1. ENGINE SYSTEM

Trouble symptom	Probable cause	Remedy
The drive pinion does not turn or turns too slowly.	· The battery is not sufficiently charged. · The connecting cable to the starter motor is loose. · The earth connection to the battery is loose. · The starter motor solenoid switch is faulty or the starter motor is faulty.	· Charge the battery. · Tighten the cable on the terminal. If necessary, solder on a new terminal. · Tighten the cable on the terminal. If necessary, solder on a new terminal. · Have it checked at a qualified specialist workshop.
The engine does not start or stalls again immediately.	· The fuel tank is empty. · The fuel filter is blocked. · The fuel prefilter contains water. · The fuel prefilter is blocked. · Leaks or insufficient pressure in the low-pressure fuel circuit	· Refill the fuel tank. · Replace the filter element. · Drain the fuel prefilter. · Replace the filter element. · Check for leaks (visual check), replace the seals if necessary. · Have the fuel pressure tested at a qualified specialist workshop. Replace the seals.
Engine fails to start when the ambient temperature is low.	· The fuel is not resistant to cold. The flow properties of the diesel fuel are inadequate due to paraffin separation. · The engine oil viscosity is incorrect.	· Malfunctions resulting from paraffin separation can be corrected by warming the entire fuel system, e.g. by parking the vehicle in a heated area. · Refuel with winter fuel. · Alter the engine oil viscosity to the conditions of use. · If the engine does not start after another attempt, have the cause traced and rectified at a qualified specialist workshop.
The engine stops inadvertently.	· The power supply to the engine management (MCM) or the exhaust gas aftertreatment (ACM) control modules is interrupted or there is a short circuit in the wiring. · Leaks or insufficient pressure in the low-pressure fuel circuit.	· Check the electrical fuses · Have the power supply checked at a qualified specialist workshop. · Carry out a check for leaks (visual check). · Have the fuel pressure tested at a qualified specialist workshop.
The engine is in emergency running mode.	· There is an interruption to the control units' data flow.	· Check the connectors on the control units for secure seating and corrosion. · Read out the control unit's fault memory. · Have it checked at a qualified specialist workshop.

Trouble symptom	Probable cause	Remedy
The engine surges, vibrates or runs irregularly.	· There is a malfunction in the fuel system.	· Carry out a check for leaks (visual check). · Read out the control unit's fault memory. · Have it checked at a qualified specialist workshop.
The engine's output is poor (lack of power).	· The air filter is dirty or blocked. · The charge-air temperature is too high; the charge-air cooler or radiator is dirty on the exterior. · The coolant temperature is too high. · Malfunction in the fuel system (blocked, leaking). · Poor fuel grade · The charge-air system is leaking; the hose clip on the charge-air hose is loose or damaged. · An operating restriction is activated due to an emissions-relevant malfunction.	· Replace the air filter element. · Clean the exterior of the charge-air cooler and radiator. · Check the temperature sensor; replace if necessary. Check the fan speed. · Check the thermostat and replace as necessary. Consult a qualified specialist workshop. · Visual inspection for leaks · Consult a qualified specialist workshop. · Use the specified type of fuel and fuel grade. · Check the charge-air system for leaks. · Check the charge-air pressure sensor and, if necessary, replace. · Consult a qualified specialist workshop. · Observe information on the warning and indicator lamps.
There is an interruption in the tractive power.	· There is an increased voltage drop to the control units (loose contact).	· Check the battery terminals on the battery and the connectors on the control units for secure seating and corrosion.
The engine braking effect is poor.	· The cause must be established in a qualified specialist workshop.	· Consult a qualified specialist workshop.
Fuel consumption is too high.	· The cause must be established in a qualified specialist workshop.	· Consult a qualified specialist workshop.
The engine gets too hot (according to the coolant temperature gauge).	· There is not enough coolant in the cooling system. · The coolant temperature sensor or display is faulty. · The poly-V-belt is damaged. · The fan does not switch on correctly. · The radiator is dirty on the inside; the radiator is very dirty on the outside. · The thermostat is faulty.	· Add and bleed the coolant. · Replace the sensor or display. · Replace the poly-V-belt. · Consult a qualified specialist workshop. · Clean the radiator. · Check and replace as necessary. · Consult a qualified specialist workshop.

Trouble symptom	Probable cause	Remedy
Indicator lamps do not light up at IGNITION ON.	· The lamps are faulty or the electrical cables are interrupted.	· Consult a qualified specialist workshop.
The charge current indicator lamp lights up when the engine is running.	· The poly-V-belt is slipping. · The poly-V-belt is torn. · The alternator or sensor is faulty.	· Check the belt tensioner function. · Check that the poly-V-belt contact surfaces are not torn, damaged, oily or glazed. Replace the poly-V-belt if necessary. · Replace the poly-V-belt. · Check the alternator or sensor. · Consult a qualified specialist workshop.
The engine is "knocking".	· The engine is misfiring.	· Consult a qualified specialist workshop.
The engine is "knocking".	· There is bearing damage.	· Consult a qualified specialist workshop.
There are abnormal sounds.	· The air intake pipe and exhaust gas pipe are leaking, causing a whistling noise. · The turbine or compressor wheel is scraping the housing; there are foreign objects in the compressor or turbine housing; bearings have seized on the rotating parts. · The valve clearance is excessive. · The poly-V-belt is slipping.	· Rectify the cause of the leak and, if necessary, replace gaskets. · Have the exhaust gas turbocharger checked at a qualified specialist workshop. · Check and adjust the valve clearance. · Check that the poly-V-belt contact surfaces are not torn, damaged, oily or glazed. Replace the poly-V-belt if necessary.

2. ELECTRICAL SYSTEM

Trouble symptom	Probable cause	Remedy
Lamps dimming even at maximum engine speed.	· Faulty wiring.	· Check for loose terminal and disconnected wire.
Lamps flicker during engine operation.	· Improper belt tension.	· Adjust belt tension.
Charge lamp does not light du-ring normal engine operation.	· Charge lamp defective. · Faulty wiring.	· Replace. · Check and repair.
Alternator makes abnormal sounds.	· Alternator defective.	· Replace
Starting motor fails to run.	· Faulty wiring. · Insufficient battery voltage.	· Check and repair. · Recharge battery.
Starting motor pinion repeats going in and out.	· Insufficient battery voltage.	· Recharge battery.
Excessively low starting motor speed.	· Insufficient battery voltage. · Starting motor defective.	· Recharge battery. · Replace
Starting motor comes to a stop before engine starts up.	· Faulty wiring. · Insufficient battery voltage.	· Check and repair. · Recharge battery.
Heater signal does not become red.	· Faulty wiring. · Glow plug damaged.	· Check and repair. · Replace
Engine oil pressure caution lamp does not light when enigne is stopped (with starting switch left in"ON" position).	· Caution lamp defective. · Caution lamp switch defective.	· Replace · Replace

3. TORQUE FLOW SYSTEM

Trouble symptom	Probable cause	Remedy
1. Excessive oil temperature rise		
1) Torque converter	· Improper oil level.	· Check oil level. Add or drain oil as necessary.
	· Impeller interfering with surroundings.	· After draining oil from oil tank and transmission, check and replace interfering parts.
	· Stator and free wheel malfunctioning.	· Check engine (stalling) speed. If necessary, replace.
	· Air sucked in.	· Check the inlet side joint or pipe. If necessary, retighten joint or replace gasket.
	· Water intruding into transmission case.	· Check drained oil. If necessary, change oil.
	· Bearing worn or seizing.	· Disassemble, inspect, repair or replace.
	· Gauge malfunctioning.	· Check and, if necessary, replace.
2) Transmission	· Clutch dragging.	· Check to see whether or not machine moves even when transmission is placed in neutral position. If so, replace clutch plate.
	· Bearing worn or seized.	· Disassemble, check and replace.
2. Noise operation		
1) Torque converter	· Cavitation produced.	· Change oil, replace parts leaking air.
	· Flexible plate damaged.	· Listen to rotating sound at lowspeed operation. If necessary, replace flexible plate.
	· Bearing damaged or worn.	· Disassemble, check and replace.
	· Gear damaged.	· Disassemble, check and replace.
	· Impeller interfering with surroundings.	· Check impeller or check drained oil for mixing of foreign matter. If necessary, change oil.
	· Bolt loosening.	· Disassemble and check. If necessary, retighten or replace.
	· Spline worn.	· Disassemble, check and replace.
	· Noise gear pump operation.	· Disassemble, check and replace.
2) Transmission	· Dragging caused by seizing clutch.	· Check to see whether or not machine moves even when transmission is in neutral position. If so, replace clutch plate.
	· Bearing worn or seizing.	· Disassemble, check and replace
	· Gear damaged.	· Disassemble, check and replace
	· Bolt loosening.	· Disassemble, check and retighten or replace
	· Spline worn.	· Disassemble, check and replace

Trouble symptom	Probable cause	Remedy
3. Low output power		
1) Torque converter	· Insufficient hydraulic pressure :	
	- Low oil level.	- Check oil level and add oil
	- Air sucked in.	- Check joints and pipes. If necessary, retighten joint or replace packing.
	- Oil filter clogging.	- Check and replace
	- Oil pump worn. (Low delivery flow)	- Check oil pressure. If necessary replace pump.
	- Regulator valve coil spring fatigued.	- Check spring tension. If necessary, replace.
	- Control valve spool malfunctioning.	- Disassemble, check and repair or replace.
	- Piston or O-ring worn.	- Disassemble, check measure and replace.
	· Stator free wheel cam damaged.	- Check stalling speed. (Increased engine load will cause excessive drop of stalling speed.)
		- Check oil temperature rise. If any, replace free wheel.
2) Transmission	· Flexile plate deformed	· Replace flexible plate
	· Stator free wheel seizing.	- Check temperature plate. (No-load will cause temperature rise)
		- Replace free wheel if a drop of starting output is found.
	· Impeller damaged for interfering with the surroundings.	- Check drained oil for foreign matter. If any, change oil.
	· Use of poor quality of oil or arising of air bubbles.	- Check and change oil.
	- Air sucked in from inlet side.	- Check joints and pipes. If necessary, retighten joint or replace packing.
	- Low torque converter oil pressure accelerates generation of air bebbles.	- Check oil pressure.
	- Oil mixing with water.	- Check drained oil and change oil.
	- Inching rod out of adjustment.	- Check and adjust.
	· Clutch slipping	
	- Lowering of weight.	- Check oil pressure.
	- Piston ring or O-ring worn.	- Disassemble, check, measure and replace.
	- Clutch piston damaged.	- Disassemble, check and replace.
	- Clutch plate seizing or dragging.	- Check to see whether or not machine moves even when transmission is in neutral position. If so, replace.

Trouble symptom	Probable cause	Remedy
4. Unusual oil pressure		
1) Oil pressure is high	· Control valve malfunctioning.	(1)Check for spool operation. If necessary, replace valve. (2)Check for clogging of small hole in valve body. If necessary, clean or repair.
	· Cold weather. (high oil viscosity)	· When atmospheric temp is below freezing point (when normal oil pressure is recovered if heated to 60~80˚C), change oil.
	· Use of improper oil.	· Check and change oil.
2) Oil pressure is low	· Gear pump malfunctioning (worn).	· Disassemble, check and replace.
	· Oil leaks excessively : (1) Control valve oil spring defective.	· Check spring tension (see spring specification). If necessary replace.
	(2) Control valve spool defective.	· Disassemble, check, and repair or replace valve.
	· Air sucked in.	· Check joints and pipes. If necessary, retighten joint or replace packing.
	· Low oil level.	· Check oil level and add oil.
	· Oil filter clogging.	· Check and replace.
3) Transmission	· Oil leaks excessively.	· Disassemble, check (piston ring and O-ring for wear and other defects), and replace.
5. Power is not transmitted		
1) Torque converter	· Clutch plate damaged.	· Check for damage by listening to abnormal sounds at a low converter speed and replace.
	· Low oil level.	· Check oil level and add oil
	· Oil pump driving system faulty.	· Disassemble and check for wear of pump gear, shaft and spline. Replace defective parts.
	· Shaft broken.	· Check and replace.
	· Lack of oil pressure.	· Check oil pump gear for wear and for oil suction force. If necessary, replace pump.
2) Transmission	· Low oil level.	· Check oil level and add oil.
	· Inching valve and link lever improperly positioned.	· Check measure and adjust.
	· Forward/reverse spool and link lever improperly positioned.	· Check and adjust.
	· Clutch fails to disengage : (1) Clutch case piston ring defective.	· Disassemble, check and replace
	(2) Main shaft plug slipping out.	· Disassemble, check and repair or replace
	· Clutch seizing.	· Check to see whether or not machine moves even then transmission is in neutral position. If so, replace.
	· Shaft broken off.	· Disassemble, check(main shaft, etc.), and replace.
	· Clutch drum damaged (spring groove).	· Disassemble, check and replace.
	· Clutch snap ring broken.	· Disassemble, check and repair or replace.

Trouble symptom	Probable cause	Remedy
5. Power is not transmitted (Continue)	· Foreign matter intruding into oil passage to clutch. · Shaft spline worn.	· Disassemble, check and repair or replace. · Disassemble, check and replace.
6. Oil leakage (Transmission and torque converter)	· Oil leaks from oil seal.	· Disassemble and check for wear of seal lips and mating sliding surfaces (pump boss, coupling etc.) Replace oil seal, pump boss, coupling, etc.
	· Oil leaks from case joining surfaces.	· Check and retighten or replace packing.
	· Oil leaks from joint or pipe.	· Check and repair or replace gasket.
	· Oil leaks from drain plug.	· Check and retighten or gasket.
	· Oil leaks from a crack.	· Check and replace cracked part.

4. STEERING SYSTEM

Trouble symptom	Probable cause	Remedy
1. Steering wheel drags.	· Low oil pressure. · Bearing faulty. · Spring spool faulty. · Reaction plunger faulty. · Ball-and-screw assembly faulty. · Sector shaft adjusting screw excessively tight. · Gears poorly meshing. · Flow divider coil spring fatigued.	· Check locknut. Repair. · Clean or replace. · Clean or replace. · Replace. · Clean or replace. · Adjust. · Check and correct meshing. · Replace.
2. Steering wheel fails to return smoothly.	· Bearing faulty. · Reaction plunger faulty. · Ball-and-screw assy faulty. · Gears poorly meshing.	· Clean or replace. · Replace. · Clean or replace. · Check and correct meshing.
3. Steering wheel turns unsteadily. Steering system makes abnormal sound or vibration.	· Locknut loosening. · Metal spring deteriorated. · Gear backlash out of adjustment. · Air in oil circuit.	· Retighten. · Replace. · Adjust. · Bleed air.
4. Abnormal sound heard when steering wheel is turned fully	Valve · Faulty. (Valve fails to open.) Piping · Pipe (from pump to power steering cylinder) dented or clogged.	· Adjust valve set pressure and check for specified oil pressure. · Repair or replace.
5. Piping makes abnormal sounds.	Oil pump · Lack of oil. · Oil inlet pipe sucks air. · Insufficient air bleeding.	· Add oil. · Repair. · Bleed air completely.
6. Valve or valve unit makes abnormal sounds.	Oil pump · Oil inlet pipe sucks air. Valve · Faulty. (Unbalance oil pressure) Piping · Pipe (from pump to power steering) dented or clogged. · Insufficient air bleeding.	· Repair or replace. · Adjust valve set pressure and check specified oil pressure. · Repair or replace. · Bleed air completely.
7. Insufficient or variable oil flow.	· Flow control valve orifice clogged.	· Clean.
8. Insufficient or variable discharge pressure.	Piping · Pipe (from tank to pipe) dented or clogged.	· Repair or replace.

5. BRAKE SYSTEM

Trouble symptom	Probable cause	Remedy
1. Insufficient braking force	· Hydraulic system leaks oil. · Hydraulic system leaks air. · Disk worn. · Brake valve malfunctioning · Hydraulic system clogged	· Repair and add oil. · Bleed air. · Replace · Repair or replace. · Clean.
2. Brake acting unevenly. (Truck is turned to one side during braking.)	· Tires unequally inflated. · Brake out of adjustment. · Disk surface roughened. · Wheel bearing out of adjustment. · Hydraulic system clogged.	· Adjust tire pressure. · Adjust. · Repair by polishing or replace. · Adjust or replace. · Clean.
3. Brake trailing.	· Pedal has no play. · Piston cup faulty. · Brake valve return port clogged. · Hydraulic system clogged. · Wheel bearing out of adjustment.	· Adjust. · Replace. · Clean. · Clean. · Adjust or replace.
4. Overheat	· Cooling oil insufficient. · Cooling system malfunctioning. · Excessive braking.	· Add. · Repair or replace. · Use engine brake.

6. HYDRAULIC SYSTEM

Trouble symptom	Probable cause	Remedy
1. Large fork lowering speed.	· Seal inside control valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Replace spool or valve body. · Replace. · Replace packing.
2. Large spontaneous tilt of mast.	· Tilting backward : Check valve defective. · Tilting forward : tilt lock valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Clean or replace. · Clean or replace. · Replace. · Replace seal.
3. Slow fork lifting or slow mast tilting.	· Lack of hydraulic oil. · Hydrauic oil mixed with air. · Oil leaks from joint or hose. · Excessive restriction of oil flow on pump suction side. · Relief valve fails to keep specified pressure. · Poor sealing inside cylinder. · High hydraulic oil viscosity. · Mast fails to move smoothly. · Oil leaks from lift control valve spool. · Oil leaks from tilt control valve spool.	· Add oil. · Bleed air. · Replace. · Clean filter. · Adjust relief valve. · Replace packing. · Change to SAE10W, class CF engine oil. · Adjust roll to rail clearance. · Replace spool or valve body. · Replace spool or valve body.
4. Hydraulic system makes abnormal sounds.	· Excessive restriction of oil flow pump suction side. · Gear or bearing in hydraulic pump defective.	· Clean filter. · Replace gear or bearing.
5. Control valve lever is locked	· Foreign matter jammed between spool and valve body. · Valve body defective.	· Clean. · Tighten body mounting bolts uniformly.
6. High oil temperature.	· Lack of hydraulic oil. · High oil viscosity. · Oil filter clogged.	· Add oil. · Change to SAE10W, class CF engine oil. · Clean filter.

7. MAST AND FORK

1) MAST

Problem	Cause	Remedy
Forks fail to lower.	· Deformed mast or carriage.	· Disassemble, repair or replace.
Fork fails to elevate	· Faulty hydraulic equipment.	· See troubleshooting hydraulic pump and cylinders in section 6, hydraulic system.
	· Deformed mast assembly.	· Disassemble mast and replace damaged parts or replace complete mast assembly.
Slow lifting speed and insufficient handling capacity.	· Faulty hydraulic equipment.	· See troubleshooting hydraulic pump and cylinders in section 6, hydraulic system.
	· Deformed mast assembly.	· Disassemble mast and replace damaged parts or replace complete mast assembly.
Mast fails to lift smoothly.	· Deformed masts or carriage.	· Disassembly, repair or replace.
	· Faulty hydraulic equipment.	· See Troubleshooting Hydraulic Cylinders, pump and control valve in section 6, hydraulic system.
	· Damaged load and side rollers.	· Replace.
	· Unequal chain tension between LH & RH sides.	· Adjust chains.
	· LH & RH mast inclination angles are unequal. (Mast assembly is twisted when tilted)	· Adjust tilt cylinder rods.
Abnormal noise is produced when mast is lifted and lowered.	· Broken load roller bearings.	· Replace.
	· Broken side roller bearings.	· Replace.
	· Deformed masts.	· Disassemble, repair or replace.
	· Bent lift cylinder rod.	· Replace.
	· Deformed carriage.	· Replace.
	· Broken sheave bearing.	· Replace.
Abnormal noise is produced during tilting operation.	· Insufficient lubrication of anchor pin, or worn bushing and pin.	· Lubricate or replace.
	· Bent tilt cylinder rod.	· Replace.

2) FORKS

<table>
<tr><th>Problem</th><th>Cause</th><th>Remedy</th></tr>
<tr><td>Abrasion</td><td>Long-time operations causes the fork to wear and reduces the thickness of the fork.
Inspection for thickness is needed.
· Wear limit : Must be 90% of fork thickness</td><td>If the measured value is below the wear limit, replace fork.</td></tr>
<tr><td>Distortion</td><td>Forks are bent out of shape by a number of reasons such as overloading, glancing blows against walls and objects, and picking up load unevenly.
· Difference in fork tip height
<table>
<tr><th>Fork length (mm)</th><th>Height difference (mm)</th></tr>
<tr><td>equal or below 1500</td><td>3</td></tr>
<tr><td>above 1500</td><td>6</td></tr>
</table>
</td><td>If the measured value exceeds the allowance, replace fork.</td></tr>
<tr><td>Fatigue</td><td>Fatigue failure may result from the fatigue crack even though the stress to fork is below the static strength of the fork. Therefore, a daily inspection should be done.
· Crack on the fork heel.
· Crack on the fork weldments.</td><td>Repair fork by expert.
In case of excessive distortion, replace fork.</td></tr>
</table>