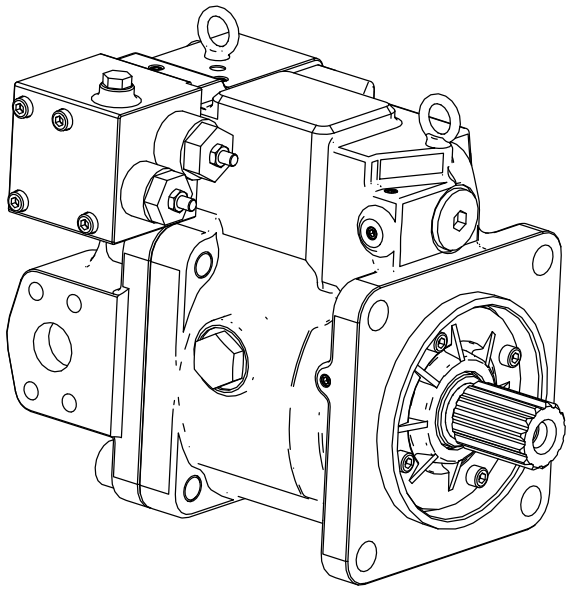
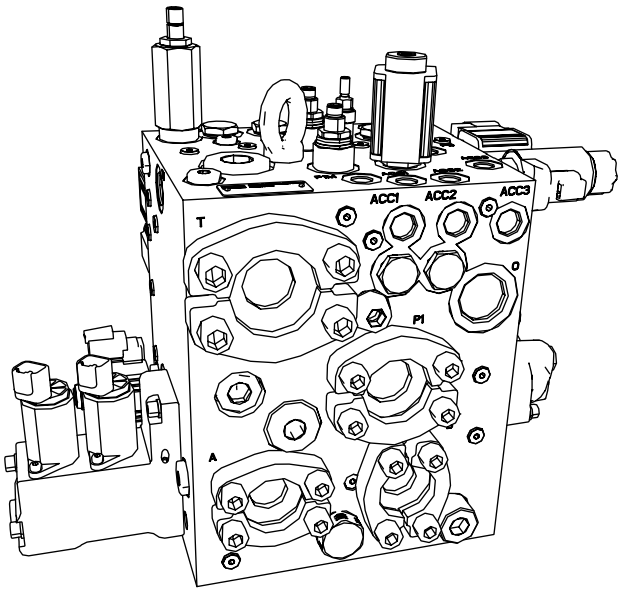
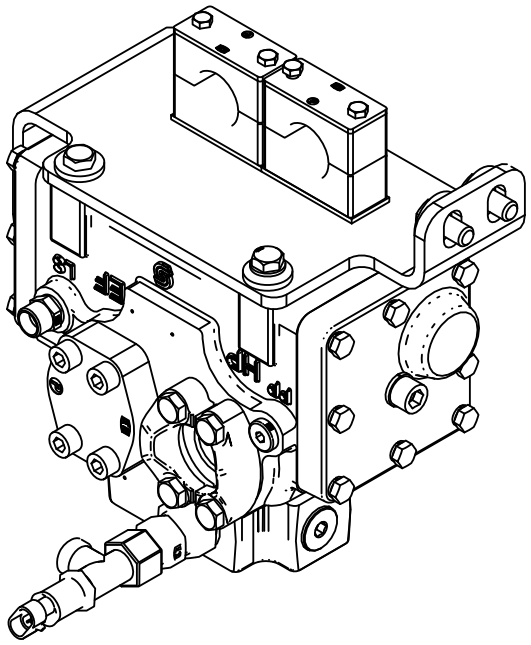
Chapter 5

Hydraulic system







Hydraulic system

Index

Components, capacities and oil types

Oil type:

- Hydraulic fluid: ISO-VG 32 (Viscosity 32)
- BIO oil can be used
- BIO oil cannot be mixed with hydraulic oil and system need to be flushed
- Type of BIOoil to be accepted by Hyundai

NOTE

For fluid type and specifications, refer to the Hyundai Operating & Maintenance Manual Chapter 6.

Hydraulic tank:

	HA30	HA45
• Two chamber tank		
• Volume oil tank	63L	63L
• Volume system	150L	160L

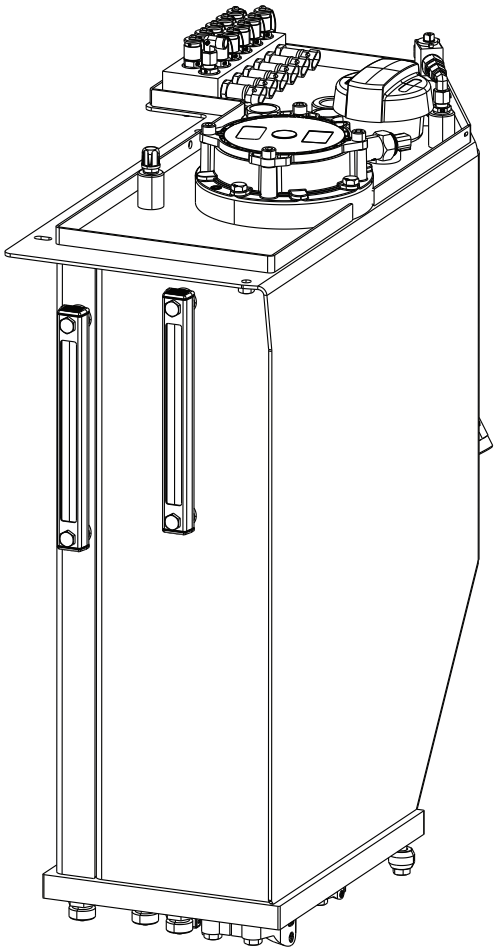


Figure 1

NOTE

If work is performed on the hydraulic system replace broken seals.
Contact your Hyundai dealer for seal kit.

Hydraulic system main function.

The hydraulic system has one pump.
The steering system, brake system, self leveling suspension, tilting functions and the cooling fan functions are fed by the hydraulic pump (140ccm/rev.), driven by the engine.

The emergency steering system is fed by the emergency steering pump (maximum 50 l/min) which is driven by the truck's motion, either forwards or backwards.

The hydraulic system has three primary functions:

First primary function: supply the steering power and transmit the drivers steering motion from the steering wheel to the steering cylinders, and safely maintain the steering function if the engine fails.

Second primary function: supply the brake and suspension accumulator with pressure in the accumulator chamber and feed the cooling fan motor which provides sufficient fan speed to maintain the engine operating temperature within given limits.

Third primary function: supply power to the tilting cylinders to manage unloading the dumper body.

Hydraulic parts view HA30

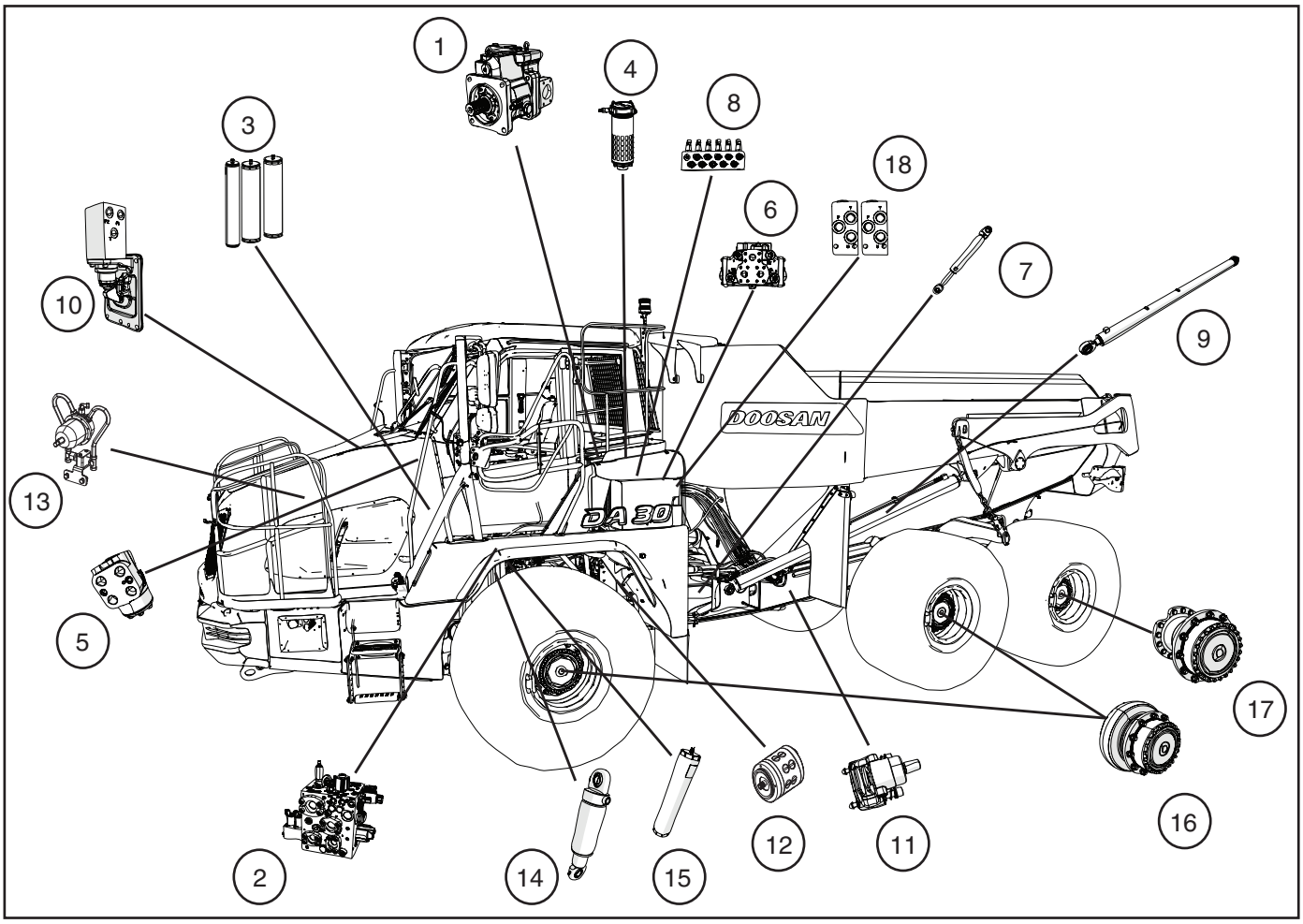


Figure 2

Hydraulic System Description

For optimum efficiency and performance, the new system is still using variable displacement pump- and load sensing technology for the operation of bin lifting-, steering-, brake-, self centering and fan control systems as its predecessor.

The new system has reduced the complexity further with fewer components, better packaging by the integration of several sub functions into one main manifold, less connecting points for simplified installation and reduction of potential leakage points. The entire hydraulic system is fed by one large variable displacement pump. Although less complex, the new one pump system offers increased lifting flow and by using an “on-demand” maximum flow boost function only when lifting, the pump margin pressure setting has been possible to reduce, (now 20bar), what reduces energy losses, heat generation and emissions further while saving fuel.

Hydraulic System Components

The hydraulic system consists of the following components:

1. Variable displacement piston pump;
Maximum displacement 140cc.The pump has maximum pressure and load sensing delta-P controller. The maximum pressure is factory set at 280bar. LS delta-P is set at 20bar at engine idle speed and no flow output (i.e. standby setting)

2. Main control manifold assembly;
It has included a control section with electrohydraulic pilot controlled three position spool operated bin lift function and lift cylinder pressure protection. The manifold also incorporates functions for steering priority, steering maximum pressure limitation, brake charging, brake- and parking brake pressure control, fan activation and speed control, pilot pressure supply, bin float function, pump de-stroking damping, pump pressure spike protection and suspension leveling.

The manifold also acts as a junction block for connection and distribution of various supply- and tank lines.

It also offers gauge ports for various important control pressures. Many of those control pressures are routed to an external test block, [Item 8], for easy access.

3. Brake Pressure Accumulators;
The 2,15 Liter parking brake accumulator is placed on the right side of the front frame, along with the 3,3 Liter front service brake accumulator, and the 3,3 Liter rear service brake accumulators. The accumulators are from Doosan Infracore Norway AS factory loaded with Nitrogen (N_2).

4. Return Filter
The filter is mounted in the tank and flow passes through it via a pipe connection from below. The optimal flow conditions created by flow from beneath guarantee optimum air separation, high pulsation stability and very long filter service lives. They consist of a housing tube, filter head and filter cover. The element is top-removable, and is equipped with a bypass valve and a non-return valve.

5. Orbitrol
Displacement:
HA30 - 160 cm^3 (9.76 in^3 / rev)
HA45 - 250 cm^3 (15.25 in^3 / rev)
Rated oil flow: 25 L/min (6.60 U.S. gal / min)

6. Steering Valve
When the orbitrol is activated, a controlled oil flow is directed to the steering valve.
This oil flow is amplified in the steering valve and the total oil flow is directed to the steering cylinders.
The orbitrol has a displacement of 160cm3/rev(HA30) and 250cm3/rev(HA45) and the amplification factor is 8.
This means that total displacement is 160 cm3 x 8 = 1280 cm3(HA30) and 250 cm3 x 8 = 2000(HA45) per steering wheel revolution.

The principle applied to the controlled operation of the flow amplifier, called “load sensing”. As name suggest , it is a system in which the load is used in this system, to control the priority valve in the flow amplifier, so that oil flow and pressure precisely matches momentary demands.

7. Steering Cylinders
The Steering Cylinders are located on each side of the articulation hinge and are responsible for the front frame turning. Their specifications are:

	HA30	HA45
• Double acting;		
• Cylinder Diameter	100mm	115mm
• Piston rod	63mm	70mm
• Stroke	515mm	550mm
• End cushion.		

8. Test Block
Located on the left side, over the hydraulic tank, has all the test ports from the hydraulic system. Also, most of the pressuresensors are mounted on the test block, and are responsible to send information to the VCU.

9. Tilt Cylinders
The Tilt Cylinders are located on the rear wagon on each side of the dumper body. The specs for them are:

	HA30	HA45
• Double acting		
• Cylinder diameter	115mm	125mm
• Piston rod	70mm	85mm
• Stroke	2290mm	2614mm

10. Brake Valve
The pedal brake is located on the cab front wall (firewall). Access is obtained by tilting the cab. The pressure setting is 120±5 bar, measured at brake port A. Pilot flow from brake valve to relay valve, 1:1.

11. Parking Brake Cylinder
The parking brake cylinder is spring actuated, hydraulic released, self-centering, single disc brake mounted at the fixed propeller shaft in rear chassis.

12. Emergency Steering Pump
The hydraulic system is equipped with a ground driven radial piston pump fitted at the transmission. This pump makes the truck manoeuvrable if the engine stops or main pump drive fall out.

13. Fan Drive Motor
The Fan Drive Motor is located at the front end of the engine, just behind the cooler package. Access is obtained by removing the bonnet.

14. Suspension cylinder
The suspension cylinders are located on each side of the front frame, behind the fenders.

	HA30	HA45
• Double acting		
• Cylinder diameter	125mm	125mm
• Piston rod	100mm	100mm
• Stroke	200mm	300mm

15. Self leveling accumulator
The 4.0 liter self leveling accumulator is placed behind the suspension cylinders on the front frame LHS and RHS.

16. Wheelhub with brake

17. Wheelhub without brake

18. Relay valves
VS relay valve provides high flow directly from the accumulators to the brakes, proportional to the control pressure, i.e. directly proportional to the pedal position. The braking is progressive. As soon as brake pedal is released, VS transfers oil from brakes to the tank.

Main Valve Circuit (Up to 7X1750 / 8X1718)

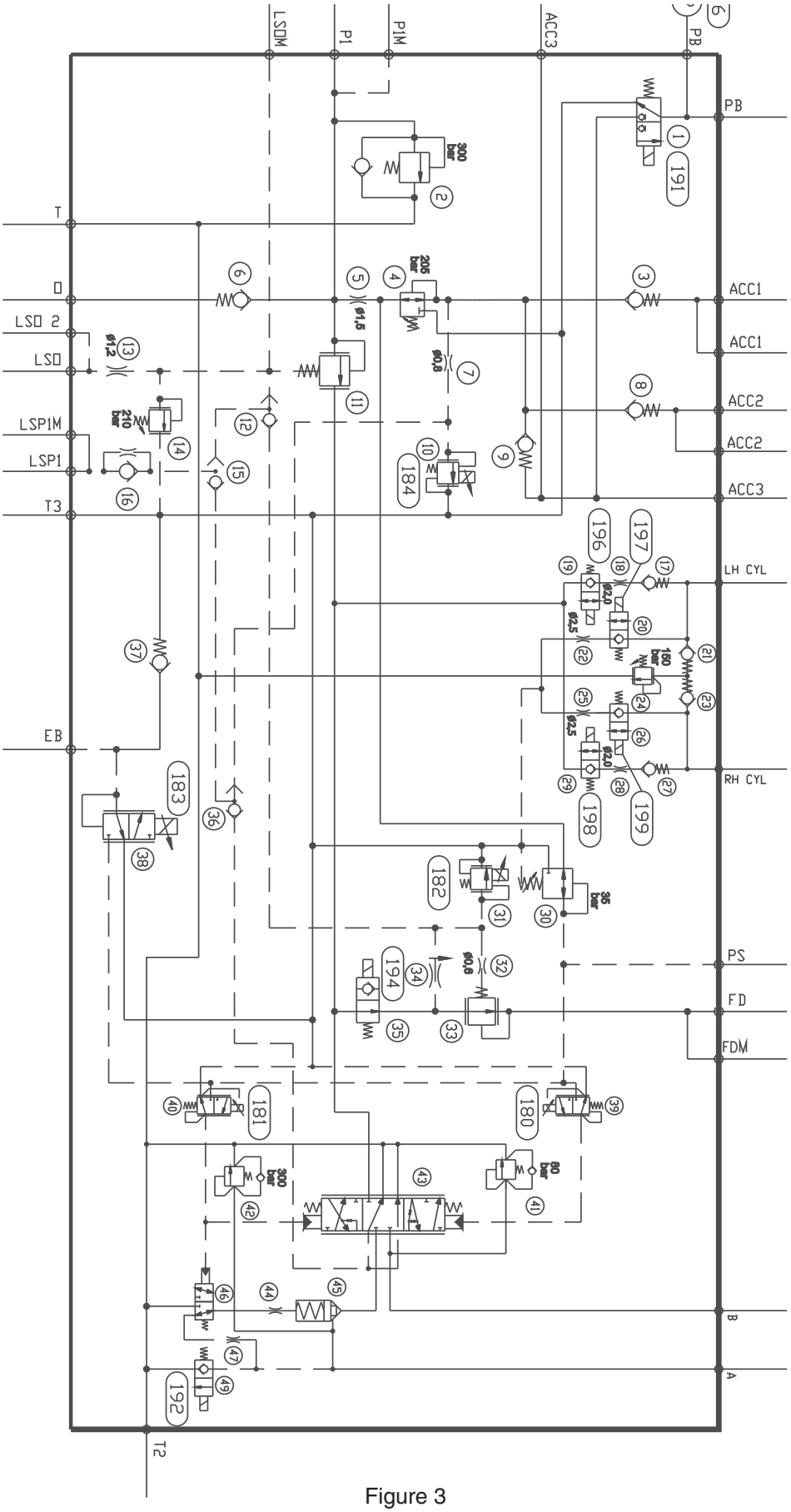


Figure 3

Main Valve Circuit (From 7X1751 / 8X1719)

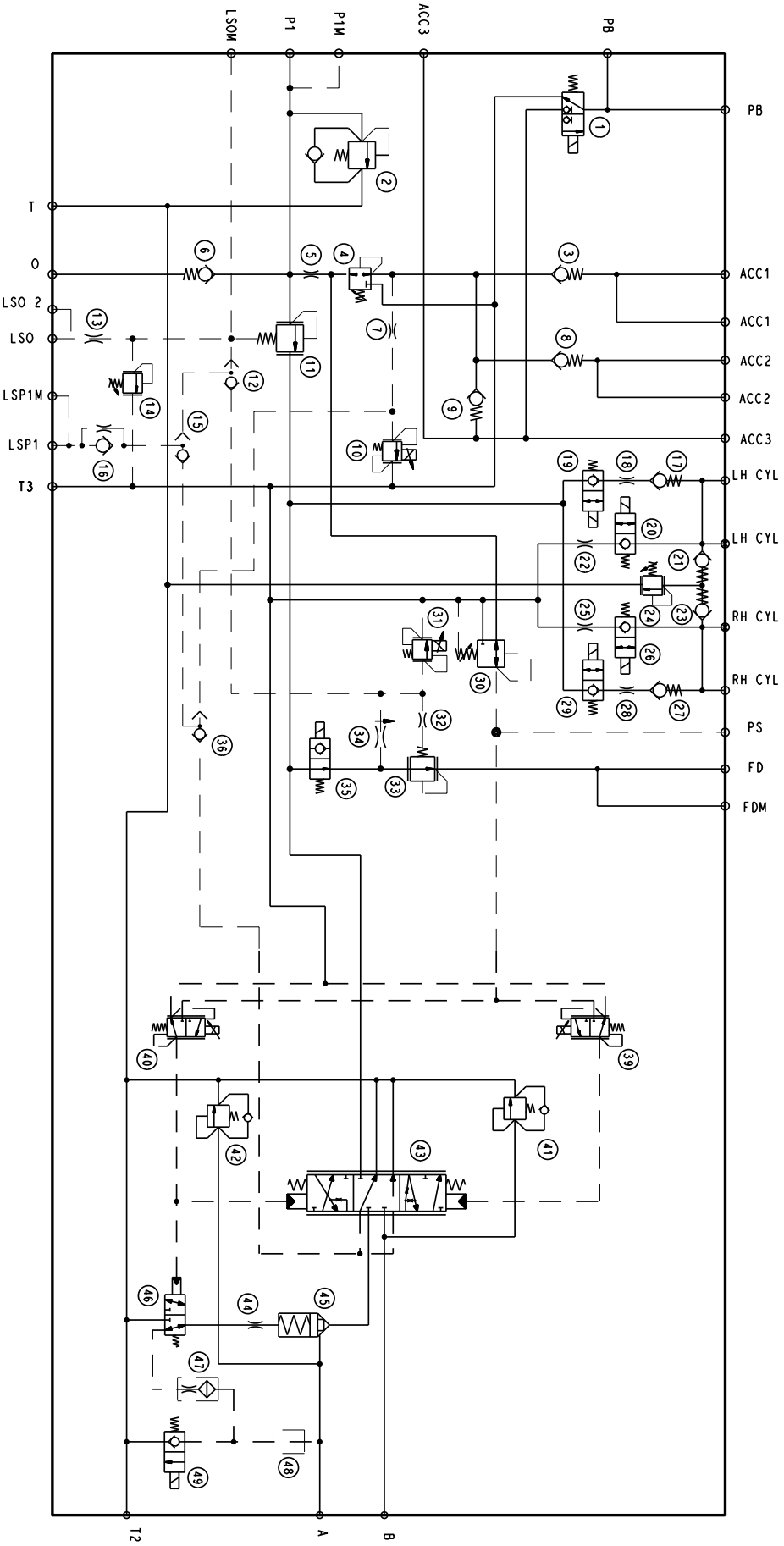


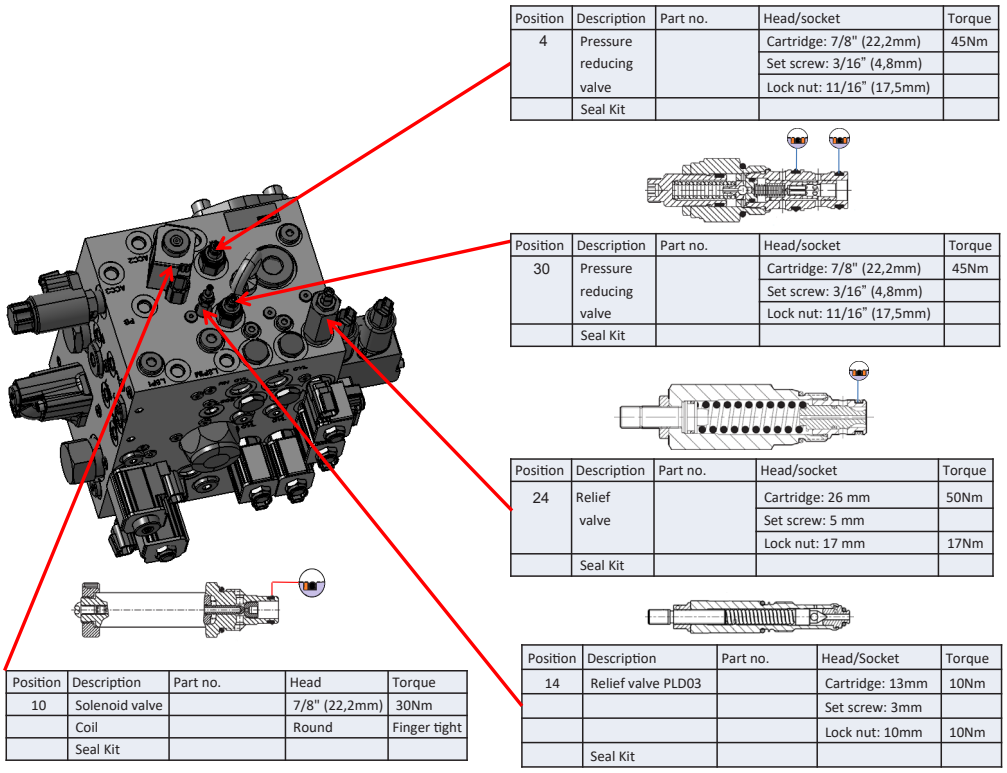
Figure 4

Main Valve - List Of Components

Pos.	Description	Function
1	Solenoid valve, Coil	Parking brake release valve
2	Pressure relief valve	Supply pressure spike clipper valve
3,8,9	Check valve	Brake accumulator charge and isolation function
4	Pressure reducing valve	Brake charge pressure limitation valve
5	Orifice screw	Flow limiting orifice
6	Check valve	Steering system feed check valve
7	Orifice screw	Flow limiting orifice
10	Proportional pressure relief valve	Brake charge pressure control valve
11	Logic Element	Steering- and brake supply priority valve
12,15, 36	Shuttle valve	Load signal shuttle valve
13	Orifice screw	LS relief flow limitation orifice
14	Pressure relief valve	Steering load signal pressure limiter
16	Orifice-check valve	Pump load signal damping restrictor
17,21, 23,27	Check valve	Suspension leveling control check valve
18,28	Orifice screw	Suspension leveling raising flow limitation orifice
19,20, 26,29	Solenoid valve, Coil	Suspension leveling control valve
22,25	Orifice screw	Suspension leveling lowering flow limitation orifice
24	Pressure relief valve	Suspension max pressure limiter
30	Pressure reducing valve	Pilot pressure supply valve
31	Proportional pressure relief valve, Coil	Fan load signal pressure control valve
32	Orifice screw	Fan speed control valve damping orifice
33	Logic element	Fan speed control valve
34	Flow control valve	Fan speed control curcuit flow regulator
35	Solenoid valve	Fan deactivation valve
37	Check valve (up to 7X1750/8X1718)	Engine exhaust brake maximum pressure limiter
38	Proportional pressure reducing valve, Coil (up to 7X1750/8X1718)	Engine exhaust brake pressure control valve
39,40	Proportional pressure reducing valve, damping orifice	Bucket function pilot pressure control valve

41	Relief valve	Port relief valve - Port B (lowering)
42	Relief valve	Port relief valve - Port A (Lifting)
43	Flow control spool	Bucket Lift spool
44	Orifice screw	Poppet damping orifice
45	Poppet valve	Load holding valve
46	Sequence valve	Load holding activation valve
47	Orifice screw	Damping orifice
48	M6 thread. Nothing installed	Provision for installation of flow limitation orifice
49	Solenoid valve	Emergency lowering valve

Main Valve - Spare Parts & Torques



Position	Description	Part no.	Head/socket	Torque
4	Pressure reducing valve		Cartridge: 7/8" (22,2mm)	45Nm
			Set screw: 3/16" (4,8mm)	
			Lock nut: 11/16" (17,5mm)	
	Seal Kit			

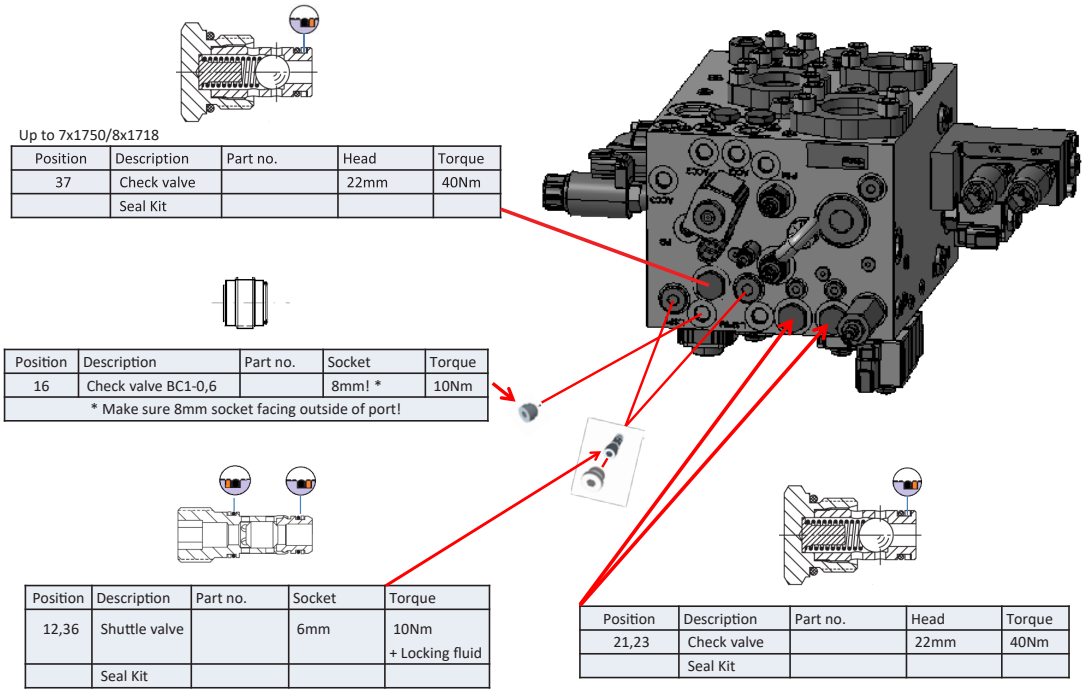
Position	Description	Part no.	Head/socket	Torque
30	Pressure reducing valve		Cartridge: 7/8" (22,2mm)	45Nm
			Set screw: 3/16" (4,8mm)	
			Lock nut: 11/16" (17,5mm)	
	Seal Kit			

Position	Description	Part no.	Head/socket	Torque
24	Relief valve		Cartridge: 26 mm	50Nm
			Set screw: 5 mm	
			Lock nut: 17 mm	17Nm
	Seal Kit			

Position	Description	Part no.	Head/Socket	Torque
14	Relief valve PLD03		Cartridge: 13mm	10Nm
			Set screw: 3mm	
			Lock nut: 10mm	10Nm
	Seal Kit			

Position	Description	Part no.	Head	Torque
10	Solenoid valve		7/8" (22,2mm)	30Nm
	Coil		Round	Finger tight
	Seal Kit			

Figure 5



Up to 7x1750/8x1718

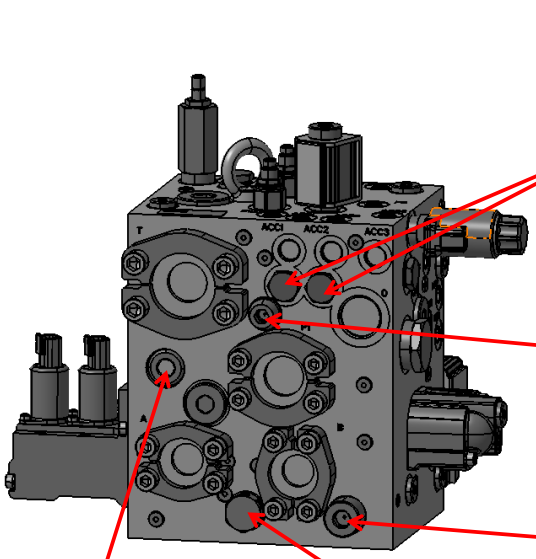
Position	Description	Part no.	Head	Torque
37	Check valve		22mm	40Nm
	Seal Kit			

Position	Description	Part no.	Socket	Torque
16	Check valve BC1-0,6		8mm! *	10Nm
* Make sure 8mm socket facing outside of port!				

Position	Description	Part no.	Socket	Torque
12,36	Shuttle valve		6mm	10Nm + Locking fluid
	Seal Kit			

Position	Description	Part no.	Head	Torque
21,23	Check valve		22mm	40Nm
	Seal Kit			

Figure 6



Position	Description	Part no.	Head	Torque
3, 8	Check valve		22mm	40Nm
	Seal Kit			

Position	Description	Part no.	Socket	Torque
2	Relief valve PLC053-300		10mm	60Nm
	Seal Kit			

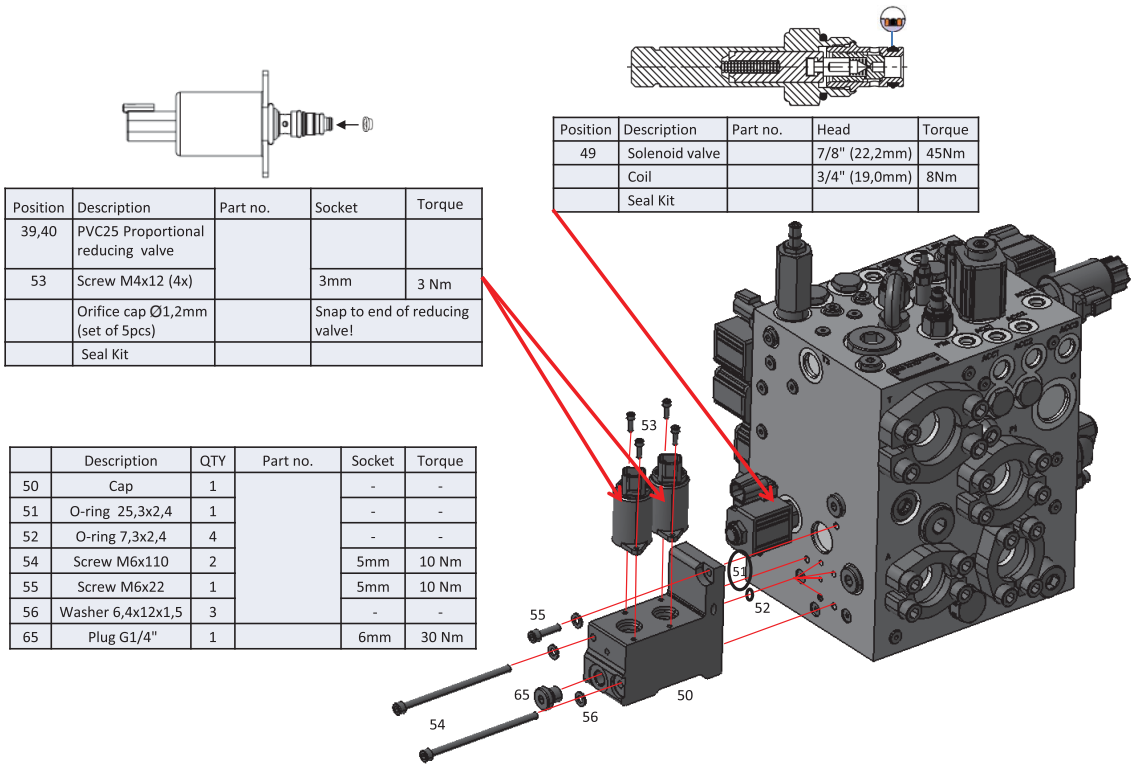
Position	Description	Part no.	Socket	Torque
41	Relief valve PLC182-080		12mm	100Nm
	Seal Kit			

Position	Description	Part no.	Socket	Torque
42	Relief valve PLC082-300		12mm	100Nm
	Seal Kit			

Position	Description	Part no.	Head	Torque
46	Sequence valve 0,8		27mm	60Nm
	Seal Kit			

Figure 7

Up to 7x1750/8x1718



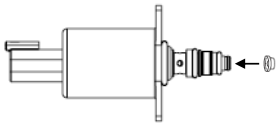
Position	Description	Part no.	Head	Torque
49	Solenoid valve		7/8" (22,2mm)	45Nm
	Coil		3/4" (19,0mm)	8Nm
	Seal Kit			

Position	Description	Part no.	Socket	Torque
39,40	PVC25 Proportional reducing valve			
53	Screw M4x12 (4x)		3mm	3 Nm
	Orifice cap Ø1,2mm (set of 5pcs)		Snap to end of reducing valve!	
	Seal Kit			

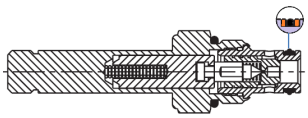
	Description	QTY	Part no.	Socket	Torque
50	Cap	1		-	-
51	O-ring 25,3x2,4	1		-	-
52	O-ring 7,3x2,4	4		-	-
54	Screw M6x110	2		5mm	10 Nm
55	Screw M6x22	1		5mm	10 Nm
56	Washer 6,4x12x1,5	3		-	-
65	Plug G1/4"	1		6mm	30 Nm

Figure 8

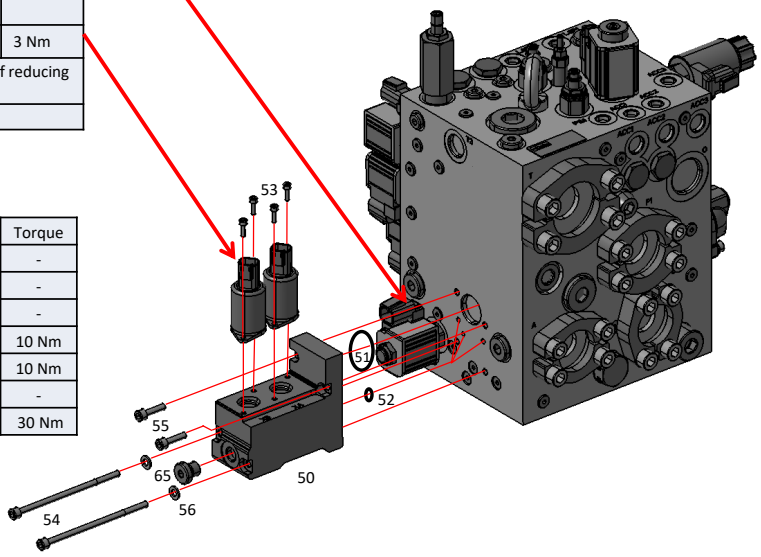
From 7x1751/8x1719



Position	Description	Part no.	Socket	Torque
39,40	PS 25 Proportional reducing valve			
53	Screw M4x12 (4x)		3mm	3 Nm
	Orifice cap Ø1,2mm (set of 5pcs)		Snap to end of reducing valve!	
	Seal Kit			

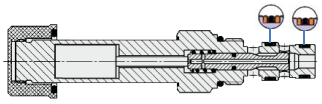


Position	Description	Part no.	Head	Torque
49	Solenoid valve		7/8" (22,2mm)	45Nm
	Coil		3/4" (19,0mm)	8Nm
	Seal Kit			

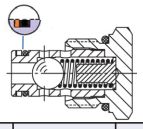


	Description	QTY	Part no.	Socket	Torque
50	Cap	1		-	-
51	O-ring 25,3x2,4	1		-	-
52	O-ring 6,3x2,4	3		-	-
54	Screw M6x110	2		5mm	10 Nm
55	Screw M6x22	2		5mm	10 Nm
56	Washer 6,4x12x1,5	2		-	-
65	Plug G1/4"	1		6mm	30 Nm

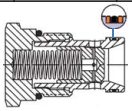
Figure 9



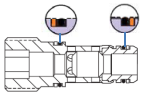
Position	Description	Part no.	Head	Torque
1	Solenoid valve	6763487	7/8" (22,2mm)	25-30Nm
	Coil	6763488	Knurled nut	4-6Nm
	Seal Kit	6763489		



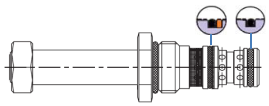
Position	Description	Part no.	Head	Torque
9	Check valve	D02B2-0.2N	22mm	40Nm
	Seal Kit	SK30515N-1		



Position	Description	Part no.	Head	Torque
6	Check valve	D06B2H0.1N	38mm	100Nm
	Seal Kit	SK30514N-1		

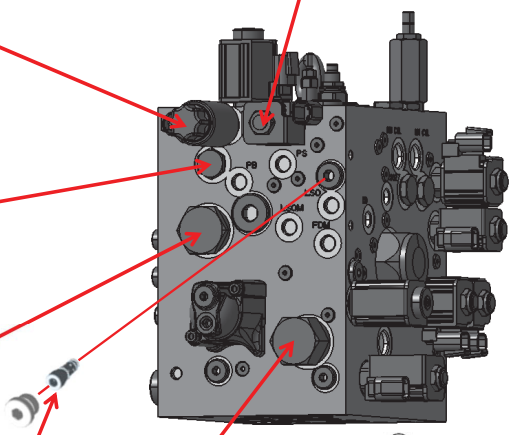


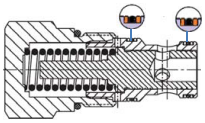
Position	Description	Part no.	Socket	Torque
15	Shuttle valve	K2A005N	6mm	10Nm + Locking fluid
	Seal Kit	SK30091N-1		



Up to 7x1750/8x1718

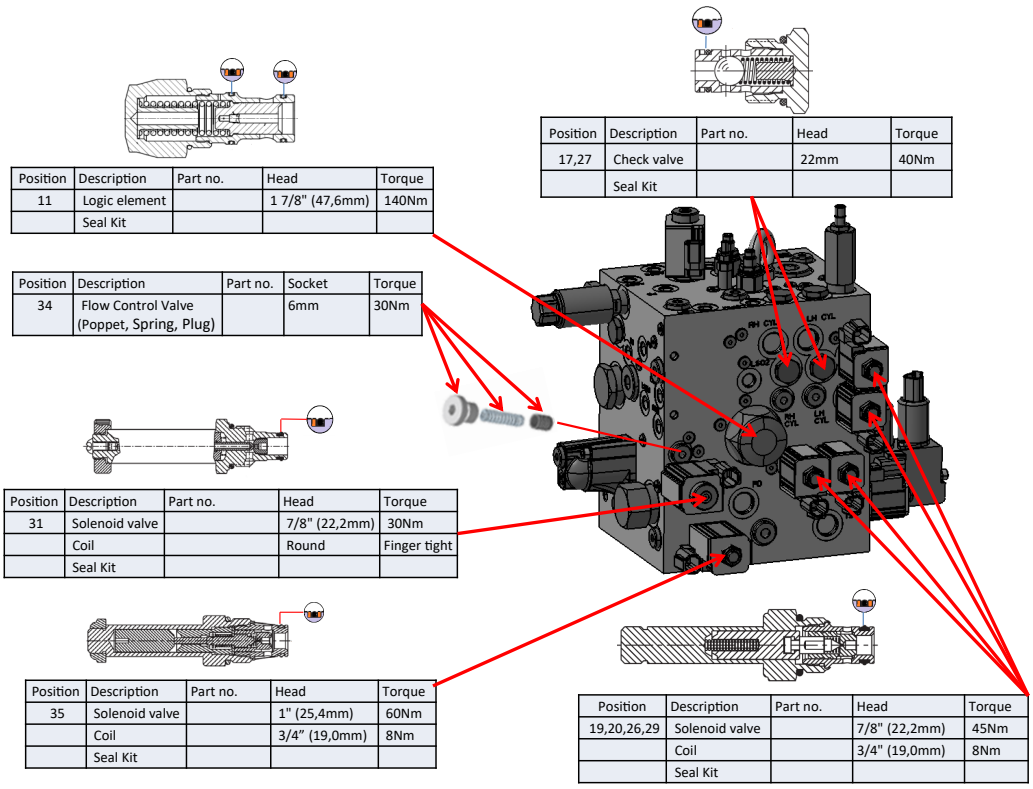
Position	Description	Part no.	Head	Torque
38	Proportional reducing valve	GTP02340301N	7/8" (22,2mm)	30Nm
	Coil	CCS024H	3/4" (19,0mm)	3,5Nm
	Seal Kit	SK30081N-1		





Position	Description	Part no.	Head	Torque
33	Logic element	R06H3-10.0N	38mm	100Nm
	Seal Kit	SK30508N-1		

Figure 10



Position	Description	Part no.	Head	Torque
11	Logic element		1 7/8" (47,6mm)	140Nm
	Seal Kit			

Position	Description	Part no.	Socket	Torque
34	Flow Control Valve (Poppet, Spring, Plug)		6mm	30Nm

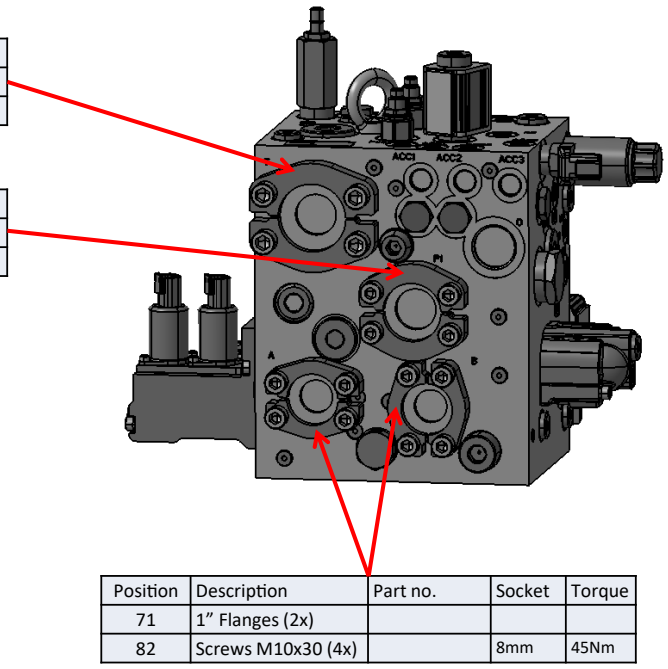
Position	Description	Part no.	Head	Torque
31	Solenoid valve		7/8" (22,2mm)	30Nm
	Coil		Round	Finger tight
	Seal Kit			

Position	Description	Part no.	Head	Torque
35	Solenoid valve		1" (25,4mm)	60Nm
	Coil		3/4" (19,0mm)	8Nm
	Seal Kit			

Position	Description	Part no.	Head	Torque
17,27	Check valve		22mm	40Nm
	Seal Kit			

Position	Description	Part no.	Head	Torque
19,20,26,29	Solenoid valve		7/8" (22,2mm)	45Nm
	Coil		3/4" (19,0mm)	8Nm
	Seal Kit			

Figure 11



Position	Description	Part no.	Socket	Torque
79	1 ½" Flanges (2x)			
76	Screws M12x35 (4x)		10mm	80Nm

Position	Description	Part no.	Socket	Torque
81	1 ¼" Flanges (2x)			
82	Screws M10x30 (4x)		8mm	45Nm

Position	Description	Part no.	Socket	Torque
71	1" Flanges (2x)			
82	Screws M10x30 (4x)		8mm	45Nm

Figure 12

Position	Description	Part no.	Socket	Torque
45	Flow Control Valve (Poppet, Spring, Plug)		17mm	200Nm

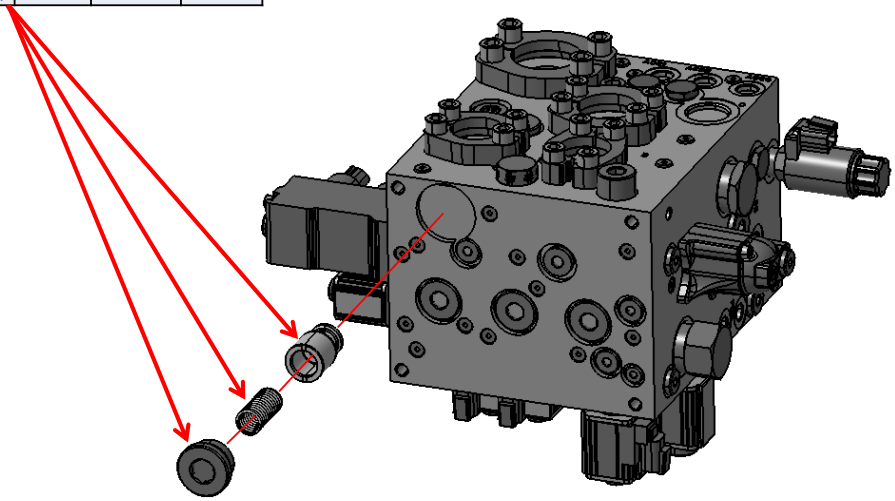


Figure 13

Up to 7x1750/8x1718

	Description	Part no.	Socket	Torque
32,44,47	Orifice screw ø0,6		3mm	3 Nm
7	Orifice screw ø0,8		3mm	3 Nm
13	Orifice screw ø1,2		3mm	3 Nm
5	Orifice screw ø1,5		3mm	3 Nm
18,28	Orifice screw ø2,0		3mm	3 Nm
22,25	Orifice screw ø2,5		3mm	3 Nm

From 7x1751/8x1719

	Description	Part no.	Socket	Torque
7,32,44	Orifice screw ø0,6		3mm	3 Nm
47	Edge Filter ø0,6		3mm	3 Nm
13	Orifice screw ø1,2		3mm	3 Nm
5	Orifice screw ø1,5		3mm	3 Nm
18,28	Orifice screw ø2,0		3mm	3 Nm
22,25	Orifice screw ø2,5		3mm	3 Nm

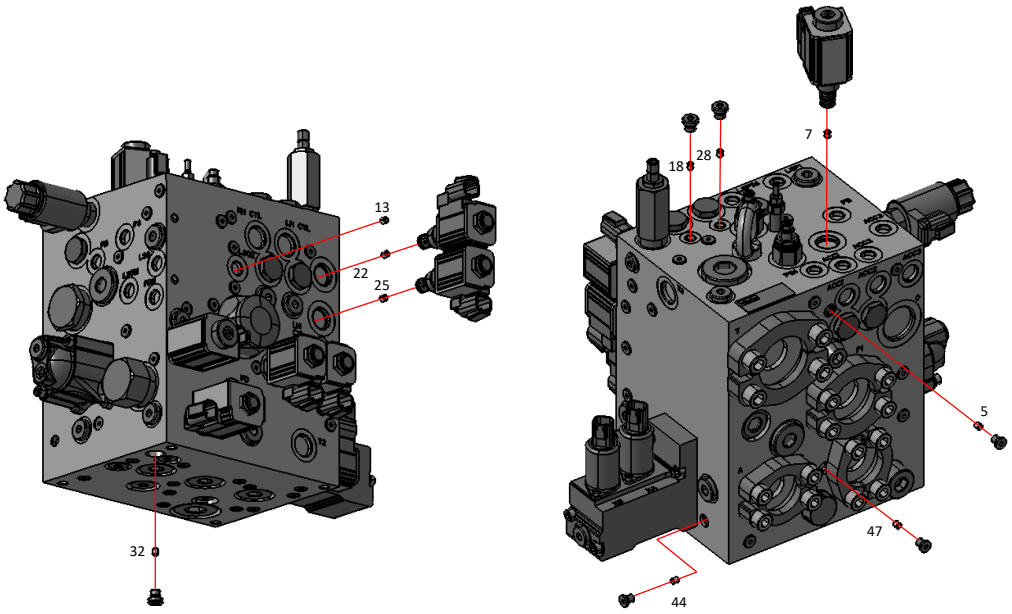


Figure 14

Up to 7x1750/8x1718

	Description	QTY	Part no.	Socket	Torque
43	Spool M200LS	1		-	-
57	Spring Pack 6,5-16bar	1		T30 torx	10 Nm
56	Washer 6,4x12x1,5	2		-	-
58	O-ring 45,4x55x2,4	1		-	-
59	Spring Cap	1		-	-
60	Screw M6x55	2		5mm	10 Nm
65	Plug G1/4"	1		6mm	30 Nm

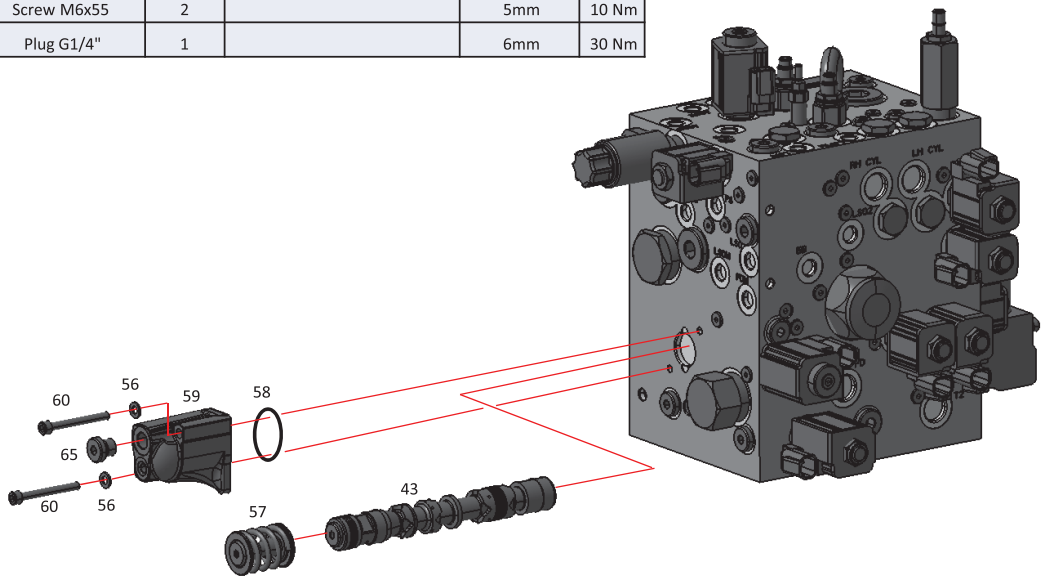


Figure 15

From 7x1751/8x1719

	Description	QTY	Part no.	Socket	Torque
43	Spool M200LS	1		-	-
57a	Spring Pack 6,5-16bar	1		-	
57b	Screw M6x50	1		T30 torx	10 Nm
56	Washer 6,4x12x1,5	2		-	-
58	O-ring 45,4x55x2,4	1		-	-
59	Spring Cap	1		-	-
60	Screw M6x55	2		5mm	10 Nm
65	Plug G1/4"	1		6mm	30 Nm

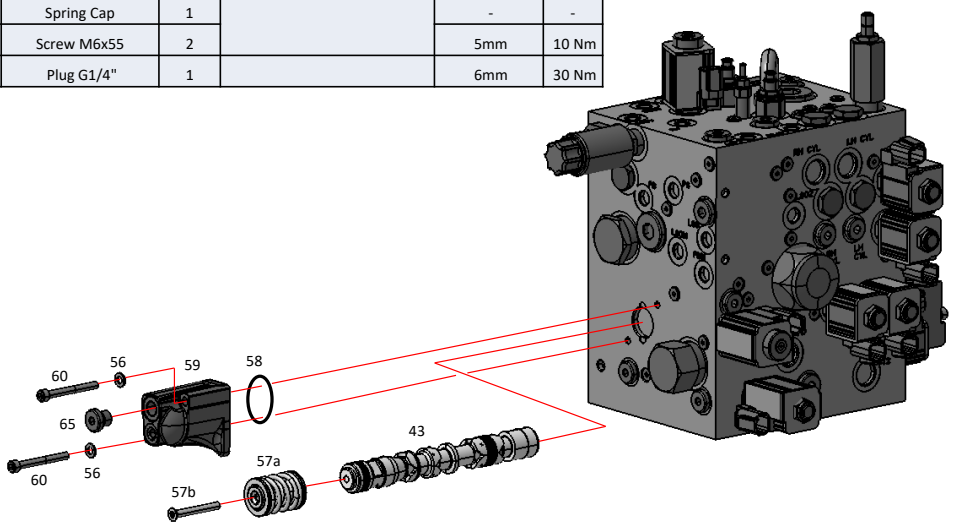
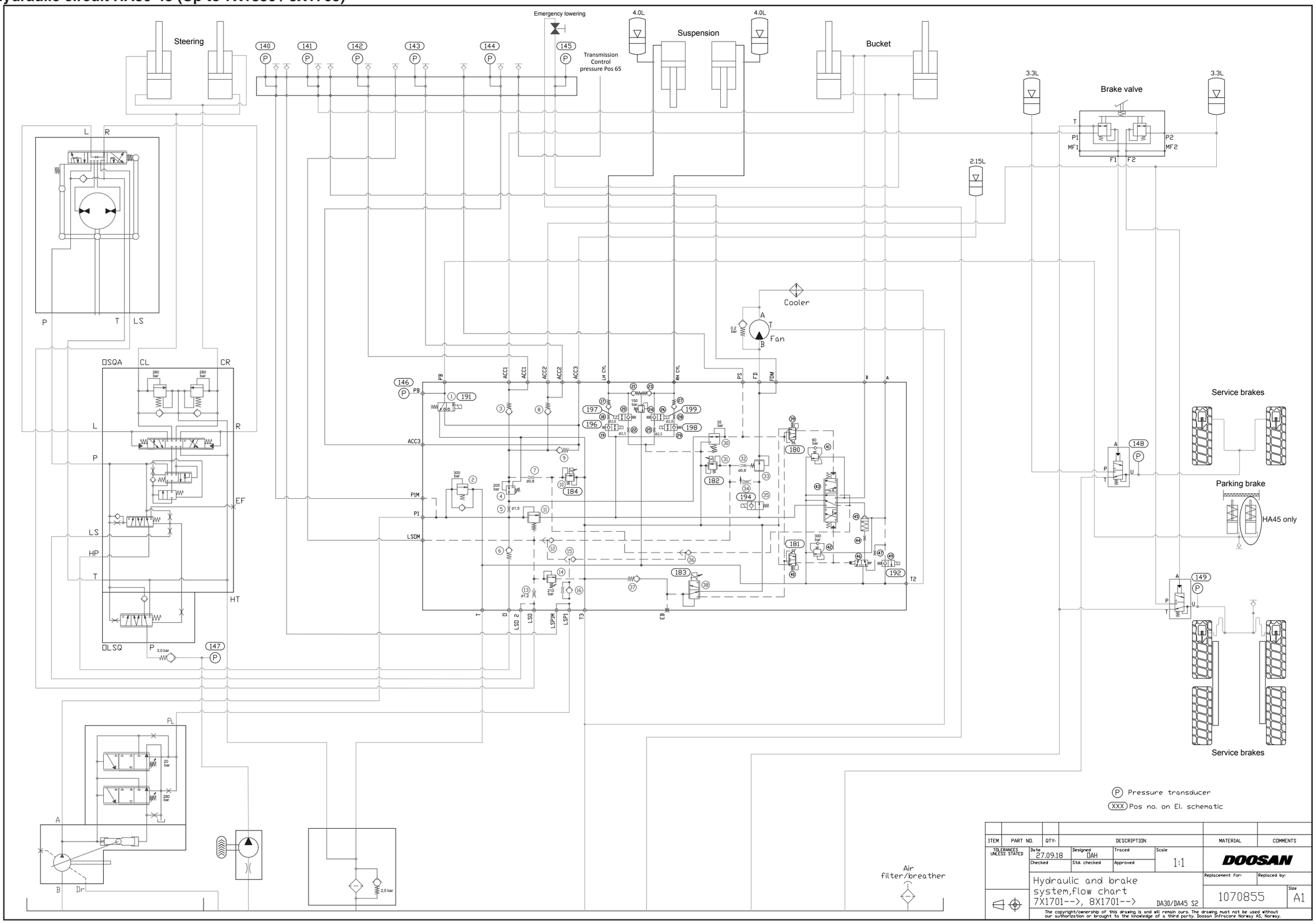


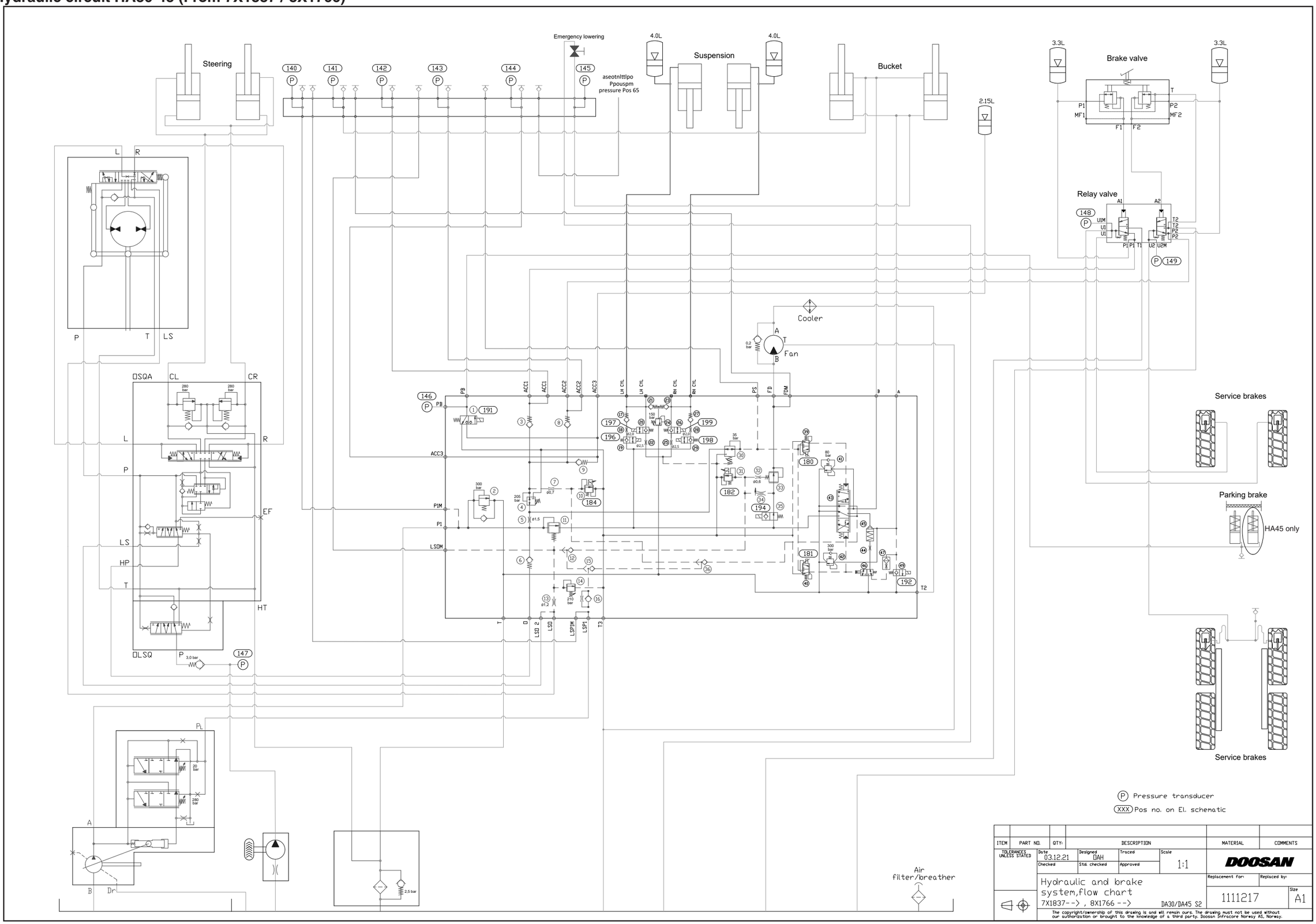
Figure 16

Find information about each part in the parts catalog

Hydraulic circuit HA30-45 (Up to 7X1836 / 8X1765)



Hydraulic circuit HA30-45 (From 7X1837 / 8X1766)



Startup test procedure

Check oil level in hydraulic tank.

Refill if necessary.
(For fluid type and specifications, refer to the Hyundai Operating & Maintenance Manual Chapter 6)

NOTE

Check level glass on the hydraulic tank.

Hydraulic fluid is preferred, but ATF oil or engine oil can be used.
(Ref. Operators Manual, Chapter 6 - Lubricants, and Chapter 7 - Maintenance)

Start engine, and let it run until hydraulic fluid temperature exceeds 40° C.
Oil temperature increases faster by tilting dumper body several times, and/or frequently moving steering wheel from lock to lock.
During warm-up check for any leaks in the hydraulic system.
Any leaks must be repaired before proceeding the warm-up.
After warm-up, re-check hydraulic fluid level, and perform an operational check of all functions as follows:

Check 1
Steering function.

Turn steering wheel from side to side, lock to lock, engine speed 720 rpm. (low idle). Count the number of turns. Approx. 5 turns is acceptable.

Check 2
Steering pressure.

Engine at 2000 rpm, hold steering wheel towards either end lock position. Hydraulic pressure: 207 - 217
(See pressure in display: P1M)

Check 3
Tilting pressure, lowering.

Engine at 720 rpm, lower dumper body. Lowering time should be approx. 18 sec. / 10 sec. at max rpm Hydraulic pressure: 100 bar ± 5.

Main Pump

Pump description

- Variable axial piston pump
- LS – operated
- Mounted at rear of transmission
- Driven by the engine
- Ratio 1:1
- Maximum volume 140 ccm
-
- Delta pressure 20 ±2.0bar (idle)
- Maximum (tilt) pressure 280 - 286 bar (1000 rpm)

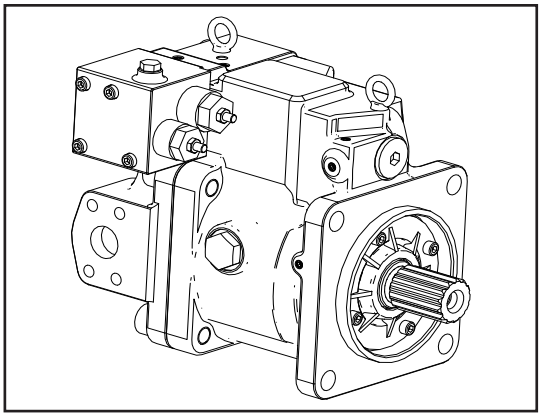


Figure 17

The Main Hydraulic Pump is located at the rear end of the transmission. Pump is accessed from rear, under the cab.

Removal:
Thoroughly clean the main pump and the area around for any accumulated dirt.
Drain tank and suction hose.
Place a container below the pump to catch any hydraulic fluid spilt during removal.
Mark both hydraulic lines for proper location and plug lines as they are removed from pump.
Unscrew the bolt securing the pump to the transmission.
Lift the pump out from the truck for exchange or overhaul.

Installation:
Apply a light coat of lubrication on the axle splines. Check that the O-ring is installed to seal the mating flange, and position the pump onto the transmission.
Check that the pump is properly seated, and tighten bolt.
Clean the flange couplings, and install new O-rings.
Connect the flange couplings, ensure that the hoses are positioned in correct angle, and tighten the bolts.
Fill oil on hydraulic tank.

Control:
Before startup - Check that all connections are located in the same positions as before removal, and that all hoses are correctly routed.

Perform startup test procedure. Ref. section: Startup test procedure.

Test block

The Test Block is the place where it is possible to check all the main pressures from the hydraulic system.

Through the test ports, it is possible to diagnose the maximum and minimum values of the hydraulic pressures of each part of the system.

The sensors (140, 141, 142, 143, 144 and 145) send the pressure signal to the VCU-2 so it shows the values on the LCD display.

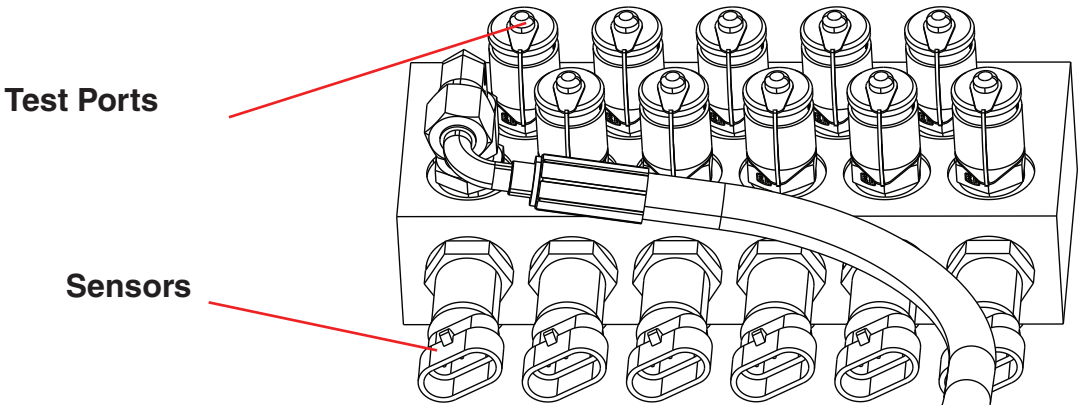


Figure 18

P1M (140)	**P1M= Pump 1 measure pressure: 280 to 286 bar**
LSP1M	**LSP1M= Load sense pump 1 measure pressure: (P1M - 20) bar**
B (141)	**B= Tilt cylinder lowering pressure: 80 to 105 bar**
FDM	**PDM= Fan drive motor pressure: 245 to 260 bar**
ACC1 (142)	**ACC1= Accumulator pressure: 203 to 210 bar**
LSOM	**LSOM= Load sense orbitrol measure pressure: 187 to 197 bar**
ACC2 (143)	**ACC2= Accumulator pressure: 203 to 210 bar**
PS	**PS= Pilot servo pressure: 33 to 40 bar**
ACC3 (144)	**ACC3= Accumulator pressure: 203 to 210 bar**
TMPR	**TMPR= Transmission control pressure: 16 to 18 bar**
A (145)	**A= Tilt cylinder raising pressure: 280 to 286 bar**

Main pump pressure adjusting

Low Pressure Adjustment:

Connect the pressure gauge at the test port LSP1M on the Test Block.
Engine idle, read pressure, move pressure gague to P1M.
Adjust the pump to the correct value (LSP1M pressure +20 bar).
Loosening the nut and turning the screw clockwise you will increase pressure

- Loosening the nut and turning the screw counterclockwise you will decrease pressure
- Be sure to lock the nut after adjustments.

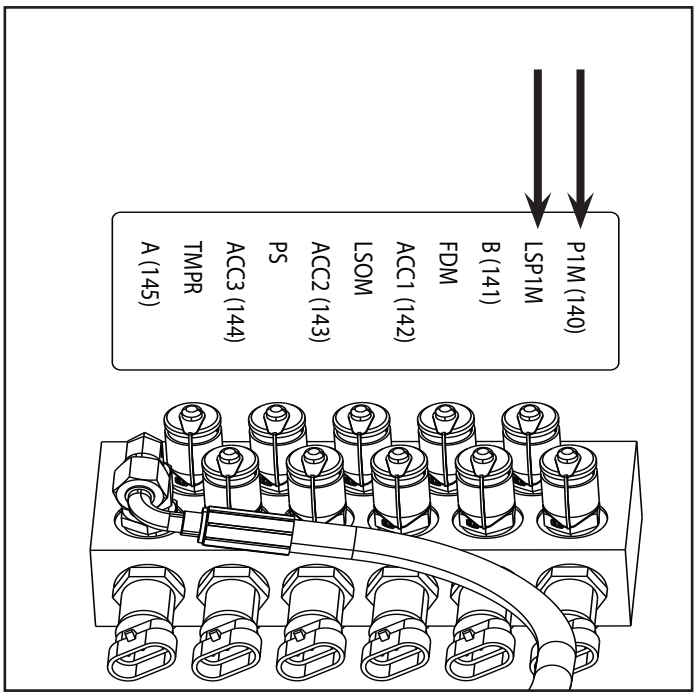


Figure 19

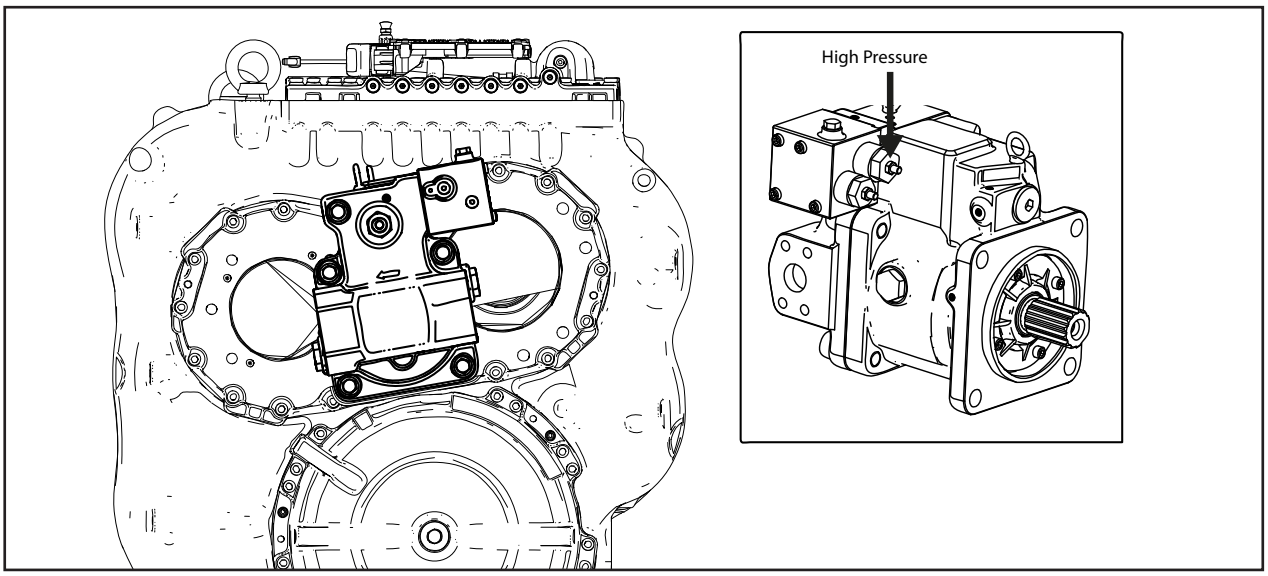


Figure 20

Main pump pressure adjusting

High Pressure Adjustment:

Connect the pressure gauge at the test port P1M on the Test Block.
Test the high pressure when you run the engine at 1000 rpm and raise the tilt cylinder to end stop.

Adjust the pump to the correct value 280 - 286 bar:

- Loosening the nut and turning the screw clockwise you will increase pressure
- Loosening the nut and turning the screw counterclockwise you will decrease pressure
- Be sure to lock the nut after adjustments.

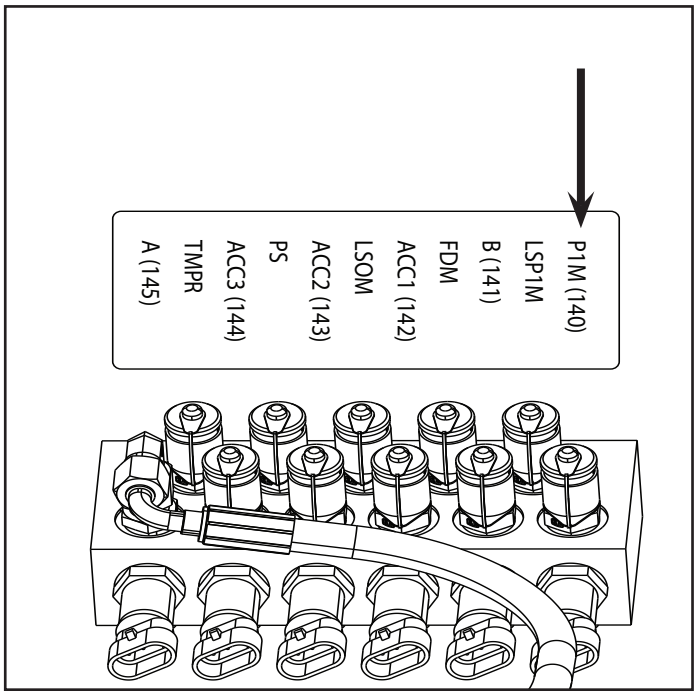


Figure 21

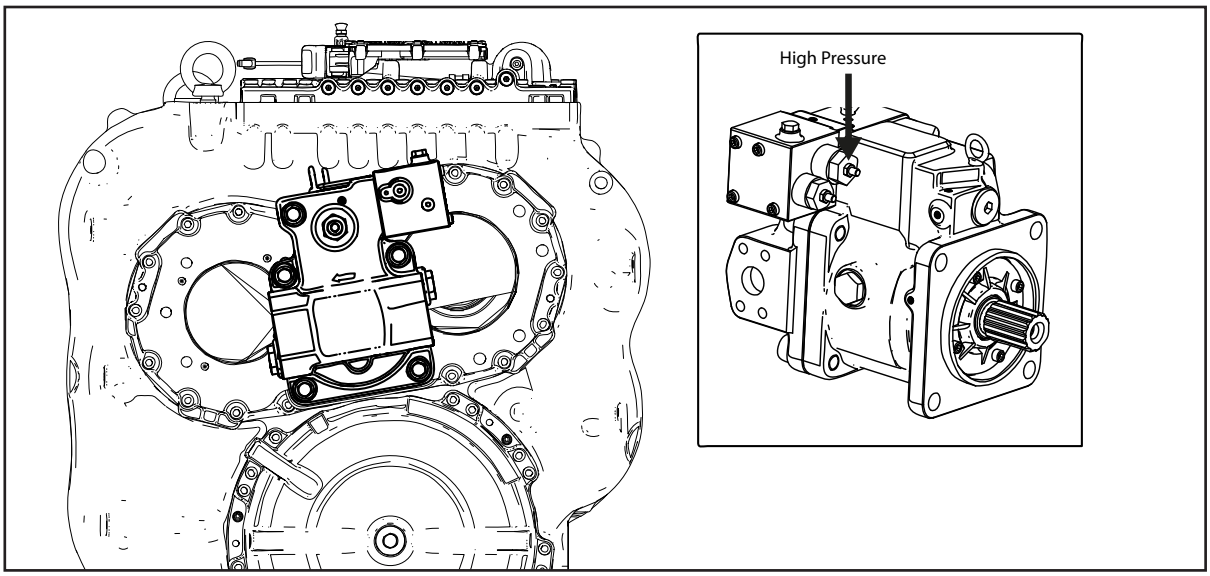


Figure 22

Main pump circuit

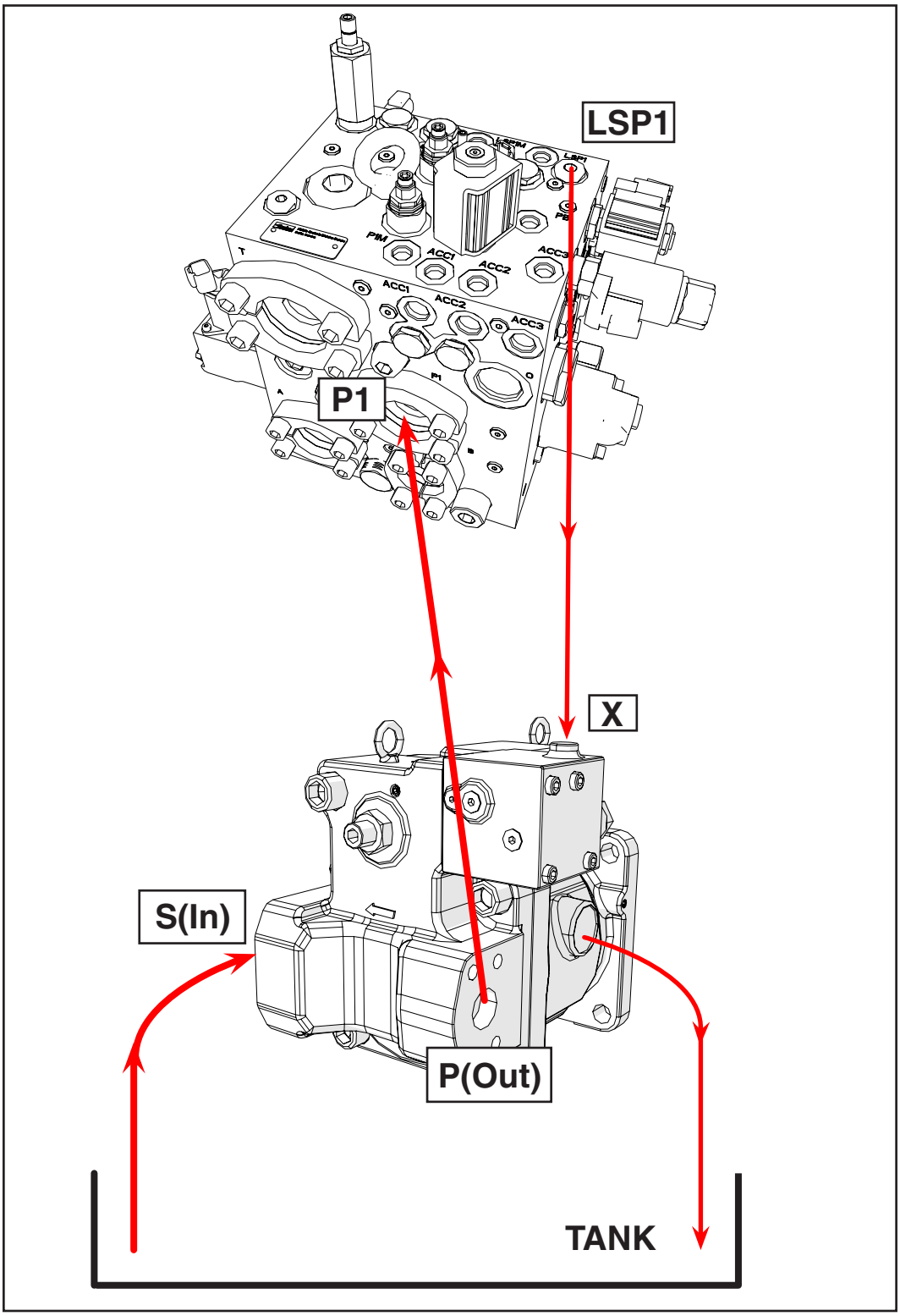


Figure 23

Main pump parts list

For part list, refer to the Hyundai Parts Catalog.

Ch 5 page 29

Main pump exploded view

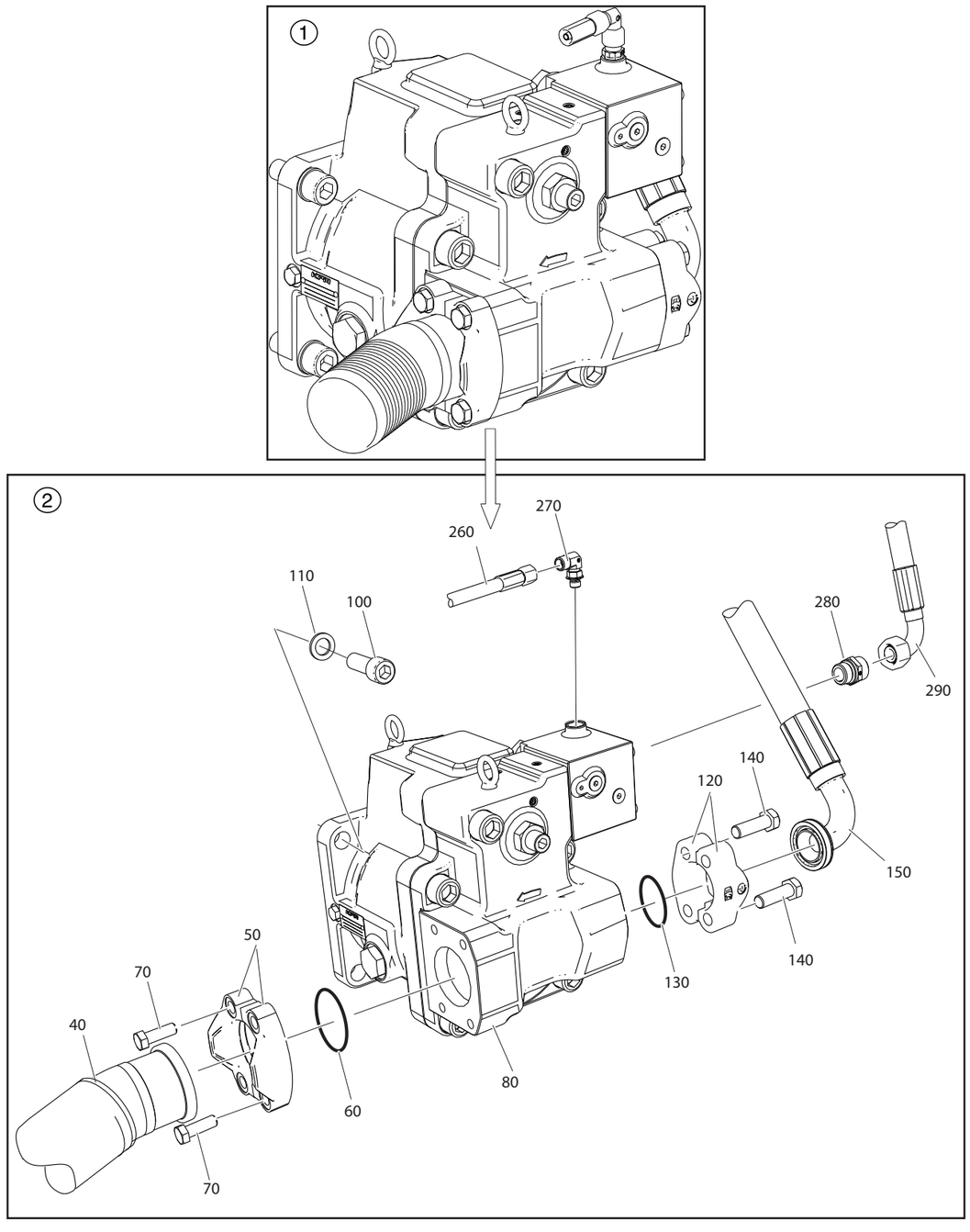


Figure 24

Steering system

Description:

The steering system is built up of an orbitrol steering unit, a steering valve dynamic flow amplifier and two steering cylinders.
A priority valve is built into the main valve. The priority valve ensures that the steering system has first priority on oil flow from the hydraulic pumps.
The principle applied to the controlled operation of the flow amplifier, called “load sensing”. As name suggest , it is a system in which the load is used in this system, to control the priority valve in the flow amplifier, so that oil flow and pressure precisely matches momentary demands.

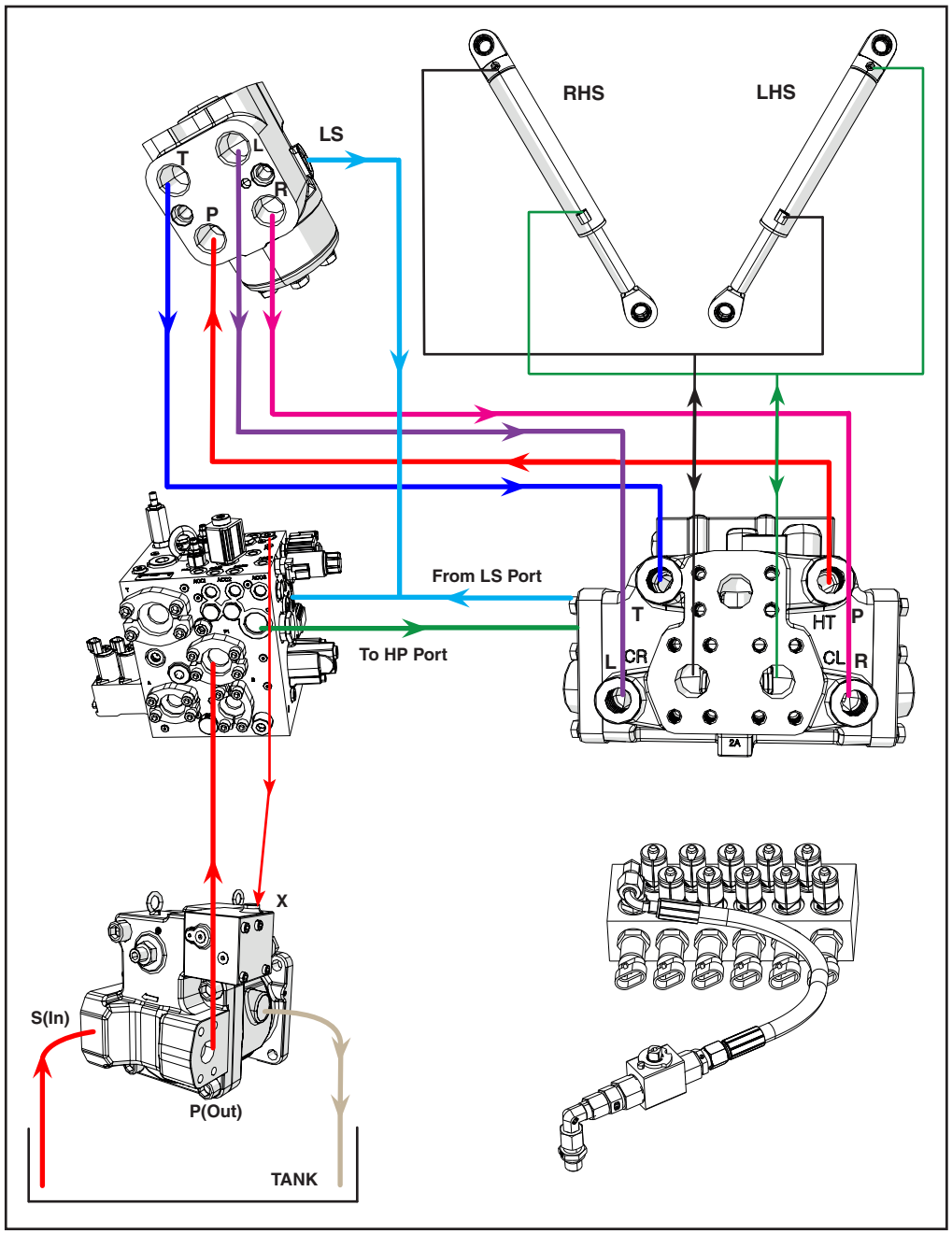


Figure 25

Orbitrol

Orbitrol:

- Displacement:
  HA30 - 160 cm³ (9.76 in³ / rev)
  HA45 - 250 cm³ (15.25 in³ / rev)
- Rated oil flow: 25 L/min (6.60 U.S. gal / min)

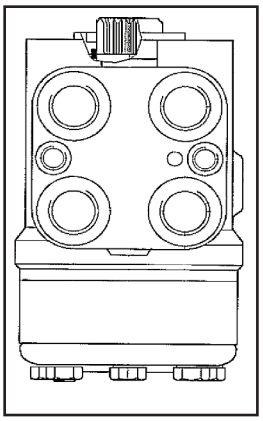


Figure 26

The Orbitrol is located on the cab front wall (firewall). Access is obtained by tilting the cab. (Ref. Operation and Maintenance Handbook)

Removal
Thoroughly clean the orbitrol and the area around for any accumulated dirt.
Place a container below the valve to catch any hydraulic fluid spilt during removal.
Mark each hydraulic line for proper location and plug lines as they are removed from valve.
From inside the cab unscrew the four bolts securing the valve to the cab floor
Lift the orbitrol out from the truck for exchange or overhaul. If the valve is exchanged, save the connectors attached to the valve body.

Installation
Check the condition of the connector seals, replace if necessary. Install the connectors in the valve body. Apply a light coat of oil to the connector seals, and tighten.
Apply a light coat of oil on the axle splines, and position the valve on the cab, and insert the fastening bolts.
Check that the valve is properly seated, and tighten the four bolts.
Install the hoses.

Control
Before startup - Check that all connections are located in the same positions as before removal, and that all hoses are correctly routed.

Perform startup test procedure. Ref. section: Startup test procedure.

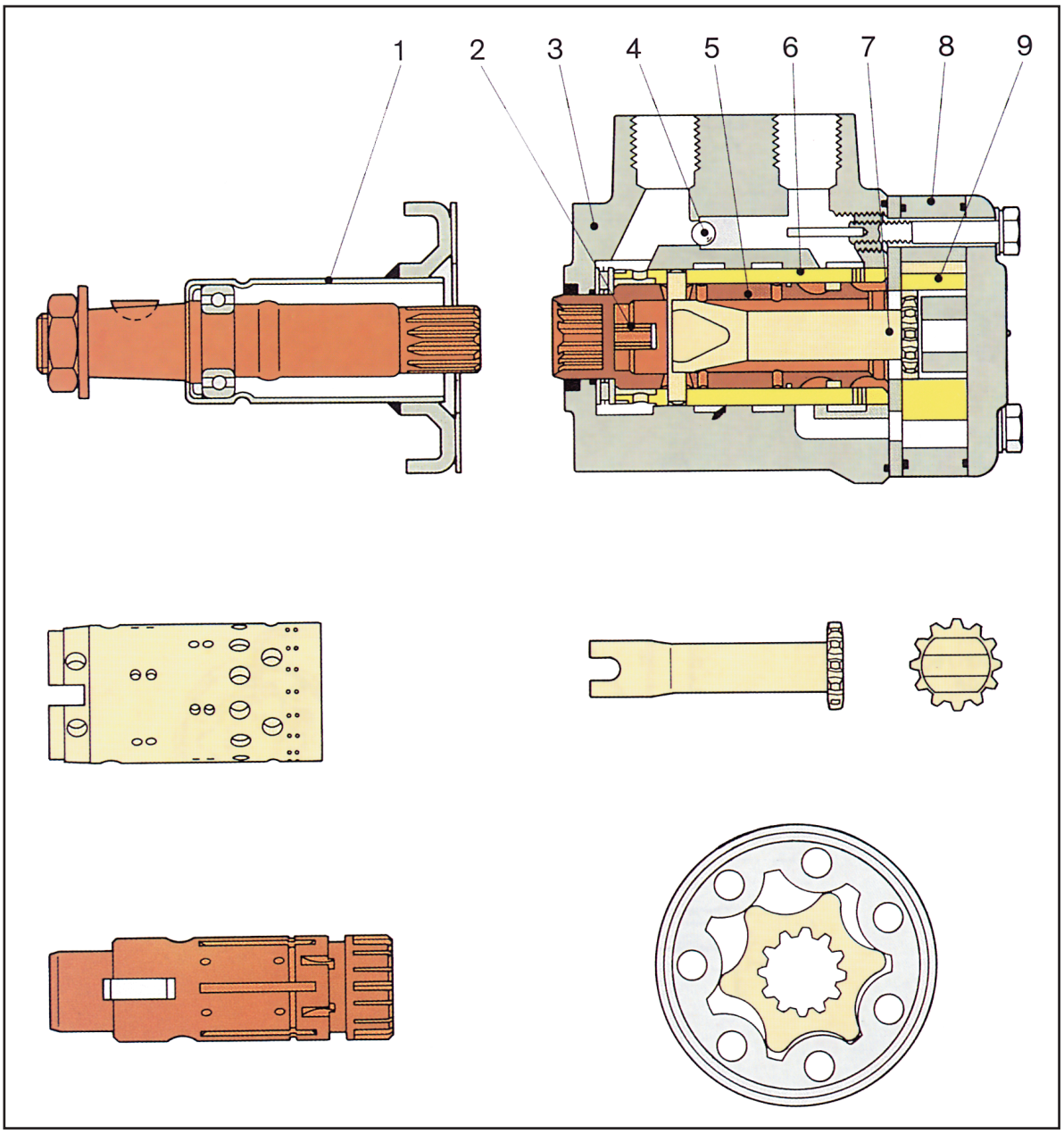


Figure 27

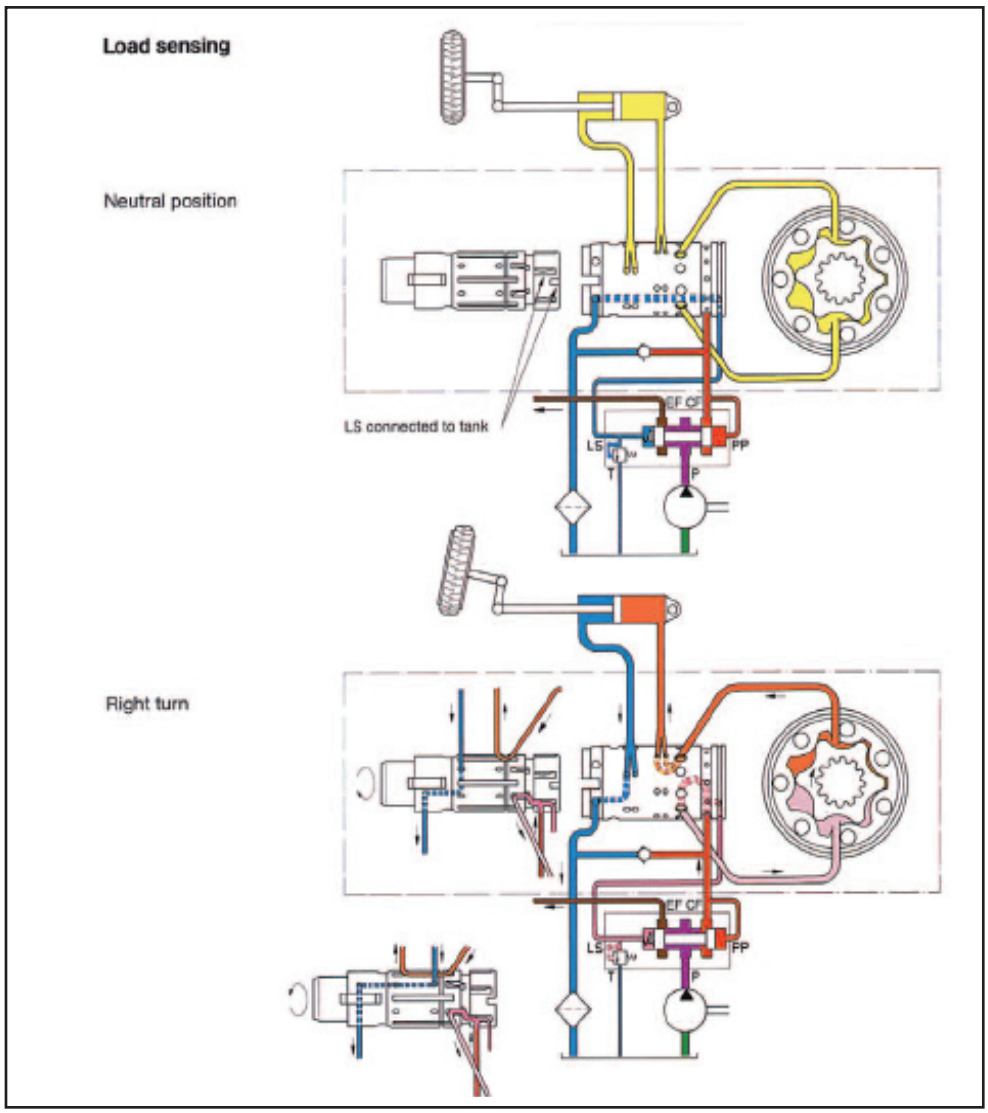

Load sensing
Neutral position
LS connected to tank
LS
T
P
PP
Right turn

Figure 28

Steering valve

- OSQA / OLSQ
- Amplification value 8

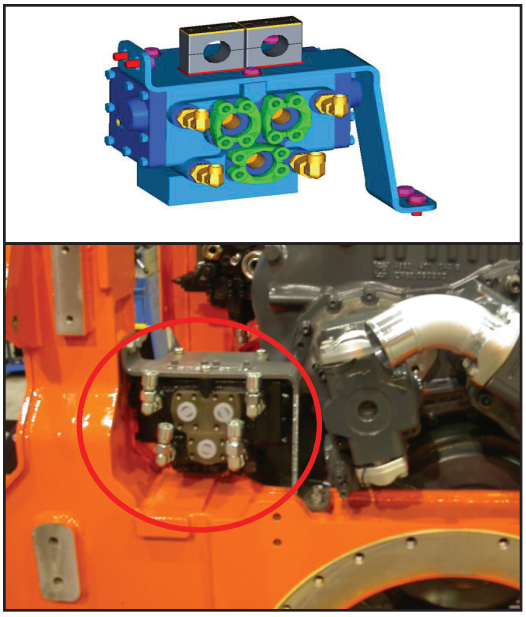


Figure 29

The Steering Valve is located on the front wagon, left-rear.

Removal
Thoroughly clean the steering valve and the area around for any accumulated dirt.

Place a container below the valve to catch any hydraulic fluid spilt during removal.
Mark each hydraulic line for proper location and plug lines as they are removed from valve.
Unscrew the three bolts securing the valve to the bracket.
Observe that each bolt has a washer between the bracket and the valve body, as well as under the head.
Lift the steering valve out from the truck for exchange or overhaul. If the valve is exchanged, save the connectors attached to the valve body.

Installation
Check the condition of the connector seals, replace if necessary. Apply a light coat of oil to the hose fitting seals. Install the connectors in valve body, and tighten.
Position the main steering valve on its bracket. Install three securing bolts with washers both under each head and between the bracket and the valve body. Tighten the bolts.
Clean the flange couplings, and install new O-rings.
Connect the flange couplings, ensure that the hoses are positioned in correct angle, and tighten the bolts.
Install the remaining smaller hoses.
Replace cover, and install wheel.

Control
Check that all connections are located in the same positions as before removal, and that all hoses are correctly routed.
Install cover, and fit the four bolts. Tighten the bolts.

Perform startup test procedure. Ref. section: Startup test procedure.

Steering circuit HA30 / DA40

Orbitrol

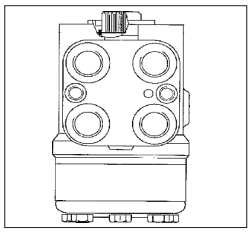


Figure 30

Steering valve

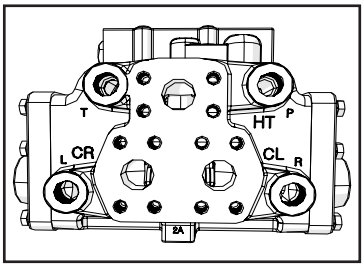


Figure 31

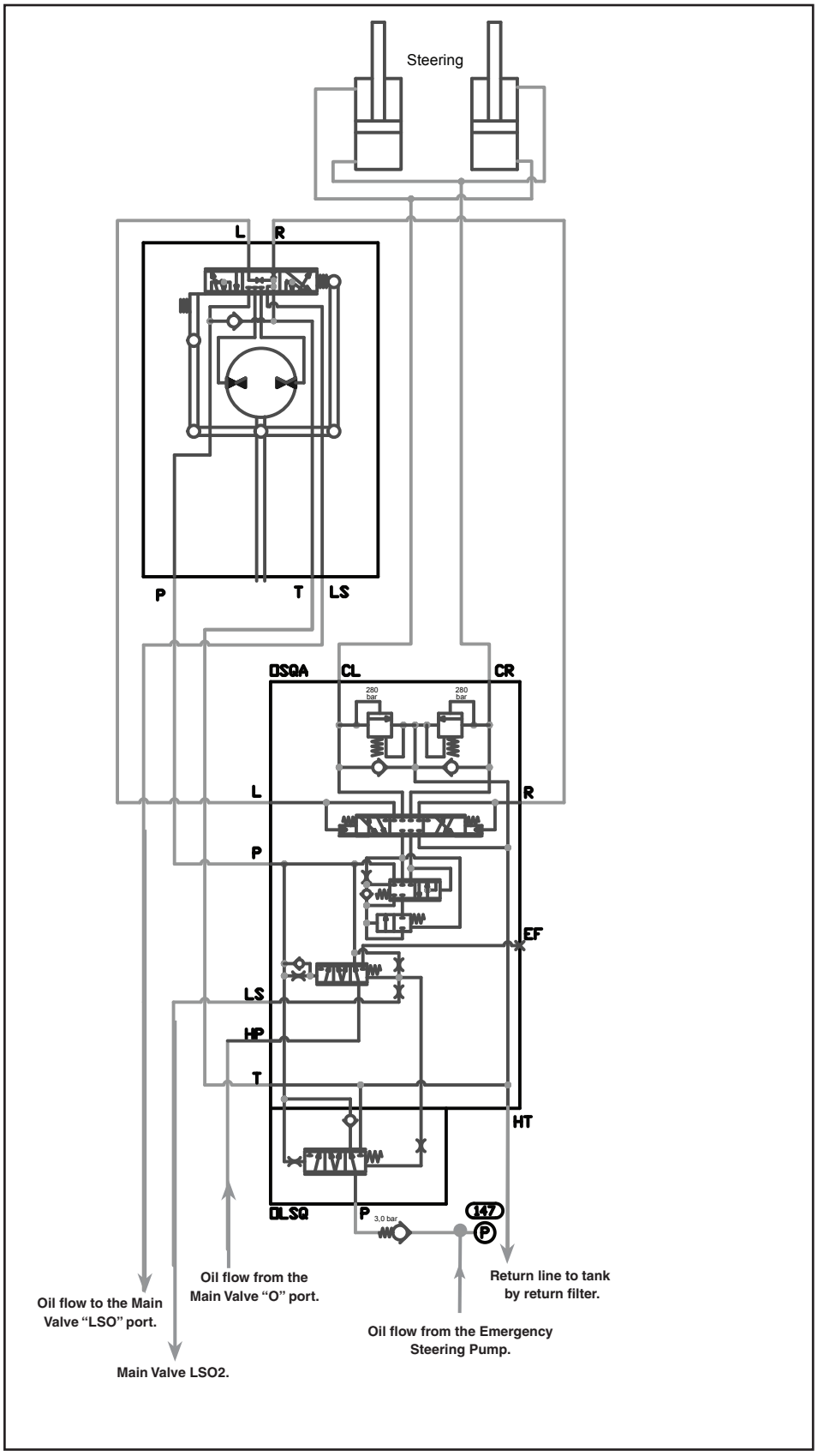


Figure 32

Steering Cylinder

	HA30	HA45
• Double acting		
• Qty	2	2
• Cylinder diameter	100mm	115
• Piston diameter	63mm	70
• Stroke	515mm	550mm
• End cushion		

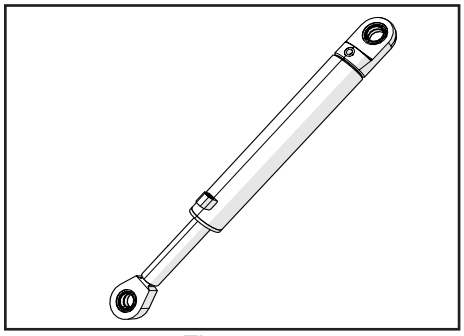


Figure 33

The Steering Cylinders are located on each side of the articulation hinge.

Removal
Thoroughly clean the steering cylinder and the area around for any accumulated dirt.
Make sure that the steering lock is in position (Ref. Operation and Maintenance Handbook)
Place a container below the cylinder to catch any hydraulic fluid spilt during removal.
Mark each hydraulic line for proper location and plug lines as they are removed from cylinder.
Remove the screws and washers securing the cylinders pivot bolts. Disconnect lubrication lines if fitted.
Drive the pivot bolts down.
Carefully lift the steering cylinder out from the truck for exchange or overhaul. If the cylinder is exchanged, save the connectors attached to the valve body.

WARNING

Be aware of the risk of injury to people and equipment when handling heavy objects!

Installation
Check the condition of the connector seals, replace if necessary. Apply a light coat of oil to the hose fitting seals. Install the connectors in cylinder body, and tighten.

Position the steering cylinder in the mounting brackets. Install the pivot bolts, with lubrication bore pointing down, by driving down from the top with a soft mallet.. Install expansion rings, securing screws and washers etc. Make sure the assembly is centred. Tighten the screws to 380 Nm.
Connect lubrication lines if fitted.

Fill cylinder with hydraulic fluid, and install hydraulic hoses. (For fluid type and specifications, refer to the Hyundai Operating & Maintenance Manual Chapter 6)

Control
Check that all connections are located in the same positions as before removal, and that all hoses are correctly routed.

Perform startup test procedure. Ref. section: Startup test procedure.

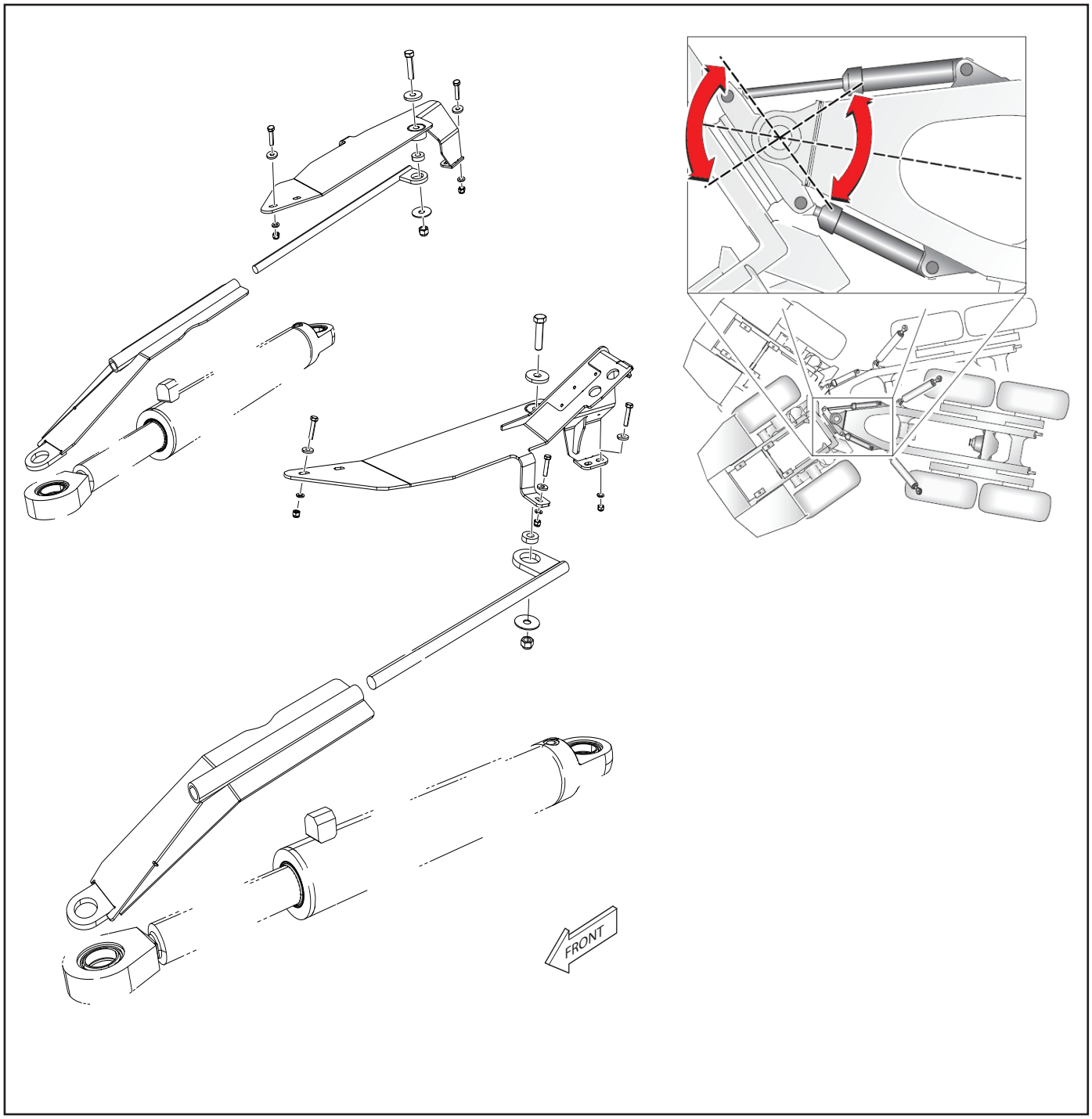


Figure 34

Steering cylinder, sectional drawing.

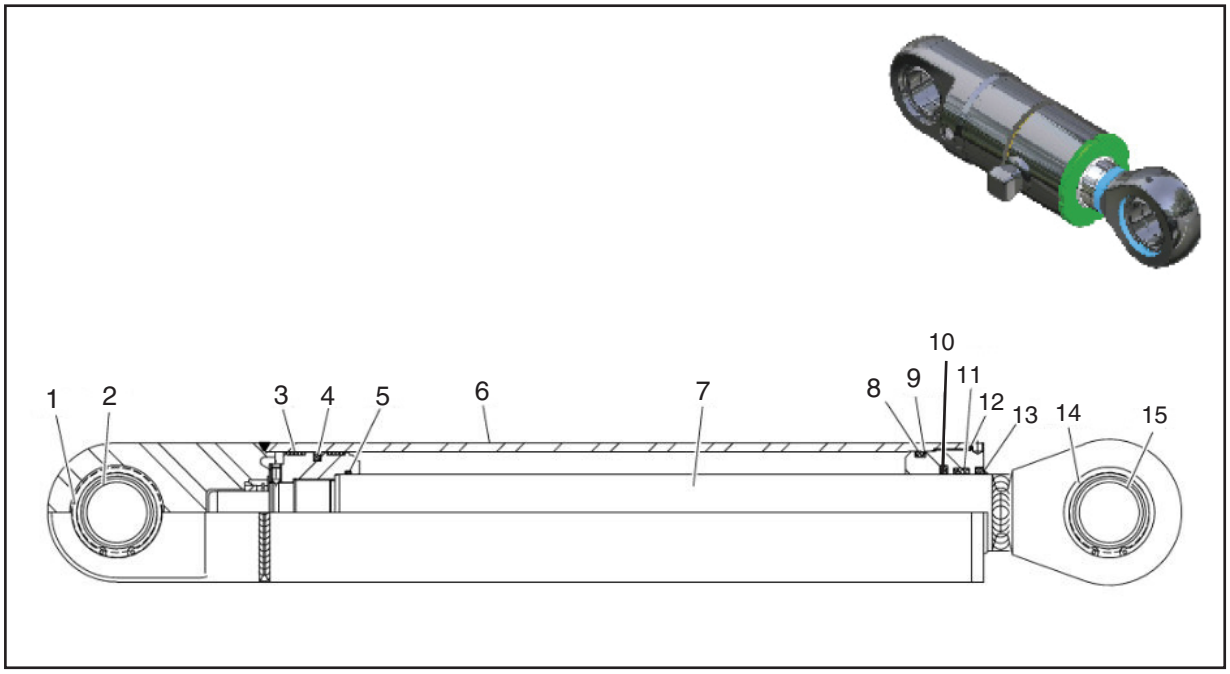


Figure 35

Steering cylinder assembly

Pos	Qt'y	Description
1	2	Ring
2	1	Bearing
3	2	Steering
4	1	Piston seal
5	1	O-ring
6	1	Cylinder tube
7	1	Piston rod
8	1	O-ring
9	1	Backup ring
10	1	Seal rod
11	1	Seal rod
12	1	O-ring
13	1	Seal
14	1	Ring
15	1	Bearing

Steering cylinder Repair Instructions

WARNING

Cylinder repair should be carried out in a workshop familiar with hydraulic cylinders. Protect against injury by wearing the correct PPE. (Personal protective equipment) appropriate for the job. Avoid high pressure oil. Never search for leaks with your hands. If hydraulig oil penetrates your skin, seek medical help immediately.

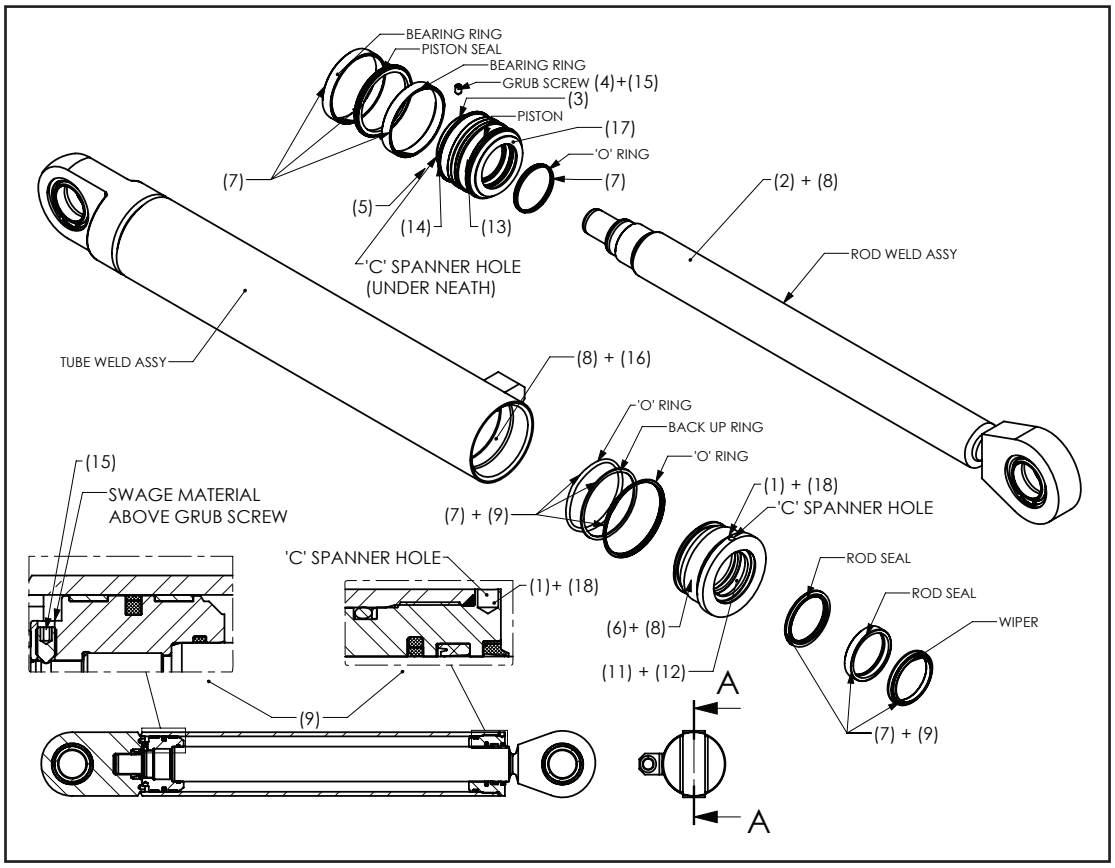


Figure 36

NOTE

Before starting work, make sure to clean the outside of the cylinder. Place the cylinder into a secure clamp in a clean working envoirnment.

(1). USING A ‘C’ SPANNER REMOVE THE GLAND (OIL WILL ESCAPE AT THIS POINT COLLECT IN A SUITABLE CONTAINER)

(2). REMOVE THE ENTIRE PISTON ROD FROM THE TUBE

(3). REMOVE THE SWAGED MATERIAL FROM ON TOP OF THE GRUB SCREW

(4). REMOVE THE GRUB SCREW WITH AN ALLEN KEY

(5). USING A ‘C’ SPANNER REMOVE THE PISTON.

(6). REMOVE THE GLAND FROM THE PISTON ROD

(7). REMOVE ALL SEALS USING APPROPRIATE TOOLS. TAKE CARE NOT TO DAMAGE THE SEALING SURFACES

(8). CLEAN ALL PARTS AND INSPECT FOR DAMAGE. IF THE SEALING SURFACES ARE DAMAGED THE PART IS BEYOND REPAIR. REPLACE ALL DAMAGED PARTS.

(9). REPLACE ALL SEALS TAKING CARE OF SEAL DIRECTION AS THE IMAGE BELOW.

(10). INSPECT ALL PARTS TO ENSURE THEY ARE CLEAN BEFORE ASSEMBLY.

(11). LIGHTLY OIL INSIDE OF GLAND
(USE HYDRAULIC OIL).

(12). PUSH GLAND ONTO THE PISTON ROD.

(13). ASSEMBLE THE PISTON ONTO THE ROD.

(14). USING A ‘C’ SPANNER AND A COPPER HAMMER, TIGHTEN THE PISTON. HIT THE ‘C’ SPANNER SEVERAL TIMES TO ENSURE THE PISTON IS TIGHT.

(15). FIT THE GRUB SCREW AND SECURE BY SWAGING MATERIAL ABOVE GRUB SCREW.

(16). MAKE SURE THE TUBE WELD ASSY IS CLEAN IN ALL AREAS

(17). ASSEMBLE THE PISTON ROD INTO THE TUBE

(18). USING A ‘C’ SPANNER TIGHTEN THE GLAND HIT THE ‘C’ SPANNER SEVERAL TIMES WITH A COPPER HAMMER TO ENSUR GLAND IS TIGHT.

NOTE

Allow the cylinder to sit for 24 hours to let the loctite cure.

Emergency steering pump

- Variable radial piston pump
- Mounted on rear of transmission
- Driven by output shaft (Ground driven)
- Maximum volume: 32 ccm
- Maximum delivery: 50 l/min

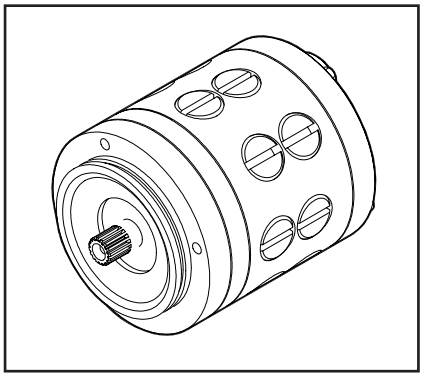


Figure 37

The dump truck is equipped with a ground driven radial piston pump fitted at the transmission.
This pump makes the truck manoeuvrable if the engine stops or main pump drive fall out.
The radial piston pump is very convenience due to the same flow direction either rotation of the pump. This ensures emergency steering function when driving either forwards or backwards.
The pump displacement is 32 cm^3/rev, and the oil flow is maximum 50 l/min.

If the main hydraulic pump should fail during driving (or engine stops), the connecting valve in steering valve will direct the oil flow from the emergency steering pump to the steering circuit.
At the same time the flow indicator valve will meter low or no oil flow and thereby connect the warning light at the instrument panel.

The Emergency Steering Pump is located at the rear end of the transmission, just above the rear output shaft.
Access is from rear of front wagon, through the drive shaft tunnel.

Removal:
Thoroughly clean the emergency pump and the area around for any accumulated dirt.
Place a container below the pump to catch any hydraulic fluid spilt during removal.
Mark both hydraulic lines for proper location and plug lines as they are removed from pump.
Unscrew the 4 Allen screws securing the pump to the transmission.

Lift the pump out from the truck for exchange or overhaul. If the pump is exchanged, save the hose fittings attached to the valve body.

Installation:
Check the condition of the connector seals, replace if necessary. Install the connectors in the valve body, using a light coat of oil on the seals, and tighten.
Check that the O-ring is installed in groove in pump mating flange.
Apply a light coat of oil on the axle splines, and position the pump onto the transmission.
Check that the pump is properly seated, and tighten the 4 Allen screws.
Install the hydraulic line hoses.

Control:
Before startup - Check that all connections are located in the same positions as before removal, and that all hoses are correctly routed.

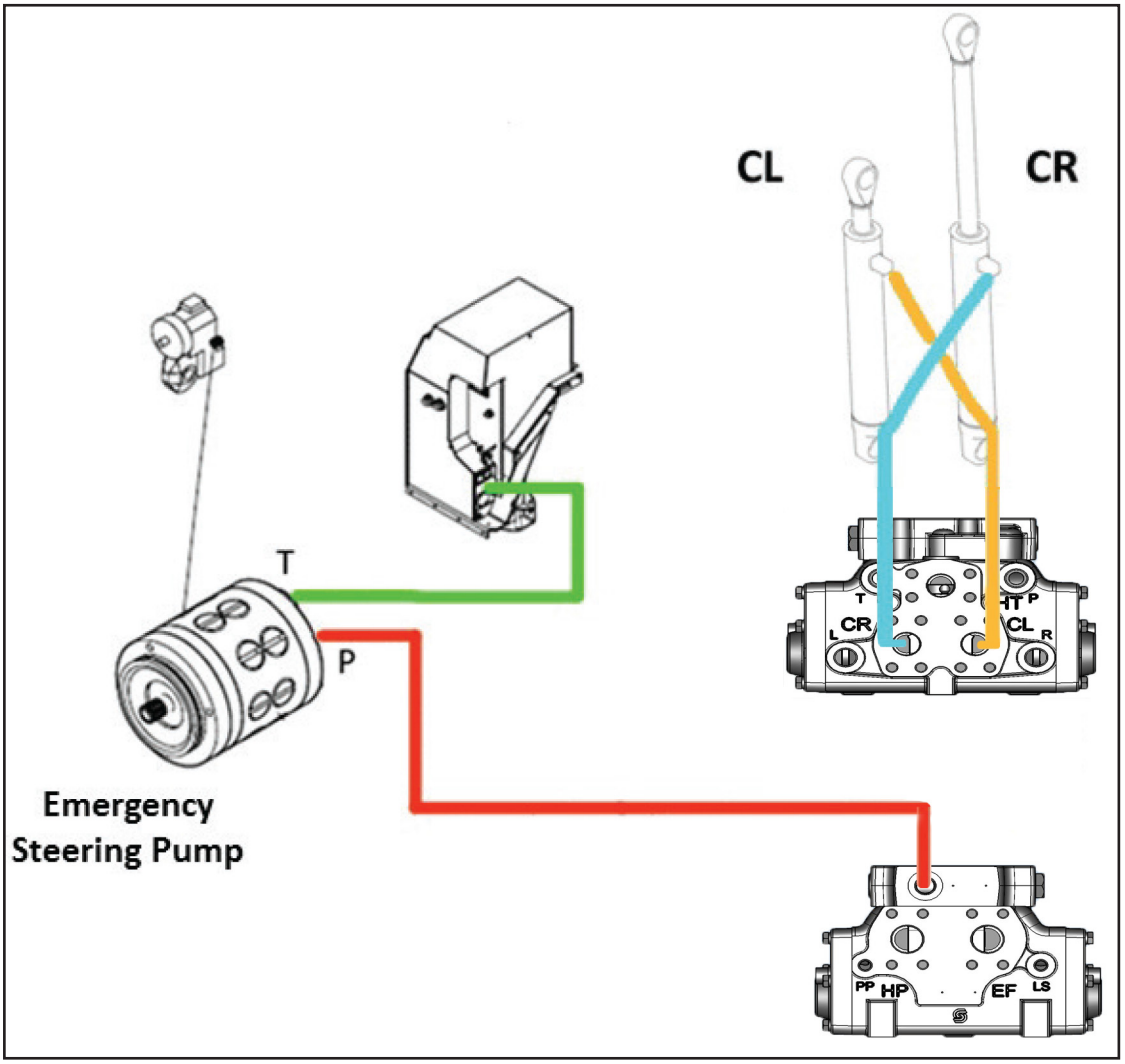


Figure 38

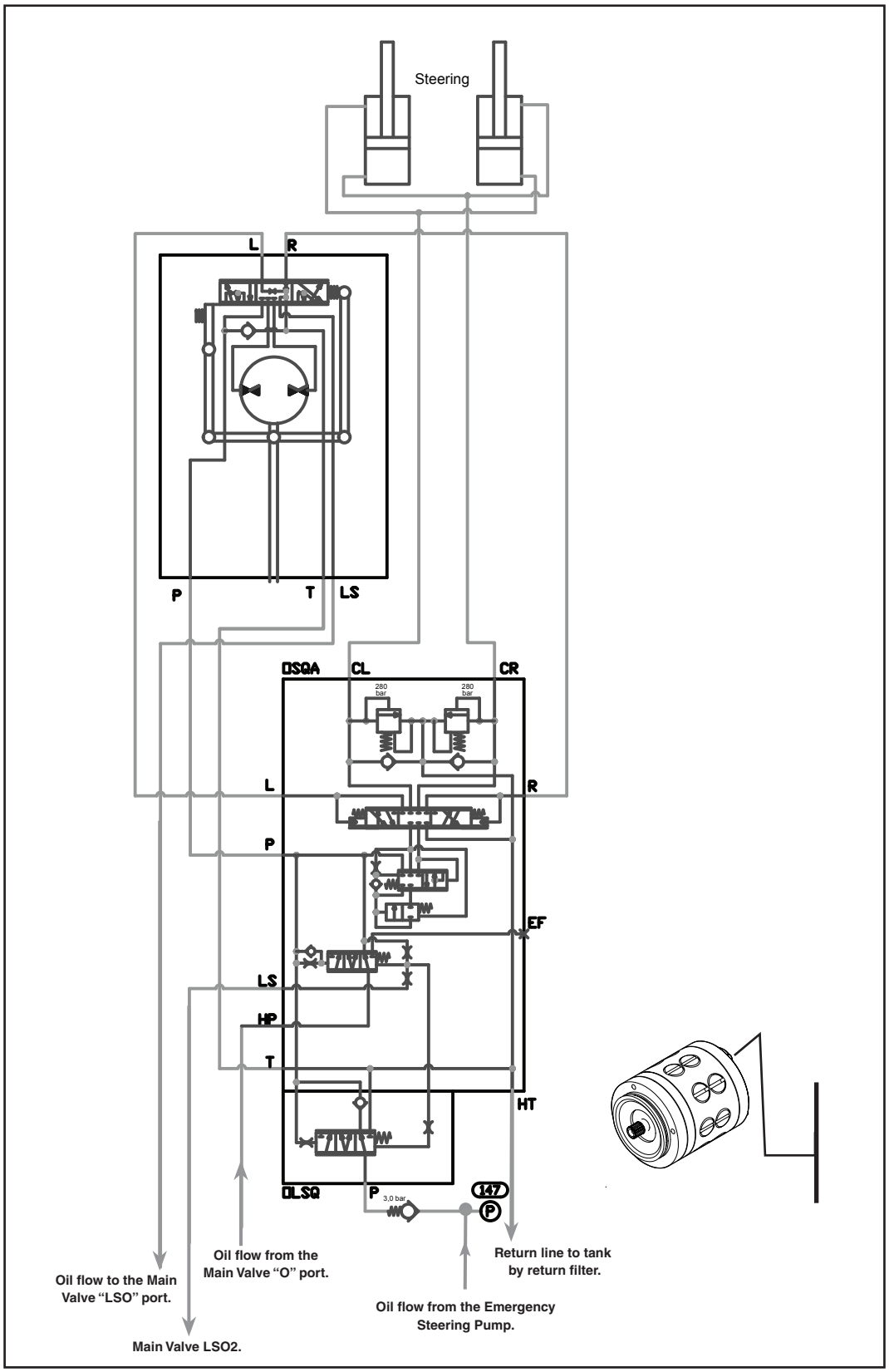

Steering
L
R
P
T
LS
LSQA
CL
CR
280 bar
280 bar
L
R
P
EF
LS
HP
T
HT
LSQ
P
3,0 bar
147
Oil flow to the Main Valve "LSO" port.
Oil flow from the Main Valve "O" port.
Return line to tank by return filter.
Oil flow from the Emergency Steering Pump.
Main Valve LSO2.

Figure 39

Tilting system

Tilt Lever

The Tilt Lever is located in the cab in console on drivers right hand side.

It is joystick designed for controlling hydraulic functions, using 0,5 - 4,5 Vdc outputs.

This joystick has two (2) contactless hall effect sensors that provide mirrored voltage
outputs for controlling proportional valve drivers.

The connectors are plugged into the VCU-3 and, from there, the signals are sent to the proportional valves on the Main Valve (Pos. 180 / Pos. 181). These valves controls the Body Dump position (raise / lower).

When the body is lifted the vehicle speed is limited to 10 km/h.

The push button on the top of the tilt lever is used to activate engine control during the tipping. The transmission and gear selector must be in neutral state to activate this function:

- Pressing the push button and moving the lever to raise the body, then engine acceleration will increase (if the parameter is fulfilled the maximum will be 1800 Rpm) and, as a function, the hydraulic pressure to fill up the hydraulic tilt cylinders will also increase.
- If you press the push button, move the lever and use the throttle to speed up the engine, the acceleration of the engine can override the 1800 Rpm.

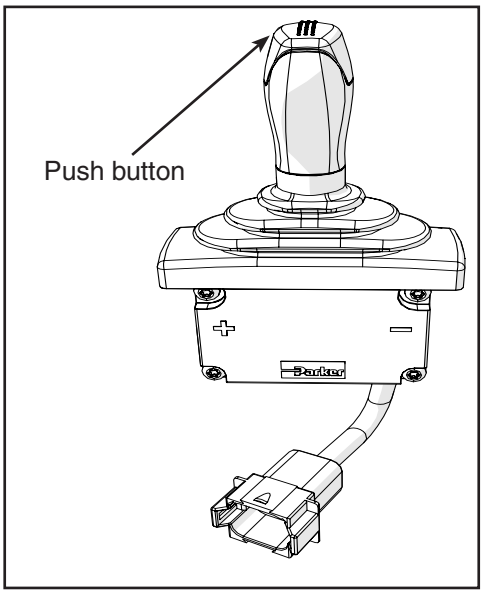


Figure 40

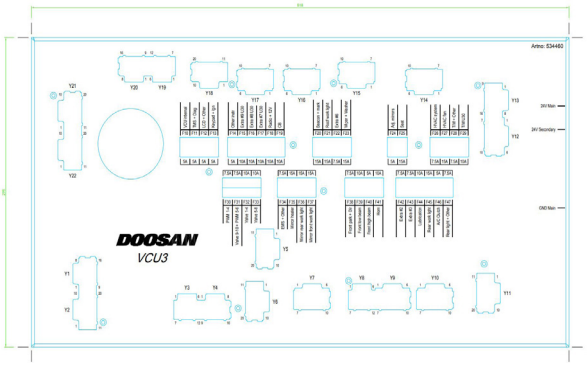


Figure 41

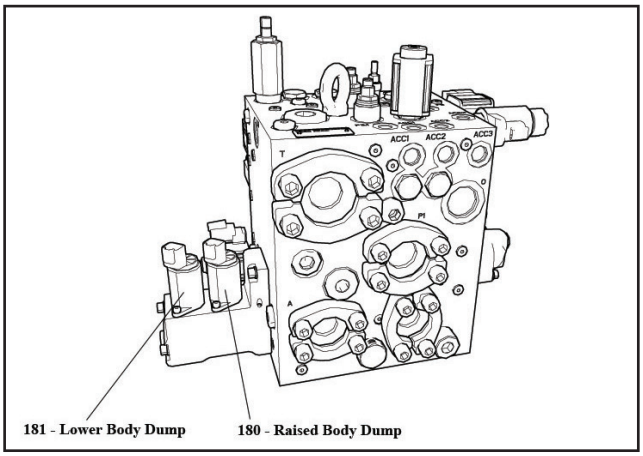


Figure 42

View of the tilting system

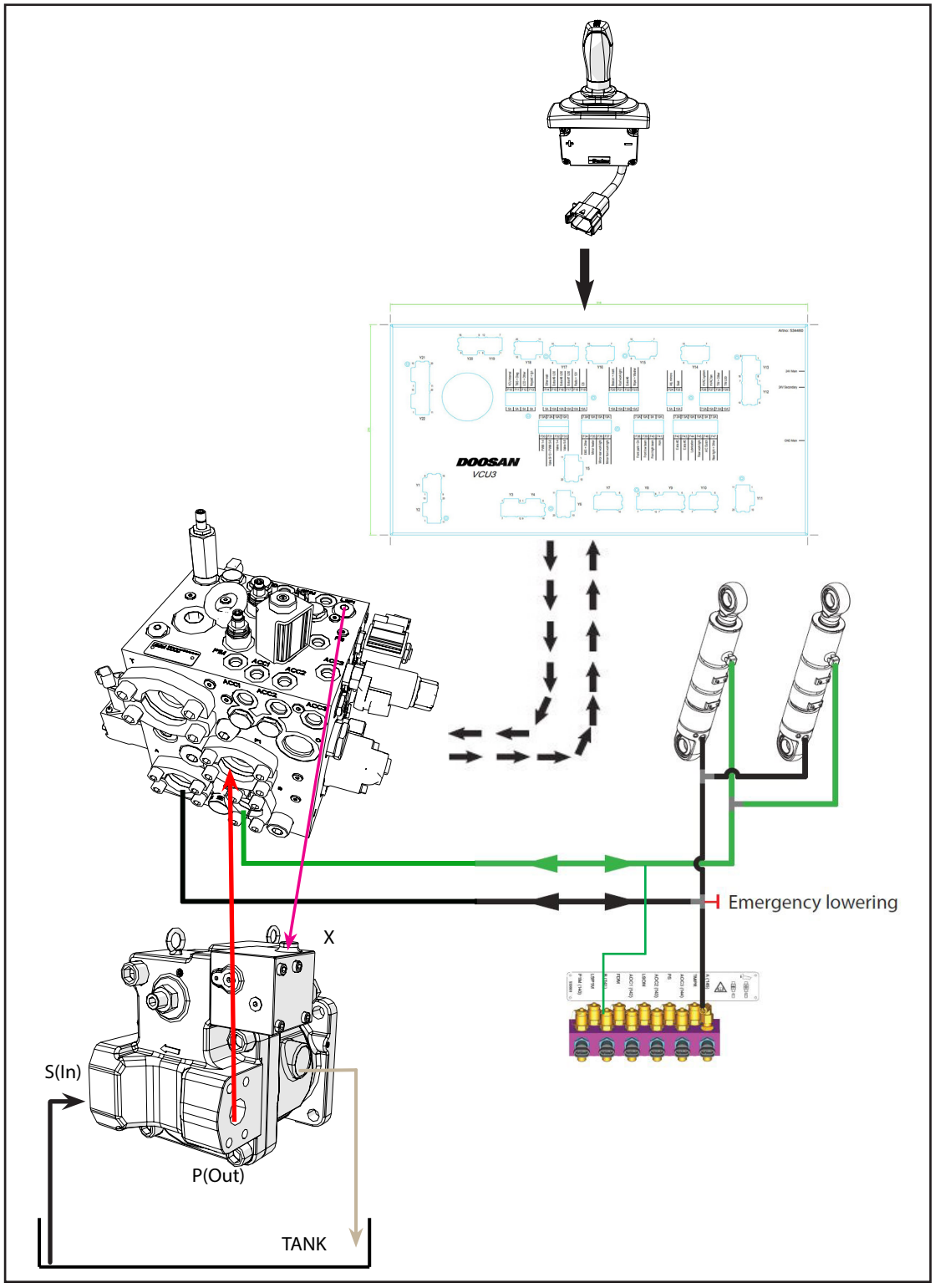


Figure 43

Tilt cylinders:

	HA30	HA45
• Double acting		
• Qty: 2		
• Cylinder diameter	115 mm	125 mm
• Piston diameter	70 mm	85 mm
• Stroke	2290 mm	2614 mm

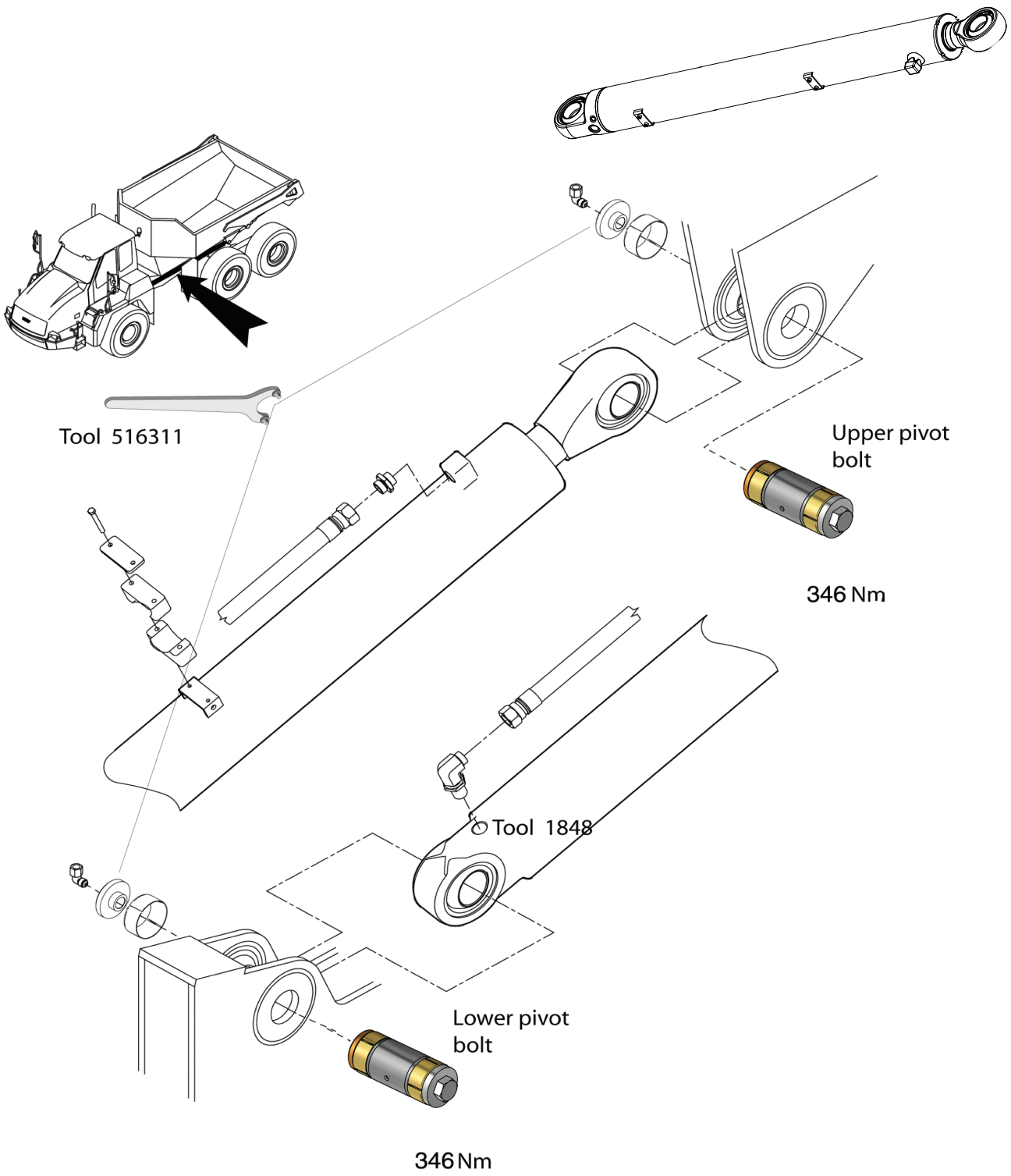


Figure 44

The Tilt Cylinders are located on the rear wagon on each side of the dumper body.
To remove the cylinders, rise the dumper body, and place body on safety stand.

Removal:
Thoroughly clean the tilt cylinder and the area around for any accumulated dirt.
Place a container below the cylinder to catch any hydraulic fluid spilt during removal.
Mark each hydraulic line for proper location and plug lines as they are disconnected from cylinder.
Fasten a lifting sling between the two hose clamps on tilting cylinder.
Lift the cylinder slightly to remove the weight on the lower pivot bolt.
To remove the upper pivot bolt, unscrew securing screws and washers. Disconnect lubrication lines if fitted.
Remove the pivot bolt and expansion rings using a slide hammer to withdraw the bolt. Slide hammer must be equipped with a M20 adapter to fit the bolt.
When bolt is free, lower cylinder to get clear of bracket.
Remove lower pivot bolt as described for upper.

WARNING

Be aware of the risk of injury to people and equipment when handling heavy objects!

Carefully lift and push cylinder rearwards out of bracket, and swing front end of cylinder out, then lower to ground level.
If the cylinder is removed for exchange, unscrew the hose fittings attached for possible reuse.

Installation:
Check the condition of the connector seals, replace if necessary. Apply a light coat of oil to the connector seals.
Install the connectors in cylinder body, and tighten.
Install cylinder in opposite order as described for removal. Pivot bolts are installed with the lubrication supply bore facing in, and lubrication cross bore pointing perpendicularly to cylinder center line.
Pivot bolts are driven in using a soft mallet. Make sure pivot bolts and attaching parts are centred before securing screws are tightened. Install lubrication lines.
Reconnect hydraulic hoses.

Control:
Check that all connections are located in the same positions as before removal, and that all hoses are correctly routed.

Perform startup test procedure.
Ref. section: Startup test procedure.

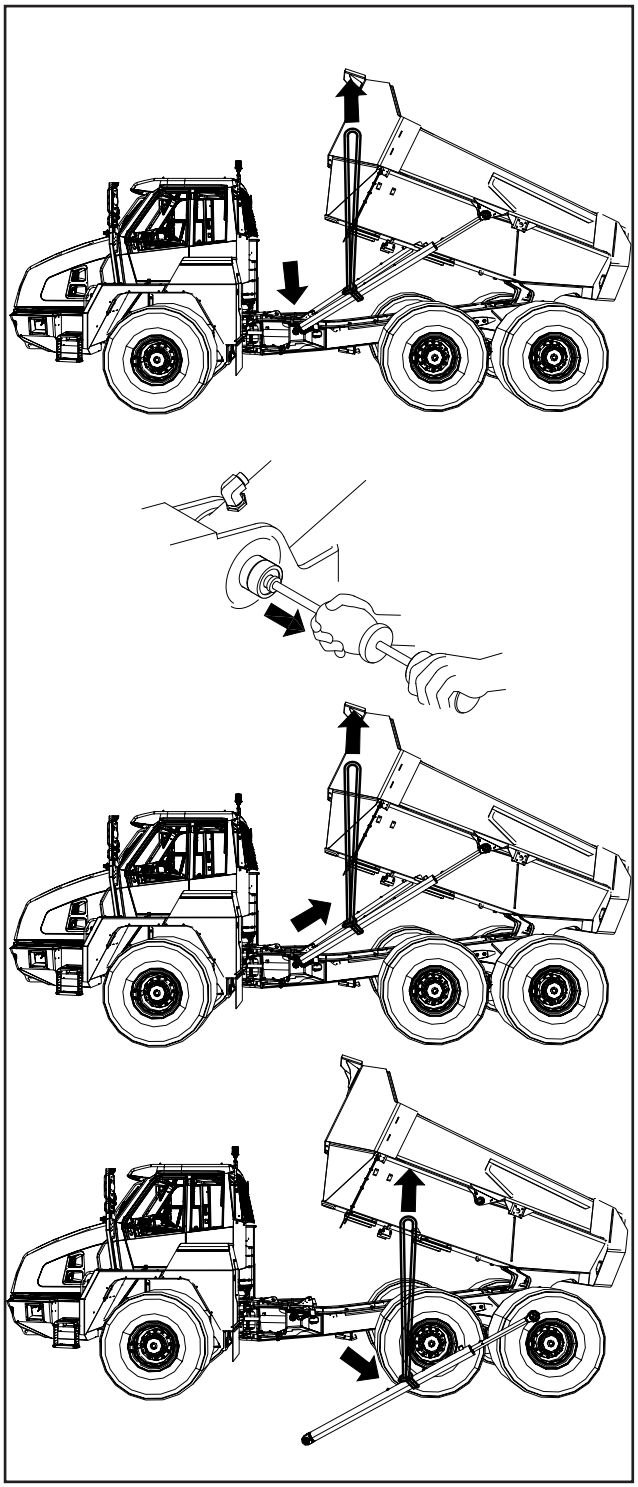
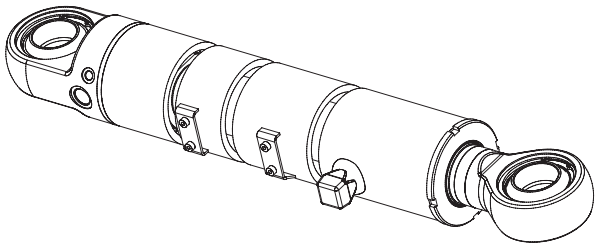


Figure 45

Tilt cylinder, sectional drawing.



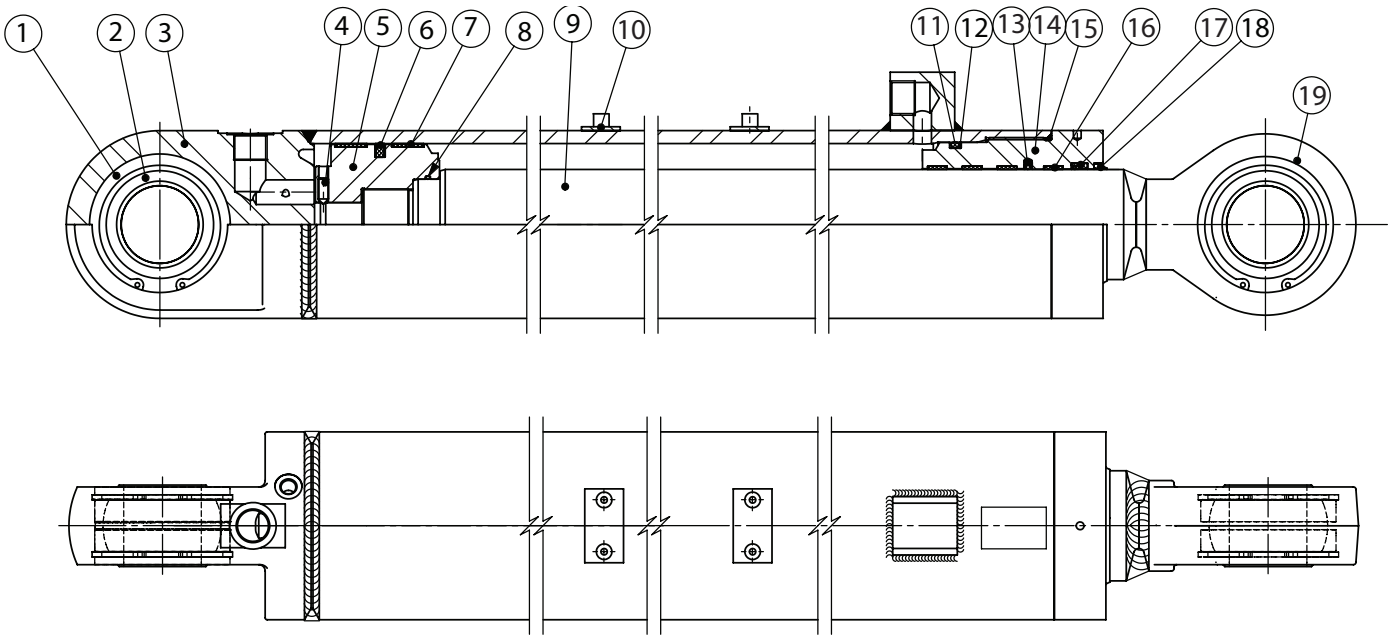


Figure 46

Pos.	Quantity	Description	HA30	HA45
1	4	Internal circlip	Ø105mm	Ø105mm
2	2	Spherical insert		
3	1	Cylinder end forged	Ø115mm	Ø125mm
4	1	Hexagonal socket screw	M8x20	M8x20
5	1	Piston head	Ø115mm	Ø125mm
6	1	Seal		
7	1	Bearing strip		
8	1	O-ring		
9	1	Piston rod		
10	2	Tube clamp weld on		
11	1	O-ring		
12	1	Back up ring		
13	1	Seal		
14	1	Screwed gland	800Nm	800Nm
15	1	O-ring		
16	4	Bearing strip		
17	1	Rod seal		
18	1	Wiper		
19	1	Rod end		

Tilt cylinder Repair Instructions

WARNING

Cylinder repair should be carried out in a workshop familiar with hydraulic cylinders. Protect against injury by wearing the correct PPE. (Personal protective equipment) appropriate for the job. Avoid high pressure oil. Never search for leaks with your hands. If hydraulig oil penetrates your skin, seek medical help immediately.

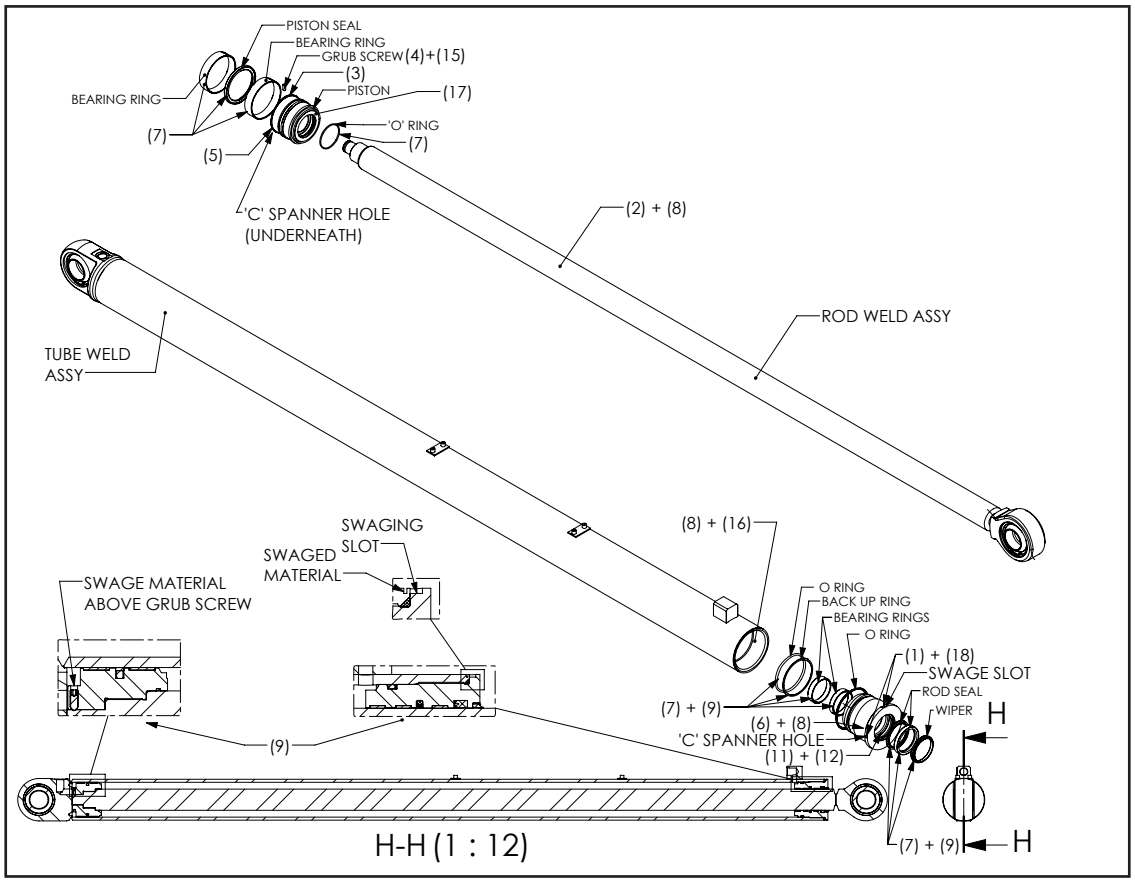


Figure 47

NOTE

Before starting work, make sure to clean the outside of the cylinder. Place the cylinder into a secure clamp in a clean working envoirnment.

(1). USING A FLAT HEAD SCREW DRIVER PUSH SWAGED MATERIAL FROM SLOT IN GLAND AND THEN USING A 'C' SPANNER REMOVE THE GLAND (OIL WILL ESCAPE AT THIS POINT COLLECT IN A SUITABLE CONTAINER)

(2). REMOVE THE ENTIRE PISTON ROD FROM THE TUBE

(3). REMOVE THE SWAGED MATERIAL FROM ON TOP OF THE GRUB SCREW

(4). REMOVE THE GRUB SCREW WITH AN ALLEN KEY

(5). USING A 'C' SPANNER REMOVE THE PISTON.

(6). REMOVE THE GLAND FROM THE PISTON ROD

(7). REMOVE ALL SEALS USING APPROPRIATE TOOLS. TAKE CARE NOT TO DAMAGE THE SEALING SURFACES

(8). CLEAN ALL PARTS AND INSPECT FOR DAMAGE. IF THE SEALING SURFACES ARE DAMAGED THE PART IS BEYOND REPAIR. REPLACE ALL DAMAGED PARTS.

(9). REPLACE ALL SEALS TAKING CARE OF SEAL DIRECTION AS THE IMAGE BELOW.

(10). INSPECT ALL PARTS TO ENSURE THEY ARE CLEAN BEFORE ASSEMBLY.

(11). LIGHTLY OIL INSIDE OF GLAND (USE HYDRAULIC OIL).

(12). PUSH GLAND ONTO THE PISTON ROD.

(13). ASSEMBLE THE PISTON ONTO THE ROD.

(14). USING A 'C' SPANNER AND A COPPER HAMMER, TIGHTEN THE PISTON. HIT THE 'C' SPANNER SEVERAL TIMES TO ENSURE THE PISTON IS TIGHT.

(15). FIT THE GRUB SCREW AND SECURE BY SWAGING MATERIAL ABOVE GRUB SCREW.

(16). MAKE SURE THE TUBE WELD ASSY IS CLEAN IN ALL AREAS

(17). ASSEMBLE THE PISTON ROD INTO THE TUBE

(18). USING A 'C' SPANNER TIGHTEN THE GLAND HIT THE 'C' SPANNER SEVERAL TIMES WITH A COPPER HAMMER TO ENSUR GLAND IS TIGHT NOTE!! AT THIS POINT SWAGE MATERIAL INTO GLAND SLOT TO LOCK GLAND

NOTE

Allow the cylinder to sit for 24 hours to let the loctite cure.

Fan system

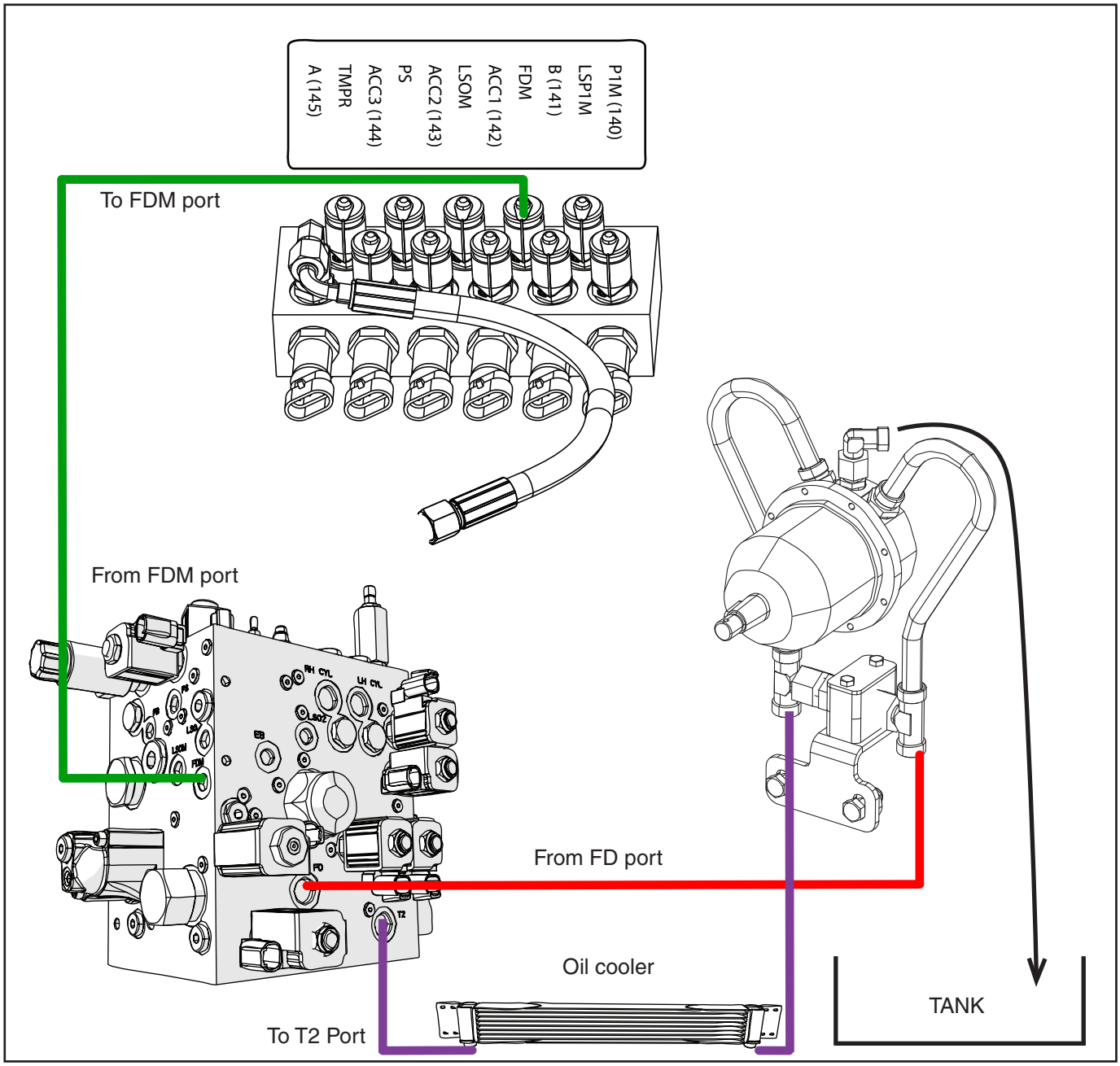


Figure 48

Fan Drive Motor

The Fan Drive Motor is located at the front end of the engine, just behind the cooler package
Access is obtained by removing the bonnet.

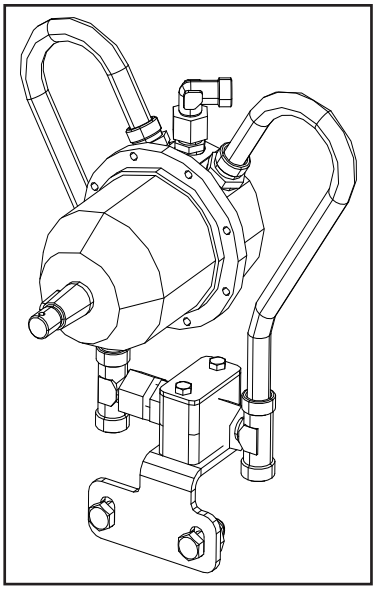


Figure 49

Removal:
-see chapter 7 to assemble and disassemble cooling elements.
Thoroughly clean the fan drive motor and the area around for any accumulated dirt.

Installation:
Check the condition of the connector seals, replace if necessary. Install the connectors in motor body, using a light coat of oil on the seals and tighten.

Install fan drive motor in support bracket, and tighten the eight bolts.
Attach the hydraulic tubing to the motor.
Position key in motor shaft slot, and slide fan in position on shaft. Tighten axle nut, and secure with cotter pin.
Replace fan unit support bracket on cooler package, and tighten the four bolts.
install cooling package (see ch. 7)
Control:
Before startup - Check that all connections are located in the same positions as before removal, and that all hoses and tubes are correctly routed.

Perform startup test procedure. Ref. section: Startup test procedure.

Disassemble the fan and fan motor

Drain the cooling system;

Remove the pipeline between the engine and the air cooler (1);

Remove clamping band for the hose and wiring;

Disassemble the inlet cooling hoses from the thermostat housing (2);

Disassemble the hydraulic hoses from the fan motor (3);

Disassemble the pipe clamps from the radiator shield (4);

Disassemble fan protection (5);

disassemble tank (6);

Disassemble the fan unit rack from the radiator shield (7);

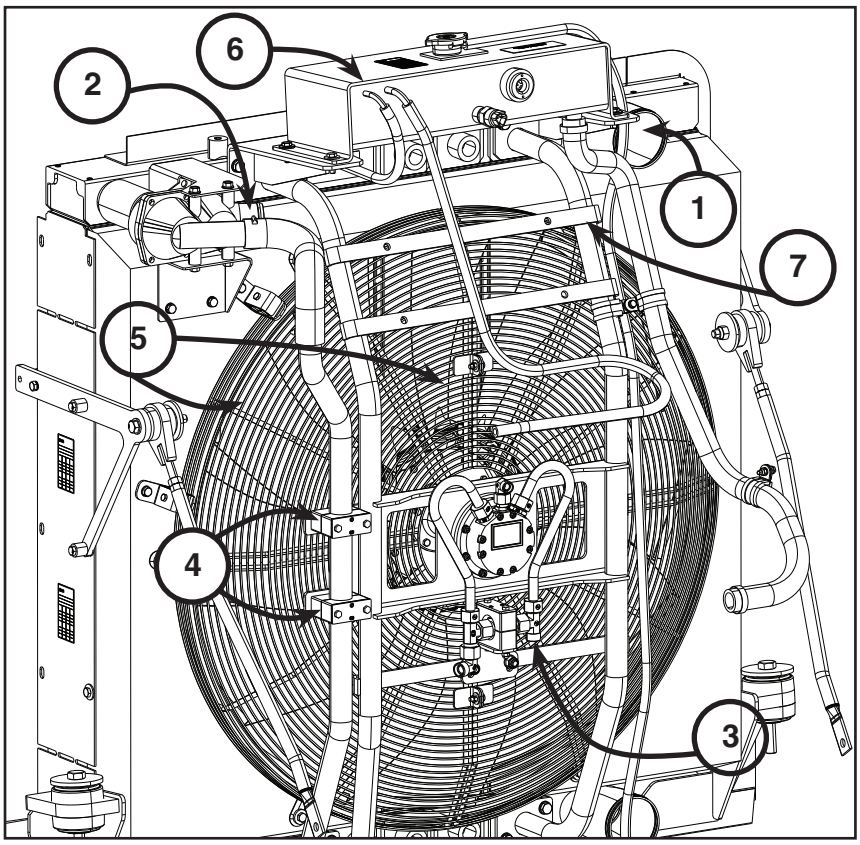


Figure 50

Pos	Qty	Description
1	1	Fan beam
2	16	Screw
3	32	Washer
4	16	Nut
5	1	Motor
6	8	Screw
7	8	Nut
8	1	Fan
9	1	Nut
10	1	Cotter pin

Disassemble cotter pin (10) and the nut (9) from the fan motor.

Disassemble the fan motor (8) from the rack.

Assemble in reverse order.

NOTE

Be aware the conical shaft end have clearance to the nut surface when assembling.

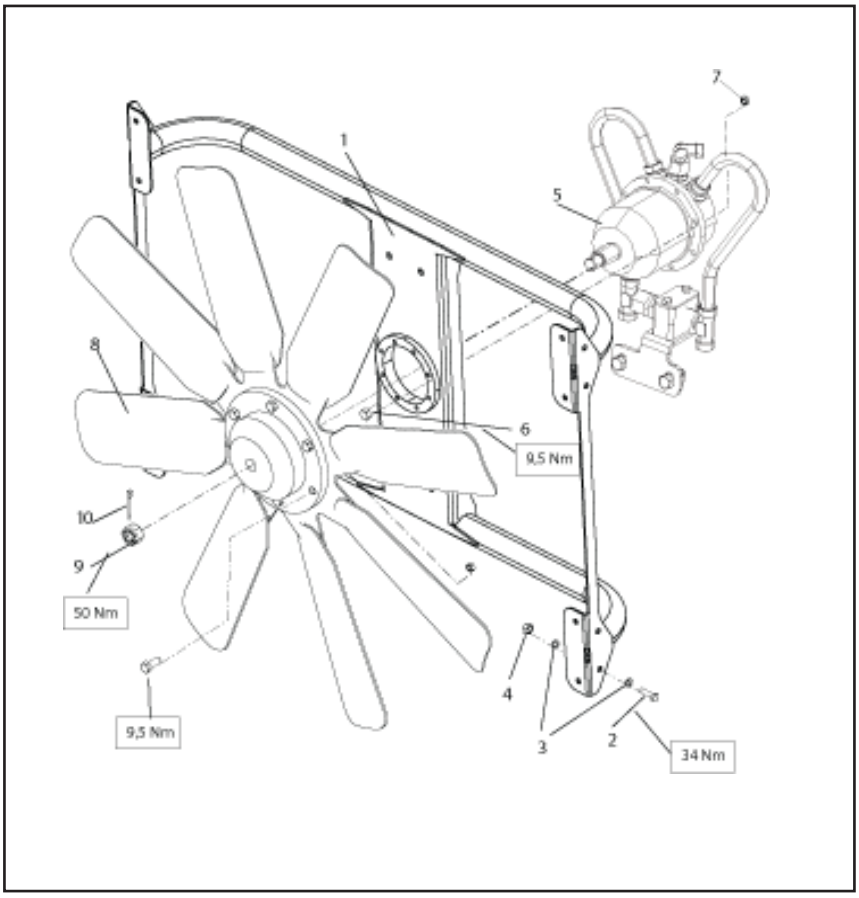
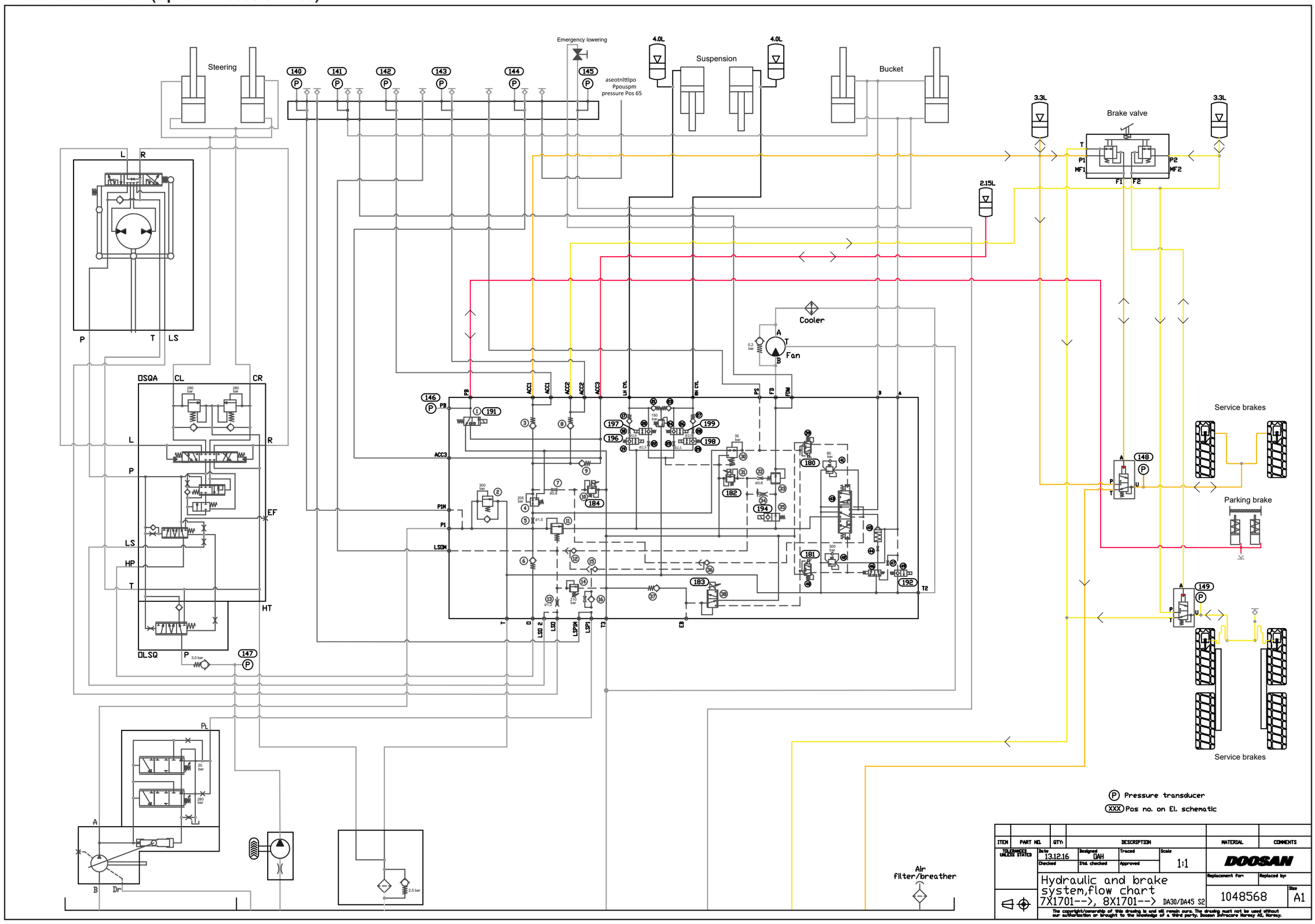


Figure 51

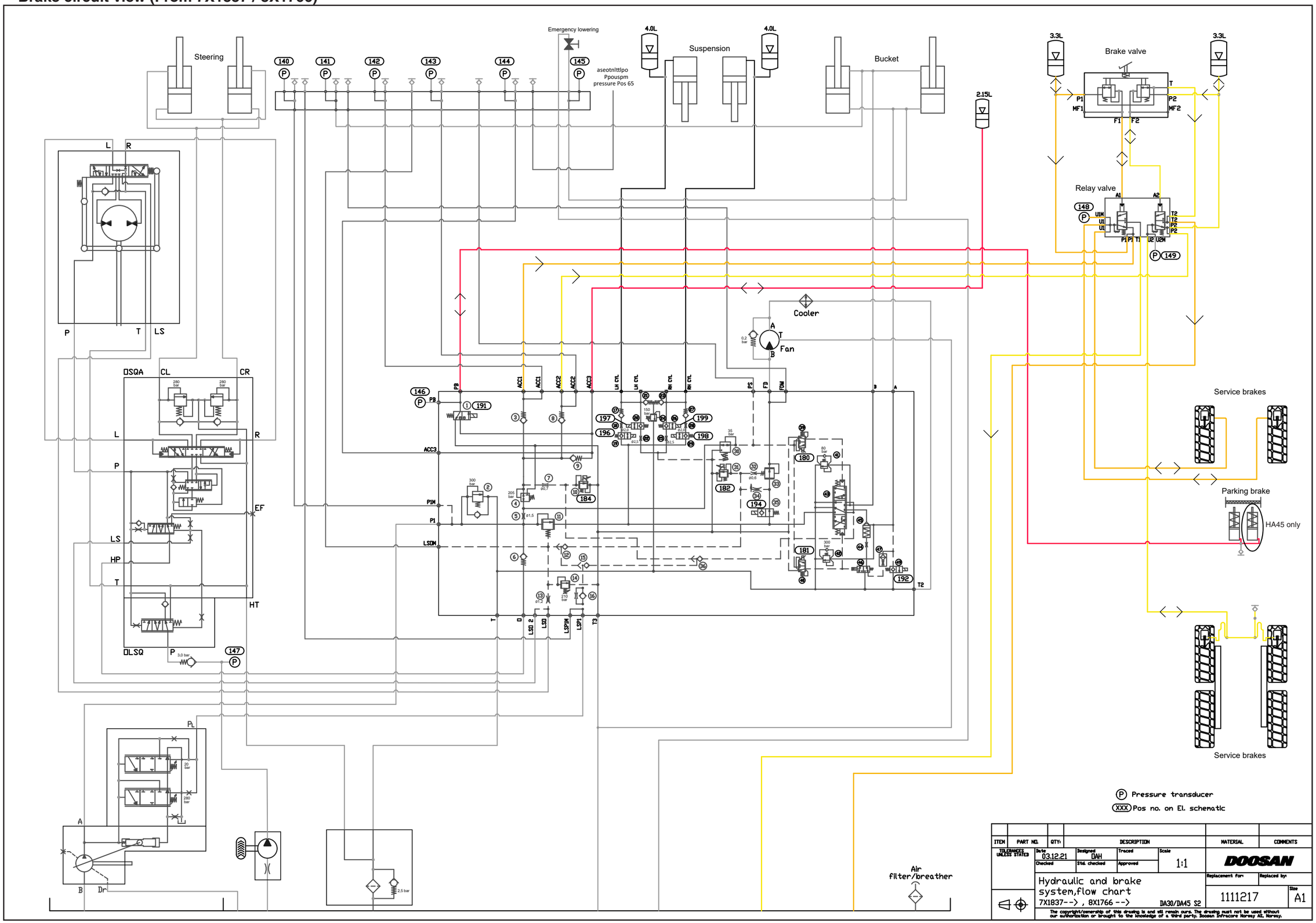
Brakes

Brake circuit view (Up to 7X1836 / 8X1765)



Ch 5 page 56

Brake circuit view (From 7X1837 / 8X1766)



General discription

This machine is equipped with a fully hydraulic operated brake system and an independent circuit for the front axle and rear axle. The brake system is composed of brake pedal valve, relay valves and accumulators and provided with oil through main valve from pump. A system pressure drop below 140 bar will indicated on the display panel in the cabin, and alarm will sound.

Parking brake, description

The parking brake is spring actuated, hydraulic released, self adjusting, single disc brake mounted at the fixed propeller shaft in rear chassis.

Operation
When the parking brake switch, is switched to the “on” - position, the parking brake accumulator, charged by the hydraulic pump is closed by the solenoid valve and park brake oil is returned to tank.
When the parking brake oil is drained, the park brake light switch is disconnected and park brake light on dashboard disconnects.

With the park brake switch in the off position, the solenoid valve allow pressurised oil to compress the spring in the brake chamber to keep park brake in the off position.

If for some reason the park brake oil pressure drops below approx 108 bar the spring force will apply the parking brake as an emergency brake. The warning light come on at 110 bar.

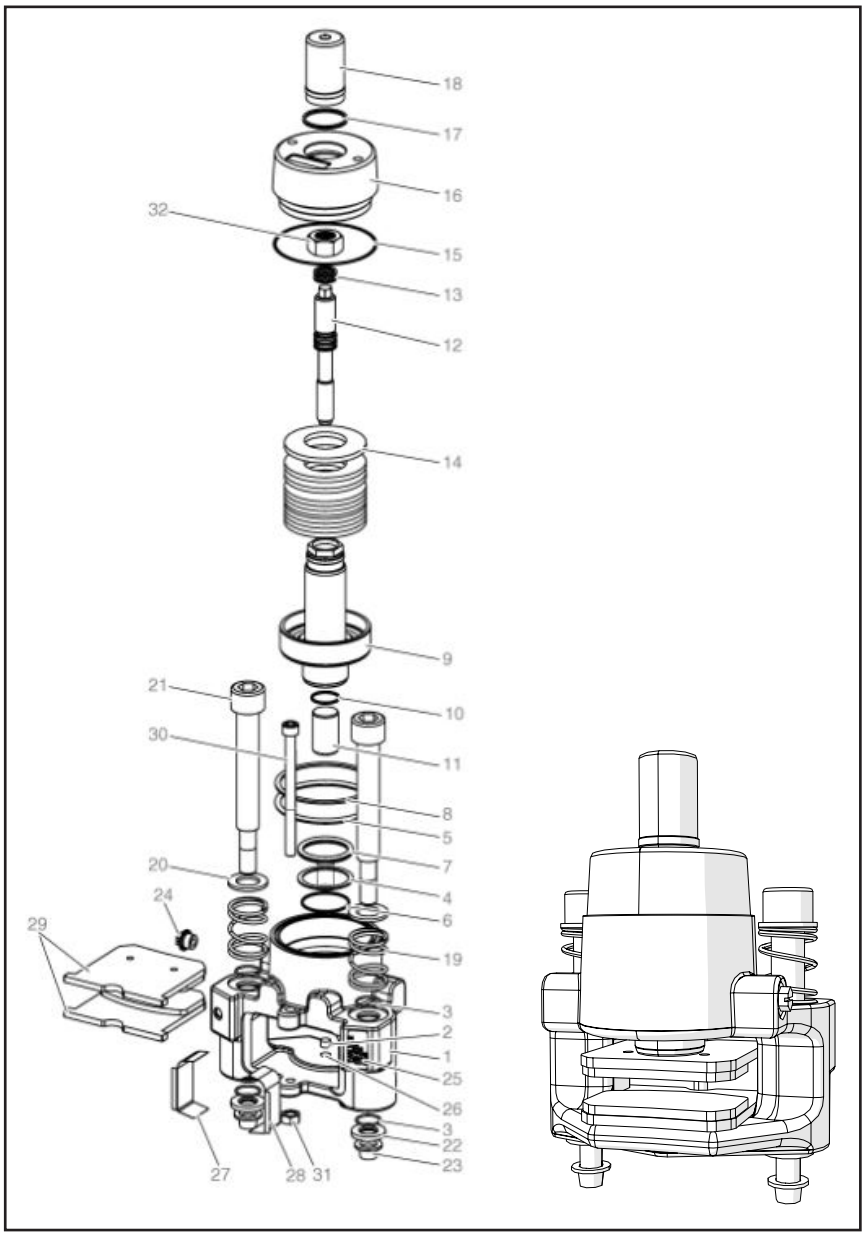
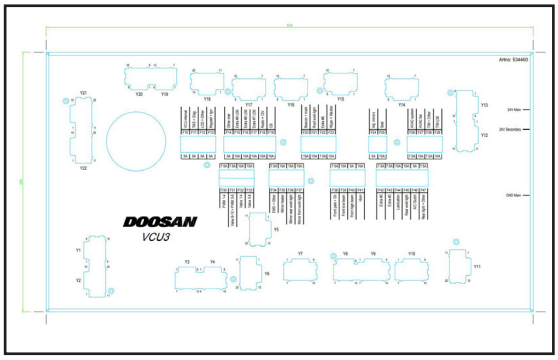
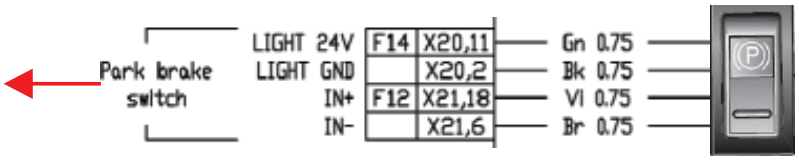


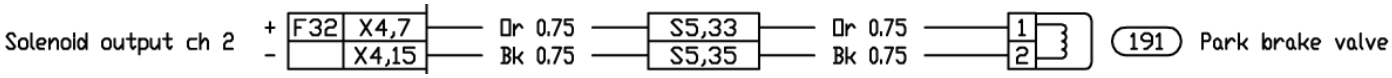
Figure 52

1	Housing
2	Magnet
3	O-ring
4	Backup ring
5	Backup ring
6	O-ring
7	O-ring
8	O-ring
9	Piston
10	O-ring
11	Piston ass’y
12	Screw
13	O-ring
14	Disc spring
15	O-ring
16	Spring cap
17	Cap
18	Cap
19	Spring compression
20	Washer
21	Bolt
22	Washer
23	Cap
24	Plug
25	Plate
26	Shim
27	Shim
28	Shim
29	Pad
30	Hexnut
31	Hexnut
32	Hexnut

Parking brake circuit view







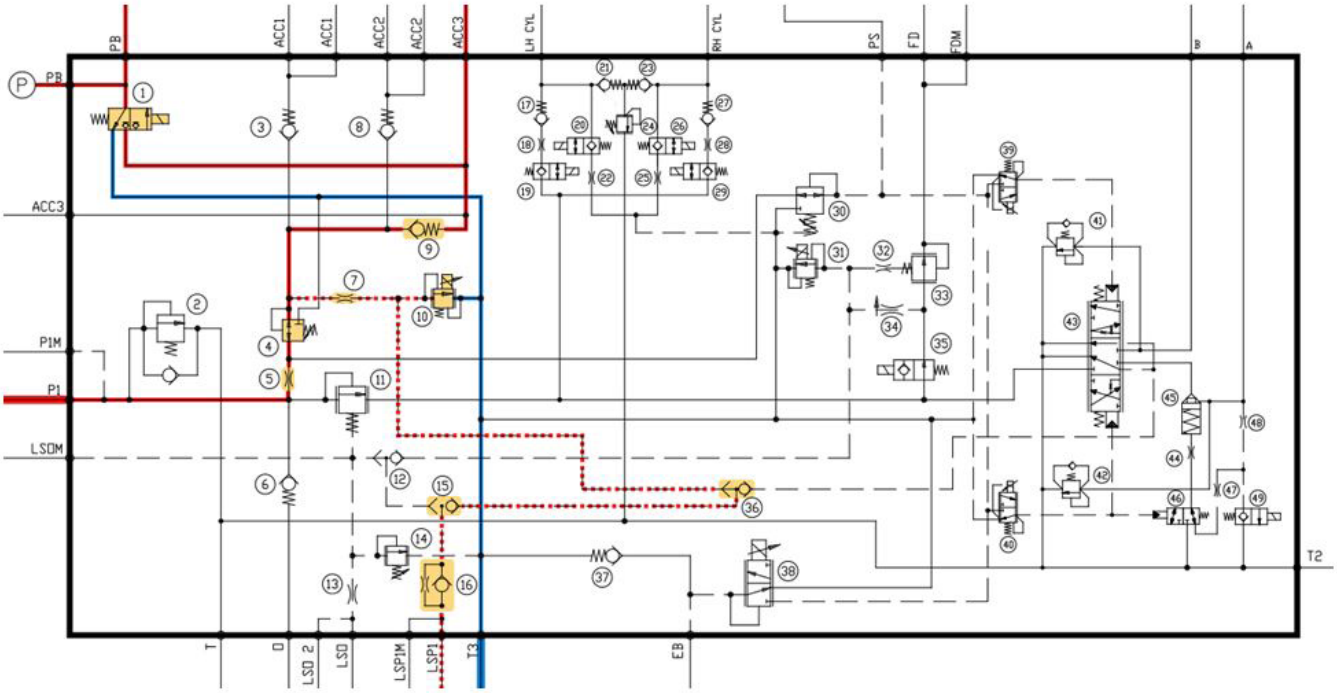


Figure 53

All the pressures on the brake system are adjusted by software.

Service brake, description

Main pump supplies pressurized fluid through main valve to the brake system.

Force on the brake pedal provides a pilot pressure to relay valves for front and rear brakes.
Relay valve provides high flow directly from the accumulators to the brakes, proportional to the pilot pressure, i.e. directly proportional to the pedal position.

Pressure on the brake pistons applies pressure to the brake discs, and this stops axle shaft and wheel rotation.
The braking is progressive. As soon as brake pedal is released, relay valves transfers oil from brakes to tank.

Accumulators

Description of the Accumulators

The 2,15 Liter parking brake accumulator is placed on a bracket on the RHS of the front frame along with the 3,3 Liter service brake accumulator, and the 3,3 Liter rear service brake accumulator, the 2x 4.0 Liter self centering accumulators are placed on both sides of the front frame, behind the sucpension cylinder.
The accumulators are from Hyundai factory loaded with Nitrogen (N_2)

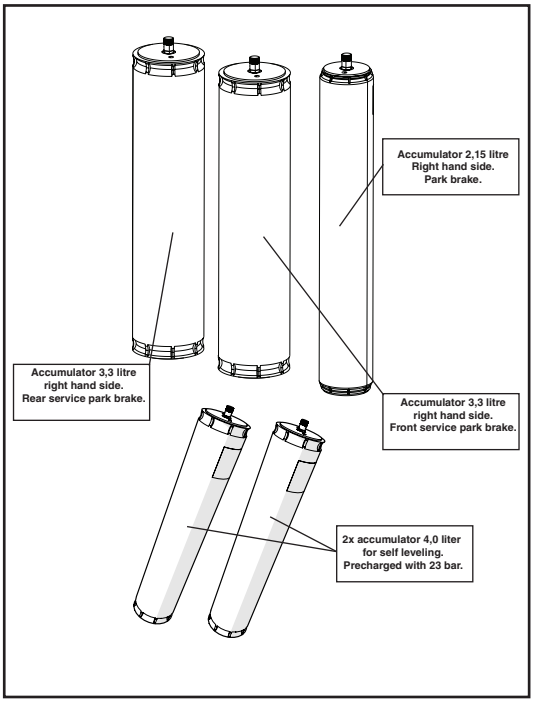


Figure 54

NOTE

Pre-charge	
Wet disc brake:	**Pressure: 60 bar**
Park brake:	**Pressure: 112,5 bar:**
ACC. self centering:	**Pressure 23 bar (HA30)**
Acc. self centering:	**Pressure 25 bar (HA45)**

Read the loading instruction marked on each of the accumulators.

Checking and Adjusting Pre-charge Pressure

The pre-charge pressure of the accumulator may be checked, and nitrogen filled or vented, using the UCA Universal Charging & Gauging kit. (See view of the kit at next page)
The UCA assembly is screwed onto the accumulator's gas valve, allowing the pre-charge pressure to be checked or reduced. If the pre-charge pressure is to be increased, the UCA can be connected to the nitrogen source with the hose supplied. The UCA kit is supplied with two pressure gauges, reading 0-25 bar and 0-250 bar; where a different pressure range is required, a Commercially-available pressure gauge may be used.

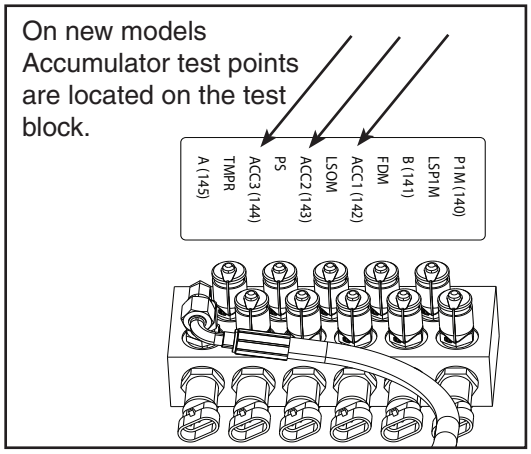


Figure 55

Safety

Charging must be carried out by qualified personnel.
Before taking any readings or pressurizing with nitrogen, the accumulator must be isolated from the hydraulic system and the fluid side discharged in order to depressurize it.
Use only nitrogen (N2) to pressurize the accumulator.

DANGER

Danger of Explosion – Never Charge with Oxygen

The types of nitrogen permitted are: type S (99.8% pure); type R (99.99% pure); type U (99.993% pure).
If the pressure of the gas contained in the nitrogen bottle is greater than the maximum permissible operating pressure of the accumulator, a pressure regulator must be fitted to the nitrogen bottle.

Hyundai recommends that the pre-charge should be checked during the first week following commissioning of the system.
Thereafter, it should be checked every three months, or at intervals determined by the system builder.

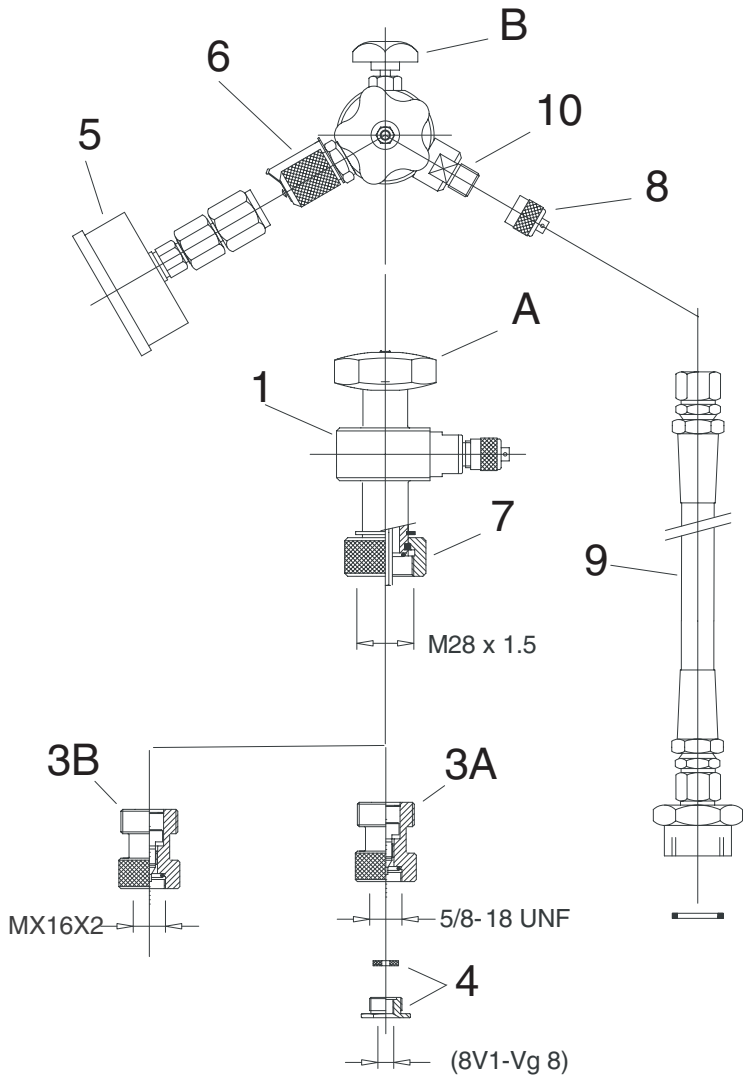
The Effect of Temperature on Pre-charge Pressure

In order to compensate for the difference in pressure at ambient and operating temperatures, it is recommended that the pre-charge pressure po should be adjusted to reflect the operating temperature of the system, using the correction factor equations and table on page 65.

Warning – Stabilization

The process of charging or discharging an accumulator with nitrogen causes a temperature change which is transmitted to the surrounding air as the temperature of the accumulator stabilizes.
To allow for the effects of temperature transfer, the accumulator should be allowed to stand for a minimum of 15 minutes before a final reading of the pre-charge pressure is taken.

Gas Bottle Fittings and Part Numbers
To meet the requirements of different markets, Parker's and Hydroll's UCA Charging and Gauging Kits are supplied with an adapter to suit the appropriate gas bottle fitting.



Controls
A Inflation valve
B Bleed valve

Key
1 UCA
3A Adapter Parker (short)
3B Adapter Hydroll (From 7X1883/8X1789)
4 Adapter (insert) with fibre washer
5 Pressure gauge
6 Knurled protective cap – gauge port
7 Knurled collar – gas port
8 Knurled protective cap – filling port
9 Filling hose (G1/4 fitting, 60° cone) with O-ring
10 Filling port valve

Pos 9 spare hose part no. 515642

Pre - charging (Nitrogen N2)

NOTE

Wet disc brake:	**(3,3L)**	**Pressure: 60,0 ± 0.5bar**
Park brake:	**(2,15L)**	**Pressure: 112,5 ± 0.5bar**
Suspenison:	**(4,0L)**	**Pressure: 23 ± 0,5 bar (HA30)**
Suspenison:	**(4,0L)**	**Pressure: 25 ± 0,5 bar (HA45)**

Figure 56

UCA Universal Charging & Gauging kit. No. 515148
Pos No 9 is special for the different country. See the list below:

Country	Gas Bottle Fitting	Part No
UK	5/8 BSP (male)	Part No. 515149
France	W 21,7 x 1/ 14" (female)	Part No. 515151
Germany	W 24,32 x 1/ 14" (female)	Part No. (Incl. 515148)
Italy	W 21,7 x 1/ 14" (male)	Part No. 515152
US	0,960 x 1/ 14" (male)	Part No. 515150

Operating Instructions

Only fluids in Group 2 as defined by the Pressure Equipment.
Before installation, refer to the pressure and temperature limits shown on the nameplate.
For cyclic loading, consult Parker or Hydroll regarding the fatigue-free working pressure range or limiting of the number of cycles for finite life applications.

Maintenance

Accumulators must be regularly examined, checked for general condition, and maintained on a periodic basis. The frequency and extent of inspection required will depend on experience with the particular application. It is the responsibility of the accumulator installer to set the frequency of maintenance appropriate to the application, but a period of one year between inspections is considered to be an acceptable maximum.

In the case of finite life applications, Parker recommends inspection of the accumulator when one half of the allowable load cycles has been completed or after a period of one year – whichever occurs first.
If the user is not competent to make the necessary assessment of reliability, then expert advice must be obtained. Examination shall consist of visual inspection of the physical integrity of the equipment and, where applicable, a functional test.

Maintenance routines shall be performed by authorised personnel only and shall include the verification of settings and operational testing where applicable.
Maintenance shall also include routine testing of individual devices after specified service cycles and the exchange of components before the end of the projected lifetime.

Maintenance programs and work, results of examinations and any resulting remedial measures taken shall be documented and retained for 10 years or the lifetime of the installation (if shorter). Replacement of components shall be documented and retained in the same way.

Repair Kits are available for all accumulator models; replacement of the piston seals is generally the only maintenance required.
When ordering repair kits, state the complete model number from the nameplate and specify the type of fluid and operating temperature. Replacement of other seals on end caps and the gas valve is also recommended.

Periodic checking of the pre-charge pressure, will provide early warning of deteriorating piston seal performance.
If pre-charge pressure is low, check also for gas valve and/or end cap seal leakage. Allowing for temperature difference, if any, the pre-charge pressure will rise if oil collects in the gas side and will fall if gas leaks into the oil side or past gas end cap seals. It is suggested that a check be made a week after installation, and thereafter once every three months or at intervals determined by the system builder.

Filling table of Correction Factors

Precharge Temperature t_0 °C

Operating Temperature t_2 °C	-20	-10	0	5	10	15	20	25	30	35	40	50	60	70	80	90	100
-20	1.00	1.04	1.08	1.10	1.12	1.14	1.16	1.18	1.20	1.22	1.24	1.28	1.32	1.36	1.40	1.43	1.47
-10	0.96	1.00	1.04	1.06	1.08	1.10	1.11	1.13	1.15	1.17	1.19	1.23	1.27	1.30	1.34	1.38	1.42
0	0.93	0.96	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.13	1.15	1.18	1.22	1.26	1.29	1.33	1.37
10	0.89	0.93	0.96	0.98	1.00	1.02	1.04	1.05	1.07	1.09	1.11	1.14	1.18	1.21	1.25	1.28	1.32
20	0.86	0.90	0.93	0.95	0.97	0.98	1.00	1.02	1.03	1.05	1.07	1.10	1.14	1.17	1.20	1.24	1.27
30	0.84	0.87	0.90	0.92	0.93	0.95	0.97	0.98	1.00	1.02	1.03	1.07	1.10	1.13	1.16	1.20	1.23
40	0.81	0.84	0.87	0.89	0.90	0.92	0.94	0.95	0.97	0.98	1.00	1.03	1.06	1.10	1.13	1.16	1.19
50	0.78	0.81	0.85	0.86	0.88	0.89	0.91	0.92	0.94	0.95	0.97	1.00	1.03	1.06	1.09	1.12	1.15
60	0.76	0.79	0.82	0.83	0.85	0.86	0.88	0.89	0.91	0.92	0.94	0.97	1.00	1.03	1.06	1.09	1.12
70	0.74	0.77	0.80	0.81	0.83	0.84	0.85	0.87	0.88	0.90	0.91	0.94	0.97	1.00	1.03	1.06	1.09
80	0.72	0.75	0.77	0.79	0.80	0.82	0.83	0.84	0.86	0.87	0.89	0.92	0.94	0.97	1.00	1.03	1.06
90	0.70	0.72	0.75	0.77	0.78	0.79	0.81	0.82	0.83	0.85	0.86	0.89	0.92	0.94	0.97	1.00	1.03
100	0.68	0.71	0.73	0.75	0.76	0.77	0.79	0.80	0.81	0.83	0.84	0.87	0.89	0.92	0.95	0.97	1.00
110	0.66	0.69	0.71	0.73	0.74	0.75	0.77	0.78	0.79	0.80	0.82	0.84	0.87	0.90	0.92	0.95	0.97
120	0.64	0.67	0.69	0.71	0.72	0.73	0.75	0.76	0.77	0.78	0.80	0.82	0.85	0.87	0.90	0.92	0.95

Example

The satisfactory operation of a hydraulic system requires a pre-charge pressure of 100 bar. The operating temperature t_2 is 50°C and the temperature at pre-charging t0 is 20°C. From the table, a correction factor of 0.91 should be applied, giving a pre-charge pressure at 20°C of 91 bar.

Warning – Stabilization

The process of filling or discharging an accumulator with nitrogen causes a temperature change which is transmitted to the surrounding air as the temperature of the accumulator stabilizes. To allow for the effects of temperature transfer, the accumulator should be allowed to stand for a minimum of 15 minutes to allow the temperature to stabilize before a final reading of the pre-charge pressure is taken.

Main valve pressure adjustment:

Pos 4 Brake charge pressure control (ACC3) 203 - 210 bar. Run fan at max pressure. Disconnect contact on solenoid valve pos 31.

Pos 14 Steering load signal pressure limiter (P1M) 207 - 217 bar. Steer to end stroke left or right.

Pos 30 Pilot pressure supply valve (PS) 33 - 40 bar. Run fan at max pressure. Disconnect contact on solenoid valve pos 31.

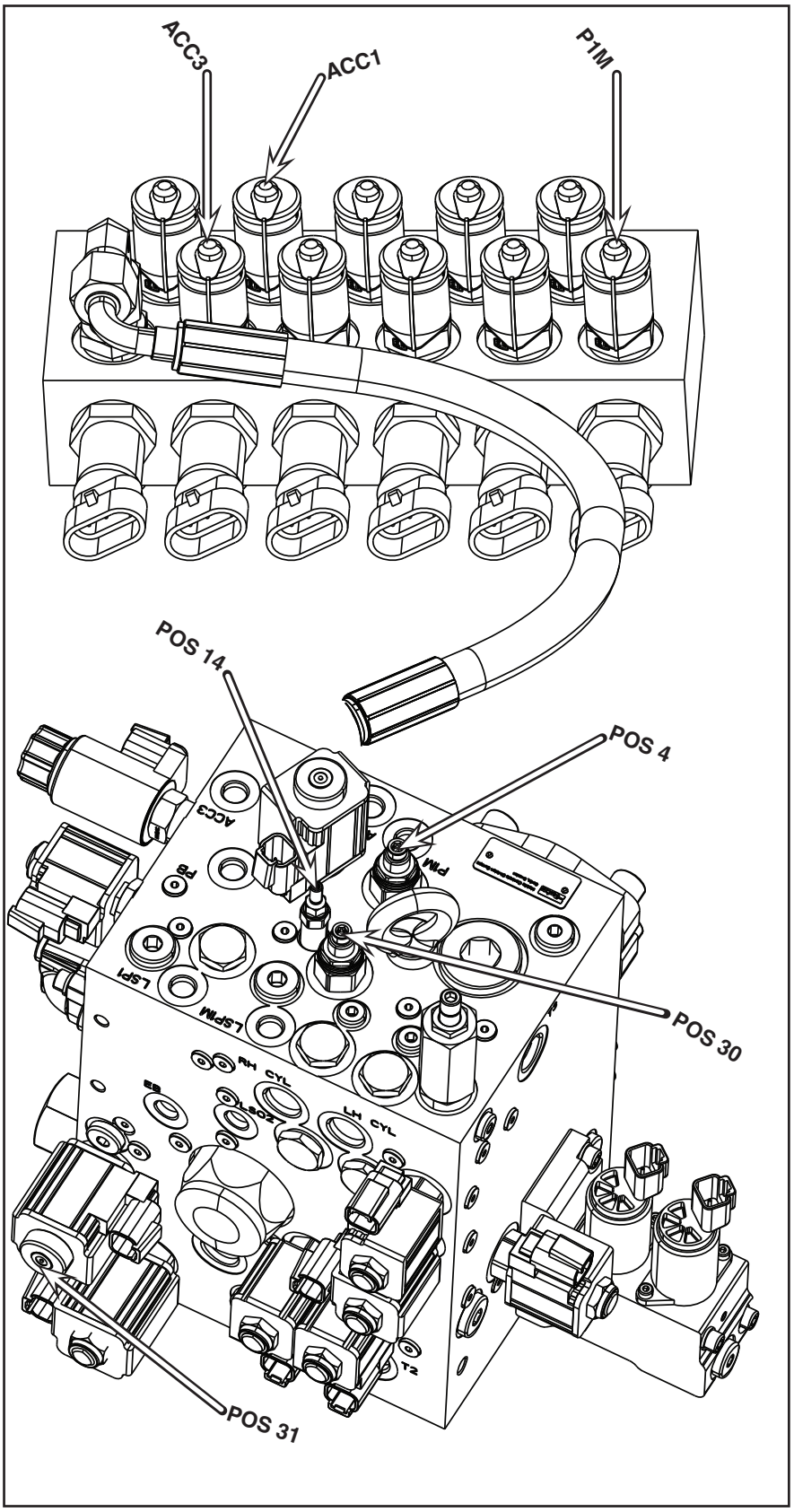
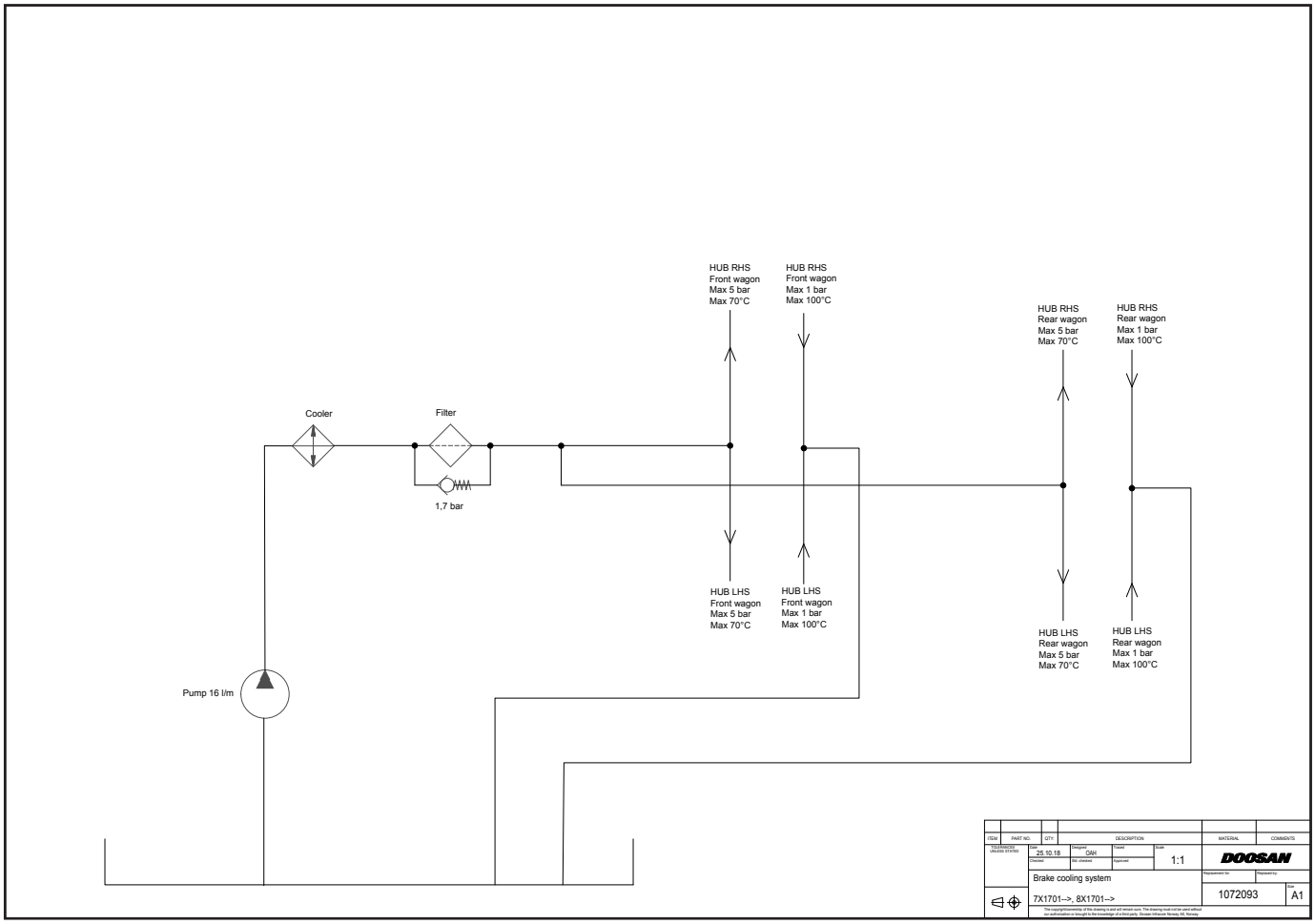


Figure 57

Brake cooling system

Brake cooling system consists of a separate tank, pump, cooler, filter with bypass, front block w/temp. sensor and rear block w/temp. sensor.



Notes: