Section 10 Chapter 7

24 Valve, 8.3 Liter Engine Troubleshooting Symptoms Identification

Note: All coding used in the 8.3 Liter and 9 Liter engine manuals are Cummins engine codes. These engine codes have no meaning to New Holland warranty codes and should only be used for procedure steps.

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Troubleshooting Procedures and Techniques

A thorough analysis of the customer's complaint is the key to successful troubleshooting. The more information known about a complaint, the faster and easier the problem can be solved.

The Troubleshooting Symptom Charts are organized so that a problem can be located and corrected by doing the easiest and most logical things first. Complete all steps in the sequence shown from top to bottom.

It is not possible to include all the solutions to problems that can occur; however, these charts are designed to stimulate a thought process that will lead to the cause and correction of the problem.

Follow these basic troubleshooting steps:

- Get all the facts concerning the complaint
- Analyze the problem thoroughly
- Relate the symptoms to the basic engine systems and components
- Consider any recent maintenance or repair action that can relate to the complaint
- Double-check before beginning any disassembly
- Solve the problem by using the symptom charts and doing the easiest things first
- Determine the cause of the problem and make a thorough repair
- After repairs have been made, operate the engine to make sure the cause of the complaint has been corrected

Troubleshooting Symptoms Charts

Use the charts on the following pages of this section to aid in diagnosing specific engine symptoms. Read each row of blocks from top to bottom. Follow through the chart to identify the corrective action.

$\underline{\Delta}$ WARNING $\underline{\Delta}$

Troubleshooting presents the risk of equipment damage, personal injury or death. Troubleshooting must be performed by trained experienced technicians.

7-89351NH

Communication Error Electronic Service Tool or Control Device





Coolant Loss External



Coolant Loss Internal



Coolant Temperature Above Normal Gradual Overheat

This is symptom tree T022.



Coolant Temperature Above Normal Gradual Overheat



Coolant Temperature Above Normal Gradual Overheat



Coolant Temperature is Above Normal -- Sudden Overheat

This is symptom tree T023



Coolant Temperature is Above Normal -- Sudden Overheat (Continued)



Coolant Temperature is Below Normal



Coolant in the Lubricating Oil



Crankcase Gases (Blowby) Excessive



Cranking Fuel Pressure is Low



This is symptom tree T033.



(Continued)

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Engine Decelerates Slowly













Engine Difficult to Start or Will Not Start (No Exhaust Smoke)



This is symptom tree T044.







Engine Noise Excessive

This is symptom tree T047.

NOTE: When troubleshooting engine noise complaints, make sure the engine accessories (air compressor, fan clutch, freon compressor, or hydraulic pump) are **not** the cause of the noise. Refer to "Engine Noise Diagnostic Procedures General Information" on page 104 before using this symptom tree.



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Engine Noise Excessive (Continued)



Engine Noise Excessive (Continued)


Engine Noise Excessive Combustion Knocks

This is symptom tree T048



Engine Noise Excessive Connecting Rod

This is symptom tree T049.



Engine Noise Excessive Main Bearing

This is symptom tree T050



Engine Noise Excessive Piston

This is symptom tree T051



Engine Noise Excessive Turbocharger

This is symptom Tree T052.



Engine Power Output Low

This is symptom tree T057.



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Engine Power Output Low (Continued)









Engine Runs Rough at Idle

This is symptom tree T061.



Engine Runs Rough at Idle (Continued)





Engine Runs Rough at Idle (Continued)



Engine Runs Rough or Misfires

This is symptom tree T062.



Engine Runs Rough or Misfires (Continued)



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Engine Runs Rough or Misfires (Continued)



Engine Runs Rough or Misfires (Continued)



Engine Shuts Off Unexpectedly or Dies During Deceleration

This is symptom tree T064.



Engine Shuts Off Unexpectedly or Dies During Deceleration (Continued)



Engine Speed Surges at Low or High Idle

This is symptom tree T066.



Engine Speed Surges at Low or High Idle (Continued)



Engine Speed Surges at Low or High Idle (Continued)



Engine Speed Surges at Low or High Idle (Continued)



Engine Speed Surges Under Load or in Operating Range

This is symptom tree T067.











Engine Speed Surges in PTO

This is symptom tree T068.



Engine Starts But Will Not Keep Running

This is symptom tree T072.



Engine Starts But Will Not Keep Running



Engine Vibration Excessive

This is symptom tree T075.



Engine Vibration Excessive (Continued)


Engine Will Not Crank or Cranks Slowly (Electric Starter)

This is symptom tree T078.



(Continued)

Engine Will Not Crank or Cranks Slowly (Electric Starter) (Continued)



Engine Will Not Reach Rated Speed (RPM)

This is symptom tree T080.



Engine Will Not Reach Rated Speed (RPM) (Continued)



(Continued)

Engine Will Not Reach Rated Speed (RPM) (Continued)



Engine Will Not Shut Off

This is symptom tree T081.



Fault Code Warning Lamps Do Not Illuminate

This is symptom tree T084.



Fuel Consumption Excessive

This is symptom tree T087.



Fuel Consumption Excessive (Continued)



Fuel Consumption Excessive (Continued)



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Fuel Consumption Excessive (Continued)



Fuel in Coolant

This is symptom tree T091.



Fuel in the Lubricating Oil

This is symptom tree T092.



Intake Manifold Air Temperature Above Specification

This is symptom tree T096.



(Continued)

Intake Manifold Air Temperature Above Specification (Continued)



Low Idle Adjust Switch Does Not Work

This is symptom tree T099.



Intake Manifold Pressure (Boost) is Below Normal

This is symptom tree T097.



Lubricating Oil Consumption Excessive

This is symptom tree T102.



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Lubricating Oil Consumption Excessive (Continued)



Lubricating Oil Contaminated

This is symptom tree T103.



Lubricating Oil Pressure High

This is symptom tree T104.



Lubricating Oil Pressure Low

This is symptom tree T105.





Lubricating Oil Sludge in the Crankcase Excessive

This is symptom tree T106.



Lubricating Oil Temperature Above Specification

This is symptom tree T107.



Lubricating or Transmission Oil in the Coolant

This is symptom tree T108.



Smoke, White Excessive

This is symptom tree T118.



(Continued)

Smoke, White -- Excessive (Continued)



(Continued)

Smoke, White -- Excessive (Continued)



Smoke, White -- Excessive (Continued)



Smoke, Black Excessive

This is symptom tree T116.



Smoke, Black Excessive (Continued)



(Continued)

Smoke, Black Excessive (Continued)



Smoke, Black Excessive (Continued)



Turbocharger Leaks Engine Oil or Fuel

This is symptom tree T122.



Engine Noise Diagnostic Procedures General Information

NOTE: When diagnosing engine noise problems, make sure that noises caused by accessories, such as the air compressor and power takeoff, are **not** mistaken for engine noises. Remove the accessory drive belts to eliminate noise caused by these units. Noise will also travel to other metal parts **not** related to the problem. The use of a stethoscope can help locate an engine noise.

Engine noises heard at the crankshaft speed, engine rpm, are noises related to the crankshaft, rods, pistons, and piston pins. Noises heard at the camshaft speed, one-half of the engine rpm, are related to the valve train. A hand-held digital tachometer can help to determine if the noise is related to components operating at the crankshaft or camshaft speed.

Engine noise can sometimes be isolated by performing a cylinder cutout test. If the volume of the noise decreases or the noise disappears, it is related to that particular engine cylinder.

There is not a definite rule or test that will positively determine the source of a noise complaint.

Engine driven components and accessories, such as gear-driven fan clutches, hydraulic pumps, belt-driven alternators, air-conditioning compressors, and turbochargers can contribute to engine noise. Use the following information as a guide to diagnosing engine noise.

Main Bearing Noise

(Refer to Engine Noise Excessive Main Bearing symptom tree)

The noise caused by a loose main bearing is a loud dull knock heard when the engine is pulling a load. If all main bearings are loose, a loud clatter will be heard. The knock is heard regularly every other revolution. The noise is the loudest when the engine is lugging or under heavy load. The knock is duller than a connecting rod noise. Low oil pressure can also accompany this condition.

If the bearing is not loose enough to produce a knock by itself, the bearing can knock if the oil is too thin, or if there is no oil at the bearing.

An irregular noise can indicate worn crankshaft thrust bearings.

An intermittent sharp knock indicates excessive crankshaft end clearance. Repeated clutch disengagements can cause a change in the noise.

Connecting Rod Bearing Noise

(Refer to Engine Noise Excessive Connecting Rod symptom tree)

Connecting rods with excessive clearance knock at all engine speeds, and under both idle and load conditions. When the bearings begin to become loose, the noise can be confused with piston slap or loose piston pins. The noise increases in volume with engine speed. Low oil pressure can also accompany this condition.

Piston Noise

(Refer to Engine Noise Excessive Piston symptom tree)

It is difficult to tell the difference between piston pin, connecting rod, and piston noise. A loose piston pin causes a loud double knock which is usually heard when the engine is idling. When the injector to this cylinder is cut out, a noticeable change will be heard in the sound of the knocking noise. However, on some engines the knock becomes more noticeable when the vehicle is operated on the road at steady speed condition.