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2017 Ford Transit-350 Service and Repair Manual

Go to manual page

B9 CHECK THE ENGINE

- Remove the cylinder heads. Refer to the 303-01 cylinder head procedure(s) for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure. Inspect the head gasket(s) for signs of damage or failure. Inspect the cylinder block and cylinder head(s) for damage.
  REFER to: Cylinder Block Distortion(303-00 Engine System - General Information, General Procedures).
  and REFER to: Cylinder Head Distortion(303-00 Engine System - General Information, General Procedures).

Are the cylinder head gasket(s), cylinder head(s) or cylinder block damaged?

Yes	REPAIR as necessary.

No	Install a new long block.

PINPOINT TEST C : ENGINE EMITS SMOKE

Possible Sources

- Condensation build up in exhaust
- Air cleaner element
- Fuel injection system
- Coolant intrusion to combustion chamber
- Excessive engine oil consumption

NOTE

Black soot near the exhaust tailpipe area is a normal condition created from rich air/fuel mixture under low load conditions.

NOTE

The higher the ambient temperature, the less likely water vapor is seen exiting the tailpipe during engine startup and engine warm-up. The colder the ambient temperature, the more likely water vapor is seen exiting the exhaust tailpipe during engine startup and engine warm-up. This is a normal operating condition.

	blue or gray smoke concern, GO to Pinpoint Test A

C3 CHECK THE AIR CLEANER ELEMENT

- Check the air cleaner element.

Is the air cleaner element relatively clean and free of debris?

Yes	GO to C4

No	INSTALL a new air cleaner element.

C4 CHECK THE FUEL SYSTEM

- Check the fuel system for normal operation. REFER to the Diagnosis and Testing procedures in 303-04 Fuel Charging and Controls for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

Is the fuel system operating correctly?

Yes	The concern is not currently present or the fuel system is not the cause of the concern. Verify the customer concern and the characteristics of the concern.

No	REPAIR as necessary.

PINPOINT TEST D : LOSS OF POWER, POOR IDLING, RUNS ROUGH

Possible Sources

- Accessory drive concern
- Air intake system concern
- Brake system concern
- Cooling system concern
- Exhaust system concern
- Fuel system concern
- Throttle body concern

- Check the following Parameter Identifications (PIDs) for simultaneous brake pedal and accelerator pedal operation:
  - Access the PCM (powertrain control module) and monitor the BRKOVR_ACTION (Number of Drive Cycles where Brake Override Accelerator Action Occurred) (Undefined / Not Used) PID (parameter identification)
  - Access the PCM (powertrain control module) and monitor the BRKOVRD_POSS (Number of Drive Cycles in which Brake Override Accelerator Action Possible) (Undefined / Not Used) PID (parameter identification)
  - Access the PCM (powertrain control module) and monitor the DIST_BRKOVRD (Distance Since Brake Override Accelerator Action occurred) (km) PID (parameter identification)

Is there an indication of both pedals being applied simultaneously?

Yes	ADVISE the vehicle owner simultaneous brake pedal and accelerator pedal operation activates the brake over accelerator feature.

No	GO to D3

D3 CHECK THE AIR CLEANER

- Inspect the air cleaner.

Is the air cleaner clogged?

Yes	REPLACE the air cleaner. Check the system for normal operation.

No	GO to D4

D4 CHECK THE AIR INTAKE SYSTEM

- Check the air intake system, air cleaner and CAC (charge air cooler) components, ducts, pipes and hoses. Check that all components are installed correctly and tight. Check that all components are aligned correctly. Check for damage that could cause an air-intake leak resulting in loss of boost. For additional information, refer to the 303-12 Intake Air Distribution and Filtering section for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

Does the air intake system have any leaks?

- Check the exhaust system for restrictions or damage. Refer to the 309-00 Exhaust System section for the engine being diagnosed. Refer to the appropriate section in Group 309for the procedure.

Is the exhaust system restricted or damaged?

Yes	Repair as necessary. Refer to the 309-00 Exhaust System section for the engine being diagnosed. Refer to the appropriate section in Group 309for the procedure.
No	GO to D8

D8 CHECK FOR OVERHEATING CONCERN

- Inspect the engine and cooling system for overheating concerns. Refer to the Diagnosis and Testing procedure in the 303-03 section for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

Is the engine overheating?

Yes	REPAIR as necessary.
No	GO to D9

D9 CHECK COMPRESSION AND CYLINDER LEAKAGE

No	REPAIR as necessary or DRAIN the fuel and fill the fuel tank with good fuel.

D12 CHECK THE ENGINE OIL PRESSURE

- Check the engine oil pressure.
  REFER to: Oil Pressure Test - Diesel (303-00 Engine System - General Information) .
  Compare the engine oil pressure gauge to the engine oil pressure specifications in the 303-01 specifications procedure of the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

Is the engine oil pressure within specification?

Yes	GO to D13

No	For a engine oil pressure concern, GO to Pinpoint Test E

D13 CHECK THE TURBOCHARGER(S)

- Inspect the turbocharger(s) for damage that could cause loss of boost. REFER to the Diagnosis and Testing procedure in the 303-04 Turbocharge section for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

Are the turbocharger(s) damaged?

Yes	INSTALL a new turbocharger. REFER to the Removal and Installation procedure in the 303-04 turbocharger section for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

No	GO to D14

D14 CHECK THE TIMING DRIVE COMPONENTS

- Remove the engine front cover. Inspect the timing components for excessive wear or damage that could cause timing concerns. Check for a stretched timing chain or belt. Check for excessive wear on the timing guides. Check the tensioner plungers for over extension. Inspect the VCT (variable camshaft timing) unit(s) for damage or excessive wear.

- Remove the cylinder heads. Refer to the 303-01 cylinder head procedure(s) for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure. Inspect the head gasket(s) for signs of damage or failure. Inspect the cylinder block and cylinder head(s) for damage.
  REFER to: Cylinder Block Distortion(303-00 Engine System - General Information, General Procedures).
  and REFER to: Cylinder Head Distortion(303-00 Engine System - General Information, General Procedures).

Are the cylinder head gasket(s), cylinder head(s) or cylinder block head damaged?

Yes	REPAIR as necessary.

No	GO to D18

D18 CHECK THE VALVE STEM SEALS

- Remove the cylinder head(s). Remove the valves from the cylinder heads and inspect the valve stem seals for damage, excessive wear and proper sealing.

Are the valve stem seals damaged?

Yes	Install new valve stem seals. REFER to the Disassembly and Assembly of Subassemblies - Cylinder Head procedure for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

No	GO to D19

D19 CHECK THE VALVE TRAIN

- Inspect the valves for excessive engine oil or carbon build up. Inspect the valve seat contact surface and valve seats for damage or wear. Inspect for a burnt or pitted sealing contact surface. Inspect for an even sealing contact surface around the valve and the valve seat. Inspect the valves, valve stems and valve guides for damage.
  REFER to: Valve Guide Inner Diameter(303-00 Engine System - General Information, General Procedures).
  REFER to: Valve Stem Diameter(303-00 Engine System - General Information, General Procedures).

Are the valves damaged or do they show excessive wear or an uneven sealing contact pattern?

NOTE

This step is only necessary for symptom based diagnostics. For DTC based diagnostics, proceed to the next step.

- Ignition ON.
- Carry out the PCM KOEO and KOER self-tests.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	Refer to the Master DTC Chart to diagnose the DTC (diagnostic trouble code) present.
No	GO to E2

E2 CHECK THE VEHICLE SERVICE HISTORY

- Check the vehicle service history and make sure the correct oil used is documented.

Is the correct oil used based on the vehicle service history?

Yes	GO to E3
No	CHANGE the engine oil and filter using the correct oil specification. Refer to the Specifications in the 303-01 section for the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

E3 CHECK THE ENGINE OIL FILTER HOUSING AND SEAL

- Inspect:
  - the oil filter housing for a plugged center stem.
  - the oil filter housing for a missing or damaged center stem.
  - for missing or damaged O-ring seal on the stem.
  - the oil filter for being damaged.
  - the oil filter header for a damaged center stem.
  - for missing or damaged O-ring seal.

Are any concerns discovered?

- Remove the engine oil pan. Refer to the Removal and Installation procedure in the 303-01 section. Refer to the appropriate section in Group 303for the procedure. INSPECT for a blocked engine oil pick up tube.
- Inspect for a blocked engine oil pick up tube.

Is the engine oil pickup tube free from obstructions and blockage?

Yes	GO to E6

No	REPAIR as necessary.

E6 CHECK FOR OBVIOUS SIGNS OF EXCESSIVE WEAR

- Visually inspect the engine oil pan for signs of a mechanical damage or excessive wear, such as metal flakes settled at the bottom of the engine oil pan, pieces of metal or other debris from the timing components.

Is any sign of excessive wear or mechanical damage present?

Yes	REPAIR as necessary.

No	INSTALL a new oil pump. REFER to the oil pump procedure in the 303-01 section for the engine being diagnosed. CHECK the system for normal operation. If the condition is still present, GO to E7

E7 CHECK THE CONNECTING ROD BEARINGS

- Remove the engine oil pan. Remove the connecting rod caps and check the bearings for signs of excessive wear or damage. Check the connecting rod bearing journal clearance.
  REFER to: Connecting Rod Bearing Journal Clearance(303-00 Engine System - General Information, General Procedures).
  Compare the connecting rod bearing journal clearance to the connecting rod bearing journal clearance specification in the specifications procedure for the 303-01 section of the engine being diagnosed. Refer to the appropriate section in Group 303for the procedure.

Are the connecting rod bearing journal clearances within specifications?

Yes	GO to E8

source) to isolate the location of the noise to one of the following areas.

- Fuel injector(s)
- Upper end of engine
- Lower end of engine
- Front of engine
- Rear of engine

Fuel injector noise

A common source of an engine ticking noise can be related to the fuel injection pump or fuel injector(s). This is normal engine noise that can be verified by listening to another like vehicle. If the injector noise is excessive or irregular, use the EngineEAR/ChassisEAR or stethoscope to isolate the noise to a specific fuel injector.

Upper End Engine Noise

A common source of upper end engine noise (ticking, knocking or rattle) includes the camshaft(s) and valve train. Upper end engine noise can be determined using the EngineEAR/ChassisEAR or stethoscope on the valve cover bolts. If the noise is loudest from the valve cover bolts, the noise is within the upper end. The EngineEAR/ChassisEAR or stethoscope can be used to further isolate the noise to the specific cylinder bank and cylinder. Removal of the valve covers is required to pinpoint the source of the noise.

Lower End Engine Noise

A common source of lower end engine noise (ticking or knocking) includes the crankshaft, connecting rod(s) and bearings. Lower end noises can be determined by using the engine oil pan or lower cylinder block. If the noise is loudest from these areas, the noise is within the lower end. If an engine noise is isolated to the lower end, some disassembly of the engine may be required to inspect for damage or wear.

Front of Engine Noise

A common source of noise from the front of the engine (squeal, chirp, whine or hoot) is the FEAD (front end accessory drive) components. To isolate FEAD (front end accessory drive) noise, carry out the Engine Accessory Test, REFER to: Noise, Vibration and Harshness (NVH)(100-04 Noise, Vibration and Harshness, Diagnosis and Testing).

Some other noises from the front of the engine (ticking, tapping or rattle) may be internal to the engine. Use the EngineEAR/ChassisEAR or stethoscope on the engine front cover to determine if the noise is internal to the engine. Removal of the engine front cover may be necessary to inspect internal engine components.

Rear of Engine Noise

A common source of noise from the rear of the engine (knocking) is the flywheel/flexplate. Inspection of the flywheel/flexplate is necessary.

Some engines have timing drive components at the rear of the engine and may be the source of noise (ticking, knocking or rattle). Use the EngineEAR/ChassisEAR or stethoscope on the rear of the engine if the noise is suspected to be internal to the engine. Some disassembly of the engine may be required to inspect for damage or wear.

Turbocharger Noise

A common source of noise is the turbocharger. Some whine or air rush noise is an acceptable condition.