KOBELCO

SERVICE MANUAL

HYDRAULIC EXCAVATOR

SK220V

SK220LC V

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LQ01

SPECIFICATION

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LOCATION AND WEIGHT OF COMPONENTS

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3.2 COOLING CIRCUIT

Fig.6 illustrates the cooling circuit of the car air-conditioner.

In this circuit diagram, the portion that cools the air of the compartment is the evaporator. The object air is cooled off by utilizing the fact that the refrigerant takes heat off the surrounding area as evaporation heat as it evaporates in the cooling circuit. Since the part at which vaporization of the refrigerant takes place is the evaporator, cooled air is constantly delivered to the circumference of the evaporator by the blower fan. In the meantime, liquid refrigerant (slightly wet vaporized refrigerant) is fed into the evaporator, when "cooling" effect is attained. For instance, in order to cool the air to 15°C (59°F), the refrigerant can not absorb evaporation heat from the air unless it evaporates at a temperature lower that 15°C (59°F). For that purpose, it can be seen from Fig.5 that the pressure of the refrigerant in the evaporator must be less than 5.2kgf/cm²G (74psi-G).

Furthermore, the cooling effect deteriorates unless the feed rate of the refrigerant is controlled so that all of the refrigerant supplied to the evaporator vaporizes and turns into dry vapor.

Consequently, the cooling circuit is so constructed that the evaporator can cool down an object (air in this case) sufficiently (i.e. so as to decrease the pressure in the evaporator) and that an adequate amount of refrigerant can be fed to the evaporator.

The feed rate of the refrigerant is controlled by the expansion valve, but the pressure in the evaporator is held low by the throttling action of the expansion valve and the suction action of the compressor. The compressor acts as a pump that allows the refrigerant to circulate. The compressive action of the compressor and the heat exchange (heat radiation) action of the condenser transform the refrigerant in a dry vapor state back to a liquid state.

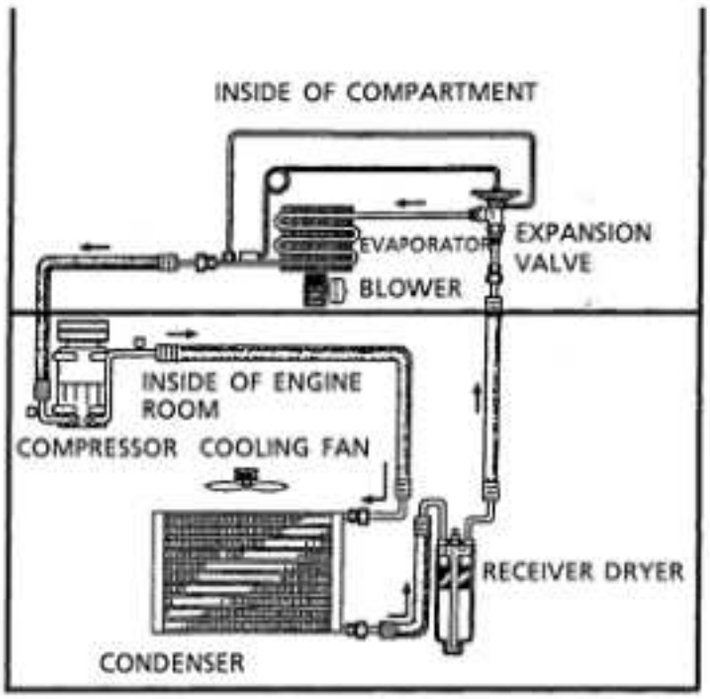


Fig. 6 Construction of cooling circuit

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1. SPECIFICATION

1.1 GENERAL VIEW

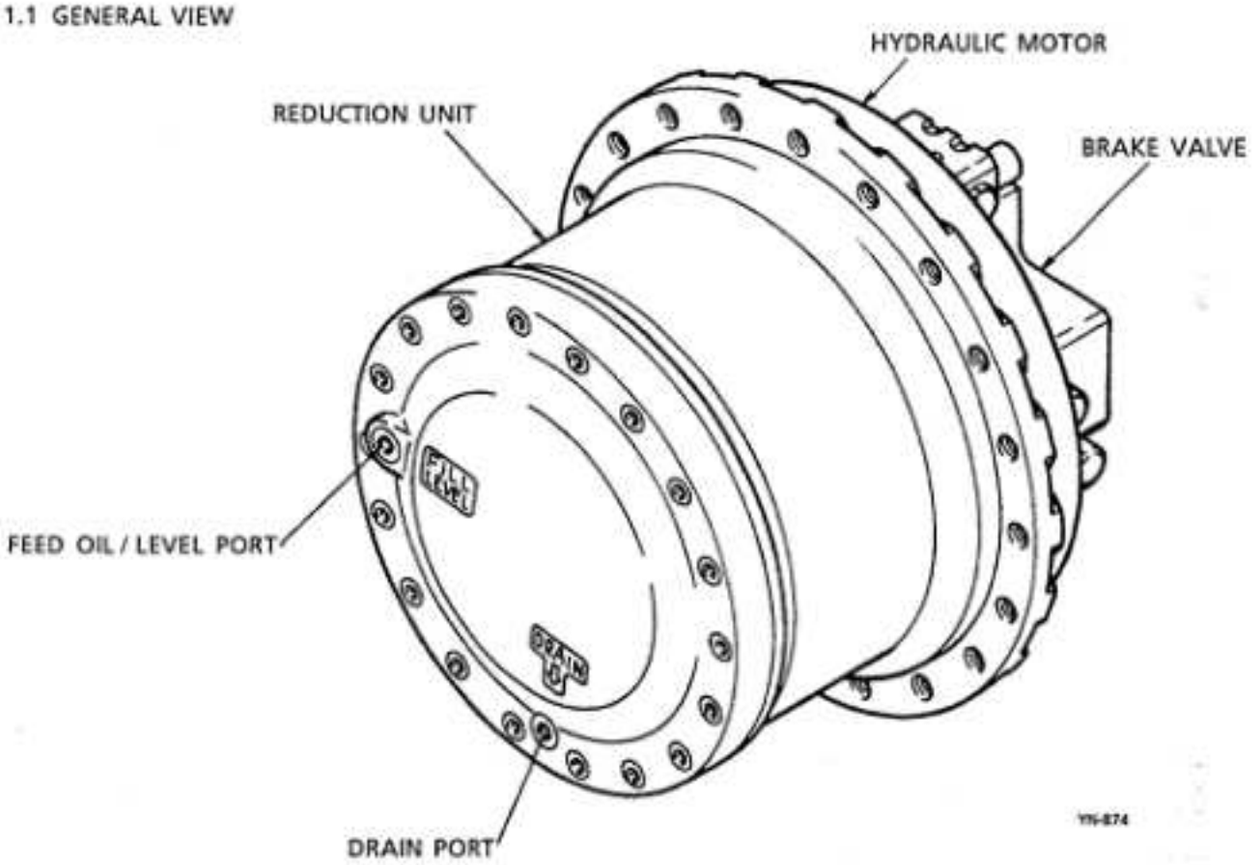


Fig. 1 Outside view of reduction unit travel motor

1.2 SPECIFICATION

Table 1

Travel unit	Parts No.	TYPE	LQ15V00003F1	M3V150/90-RG4,5
• Motor			LQ15V00004F1	M3V150/90Z
• Reduction			LQ15V00005F1	—
Number of reduction stages			2-Stage	
Reduction ratio			49.33	
Oil volume			9ℓ (2.38gal)	Engine oil SAE30 (API Group CD class)
Weight	Travel unit		320kg (705 lbs)	(Dry)
	Motor		110kg (243 lbs)	
	Reduction		210kg (463 lbs)	

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Possible causes	Symptoms	Overheating (insufficient cooling)	Overcooling	Abnormal noise	Excessive coolant loss	Remarks
V-belt	Loose or damaged	○		○		
	Excessive tension			○		
	Oil on belt	○				
Water pump	Water pump fitted poorly	○			○	
	Gasket defective	○			○	
	Bearing defective	○		○		
	Impeller defective	○				
	Unit seal defective	○			○	
	Loose fit between shaft and flange and/or shaft and impeller	○		○		
Thermostat	Case fitted poorly	○			○	
	Gasket defective	○			○	
	Valve opening temperature too high; valve remains closed	○				
	Valve opening temperature too low; valve remains open		○			
	Water leaking from water temperature sensor	○			○	
Radiator	Space between core and fins clogged	○				
	Core cracked and/or separation of soldered joints	○			○	
	Pressure cap not sufficiently airtight	○				
Cooling fan	Fan shroud fitted poorly	○		○		
Automatic cooling fan coupling	Bearing defective	○		○		
	Bimetal damaged	○				
	Bimetal contaminated with foreign particles	○	○			
	Silicon oil leaking	○		○		
Oil cooler	Oil cooler fitted poorly	○			○	🕮 Gr 12
	Gasket defective	○			○	
Cylinder head	Cylinder head fitted poorly	○			○	🕮 Gr 11
	Gasket defective	○			○	
Coolant quantity insufficient and/or coolant dirty		○				
Coolant passages dirty and/or clogged		○				
Hoses fitted poorly		○			○	
Ambient temperature extremely low			○			

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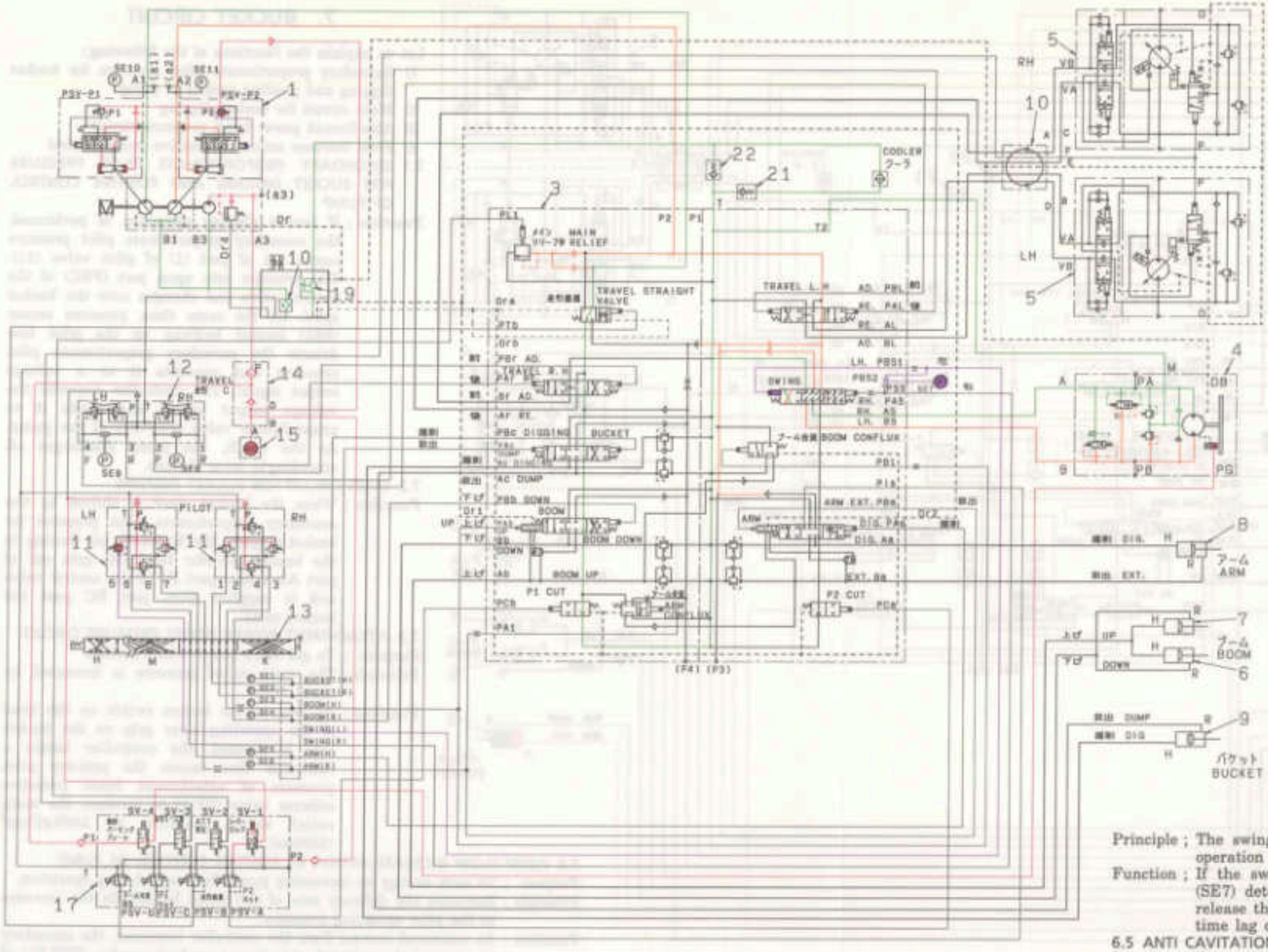


Fig. 5 Swing circuit, at left swing

6. SWING CIRCUIT

Let us explain the following functions :

1) Secondary proportionate swing pilot pressure and positive control of pump
2) Main swing (left) circuit
3) Release of automatic swing parking brake
4) Delay braking by a 5-second time lag of the controller
5) Anti-cavitation circuit when swing inertia occurs
6) Prevention of reverse swing by the reactionless valve

6.1 SECONDARY PROPORTIONATE SWING PILOT PRESSURE AND POSITIVE CONTROL OF PUMP

Function ; If lever action for left swing is performed, the secondary proportionate pilot pressure comes out of port (5) of pilot valve (11). The pressure acts upon port (PBS1) of the control valve and changes over the swing spool. At the same time, the pressure sensor (SE7) detects the secondary proportionate pilot pressure and changes it to a voltage output signal. Then the pump proportionate valve (PSV-P2) delivers a flow according to lever strokes.

6.2 SWING (LEFT) MAIN CIRCUIT

Function ; When the swing spool is shifted by the secondary proportionate swing pilot pressure, the hydraulic oil, which has been running to port B of the swing motor, passes from pump P2 through port P2, and is supplied to port BS past the swing spool.

6.3 RELEASE OF AUTOMATIC SWING PARKING BRAKE

Purpose ; To prevent the swing motion from drifting at neutral.

Principle ; The mechanical brake operates in neutral position.

Function ; If the pressure sensor (SE7) detects the secondary proportionate pressure, the swing parking brake solenoid selector valve (SV-4) is de-excited. This causes the primary pilot pressure to connect from port PG of the swing motor to the release cylinder chamber and releases the parking brake.

6.4 DELAYED BRAKING BY 5-SECOND TIME LAG OF THE CONTROLLER

Purpose ; To prevent the swing parking brake from operating when swing inertia occurs.

Principle ; The swing parking brake operates five seconds after the swing operation is brought to neutral.

Function ; If the swing lever is brought to neutral, the pressure sensor (SE7) detects that the lever is in neutral. Then the controller release the de-excitation of solenoid selector valve (SV-4) after a time lag of five seconds and actuates the swing parking brake.

6.5 ANTI CAVITATION CIRCUIT WHEN SWING INERTIA OCCURS

Purpose ; To prevent cavitation when the swing deceleration or swing operating lever is in neutral.

Principle ; Oil is supplied from the feed circuit when the supply side becomes negative pressure during swing action.

Function ; Oil is sucked from port M of the swing motor when pressure is negative.

6.6 PREVENTION OF REVERSE MOTION BY REACTIONLESS VALVE

Purpose ; To hold the reversed revolution within one turn after swing action stops.

Principle ; Prevention of reverse motor pressure from occurring.

Function ; The circuit prevents reverses rotation pressure from occurring by bypassing pressure between the supply side A and the return side B while the motor is turning in reverse direction.

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