Additions, Revisions, or Updates

<table>
<thead>
<tr>
<th>Publication Number / Title</th>
<th>Platform</th>
<th>Section Title</th>
<th>Change</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>Inspection of the GHG14 DD13 Turbocharger Wastegate Actuator</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Installation and Adjustment of the GHG14 DD13 Turbocharger Wastegate Actuator</td>
<td></td>
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</tbody>
</table>
2 Removal of the GHG14 DD13 Turbocharger Wastegate Actuator

1. Hose
2. Wastegate Can
3. Wastegate Can Mounting Bolts
4. Adjustment Arm
5. Wastegate Bracket
6. Jam Nut
7. Adjustment Arm Sleeve
8. Lever Pin and Circlip
9. Wastegate Support Bracket Bolt
10. Crimp Clamp

Figure 1. DD13 Turbocharger Wastegate Actuator

<table>
<thead>
<tr>
<th>Tool Number</th>
<th>Tool Name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>DKI470E16019</td>
<td>Wastegate Repair Kit</td>
<td>Wastegate arm puller and adjustment valve</td>
</tr>
<tr>
<td>DKI470E16019-1</td>
<td>Wastegate Arm Puller</td>
<td></td>
</tr>
<tr>
<td>DKI470E16019-2</td>
<td>Wastegate Adjustment Valve</td>
<td></td>
</tr>
<tr>
<td>TLZ-00100 or DSN930E16009 or equivalent</td>
<td>(Using air regulator only)</td>
<td>Use air regulator or equivalent</td>
</tr>
</tbody>
</table>

Table 1. Special Service Tools Used in the Procedure
Remove as follows:

NOTE: This procedure is for GHG14 DD13 units only.

NOTE: Units built prior to May 2014 may be equipped with a unique turbocharger assembly with a wastegate actuator that cannot be serviced. The pin diameter is smaller and can be verified during the inspection procedure.

1. Remove the turbocharger and place on a suitable work bench with the compressor housing side down. Refer to section "Removal of the DD13 Turbocharger".

2. Inspection of the lever arm is required before any further work can be performed. Lever arm needs to be perpendicular to its pivot axis. Refer to section "Inspection of the GHG14 DD13 Turbocharger Wastegate Actuator".

3. Connect TLZ-00100 or DSN930E16009 or equivalent air pressure regulator to DKI470E16019-2 wastegate adjustment valve.

4. Using the provided hose clamp in the wastegate replacement kit; make sure the silicone hose is secured to the barbed side of the wastegate adjustment valve.

5. Open the wastegate adjustment valve half way. Valve will remain in this position for the duration of the removal of the actuator.

   WARNING: EYE INJURY

To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.

6. Supply 1.8 bar (27 psi) regulated shop air to the wastegate actuator at the open hose end.
7. Remove the circlip.

8. Remove the two retaining bolts (1) that hold the turbocharger wastegate bracket to the turbocharger assembly. Discard bolts.
9. Release air pressure and disconnect the wastegate hose at the barb fitting.
Table 2.

| NOTE: Use caution not to bend lever while removing the turbocharger wastegate assembly. |

10. Slide the wastegate arm puller DKL470E16019-1 over the wastegate adjustment arm.
11. Tighten down the bolt on the wastegate puller until the wastegate adjustment arm is free from the lever pin.
12. Remove the wastegate puller and save the turbocharger wastegate assembly for additional measurement during the installation procedure.
13. Use P600 or equivalent sandpaper to clean up the lever arm pin surface. See below.

Table 3.

<table>
<thead>
<tr>
<th>Before Cleaning</th>
<th>After Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Before Cleaning" /></td>
<td><img src="image2.png" alt="After Cleaning" /></td>
</tr>
</tbody>
</table>

14. Measurement of the lever arm pin is required before any further work can be performed. Lever arm pin must average 9.8mm (0.386 in.) in width. Refer to section "Inspection of the GHG14 DD13 Turbocharger Wastegate Actuator".
3 Inspection of the GHG14 DD13 Turbocharger Wastegate Actuator

Inspect as follows:

NOTE: This procedure is for GHG14 DD13 units only.

1. Inspect turbocharger assembly for any housing or fin damage. For more turbocharger inspection details, Refer to section "Inspection of the DD13 Turbocharger".
2. Verify the lever arm on the turbocharger assembly is not bent. See figure below.

NOTICE: Units built prior to May 2014 may be equipped with a unique turbocharger assembly with a wastegate actuator that cannot be serviced. The pin width will be smaller than 9.80 mm (0.386 in.) and the turbocharger and wastegate must be replaced as an assembly.

3. The lever arm pin must have an average width greater than 9.80 mm (0.386 in.) when measured at three different points. If the lever arm pin does not measure greater than 9.80 mm (0.386 in.), the turbocharger assembly must be replaced.
3 Inspection of the GHG14 DD13 Turbocharger Wastegate Actuator

1
2
3

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Table 4.

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<td>(Using air regulator only)</td>
<td>Use air regulator or equivalent</td>
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Install as follows:

NOTE: This procedure is for GHG14 DD13 units only.

NOTE: Retain the new hose clamp provided in the turbocharger wastegate service kit for the wastegate air hose during turbocharger installation.

1. Measure the distance (A) from the wastegate can and the end of the adjustment arm on the original wastegate; record distance. See figures below.
2. Using an open end wrench to hold the wastegate actuator adjustment arm, adjust the new adjustment arm to the recorded length from step 1.
3. Hand-tighten adjustment arm jam nut (1) so adjustment arm does not move during assembly.
4. Using a 10MM x 1.5 thread chaser, clean both mounting bolt bores. See graphic below.

5. If not already connected, connect TLZ-00100 or DSN930E16009 or equivalent air pressure regulator to DKI470E16019-2 wastegate adjustment valve.
6. Using the provided hose clamp in the wastegate replacement kit, make sure the silicone hose is secured to the barbed side of the wastegate adjustment valve.
7. Open the wastegate adjustment valve half way. Valve will remain in this position for the duration of the adjustment.
WARNING: EYE INJURY
To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.

8. With wastegate actuator on the bench, supply 2.5 bar (36 psi) regulated shop air and release. Repeat two more times. This allows the turbocharger wastegate actuator to settle.
9. Supply 1.72 bar (25 psi) regulated shop air. Wastegate should remain pressurized during installation of the mounting bolts.
10. Apply a small amount of copper paste to the two new mounting bolts included in the wastegate service kit and install turbocharger wastegate actuator. Hand-tighten the bolts.
11. Slide the adjustment arm eyelet over the lever arm pin; install circlip. Adjust wastegate adjustment arm if necessary to achieve correct alignment. Tighten the wastegate adjustment arm jam nut as necessary.
12. Torque wastegate mounting bolts to 34 N·m (25 lb·ft).
13. Lower the regulated air supply to 0 Bar (0 psi).

NOTE: A digital dial indicator is recommended to complete the next steps.

14. Mount a dial indicator with the needle contacting the end of the wastegate actuator adjustment arm and zero out dial indicator. See figure below.

NOTE: Once shop regulated air is applied for the following steps, at no point should air pressure be lowered back down to zero prior to completion of the adjustment.
WARNING: EYE INJURY
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15. Set regulated shop air to 1.85 bar (27 psi) and record dial indicator reading. Note reading in Table "Initial Dial Indicator Readings" as A1. Air pressure regulator from TLZ-00100 shown below.

16. Raise air pressure to 2.5 bar (36 psi); this is full stroke(c) and no measurement is required.
17. Lower air pressure to 1.85 bar (27 psi) and record dial indicator reading. Note reading in Table "Initial Dial Indicator Readings" as A2.

<table>
<thead>
<tr>
<th>Initial Dial Indicator Readings</th>
<th>Stroke Distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td></td>
</tr>
</tbody>
</table>

18. Calculate (A1+A2)/2 from Table 1. Value should be between 1.0 mm and 2.0 mm (.04 in. and .08 in.). Adjust wastegate adjustment arm as needed. (Each 180° rotation is equal to 0.25 mm (.001 in.) of wastegate adjustment arm travel). Adjustments can only be performed with the eyelet pulled away from the pin; damage to the wastegate will occur otherwise.

19. Lower the regulated air supply to 0 Bar (0 psi).
20. Set regulated shop air to 1.85 bar (27 psi) and record dial indicator reading. Note reading in Table "Wastegate Adjustment Arm Travel" as A1.
21. Raise air pressure to 2.08 bar (30 psi), and record dial indicator reading. Note reading in Table "Wastegate Adjustment Arm Travel" as B1.
22. Raise air pressure to 2.5 bar (36 psi); this is full stroke(c) and no measurement is required.
23. Lower air pressure to 2.08 bar (30 psi), and record dial indicator reading. Note reading in Table "Wastegate Adjustment Arm Travel" as B2.
24. Lower air pressure to 1.85 bar (27 psi) and record dial indicator reading. Note reading in Table "Wastegate Adjustment Arm Travel" as A2.
25. Relieve all shop regulated air pressure from wastegate actuator.

### Table 6.
<table>
<thead>
<tr>
<th>Wastegate Adjustment Arm Travel</th>
<th>Stroke Distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td></td>
</tr>
</tbody>
</table>

26. Calculate the Set Point and the Control Point from Table "Wastegate Adjustment Arm Travel" data and enter into the fields found in Table "Calculating Set Point and Control Point".

### Table 7.
<table>
<thead>
<tr>
<th>Calculating Set Point and Control Point</th>
<th>Distance (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Point</td>
<td></td>
</tr>
<tr>
<td>Control Point</td>
<td></td>
</tr>
</tbody>
</table>

a. Set Point is calculated by \((A1 + A2)/2\).
b. Control Point is calculated by \((B1 + B2)/2\).

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### WARNING: EYE INJURY

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27. Check the arm travel distance in the next three steps.
28. With 1.85 bar (27 psi) regulated shop air applied, adjustment arm should travel between 1.0 mm and 2.0 mm (.04 in. and .08 in.). (This is called the set point).
29. With 2.08 bar (30 psi) regulated shop air applied, adjustment arm should travel between 3.5 mm and 6.5 mm (.14 in. and .26 in.). (This is called the control point).
30. If arm travel does not fall into the ranges found in Table "Arm Travel Distance", remove the circlip and pull the adjustment arm off the turbocharger lever, loosen set nut and rotate adjustment arm. (Each 180° rotation is equal to 0.25mm (.001 in.) of wastegate adjustment arm travel). Repeat steps 9 through 27

### Table 8.
<table>
<thead>
<tr>
<th>Arm Travel Distance</th>
<th>Pressure</th>
<th>Stroke Value Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Point</td>
<td>1.85 bar (27 psi)</td>
<td>1.0 to 2.0 mm (0.04 to 0.08 in.)</td>
</tr>
<tr>
<td>Control Point</td>
<td>2.08 bar (30 psi)</td>
<td>3.5 to 6.5 mm (0.138 to 0.256 in.)</td>
</tr>
</tbody>
</table>

31. Using an open end wrench to hold the wastegate actuator adjustment arm, turn the wastegate adjusting sleeve jam nut and secure to the adjustment sleeve. Torque to 5 N·m (2 lb·ft).
32. Install the turbocharger assembly. Refer to section "Installation of the DD13 Turbocharger".