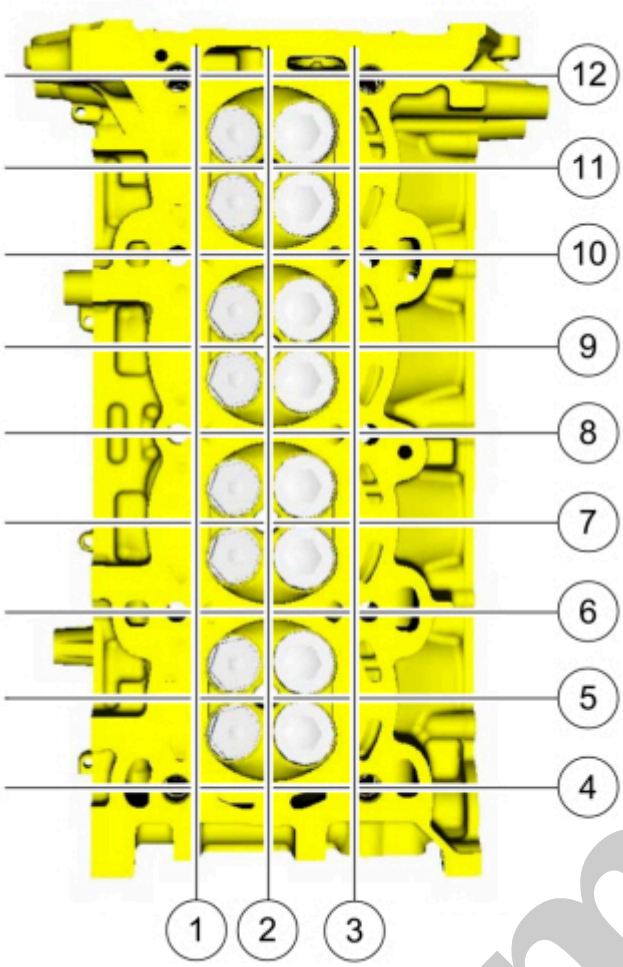
Your Ultimate Source for OEM Repair Manuals

FactoryManuals.net is a great resource for anyone who wants to save money on repairs by doing their own work. The manuals provide detailed instructions and diagrams that make it easy to understand how to fix a vehicle.

2017 Ford Special Service Police Sedan Service and Repair Manual

Go to manual page



E148404

Click here to learn about symbols, color coding, and icons used in this manual.

6. **NOTE**

   Make sure to use the latest scan tool software release.

   If the cause is not visually evident, connect the scan tool to the DLC (data link connector) .

7. **NOTE**

   The VCM (Vehicle Communication Module) LED prove out confirms power and ground from the DLC (data link connector) are provided to the VCM (Vehicle Communication Module) .

   If the scan tool does not communicate with the VCM (Vehicle Communication Module) :

   - check the VCM (Vehicle Communication Module) connection to the vehicle.
   - check the scan tool connection to the VCM (Vehicle Communication Module) .
   - check for No Power To The Scan Tool, to diagnose no power to the scan tool.

     For additional information, refer to: Controller Area Network (CAN) Module Communications Network(418-00A Controller Area Network (CAN) Module Communications Network, Diagnosis and Testing).

8. If the scan tool does not communicate with the vehicle:

   - verify the ignition key is in the ON position.
   - verify the scan tool operation with a known good vehicle.
   - to diagnose no response from the PCM (powertrain control module) ,

     For additional information, refer to: Controller Area Network (CAN) Module Communications Network(418-00A Controller Area Network (CAN) Module Communications Network, Diagnosis and Testing).

9. Carry out the network test.

   - If the scan tool responds with no communication for one or more modules,

     For additional information, refer to: Controller Area Network (CAN) Module Communications Network(418-00A Controller Area Network (CAN) Module Communications Network, Diagnosis and Testing).

   - If the network test passes, retrieve and record continuous memory DTCs.

accelerometers at either end of the valve cover. For lower engine noises, place the accelerometers at either end or side to side of the engine block.

A video version of this procedure is available on-line - Click here to view engine noise diagnosis using VCMM and accelerometers. ***(https://bcove.video/32vT3eV)***

4. **NOTE**

   ChassisEAR and EngineEAR allow the use of a microphone for listening. These tools may be connected directly to the VCMM (Vehicle Communication and Measurement Module) by using a 3.5mm male to RCA female adapter.

   If the noise remains unclear or to verify the suspected noise from the stethoscope ChassisEAR, EngineEAR or graphed accelerometers, using a 3.5mm male to RCA female adapter, attach the ChassisEAR or EngineEAR to the VCMM (Vehicle Communication and Measurement Module) . Graph all or some of the noises, as like the accelerometers.

   A video version of this procedure is available on-line - Click here to view engine noise diagnosis using VCMM and ChassisEAR. ***(https://bcove.video/32stnzH)***

   A video version of this procedure is available on-line - Click here to view engine noise diagnosis using VCMM and EngineEAR. ***(https://bcove.video/2PFUm9s)***

5. If the suspected noise location still cannot be determined, using the oscilloscope function of the VCMM (Vehicle Communication and Measurement Module) , graph any combination of the accelerometer(s), ChassisEAR and/or EngineEAR to compare or identify the suspected noise. All 4 ports on the VCMM (Vehicle Communication and Measurement Module) may be utilized for graphing noise.

   A video version of this procedure is available on-line - Click here to view engine noise diagnosis using VCMM and ChassisEAR and accelerometer(s). ***(https://bcove.video/2PPqmYW)***

   A video version of this procedure is available on-line - Click here to view engine noise diagnosis using VCMM and EngineEAR and accelerometer(s). ***(https://bcove.video/32k6374)***

14. After the noise is localized, note the characteristics of the noise, including type of noise, frequency and conditions when the noise occurs. Use the NVH (noise, vibration and harshness) chart to help identify the source of the noise.

    NVH (noise, vibration and harshness) Chart

    NOTE

    Possible sources and their listed actions are not limited to the symptoms provided below. Noise may be telegraphed from other areas or excited from associated parts and/or assemblies. The below chart

the first start of the day	stick/slip between ball bearings and the bearing race
Accessory drive belt noise, squeal or chirping	• Defective/worn or incorrect accessory drive belt • Misaligned pulley(s) • Pulley runout • Damaged or worn accessory drive component or idler • Fluid contamination of the accessory drive belt or pulleys • Damaged or worn accessory drive belt tensioner • Damaged pulley grooves • Damaged or worn coolant pump pulley
Pop noise - happens approximately 30 seconds after cold start up	• Turbocharger bypass valve
Clunking/moaning/grinding noise	• Coolant pump has excessive end play or imbalance
Humming	• Air Induction • Powertrain mounts
Whining	• FEAD (front end accessory drive) •
Whine/hum - occurs when unlocking the vehicle or opening the door with the engine off (GTDI only)	• Fuel pump module
Whine or moaning noise	• Air intake system
Whistling noise - normally accompanied with poor idle condition	• Air intake system • Turbocharger intake tube assembly leaking

Engine noise, upper end - ticking noise near the fuel rail and intake manifold	• Fuel rail clip • Fuel injector • Fuel injection pump (DI (direct injection) engines only)
Engine noise, upper end - ticking, knocking or rattle noise that occurs during idle or high idle during the first cold start of the day and may disappear as the engine warms	• Valve train noise (bled down lifter/lash adjuster) • Cam Drive
Engine noise, upper end - occurs mostly with a warm engine at light/medium acceleration	• Worn or damaged spark plugs •
Engine noise, upper end - rattling noise from the valve train. Worse when the engine is cold	• Low oil level • Thin or diluted oil • Low oil pressure • Worn valve train components • Worn valve guides • Excessive runout of the valve seats on the valve face
Engine noise, upper end - pinging noise	• Gasoline octane too low • KS (knock sensor) operation • Incorrect spark timing • High operating temperature • Spark plug • Catalytic converter • Cylinder head • Valvetrain
Engine noise, lower end - ticking or knocking noise near the oil filter adapter	• Oil pump • Lower end, excessive clearance between the connecting rod bearings and the crankshaft • Lower end, worn or damaged crankshaft main bearings

Engine vibration - increases intensity as the engine rpm is increased	• Engine out-of-balance •
Engine vibration - mostly at coast/neutral coast. Condition improves with vehicle acceleration	• Combustion instability
Engine vibration or shudder - occurs with light to medium acceleration above 56 km/h (35 mph)	• Worn or damaged spark plugs • Plugged fuel injector • Contaminated fuel
Bongo	• Balance shaft
Chatter	• Valvetrain
Chirping	• FEAD (front end accessory drive) • Piston Rings • Valvetrain
Clicking	• Fuel • PCV (positive crankcase ventilation) • Valvetrain
Clatter	• Cam Drive • Piston
Crickets	• Cam Drive •
Dieseling	• Lower end, excessive clearance between the connecting rod bearings and the crankshaft • Lower end, worn or damaged crankshaft main bearings • Piston
Quacking	• Cam Drive

	bearings and the crankshaft • Lower end, worn or damaged crankshaft main bearings
Tin-Like	• Drivetrain • Cylinder Head • Manifold

Exhaust Manifold Cleaning and Inspection

303-00 Engine System - General Information	***2022 F-150***
General Procedures	***Procedure revision date: 08/28/2012***

Exhaust Manifold Cleaning and Inspection

Cleaning

1. Clean the exhaust manifold using a suitable solvent. Use a plastic scraping tool to clean the gasket sealing surfaces.

Inspection

1. **NOTE**

   New exhaust manifold gaskets, studs, nuts and/or bolts must be installed when an exhaust manifold is serviced.

   NOTE

   Use a Straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot of length, such as Snap-On® GA438A or equivalent. For example, if the Straightedge is 61 cm (24 in) long, the machined edge must be flat within 0.010 mm (0.0004 in) from end to end.

   Using the Straightedge and a Feeler Gauge Set, check the exhaust manifold sealing surface for warpage. If the warpage is greater than 0.76 mm (0.0299 in), install a new exhaust manifold.

   Use the General Equipment: Feeler Gauge

Intake Manifold Vacuum Test - Flex Fuel - Ethanol/Full Hybrid Electric Vehicle (FHEV)/Gasoline

303-00 Engine System - General Information	***2022 F-150***
General Procedures	***Procedure revision date: 10/2/2020***

Intake Manifold Vacuum Test - Flex Fuel – Ethanol/Full Hybrid Electric Vehicle (FHEV)/Gasoline

1. Bring the engine to normal operating temperature. Connect the Vacuum/Pressure Tester to the intake manifold. Run the engine at the specified idle speed.
2. The vacuum gauge should read between 51-74 kPa (15-22 in-Hg) depending upon the engine condition and the altitude at which the test is conducted. Subtract 4.0193 kPa (1 in-Hg) from the specified reading for every 304.8 m (1,000 feet) of elevation above sea level.
3. The reading should be steady. If necessary, adjust the gauge damper control (where used) if the needle is fluttering rapidly. Adjust the damper until the needle moves easily without excessive flutter.

Intake Manifold Vacuum Test - Interpreting Vacuum Gauge Readings

1. A careful study of the vacuum gauge reading while the engine is idling will help pinpoint trouble areas. Always conduct other appropriate tests before arriving at a final diagnostic decision. Vacuum gauge readings, although helpful, must be interpreted carefully.
2. Most vacuum gauges have a normal band indicated on the gauge face. The following are potential gauge readings. Some are normal; others should be investigated further.
3. The following are potential gauge readings. Some are normal; others should be investigated further.

   Visual Inspection Chart

Mechanical
• 1. NORMAL READING: Needle between 51-74 kPa (15-22 in-Hg) and holding steady.