

Chapter 6 Troubleshooting



When the engine has some faults, you should remove them. If the engine works with faults, it will not only result in low power, low efficiency, but also in excessive parts abrasion, and even machine damage.

The items marked with "★" in troubleshooting table are the fault which may happen to the electronic injection diesel engine, but for the engine without electronic injection, it doesn't matter.

The common malfunctions are: hard to start, running rough, low power, abnormal running sound, abnormal smoke low oil pressure, over-heated coolant, automatic shut down, running-away and so on.

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For removing the faults as soon as possible, the following procedures are suggested:

(1) Before removing the faults, you had better understand the features and details of faults such as the load, ambient temperature and altitude and other conditions.

(2) Analyze the faults carefully.

(3) Consider the relationship between the faults and the relevant engine system and parts.

(4) Review the latest service or repair and make a careful check.

(5) Remove the faults from the most easy ones.

(6) Find out the causes and remove them.

(7) Start the engine, make sure the faults have been eliminated.

Some of the typical faults and their elimination methods are as follows:

1 Engine hard to start

Cause	Solution
1.Engine hard to start	
(1)Low battery	→Recharge the battery
(2)Bad electrical contact	→Remove ill contact
(3)Starter gear does not engage with the flywheel ring gear	→Find out the causes and correct them.
2.Malfunction of fuel supply system	
(1)Fuse burnt ★	→Change fuse
(2)Fuel tank without fuel	→Add the fuel
(3)Jams in outlet pipes	→Clean and make it smoothly
(4)Air in the fuel system	→Bleed the system
(5)Jams in the fuel pipes or fuel filter	→Clean the fuel pipes, and change filter
(6)Poor quality fuel injection or low injection pressure	→Clean and repair the injector
(7)Loose connector in electrical equipment ★	→Fasten connectors
(8)Abnormal power supply of ECU controller ★	→Check supply circuit of ECU controller

Cause	Solution
(9)Low engine temperature	→Use winter lubrication and fuel, switch on the electric heater
(10)Incorrect installing gap of cam speed sensor or sensor damaged ★	→Adjust installing gap of cam speed sensor or replace the sensor
(11)Power supply of cam and crankshaft speed sensors or temperature pressure sensor is shorted to ground ★	→Replace cam and crankshaft speed sensors or temperature pressure sensor
(12)Fault diagnosis switch is turned on before starting ★	→Turn off fault diagnosis switch, and resupply power to make it return
(13) ECU controller damaged ★	→Replace ECU controller
(14)Back pressure valve damaged ★	→Replace Back pressure valve
3.Low compression pressure in cylinder	
(1)Piston ring worn out	→Replace piston ring
(2)Valve leakage	→Check and rub valve
4.Low ambient temperature	→Use pre-heater
5.Jam in air cleaner	→Check, clean or change air filter

2 Running rough

cause	solution
1.Air or water in fuel system	→Bleed the system and check water content in the diesel fuel
2.Malfunction fuel transfer pump	→Repair or replace fuel transfer pump
3.Valve spring break or improper valve clearance	→Replace valve spring and readjust the valve clearance
4.Gas leakage	→Replace cylinder head gasket

3 Lack of engine power

Cause	Solution
1.Turbocharged system	
(1)Leaks in inlet pipe of turbocharger	→Find out leaks in pipes and tubes of turbocharger and intercooler, and correct them
(2)Leaks in exhaust pipe of turbocharger	→Replace gasket. Find out leaks and correct them
(3)Turbocharger works abnormally	→check
2.Fuel supply system	
(1)Fuel pipes and fuel filter throttled	→Clean fuel pipes and filter or replace filter element
(2)Water in fuel	→Drain out the water and change fuel
(3)Injector damaged	→repair or replace
(4)Bad contacts between connector and pressure temperature sensors or sensor damaged ★	→Check pressure sensor connector or replace super-charged pressure sensor
(5)Injection pump performance reduction or does not work	→Adjust flow coefficient or replace injection pump
(6)Scrap iron is absorbed by crankshaft speed sensor ★	→Remove scrap iron on crankshaft speed sensor

Cause	Solution
(7) Poor contacts in throttle sensor or sensor damaged★	→ Plug in and pull out connector again or replace throttle
(8) Low engine temperature results in throttle without output★	→ Wait for engine warm-up
3. Air cleaner blocked	→ Clean or replace air filter
4. Muffler blocked	→ Clean muffler
5. Low pressure in cylinder	
(1) Valve spring break	→ replace valve spring
(2) Incorrect valve clearance	→ Adjust valve clearance
(3) Valve leakage	→ Rub valve
(4) Piston ring soot or worn-out	→ Clean soot or replace piston ring

4 Abnormal noise

Cause	Solution
1. Excessive clearance between piston and cylinder results in knock sound in the cylinder after engine starts and it will go less with engine warm-up	→ Replace piston or cylinder liner
2. Excessive clearance between piston pin and small end bushing of connecting rod results in clear knock on the top of cylinder at low speed	→ Replace small end bushing of connecting rod
3. Excessive valve clearance results in rhythmical knock at valve cover.	→ Adjust valve clearance
4. Excessive valve clearance of connecting rod bearing shell or main bearing, there are clash noise at low speed	→ Replace main bearing or connecting rod bearing shell
5. Turbocharger noise	→ Look for friction between impellers and the housing of turbocharger or compressor
6. Driver gear noise	→ Replace gears

5 Black smoke

Cause	Solution
1. Engine over-load	→ Reduce engine load
2. Bad fuel spraying	→ Check or replace injector
3. Leakage at the connection of turbocharger and the intake pipe or exhaust pipe	→ Look for the leaks and correct them
4. Turbocharger failure	→ Replace turbocharger
5. Transient state switch without opening★	→ Turn on transient state switch
6. Scrap iron is absorbed on crankshaft speed sensor★	→ Remove scrap iron on crankshaft speed sensor
7. ECU control procedure is not compatible★	→ Replace ECU control procedure or ECU control unit
8. Defective intercooler	→ Clean intercooler or repair fan
9. Air cleaner blocked	→ Check, clean or replace filter element

6 White smoke

Cause	Solution
1.Low ambient temperature	→Warm up engine with low load
2.Low coolant temperature or water in cylinder	→Warm up coolant, find out the sources of water in cylinder and correct them
3.Poor fuel spraying or leaks	→Repair or replace injector
4.Scrap iron is absorbed on crankshaft speed sensor★	→Remove scrap iron on crankshaft speed sensor
5.Water in fuel	→Wash fuel tank and filter, change fuel
6.Cylinder score	→Repair or replace piston and cylinder liner

7 Blue smoke

Cause	Solution
1.Poor fuel spraying	→Repair or replace injector
2.Piston ring installed upside down	→Reinstall piston ring
3.Piston ring worn-out	→Replace piston ring

8 Lack of Oil Pressure



Never operate the engine when engine oil pressure is too low. Whenever when engine oil pressure is too low, stop the engine immediately. Find out the causes and correct them

Cause	Solution
1.Oil pressure gauge or sensor damaged	→Replace gauge or sensor, check connect lines
2.Low level in oil sump	→Add oil to specified level
3.Oil screen, oil filter plugged or filter bypass valve stuck	→Clean Oil screen, adjust or replace bypass valve
4.Main relief valve failure	→Adjust or replace relief valve
5.Leaks in oil inlet or outlet pipe of turbocharger	→Look for the leaks, tighten or replace oil pipe
6.Excessive clearance at connecting -rod bearing, crankshaft bearing and camshaft bearing	→Replace the bearing
7.Damaged or wear-out oil pump	→Find out the causes and correct them
8.Improper engine oil	→Change with correct engine oil and find out the causes

9 Coolant is too hot



When the coolant in engine radiator is bolting, do not stop the engine immediately or add cold water in it. To avoid cylinder liner damage, the speed should be reduced, and keep the engine run at low speed until the coolant temperature becomes lower. Then stop the engine to find out the causes.

Cause	Solution
1.Damaged coolant temperature gauge or sensor 2.Excess fuel injection quantity 3.Overload 4.Low coolant level, V-belt loose 5.Damaged thermostat 6.Serious scale deposit in the water jacket of cylinder head or block 7.Damaged cylinder liner O-ring, leaks in cooling system 8.Intercooler or radiator is too dirty 9.Damaged water pump	→Check and replace coolant temperature gauge or sensor →Check or replace fuel injection pump (or readjust) →Reduce load →Add coolant, adjust V-belt tension →Replace thermostat →Scour out the jacket and Clean cooling system →Replace sealing ring or correct leaks →Clean intercooler or radiator →Check or replace water pump

10 Engine stalls abruptly

Cause	Solution
1.Engine stalls abruptly and crankshaft can be cranked (1)Engine overloaded (2)Fuel tank without fuel (3)Air in fuel supply system (4)clogged fuel supply system (5)Air cleaner clogged (6)Short circuit caused by damaged sensor ★ (7)Loose plug of cam speed sensor ★ (8)Damaged controller ECU ★ (9)Coolant temperature is too hot (10)Damaged wiring harness ★ (11)Impurity is absorbed on cam sensor ★ (12)Ground connection is bad ★ 2.Engine stalls abruptly and crankshaft cannot be cranked (1)Crankshaft and bearing stuck (2)Piston and cylinder liner stuck	→Reduce loads and restart engine →Add fuel to fuel tank →Bleed the system →Clean fuel supply system →Clean or replace filter element →Replace sensor →Check cam speed sensor plug or replace sensor →Replace controller ECU →Check coolant system →Replace wiring harness →Clean impurity on sensor →Connect earth line well →Check crankshaft and bearing, repair or replace them →Replace piston and cylinder liner

11 Runaway



When runaway happens, try to stop the engine immediately. The general way is as follows: stop the engine and cut off fuel and air supply so as to avoid personal injury or machine damage. When runaway happens on tractors, vehicles and construction machinery except the measures mentioned above, depress the brake pedal to stall the engine. However never depress clutch pedal.

Cause	Solution
1.Controller ECU works abnormally★	→Replace or repair controller ECU
2.Injection pump works abnormally	→Replace or repair Injection pump
3.Throttle line failure(including whole vehicle)★	→Check throttle line
4.Pre-heater failed, much fuel in intake pipe	→Replace pre-heater, clean up fuel in intake pipe
5.Incorrect oil or too much oil in oil bath air filter	→Change with correct oil, set oil level to specified level, and wash intake pipe and intake passage
6.Excessive oil in oil sump	→Drain out excessive oil, and clean air intake pipe

12 Lack of power, higher fuel consumption due to excessive wear



The sealing in the air inlet pipeline should be frequently checked. If any leak happens, find out the causes and remove them immediately to avoid lack of power or excessive wear.

Turbocharged engines should use ADI CF grade oil. Common oil is prohibited. When changing oil, do not mix with used oil or other brands oil.

Cause	Solution
1.Parts excessive worn out due to incorrect oil	→Clean oil sump and oil filter, replace element, add specified oil, replace worn components
2.Cylinder liner, piston ring and bearing damaged due to not changing oil for a long time or use incorrect oil	→Same as above
3.Injector pair wear or plugged	→Replace or clean injector pair
4.Parts seriously worn out due to damaged air filter	→Replace element or air cleaner, replace parts as necessary
5.Piston, cylinder liner, piston ring seriously worn out due to leaks or other trouble in air intake system	→Find out causes and correct them, replace parts as necessary

13 Low air pressure or oil leaks of air compressor

Cause	Solution
1. Low air pressure	
(1)Soot on intake or exhaust valve or diaphragm broken or too weak	→Replace diaphragm, rub valve seat and remove soot
(2)Loose cylinder head bolts or leaks at valve seat gasket	→Retighten bolts and replace gasket
(3)Safety valve can not close completely	→Clean safety valve, remove dirt at air intake or exhaust port and replace spring
(4)Air filter plugged	→Clean air filter
(5)Leaks or plugged at the pipe connection	→Tighten nuts, remove soot or dirt
2. Too much lubrication oil consumed	
(1)Cylinder liner or piston ring worn out	→Replace cylinder liner or piston ring

Cause	Solution
(2)Oil return orifice plugged, or high oil level	→Clean oil sump and oil return orifice
3. Leaks on joint surface	
(1)Loose fasteners	→Tighten bolts
(2)Damaged gaskets	→Replace gasket

14 Alternator faults

Cause	Solution
1.Alternator does not work	
(1)Electrical wire broken, short circuit, improper connection or wire connected incorrectly	→Connect wire tightly and correctly
(2)Loose Claw pole, rotor winding broken, damaged rectifier bridge, bad brush connect	→Repair and replace components as necessary
(3)Low regulator voltage, wire connected incorrectly, contact point burnt or oxidated , relay winding burnt	→Repair and replace components as necessary
2.Undercharge	
(1)Damaged rectifier bridge, bad brush connect, weaken spring, grease on slip ring, loose V-belt	→Repair and replace alternator
(2)Low regulator voltage, connect point burnt	→Repair and replace regulator
(3)Insufficient battery electrolyte, obsolete battery	→Add specified electrolyte or replace battery
3.Unsteady charging	
(1)Loose V-belt, bad brush connect, weaken spring, loose terminal or improper contact	→Tighten V-belt, adjust brush and spring, screw down terminals
(2)Dirty regulator contactor	→Clean regulator contact point
4.Abnormal noise	
(1)Alternator improperly installed	→Re-install alternator as necessary
(2)Damaged bearing, friction between stator and rotor or stator winding short circuit	→Repair or replace alternator
5.Charging current is too high	
(1)High regulator voltage or regulator failed	→Repair regulator
(2)Brush runs into rectifier or short circuit with armature. Current output goes directly to excitation coil which results in uncontrollable voltage	→Repair alternator
6.Alternator damaged	
(1)Rectifier element short circuit or friction between stator and rotator	→Repair alternator, replace it as necessary
(2)Damaged regulator	→Repair regulator, and replace it as necessary