

SUPER DUTY



6.4L Power Stroke[®] Diesel Engine



2008 "F" SERIES SUPER DUTY

-
- Engine Description • Systems Overview • Component Location • Technician Tips •

This publication is intended to provide technicians and service personnel with an overview of technical advancements in the 6.4L POWER STROKE® DIESEL Engine. The information contained in this publication will supplement information contained in available service literature.

IMPORTANT SAFETY NOTICE

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles, as well as, the personal safety of the individual performing the work. This manual provides general directions for accomplishing service repair work with tested, effective techniques. Following the directions will assure reliability. There are numerous variations in the procedures; techniques, tools, parts for servicing vehicles and the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that they do not compromise their personal safety or the vehicle integrity by their choice of methods, tools or parts.

The following list contains some general WARNINGS that you should follow when you work on a vehicle.

Always wear safety glasses for eye protection.

Always perform work in a well ventilated area.

Use safety stands whenever a procedure requires you to be under the vehicle.

Be sure that the ignition switch is always in the OFF position, unless otherwise required by the procedure.

Never perform any service to the engine with the air cleaner removed and the engine running unless a turbocharger compressor inlet shield is installed.

Set the parking brake when working on the vehicle. If you have an automatic transmission, set it in PARK unless instructed otherwise for a specific service operation. If you have a manual transmission, it should be in REVERSE (engine OFF) or NEUTRAL (engine ON) unless instructed otherwise for a specific service operation.

Operate the engine only in a well-ventilated area to avoid the danger of carbon monoxide.

Keep yourself and your clothing away from moving parts when the engine is running, especially the fan, belts, and the turbocharger compressor.

To prevent serious burns, avoid contact with hot metal parts such as the radiator, turbocharger pipes, exhaust manifold, tail pipe, catalytic converter and muffler.

Do not smoke while working on the vehicle.

To avoid injury, always remove rings, watches, loose hanging jewelry, and loose clothing before beginning to work on a vehicle. Tie long hair securely behind the head.

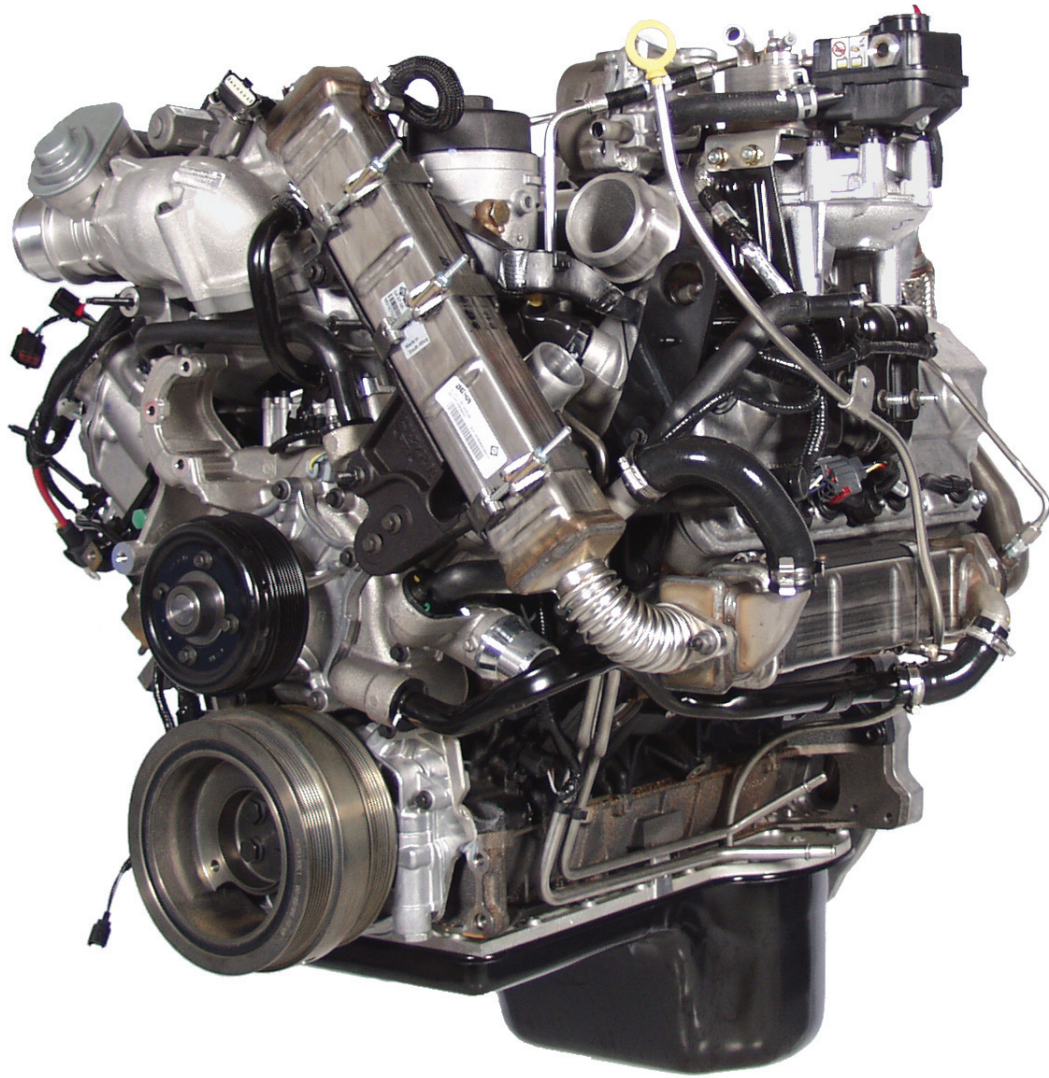
Keep hands and other objects clear of the radiator fan blades.

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6.4L Power Stroke[®] Diesel

**Direct Injection
Turbocharged
Diesel Engine**

6.4L POWER STROKE® DIESEL OVERVIEW

6.4L Power Stroke Diesel Overview

- This publication is not intended to replace the Service Manual but to introduce the 6.4L Power Stroke® Diesel Engine.

6.4L Power Stroke Diesel Direct Injected Turbocharged Diesel Engine Overview

- Engine Features
- Horsepower & Torque
- Engine Specifications
- Physical ID
- Labeling

1

Engine Features

- The 6.4L Power Stroke Diesel has been designed to meet the tougher emissions standards set by the government.
- The 6.4L Power Stroke Diesel has been designed to meet the customers' expectations of high horsepower and torque over a wide RPM range.
- Meeting the more stringent customer and regulated demands are accomplished in part by: High Pressure Common Rail Fuel System, Series Sequential Turbocharger System, 4 valves per cylinder, and a dual timing system.

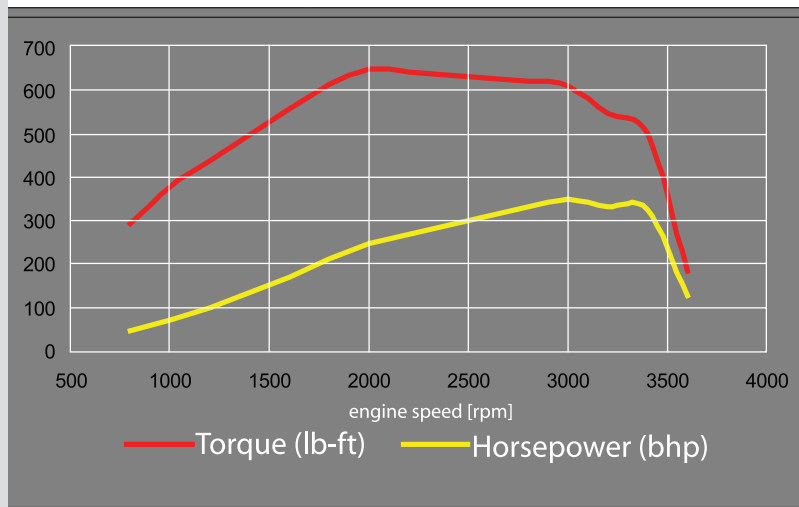
Engine Features

- High Pressure Common Rail Fuel System
- Series Sequential Turbocharger
- 4 Valves per Cylinder
- Rear Gear Train
- Dual Timing System

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Horsepower & Torque

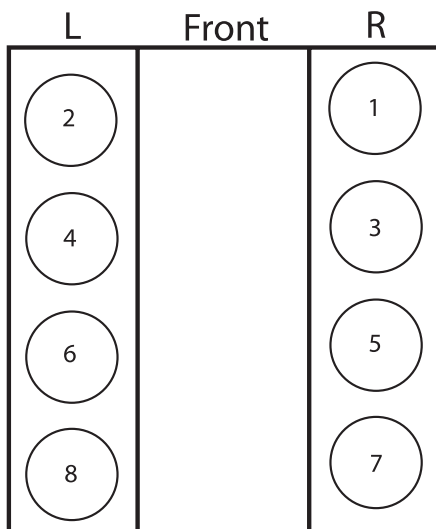
- The 6.4L Power Stroke Diesel creates 350 horsepower at 3000rpm and 650 lb/ft of torque at 2000rpm.



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6.4L Power Stroke Diesel Specifications

Engine Type	Diesel, 4 Cycle
Configuration	4 OHV/1 Cam-in-Crankcase-V8
Displacement	390 cu. in. (6.4L)
Bore & Stroke	3.87 X 4.134 (98.2 X 105 mm)
Compression Ratio	17.5:1
Aspiration	Series Sequential Turbo with CAC
Rated Power @ RPM	350 @ 3000 RPM
Peak Torque @ RPM	650 @ 2000 RPM
Engine Rotation, Facing Flywheel	Counter Clockwise
Combustion System	High Pressure Common Rail Direct Injection
Total Engine Weight (auto with oil)	1130 lb. (498.95 kg)
Coolant Flow (to radiator)	125 gal/min (473 L/min) @ 3000 RPM
Air Flow @ RPM (compressor inlet)	744 CFM (21.1 m3/min) @ 3000 RPM
Exhaust Flow @ RPM (engine outlet)	1962 CFM (55.6 m3/min) @ 3000 RPM
Oil Flow @ RPM	13 gal/min (59 L/min) @ 3000 RPM
Cooling System Capacity (engine only)	25.3 qts (24 L)
Lube System Capacity (including filter)	15 qts. (14.2 L)
Firing Order	1-2-7-3-4-5-6-8



Specifications

- The cylinders of the 6.4L Power Stroke Diesel are numbered from the front on the right side 1,3,5,7 and from the front on the left side 2,4,6,8.

6.4L POWER STROKE® DIESEL OVERVIEW

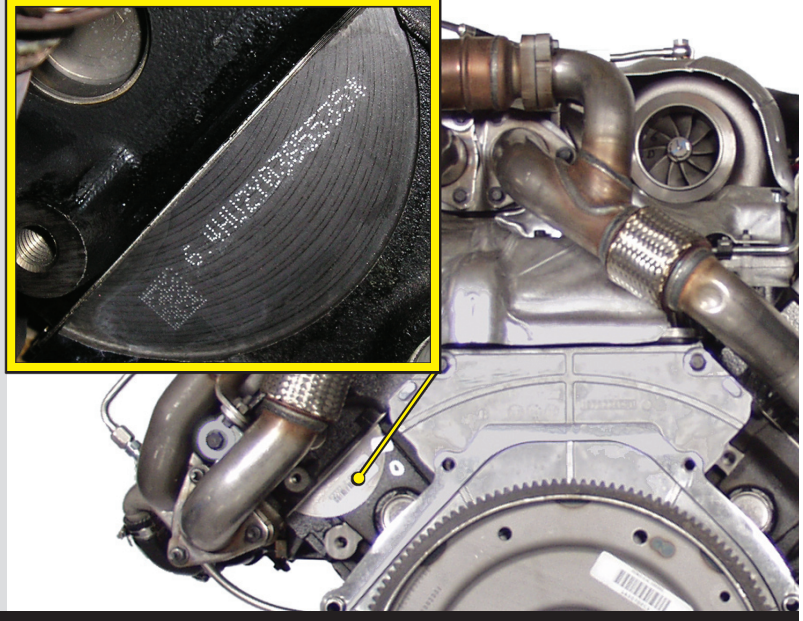
Engine Serial Number

- The engine serial number is located on the left rear corner of the crank case on a half moon machined surface.
- A white sticker is placed over this number during production, this sticker was removed for illustration purposes.

- 6.4 - is the engine family identifier.
- HU2Y - is a manufacturing designator

Ex: HU2Y or HU2U “Y designates Huntsville, AL and U designates Indianapolis, IN”

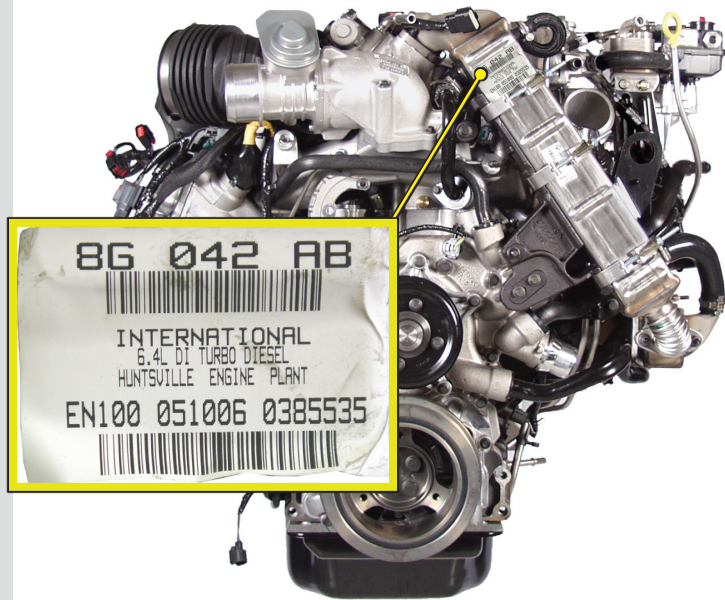
- 0385535 - is a sequential build number



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Serial Number Label

- Located on the top of the vertical EGR cooler.
- States the engine serial number.
- example at right, “0385535”
- States the engine family.
- example at right, “6.4L DI turbo diesel”



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Emissions Label

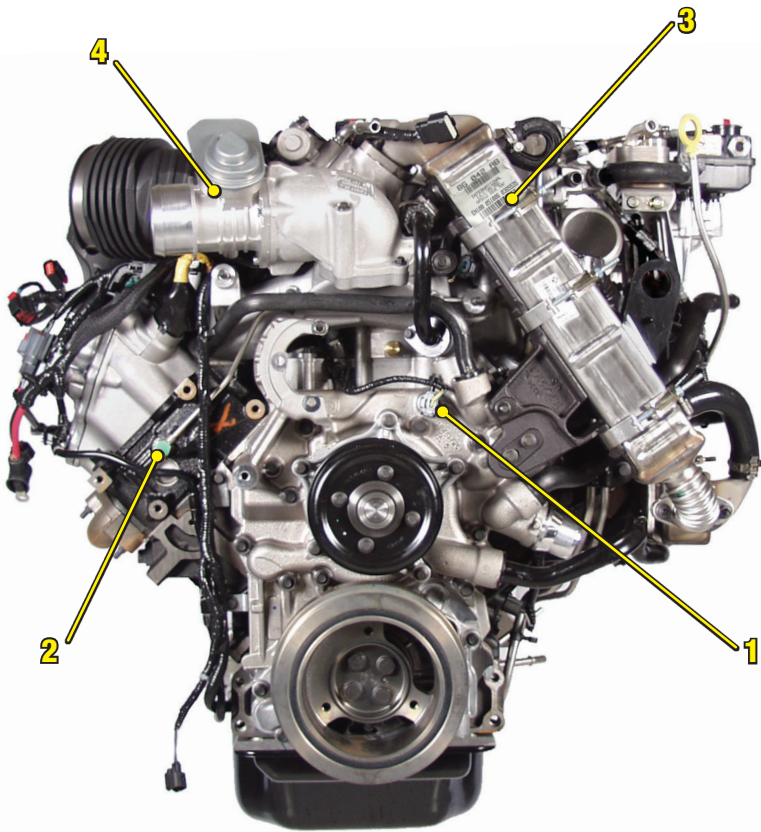
- States the horsepower rating for the engine, programmed in the Engine Control Module (ECM).
- Depicts where the engine meets or exceeds emission standards.
- Shows the engine displacement.
- Is affixed to the right hand valve cover.
- F250/350 labels are red.
- F450/550 labels are blue.

2006 6.4L ENGINE FAMILY 6NVX86 .4AGC EMISSION CONTROL INFORMATION ENGINE MANUFACTURED BY: INTERNATIONAL TRUCK AND ENGINE CORPORATION INTERNATIONAL® 1874332C2	<table border="1"> <thead> <tr> <th>MODEL</th> <th>ADV. BHP @ RPM</th> <th>LB - FT TORQ. @ RPM</th> </tr> </thead> <tbody> <tr> <td>A350</td> <td>350 @ 3000</td> <td>650 @ 2000</td> </tr> </tbody> </table>	MODEL	ADV. BHP @ RPM	LB - FT TORQ. @ RPM	A350	350 @ 3000	650 @ 2000	<table border="1"> <thead> <tr> <th>HC + NOX PART. EMISSION LIMITS</th> <th>PART. EMISSION LIMITS</th> </tr> </thead> <tbody> <tr> <td>1.3</td> <td>1874332C2</td> </tr> </tbody> </table>	HC + NOX PART. EMISSION LIMITS	PART. EMISSION LIMITS	1.3	1874332C2
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A350	350 @ 3000	650 @ 2000										
HC + NOX PART. EMISSION LIMITS	PART. EMISSION LIMITS											
1.3	1874332C2											
CURB IDLE, FUEL RATE @ ADVERTISED POWER, AND INJECTION TIMING ARE NON-ADJUSTABLE. EMISSION CONTROL SYSTEM: ECM, TC, DI, CAC, EGR, OC, PTOX DISPLACEMENT: 6.4L IMPORTANT ENGINE INFORMATION: THIS ENGINE CONFORMS TO: CALIFORNIA REGULATIONS APPLICABLE TO 2006 MODEL YEAR ULEV MEDIUM-DUTY VEHICLES FOR A COMPLETE VEHICLE 8,501 TO 14,000 POUNDS GVWR AND A MAXIMUM FRONTAL AREA OF 45 SQUARE FEET. THIS ENGINE MEETS OBDII REQUIREMENTS, AND U.S. EPA REGULATIONS AND OBD REGULATIONS, CANADIAN, AND AUSTRALIAN ADR-30 REGULATIONS FOR THE 2006 MODEL YEAR AND IS CERTIFIED TO OPERATE ON DIESEL FUEL. THIS ENGINE IS INTRODUCED EARLY PURSUANT TO 86,007-11(g) (2) AND CERTIFIED TO THE PM STANDARD OF 0.01 g/BHP-HR.												

2006 6.4L ENGINE FAMILY 6NVX86 .4AGA EMISSION CONTROL INFORMATION ENGINE MANUFACTURED BY: INTERNATIONAL TRUCK AND ENGINE CORPORATION INTERNATIONAL® 1874333C2	<table border="1"> <thead> <tr> <th>MODEL</th> <th>ADV. BHP @ RPM</th> <th>LB - FT TORQ. @ RPM</th> </tr> </thead> <tbody> <tr> <td>A325</td> <td>325 @ 3000</td> <td>600 @ 2000</td> </tr> </tbody> </table>	MODEL	ADV. BHP @ RPM	LB - FT TORQ. @ RPM	A325	325 @ 3000	600 @ 2000	<table border="1"> <thead> <tr> <th>HC + NOX PART. EMISSION LIMITS</th> <th>PART. EMISSION LIMITS</th> </tr> </thead> <tbody> <tr> <td>1.3</td> <td>1874333C2</td> </tr> </tbody> </table>	HC + NOX PART. EMISSION LIMITS	PART. EMISSION LIMITS	1.3	1874333C2
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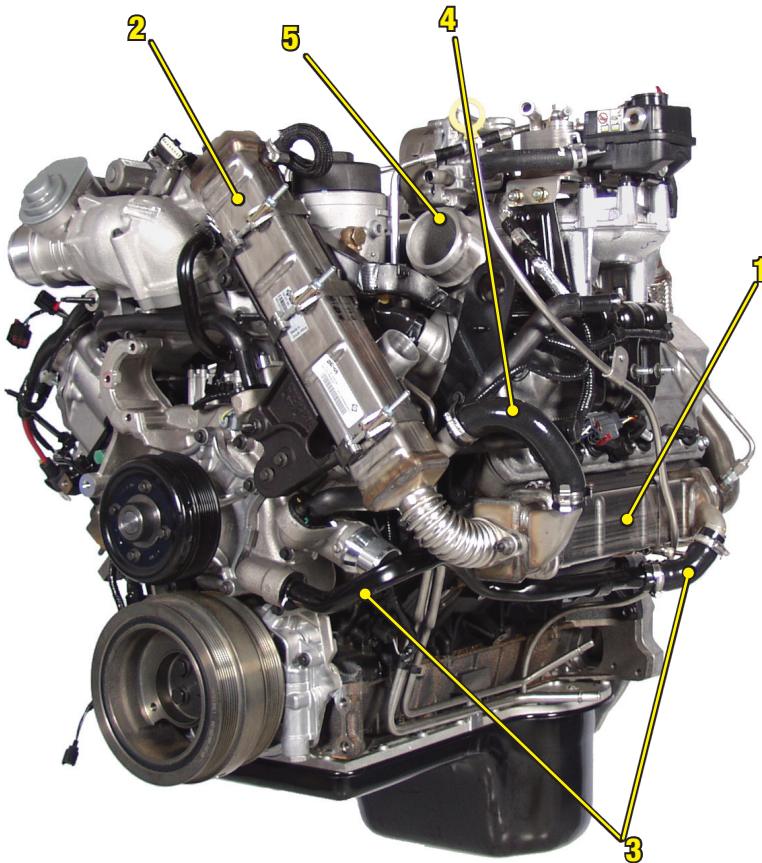
COMPONENT LOCATIONS



Front of Engine

- 1) ECT Sensor
- 2) Fuel Return Line
- 3) EGR Cooler Vertical
- 4) EGR Throttle

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Left Front of Engine

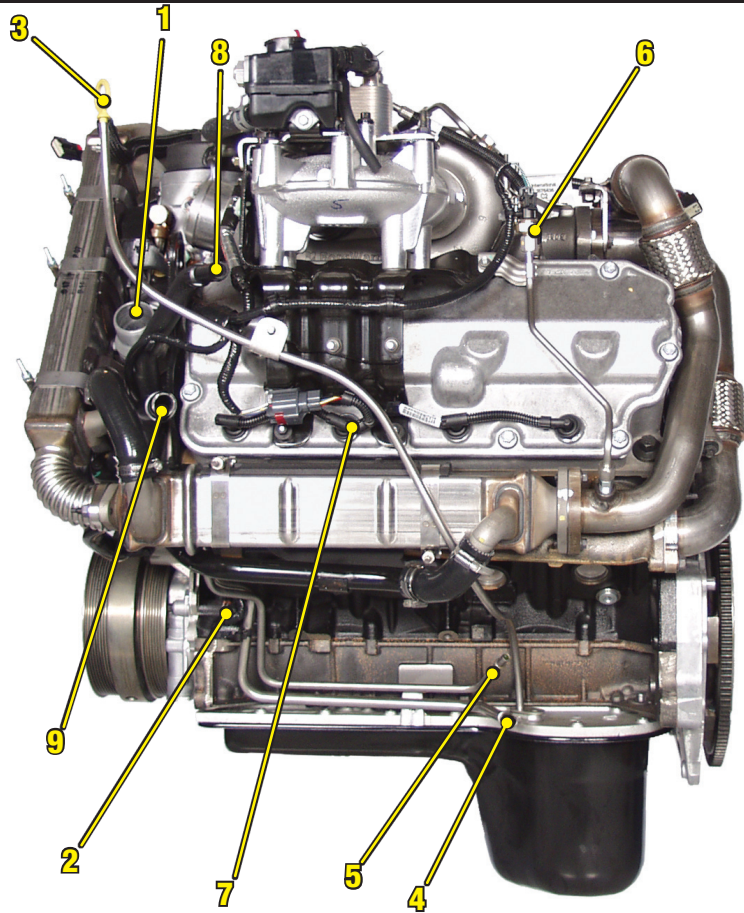
- 1) EGR Cooler Horizontal
- 2) EGR Cooler Vertical
- 3) Coolant Supply for Horizontal Cooler
- 4) Coolant Supply for Vertical Cooler
- 5) Turbocharger Outlet

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COMPONENT LOCATIONS

Left of Engine

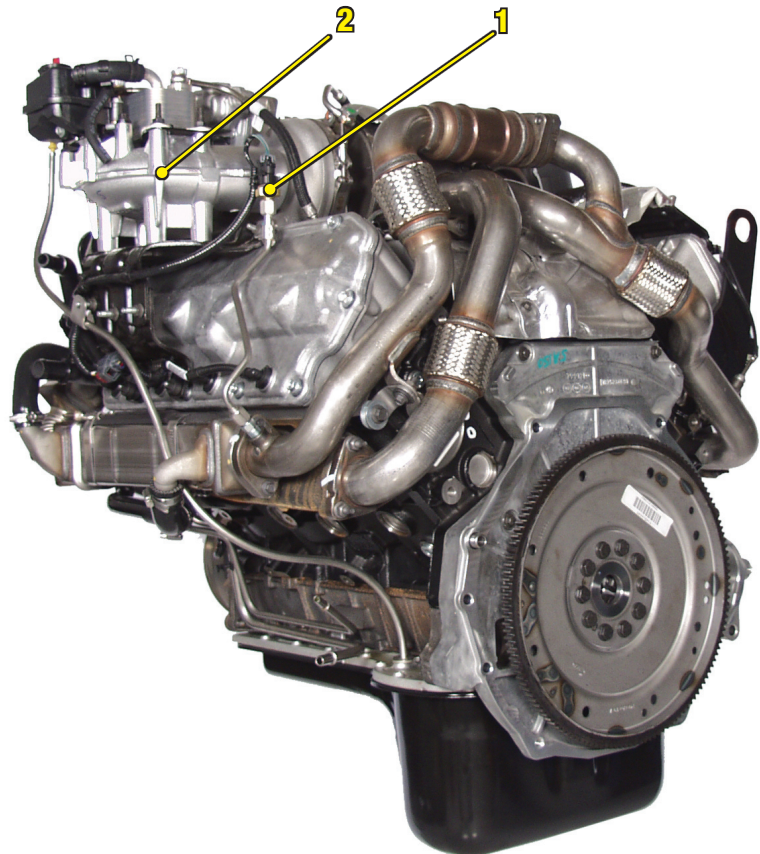
- 1) Thermostat Housing Outlet
- 2) CMP Sensor
- 3) Oil Level Gauge
- 4) Fuel Supply Line
- 5) Fuel Return Line
- 6) EP Sensor
- 7) Glow Plug Harness
- 8) Heater Return Line
- 9) Degas Bottle Return Line



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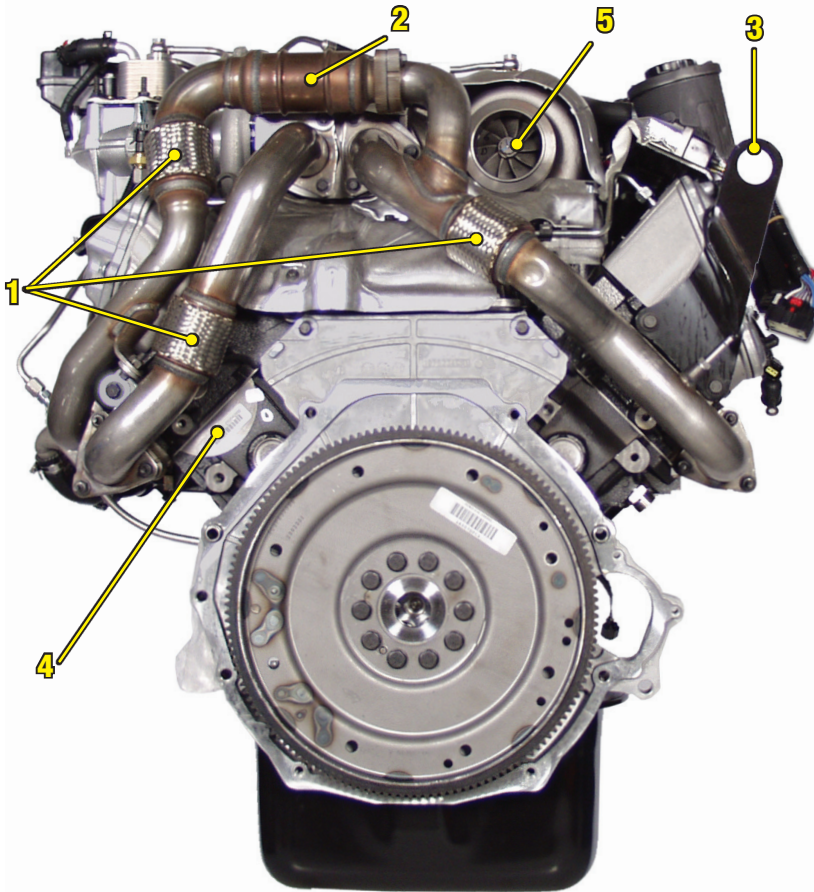
Left Rear of Engine

- 1) EP Sensor
- 2) Turbocharger Crossover Tube



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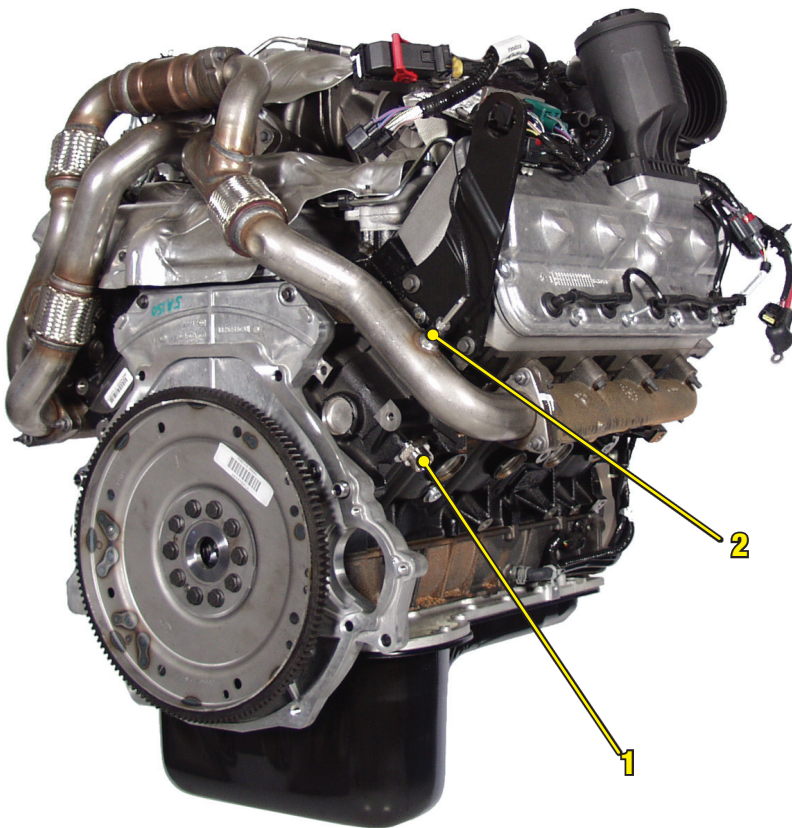
COMPONENT LOCATIONS



Rear of Engine

- 1) Exhaust Expansion Joints
- 2) Catalyast
- 3) Lifting Eye
- 4) Serial Number
- 5) Turbocharger Outlet to Exhaust System

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Right Rear of Engine

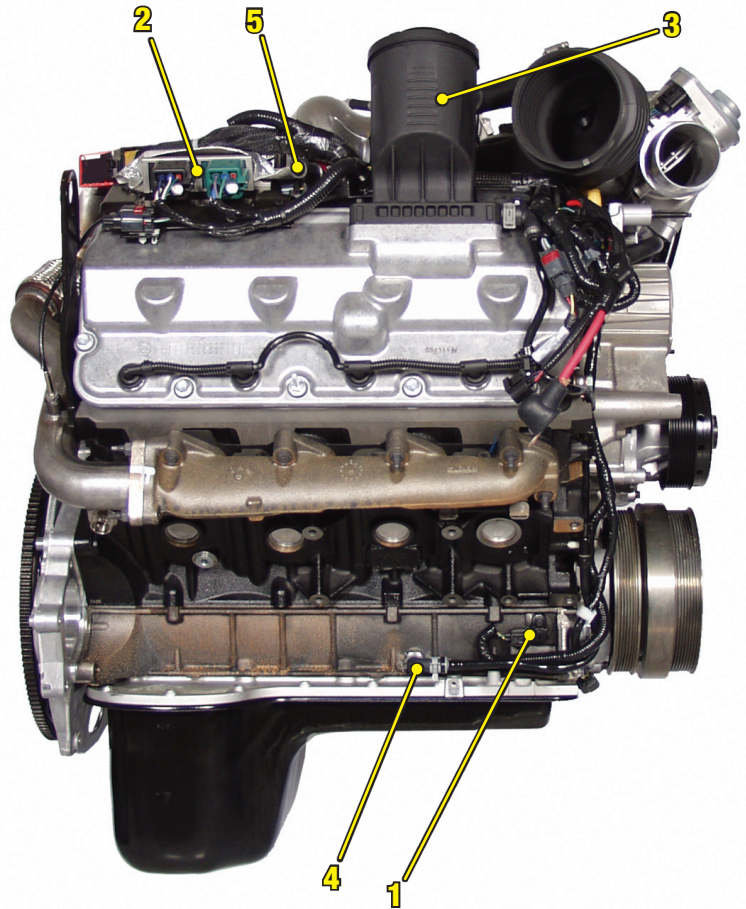
- 1) Block Heater
- 2) EGRT Inlet Sensor

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COMPONENT LOCATIONS

Right Side of Engine

- 1) CKP Sensor
- 2) Glow Plug Control Module
- 3) Crankcase Ventilation/Oil Separator
- 4) Oil Separator Drain Tube
- 5) Heater Supply



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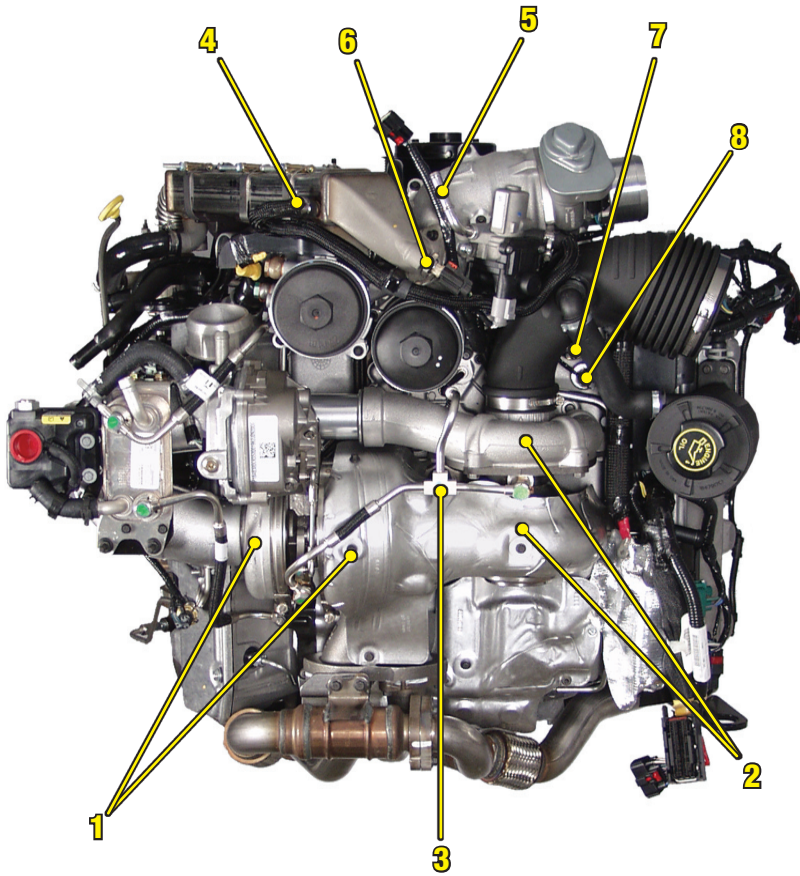
Right Front of Engine

- 1) Injector Electrical Connector
- 2) Throttle Body



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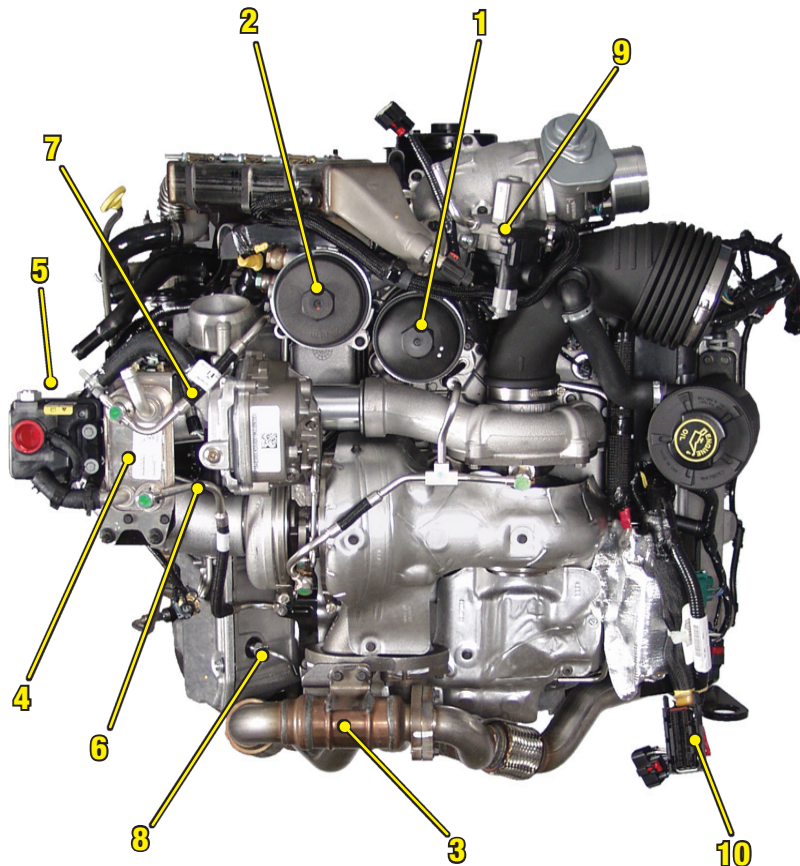
COMPONENT LOCATIONS



Top of Engine

- 1) High Pressure Turbocharger
- 2) Low Pressure Turbocharger
- 3) Turbocharger Oil Supply Line
- 4) EGR Valve Coolant Supply Port
- 5) EGR Valve Coolant Return Port/Deaeration Port
- 6) EGRT Outlet Sensor
- 7) MAP Sensor
- 8) IAT 2 Sensor

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Top of Engine

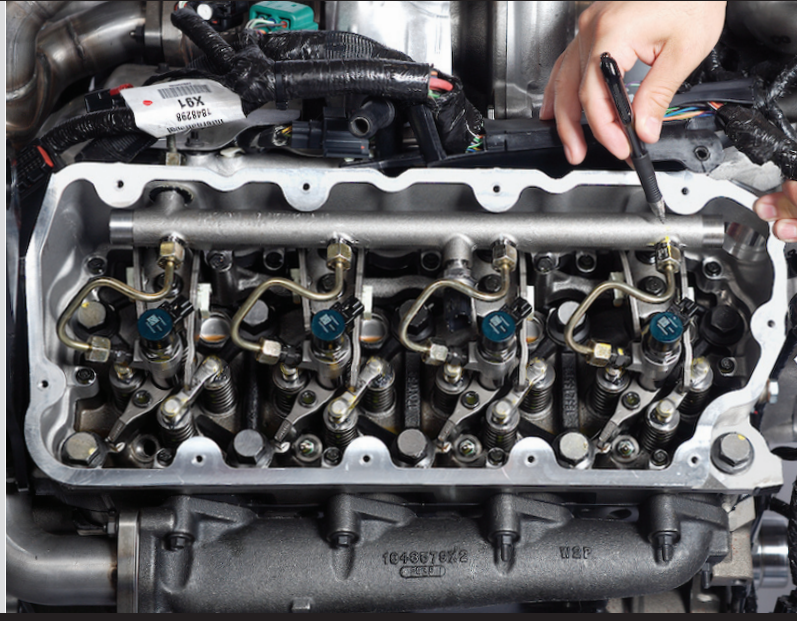
- 1) Oil Filter
- 2) Engine Mounted Fuel Filter
- 3) Catalyst
- 4) Fuel Cooler
- 5) Fuel Cooler Coolant Tank
- 6) Fuel Return Hot (inlet to cooler)
- 7) Fuel Return Cold (outlet from cooler)
- 8) LH High Pressure Fuel Line
- 9) EGR Valve
- 10) ECM Connection

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6.4L POWER STROKE® DIESEL OVERVIEW

High Pressure Common Rail Fuel System

- The 6.4L Power Stroke Diesel engine uses a high pressure fuel injection pump to deliver fuel to each piezo electric fuel injector via a high pressure common fuel rail, one rail per bank.



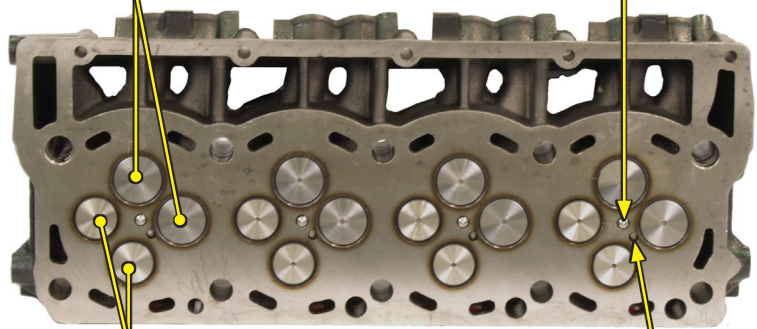
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Cylinder Head & Head Bolts

- The 6.4L Power Stroke Diesel uses a four (4) valve per cylinder head design to optimize airflow and efficiency.
- The 6.4L Power Stroke Diesel engine uses larger head bolts than the 6.0L Power Stroke Diesel engine (M16 vs M14).
- The 6.4L head bolts are also slightly shorter than the 6.0L head bolts. The 6.4L head bolts do not retain the rocker carrier like the 6.0L head bolts do.

Intake Valves

Injector Nozzle



Exhaust Valves

Glow Plug

6.4L (M16)

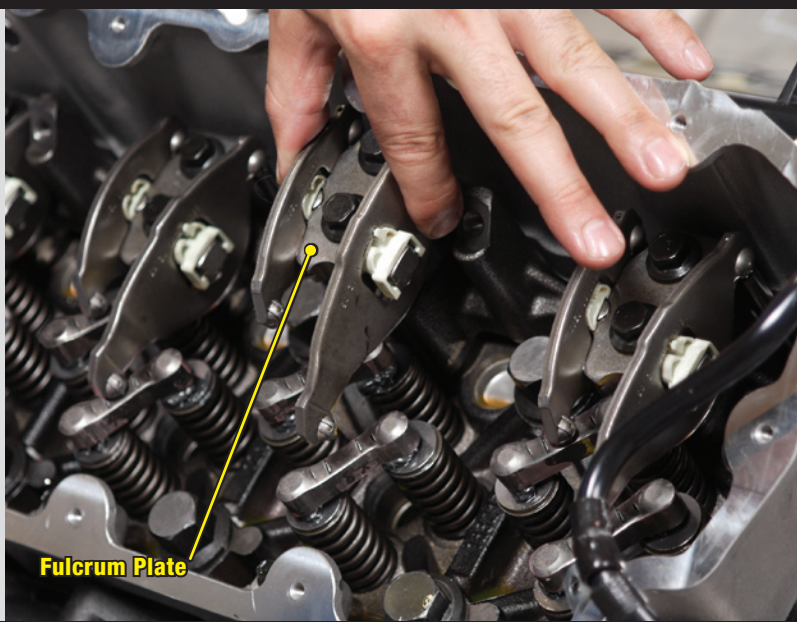
6.0L (M14)



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Fulcrum Plate & Rocker Arms

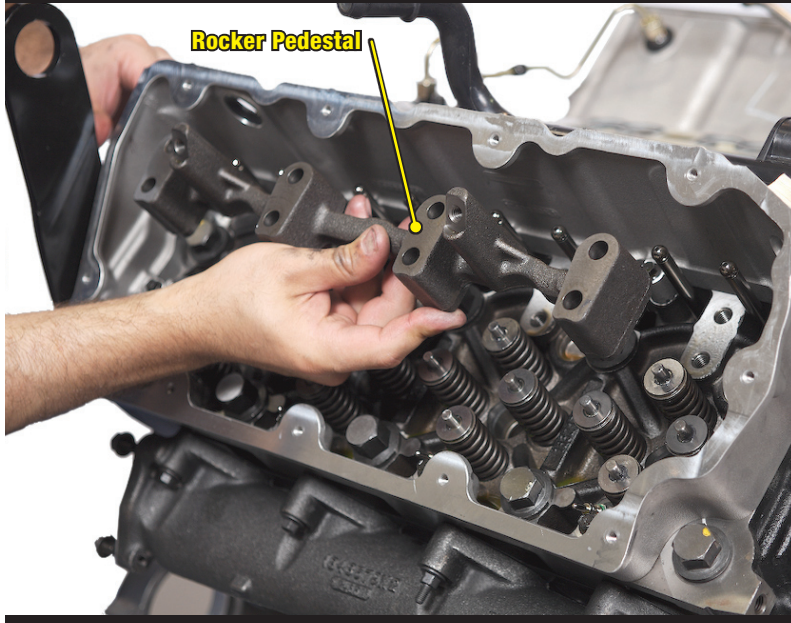
- The fulcrum plate, which holds the rocker arms, is bolted to the rocker pedestal.
- The two (2) bolts that secure the fulcrum plate pass through the fulcrum plate and the rocker pedestal and are then secured into the cylinder head.



Fulcrum Plate

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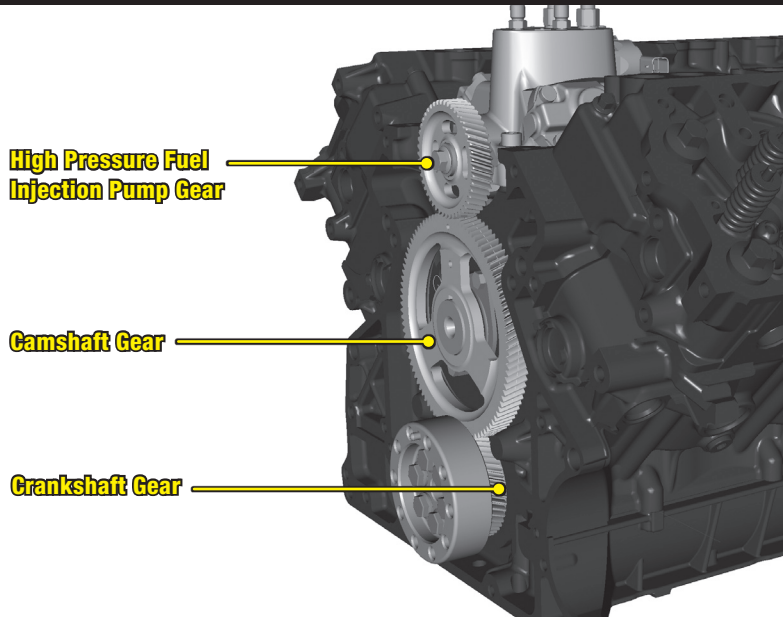
6.4L POWER STROKE® DIESEL OVERVIEW



Rocker Pedestal

- The rocker pedestal is secured independent of the cylinder head bolts, which no longer need to be removed to service the rocker arms.

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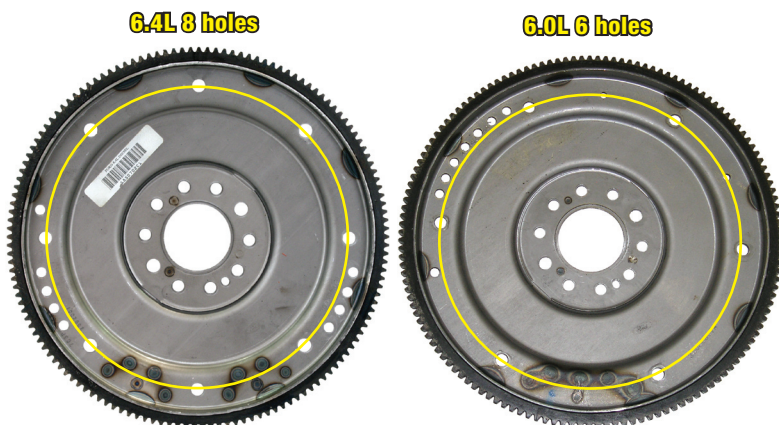


High Pressure Fuel Injection Pump & Rear Geartrain

- The geartrain for the crankshaft, camshaft, and the high pressure fuel injection pump are located in the rear of the engine under the rear cover.
- This allows for the high pressure fuel pump to be mounted inside the engine and also reduces noise.
- The high pressure fuel injection pump turns at a ratio of 1:1 with crankshaft speed.

NOTE: The helical cut gears used on the 6.4L differ from those used on the 6.0L.

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6.4L vs 6.0L Flexplate

- The flexplate for the 6.4L automatic equipped engine uses an 8 bolt torque converter bolt pattern.
- The flexplate for the 6.0L automatic equipped engine uses a 6 bolt torque converter bolt pattern.

NOTE: Yellow circle added for bolt circle reference.

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