

# SHOP MANUAL

# 410<sub>w</sub>

## HYDRAULIC EXCAVATOR

FROM SERIAL No. **0000007**

- This shop manual may contain attachments and optional equipment that are not available in your area.  
Please consult your local FAI distributor for those items you may require.  
Materials and specifications are subject to change without notice.
- 410C mount the 1004-4 engine.
- For detail of the engine, see the 1000 Series Engine Shop Manual.



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## TABLE OF OIL AND COOLANT QUANTITIES

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE						CAPACITY (ℓ)		
		-20	-10	0	10	20	30°C	Specified	Refill	
Lubricating oil sump Engine oil filter	OIL ● API CD-SG ● MIL-L-2104 E ● CCMC D4-G4	SAE 10W						11.5	11.5	
		SAE 20W-20								
		SAE 30								
		SAE 40								
Hydraulic system		SAE 10W						148	82	
Front axle: ● differential ● planetary (each)	OIL ● UTTO FLUID							7.8	7.8	
Rear axle: ● differential ● planetary (each)								0.9	0.9	
Transmission								7.8	7.8	
Swing machinery								0.9	0.9	
Swing machinery	OIL ● API GL5 ● MIL-L-2105 D	SAE 80W/90						1.9	1.9	
Fuel tank	DIESEL FUEL	*							140	---
		ASTM D975 N. 2								
Cooling system	WATER + ANTI-FREEZE							20	---	
	WATER							20	---	
	PERMANENT LIQUID							20	---	

\* ASTM D975 N. 1

ASTM: America Society of Testing and Materials

SAE: Society of Automotive Engineers

API: American Petroleum Institute

MIL: USA Military Specification

CCMC: Common Market Constructors Committe

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

### NOTE:

(1) When fuel sulphur content is less than 0.5%, change oil in the oil pan every periodic maintenance hours described in operation and maintenance manual.

Change oil according to the following table if fuel sulphur content is above 0.5%.

Fuel sulphur content	Oil change interval in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

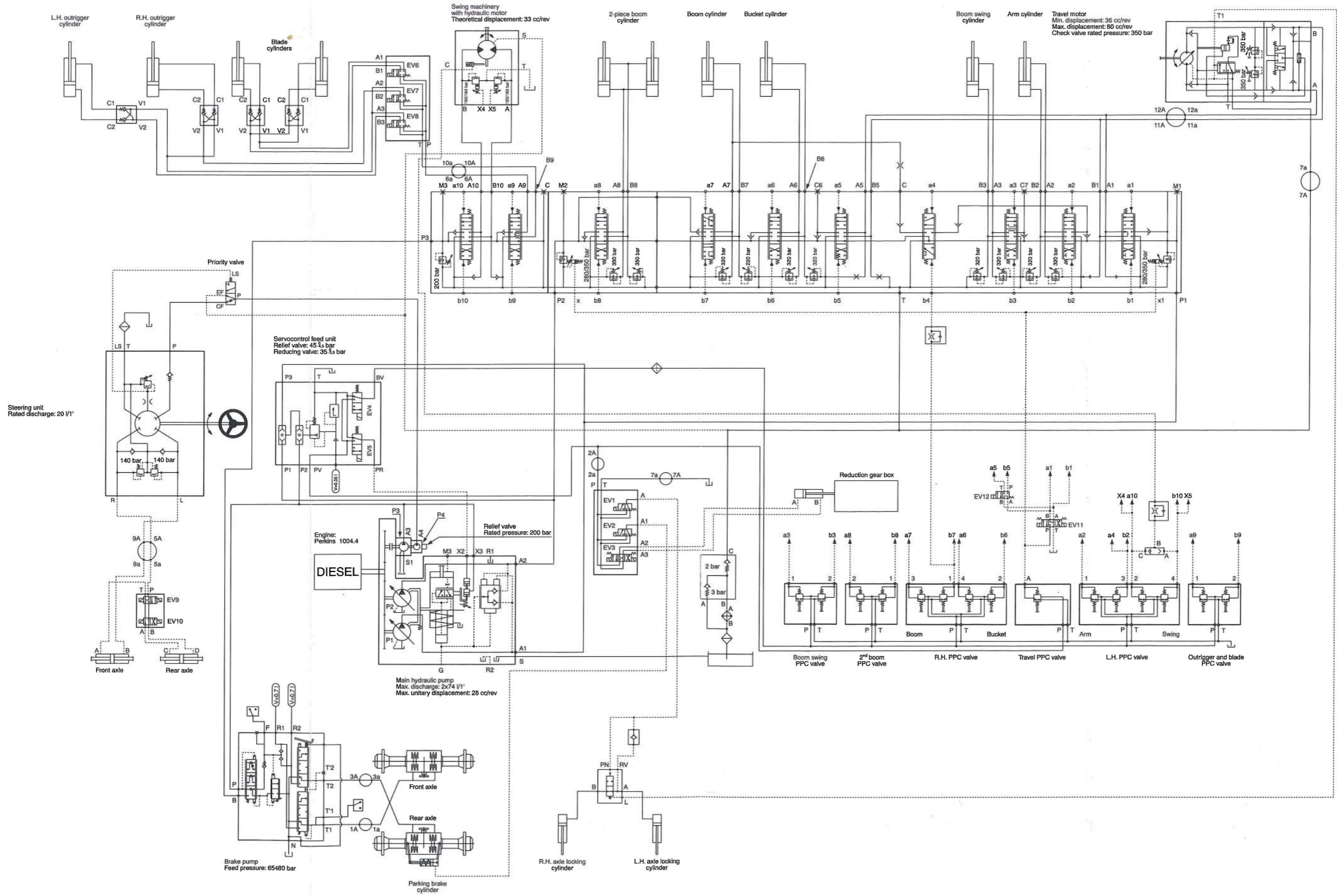
(2) When starting the engine is weathers temperature below 0°C, be sure to use engine oil SAE 10W, SAE 20W-20, even if weather temperature goes up to 10°C day time.

(3) Use classification CD as engine oil, if use classification CC, reduce the engine oil change interval to half.

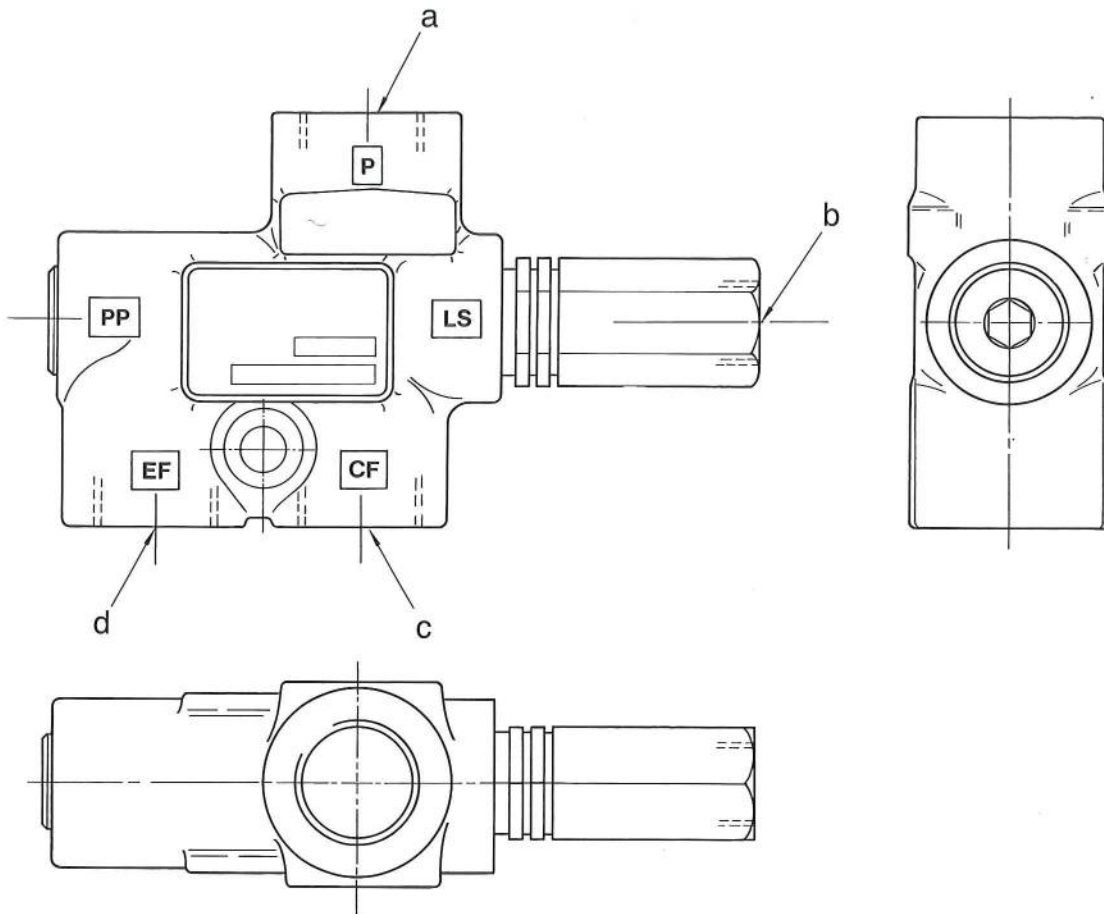
(4) Use original products, which have characteristics specifically formulated and approved for the engine, the hydraulic circuit of equipment and for reductions.



# HYDRAULIC CIRCUIT DIAGRAM



# PRIORITY VALVE



D0400036

- a. P Port - From P4 pump (A4 Port)
- b. LS Port - To steering unit (LS Port)
- c. CF Port - To steering unit (P Port)
- d. EF Port - To by-pass valve (C Port)

## SPECIFICATIONS

Type: OLS40

## OPERATION

- The oil from the pump is distributed through the priority valve to the steering unit (Port **CF**) and to the other hydraulic components (Port **EF**).
- Distribution is determined by the position of the priority valve slider in function of:
  - a - the Load Sensing signal coming from the steering unit (Port **LS**);
  - b - the pump oil delivery;
  - c - the pressure in the steering system;
  - d - the pressure in the connected hydraulic circuit.
- The slider position is such as to ensure that delivery to the steering unit always corresponds to the actual requirements.

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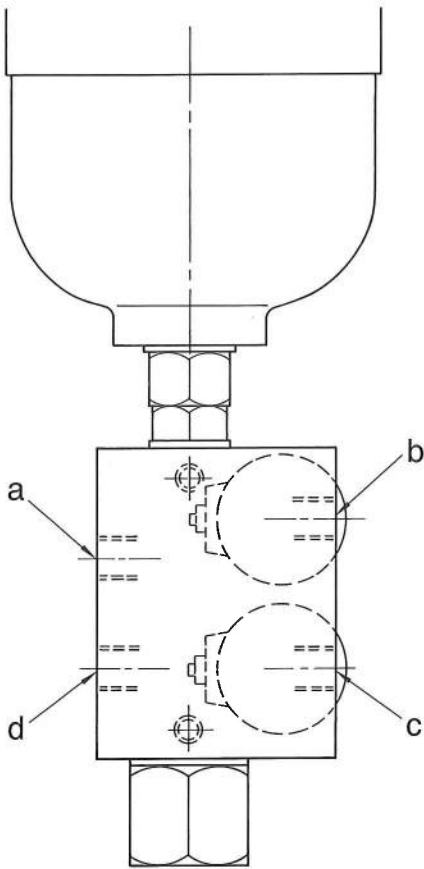
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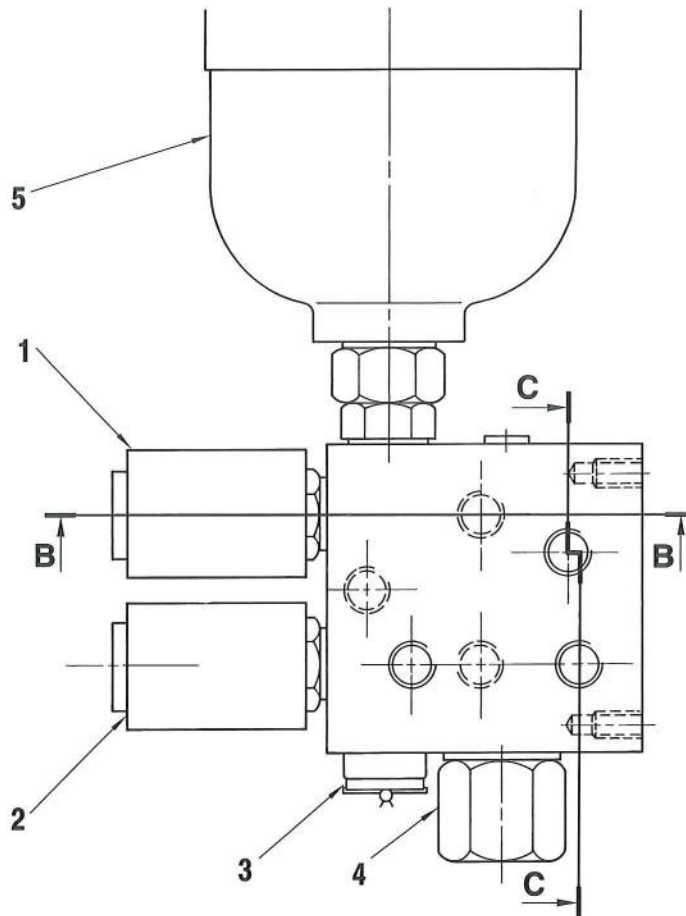
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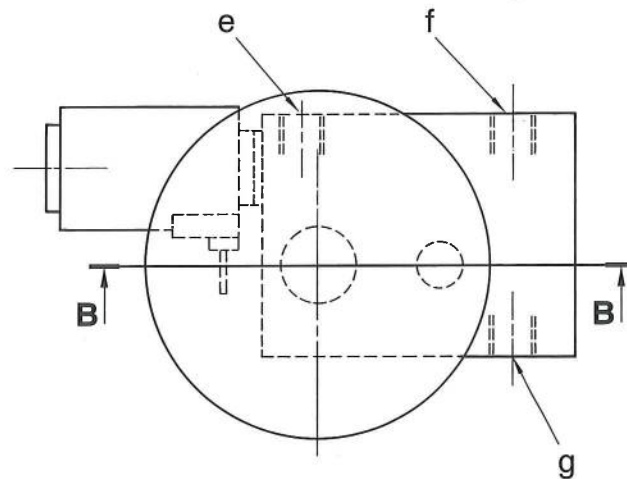
# SERVOCONTROL FEED UNIT



D0400047



1. Relief servocontrol solenoid valve (EV4)
2. Mode-system solenoid valve (EV5)
3. Relief valve
4. Reducing valve
5. Accumulator

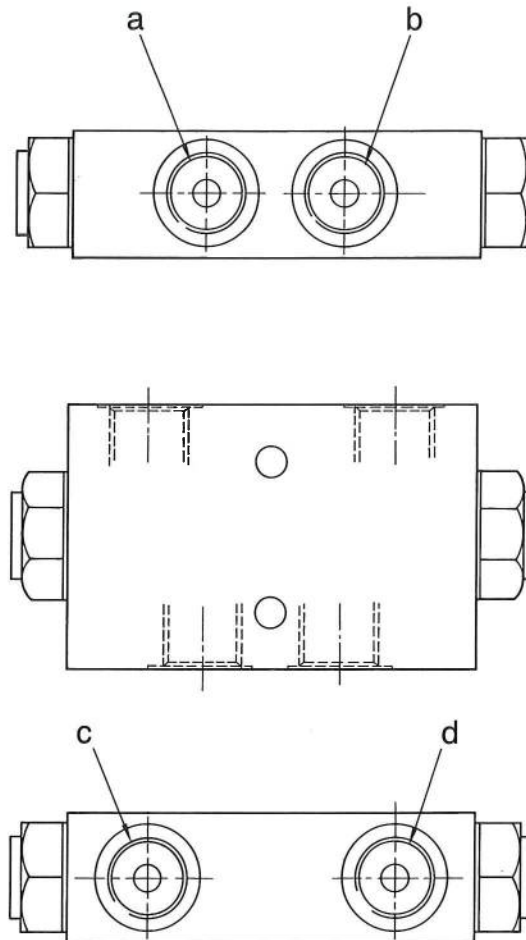


- a. P2 Port - From P3 pump (A3 Port)
- b. PR Port - To mode-system (X4 Port)
- c. BV Port - To PPC valve (P Port)
- d. T Port - To tank
- e. PV Port - To center swivel joint (2A Port) and travel PPC valve (P Port)
- f. P1 Port - From P3 pump (A3 Port)

## SPECIFICATIONS

Relief valve (3):  $45 \overset{\circ}{\pm} 4.5$  bar  
 Reducing valve (4):  $35 \overset{\circ}{\pm} 3.5$  bar

# OUTRIGGER AND BLADE SAFETY VALVE

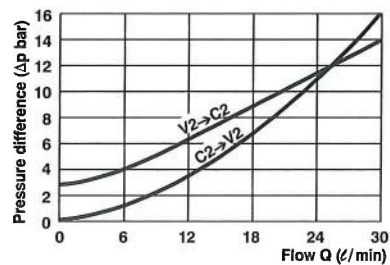


D0400060

- a. V2 Port  
R.H. outrigger: from EV7 (B2 Port)  
L.H. outrigger: from EV8 (B3 Port)  
Blade: from EV6 (B1 Port)
- b. V1 Port  
R.H. outrigger: from EV7 (A2 Port)  
L.H. outrigger: from EV8 (A3 Port)  
Blade: from EV6 (A1 Port)
- c. C2 Port - To cylinder bottom side
- d. C1 Port - To cylinder head side

## SPECIFICATIONS

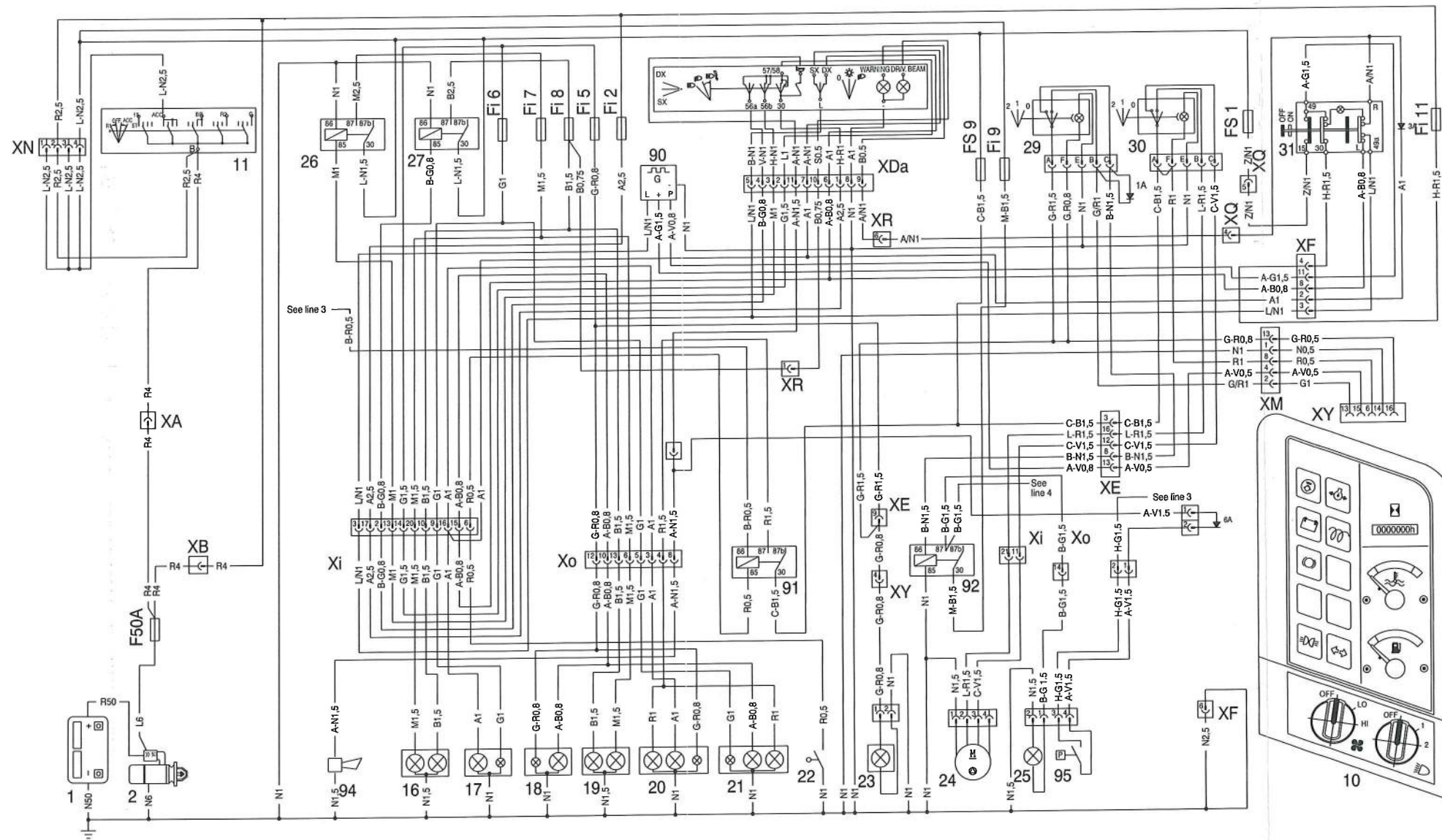
Start opening: 8 bar



D0400143

# ELECTRICAL CIRCUIT DIAGRAM

## 2 - BEAMS, DIRECTION INDICATOR HORN AND FAN LINE



### COMPONENTS

- 1 - Battery
- 2 - Starter motor
- 10 - Control panel
- 11 - Starter switch
- 16 - L.H. beam
- 17 - L.H. travel direction indicator beam
- 18 - R.H. travel direction indicator beam
- 19 - R.H. beam
- 20 - Rear L.H. beam
- 21 - Rear R.H. beam
- 22 - Brake switch
- 23 - Registration number beam
- 24 - Heating fan motor
- 25 - Working beam (optional)
- 26 - Lower beam relay
- 27 - Driving beam relay
- 29 - Working beam switch
- 31 - Emergency switch
- 90 - Flashing light relay
- 91 - Stop beam relay
- 92 - Working beam relay
- 94 - Horn
- 95 - Overload pressure sensor

### CONNECTOR

- XA - 2-ways connector starting switch
- XB - 2-ways connector supply and pre-heater
- XDa - 13-ways connector column steering switch
- XE - 17-ways connector main box - R.H. dashboard
- XF - 7-ways connector L.H. dashboard
- XY - 7-ways connector engine - R.H. dashboard
- Xi - 21-ways connector service and indicator light line
- XM - 13-ways connector control panel
- XN - 17-ways connector supply
- XO - 17-ways connector beam line
- XQ - 9-ways connector L.H. dashboard
- XR - 5-ways connector main box - column travel switch line

### FUSES A:

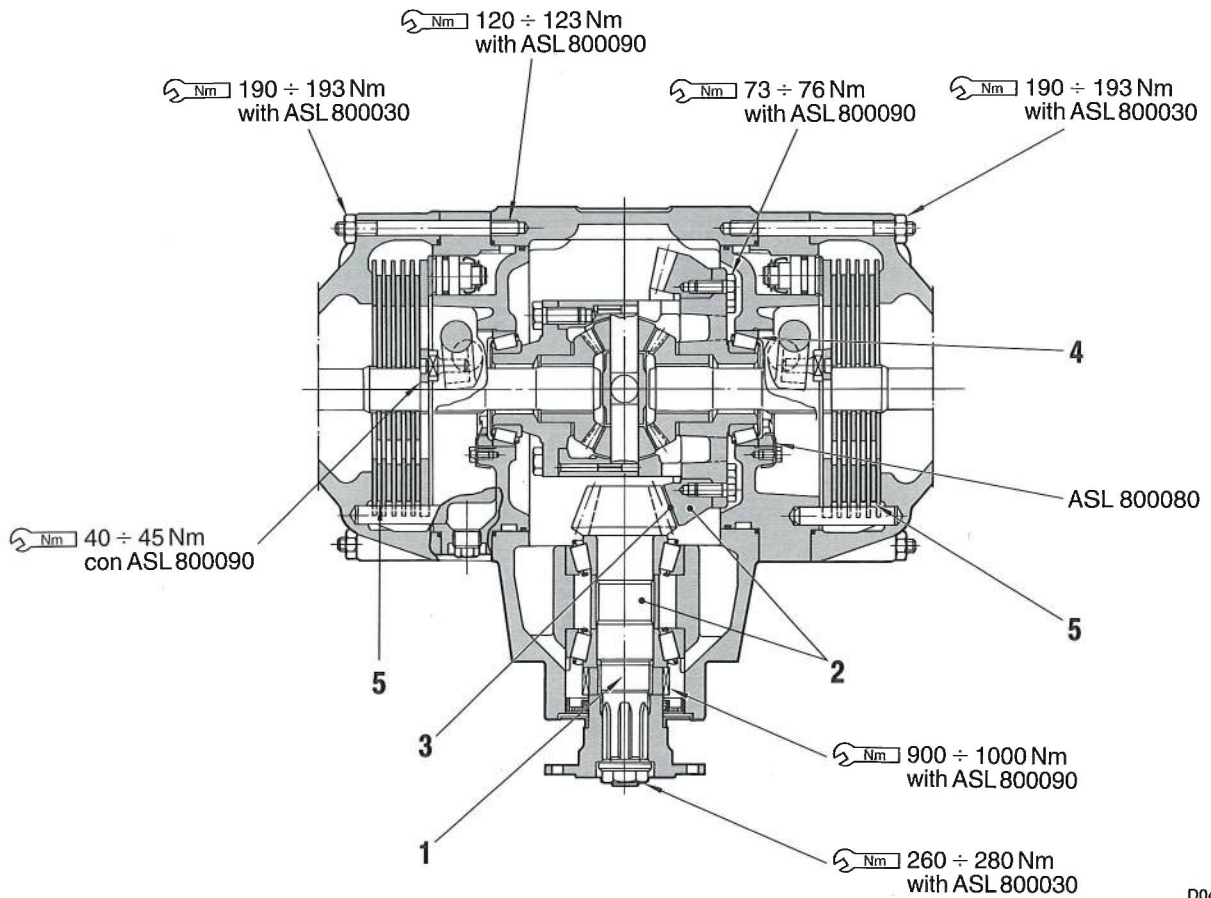
- FS1 - + 15 Turning indicator lights
- FS9 - Stop, heater, working mode, R.H. switch, control panel

### FUSES B:

- Fi2 - Turning indicator lights
- Fi5 - Front R.H. and rear L.H. parking light
- Fi6 - Front L.H. and rear R.H. parking light
- Fi7 - Lower beam
- Fi8 - Driving beam
- Fi9 - Working lamp
- Fi11 - + 30 emergency warning lights

# FRONT AND REAR AXLES DIFFERENTIAL - BRAKE DISKS

(Also valid for L.H. crown)

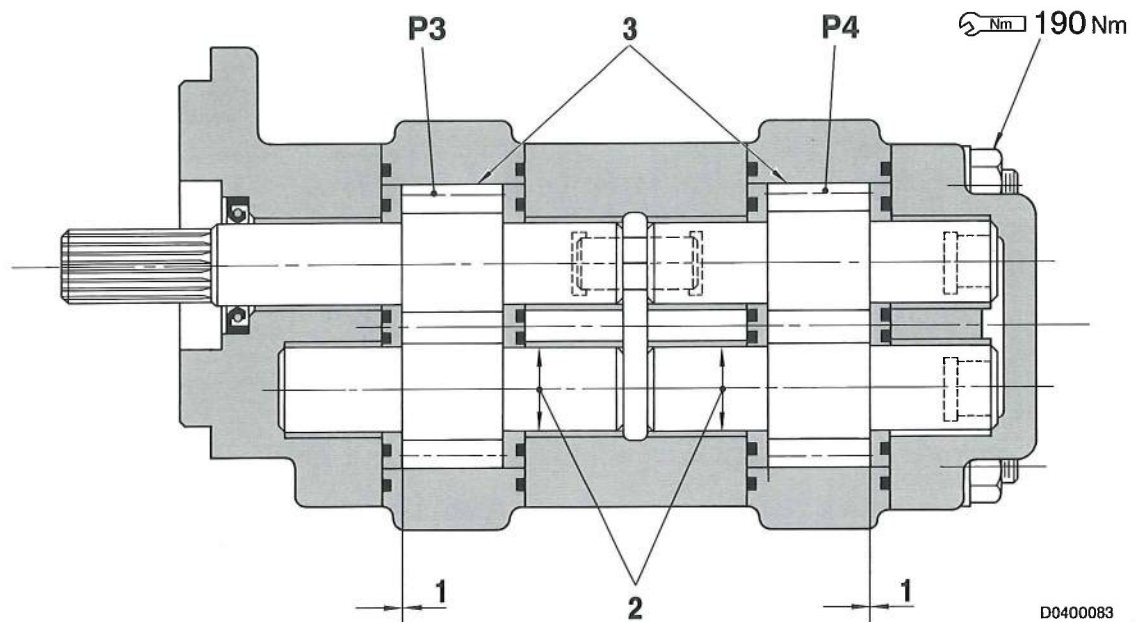


D0400073

Unit: mm

N°	Check item	Criteria		Remedy
1	Pinion rotation torque	120 ÷ 170 Nm		
2	Pinion - crown rotation torque	155 ÷ 215 Nm		
3	Backlash of crown wheel and pinion	Standard clearance	Clearance limit	Adjust
		0.15 ÷ 0.18	0.2	
4	Bearing axial clearance	0.05	0.08 ÷ 0.1	
5	Disk thickness	Standard thickness	Min. thickness	Replace
		4.9	4.5	

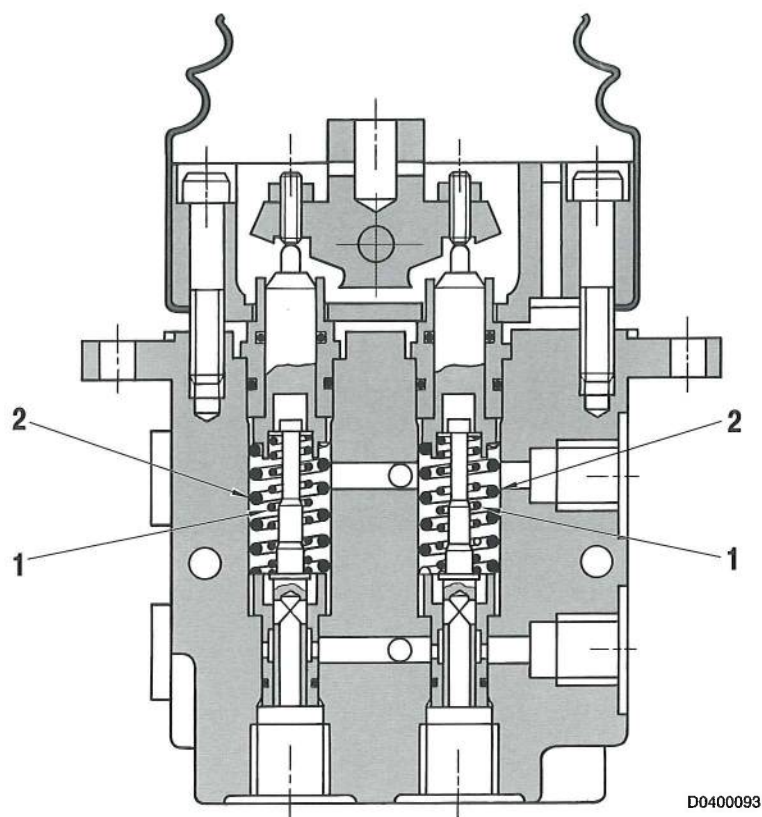
# AUXILIARY PUMP



Unit: mm

N°	Check item	Criteria				Remedy
		Standard clearance		Clearance limit		
1	Clearance between side plate and gear	---		---		Replace
2	Clearance between shaft and bushing	---		---		
3	Clearance between gears and casing	---		---		Replace
4	Delivery	Pump speed rpm	Delivery pressure bar	Standard delivery (ℓ/min.)	Repair limit delivery (ℓ/min.)	Check
		Pump P3	---	---	---	
		Pump P4	---	---	---	

# OUTRIGGER AND BLADE PPC VALVES



D0400093

Unit: mm

N°	Check item	Criteria					Remedy
		Standard size			Repair limit		
		Free length	Installed length	Installed load	Free length	Installed load	
1	Metering spring	---	---	---	---	---	Replace
2	Centering spring	---	---	---	---	---	Replace

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