ENGINE
6G7 SERIES
<From 2002>

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## GENERAL INFORMATION

### 6G72

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>6G72 12-valve</th>
<th>6G72 24-valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>60° OHV, SOHC</td>
<td>60° OHV, DOHC</td>
</tr>
<tr>
<td>Number of cylinders</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Combustion chamber</td>
<td>Compact type</td>
<td>Pentroof type</td>
</tr>
<tr>
<td>Total displacement dm³</td>
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<td>2,972</td>
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<tr>
<td>Cylinder bore mm</td>
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<tr>
<td>Piston stroke mm</td>
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<tr>
<td>Compression ratio</td>
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<td>9.0</td>
</tr>
<tr>
<td>Valve timing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens (BTDC)</td>
<td>19°</td>
<td>19°*1, 11°*2</td>
</tr>
<tr>
<td>Closes (ABDC)</td>
<td>59°</td>
<td>45°*1, 49°*2</td>
</tr>
<tr>
<td>Exhaust valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opens (BBDC)</td>
<td>59°</td>
<td>49°</td>
</tr>
<tr>
<td>Closes (ATDC)</td>
<td>19°</td>
<td>15°</td>
</tr>
<tr>
<td>Lubrication system</td>
<td>Pressure feed, full-flow filtration</td>
<td>Pressure feed, full-flow filtration</td>
</tr>
<tr>
<td>Oil pump type</td>
<td>Trochoid type</td>
<td>Trochoid type</td>
</tr>
<tr>
<td>Cooling system</td>
<td>Water-cooled forced circulation</td>
<td>Water-cooled forced circulation</td>
</tr>
<tr>
<td>Water pump type</td>
<td>Centrifugal impeller type</td>
<td>Centrifugal impeller type</td>
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*1: Except for Hong Kong  
*2: For Hong Kong
### 6G74

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>6G74 24-valve</th>
<th>6G74 24-valve-GDI</th>
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<td>60° OHV, DOHC</td>
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<td><strong>Number of cylinders</strong></td>
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<td>6</td>
</tr>
<tr>
<td><strong>Combustion chamber</strong></td>
<td>Pentroof type</td>
<td>Pentroof+curved top piston type</td>
</tr>
<tr>
<td><strong>Total displacement dm³</strong></td>
<td>3,497</td>
<td>3,497</td>
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<tr>
<td><strong>Cylinder bore mm</strong></td>
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<td><strong>Piston stroke mm</strong></td>
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<td>85.8</td>
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<td><strong>Compression ratio</strong></td>
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<td>10.4</td>
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<table>
<thead>
<tr>
<th>Valve timing</th>
<th>Intake valve</th>
<th>Closes (BTDC)</th>
<th>Intake valve</th>
<th>Closes (BTDC)</th>
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<tbody>
<tr>
<td></td>
<td>Opens (BTDC)</td>
<td>13°*1, 5°*2</td>
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<td>8°*3, 12°*4</td>
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<tr>
<td></td>
<td>Closes (ABDC)</td>
<td>55°</td>
<td></td>
<td>52°*3, 48°*4</td>
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<tr>
<td>Exhaust valve</td>
<td>Opens (BBDC)</td>
<td>51°</td>
<td></td>
<td>52°*3, 48°*4</td>
</tr>
<tr>
<td></td>
<td>Closes (ATDC)</td>
<td>17°</td>
<td></td>
<td>8°*3, 12°*4</td>
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<thead>
<tr>
<th>Lubrication system</th>
<th>Pressure feed, full-flow filtration</th>
<th>Pressure feed, full-flow filtration</th>
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<tbody>
<tr>
<td>Oil pump type</td>
<td>Trochoid type</td>
<td>Trochoid type</td>
</tr>
<tr>
<td>Cooling system</td>
<td>Water-cooled forced circulation</td>
<td>Water-cooled forced circulation</td>
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<tr>
<td>Water pump type</td>
<td>Centrifugal impeller type</td>
<td>Centrifugal impeller type</td>
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*1: Up to 2002 model  
*2: From 2003 model  
*3: For Europe  
*4: For Hong Kong
### 6G75

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<tr>
<td><strong>Number of cylinders</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Combustion chamber</strong></td>
<td>Pentroof type</td>
</tr>
<tr>
<td><strong>Total displacement dm³</strong></td>
<td>3,828</td>
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<tr>
<td><strong>Cylinder bore mm</strong></td>
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<tr>
<td><strong>Piston stroke mm</strong></td>
<td>90.0</td>
</tr>
<tr>
<td><strong>Compression ratio</strong></td>
<td>9.5&lt;sup&gt;*&lt;/sup&gt;, 10.0&lt;sup&gt;**&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Valve timing</strong></td>
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</tr>
<tr>
<td>Intake valve</td>
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</tr>
<tr>
<td>Opens (BTDC)</td>
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</tr>
<tr>
<td>Closes (ABDC)</td>
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<td>Exhaust valve</td>
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<tr>
<td>Opens (BBDC)</td>
<td>51°</td>
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<tr>
<td>Closes (ATDC)</td>
<td>17°</td>
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<tr>
<td><strong>Lubrication system</strong></td>
<td>Pressure feed, full-flow filtration</td>
</tr>
<tr>
<td><strong>Oil pump type</strong></td>
<td>Trochoid type</td>
</tr>
<tr>
<td><strong>Cooling system</strong></td>
<td>Water-cooled forced circulation</td>
</tr>
<tr>
<td><strong>Water pump type</strong></td>
<td>Centrifugal impeller type</td>
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*1: Except for Taiwan  
*2: For Taiwan
## 1. SPECIFICATIONS
### SERVICE SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
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<tbody>
<tr>
<td><strong>Timing belt</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-tensioner rod length mm</td>
<td>Except PAJERO (V63W, V65W, V67W, V73W, V75W, V77W)</td>
<td>3.8–4.5</td>
</tr>
<tr>
<td></td>
<td>PAJERO (V63W, V65W, V67W, V73W, V75W, V77W)</td>
<td>4.8–5.5</td>
</tr>
<tr>
<td>Auto-tensioner rod projection length mm</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Auto-tensioner rod pushed-in amount (when pushed with a force of 98–196N) mm</td>
<td></td>
<td>1.0 or less</td>
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### Rocker arms and camshaft

<table>
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<th>Item</th>
<th>Standard</th>
<th>Limit</th>
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</thead>
<tbody>
<tr>
<td><strong>Camshaft cam height mm</strong></td>
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</tr>
<tr>
<td>12-valve</td>
<td>41.25</td>
<td>40.75</td>
</tr>
<tr>
<td>24-valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>37.58&lt;sup&gt;*1&lt;/sup&gt;, 37.39&lt;sup&gt;*2&lt;/sup&gt;</td>
<td>37.08&lt;sup&gt;*1&lt;/sup&gt;, 36.89&lt;sup&gt;*2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Exhaust</td>
<td>37.14&lt;sup&gt;*3&lt;/sup&gt;, 36.95&lt;sup&gt;*4&lt;/sup&gt;</td>
<td>36.64&lt;sup&gt;*3&lt;/sup&gt;, 36.45&lt;sup&gt;*4&lt;/sup&gt;</td>
</tr>
<tr>
<td>GDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>35.20&lt;sup&gt;*5&lt;/sup&gt;, 34.85&lt;sup&gt;*6&lt;/sup&gt;</td>
<td>34.70&lt;sup&gt;*5&lt;/sup&gt;, 34.35&lt;sup&gt;*6&lt;/sup&gt;</td>
</tr>
<tr>
<td>Exhaust</td>
<td>34.91</td>
<td>34.41</td>
</tr>
</tbody>
</table>

| **Camshaft journal outside diameter mm** | | |
| 12-valve | 34.5 | – |
| 24-valve | 45 | – |
| GDI | 26 | – |

### Cylinder head and valves

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cylinder head Flatness of gasket surface mm</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-valve</td>
<td>Less than 0.05</td>
<td>0.2</td>
</tr>
<tr>
<td>24-valve, GDI</td>
<td>Less than 0.03</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Cylinder head grinding limit of gasket surface (including grinding of cylinder block gasket surface) mm</strong></td>
<td></td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.2</td>
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<tr>
<td><strong>Cylinder head overall height mm</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-valve</td>
<td>84</td>
<td>–</td>
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<tr>
<td>24-valve</td>
<td>120</td>
<td>–</td>
</tr>
<tr>
<td>GDI</td>
<td>132</td>
<td>–</td>
</tr>
<tr>
<td><strong>Valve thickness of valve head (margin) mm</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-valve</td>
<td>Intake</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
<td>2.0</td>
</tr>
<tr>
<td>24-valve</td>
<td>Intake</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
<td>1.2</td>
</tr>
<tr>
<td>GDI</td>
<td>Intake</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
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</tr>
<tr>
<td><strong>Valve overall height mm</strong></td>
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<tr>
<td>12-valve</td>
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<td>102.97</td>
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<td>Exhaust</td>
<td>102.67</td>
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<tr>
<td>24-valve</td>
<td>Intake</td>
<td>112.30&lt;sup&gt;*7&lt;/sup&gt;, 110.30&lt;sup&gt;*8&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
<td>114.11&lt;sup&gt;*7&lt;/sup&gt;, 112.11&lt;sup&gt;*8&lt;/sup&gt;</td>
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<td>GDI</td>
<td>Intake</td>
<td>102.28</td>
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<td>Exhaust</td>
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<tr>
<td><strong>Valve stem outside diameter mm</strong></td>
<td></td>
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</tr>
<tr>
<td>12-valve, GDI</td>
<td>6.6</td>
<td>–</td>
</tr>
<tr>
<td>24-valve</td>
<td>6.0</td>
<td>–</td>
</tr>
</tbody>
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<sup>*1</sup>: 6G72 (Except for Hong Kong)  <sup>*3</sup>: For 6G74 and 6G75  <sup>*5</sup>: Except for Hong Kong  <sup>*7</sup>: For 6G72 and 6G74  
<sup>*2</sup>: 6G72 (For Hong Kong) and 6G74, 6G75  <sup>*4</sup>: For 6G72  
<sup>*6</sup>: For Hong Kong  <sup>*8</sup>: For 6G75

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<table>
<thead>
<tr>
<th>Item</th>
<th>Standard</th>
<th>Limit</th>
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<tr>
<td>Valve stem to guide clearance mm</td>
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<td>12-valve</td>
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<tr>
<td>Intake</td>
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<tr>
<td>Exhaust</td>
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<td>24-valve</td>
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<tr>
<td>Intake</td>
<td>0.02–0.05</td>
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</tr>
<tr>
<td>Exhaust</td>
<td>0.04–0.06</td>
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<tr>
<td>GDI</td>
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<tr>
<td>Intake</td>
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<td>Exhaust</td>
<td>0.04–0.07</td>
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<tr>
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<td>216/44.2</td>
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<tr>
<td></td>
<td>230/37.9</td>
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<tr>
<td>Valve spring out of squareness</td>
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<td>Valve seat contact width mm</td>
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<td>Valve guide internal diameter mm</td>
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<td>12-valve, GDI</td>
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<td>6.0</td>
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<tr>
<td>Valve guide projection mm</td>
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<td>Valve stem projection mm</td>
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<td>Oil pump and oil pan</td>
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<tr>
<td>Oil pump tip clearance mm</td>
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<tr>
<td></td>
<td>0.04–0.10</td>
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<td>Oil pump body clearance mm</td>
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<tr>
<td>Pistons and connecting rods</td>
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<td>Piston ring side clearance mm</td>
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<td>No.1 ring</td>
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<tr>
<td>No. 2 ring</td>
<td>0.02–0.06</td>
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<tr>
<td>Item</td>
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<td>Limit</td>
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<tr>
<td>Piston ring out gap clearance mm</td>
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<tr>
<td>No. 1 ring</td>
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<td>6G72</td>
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<td>0.30–0.45</td>
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<td>6G74</td>
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<td>6G75</td>
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<td>Oil ring</td>
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<td>6G72 (For Hong Kong), 6G74, 6G75</td>
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<td>Piston pin O.D. mm</td>
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<td>Crankshaft pin oil clearance mm</td>
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<tr>
<td>Connecting rod big end side clearance mm</td>
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**Crankshaft, flywheel and drive plate**

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<tr>
<td>Crankshaft end play mm</td>
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<tr>
<td>Crankshaft journal outside diameter mm</td>
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<td>6G74, 6G75</td>
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<td>Crankshaft pin outside diameter mm</td>
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<td>6G74, 6G75</td>
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<tr>
<td>Piston to cylinder clearance mm</td>
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<td>0.02–0.04</td>
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<td>6G74</td>
<td>0.03–0.05</td>
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<td>Cylinder block flatness of gasket surface mm</td>
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<td>Cylinder block grinding limit of gasket surface mm (Total resurfacing depth of both cylinder head and cylinder block)</td>
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<tr>
<td>Cylinder block overall height mm</td>
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<td>6G74, 6G75</td>
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<tr>
<td>Cylinder bore inside diameter mm</td>
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<td>Cylinder block cylindricity mm</td>
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## REWORK DIMENSIONS

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<td>Cylinder head oversize valve guide hole diameter mm</td>
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<td>12-valve</td>
<td>0.05 O.S.</td>
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<td>0.25 O.S.</td>
<td>13.25–13.27 –</td>
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<td>13.50–13.52 –</td>
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<td>0.05 O.S.</td>
<td>11.05–11.07 –</td>
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<td>0.25 O.S.</td>
<td>11.25–11.27 –</td>
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<td>11.50–11.52 –</td>
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<td>12.05–12.07 –</td>
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<td>Exhaust</td>
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<td>Auto tensioner bolt (Washer)</td>
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<td>Cooling fan bracket bolt &lt;12-valve&gt; (M10)</td>
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<td>Cooling fan pulley bolt</td>
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<td>Crankshaft bolt</td>
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<td>Drive belt tensioner pulley nut</td>
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<td>Fan clutch bolt</td>
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<td>Idler pulley bolt</td>
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<td>EGR pipe bolt</td>
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<td>EGR pipe flare nut</td>
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<td>Vacuum pipe and hose bolt</td>
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<td>Solenoid valve bolt</td>
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**Intake and ignition system**

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<td>Air intake fitting bolt</td>
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<td>Air intake plenum bolt, nut &lt;Except 6G75&gt;</td>
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<td>Air intake plenum bolt (M6) &lt;6G75&gt;</td>
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<tr>
<td>Air intake plenum bolt (M8) &lt;6G75&gt;</td>
<td>18 ± 2</td>
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<tr>
<td>Air intake plenum nut</td>
<td>9 ± 1</td>
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<tr>
<td>Air intake plenum stay bolt (M8)</td>
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<tr>
<td>Air intake plenum stay bolt (M10)</td>
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<tr>
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<td>Bracket bolt</td>
<td>24 ± 3</td>
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<tr>
<td>Center cover bolt</td>
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<td>Distributor nut</td>
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<tr>
<td>Engine hanger bolt</td>
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<tr>
<td>Ignition coil assembly bolt &lt;12-valve&gt;</td>
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<td>Ignition coil assembly bolt &lt;24-valve for L200&gt;</td>
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<td>Ignition coil bolt &lt;GDI and 6G75&gt;</td>
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<td>Ignition failure sensor bolt</td>
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<td>Intake manifold nut</td>
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<td>MDP sensor bolt</td>
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<td>Power transistor bolt</td>
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<td>Spark plug</td>
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**Timing belt**

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<td>Cam position sensor bolt</td>
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<td>Cam position sensor support bolt</td>
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<td>Cam position sensing cylinder bolt</td>
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<td>Tensioner pulley bolt</td>
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<td>Item</td>
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<td>Timing belt cover bolt (M6)</td>
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<td>Timing belt cover bolt (M8)</td>
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<td>Timing belt cover nut</td>
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<td>Engine coolant temperature gauge unit</td>
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<td><strong>Rocker arms and camshaft</strong></td>
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</tr>
<tr>
<td>Distributor adaptor bolt</td>
<td>14 ± 1</td>
</tr>
<tr>
<td>Rocker arms, rocker arm shaft bolt &lt;12-valve&gt;</td>
<td>20 ± 1</td>
</tr>
<tr>
<td>Rocker arms, rocker arm shaft bolt &lt;24-valve&gt;</td>
<td>31 ± 3</td>
</tr>
<tr>
<td>Rocker cover bolt &lt;12-valve&gt;</td>
<td>9 ± 1</td>
</tr>
<tr>
<td>Rocker cover bolt &lt;24-valve&gt;</td>
<td>3.5 ± 0.5</td>
</tr>
<tr>
<td>Thrust case bolt</td>
<td>13 ± 2</td>
</tr>
<tr>
<td><strong>Rocker arms and camshaft &lt;GDI&gt;</strong></td>
<td></td>
</tr>
<tr>
<td>Beam camshaft cap bolt (M6)</td>
<td>11 ± 1</td>
</tr>
<tr>
<td>Beam camshaft cap bolt (M8)</td>
<td>24 ± 2</td>
</tr>
<tr>
<td>Rocker cover bolt</td>
<td>3.5 ± 0.5</td>
</tr>
<tr>
<td><strong>Cylinder head and valves</strong></td>
<td></td>
</tr>
<tr>
<td>Cylinder head bolt</td>
<td>108 ± 5→Back off→108 ± 5</td>
</tr>
<tr>
<td><strong>Oil pan and oil pump</strong></td>
<td></td>
</tr>
<tr>
<td>Baffle plate bolt &lt;6G72 and 6G74&gt;</td>
<td>11 ± 1</td>
</tr>
<tr>
<td>Baffle plate bolt &lt;6G75&gt;</td>
<td>9 ± 2</td>
</tr>
<tr>
<td>Cover bolt</td>
<td>11 ± 1</td>
</tr>
<tr>
<td>Drain plug</td>
<td>39 ± 5</td>
</tr>
<tr>
<td>Oil cooler by-pass valve</td>
<td>54 ± 5</td>
</tr>
<tr>
<td>Oil filter bracket bolt &lt;12-valve&gt;</td>
<td>25 ± 2</td>
</tr>
<tr>
<td>Oil filter bracket bolt &lt;24-valve for PAJERO&gt;  (M8)</td>
<td>24 ± 4</td>
</tr>
<tr>
<td>Oil filter bracket bolt &lt;24-valve for except PAJERO&gt; (M8)</td>
<td>23 ± 3</td>
</tr>
<tr>
<td>Oil filter bracket bolt &lt;24-valve&gt; (M10)</td>
<td>25 ± 2</td>
</tr>
<tr>
<td>Oil level sensor bolt &lt;GDI&gt;</td>
<td>23 ± 3</td>
</tr>
<tr>
<td>Oil pan bolt</td>
<td>9 ± 3</td>
</tr>
<tr>
<td>Oil pan lower bolt</td>
<td>11 ± 1</td>
</tr>
<tr>
<td>Oil pressure switch</td>
<td>10 ± 2</td>
</tr>
<tr>
<td>Oil pump case bolt</td>
<td>14 ± 1</td>
</tr>
<tr>
<td>Oil pump cover screw</td>
<td>10 ± 2</td>
</tr>
<tr>
<td>Oil screen bolt &lt;GDI&gt; (Flange)</td>
<td>5 ± 1</td>
</tr>
<tr>
<td>Oil screen bolt &lt;Except GDI&gt; (Flange)</td>
<td>14 ± 1</td>
</tr>
<tr>
<td>Oil screen bolt (Washer)</td>
<td>19 ± 3</td>
</tr>
<tr>
<td>Relief valve</td>
<td>44 ± 5</td>
</tr>
</tbody>
</table>

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### Pistons and connecting rod

<table>
<thead>
<tr>
<th>Item</th>
<th>Nm</th>
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</thead>
<tbody>
<tr>
<td>Connecting rod cap nut &lt;12-valve&gt;</td>
<td>51 ± 1</td>
</tr>
<tr>
<td>Connecting rod cap bolt &lt;24-valve&gt;</td>
<td>34 ± 2+90°</td>
</tr>
</tbody>
</table>

### Crankshaft, flywheel and drive plate

<table>
<thead>
<tr>
<th>Item</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bearing cap bolt &lt;12-valve&gt;</td>
<td>93 ± 4</td>
</tr>
<tr>
<td>Bearing cap bolt &lt;24-valve&gt;</td>
<td>74 ± 4</td>
</tr>
<tr>
<td>Bell housing cover bolt</td>
<td>11 ± 2</td>
</tr>
<tr>
<td>Detonation sensor bracket bolt</td>
<td>28 ± 2</td>
</tr>
<tr>
<td>Drive plate bolt</td>
<td>74 ± 2</td>
</tr>
<tr>
<td>Flywheel bolt</td>
<td>74 ± 2</td>
</tr>
<tr>
<td>Knock sensor</td>
<td>23 ± 2</td>
</tr>
<tr>
<td>Knock sensor bracket bolt</td>
<td>28 ± 2</td>
</tr>
<tr>
<td>Oil seal case bolt</td>
<td>11 ± 2</td>
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<tr>
<td>Rear plate bolt</td>
<td>11 ± 2</td>
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### SEALANTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Specified sealant</th>
<th>Quantity</th>
</tr>
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<tbody>
<tr>
<td>Cam position sensor support</td>
<td>Mitsubishi Genuine Part No. MD970389 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Engine coolant temperature sensor</td>
<td>3M Nut Locking Part No. 4171 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Engine coolant temperature gauge unit</td>
<td>3M ATD Part No. 8660 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Thermo switch</td>
<td>3M Nut Locking Part No. 4171 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Rocker arms, rocker arm shaft</td>
<td>3M Nut Locking Part No. 4171 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Rocker cover</td>
<td>3M ATD Part No. 8660 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Beam bearing cap</td>
<td>Mitsubishi Genuine Part No. MD970389 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Oil pump case</td>
<td>Mitsubishi Genuine Part No. MD970389 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Oil pan</td>
<td>Mitsubishi Genuine Part No. MD970389 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Oil pressure switch</td>
<td>3M ATD Part No. 8660 or equivalent</td>
<td>As required</td>
</tr>
<tr>
<td>Oil seal case</td>
<td>Mitsubishi Genuine Part No. MD970389 or equivalent</td>
<td>As required</td>
</tr>
</tbody>
</table>
FORM-IN-PLACE GASKET

The engine has several areas where the form-in-place gasket (FIPG) is in use. To ensure that the gasket fully serves its purpose, it is necessary to observe some precautions when applying the gasket. Bead size, continuity and location are of paramount importance. Too thin a bead could cause leaks. Too thick a bead, on the other hand, could be squeezed out of location, causing blocking or narrowing of the fluid feed line. To eliminate the possibility of leaks from a joint, therefore, it is absolutely necessary to apply the gasket evenly without a break, while observing the correct bead size.

The FIPG used in the engine is a room temperature vulcanisation (RTV) type and is supplied in a 100-gram tube (Part No. MD970389 or MD997110). Since the RTV hardens as it reacts with the moisture in the atmospheric air, it is normally used in the metallic flange areas. The FIPG, Part No. MD970389, can be used for sealing both engine oil and coolant, while Part No. MD997110 can only be used for engine oil sealing.

Disassembly

The parts assembled with the FIPG can be easily disassembled without use of a special method. In some cases, however, the sealant between the joined surfaces may have to be broken by lightly striking with a mallet or similar tool. A flat and thin gasket scraper may be lightly hammered in between the joined surfaces. In this case, however, care must be taken to prevent damage to the joined surfaces.

Surface Preparation

Thoroughly remove all substances deposited on the gasket application surfaces, using a gasket scraper or wire brush. Check to ensure that the surfaces to which the FIPG is to be applied is flat. Make sure that there are no oils, greases and foreign substances deposited on the application surfaces. Do not forget to remove the old sealant remaining in the bolt holes.

Form-in-Place Gasket Application (FIPG)

When assembling parts with the FIPG, you must observe some precautions, but the procedure is very simple as in the case of a conventional pre-cut gasket.

Applied FIPG bead should be of the specified size and without breaks. Also be sure to encircle the bolt hole circumference with a completely continuous bead. The FIPG can be wiped away unless it is hardened. While the FIPG is still moist (in less than 15 minutes), mount the parts in position. When the parts are mounted, make sure that the gasket is applied to the required area only.

The FIPG application procedure may vary on different areas. Observe the procedure described in the text when applying the FIPG.
<table>
<thead>
<tr>
<th>Tool</th>
<th>Number</th>
<th>Name</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>MB990767</td>
<td>End yoke holder</td>
<td>Holding camshaft sprocket (Used in combination with MD998715)</td>
<td></td>
</tr>
<tr>
<td>MB991559</td>
<td>Camshaft oil seal installer adaptor</td>
<td>Installation of camshaft oil seal (on left bank) (Used in combination with MD998713)</td>
<td></td>
</tr>
<tr>
<td>MD998051</td>
<td>Cylinder head bolt wrench</td>
<td>Loosening and tightening of cylinder head bolt</td>
<td></td>
</tr>
<tr>
<td>MD998442</td>
<td>Air bleed wire</td>
<td>Air bleeding of lash adjuster</td>
<td></td>
</tr>
<tr>
<td>MD998443</td>
<td>Auto-lash adjuster holder</td>
<td>Holding of the lash adjuster to prevent it from falling when rocker shaft assembly is removed or installed &lt;SOHC 24-valve&gt;</td>
<td></td>
</tr>
<tr>
<td>MD998713</td>
<td>Camshaft oil seal installer</td>
<td>Installation of camshaft oil seal</td>
<td></td>
</tr>
<tr>
<td>MD998714</td>
<td>Circular packing installer</td>
<td>Installation of circular packing &lt;6G72 12-valve&gt;</td>
<td></td>
</tr>
<tr>
<td>MD998715</td>
<td>Pulley holder pin</td>
<td>Holding camshaft sprocket (Used in combination with MB990767)</td>
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<tr>
<td>MD998716</td>
<td>Crankshaft wrench</td>
<td>Rotation of crankshaft</td>
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</tr>
<tr>
<td>Tool</td>
<td>Number</td>
<td>Name</td>
<td>Use</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>-------------------------------------------</td>
<td>---------------------------------------------</td>
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<tr>
<td></td>
<td>MD998717</td>
<td>Crankshaft front oil seal</td>
<td>Installation of crankshaft front oil seal installer</td>
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<tr>
<td></td>
<td>MD998718</td>
<td>Crankshaft rear oil seal installer</td>
<td>Press fitting crankshaft rear oil seal</td>
</tr>
<tr>
<td></td>
<td>MD998727</td>
<td>Oil pan remover</td>
<td>Removal of oil pan</td>
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<tr>
<td></td>
<td>MD998729</td>
<td>Valve stem seal installer</td>
<td>Installation of valve stem seal &lt;6G72 12-valve&gt;</td>
</tr>
<tr>
<td></td>
<td>MD998735</td>
<td>Valve spring compressor</td>
<td>Compressing the valve springs</td>
</tr>
<tr>
<td></td>
<td>MD998761</td>
<td>Camshaft oil seal installer</td>
<td>Installation of camshaft oil seal &lt;6G74 GDi&gt;</td>
</tr>
<tr>
<td></td>
<td>MD998762</td>
<td>Circular packing installer</td>
<td>Installation of circular packing &lt;6G74 GDi&gt;</td>
</tr>
<tr>
<td></td>
<td>MD998763</td>
<td>Valve stem seal installer</td>
<td>Installation of valve stem seal &lt;6G74 GDi&gt;</td>
</tr>
<tr>
<td></td>
<td>MD998767</td>
<td>Tensioner pulley</td>
<td>Adjustment of timing belt tension</td>
</tr>
<tr>
<td>Tool</td>
<td>Number</td>
<td>Name</td>
<td>Use</td>
</tr>
<tr>
<td>------</td>
<td>--------</td>
<td>-----------------------------</td>
<td>------------------------------------------------------------</td>
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<tr>
<td></td>
<td>MD998769</td>
<td>Crank pulley spacer</td>
<td>Cranking the crankshaft to install timing belt</td>
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<tr>
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<td>MD998772</td>
<td>Valve spring compressor</td>
<td>Compressing of the valve springs</td>
</tr>
<tr>
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<td>MB991999</td>
<td>Valve stem seal installer</td>
<td>Installation of valve stem seal &lt;SOHC 24-valve&gt;</td>
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<tr>
<td></td>
<td>MD998780</td>
<td>Piston pin setting tool</td>
<td>Removal and installation of piston pin</td>
</tr>
<tr>
<td></td>
<td>MD998781</td>
<td>Flywheel stopper</td>
<td>Holding flywheel or drive plate</td>
</tr>
</tbody>
</table>
3. ALTERNATOR

<12-VALVE>

Removal steps
1. Drive belt
2. Cooling fan
3. Fan clutch
4. Cooling fan pulley
5. Idler pulley
6. Tensioner pulley
7. Adjusting bolt
8. Adjusting stud
9. Tensioner bracket
10. Cooling fan bracket
11. Tensioner bracket stay
12. Alternator cover
13. Alternator
14. Crankshaft bolt
15. Special washer
16. Crankshaft pulley
17. Oil filler cap
18. Oil filler
19. Tube
REMOVAL AND INSTALLATION
<24-VALVE FOR PAJERO (V33V), CHALLENGER, L200>

Removal steps
1. Cooling fan
2. Fan clutch
3. Drive belt
4. Cooling fan pulley
5. Cooling fan bracket
6. Drive belt tensioner pulley
7. Timing indicator
8. Alternator
9. Accessory mount stay
10. Oil filler cap
11. Oil filler
12. Tube
13. Engine hanger
14. Accessory mount
15. Adjusting bolt
16. Adjusting stud
17. Crankshaft bolt
18. Special washer
19. Damper pulley
REMOVAL AND INSTALLATION

<24-VALVE FOR PAJERO (V63W, V65W, V67W, V73W, V75W, V77W), GDI>
REMOVAL SERVICE POINTS

CRANKSHAFT BOLT REMOVAL

With the Special Tool fixed to the drive plate or flywheel, remove the crankshaft bolt.

INSTALLATION SERVICE POINTS

CRANKSHAFT BOLT / WASHER / CRANKSHAFT PULLEY INSTALLATION

1. Clean the bolt hole in crankshaft bolt and damper pulley’s seating surface.
2. Degrease the cleaned seating surface of the damper pulley.
3. Install the damper pulley.
4. Apply oil to the threads of crankshaft bolt and the outer surface of washer.
5. Install the washer to the crankshaft bolt with its inside chamfered side toward the bolt head.
6. With the Special Tool fixed to the drive plate or flywheel, install the crankshaft bolt to the specified torque of 185 ± 5 Nm.
4. CONTROL AND EGR SYSTEM
REMOVAL AND INSTALLATION
<12-VALVE>

Removal steps
1. Breather hose
2. Vacuum pipe
3. Vacuum pipe and hose
4. EGR valve
5. EGR valve gasket
6. EGR pipe
7. EGR pipe gasket
REMOVAL AND INSTALLATION

<24-VALVE WITH VACUUM CONTROL VALVE (PAJERO-6G72)>

Removal steps

1. PCV hose
2. Breather hose
3. Blow-by hose
4. Vacuum hose
5. Hose
6. Vacuum pipe and hose
7. Vacuum pipe and hose
8. Solenoid valve
9. Vacuum control valve
10. Vacuum control valve bracket
11. EGR valve
12. EGR valve gasket
13. EGR pipe
14. EGR pipe gasket
REMOVAL AND INSTALLATION
<24-VALVE WITH VACUUM CONTROL VALVE (PAJERO-6G74)>

Removal steps
1. PCV hose
2. Breather hose
3. Blow-by hose
4. Vacuum hose
5. Vacuum pipe and hose
6. Solenoid valve
7. Vacuum control valve
8. Vacuum control valve bracket
9. EGR valve
10. EGR valve gasket
11. EGR pipe
12. EGR pipe gasket
REMOVAL AND INSTALLATION

<24-VALVE WITH VACUUM CONTROL VALVE (CHALLENGER)>

Removal steps
1. PCV hose
2. Breather hose
3. Blow-by hose
4. Vacuum hose
5. Hose
6. Vacuum pipe and hose
7. Vacuum pipe and hose
8. Solenoid valve
9. Vacuum control valve
10. Vacuum control valve bracket
11. EGR valve
12. EGR valve gasket
13. EGR pipe
14. EGR pipe gasket
REMOVAL AND INSTALLATION

<24-VALVE WITHOUT VACUUM CONTROL VALVE (6G75)>

Removal steps:
1. PCV hose A
2. PCV hose B
3. Blow-by hose
4. Breather and water hose assembly
5. Fuel return pipe
6. Vacuum pipe and hose assembly
7. Vacuum hose
8. Solenoid valve assembly
9. Purge hose assembly
10. Solenoid valve assembly
11. EGR valve
12. EGR valve gasket
13. EGR pipe
14. EGR pipe gasket
REMOVAL AND INSTALLATION
<24-VALVE WITHOUT VACUUM CONTROL VALVE (6G72 and 6G74)>

Removal steps
1. PCV hose
2. Breather hose
3. Blow-by hose
4. Vacuum pipe and hose <PAJERO for General Export, GCC–6G72, Australia, CHALLENGER>
5. Vacuum pipe and hose <PAJERO for Europe, Brazil, GCC–6G74>
6. Vacuum pipe and hose <L200>
7. Vacuum pipe and hose <PAJERO (V33V) for GCC, CHALLENGER for Europe, Australia>
8. Vacuum pipe <PAJERO (V63W, V73W) for GCC–6G72>
9. Vacuum pipe
10. Solenoid valve <Except for L200 (Up to 2003 model)>
11. EGR valve <Except for L200 (Up to 2003 model)>
12. EGR valve gasket <Except for L200 (Up to 2003 model)>
13. EGR pipe <Except for L200 (Up to 2003 model)>
14. EGR pipe gasket <Except for L200 (Up to 2003 model)>
REMOVAL AND INSTALLATION

<24-VALVE WITHOUT VACUUM CONTROL VALVE (6G75)>

Removal steps

1. PCV hose A
2. PCV hose B
3. Blow-by hose
4. Breather and water hose assembly
5. Fuel return pipe
6. Vacuum pipe and hose assembly
7. Vacuum hose
8. Vacuum hose
9. Vacuum tank
10. Solenoid valve assembly
11. Purge hose assembly
12. Solenoid valve assembly
13. EGR valve
14. EGR valve gasket
15. EGR pipe
16. EGR pipe gasket
REMOVAL AND INSTALLATION

<GD1>

Removal steps

1. PCV hose A
2. PCV hose B
3. PCV hose C
4. Breather hose
5. Blow-by hose
6. PCV pipe
7. Purge hose
8. Vacuum pipe and hose
9. Solenoid valve
10. Water hose
11. Water hose
12. Water hose
13. Water pipe assembly A
14. EGR valve
15. EGR valve gasket
16. EGR pipe
17. EGR pipe gasket
5. INTAKE AND IGNITION SYSTEM

REMOVAL AND INSTALLATION

<12-VALVE>

Removal steps
1. Spark plug cable
2. High tension cable
3. Ignition coil assembly
4. Stay B
5. Spark plug
6. Distributor
7. Air intake plenum stay, front
8. Air intake plenum stay, rear
9. Throttle body
10. Throttle body gasket
11. Air intake plenum
12. Air intake plenum gasket
13. PCV hose
REMOVAL AND INSTALLATION
<24-VALVE FOR PAJERO (6G72 and 6G74), CHALLENGER, L200 (From 2004 model)>

Removal steps
1. Ignition coil assembly
2. Ignition power transistor
3. MDP sensor <For Taiwan>
4. Boost sensor <For Hong Kong>
5. Air intake plenum stay
6. Water outlet fitting bracket
7. Throttle body
8. Throttle body gasket
9. Air intake fitting
10. Intake fitting gasket
11. Intake upper manifold
12. Air intake plenum gasket
13. Spark plug cable
14. Spark plug
REMOVAL AND INSTALLATION
<24-VALVE FOR L200 (Up to 2003 model)>

Removal steps
1. Air intake plenum stay
2. Ignition coil assembly
3. Water outlet fitting bracket
4. Power transistor
5. Bracket
6. Accel cable bracket
7. Throttle body
8. Throttle body gasket
9. Air intake plenum
10. Air intake plenum gasket
11. Spark plug cable
12. Spark plug
REMOVAL AND INSTALLATION

<GDI>

Removal steps
1. Engine hanger
2. Water outlet fitting bracket
3. Throttle body stay
4. Throttle body
5. Throttle body gasket
6. Center cover, left
7. Center cover, right
8. Ignition coil harness
9. Ignition coil
10. Spark plug
11. Ignition failure sensor
12. Cone disc spring
13. Intake manifold
14. Intake manifold gasket
REMOVAL AND INSTALLATION

<24-VALVE (6G75)>

Removal steps

1. Boost sensor (For Taiwan)
2. Air intake plenum stay
3. Water outlet fitting bracket
4. Throttle body
5. Throttle body gasket
6. Air intake plenum
7. ICV primary gasket
8. ICV secondary gasket
9. Induction control valve assembly
10. Air intake plenum gasket
11. Spark plug cable
12. Ignition coil assembly
13. Spark plug
INSTALLATION SERVICE POINTS

A. INTAKE MANIFOLD INSTALLATION
Tighten the intake manifold mounting nuts in the following order.
1. Tighten nut (L) on the left bank side to 7 Nm.
2. Tighten nut (R) on the right bank side to the specified torque.
3. Tighten (L) to the specified torque.
4. Tighten (R) to the specified torque.
5. Tighten (L) to the specified torque.

B. THROTTLE BODY GASKET INSTALLATION
Install the throttle body gasket so that its tab is located at the position shown.

C. BOOST SENSOR/MDP SENSOR INSTALLATION
Caution
Do not apply an impact to the sensor. Never use a dropped sensor.
6. TIMING BELT
REMOVAL AND INSTALLATION
<12-VALVE>

Removal steps
1. Timing belt front upper cover, right
2. Timing belt front upper cover, left
3. Timing belt front lower cover
4. Timing belt
5. Timing belt tensioner
6. Tensioner spring
7. Front flange
8. Crankshaft sprocket
9. Camshaft sprocket bolt
10. Camshaft sprocket
11. Timing belt rear upper cover, left
12. Alternator stay
13. Alternator bracket
REMOVAL AND INSTALLATION
<24-VALVE FOR PAJERO (V33V), CHALLENGER, L200>

Removal steps
1. Timing belt cover cap
2. Timing belt front upper cover, right
3. Timing belt front upper cover, left
4. Timing belt front lower cover
5. Timing belt
6. Crankshaft position sensor
7. Camshaft position sensor
8. Auto tensioner
9. Tensioner pulley
10. Tensioner arm
11. Shaft
12. Idler pulley
13. Idler pulley spacer
14. Crankshaft sprocket
15. Crankshaft spacer
16. Crankshaft sensing blade
17. Camshaft sprocket bolt
18. Camshaft sprocket
19. Harness protector
20. Timing belt rear cover
REMOVAL AND INSTALLATION
<24-VALVE FOR PAJERO (V63W, V65W, V67W, V73W, V75W, V77W)>

Removal steps
1. Timing belt front upper cover, right
2. Timing belt front upper cover, left
3. Timing belt front lower cover
4. Timing belt
5. Crankshaft position sensor
6. Auto tensioner
7. Tensioner pulley
8. Tensioner arm
9. Shaft
10. Idler pulley
11. Crankshaft sprocket
12. Crankshaft spacer
13. Crankshaft sensing blade
14. Cam position sensor
15. Cam position sensor support
16. Cam position sensing cylinder
17. Camshaft sprocket bolt
18. Camshaft sprocket
19. Timing belt rear cover
REMOVAL AND INSTALLATION

<GI>
REMOVAL SERVICE POINTS

A TIMING BELT REMOVAL

When the timing belt is to be reused, in order to allow re-installation of the belt so that it travels in the same direction as before it was removed, mark the direction of travel with an arrow before removing it.

Caution
(1) As water or oil on the belt can seriously reduce its usable life, ensure that the timing belt, sprocket, and tensioner stay clean and dry while removed, and never wash them. Parts that have become too dirty should be replaced.
(2) When any of the parts are oily, check to see whether there are any oil leaks in any of the oil seals or the camshaft oil seal on the front of the engine.

B TIMING BELT REMOVAL

1. Turn the crankshaft to bring the piston in No. 1 cylinder to its TDC on the compression stroke.

2. If reusing the timing belt, use a chalk to draw an arrow on back of the timing belt to indicate rotation direction.

NOTE
(1) Water or oil on the belt shortens its life drastically, so the removed timing belt, sprocket, and tensioner must be kept free from oil and water. Do not immerse parts in cleaning solvent.
(2) If there is oil or water on any part, check the front case oil seal, camshaft oil seal and water pump for leaks.

C CAM POSITION SENSING CYLINDER REMOVAL

With the camshaft sprocket locked in position using the special tool, remove the cam position sensing cylinder.
CAMSHAFT SPROCKET BOLT REMOVAL
1. Using the Special Tool, hold the camshaft sprocket.
2. Remove the camshaft sprocket bolt.

INSTALLATION SERVICE POINTS

CAMSHAFT SPROCKET BOLT INSTALLATION
1. Using the Special Tool, hold the camshaft sprocket.
2. Torque the camshaft sprocket bolt to the specified torque.

CAMSHAFT SPROCKET BOLT INSTALLATION
1. Using the Special Tool, hold the camshaft sprocket.
2. Torque the camshaft sprocket bolt to the specified torque.

CAM POSITION SENSING CYLINDER INSTALLATION
With the camshaft sprocket locked in position using the special tool, install the cam position sensing cylinder.
**D** CAM POSITION SENSOR SUPPORT INSTALLATION

Apply a 3 mm bead of form-in-place gasket (FIPG) to the area shown.

**Specified sealant:**
Mitsubishi Genuine Part No. MD970389 or equivalent

**E** CRANKSHAFT SPROCKET / CRANKSHAFT SENSING BLADE / CRANKSHAFT SPACER INSTALLATION

1. Wipe clean the crankshaft fitting surface of the crankshaft sprocket.
2. Clean and degrease the crankshaft sprocket, the crankshaft sprocket fitting surface of the crankshaft, the sensing blade and the crankshaft spacer. Then, install the crankshaft sprocket, crankshaft sensing blade and crankshaft spacer on the crankshaft.

**F** CRANKSHAFT SPROCKET / FRONT FLANGE INSTALLATION

1. Wipe clean the crankshaft fitting surface of the crankshaft sprocket.
2. Clean and degrease the crankshaft sprocket, the crankshaft sprocket fitting surface of the crankshaft, front flange. Then, install the crankshaft sprocket, front flange on the crankshaft.

**G** AUTO TENSIONER INSTALLATION

1. If the auto tensioner rod is fully extended, set it in the retracted position with the following procedure.
   (1) Set the auto tensioner in a vice, while making sure it is not tilted.
   (2) Slowly close the vice to force the rod in until the set hole (A) of the rod is lined up with the set hole (B) of the cylinder.
   (3) Insert a metal wire (1.4 mm in diameter) into the set holes.
   (4) Remove the auto tensioner from the vice.
2. On engines with turbocharger, apply sealant to the threads of the auto tensioner mounting bolt.

**Specified sealant:** 3M ATD Part No. 8660 or equivalent
3. Install the auto tensioner on the cylinder block through the oil pump case.
TIMING BELT INSTALLATION

1. Align the timing marks of the camshaft sprockets and the crankshaft sprocket.
2. First, route the timing belt on the crankshaft sprocket, then on the camshaft sprocket of the left bank side without slackness in the tension side.
3. Next, run the timing belt onto the water pump pulley, the camshaft sprocket on the right bank side, and the timing belt tensioner.

4. Back off the tensioner lock bolt one or two turns.
5. Install the flange onto the front end of crankshaft.
6. Install the special tool onto the crankshaft.
7. Turn the crankshaft clockwise smoothly two turns.
8. Tighten the tensioner lock nut to specified torque.
TIMING BELT INSTALLATION

1. Turn the crankshaft sprocket to position its timing mark 3 teeth away from the timing mark on the crankcase. (That is, slightly lower the No. 1 piston from the top dead center on the compression stroke.)

**Caution**
If the camshaft sprocket is turned with the piston at the top dead center on the compression stroke, valves may interfere with the piston.

2. Align the timing marks for the left bank camshaft sprocket.
3. Align the timing marks for the right bank camshaft sprocket.

**Caution**
The camshaft sprocket may turn unintentionally due to the valve spring tension. Take care not to injure your fingers.

4. Align timing marks for the crankshaft sprocket.
5. Install the timing belt over the sprockets in the following procedure.
   (1) Place the timing belt over the crankshaft. While giving tension to the belt, set it over the idler pulley.
   (2) Place the belt over the left bank camshaft sprocket.
   (3) While giving tension to the belt, place it over the water pump pulley.
   (4) Place the belt over the right bank camshaft sprocket.
   (5) Place the belt over the tensioner pulley.
6. While pressing the tensioner pulley lightly against the timing belt, temporarily tighten its center bolt.
7. Check that all timing marks are in alignment.

8. Using the special tool, turn the crankshaft counter-clockwise a quarter turn, then turn it clockwise and align the timing marks. Make sure that all timing marks are in alignment.
6G7 ENGINE – Timing Belt

<PAJERO (V33V), CHALLENGER, L200>

Right bank

Left bank

Crankshaft sprocket

Timing mark

Water pump pulley

Tensioner pulley

Auto tensioner

Camshaft sprocket

Idler pulley

<PAJERO (V63W, V65W, V67W, V73W, V75W, V77W)>

Right bank

Left bank

Water pump pulley

Timing mark

Camshaft sprocket

Tensioner pulley

Idler pulley

Auto tensioner

Camshaft sprocket

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9. Set the special tool and a torque wrench on the tensioner pulley.
10. Torque the tensioner pulley to 4.4 Nm.
11. While holding the tensioner pulley, tighten its center bolt to the specified torque.
12. Turn the crankshaft 2 turns clockwise and let it stand for approx. 5 minutes.

13. Remove the wire, which has been inserted when installing the tensioner, from the auto tensioner. If it is removed easily, the timing belt tension is correct. Make sure that the auto tensioner rod projection is within specification.

Standard value:
- 3.8 – 4.5 mm
- 4.8 – 5.5 mm

14. If the wire cannot be removed easily or the rod protrusion is not up to specification, repeat steps 9. through 12. to obtain the correct tension.

► TIMING BELT INSTALLATION

1. Turn the crankshaft sprocket so that its timing mark is off three teeth to slightly lower the piston in No. 1 cylinder from its TDC on the compression stroke.

Caution
There can be an interference between the valve and piston when the camshaft sprocket is turned with the piston in No. 1 cylinder at its TDC on the compression stroke.
2. Align the timing mark of the camshaft sprocket on the left bank side.

3. Align the timing marks of the camshaft sprockets on the right bank side. When the special tool is removed, the sprocket turns by itself, letting the timing mark to deviate. Make necessary corrections, therefore, in step 5. to align the timing mark before installing the belt.

**Caution**

1. The camshaft sprockets on the right bank side are easy to turn because of the spring tension involved. Be careful not to allow your finger to be pinched in the mechanism.

2. Do not attempt to turn one of the sprockets on the right side one turn with the timing mark of another one aligned. It may cause the intake and exhaust valves to interfere with each other.

4. Align the timing mark of the crankshaft sprocket. Then, turn the crankshaft sprocket one tooth counterclockwise.

5. Align the timing marks of the camshaft sprockets on the right bank side and lock them in position with box wrenches.
6. Make sure that the timing mark of the exhaust camshaft sprocket on the right bank side is in alignment. Then install the timing belt over the sprocket and secure it with a paper clip.

**Caution**
If the old timing belt is to be reused, install it so that the arrow marked during removal procedures points in the turning direction.

7. Check that the timing mark is aligned on the intake camshaft sprocket. Then install the timing belt and secure it with a paper clip.

8. Place the timing belt around the water pump pulley.

9. Check that the timing marks of the camshaft sprockets on the left bank side are in alignment. Then install the timing belt over the sprockets and secure it with paper clips.

10. Place the timing belt around the idler pulley.

11. Place the timing belt around the crankshaft sprocket.

12. Place the timing belt around the tensioner pulley.

13. Make sure that the tensioner pulley is positioned so that its pinhole is on the upper side. Then, lightly press the tensioner pulley against the timing belt and temporarily tighten the fixing bolt.

14. Remove all four paper clips.

15. Turn the crankshaft one tooth clockwise.

16. Check that the timing mark of each sprocket is properly aligned.

17. Turn the crankshaft 1/4 turns counter-clockwise. Then, turn it clockwise and check that the timing marks are properly aligned.
18. Loosen the center bolt of the tensioner pulley and install the special tool and torque wrench. Apply a torque of 4.4 Nm to prevent the tensioner pulley from turning together, tighten the center bolt to the specified torque.

19. Turn the crankshaft two complete turns clockwise and leave it to stand for about 5 minutes.

20. Check to see if the metal wire, which has been inserted during installation procedures, can be removed easily from the auto tensioner. If it can be removed with a light force, it indicates that the belt tension is appropriate. Now, remove the metal wire. Another indication of an adequate belt tension is that the protrusion of the rod of the auto tensioner falls within the standard value range.

**Standard value: 4.8 – 5.5 mm**

21. If the metal wire cannot be pulled out easily, repeat steps 18. and 19. until an adequate tension is obtained.
INSPECTION

1. TIMING BELT
Check the belt in detail. If the following is evident, replace the belt.
(1) Hardened back surface rubber.
Back surface glossy, non-elastic and so hard that even if a finger nail is forced into it, no mark is produced.

(2) Cracked back surface rubber.
(3) Cracked or separated canvas.
(4) Cracked tooth bottom.
(5) Cracked side of belt.

(6) Side of belt badly worn.
NOTE
Normal belt should have clear-cut sides as if cut with a sharp knife.

(7) Badly worn teeth.
Initial stage:
Canvas is worn (fluffy canvas fibres are visible, rubber is gone and colour has changed to white. Canvas texture is not clear).
Last stage:
Canvas is worn out and rubber exposed and its width is reduced.

(8) Missing tooth.

2. AUTO TENSIONER
(1) Check for oil leaks. If oil leaks are evident, replace the auto tensioner.
(2) Check the rod end for wear or damage and replace the auto tensioner if necessary.
(3) Measure the rod projection length “L”. If the reading is outside the standard value, replace the auto tensioner.

Standard value “L”: 12 mm
(4) Press the rod by a force of 98 to 196 N and measure the rod stroke. If the measured value exceeds the standard value, replace the tensioner.

**Standard value: 1 mm or less**
7. WATER PIPE AND WATER HOSE
REMOVAL AND INSTALLATION
<12-VALVE>

Removal steps
1. Water hose
2. Water hose
3. Water by-pass hose
4. Heat pipe
5. Heat pipe gasket
6. Thermo switch <for A/T>
7. Engine coolant temperature gauge unit
8. Engine coolant temperature sensor
9. Water outlet fitting
10. Water outlet fitting gasket
11. Thermostat
12. Water pipe
13. O-ring
REMOVAL AND INSTALLATION

<24-VALVE FOR PAJERO (V33V), CHALLENGER, L200>

Removal steps
1. Water hose
2. Water hose
3. Water hose
4. Water hose
5. Engine coolant temperature gauge unit
6. Engine coolant temperature sensor
7. Thermo switch (For PAJERO-A/T)
8. Water outlet fitting
9. Water outlet fitting gasket
10. Water outlet pipe
11. O-ring
12. Water inlet fitting
13. Thermostat
14. Thermostat case
15. Gasket
16. Water passage
17. Gasket
18. Water pipe
19. O-ring
REMOVAL AND INSTALLATION

<24-VALVE FOR PAJERO (V63W, V65W, V67W, V73W, V75W, V77W)>

Removal steps
1. Water hose
2. Water hose
3. Water hose
4. Water hose
5. Engine coolant temperature gauge unit
6. Engine coolant temperature sensor
7. Water outlet fitting
8. Gasket
9. Water outlet pipe
10. O-ring
11. Water inlet fitting
12. Thermostat
13. Thermostat case
14. Gasket
15. Water pump fitting
16. Gasket
17. Water passage
18. Gasket
19. Water pipe
20. O-ring
REMOVAL AND INSTALLATION

1. Engine coolant temperature gauge unit
2. Engine coolant temperature sensor
3. Water outlet fitting
4. Gasket
5. Water outlet pipe
6. O-ring
7. Water hose
8. Water inlet fitting
9. Thermostat
10. Thermostat case
11. Gasket
12. Water pump fitting
13. Gasket
14. Timing belt rear center cover, right
15. Fitting, right
16. Gasket
17. Fitting, left
18. Gasket
19. Timing belt rear center cover, left
20. Water hose
21. Water passage
22. Gasket
23. Water pipe
24. O-ring
25. Water hose
26. Water pipe assembly B
27. Water hose
INSTALLATION SERVICE POINTS

A  O-RING / WATER PIPE INSTALLATION
1. Fit a new O-ring in the groove at the front end of the water pipe.
2. Coat the O-ring with water or soapsuds.
   **Caution**
   Never apply engine oil or any other grease to the O-ring.
3. Insert the front end of the water pipe in the water pump.

B  THERMOSTAT INSTALLATION
Install the thermostat so that the jiggle valve is on the top end.

C  O-RING / WATER OUTLET PIPE INSTALLATION
1. Fit new O-rings in the grooves at the front and rear ends of the water pipe.
2. Coat the O-rings with water or soapsuds.
   **Caution**
   Never apply engine oil or any other grease to the O-rings.
3. Insert the front end of the pipe into the water outlet pipe and rear end into the water passage.

D  ENGINE COOLANT TEMPERATURE SENSOR INSTALLATION
If the engine coolant temperature sensor is to be reused, apply the specified sealant to its threads.
   **Specified sealant:**
   3M Nut Locking Part No. 4171 or equivalent

E  ENGINE COOLANT TEMPERATURE GAUGE UNIT INSTALLATION
If the engine coolant temperature gauge unit is to be reused, apply the specified sealant to its threads.
   **Specified sealant:**
   3M ATD Part No. 8660 or equivalent
THERMO SWITCH INSTALLATION

If the thermo switch is to be reused, apply the specified sealant to its threads.

Specified sealant:
3M Nut Locking Part No. 4171 or equivalent
8. FUEL SYSTEM

REMOVAL AND INSTALLATION

<12-VALVE>

Removal steps

1. Injector and delivery pipe
2. Insulator
3. Fuel pressure regulator
4. O-ring
5. Insulator
6. Injector
7. O-ring
8. Grommet
9. Delivery pipe
10. Intake manifold
11. Intake manifold gasket
**Removal steps**

1. Injector harness
2. Vacuum hose (6G75)
3. Fuel hose (6G75)
4. Injector and delivery pipe
5. Insulator
6. Fuel pressure regulator
7. O-ring
8. Insulator
9. Injector
10. O-ring
11. Grommet
12. Fuel pipe
13. O-ring
14. Delivery pipe
15. Water pump bracket
16. Intake manifold
17. Intake manifold gasket

<Except PAJERO (V63W, V65W, V67W, V73W, V75W, V77W)>
REMOVAL AND INSTALLATION

<GDI>

Removal steps

1. Injector harness
2. Fuel feed pipe
3. Backup ring
4. O-ring
5. Backup ring
6. Fuel pump
7. O-ring
8. Flange
9. Fuel pressure sensor
10. O-ring
11. Backup ring
12. Fuel center pipe
13. Backup ring
14. O-ring

15. Backup ring
16. Washer
17. Injector holder
18. Injector and delivery pipe
19. Insulator
20. Injector gasket
21. Corrugated washer
22. Backup ring
23. O-ring
24. Backup ring
25. Injector
26. Delivery pipe, right
27. Delivery pipe, left
INSTALLATION SERVICE POINTS

► A INTAKE MANIFOLD INSTALLATION
1. Tighten the nuts on the right bank to 7 ± 1 Nm.
2. Tighten the nuts on the left bank to the specified torque. Then tighten the nuts on right bank to the specified torque.
3. Tighten the nuts on the left bank and those on the right bank again in that order.

► B FUEL PRESSURE REGULATOR INSTALLATION
Before installing the pressure regulator, the O-ring must be lubricated with a drop of new engine oil for easy installation.

Caution
Use care not to let the engine oil enter the delivery pipe.

► C BACKUP RING / O-RING INSTALLATION
Install the backup rings and O-ring to the injector. Install the backup ring (thicker one) in the injector so that its inner cut surface faces in the direction shown.

► D CORRUGATED WASHER INSTALLATION
Coat the corrugated washer with white vaseline and install it to the injector as shown.

Caution
Always replace the corrugated washer with new one. Reused corrugated washer can cause fuel or gas leaks.

► E INJECTOR AND DELIVERY PIPE INSTALLATION
1. Apply spindle oil or gasoline to the O-ring in the injector.
2. Insert the injectors straight into the injector mounting holes in the delivery pipe.
3. Turn each injector. If it does not turn smoothly, remove it and check the O-ring for damage. If the O-ring is damaged, replace it with a new one; then, reinstall the injector and check to see if it turns smoothly.
4. Align the alignment mark on each injector with that on the delivery pipe.
5. Install the injector and delivery pipe into the cylinder head.
6. Tighten the bolt at the center of each delivery pipe to the specified torque. Then tighten bolts on both ends to the specified torque.

**F** BACKUP RING / O-RING / FUEL CENTER PIPE INSTALLATION

1. Fit the backup rings and O-ring to both ends of the fuel center pipe. Mount the backup ring (thicker one) so that its inner cut surface faces in the direction shown.
2. Coat the O-rings on both ends of the pipe with spindle oil or gasoline.
3. Insert the fuel center pipe straight into the mounting hole in the delivery pipe. Insert it all the way into the hole, ensuring that it does not twist.
4. Tighten the bolts on both ends of the fuel center pipe to the specified torque.

**G** BACKUP RING / O-RING / FUEL PRESSURE SENSOR INSTALLATION

1. Fit the backup ring to the fuel pressure sensor so that its inner cut surface faces in the direction shown.
2. Being attentive to the shape of the connector and label surface of the fuel pressure sensor, install the fuel pressure sensor in the direction shown.
**FUEL PUMP / BACKUP RING / O-RING / FUEL FEED PIPE INSTALLATION**

1. Apply engine oil to the roller of the fuel pump and O-ring.

2. Insert the fuel pump into the mounting hole in the cylinder head and lightly tighten the four bolts (slightly tighter than finger-tight).

3. Fit the backup rings and O-ring to both ends of the fuel feed pipe. Mount the backup ring (thicker one) so that its inner cut surface faces in the direction shown.

4. Coat the O-rings on both ends of the pipe with spindle oil or gasoline.

5. Insert the fuel feed pipe straight into the mounting hole in the fuel pump. Insert it all the way into the hole, ensuring that it does not twist.

6. Tighten the bolts on both ends of the pipe to the specified torque.

7. Using a torque wrench (minimum graduations), follow these steps to tighten the fuel pump mounting bolts.
   (1) Tighten the bolts to 5 Nm in the order shown.
   (2) Tighten the bolts to 17 Nm in the order shown.

   Variations in torque among the four bolts should be within 2 Nm.

**Caution**
Strictly observe the tightening order. A leak and other problem could result if the torque specifications and torquing order are not met.
9. EXHAUST MANIFOLD
REMOVAL AND INSTALLATION
<12-VALVE>

Removal steps
1. Oil level gauge
2. Oil level gauge guide
3. O-ring
4. Heat protector, right
5. Engine hanger
6. Exhaust manifold, right
7. Exhaust manifold gasket
8. Heat protector, left
9. Bracket
10. Exhaust manifold, left
11. Exhaust manifold gasket
12. Water inlet fitting
13. Water inlet fitting gasket
14. Water pump
15. Water pump gasket
REMOVAL AND INSTALLATION
<24-VALVE (6G72 and 6G74)>

Removal steps
1. Oil level gauge
2. Oil level gauge guide
3. O-ring
4. Heat protector, right
5. Exhaust manifold, right
6. Exhaust manifold gasket
7. Heat protector, left
8. Exhaust manifold, left
9. Exhaust manifold gasket
10. Water pump
11. Gasket
REMOVAL AND INSTALLATION
<24-VALVE (6G75), GDI>

Removal steps
1. Oil level gauge
2. Oil level gauge guide
3. O-ring
4. Heat protector, right
5. Exhaust manifold, right
6. Exhaust manifold gasket
7. Heat protector, left
8. Exhaust manifold, left
9. Exhaust manifold gasket
10. Water pump
11. Gasket

Torque values:
- 14 ± 1 Nm
- 49 ± 5 Nm <GDI>
- 44 ± 5 Nm <24-valve (6G75)>
- 24 ± 3 Nm
INSTALLATION SERVICE POINTS

EXHAUST MANIFOLD GASKET INSTALLATION

Install gaskets with number 1, 3 and 5 embossed on their top side to the right bank and install those with number 2, 4 and 6 to the left bank.
10. ROCKER ARMS AND CAMSHAFT
REMOVAL AND INSTALLATION

<12-VALVE>

Removal steps

1. Rocker cover
2. Rocker cover gasket
3. Circular packing
4. Oil seal
5. Distributor adaptor
6. O-ring
7. Rocker arms, rocker arm shaft
8. Bearing cap No. 4
9. Rocker arms
10. Rocker shaft spring
11. Bearing cap No. 3
12. Bearing cap No. 2
13. Rocker arm shaft “B”
14. Rocker arm shaft “A”
15. Lash adjuster
16. Bearing cap No. 1
17. Camshaft

Apply engine oil to all moving parts before installation.
Apply engine oil to all moving parts before installation.

Removal steps
1. Rocker cover
2. Gasket
3. Oil seal
4. Oil seal
5. Rocker arms, Rocker arm shaft
6. Rocker arms, Rocker arm shaft
7. Rocker shaft spring
8. Rocker arm “A”
9. Rocker arm “B”
10. Rocker arm shaft
11. Lash adjuster
12. Rocker arm “C”
13. Rocker arm shaft
14. Lash adjuster
15. Thrust case
   <Except PAJERO (V63W, V73W)>
16. O-ring
   <Except PAJERO (V63W, V73W)>
17. Camshaft
REMOVAL SERVICE POINTS

A LASH ADJUSTER REMOVAL
Before removing the rocker arms and rocker arm shafts, install the Special Tools to prevent the lash adjusters from falling off.

Caution
If the lash adjuster is re-used, clean the lash adjuster. (Refer to LASH ADJUSTER INSPECTION)

INSTALLATION SERVICE POINTS

CAMSHAFT INSTALLATION
1. Before attaching the camshafts, apply engine oil to the journals and cams. Take care not to confuse the right bank and left bank camshafts.

   NOTE
   The right bank camshaft has 4-mm-wide slits in the rear end surface.

2. Make sure the camshaft dowel pin is at the location shown.

B LASH ADJUSTER INSTALLATION

Caution
If the lash adjuster is re-used, clean the lash adjuster. (Refer to LASH ADJUSTER INSPECTION)

Taking care not to spill the diesel fuel, install the lash adjuster into the rocker arm and attach a special tool to prevent it from falling out.

ROCKER ARM SHAFT INSTALLATION
1. The end with the larger chamfer is at the right on the front bank and at the left on the rear bank.

   NOTE
   The side with the four bolt holes is on the intake side.

2. The side with the oil holes is on the lower side (cylinder head side).
**ROCKER ARM SHAFTS INSTALLATION**

1. Install the rocker arm shafts “A” and “B” to the camshaft bearing cap No. 1 and insert the bolts into the holes of bearing cap and shafts.

2. Install rocker arm shafts with the notched side facing the bearing cap No. 1 and the oil grooved side facing downward. The shaft with a smaller oil hole is the rocker arm shaft “A”.

**ROCKER ARMS, ROCKER ARM SHAFTS INSTALLATION**

1. Apply a minimum amount of specified sealant on the four places of cylinder head.

   **NOTE**

   Be sure the sealing agent does not swell out onto the cam journal surface of the cylinder head. If it swells out, immediately wipe it off before it can dry.

   **Specified sealant:**
   
   3M NUT Locking No. 4171 or equivalent

2. Install the rocker arms, shafts and bearing caps such that the arrow mark on the bearing cap faces in the same direction as the arrow mark on the cylinder head.
3. Tighten the bearing cap bolts to the specified torque.
4. Remove the special tools from all rocker arms.

**F** ROCKER SHAFT SPRING INSTALLATION
Insert the rocker shaft spring at a slant with respect to the spark plug guide and install it normal to the guide.

**G** CAMSHAFT OIL SEAL INSTALLATION
Using the special tool, install the oil seal.

**H** CIRCULAR PACKING INSTALLATION
Install a 1.3 to 1.5 mm thick spacer to the special tool and drive in the circular packing.

**NOTE**
Use of MD724328 spacer for transmission is recommended.
Caution
The packing is overdriven if no spacer is fitted to the special tool.

ROCKER COVER INSTALLATION
Apply specified sealant on the area specified in the figure.
Specified sealant: 3M ATD Part No.8660 or equivalent

INSPECTION
1. CAMSHAFT
   Measure the cam height.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-valve</td>
<td>41.25</td>
<td>40.75</td>
</tr>
<tr>
<td>24-valve</td>
<td>37.58<em>1, 37.39</em>2</td>
<td>37.08<em>1, 36.89</em>2</td>
</tr>
<tr>
<td>Exhaust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-valve</td>
<td>41.25</td>
<td>40.75</td>
</tr>
<tr>
<td>24-valve</td>
<td>37.14<em>3, 36.95</em>4</td>
<td>36.64<em>3, 36.45</em>4</td>
</tr>
</tbody>
</table>

*1: 6G72 (except for Hong Kong)
*2: 6G72 (for Hong Kong) and 6G74, 6G75
*3: 6G74 and 6G75
*4: 6G72

2. ROCKER ARM
   (1) Check the roller surface and replace the rocker arm if recesses, damage or heat seizure is observed.
   (2) Check roller rotation and replace the rocker arm if uneven rotation or roller backlash is observed.
   (3) Check the inside diameter and replace the rocker arm if damage or seizure is observed.
3. ROCKER ARM SHAFT
   (1) Check rocker arm mounting portions of rocker arm shaft for wear or damage. Replace as necessary.
   (2) Check to ensure that oil holes are clear.
4. LASH ADJUSTERS

Caution
(1) The lash adjusters are precision-engineered mechanisms. Do not allow them to become contaminated by dirt or other foreign substances.
(2) Do not attempt to disassemble the lash adjusters.
(3) Use only fresh diesel fuel to clean the lash adjusters.

(1) Prepare three containers and approximately five liters of diesel fuel. Into each container, pour enough diesel fuel to completely cover a lash adjuster when it is standing upright. Then, perform the following steps with each lash adjuster.

(2) Place the lash adjuster in container A and clean its outside surface.

NOTE
Use a nylon brush if deposits are hard to remove.

(3) While gently pushing down the internal steel ball using special tool MD998442, move the plunger through 5 to 10 strokes until it slides smoothly. In addition to eliminating stiffness in the plunger, this operation will remove dirty oil.

Caution
The steel ball spring is extremely weak, so the lash adjuster’s functionality may be lost if the air bleed wire is pushed in hard.

NOTE
If the plunger remains stiff or the mechanism appears otherwise abnormal, replace the lash adjuster.
(4) Remove the lash adjuster from the container. Then, push down the steel ball gently and push the plunger to eliminate diesel fuel from the pressure chamber.

(5) Place the lash adjuster in container B. Then, gently push down the internal steel ball using special tool MD998442 and move the plunger through 5 to 10 strokes until it slides smoothly. This operation will clean the lash adjuster’s pressure chamber.

**Caution**
The steel ball spring is extremely weak, so the lash adjuster’s functionality may be lost if the air bleed wire is pushed in hard.

(6) Remove the lash adjuster from the container. Then, push down the steel ball gently and push the plunger to eliminate diesel fuel from the pressure chamber.

(7) Place the lash adjuster in container C. Then, gently push down the internal steel ball using special tool MD998442.

**Caution**
Do not use container C for cleaning. If cleaning is performed in container C, foreign matter could enter the pressure chamber when chamber is filled with diesel fuel.

(8) Stand the lash adjuster with its plunger at the top, then push the plunger downward firmly until it moves through its greatest possible stroke. Return the plunger slowly, then release the steel ball and allow the pressure chamber to fill with diesel fuel.
(9) Remove the lash adjuster from the container, then stand the lash adjuster with its plunger at the top. Push the plunger firmly and check that it does not move. Also, check that the lash adjuster’s height matches that of a new lash adjuster.

NOTE
If lash adjuster contracts, perform the operations (7) through (9) again to fill it with diesel fuel completely. Replace the lash adjuster if it still contracts after performing these steps.

(10) Stand the lash adjuster upright to prevent diesel fuel from spilling out. Do not allow the lash adjuster to become contaminated by dirt or other foreign matter. Fit the lash adjuster onto the engine as soon as possible.
11. ROCKER ARMS AND CAMSHAFT <GDI>

REMOVAL AND INSTALLATION

Apply engine oil to all moving parts before installation.

Removal steps

1. Rocker cover, right
2. Rocker cover gasket
3. Oil filler cap
4. Rocker cover, left
5. Rocker cover gasket
6. Oil seal
7. Circular packing
8. Beam camshaft cap, right
9. Beam camshaft cap, left
10. Exhaust camshaft, right
11. Intake camshaft, right
12. Intake camshaft, left
13. Exhaust camshaft, left
14. Rocker arm
15. Lash adjuster
REMOVAL SERVICE POINT

A LASH ADJUSTER REMOVAL

Caution
If the lash adjuster is re-used, clean the lash adjuster.
(Refer to LASH ADJUSTER INSPECTION)

INSTALLATION SERVICE POINTS

A LASH ADJUSTER INSTALLATION

Caution
If the lash adjuster is re-used, clean the lash adjuster.
(Refer to LASH ADJUSTER INSPECTION)

Fit the lash adjuster onto the rocker arm without allowing diesel fuel to spill out.

B BEAM CAMSHAFT CAP, LEFT / BEAM CAMSHAFT CAP, RIGHT INSTALLATION

1. Remove deposits from the surfaces of the beam camshaft caps and cylinder head, to which sealant is to be applied.
2. Squeeze a 3-mm-thick bead of sealant from the tube out into the groove in the bottom surface of the beam camshaft caps. Fit the caps before the sealant hardens.
   Specified sealant:
   MITSUBISHI GENUINE Part No. MD970389 or equivalent
3. Apply an adequate amount of sealant to the top surface of the cylinder head. Mount the beam bearing caps before the sealant hardens.
   Specified sealant:
   MITSUBISHI GENUINE Part No. MD970389 or equivalent
4. Mount the beam camshaft caps and tighten them in the order shown to the specified torque.
   Specified torque:
   M6 bolt: 11 ± 1 Nm
   M8 bolt: 24 ± 2 Nm
5. After the caps have been tightened, wipe the portion of the sealant that is squeezed out at the intake port before it hardens.
CIRCULA PACKING INSTALLATION
Using the special tool, install the oil seal.

OIL SEAL INSTALLATION
Using the special tool, install the oil seal.

INSPECTION

1. CAMSHAFT
   Measure the cam height.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>35.20</td>
<td>34.70</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>34.85</td>
<td>34.35</td>
</tr>
<tr>
<td>Exhaust</td>
<td>34.91</td>
<td>34.41</td>
</tr>
</tbody>
</table>

2. LASH ADJUSTER
   
   Caution
   (1) The lash adjusters are precision-engineered mechanisms. Do not allow them to become contaminated by dirt or other foreign substances.
   (2) Do not attempt to disassemble the lash adjusters.
   (3) Use only fresh diesel fuel to clean the lash adjusters.

   (1) Prepare three containers and approximately five liters of diesel fuel. Into each container, pour enough diesel fuel to completely cover a lash adjuster when it is standing upright. Then, perform the following steps with each lash adjuster.
(2) Place the lash adjuster in container A and clean its outside surface.

**NOTE**
Use a nylon brush if deposits are hard to remove.

(3) While gently pushing down the internal steel ball using special tool MD998442, move the plunger through 5 to 10 strokes until it slides smoothly. In addition to eliminating stiffness in the plunger, this operation will remove dirty oil.

**Caution**
The steel ball spring is extremely weak, so the lash adjuster’s functionality may be lost if the air bleed wire is pushed in hard.

**NOTE**
If the plunger remains stiff or the mechanism appears otherwise abnormal, replace the lash adjuster.

(4) Removal the lash adjuster from the container. Then, push down the steel ball gently and push the plunger to eliminate diesel fuel from the pressure chamber.

**Caution**
Make sure the oil hole in the side of the body is pointing toward container A. Do not point the oil hole at yourself or other people.

(5) Place the lash adjuster in container B. Then, gently push down the internal steel ball using special tool MD998442 and move the plunger through 5 to 10 strokes until it slides smoothly. This operation will clean the lash adjuster’s pressure chamber.

**Caution**
The steel ball spring is extremely weak, so the lash adjuster’s functionality may be lost if the air bleed wire is pushed in hard.
(6) Remove the lash adjuster from the container. Then, push down the steel ball gently and push the plunger to eliminate diesel fuel from the pressure chamber.

**Caution**
Make sure the oil hole in the side of the body is pointing toward container A. Do not point the oil hole at yourself or other people.

(7) Place the lash adjuster in container C. Then, gently push down the internal steel ball using special tool MD998442.

**Caution**
Do not use container C for cleaning. If cleaning is performed in container C, foreign matter could enter the pressure chamber when chamber is filled with diesel fuel.

(8) Stand the lash adjuster with its plunger at the top, then push the plunger downward firmly until it moves through its greatest possible stroke. Return the plunger slowly, then release the steel ball and allow the pressure chamber to fill with diesel fuel.

(9) Remove the lash adjuster from the container, then stand the lash adjuster with its plunger at the top. Push the plunger firmly and check that it does not move. Also, check that the lash adjuster’s height matches that of a new lash adjuster.

**NOTE**
If lash adjuster contracts, perform the operations (7) through (9) again to fill it with diesel fuel completely. Replace the lash adjuster if it still contracts after performing these steps.

(10) Stand the lash adjuster upright to prevent diesel fuel from spilling out. Do not allow the lash adjuster to become contaminated by dirt or other foreign matter. Fit the lash adjuster onto the engine as soon as possible.
12. CYLINDER HEAD AND VALVES
REMOVAL AND INSTALLATION

<12-VALVE>

Apply engine oil to all moving parts before installation.

Removal steps

1. Cylinder head bolt
2. Washer
3. Cylinder head assembly
4. Cylinder head gasket
5. Retainer lock
6. Valve spring retainer
7. Valve spring
8. Intake valve
9. Retainer lock
10. Valve spring retainer
11. Valve spring
12. Exhaust valve
13. Valve stem seal
14. Valve spring seat
15. Valve stem seal
16. Valve spring seat
17. Intake valve guide
18. Snap ring
19. Exhaust valve guide
20. Intake valve seat
21. Exhaust valve seat
22. Cylinder head
REMOVAL AND INSTALLATION

<24-VALVE>

Apply engine oil to all moving parts before installation.

Removal steps

1. Cylinder head bolt
2. Washer
3. Cylinder head assembly
4. Cylinder head gasket
5. Retainer lock
6. Valve spring retainer
7. Valve spring
8. Intake valve
9. Retainer lock
10. Valve spring retainer
11. Valve spring
12. Exhaust valve
13. Valve stem seal
14. Valve spring seat
15. Valve stem seal
16. Valve spring seat
17. Intake valve guide
18. Snap ring
19. Exhaust valve guide
20. Intake valve seat
21. Exhaust valve seat
22. Cylinder head
REMOVAL AND INSTALLATION

Apply engine oil to all moving parts before installation.

Removal steps

1. Cylinder head bolt
2. Washer
3. Cylinder head assembly
4. Cylinder head gasket
5. Retainer lock
6. Valve spring retainer
7. Valve spring
8. Intake valve
9. Retainer lock
10. Valve spring retainer
11. Valve spring
12. Exhaust valve
13. Valve stem seal
14. Valve spring seat
15. Valve stem seal
16. Valve spring seat
17. Intake valve guide
18. Exhaust valve guide
19. Intake valve seat
20. Exhaust valve seat
21. Cylinder head
REMOVAL SERVICE POINTS

**A. CYLINDER HEAD BOLT REMOVAL**
Using the special tool, loosen the cylinder head bolts. Loosen evenly, little by little.

**B. RETAINER LOCK REMOVAL**
Attach a tag with the cylinder No. and mounting location to the detached valves, springs and other parts and store them for reassembly.
VALVE STEM SEAL REMOVAL

Caution
Remove the valve stem seals with pliers and discard them.
Do not reuse the stem seal.
INSTALLATION SERVICE POINTS

VALVE STEM SEAL INSTALLATION

<12-VALVE>
1. Install the valve spring seat.

2. Using the special tool, install a new stem seal to the valve guide.
   
   Caution
   Do not reuse the valve stem seal.

<24-VALVE, GDI>
1. Attach a valve spring seat.
2. Attach a new stem seal to the valve guide with the Special Tool.

   NOTE
   Pay attention to the difference between the intake side and exhaust side valve stem seals.

   Identifying colour at the valve stem seal portion
   Intake side: Gray
   Exhaust side: Gray green

   Caution
   (1) Do not reuse valve stem seals.
   (2) Always use the Special Tool to install valve stem seals. Improper installation will cause oil leaks.
**B** VALVE SPRING INSTALLATION

1. Install the valve spring with the painted end on the rocker arm side.

**C** VALVE RETAINER LOCK INSTALLATION

Using Special Tool install the valve retainer lock.
CYLINDER HEAD BOLT INSTALLATION

1. Fit washers to the cylinder head bolts and install the bolts in the bolt holes in the cylinder head. Make sure of the correct orientation of the washer when installed.

2. Tighten the cylinder head bolts to the specified torque in the order shown.

3. Loosen all bolts.

4. Tighten the cylinder head bolts to the specified torque in the order shown.
INSPECTION

1. CYLINDER HEAD

(1) Check the cylinder head for water leaks, gas leaks, damage or cracks before washing it.
(2) Completely remove oil, fur, sealer, carbon and the like.
   After washing the oil passages, blow air through them to make sure they are not clogged.
(3) To ensure flatness of the cylinder head bottom surface, measure the distortion of the surface using a straight edge and a thickness gauge. When the distortion exceeds the specifications, correct by grinding the surface.

   Standard values of bottom surface distortion:
   - 12-valve engine: 0.05 mm
   - 24-valve, GDI engine: 0.03 mm

   Limit: 0.2 mm
   Grinding limit: 0.2 mm

Height of the cylinder head:
   - 12-valve engine: 84 mm
   - 24-valve engine: 120 mm
   - GDI engine: 132 mm

   Caution
   The cylinder head bottom surface may be ground to within 0.2 mm of the mating cylinder block.

2. VALVES

(1) When contact between the valve and the valve seat is improper, unbalanced or nonexistent, correct the valve seat.
(2) Change the valve when the margin doesn’t meet the specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-valve</td>
<td>Intake</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
<td>2.0</td>
</tr>
<tr>
<td>24-valve</td>
<td>Intake</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
<td>1.2</td>
</tr>
<tr>
<td>GDI</td>
<td>Intake</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Exhaust</td>
<td>1.5</td>
</tr>
</tbody>
</table>
(3) Measure the total length of the valve. If the measured value is below the limit, change the valve.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>102.97</td>
<td>102.47</td>
</tr>
<tr>
<td>Exhaust</td>
<td>102.67</td>
<td>102.17</td>
</tr>
<tr>
<td>24-valve (6G72, 6G74)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>112.30</td>
<td>111.80</td>
</tr>
<tr>
<td>Exhaust</td>
<td>114.11</td>
<td>113.61</td>
</tr>
<tr>
<td>24-valve (6G75)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>110.30</td>
<td>109.80</td>
</tr>
<tr>
<td>Exhaust</td>
<td>112.11</td>
<td>111.61</td>
</tr>
<tr>
<td>GDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>102.28</td>
<td>101.78</td>
</tr>
<tr>
<td>Exhaust</td>
<td>101.40</td>
<td>100.90</td>
</tr>
</tbody>
</table>

3. VALVE SPRING

(1) Measure the free height of the valve spring. When the measured value exceeds the specified limit, change the valve spring.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-valve</td>
<td>49.8</td>
<td>48.8</td>
</tr>
<tr>
<td>24-valve</td>
<td>51.0</td>
<td>50.0</td>
</tr>
<tr>
<td>GDI</td>
<td>47.2</td>
<td>46.2</td>
</tr>
</tbody>
</table>

(2) Measure the perpendicularity of the valve spring. When the measured value exceeds the specified limit, change the valve spring.

Standard value: $2^\circ$ max.
Limit: $4^\circ$
4. VALVE GUIDE

Measure the clearance between the valve guide and the valve stem. When the clearance exceeds the specified limit, change the valve guide or the valve or both.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.03–0.06</td>
<td>0.10</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.05–0.09</td>
<td>0.15</td>
</tr>
<tr>
<td>24-valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.02–0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.04–0.06</td>
<td>0.15</td>
</tr>
<tr>
<td>GDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.02–0.05</td>
<td>0.10</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.04–0.07</td>
<td>0.15</td>
</tr>
</tbody>
</table>

5. VALVE SEAT

Assemble the valve, and with it pressed down on the valve seat measure the part of the valve which protrudes from the spring seat surface. The length measured should be between the spring seat surface and the valve stem end. If the measured value exceeds the limit, change the valve.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>41.65</td>
<td>42.15</td>
</tr>
<tr>
<td>Exhaust</td>
<td>41.65</td>
<td>42.15</td>
</tr>
<tr>
<td>24-valve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>49.30</td>
<td>49.80</td>
</tr>
<tr>
<td>Exhaust</td>
<td>49.30</td>
<td>49.80</td>
</tr>
<tr>
<td>GDI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>47.10</td>
<td>47.60</td>
</tr>
<tr>
<td>Exhaust</td>
<td>46.60</td>
<td>47.10</td>
</tr>
</tbody>
</table>

6. VALVE SEAT RECONDITIONING PROCEDURE

(1) Check the clearance between the valve guide and the valve, and if necessary, change the valve guide before correcting the valve seat.

(2) Correct so that the valve seat width and angle are as specified in the figure at left.

(3) After making the corrections, apply lapping compound and adjust the valve and valve seat.
7. VALVE SEAT REPLACEMENT PROCEDURE

(1) Cut off the inside of the valve seat to reduce its thickness before pulling out the valve seat.
(2) Adjust the valve cylinder hole in the cylinder head to the diameter of the oversize valve seat to be press fitted.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>12-valve</td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.30 O.S. 44.30–44.33</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 44.60–44.63</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.30 O.S. 38.30–38.33</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 38.60–38.63</td>
</tr>
<tr>
<td>24-valve (6G72, 6G74)</td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.30 O.S. 34.30–34.33</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 34.60–34.63</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.30 O.S. 31.80–31.83</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 32.10–32.13</td>
</tr>
<tr>
<td>24-valve (6G75)</td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.30 O.S. 37.80–37.83</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 38.10–38.13</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.30 O.S. 34.80–34.83</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 35.10–35.13</td>
</tr>
<tr>
<td>GDI</td>
<td></td>
</tr>
<tr>
<td>Intake</td>
<td>0.30 O.S. 36.30–36.33</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 36.60–36.63</td>
</tr>
<tr>
<td>Exhaust</td>
<td>0.30 O.S. 33.30–33.33</td>
</tr>
<tr>
<td></td>
<td>0.60 O.S. 33.60–33.63</td>
</tr>
</tbody>
</table>

(3) When press fitting a valve seat, cool it using liquid nitrogen so as not to gall the cylinder head inside diameter.
(4) Machine the valve seat.
(5) See “Valve seat reconditioning procedure.”
8. VALVE GUIDE REPLACEMENT PROCEDURE

<12-VALVE>

(1) Remove the snap ring from the exhaust valve guide.
(2) Using the special tool and a press, remove the valve guide toward cylinder head gasket surface.
(3) Rebore valve guide hole to the new oversize valve guide outside diameter.

<table>
<thead>
<tr>
<th>Valve guide hole diameter</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05 O.S.: 13.05 – 13.07 mm</td>
<td></td>
</tr>
<tr>
<td>0.25 O.S.: 13.25 – 13.27 mm</td>
<td></td>
</tr>
<tr>
<td>0.50 O.S.: 13.50 – 13.52 mm</td>
<td></td>
</tr>
</tbody>
</table>

NOTE
Do not install a valve guide of the same size again.

(4) Using the special tool, press-fit the valve guide, working from the cylinder head top surface.
(5) After installing valve guides, insert new valves in them to check for sliding condition.
(6) When valve guides have been replace, check for valve contact and correct valve seats as necessary.

<24-VALVE, GDI>

(1) Remove the snap ring from the exhaust valve guide.
(2) Pull out to the cylinder block side using a press.
(3) Machine the valve guide hole in the cylinder head to match the oversize valve guide to be press fitted.

Caution
Do not press fit another valve guide of the same size.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>24-valve</td>
<td>0.05 O.S. 11.05–11.07</td>
</tr>
<tr>
<td>24-valve</td>
<td>0.25 O.S. 11.25–11.27</td>
</tr>
<tr>
<td>24-valve</td>
<td>0.50 O.S. 11.50–11.52</td>
</tr>
<tr>
<td>GDI</td>
<td>0.05 O.S. 12.05–12.07</td>
</tr>
<tr>
<td>GDI</td>
<td>0.25 O.S. 12.25–12.27</td>
</tr>
<tr>
<td>GDI</td>
<td>0.50 O.S. 12.50–12.52</td>
</tr>
</tbody>
</table>

(4) Press fit the valve guide until the projection is 14.0 mm, as shown.

NOTE
(1) Press fit the valve guide from the top surface of the cylinder head.
(2) Pay attention to the difference in the valve guide length (45.5 mm for the intake side valve guide and 50.5 mm for the exhaust side valve guide).
(3) After press fitting the valve guide, insert a new valve and check the contact between the valve guide and the valve.
13. OIL PAN AND OIL PUMP
REMOval AND INSTALLATION
<12-VAlve>

Apply engine oil to all moving parts before installation.

Removal steps
1. Oil pressure switch
2. Oil cooler by-pass valve
3. Oil filter
4. Oil filter bracket
5. Oil filter bracket gasket
6. Drain plug
7. Drain plug gasket
8. Oil pan
9. Oil screen
10. Oil screen gasket
11. Plug
12. Relief spring
13. Relief plunger
14. Oil seal
15. Oil pump case
16. Oil pump gasket
17. Oil pump cover
18. Oil pump outer rotor
19. Oil pump inner rotor
REMOVAL AND INSTALLATION

<24-VALVE FOR L200, CHALLENGER>

Apply engine oil to all moving parts before installation.

Removal steps:
1. Oil pressure switch
2. Oil filter
3. Oil filter bracket
4. Oil filter bracket gasket
5. Drain plug
6. Drain plug gasket
7. Cover
8. Oil level sensor <For Europe>
9. Oil pan
10. Baffle plate
11. Oil screen
12. Oil screen gasket
13. Plug
14. Relief spring
15. Relief plunger
16. Oil seal
17. Oil pump case
18. O-ring
19. Oil pump cover
20. Oil pump outer rotor
21. Oil pump inner rotor
REMOVAL AND INSTALLATION

<24-VALVE FOR PAJERO (V33V)>

Apply engine oil to all moving parts before installation.

Removal steps

1. Oil pressure switch
2. Oil cooler by-pass valve
3. Oil filter
4. Oil filter bracket
5. Oil filter bracket gasket
6. Drain plug
7. Drain plug gasket
8. Cover
9. Cover
10. Oil pan, lower
11. Oil pan, upper
12. Baffle plate
13. Oil screen
14. Oil screen gasket
15. Plug
16. Relief spring
17. Relief plunger
18. Oil seal
19. Oil pump case
20. O-ring
21. Oil pump cover
22. Oil pump outer rotor
23. Oil pump inner rotor
REMOVAL AND INSTALLATION
<24-VALVE FOR PAJERO (V63W, V65W, V73W, V75W), GDI>

Apply engine oil to all moving parts before installation.

Removal steps
1. Oil pressure switch
2. Oil filter
3. Oil cooler by-pass valve
   <Except for Hong Kong>
4. Oil filter bracket
5. Oil filter bracket gasket
6. Drain plug
7. Drain plug gasket
8. Cover
9. Oil level sensor <For Europe>
10. Oil pan
11. Baffle plate
12. Oil screen
13. Oil screen gasket
14. Relief plug
15. Relief spring
16. Relief plunger
17. Oil seal
18. Oil pump case
19. Oil pump case gasket
20. Oil pump cover
21. Oil pump outer rotor
22. Oil pump inner rotor
Apply engine oil to all moving parts before installation.

Removal steps

1. Oil pressure switch
2. Oil filter
3. Oil cooler by-pass valve
   <Except for Hong Kong>
4. Oil filter bracket
5. Oil filter bracket gasket
6. Drain plug
7. Drain plug gasket
8. Cover
9. Oil level sensor <For Europe>
10. Oil pan
11. Oil screen
12. Oil screen gasket
13. Baffle plate
14. Relief plug
15. Relief spring
16. Relief plunger
17. Oil seal
18. Oil pump case
19. Oil pump case gasket
20. Oil pump cover
21. Oil pump outer rotor
22. Oil pump inner rotor
REMOVAL SERVICE POINTS

**A ➤ OIL PAN REMOVAL**
1. Remove the oil pan mounting bolts.
2. Knock the special tool between the oil pan and cylinder block as shown in the illustration.
3. Tapping the side of the special tool, slide the tool along the oil pan/cylinder block seal and thus remove the oil pan.

**B ➤ OIL PAN LOWER REMOVAL**
Apply wood to the oil pan side and remove the oil pan lower with a plastic hammer.

**C ➤ OIL PAN UPPER REMOVAL**
1. Detach the bolt (1) shown at left.
2. Detach all other bolts.
3. Screw a M10 bolt into bolt hole (A) shown (at both ends) to remove the oil pan.
   **Caution**
   Do not use a scraper or special tool to remove the oil pan.

**D ➤ OIL PUMP OUTER AND INNER ROTORS REMOVAL**
Draw a setting mark on the oil pump outer and inner rotors to facilitate reassembly.
INSTALLATION SERVICE POINTS

A. OIL PUMP INNER AND OUTER ROTORS INSTALLATION

Install the oil pump outer rotor in the proper direction using the setting mark drawn on it before disassembly. Apply engine oil over the entire rotor surface.

B. OIL PUMP CASE INSTALLATION

1. Remove the old liquid gasket from the cylinder block (oil pump mounting surface) and from the oil pump.
2. Squeeze out about 3 mm of liquid gasket (FIPG) and coat the coating surface with it.

Specified sealant:
MITSUBISHI GENUINE Part No. MD970389 or equivalent

C. OIL SEAL INSTALLATION

Using the special tool, knock the oil seal into the oil pump case.

NOTE
Knock it as far as the surface.
**D** OIL PAN UPPER INSTALLATION

1. Clean the gasket coating surfaces of the cylinder block and the oil pan upper.
2. Squeeze out a 4 mm bead of liquid gasket and coat the coating surface with it.

**NOTE**

During attachment of the oil pan upper, the sealer must not be expelled from the flange portion of the oil pan for distance A as shown.

**Liquid gasket:**

MITSUBISHI GENUINE Part No. MD970389 or equivalent

---

**E** OIL PAN LOWER INSTALLATION

1. Clean the gasket coating surfaces of the oil pan upper and the oil pan lower.
2. Squeeze out a 4 mm bead of liquid gasket and coat the coating surfaces.

**Liquid gasket:**

MITSUBISHI GENUINE Part No. MD970389 or equivalent
**F** OIL PAN

1. Clean the gasket coating surfaces of the cylinder block and the oil pan upper.
2. Squeeze out a 4 mm bead of liquid gasket and coat the coating surface with it.

**NOTE**
During attachment of the oil pan upper, the sealer must not be expelled from the flange portion of the oil pan for distance A as shown.

**Liquid gasket:**
MITSUBISHI GENUINE Part No. MD970389 or equivalent

**G** DRAIN PLUG GASKET INSTALLATION
Replace the drain plug gasket with a new one. Fit the new gasket as shown.

**Caution**
If the gasket is installed in the wrong direction, oil leaks will occur.

**H** OIL FILTER

1. Clean the oil filter attaching surface on the side of the cylinder block.
2. Apply engine oil to the O-ring for the oil filter.
3. Screw in the oil filter until its O-ring contacts the oil filter attaching surface. Then tighten it further by about one turn (at approx. 14 Nm).

**I** OIL PRESSURE SWITCH

**Sealant:** 3M ATD Part No. 8660 or equivalent

**NOTE**
(1) Sealant must not extend beyond the tip of the thread portion.
(2) Do not overtighten the switch.
INSPECTION

1. OIL PUMP

   (1) Check for tip clearance.
   
   Standard value: 0.03 – 0.08 mm

   (2) Check for side clearance.
   
   Standard value: 0.04 – 0.10 mm

   (3) Check for body clearance.
   
   Standard value: 0.10 – 0.18 mm
   Limit: 0.35 mm

2. OIL COOLER BY-PASS VALVE

   (1) Make sure that the valve moves smoothly.

   (2) Ensure that the dimension L measures the standard value under normal temperature and humidity.
   
   Dimension L: 34.5 mm

   (3) The dimension must be the standard value when measured after the valve has been dipped in 100°C oil.
   
   Dimension L: 40 mm or more
3. **OIL LEVEL SENSOR**

Put the oil level sensor in the oil, then move the float up and down with the oil at a temperature either lower than 40°C or higher than 80°C, and check for continuity.

**40°C**

<table>
<thead>
<tr>
<th>Float position</th>
<th>Switch ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition when down</td>
<td>ON (continuity)</td>
</tr>
<tr>
<td>Condition when up</td>
<td>ON (continuity)</td>
</tr>
</tbody>
</table>

**80°C**

<table>
<thead>
<tr>
<th>Float position</th>
<th>Switch ON/OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition when down</td>
<td>OFF (no continuity)</td>
</tr>
<tr>
<td>Condition when up</td>
<td>ON (continuity)</td>
</tr>
</tbody>
</table>
14. PISTON AND CONNECTING ROD

REMOVAL AND INSTALLATION

<12-VALVE, 6G72–24-VALVE>

Removal steps

1. Connecting rod cap nut
2. Connecting rod cap
3. Connecting rod bearing, lower
4. Piston, connecting rod assembly
5. Connecting rod bearing, upper
6. Piston ring No.1
7. Piston ring No.2
8. Oil ring
9. Piston pin
10. Piston
11. Connecting rod
12. Bolt

Apply engine oil to all moving parts before installation.

51 ± 1 Nm

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Apply engine oil to all moving parts before installation.

Removal steps

1. Connecting rod cap nut
2. Connecting rod cap
3. Connecting rod bearing, lower
4. Piston, connecting rod assembly
5. Connecting rod bearing, upper
6. Piston ring No.1
7. Piston ring No.2
8. Oil ring
9. Snap ring
10. Piston pin
11. Snap ring
12. Piston
13. Connecting rod
14. Bolt

Apply engine oil to all moving parts before installation.

6G7 ENGINE – Piston and Connecting Rod

REMOVAL AND INSTALLATION

<6G74–24-VALVE, 6G75>
REMOVAL AND INSTALLATION

Apply engine oil to all moving parts before installation.

Removal steps

1. Connecting rod cap nut
2. Connecting rod cap
3. Connecting rod bearing, lower
4. Piston, connecting rod assembly
5. Connecting rod bearing, upper
6. Piston ring No.1
7. Piston ring No.2
8. Oil ring
9. Snap ring
10. Piston pin
11. Snap ring
12. Piston
13. Connecting rod
14. Bolt
REMOVAL SERVICE POINTS

A. CONNECTING ROD CAP REMOVAL
Enter the cylinder No. on the side of the large end of the connecting rod to facilitate reassembly.

B. PISTON PIN REMOVAL <6G72>
The special piston pin setting tool (MD998780) consists of the parts shown at left.

1. Insert the special push rod tool from the front marked side of the piston side and attach guide C.
2. Set the piston and connecting rod assembly to the special tool piston pin setting base such that the front mark on the piston faces upward.
3. Pull out the piston pin with a press.

**NOTE**
After pulling out the piston pin, place the piston, the piston pin, and the connecting rod in order for each cylinder number.

---

**<C> PISTON PIN REMOVAL <6G74, 6G75>**

1. Remove the snap rings.
2. Heat the piston to approximately 70°C and pull out the piston pin.

**Caution**
The clearance between the piston and the piston pin is an almost tight fit at normal temperature. Therefore, be sure to heat the piston before pulling out the piston pin. In addition, note that the piston is hot after heating.
INSTALLATION SERVICE POINTS

A. PISTON PIN INSTALLATION <6G72>

1. When replacing the piston, read off the cylinder bore size mark on the cylinder block as illustrated, and select a piston according to the following table.

<table>
<thead>
<tr>
<th>Cylinder bore size mark</th>
<th>Piston size mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>II</td>
<td>None</td>
</tr>
<tr>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>

NOTE
The piston size mark shows on the top of the piston.

2. Measure the dimensions of the following parts and portions:
   A: Piston pin mounting portion
   B: Distance between piston bosses
   C: Piston pin
   D: Connecting rod

3. Calculate by substituting each measured value into the following equation:

\[
L = \frac{(A + 3.5 - C) - (B - D)}{2}
\]

4. Insert the special push rod tool into the piston pin and attach guide A to it.
5. Combine the piston and the connecting rod, matching their front marks.
6. Apply engine oil to the outer periphery of the piston pin.

7. Insert the side of the piston pin guide A attached per Step 4, into the pin hole from the side of the piston containing the front mark.
8. Screw guide B into guide A until they are distance L (obtained per Step 3. above) plus 3 mm apart as shown.

9. Use special tools to set the piston pin to a special tool piston setting base with the front mark of the piston facing up.

10. Press fit the piston pin with a press. When the load required for press fitting the piston pin is below the standard value, change the piston pin (piston assembly) or the connecting rod or both.

**Standard values:** 7,350 – 17,200 N
PISTON PIN INSTALLATION <6G74, 6G75>

1. When replacing the piston, read off the cylinder bore size mark on the cylinder block as illustrated, and select a piston according to the following table.

<table>
<thead>
<tr>
<th>Cylinder bore size mark</th>
<th>Piston size mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>II</td>
<td>None</td>
</tr>
<tr>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>

**NOTE**
The piston size mark shows on the top of the piston.

2. Heat the piston pin to approximately 70°C and set the snap ring on one side first. Be sure to install the snap ring with the shear droop directed toward the inside.

3. Make sure that the identification marks of the piston, piston pin and connecting rod small end are of the appropriate class. <6G74-SOHC>

<table>
<thead>
<tr>
<th>Class</th>
<th>I</th>
<th>II</th>
<th>III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piston pin</td>
<td>Identification mark</td>
<td>I</td>
<td>No mark</td>
</tr>
<tr>
<td>O.D.</td>
<td>22.005 – 22.007</td>
<td>22.003 – 22.005</td>
<td>22.001 – 22.003</td>
</tr>
<tr>
<td>Piston</td>
<td>Identification</td>
<td>I</td>
<td>No mark</td>
</tr>
<tr>
<td>Connecting rod small end</td>
<td>Identification</td>
<td>I</td>
<td>No mark</td>
</tr>
<tr>
<td>Clearance (at normal temperature)</td>
<td>–0.04 – 0</td>
<td>–0.04 – 0</td>
<td>–0.04 – 0</td>
</tr>
<tr>
<td>Clearance (at normal temperature)</td>
<td>0.005 – 0.015</td>
<td>0.005 – 0.015</td>
<td>0.005 – 0.015</td>
</tr>
</tbody>
</table>

4. With the front mark of the connecting rod and that of the piston located on the same side, insert the piston pin.

5. After insertion of the piston pin, set the other snap ring.

**Caution**

1. (1) Apply ample coat of engine oil to the periphery of the piston pin and the hole of the connecting rod small end.

2. (2) The clearance between the piston and the piston pin is an almost tight fit at normal temperature. Therefore, be sure to heat the piston before inserting the piston pin.

3. (3) In addition, note that the piston is hot after heating.
**OIL RING INSTALLATION**

1. Fit the oil ring spacer into the piston ring groove.

   **NOTE**
   
   (1) Ensure that the end gaps of the side rails and spacer are located as shown.
   
   (2) The spacer and side rails (new) are color-coded as detailed below according to their sizes.

<table>
<thead>
<tr>
<th>Size</th>
<th>Identification color</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.T.D.</td>
<td>None</td>
</tr>
<tr>
<td>0.50 mm O.S.</td>
<td>Blue</td>
</tr>
<tr>
<td>1.00 mm O.S.</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

2. Install the upper side rail

   To install the side rail, first fit one end of the rail into the piston groove, then press the remaining portion into position by finger. See illustration.

   Use of ring expander to expand the side rail end gap can break the side rail, unlike other piston rings.

   **Caution**
   
   Unlike other piston rings, the side rail can break if it is expanded with a ring expander.
3. Mount the lower side rail.
4. A three-piece oil ring, if installed correctly, should turn smoothly in either direction. Check this.

**PISTON RING NO.2 / PISTON RING NO.1 INSTALLATION**

Using a piston ring expander, fit the piston rings into position with the ring ID mark facing up.

**NOTE**

Each piston ring is stamped with the following size mark as appropriately.

**<6G72, 6G74>**

<table>
<thead>
<tr>
<th>Size</th>
<th>Size mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.T.D.</td>
<td>None</td>
</tr>
<tr>
<td>0.50 mm O.S.</td>
<td>50</td>
</tr>
<tr>
<td>1.00 mm O.S.</td>
<td>100</td>
</tr>
</tbody>
</table>

**<6G75>**

<table>
<thead>
<tr>
<th>Size</th>
<th>Size mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.T.D.</td>
<td>None</td>
</tr>
<tr>
<td>0.25 mm O.S.</td>
<td>25</td>
</tr>
<tr>
<td>0.50 mm O.S.</td>
<td>50</td>
</tr>
</tbody>
</table>
### CONNECTING ROD BEARING INSTALLATION

**NOTE**

The replacement connecting rod bearings for the 6G72 and 6G73 engines are supplied in the unit of a package containing all necessary number of bearings for the engine.

When replacing the bearing, select the proper bearing according to the crankshaft identification color and the connecting rod identification mark and install it.

**<6G74, 6G75>**

<table>
<thead>
<tr>
<th>Crankshaft</th>
<th>Connecting rod</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin O.D. mm</td>
<td>Big end</td>
</tr>
<tr>
<td>Identification mark (color)</td>
<td>I.D. mm</td>
</tr>
<tr>
<td>Production part</td>
<td>Spare part</td>
</tr>
<tr>
<td>None</td>
<td>Yellow</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**PISTON AND CONNECTING ROD INSTALLATION**

1. Liberally coat the circumference of the piston, piston ring, and oil ring with engine oil.
2. Arrange the piston ring and oil ring gaps (side rail and spacer) as shown in the figure.
3. Rotate crankshaft so that crank pin is on center of cylinder bore.
4. Use suitable thread protectors on connecting rod bolts before inserting piston and connecting rod assembly into cylinder block.
   Care must be taken not to nick crank pin.
5. Using a suitable piston ring compressor tool, install piston and connecting rod assembly into cylinder block.

**Caution**

Install the piston with the front mark on the top of the piston facing towards the engine front (timing belt side).

**NOTE**

6G72–12-valve or 6G74–GDI engine for rear wheel drive vehicle, two types of pistons, one for cylinders 1, 3 and 5 and the other for cylinders 2, 4 and 6, have been used.

Piston with R: For cylinders 1, 3 and 5
Piston with L: For cylinders 2, 4 and 6

**CONNECTING ROD CAP INSTALLATION**

1. Mate the correct bearing cap with the correct connecting rod by checking with the alignment marks marked during disassembly. If a new connecting rod is used which has no alignment mark, position the notches for locking the bearing on the same side.
2. Check if the thrust clearance in the connecting rod big end is correct.

**Standard value:** 0.10 – 0.25 mm

**Limit:** 0.4 mm

---

**CONNECTING ROD CAP NUT INSTALLATION**

1. Since the plastic region tightening method has been employed for the connecting rod bolts and nuts, be sure to check the bolts for elongation before reuse. Bolts can be checked for elongation by finger-screwing the nut to the end of the bolt threads. If the nut cannot be screwed to the end smoothly, it indicates that the bolt threads have elongated. In this case, replace the bolt with a new one.

2. Before mounting the nut, coat the nut threads and seating surface with engine oil.

3. After the nut has been mounted to each bolt and tightened finger-tight, alternately tighten nuts as follows to install caps properly.

4. Tighten nuts to 34 Nm.

5. Put a paint mark to the head of the nut.

6. With reference to the paint mark on the nut, mark the bolt with a paint mark at the position angled 90° in the nut tightening direction.

7. Tighten the nut 90° and check that the paint marks on the nut and bolt are aligned with each other.

Caution

1. If the tightening angle is less than 90°, poor tightening performance could result. Make sure of the correct tightening angle.

2. If the tightening angle exceeds 100°, completely back off the nut and start the procedure over.
INSPECTION

1. PISTON RING

(1) Check the clearance between the piston ring and the ring groove. If it exceeds the specified limit, change the ring or the piston and piston ring.

**Standard values:**
- No. 1 0.03 – 0.07 mm
- No. 2 0.02 – 0.06 mm

**Limit:** 0.1 mm

(2) Place the piston ring in the cylinder bore, push it in by applying the piston head side, and make sure it is square.

Then measure the clearance at the ring ends with a thickness gauge.

Change the piston ring if the clearance at the ring end is excessive.

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard value mm</th>
<th>Limit mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1 ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6G72 For Hong Kong</td>
<td>0.25 – 0.35</td>
<td>0.8</td>
</tr>
<tr>
<td>6G74 From 2003 model GDI</td>
<td>0.25 – 0.40</td>
<td>0.8</td>
</tr>
<tr>
<td>6G75 SOHC, 2002 model GDI</td>
<td>0.30 – 0.45</td>
<td>0.8</td>
</tr>
<tr>
<td>No. 2 ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6G72 For Hong Kong</td>
<td>0.35 – 0.50</td>
<td>0.8</td>
</tr>
<tr>
<td>6G74 From 2003 model GDI</td>
<td>0.35 – 0.50</td>
<td>0.8</td>
</tr>
<tr>
<td>6G75 SOHC, 2002 model GDI</td>
<td>0.45 – 0.60</td>
<td>0.8</td>
</tr>
<tr>
<td>Oil ring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6G72 (For Hong Kong), 6G74, 6G75</td>
<td>0.10 – 0.35</td>
<td>1.0</td>
</tr>
<tr>
<td>6G72 Except for Hong Kong</td>
<td>0.20 – 0.60</td>
<td>1.0</td>
</tr>
</tbody>
</table>

2. CRANKSHAFT PIN OIL CLEARANCE (PLASTIGAUGE METHOD)

(1) Drain oil from the crankshaft pin and the connecting rod bearing.

(2) Place a piece of Plastigauge the length of the bearing width on the crankshaft pin straight along the pin centre.

(3) Gently place the connecting rod cap on top and tighten the bolt to the specified torque.

(4) Detach the bolt and gently remove the connecting rod cap.

(5) Measure the width of the crushed Plastigauge (at the widest point) using the scale printed on the Plastigauge package.

**Standard value:** 0.02 – 0.05 mm

**Limit:** 0.1 mm
15. CRANKSHAFT, FLYWHEEL AND DRIVE PLATE
REMOVAL AND INSTALLATION

<6G72–12-VALVE>

Apply engine oil to all moving parts before installation.

Removal steps
1. Flywheel bolt
2. Flywheel
3. Ball bearing
4. Adaptor plate
5. Drive plate
6. Crankshaft adaptor
7. Rear plate
8. Ball bearing cover
9. Oil seal case
10. Oil seal
11. Bearing cap bolt
12. Bearing cap
13. Thrust bearing (A)
14. Thrust bearing (B)
15. Crankshaft bearing lower
16. Crankshaft
17. Thrust bearing (B)
18. Thrust bearing (A)
19. Crankshaft bearing upper
20. Cylinder block
REMOVAL AND INSTALLATION

<6G72–24-VALVE>

Apply engine oil to all moving parts before installation.

Removal steps
1. Flywheel bolt
2. Flywheel
3. Ball bearing
4. Adaptor plate
5. Drive plate
6. Crankshaft adaptor
7. Rear plate (M/T)
8. Rear plate (A/T)
9. Oil seal case
10. Oil seal
11. Bearing cap bolt
12. Bearing cap
13. Thrust bearing (A)
14. Thrust bearing (B)
15. Crankshaft bearing lower
16. Crankshaft
17. Thrust bearing (B)
18. Thrust bearing (A)
19. Crankshaft bearing upper
20. Knock sensor <For Hong Kong>
21. Knock sensor bracket <For Hong Kong>
22. Cylinder block
REMOVAL AND INSTALLATION

<6G74, 6G75>

Removal steps
1. Flywheel bolt
2. Flywheel
3. Ball bearing
4. Adaptor plate
5. Drive plate
6. Crankshaft adaptor
7. Rear plate (M/T)
8. Rear plate (A/T)
9. Oil seal case
10. Oil seal
11. Bearing cap bolt
12. Bearing cap
13. Crankshaft bearing lower
14. Crankshaft
15. Thrust bearing
16. Crankshaft bearing upper
17. Knock sensor <For Taiwan, GDI>
18. Detonation sensor bracket <For Taiwan, GDI>
19. Cylinder block

Apply engine oil to all moving parts before installation.
INSTALLATION SERVICE POINTS

A DETONATION SENSOR BRACKET INSTALLATION
Check that the bracket is in proper contact with the cylinder block bores and tighten to the specified torque in the order shown.

B CRANKSHAFT BEARING INSTALLATION
When the bearing needs replacing, select and install a proper bearing by the following procedure.

1. Measure the crankshaft journal diameter and confirm its classification from the following table. In the case of a crankshaft supplied as a service part, identification colors or mark of its journals are painted at the positions shown in the illustration.

2. The cylinder block bearing bore diameter identification marks are stamped at the position shown in the illustration from front to back, beginning at No. 1.
### Combination of crankshaft journal diameter and cylinder block bearing bore diameter

#### Crankshaft journal

<table>
<thead>
<tr>
<th>Classification</th>
<th>Identification color or mark</th>
<th>O.D. mm</th>
<th>Cylinder block bearing bore diameter identification mark</th>
<th>Bearing identification color or identification mark (for service part)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production part</strong></td>
<td><strong>Service part</strong></td>
<td><strong>I</strong></td>
<td><strong>II</strong></td>
<td><strong>III</strong></td>
</tr>
<tr>
<td><strong>&lt;6G7–12-VALVE&gt;</strong></td>
<td></td>
<td><strong>Pink, 1</strong></td>
<td><strong>Red, 2</strong></td>
<td><strong>Green, 3</strong></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>Yellow or 0</td>
<td>59.994 – 60.000</td>
<td><strong>Pink, 1</strong></td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>None or 1</td>
<td>59.988 – 59.994</td>
<td><strong>Red, 2</strong></td>
</tr>
<tr>
<td>3</td>
<td>None</td>
<td>White or 2</td>
<td>59.982 – 59.988</td>
<td><strong>Green, 3</strong></td>
</tr>
</tbody>
</table>

#### Crankshaft journal

<table>
<thead>
<tr>
<th>Classification</th>
<th>Identification mark</th>
<th>O.D. mm</th>
<th>Cylinder block bearing bore diameter identification mark</th>
<th>Bearing identification color (for service part)</th>
</tr>
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<tbody>
<tr>
<td><strong>Production part</strong></td>
<td><strong>Service part</strong></td>
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<td><strong>III</strong></td>
</tr>
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<td><strong>Green, 3</strong></td>
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<td>0</td>
<td>59.994 – 60.000</td>
<td><strong>Pink, 1</strong></td>
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<tr>
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<td>None</td>
<td>1</td>
<td>59.988 – 59.994</td>
<td><strong>Red, 2</strong></td>
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<td>3</td>
<td>None</td>
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<td>59.982 – 59.988</td>
<td><strong>Green, 3</strong></td>
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</table>
Combination of crankshaft journal diameter and cylinder block bearing bore diameter

<table>
<thead>
<tr>
<th>Classification</th>
<th>Identification color</th>
<th>O.D. mm</th>
<th>Bearing identification color (for service part)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Production part</td>
<td>Service part</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>None</td>
<td>Yellow</td>
<td>I Pink</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>II Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>III Green</td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>None</td>
<td>I Red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>II Green</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>III Black</td>
</tr>
<tr>
<td>3</td>
<td>None</td>
<td>White</td>
<td>I Green</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>II Black</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>III Brown</td>
</tr>
</tbody>
</table>

3. Select a proper bearing from the above table on the basis of the identification data confirmed under Items 1. and 2..

[Example – Two-camshaft engine]
(1) If the measured value of a crankshaft journal outer diameter is 59.996 mm, the journal is classified as “1” in the table.
   In case the crankshaft is also replaced by a spare part, check the identification colors of the journals painted on the new crankshaft. If the color is yellow, for example, the journal is classified as “1”.
(2) Next, check the cylinder block bearing bore identification mark stamped on the cylinder block. If it is “I”, read the “Bearing identification color” column to find the identification color of the bearing to be used. In this case, it is “pink”.
(3) Install the bearing halves with oil groove on the cylinder block side.
(4) Install the bearing halves without oil groove on the bearing cap side.
(5) Install the thrust bearings on both sides of the No.3 bearing with the grooves facing outward.
BEARING CAP / BEARING BOLT INSTALLATION

1. Attach the bearing cap on the cylinder block as shown in the figure.
2. Tighten the bearing cap bolts to the specified torque in the sequence shown in the figure.
3. Check that the crankshaft rotates smoothly.

4. Check the end play. If it exceeds the limit value, replace the thrust bearing.
   - **Standard value:** 0.05 – 0.25 mm
   - **Limit:** 0.4 mm

CRANKSHAFT REAR OIL SEAL INSTALLATION

Using the Special Tool, press-fit a new crankshaft rear oil seal into the seal case.
OIL SEAL CASE INSTALLATION
Squeeze out a 3 mm bead of liquid gasket (FIPG) and apply it to the coating surface.
Liquid gasket:
MITSUBISHI genuine Part No. MD970389

INSPECTION
1. CRANKSHAFT
If the oil clearance exceeds the limit, replace the bearing, and crankshaft if necessary.

Measure the outside diameter of journal and inside diameter of crankshaft bearing. If the difference between them (oil clearance) exceeds the limit, replace the crankshaft bearing and, if necessary, crankshaft.
Standard value: 0.02 – 0.05 mm
Limit: 0.1 mm

Caution
Do not attempt an undersize machining on the crankshaft with special surface treatment. This crankshaft can be identified by its dull gray appearance.

2. CRANKSHAFT OIL CLEARANCE
(PLASTIC GAUGE METHOD)
This crankshaft oil clearance can be measured easily by using a plastic gauge, as follows:
(1) Remove oil and grease and any other foreign matters from crankshaft journal and bearing inner surface.
(2) Install the crankshaft.
(3) Cut the plastic gauge to the same length as the width of bearing and place it on journal in parallel with its axis.
(4) Gently place the crankshaft bearing cap over it and tighten the bolts to the specified torque.
(5) Remove the bolts and gently remove the crankshaft bearing cap.
(6) Measure the width of the smashed plastic gauge at its widest section by using a scale printed on the plastic gauge bag.

**Standard value:** 0.02 – 0.04 mm

**Limit:** 0.1 mm

3. **CYLINDER BLOCK**

(1) Visually check for scratches, rust and corrosion. Also use flaw detecting agents and the like to check for cracks. If there are any defects, rectify the cylinder block.

(2) Measure the flatness of the cylinder block top surface with a straight edge and a thickness gauge. During measurement, the cylinder block top surface must be free from gasket pieces and the like.

**Standard values:** 0.05 mm

**Limit:** 0.1 mm

(3) Check for scratches or seizure of the cylinder wall. If there are any defects, correct (bore it a oversize) or change the cylinder block.

(4) Measure the inside diameter and the ovality of the cylinder. If the cylinder is overly worn, correct it to a larger size and change the pistons and the piston rings.

**Standard value:**

- **Cylinder inside diameter:**
  - 6G72 91.1 mm
  - 6G74 93.0 mm
  - 6G75 95.0 mm

- **Ovality:** 0.01 mm
4. BORING CYLINDER

(1) Oversize pistons to be used should be determined on the basis of the largest bore cylinder.

Piston size identification

<table>
<thead>
<tr>
<th>Size</th>
<th>Identification mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 mm O.S.</td>
<td>0.50</td>
</tr>
<tr>
<td>1.00 mm O.S.</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<6G75>

<table>
<thead>
<tr>
<th>Size</th>
<th>Identification mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25 mm O.S.</td>
<td>0.25</td>
</tr>
<tr>
<td>0.50 mm O.S.</td>
<td>0.50</td>
</tr>
</tbody>
</table>

NOTE
Size mark is stamped on the piston top.

(2) Measure outside diameter of piston to be used. Measure it in thrust direction as shown.

(3) Based on the measured piston O.D., calculate the boring finish dimension.

Boring finish dimension = Piston O.D. + (Clearance between piston O.D. and cylinder) – 0.02 mm (honing margin)

(4) Bore all cylinders to the calculated boring finish dimension.

Caution
To prevent distortion that may result from temperature rise during honing, bore cylinders, in the order of No. 1, No. 2, No. 3, No. 4, No. 5 and No. 6.

(5) Hone to the final finish dimension (Piston O.D. + clearance between piston O.D. and cylinder.)

(6) Check the clearance between piston and cylinder.

Clearance between piston and cylinder:

<table>
<thead>
<tr>
<th>Engine Code</th>
<th>Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>6G72</td>
<td>0.02 – 0.04 mm</td>
</tr>
<tr>
<td>6G74</td>
<td>0.03 – 0.05 mm</td>
</tr>
<tr>
<td>6G75</td>
<td>0.02 – 0.04 mm</td>
</tr>
</tbody>
</table>

NOTE
When boring cylinders, finish all of four cylinders to the same oversize. Do not bore only one cylinder to an oversize.
Service Bulletins

Click on the applicable bookmark to select the Service Bulletin.
1. **Description:**
   This service bulletin informs you of disuse of one of the backup rings that has been used in each fuel injector on GDI engines.

2. **Applicable Manuals:**
   See attachment.

3. **Effective date:**
   From the engines produced in the middle of July 2002. This modification is also applicable to the engines produced before that date, as modified injectors will be supplied as service parts for these engines.

4. **Details:**
   The backup ring indicated by the arrow in the drawing below has been disused.

---

**SERVICES BULLETIN**

**NO.:** MSB-03E11-001

**DATE:** 2003-01-20

<table>
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<th>&lt;MODEL&gt;</th>
<th>&lt;M/Y&gt;</th>
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<tbody>
<tr>
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<td>97-01</td>
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<tr>
<td>(EUR)SPACE RUNNER(DZ)</td>
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<tr>
<td>(EUR)SPACE WAGON(DZL)</td>
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<tr>
<td>(EUR)GALANT(ST41)</td>
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<td>(EUR)SPACE STAR (MGX)</td>
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<td>(EUR)PAJERO</td>
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<td>(EUR)PAJERO/PININ(KR)</td>
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<td>(EUR)PAJERO/MONTERO(CK)</td>
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</tr>
</tbody>
</table>

**SUBJECT:** DISUSE OF INJECTOR BACKUP RINGS IN GDI ENGINES

**GROUP:** ENGINE

**DRAFT NO.:** 02EN516

**INFORMATION**

**INTERNATIONAL AFTER-SALES DEPARTMENT**

T. Kobayashi – Manager SERVICE PUBLICATION & TRAINING

---

![Diagram of fuel injector with backup ring disused]
### Attachment

**Applicable Manuals:**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGINE 4G6 (E–W) Workshop Manual</td>
<td>PWEE9616 (English)</td>
<td>11A-5a-1, 11A-5a-2a</td>
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<tr>
<td>ENGINE 4G9 (E–W) Workshop Manual</td>
<td>PWEE9502 (English)</td>
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<td>PWED9506 (Dutch)</td>
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<tr>
<td></td>
<td>PWEW9507 (Swedish)</td>
<td></td>
</tr>
<tr>
<td>ENGINE 6G7 (E–W) Workshop Manual</td>
<td>PWEE9061 (English)</td>
<td>11A-6c-1, 11B-8-3</td>
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<tr>
<td></td>
<td>PWES9062 (Spanish)</td>
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<td>PWEF9063 (French)</td>
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<td>PWEG9064 (German)</td>
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<td>'98 CARISMA GDI Workshop Manual chassis</td>
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<td>PWDW9507-E (Swedish)</td>
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</tr>
</tbody>
</table>
1. **Description:**

A crankshaft bearing with a blue identification color has been added to the assortment of bearings available for selection when servicing a 6G75 engine in order to improve serviceability. This service bulletin informs you of the changes to the bearing selection tables and bearing selection examples necessitated by this addition of the bearing. Please incorporate them into the following Workshop Manuals.

2. **Applicable Manuals:**

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<tbody>
<tr>
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3. **Effective Date (Effective Models):**

From the first production vehicles.
### Details:

#### 6G7 ENGINE – Crankshaft, Flywheel and Drive Plate

<table>
<thead>
<tr>
<th>Crankshaft journal</th>
<th>Identification color or mark</th>
<th>O.D. mm</th>
<th>Bearing identification color or identification mark</th>
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<tr>
<td>1</td>
<td>None</td>
<td>59.994 – 60.000</td>
<td>I Pink, 1</td>
</tr>
<tr>
<td></td>
<td>Yellow or 0</td>
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<td>II Red, 2</td>
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<tr>
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<td></td>
<td></td>
<td>III Green, 3</td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>59.988 – 59.994</td>
<td>I Red, 2</td>
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<td></td>
<td>None or 1</td>
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<td></td>
<td></td>
<td>III Black, 4</td>
</tr>
<tr>
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<td>None</td>
<td>59.982 – 59.988</td>
<td>I Green, 3</td>
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<td>White or 2</td>
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<td>II Black, 4</td>
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<td>III Brown, 5</td>
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#### Combination of crankshaft journal diameter and cylinder block bearing bore diameter

<table>
<thead>
<tr>
<th>Crankshaft journal</th>
<th>Identification mark</th>
<th>O.D. mm</th>
<th>Bearing identification color or identification mark</th>
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<tbody>
<tr>
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<td>II Red, 2</td>
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#### <6G74>

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<th>Cylinder block bearing bore diameter Identification mark</th>
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<td>63.994 – 64.000</td>
<td>I</td>
<td>Pink</td>
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<td>II</td>
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<td>63.988 – 63.994</td>
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<th>No.1, 4 Bearing Identification color</th>
<th>No.2, 3 Bearing Identification color</th>
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<tr>
<td>1</td>
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<td>63.994 – 64.000</td>
<td>I</td>
<td>Pink</td>
<td>Blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>II</td>
<td>Red</td>
<td>Pink</td>
</tr>
<tr>
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<td></td>
<td></td>
<td>III</td>
<td>Green</td>
<td>Red</td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>63.988 – 63.994</td>
<td>I</td>
<td>Red</td>
<td>Pink</td>
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