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MANUAL PREVIEW

J.I. Case

Service Manual

JENSALES

336 Engine

Used on Drott Equipment

Service Manual

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CA-S-336 BDT

GENERAL INFORMATION

Before making any repairs or adjustments on an engine, a mechanic or technician must properly diagnose the trouble.

Locating the trouble and repairing it is only part of the job, a technician must find and eliminate the cause of the trouble as well. Too many repairs are made with no thought to removing the causes that made the repair necessary.

For any engine to start or perform properly, three main requirements must be present.

1. FUEL
2. COMPRESSION
3. IGNITION

When any of these requirements are not present or limited by some mechanical reason the engine will not start or fails to operate properly throughout the power range.

1. FUEL. Fuel system problems can be present anywhere from the fuel tank, through the filters and injection pump as well as the injectors. Correct injection pump timing is important in the overall fuel system performance.

2. COMPRESSION. Compression on an engine is related to the "breathing function".

Proper compression is affected by the air cleaner condition, muffler restriction, valve condition and operation including proper valve adjustment, cylinder head gaskets condition of sleeves, rings, pistons, camshaft, and camshaft timing.

3. IGNITION. Ignition is the result of adequate compression to develop enough heat in the air charge on the compression stroke to fire the fuel being injected into the engine cylinders. Proper spray pattern and atomization of the fuel by the injector is very important. Timing the fuel injection pump to the engine to a precise degree BTDC is a vital requirement for proper ignition.

The engine diagnosis contained in the following pages covers many trouble symptoms, the causes, and what will be necessary to repair or eliminate the problem. Under each symptom are listed the most common and re-occurring problems progressively to the not so common problems. Locate your problem symptom in the diagnosis chart and refer to the pages listed for the probable causes and remedies.

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ENGINE DIAGNOSIS CHART

REVIEW THE PROBLEM AND DETERMINE THE EXACT SYMPTOMS.

NO SMOKE FROM EXHAUST (SEE PAGE 4)

ENGINE HARD TO START OR WILL NOT START
(SEE PAGES 4 THRU 6)

SMOKE FROM EXHAUST (SEE PAGE 5)

ENGINE STARTS BUT WILL NOT RUN (SEE
PAGES 7 AND 8)

ENGINE MISFIRES (SEE PAGES 9 AND 10)

ENGINE KNOCKS (SEE PAGES 11 AND 12)

ENGINE OVERHEATS (SEE PAGES 13 THRU 15)

ENGINE LACKS POWER (SEE PAGES 16 AND 17)

EXTERNAL LEAKAGE (SEE PAGE 18)

HIGH ENGINE OIL CONSUMPTION (SEE PAGES
18 THRU 20)

INTERNAL LEAKAGE (SEE PAGE 19)

EXTERNAL PROBLEMS (SEE PAGE 21)

LOW ENGINE OIL PRESSURE (SEE PAGES 21
THRU 23)

INTERNAL PROBLEMS (SEE PAGE 22)

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ENGINE HARD TO START OR WILL NOT START

NO SMOKE FROM EXHAUST

1. Fuel Shut-Off Not Open Completely.

Improper cable adjustment, damaged cable, cable slipping in clamps, misadjusted or in-operative solenoid will not completely return fuel shut-off lever to open position. Check lever to be sure it is opening completely. A partially opened lever limits the amount of fuel to the injection pump and results in low engine horsepower.

2. Final Air Filter Plugged

A dirty filter will cause rich fuel mixture and low engine power. Check filter restriction indicator and service final air filter if required.

3. Slow Cranking Speed

Starter must crank engine 200 to 300 RPM in order to ignite the diesel fuel. Check engine RPM while cranking. If cranking is slow, check starter amperage draw to help determine the following defective areas: batteries, cables, solenoid, and starting motor.

Slow cranking speed can be caused by the following internal and external engine defects: scuffing and scoring of pistons and sleeves, improper crankshaft or camshaft end play, defective rod or crank bearings, oil pump, air compressor, water pump or hydraulic pump.

4. Fuel Supply Shut Off or No Fuel

Check that fuel tank shutoff valve is open. Check fuel supply in tank.

5. Air In Fuel System

Bleed fuel system until fuel flows steadily with no bubbles. Check for air leaks at fittings between tank and fuel pump.

6. Camshaft Damaged

A sheared key in the cam drive gear or a broken cam shaft will throw valve timing out of sequence affecting engine operation. Remove cylinder head cover and check valve timing in reference to crankshaft timing marks with a dial indicator.

7. Fuel Injection Nozzle Not Seated In Head.

A nozzle that is not seated in the cylinder head will let compression leak by and not produce enough heat to fire the injected fuel. Check for damaged nozzle gasket or seals, lose nozzle, or broken stud.

8. Fuel Line Plugged

A fuel line plugged with dirt will not let fuel through to the injection pump. Remove line at fuel filters and check for fuel flow through line.

9. Clogged Fuel Filter

Check and service fuel filters.

10. Wrong Fuel or Contaminated Fuel

Wrong fuel or contaminated fuel can cause the unit not to run, or to have preignition and detonation causing serious damage to the engine. Drain fuel tank and refill with correct fuel.

11. Sticking Rack Control

A sticking rack control will not let the fuel injection pump accept any fuel. Remove cap from front of injection pump to see if rack moves when throttle lever is moved.

12. Piston Rings Worn

As piston rings become worn, they lose tension and ability to seal and wipe lubrication oil off cylinder walls. Take a compression test to determine piston ring condition. If readings are low, squirt a small amount of oil into the cylinder and retest. If compression comes up because the oil helps the rings seal, it will be necessary to install new piston rings and possibly sleeve and pistons.

13. Injection Pump Malfunction

A malfunctioning injection pump will usually under-fuel the engine. Adjust or replace the injection pump.

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ENGINE OVERHEATS

1. Fan Belt Loose

Check fan belt for proper tension. Check that the belt is not covered with oil or worn badly and riding very deep in pulley groove. Check for pulley groove wear.

2. Low Coolant Level

Check coolant level in radiator and refill if necessary.

3. Water Pump Malfunction

Remove the radiator cap and observe the coolant to see if there is movement which indicates the water pump is pumping. Move the fan back and forth to check for any defective bearings. Check around the water pump for any signs of coolant leakage indicating a bad water pump seal. Remove water pump and rebuild or replace.

4. Thermostat Inoperative

If there is high coolant temperature and boiling coolant, remove thermostats and test them.

5. Engine Timing Incorrect

Combustion will not occur in the cylinder at the correct moment (degrees BTDC) if the engine timing is incorrect. This can cause pre-ignition or detonation and serious damage to the engine. Check for proper engine timing.

6. Tractor Mechanical Drag

A mechanical drag on a unit can cause low horsepower and engine overheating. Causes of some mechanical drags are defective brakes, bad bearings, or gears in transmission.

7. Radiator Cap Inoperative

Test radiator cap to see that it relieves at the correct pressure. Inspect cap gasket for proper sealing. An inoperative cap can cause water pump cavitation and lower coolant boiling points.

8. Radiator Fins Bent

Bent or damaged fins can cause a cooling system to overheat because of restricted air

flow through the radiator core. All of the fin area is needed to dissipate the engine heat from the radiator.

9. Radiator Fins Plugged With Dirt

Radiator fins must be clean so air can flow through the radiator fins and help dissipate the heat of the coolant. Items that affect radiator cooling are: oil and grease on fins, leaves, and attachments covering radiator air inlet.

10. Cylinder Head Gasket Blown

A blown cylinder head gasket will cause one or two cylinders to lose power and cause an engine miss. It can also cause cooling system pressure to rise and blow engine coolant out the radiator overflow. Take a compression test to help determine a defective head gasket or, remove thermostats and fan belts, run engine, and check for gas bubbles rising in coolant in the water manifold.

11. Injection Pump Malfunction

A malfunctioning injection pump will usually under-fuel the engine. Adjust or replace the injection pump.

12. Radiator Baffling Missing

The removal of or non-reinstalling of radiator baffling, whether foam rubber or sheet metal, will cause cooling air flow to escape around the radiator instead of drawing in cool external air through the radiator.

13. Engine Low On Oil

An engine low on oil could lose lubrication to internal parts and start scoring pistons, sleeves and damage engine bearings. Proper oil level is required to help dissipate some of the engine heat. Check engine oil level every eight hours of operation. Low engine oil can also give low oil pressure readings.

14. Wrong Fuel or Contaminated Fuel

Wrong fuel or contaminated fuel can cause the unit not to run or to have pre-ignition and detonation causing serious damage to the engine. Drain fuel tank and refill with correct fuel.