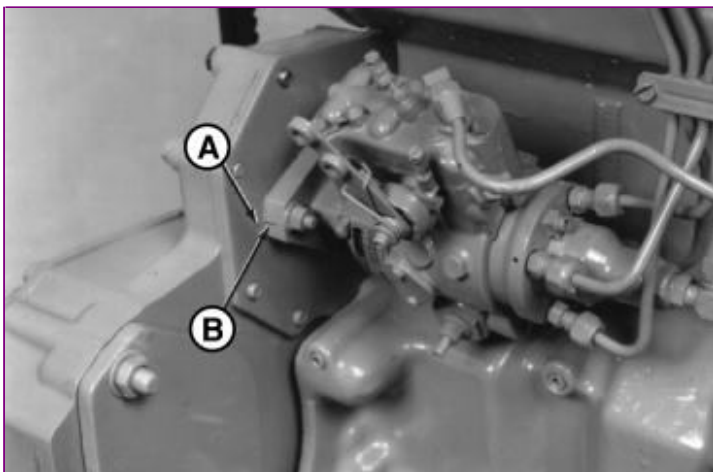


CTM207 - PowerTech™ 4.5L and 6.8LDiesel EnginesMechanical Fuel Systems

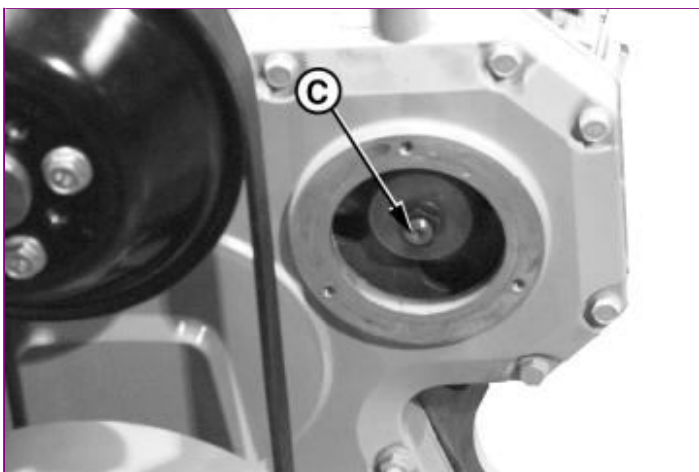
Install Stanadyne Model DB2 and DB4 Injection Pump (without Lock Shaft Timing)

Install Stanadyne Model DB2 and DB4 Injection Pump (without Lock Shaft Timing)

1. **IMPORTANT:**



RG6278-UN: Injection Pump Timing Marks



RG7630C-UN: Pump Drive Gear Retaining Nut

LEGEND:

- A - Front Plate Timing Mark
- B - Pump Timing Mark
- C - Pump Drive Gear Retaining Nut

Injection pump mounting flange timing mark (B) and front plate timing mark (A) presence and alignment **MUST BE** verified before removing pumps from engine. When pump is reinstalled on engine, time pump by aligning these two (external) marks. **DO NOT** reference internal timing marks (on pump cam ring and governor weight retainer) for accurate pump timing.

Lubricate a new square sealing ring with clean engine oil. Install ring into groove on front face of pump mounting flange. Slide injection pump onto mounting studs while inserting pump shaft into drive gear.

2. **IMPORTANT:**

Shaft roll pin may be easily damaged if improperly assembled. Pump drive gear should not move when initially installing pump index pin into drive gear key slot.

Check pump shaft and index pin for proper alignment with pump drive gear key slot.

3. Install injection pump partially onto mounting studs without engaging pump pilot hub into engine front plate.

4. **IMPORTANT:**

DO NOT tighten hex nuts more than three full turns on mounting studs. Pump drive shaft index pin may be damaged if pin is not properly aligned with drive gear key slot and nuts are tightened more than three turns.

Install three flat washers, lock washers, and hex nuts onto pump mounting studs. Tighten nuts three turns only so that pump will not fall off mounting studs.

NOTE:

The pump drive gear should begin to move forward (away from engine front plate) with the pump when flange is approximately 3.2 mm (1/8 in.) away from engine front plate.

5. Install pump mounting flange flush to engine front plate with drive gear held flush against front side of engine front plate.

6. **IMPORTANT:**

DO NOT use tightening force of pump mounting stud nuts to pull pump shaft into drive gear ID.

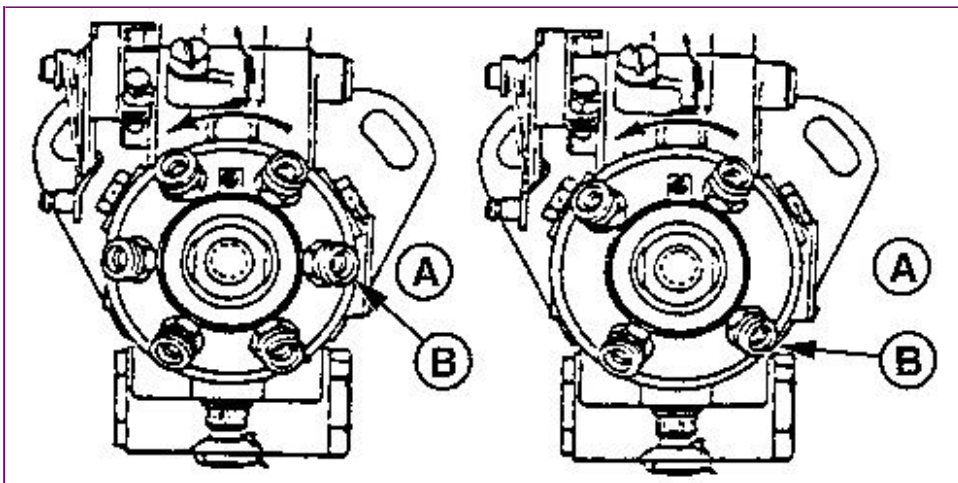
With the pump shaft index pin properly engaged in the drive gear key slot, finger tighten mounting stud nuts.

7. Push pump drive gear firmly onto shaft taper. Install washer and retaining nut (C) onto end of shaft. Tighten retaining nut to the following torque specification:

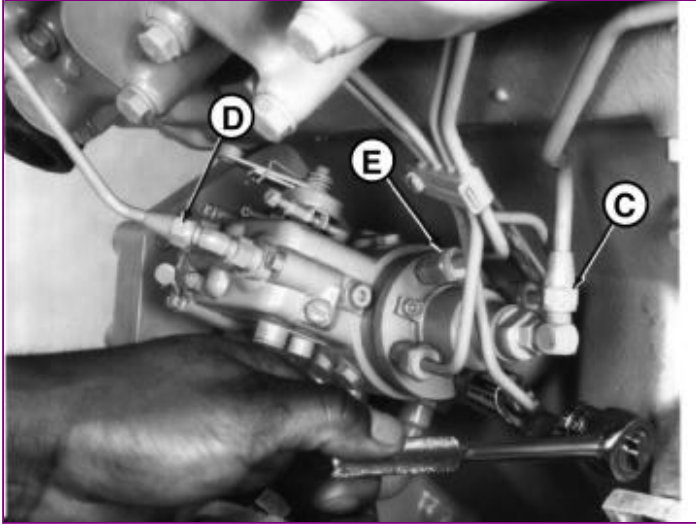
Item	Measurement	Specification
Stanadyne DB2 Fuel Injection Pump Drive Gear-to-Shaft Retaining Nut	Torque	125 N·m (92 lb-ft)
Stanadyne DB4 Fuel Injection Pump Drive Gear-to-Shaft Retaining Nut	Torque	200 N·m (148 lb-ft)

8. **IMPORTANT:**

To avoid damage to O-ring, Do NOT overtighten cap screws on pump cover plate.



RG9089-UN: 6-Cylinder Engine (Left)
4-Cylinder Engine (Right)



RG5664-UN: Fuel Supply, Return and Pressure Lines

LEGEND:

- A - Engine Block Side
- B - Outlet Connection to No. 1 Cylinder
- C - Fuel Supply Line
- D - Fuel Return Line
- E - Fuel Delivery (Pressure) Lines (4 or 6 used)

Install access cover plate using a new O-ring, if needed. Apply LOCTITE ® 242 (T43512) to cap screw threads and tighten to specifications.

Item	Measurement	Specification
Rotary Injection Pump Front Access Plate Cap Screws	Torque	6 N·m (4.5 lb-ft) (54 lb-in.)

9. Align timing mark on pump flange with timing mark on front plate.
10. Tighten three hex nuts securing the pump to the front plate to specifications.

Item	Measurement	Specification
Rotary Injection Pump Mounting Nuts	Torque	27 N·m (20 lb-ft)

11. Connect injection pump pressure lines (E). Beginning with outlet (B) and continuing around the pump head in counterclockwise direction, attach lines in same order as engine firing (1-5-3-6-2-4 on 6-cylinder engines and 1-3-4-2 on 4-cylinder engines).
12. Tighten fuel delivery (pressure) lines at pump to specifications, using a suitable 17 mm deep-well socket.

Item	Measurement	Specification
Fuel Injection Pump Delivery Lines (At Pump)	Torque	27 N·m (20 lb-ft)

13. **IMPORTANT:**

ALWAYS use a backup wrench when loosening or tightening fuel delivery lines at fuel injection pump, so that the pump discharge fittings are not altered. This prevents possible internal pump damage.

Connect fuel supply line (C) and fuel return line (D).

14. Connect fuel shut-off cable and speed control linkage, if equipped. Install and securely tighten electrical connections to shut-off solenoid and throttle positioning solenoid, if equipped. Connect cold start switch, if equipped.

15. Bleed air from fuel system as outlined in this group. (See [BLEED THE FUEL SYSTEM](#) in this group.) Start engine, run for several minutes and check entire fuel system for leaks.
16. If required, proceed with Dynamic Timing.

CTM207 - PowerTech™ 4.5L and 6.8LDiesel EnginesMechanical Fuel Systems Install Stanadyne Model DB4 Injection Pump (with Lock Shaft Timing)

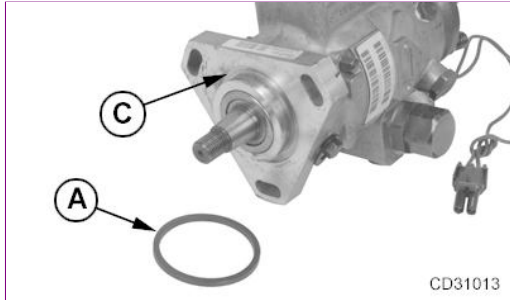
Install Stanadyne Model DB4 Injection Pump (with Lock Shaft Timing)

1. **IMPORTANT:**

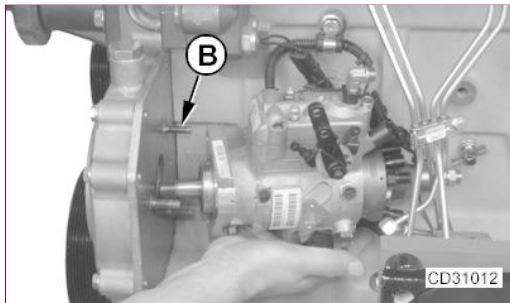
Repaired or replacement pumps have the drive shaft locked by the manufacturer or by the workshop Dealer once proper pump timing orientation has been established. To comply with Emission Regulations, do not install pump which has not the drive shaft locked. Bring the pump to a Stanadyne Agent for timing and installation of the lock shaft timing screw.

NOTE:

When installing pump, do not use previous timing marks (if any) on front plate and on pump flange.



CD31013-UN: Install Sealing Ring



CD31012-UN: Install Injection Pump

LEGEND:

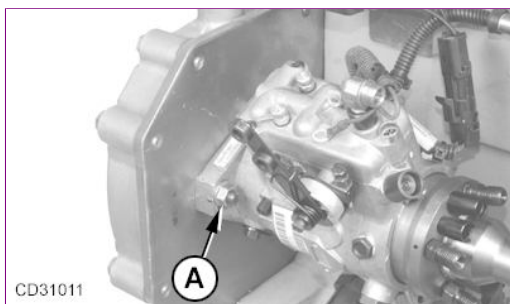
- A - Sealing Ring
- B - Injection Pump Mounting Studs
- C - Sealing Ring Groove

Lubricate a new square sealing ring (A) with clean engine oil. Install ring into groove (C) on front face of pump mounting flange.

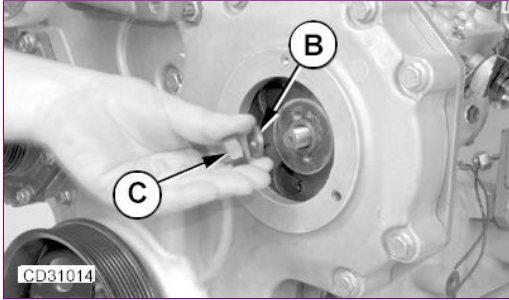
2. Slide and rotate injection pump onto mounting studs (B) while inserting pump shaft into drive gear.

IMPORTANT:

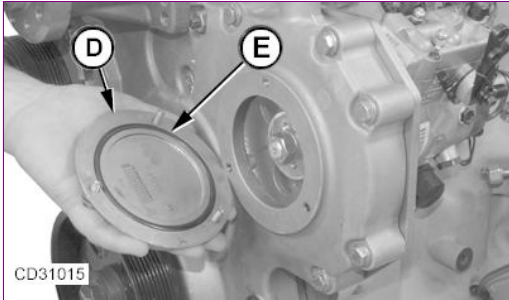
Rotate the complete pump to align pump shaft key with gear key slot.



3. CD31011-UN: Install Stud Nuts



CD31014-UN: Install Drive Gear Washer and Nut



CD31015-UN: Install Injection Pump Drive Gear Cover

LEGEND:

- A - Injection Pump Mounting Stud Nuts
- B - Drive Gear Washer
- C - Drive Gear Retaining Nut
- D - Drive Gear Cover
- E - Drive Gear Cover O-Ring

Install the 3 injection pump mounting stud nuts (A) but do not tighten at this stage.

4. Install washer (B) and drive gear retaining nut (C) onto end of pump shaft. Tighten to specifications.

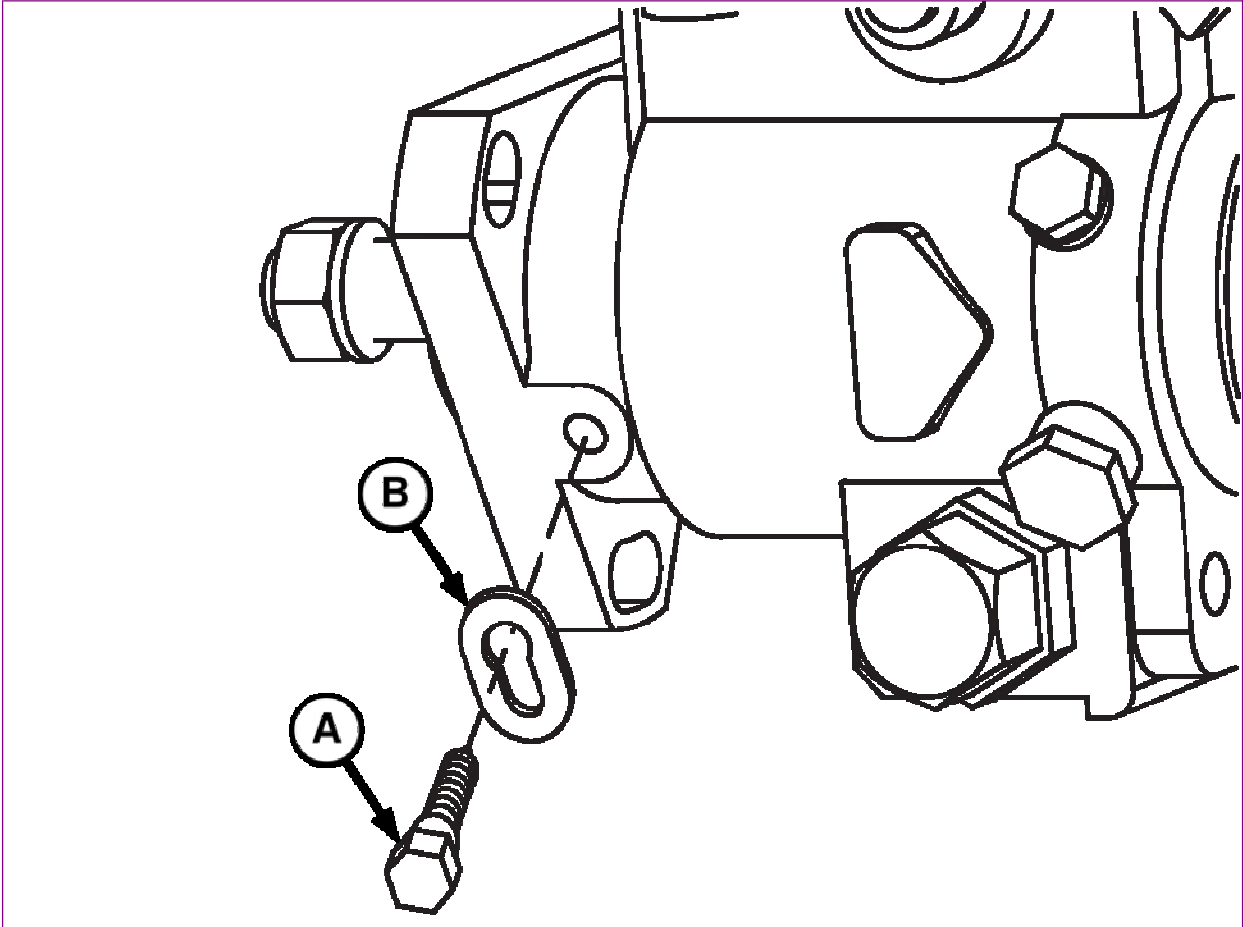
Item	Measurement	Specification
Stanadyne DB4 Fuel Injection Pump	Torque	200 N·m (148 lb-ft)
Drive Gear-to-Shaft Retaining Nut		

5. Rotate pump towards engine to eliminate the gear backlash then tighten to specifications.

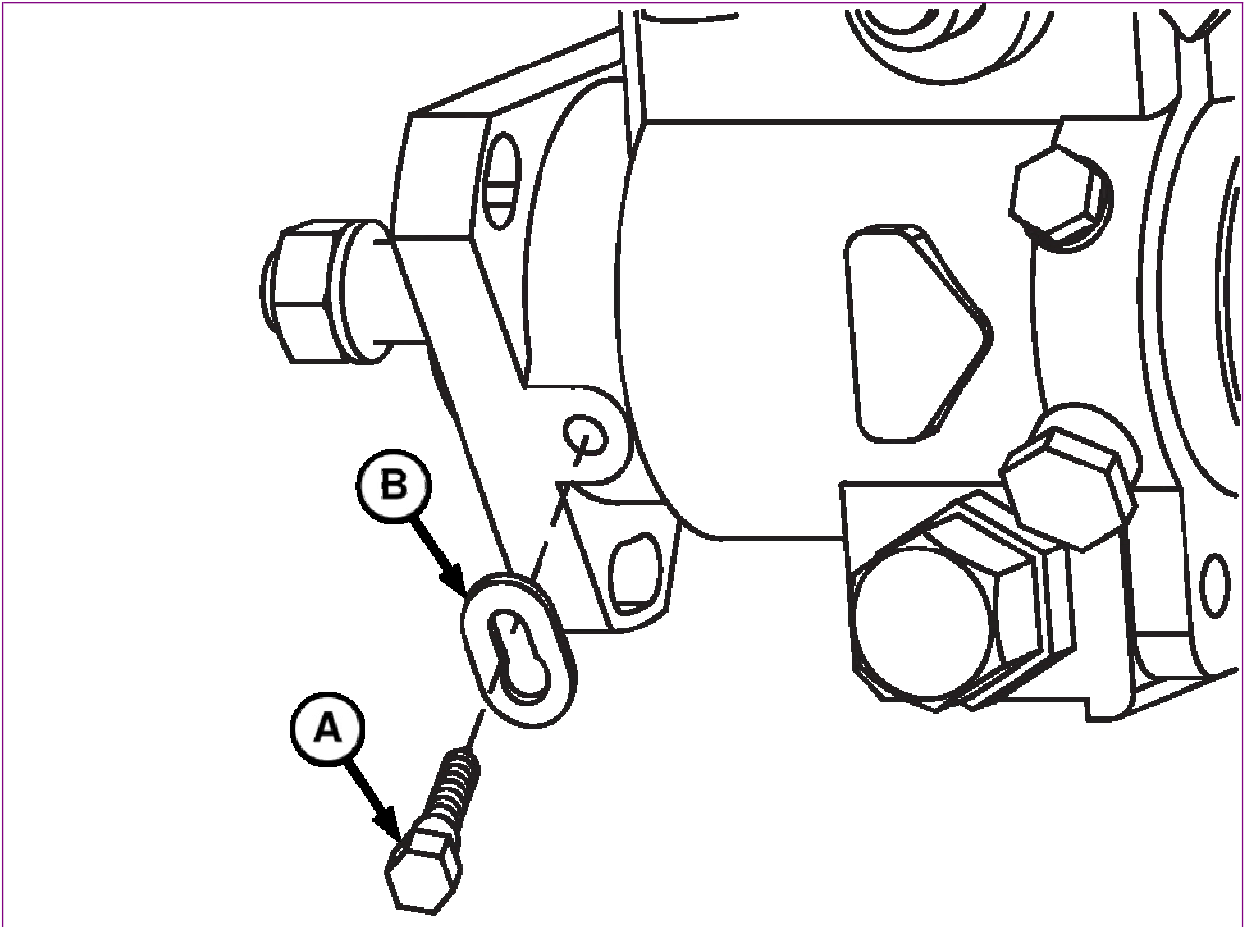
Item	Measurement	Specification
Injection Pump Mounting Nuts	Torque	27 N·m (20 lb-ft)

6. Install injection pump drive gear cover (D) using a new O-ring (E), if needed. Apply LOCTITE ® 242 (T43512) to cap screw threads and tighten to specifications.

Item	Measurement	Specification
Injection Pump Drive Gear Cover	Torque	6 N·m (4.5 lb-ft) (54 lb-in.)
Cap Screws		



7. RG15538-UN: Lock Screw in Locked Position



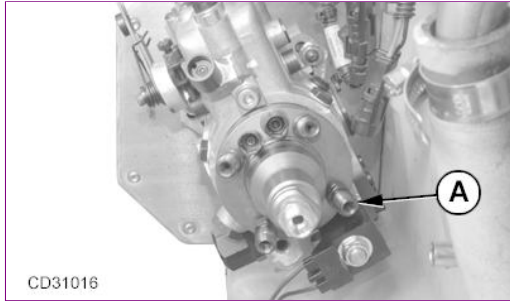
RG15539-UN: Lock Screw in Unlocked Position

LEGEND:

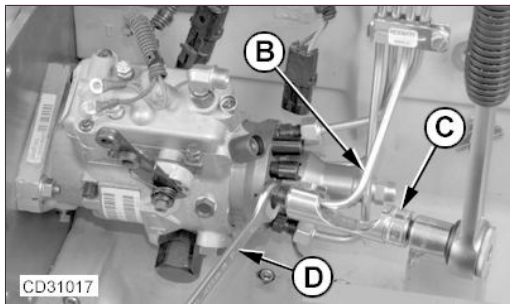
- A - Lock Screw
- B - Key Plate

Loosen injection pump drive shaft lock screw (A) and position key plate (B) to unlocked position (small diameter end behind the lock screw head). Tighten lock screw to specification.

Item	Measurement	Specification
Lock Shaft Timing Lock Screw— Unlocked Position	Torque	8 N·m (71 lb-in.)



8. CD31016-UN: High Pressure Outlet for Cylinder N° 1



CD31017-UN: Install High Pressure Fuel Lines

LEGEND:

- A - High Pressure Outlet for Cylinder N° 1
- B - High Pressure Fuel Lines
- C - Suitable 17 mm Socket
- D - Backup Wrench

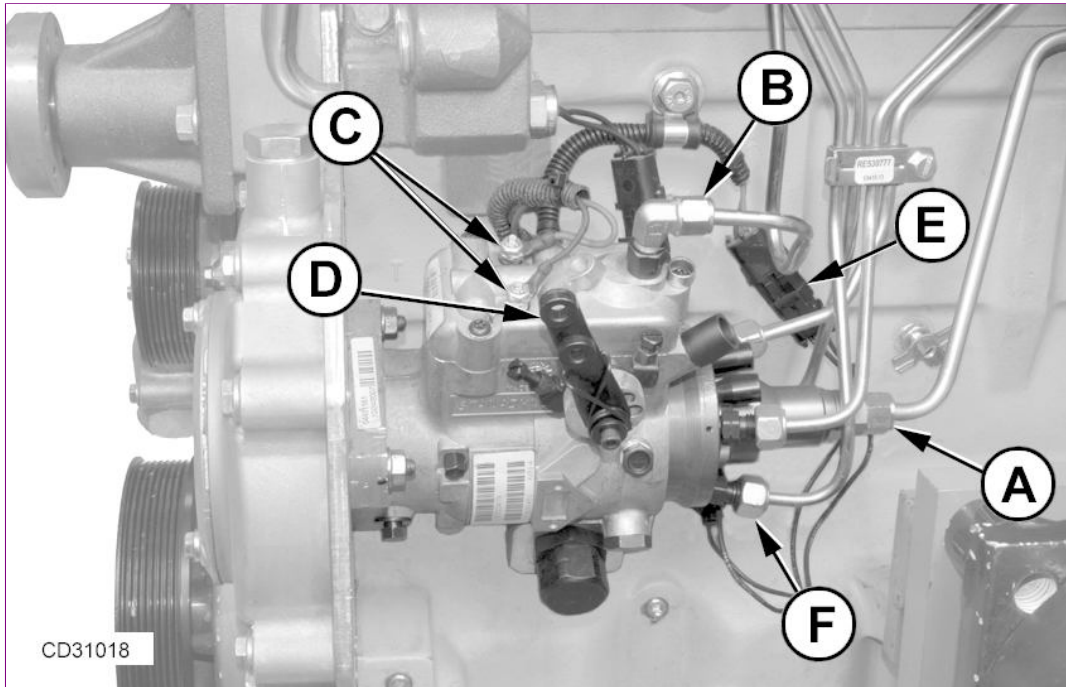
Connect high pressure fuel lines (B). Beginning with outlet (A) and continuing around the pump head in counterclockwise direction, attach lines in same order as engine firing (1-5-3-6-2-4 on 6-cylinder engines and 1-3-4-2 on 4-cylinder engines).

IMPORTANT:

ALWAYS use a backup wrench (D) when loosening or tightening fuel delivery lines at fuel injection pump, so that the pump discharge fittings are not altered. This prevents possible internal pump damage.

9. Tighten high pressure fuel lines at pump to specifications, using a suitable 17 mm deep-well socket (C).

Item	Measurement	Specification
Fuel Injection Pump Delivery Lines (At Pump)	Torque	27 N·m (20 lb-ft)



10. CD31018-UN: Install Connections

LEGEND:

- A - Fuel Supply Line
- B - Fuel Return Line
- C - Fuel Shut-Off Wires
- D - Speed Control Linkage
- E - Cold Start Switch
- F - High Pressure Fuel Lines

Connect fuel supply line (A) and fuel return line (B).

11. Connect fuel shut-off wires (C) and speed control linkage (D), if equipped.
12. Connect cold start switch (E).

NOTE:

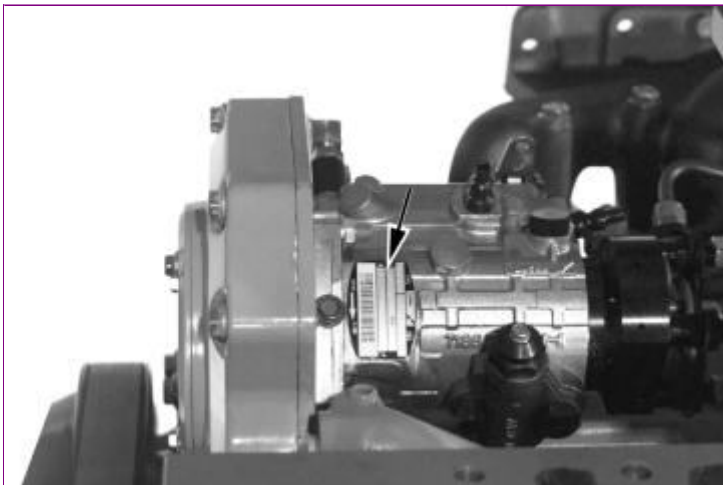
Fuel injection pumps with lock shaft timing do not require additional static or dynamic timing.

13. Bleed air from fuel system as outlined in this group. (See [BLEED THE FUEL SYSTEM](#) in this group.) Start engine, run for several minutes and check entire fuel system for leaks.

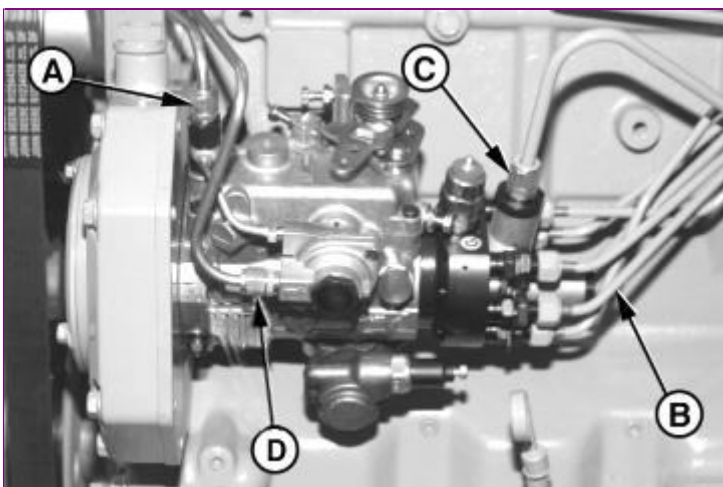
CTM207 - PowerTech™ 4.5L and 6.8LDiesel EnginesMechanical Fuel Systems

Remove Delphi/Lucas Fuel Injection Pump

Remove Delphi/Lucas Fuel Injection Pump



RG7722-UN: Delphi/Lucas Fuel Injection Pump



RG9069-UN: Fuel Supply, Return and Pressure Lines

LEGEND:

- A - Fuel Return Line
- B - Fuel Delivery (Pressure) Lines
- C - Fuel Supply Line
- D - Aneroid Line

NOTE:

The injection pump serial number tag (bold arrow) is located on the bottom of the pump.

1. **IMPORTANT:**

Never steam clean or pour cold water on a fuel injection pump while the pump is running or while it is warm. Doing so may cause seizure of internal rotating pump parts.

Clean the fuel injection pump, lines and area around the pump with cleaning solvent or a steam cleaner.

2. Disconnect shut-off cable and speed control linkage, if equipped. Disconnect electrical connection to shut-off

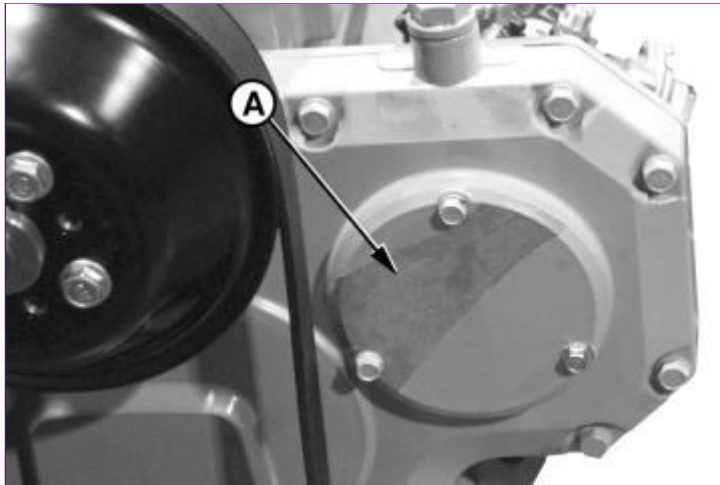
solenoid or throttle positioning solenoid, if equipped. Disconnect cold start switch, if equipped. Tag electrical wires for correct reassembly.

3. **IMPORTANT:**

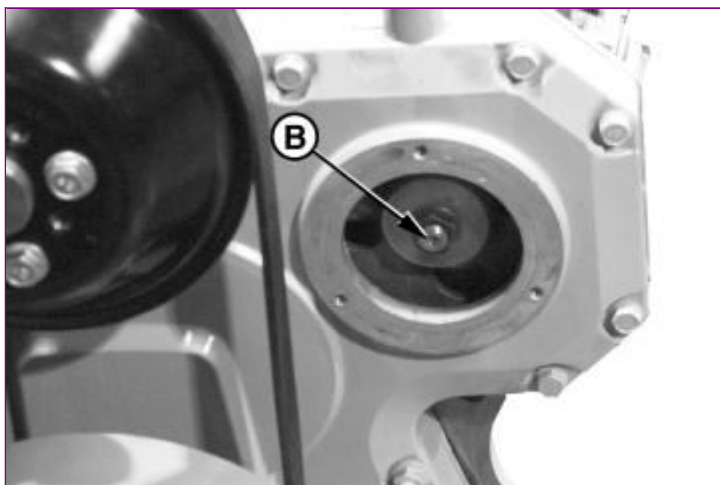
ALWAYS use a backup wrench when loosening or tightening fuel lines at injection pump so that discharge fittings are not altered to prevent possible internal pump damage.

Disconnect fuel return line (A), fuel supply line (C) and aneroid line (D).

4. Disconnect all fuel delivery (pressure) lines (B) from injection pump using a suitable 17 mm deep-well crowsfoot socket.



5. RG7629A-UN: Injection Pump Drive Cover



RG7630B-UN: Pump Drive Gear Retaining Nut

LEGEND:

- A - Drive Gear Cover
- B - Drive Gear Retaining Nut

Remove injection pump drive gear cover (A). Remove drive gear retaining nut (B) and washer from end of pump shaft. Be careful not to let washer fall inside timing gear cover.

6. **NOTE:**

The injection pump drive gear fits snugly onto a tapered drive shaft and is indexed by a Woodruff key installed in drive shaft. Use JDG1560 Drive Gear Puller (A) to remove drive gear

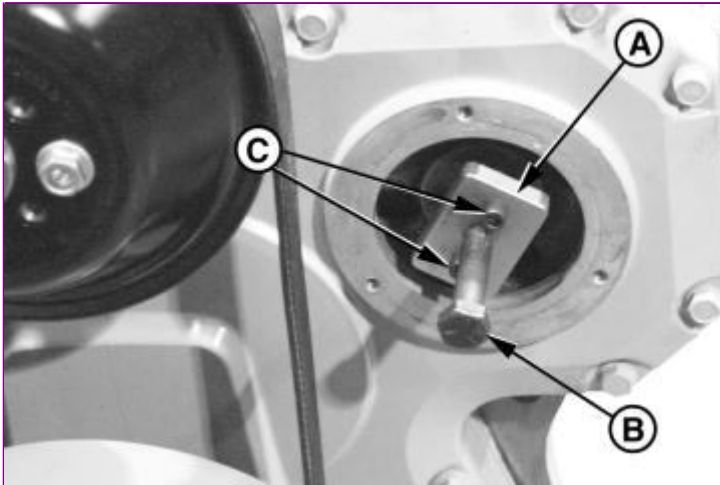
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from shaft.



RG7631-UN: Pump Drive Gear Puller in Place

LEGEND:

- A - Drive Gear Puller
- B - Forcing Screw
- C - Cap Screws

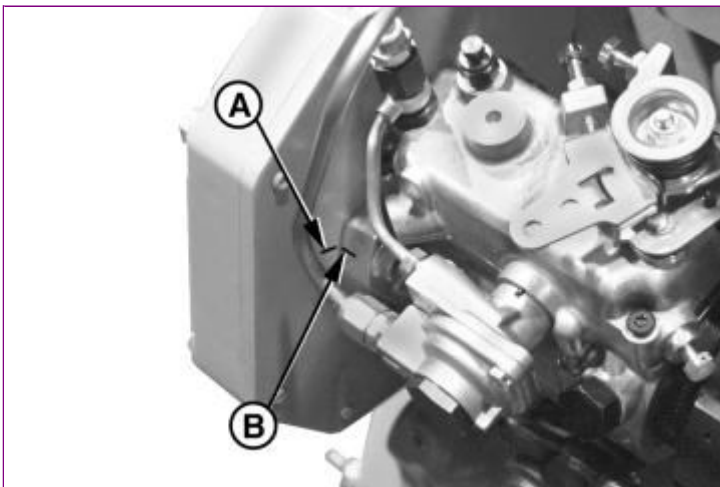
Attach JDG1560 Injection Pump Drive Gear Puller to injection pump drive gear as shown. Follow instructions provided with tool set.

7. **NOTE:**

Replace 6 mm, Grade 12.9 cap screws (C) as needed.

Evenly tighten the two 6 mm, Grade 12.9 screws (threaded in drive gear) and snugly tighten center forcing screw (B) against end of pump shaft.

8. Tighten center forcing screw until pump drive gear is free from tapered shaft. Remove JDG1560 Injection Pump Drive Gear Puller from drive gear.



9. RG7723A-UN: Injection Pump Timing Marks

LEGEND:

- A - Timing Mark on Front Plate
- B - Timing Mark on Injection Pump Flange

Check to make sure that timing marks on back side of front plate (A) and injection pump flange (B) are present and

properly aligned. This ensures that repaired or replacement pump can be properly timed to engine when installed.

If timing mark is not clearly visible on front plate, scribe a visible reference mark as accurately as possible in-line with mark on pump flange.

10. Remove injection pump mounting stud nuts. Remove injection pump from mounting studs.

CTM207 - PowerTech™ 4.5L and 6.8LDiesel EnginesMechanical Fuel Systems

Repair Delphi/Lucas Fuel Injection Pump

Repair Delphi/Lucas Fuel Injection Pump

IMPORTANT:

DO NOT disassemble the Delphi/Lucas fuel injection pump any further than necessary for installing available repair parts, not even for cleaning.

Have an authorized ADS Diesel Repair Station perform all injection pump testing, adjustments, and repairs.

RG,35,JW7604-19-20020708