GROUP 2 HYDRAULIC COMPONENTS

1. TRAVEL MOTOR

Symptom		Cause	Remedy
Does not start	Pressure is not developed	• Main relief pressure dropped	• Replace main relief valve
		• Pump failure	• Check if action other than traveling is available. If faulty, repair
		• Control valve malfunction	• Check if spool moves correctly. Repair if necessary
	Pressure is developed	• Brake valve failure *Spool stick *Check valve stick	• Replace brake valve
		• Motor failure	• Replace motor • Check hydraulic oil for contamination
		• Gear broken and fragment locked	• Replace reduction gear
		• Overloaded	• Reduce load
Oil leakage	Leakage from engaging surfaces	• Scratch on engaging surfaces	• Correct surfaces by oil stone or sandpaper or replace
		• Loosening by poor bolt tightening	• Check after retightening
	Leakage from casing	• Plug loosened • Crack formed by stone	• Retighten • Replace reduction gear
	Leakage from floating seal	• Sliding surfaces worn • Creep on O-ring	• Replace reduction gear • Replace floating seal
	Leakage from hydraulic motor	• Bolt loosened • O-ring damaged • Sealing surface scratched	• Tighten properly • Replace O-ring • Correct by oil stone or sandpaper
Excessive temperature on reduction gear case		• Pitting on bearing • Lack of gear oil • Hydraulic oil introduced to gear case	• Replace reduction gear • Supply gear oil properly • Check hydraulic motor, and replace oil seal
Coasts on slope excessively		• Poor volumetric efficiency of hydraulic motor	• Replace hydraulic motor
		• Increase of internal leakage of brake valve	• Replace brake valve
		• Parking brake does not actuated *Spring breakage *Wear of friction plate	• Replace spring • Replace parking brake

Symptom		Cause	Remedy
Meanders	Meanders at low pressure	• Delivery rate is different between right and left • Motor drain rate is different between right and left	• Repair pump • Replace motor
	Meanders at high pressrue	• Delivery rate is different between right and left • Motor drain rate is different between right and left • Main relief pressure dropped at right or left of control	• Repair regulator of pump • Reduce motor • Replace main relief valve
Speed is poor	Pump delivery is poor	• Regulator operation is poor • External leakage of pump is excessive	• Repair regulator • Repair pump
	External leakage of motor is excessive		• Replace motor
Does not switch to high-speed from low-speed		• Ball check valve (shuttle valve) failure • 2-speed control valve failure • Pilot pressure is lower • 2-speed control piston failure	• Check if check valve correctly. Repair or replace if necessary • Check if valve correctly. Repair or replace if necessary • Reset to correct pressure • Check if piston correctly. Repair or replace if necessary
Does not switch to low-speed from high-speed		• Ball check valve (shuttle valve) failure • 2-speed control valve failure	• Check if check valve correctly. Repair or replace if necessary • Check if valve correctly. Repair or replace if necessary

2. HYDRAULIC PUMP

Symptom	Main causes	Check	Remedy
Abnormal noise	• Air sucked due to lowering of the oil level	• Check the hydraulic oil level	• Check the hydraulic oil
	• Increase in the suction pressure loss due to the dogged filter	• Check the filter element	• Chean or change the element
	• Increase in the suction pressure loss due to increase in the viscosity of the hydraulic oil when the temperature is low	• Check the hydraulic oil temperature and the type of hydraulic oil	• Ensure the correct oil temperature or replace with the appropriate oil
	• Input shaft speed higher than the specified one	• Check the input shaft speed - Check the pressure which may cause overload - Measure contamination of the hydraulic oil - Check if the hydraulic oil is emulsified due to mixing of water	• Readjust the rotating speed • Replace the damaged part or the pump - Set the pressure again - Carry out flashing in the circuit - Change the oil
	• Mechanical damage (Bearing, etc)		
Insufficient flow rate	• Lowering of the input shaft speed	• Check the input shaft speed	• Readjust the rotating speed
	• Abnormally high oil temperature	• Check the oil temperature	• Stop the operation and check again when the oil temperature has lowered
	• Abnormally high viscocity	• Check the oil temperature and type	• Change the oil to a type having an appropriate viscosity
	• Increase in the leakage from the directional control valve and actuator	• Check if this problem occurs in a specific actuator only	• Replace the directional control valve and actuator
	• Lowering of the pump displacement efficiency	• Check if this problem occurs in a specific pump only	• Replace the pump
	• Loosen power setting adjusting screw	• Check locknut for looseness	• Set again and lock
	• Air sucked due to lowering of the oil level	• Check the hydraulic oil level	• Add the hydraulic oil
	• Increase in the suction pressure loss due to the clogged filter	• Check the filter element	• Clean or replace the element
	• Increase in the suction pressure loss due to increase in the viscosity of the hydraulic oil when the temperature is low	• Check the hydraulic oil temperature and type	• Ensure the correct oil temperature or replace with the appropriate oil

Symptom	Main causes	Check	Remedy
No pressure rise	• Lowering of the setting of the relief valve	• Measure the circuit pressure	• Set the relief valve again
	• Increase in the leakage from the directional control valve and actuator	• Check the operation of each actuator and check the tank return piping for abnormal heat generation	• Replace the directional control valve and actuator
	• Lowering of the pump displacement efficiency	• Check if this problem occurs in a specific pump only	• Replace the pump
Overload under static load	• Increase in the setting of pump power	• Check the motor sound and speed	• Set the pump power again by means of the bench test or motor
	• Malfunction of the control device	• Check the slide portions of the control device for any inclusion of foreign materials	• Repair the damaged part caused by inclusion of foreign materials or replace
	• Mechanical damage (Bearing, etc)	• Check the housing around the bearing for abnormal heat generation and noise	• Replace the damaged part or pump
Rotating speed decreasing under dynamic load	• Peak pressure occurred due to deterioration of response performance of the relief valve	• Check the circuit for abnormal vibration and measure the pressure - Check if the pilot line is clogged with foreign materials - Check the slide portions of the control device for any inclusion of foreign materials	• Replace the relief valve - Remove the foreign materials - Repair the damaged part caused by inclusion of foreign materials or replace
	• Deterioration of response performance of the control device		
Abnormal heat generation	• Increase in the leakage from the pump	• Measure the actuator speed	• Replace the pump
	• Mechanical damage (Bearing, etc)	• Check the abnormal noise and the location where abnormal heat is generated	• Replace the damaged part or pump
	• Seizure of the slide portion	• Check the location where abnormal heat is generated	• Replace the damaged part or pump

Symptom	Main causes	Check	Remedy
Oil leakage	• Damage to O-ring and packing	• Confirm the oil leaking point and check for abnormal pressure	• Replace the seal material
	• Damage to the oil seal	• Check for damage caused by foreign materials and check for abnormal pressure	• Replace the seal material
	• Worn oil seal contact of input shaft	• Check for adhesion of foreign materials and check for abnormal pressure	• Replace the input shaft or pump
	• Loosen plugs	• Confirm the oil leaking point	• Retighten or replace the seal material

3. MAIN CONTROL VALVE

Symptom	Main causes	Remedy
Oil leakage from spool seal	• Seal is scratched or the seal lip is worn due to long use	• Replace with a new one
	• Paint adhered to the sliding portion of the spool's seal portion	• Remove paint mechanically. However at this time, be careful not to damage the spool surface or the seal lip
Spool's sliding is not smooth	• Foreign matter is bitting into the spool's sliding surface	• Overhaul and repair or replace
	• Spool is bent from externally applied pressure	• Repair or replace
	• Oil is accumulating in the cover (the side with a spring or a detent) opposite the side where the spool operates	• The spool is leaking oil, so when the spool moves, oil leaks from the cover. After confirming this, replace the seal
	• Bolts used to assemble the valve were tightened excessively	• Check tightening torque (2 kg · m)
	• Entire valve is strained due to strain in the installation face	• Loosen the installation bolts, then cut the installation face and edge and check
	• Oil film between the spool and body disappears due to abnormally high oil temperature	• Use some method to lower the oil temperature or if the relief valve is operating frequently, investigate the cause and reduce the frequency
Can't be held in the spool neutral position (Cylinder drops)	• Could be mistaken for a great amount of leakage in the cylinder	• Check if it isn't just the cylinder's natural drop when the cylinder is held. If the problem is in the cylinder, disassemble and repair it
	• The gap between the spool and body is large, so the amount of oil leaking from the spool is great	• Replace the spool or replace the valve block assembly
	• Spool won't return completely to the neutral position	• Manual operation : Check if there is something interfering with the link mechanism • Hydraulic operation : Check the pilot pressure
	• Foreign matter is bitting into the port relief valve seat or the anti-cavitation valve seat and oil is bypassing. Or a seat is damage	• Disassemble and check, then overhaul or replace

Symptom	Main causes	Remedy
The load won't move (Pressure won't increase)	• Foreign matter is bitting into the relief valve seat and oil is bypassing. Or a seat is damaged	• Disassemble and check, then overhaul or replace
	• The relief valve's adjustment screw is loose	• Try tightening the adjustment screw. If it is loose, correct the setting and tighten the lock nut securely
	• Foreign matter is bitting into the port relief valve seat or the anti-cavitation valve seat and oil is bypassing. Or a seat is damaged	• Disassemble and check, then overhaul or replace
	• Pump is damaged and no oil is discharged	• Check if the pump is abnormal or not. If the pump is bad, replace it. Check if the cause of the abnormality is air being sucked in, deterioration of hydraulic oil or shafts not centered, etc
The load won't move (Pressure won't increase)	• The load is too heavy	• Compare with an object of the specified weight
	• Mechanical resistance of connecting parts is great regardless of the hydraulic pressure in the operating unit	• Check and replenish hydraulic oil, etc, modify or repair
	• A large piece of foreign matter is trapped in the circuit or a pipe is bent, causing great resistance	• Find the affected place and repair it
	• Spool stroke is not the specified stroke	• Check if there is something interfering with the link mechanism. Check if a pin or a pin hole in the link connection is worn or not