Testing and Adjusting
3114, 3116 and 3126 Engines for Caterpillar Built Machines

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Unit Injector Synchronization - Adjust

SMCS - 1290-025

Injector synchronization is the setting of all fuel injector racks to a reference position so that each injector gives the same amount of fuel to each cylinder. This is done by setting each fuel injector rack to the same position while the control linkage is in a fixed position.

Always synchronize an injector after the injector has been removed, replaced, or reused. If the No. 1 injector is reused or replaced, synchronization of all injectors must be checked and adjusted.

This entire procedure should be read and understood before you begin any work on the engine.

Note: The procedure that is described in this article is a new procedure that does not involve the use of gauge blocks in order to adjust the unit injector synchronization. The earlier procedure that utilizes the gauge blocks may still be used. However, the new procedure will provide the most accurate results.

Note: The following list includes additional parts that need to be supplied in order to perform the new procedure: 9U-7282 Indicator Fixture Group, 8T-4177 Bolt, 9U-7263 Indicator Contact Point and 1U-8869 Dial Indicator.

Refer to Table 1 for the tools that are required to check or adjust the unit injector synchronization. Many of the tools that are required can be found in the 223-2454 Fuel System and Governor Tool Gp.

### Table 1

<table>
<thead>
<tr>
<th>Required Tools (1)</th>
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<tbody>
<tr>
<td><strong>Tool</strong></td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
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<tr>
<td>C</td>
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The following procedure may be used to synchronize the unit injectors and the following procedure may be used to adjust the unit injectors.

1. Stop the engine and turn the electrical system to the OFF position.

2. Remove the fuel shutoff solenoid.

   **Note:** If the fuel shutoff solenoid is inaccessible, the following steps may be followed.

   a. Turn the engine start switch to the ON position. Briefly engage the starter. Do not start the engine. Return the engine start switch to the ON position. Do not turn the engine start switch to the OFF position.

   b. Turn the battery disconnect switch to the OFF position or disconnect the negative terminal of the battery. This will leave the fuel shutoff solenoid in the OPEN position.

3. Remove the valve cover.

4. Remove bolts (1) that attach the valve mechanism cover base.
5. Attach Tooling (A) to the rail for the fuel (2).

6. Install Tooling (B) in hole (3) for the valve mechanism cover base that is near the No. 1 cylinder. Attach Tooling (D) to Tooling (E). Insert Tooling (E) into the hole in Tooling (B).

**Note:** Orient face (4) on Tooling (B) parallel to the crankshaft.

7. Install the other Tooling (B) in hole (3) for the valve mechanism cover base that is near the No. 2 cylinder. Attach Tooling (D) to Tooling (E). Insert Tooling (E) into the hole in Tooling (B).

**Note:** Orient face (5) on Tooling (B) parallel to the crankshaft.

8. When the engine is viewed from the flywheel end, rotate Tooling (A) in a counterclockwise direction. You should feel resistance to a spring. Turn Tooling (A) past the start of the resistance of the spring. Zero out Tooling (E) for both the injectors.

**Note:** Do not turn Tooling (A) all the way. This will lead to an inaccurate synchronization.
9. When the engine is viewed from the flywheel end, rotate Tooling (A) in a clockwise direction through the entire range of motion. The readings on Tooling (E) should change as the position of Tooling (A) is changed. Take a note of the values and of the difference in the values.

![Illustration 4](g00998590)

10. If the values are within a tolerance of 0.05 mm (0.0020 inch), no adjustment is required. If an adjustment is required, install Tooling (F) on the locknut at the base of the unit injector.

![Illustration 5](g00998591)

11. Loosen the locknut with the outer rod (6) and adjust the injector with the inner rod (7). Tighten the locknut when the adjustment is complete.

12. Repeat Step 8 through Step 11. Illustration 4 shows two unit injectors that have been properly synchronized.

13. Once the first two injectors have been synchronized, synchronize the remaining injectors by following the previous procedure. Remove Tooling (B) from the No. 2 cylinder and move to the No. 3 cylinder. Do not move Tooling (B) from the No. 1 cylinder. Always synchronize the injectors with the first injector. The first injector is the reference point for all the injectors.
Once all the injectors have been synchronized, remove all the tooling from the engine. Install bolts (1) that attach the air intake housing. Replace the valve cover and tighten the bolts that attach the valve cover. Refer to Specifications, "Valve Mechanism Cover" for instructions.