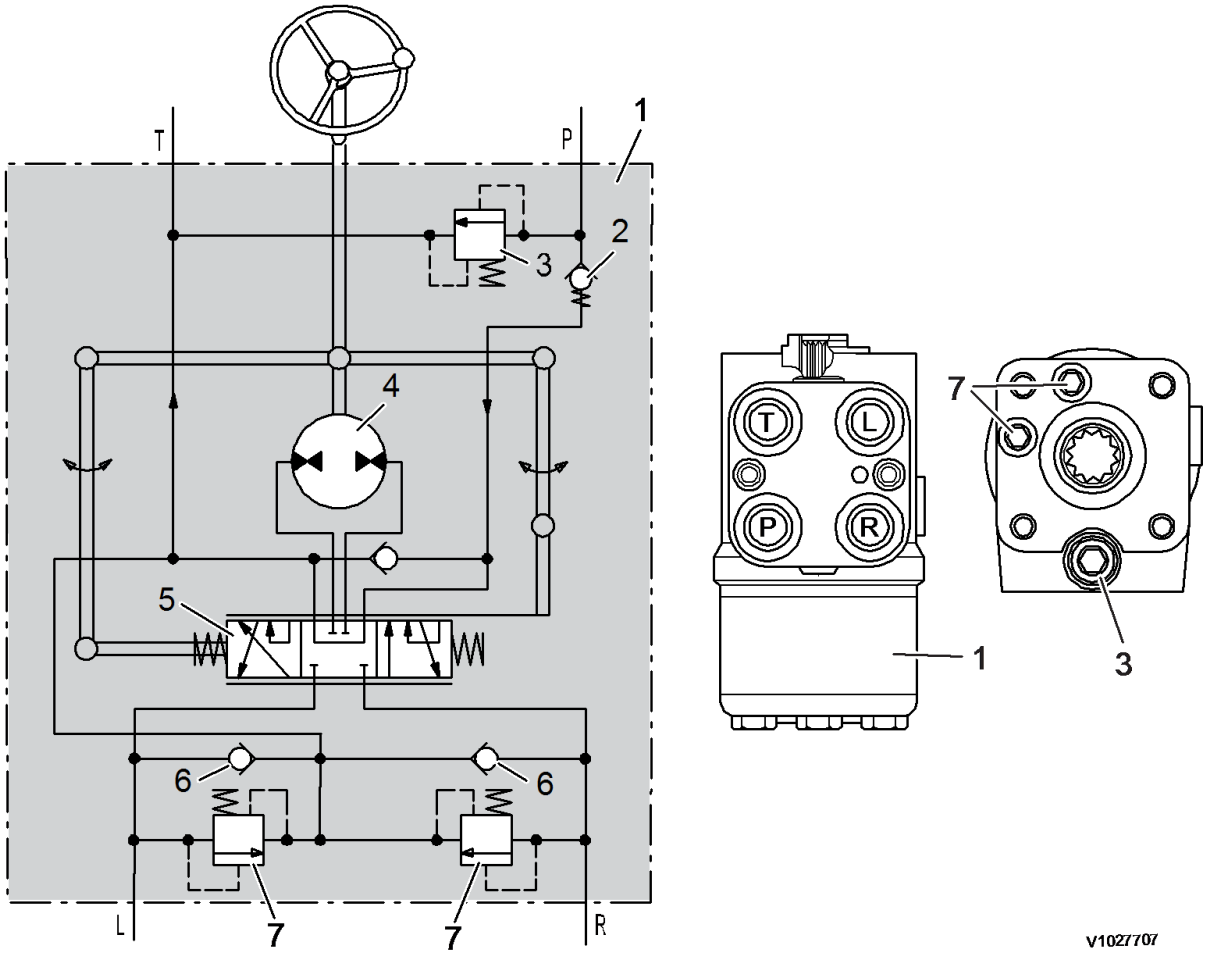


Figure 2
Hydraulic diagram, steering valve

1. Steering valve
2. Non return valve
3. Primary limiting valve (pressure limiter valve)
4. Rotor
5. Spool
6. Anti-cavitation valves
7. Secondary limiting valve

Document Title: **Steering valve, removal**	Function Group: **645**	Information Type: **Service Information**	Date: **2014/3/8 0**
Profile: **CWL, L25F [GB]**			

Steering valve, removal

Op nbr 645-022

1. Place the machine in service position.
2. Turn OFF the battery disconnect switch.
3. Remove floor mat (1) and remove steering column panelling (2).

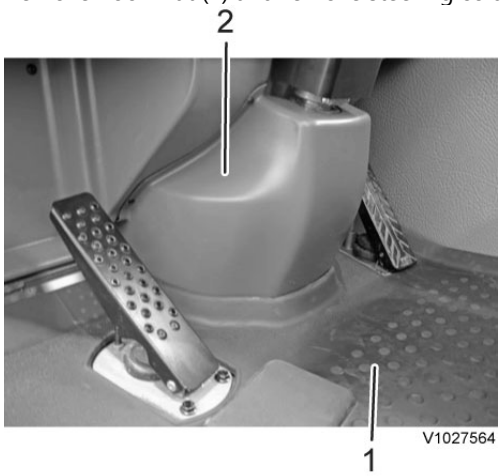


Figure 1

4. Unscrew bleed valve (1).

WARNING

Hot hydraulic oil and hydraulic oil under pressure may result in severe personal injuries

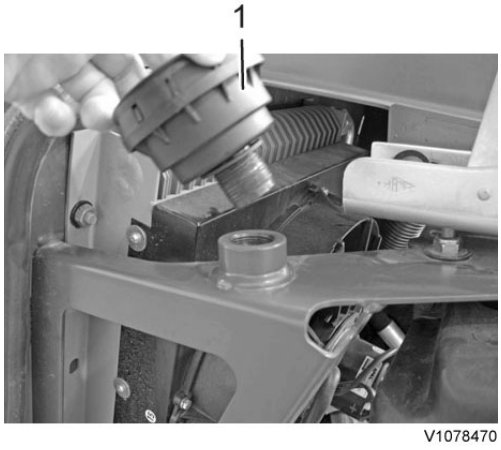
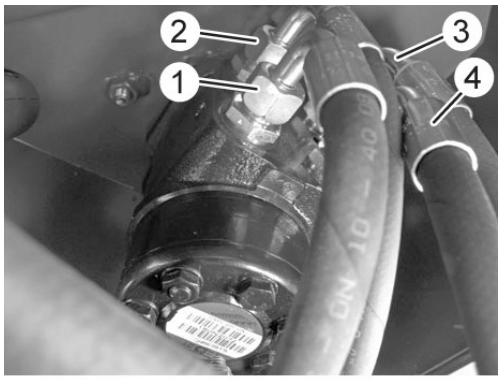


Figure 2

5. Remove all hydraulic lines at the steering valve.
   NOTE!
   Place suitable catchment container below to catch escaping oil.

   NOTICE

   When a hose has been disconnected, plug both the hose and the connection immediately. The hoses should be marked for correct connection.

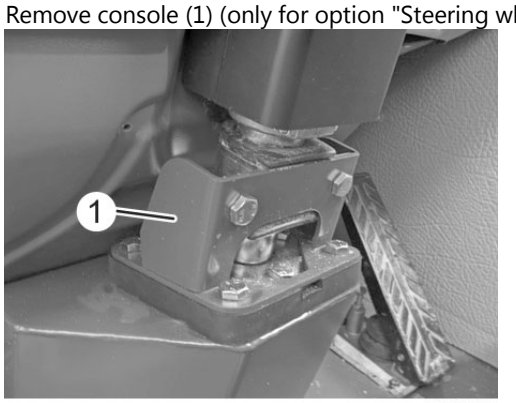


V1027565

Figure 3

1. Pressure line (P)
2. Tank return line (T)
3. Connection to steering cylinder, left (L)
4. Connection to steering cylinder, right (R)

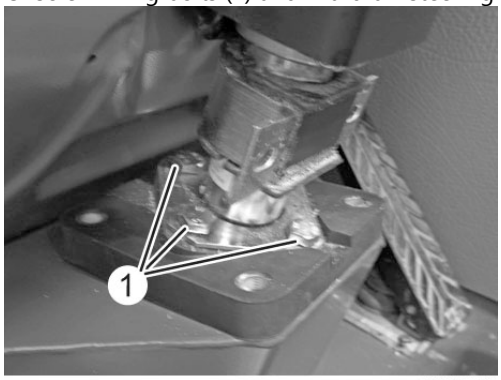
6. Remove console (1) (only for option "Steering wheel adjustment"



V1027566

Figure 4

7. Unscrew fixing bolts (1) and withdraw steering valve downwards.



V1027549

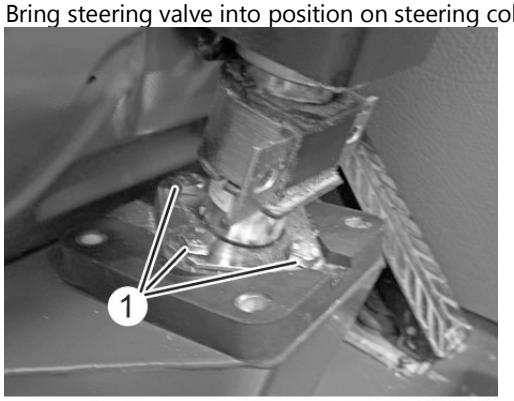
Figure 5

Document Title:	Function Group:	Information Type:	Date:
Steering valve, installation	**645**	**Service Information**	**2014/3/8 0**
Profile: **CWL, L25F [GB]**			

Steering valve, installation

Op nbr 645-023

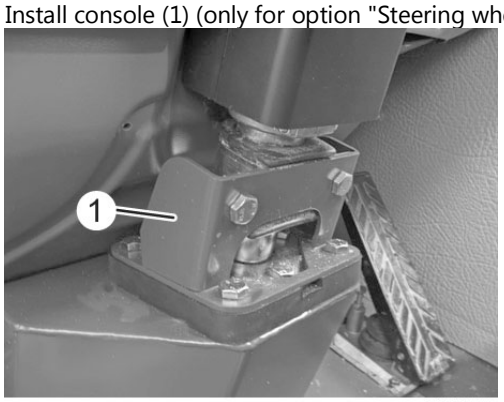
1. Bring steering valve into position on steering column. Screw in fixing bolts (1) and tighten alternately.



V1027549

Figure 1

2. Install console (1) (only for option "Steering wheel adjustment"



V1027566

Figure 2

3. Install steering column panelling (2) and floor mat (1).

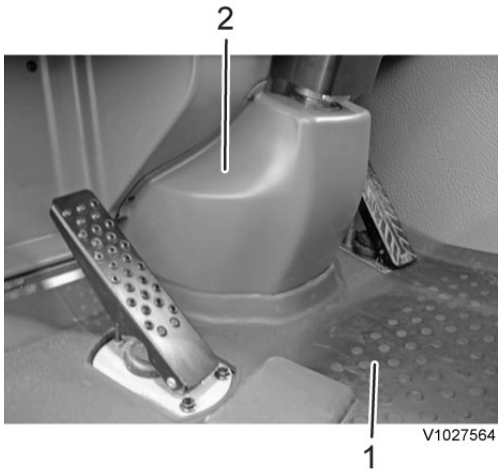


Figure 3

4. Install all hydraulic lines at the steering valve.

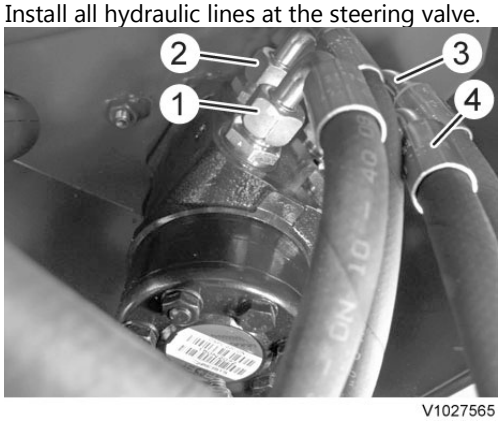


Figure 4

1. Pressure line (P)
2. Tank return line (T)
3. Connection to steering cylinder, left (L)
4. Connection to steering cylinder, right (R)

5. Screw in bleed valve (1).

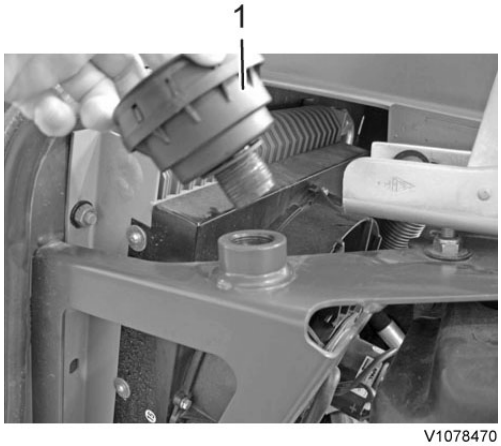


Figure 5

6. Bleed steering circuit. Start engine and turn steering wheel 2 to 3 times clockwise and anticlockwise to stop.

7. Check the hydraulic oil level and top up if necessary. See 173 Hydraulic oil level, check.
8. Check operating pressure of steering, see 645 Steering system, checking and adjusting working pressure.
9. Carry out test drive and check steering function.

Document Title: **Steering system, checking and adjusting working pressure**	Function Group: **645**	Information Type: **Service Information**	Date: **2014/3/8 0**
Profile: **CWL, L25F [GB]**			

Steering system, checking and adjusting working pressure

Op nbr 645-028

88830055 Pressure checking set

Inspection item

NOTE!
Warm up the machine until the hydraulic system is at operating temperature 60°C (140°F).

1. Place the machine in service position.

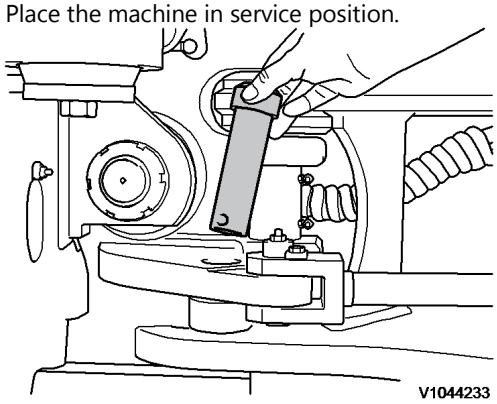


Figure 1
Steering joint lock

2. Block articulation joint using “Joint lock”.

3. Connect pressure gauge to measurement connection on steering pump (1).

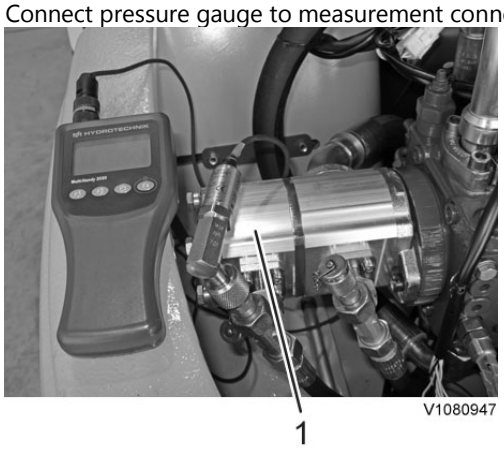


Figure 2
Steering pump

4. Start engine. Increase engine speed to high idle and at the same time turn the steering clockwise or anticlockwise

until the maximum steering pressure is achieved. For nominal value, see 030 Steering unit, specification.

NOTE!

If the specified nominal value is not reached, set steering pressure on the pressure limiter valve.

Adjust

5. Unscrew lock plug on pressure limiter valve on steering valve and remove seal ring.

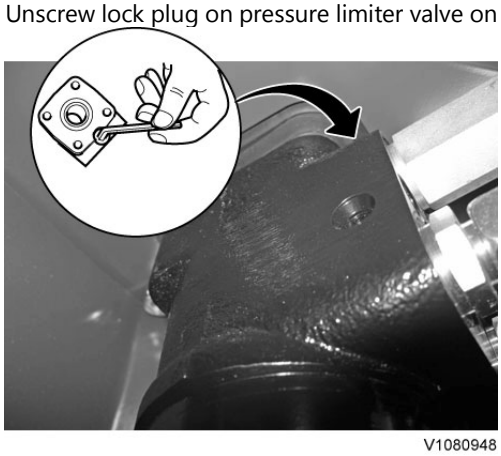


Figure 3
Pressure limiter valve on steering valve

6. Turn pressure limiter valve adjusting screw to left until the pressure gauge shows the specified nominal value.
   Turn to right: increase pressure
   Turn to left: reduce pressure

7. Screw in lock plug with new seal ring and tighten to a torque of **50 Nm (36.8 lbf ft)**.

8. Restore the machine to its operational state.

Many thanks for your purchase.
Happy every day.