



# OREGON FUEL INJECTION, INC.

Corporate Office: P.O. Box 21121, Eugene, OR 97402  
[oregonfuelinjection.com](http://oregonfuelinjection.com)

## VE Pump Removal and Installation Cummins "Lock Timed" Applications

### Removal

Clean the exterior of the injection pump and mounting surfaces.

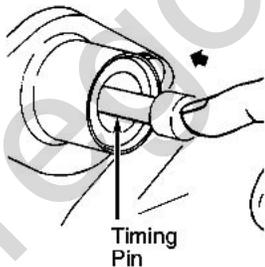
1. Disconnect the fuel return line.
2. Remove the injection pump supply line.
3. Remove the high-pressure injection lines.
4. Disconnect the electrical wire to the fuel shutoff solenoid valve.
5. Remove the fuel air control tube, if used.
6. Disconnect all control linkage. Refer to the OEM service manual
7. Remove the pump support bracket.

**Note:** Do not remove the throttle lever. The throttle lever on the Bosch VE fuel injection pump is indexed to the shaft during pump calibration. If the lever has been removed and reinstalled incorrectly, engine speed and power will be affected.

8. Remove the access cap, gear retaining nut, and washer.



9. Locate top dead center (TDC) for cylinder Number 1 by barring the engine slowly, while pushing in on the top dead center pin.



**NOTE:** Be sure to disengage the pin after locating top dead center.

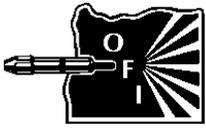
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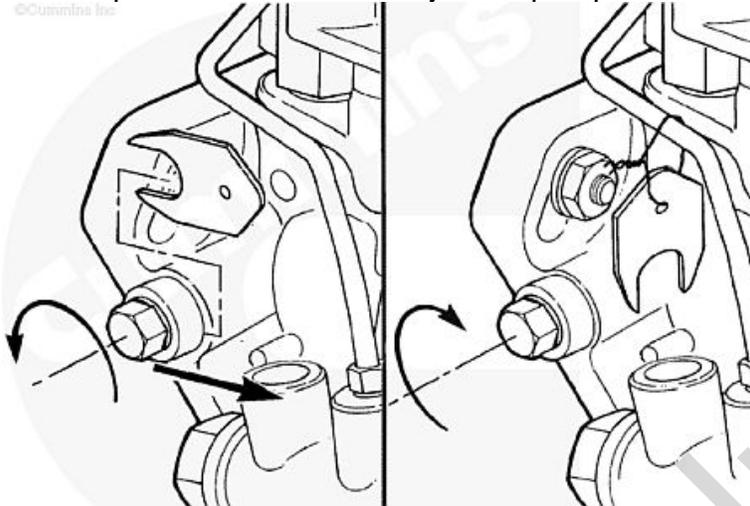
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10. The special washer on the Bosch VE injection pump must be removed so the lock screw can be tightened against the drive shaft. Wire tie the special washer to the injection pump as shown.



Pull the fuel injection pump drive gear loose from the pump drive shaft. Use a gear puller, making sure that the bolts do not bottom onto the pump housing. Remove the three mounting nuts and take off the fuel injection pump.



**Important:** Do not drop drive gear key when removing the pump. Dropping the drive key in the engine can result in severe engine damage.

**NOTE:** Injection pumps designed to meet Tier 2/Stage II Industrial emissions levels have straight holes (not kidney slots) and do not use a timing key.

## Inspection

1. Remove the gasket material and clean the surface making sure that it is smooth and free of burrs.
2. Inspect the rear support bracket making sure it is in good condition and not cracked or broken. Replace if necessary.

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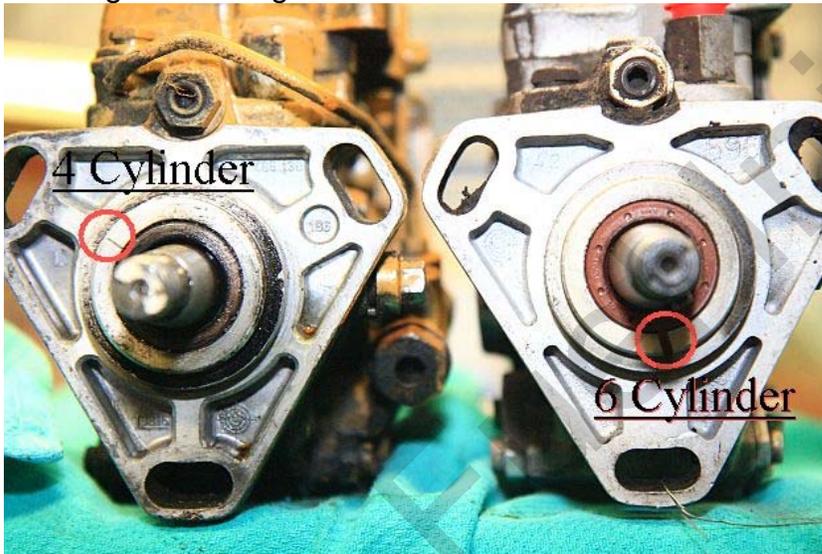
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## Installation

1. Verify cylinder Number 1 is at top dead center by barring the engine over slowly while pushing in on the top dead center pin.
2. Install a new gasket on the injection pump
3. The drive shaft must be clean and free of all oil before installation. Failure to make certain the drive shaft is free of oil can result in the drive gear slipping on the shaft, on Tier 2 engines.

**NOTE:** The shaft of a new or reconditioned pump is locked so the key aligns with the drive gear keyway when cylinder Number 1 is at top dead center on the compression stroke. Install the pump. Make sure the key does not fall into the gear housing.



When the pump is locked in time the keyway should be in the following approximate position:

4 cylinder 10:00 o'clock position

6 cylinder 5:30 o'clock position

Do Not loosen the locking bolt until instructed. Special tools are required to set lock timing

**NOTE:** Fuel pumps on engines designed to meet Tier 2/Stage II Industrial emission levels have straight holes and do not use a timing key.

4. Hand-tighten the three mounting nuts, the pump must be free to move in the slots.
5. Be sure the engine timing pin is disengaged before the final torque step to avoid damage to the timing pin.
6. Install the pump drive shaft nut and spring washer. The pump will rotate slightly because of gear helix and clearance. This is acceptable, provided the pump is free to move on the flange slots and the crankshaft does not move.
7. Take up gear lash by rotating the pump against the direction of drive rotation. Tighten the flange mounting nuts.
8. Torque drive shaft nut to initial torque. Torque Value: 15 to 20 nm [132 to 177 in-lb]

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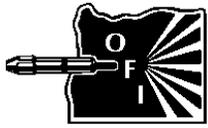
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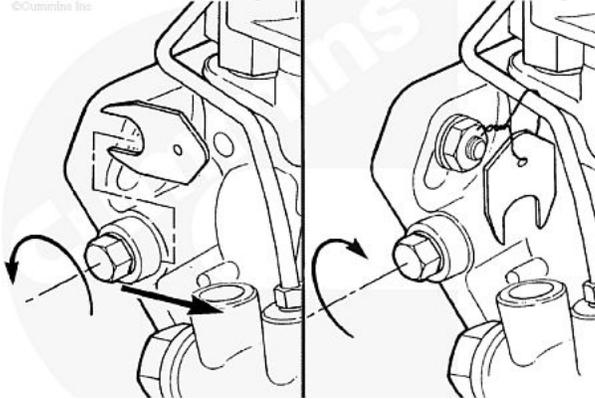
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9. Loosen the Bosch fuel pump lock timing screw and install the special washer that is wired to the fuel pump, this will keep the lock timing screw from contacting the drive shaft during operation.



10. Tighten the fuel pump lock timing screw, with the washer under the screw.
11. Disengage the engine timing pin before rotating the crankshaft.
12. Torque driveshaft nut to final torque specification (Bosch VE pump with M12 drive nut 48 ft-lb, Bosch with M14-1.5 nut 60 ft-lb, see your service manual for correct torque specifications. Excessive torque or insufficient torque can cause engine and injection pump damage.
13. Install the injection pump rear support bracket.
14. Install all high-pressure fuel lines, leave injection loose at the injectors
15. Install the injection pump supply line, leave loose for bleeding.
16. Connect the fuel return line, leave loose for bleeding.
17. Connect the electrical wire to the fuel shutoff valve.
18. If required, install the air-to fuel control line.
19. Connect all control linkage. Refer to OEM service manual.

**NOTE:** When connecting the cable and rod to the control lever, adjust the length so the lever has stop-to-stop movement. Adjust the cable or rod to the mechanical shutdown lever so there is stop-to-stop movement. Excessive travel will cause accelerated wear of the throttle shaft components.

## Priming and Starting

1. Operate the hand primer on the supply pump, when fuel flows freely from the fuel inlet line tighten the fuel inlet line at the injection pump.
2. Continue to operate the hand primer on the supply pump until fuel flows from the return line, tighten the return, or overflow fitting.
3. Crank the engine until fuel flows from the injection lines, tighten the injection lines.
4. Start the engine and check for fuel leaks.

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