<p>| SST (SPECIAL SERVICE TOOLS) |  |
|-----------------------------|  |
| 09201–10000 Valve Guide Bushing Remover &amp; Replacer Set |  |
| (09201–01060) Valve Guide Bushing Remover &amp; Replacer 6 |  |
| 09202–70010 Valve Spring Compressor |  |
| 09213–70010 Crankshaft Pulley Holding Tool |  |
| 09222–30010 Connecting Rod Bushing Remover &amp; Replacer |  |
| 09223–15030 Oil Seal &amp; Bearing Replacer | Crankshaft rear oil seal |
| 09248–55040 Valve Clearance Adjust Tool Set |  |
| (09248–05410) Valve Lifter Press |  |
| (09248–05420) Valve Lifter Stopper |  |
| 09301–00110 Clutch Guide Tool | 2JZ–GE M/T |
| 09316–60010 Transmission &amp; Transfer Bearing Replacer |  |
| (09316–00010) Replacer Pipe | Crankshaft front oil seal Camshaft oil seal |</p>
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<th>Part Number</th>
<th>Description</th>
<th>Component</th>
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<td>Replacer &quot;D&quot;</td>
<td>Camshaft oil seal</td>
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<tr>
<td>09330–00021</td>
<td>Companion Flange Holding Tool</td>
<td>Crankshaft pulley</td>
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<tr>
<td>09608–30022</td>
<td>Front Hub Bearing Replacer Set</td>
<td>Crankshaft pulley</td>
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<td>(09608–05010)</td>
<td>Handle</td>
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<td>Valve guide bushing</td>
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<tr>
<td>09816–30010</td>
<td>Oil Pressure Switch Socket</td>
<td>Knock sensor</td>
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<td>Oil pressure switch</td>
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<td>09843–18020</td>
<td>Diagnosis Check Wire</td>
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<td>09950–50010</td>
<td>Puller C Set</td>
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<td>(09951–05010)</td>
<td>Hanger 150</td>
<td>Crankshaft pulley</td>
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<td>Crankshaft timing pulley</td>
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<td>(09952–05010)</td>
<td>Slide Arm</td>
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<td>Crankshaft timing pulley</td>
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<td>(09953–05020)</td>
<td>Center Bolt 150</td>
<td>Crankshaft pulley</td>
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<td>Crankshaft timing pulley</td>
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<td>(09954–05010)</td>
<td>Claw No.1</td>
<td>Crankshaft timing pulley</td>
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<td>(09954–05030)</td>
<td>Claw No.3</td>
<td>Camshaft pulley</td>
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<td>09960–10010</td>
<td>Variable Pin Wrench Set</td>
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<td>(09962–01000)</td>
<td>Variable Pin Wrench Arm Assy</td>
<td>Camshaft timing pulley</td>
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<tr>
<td>09040–00010</td>
<td>Hexagon Wrench Set •</td>
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<td>09043–50100</td>
<td>Bi–hexagon Wrench 10 mm •</td>
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<td>Torx Socket E10 •</td>
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<td>09082–00050</td>
<td>TOYOTA Electrical Tester Set •</td>
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<td>09090–04010</td>
<td>Engine Sling Device •</td>
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<td>09200–00010</td>
<td>Engine Adjust Kit •</td>
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<td>09258–00030</td>
<td>Hose Plug Set •</td>
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<table>
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<td>Caliper gauge</td>
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<td>CO/HC meter</td>
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<tr>
<td>Compression gauge</td>
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<td>Connecting rod aligner</td>
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<tr>
<td>Cylinder gauge</td>
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<tr>
<td>Dial indicator</td>
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<tr>
<td>Dye penetrant</td>
<td></td>
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<tr>
<td>Engine tune–up tester</td>
<td></td>
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<tr>
<td>Tool / Material</td>
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<tr>
<td>Heater</td>
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<td>Micrometer</td>
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<tr>
<td>Mirror</td>
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<td>Magnetic finger</td>
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<td>Piston ring compressor</td>
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<td>Piston ring expander</td>
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<td>Plastigage</td>
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<td>Precision straight edge</td>
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<td>Spring tester</td>
<td>Valve spring</td>
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<td>Steel square</td>
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<td>Thermometer</td>
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<td>Torque wrench</td>
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<td>Valve seat cutter</td>
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<tr>
<td>Vernier calipers</td>
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<tr>
<td>V–block</td>
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</table>

**SSM (SERVICE SPECIAL MATERIALS)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Material Description</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>08826–00080</td>
<td>Seal Packing Black or equivalent (FIPG)</td>
<td>No.1 camshaft bearing cap</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cylinder head</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rear oil seal retainer</td>
</tr>
<tr>
<td>08833–00070</td>
<td>Adhesive 1324, THREE BOND 1324 or equivalent</td>
<td>Drive plate bolt (A/T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Union for oil cooler hose (2JZ–GTE)</td>
</tr>
<tr>
<td>08833–00080</td>
<td>Adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent</td>
<td>Idler pulley pivot bolt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oil pressure switch</td>
</tr>
</tbody>
</table>
IDLE AND OR 2500 RPM CO HC CHECK

HINT: This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. INITIAL CONDITIONS
   (a) Engine at normal operating temperature
   (b) Air cleaner installed
   (c) All pipes and hoses of air induction system connected
   (d) All accessories switched OFF
   (e) All vacuum lines properly connected
      HINT: All vacuum hoses for EGR system, etc. should be properly connected.
   (f) SFI system wiring connectors fully plugged
   (g) Ignition timing set correctly
   (h) Transmission in neutral position
   (i) Tachometer and CO/HC meter calibrated by hand

2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS

4. INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING

5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM
   HINT: When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.
Troubleshooting

If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.

(a) Check (main heated) oxygen sensors operation.  
(See oxygen sensor(s) inspection in SFI System)

(b) See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

<table>
<thead>
<tr>
<th>CO</th>
<th>HC</th>
<th>Phenomenon</th>
<th>Causes</th>
</tr>
</thead>
</table>
| Normal | High | Rough idle            | 1. Faulty ignitions:  
  • Incorrect timing  
  • Fouled, shorted or improperly gapped plugs  
  • Open or crossed high-tension cords (2JZ–GE)  
  • Cracked distributor cap (2JZ–GE)  
  2. Incorrect valve clearance  
  3. Leaky EGR valve  
  4. Leaky intake and exhaust valves  
  5. Leaky cylinder |
| Low  | High | Rough idle (Fluctuating HC reading) | 1. Vacuum leaks:  
  • PCV hose  
  • EGR valve  
  • Intake manifold  
  • Air intake chamber  
  • Throttle body  
  • IAC valve  
  • Brake booster line  
  2. Lean mixture causing misfire |
| High | High | Rough idle (Black smoke from exhaust) | 1. Restricted air filter  
  2. Faulty SFI systems:  
  • Faulty fuel pressure regulator  
  • Clogged fuel return line  
  • Defective ECT switch  
  • Defective turbo pressure sensor (2JZ–GTE)  
  • Faulty ECM  
  • Faulty injector  
  • Faulty throttle position sensor  
  • Faulty VAF meter (2JZ–GE)  
  • Faulty MAF meter (2JZ–GTE) |
COMPRESsION CHECK

HINT: If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. WARM UP AND STOP ENGINE
   Allow the engine to warm up to normal operating temperature.

2. 2JZ–GE:
   DISCONNECT DISTRIBUTOR CONNECTOR

3. 2JZ–GTE:
   DISCONNECT CAMSHAFT POSITION SENSOR CONNECTORS

4. 2JZ–GE:
   DISCONNECT HIGH–TENSION CORDS FROM SPARK PLUGS
   (See high–tension cords and cord clamps removal in Ignition System)

5. 2JZ–GTE:
   REMOVE IGNITION COILS ASSEMBLIES
   (See ignition coils removal in Ignition System)

6. REMOVE SPARK PLUGS

7. CHECK CYLINDER COMPRESSION
   (a) Insert a compression tester into the spark plug hole.
   (b) While cranking the engine, measure the compression pressure.
   HINT: Always use a fully charged battery to obtain engine revolutions of 250 rpm or more.
   (c) Repeat steps (a) through (b) for each cylinder.
   NOTICE: This measurement must be done in as short a time as possible.
   Standard pressure:
   
   2JZ–GE
   1,275 kPa (13.0 kgf/cm², 185 psi) or more
   2JZ–GTE
   1,079 kPa (11.0 kgf/cm², 156 psi) or more
   Minimum pressure:
   
   2JZ–GE
   1,079 kPa (11.0 kgf/cm², 156 psi)
   2JZ–GTE
   883 kPa (9.0 kgf/cm², 128 psi)
   Difference between each cylinder:
   
   98 kPa (1.0 kgf/cm², 14 psi) or less
   (d) If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (b) for the cylinder with low compression.
• If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are probably worn or damaged.
• If pressure stays low, a valve may be sticking or seating improper, or there may be leakage past the gasket.

8. REINSTALL SPARK PLUGS
9. 2JZ–GE:
   RECONNECT HIGH–TENSION CORDS TO SPARK PLUGS
   (See high–tension cords and cord clamps installation in Ignition System)
10. 2JZ–GTE:
    REINSTALL IGNITION COILS ASSEMBLIES
    (See ignition coils installation in Ignition System)
11. 2JZ–GE:
    RECONNECT DISTRIBUTOR CONNECTOR
12. 2JZ–GTE:
    RECONNECT CAMSHAFT POSITION SENSOR CONNECTORS
VALVE CLEARANCE INSPECTION AND ADJUSTMENT (2JZ-GE)

HINT: Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY
(See steps 1 to 9 in injector removal in SFI System)

2. DISCONNECT HIGH–TENSION CORDS FROM CYLINDER HEAD COVERS
(See high–tension cords and cord clamps removal in Ignition System)

3. REMOVE NO.3, NO.1 AND NO.2 CYLINDER HEAD COVERS
   (a) Remove the 4 bolts, 4 nuts and No.3 cylinder head cover.
   (b) Remove the 4 bolts, No.1 cylinder head cover and gasket.
   (c) Remove the 4 bolts, No.2 cylinder head cover and gasket.

4. SET NO.1 CYLINDER TO TDC/COMPRESSION
   (a) Turn the crankshaft pulley, and align its groove with timing mark "O" of the No.1 timing belt cover.
   NOTICE: Always turn the crankshaft clockwise.
   (b) Check that the timing marks of the camshaft timing pulleys are aligned with the timing marks of the No.4 timing belt cover.
   If not, turn the crankshaft 1 revolution (360°).

5. INSPECT VALVE CLEARANCE
   (a) Check only those valves indicated in the illustration.
   • Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
   • Record the valve clearance measurements of those that are out of specification. They will be used later to determine the required replacement adjusting shim.
Valve clearance (Cold):

Intake
  .15–0.25 mm (0.006–0.010 in.)
Exhaust
  .25–0.35 mm (0.010–0.014 in.)

(b) Turn the crankshaft pulley 1 revolution (360°), and align the groove with timing mark “O” of the No.1 timing belt cover.

(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))

6. ADJUST VALVE CLEARANCE

(a) Remove the adjusting shim.
  • Turn the camshaft so that the cam lobe for the valve to be adjusted faces up.
  • Turn the valve lifter with a screwdriver so that the notches are perpendicular to the camshaft.

• Using SST (A), hold the camshaft as shown in the illustration.
  SST 09248–55040 (09248–05410)

• Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).
  SST 09248–55040 (09248–05410, 09248–05420)

  HINT:
  • Apply SST (B) at slight angle on the side marked with “7”, at the position shown in the illustration.
- Insert SST (B) gently from the inside as shown in the illustration.

- Using a small screwdriver and a magnetic finger, remove the adjusting shim.

(b) Determine the replacement adjusting shim size according to the following Formula or Charts on the next 2 pages:
- Using a micrometer, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so the valve clearance comes within specified value.

\[ T \ldots \text{Thickness of used shim} \]
\[ A \ldots \text{Measured valve clearance} \]
\[ N \ldots \text{Thickness of new shim} \]

**Intake**
\[ N = T + (A-0.20 \text{ mm} (0.008 \text{ in.})) \]

**Exhaust**
\[ N = T + (A-0.30 \text{ mm} (0.012 \text{ in.})) \]

- Select a new shim with a thickness as close as possible to the calculated values.

HINT: Shims are available in 17 sizes in increments of 0.050 mm (0.0020 in.), from 2.500 mm (0.0984 in.) to 3.300 mm (0.1299 in.).

(c) Install a new adjusting shim.
- Place a new adjusting shim on the valve lifter, with imprinted numbers facing down.
- Press down the valve lifter with SST (A), and remove SST (B).

SST 09248–55040

(d) Recheck the valve clearance.
Adjusting Shim Selection Chart (Intake)

Intake valve clearance (Cold):
0.15 – 0.25 mm (0.006 – 0.010 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.12 shim.

HINT: New shims have the thickness in millimeters imprinted on the face.
Adjusting Shim Selection Chart (Exhaust)

Exhaust valve clearance (Cold):
0.25 – 0.35 mm (0.010 – 0.014 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.10 shim.

HINT: New shims have the thickness in millimeters imprinted on the face.
7. REINSTALL NO.2, NO.1 AND NO.3 CYLINDER HEAD COVERS
   (a) Remove any old packing (FIPG) material.
   (b) Apply seal packing to the cylinder head as shown in the illustration.
   Seal packing:
   Part No. 08826–00080 or equivalent
   (c) Install the gaskets to the No.1 and No.2 cylinder head covers.
   (d) Install the No.2 cylinder head cover with the 4 bolts.
      Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)
   (e) Install the No.1 cylinder head cover with the 4 bolts.
      Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)
   (f) Install the No.3 cylinder head cover with the 4 bolts and 4 nuts.
      Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)
8. RECONNECT HIGH–TENSION CORDS TO CYLINDER HEAD COVERS
   (See high–tension cords and cord clamps installation in Ignition System)
9. REINSTALL THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY
   (See steps 8 to 17 in injector installation in SFI System)

VALVE CLEARANCE INSPECTION AND ADJUSTMENT (2JZ–GTE)
HINT: Inspect and adjust the valve clearance when the engine is cold.
1. REMOVE IGNITION COILS ASSEMBLIES
   (See ignition coils removal in Ignition System)
2. DISCONNECT ENGINE WIRE PROTECTOR FROM NO.4 TIMING BELT COVER
   (a) Disconnect the engine wire from the 4 wire clamps.
   (b) Lift out the engine wire protector from the cylinder head covers.
3. **DISCONNECT ENGINE WIRE PROTECTOR FROM COWL TOP PANEL**
   (a) Remove the bolt, and disconnect the ground strap.
   (b) Remove the 2 bolts, and lift up the engine wire protector.

4. **REMOVE IAC VALVE PIPE**
   (a) Disconnect the 5 air hoses from the IAC valve pipe.
   (b) Remove the IAC valve pipe from the pipe clamp on the No.1 cylinder head cover.

5. **REMOVE NO.1 AND NO.2 CYLINDER HEAD COVERS**
   (a) Disconnect the cruise control actuator cable from the cable bracket.
   (b) Remove the bolt holding the VSV to the turbo outlet duct.
   (c) Disconnect the 2 PCV hoses from the cylinder head covers.
   (d) Remove the 6 bolts, 2 nuts, 8 seal washers, No.1 cylinder head cover and gasket.
   (e) Remove the 6 bolts, 2 nuts, 8 seal washers, No.2 cylinder head cover and gasket.

6. **SET NO.1 CYLINDER TO TDC/COMPRESSION**
   (See step 4 in valve clearance inspection and adjustment (2JZ–GE))

7. **INSPECT VALVE CLEARANCE**
   (See step 5 in valve clearance inspection and adjustment (2JZ–GE))

8. **ADJUST VALVE CLEARANCE**
   (See step 6 in valve clearance inspection and adjustment (2JZ–GE))
9. REINSTALL NO.1 AND NO.2 CYLINDER HEAD COVERS
   (a) Remove any old packing (FIPG) material.
   (b) Apply seal packing to the cylinder head as shown in the illustration.
       Seal packing:
       Part No. 08826–00080 or equivalent
   (c) Install the gaskets to the No.1 and No.2 cylinder head covers.
   (d) Install the 12 seal washers to the bolts.
   (e) Install the No.2 cylinder head cover with the 6 bolts, 4 seal washers and 4 nuts.
       Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)
   (f) Install the No.1 cylinder head cover with the 6 bolts, 4 seal washers and 4 nuts.
       Torque: 5.4 N·m (55 kgf·cm, 48 in·lbf)
   (g) Connect the 2 PCV hoses to the cylinder head covers.
   (h) Install the bolt holding the VSV to the turbo outlet duct.
   (i) Connect the cruise control actuator cable to the cable bracket.

10. RECONNECT ENGINE WIRE PROTECTOR TO NO.4 TIMING BELT COVER
11. REINSTALL IAC VALVE PIPE
12. RECONNECT ENGINE WIRE PROTECTOR TO COWL TOP PANEL
13. REINSTALL IGNITION COILS ASSEMBLIES
    (See ignition coils installation in Ignition System)

IGNITION TIMING INSPECTION AND ADJUSTMENT
(2JZ–GE)
1. WARM UP ENGINE
   Allow the engine to warm up to normal operating temperature.

2. CONNECT TACHOMETER AND TIMING LIGHT
   Connect the tester probe of a tachometer to terminal IG ⊗ of the DLC1.
   NOTICE:
   • Never allow the tachometer terminal to touch ground as it could result in damage to the Igniter and/or ignition coil.
   • As some tachometers are not compatible with this ignition system, we recommend that you confirm the compatibility of your unit before use.
3. CHECK IDLE SPEED
   (a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
   (b) Check the idle speed.
      Idle speed: 
      \[ 700 \pm 50 \text{ rpm} \]

4. ADJUST IGNITION TIMING
   (a) Using SST, connect terminals TE1 and E1 of the DLC 1.
      SST 09843–18020
   (b) Using a timing light, check the ignition timing.
      Ignition timing:
      \[ 10 \pm 2^\circ \text{ BTDC @ idle} \]
      (Transmission in neutral position)
   (c) Loosen the nut, and adjust by turning the distributor.
      Ignition timing:
      \[ 10^\circ \text{ BTDC @ idle} \]
      (Transmission in neutral position)
   (d) Tighten the nut, and recheck the ignition timing.
      Torque: 19 N\cdot m (195 kgf\cdot cm, 14 ft\cdot lbf)
   (e) Remove the SST from the DLC1.
      SST 09843–18020

5. FURTHER CHECK IGNITION TIMING
   Ignition timing:
   \[ 7^\circ - 19^\circ \text{ BTDC @ idle} \]
   (Transmission in neutral position)
   HINT: The timing mark moves in a range between 7\° and 19\°.

6. DISCONNECT TACHOMETER AND TIMING LIGHT
IGNITION TIMING INSPECTION
(2JZ–GTE)

1. WARM UP ENGINE
   Allow the engine to warm up to normal operating temperature.

2. CONNECT TACHOMETER AND TIMING LIGHT
   (See step 2 in ignition timing inspection and adjustment (2JZ–GE))

3. CHECK IDLE SPEED
   (a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
   (b) Check the idle speed.
       Idle speed:  
       650 ± 50 rpm

4. CHECK IGNITION TIMING
   (a) Using SST, connect terminals TE1 and E1 of the DLC 1.
       SST 09843–18020
   (b) Open the igniter connector cover and remove the green lead wire.
   (c) Connect the timing light clip to the green lead wire.

NOTICE:
• Use a timing light that can detect the primary signal.
• After finishing the inspection, make sure the lead wire is stored inside the connector cover.
(d) Using a timing light, check the ignition timing.

Ignition timing:

10 ± 2° BTDC @ idle

(Transmission in neutral position)

If the ignition timing is not as specified, check the valve timing. (See step 14 in timing belt installation)

(e) Remove the SST from the DLC1.

SST 09843–18020

5. FURTHER CHECK IGNITION TIMING

Ignition timing:

10–20° BTDC @ idle

(Transmission in neutral position)

HINT: The timing mark moves in a range between 10° and 20°.

6. DISCONNECT TACHOMETER AND TIMING LIGHT

IDLE SPEED INSPECTION

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected

HINT: All vacuum hoses for EGR system, etc. should be properly connected.
(f) SFI system wiring connectors fully plugged
(g) Ignition timing set correctly
(h) Transmission in neutral position

2. CONNECT TACHOMETER

(See step 2 in ignition timing inspection and adjustment (2JZ–GE))

3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
(b) Check the idle speed.

Idle speed:

2JZ–GE
700 ± 50 rpm

2JZ–GTE
650 ± 50 rpm

If the idle speed is not as specified, check the IAC valve. (See on–vehicle inspection in ISC valve in SFI System)

4. DISCONNECT TACHOMETER
TIMING BELT COMPONENTS FOR REMOVAL AND INSTALLATION
TIMING BELT REMOVAL

1. REMOVE RADIATOR ASSEMBLY
   (See radiator removal in Cooling System)

2. 2JZ–GTE M/T:
   REMOVE DRIVE BELT TENSIONER DAMPER
   Remove the 2 nuts and tensioner damper.

3. REMOVE DRIVE BELT, FAN, FLUID COUPLING
   ASSEMBLY AND WATER PUMP PULLEY
   (See step 6 in water pump removal in Cooling System)

4. REMOVE NO.3 TIMING BELT COVER
   (a) Remove the oil filler cap.
   (b) 2JZ–GE:
       Using a 5 mm hexagon wrench, remove the 6 bolts and belt cover.
   (c) 2JZ–GTE:
       Using a 5 mm hexagon wrench, remove the 10 bolts and belt cover.

5. REMOVE NO.2 TIMING BELT COVER
   Using a 5 mm hexagon wrench, remove the 3 bolts, belt cover
   and gasket.
   If you are unable to loosen the bolt on the right because the
   PS pump pulley interferes with the hexagon wrench, first re-
   move the pulley.

6. REMOVE DRIVE BELT TENSIONER
   Remove the 3 bolts and tensioner.
7. SET NO.1 CYLINDER TO TDC/COMPRESSION
(a) Turn the crankshaft pulley, and align its groove with timing mark "O" of the No.1 timing belt cover.
NOTICE: Always turn the crankshaft clockwise.

(b) Check that the timing marks of the camshaft timing pulleys are aligned with the timing marks of the No.4 timing belt cover.
If not, turn the crankshaft 1 revolution (360°).

8. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS
HINT (Re–using timing belt): Place matchmarks on the timing belt and camshaft timing pulleys as shown in the illustration.

(a) Alternately loosen the 2 bolts, and remove them, the tensioner and dust boot.

(b) Disconnect the timing belt from the camshaft timing pulleys.
9. REMOVE CAMSHAFT TIMING PULLEYS
Using SST, remove the pulley bolt. Remove the 2 timing pulleys.
SST 09960–10010 (09962–01000, 09963–01000)

10. A/T:
DISCONNECT OIL COOLER TUBES
Remove the 2 bolts and hose clamps, and disconnect oil cooler tubes.

11. REMOVE CRANKSHAFT PULLEY
(a) Using SST, loosen the pulley bolt.
SST 09213–70010, 09330–00021
(b) Remove the pulley bolt.
(c) Using SST, remove the pulley.

12. 2JZ–GE:
REMOVE PS PUMP FRONT BRACKET
Remove the 3 bolts, plate washer and pump front bracket.
13. REMOVE NO.1 TIMING BELT COVER  
   Remove the 5 bolts, timing belt cover and gasket.

14. REMOVE TIMING BELT GUIDE

15. REMOVE TIMING BELT  
   HINT (When re–using timing belt): Draw an arrow on the timing belt in the direction of engine revolution, and place matchmarks on the timing belt and crankshaft timing pulley.

16. REMOVE IDLER PULLEY  
   Using a 10 mm hexagon wrench, remove the pivot bolt, plate washer and idler pulley.

17. REMOVE CRANKSHAFT TIMING PULLEY  
   (a) 2JZ–GTE:  
      Remove the bolt and timing belt plate.

   (b) Remove the crankshaft timing pulley.  
      If the pulley cannot be removed by hand, use SST to remove the crankshaft timing pulley.  
      SST 09950–50010 (09951–05010, 09952–05010, 09953–05020, 09954–00010)
TIMING BELT COMPONENTS INSPECTION

1. INSPECTION TIMING BELT

NOTICE:
- Do not bend, twist or turn the timing belt inside out.
- Do not allow the timing belt to come into contact with oil, water or steam.
- Do not utilize timing belt tension when installing or removing the mount bolt of the camshaft timing pulley.

If there are any defects, as shown in the illustrations, check the following points.

(a) Premature parting
- Check for proper installation.
- Check the timing cover gasket for damage and proper installation.

(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.

(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock.

(d) If there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.

(e) If there is noticeable wear on the belt teeth, check timing cover for damage and check gasket has been installed correctly and for foreign material on the pulley teeth.

If necessary, replace the timing belt.

2. INSPECT IDLER PULLEY

Check the turning smoothness of the idler pulley.
If necessary, replace the idler pulley.

3. INSPECT DRIVE BELT TENSIONER

Check the turning smoothness of the tensioner.
If necessary, replace the tensioner.

4. INSPECT TIMING BELT TENSIONER

(a) Visually check tensioner for oil leakage.
HINT: If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right.
If leakage is found, replace tensioner.
(b) Hold the tensioner with both hands and push the push rod strongly against the floor or wall to check that it doesn't move. If the push rod moves, replace the tensioner.

(c) Measure the protrusion of the push rod from the housing end. **Protrusion:**

\[
8.0–8.8 \text{ mm (0.315–0.346 in.)}
\]

If the protrusion is not as specified, replace the tensioner.

---

**5. 2JZ–GTE M/T:**

**INSPECT DRIVE BELT TENSION DAMPER**

Compress and extend the tension damper rod and check that there is no abnormal resistance or unusual operation sounds.

If there is any abnormality, replace the tension damper with a new one.

**NOTICE:** When discarding the tension damper, use the following procedure.

- Fully extend the damper rod.
- Using a drill, make a hole in the cylinder as shown to release the gas inside.

**CAUTION:** The gas coming out is harmless, but be careful of the chips which may fly up when drilling.

---

**TIMING BELT INSTALLATION**

1. **INSTALL CRANKSHAFT TIMING PULLEY**

(a) Align the pulley set key with the key groove of the pulley.

(b) Slide on the timing pulley facing the flange side inward.
2. INSTALL IDLER PULLEY
(a) Apply adhesive to 2 or 3 threads of the pivot bolt.
   Adhesive:
   - Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent
(b) Using a 10 mm hexagon wrench, install the plate washer and pulley with the pivot bolt.
   Torque: 34 N⋅m (350 kgf⋅cm, 25 ft⋅lbf)
(c) Check that the pulley bracket moves smoothly.

3. TEMPORARILY INSTALL TIMING BELT
   NOTICE: The engine should be cold.
   (a) Using the crankshaft pulley bolt, turn the crankshaft, and align the timing marks on the crankshaft timing pulley and on the oil pump body.
   (b) Remove any oil or water on the crankshaft timing pulley and idler pulley, and keep them clean.
   (c) Install the timing belt on the crankshaft timing pulley and idler pulley.
   HINT (When re–using timing belt): Align the match marks of the crankshaft timing pulley and timing belt, and install the belt with the arrow pointing in the direction of engine revolution.

4. INSTALL TIMING BELT GUIDE
   Install the guide, facing the cup side outward.
5. INSTALL NO.1 TIMING BELT COVER
6. 2JZ–GE:
INSTALL PS PUMP FRONT BRACKET
(a) Install the pump front bracket with the 2 bolts (A).
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)
(b) Install the plate washer and bolt (b) to the oil pump.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

7. INSTALL CRANKSHAFT PULLEY
(a) Align the pulley set key with the key groove of the pulley, and
slide on the pulley.
(b) Using SST, install the bolt.
SST 09213–70010, 09330–00021
Torque: 324 N·m (3,300 kgf·cm, 239 ft·lbf)

8. A/T:
CONNECT OIL COOLER TUBES

9. INSTALL CAMSHAFT TIMING PULLEYS
(a) Align the camshaft knock pin with the groove of the pulley,
and slide on the timing pulley.
(b) Temporarily install the timing pulley bolt.
(c) Using SST, tighten the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 79 N·m (810 kgf·cm, 59 ft·lbf)

10. SET NO.1 CYLINDER TO TDC/COMPRESSION
(a) Turn the crankshaft pulley, and align its groove with timing
mark "O" of the No.1 timing belt cover.
NOTICE: Always turn the crankshaft clockwise.
(b) Using SST, align the timing marks of the camshaft timing pulleys and No.4 timing belt cover.
SST 09960–10010 (09962–01000, 09963–01000)

11. INSTALL TIMING BELT
HINT (When re–using timing belt): Align the matchmarks of the timing belt and camshaft timing pulleys.
(a) Remove any oil or water on the camshaft timing pulley, and keep it clean.
(b) Install the timing belt, checking the tension between the crankshaft timing pulley and exhaust camshaft timing pulley.

12. SET TIMING BELT TENSIONER
(a) Using a press, slowly press in the push rod using 981 –9,807 N (100–1,000 kgf, 220–2,205 lbf) of force.
(b) Align the holes of the push rod and housing, pass a 1.5 mm hexagon wrench through the holes to keep the push rod retracted.
(c) Release the press.
(d) Install the dust boot onto the tensioner.

13. INSTALL TIMING BELT TENSIONER
(a) Temporarily install the tensioner with the 2 bolts.
(b) Alternately tighten the 2 bolts.
   Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)
(c) Remove the 1.5 mm hexagon wrench from the tensioner.

14. CHECK VALVE TIMING
(a) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.
   NOTICE: Always turn the crankshaft clockwise.

(b) Check that each pulley aligns with the timing marks as shown in the illustration.
   If the marks do not align, remove the timing belt and reinstall it.

15. INSTALL DRIVE BELT TENSIONER
   Install the tensioner with the 3 bolts.
   Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
   NOTICE: Be careful not to drop the bolts inside the timing belt cover.

16. INSTALL NO.2 TIMING BELT COVER
17. INSTALL NO.3 TIMING BELT COVER
18. INSTALL WATER PUMP PULLEY, FAN, FLUID COUPLING ASSEMBLY AND DRIVE BELT
   (See step 10 in water pump installation in Cooling System)
19. 2JZ–GTE M/T:
   INSTALL DRIVE BELT TENSIONER DAMPER
   Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

20. INSTALL RADIATOR ASSEMBLY
    (See radiator installation in Cooling System)
21. ROAD TEST VEHICLE
    Check for abnormal noise, shock, slippage, correct shift points and smooth operation.
CYLINDER HEAD
COMPONENTS FOR REMOVAL AND INSTALLATION

2JZ-GE
Air Cleaner, VAF Meter and Intake Air Connector Pipe Assembly

Exhaust Manifold
Heat Insulator (Except California)
Exhaust Manifold

x8

Gasket

Cruise Control Actuator Cable
Throttle Control Cable (A/T)
Accelerator Cable

Air Cleaner Duct

Drive Belt

Gasket

Engine Under Cover

x16

No.2 Front Exhaust Pipe

Pipe Support Bracket

Gasket

Non-reusable part
2JZ - GTE

- No.1 Air Hose
- Air Cleaner and MAF Meter Assembly
- Air Cleaner Duct
- Theft Deterrent Horn
- Drive Belt
- No.5 Air Hose
- Oil Cooler Tube (A/T)
- Hose Clamp
- Hose Clamp
- Front Lower Arm Bracket Stay
- Upper Crossmember Extension
- Engine Under Cover
- Engine Wire Protector
- EVAP Hose
- Brake Booster Vacuum Hose
- Heat Insulator
- No.2 Front Exhaust Pipe
- Tube Clamp
- Gasket
- Gasket
- Pipe Support Bracket

* Non-reusable part
2JZ-GTE
No.1 Vacuum Pipe

Heat Insulator for Turbocharger

Exhaust Connector and No.1 Air Tube

No.4 Air Tube and Air Bypass Valve Assembly

No.2 Turbocharger Stay

No.1 Turbocharger Stay

No.1 Turbo Oil Pipe

Crankshaft Position Sensor Connector

VSV Assembly

Engine Wire

VSV Connector for Waste Gate Valve

Main Heated Oxygen Sensor Connector

Air Hose

Exhaust Gas Control Valve

Exhaust Manifold

Turbochargers and Turbine Outlet Elbow Assembly

Turbochargers and Turbine Outlet Elbow Assembly

VSV Connector for Exhaust Gas Control Valve

Gasket

Non-reusable part
- Non-reusable part
CYLINDER HEAD REMOVAL (2JZ–GE)
1. REMOVE ENGINE UNDER COVER
2. DRAIN ENGINE COOLANT
3. REMOVE AIR CLEANER DUCT
4. REMOVE AIR CLEANER, VAF METER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY
   (See step 6 in engine removal in Engine Mechanical)

5. REMOVE DRIVE BELT
   Loosen the drive belt tension by turning the drive belt tensioner clockwise, and remove the drive belt.
6. REMOVE NO.2 FRONT EXHAUST PIPE
   (See step 22 in engine removal in Engine Mechanical)

7. REMOVE EXHAUST MANIFOLDS
   (a) Except California:
   Remove the 4 nuts and manifold heat insulator.
   (b) Disconnect the 2 (main heated) oxygen sensor connectors.
   (c) Remove the 4 nuts, exhaust manifold and gasket.
   Remove the No.1 and No.2 exhaust manifolds.

8. DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES
   (a) Disconnect these hoses:
   (1) Air hose from No.4 timing belt cover
   (2) Air hose from air intake chamber
   (b) Remove the 2 bolts, and disconnect the pump housing from the pump bracket.
   HINT: Put aside the pump housing, and suspend it.
   (c) Remove the 2 bolts and pump rear stay.

9. DISCONNECT BRAKE BOOSTER VACUUM HOSE
10. DISCONNECT EVAP HOSE
11. REMOVE THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY
    (See injector removal in SFI System)
12. REMOVE AIR INTAKE CHAMBER STAYS
   (a) Remove the bolt, nut and No.1 stay.
   (b) Remove the bolt, nut and No.2 stay.

13. REMOVE NO.2 VACUUM PIPE AND VSV ASSEMBLY

14. REMOVE NO.3 TIMING BELT COVER
   (a) Remove the oil filler cap.
   (b) Using a 5 mm hexagon wrench, remove the 6 bolts and timing
       belt cover.

15. REMOVE CYLINDER HEAD REAR COVER
   Using a 5 mm hexagon wrench, remove the 4 bolts and cylin-
   der head rear cover.

16. DISCONNECT HIGH–TENSION CORDS FROM
    CYLINDER HEAD COVERS
   (See step 4 in high–tension cords and cord clamps re-
    moval in Ignition System)

17. REMOVE DISTRIBUTOR AND CORDS ASSEMBLY
   (See steps 1 to 3 in distributor removal in Ignition Sys-
    tem)

18. REMOVE SPARK PLUGS

19. REMOVE TIMING BELT FROM CAMSHAFT TIMING
    PULLEYS
   (See steps 5 to 8 in timing belt removal)
    NOTICE:
    • Support the timing belt, so that the meshing of the crank-
      shaft timing pulley and timing belt does not shift.
    • Be careful not to drop anything inside the timing belt cov-
      er.
    • Do not allow the timing belt to come into contact with oil, 
      water or dust.

20. REMOVE WATER BYPASS OUTLET AND NO.1 WATER
    BYPASS PIPE
   (See step 13 in water pump removal in Cooling System)

21. DISCONNECT FUEL RETURN HOSE
   (a) Disconnect the fuel return hose from the fuel return pipe. Plug
       the hose end.
   (b) Disconnect the fuel return hose from the oil dipstick guide.

22. REMOVE ENGINE WIRE BRACET
   Remove the bolt and bracket, disconnect the engine wire the
   intake manifold stay.
23. REMOVE OIL DIPSTICK GUIDES FOR ENGINE AND TRANSMISSION
(a) Remove the 2 bolts.
(b) Pull out the dipstick guide together with the dipstick.
(c) Remove the O–ring from the dipstick guide.

24. REMOVE STARTER
(See starter removal in Starting System)

25. REMOVE AIR INTAKE CHAMBER
(a) Except California:
   Disconnect the vacuum sensing hose from the fuel pressure regulator.
(b) Remove the bolt holding the engine wire protector to the air intake chamber.
(c) Remove the 5 bolts, nut, air intake chamber and gasket.

26. REMOVE VACUUM CONTROL VALVE SET
(a) Disconnect the VSV connector.
(b) Remove the 2 nuts and vacuum control valve set.

27. DISCONNECT ENGINE WIRE
(a) Remove the bolt, and disconnect the engine wire bracket from the water pump.
(b) Remove the 2 bolts, and disconnect the 2 ground straps from the intake manifold.
(c) Remove the 2 bolts, and disconnect the 2 wire clamps from the intake manifold.
(d) Disconnect these connectors:
   • 6 injector connectors
   • ECT sensor connector
   • ECT sender gauge connector
(e) Remove the 3 nuts, and disconnect the engine wire protector from the intake manifold.

28. REMOVE WATER OUTLET AND NO.1 BYPASS HOSE ASSEMBLY
Remove the 2 nuts, bolt and water outlet.

29. REMOVE INTAKE MANIFOLD STAY
Remove the 2 bolts and manifold stay.

30. REMOVE FUEL PRESSURE PULSATION DAMPER
(See step 2 in fuel pressure pulsation damper in SFI System)

31. REMOVE FUEL INLET PIPE
(a) Remove the clamp bolt from the intake manifold.
(b) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet pipe.

32. REMOVE INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY
Remove the 6 bolts, 2 nuts, the intake manifold, delivery pipe assembly and gasket.
33. REMOVE NO.3, NO.1 AND NO.2 CYLINDER HEAD COVERS
(a) Remove the PCV valve.
(b) Remove the 4 bolts, 4 nuts and No.3 cylinder head cover.
(c) Remove the 4 bolts, No.1 cylinder head cover and gasket.
(d) Remove the 4 bolts, No.2 cylinder head cover and gasket.

34. REMOVE CAMSHAFT TIMING PULLEYS
Hold the hexagon portion of the camshaft with a wrench, and remove the pulley mounting bolt and camshaft pulley.

35. REMOVE NO.4 TIMING BELT COVER
Remove the 4 bolts and timing belt cover.

36. REMOVE CAMSHAFTS
(a) Uniformly loosen and remove the 4 No.1 bearing cap bolts.

(b) Using a screwdriver, pry out the 2 No.1 camshaft bearing caps and oil seals.
NOTICE: Be careful not to damage the cap. Tape the screwdriver tip.
(c) Uniformly loosen and remove the 12 bearing cap bolts, in several passes, in the sequence shown, and remove the 6 bearing caps and camshaft.
(d) Remove the intake and exhaust camshafts.

37. REMOVE CYLINDER HEAD
(a) Using a 10 mm bi–hexagon wrench, uniformly loosen and remove the 14 cylinder head bolts, in several passes, in the sequence shown.
   NOTICE: Cylinder head warpage or cracking could result from removing in incorrect order.
(b) Remove the 14 plate washers.

(c) Lift the cylinder head from the dowels on the cylinder block.
(d) Place the head on wooden blocks on a bench.
   If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block projection.
   NOTICE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

CYLINDER HEAD REMOVAL (2JZ–GTE)
1. REMOVE TURBOCHARGER
   (See turbocharger removal in Turbocharger System)
2. REMOVE EXHAUST MANIFOLD
   Remove the 12 nuts, exhaust manifold and 2 gaskets.
3. M/T:
   REMOVE DRIVE BELT TENSIONER DAMPER
   (See step 2 in timing belt removal)
4. **REMOVE DRIVE BELT**
   Loosen the drive belt tension by turning the drive belt tensioner clockwise, and remove the drive belt.

5. **REMOVE WATER OUTLET AND NO.1 WATER BYPASS PIPE**
   (a) Disconnect the upper radiator hose from the water outlet.
   (b) Disconnect the ECT sensor and sender gauge connectors.
   (c) Remove the 2 bolts, water outlet and gasket.
   (d) Remove the No.1 water bypass pipe and 2 O–rings.

6. **DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES**
   (a) Disconnect these hoses:
      (1) Air hose from throttle body
      (2) Air hose from air intake chamber
   (b) Remove the 2 bolts, and disconnect the pump housing from the pump bracket.
      HINT: Put aside the pump housing, and suspend it securely.

7. **DISCONNECT FUEL RETURN HOSE**
   Disconnect the fuel return hose from the fuel return pipe. Plug the hose end.

8. **REMOVE AIR INTAKE CHAMBER ASSEMBLY**
   (See injector removal in SFI System)
9. **DISCONNECT ENGINE WIRE**
   (a) Disconnect these connectors and clamps:
       (1) 6 injectors connectors
       (2) 2 camshaft position sensor connectors
       (3) 3 engine wire clamps from injector holders
       (4) VSV connector for EVAP
   (b) Remove the 2 bolts, and disconnect the 2 ground straps from the intake manifold.
   (c) Remove the nut, and disconnect the engine wire protector from the intake manifold.

10. **REMOVE STARTER**
    (See starter removal in Starting System)

11. **REMOVE PRESSURE TANK AND VSV ASSEMBLY**
    (a) Disconnect the 2 vacuum hoses from the pressure tank.
    (b) Remove the 2 nuts and pressure tank and VSV assembly.

12. **REMOVE FUEL PRESSURE PULSATION DAMPER**
    (See step 2 in fuel pressure pulsation damper in SFI System)

13. **REMOVE FUEL INLET PIPE**
    Remove the union bolt, 2 gaskets, clamp bolt and fuel inlet pipe.

14. **REMOVE INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY**
    Remove the 4 bolts, 2 nuts, engine wire bracket, the intake manifold, delivery pipe assembly and gasket.
15. REMOVE TIMING BELT FROM CAMSHAFT TIMING PULLEYS
(See steps 5 to 8 in timing belt removal)
NOTICE:
- Support the timing belt, so that the meshing of the crankshaft timing pulley and timing belt does not shift.
- Be careful not to drop anything inside the timing belt cover.
- Do not allow the timing belt to come into contact with oil, water or dust.

16. REMOVE IGNITION COILS ASSEMBLIES
(See steps 2 to 5 in ignition coils removal in Ignition System)

17. REMOVE SPARK PLUGS

18. REMOVE NO.1 AND NO.2 CYLINDER HEAD COVERS
(a) Remove the 2 bolts, cruise control actuator cable bracket and IAC valve pipe clamp.
(b) Remove the PCV valve.
(c) Remove the 6 bolts, 2 nuts, 8 seal washers and No.1 cylinder head cover and gasket.
(d) Remove the 6 bolts, 2 nuts, 8 seal washers and No.2 cylinder head cover and gasket.

19. REMOVE CAMSHAFT TIMING PULLEYS
(See step 34 cylinder head removal (2JZ–GE))

20. REMOVE NO.4 TIMING BELT COVER
(See step 35 cylinder head removal (2JZ–GE))

21. REMOVE CAMSHAFTS
(See step 36 cylinder head removal (2JZ–GE))

22. REMOVE CYLINDER HEAD
(See step 37 cylinder head removal (2JZ–GE))

CYLINDER HEAD DISASSEMBLY
1. 2JZ–GE:
   REMOVE ENGINE HANGERS
2. 2JZ–GE:
   REMOVE ECT SENSOR AND SENDER GAUGE
3. 2JZ–GE:
   REMOVE THROTTLE CABLE BRACKET AND GROUND STRAP
4. 2JZ–GTE: REMOVE ENGINE HANGERS AND GROUND STRAP
5. 2JZ–GTE: REMOVE CAMSHAFT POSITION SENSORS
6. REMOVE EGR COOLER

7. REMOVE VALVE LIFTERS AND SHIMS
   HINT: Store the valve lifters and shims in correct order.

8. REMOVE VALVES
   (a) Using SST, compress the valve spring and remove the 2 keepers.
       SST 09202–70010
   (b) Remove the spring retainer, valve spring, valve and spring seat.
       HINT: Store the valves, valve springs, spring seats and spring retainers in correct order.
   (c) Using needle–nose pliers, remove the oil seal.

CYLINDER HEAD COMPONENTS
INSPECTION AND REPAIR
1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK
   (a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.
(b) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.
(c) Using compressed air, blow carbon and oil from the bolt holes.
CAUTION: Protect your eyes when using high pressure compressed air.

2. CLEAN CYLINDER HEAD
A. Remove gasket material
Using a gasket scraper, remove all the gasket material from the cylinder block surface.
NOTICE: Be careful not to scratch the cylinder block contact surface.

B. Clean combustion chambers
Using a wire brush, remove all the carbon from the combustion chambers.
NOTICE: Be careful not to scratch the cylinder block contact surface.

C. Clean valve guide bushings
Using a valve guide bushing brush and solvent, clean all the guide bushings.

D. Clean cylinder head
Using a soft brush and solvent, thoroughly clean the cylinder head.
3. **INSPECT CYLINDER HEAD**

   **A. Inspect for flatness**
   Using precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block, intake and exhaust manifolds for warpage.
   **Maximum warpage:**
   0.10 mm (0.0039 in.)
   If warpage is greater than maximum, replace the cylinder head.

   **B. Inspect for cracks**
   Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.
   If cracked, replace the cylinder head.

4. **CLEAN VALVES**

   (a) Using a gasket scraper, chip off any carbon from the valve head.
   (b) Using a wire brush, thoroughly clean the valve.

5. **INSPECT VALVE STEMS AND GUIDE BUSHINGS**

   (a) Using a caliper gauge, measure the inside diameter of the guide bushing.
   **Bushing inside diameter:**
   6.010–6.030 mm (0.2366–0.2374 in.)
(b) Using a micrometer, measure the diameter of the valve stem. 

Valve stem diameter:
- Intake: 5.970–5.985 mm (0.2350–0.2356 in.)
- Exhaust: 5.965–5.980 mm (0.2348–0.2354 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:
- Intake: .025–.060 mm (0.0010–0.0024 in.)
- Exhaust: .030–.065 mm (0.0012–0.0026 in.)

Maximum oil clearance:
- Intake: .08 mm (0.0031 in.)
- Exhaust: .10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and guide bushing.

6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

(a) Using SST and a hammer, tap out the guide bushing. 

SST 09201–10000 (09201–01060).  
09608–30022 (09608–05010)

(b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

<table>
<thead>
<tr>
<th>Bushing bore diameter mm (in.)</th>
<th>Bushing size</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.985–11.006 mm (0.4325–0.4333 in.)</td>
<td>Use STD</td>
</tr>
<tr>
<td>11.035–11.056 mm (0.4344–0.4353 in.)</td>
<td>Use O/S 0.05</td>
</tr>
</tbody>
</table>

Select a new guide bushing (STD or O/S 0.05).

If the bushing bore diameter of the cylinder head is greater than 11.006 mm (0.4333 in.), machine the bushing bore to the following dimension:

11.035–11.056 mm (0.4344–0.4353 in.)

If the bushing bore diameter of the cylinder head is greater than 11.056 mm (0.4353 in.), replace the cylinder head.
(d) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.
SST 09201–10000 (09201–01060), 09608–30022 (09608–05010)

**Protrusion height:**

- **Intake**
  - 12.3–12.7 mm (0.484–0.500 in.)

- **Exhaust**
  - 11.4–11.8 mm (0.449–0.465 in.)

**HINT:** Different bushings are used for the intake and exhaust.

(e) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See step 6) between the guide bushing and valve stem.

7. **INSPECT AND GRIND VALVES**

(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

Valve face angle:

- **44.5°**

(c) Check the valve head margin thickness.

**Standard margin thickness:**

- 0.8–1.2 mm (0.031–0.047 in.)

**Minimum margin thickness:**

- 0.5 mm (0.020 in.)

If the margin thickness is less than minimum, replace the valve.
(d) Check the valve overall length.

**Standard overall length:**
- **Intake**
  - 98.29–98.79 mm (3.8697–3.8894 in.)
- **Exhaust**
  - 98.84–99.34 mm (3.8913–3.9110 in.)

**Minimum overall length:**
- **Intake**
  - 98.19 mm (3.8657 in.)
- **Exhaust**
  - 98.74 mm (3.8874 in.)

If the overall length is less than minimum, replace the valve.

(e) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

**NOTICE:** Do not grind off more than the minimum overall length.

8. **INSPECT AND CLEAN VALVE SEATS**

(a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.

(b) Check the valve seating position.

Apply a thin coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate the valve.

(c) Check the valve face and seat for the following:
- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:
  - **Intake**
    - 1.0–1.4 mm (0.039–0.055 in.)
  - **Exhaust**
    - 1.2–1.6 mm (0.047–0.063 in.)

If not, correct the valve seats as follows:
- If the seating is too high on the valve face, use 15° and 45° cutters to correct the seat.
- If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.

(d) Hand-lap the valve and valve seat with an abrasive compound.

(e) After hand-lapping, clean the valve and valve seat.

9. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:
2.0 mm (0.079 in.)

If deviation is greater than maximum, replace the valve spring.

(b) Using vernier calipers, measure the free length of the valve spring.

Free length:
Blue painted mark
41.74 mm (1.6433 in.)
Yellow painted mark
41.70 mm (1.6417 in.)

If the free length is not as specified, replace the valve spring.

(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:
186–206 N (19.0–21.0 kgf, 42–46 lbf) at 34.5 mm (1.358 in.)

If the installed tension is not as specified, replace the valve spring.
10. **INSPECT CAMSHAFTS AND BEARINGS**

A. **Inspect camshaft for runout**
   (a) Place the camshaft on V–blocks.
   (b) Using a dial indicator, measure the circle runout at the center journal.
      **Maximum circle runout:**
      
      0.08 mm \((0.0031\text{ in.})\)

      If the circle runout is greater than maximum, replace the camshaft.

B. **Inspect cam lobes**
   Using a micrometer, measure the cam lobe height.
   **Standard cam lobe height:**
   
   **Intake**
   
   44.570–44.670 mm \((1.7547–1.7587\text{ in.})\)
   
   **Exhaust**
   
   44.770–44.870 mm \((1.7626–1.7665\text{ in.})\)

   **Maximum cam lobe height:**
   
   **Intake**
   
   44.42 mm \((1.7488\text{ in.})\)
   
   **Exhaust**
   
   44.62 mm \((1.7567\text{ in.})\)

   If the cam lobe height is less than minimum, replace the camshaft.

C. **Inspect camshaft journals**
   Using a micrometer, measure the journal diameter.
   **Journal diameter:**
   
   28.949–28.965 mm \((1.1397–1.1404\text{ in.})\)

   If the journal diameter is not as specified, check the oil clearance.

D. **Inspect camshaft bearings**
   Check the bearings for flaking and scoring.
   If the bearings are damaged, replace the bearing caps and cylinder head as a set.

E. **Inspect camshaft journal oil clearance**
   (a) Clean the bearing caps and camshaft journals.
   (b) Place the camshafts on the cylinder head.
   (c) Lay a strip of Plastigage across each of the camshaft journals.
(d) Install the bearing caps.
   (See step 2 in cylinder head installation (2JZ–GE))
   Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)
   NOTICE: Do not turn the camshaft.

(e) Remove the bearing caps.

(f) Measure the Plastigage at its widest point.
   Standard oil clearance:
   0.035–0.072 mm (0.0014–0.0028 in.)
   Maximum oil clearance:
   0.10 mm (0.0039 in.)
   If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(g) Completely remove the Plastigage.

F. Inspect camshaft thrust clearance
   (a) Install the camshafts.
      (See step 2 in cylinder head installation (2JZ–GE))
   (b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
      Standard thrust clearance:
      0.080–0.190 mm (0.0031–0.0075 in.)
      Maximum thrust clearance:
      0.30 mm (0.0118 in.)
      If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

11. INSPECT VALVE LIFTERS AND LIFTER BORES
   (a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
      Lifter bore diameter:
      31.000–31.016 mm (1.2205–1.2211 in.)
   (b) Using a micrometer, measure the lifter diameter.
      Lifter diameter:
      30.966–30.976 mm (1.2191–1.2195 in.)
   (c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
      Standard oil clearance:
      0.024–0.050 mm (0.0009–0.0020 in.)
      Maximum oil clearance:
      0.07 mm (0.0028 in.)
      If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.
12. **INSPECT AIR INTAKE CHAMBER**
Using a precision straight edge and feeler gauge, measure the surfaces contacting the intake manifold for warpage.
**Maximum warpage:**
0.15 mm (0.0059 in.)
If warpage is greater than maximum, replace the chamber.

13. **INSPECT INTAKE MANIFOLD**
Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and air intake chamber for warpage.
**Maximum warpage:**
0.15 mm (0.0059 in.)
If warpage is greater than maximum, replace the manifold.

14. **2JZ–GE:**
**INSPECT EXHAUST MANIFOLDS**
Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head for warpage.
**Maximum warpage:**
0.50 mm (0.0196 in.)
If warpage is greater than maximum, replace the manifold.

15. **2JZ–GTE:**
**INSPECT EXHAUST MANIFOLD**
Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head for warpage.
**Maximum warpage:**
0.80 mm (0.0315 in.)
If warpage is greater than maximum, replace the manifold.
16. **INSPECT CYLINDER HEAD BOLTS**

Using a vernier caliper, measure the thread outside diameter of the bolt.

**Standard outside diameter:**
10.8–11.0 mm (0.425–0.433 in.)

**Minimum outside diameter:**
10.7 mm (0.421 in.)

If the diameter is less than minimum, replace the bolt.

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**CYLINDER HEAD ASSEMBLY**

**HINT:**
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.

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1. **INSTALL HEATER UNION**

**HINT:** When using a new cylinder head, a new heater union must be installed.

(a) Apply adhesive to the end of the heater union as shown in the illustration.

**Adhesive:**
- Part No. 08833–00070, THREE BOND 1324 or equivalent

(b) Using a wooden block and hammer, tap in a new heater union, leaving standard position protruding from the cylinder head.

**Standard protrusion:**
- 2JZ–GE
  - 48 mm (1.89 in.)
- 2JZ–GTE
  - 73 mm (2.87 in.)

**NOTICE:** Do not tap it in too far.

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2. **INSTALL VALVES**

(a) Install a new oil seal on the valve guide bushing.
(b) Install these parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer

HINT: Install the valve spring, facing the painted mark upward.

(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70010

(d) Using a plastic–faced hammer, lightly tap the valve stem tip to ensure a proper fit.

3. INSTALL VALVE LIFTERS AND SHIMS
(a) Install the valve lifter and shim.
(b) Check that the valve lifter rotates smoothly by hand.

4. INSTALL EGR COOLER
Install a new gasket and the EGR cooler with the 8 bolts.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

5. 2JZ–GE:
INSTALL ECT SENSOR AND SENDER GAUGE
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

6. 2JZ–GE:
INSTALL GROUND STRAP AND THROTTLE CABLE BRACKET

7. 2JZ–GE:
INSTALL ENGINE HANGERS
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
8. **2JZ–GTE:**
   INSTALL CAMSHAFT POSITION SENSORS
   Install the gasket and sensor with the 2 bolts.
   Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

9. **2JZ–GTE:**
   INSTALL ENGINE HANGERS AND GROUND STRAP
   Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

### CYLINDER HEAD INSTALLATION

(2JZ–GE)

1. **INSTALL CYLINDER HEAD**
   A. Place cylinder head on cylinder block
      (a) Place a new cylinder head gasket in position on the cylinder block.
         **NOTICE:** Be sure to install it correctly.
      (b) Place the cylinder head in position on the cylinder head gasket.

   B. Install cylinder head bolts
      **HINT:**
      - The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (f)).
      - If any of bolts break or deform, replace them.
      (a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
      (b) Install the 14 plate washers to each cylinder head bolt.
      (c) Using a 10 mm bi–hexagon wrench, uniformly tighten the cylinder head bolts, in several passes, in the sequence shown.
         **Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)**
         If any of the bolts do not meet the torque specification, replace the bolt.

      (d) Mark the front of the cylinder head bolt head with paint.
(e) Retighten the cylinder head bolts by $90^\circ$ in the numerical order shown in the illustration on previous page.
(f) Retighten cylinder head bolts by an additional $90^\circ$ shown in the illustration on previous page.
(g) Check that the painted mark is now turned to the rear.

2. **INSTALL CAMSHAFTS**

(a) Apply engine oil to the thrust portion of the camshaft.
(b) Place the camshaft on the cylinder head with the cam lobe facing up as shown.
(c) Place the No.3 and No.7 bearing caps in their proper location.
(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(e) Temporarily tighten these bearing cap bolts uniformly and alternately, in several passes, until the bearing caps are snug with the cylinder head.
(f) Apply MP grease to a new camshaft oil seal lip.
(g) Install the 2 oil seals to the camshafts.

(h) Clean the installed surfaces of the No.1 bearing cap and cylinder head with cleaner.

(i) Apply seal packing to the No.1 bearing cap as shown.  
**Seal packing:**  
Part No. 08826–00080 or equivalent

(j) Install the No.1, No.2, No.4, No.5 and No.6 bearing caps in their proper locations.

(k) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(l) Install and uniformly tighten the 14 bearing cap bolts on one side, in several passes, in the sequence shown.  
**Torque:** 20 N·m (200 kgf·cm, 14 ft-lbf)
(m) Using SST, push the 2 oil seals in as far as they can go. SST 09316–60010 (09316–00010, 09316–00050)

(n) Rotate the camshaft with a wrench at the hexagon position, bring the forward straight pin up.

(o) Loosen the 3 bearing cap bolts as shown, until they can be turned by hand; retighten, in several passes. Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

(p) Turn the camshaft 1/3 of revolution.

(q) Loosen the 2 bearing cap bolts as shown, until they can be turned by hand; retighten, in several passes. Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

(r) Turn the camshaft a further 1/3 of a revolution.

(s) Loosen the 2 bearing cap bolts as shown, until they can be turned by hand; retighten, in several passes. Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

3. CHECK AND ADJUST VALVE CLEARANCE
   (See steps 5 to 6 in valve clearance inspection and adjustment)
   Turn the camshaft, and position the cam lobe upward, check and adjust the valve clearance.

4. INSTALL NO.4 TIMING BELT COVER
   Install the timing belt cover with 4 bolts. Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)
5. **INSTALL CAMSHAFT TIMING PULLEYS**
   (a) Align the camshaft knock pin with the groove in the pulley, and slide on the pulley.
   (b) Temporarily install the timing pulley bolt.
   (c) Hold the hexagon portion of the camshaft with a wrench, and tighten the timing pulley bolt.
   Torque: 79 N·m (810 kgf·cm, 59 ft-lbf)

6. **INSTALL NO.3, NO.1 AND NO.2 CYLINDER HEAD COVERS**
   (a) Remove any old packing (FIPG) material.
   (b) Apply seal packing to the cylinder head as shown in the illustration.
   Seal packing:
   Part No. 08826–00080 or equivalent
   (c) Install the gaskets to the No.1 and No.2 cylinder head covers.
   (d) Install the No.2 cylinder head cover with the 4 bolts.
   Torque: 8.3 N·m (85 kgf·cm, 74 in.-lbf)
   (e) Install the No.1 cylinder head cover with the 4 bolts.
   Torque: 8.3 N·m (85 kgf·cm, 74 in.-lbf)
   (f) Install the No.3 cylinder head cover with the 4 bolts and 4 nuts.
   Torque: 8.3 N·m (85 kgf·cm, 74 in.-lbf)
   (g) Install the PCV valve.

7. **INSTALL INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY**
   Install a new gasket, the intake manifold and delivery pipe assembly with the 6 bolts and 2 nuts.
   Torque: 27 N·m (280 kgf·cm, 20 ft-lbf)
8. INSTALL FUEL INLET PIPE
   (a) Connect the fuel inlet pipe with 2 new gaskets and the union bolt.
      Torque: 42 N⋅m (420 kgf⋅cm, 30 ft⋅lbf)
   (b) Install the clamp bolt to the intake manifold.
9. INSTALL FUEL PRESSURE PULSATION DAMPER
   (See fuel pressure pulsation damper installation in SFI System)
10. INSTALL INTAKE MANIFOLD STAY
    Torque: 39 N⋅m (400 kgf⋅cm, 29 ft⋅lbf)
11. INSTALL WATER OUTLET AND NO.1 BYPASS HOSE ASSEMBLY
12. CONNECT ENGINE WIRE
    (a) Install the engine wire protector to the intake manifold with the 3 nuts.
    (b) Connect these connectors:
        • 6 injector connectors
        HINT: The No.1, No.3 and No.5 injector connectors are dark gray, and the No.2, No.4 and No.6 injector connectors are gray.
        • ECT sensor connector
        • ECT sender gauge connector
    (c) Install the 2 wire clamps to the intake manifold with the bolts.
    (d) Install the 2 ground straps to the intake manifold with the bolts.
    (e) Install the engine wire bracket to the water pump with the bolt.
13. INSTALL VACUUM CONTROL VALVE SET
    Torque: 21 N⋅m (210 kgf⋅cm, 15 ft⋅lbf)
14. INSTALL AIR INTAKE CHAMBER
    (a) Install a new gasket and the intake chamber with the 5 bolts and nut.
       Torque: 27 N⋅m (280 kgf⋅cm, 20 ft⋅lbf)
    (b) Install the bolt holding the engine wire protector to the air intake chamber.
    (c) Except California:
       Connect the vacuum sensing hose to the fuel pressure regulator.
15. INSTALL STARTER
    (See starter removal in Starting System)
16. INSTALL OIL DIPSTICK GUIDES FOR ENGINE AND TRANSMISSION
    (a) Install a new O–ring to the dipstick guide.
    (b) Apply soapy water to the O–ring.
    (c) Connect the dipstick guide end to the oil pan.
    (d) Install the 2 dipstick guides with the 2 bolts.
17. INSTALL ENGINE WIRE BRACKET
18. CONNECT FUEL RETURN HOSE
19. INSTALL WATER BYPASS OUTLET AND NO.1 WATER BYPASS PIPE  
(See step 3 in water pump installation in Cooling System)

20. INSTALL TIMING BELT  
(See steps 11 to 17 in timing belt removal)

21. INSTALL SPARK PLUGS

22. INSTALL DISTRIBUTOR AND CORDS ASSEMBLY  
(See steps 2, 3 and 5 in distributor installation in Ignition System)

23. CONNECT HIGH–TENSION CORDS TO CYLINDER HEAD COVERS  
(See step 1 in high–tension cords and cord clamps installation in Ignition System)

24. INSTALL NO.3 TIMING BELT COVER

25. INSTALL CYLINDER HEAD REAR COVER

26. INSTALL NO.2 VACUUM PIPE AND VSV ASSEMBLY

27. INSTALL AIR INTAKE CHAMBER STAYS  
HINT: The No.1 stay is marked with "F", and No.2 stay is marked with "R".  
(a) Install the No.1 stay with the bolt and nut.  
Torque: 18 N⋅m (185 kgf⋅cm, 13 ft⋅lbf)

(a) Install the No.2 stay with the bolt and nut.  
Torque: 18 N⋅m (185 kgf⋅cm, 13 ft⋅lbf)

28. INSTALL THROTTLE BODY AND INTAKE AIR CONNECTOR ASSEMBLY  
(See in injector removal in SFI System)

29. CONNECT EVAP HOSE

30. CONNECT BRAKE BOOSTER VACUUM HOSE

31. INSTALL PS PUMP  
(a) Install the pump rear stay with the 2 bolts.  
Torque: 39 N⋅m (400 kgf⋅cm, 29 ft⋅lbf)

(b) Install the pump housing with the 2 bolts.  
Torque: 58 N⋅m (590 kgf⋅cm, 43 ft⋅lbf)

(c) Connect these hoses:  
• Air hose to No.4 timing belt cover  
• Air hose to air intake chamber

32. INSTALL EXHAUST MANIFOLDS  
(a) Install a new gasket and the exhaust manifold with 4 new nuts. Install the No.1 and No.2 exhaust manifolds.  
Torque: 39 N⋅m (400 kgf⋅cm, 29 ft⋅lbf)

(b) Connect the 2 (main heated) oxygen sensor connectors.  
(c) Except California:  
Install the manifold heat insulator with the 4 nuts.
33. INSTALL NO.2 FRONT EXHAUST PIPE
   (See step 6 in engine installation in Engine Mechanical)
34. INSTALL DRIVE BELT
35. INSTALL AIR CLEANER, VAF METER AND INTAKE AIR
    CONNECTOR PIPE ASSEMBLY
   (See step 22 in engine installation in Engine Mechanical)
36. INSTALL AIR CLEANER DUCT
37. FILL WITH ENGINE COOLANT
38. START ENGINE AND CHECK FOR LEAKS
39. CHECK IGNITION TIMING
   (See steps 8 to 12 in distributor installation in Ignition
    System)
40. INSTALL ENGINE UNDER COVER
41. PERFORM ROAD TEST
   Check for abnormal noise, shock, slippage, correct shift
   points and smooth operation.
42. RECHECK ENGINE COOLANT LEVEL

CYLINDER HEAD INSTALLATION
(2JZ–GTE)

1. INSTALL CYLINDER HEAD
   (See step 1 in cylinder head installation (2JZ–GE))
2. INSTALL CAMSHAFTS
   (See step 2 ((a) to (m)) in cylinder head installation (2JZ–GE))
3. CHECK AND ADJUST VALVE CLEARANCE
   (See steps 5 to 6 in valve clearance inspection and ad-
    justment)
   Turn the camshaft, and position the cam lobe upward, check
   and adjust the valve clearance.
4. INSTALL NO.4 TIMING BELT COVER
   (See step 4 in cylinder head installation (2JZ–GE))
5. INSTALL CAMSHAFT TIMING PULLEYS
   (See step 5 in cylinder head installation (2JZ–GE))

6. INSTALL NO.1 AND NO.2 CYLINDER HEAD COVERS
   (a) Remove any old packing (FIPG) material.
   (b) Apply seal packing to the cylinder head as shown in the
       illustration.
       Seal packing:
       Part No. 08826–00080 or equivalent
   (c) Install the gaskets to the No.1 and No.2 cylinder head covers.
(d) Install the seal washers to the mounting bolts.
(e) Install the No.2 cylinder head cover with the 4 seal washers and 4 bolts.
   Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)
(f) Install the No.1 cylinder head cover with the 4 seal washers and 4 bolts.
   Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)
(g) Install the PCV valve.
(h) Install the cruise control actuator cable bracket and IAC valve pipe clamp with the 2 bolts.

7. INSTALL SPARK PLUGS
8. INSTALL IGNITION COILS ASSEMBLIES
   (See ignition coils installation in Ignition System)
9. INSTALL TIMING BELT
   (See steps 11 to 17 in timing belt installation)

10. INSTALL INTAKE MANIFOLD AND DELIVERY PIPE ASSEMBLY
    Install a new gasket, the intake manifold, delivery pipe assembly and engine wire bracket with the 4 bolts and 2 nuts.
    Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

11. INSTALL FUEL INLET PIPE
    (a) Connect the fuel inlet pipe with 2 new gaskets and the union bolt.
        Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)
    (b) Install the clamp bolt to the intake manifold.

12. INSTALL FUEL PRESSURE PULSATION DAMPER
    (See fuel pressure pulsation damper installation in SFI System)

13. INSTALL PRESSURE TANK AND VSV ASSEMBLY
    Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

14. INSTALL STATER
    (See starter installation in Starting System)

15. CONNECT ENGINE WIRE
    (a) Install the engine wire protector to the intake manifold with the nut.
    (b) Install the 2 ground straps to the intake manifold with the bolts.
    (c) Connect these connectors and clamps:
        • VSV connector for EVAP
6 injectors connectors
HINT: The No.1, No.3 and No.5 injector connectors are dark gray, and the No.2, No.4 and No.6 injector connectors are gray.
- 2 camshaft position sensor connectors
- 3 engine wire clamps to injector holders

16. INSTALL AIR INTAKE CHAMBER ASSEMBLY
   (See injector installation in SFI System)

17. CONNECT FUEL RETURN HOSE

18. INSTALL PS PUMP
   Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

19. INSTALL WATER OUTLET AND NO.1 WATER BYPASS PIPE
   (a) Install 2 new O–rings to the No.1 water bypass pipe.
   (b) Apply soapy water to the O–rings.
   (c) Install the No.1 water bypass pipe to the water pump.
   (d) Install a new gasket and the water outlet with the 2 bolts.
   Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)
   (e) Connect the ECT sensor and sender gauge connectors.
   (f) Connect the upper radiator hose to the water outlet.

20. INSTALL DRIVE BELT
   Install the drive belt by turning the drive belt tensioner clockwise.

21. M/T: INSTALL DRIVE BELT TENSIONER DAMPER
   (See step 19 in timing belt installation)

22. INSTALL EXHAUST MANIFOLD
   (a) Place 2 new gaskets to the cylinder head facing the protrusion as shown.
   (b) Install the exhaust manifold with 12 new nuts, in several passes, in the sequence shown.
   Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

23. INSTALL TURBOCHARGER
   (See turbocharger installation in Turbocharger System)
CYLINDER BLOCK
COMPONENTS FOR ENGINE REMOVAL AND INSTALLATION
ENGINE REMOVAL (2JZ–GE)

1. REMOVE HOOD
2. REMOVE RADIATOR ASSEMBLY
   (See radiator removal in Cooling System)
3. DRAIN ENGINE OIL
4. DRAIN FUEL FROM FUEL TANK
5. DISCONNECT CONTROL CABLES FROM THROTTLE BODY
   Disconnect these cables:
   • Accelerator cable
   • Cruise control actuator cable
6. REMOVE AIR CLEANER, VAF METER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY
   (a) Disconnect the high–tension cord from the ignition coil.
   (b) Disconnect the high–tension cord from the clamp on the air cleaner.
   (c) Disconnect the VAF meter connector.
   (d) Disconnect the engine wire from the VAF meter.
   (e) Disconnect these hoses:
       (1) PS air hose from No.4 timing belt cover
       (2) PCV hose from No.2 cylinder head cover
   (f) Loosen the hose clamp bolt holding the intake air connector pipe to the throttle body.
   (g) Remove the 3 bolts, air cleaner, VAF meter and intake air connector pipe assembly.
7. REMOVE DRIVE BELT, FAN, FLUID COUPLING ASSEMBLY AND WATER PUMP PULLEY
   (See step 6 in water pump removal in Cooling System)
8. REMOVE CHARCOAL CANISTER
9. DISCONNECT HEATER WATER HOSES
10. DISCONNECT BRAKE BOOSTER VACUUM HOSE
11. DISCONNECT EVAP HOSE
12. DISCONNECT WIRES AND CONNECTORS
    (a) Disconnect the noise filter connector.
    (b) Disconnect the ignition coil connector.
    (c) Disconnect the engine wire from the wire clamp.
(d) Remove the rubber cap and nut, and disconnect the generator wire.

(e) Disconnect these connectors:
   (1) Connector from engine room main wire
   (2) Igniter connector
   (3) Theft deterrent horn connector

(f) Disconnect the engine wire from the 2 wire clamps.

(g) Disconnect the wire clamp and PS solenoid valve connector.

(h) Remove the bolt, and disconnect the ground strap from the cylinder block.

(i) Remove the rubber cap and nut, and disconnect the starter wire.
13. **DISCONNECT FUEL HOSES**
   (a) Remove the union bolt and 2 gaskets, disconnect the fuel inlet hose.
   HINT:
   - Put a suitable container or shop rag under the fuel pipe support.
   - Slowly loosen the union bolt.
   (b) Suspend the hose union end upward.
   (c) Disconnect the fuel return hose from the oil dipstick guide.
   (d) Disconnect the fuel return hose from the fuel return hose. Plug the hose end.

14. **REMOVE ENGINE WIRE BRACKET**
   Remove the bolt and bracket, and disconnect the engine wire from the intake manifold stay.

15. **DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES**
   (a) Remove the 3 bolts, plate washer and pump front bracket.
   (b) Disconnect these hoses:
      (1) Air hose from No.4 timing belt cover
      (2) Air hose from air intake chamber
   (c) Disconnect the pump housing from the pump bracket.
      HINT: Put aside the pump housing, and suspend it.
   (d) Remove the 2 bolts and pump rear stay.
   (e) Remove the 2 bolts and pump bracket.
16. DISCONNECT PS PRESSURE TUBE FROM ENGINE
   Remove the 2 clamp bolts, and disconnect the pressure tube.

17. DISCONNECT A/C COMPRESSOR WITHOUT DISCONNECTING HOSES
   (a) Remove the 2 bolts.
   (b) Disconnect the compressor connector.
   (c) Remove the nut.
   (d) Using a torx socket (E10), remove the stud bolt, and disconnect the compressor from the engine.
   HINT: Put aside the compressor, and suspend it securely.

18. DISCONNECT ENGINE WIRE FROM COWL PANEL
   (a) Remove the bolt, and disconnect the ground strap.
   (b) Remove the 2 bolt, and disconnect the engine wire protector.
   (c) Remove the 2 bolts holding the engine wire retainer to the cowl panel.
19. **DISCONNECT ENGINE WIRE FROM CABIN**
(a) Remove the scuff plate.
(b) Take out the front side of the floor carpet.
(c) Remove the 2 nuts and ECM protector.
(d) Remove the nut, and disconnect the ECM from the floor panel.
(e) Disconnect the 2 connectors from the ECM.
(f) Disconnect the connector from the instrument panel wire.
(g) Disconnect the connector from the connector cassette.
(h) Pull out the engine wire from the cabin.

20. **M/T:**
**REMOVE UPPER CONSOLE PANEL, SHIFT LEVER BOOTS AND HOLDING BOLTS**
(a) Remove the shift lever knob.
(b) Using a screwdriver, pry out the upper console panel.
(c) Remove the 4 bolts holding the lever boot to the transmission cover.
(d) Remove the shift and select lever boots.

(e) Remove the 4 bolts holding the shift lever to the shift lever retainer.

21. M/T:
DISCONNECT CLUTCH RELEASE CYLINDER AND GROUND STRAP FROM TRANSMISSION
(a) Remove the 2 bolts and clutch release cylinder.
(b) Remove the bolt, and disconnect the ground strap.

22. REMOVE NO.2 EXHAUST PIPE
(a) Remove the 2 bolts and nuts holding the No.2 front exhaust pipe to the front exhaust pipe.
(b) Remove the 2 bolts and pipe support bracket.
(c) Remove the gasket, and disconnect the front exhaust pipe.
(d) Remove the 4 nuts, No.2 front exhaust pipe and 2 gaskets.

23. REMOVE EXHAUST PIPE HEAT INSULATOR

24. REMOVE PROPELLER SHAFT
(See propeller shaft removal in Propeller Shaft)
25. A/T: DISCONNECT TRANSMISSION CONTROL ROD
Remove the nut, and disconnect the control rod from the shift lever.

26. M/T: REMOVE TRANSMISSION SHIFT LEVER
(a) Remove the bolt and nut.
(b) Remove the transmission shift lever, inside of vehicle.

27. PLACE JACK UNDER TRANSMISSION
NOTICE (A/T): Be sure to put a wooden block between the jack and the transmission oil pan to prevent damage.

28. REMOVE REAR SUPPORT MEMBER
(a) Remove the 4 nuts holding the member to the engine rear mounting insulator.
(b) Remove the 4 bolts and rear support member.

29. REMOVE ENGINE AND TRANSMISSION ASSEMBLY FROM VEHICLE
(a) Attach the engine hoist chain to the 2 engine hangers.
(b) Remove the 2 nuts holding the engine front mounting insulators to the front suspension crossmember.
(c) Lift the engine out of the vehicle slowly and carefully. 
   **NOTICE:** Remove the engine and transmission assembly carefully without damaging the shift lever retainer (M/T), A/C compressor or PS solenoid valve.

(d) Make sure the engine is clear of all wiring, hoses and cables.

(e) Place the engine and transmission assembly onto the stand.

**ENGINE REMOVAL (2JZ–GTE)**

1. **REMOVE HOOD**
2. **REMOVE RADIATOR ASSEMBLY**
   (See radiator removal in Cooling System)
3. **DRAIN ENGINE OIL**
4. **DRAIN FUEL FROM FUEL TANK**
5. **REMOVE NO.1 AIR HOSE**
6. **DISCONNECT CONTROL CABLES FROM THROTTLE BODY**

   Disconnect these cables:
   - Accelerator cable
   - Cruise control actuator cable

7. **REMOVE AIR CLEANER AND MAF METER ASSEMBLY**
   (a) Remove the 3 bolts.
   (b) Loosen the hose clamp, disconnect the air hose from the intake air connector.
   (c) Disconnect the MAF meter wire from the clamp on the air cleaner case.
   (d) Disconnect the MAF meter connector, and remove the air cleaner and MAF meter assembly.

8. **M/T:**
   **REMOVE DRIVE BELT TENSIONER DAMPER**
   (See step 2 in timing belt removal)
9. **REMOVE DRIVE BELT, FAN, FLUID COUPLING ASSEMBLY AND WATER PUMP PULLEY**
   (See step 6 in water pump removal in Cooling System)
10. **REMOVE CHARCOAL CANISTER**
11. **DISCONNECT HEATER WATER HOSES**
12. **DISCONNECT BRAKE BOOSTER VACUUM HOSE**
13. **DISCONNECT EVAP HOSE**
14. DISCONNECT WIRES AND CONNECTORS

(a) Disconnect these connectors:
   (1) Solenoid resistor connector
   (2) Noise filter connector
   (3) Igniter connectors

(b) Disconnect the engine wire from the PS reservoir tank protector.

(c) Disconnect the connector from the engine room main wire.

(d) Disconnect the engine wire from the 2 wire clamps.

(e) Remove the rubber cap and nut, and disconnect the generator wire.

(f) Disconnect the wire clamp and PS solenoid valve connector.

(g) Remove the bolt and disconnect the ground strap from the cylinder block.
(h) Disconnect the starter wire from the LH engine mounting bracket.
(i) Remove the rubber cap and nut, and disconnect the starter wire.

15. DISCONNECT FUEL HOSES
(a) Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose.
   HINT:
   • Put a suitable container or shop rag under the fuel pipe support.
   • Slowly loosen the union bolt.
(b) Suspend the hose union end upward.
(c) Disconnect the fuel return hose from the clamp of the dipstick guide.
(d) Disconnect the fuel return hose from the fuel return pipe. Plug the hose end.

16. DISCONNECT PS PUMP WITHOUT DISCONNECTING HOSES
(a) Disconnect these hoses:
   (1) Air hose from throttle body
   (2) Air hose from air intake chamber
(b) Remove the 2 bolts, and disconnect the pump housing from the pump bracket.
   HINT: Put aside the pump housing, and suspend it securely.
(c) Remove the 3 bolts and pump bracket.
17. DISCONNECT PS PRESSURE TUBE FROM ENGINE
   Remove the 2 clamp bolts and disconnect the pressure tube.

18. DISCONNECT A/C COMPRESSOR WITHOUT DISCONNECTING HOSES
   (a) Remove the 2 bolts.
   (b) Disconnect the compressor connector.
   (c) Remove the bolt and nut.
   (d) Using a torx socket (E10), remove the stud bolt, and disconnect the compressor from the engine.
       HINT: Put aside the compressor, and suspend it securely.

19. DISCONNECT ENGINE WIRE FROM COWL PANEL
   (a) Remove the bolt, and disconnect the ground strap.
   (b) Remove the 2 bolts, and disconnect the engine wire protector.
   (c) Remove the 2 bolts holding the engine wire retainer to the cowl panel.
20. DISCONNECT ENGINE WIRE FROM CABIN
(a) Remove the scuff plate.
(b) Take out the front side of the floor carpet.
(c) Remove the 2 nuts and ECM protector.
(d) Remove the nut, and disconnect the ECM from the floor panel.
(e) Disconnect the 2 connectors from the ECM.
(f) Disconnect the connector from the TRAC ECU.
(g) Disconnect the connector from the instrument panel wire.
(h) Disconnect the connectors from the connector cassette.
(j) Pull out the engine wire from the cabin.

21. M/T:
REMOVE UPPER CONSOLE PANEL, SHIFT LEVER BOOTS AND HOLDING BOLTS
(a) Remove the shift lever knob.
(b) Using a screwdriver, pry out the upper console panel.
22. M/T:
**DISCONNECT CLUTCH RELEASE CYLINDER AND GROUND STRAP FROM TRANSMISSION**
(a) Remove the 2 bolts, and disconnect clutch release cylinder.
(b) Remove the bolt, and disconnect the clutch line tube.
(c) Remove the bolt, and disconnect ground strap.

23. **DISCONNECT SUB HEATED OXYGEN SENSOR FROM FRONT EXHAUST PIPE**
Remove the 2 nuts and sensor cover, and disconnect oxygen sensor and gasket.

24. **REMOVE EXHAUST PIPE ASSEMBLY**
(a) Remove the 2 bolts and nuts holding the front exhaust pipe to the No.2 front exhaust pipe.
(b) Remove the 2 bolts and pipe support bracket.
(c) Remove the gasket, and disconnect the front exhaust pipe.
(d) Disconnect the hook of the tailpipe from the 2 rings.
(e) Disconnect the 2 rings on the exhaust pipe from the exhaust pipe brackets, and remove the exhaust pipe assembly.

25. REMOVE NO.2 FRONT EXHAUST PIPE
Remove the 3 nuts, front exhaust pipe and gasket.

26. REMOVE EXHAUST PIPE HEAT INSULATOR
Remove the 4 nuts and heat insulator.

27. REMOVE REAR CENTER FLOOR CROSSMEMBER BRACE
Remove the 4 bolts (Normal roof) or 6 bolts (Sport Roof) and crossmember brace.

28. REMOVE PROPELLER SHAFT
(See propeller shaft removal in Propeller Shaft)

29. A/T:
DISCONNECT TRANSMISSION CONTROL ROD
Remove the nut, and disconnect the control rod from the shift lever.
30. M/T: REMOVE TRANSMISSION SHIFT LEVER
   (a) Remove the bolt and nut.
   (b) Remove the transmission shift lever, inside of vehicle.

31. PLACE JACK UNDER TRANSMISSION
   NOTICE (A/T): Be sure to put a wooden block between the jack and the transmission oil pan to prevent damage.

32. REMOVE REAR SUPPORT MEMBER
   (a) Remove the 4 nuts holding the member to the engine rear mounting insulator.
   (b) Remove the 4 bolts and rear support member.

33. REMOVE ENGINE AND TRANSMISSION ASSEMBLY FROM VEHICLE
   (a) Attach the engine hoist chain to the 2 engine hangers.
   (b) Remove the 2 nuts holding the engine front mounting insulators to the front suspension crossmember.
   (c) Lift the engine out of the vehicle slowly and carefully.
   NOTICE: Remove the engine and transmission assembly carefully without damaging the shift lever retainer (M/T), A/C compressor or PS solenoid valve
   (d) Make sure the engine is clear of all wiring, hoses and cables.
   (e) Place the engine and transmission assembly onto the stand.
COMPONENTS FOR ENGINE & TRANSMISSION SEPERATION AND ASSEMBLY

M/T 2JZ-GE

- Engine Wire
- Wire Bracket
- Starter Connector
- Clutch Cover
- Clutch Disc
- Transmission

M/T 2JZ-GTE

- Wire Bracket
- Transmission
- Service Hole Cover

A/T

- Oil Cooler Tube
- Wire Bracket
- Throttle Cable
- Starter
- Starter Connector
- Transmission

- Oil Dipstick and Guide Assembly (for Transmission)

- O-Ring

* Non-reusable part
ENGINE & TRANSMISSION SEPARATION

1. **A/T:**
   REMOVE OIL DIPSTICK GUIDE FOR TRANSMISSION
   (a) Remove the bolt.
   (b) Pull out the dipstick and guide from the transmission.
   (c) Remove the O–ring from the dipstick guide.

2. **DISCONNECT ENGINE WIRE FROM TRANSMISSION**
   (a) Disconnect the connectors.
   (b) Disconnect the wire clamps from the brackets.

3. **REMOVE STARTER**
   (a) Disconnect the starter connector.
   (b) Remove the 2 bolts, engine wire bracket and starter.

4. **2JZ–GE A/T:**
   **DISCONNECT THROTTLE CABLE**
   (a) Disconnect the throttle cable from the throttle body.
   (b) Disconnect the throttle cable from the cable bracket on the cylinder head.

5. **A/T:**
   **REMOVE OIL COOLER TUBES FOR TRANSMISSION**
   (a) Remove the 2 hose clamp bolts and tube clamp bolt.
   (b) Loosen the 2 union nuts, and remove the oil cooler tubes.
6. 2JZ–GTE M/T:
   REMOVE CLUTCH COVER SET BOLTS
   (a) Remove the 2 bolts and service hole cover.
   (b) Place the matchmarks on the flywheel and clutch cover.
   (c) Remove the 6 bolts.

7. A/T:
   REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLTS
   (a) Remove the hole plug.
   (b) Turn the crankshaft to gain access to each bolt.
   Remove the 6 bolts.

8. SEPARATE ENGINE AND TRANSMISSION
   Remove the 6 bolts and transmission.
   HINT: The "17" is 17 mm head bolt, and "14" is 14 mm head bolt.

9. 2JZ–GE M/T:
   REMOVE CLUTCH COVER AND DISC
   (a) Place matchmarks on the flywheel and clutch cover.
   (b) Loosen each bolt one turn at a time until spring tension is released.
   (c) Remove the bolts, and pull off the clutch cover with the clutch disc.
   NOTICE: Do not drop the clutch disc.
PREPARATION FOR DISASSEMBLY

1. M/T:
   REMOVE FLYWHEEL

2. A/T:
   REMOVE DRIVE PLATE

3. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY

4. REMOVE GENERATOR

5. REMOVE TIMING BELT AND PULLEYS
   (See timing belt removal)

6. REMOVE CYLINDER HEAD
   (See cylinder head removal)

7. REMOVE OIL FILTER
   (See oil and filter replacement in Lubrication System)

8. 2JZ–GTE:
   REMOVE OIL COOLER
   (See oil cooler removal in Lubrication System)

9. REMOVE NO.2 WATER BYPASS PIPE
   (a) 2JZ–GE:
       Remove the bolt, 2 nuts, water bypass pipe and gasket.
   (b) 2JZ–GTE:
       Remove the 2 bolts, 2 nuts, water bypass pipe and gasket.

10. REMOVE OIL FILTER BRACKET
    Remove the union bolt, gasket, oil filter bracket and O–ring.

11. REMOVE LH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY

12. REMOVE FUEL PIPE SUPPORT
13. REMOVE OIL PRESSURE SWITCH AND KNOCK SENSORS
Using SST, remove the switch and sensors.
SST 09816–30010

14. 2JZ–GTE:
REMOVE UNION FOR OIL COOLER HOSE

15. REMOVE ENGINE COOLANT DRAIN PLUG

16. REMOVE RH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY

17. 2JZ–GTE:
REMOVE CRANKSHAFT POSITION SENSOR

18. REMOVE WATER PUMP
(See water pump removal in Cooling System)

19. REMOVE OIL PUMP
(See oil pump removal in Lubrication System)

CYLINDER BLOCK DISASSEMBLY

1. REMOVE REAR OIL SEAL RETAINER
   (a) Remove the 6 bolts.
   (b) Remove the oil seal retainer by prying the area between the oil seal retainer and main bearing cap with a screwdriver.

2. CHECK CONNECTING ROD THRUST CLEARANCE
Using a dial indicator, measure the thrust clearance while moving the connecting rods back and forth.
Standard thrust clearance:
   0.250–0.402 mm (0.0098–0.0158 in.)
Maximum thrust clearance:
   0.50 mm (0.0197 in.)
If the thrust clearance is greater than maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.
Connecting rod thickness:
   25.898–25.950 mm (1.0196–1.0217 in.)

3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE
   (a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.
(b) Remove the connecting rod cap bolts.

(c) Using the 2 removed connecting rod bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
HINT: Keep the lower bearing inserted with the connecting rod cap.

(d) Clean the crank pin and bearings.
(e) Check the crank pin and bearing for pitting and scratches.
   If the crank pin or bearing is damaged, replace the bearings.
   If necessary, replace the crankshaft.

(f) Lay a strip of Plastigage across the crank pin.

(g) Install the connecting rod cap with the 2 bolts.
   (See step 8 in cylinder block assembly)
   Torque:
   1st
   29 N·m (300 kgf·cm, 22 ft·lbf)
   2nd
   Turn 90°
   NOTICE: Do not turn the crankshaft.
(h) Remove the 2 bolts, connecting rod cap and lower bearing.
   (See procedure (b) and (c) above)
(i) Measure the Plastigage at its widest point.

**Standard oil clearance:**

STD

- .035–0.053 mm (0.0014–0.0021 in.)

U/S 0.25

- .040–0.078 mm (0.0016–0.0031 in.)

**Maximum oil clearance.**

STD

- .08 mm (0.0031 in.)

U/S 0.25

- .09 mm (0.0035 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

**HINT:** If using a standard bearing, replace with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the connecting rod cap and crankshaft, then selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

<table>
<thead>
<tr>
<th>Number mark</th>
<th>Connecting rod cap</th>
<th>Crankshaft</th>
<th>Use bearing</th>
</tr>
</thead>
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<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Connecting rod cap</td>
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<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Crankshaft</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Use bearing</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

**EXAMPLE:** Connecting rod cap “3” + Crankshaft “1” = Total number 4 (Use bearing "4")

**Reference:**

**Connecting rod big end inside diameter:**

- Mark "1"  
  55.025–55.031 mm (2.1663–2.1666 in.)

- Mark "2"  
  55.031–55.037 mm (2.1666–2.1668 in.)

- Mark "3"  
  55.037–55.043 mm (2.1668–2.1670 in.)

**Crankshaft crank pin diameter:**

- Mark "0"  
  51.994–52.000 mm (2.0470–2.0472 in.)

- Mark "1"  
  51.988–51.994 mm (2.0468–2.0470 in.)

- Mark "2"  
  51.982–51.988 mm (2.0465–2.0468 in.)
Bearing center wall thickness:

Mark "1"
1.492–1.495 mm (0.0587–0.0589 in.)
Mark "2"
1.495–1.498 mm (0.0589–0.0590 in.)
Mark "3"
1.498–1.501 mm (0.0590–0.0591 in.)
Mark "4"
1.501–1.504 mm (0.0591–0.0592 in.)
Mark "5"
1.504–1.507 mm (0.0592–0.0593 in.)

(j) Completely remove the Plastigage.

4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:
- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.

5. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.020–0.220 mm (0.0008–0.0087 in.)

Maximum thrust clearance:
0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:
1.940–1.990 mm (0.0764–0.0783 in.)

6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the 14 main bearing cap bolts, in several passes, in the sequence shown.

(b) Using the removed main bearing cap bolts, pry the main bearing cap back and forth, and remove the main bearing caps, lower bearings and lower thrust washers (No.4 main bearing cap only).

HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.
(c) Lift out the crankshaft.
HINT: Keep the upper bearing and upper thrust washers together with the cylinder block.
(d) Clean each main journal and bearing.
(e) Check each main journal and bearing for pitting and scratches.
   If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.
(f) Place the crankshaft on the cylinder block.
(g) Lay a strip of Plastigage across each journal.

(h) Install the main bearing caps.
   (See step 5 in cylinder block installation)
   Torque:
   1st
   44 N·m (450 kgf·cm, 33 ft·lb)
   2nd
   Turn 90°
   NOTICE: Do not turn the crankshaft.
(i) Remove the main bearing caps.
   (See procedures (a) and (b) above)
(j) Measure the Plastigage at its widest point.
   Standard clearance:
   STD
   .026–.040 mm (0.0010–0.0016 in.)
   U/S 0.25
   .025–.061 mm (0.0010–0.0024 in.)
   Maximum clearance:
   STD
   .06 mm (0.0024 in.)
   U/S 0.25
   .08 mm (0.0031 in.)
   If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.
HINT: If using a standard bearing, replace with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

<table>
<thead>
<tr>
<th>Cylinder block (A) + Crankshaft (B) =</th>
<th>Total number</th>
<th>&quot; &quot; Number mark</th>
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<tr>
<td></td>
<td>0–2</td>
<td>3–5</td>
</tr>
<tr>
<td>Use bearing</td>
<td>&quot;1&quot;</td>
<td>&quot;2&quot;</td>
</tr>
</tbody>
</table>

EXAMPLE: Cylinder block "3" (A) + Crankshaft "4" (B) = Total number 7 (Use bearing "3")

Reference:
Cylinder block main journal bore diameter (A):
Mark "0"
66.020–66.022 mm (2.59922–2.59929 in.)
Mark "1"
66.022–66.024 mm (2.59929–2.59936 in.)
Mark "2"
66.024–66.026 mm (2.59936–2.59944 in.)
Mark "3"
66.026–66.028 mm (2.59944–2.59952 in.)
Mark "4"
66.028–66.030 mm (2.59952–2.59960 in.)
Mark "5"
66.030–66.032 mm (2.59960–2.59968 in.)
Mark "6"
66.032–66.034 mm (2.59968–2.59976 in.)
Mark "7"
66.034–66.036 mm (2.59976–2.59984 in.)
Crankshaft main journal diameter (B):
Mark "0"
61.998–62.000 mm (2.44086–2.44094 in.)
Mark "1"
61.996–61.998 mm (2.44078–2.44086 in.)
Mark "2"
61.994–61.996 mm (2.44070–2.44078 in.)
Mark "3"
61.992–61.994 mm (2.44063–2.44070 in.)
Mark "4"
61.990–61.992 mm (2.44055–2.44063 in.)
Mark "5"
61.988–61.990 mm (2.44047–2.44055 in.)
Mark "6"
61.986–61.988 mm (2.44039–2.44047 in.)
Mark "7"
61.984–61.986 mm (2.44031–2.44039 in.)

Bearing center wall thickness:
Mark "1"
1.994–1.997 mm (0.0785–0.0786 in.)
Mark "2"
1.997–2.000 mm (0.0786–0.0787 in.)
Mark "3"
2.000–2.003 mm (0.0787–0.0789 in.)
Mark "4"
2.003–2.006 mm (0.0789–0.0790 in.)
Mark "5"
2.006–2.009 mm (0.0790–0.0791 in.)

Standard sized Bearing Selection chart

<table>
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<tr>
<th>Crankshaft number mark</th>
<th>Cylinder block number mark</th>
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EXAMPLE: Cylinder block "3" Crankshaft "4"
= Use bearing "3"

(k) Completely remove the Plastigage.

7. REMOVE CRANKSHAFT
(a) Lift out the crankshaft
(b) Remove the upper bearings and upper thrust washers from the cylinder block.
   HINT: Arrange the main bearing caps, bearings and thrust washers in the correct order.

8. 2JZ–GTE:
   REMOVE OIL NOZZLES (WITH RELIEF VALVES)
   Using a 5 mm hexagon wrench, remove the bolt and oil nozzle. Remove the 6 oil nozzles.
CYLINDER BLOCK INSPECTION

1. CLEAN CYLINDER BLOCK
   A. Remove gasket material
      Using a gasket scraper, remove all the gasket material from
      the cylinder block surface.
   B. Clean cylinder block
      Using a soft brush and solvent, thoroughly clean the cylinder
      block.

2. INSPECT CYLINDER BLOCK SURFACE FOR FLATNESS
   Using precision straight edge and feeler gauge, measure the
   surfaces of the cylinder block for warpage.
   Maximum warpage:
   0.07 mm (0.0028 in.)
   If warpage is greater than maximum, replace the cylinder
   block.

3. INSPECT CYLINDER FOR VERTICAL SCRATCHES
   Visually check the cylinder for vertical scratches.
   If deep scratches are present, replace the cylinder block.

4. INSPECT CYLINDER BORE DIAMETER
   Using a cylinder gauge, measure the cylinder bore diameter
   at positions A, B and C in the thrust and axial directions.
   Standard diameter:
   86.000–86.013 mm (3.3858–3.3863 in.)
   Maximum diameter:
   86.02 mm (3.3866 in.)
   If the diameter is greater than maximum, replace the cylinder
   block.
5. REMOVE CYLINDER RIDGE
If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.

6. INSPECT MAIN BEARING CAP BOLTS
Using vernier calipers, measure the minimum diameter of the compressed thread at the measuring point.
Standard diameter: 9.96–9.97 mm (0.3921–0.3925 in.)
Minimum diameter: 9.7 mm (0.382 in.)
If the diameter is less than minimum, replace the bolt.

PISTON AND CONNECTING ROD DISASSEMBLY
1. CHECK FIT BETWEEN PISTON AND PISTON PIN
Try to move the piston back and forth on the piston pin.
If any movement is felt, replace the piston and pin as a set.

2. REMOVE PISTON RINGS
(a) Using a piston ring expander, remove the 2 compression rings.
(b) Remove the 2 side rails and oil ring expander by hand.
HINT: Arrange the piston rings in correct order only.

3. DISCONNECT CONNECTING ROD FROM PISTON
(a) Using a small screwdriver, remove the 2 snap rings.
(b) Gradually heat the piston to about 80°C (176°F).

(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:
• The piston and pin are a matched set.
• Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

PISTON AND CONNECTING ROD INSPECTION

1. CLEAN PISTON
(a) Using a gasket scraper, remove the carbon from the piston top.

(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.

(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE: Do not use a wire brush.
2. **INSPECT PISTON**

A. **Inspect piston oil clearance**

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 34 mm (1.34 in.) from the piston head.

**Piston diameter:**

- **2JZ–GE**
  - 85.935–85.945 mm (3.3833–3.3837 in.)
- **2JZ–GTE**
  - 85.917–85.927 mm (3.3826–3.3830 in.)

(b) Measure the cylinder bore diameter in the thrust directions.

(See step 4 in cylinder block inspection)

(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

**Standard oil clearance:**

- **2JZ–GE**
  - .055–.078 mm (0.0022–0.0031 in.)
- **2JZ–GTE**
  - .073–.096 mm (0.0029–0.0038 in.)

**Maximum oil clearance:**

- **2JZ–GE**
  - .10 mm (0.0039 in.)
- **2JZ–GTE**
  - .12 mm (0.0047 in.)

If the oil clearance is greater than maximum, replace all the 6 pistons. If necessary, replace the cylinder block.

B. **Inspect piston ring groove clearance**

Using a feeler gauge, measure the clearance between new piston ring and the wall of the piston ring groove.

**Ring groove clearance:**

- **No.1**
  - **2JZ–GE**
    - 0.011–0.070 mm (0.0004–0.0028 in.)
  - **2JZ–GTE**
    - 0.040–0.080 mm (0.0016–0.0031 in.)

- **No.2**
  - 0.030–0.070 mm (0.0012–0.0028 in.)

If the clearance is not as specified, replace the piston.

C. **Inspect piston ring end gap**

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.
(c) Using a feeler gauge, measure the ring end gap.

**Standard ring end gap:**

No.1

- **2JZ–GE**
  - 0.300–0.470 mm (0.0118–0.0185 in.)
- **2JZ–GTE**
  - 0.300–0.400 mm (0.0118–0.0157 in.)

No.2

- **2JZ–GE**
  - 0.350–0.520 mm (0.0138–0.0205 in.)
- **2JZ–GTE**
  - 0.350–0.450 mm (0.0138–0.0178 in.)

**Oil (Side rail)**

- **2JZ–GE**
  - 0.130–0.450 mm (0.0051–0.0177 in.)
- **2JZ–GTE**
  - 0.130–0.380 mm (0.0051–0.0150 in.)

**Maximum ring end gap:**

No.1

- **2JZ–GE**
  - 1.07 mm (0.0421 in.)
- **2JZ–GTE**
  - 1.00 mm (0.0394 in.)

No.2

- **2JZ–GE**
  - 1.12 mm (0.0441 in.)
- **2JZ–GTE**
  - 1.05 mm (0.0413 in.)

**Oil (Side rail)**

- **2JZ–GE**
  - 1.05 mm (0.0413 in.)
- **2JZ–GTE**
  - 0.98 mm (0.0386 in.)

If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, replace the cylinder block.

---

**D. Inspect piston pin fit**

At 80°C (176°F), you should be able to push the piston pin into the piston pin hole with your thumb.
3. **INSPECT CONNECTING ROD**

A. **Inspect connecting rod alignment**
   Using a feeler gauge and rod aligner, check the connecting rod alignment.
   - Check for out-of-alignment
     Maximum out-of-alignment:
     0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
     If out-of-alignment is greater than maximum, replace the connecting rod assembly.
   - Check for twist
     Maximum twist:
     0.15 mm (0.0059 in.) per 100 mm (3.94 in.)
     If twist is greater than maximum, replace the connecting rod assembly.

B. **Inspect piston pin oil clearance**
   (a) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.
   Bushing inside diameter:
   22.005–22.014 mm (0.8663–0.8667 in.)
   (b) Using a micrometer, measure the piston pin diameter.
   Piston pin diameter:
   21.997–22.006 mm (0.8660–0.8664 in.)
   (c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.
   Standard oil clearance:
   0.005–0.011 mm (0.0002–0.0004 in.)
   Maximum oil clearance:
   0.05 mm (0.0020 in.)
   If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.
C. If necessary, replace connecting rod bushing
   (a) Using SST and a press, press out the bushing.
       SST 09222–30010
   (b) Align the oil holes of a new bushing and the connecting rod.
   (c) Using SST and a press, press in the bushing.
       SST 09222–30010
   (d) Using a pin hole grinder, bore the bushing to obtain the
       standard specified clearance (see step B) between the
       bushing and piston pin.
   (e) Check the piston pin fit at room temperature.
       Coat the piston pin with engine oil and push it into the con-
       necting rod with your thumb.

D. Inspect connecting rod bolts
   Using vernier calipers, measure the minimum diameter of the
   compressed bolt at the measuring point.
   **Standard diameter:**
   8.1–8.3 mm (0.319–0.327 in.)
   **Minimum diameter:**
   8.0 mm (0.315 in.)
   If the diameter is less than minimum, replace the connecting
   rod bolt.
CRANKSHAFT INSPECTION

1. INSPECT CRANKSHAFT FOR RUNOUT
(a) Place the crankshaft on V–blocks.
(b) Using a dial indicator, measure the circle runout at the center journal.
   - Maximum circle runout: 0.06 mm (0.0024 in.)
   - If the circle runout is greater than maximum, replace the crankshaft.

2. INSPECT MAIN JOURNALS AND CRANK PINS
(a) Using a micrometer, measure the diameter of each main journal and crank pin.
   - Main journal diameter:
     - STD: 61.984–62.000 mm (2.4403–2.4409 in.)
     - U/S 0.25: 61.745–61.755 mm (2.4309–2.4313 in.)
   - Crank pin diameter:
     - STD: 51.982–52.000 mm (2.0465–2.0472 in.)
     - U/S 0.25: 51.745–51.755 mm (2.0372–2.0376 in.)
   - If the diameter is not as specified, check the oil clearance. (See steps 3 and 6 in cylinder block disassembly)
(b) Check each main journal and crank pin for taper and out–of–round as shown.
   - Maximum taper and out–of–round: 0.02 mm (0.0008 in.)
   - If the taper or out–of–round is greater than maximum, grind or replace the crankshaft.

3. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS
   Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure step 2).
   Install new main journal and/or crank pin undersized bearings.
CRANKSHAFT OIL SEALS REPLACEMENT

HINT: There are 2 methods A and B to replace the oil seal as follows:

1. REPLACE CRANKSHAFT FRONT OIL SEAL
   A. If oil pump is removed from cylinder block:
      (a) Using a screwdriver, pry out the oil seal.
      (b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
         SST 09316–60010 (09316–00010)
      (c) Apply MP grease to the oil seal lip.

   B. If oil pump is installed on cylinder block:
      (a) Using a knife, cut off the oil seal lip.
      (b) Using a screwdriver, pry out the oil seal.
         NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.
      (c) Apply MP grease to a new oil seal lip.
      (d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
         SST 09316–60010 (09316–00010)

2. REPLACE CRANKSHAFT REAR OIL SEAL
   A. If rear oil seal retainer is removed from cylinder block:
      (a) Using a screwdriver and hammer, tap out the oil seal.
(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge. SST 09223–15030, 09608–30022 (09608–05010)

(c) Apply MP grease to the oil seal lip.

B. If rear oil seal retainer is installed on cylinder block:
(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver, pry out the oil seal.
   NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.

(c) Apply MP grease to a new oil seal lip.
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge. SST 09223–15030, 09608–30022 (09608–05010)

PISTON AND CONNECTING ROD ASSEMBLY
1. ASSEMBLE PISTON AND CONNECTING ROD
(a) Install a new snap ring at one end of the piston pin hole. HINT: Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

(b) Gradually heat the piston to about 80°C (176°F).
(c) Coat the piston pin with engine oil.
(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.

(e) Install a new snap ring at the other end of the piston pin hole. HINT: Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

2. INSTALL PISTON RINGS
(a) Install the oil ring expander and 2 side rails by hand.
(b) Using a piston ring expander, install the 2 compression rings with the code mark facing up.
   Code mark:
   2JZ–GE
   No.1 1T
   No.2 2T
   2JZ–GTE
   No.1 1N
   No.2 2N
(c) Position the piston rings so that the ring ends are as shown. NOTICE: Do not align the piston ring ends.

3. INSTALL BEARINGS
(a) Align the bearing claw with the groove of the connecting rod and connecting cap.
(b) Install the bearings in the connecting rod and connecting rod cap.
CYLINDER BLOCK ASSEMBLY

HINT:
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new parts.

NOTICE: Apply a generous amount of oil on the sliding surface of the bearing, and not on the back of it or on the surface to which it is installed.

1. 2JZ–GTE:
INSTALL OIL NOZZLES (WITH RELIEF VALVES)
Using a 5 mm hexagon wrench, install the oil nozzle with the bolt. Install the 6 oil nozzles.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

2. INSTALL MAIN BEARINGS
HINT:
- Main bearings come in widths of 20.0 mm (0.787 in.) and 23.0 mm (0.906 in.). Install the 23.0 mm bearings in the No.1 cylinder block journal position with the main bearing cap. Install the 20.0 mm bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

(a) Align the bearing claw with the claw groove of the main bearing cap or cylinder block.
NOTICE: Install the bearing with the oil hole in the cylinder block.

(b) Install the bearings in the cylinder block and main bearing caps.
3. **INSTALL UPPER THRUST WASHERS**
   Install the 2 thrust washers under the No.4 main journal position of the cylinder block with the oil grooves facing outward.

4. **PLACE CRANKSHAFT ON CYLINDER BLOCK**

5. **INSTALL MAIN BEARING CAP AND LOWER THRUST WASHERS**
   **A. Place main bearing cap and lower thrust washers on cylinder block**
   (a) Install the lower thrust washers on the No.4 main bearing with the grooves facing outward.
   (b) Install the main bearing caps in numerical order with the arrows facing forward.
   **B. Install main bearing cap bolts**
   HINT:
   • The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
   • If any of the main bearing bolts break or deform, replace them.
   (a) Apply a light coat of engine oil on the threads and under the heads of the main bearing cap bolts.
   (b) Install and uniformly tighten the 14 main bearing cap bolts, in several passes, in the sequence shown. **Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)**
   If any one of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.
(c) Mark the front of the main bearing cap bolt head with paint.

(d) Retighten the main bearing cap bolts 90° in the numerical order shown above.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

6. CHECK CRANKSHAFT THRUST CLEARANCE
(See step 5 in cylinder block disassembly)

7. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES
Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

8. INSTALL CONNECTING ROD CAPS
A. Place connecting rod cap on connecting rod
(a) Match the numbered connecting rod cap with the connecting rod.
(b) Install the connecting rod cap with by aligning the dowel pin to the corresponding hole.
B. Install connecting rod cap bolts
HINT:
• The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
• If any of the connecting rod bolts break or deform, replace them.
(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.
(b) At first, install and alternately tighten the bolts of the connecting rod cap in several passes.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)
If any one of the connecting rod cap bolts does not meet the torque specification, replace the cap bolt.
(c) Mark the front of the connecting rod cap bolt with paint.

(d) Retighten the connecting rod cap bolts 90° in the numerical order shown.

(e) Check that the painted mark is now at a 90° angle to the front.

(f) Check that the crankshaft turns smoothly.

9. CHECK CONNECTING ROD THRUST CLEARANCE
(See step 2 in cylinder block disassembly)

10. INSTALL REAR OIL SEAL RETAINER

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the retainer and cylinder block.
   • Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
   • Thoroughly clean all components to remove all debris.
   • Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the retainer as shown in the illustration. Seal packing:
   Part No. 08826-00080 or equivalent
   • Install a nozzle that has been cut to a 2–3 mm (0.08–0.12 in.) opening.
   • Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
   • Immediately remove nozzle from the tube and reinstall cap.

(c) Install the retainer with the 6 bolts. Torque: 5.9 N·m (60 kgf·cm, 52 in.-lbf)
AFTER ASSEMBLY

1. INSTALL OIL PUMP
   (See oil pump installation in Lubrication System)

2. INSTALL WATER PUMP
   (See water pump installation in Cooling System)

3. 2JZ–GTE:
   INSTALL CRANKSHAFT POSITION SENSOR
   Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)

4. INSTALL RH ENGINE MOUNTING BRACKET AND
   INSULATOR ASSEMBLY
   HINT: The RH mounting bracket is marked "A ← EX".
   Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

5. INSTALL ENGINE COOLANT DRAIN PLUG
   Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

6. 2JZ–GTE:
   INSTALL UNION FOR OIL COOLER HOSE
   (a) Apply adhesive to 2 or 3 threads of the union.
       Adhesive:
       Part No. 08833–00070, THREE BOND 1324, or equivalent
   (b) Install the union.
       Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

7. INSTALL KNOCK SENSORS AND OIL PRESSURE SWITCH
   (a) Apply adhesive to 2 or 3 threads of the oil pressure switch.
       Adhesive:
       Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent
   (b) Using SST, install the 2 knock sensors and oil pressure switch.
       SST 09816–30010
       Torque:
       Knock sensor
       44 N·m (450 kgf·cm, 33 ft·lbf)
       Oil pressure switch
       14 N·m (150 kgf·cm, 11 ft·lbf)
8. INSTALL FUEL PIPE SUPPORT  
Torque: 14 N·m (145 kgf·cm, 10 ft·lbf)

9. INSTALL LH ENGINE MOUNTING BRACKET AND INSULATOR ASSEMBLY  
HINT: LH mounting bracket is marked “A ← IN”.  
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

10. INSTALL OIL FILTER BRACKET  
(a) Check and clean the oil filter bracket installation.  
(b) Place a new O–ring in position on the oil filter bracket.  
(c) Apply clean engine oil to the O–ring.  
(d) Install a new gasket to the union bolt.  
(e) Install the oil filter bracket with the union bolt.  
Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)

11. INSTALL NO.2 WATER BYPASS PIPE  
(a) Install a new gasket to the water pump.  
(b) 2JZ–GE:  
Install the water bypass pipe with the bolt and 2 nuts.  
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)  
(c) 2JZ–GTE:  
Install the water bypass pipe with the 2 bolts and 2 nuts.  
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

12. 2JZ–GTE:  
INSTALL OIL COOLER  
(See oil cooler installation in Lubrication System)

13. INSTALL OIL FILTER  
(See oil and filter replacement in Lubrication System)

14. INSTALL CYLINDER HEAD  
(See cylinder head installation)

15. INSTALL TIMING PULLEYS AND BELT  
(See timing belt installation)

16. INSTALL GENERATOR  
(See generator installation in Charging System)

17. REMOVE ENGINE STAND FROM ENGINE

18. M/T:  
INSTALL FLYWHEEL  
HINT: The flywheel bolts are tightened in 2 progressive step, (b) and (d).  
(a) Install the flywheel on the crankshaft.  
(b) Install and uniformly tighten the 8 bolts, in several passes, in the sequence shown.  
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
(c) Mark the flywheel bolt with paint.

(d) Retighten the flywheel bolts by an additional 90°.
(e) Check that the painted mark is now at a 90° angle to (d).

19. A/T:
**INSTALL DRIVE PLATE**
(a) Install the front spacer, drive plate and rear plate on the crankshaft.

*Adhesive:*

Part No. 08833-00070, THREE BOND 1324 or equivalent

(b) Apply adhesive to 2 or 3 threads of the mounting bolt end.

(c) Install and uniformly tighten the 8 bolts, in several passes, in the sequence shown.

*Torque: 83 N m (850 kgf-cm, 61 ft lbf)*
ENGINE & TRANSMISSION ASSEMBLY

1. A/T:
   CHECK TORQUE CONVERTER CLUTCH INSTALLATION
   Using calipers and straight edge, measure from the installed surface of the torque converter clutch to the front surface of the transmission.
   Correct distance:
   Less than 0.1 mm (0.004 in.)

   If the distance is not as specified, check for an improper installation.

2. 2JZ–GE M/T:
   INSTALL CLUTCH DISC AND COVER
   (a) Insert SST in the clutch disc, and then set them and the cover in position.
   SST 09301–00110
   (b) Align the matchmarks on the clutch cover and flywheel.
   (c) Tighten the bolts evenly and gradually while pushing SST. Make several passes around the cover until it is snug.
   SST 09301–00110
   (d) Torque the bolts on the clutch cover in the order shown.
   Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

3. ASSEMBLE ENGINE AND TRANSMISSION
   (a) M/T:
   Align the input spline with the clutch disc and install the transmission to the engine.
   (b) Align the 2 knock pins on the cylinder block with the pin holes of the clutch housing.
   (c) Install the transmission with the 6 bolts.
   Torque:
   14 mm head
   39 N·m (400 kgf·cm, 29 ft·lbf)
   17 mm head
   72 N·m (730 kgf·cm, 43 ft·lbf)
4. **2JZ–GTE M/T:**
   **INSTALL CLUTCH COVER SET BOLTS**
   (a) Align the matchmarks.
   (b) Install the 6 bolts while turning the crankshaft to gain access. Tighten the bolts evenly.
   Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)
   (c) Install the service hole cover with the 2 bolts.
   Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

5. **A/T:**
   **INSTALL TORQUE CONVERTER CLUTCH MOUNTING BOLTS**
   (a) First, install the gray bolt. Then install 5 black bolts while turning the crankshaft to gain access. Tighten the bolts evenly.
   Torque: 33 N·m (340 kgf·cm, 25 ft·lbf)
   (b) Install the hole plug.

6. **2JZ–GE A/T:**
   **CONNECT THROTTLE CABLE**

7. **A/T:**
   **INSTALL OIL COOLER TUBES FOR TRANSMISSION**
   (a) Temporarily install the 2 oil cooler tubes, 2 hose clamps and tube clamp with 3 clamp bolts.
   (b) Connect the 2 oil cooler tubes to the unions on the transmission. Tighten the union nuts.
   Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)
   (c) Tighten the 3 clamp bolts.

8. **INSTALL STARTER**

9. **CONNECT ENGINE WIRE TO TRANSMISSION**

10. **A/T:**
    **INSTALL OIL DIPSTICK GUIDE AND DIPSTICK FOR TRANSMISSION**
    (a) Install a new O–ring to the dipstick guide.
    (b) Apply soapy water to the O–ring.
    (c) Connect the dipstick guide end to the dipstick tube of the oil pan.
    (d) Install the dipstick guide with the bolt.
    (e) Install the dipstick.
ENGINE INSTALLATION (2JZ–GE)

1. INSTALL ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE

(a) Attach the engine hoist chain to the engine hangers.
(b) Lower the engine and transmission assembly into the engine compartment.
   NOTICE: Install the engine and transmission assembly carefully without damaging the shift lever retainer (M/T), A/C compressor and PS solenoid valve.
(c) Insert the stud bolts of the front engine mounting insulators into the stud bolt holes of the front suspension crossmember.
(d) Temporarily install the 2 nuts holding the engine front mounting insulators to the front suspension crossmember.
(e) Keep the engine level with a jack.
(f) Remove the hoist chain.

(g) Temporarily install the support member to the engine rear mounting insulator with the 4 nuts.
(h) Install the 4 bolts holding the support member to the body.
   Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)
(i) Tighten the 4 nuts holding the support member to the engine rear mounting insulator.
   Torque: 13 N·m (135 kgf·cm, 10 ft·lbf)

(j) Tighten the 2 nuts holding the engine front mounting insulators to the front suspension crossmember.
   Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)

2. M/T:
   INSTALL TRANSMISSION SHIFT LEVER
   Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

3. INSTALL PROPELLER SHAFT
   (See propeller shaft installation in Propeller Shaft)

4. A/T:
   CONNECT TRANSMISSION CONTROL ROD
   (a) Shift the shift lever to N position.
   (b) Fully turn the control shaft lever back and return 2 notches. It is now in neutral position.
   (c) Connect the control rod to the shift lever with the nut.
   Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
5. INSTALL EXHAUST PIPE HEAT INSULATOR
6. INSTALL NO.2 FRONT EXHAUST PIPE
   (a) Install 2 new gaskets and the No.2 front exhaust pipe to the
       exhaust manifold with 4 new nuts.
       Torque: 62 N\text{m} (630 \text{kgf\cdotcm}, 46 \text{ft\cdotlbf})
   (b) Install the pipe support bracket with the 2 bolts.
       Torque: 43 N\text{m} (440 \text{kgf\cdotcm}, 32 \text{ft\cdotlbf})
   (c) Install a new gasket and the No.2 front exhaust pipe to the
       front exhaust pipe with the 2 bolts and 2 new nuts.
       Torque: 58 N\text{m} (590 \text{kgf\cdotcm}, 43 \text{ft\cdotlbf})

7. M/T: INSTALL CLUTCH RELEASE CYLINDER AND GROUND STRAP
   (a) Install the clutch release cylinder with the 2 bolts.
       Torque: 13 N\text{m} (130 \text{kgf\cdotcm}, 9 \text{ft\cdotlbf})
   (b) Install the ground strap with the bolt.
       Torque: 37 N\text{m} (380 \text{kgf\cdotcm}, 27 \text{ft\cdotlbf})

8. M/T: INSTALL UPPER CONSOLE PANEL, SHIFT LEVER BOOTS AND HOLDING BOLTS

9. CONNECT ENGINE WIRE TO CABIN
   (a) Push in the engine wire through the cowl panel.
       NOTICE: Be careful not to damage the engine wire.
   (b) Connect the connector to the connector cassette.
   (c) Connect the connector to the instrament panel wire connector.
   (d) Connect the 2 connectors to the ECM.
   (e) Insert the ECM bracket into the stay on the floor panel.
   (f) Install the ECM with the nut.
   (g) Install the ECM protector with the 2 nuts.
   (h) Install the floor carpet.
   (i) Install the scuff plate.

10. CONNECT ENGINE WIRE TO COWL PANEL
11. INSTALL A/C COMPRESSOR
   (a) Using a torx socket (E10), install the stud bolt and compressor.
       Torque: 26 N\text{m} (265 \text{kgf\cdotcm}, 19 \text{ft\cdotlbf})
   (b) Connect the compressor connector.
   (c) Temporarily install the compessor with the nut and 2 bolts.
   (d) Alternately tighten the nut and 2 bolts.
       Torque: 52 N\text{m} (530 \text{kgf\cdotcm}, 38 \text{ft\cdotlbf})

12. INSTALL PS PRESSURE TUBE
    Install the pressure tube with the 2 clamp bolts.
13. INSTALL PS PUMP
(a) Install the pump bracket with the 2 bolts.
   Torque:
   A 58 N·m (590 kgf·cm, 43 ft·lbf)
   B 39 N·m (400 kgf·cm, 29 ft·lbf)
(b) Install the pump rear stay with the 2 bolts.
   Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(c) Install the pump housing to the pump bracket.
(d) Connect the following hoses:
   • Air hose to No.4 timing belt cover
   • Air hose to air intake chamber
(e) Install the front pump bracket with the 2 bolts (A).
   Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)
(f) Install the plate washer and bolt (B) to the oil pump.
   Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

14. INSTALL ENGINE WIRE BRACKET
15. CONNECT FUEL HOSES
(a) Connect the fuel return hose to the fuel return pipe.
(b) Install the fuel return hose to the clamp of the oil dipstick guide.
(c) Install the fuel inlet hose with 2 new gaskets and the union bolt.
   Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

16. CONNECT WIRES AND CONNECTORS
17. CONNECT EVAP HOSE
18. CONNECT BRAKE BOOSTER VACUUM HOSE
19. CONNECT HEATER HOSES
20. INSTALL CHARCOAL CANISTER
21. INSTALL WATER PUMP PULLEY, FAN, FLUID COUPLING ASSEMBLY AND DRIVE BELT
   (See step 10 in water pump installation in Cooling System)
22. INSTALL AIR CLEANER, VAF METER AND INTAKE AIR CONNECTOR PIPE ASSEMBLY
23. CONNECT CONTROL CABLES TO THROTTLE BODY
24. FILL WITH FUEL
25. FILL WITH ENGINE OIL
26. CHECK IGNITION TIMING
   (See ignition timing inspection and adjustment)
27. INSTALL RADIATOR ASSEMBLY
   (See radiator installation in Cooling System)
28. START ENGINE AND CHECK FOR LEAKS
29. INSTALL HOOD
30. ROAD TEST VEHICLE
   Check for abnormal noise, shock slippage, correct shift points and smooth operation.
31. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS
ENGINE INSTALLATION (2JZ–GTE)

1. INSTALL ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE
   (a) Attach the engine hoist chain to the engine hangers.
   (b) Lower the engine and transmission assembly into the engine compartment.
       NOTICE: Install the engine and transmission assembly carefully without damaging the shift lever retainer (M/T), A/C compressor and PS solenoid valve.
   (c) Insert the stud bolts of the front engine mounting insulators into the stud bolt holes of the front suspension crossmember.
   (d) Temporarily install the 2 nuts holding the engine front mounting insulators to the front suspension crossmember.
   (e) Keep the engine level with a jack.
   (f) Remove the hoist chain.
   (g) Temporarily install the support member to the engine rear mounting insulator with the 4 nuts.
   (h) Install the 4 bolts holding the support member to the body. Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)
   (i) Tighten the 4 nuts holding the support member to the engine rear mounting insulator. Torque: 13 N·m (135 kgf·cm, 10 ft·lbf)
   (j) Tighten the 2 nuts holding the engine front mounting insulators to the front suspension crossmember. Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)

2. M/T:
   INSTALL TRANSMISSION SHIFT LEVER
   Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

3. A/T:
   CONNECT TRANSMISSION CONTROL ROD
   (a) Shift the shift lever to N position.
   (b) Fully turn the control shaft lever back and return 2 notches. It is now in neutral position.
   (c) Connect the control rod to the shift lever with the nut. Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

4. INSTALL PROPELLER SHAFT
   (See propeller shaft installation in Propeller Shaft)
5. **INSTALL REAR CENTER FLOOR CROSSMEMBER BRACE**
   Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

6. **INSTALL EXHAUST PIPE HEAT INSULATOR**

7. **INSTALL NO.2 FRONT EXHAUST PIPE**
   Install a new gasket and the front exhaust pipe with 3 new nuts.
   Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

8. **INSTALL EXHAUST PIPE ASSEMBLY**
   (a) Install the hook of the tailpipe to the 2 rings on the tailpipe bracket.
   (b) Install the hook of the exhaust pipe to the 2 rings on the exhaust pipe brackets.
   (c) Install the pipe support bracket with the 2 bolts.
       Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)
   (d) Install a new gasket and the No.2 front exhaust pipe to the front exhaust pipe with the 2 bolts and 2 new nuts.
       Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)

9. **INSTALL SUB HEATED OXYGEN SENSOR**
   Install a new gasket, the oxygen sensor and sensor cover with the 2 nuts.
   Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

10. **M/T:**
    **INSTALL CLUTCH RELEASE CYLINDER AND GROUND STRAP**
    (a) Install the clutch release cylinder with the 2 bolts.
        Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
    (b) Connect the clutch line tube with the bolt.
        Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)
    (c) Install the ground strap with the bolt.
        Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

11. **CONNECT ENGINE WIRE TO CABIN**
    (a) Push in the engine wire through the cowl panel.
        **NOTICE:** Be careful not to damage the engine wire.
    (b) Connect the 2 connectors to the connector cassette.
    (c) Connect the connector to the instrument panel wire connector.
    (d) Connect the 2 connectors to the ECM.
    (e) Connect the connector to the TRAC ECU.
    (f) Insert the ECM bracket into the stay on the floor panel.
    (g) Install the ECM with the nut.
    (h) Install the ECM protector with the 2 nuts.
    (i) Install the floor carpet.
    (j) Install the scuff plate.

12. **M/T:**
    **INSTALL UPPER CONSOLE PANEL, SHIFT LEVER BOOTS AND HOLDING BOLTS**
13. CONNECT ENGINE WIRE TO COWL PANEL
14. INSTALL A/C COMPRESSOR
   (a) Using a torx socket (E10), install the stud bolt and and compressor.
       Torque: 26 N m (265 kgf cm, 19 ft lbf)
   (b) Connect the compressor connector.
   (c) Temporarily install the compressor with nut and 3 bolts.
   (d) Alternately tighten the bolt and nut.
       Torque: 52 N m (530 kgf cm, 38 ft lbf)

15. INSTALL PS PRESSURE TUBE
16. INSTALL PS PUMP
   (a) Install the pump bracket with the 3 bolts.
       Torque:
       A 58 N m (590 kgf cm, 43 ft lbf)
       B 39 N m (400 kgf cm, 29 ft lbf)
   (b) Install the pump housing with the 2 bolts.
       Torque: 58 N m (590 kgf cm, 43 ft lbf)
   (c) Connect these hoses:
       • Air hose to throttle body
       • Air hose to air intake chamber

17. CONNECT FUEL HOSES
   (a) Connect the fuel return hose to the fuel return pipe.
   (b) Install the fuel return hose to the clamp of the dipstick guide.
   (c) Install the fuel inlet hose with 2 new gaskets and the union bolt.
       Torque: 29 N m (300 kgf cm, 22 ft lbf)

18. CONNECT WIRES AND CONNECTORS
19. CONNECT EVAP HOSE
20. CONNECT BRAKE BOOSTER VACUUM HOSE
21. CONNECT HEATER WATER HOSES
22. INSTALL CHARCOAL CANISTER
23. INSTALL WATER PUMP PULLEY, FAN, FLUID COUPLING ASSEMBLY AND DRIVE BELT
   (See step 10 in water pump installation in Cooling System)
24. M/T:
   INSTALL DRIVE BELT TENSIONER DAMPER
   (See step 19 timing belt installation)
25. INSTALL AIR CLEANER AND MAF METER ASSEMBLY
26. INSTALL NO.1 AIR HOSE
27. CONNECT CONTROL CABLES TO THROTTLE BODY
28. FILL WITH FUEL
29. FILL WITH ENGINE OIL
30. START ENGINE AND CHECK FOR LEAKS
31. CHECK IGNITION TIMING  
   (See ignition timing inspection)

32. INSTALL RADIATOR ASSEMBLY  
   (See radiator installation in Cooling System)

33. INSTALL HOOD

34. ROAD TEST VEHICLE  
   Check for abnormal noise, shock slippage, correct shift points and smooth operation.

35. RECHECK ENGINE COOLANT AND ENGINE OIL LEVELS
## SERVICE SPECIFICATIONS

### SERVICE DATA

| Compression pressure | at 250 rpm STD 2JZ–GE  
|                    | 2JZ–GTE  
| Minimum 2JZ–GE  
|                    | 2JZ–GTE  
| Difference of pressure between each cylinder | 1,275 kPa (13.0 kgf/cm², 185 psi) or more  
|                    | 1,079 kPa (11.0 kgf/cm², 156 psi) or more  
|                    | 1,079 kPa (11.0 kgf/cm², 156 psi)  
|                    | 883 kPa (9.0 kgf/cm², 128 psi)  
|                    | 98 kPa (1.0 kgf/cm², 14 psi) or less  

| Valve clearance | at cold Intake  
| Adjusting shim (for repair part) | Exhaust  
|                    | Mark 2500  
|                    | Mark 2.550  
|                    | Mark 2.600  
|                    | Mark 2.650  
|                    | Mark 2.700  
|                    | Mark 2.750  
|                    | Mark 2.800  
|                    | Mark 2.850  
|                    | Mark 2.900  
|                    | Mark 2.950  
|                    | Mark 3.000  
|                    | Mark 3.050  
|                    | Mark 3.100  
|                    | Mark 3.150  
|                    | Mark 3.200  
|                    | Mark 3.250  
|                    | Mark 3.300  
|                    | 0.15–0.25 mm (0.006–0.010 in.)  
|                    | 0.25–0.35 mm (0.010–0.014 in.)  
|                    | 2.500 mm (0.0984 in.)  
|                    | 2.550 mm (0.1004 in.)  
|                    | 2.600 mm (0.1024 in.)  
|                    | 2.650 mm (0.1043 in.)  
|                    | 2.700 mm (0.1063 in.)  
|                    | 2.750 mm (0.1083 in.)  
|                    | 2.800 mm (0.1102 in.)  
|                    | 2.850 mm (0.1122 in.)  
|                    | 2.900 mm (0.1142 in.)  
|                    | 2.950 mm (0.1161 in.)  
|                    | 3.000 mm (0.1181 in.)  
|                    | 3.050 mm (0.1201 in.)  
|                    | 3.100 mm (0.1220 in.)  
|                    | 3.150 mm (0.1240 in.)  
|                    | 3.200 mm (0.1260 in.)  
|                    | 3.250 mm (0.1280 in.)  
|                    | 3.300 mm (0.1299 in.)  

| Ignition timing | w/ Terminals TE1 and E1 connected of DLC1  
|                | 10° BTDC @ idle  

| Idle speed | 2JZ–GE  
|           | 2JZ–GTE  
|           | 700 ± 50 rpm  
|           | 650 ± 50 rpm  

| Intake Manifold Vacuum | at idle speed 2JZ–GE  
|                        | 2JZ–GTE  
|                        | 66.6 kPa (500 mmHg, 19.7 in.Hg) or more  
|                        | 60 kPa (450 mmHg, 17.7 in.Hg) or more  

| Timing belt Tensioner | Protrusion (from housing side) | 8.0–8.8 mm (0.315–0.346 in.)  

| Cylinder head | Warpage  
|              | Cylinder block side Maximum | 0.10 mm (0.0039 in.)  
|              | Intake manifold side Maximum | 0.10 mm (0.0039 in.)  
|              | Exhaust manifold side Maximum | 0.10 mm (0.0039 in.)  
|              | Valve guide bore diameter STD O/S 0.05 | 10.985–11.006 mm (0.4325–0.4333 in.)  
|              | 11.035–11.056 mm (0.4344–0.4353 in.)  

| Valve seat | Refacing angle | 15°, 45°, 60°  
|           | Contacting angle | 45°  
|           | Contacting width | Intake 1.0–1.4 mm (0.039–0.055 in.)  
|           | Exhaust 1.2–1.6 mm (0.047–0.063 in.)  

| Cylinder head bolt diameter | STD Minimum | 10.8–11.0 mm (0.434–0.433 in.)  
|                             | 10.7 mm (0.421 in.)  

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EG–135 Engine Specifications
<table>
<thead>
<tr>
<th>Valve guide Bushing</th>
<th>Inside diameter</th>
<th>Outside diameter (for repair part)</th>
<th>6.010–6.030 mm (0.2366–0.2374 in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STD O/S 0.05</td>
<td>11.033–11.044 mm (0.4344–0.4348 in.)</td>
</tr>
<tr>
<td></td>
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<td>11.083–11.094 mm (0.4363–0.4368 in.)</td>
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<tr>
<td>Valve</td>
<td>Valve overall length</td>
<td>Exhaust Minimum Intake Exhaust</td>
<td>98.29–98.79 mm (3.8697–3.8894 in.)</td>
</tr>
<tr>
<td></td>
<td>Valve face angle</td>
<td>Intake Exhaust</td>
<td>98.84–99.34 mm (3.8913–3.9110 in.)</td>
</tr>
<tr>
<td></td>
<td>Stem diameter</td>
<td>Exhaust Intake</td>
<td>98.19 mm (3.8657 in.)</td>
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<tr>
<td></td>
<td>Stem oil clearance</td>
<td>STD Intake Exhaust</td>
<td>98.74 mm (3.8874 in.)</td>
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<td>Margin thickness</td>
<td>Exhaust STD</td>
<td>44.5°</td>
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<tr>
<td></td>
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<td>Exhaust Minimum</td>
<td>0.07 mm (0.0028 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intake Maximum</td>
<td>0.08 mm (0.0031 in.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exhaust Minimum</td>
<td>0.10 mm (0.0039 in.)</td>
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<tr>
<td></td>
<td></td>
<td>Intake 0.8–1.2 mm (0.031–0.047 in.)</td>
<td>0.5 mm (0.020 in.)</td>
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<tr>
<td>Valve spring</td>
<td>Deviation</td>
<td>Maximum</td>
<td>2.0 mm (0.079 in.)</td>
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<td>Free length</td>
<td>Blue painted mark</td>
<td>41.74 mm (1.6433 in.)</td>
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<td>Yellow painted mark</td>
<td>41.70 mm (1.6417 in.)</td>
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<td></td>
<td>Installed tension at 34.5 mm (1.358 in.)</td>
<td></td>
<td>186–206 N (19.0–21.0 kgf, 42–46 lbf)</td>
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<tr>
<td>Valve lifter</td>
<td>Lifter diameter</td>
<td>Exhaust Intake</td>
<td>30.966–30.976 mm (1.2191–1.2195 in.)</td>
</tr>
<tr>
<td></td>
<td>Lifter bore diameter</td>
<td>Exhaust</td>
<td>31.000–31.016 mm (1.2205–1.2211 in.)</td>
</tr>
<tr>
<td></td>
<td>Oil clearance</td>
<td>STD Maximum</td>
<td>0.024–0.050 mm (0.0009–0.0020 in.)</td>
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<tr>
<td></td>
<td></td>
<td>Maximum</td>
<td>0.07 mm (0.0028 in.)</td>
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<tr>
<td>Camshaft</td>
<td>Thrust clearance</td>
<td>STD Maximum</td>
<td>0.080–0.190 mm (0.0031–0.0075 in.)</td>
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<td>Cam lobe height</td>
<td>STD Intake Exhaust Maximum Intake</td>
<td>0.30 mm (0.0118 in.)</td>
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<td>Exhaust</td>
<td>44.570–44.670 mm (1.7547–1.7587 in.)</td>
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<td></td>
<td>Maximum Intake</td>
<td>44.770–44.870 mm (1.7626–1.7665 in.)</td>
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<tr>
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<td></td>
<td>Exhaust</td>
<td>44.42 mm (1.7488 in.)</td>
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<td>Journal diameter</td>
<td>STD Maximum</td>
<td>44.62 mm (1.7567 in.)</td>
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<td>Circle runout</td>
<td>Maximum</td>
<td>0.035–0.072 mm (0.0014–0.0028 in.)</td>
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<td></td>
<td>Maximum</td>
<td>0.10 mm (0.0039 in.)</td>
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<td></td>
<td>Maximum</td>
<td>0.08 mm (0.0031 in.)</td>
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<tr>
<td>Air intake chamber</td>
<td>Warpage</td>
<td>Maximum</td>
<td>0.15 mm (0.0059 in.)</td>
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<tr>
<td>Manifold</td>
<td>Warpage</td>
<td>Maximum Intake</td>
<td>0.15 mm (0.0059 in.)</td>
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<td>Exhaust 2JZ–GE</td>
<td>0.50 mm (0.0196 in.)</td>
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<td></td>
<td></td>
<td>2JZ–GTE</td>
<td>0.80 mm (0.0315 in.)</td>
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<tr>
<td>Cylinder block</td>
<td>Cylinder head surface warpage</td>
<td>Maximum STD</td>
<td>0.07 mm (0.0028 in.)</td>
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<tr>
<td></td>
<td>Cylinder bore diameter</td>
<td>Maximum</td>
<td>86.000–86.013 mm (3.3858–3.3863 in.)</td>
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<td>Main bearing bolt diameter</td>
<td>Maximum</td>
<td>86.02 mm (3.3866 in.)</td>
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<td></td>
<td>STD Minimum</td>
<td>9.96–9.97 mm (0.3921–0.3925 in.)</td>
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<td></td>
<td>Minimum</td>
<td>9.7 mm (0.382 in.)</td>
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<tr>
<td>Connecting Rod</td>
<td>Thrust clearance</td>
<td>STD Maximum</td>
<td>0.250–0.402 mm (0.0098–0.0158 in.)</td>
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<td></td>
<td></td>
<td>Maximum</td>
<td>0.50 mm (0.0197 in.)</td>
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<tr>
<td></td>
<td>Connecting bolt diameter</td>
<td>STD Minimum</td>
<td>8.1–8.3 mm (0.319–0.327 in.)</td>
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<td></td>
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<td>Minimum</td>
<td>8.0 mm (0.315 in.)</td>
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<td>Connecting rod (cont’d)</td>
<td>Connecting rod oil clearance</td>
<td>STD</td>
<td>STD 0.25</td>
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<tr>
<td>Connecting rod bearing center wall thickness (Reference)</td>
<td>STD Mark 1</td>
<td>1.492–1.495 mm (0.0587–0.0589 in.)</td>
<td>STD Mark 2</td>
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<tr>
<td>Bushing inside diameter</td>
<td>STD</td>
<td>22.005–22.014 mm (0.8663–0.8667 in.)</td>
<td>STD</td>
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<tr>
<td>Piston pin diameter</td>
<td>STD</td>
<td>0.005–0.011 mm (0.0002–0.0004 in.)</td>
<td>Maximum</td>
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<tr>
<td>Piston pin oil clearance</td>
<td>STD</td>
<td>0.05 mm (0.0020 in.)</td>
<td>Maximum</td>
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<tr>
<td>Rod bent</td>
<td>Maximum per 100 mm (3.94 in.)</td>
<td>0.05 mm (0.0020 in.)</td>
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<tr>
<td>Rod twist</td>
<td>Maximum per 100 mm (3.94 in.)</td>
<td>0.15 mm (0.0059 in.)</td>
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<table>
<thead>
<tr>
<th>Piston and Piston ring (2JZ–GE)</th>
<th>Piston diameter</th>
<th>85.935–85.945 mm (3.3833–3.3837 in.)</th>
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</thead>
<tbody>
<tr>
<td>Piston oil clearance</td>
<td>STD</td>
<td>0.055–0.078 mm (0.0022–0.0031 in.)</td>
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<tr>
<td>Piston ring groove clearance</td>
<td>No.1</td>
<td>0.011–0.070 mm (0.0004–0.0028 in.)</td>
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<tr>
<td>Piston ring end gap</td>
<td>STD No.1</td>
<td>0.300–0.470 mm (0.0118–0.0185 in.)</td>
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<tr>
<td></td>
<td>Oil</td>
<td>0.130–0.450 mm (0.0051–0.0177 in.)</td>
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<tr>
<td></td>
<td>No.2</td>
<td>1.12 mm (0.0441 in.)</td>
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<tr>
<th>Piston and Piston ring (2JZ–GTE)</th>
<th>Piston diameter</th>
<th>85.917–85.927 mm (3.3826–3.3830 in.)</th>
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<tbody>
<tr>
<td>Piston oil clearance</td>
<td>STD</td>
<td>0.073–0.096 mm (0.0029–0.0038 in.)</td>
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<tr>
<td>Piston ring groove clearance</td>
<td>No.1</td>
<td>0.040–0.080 mm (0.0016–0.0031 in.)</td>
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<tr>
<td>Piston ring end gap</td>
<td>STD No.1</td>
<td>0.300–0.400 mm (0.0118–0.0157 in.)</td>
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<td>Oil</td>
<td>0.130–0.380 mm (0.0051–0.0150 in.)</td>
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<td>No.2</td>
<td>1.05 mm (0.0413 in.)</td>
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<tr>
<th>Crankshaft</th>
<th>Thrust clearance</th>
<th>STD</th>
<th>0.020–0.220 mm (0.0008–0.0087 in.)</th>
<th>Maximum</th>
<th>0.30 mm (0.0118 in.)</th>
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<tr>
<td>Thrust washer thickness</td>
<td>STD</td>
<td>1.940–1.990 mm (0.0764–0.0783 in.)</td>
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<tr>
<td>Main journal oil clearance</td>
<td>STD STD</td>
<td>0.026–0.040 mm (0.0010–0.0016 in.)</td>
<td>U/S 0.25</td>
<td>0.025–0.061 mm (0.0010–0.0024 in.)</td>
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<td>Maximum STD</td>
<td>0.06 mm (0.0024 in.)</td>
<td>U/S 0.25</td>
<td>0.08 mm (0.0313 in.)</td>
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<td>Main journal diameter</td>
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<td>61.984–62.000 mm (2.4403–2.4409 in.)</td>
<td>U/S 0.25</td>
<td>61.745–61.755 mm (2.4309–2.4313 in.)</td>
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### TORQUE SPECIFICATIONS

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<tr>
<th>Part tightened</th>
<th>N·m</th>
<th>kgf·cm</th>
<th>ft lbf</th>
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<tbody>
<tr>
<td>Timing belt plate X Oil pump (2JZ–GTE)</td>
<td>7.8</td>
<td>80</td>
<td>69 in. lbf</td>
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<tr>
<td>Idler pulley X Oil pump</td>
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<td>Crankshaft pulley X Crankshaft</td>
<td>324</td>
<td>3,300</td>
<td>239</td>
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<td>Camshaft timing pulley X Camshaft</td>
<td>79</td>
<td>810</td>
<td>59</td>
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<tr>
<td>Timing belt tensioner X Oil pump</td>
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<td>20</td>
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<tr>
<td>Drive belt tensioner X Cylinder head</td>
<td>21</td>
<td>210</td>
<td>15</td>
</tr>
<tr>
<td>Drive belt tensioner damper X Tensioner arm (2JZ–GTE M/T)</td>
<td>20</td>
<td>200</td>
<td>14</td>
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<tr>
<td>Drive belt tensioner damper X Tensioner bracket (2JZ–GTE M/T)</td>
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<tr>
<td>EGR cooler X Cylinder head</td>
<td>8.8</td>
<td>90</td>
<td>78 in. lbf</td>
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<tr>
<td>ECT sensor X Cylinder head (2JZ–GE)</td>
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</tr>
<tr>
<td>ECT sender gauge X Cylinder head (2JZ–GE)</td>
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<tr>
<td>Engine hanger X Cylinder head</td>
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<td>29</td>
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<tr>
<td>Camshaft position sensor X Cylinder head (2JZ–GTE)</td>
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<td>90</td>
<td>78 in. lbf</td>
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<tr>
<td>Cylinder head X Cylinder block 1st</td>
<td>34</td>
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<td>25</td>
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<td>2nd Turn 90°</td>
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<tr>
<td>3rd Turn 90°</td>
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<tr>
<td>Camshaft bearing cap X Cylinder head</td>
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<td>No.4 timing belt cover X Cylinder head</td>
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<td>Cylinder head cover X Cylinder head 2JZ–GE</td>
<td>8.3</td>
<td>85</td>
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<td>2JZ–GTE</td>
<td>5.4</td>
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<td>Intake manifold X Cylinder head 2JZ–GE</td>
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<td>280</td>
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<td>2JZ–GTE</td>
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<tr>
<td>Fuel inlet pipe X Delivery pipe</td>
<td>42</td>
<td>420</td>
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<tr>
<td>Intake manifold stay X Intake manifold</td>
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<tr>
<td>Intake manifold stay X Cylinder block</td>
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<td>Water outlet X Cylinder head (2JZ–GTE)</td>
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<tr>
<td>Vacuum control valve set X Intake manifold (2JZ–GE)</td>
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<tr>
<td>Air intake chamber X Intake manifold 2JZ–GE</td>
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<td>2JZ–GTE</td>
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<td>Air intake chamber stay X Cylinder head (2JZ–GE)</td>
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<td>185</td>
<td>13</td>
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<td>Exhaust manifold X Cylinder head</td>
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<td>Pressure tank X Intake manifold (2JZ–GTE)</td>
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<td>Main bearing cap X Cylinder block 1st</td>
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<td>Connecting rod cap X Connecting rod</td>
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<td>2nd Turn 90°</td>
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<td>Oil nozzle X Crankshaft (2JZ–GTE)</td>
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<td>Rear oil seal retainer X Cylinder block</td>
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<td>52 in. lbf</td>
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<td>Crankshaft position sensor X Cylinder block (2JZ–GTE)</td>
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<td>78 in. lbf</td>
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<tr>
<td>Engine mounting bracket X Cylinder block</td>
<td>58</td>
<td>590</td>
<td>43</td>
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<tr>
<td>Engine coolant drain plug X Cylinder block</td>
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<td>Union for oil cooler X Cylinder block (2JZ–GTE)</td>
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<td>Knock sensor X Cylinder block</td>
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<td>Oil pressure switch X Cylinder block</td>
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<td>Fuel pipe support X Cylinder block</td>
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<td>Oil filter bracket X Cylinder block</td>
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<td>No.2 water bypass pipe X Water pump</td>
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<td>No.2 water bypass pipe X Cylinder block</td>
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<td>Flywheel X Crankshaft (M/T)</td>
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<td>2nd Turn 90°</td>
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<td>Drive plate X Crankshaft (A/T)</td>
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<td>Clutch cover X Flywheel (M/T)</td>
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<td>17 mm head</td>
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<td>Clutch service hole cover X Clutch housing (2JZ–GTE M/T)</td>
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<td>Drive plate X Torque converter clutch (A/T)</td>
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<td>Oil cooler tube X Union for transmission (A/T)</td>
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<td>Rear support member X Engine rear mounting insulator</td>
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<td>Front suspension crossmember X Engine mounting insulator</td>
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<td>Transmission shift lever X Shift lever retainer (M/T)</td>
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<td>A/C compressor X Cylinder block</td>
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<td>PS pump front bracket X Oil pump (2JZ–GE)</td>
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<td>530</td>
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<td>PS pump bracket X A/C compressor</td>
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<td>PS pump rear stay X Intake manifold stay (2JZ–GE)</td>
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<td>Rear center floor crossmember brace X Body (2JZ–GTE)</td>
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<td>No.2 front exhaust pipe X Exhaust manifold</td>
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<td>Pipe support bracket X Transmission</td>
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<tr>
<td>Front exhaust pipe X Center exhaust pipe</td>
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<td>Center exhaust pipe X Tailpipe</td>
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<td>Sub heated oxygen sensor x Front exhaust pipe (2JZ–GE (California), 2JZ–GTE)</td>
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<td>200</td>
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