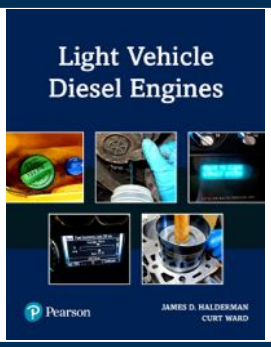
Light Vehicle Diesel Engines

First Edition



Chapter 22

FORD Power Stroke Diesel Engines

LEARNING OBJECTIVES (1 of 2)

22.1 Identify the major engine components on the 7.3, 6.0, 6.4, and 6.7 liter diesel engines. •

22.2 Explain the cooling system, air intake system, and the lubrication system service on the various Power Stroke diesel. •

22.3 Explain unique features of the Ford Power Stroke upper engine, lower engine, and the engine timing system.

LEARNING OBJECTIVES (2 of 2)

22.4 Perform component identification; verify the location and function of the major engine inputs and outputs of the Ford Power Stroke diesel engines.

22.5 Explain the location, function, and diagnosis of the low-pressure fuel system.

22.6 Identify the components, location, and function of the high-pressure fuel system.

BACKGROUND (1 of 3)

- **7.3L DI Power Stroke**
  - Ford/International IDI 6.9 L V8
    - Introduced in 1983 became 7.3L IDI in 1988
    - 1994 7.3L with direct injection (DI)
    - DI version named "Power Stroke V8"
      - Common rail Hydraulically Actuated Electronic Unit Injection
      - HEUI injection system of both 7.3L and 6.0L DI engines

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CHART 22-1 specifications for 7.3-liter Ford Power Stroke diesel engine used in 1994–2003 model years (MY).

Type	4-cycle Turbocharged and Intercooled
Configuration	90° V-8 Cam-in-block OHV Two valves per cylinder
Displacement	7.3 liter (444 cubic inches)
Bore and stroke	4.11 × 4.18 inches (104 mm × 106 mm)
Block/Heads	Cast iron/cast iron
Compression ratio	17.5:1
Firing order	1-2-7-3-4-5-6-8
Fuel injection system	HEUI
Starting heat method	Glow plugs
Horsepower	275 HP @ 2,800 RPM
Torque	525 lb-ft @ 1,600 RPM
Oil capacity with filter	15 quarts

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Case of Noisy 7.3-Liter Power Stroke Starter (1 of 2)

REAL WORLD FIX

2002 Ford F-Super Duty 7.3-liter turbo diesel engine had buzzing/screeching starter noise during some engine start attempts. Customer thought engine needed a new starter. Technician was aware that diesel starter mounting bolts can loosen over time, so they were checked first. Both bolts on the 2-bolt starter were found to be extremely loose, allowing starter to jump around with intermittent engagement. Factory specification for the 10 mm * 1.5 bolts calls for 16-20 ft.-lbs. However, replacement starter instructions specified a torque specification of 40-57 ft.-lbs. Technician tightened both bolts to 50 ft.-lbs. After tightening starter bolts, noisy starter problem was solved.

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Case of Noisy 7.3-Liter Power Stroke Starter (2 of 2)

REAL WORLD FIX

- **Summary**
  - **Complaint** – The owner complained of a noisy starter.
  - **Cause** – Loose starter attachment bolts were found.
  - **Correction** – The starter bolts were tightened to specifications found in replacement starter instructions

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BACKGROUND (2 of 3)

- **6.0L V8 for 2003-2007**
  - International built 6.0-liter designed and built
  - Provide increased power and torque
  - Had less piston displacement
  - Meet the new emission standard
  - Older 7.3-liter diesel not able to meet
  - International version VT365.

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CHART 22-2 specifications for 6.0-liter Ford Power Stroke diesel engine 2003–2007 model years (MY).

Type	4-cycle Turbocharged and Intercooled
Configuration	90° V-8 Cam-in-block OHV Four valves per cylinder
Displacement	6.0 liter (365 cubic inches)
Bore and stroke	3.74 × 4.13 inches (95 mm × 105 mm)
Block/Heads	Cast iron/cast iron
Compression ratio	17.5:1
Firing order	1-2-7-3-4-5-6-8
Fuel injection system	HEUI
Starting heat method	Glow plugs
Horsepower	325 HP @ 3,300 RPM
Torque	560 lb-ft @ 2,000 RPM (2003-2004 model year) 570 lb-ft @2,000 (2005-2007 model year)
Oil capacity with filter	15 quarts

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BACKGROUND (3 of 3)

- **2008 6.4L Power Stroke**
  - **MaxxForce® 7 Ford Power Stroke**
    - IH V8 platform,
      - High-pressure common-rail fuel injection system utilizing
      - Electronically actuated piezo-electric injectors

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Use a 6.4 Starter on a 6.0

TECH TIP

While more expensive, using a starter for a 6.4-liter Power Stroke diesel engine on a 6.0 will cause the engine to crank a lot faster making starting easier. The starter bolts up without any issues.

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CHART 22-3 specifications for 6.4-liter Ford Power Stroke diesel engine 2008–2010 model years (MY)

Type	4-cycle Turbocharged (twin sequential turbochargers) and Intercooled
Configuration	90° V-8 Cam-in-block OHV Four valves per cylinder
Displacement	6.4 liter (390 cubic inches)
Bore and stroke	3.87 × 4.13 inches (98 mm × 105 mm)
Block/Heads	Cast iron/cast iron
Compression ratio	17.5:1
Firing order	1-2-7-3-4-5-6-8
Fuel injection system	High-pressure common rail (HPCR)
Starting heat method	Glow plugs
Horsepower	350 HP @ 3,000 RPM
Torque	650 lb-ft @ 2,000 RPM
Oil capacity with filter	15 quarts

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6.7-LITER POWER STROKE

- **6.7L Diesel**
  - First medium-duty diesel designed & built by Ford
  - Designed in conjunction with AVL of Austria
  - Ford engineers code named this engine ***Scorpion***
  - **Compacted Graphite Iron (CGI) Block**
  - **OTHER ENGINE FEATURES: Page 252**

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Purchase International Parts for Ford Power Stroke Diesels

TECH TIP

When purchasing service or repair parts for a Ford 7.3, 6.0, or 6.4-liter Power Stroke diesel engine, look at a store that sells parts for the International version of these engines. They are often same exact part and the cost is usually lower.

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CHART 22-4 specifications for 6.7 liter Ford Power Stroke diesel engine used in the 2011+ model years (MY).

Type	4-cycle Turbocharged and Intercooled
Configuration	90° V-8 Cam-in-block OHV Four valves per cylinder
Displacement	6.4 liter (390 cubic inches)
Bore and stroke	3.90 × 4.25 inches (99 mm × 108 mm)
Block/Heads	Compacted graphite iron block/Aluminum cylinder heads
Compression ratio	16.2:1
Firing order	1-3-7-2-6-5-4-8
Fuel injection system	High-pressure common rail (HPCR)
Starting heat method	Glow plugs
Horsepower	400 HP @ 2,800 RPM-(2010-2014) 440@2,800 (2015+)
Torque	800 lb-ft @ 1,600 RPM-(2010-2014) 860 lb-ft @ 1,600 RPM (2015-2016) 925 lb-ft @ 1,800 RPM(2017+)
Oil capacity with filter	13 quarts – 2011–2016 model years 15 quarts – 2017+ model years

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Be Sure to Check Cylinder Numbering

TECH TIP

Older Ford Power Stroke diesel engines (7.3, 6.0, and 6.4 liter) were made by International and used their typical cylinder numbering. 6.7-liter diesel is built by Ford and uses the typical Ford V-8 cylinder numbering. Using the incorrect cylinder numbering can cause confusion when trying to diagnosis a misfire fault. Always check service information that the cylinders are correctly identified on the engine being serviced.● SEE FIGURE 22–1.

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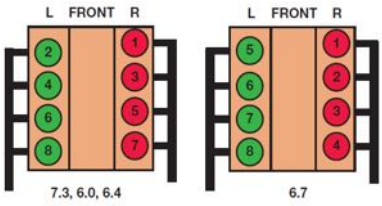
FIGURE 22–1 Older Ford Power Stroke diesel engines (7.3, 6.0, and 6.4 liter) were built by International and used by International cylinder numbering as shown on left. 6.7-liter Power Stroke is built by Ford and uses typical Ford cylinder numbering as shown on right.



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6.7 COOLING SYSTEM (1 of 3)

- **6.7L has 2 Cooling Systems**
  - **(primary and secondary).**
  - **Primary Cooling System: 29.4 Quarts (28 L):**
    - Rear-mounted radiator
    - Water pump on left front
    - Engine, oil, turbocharger cooling
    - Charge air cooler (CAC) cooling
    - Heater core to provide cab heat
    - 2 engine-mounted thermostats
    - Fuel cooler, EGR cooler, degas bottle

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6.7 COOLING SYSTEM (2 of 3)

- **6.7L has 2 Cooling Systems**
  - **Secondary Cooling System 11.7 Quarts (11L):**
    - Forward-mounted Radiator
      - Allows secondary cooling system to operate at lower temperature
      - Than primary cooling system
    - Radiator-mounted Thermostats (Two)
    - Water Pump On Right Front
    - Transmission Fluid Cooler
    - Degas Bottle

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6.7 COOLING SYSTEM (3 of 3)

- **Block Heater: Page 253 of text**
- **Engine Cooling Fan Page 253 of text**
- **Coolant Page 253 of text**

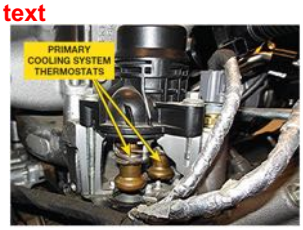

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FIGURE 22–2 primary cooling system uses 2 thermostats designed to precisely control coolant temperature. One thermostat opens at 194°F (90°C) and the other opens at 201°F (94°C).

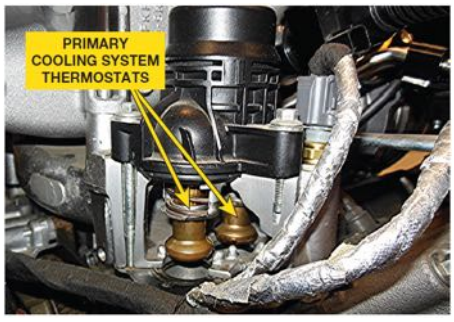

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FIGURE 22–3 overflow and Degas bottle located under hood on driver's side.

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6.7 LUBRICATION SYSTEM (1 of 2)

- **Oil Pump Flow:**
  - Through galleries in pan to oil cooler
  - From oil cooler to oil filter **FIGURE 22–4**
  - To main gallery, feeds both right & left side galleries.
  - Left gallery feeds following:
    - Vacuum pump lubrication
    - HPFP gears
    - Left bank piston cooling jets
    - Camshaft journals
    - Left head lifters & rocker arms

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6.7 LUBRICATION SYSTEM (2 of 2)

- **Oil Pump Flow:**
  - Right gallery feeds the following:
    - Turbocharger lubrication
    - Right head lifters & rocker arms
    - Right bank piston & cooling jets
    - Main and rod bearings

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FIGURE 22–4 oil filter used on 6.7 Power Stroke is a spin-on type. Oil pan was updated for 2012 model year with stamped steel lower pan with conventional plug instead of plastic (composite) pan used with plastic drain plug on 2011 mode year version.

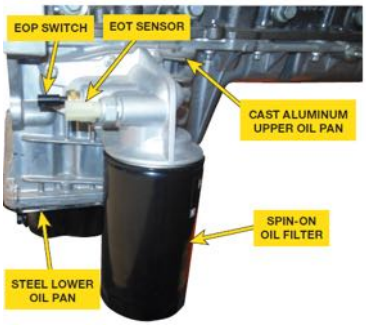

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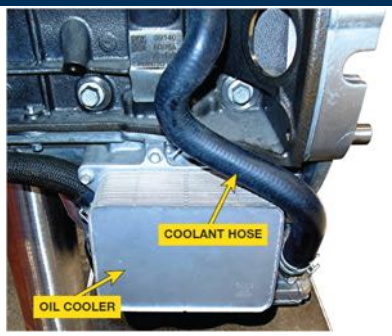
FIGURE 22–5 Large rubber coolant hoses are used to supply coolant to and from the oil cooler.



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ENGINE MECHANICAL (1 of 2)

- **Lower Engine:** Page 254 Figure 22-6
  - Both crankshaft main & rod bearings
  - Color coded, do not use a tang
  - Crankshaft main bearing lower half dark gray color
  - Upper half bright metal with lubrication groove
  - Slot for oil to flow through.
  - Rod bearing upper half is dark gray
  - Lower half bright metal with no grooves
- **Upper Engine** Page 255 Figure 22-7

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FIGURE 22–6 6.7 block made from compacted graphite iron (CGI) & uses cross-bolted main bearing caps for strength.

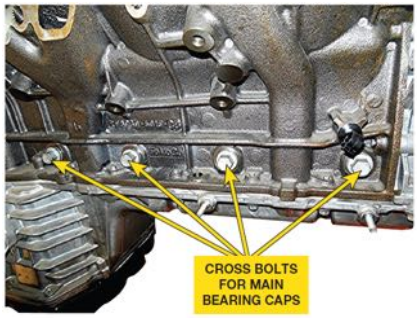

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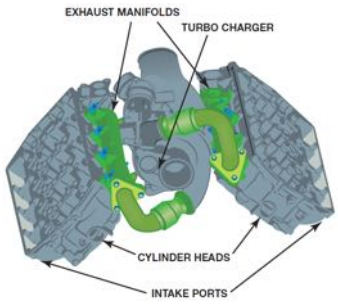
FIGURE 22–7 aluminum cylinder head features intake ports on outside of head where exhaust ports are usually located. This design allows exhaust posts to be close to turbocharger, making it more efficient.



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ENGINE MECHANICAL (2 of 2)

- **Timing System**
  - Crankshaft drives camshaft & High-pressure fuel pump
  - With helical gears
  - Timing gears accessible removing front cover
    - Camshaft, crankshaft, & high-pressure fuel pump
    - Timed together
    - HP pump timed so that fuel pump stroke happens
    - Same time as injection stroke
    - Provides more consistent fuel delivery, reduces noise

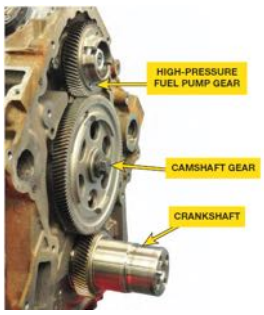

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FIGURE 22–8 (a) patented dual hydraulic lash adjusters within one roller lifter, allows 6.7 liter Power Stroke diesel to use single rocker arm for each valve.

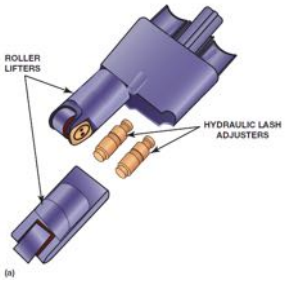

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FIGURE 22–8 (b) Each valve is opened by its own stamped steel rocker arm. Using incorrect engine oil can often lead to wear problems especially on push rods and rocker arm fulcrums and pads

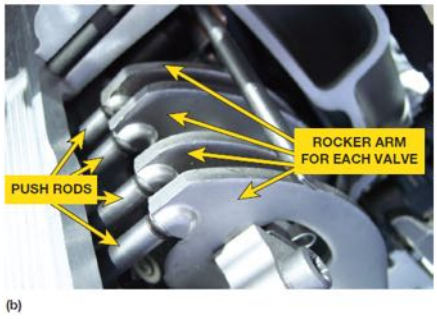

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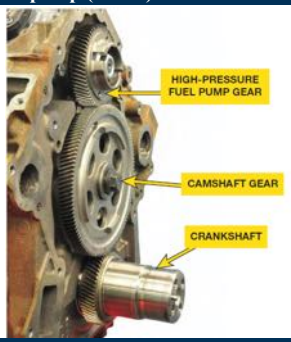
FIGURE 22–9 forged module steel crankshaft uses a shrink fit front drive gear to rotate camshaft gear, which is timed to high-pressure fuel pump (HPFP).



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LOW-PRESSURE FUEL SYSTEM

- **Fuel**
  - Ultra-low sulfur diesel (ULSD)
  - Aftertreatment system requires ULSD
  - 2 additives to insure best fuel economy
  - Lowest possible emissions including:
    - Anti-gel additive – PM 23A U.S. (PM 23B Canada)
    - Cetane booster – PM 22A U.S. (PM 22B Canada)
  - Cetane at 40

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DIESEL FUEL CONDITIONER MODULE (DFCM) (1 of 2)

- **DFCM located on Frame**
  - Contains following components:
    - Lift (transfer) fuel pump.
    - Top assembly is where fuel lines attached
    - Electrical connector for fuel pump
    - 10 micron cartridge-type primary filter
    - Water-in-fuel (WIF) sensor located inside DFCM
  - **Fuel Filter Replacement**
    - **Page 257 of text Figure 22-12**

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FIGURE 22–11 water-in-fuel sensor is a two-wire sensor shown with the connecter disconnected.

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FIGURE 22–12 Use 32 mm socket with a ratchet to loosen filter housing. After loosening, housing can often be removed by hand, rotating it counterclockwise.

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FIGURE 22–13 old filter is removed for housing over an oil drain unit so as to not spill diesel fuel onto floor.

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DIESEL FUEL CONDITIONER MODULE (DFCM) (2 of 2)

- **SERVICE**
  - Primary Fuel Filter Replacement Page 257
  - Secondary Fuel Filter Replacement Page 258
  - Fuel Pressure & Temperature Page 258

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FIGURE 22–14 Lubricating the O-ring with grease will allow the housing to move freer when the housing is being rotated back into the DFCM.

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FIGURE 22–15 connector tabs are depressed to release them from the fuel filter.

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FIGURE 22–16 new filter is on left and old filter is on right. Dispose of old filter according to federal, state, and local laws. (SECONDARY)

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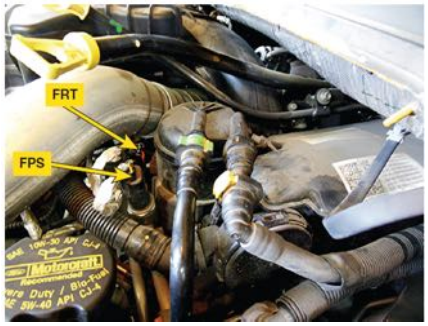
FIGURE 22–17 fuel rail temperature (FRT) sensor and the fuel rail pressure (FPS) sensor are both next to secondary fuel filter under the hood on the driver's side.



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Why Is a Fuel Cooler Used?

? FREQUENTLY ASKED QUESTION

Depending on temperature of fuel from injectors, fuel cooler can be used to either cool or heat fuel going back to DFCM. The powertrain secondary cooling system provides coolant for fuel cooler. Cold fuel needs to be heated to be able to flow easily through high-pressure system, and hot fuel many be too hot to lubricate the high pressure pump. Fuel cooler on a 6.7-liter Power Stroke diesel located on left frame rail forward of DFCM. Black fuel line is used for fuel return from engine to cooler. Gray fuel line returns fuel from cooler to DFCM.

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HIGH-PRESSURE FUEL SYSTEM (1 of 3)

- **High-Pressure Fuel Pump (HPFP)**
  - 2-cylinder design
  - Front of intake valley
  - Delivers 2,900–29,008 PSI
  - **Volume Control Valve (VCV)**
    - Top of HPFP
    - Restricts fuel flow as duty cycle increased
    - Low Duty Cycle Creates More Volume
    - Higher Duty Cycle Creates Less Volume

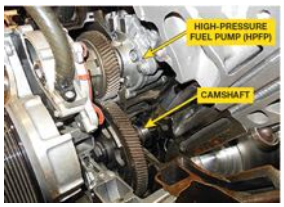

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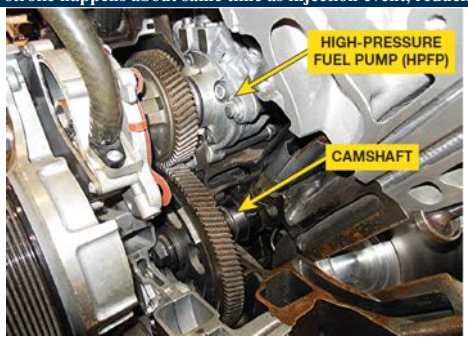
FIGURE 22–18 partial cutaway of 6.7-liter Ford Power Stroke engine showing how HP pump is driven by camshaft gear, and timed so that pump stroke happens about same time as injection event, reducing noise.



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HIGH-PRESSURE FUEL SYSTEM (2 of 3)

- **Pressure Control Valve (PCV)**
  - Regulate pressurized fuel
  - Rear of left side fuel rail
  - N.O. solenoid
  - Low duty cycle means low pressure
  - High duty cycle creates higher pressure

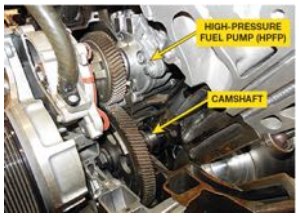

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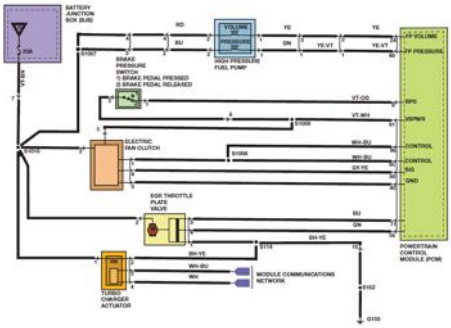
FIGURE 22–19 schematic of Ford 6.7 Power Stroke Diesel engine showing pressure and volume solenoids.



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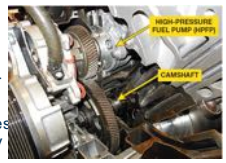
HIGH-PRESSURE FUEL SYSTEM (3 of 3)

- **KOEO** –PCV & VCV solenoids open
  - **Engine Cranking**: VCV low, but PCV commanded high to build pressure
    - Injectors will not operate until FRP sensor indicates enough pressure
  - **Engine Startup** – engine speed increases VCV will increase to restrict volume, PCV decrease to bleed pressure.
  - **Normal:** PCM controls both solenoids achieve desired pressure to injectors.
  - **Deceleration** VCV closed & PCV opened on deceleration



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HIGH-PRESSURE COMMON RAIL FUEL INJECTORS (1 of 2)

- **Fuel Rails:** Page 260 of text
- **Injector Low-Pressure Connections**
  - Page 260 of text
- **Injector Operation** Page 260 of text
- **Hydraulic Coupler** Page 261 of text
- **Control Valve** Page 261 of text
- **Injector Nozzle Needle** Page 261 of text

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HIGH-PRESSURE COMMON RAIL FUEL INJECTORS (2 of 2)

- **Injector Operation**
  - Piezo actuator stack of piezo crystals.
    - Current applied to crystals, they expand
    - Fuel Injector opens/injection
    - Current removed from piezo crystals
    - Contract injector closes injection ends
  - **Injector Quantity Adjustment (IQA)** Page 262

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FIGURE 22–20 A piezo fuel injector uses piezoelectric crystals to create a small movement when a voltage is applied to open the injector.

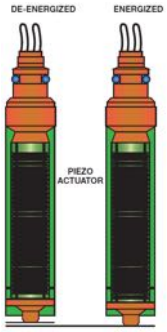

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FIGURE 22–21 hydraulic coupler inside injector is used to multiply small movement of piezo actuator to produce more travel.

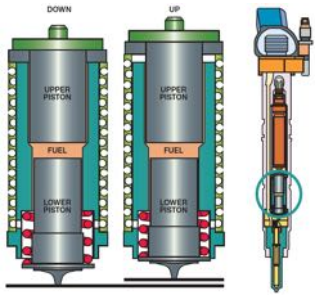

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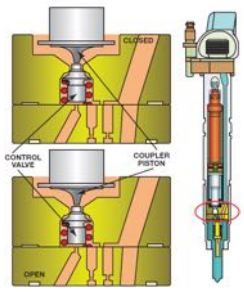
FIGURE 22–22 injector nozzle needle operates to open and close injector to deliver fuel to combustion chamber.



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CONTROL SYSTEM INPUTS

- Crankshaft Position Sensor (CKP) Page 262
- Camshaft Position Sensor (CMP) Page 262
- Mass Air Flow Sensor Page 262
- Exhaust Gas Recirculation Valve Position (EGRVP) Page 262

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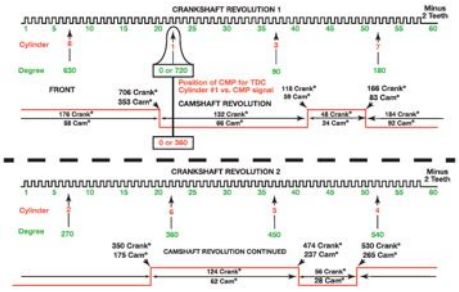
FIGURE 22–23 relationship between crankshaft position sensor (CKP) and camshaft position sensor (CMP) over period of 2 crankshaft revolutions.



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ENGINE OUTPUTS

- Glow Plugs & Glow Plug Module (GPCM)
  - Page 263 OF TEXT
- Glow Plugs Page 263 OF TEXT
- Exhaust Gas Recirculation Valve (EGR)
  - Page 263 OF TEXT
- EGR Cooler Bypass Valve Page 263 OF TEXT
- Intake Air Flow Control Valve Page 264 OF TEXT

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FIGURE 22–24 EGR bypass actuator is located on top of engine above EGR cooler.

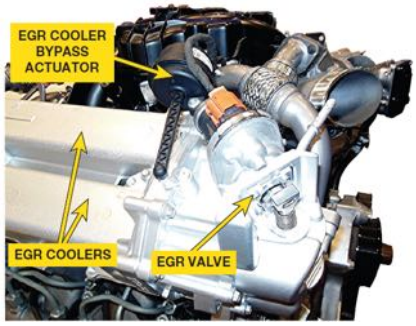

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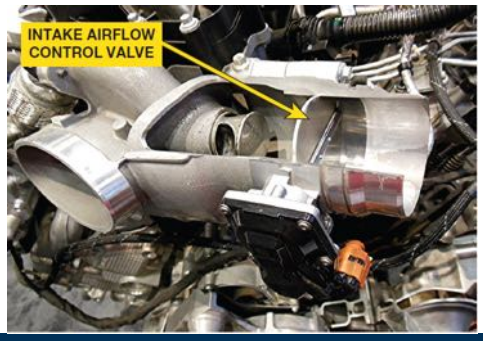
FIGURE 22–25 cutaway of intake air flow control valve used on 6.7-liter Ford Power Stroke diesel engine.



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Case of the Stuck Open EGR Valve (1 of 2)

REAL WORLD FIX

2011 Ford Power Stroke stated that while driving down highway, engine lost power. Engine still running, but it had no power and would blow black smoke from exhaust when accelerating. Retrieved a P1355 DTC (exhaust gas recirculation (EGR) position sensor minimum/maximum stop performance). Inspection of EGR valve showed that it was stuck open by a large carbon particle that looked like a small rock. Most likely cause of this type of failure is due to small coolant leak in EGR cooler, which causes carbon particles to loosen and break off, causing EGR valve to become clogged. This fault required that the EGR cooler be replaced and EGR valve cleaned. After the repair, the truck ran normally.

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Case of the Stuck Open EGR Valve (2 of 2)

REAL WORLD FIX

- **Summary:**
- **Complaint**—Vehicle owner complained that the engine lost power while driving.
- **Cause**—stuck open EGR valve caused by carbon particles from a defective EGR cooler
- **Correction**—EGR cooler was replaced and EGR valve was cleaned, which restored proper engine operation.

DIESEL AFTERTREATMENT SYSTEM

- **Emissions Controls Include**:
  - EGR (exhaust gas recirculation)
  - SCR (selective catalytic reduction) converter
  - DPF (diesel particulate filter)
    - **See Chapter 15 for details on these systems**
  - **6.7-liter Power Stroke DEF: Page 264**

CHART 22-5 Low DEF warnings and actions, plus instrument cluster messages

DRIVER INFORMATION MESSAGE	DISTANCE/EXHAUST FLUID LEVEL OR ACTION	REQUESTED CUSTOMER ACTION	VEHICLE ACTIONS
Exhaust Fluid Level OK	Exhaust Fluid Tank Full	Drive Normally	None
Exhaust Fluid Under 1/2 Full	Exhaust Fluid Blow 1/2 Full	Drive Normally	None
Exhaust Fluid Range 500 Miles (800 km)	About 500 miles (800 km) left before DEF tank is empty	Refill Diesel Exhaust Fluid	None
Exhaust Fluid Empty In 99 miles, Speed limited to 50 MPH (80 km/h)	Exhaust Fluid Empty In 99 miles, Speed limited to 50 MPH (80 km/h)	Refill Diesel Exhaust Fluid	None
Exhaust Fluid Empty Speed limited to 50 MPH (80 km/h)	Vehicle restarted with DEF tank empty	Refill Diesel Exhaust Fluid	Speed is limited to 50 MPH (80 km/h)
Engine Idled Soon Exhaust Fluid Empty	Occurs 200 Miles (320 km) after the vehicle reaches the 0 mile (0 km) exhaust fluid range	Refill Diesel Exhaust Fluid	-
Engine Idled – See Owner's Manual Exhaust Fluid Empty	This occurs when the DEF tank is empty and: • The diesel fuel tank is refueled or • The engine is shut off for 10 minutes • The engine is idling with the parking brake engaged for 60 minutes.	Refill Diesel Exhaust Fluid	Engine is limited to idle ONLY

FIVE- & SIX-CYLINDER POWER STROKE DIESEL ENGINES

- 3.2-liter Five-Cylinder Power Stroke Engine
- 3.0 Liter V-6 Power Stroke Engine
  - See Page 265 of text

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CHART 22-6 specifications for 3.2 liter Ford Power Stroke diesel engine used in 2015+ model year (MY) in Transit vans.

Type	4-cycle Turbocharged and Intercooled
Configuration	Inline five cylinders DOHC Four valves per cylinder
Displacement	3.2 liter (195 cubic inches)
Bore and stroke	3.54 × 3.96 inches (89.9 mm × 100.7 mm)
Block/Heads	Cast iron/Aluminum cylinder heads
Compression ratio	15.8:1
Firing order	1-2-4-5-3
Fuel injection system	High-pressure common rail (HPCR)
Starting heat method	Glow plugs
Horsepower	185 HP @ 3,900 RPM
Torque	350 lb-ft @ 1,500–2,500 RPM
Oil capacity with filter	12 quarts

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CHART 22-7 specifications for 3.0 liter V-6 Ford Power Stroke diesel engine in 2018+ model year (MY) F-150 trucks.

Type	4-cycle Turbocharged and Intercooled
Configuration	3.0 liter 60° V-6 DOHC Four valves per cylinder
Displacement	3.0 liter (183 cubic inches)
Bore and stroke	3.31 × 3.54 inches (84 mm × 90 mm)
Block/Heads	Compacted graphite iron block/Aluminum cylinder heads
Compression ratio	16.4:1
Fuel injection system	High-pressure common rail (HPCR) Piezo injectors
Starting heat method	Glow plugs
Horsepower	254 HP at 3.500 RPM
Torque	443 lb-ft at 1.750 RPM

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QUESTION 1

- Why is an intake air flow control valve used on the 6.7-liter Power Stroke diesel engine?

ANSWER 1

- The position of the valve determines the mix of fresh air and exhaust gasses in the intake manifold. The PCM uses the feedback from the O2 sensor to help determine the valve position. The default position of the valve is the open position.

QUESTION 2

- What Power Stroke diesel engines were made by International?

ANSWER 2

- Ford Power Stroke diesel engines (7.3, 6.0, and 6.4 liter) were built by International

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Summary (1 of 3)

- The old 7.3 and 6.0-liter Power Stroke diesel engines used direct injection and the HEUI fuel injection system and built by International.
- 6.4-liter Power Stroke was equipped with four valves per cylinder and used a high-pressure common rails (HPCR) fuel injection system built by International.
- 6.7-liter Power Stroke is built by Ford and Incorporates a high-pressure common rails (HPCR) fuel injection system with increased power compared to previous Power Stroke diesel engines.
- 6.7-liter diesel engine uses two cooling systems and four thermostats.

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Summary (2 of 3)

- The 6.7-liter Power Stroke diesel engine uses a gerotor type oil pump driven from the front of the crankshaft. The lubrication system includes a spin-on type oil filer located at the lower right of the engine, under the starter motor.
- The block is cast from compacted graphite iron (CGI) and the cylinder heads are aluminum.
- The air inlet located on the outboard side of the cylinder heads and the exhaust outlet is located on the in-board side (lifter side) of the cylinder head to reduce the loss of heat to improve the efficiency of the turbocharger.
- The water-in-fuel (WIF) sensor is located inside the diesel fuel control module (DFCM).

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Summary (3 of 3)

- Fuel pressure and volume are controlled by two solenoids, volume control valve (VCV) solenoid and the pressure control valve (PCV) solenoid.
- A piezo fuel injector uses piezoelectric crystals to create a small movement when a voltage is applied to open the injector.
- EGR system uses an EGR cooler after the EGR valve.
- The diesel exhaust fluid (DEF) tank holds five gallons and is usually enough to last to the next scheduled oil change, or ever 7,500 miles under normal operating conditions.
- Ford Power Stroke family of engines also includes, inline five cylinder used in Transit vans and 3.0 liter V-6 used in the F-150.

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