

2009 ENGINE**2AZ-FE Engine Mechanical - xB****ENGINE****ON-VEHICLE INSPECTION****1. INSPECT ENGINE COOLANT**

(See ON-VEHICLE INSPECTION)

2. INSPECT ENGINE OIL

(See ON-VEHICLE INSPECTION)

3. INSPECT BATTERY

(See ON-VEHICLE INSPECTION)

4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

- a. Remove the air cleaner cap.
- b. Remove the air filter element.
- c. Visually check that the air filter is not excessively damaged or oily.

If necessary, replace the air filter.

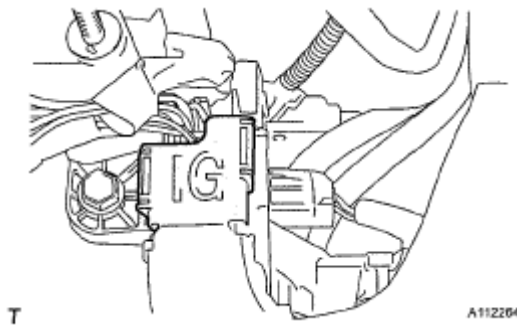
5. INSPECT SPARK PLUG (See ON-VEHICLE INSPECTION)**6. INSPECT FAN AND GENERATOR V BELT (See ON-VEHICLE INSPECTION)****7. INSPECT IGNITION TIMING****NOTE:**

- Turn all the electrical systems and the A/C OFF.
- When checking the ignition timing, shift the transmission to the neutral position.

- a. Warm up and stop the engine.
- b. When the Techstream:
 1. Connect the Techstream to the DLC3.
 2. Turn the ignition switch to ON.
 3. Turn the tester ON.
 4. Select the following menu items: Power Train / Engine and ECT / Data List / IGN Advance
 5. Start the engine.
 6. According to the display on tester, read the Data List.

Standard ignition timing: BTDC 0 to 15° at idle

7. Check that the ignition timing advances immediately when the engine speed is increased.
8. Turn the ignition switch to OFF.
9. Disconnect the Techstream from the DLC3.
- c. When not using the Techstream:
 1. Remove the No. 1 engine cover (See **REMOVAL**).
 2. Open the ignition cover located to the right of the No. 4 ignition coil.
 3. Pull the wire harness out from the IG cover.

**Fig. 1: Identifying IG Cover**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Connect a timing light to the wire harness.

NOTE: Use a timing light that detects the first signal.

5. Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST 09843-18040

6. Allow the engine to idle and check the ignition timing.

Standard ignition timing: BTDC 8 to 12° at idle

HINT:

Run the engine at 1000 to 1300 rpm for 5 seconds, then check that the engine speed returns to the idling speed.

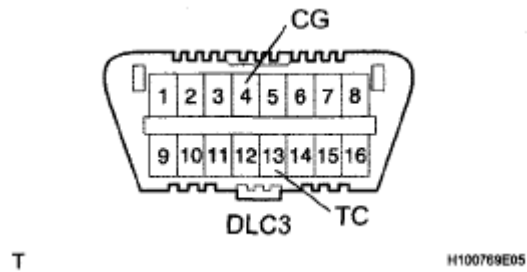


Fig. 2: Identifying DLC3 Terminals TC And CG
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. Remove SST from the DLC3.
8. Allow the engine to idle and check the ignition timing.

Standard ignition timing: BTDC 5 to 15°

9. Check that the ignition timing advances immediately when the engine speed is increased.
10. Turn the ignition switch OFF.
11. Remove the timing light.
12. Close the IG cover.
13. Install the No. 1 engine cover (see INSTALLATION).

8. INSPECT ENGINE IDLING SPEED

NOTE:

- Turn all the electrical systems and the A/C OFF.
- When checking the ignition timing, shift the transmission to the P or neutral position.

a. When using the Techstream:

1. Warm up the engine.
2. Turn the ignition switch to OFF.
3. Connect the Techstream to the DLC3.
4. Turn the ignition switch to ON.
5. Turn the tester ON.
6. Select the following menu items: Power Train / Engine and ECT / Data List / Engine Speed
7. Start the engine.
8. According to the display on tester, read the Data List.

Standard idle speed: 600 to 700 rpm

9. Turn the ignition switch to OFF.
 10. Disconnect the Techstream from the DLC3.
- b. When not using the Techstream:

1. Turn OFF all the accessories and air conditioning.
2. Move the shift lever to P or neutral.
3. Connect SST to 9 (TAC) of the DLC3 terminal, and then connect a tachometer to SST.

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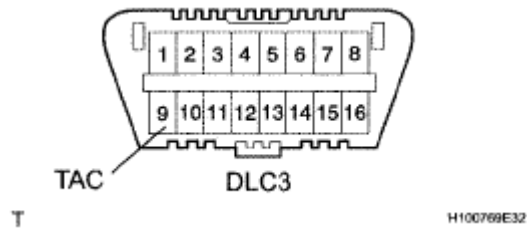


Fig. 3: Identifying DLC3 Terminal TAC
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. Warm up the engine.
5. Check the idle speed while the radiator-cooling fan is not rotating.

Standard idle speed: 600 to 700 rpm

6. Turn the ignition switch OFF.
7. Remove the tachometer and disconnect SST from the DLC3.

9. INSPECT COMPRESSION

- a. Warm up and then stop the engine.
- b. Remove the 4 ignition coils and spark plugs (See **REMOVAL**).
- c. Disconnect the 4 fuel injector connectors.
- d. Set SST and a compression gauge.

SST 09992-00500

- e. Insert the compression gauge into the spark plug hole.
- f. While cranking the engine, measure the compression pressure.

Standard compression pressure: 1300 kPa (13.3 kgf/cm² , 189 psi)

Minimum compression pressure: 1000 kPa (10.0 kgf/cm² , 145 psi)

Standard difference between each cylinder: 100 kPa (1.0 kgf/cm² , 15 psi)

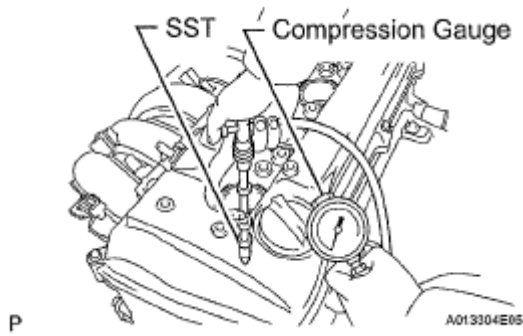


Fig. 4: Measuring Compression Pressure

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Always use a fully charged battery to obtain an engine speed of 250 rpm or more.
- Check the other cylinders' compression pressures in the same way.
- This measurement must be done as quickly as possible.

If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect again.

HINT:

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If pressure stays low, a valve may be stuck or seated improperly, or there may be leakage in the gasket.

g. Connect the 4 fuel injector connectors.

h. Install the 4 spark plugs and ignition coils. (See **INSTALLATION**)

10. INSPECT CO/HC

HINT:

The ECM properly controls the CO/HC concentration in the emission gas.

- a. Start and warm up the engine.
- b. Run the engine at 2500 rpm for approximately 180 seconds.
- c. Insert the CO/HC meter testing probe at least 40 cm (1.3 ft.) into the tailpipe while idling.
- d. Inspect the CO/HC concentration while idling and/or at 2500 rpm.

If the CO/HC concentration is not as specified, perform troubleshooting.

HINT:

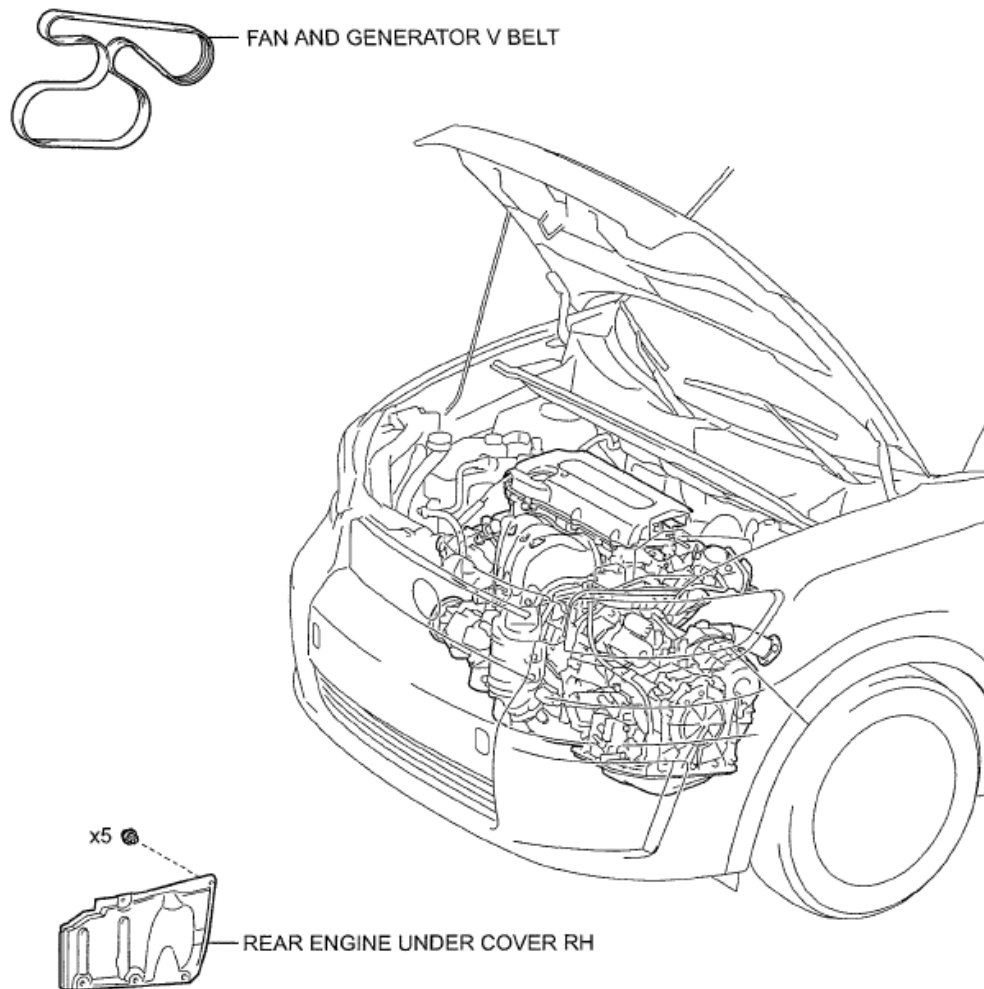
See the table below for possible causes, and then inspect and repair the applicable causes if necessary.

POSSIBLE CAUSES

CO	HC	Problems	Causes
Normal	High	Rough idle	- Faulty ignition: - Incorrect timing - Plugs are contaminated, shorted, or gaps are defective - Incorrect valve clearance - Leaks in intake and exhaust valve - Leaks in cylinders
Low	High	Rough idle (Fluctuating HC reading)	- Vacuum leakage: - Ventilation hoses - Intake manifold - Throttle body - Brake booster line - Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	- Restricted air filter - Plugged PCV valve - Faulty SFI system: - Faulty pressure regulator - Faulty engine coolant temperature sensor - Faulty mass air flow meter - Faulty ECM - Faulty injectors - Faulty throttle body

DRIVE BELT

COMPONENTS



P

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Fig. 5: Identifying Drive Belt Components

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

ON-VEHICLE INSPECTION

1. CHECK FAN AND GENERATOR V BELT

- Visually check the drive belt for excessive wear, frayed cords, etc.

If any defect has been found, replace the drive belt.

HINT:

Cracks on the rib side of a drive belt are considered acceptable.

If the drive belt has chunks missing from the ribs, it should be replaced.

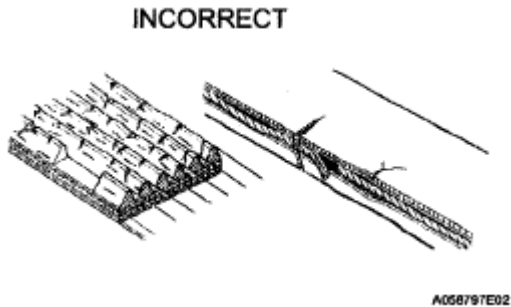


Fig. 6: Checking Drive Belt For Excessive Wear, Frayed Cords, Etc
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. After installing the drive belt, check that it fits properly in the ribbed grooves.

Check with your hand to confirm that the belt has not slipped out of the grooves on the bottom of the crank pulley.

HINT:

- A "new belt" is a belt which has been used for less than 5 minutes on a running engine.
- A "used belt" is a belt which has been used on a running engine for 5 minutes or more.
- After installing a new belt, run the engine for approximately 5 minutes and then recheck the tension.

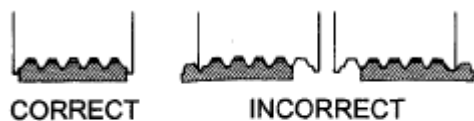


Fig. 7: Checking Drive Belt Fits Properly In Ribbed Grooves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE REAR ENGINE UNDER COVER RH
2. REMOVE FAN AND GENERATOR V BELT

- a. Using SST and 19 mm socket wrench, loosen the V-ribbed belt tensioner arm clockwise, then remove the fan and generator V belt.

SST 09216-42010 (09216-04010)

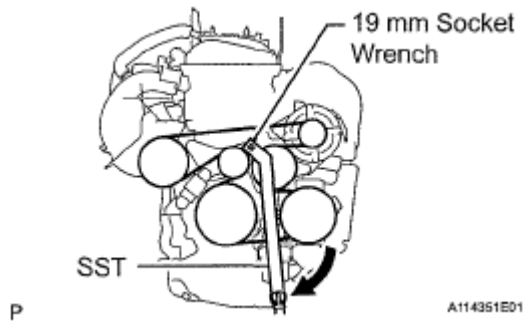


Fig. 8: Identifying Fan And Generator V Belt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Be sure to connect SST and the tools so that they are in line during use.
- When retracting the tensioner, turn it clockwise slowly for 3 seconds or more. Do not apply force rapidly.
- After the tensioner is fully retracted, do not apply force any more than necessary.

INSTALLATION

1. INSTALL FAN AND GENERATOR V BELT

- Using SST and 19 mm socket wrench, loosen the V-ribbed belt tensioner arm clockwise, then install the fan and generator V belt.

SST 09216-42010 (09216-04010)

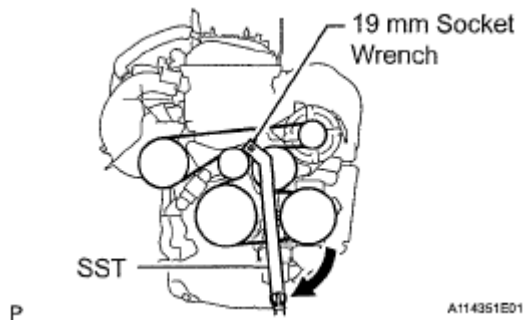


Fig. 9: Identifying Fan And Generator V Belt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Be sure to connect SST and the tools so that they are in line during use.

- When retracting the tensioner, turn it clockwise slowly for 3 seconds or more. Do not apply force rapidly.
- After the tensioner is fully retracted, do not apply any more force than is necessary.

2. INSTALL REAR ENGINE UNDER COVER RH

VALVE CLEARANCE

ADJUSTMENT

1. REMOVE REAR ENGINE UNDER COVER RH
2. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See REMOVAL)
3. REMOVE IGNITION COIL ASSEMBLY (See REMOVAL)
4. REMOVE SPARK PLUG (See REMOVAL)
5. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See REMOVAL)
6. SET NO. 1 CYLINDER TO TDC / COMPRESSION (See REMOVAL)
7. CHECK VALVE CLEARANCE
 - a. Check only the valves indicated.
 1. Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

Standard valve clearance (cold)

VALVE CLEARANCE SPECIFICATION

Item	Specified Condition
Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)

No. 1 Cylinder TDC/Compression

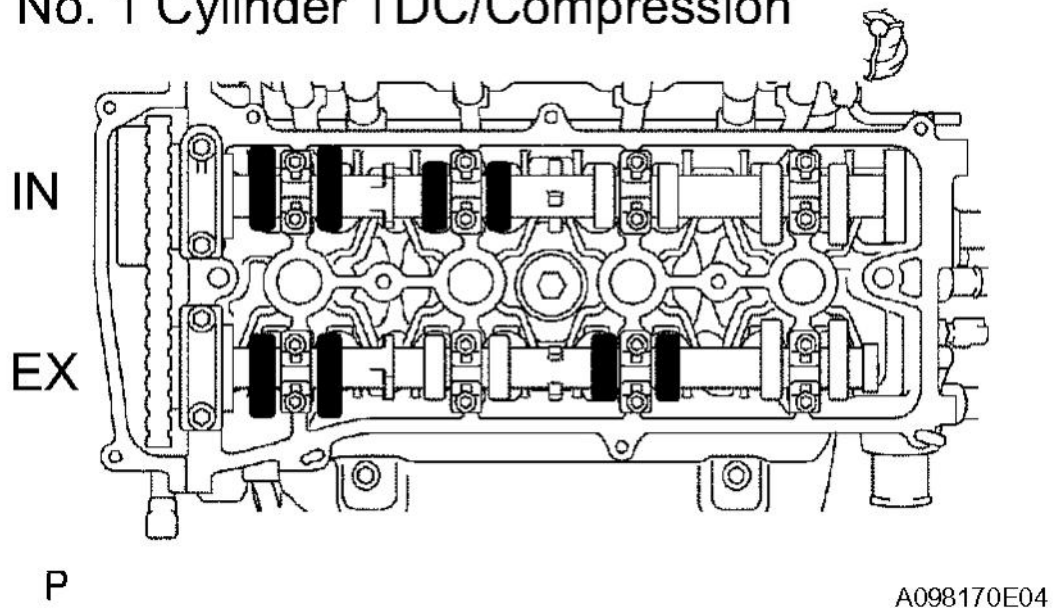


Fig. 10: Measuring Clearance Between Valve Lifter And Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve clearance lifters.
- b. Turn the crankshaft 1 revolution (360°) and set the No. 4 cylinder to the TDC/compression.
- c. Check only the valves indicated.
 1. Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

Standard valve clearance (cold)

VALVE CLEARANCE SPECIFICATION

Item	Specified Condition
Intake	0.19 to 0.29 mm (0.0075 to 0.0114 in.)
Exhaust	0.38 to 0.48 mm (0.0150 to 0.0189 in.)

No. 4 Cylinder TDC/Compression

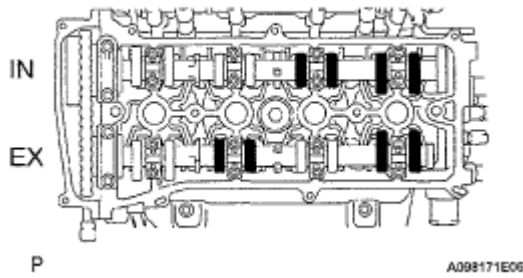


Fig. 11: Measuring Clearance Between Valve Lifter And Camshaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifters.

8. ADJUST VALVE CLEARANCE

- a. Set No. 1 cylinder to TDC/compression (See **REMOVAL**).
- b. Remove the No. 1 chain tensioner (See **REMOVAL**).
- c. Loosen the camshaft timing sprocket (See **REMOVAL**).
- d. Remove the No. 2 camshaft (See **REMOVAL**).
- e. Remove the camshaft (See **REMOVAL**).
- f. Remove the valve lifters.
- g. Using a micrometer, measure the thickness of the removed valve lifters.
- h. Calculate the thickness of a new lifter so that the valve clearance comes within the specified values.

New lifter thickness

THICKNESS SPECIFICATION

Item	Specification
Intake	$A = B + (C - 0.24 \text{ mm (0.0095 in.)})$
Exhaust	$A = B + (C - 0.43 \text{ mm (0.0169 in.)})$

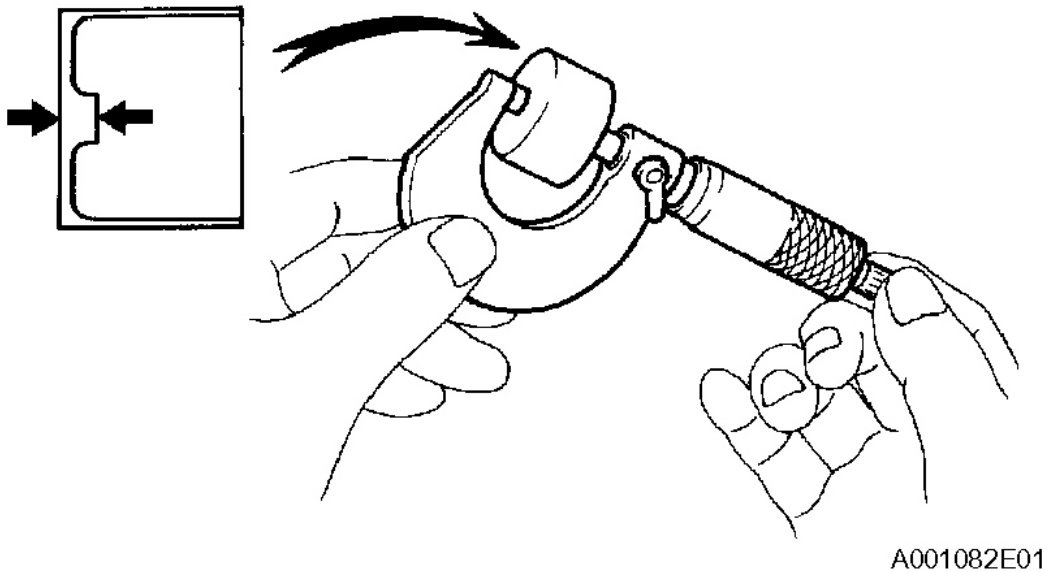


Fig. 12: Measuring Thickness Of Removed Valve Lifters
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

THICKNESS SPECIFICATION

A	New lifter thickness
B	Used lifter thickness
C	Measured valve clearance

CALCULATION EXAMPLE (Intake):

1. Measured intake valve clearance = 0.40 mm (0.0158 in.)

(Measured - Specification = Excess clearance) (a)0.40 mm (0.0158 in.) - 0.24 mm (0.0095 in.) = 0.16 mm (0.0063 in.)

2. Measured used lifter thickness = 5.250 mm (0.2067 in.)

3. New lifter thickness = 5.410 mm (0.2130 in.) (Excess clearance + Used lifter thickness = Ideal new lifter)

(a)0.16 mm (0.0063 in.) + 5.250 mm (0.2067 in.) = 5.410 mm (0.2130 in.)

4. Closest new lifter = 5.420 mm (0.2134 in.)

○ Select No. 42 lifter

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

HINT:

- Lifters are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 to 5.740 mm (0.1992 to 0.2260 in.).
- The identification number inside the valve lifters shows the value to 2 decimal places. (The illustration shows 5.420 mm (0.2134 in.)

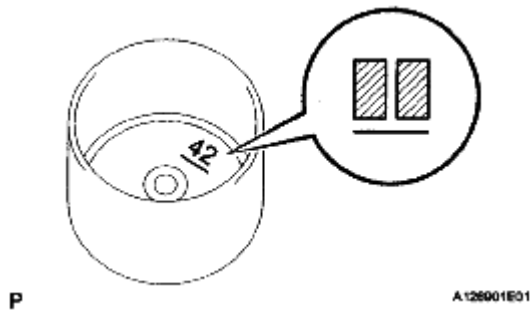


Fig. 13: Identifying Identification Number Inside Valve Lifters
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- j. Valve lifter selection chart (intake).

Measured clearance Installed lifter thickness	mm (in.)	
	mm (in.)	mm (in.)
5.060 (0.1992)	0.000 - 0.030 (0.0000 - 0.0012)	0.000 - 0.030 (0.0000 - 0.0012)
5.080 (0.2000)	0.031 - 0.050 (0.0012 - 0.0020)	0.031 - 0.050 (0.0012 - 0.0020)
5.100 (0.2008)	0.051 - 0.070 (0.0020 - 0.0028)	0.051 - 0.070 (0.0020 - 0.0028)
5.120 (0.2016)	0.071 - 0.090 (0.0028 - 0.0035)	0.071 - 0.090 (0.0028 - 0.0035)
5.140 (0.2024)	0.091 - 0.110 (0.0036 - 0.0043)	0.091 - 0.110 (0.0036 - 0.0043)
5.160 (0.2031)	0.111 - 0.130 (0.0044 - 0.0051)	0.111 - 0.130 (0.0044 - 0.0051)
5.180 (0.2039)	0.131 - 0.150 (0.0052 - 0.0059)	0.131 - 0.150 (0.0052 - 0.0059)
5.200 (0.2047)	0.151 - 0.170 (0.0059 - 0.0067)	0.151 - 0.170 (0.0059 - 0.0067)
5.210 (0.2051)	0.171 - 0.190 (0.0067 - 0.0074)	0.171 - 0.190 (0.0067 - 0.0074)
5.220 (0.2055)	0.191 - 0.210 (0.0075 - 0.0083)	0.191 - 0.210 (0.0075 - 0.0083)
5.230 (0.2059)	0.211 - 0.230 (0.0083 - 0.0091)	0.211 - 0.230 (0.0083 - 0.0091)
5.240 (0.2063)	0.231 - 0.250 (0.0091 - 0.0099)	0.231 - 0.250 (0.0091 - 0.0099)
5.250 (0.2067)	0.251 - 0.270 (0.0099 - 0.0107)	0.251 - 0.270 (0.0099 - 0.0107)
5.260 (0.2071)	0.271 - 0.290 (0.0107 - 0.0115)	0.271 - 0.290 (0.0107 - 0.0115)
5.270 (0.2075)	0.291 - 0.310 (0.0115 - 0.0123)	0.291 - 0.310 (0.0115 - 0.0123)
5.280 (0.2079)	0.311 - 0.330 (0.0123 - 0.0131)	0.311 - 0.330 (0.0123 - 0.0131)
5.290 (0.2083)	0.331 - 0.350 (0.0131 - 0.0139)	0.331 - 0.350 (0.0131 - 0.0139)
5.300 (0.2087)	0.351 - 0.370 (0.0139 - 0.0147)	0.351 - 0.370 (0.0139 - 0.0147)
5.310 (0.2091)	0.371 - 0.390 (0.0147 - 0.0155)	0.371 - 0.390 (0.0147 - 0.0155)
5.320 (0.2094)	0.391 - 0.410 (0.0155 - 0.0163)	0.391 - 0.410 (0.0155 - 0.0163)
5.330 (0.2098)	0.411 - 0.430 (0.0163 - 0.0171)	0.411 - 0.430 (0.0163 - 0.0171)
5.340 (0.2102)	0.431 - 0.450 (0.0171 - 0.0179)	0.431 - 0.450 (0.0171 - 0.0179)
5.350 (0.2106)	0.451 - 0.470 (0.0179 - 0.0187)	0.451 - 0.470 (0.0179 - 0.0187)
5.360 (0.2110)	0.471 - 0.490 (0.0187 - 0.0195)	0.471 - 0.490 (0.0187 - 0.0195)
5.370 (0.2114)	0.491 - 0.510 (0.0195 - 0.0203)	0.491 - 0.510 (0.0195 - 0.0203)
5.380 (0.2118)	0.511 - 0.530 (0.0203 - 0.0211)	0.511 - 0.530 (0.0203 - 0.0211)
5.390 (0.2122)	0.531 - 0.550 (0.0211 - 0.0219)	0.531 - 0.550 (0.0211 - 0.0219)
5.400 (0.2126)	0.551 - 0.570 (0.0219 - 0.0227)	0.551 - 0.570 (0.0219 - 0.0227)
5.410 (0.2130)	0.571 - 0.590 (0.0227 - 0.0235)	0.571 - 0.590 (0.0227 - 0.0235)
5.420 (0.2134)	0.591 - 0.610 (0.0235 - 0.0243)	0.591 - 0.610 (0.0235 - 0.0243)
5.430 (0.2138)	0.611 - 0.630 (0.0243 - 0.0251)	0.611 - 0.630 (0.0243 - 0.0251)
5.440 (0.2142)	0.631 - 0.650 (0.0251 - 0.0259)	0.631 - 0.650 (0.0251 - 0.0259)
5.450 (0.2146)	0.651 - 0.670 (0.0259 - 0.0267)	0.651 - 0.670 (0.0259 - 0.0267)
5.460 (0.2150)	0.671 - 0.690 (0.0267 - 0.0275)	0.671 - 0.690 (0.0267 - 0.0275)
5.470 (0.2154)	0.691 - 0.710 (0.0275 - 0.0283)	0.691 - 0.710 (0.0275 - 0.0283)
5.480 (0.2157)	0.711 - 0.730 (0.0283 - 0.0291)	0.711 - 0.730 (0.0283 - 0.0291)
5.490 (0.2161)	0.731 - 0.750 (0.0291 - 0.0299)	0.731 - 0.750 (0.0291 - 0.0299)
5.500 (0.2165)	0.751 - 0.770 (0.0299 - 0.0307)	0.751 - 0.770 (0.0299 - 0.0307)
5.510 (0.2169)	0.771 - 0.790 (0.0307 - 0.0315)	0.771 - 0.790 (0.0307 - 0.0315)
5.520 (0.2173)	0.791 - 0.810 (0.0315 - 0.0323)	0.791 - 0.810 (0.0315 - 0.0323)
5.530 (0.2177)	0.811 - 0.830 (0.0323 - 0.0331)	0.811 - 0.830 (0.0323 - 0.0331)
5.540 (0.2181)	0.831 - 0.850 (0.0331 - 0.0339)	0.831 - 0.850 (0.0331 - 0.0339)
5.550 (0.2185)	0.851 - 0.870 (0.0339 - 0.0347)	0.851 - 0.870 (0.0339 - 0.0347)
5.560 (0.2189)	0.871 - 0.890 (0.0347 - 0.0355)	0.871 - 0.890 (0.0347 - 0.0355)
5.570 (0.2193)	0.891 - 0.910 (0.0355 - 0.0363)	0.891 - 0.910 (0.0355 - 0.0363)
5.580 (0.2197)	0.911 - 0.930 (0.0363 - 0.0371)	0.911 - 0.930 (0.0363 - 0.0371)
5.590 (0.2201)		
5.600 (0.2205)		
5.620 (0.2213)		
5.640 (0.2220)		
5.660 (0.2228)		
5.680 (0.2236)		
5.700 (0.2244)		
5.720 (0.2262)		
5.740 (0.2260)		

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Fig. 14: Identifying Valve Lifter Selection Chart (Intake)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

New lifter thickness

NEW LIFTER THICKNESS

Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)

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12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)	-	-

Standard intake valve clearance (cold): 0.19 to 0.29 mm (0.0075 to 0.0114 in.)

EXAMPLE:

The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0157 in.). Replace the 5.250 mm (0.2067 in.) lifter with a new No. 42 lifter.

- k. Valve lifter selection chart (exhaust).



New lifter thickness

NEW LIFTER THICKNESS

Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)	Lifter No.	Thickness mm (in.)
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)

10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)	-	-

Standard exhaust valve clearance (cold): 0.38 to 0.48 mm (0.0150 to 0.0189 in.)

EXAMPLE:

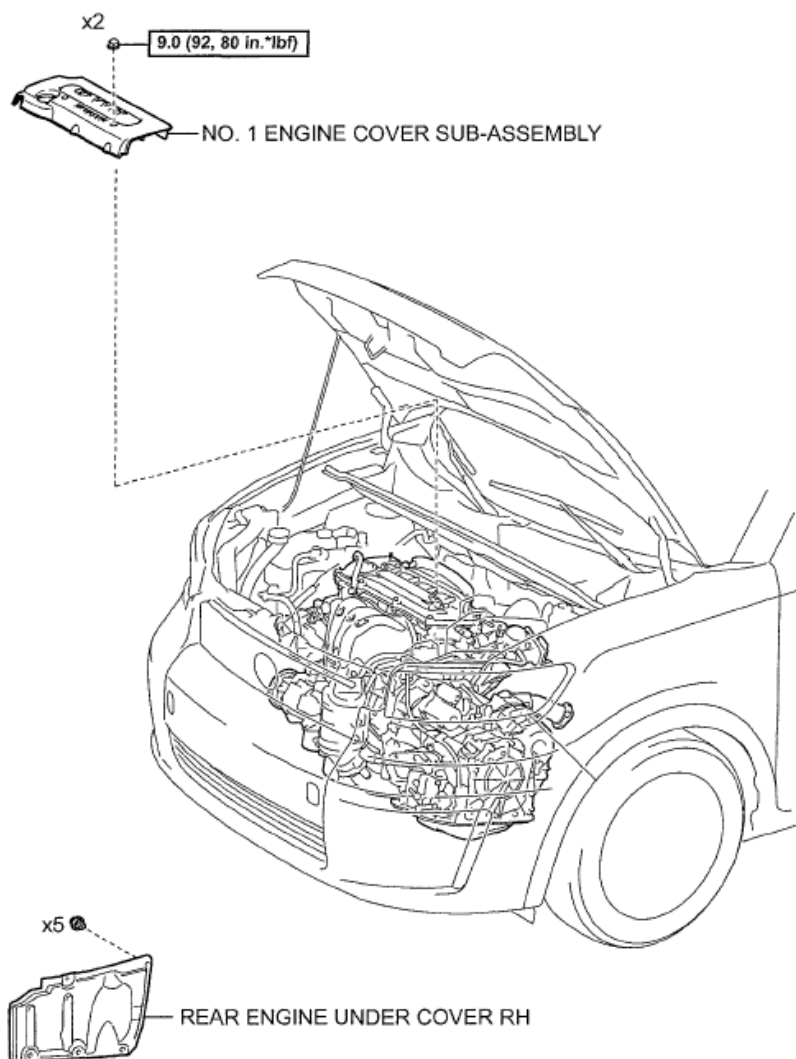
The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.510 mm (0.020 in.).

Replace the 5.340 mm (0.2102 in.) lifter with a new No. 42 lifter.

- l. Install the selected valve lifter.
- m. Install the camshaft (See **INSTALLATION**).
- n. Install the No. 2 camshaft (See **INSTALLATION**).
- o. Install the No. 1 chain tensioner (See **INSTALLATION**).
9. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY** (See **INSTALLATION**)
10. **INSTALL SPARK PLUG** (See **INSTALLATION**)
11. **INSTALL IGNITION COIL ASSEMBLY** (See **INSTALLATION**)
12. **INSPECT FOR ENGINE OIL LEAK**
13. **INSPECT IGNITION TIMING** (See **ON-VEHICLE INSPECTION**)
14. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY** (See **INSTALLATION**)
15. **INSTALL REAR ENGINE UNDER COVER RH**

CAMSHAFT

COMPONENTS

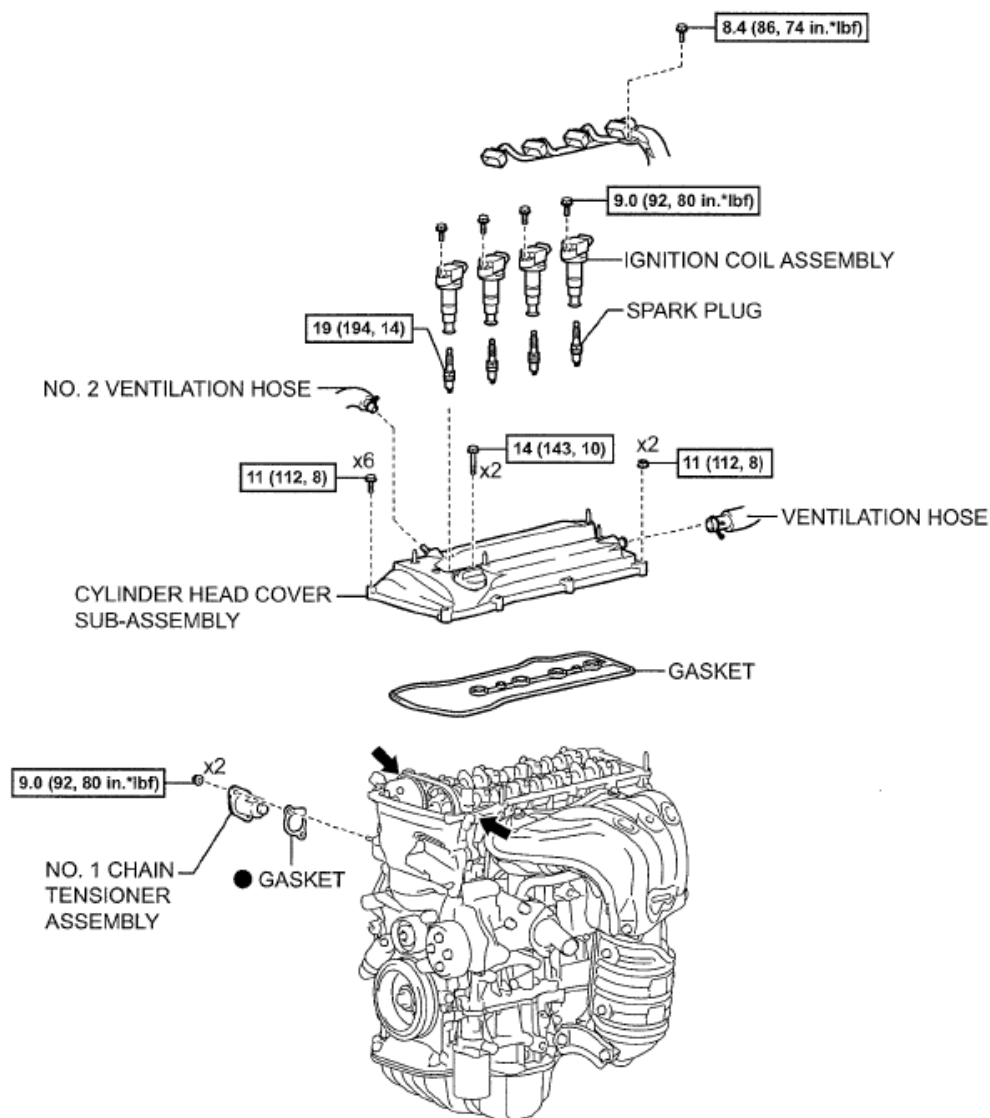


N*m (kgf*cm, ft*lbf) : Specified torque

P

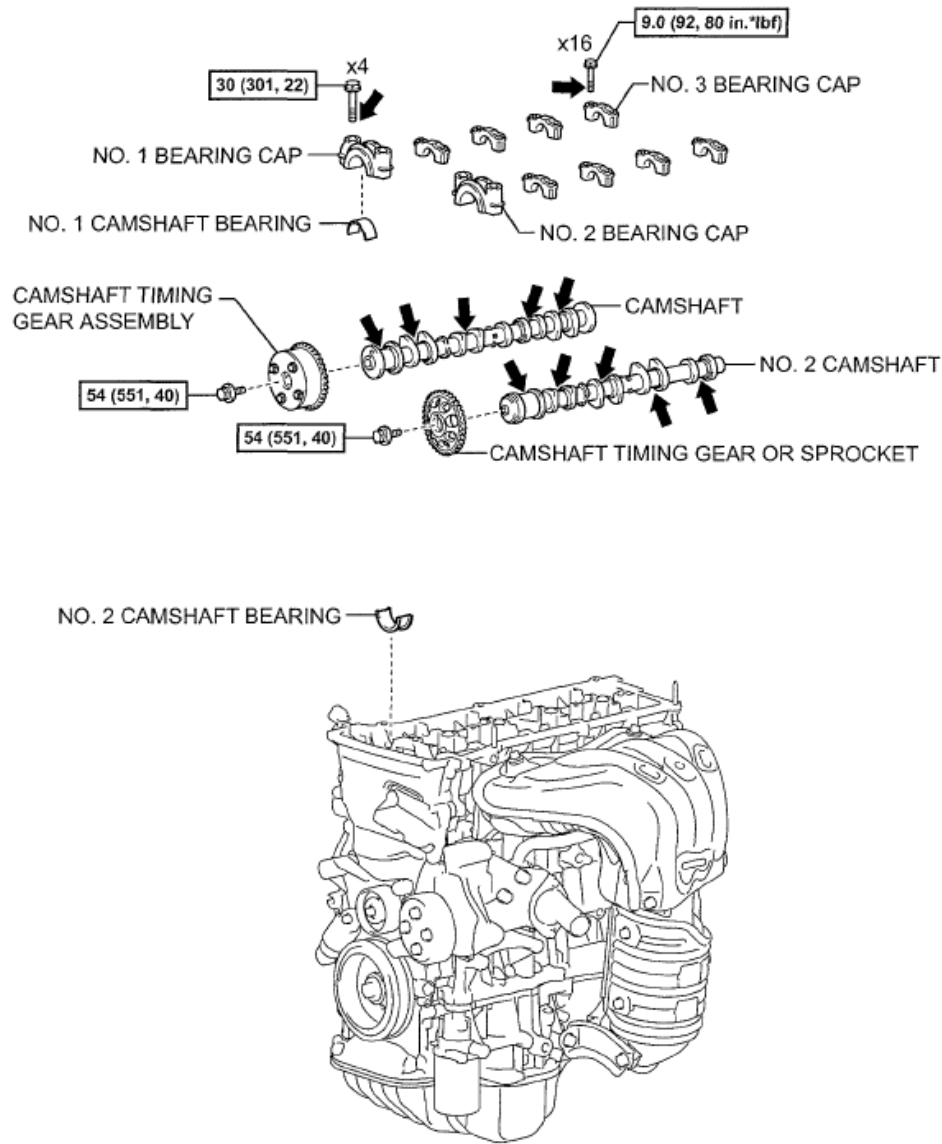
A156874E01

Fig. 16: Identifying Camshaft Replacement Components With Torque Specification(1 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 17: Identifying Camshaft Replacement Components With Torque Specifications (2 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lbf) : Specified torque

← Engine oil

P

A156825E01

Fig. 18: Identifying Camshaft Replacement Components With Torque Specifications (3 Of 3)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE REAR ENGINE UNDER COVER RH
2. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See [REMOVAL](#))
3. REMOVE IGNITION COIL ASSEMBLY (See [REMOVAL](#))
4. REMOVE SPARK PLUG (See [REMOVAL](#))
5. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

- a. Remove the 2 ventilation hoses from the cylinder head.

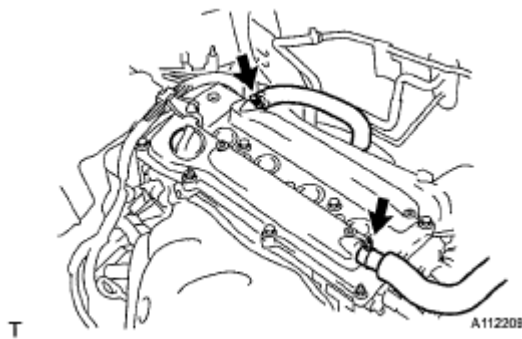


Fig. 19: Locating Cylinder Head Ventilation Hoses
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 2 bolts and separate the 2 wire harness brackets.

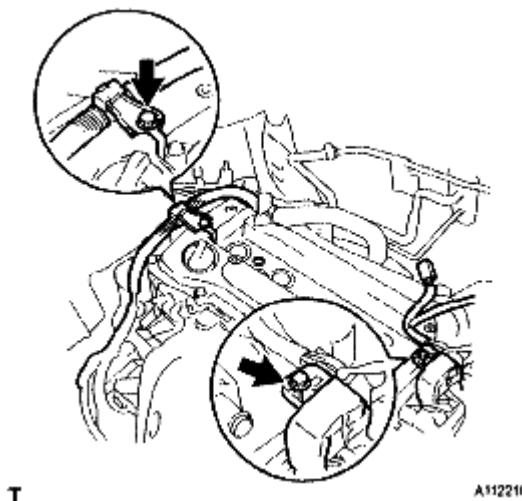


Fig. 20: Locating Bolts Of Wire Harness Brackets
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 8 bolts and 2 nuts, and then remove the cylinder head cover and gasket.

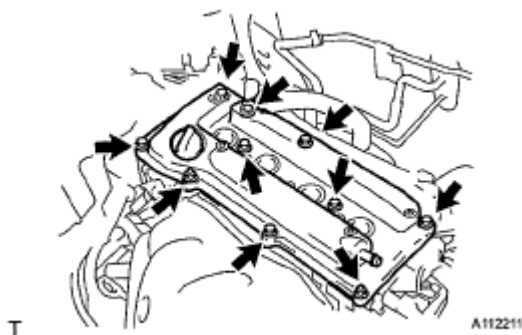


Fig. 21: Locating Cylinder Head Cover Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. SET NO. 1 CYLINDER TO TDC / COMPRESSION

- a. Turn the crankshaft pulley until the groove and the timing mark "0" on the timing chain cover are aligned.
- b. Check that each timing mark on the camshaft timing gear and sprocket is aligned with each timing mark located on the No. 1 and No. 2 bearing caps as shown in the illustration.

If not, turn the crankshaft pulley by 1 revolution (360°) to align the timing marks as above.

- c. Place paint marks on the chain in alignment with the timing marks on the camshaft timing gear and camshaft timing sprocket.

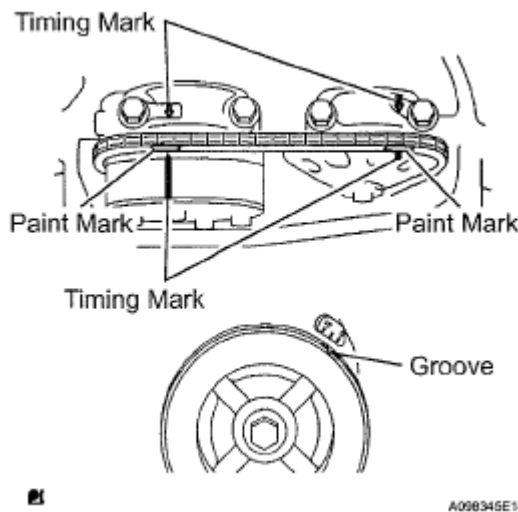
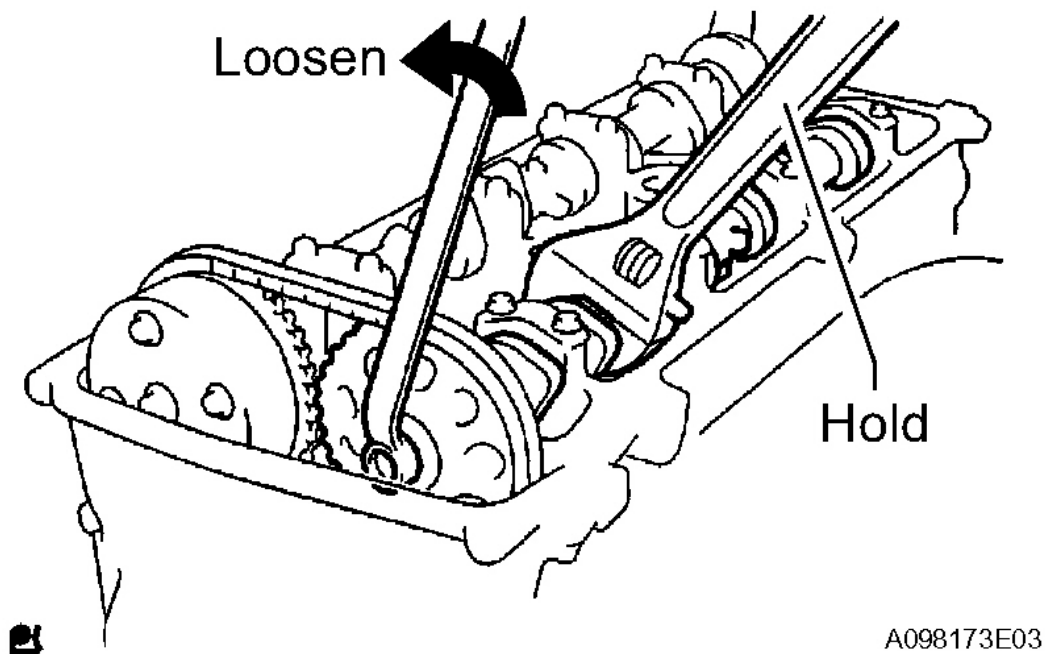


Fig. 22: Identifying No. 1 Cylinder To TDC/Compression
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See REMOVAL)

8. LOOSEN CAMSHAFT TIMING GEAR OR SPROCKET

- a. While holding the No. 2 camshaft with a wrench, loosen the No. 2 camshaft timing set bolt.



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Fig. 23: Loosening Camshaft Timing Set Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE NO. 2 CAMSHAFT

- a. Using several steps, uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.
- b. Remove the 5 bearing caps.

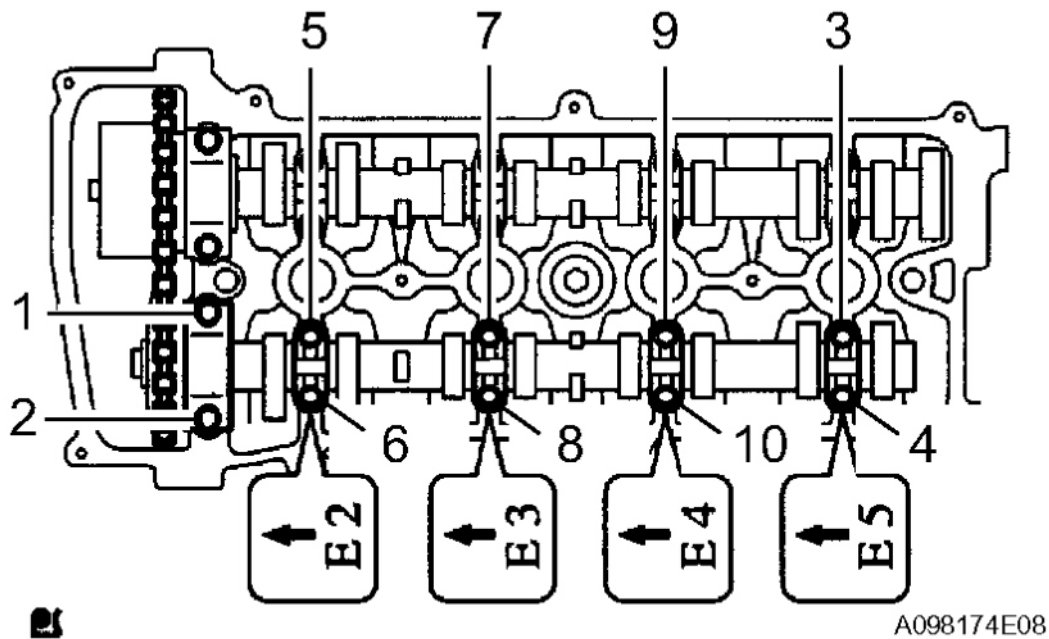


Fig. 24: Identifying Bearing Cap Bolts In Sequence
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. While holding the No. 2 camshaft by hand, remove the camshaft timing sprocket set bolt.
- d. Remove the camshaft timing sprocket from the No. 2 camshaft with the timing chain wrapped on the sprocket.
- e. Remove the camshaft timing sprocket from the timing chain.

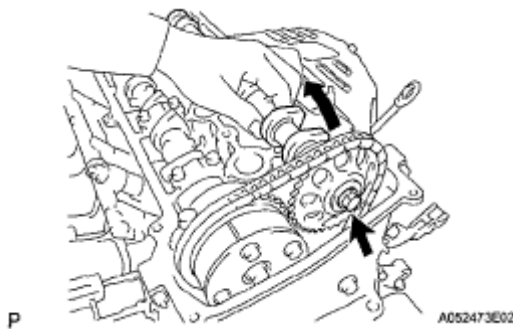


Fig. 25: Identifying Camshaft Timing Sprocket Set Bolt
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. REMOVE CAMSHAFT

- a. In several steps, uniformly loosen and remove the 10 bearing caps bolts in the sequence shown in the illustration.

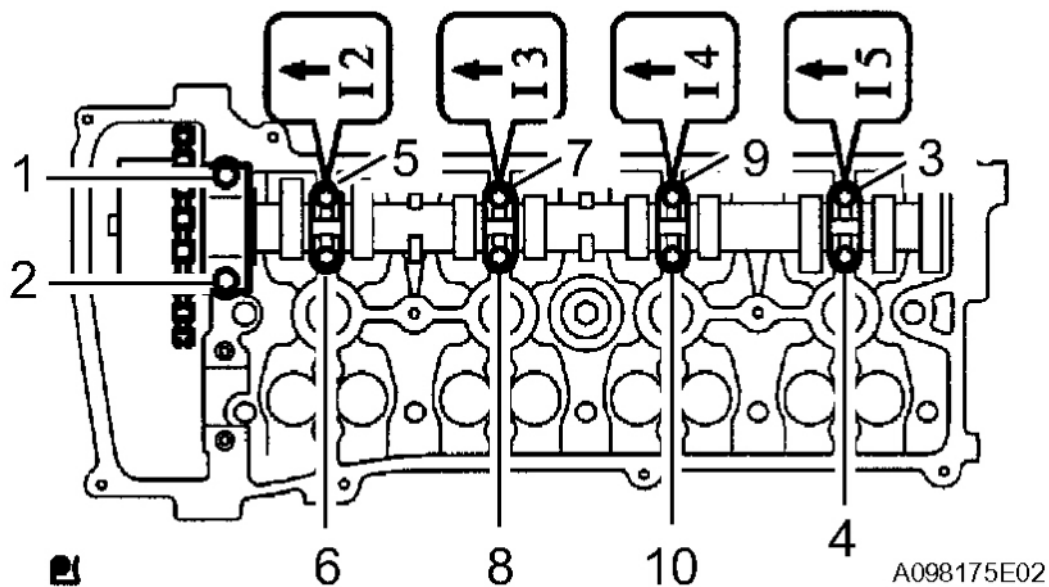


Fig. 26: Identifying Bearing Cap Bolts In Sequence
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 5 bearing caps.
- c. Remove the camshaft and camshaft timing gear while holding the timing chain by hand.
- d. Tie the timing chain with a string as shown in the illustration.

NOTE: Be careful not to drop anything inside the timing chain cover.

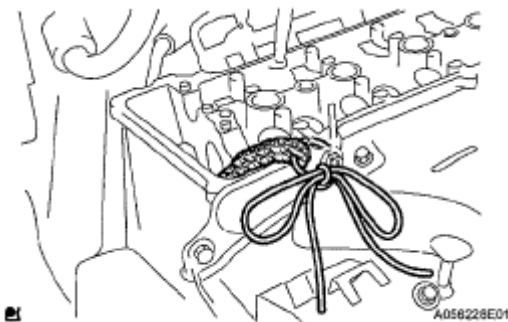


Fig. 27: Tying Timing Chain With String
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

- a. Clamp the camshaft in a vise, and make sure that the camshaft timing gear does not rotate.
- b. Cover all the oil ports with vinyl tape except the advance side port shown in the illustration.

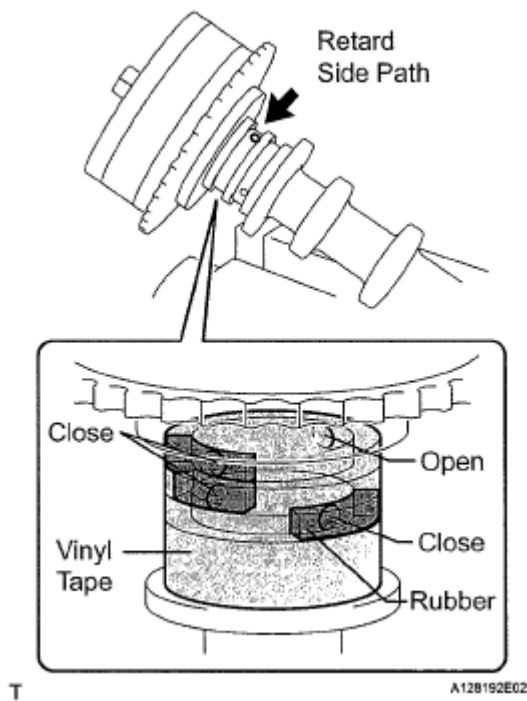


Fig. 28: Covering Oil Ports With Vinyl Tape Except Advance Side Port
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Apply air pressure of 150 kPa (1.5 kgf/cm², 22 psi) to the oil path, then turn the camshaft timing gear to the advance direction (counterclockwise) by hand.

CAUTION: Cover the paths with a piece of cloth to avoid oil splashes.

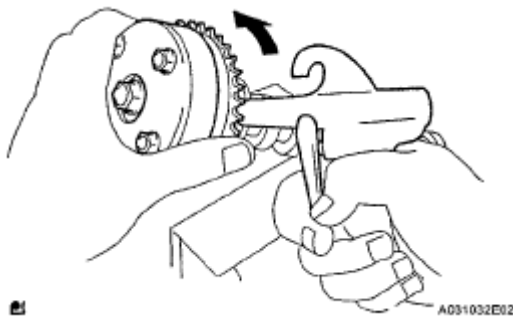


Fig. 29: Applying Air Pressure To Oil Path
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

Depending on the air pressure, the camshaft timing gear may turn to the advance side without applying force by hand. Also, if the pressure is difficult to apply because of air leakage from the

port, the lock pin may be difficult to release.

- d. Remove the flange bolt of the camshaft timing gear.

NOTE:

- Be sure not to remove the other 4 bolts.
- When reusing the camshaft timing gear, release the straight pin lock first, then install the gear.

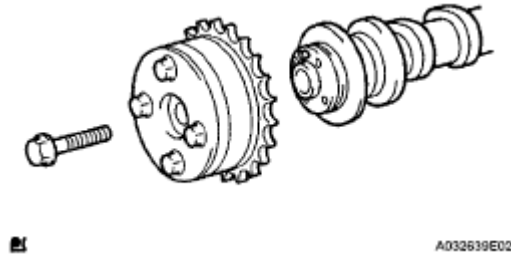


Fig. 30: Identifying Flange Bolt Of Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSPECTION

1. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

- a. Install the camshaft timing gear assembly. (See INSTALLATION)
- b. Clamp the camshaft in a vise, and make sure that the camshaft timing gear does not rotate.
- c. Cover all the oil ports with vinyl tape except the advance side port shown in the illustration.

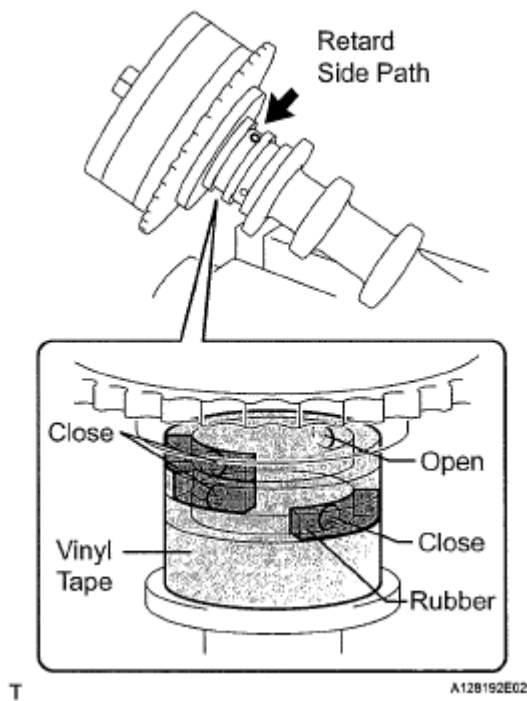


Fig. 31: Covering All Oil Ports With Vinyl Tape Except Advance Side Port
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Apply air pressure of 150 kPa (1.5 kgf/cm², 22 psi) to the oil path

CAUTION: Cover the paths with a piece of cloth to avoid oil splashes.

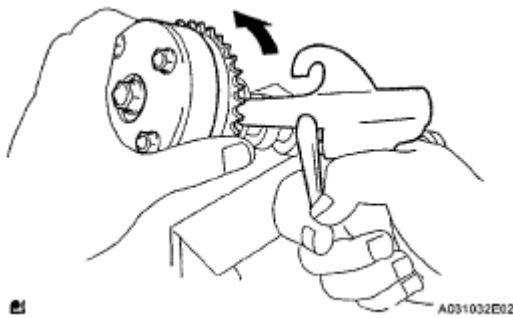


Fig. 32: Applying Air Pressure To Oil Path
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Check that the camshaft timing gear revolves in the advance direction (counterclockwise) by hand.

HINT:

Depending on the air pressure, the camshaft timing gear may turn to the advance side without

applying force by hand. Also, if the pressure is difficult to apply because of air leakage from the port, the lock pin may be difficult to release.

f. Check for smooth rotation.

1. Turn the camshaft timing gear within its movable range (21°) 2 or 3 times, but do not turn it to the most retarded position. Make sure that the gear turns smoothly.

NOTE: Do not use air pressure to perform the smooth rotation check.

g. Check the lock in the most retarded position.

1. Confirm that the camshaft timing gear is locked at the most retarded position.

h. Remove the camshaft timing gear assembly. (See **REMOVAL**)

INSTALLATION

1. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

- a. Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned, as shown in the illustration.

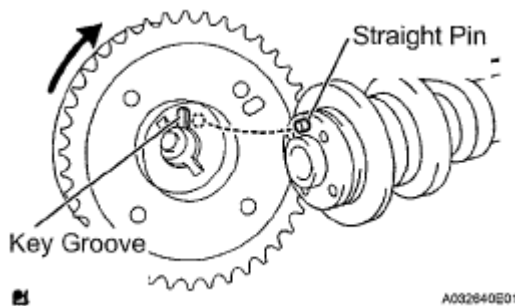


Fig. 33: Putting Camshaft Timing Gear And Camshaft Together With Straight Pin And Key Groove Misaligned

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.

NOTE: Be sure not to turn the camshaft timing gear to the retard angle side (the right angle).

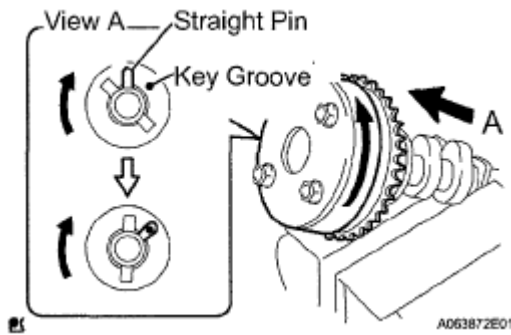


Fig. 34: Turning Camshaft Timing Gear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Check that there is no clearance between the gear fringe and camshaft.

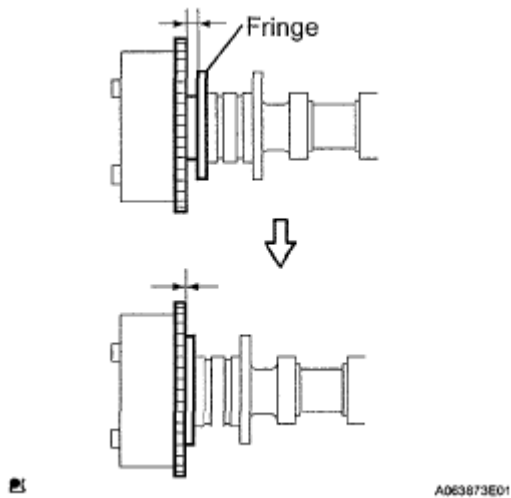


Fig. 35: Checking That There Is No Clearance Between Gear Fringe And Camshaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Tighten the flange bolt with the camshaft timing gear fixed in place.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

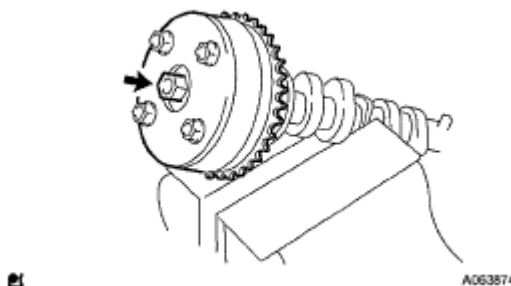


Fig. 36: Locating Flange Bolt With Camshaft Timing Gear Fixed In Place
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Check that the camshaft timing gear can move to the retard angle side (the right direction) and is locked in the most retarded position.

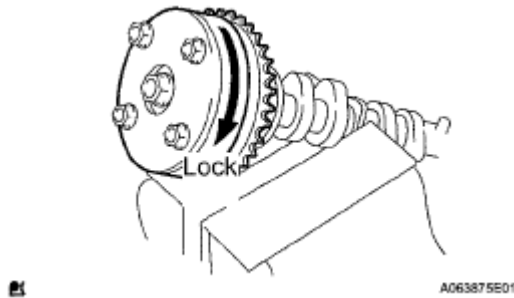


Fig. 37: Checking That Camshaft Timing Gear Can Move To Retard Angle Side (The Right Direction)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL CAMSHAFT

- a. Apply a light coat of engine oil to the journal portion of the camshaft.
- b. Install the timing chain onto the camshaft timing gear with the paint mark aligned with the timing mark on the camshaft timing gear as shown in the illustration.

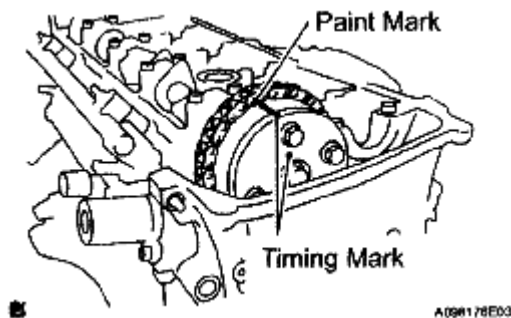


Fig. 38: Identifying Camshaft Timing Gear Paint Mark And Timing Mark On Camshaft Timing Gear

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps into the cylinder head.
- d. Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

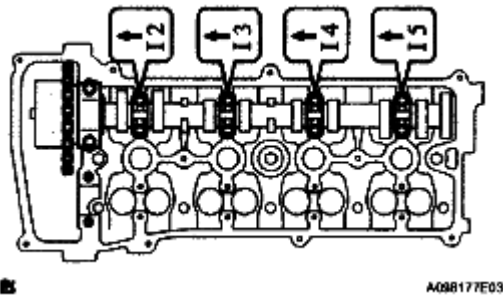


Fig. 39: Identifying Bearing Caps Front Marks And Numbers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the illustration.

Torque:

No. 1 bearing

30 N*m (301 kgf*cm, 22 ft.*lbf)

No. 3 bearing

9.0 N*m (92 kgf*cm, 80 in.*lbf)

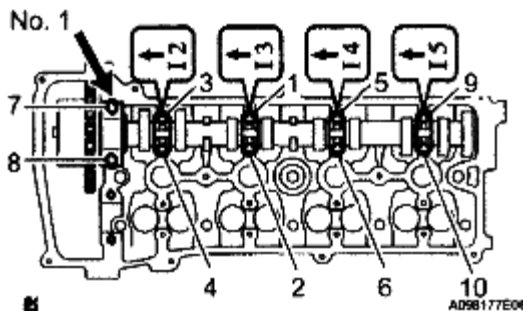


Fig. 40: Identifying Bearing Cap Bolts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL NO. 2 CAMSHAFT

- a. Apply a light coat of engine oil to the journal portion of the No. 2 camshaft.
- b. Put the No. 2 camshaft on the cylinder head with the paint mark on the chain aligned with the timing mark on the camshaft timing sprocket.

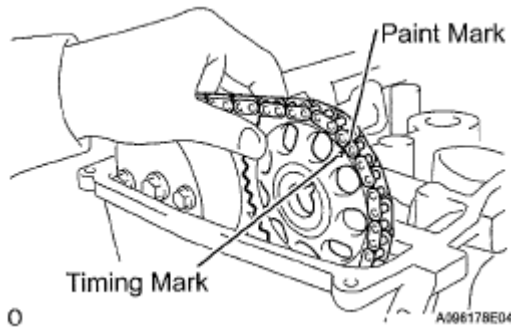


Fig. 41: Aligning Paint Mark On Chain With Timing Mark On Camshaft Timing Sprocket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. While holding the No. 2 camshaft by hand, temporarily tighten the camshaft timing sprocket set bolt.

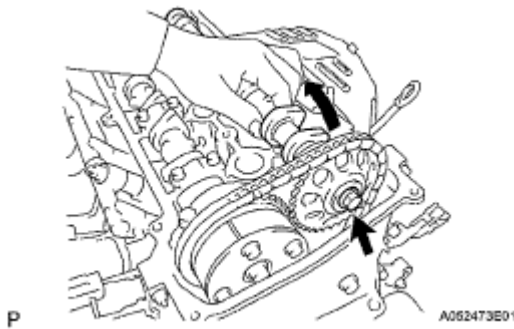


Fig. 42: Tightening Camshaft Timing Sprocket Set Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.
- e. Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.

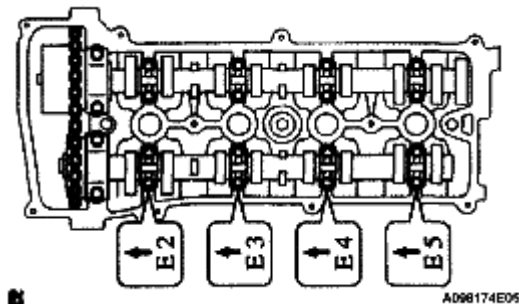


Fig. 43: Identifying Bearing Caps Front Marks And Numbers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Using several steps, uniformly tighten the 10 bearing cap bolts in the sequence shown in the

illustration.

Torque:

No. 2 bearing

30 N*m (301 kgf*cm, 22 ft.*lbf)

No. 3 bearing

9.0 N*m (92 kgf*cm, 80 in.*lbf)

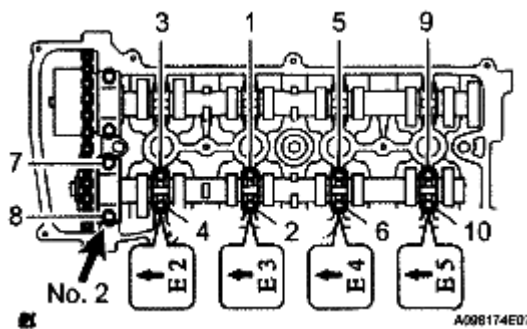


Fig. 44: Identifying Bearing Cap Bolts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. While holding the camshaft with a wrench, tighten the camshaft timing sprocket set bolt.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

NOTE: Be careful not to damage the valve lifter.

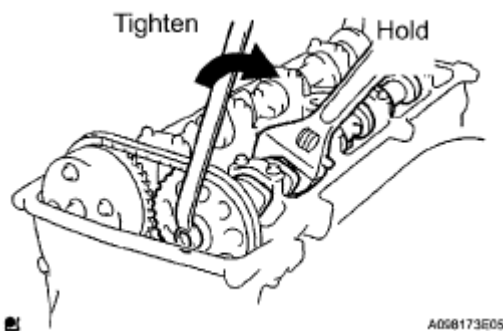
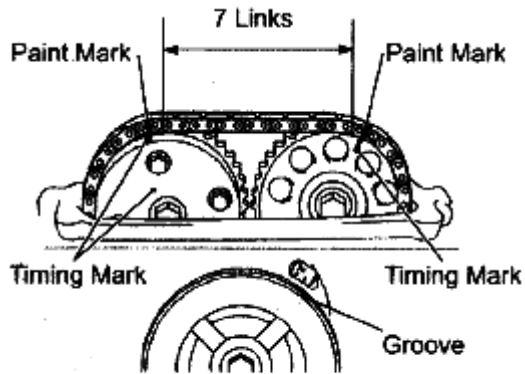


Fig. 45: Tightening Camshaft Timing Sprocket Set Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- h. Check that the paint marks on the chain are aligned with the timing marks on the camshaft timing gear and camshaft timing sprocket. Also, check that the crankshaft pulley groove is aligned with the timing mark "0" on the timing mark chain cover.

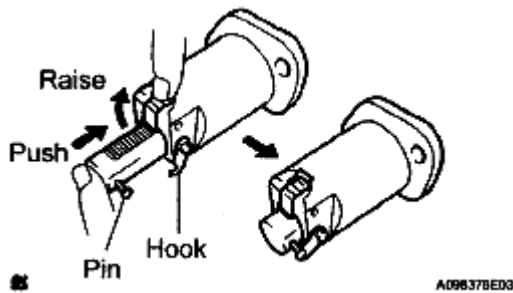


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Fig. 46: Checking That Paint Marks On Chain Are Aligned With Timing Marks On Camshaft Timing Gear And Camshaft Timing Sprocket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

- a. Release the ratchet pawl, then fully push in the plunger and hook the hook to the pin so that the plunger is in the position shown in the illustration.



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Fig. 47: Pushing In Plunger And Hook Hook To Pin
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install a new gasket and the chain tensioner with the 2 nuts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

NOTE: When installing the chain tensioner, set the hook again if the hook releases the plunger.

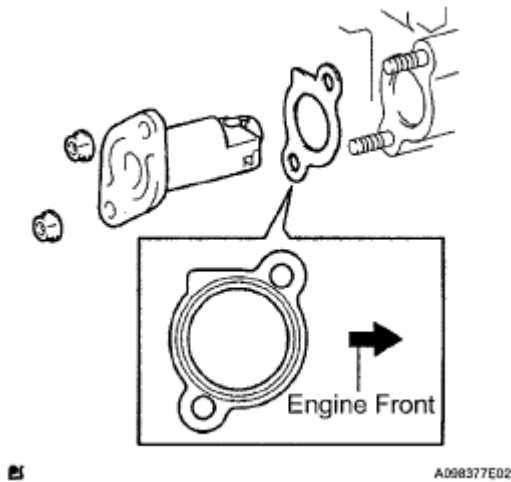


Fig. 48: Identifying Chain Tensioner Gasket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Turn the crankshaft counterclockwise, then disconnect the plunger knock pin from the hook.

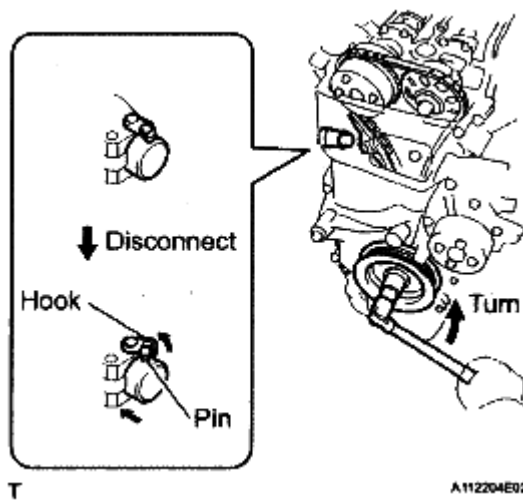
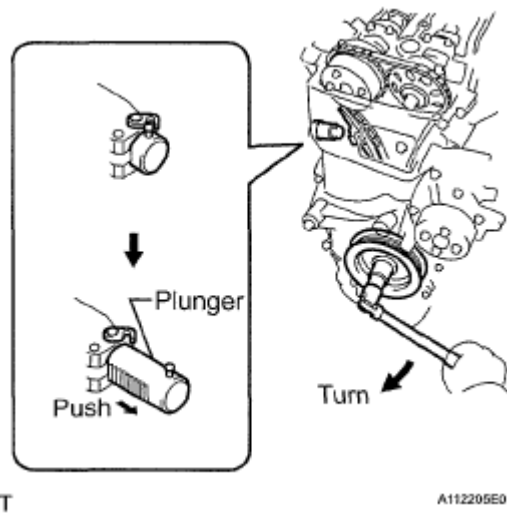


Fig. 49: Turning Crankshaft Counterclockwise, Then Disconnect Plunger Knock Pin From Hook
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Turn the crankshaft clockwise, then check that the plunger is extended.



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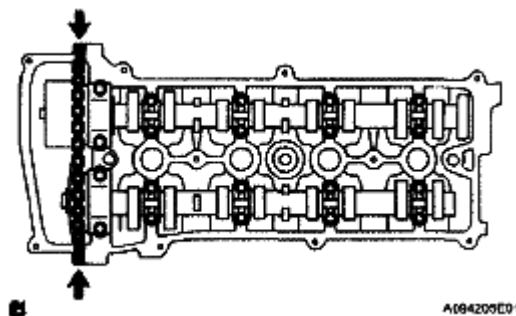
Fig. 50: Turning Crankshaft Clockwise, Then Check That Plunger Is Extended
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. SET NO. 1 CYLINDER TO TDC / COMPRESSION (See REMOVAL)
6. CHECK VALVE CLEARANCE (See ADJUSTMENT)
7. ADJUST VALVE CLEARANCE (See ADJUSTMENT)
8. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY
 - a. Remove any old packing material from the contact surface.
 - b. Apply seal packing to the 2 locations shown in the illustration.

Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.



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Fig. 51: Locating Seal Packing Applying Locations
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Install the cylinder head cover with the 8 bolts and 2 nuts.

Torque:

Bolt A

11 N*m (112 kgf*cm, 8 ft.*lbf)

Bolt B

14 N*m (143 kgf*cm, 10 ft.*lbf)

Nut

11 N*m (112 kgf*cm, 8 ft.*lbf)

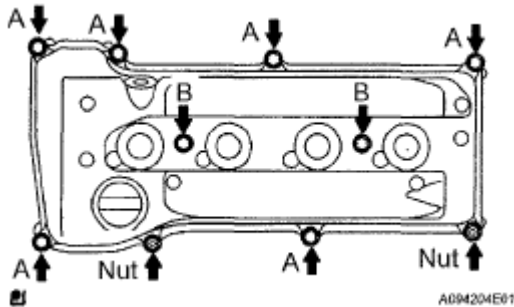


Fig. 52: Locating Cylinder Head Cover Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Install the 2 engine wires with the 2 bolts.

Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

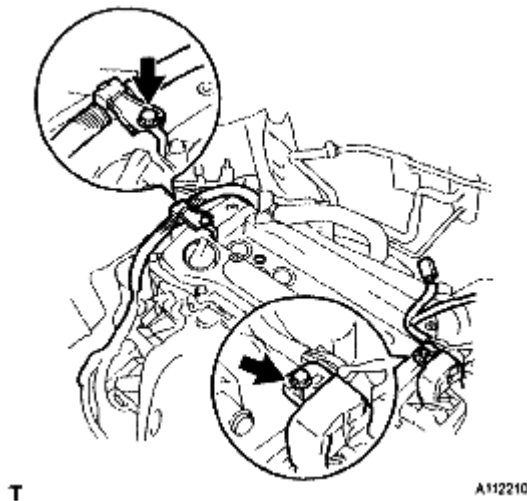
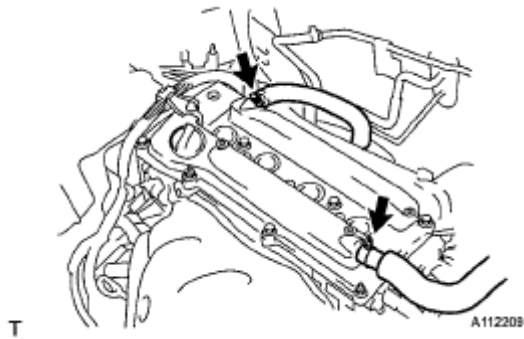


Fig. 53: Locating Engine Wires Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Connect the 2 ventilation hoses to the cylinder head cover.

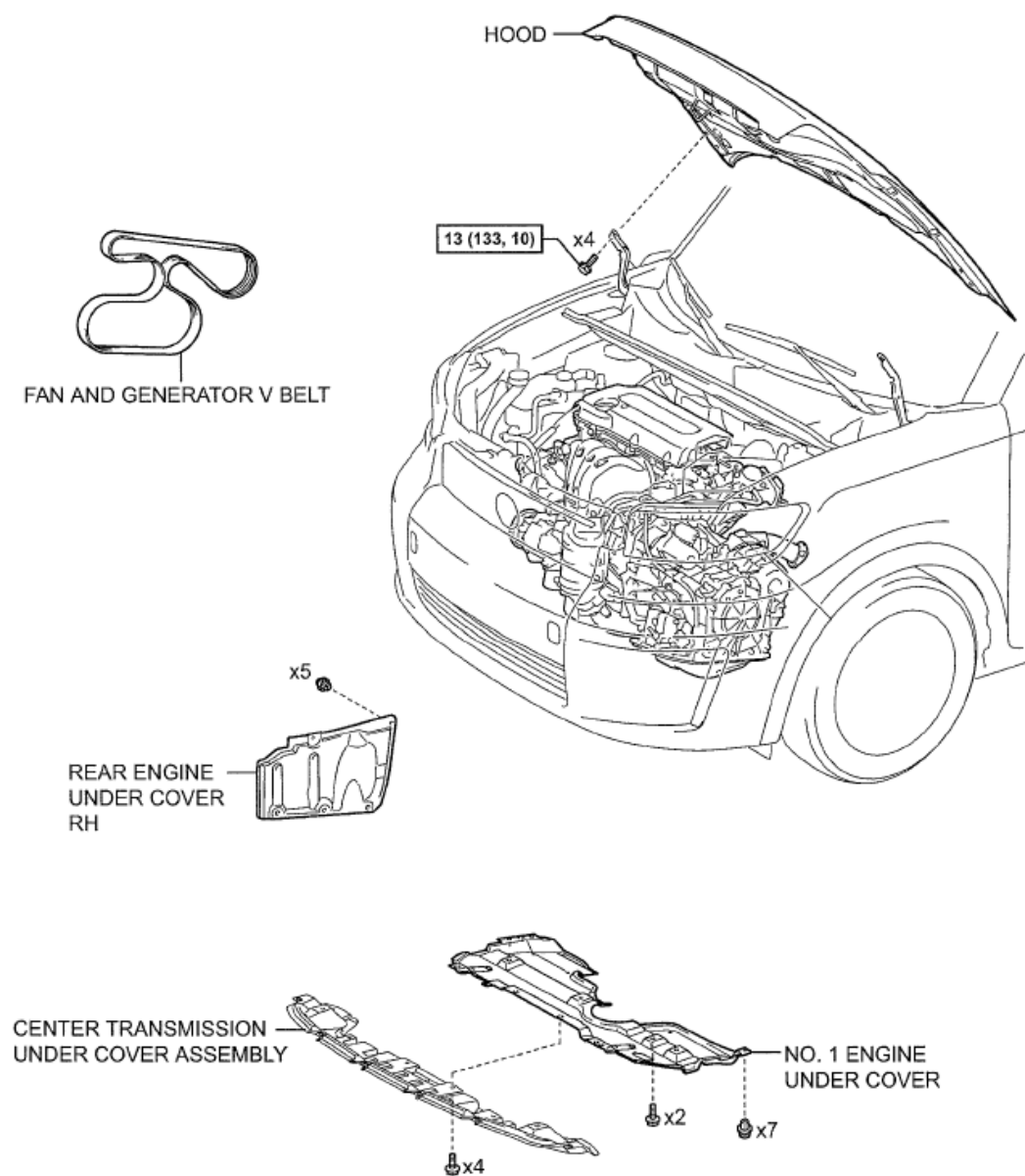
**Fig. 54: Locating Ventilation Hoses To Cylinder Head Cover**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSTALL SPARK PLUG** (See INSTALLATION)
10. **INSTALL IGNITION COIL ASSEMBLY** (See INSTALLATION)
11. **INSPECT FOR ENGINE OIL LEAK**
12. **INSPECT IGNITION TIMING** (See ON-VEHICLE INSPECTION)
13. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY** (See INSTALLATION)
14. **INSTALL REAR ENGINE UNDER COVER RH**

CYLINDER HEAD GASKET

COMPONENTS



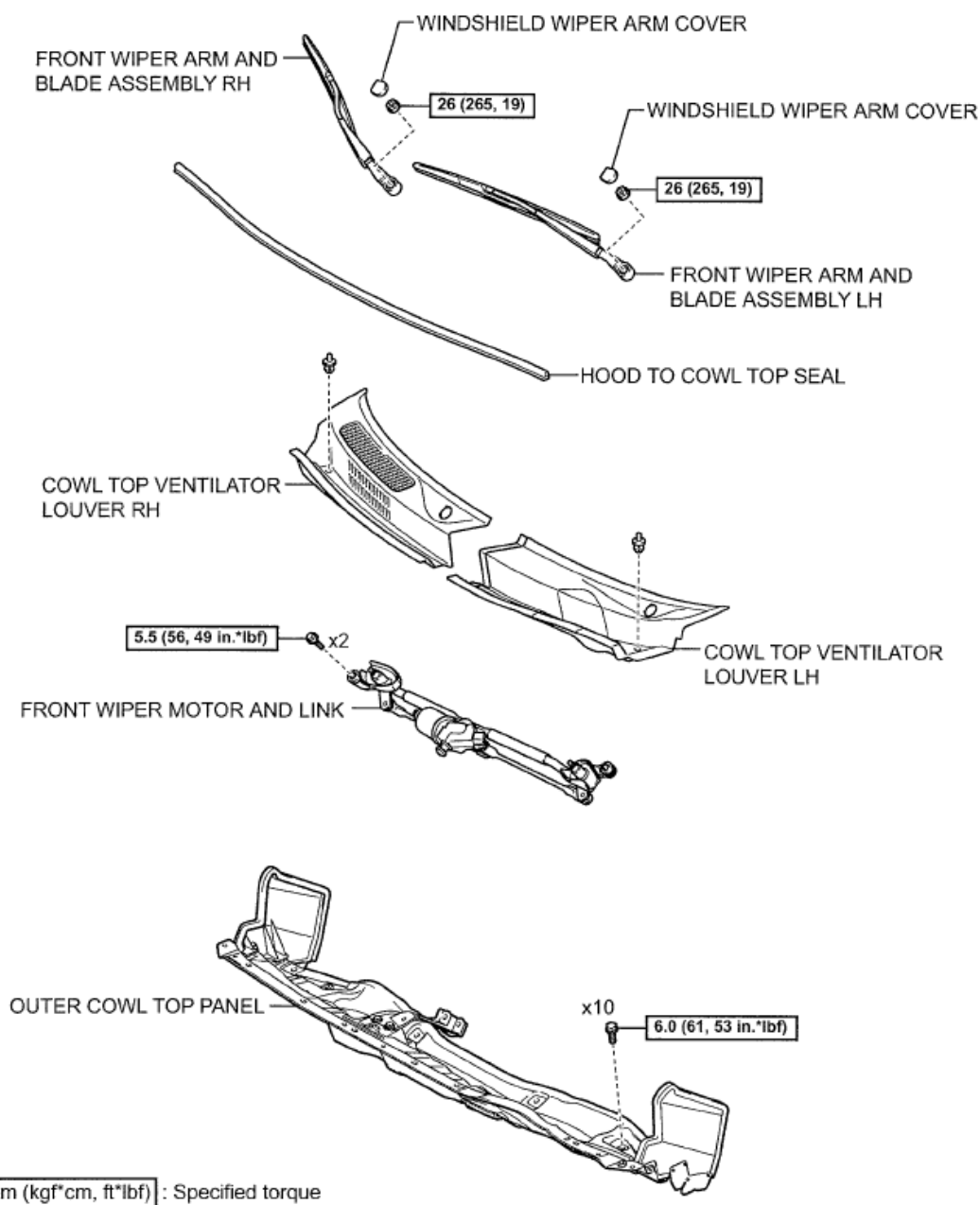
N*m (kgf*cm, ft*lb) : Specified torque

P

A156B16E01

Fig. 55: Identifying Cylinder Head Gasket Replacement Components With Torque Specification (1 Of 13)

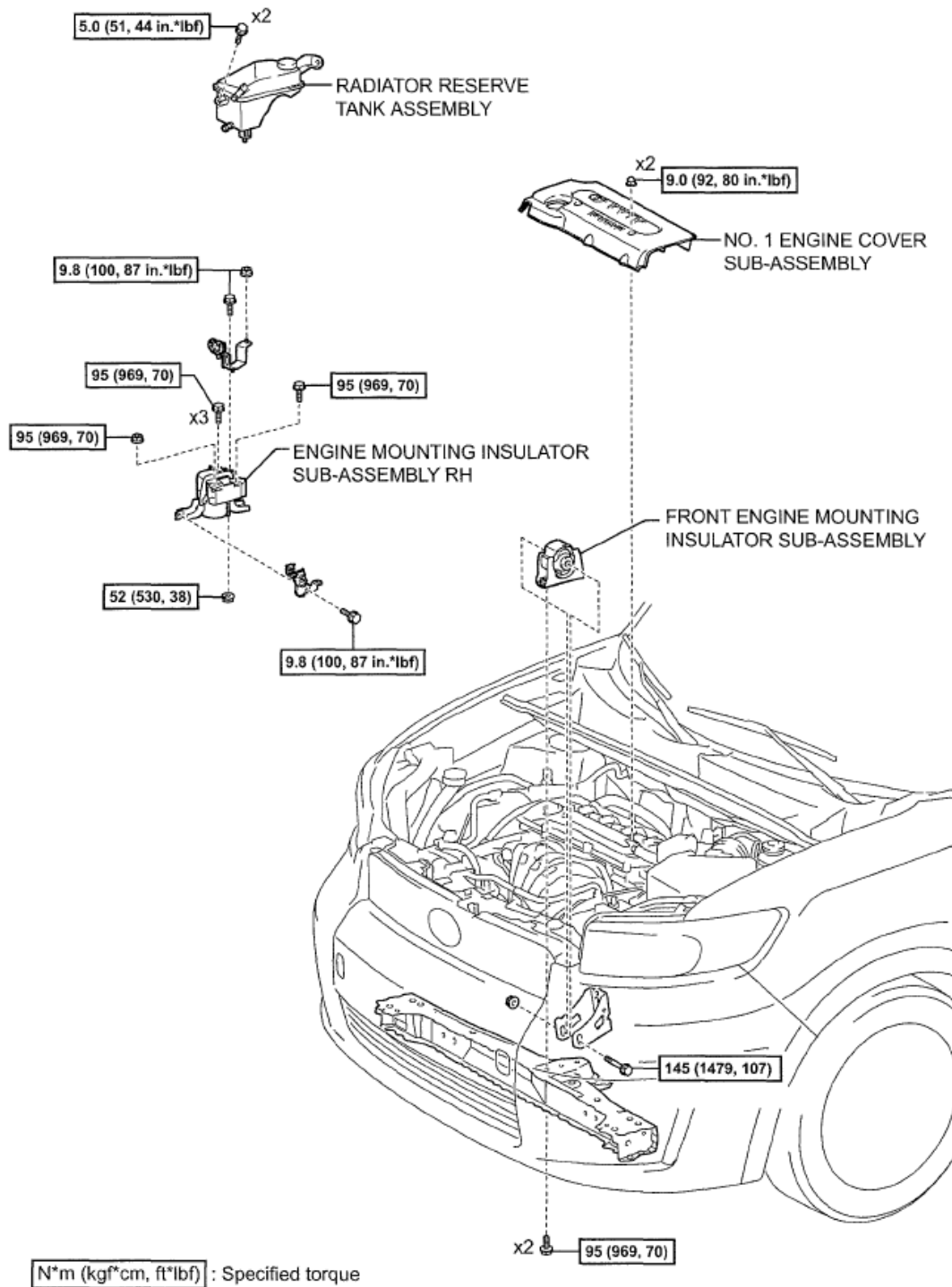
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



A167187E03

Fig. 56: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (2 Of 13)

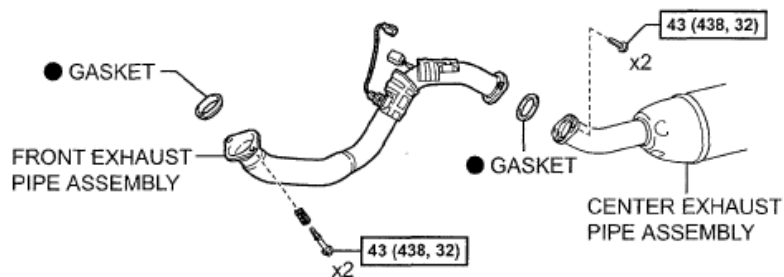
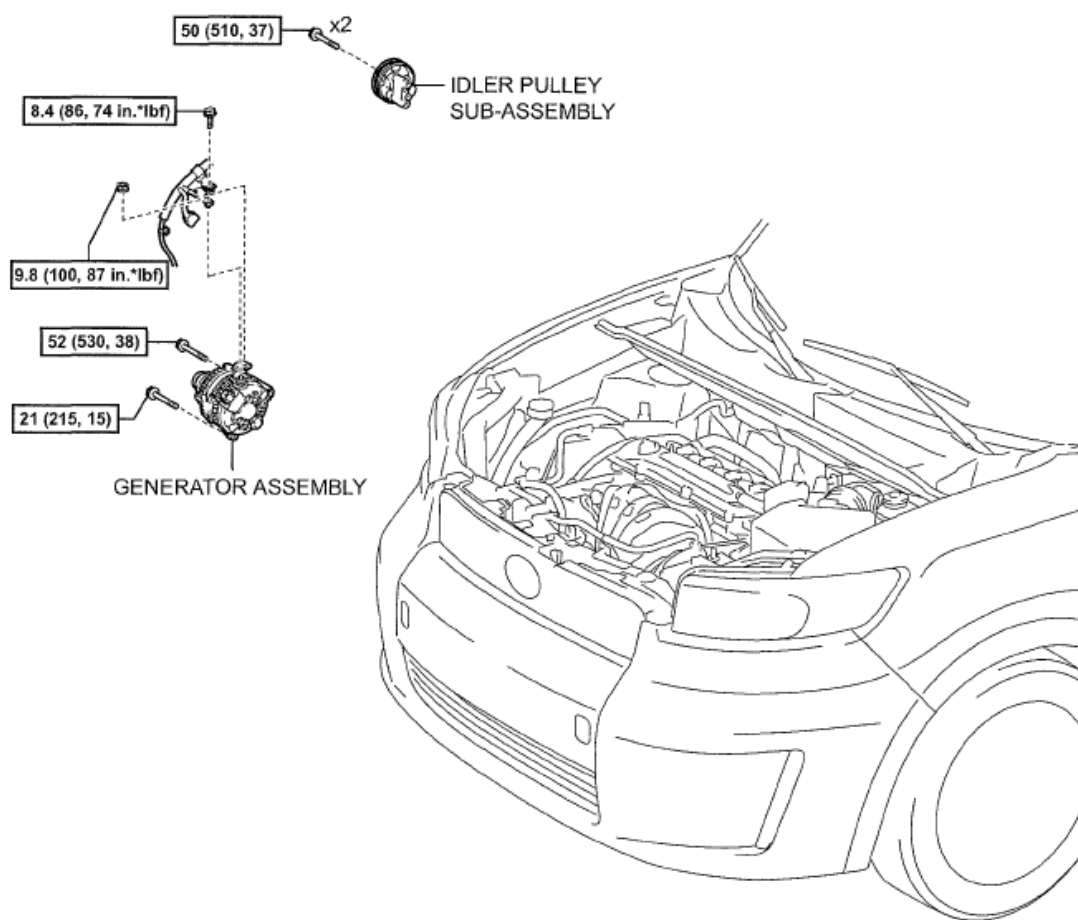
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



A156817E01

Fig. 57: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (3 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



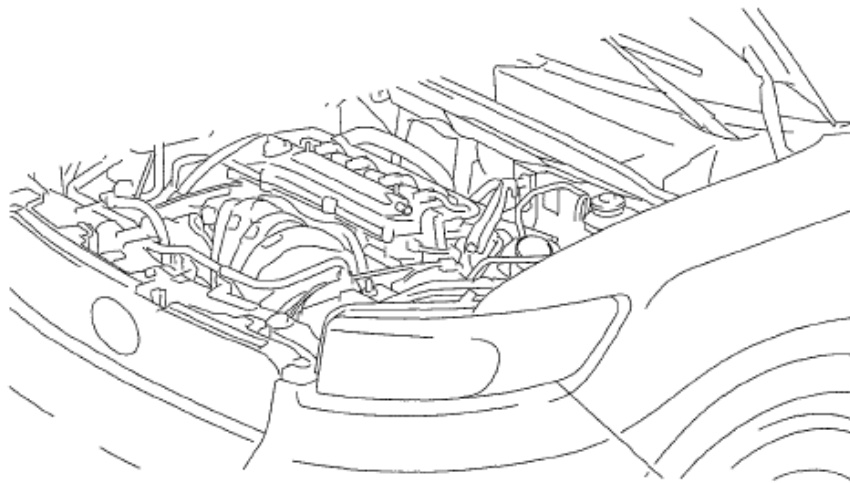
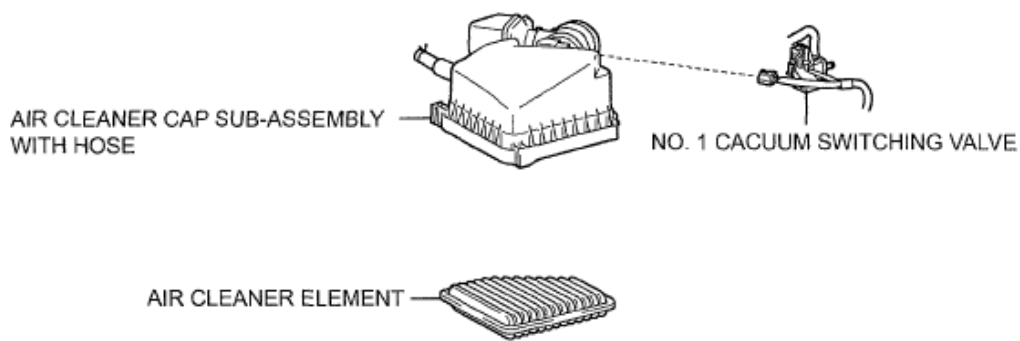
N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

P A156B18E01

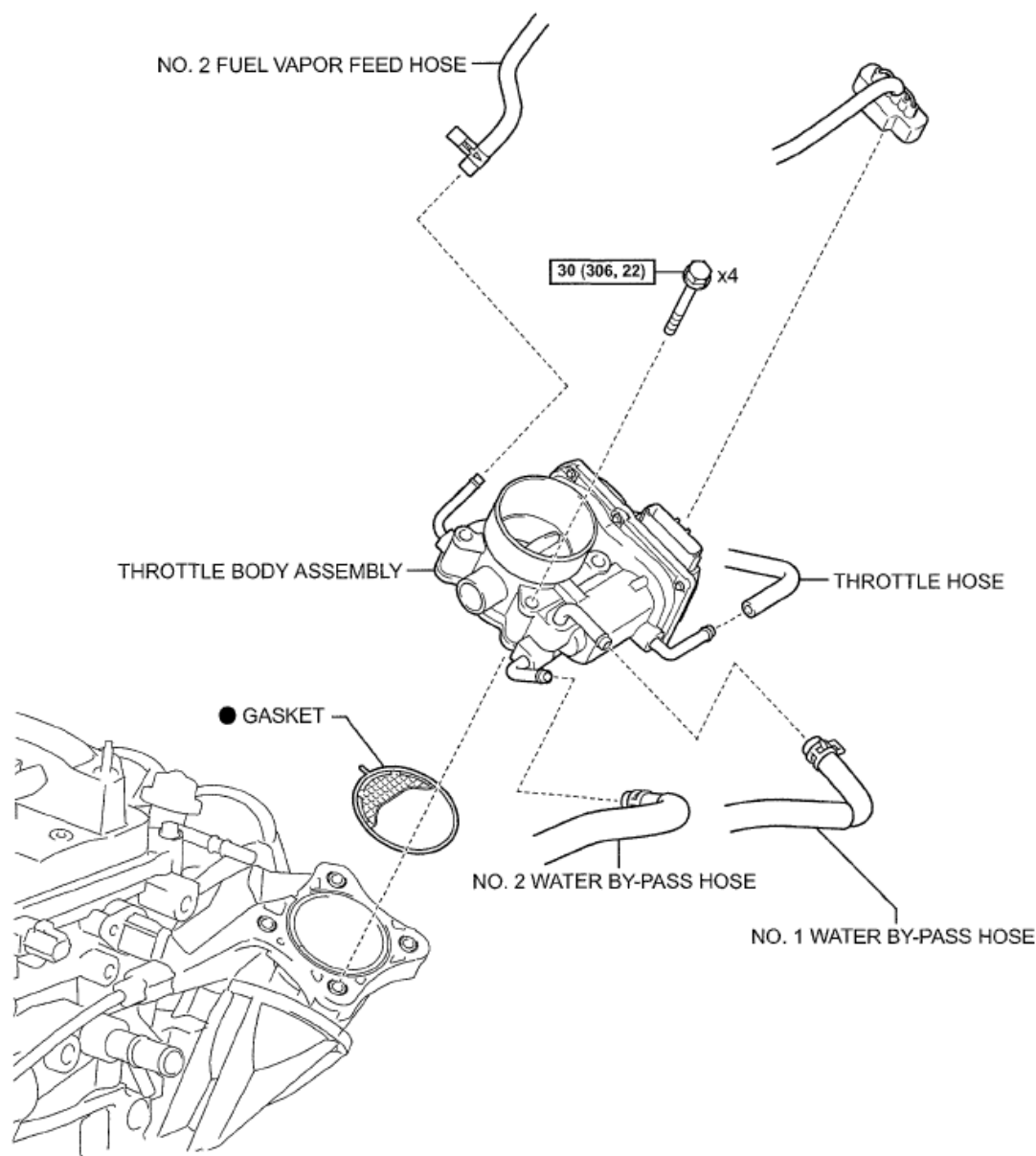
Fig. 58: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (4 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



A150895E01

Fig. 59: Identifying Cylinder Head Gasket Components (5 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lb) : Specified torque

● Non-reusable part

P

A167200E02

Fig. 60: Identifying Cylinder Head Gasket Replacement Components With Torque Specification (6 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

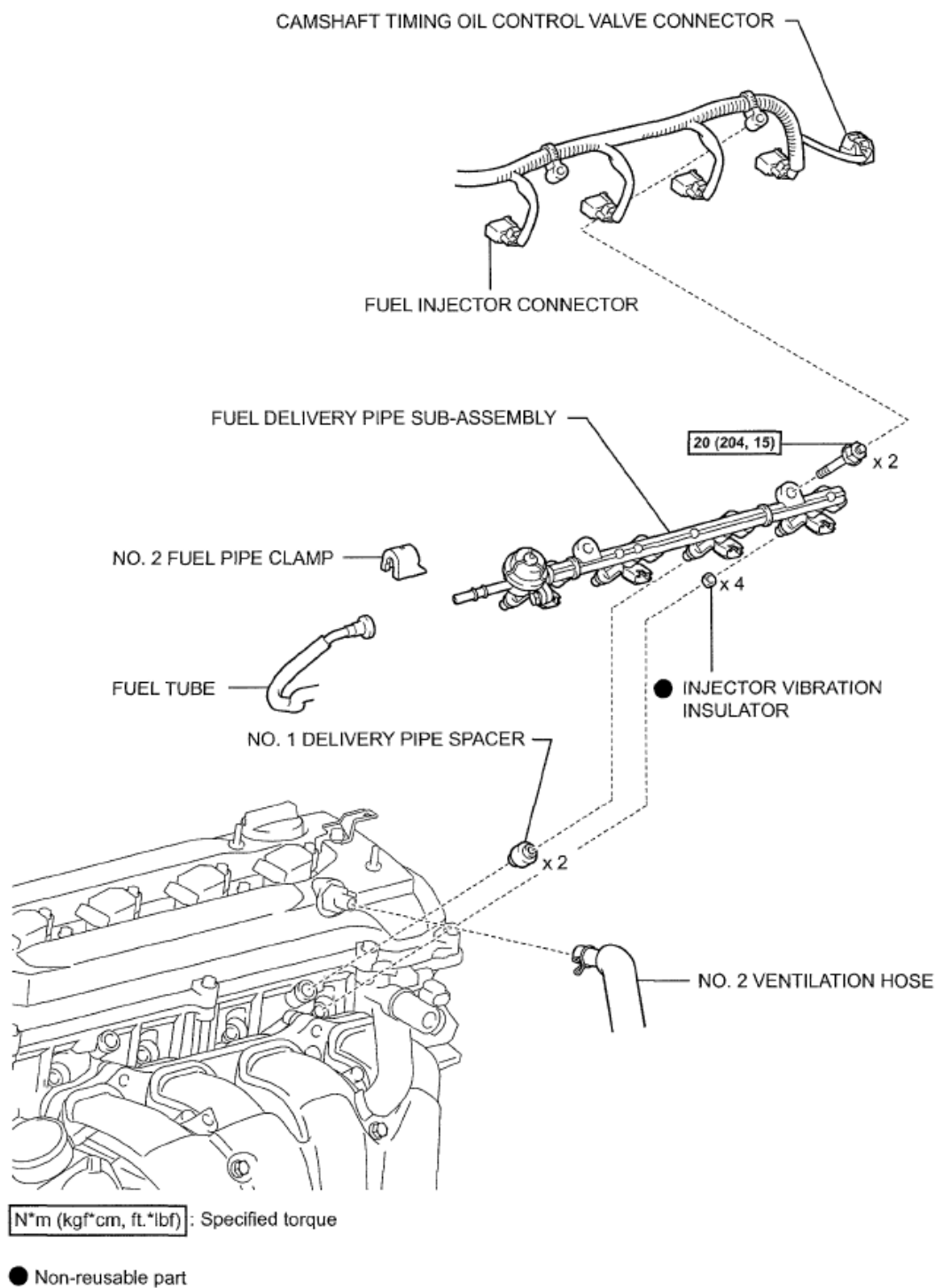
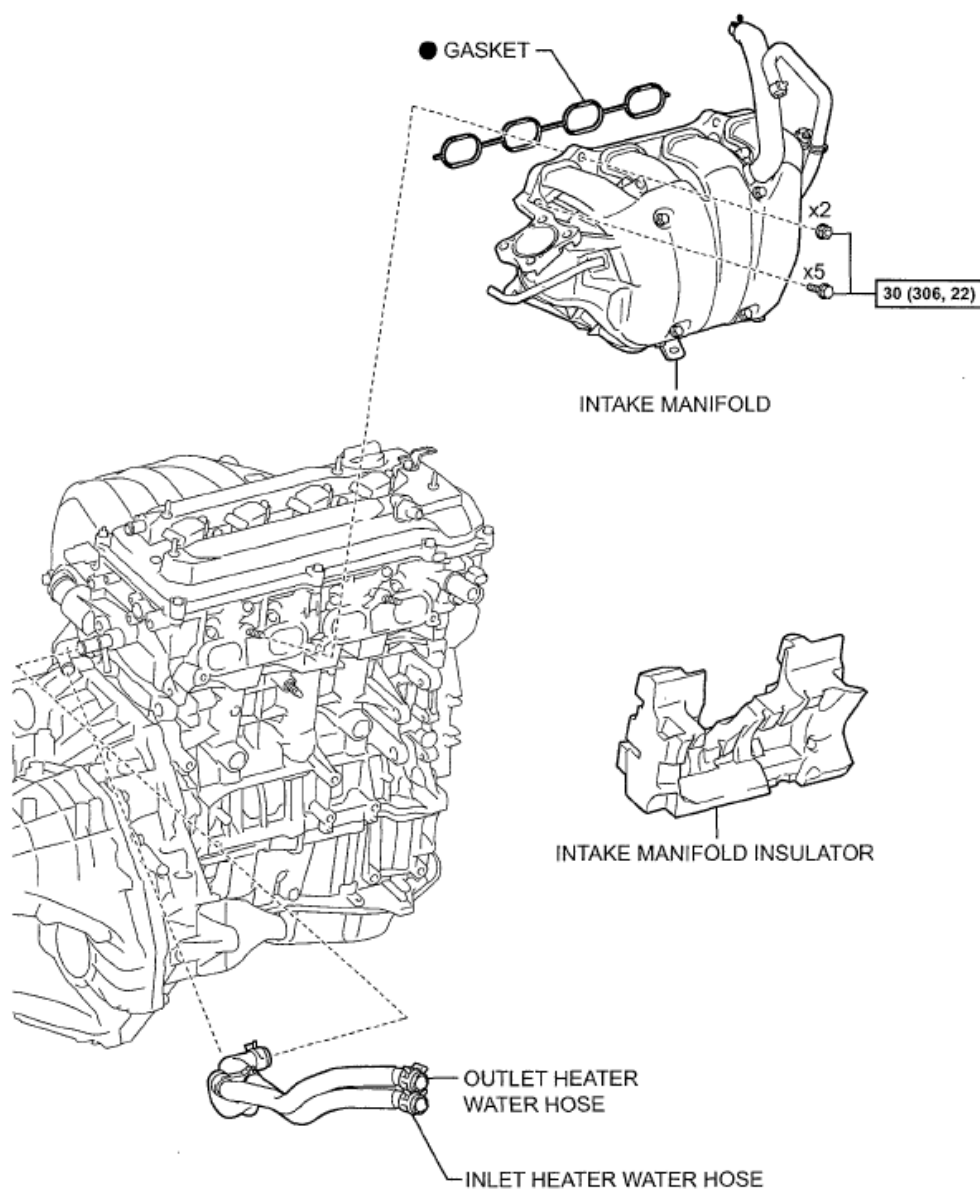


Fig. 61: Identifying Cylinder Head Gasket Replacement Components With Torque Specification (7 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N·m (kgf·cm, ft·lbf) : Specified torque

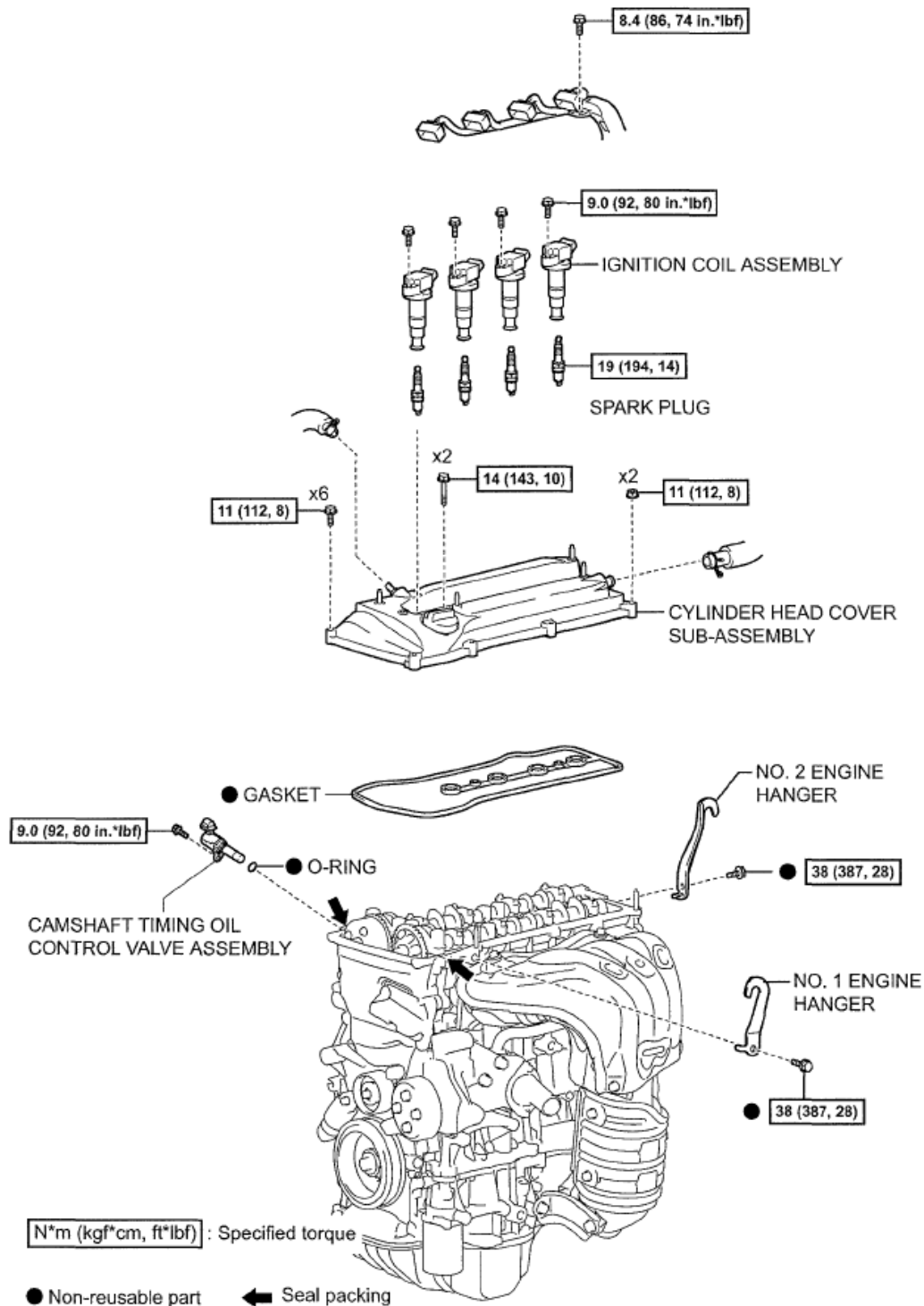
● Non-reusable part

P

A156820E01

Fig. 62: Identifying Cylinder Head Gasket Replacement Components With Torque Specification (8 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

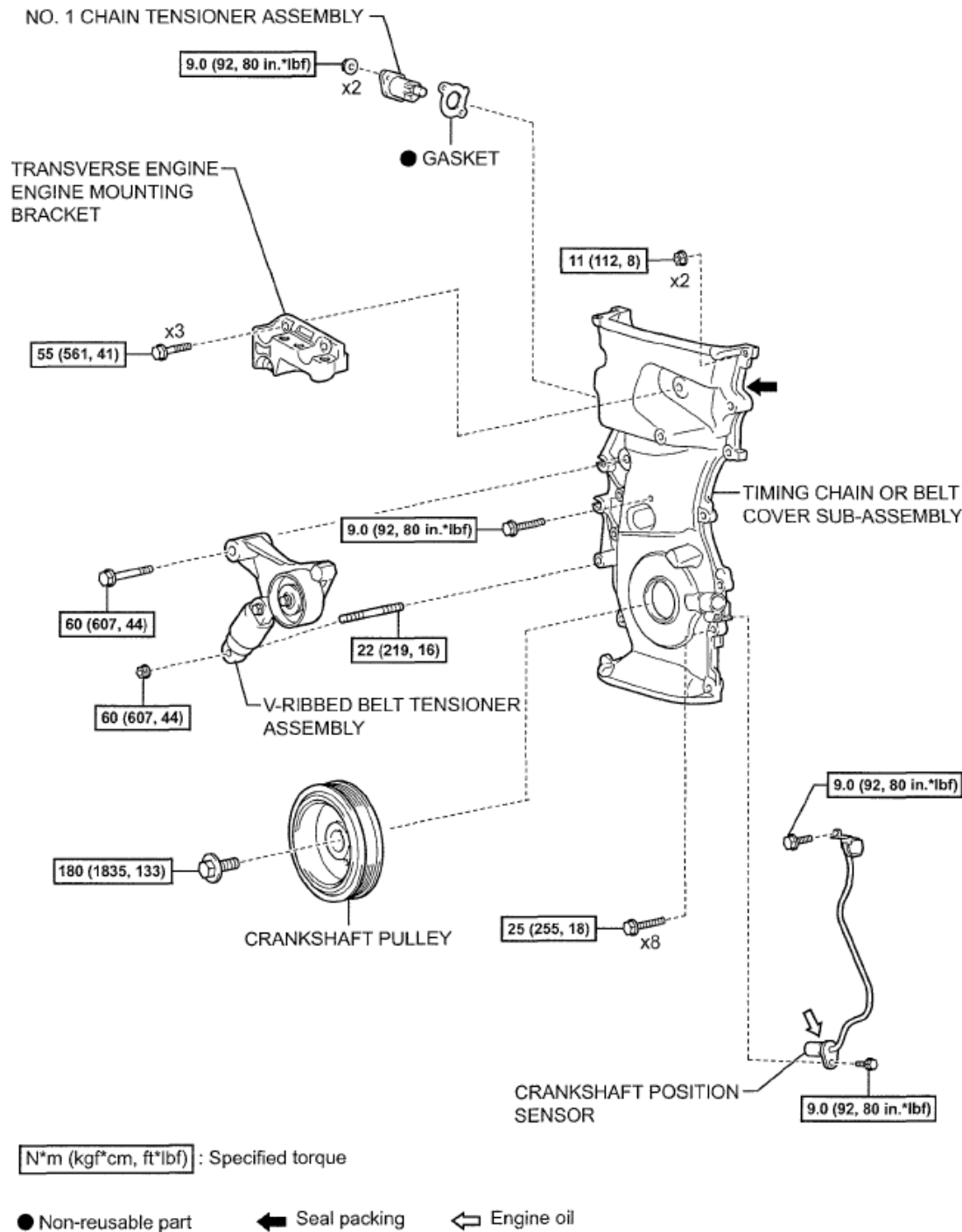


P

A156823E01

Fig. 63: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (9 Of 13)

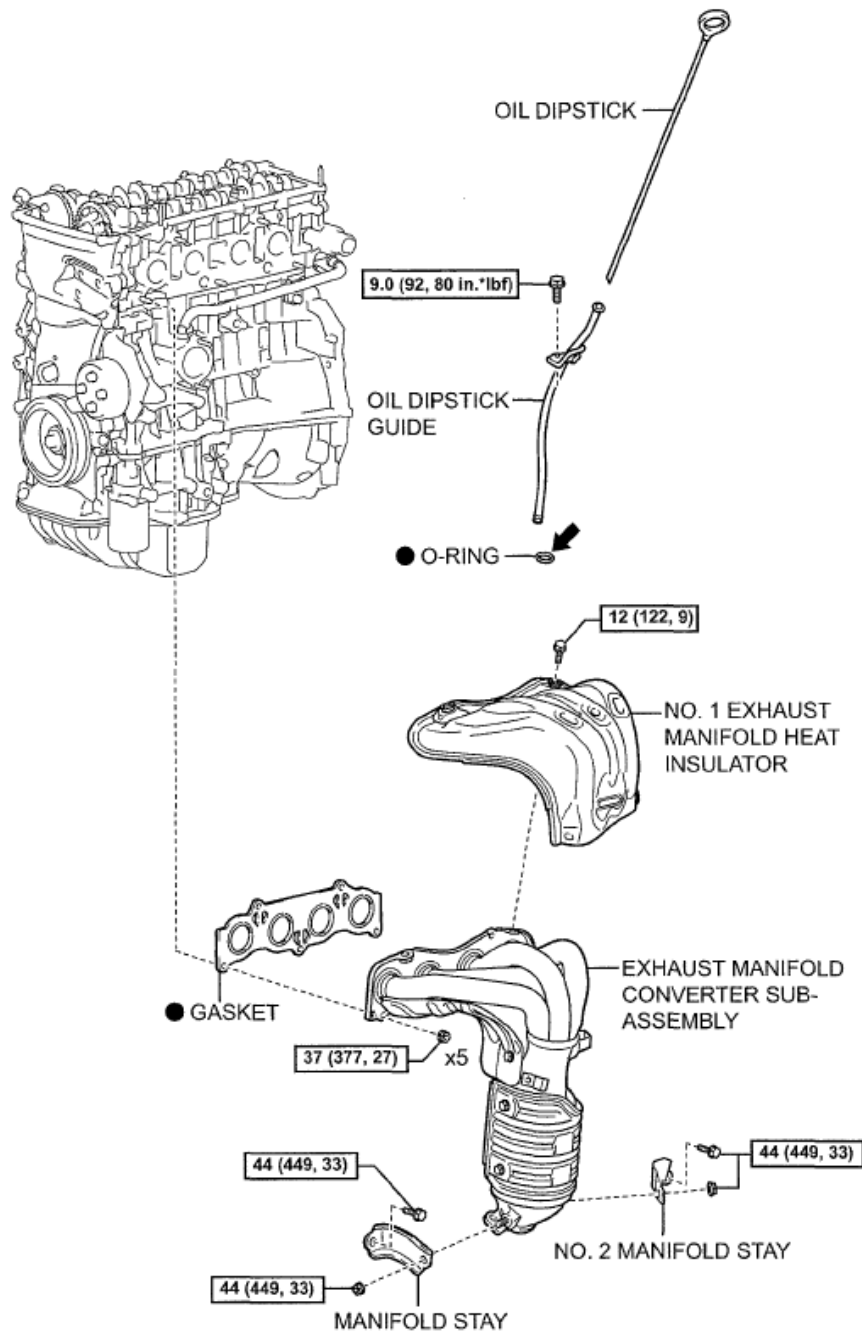
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



A155877ED1

Fig. 64: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (10 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



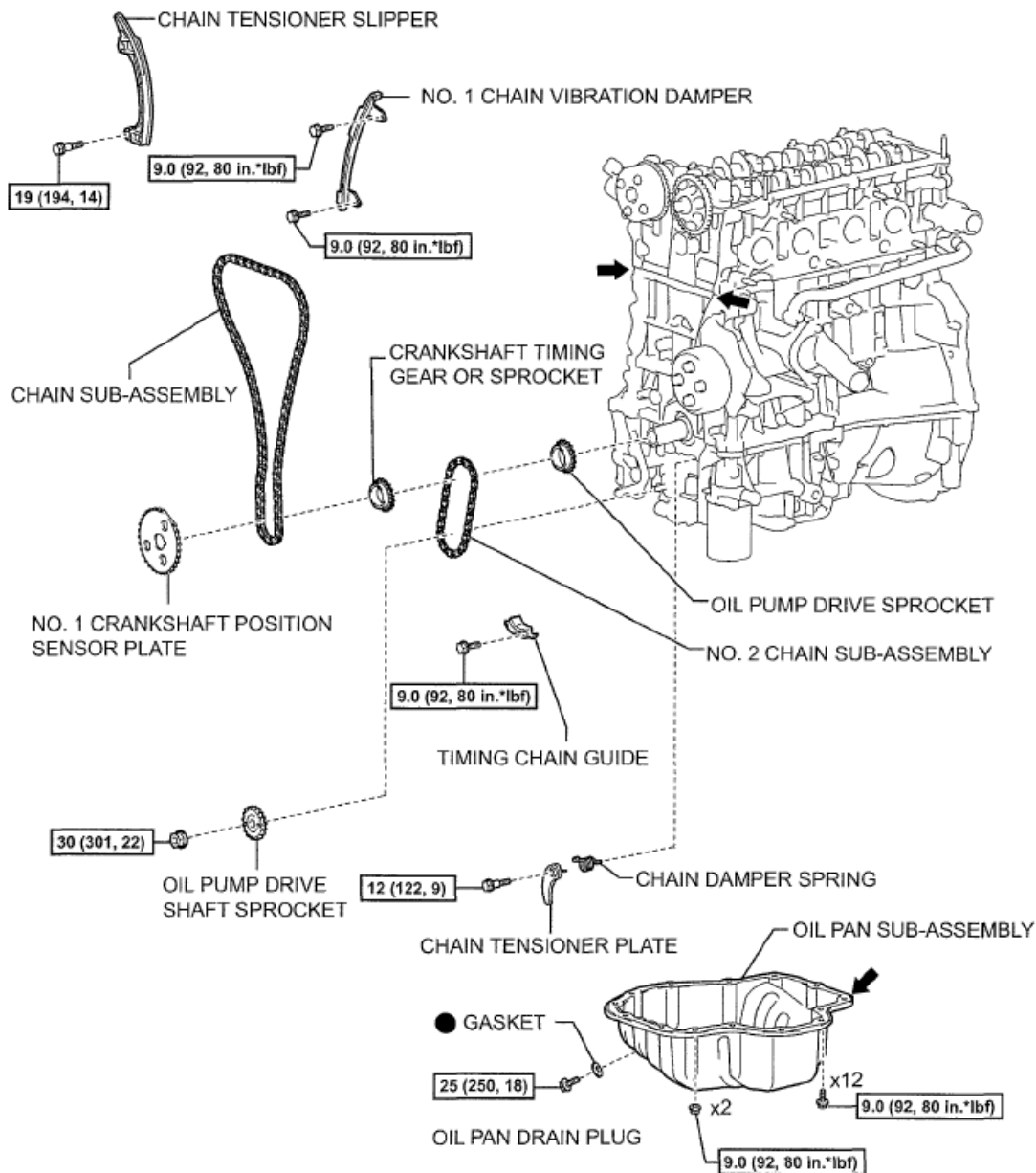
[N*m (kgf*cm, ft*lbf)] : Specified torque

● Non-reusable part ← Engine oil

A158892E01

Fig. 65: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (11 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

◀ Seal packing

A156801E01

Fig. 66: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (12 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

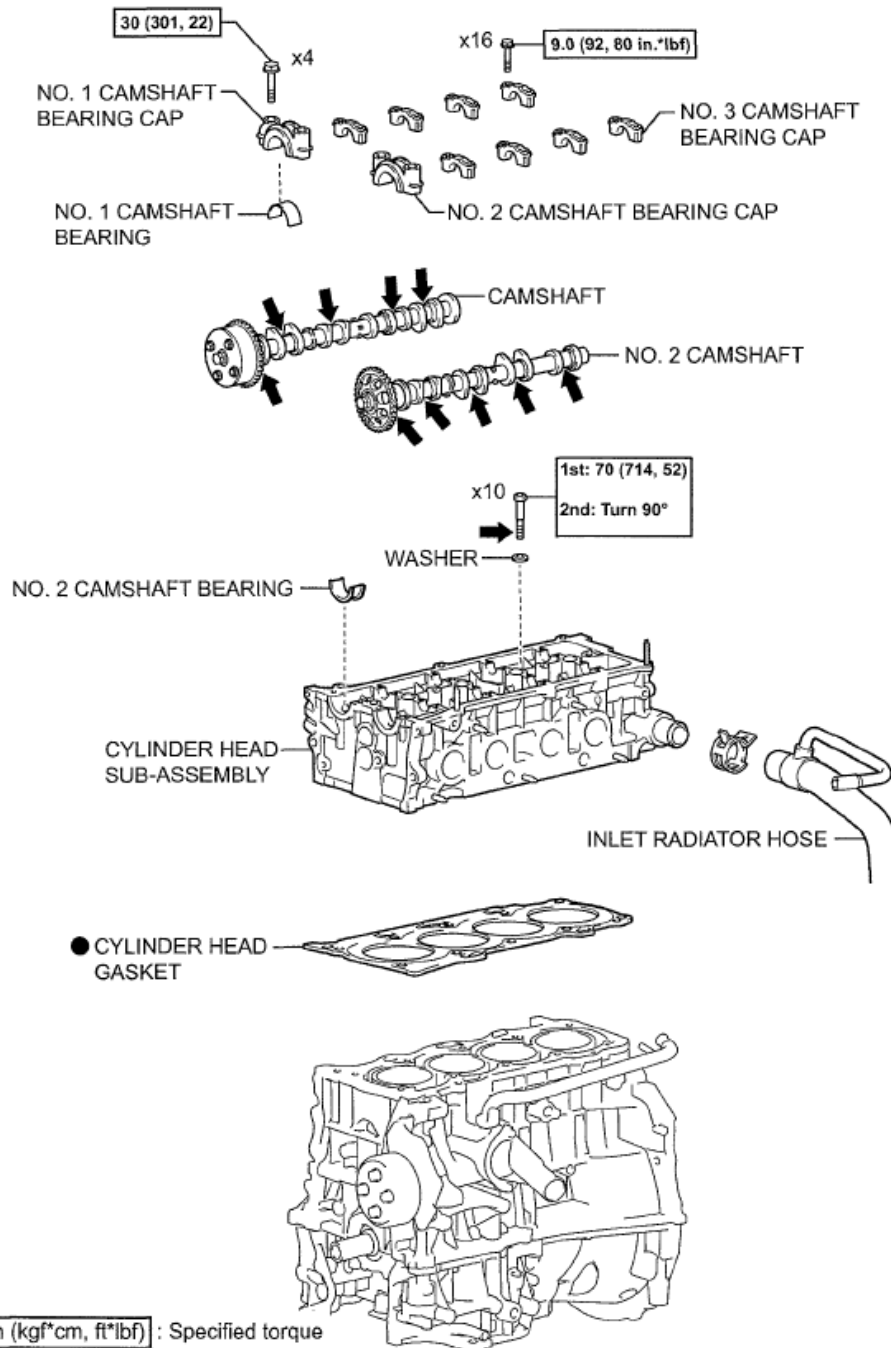


Fig. 67: Identifying Cylinder Head Gasket Replacement Components With Torque Specifications (13 Of 13)

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE

(See **PRECAUTION**)

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION: Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.

3. REMOVE HOOD

- a. Disconnect the washer hose.
- b. Remove the 4 bolts and remove the hood.

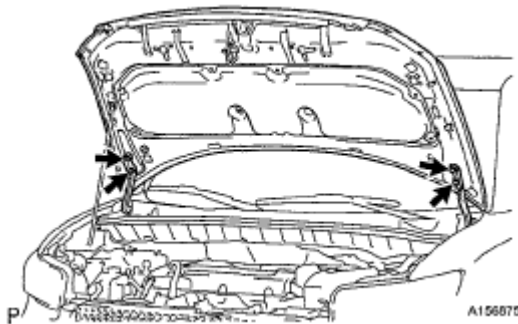


Fig. 68: Locating Hood Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE FRONT WHEEL RH
5. REMOVE NO. 1 ENGINE UNDER COVER
6. REMOVE REAR ENGINE UNDER COVER RH
7. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY (See **REMOVAL**)
8. DRAIN ENGINE COOLANT (See **REPLACEMENT**)
9. DRAIN ENGINE OIL (See **REPLACEMENT**)
10. SEPARATE CENTER EXHAUST PIPE ASSEMBLY (See **REMOVAL**)
11. REMOVE FRONT EXHAUST PIPE ASSEMBLY (See **REMOVAL**)
12. REMOVE WINDSHIELD WIPER ARM COVER (See **REMOVAL**)
13. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (See **REMOVAL**)
14. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (See **REMOVAL**)
15. REMOVE HOOD TO COWL TOP SEAL (See **REMOVAL**)
16. REMOVE COWL TOP VENTILATOR LOUVER RH (See **REMOVAL**)
17. REMOVE COWL TOP VENTILATOR LOUVER LH (See **REMOVAL**)
18. REMOVE FRONT WIPER MOTOR AND LINK (See **REMOVAL**)

19. **REMOVE OUTER COWL TOP PANEL** (See REMOVAL)
20. **REMOVE FAN AND GENERATOR V BELT** (See ON-VEHICLE INSPECTION)
21. **REMOVE GENERATOR ASSEMBLY** (See REMOVAL)
22. **SEPARATE RADIATOR RESERVE TANK ASSEMBLY**
 - a. Separate the 2 bolts and radiator reserve tank.

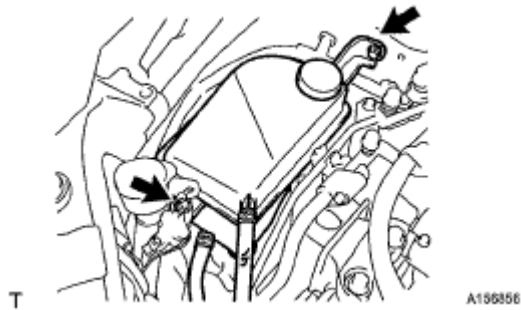


Fig. 69: Locating Radiator Reserve Tank Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

23. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE** (See REMOVAL)
24. **REMOVE THROTTLE BODY ASSEMBLY** (See REMOVAL)
25. **REMOVE IGNITION COIL ASSEMBLY** (See REMOVAL)
26. **REMOVE SPARK PLUG** (See REMOVAL)
27. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY** (See REMOVAL)
28. **REMOVE OIL DIPSTICK**
29. **REMOVE OIL DIPSTICK GUIDE**
 - a. Remove the bolt and guide.
 - b. Remove the O-ring from the guide.

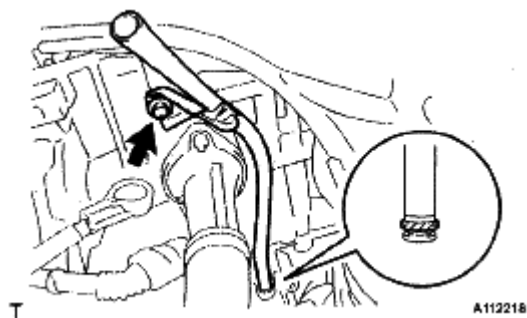


Fig. 70: Locating Oil Dipstick Guide Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

30. **DISCONNECT FUEL MAIN TUBE** (See REMOVAL)
31. **REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY** (See REMOVAL)

32. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY** (See REMOVAL)
33. **REMOVE INTAKE MANIFOLD** (See REMOVAL)
34. **REMOVE INTAKE MANIFOLD INSULATOR** (See REMOVAL)
35. **REMOVE MANIFOLD STAY**
 - a. Remove the bolt, nut and stay.

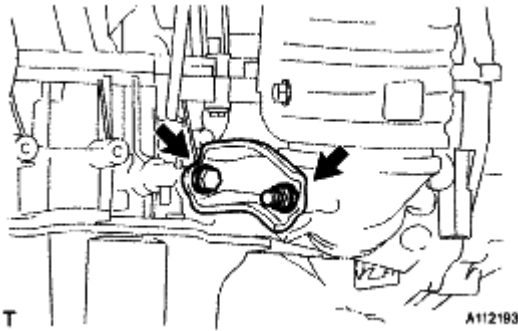


Fig. 71: Locating Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

36. **REMOVE NO. 2 MANIFOLD STAY**
 - a. Remove the bolt, nut and stay.

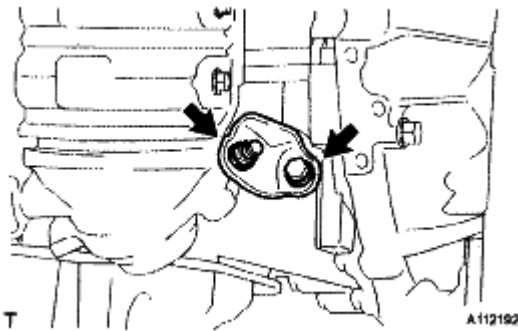


Fig. 72: Locating No.2 Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

37. **REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR**
 - a. Remove the 4 bolts and heat insulator.

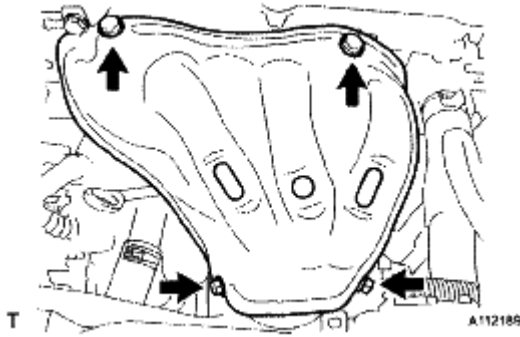


Fig. 73: Locating No. 1 Exhaust Manifold Heat Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

38. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

- a. Disconnect the air-fuel ratio sensor connector.

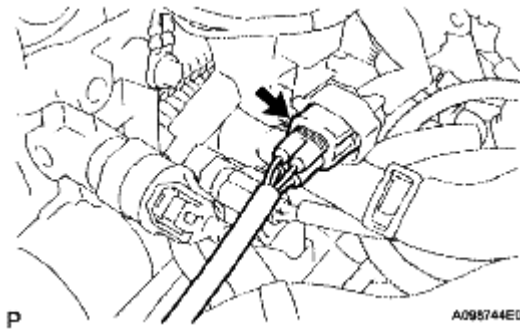


Fig. 74: Locating Air-Fuel Ratio Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 5 nuts, manifold converter and gasket.

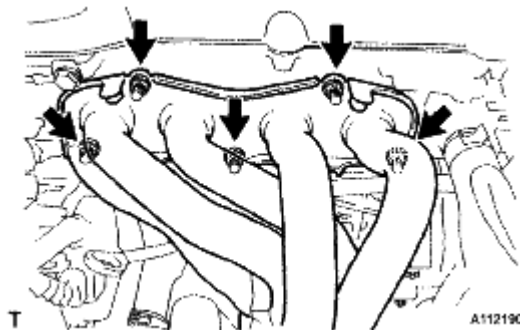


Fig. 75: Locating Nuts, Manifold Converter And Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

39. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH

- a. Place a transmission jack underneath the engine, then put a wooden block on the jack.

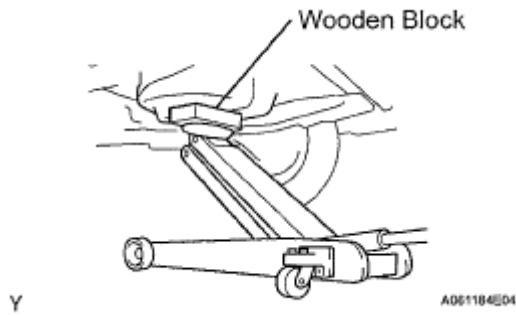


Fig. 76: Identifying Wooden Block On Jack
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the bolt and cooler bracket.



Fig. 77: Locating Cooler Bracket Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the bolt and nut, then remove the No. 2 air conditioning pipe bracket.

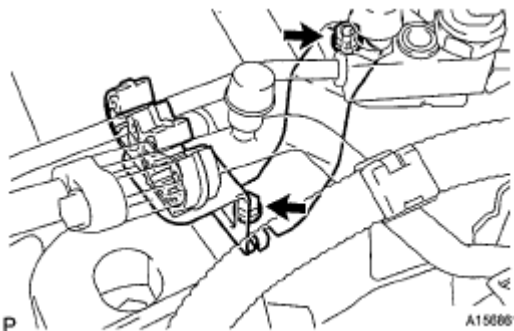


Fig. 78: Locating No. 2 Air Conditioning Pipe Bracket Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Remove the 4 bolts and 2 nuts, then remove the engine mounting insulator RH.

NOTE: Do not apply excessive force to the return tube when removing the engine mounting insulator RH.

HINT:

Keep clearance by lowering the engine using the transmission jack when removing the front engine mounting insulator.

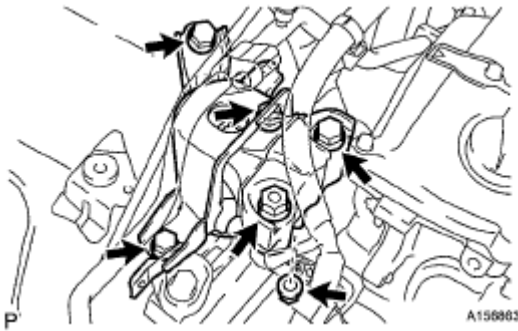


Fig. 79: Locating Engine Mounting Insulator RH Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

40. REMOVE FRONT ENGINE MOUNTING INSULATOR SUB-ASSEMBLY

- a. Remove the through bolt and nut.
- b. Remove the 2 bolts and front engine mounting insulator.

HINT:

Keep clearance by lowering the engine using the transmission jack when removing the front engine mounting insulator.

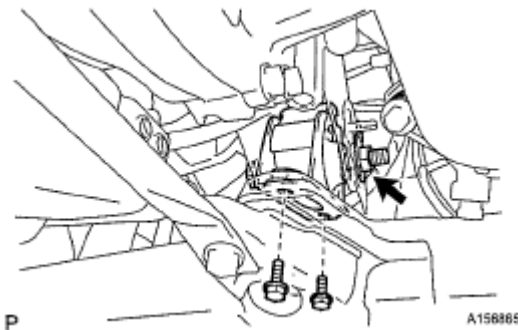


Fig. 80: Locating Front Engine Mounting Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

41. REMOVE IDLER PULLEY SUB-ASSEMBLY

- a. Loosen the 2 bolts and remove the idler pulley with the 2 bolts.

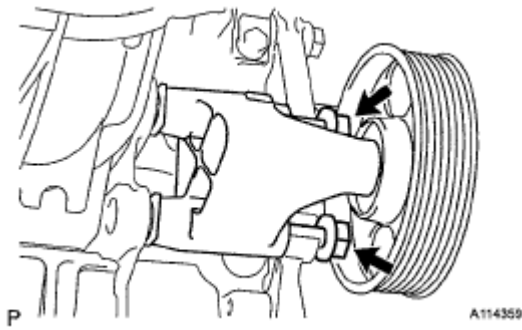


Fig. 81: Locating Idler Pulley Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

42. REMOVE OIL PAN SUB-ASSEMBLY

- a. Install the No. 1 and No. 2 engine hangers with the new bolts.

Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)

Part No.

PART NO. REFERENCE CHART

Item	Part No.
No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010
Bolt	91512-61020

- b. Attach the sling device to the engine hangers and chain block.

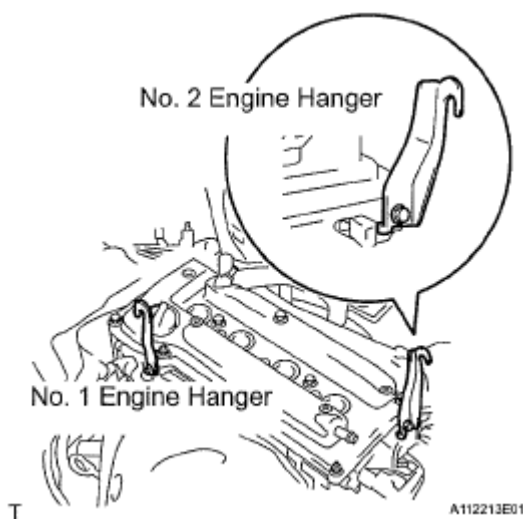


Fig. 82: Identifying No. 1 And No. 2 Engine Hangers

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 12 bolts and 2 nuts.

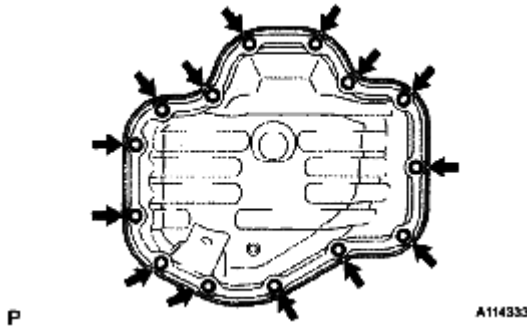


Fig. 83: Locating Bolts And Nuts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Insert the blade of oil pan seal cutter between the crankcase, chain cover and oil pan, then cut through the applied sealer and remove the oil pan.

NOTE: Be careful not to damage the contact surface of the crankcase, chain cover or oil pan.

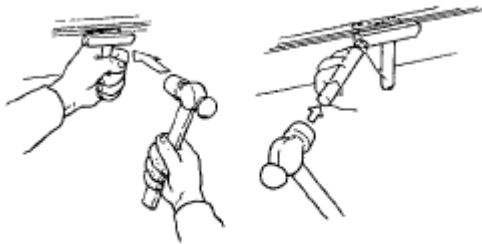


Fig. 84: Inserting Blade Of Oil Pan Seal Cutter Between Crankcase, Chain Cover And Oil Pan

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

43. SET NO. 1 CYLINDER TO TDC / COMPRESSION

- Turn the crankshaft pulley until the groove and the timing mark "0" on the timing chain cover are aligned.
- Check that each timing mark on the camshaft timing gear and sprocket is aligned with the timing marks located on the No. 1 and No. 2 bearing caps as shown in the illustration.

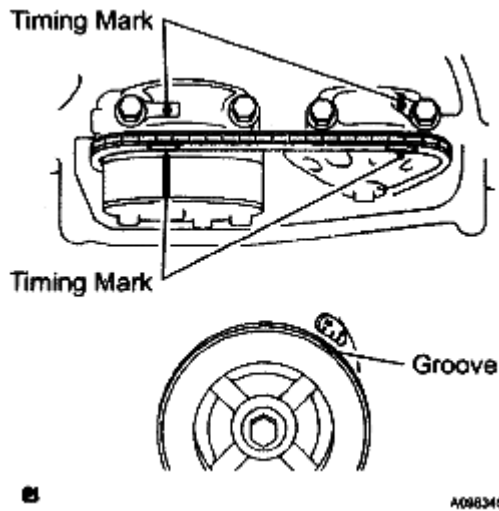


Fig. 85: Checking That Each Timing Mark On Camshaft Timing Gear And Sprocket Is Aligned With Timing Marks Located On No. 1 And No. 2 Bearing Caps
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If not, turn the crankshaft by 1 revolution (360°) to align the timing marks as above.

44. **REMOVE CRANKSHAFT PULLEY** (See **REMOVAL**)
45. **REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY**
 - a. Remove the 2 nuts, chain tensioner and gasket.

NOTE: Do not turn the crankshaft without the chain tensioner

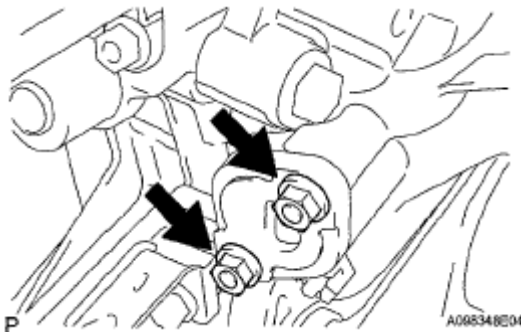


Fig. 86: Locating No. 1 Chain Tensioner Assembly Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

46. **REMOVE TRANSVERSE ENGINE MOUNTING BRACKET**
 - a. Remove the 3 bolts and transverse engine mounting bracket.

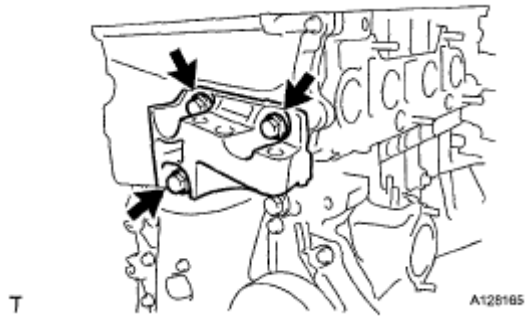


Fig. 87: Locating Transverse Engine Mounting Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

47. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

- a. Lift the engine upward.

NOTE: Do not lift the engine more than necessary.

- b. Remove the bolt, nut and V-ribbed belt tensioner.

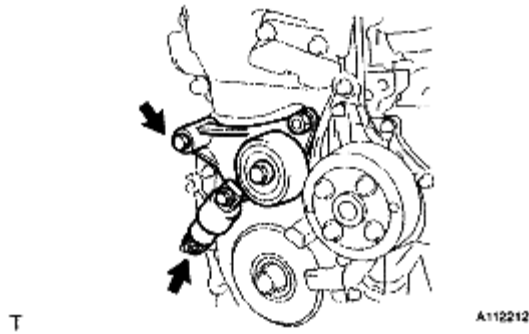


Fig. 88: Locating Bolt, Nut And V-Ribbed Belt Tensioner
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

48. REMOVE CRANKSHAFT POSITION SENSOR (See REMOVAL)

49. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

- a. Using an E10 "TORX" socket, remove the stud bolt for the V-ribbed belt tensioner.

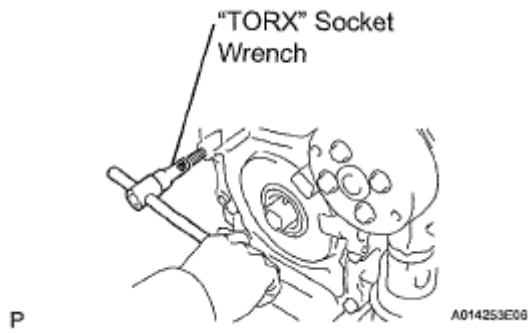


Fig. 89: Identifying Stud Bolt For V-Ribbed Belt Tensioner
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 12 bolts and 2 nuts.

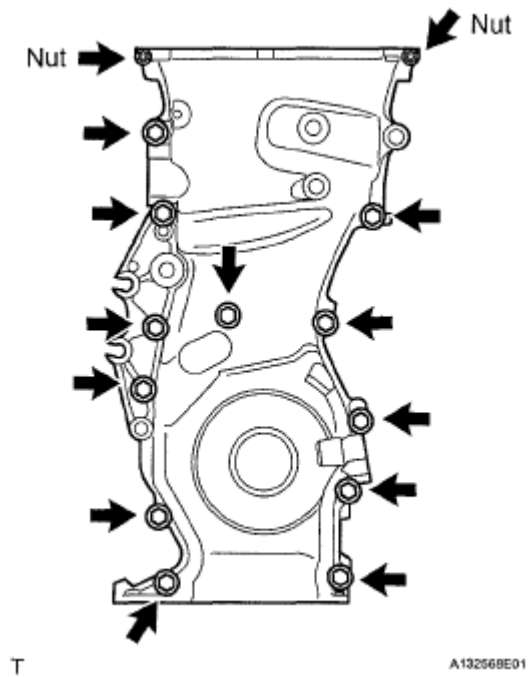


Fig. 90: Locating Timing Chain Or Belt Cover Bolts And Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the timing chain cover by prying the portions between the timing chain cover, cylinder head and cylinder block with a screwdriver.

NOTE: Be careful not to damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.

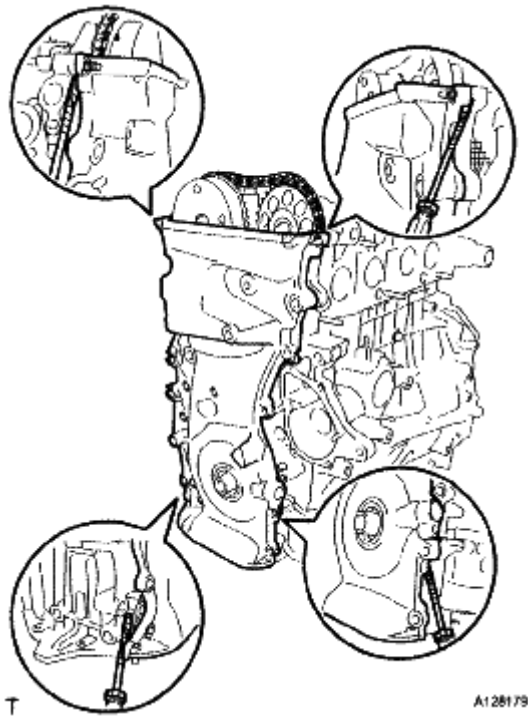


Fig. 91: Identifying Timing Chain Cover By Prying
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

50. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE

- a. Remove the No. 1 crankshaft position sensor plate.

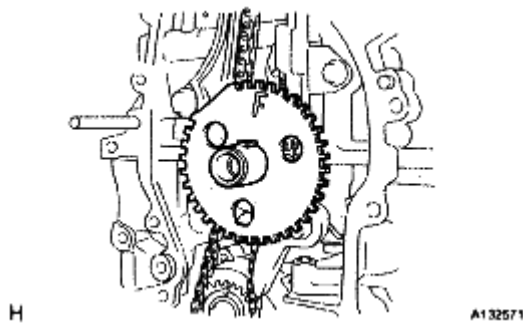


Fig. 92: Identifying No. 1 Crankshaft Position Sensor Plate
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

51. REMOVE TIMING CHAIN GUIDE

- a. Remove the bolt and timing chain guide.

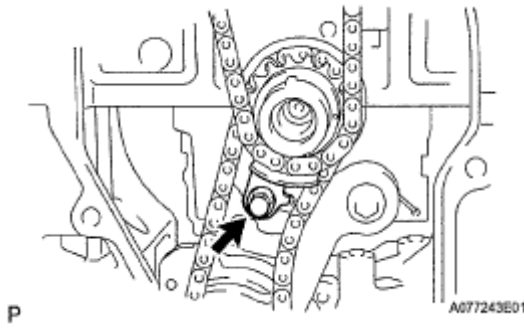


Fig. 93: Locating Timing Chain Guide Bolt
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

52. REMOVE CHAIN TENSIONER SLIPPER

- a. Remove the bolt and chain tensioner slipper.

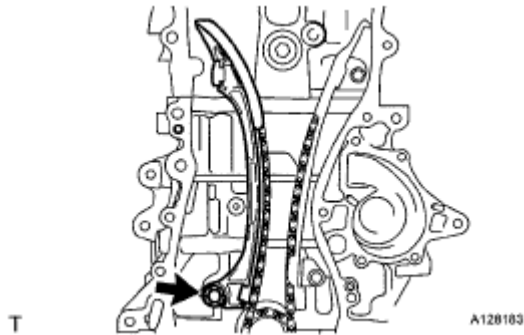


Fig. 94: Locating Chain Tensioner Slipper Bolt
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

53. REMOVE NO. 1 CHAIN VIBRATION DAMPER

- a. Remove the 2 bolts and chain vibration damper.

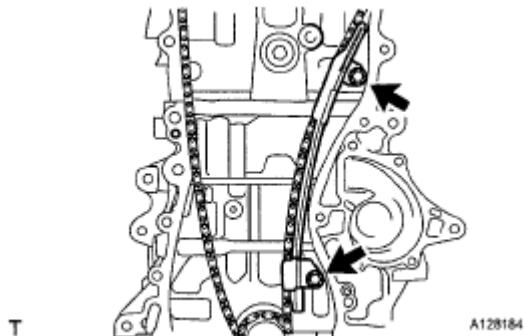


Fig. 95: Locating Chain Vibration Damper Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

54. REMOVE CHAIN SUB-ASSEMBLY

55. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

- a. Remove the crankshaft timing gear or sprocket from the crankshaft.

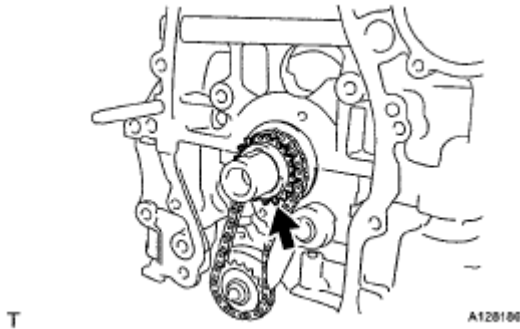


Fig. 96: Locating Crankshaft Timing Gear Or Sprocket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

56. REMOVE NO. 2 CHAIN SUB-ASSEMBLY

- a. Turn the crankshaft 90° counterclockwise to align the adjusting hole on the oil pump drive shaft sprocket with the groove on the oil pump.

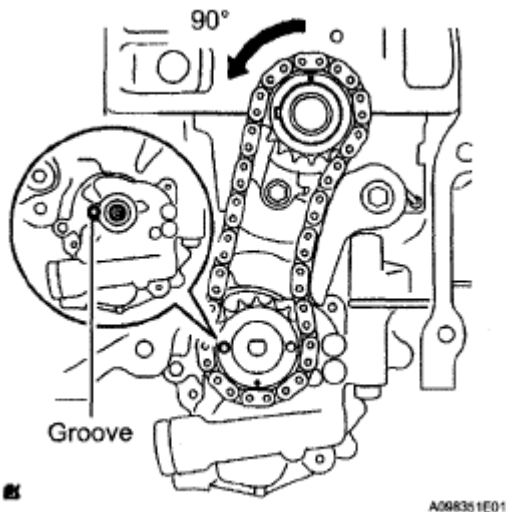


Fig. 97: Turning Crankshaft 90° Counterclockwise To Align Adjusting Hole On Oil Pump Drive Shaft Sprocket With Groove On Oil Pump
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Insert a 4 mm diameter bar into the adjusting hole of the oil pump drive shaft sprocket to lock the gear in position, and then remove the nut.

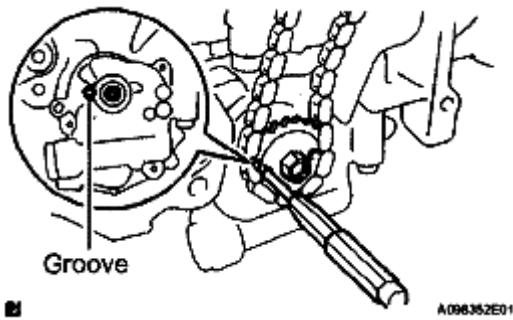


Fig. 98: Inserting Bar Into Adjusting Hole Of Oil Pump Drive Shaft Sprocket To Lock Gear In Position

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the bolt, chain tensioner plate and spring.
- d. Remove the oil pump drive sprocket, oil pump drive shaft sprocket and No. 2 chain.

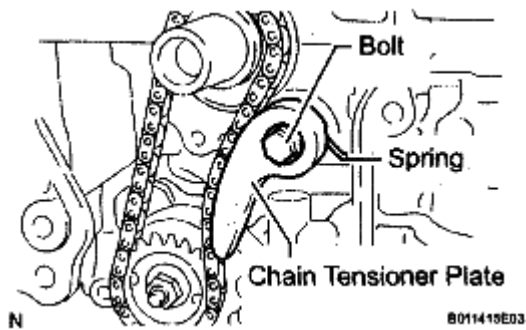


Fig. 99: Identifying Bolt, Chain Tensioner Plate And Spring

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 57. **DISCONNECT INLET RADIATOR HOSE** (See **REMOVAL**)
- 58. **DISCONNECT OUTLET HEATER WATER HOSE**
- 59. **DISCONNECT INLET HEATER WATER HOSE**
- 60. **DISCONNECT ENGINE WIRE**
 - a. Disconnect the radio setting condenser connector.
 - b. Disconnect the engine oil pressure switch connector.
 - c. Disconnect the engine coolant temperature sensor connector.
 - d. Disconnect the camshaft position sensor connector.
 - e. Remove the bolt and ground cable.

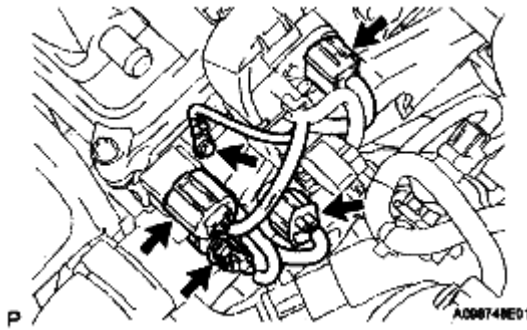


Fig. 100: Locating Camshaft Position Sensor Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

61. REMOVE NO. 2 CAMSHAFT (See DISASSEMBLY)
62. REMOVE CAMSHAFT (See DISASSEMBLY)
63. REMOVE NO. 1 CAMSHAFT BEARING (See DISASSEMBLY)
64. REMOVE NO. 2 CAMSHAFT BEARING (See DISASSEMBLY)
65. REMOVE CYLINDER HEAD SUB-ASSEMBLY
 - a. In several steps, uniformly loosen and remove the 10 cylinder head bolts and 10 plate washers with a 10 mm bi-hexagon wrench in the sequence shown in the illustration.

NOTE: Head warpage or cracking could result from removing the bolts in the wrong order.

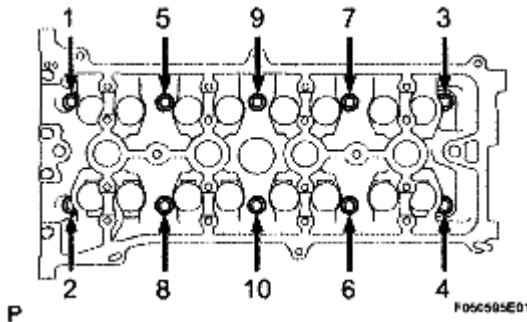


Fig. 101: Identifying Cylinder Head Bolts In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a screwdriver with its tip wrapped with tape, pry between the cylinder head and cylinder block, and remove the cylinder head.

NOTE: Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

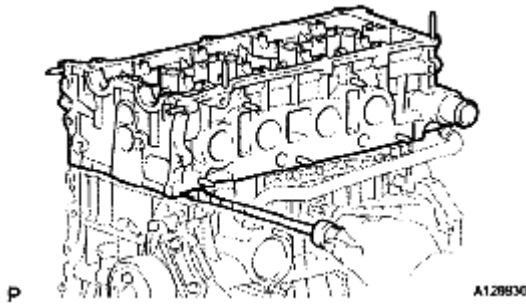


Fig. 102: Prying Between Cylinder Head And Cylinder Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

66. REMOVE CYLINDER HEAD GASKET

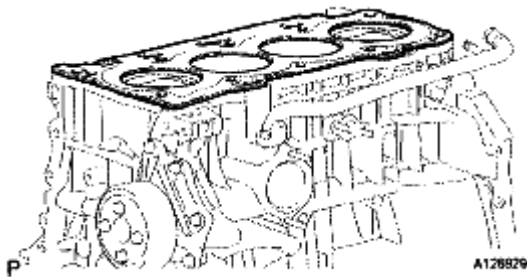


Fig. 103: Identifying Cylinder Head Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL CYLINDER HEAD GASKET

- Place a new gasket on the cylinder block surface with the Lot No. stamp facing upward.

NOTE:

- Remove any oil from contact surface.
- Be careful of the installation direction.

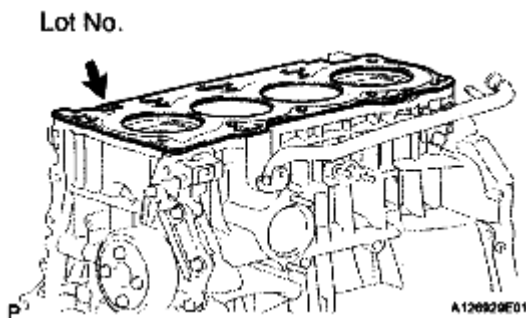


Fig. 104: Identifying Cylinder Head Gasket With Lot No.
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL CYLINDER HEAD SUB-ASSEMBLY

- a. Place the cylinder head on the head gasket.

NOTE: Place the cylinder head gently in order to avoid damaging the gasket.

- b. Install the cylinder head bolts.

NOTE: The cylinder head bolts are tightened in 2 successive steps.

1. Apply a light coat of engine oil to the threads and under the heads of the cylinder head set bolts.
2. Using several steps, uniformly install and tighten the 10 cylinder head set bolts and plate washers with a 10 mm bi-hexagon wrench in the order shown in the illustration.

Torque: 70 N*m (714 kgf*cm, 52 ft.*lbf)

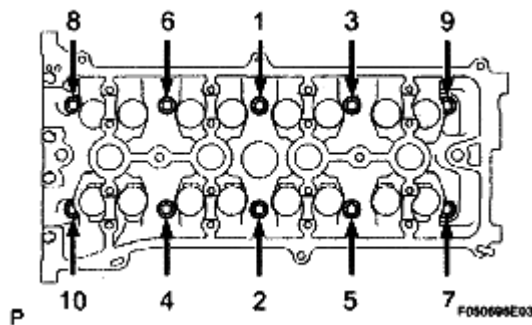


Fig. 105: Identifying Cylinder Head Set Bolts In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Mark the front of the cylinder head bolts with paint.
- d. Further tighten the cylinder head bolts by 90° as shown in **Fig. 106**.
- e. Check that the paint mark is now at a 90° angle to the front.

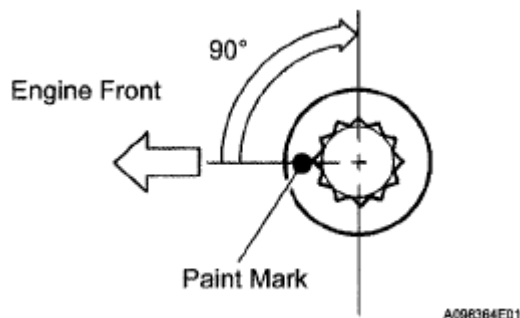


Fig. 106: Tightening Cylinder Head Bolts An Additional 90°
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL NO. 1 CAMSHAFT BEARING** (See INSTALLATION)
4. **INSTALL NO. 2 CAMSHAFT BEARING** (See INSTALLATION)
5. **INSTALL CAMSHAFT** (See INSTALLATION)
6. **INSTALL NO. 2 CAMSHAFT** (See INSTALLATION)
7. **CONNECT INLET HEATER WATER HOSE**
8. **CONNECT OUTLET HEATER WATER HOSE**
9. **CONNECT INLET RADIATOR HOSE** (See INSTALLATION)
10. **CONNECT ENGINE WIRE**
 - a. Connect the ground cable with the bolt.

Torque: 8.4 N*m (86 kgf*cm, 74 in.*lbf)

- b. Connect the camshaft position sensor connector.
- c. Connect the engine coolant temperature sensor connector.
- d. Connect the engine oil pressure switch connector.
- e. Connect the radio setting condenser connector.
- f. Connect the heater water inlet hose.

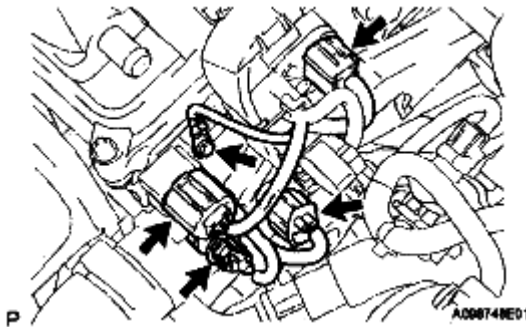


Fig. 107: Identifying Engine Wire

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY**

- a. Set the crankshaft key in the left horizontal position.

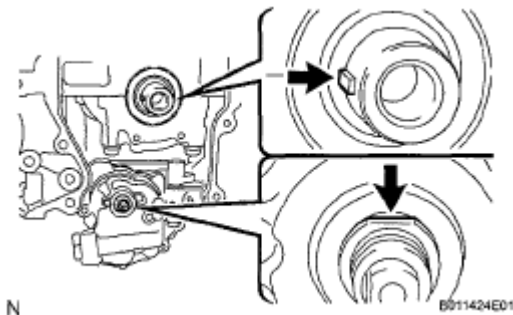


Fig. 108: Setting Crankshaft Key In Left Horizontal Position
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Turn the cutout of the drive shaft so that it faces upward.
- c. Align the yellow mark links with the timing marks of each gear as shown in the illustration.

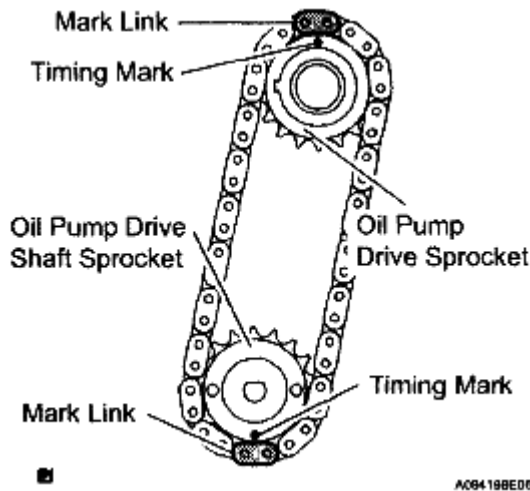


Fig. 109: Aligning Yellow Mark Links With Timing Marks Of Each Gear
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Install the sprockets onto the crankshaft and oil pump shaft with the chain wrapped on the gears.
- e. Temporarily tighten the oil pump drive shaft sprocket with the nut.
- f. Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

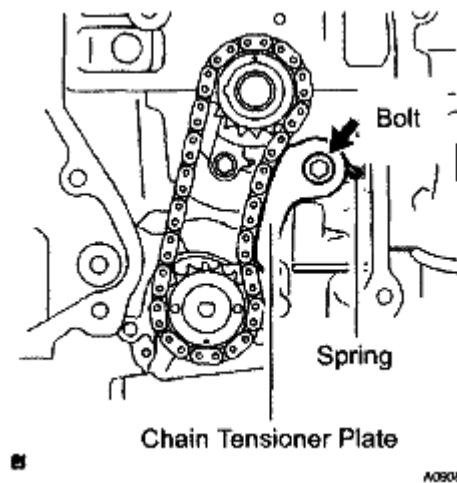


Fig. 110: Locating Chain Tensioner Plate Bolt
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Align the adjusting hole on the oil pump drive shaft sprocket with the groove on the oil pump.
- h. Insert a 4 mm diameter bar into the adjusting hole on the oil pump drive shaft gear to lock the gear in position, and then tighten the nut.

Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)

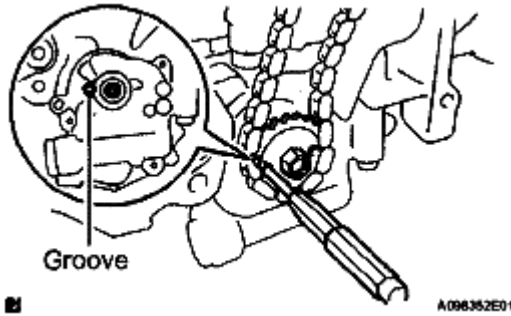


Fig. 111: Inserting Bar Into Adjusting Hole On Oil Pump Drive Shaft Gear To Lock Gear In Position

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

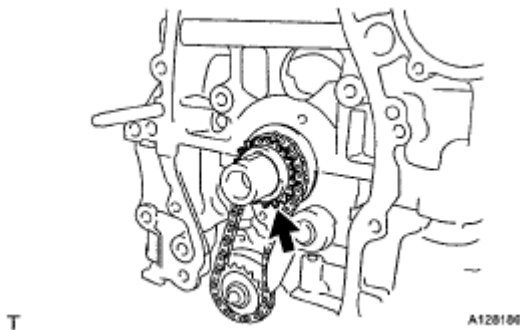


Fig. 112: Identifying Crankshaft Timing Gear Or Sprocket

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSTALL NO. 1 CHAIN VIBRATION DAMPER

- a. Install the chain vibration damper with the 2 bolts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

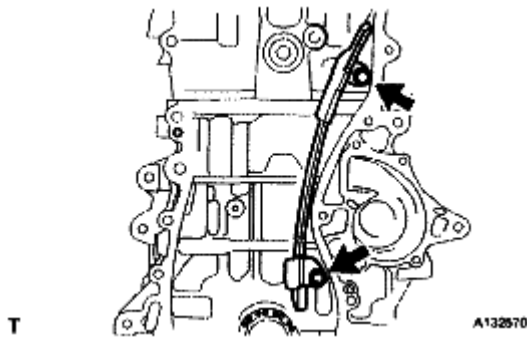


Fig. 113: Identifying No. 1 Chain Vibration Damper Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL CHAIN SUB-ASSEMBLY

- a. Set the No. 1 cylinder to TDC/compression.
 1. Turn the camshafts with a wrench (using the hexagonal lobe) to align the timing marks on the camshaft timing gear with the timing marks located on the No. 1 and No. 2 bearing caps as shown in the illustration.

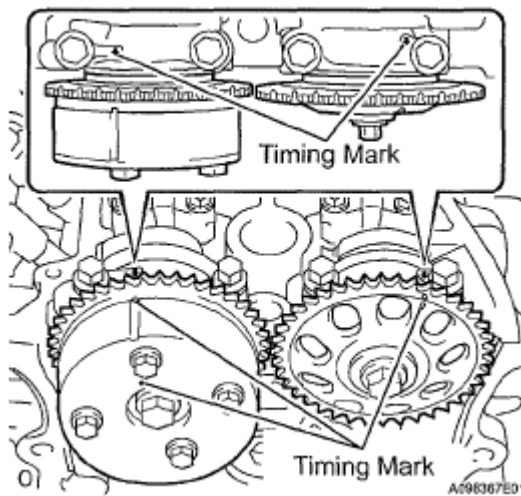


Fig. 114: Aligning Timing Marks On Camshaft Timing Gear With Timing Marks Located On No. 1 And No. 2 Bearing Caps
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Using the crankshaft pulley bolt, turn the crankshaft to position the key on the crankshaft upward.

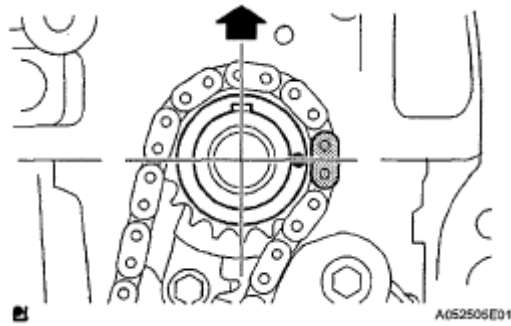


Fig. 115: Turning Crankshaft To Position Key On Crankshaft Upward
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the chain onto the crankshaft timing sprocket with the gold or orange mark link aligned with the timing mark on the crankshaft.

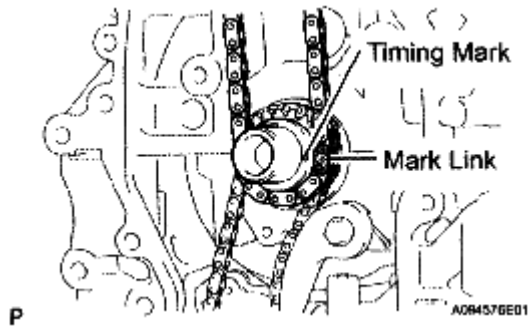


Fig. 116: Identifying Gold Or Orange Mark Link Aligned With Timing Mark On Crankshaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using SST and a hammer, tap in the crankshaft timing sprocket.

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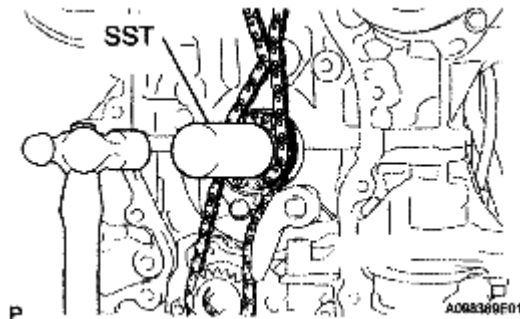


Fig. 117: Tapping In Crankshaft Timing Sprocket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Align the gold or yellow links with the timing marks located on the camshaft timing gear and sprocket, then install the chain.

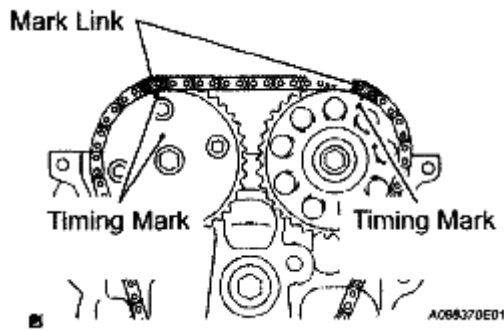


Fig. 118: Aligning Gold Or Yellow Links With Timing Marks Located On Camshaft Timing Gear And Sprocket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. INSTALL CHAIN TENSIONER SLIPPER

- a. Install the chain tensioner slipper with the bolt.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

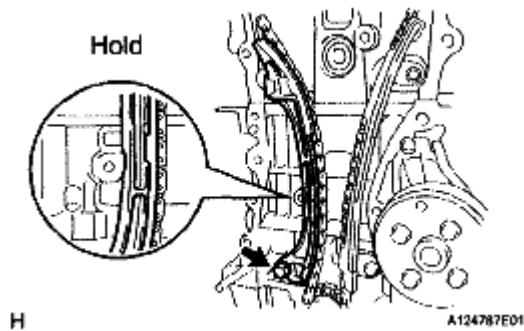


Fig. 119: Locating Chain Tensioner Slipper Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. INSTALL TIMING CHAIN GUIDE

- a. Install the timing chain guide with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

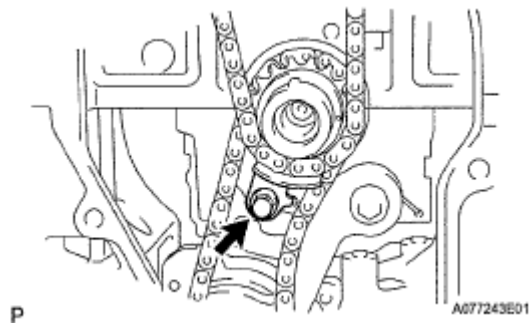
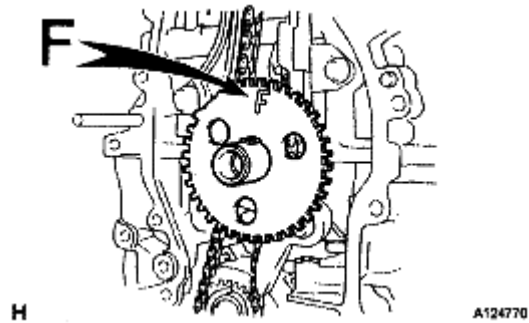


Fig. 120: Locating Timing Chain Guide Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE

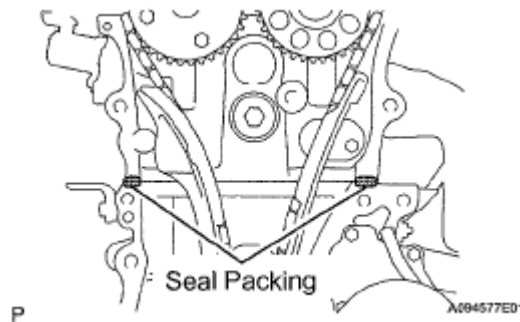
- a. Install the sensor plate with the "F" mark facing forward.

**Fig. 121: Identifying No. 1 Crankshaft Position Sensor Plate F Mark**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.**18. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY**

- a. Remove any old packing material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.
- b. Apply seal packing (Diameter 4.0 to 4.5 mm (0.157 to 0.177 in.)) as shown in the illustration.

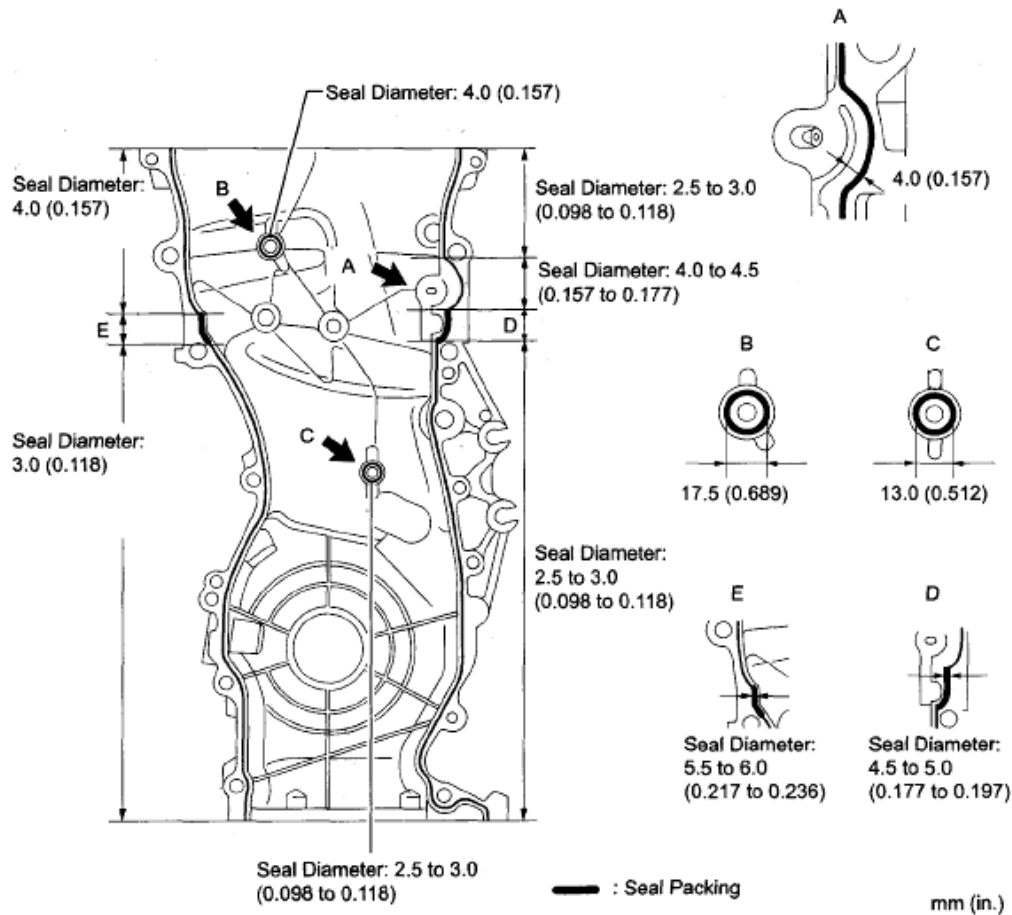
Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent**NOTE:**

- Remove any oil from the contact surface.
- Install the chain cover within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the chain cover.

**Fig. 122: Identifying Seal Packing Applying Area**
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Apply a continuous bead of seal packing as shown in the illustration.

Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent



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Fig. 123: Applying Continuous Bead Of Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Remove any oil from the contact surface.
- Install the chain cover within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the chain cover.

- d. Install the timing chain cover with the 12 bolts and 2 nuts.

Torque:

Bolt A

9.0 N*m (92 kgf*cm, 80 in.*lbf)

Bolt B

25 N*m (255 kgf*cm, 18 ft.*lbf)

Bolt C

55 N*m (561 kgf*cm, 41 ft.*lbf)

Nut

11 N*m (112 kgf*cm, 8 ft.*lbf)

Bolt length

BOLT LENGTH SPECIFICATION

Item	Specification
Bolt A	30 mm (1.18 in.) length for 10 mm head
Bolt B	30 mm (1.18 in.) length for 12 mm head
Bolt C	40 mm (1.57 in.) length for 14 mm head

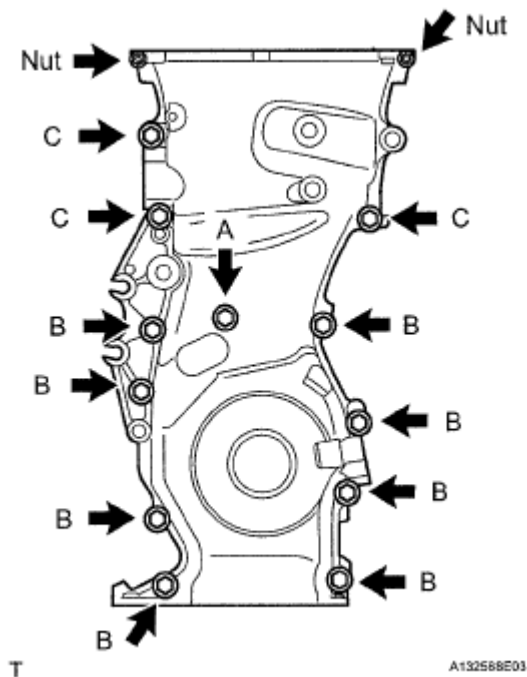


Fig. 124: Locating Timing Chain Cover Bolts And Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Using an E10 "TORX" socket, install the stud bolt for the V-ribbed belt tensioner.

Torque: 22 N*m (219 kgf*cm, 16 ft.*lbf)

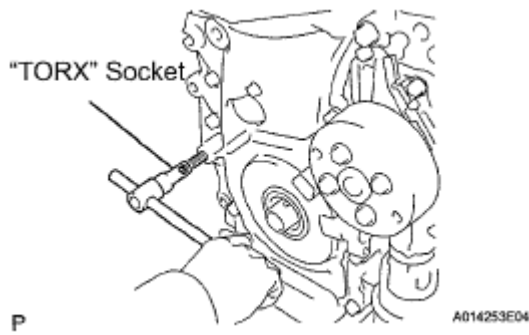


Fig. 125: Identifying Stud Bolt For V-Ribbed Belt Tensioner
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY

- a. Release the ratchet pawl, then fully push in the plunger and hook the hook to the pin so that the plunger is in the position shown in the illustration.

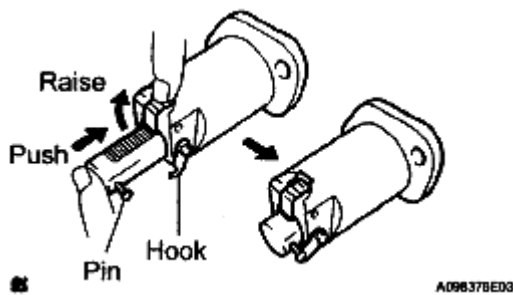


Fig. 126: Pushing In Plunger And Hook Hook To Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install a new gasket and the chain tensioner with the 2 nuts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

NOTE: When installing the chain tensioner, set the hook again if the hook releases the plunger.

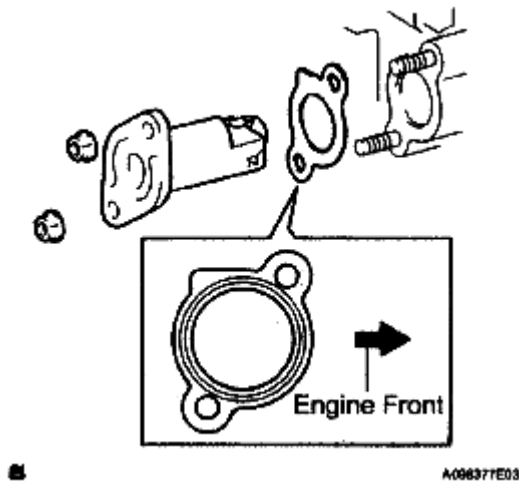


Fig. 127: Identifying Gasket And Chain Tensioner
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

- a. Install the V-ribbed belt tensioner with the bolt and nut.

Torque: 60 N*m (607 kgf*cm, 44 ft.*lbf)

NOTE: Do not lift the engine more than necessary.

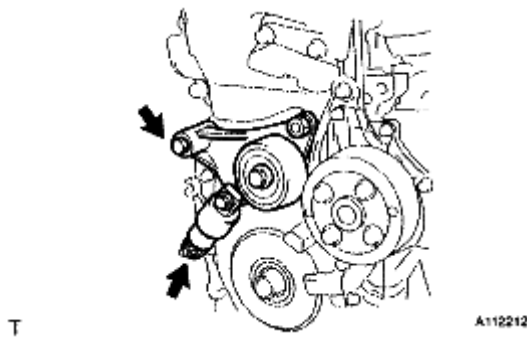


Fig. 128: Locating V-Ribbed Belt Tensioner Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

21. INSTALL TRANSVERSE ENGINE MOUNTING BRACKET

- a. Install the engine transverse engine mounting bracket with the 3 bolts.

Torque: 55 N*m (561 kgf*cm, 41 ft.*lbf)

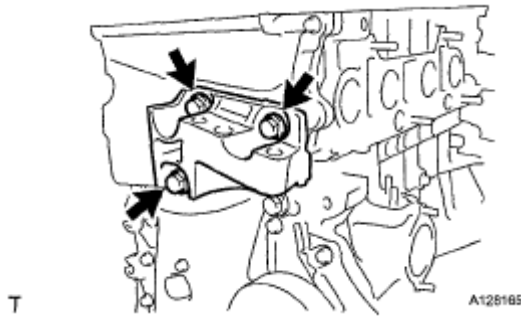


Fig. 129: Locating Engine Transverse Engine Mounting Bracket Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. INSTALL CRANKSHAFT PULLEY

- a. Using SST, fix the pulley in place and tighten the bolt.

SST 09213-54015 (91651 -60855), 09330-00021

Torque: 180 N*m (1835 kgf*cm, 133 ft.*lbf)

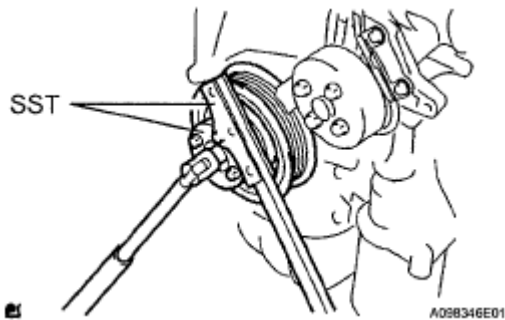


Fig. 130: Tightening Crankshaft Pulley Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Turn the crankshaft counterclockwise, then disconnect the plunger knock pin from the hook.

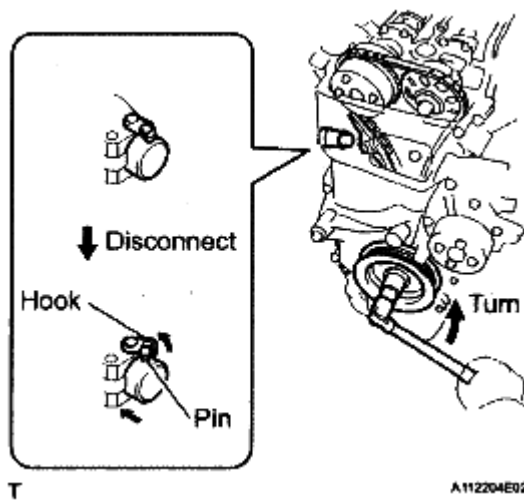


Fig. 131: Turning Crankshaft Counterclockwise
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Turn the crankshaft clockwise, then check that the plunger is extended.

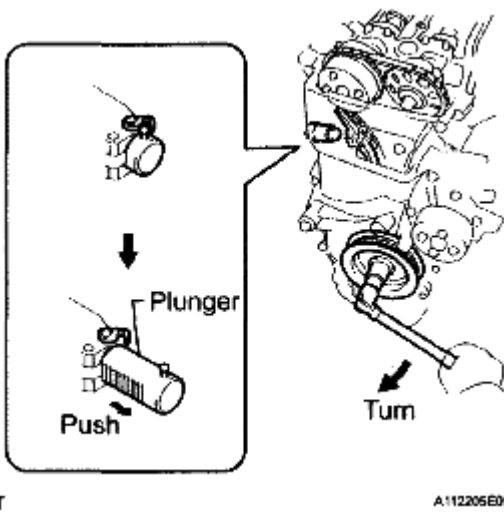


Fig. 132: Turning Crankshaft Clockwise
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

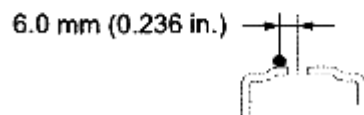
23. INSTALL OIL PAN SUB-ASSEMBLY

- Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.
- Apply a continuous bead of seal packing (Diameter 3.0 to 4.0 mm (0.118 to 0.157 in.)) as shown in the illustration.

Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.



Seal Diameter: 3.0 to 4.0 mm

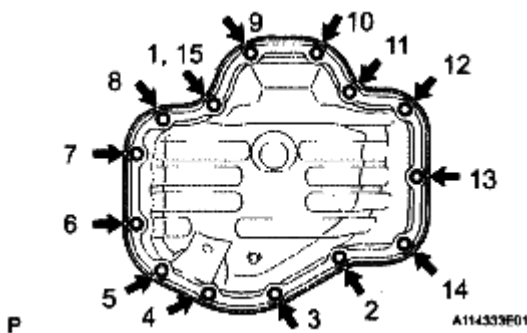
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Fig. 133: Identifying Seal Packing Bead Diameter Of Oil Pan
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Install the oil pan onto the cylinder block.
- Uniformly tighten the 12 bolts and 2 nuts in the sequence shown in the illustration.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



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Fig. 134: Tightening Oil Pan Bolts And Nuts In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Place a transmission jack underneath the engine, then put a wooden block on the jack.
- f. Remove the chain block and sling device.
- g. Remove the No. 1 and No. 2 engine hangers.

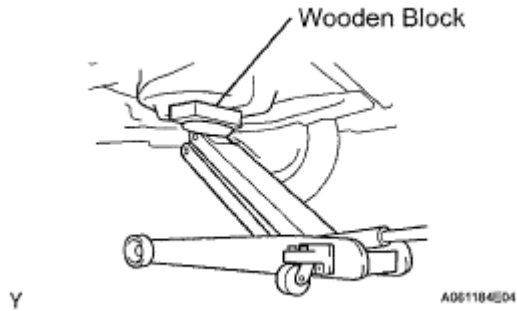


Fig. 135: Identifying Wooden Block On Jack
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

24. **INSTALL CRANKSHAFT POSITION SENSOR** (See INSTALLATION)
25. **INSTALL IDLER PULLEY SUB-ASSEMBLY**
 - a. Install the idler pulley with the 2 bolts.

Torque: 50 N*m (510 kgf*cm, 37 ft.*lbf)

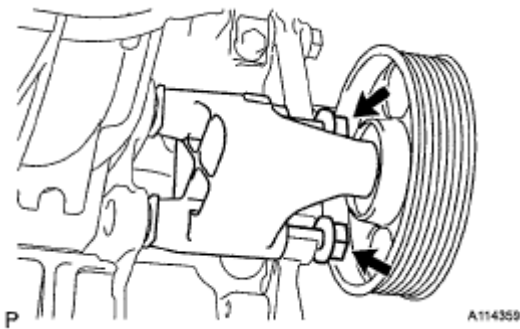


Fig. 136: Locating Idler Pulley Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

26. **INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH**
 - a. Install the engine mounting insulator RH with the 4 bolts and 2 nuts.

Torque:

Bolt

95 N*m (969 kgf*cm, 70 ft.*lbf)

Nut A

95 N*m (969 kgf*cm, 70 ft.*lbf)

Nut B

52 N*m (530 kgf*cm, 38 ft.*lbf)

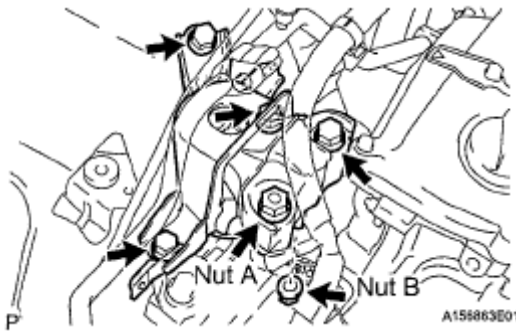


Fig. 137: Identifying Engine Mounting Insulator RH Bolts And Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the 2 cooler brackets with the 2 bolts and nut.

Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

27. INSTALL FRONT ENGINE MOUNTING INSULATOR SUB-ASSEMBLY

- a. Install the front engine mounting insulator with the 2 bolts, through bolt and nut.

Torque:

Bolt

95 N*m (969 kgf*cm, 70 ft.*lbf)

Through bolt and Nut

145 N*m (1479 kgf*cm, 107 ft.*lbf)

HINT:

Install the bolt which is used to secure the front engine mounting bracket.

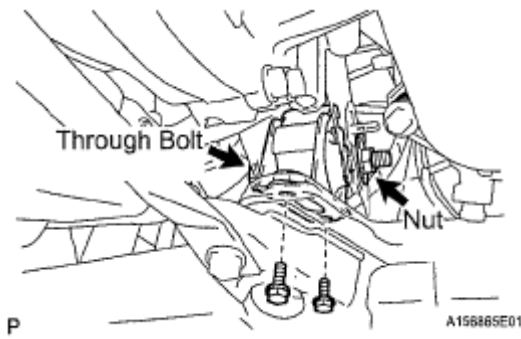


Fig. 138: Locating Front Engine Mounting Insulator Through Bolt And Nut
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

- a. Install a new gasket onto the cylinder head.
- b. Temporarily tighten the exhaust manifold converter with the 5 nuts.
- c. Tighten the 5 nuts in the sequence shown in the illustration.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

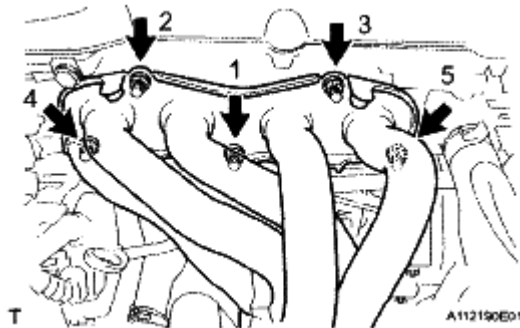


Fig. 139: Identifying Exhaust Manifold Converter Nuts Tightening Sequence
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Connect the air-fuel ratio sensor connector.

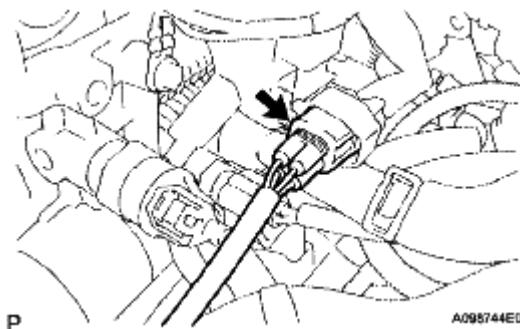


Fig. 140: Locating Air-Fuel Ratio Sensor Connector

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

29. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

- a. Install the exhaust manifold heat insulator with the 4 bolts.

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

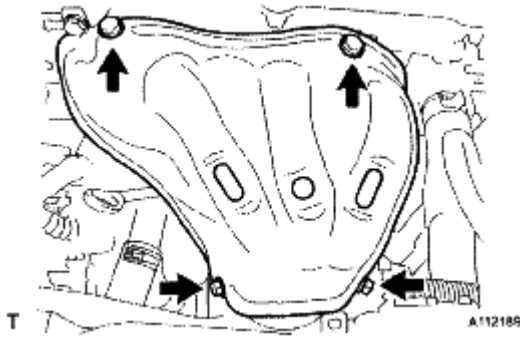


Fig. 141: Locating Exhaust Manifold Heat Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

30. INSTALL NO. 2 MANIFOLD STAY

- a. Install the stay with the bolt and nut.

Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

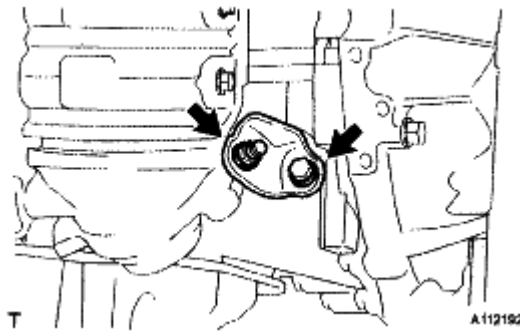


Fig. 142: Locating Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

31. INSTALL MANIFOLD STAY

- a. Install the stay with the bolt and nut.

Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

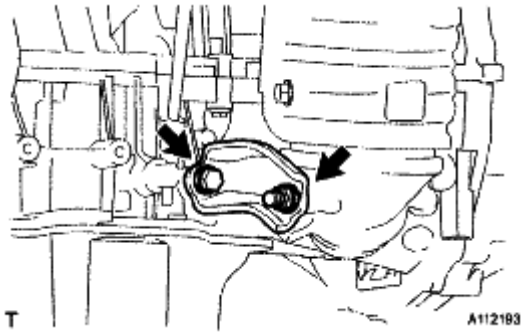


Fig. 143: Locating Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

32. INSTALL INTAKE MANIFOLD INSULATOR
33. INSTALL INTAKE MANIFOLD (See INSTALLATION)
34. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY (See INSTALLATION)
35. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY (See INSTALLATION)
36. CONNECT FUEL MAIN TUBE (See INSTALLATION)
37. INSTALL OIL DIPSTICK GUIDE
 - a. Apply a light coat of engine oil to a new O-ring and install it onto the guide.
 - b. Install the guide with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

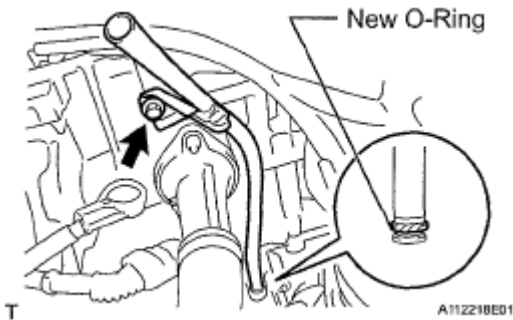


Fig. 144: Locating Oil Dipstick Guide Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

38. INSTALL OIL DIPSTICK
39. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See INSTALLATION)
40. INSTALL SPARK PLUG (See INSTALLATION)
41. INSTALL IGNITION COIL ASSEMBLY (See INSTALLATION)
42. INSTALL THROTTLE BODY ASSEMBLY (See INSTALLATION)
43. INSTALL AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE (See INSTALLATION)
44. INSTALL RADIATOR RESERVE TANK ASSEMBLY

- a. Install the radiator reservoir with the 2 bolts.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

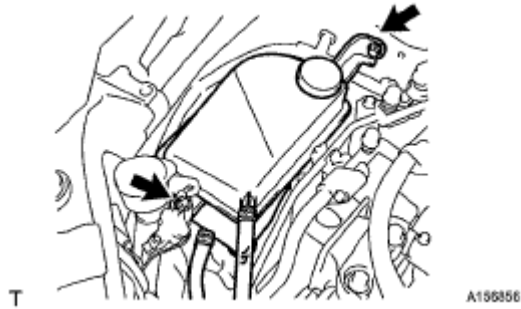


Fig. 145: Locating Radiator Reservoir Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

45. INSTALL GENERATOR ASSEMBLY (See INSTALLATION)
46. INSTALL FAN AND GENERATOR V BELT (See ON-VEHICLE INSPECTION)
47. INSTALL FRONT EXHAUST PIPE ASSEMBLY (See INSTALLATION)
48. INSTALL CENTER EXHAUST PIPE ASSEMBLY (See INSTALLATION)
49. INSTALL OUTER COWL TOP PANEL (See INSTALLATION)
50. INSTALL FRONT WIPER MOTOR AND LINK (See INSTALLATION)
51. INSTALL COWL TOP VENTILATOR LOUVER LH (See INSTALLATION)
52. INSTALL COWL TOP VENTILATOR LOUVER RH (See INSTALLATION)
53. INSTALL HOOD TO COWL TOP SEAL (See INSTALLATION)
54. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (See INSTALLATION)
55. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (See INSTALLATION)
56. INSTALL WINDSHIELD WIPER ARM COVER (See INSTALLATION)
57. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque: 5.4 N*m (55 kgf*cm, 48 in.*lbf)

58. ADD ENGINE OIL (See REPLACEMENT)
59. ADD ENGINE COOLANT (See REPLACEMENT)
60. INSPECT FOR FUEL LEAK

(See PRECAUTION)

61. INSPECT FOR ENGINE COOLANT LEAK (See ON-VEHICLE INSPECTION)
62. INSPECT FOR ENGINE OIL LEAK
63. INSPECT FOR EXHAUST GAS LEAK
64. INSPECT IGNITION TIMING (See ON-VEHICLE INSPECTION)

- 65. **INSPECT ENGINE IDLING SPEED** (See ON-VEHICLE INSPECTION)
- 66. **INSPECT COMPRESSION** (See ON-VEHICLE INSPECTION)
- 67. **INSPECT CO/HC** (See ON-VEHICLE INSPECTION)
- 68. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY** (See INSTALLATION)
- 69. **INSTALL NO. 1 ENGINE UNDER COVER**
- 70. **INSTALL REAR ENGINE UNDER COVER RH**
- 71. **INSTALL FRONT WHEEL RH**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

- 72. **INSTALL HOOD**
 - a. Temporarily install the hood with the 4 bolts.
 - b. Connect the washer hose.

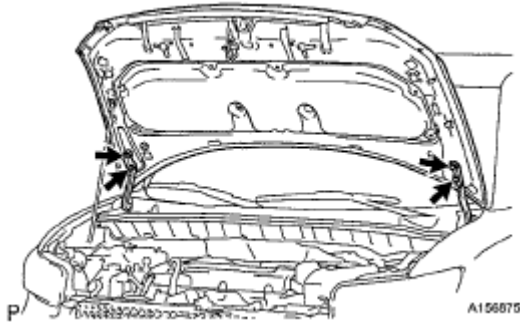


Fig. 146: Locating Hood Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 73. **INSPECT HOOD** (See ADJUSTMENT)
- 74. **ADJUST HOOD** (See ADJUSTMENT)

CYLINDER HEAD

COMPONENTS

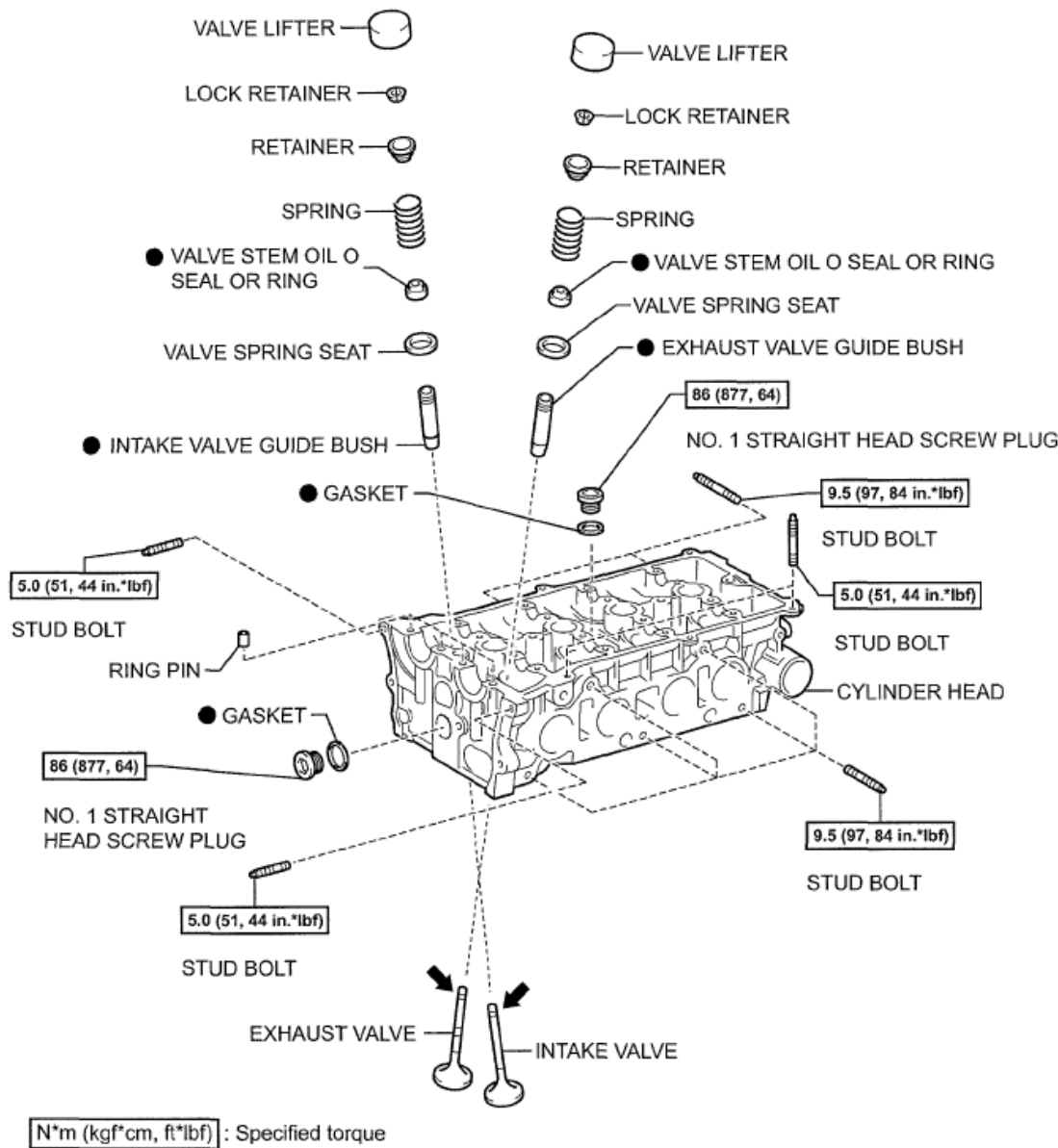


Fig. 147: Identifying Cylinder Head Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. REMOVE VALVE LIFTER

- Remove the 16 valve lifters from the cylinder head.

HINT:

Arrange the valve lifters in the correct order.

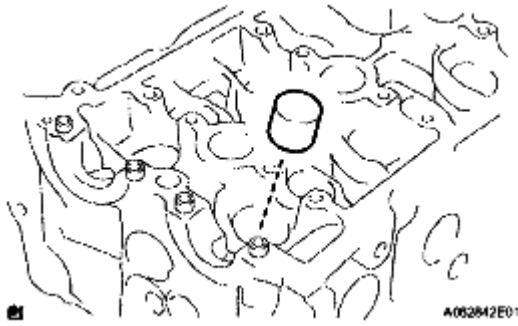


Fig. 148: Identifying Valve Lifters

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. REMOVE INTAKE VALVE

- a. Using SST, remove the 16 retainer locks.

SST 09202-70020(09202-00010)

- b. Remove the 8 retainers, compression springs and intake valves.

HINT:

Arrange the removed parts in the correct order.

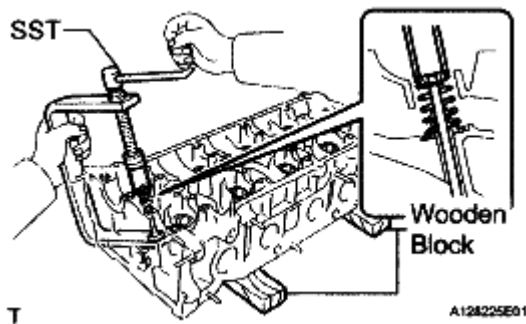


Fig. 149: Identifying Intake Valve Retainer Locks

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. REMOVE EXHAUST VALVE

- a. Using SST, remove the 16 retainer locks.

SST 09202-70020(09202-00010)

- b. Remove the 8 retainers, compression springs and exhaust valves.

HINT:

Arrange the removed parts in the correct order.

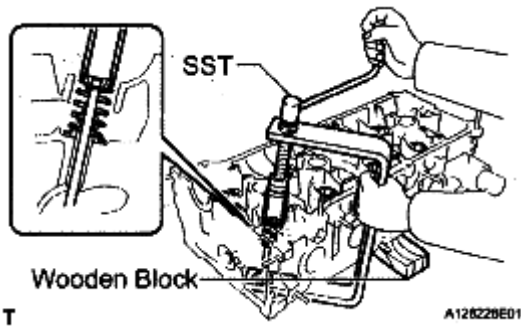


Fig. 150: Identifying Exhaust Valve Retainer Locks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. REMOVE VALVE STEM OIL O SEAL OR RING

- a. Using a needle nose pliers, remove the oil seals.



Fig. 151: Identifying Oil Seals Using Needle Nose Pliers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REMOVE VALVE SPRING SEAT

- a. Using compressed air and a magnetic finger, remove the valve spring seats by blowing air onto them.

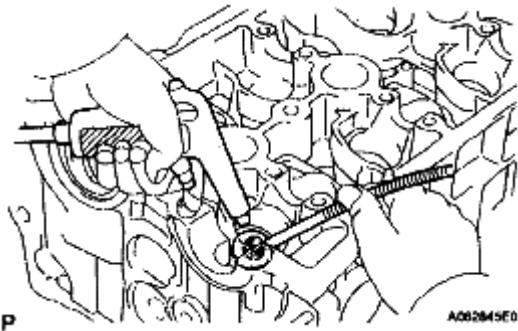


Fig. 152: Removing Valve Spring Seat Using Compressed Air And Magnetic Finger
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE NO. 1 STRAIGHT HEAD SCREW PLUG

- a. Using a 14 mm straight hexagon wrench, remove the 2 screw plugs and 2 gaskets.

NOTE: If water leaks from the straight head screw plug or the plug corrodes, replace it.

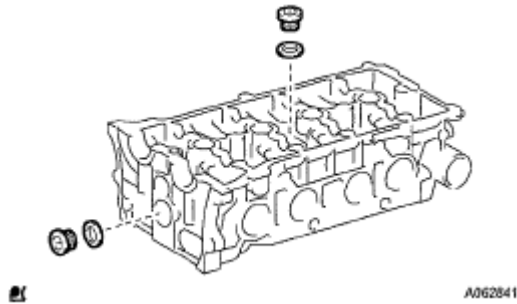


Fig. 153: Identifying No. 1 Straight Head Screw Plugs And Gaskets
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE STUD BOLT
8. REMOVE RING PIN

INSPECTION

1. INSPECT CYLINDER HEAD FOR FLATNESS

- a. Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

Maximum warpage

CYLINDER HEAD SPECIFICATION CHART

Item	Specified Condition
Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.08 mm (0.0031 in.)
Exhaust manifold side	0.08 mm (0.0031 in.)

If the warpage is greater than the maximum, replace the cylinder head.

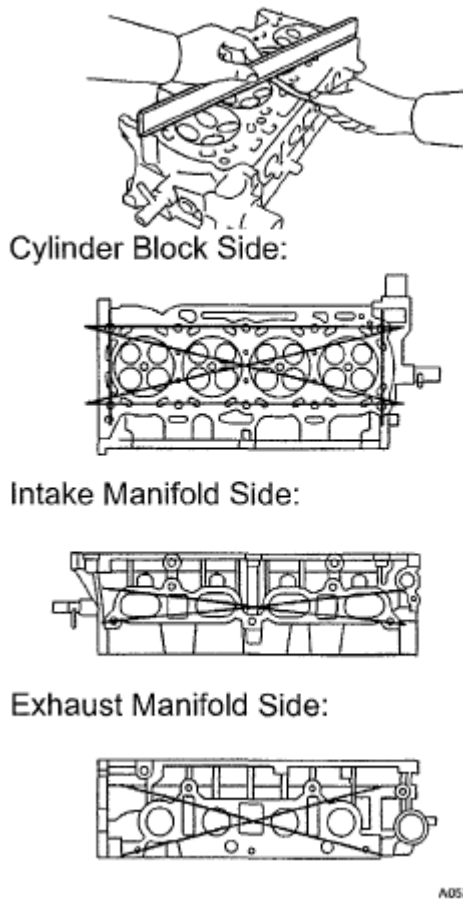


Fig. 154: Inspecting Cylinder Head For Flatness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT CYLINDER HEAD FOR CRACKS

- a. Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks. If cracked, replace the cylinder head.

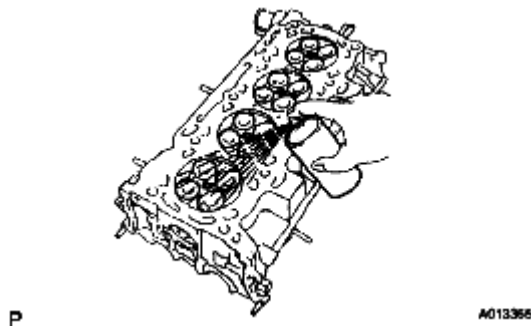


Fig. 155: Inspecting Cylinder Head For Cracks
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSPECT CAMSHAFT THRUST CLEARANCE

- a. Install the camshafts (See **REASSEMBLY**).
- b. Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance

STANDARD THRUST CLEARANCE SPECIFICATION

Item	Specified Condition
Intake	0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Exhaust	0.080 to 0.135 mm (0.0032 to 0.0053 in.)

Maximum thrust clearance

MAXIMUM THRUST CLEARANCE SPECIFICATION

Item	Specified Condition
Intake	0.110 mm (0.0043 in.)
Exhaust	0.150 mm (0.0059 in.)

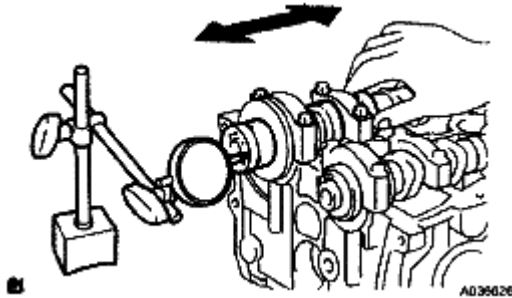


Fig. 156: Measuring Thrust Clearance While Moving Camshaft Back And Forth
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the thrust clearance is greater than the maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.

4. INSPECT CAMSHAFT 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 **REASSEMBLY**).

NOTE: Do not turn the camshaft.

- e. Remove the bearing caps (See **REASSEMBLY**).

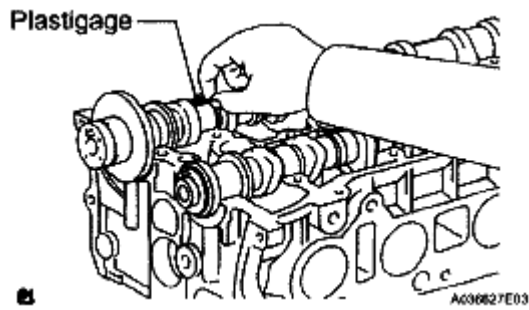


Fig. 157: Laying Strip Of Plastigage Across Each Of Camshaft Journals

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Measure the Plastigage at its widest point.

Standard oil clearance

OIL CLEARANCE SPECIFICATION

Item	Specified Condition
Camshaft No. 1 journal bearing mark 1	0.007 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft No. 1 journal bearing mark 2	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft No. 1 journal bearing mark 3	0.008 to 0.038 mm (0.0003 to 0.0015 in.)
Camshaft other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)
No. 2 camshaft No. 1 journal	0.015 to 0.054 mm (0.0006 to 0.0021 in.)
No. 2 camshaft other journals	0.025 to 0.062 mm (0.0010 to 0.0024 in.)

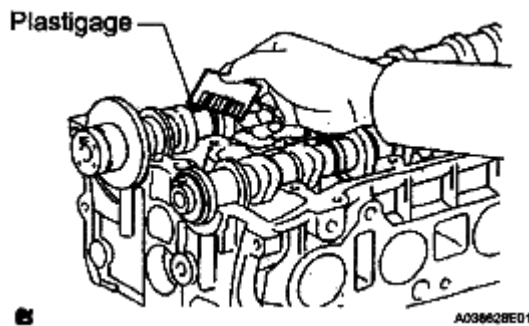


Fig. 158: Measuring Plastigage At Its Widest Point

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Maximum oil clearance

OIL CLEARANCE SPECIFICATION

Item	Specified Condition
Intake	0.070 mm (0.0028 in.)
Exhaust	0.100 mm (0.0039 in.)

NOTE: Completely remove the Plastigage after the inspection.

- If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the cylinder head.
 - If the oil clearance on the camshaft No. 1 journal is greater than the maximum, choose a new bearing and install it.
1. Check the number mark shown in the illustration.

Cylinder head journal bore diameter

CYLINDER HEAD JOURNAL BORE DIAMETER

Mark 1	Mark 2	Mark 3
40.000 to 40.008 mm (1.5748 to 1.5752 in.)	40.009 to 40.017 mm (1.5752 to 1.5755 in.)	40.018 to 40.025 mm (1.5755 to 1.5758 in.)

Standard bearing center wall thickness

BEARING CENTER WALL THICKNESS SPECIFICATION

Mark 1	Mark 2	Mark 3
2.000 to 2.004 mm (0.0787 to 0.0789 in.)	2.005 to 2.008 mm (0.0789 to 0.0791 in.)	2.009 to 2.012 mm (0.0791 to 0.0792 in.)

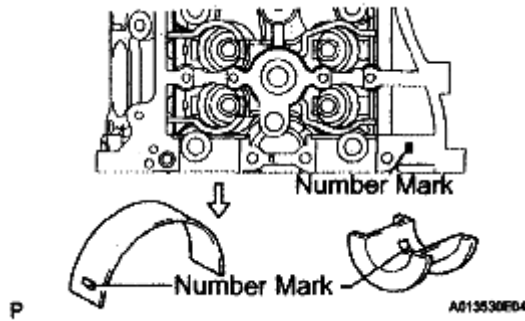


Fig. 159: Identifying Number Mark
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Camshaft journal diameter

CAMSHAFT JOURNAL DIAMETER

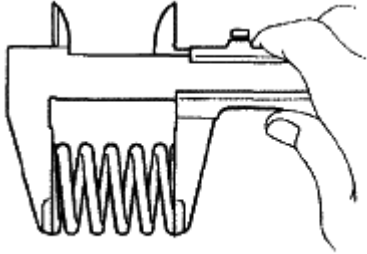
Mark 1	Mark 2	Mark 3
35.971 to 35.985 mm (1.4162 to 1.4167 in.)	35.971 to 35.985 mm (1.4162 to 1.4167 in.)	35.971 to 35.985 mm (1.4162 to 1.4167 in.)

5. INSPECT INNER COMPRESSION SPRING

- a. Using vernier calipers, measure the free length of the valve spring.

Free length: 47.43 mm (1.867 in.)

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



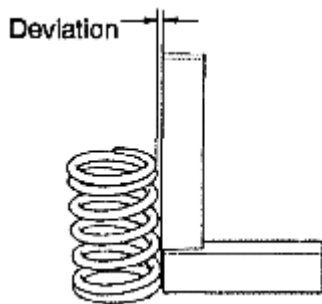
EM00801

Fig. 160: Measuring Free Length Of Valve Spring Using Vernier Calipers
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a steel set square, measure the deviation of the valve spring.

Maximum deviation: 1.6 mm (0.063 in.)

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

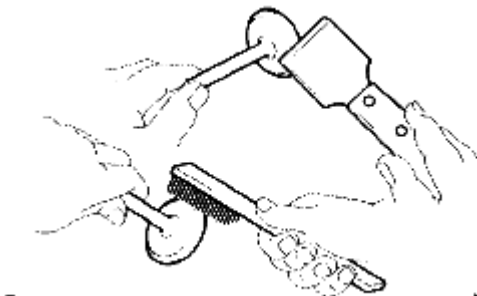


EM00908E01

Fig. 161: Measuring Deviation Of Valve Spring Using Steel Set Square
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSPECT INTAKE VALVE

- a. Using a gasket scraper, scrape off any carbon on the valve head.



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Fig. 162: Scraping Off Any Carbon On Valve Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using vernier calipers, measure the overall length of the valve.

Standard overall length: 101.71 mm (4.0043 in.)

Minimum overall length: 101.21 mm (3.9846 in.)

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

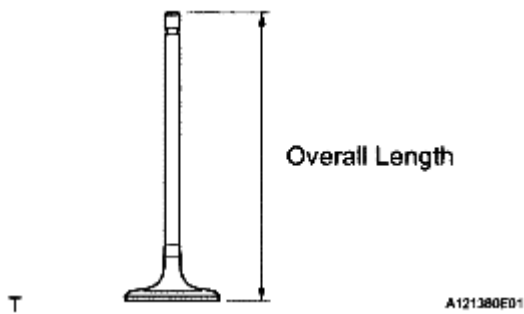


Fig. 163: Identifying Overall Length Of Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter: 5.470 to 5.485 mm (0.2154 to 0.2159 in.)

If the valve stem is not as specified, check the oil clearance.

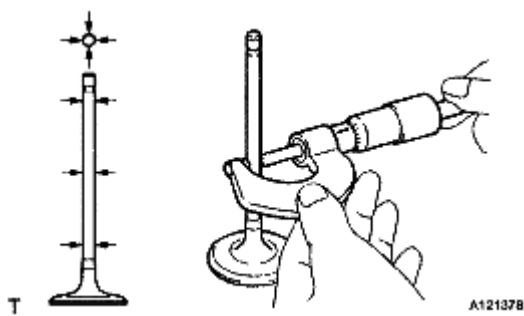


Fig. 164: Measuring Diameter Of Valve Stem Using Micrometer
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using vernier calipers, measure the valve head margin thickness.

Standard margin thickness: 1.05 to 1.45 mm (0.0413 to 0.0571 in.)

Minimum margin thickness: 0.50 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

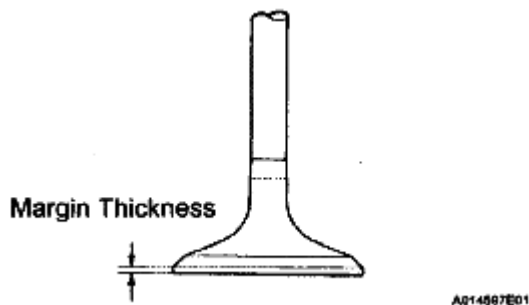


Fig. 165: Identifying Valve Head Margin Thickness
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSPECT EXHAUST VALVE

- a. Using a gasket scraper, scrape off any carbon on the valve head.

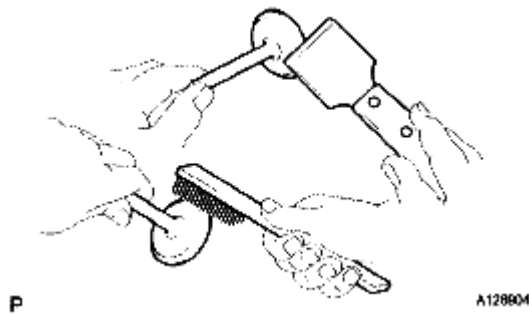


Fig. 166: Scraping Off Any Carbon On Valve Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using vernier calipers, measure the overall length of the valve.

Standard overall length: 101.15 mm (3.9823 in.)

Minimum overall length: 100.70 mm (3.9646 in.)

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

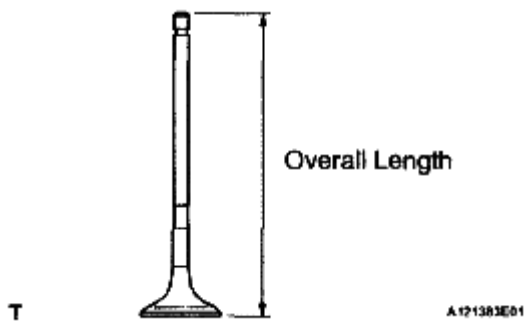


Fig. 167: Identifying Overall Length Of Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter: 5.465 to 5.480 mm (0.2152 to 0.2157 in.)

If the valve stem is not as specified, check the oil clearance.

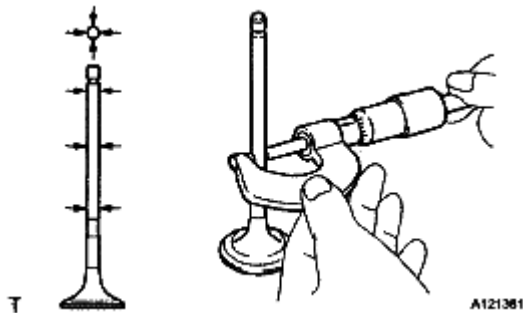


Fig. 168: Measuring Diameter Of Valve Stem
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using vernier calipers, measure the valve head margin thickness.

Standard margin thickness: 1.20 to 1.60 mm (0.0472 to 0.0630 in.)

Minimum margin thickness: 0.50 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

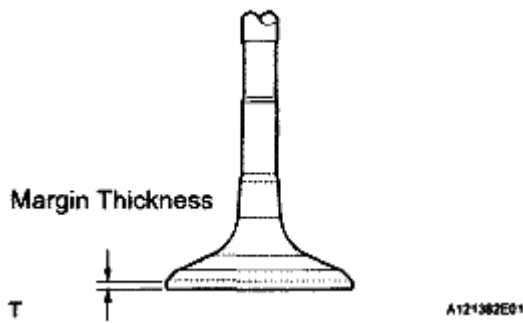


Fig. 169: Identifying Valve Head Margin Thickness
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSPECT INTAKE VALVE GUIDE BUSH

- a. Using a caliper gauge, measure the inside diameter of the guide bush.

Bushing inside diameter: 5.510 to 5.530 mm (0.2169 to 0.2177 in.)

- b. Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard oil clearance: 0.025 to 0.060 mm (0.0010 to 0.0024 in.)

Maximum oil clearance: 0.080 mm (0.0031 in.)

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

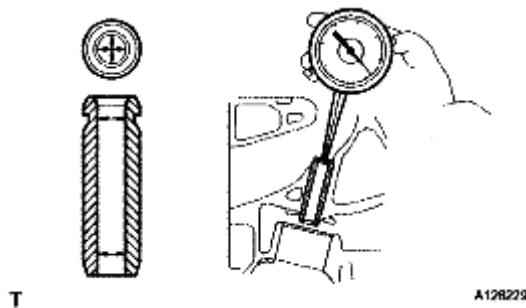


Fig. 170: Measuring Inside Diameter Of Guide Bush
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSPECT EXHAUST VALVE GUIDE BUSH

- a. Using a caliper gauge, measure the inside diameter of the guide bush.

Bushing inside diameter: 5.510 to 5.530 mm (0.2169 to 0.2177 in.)

- b. Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance: 0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance: 0.100 mm (0.0039 in.)

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

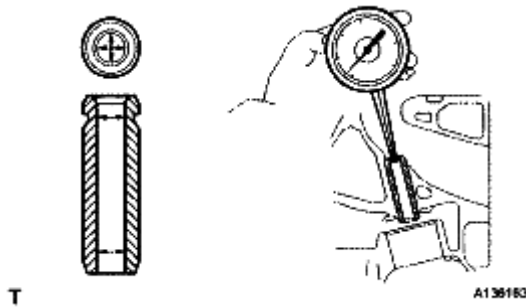


Fig. 171: Measuring Inside Diameter Of Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. INSPECT VALVE LIFTER

- a. Using a micrometer, measure the lifter diameter.

Lifter diameter: 30.966 to 30.976 mm (1.2191 to 1.2195 in.)

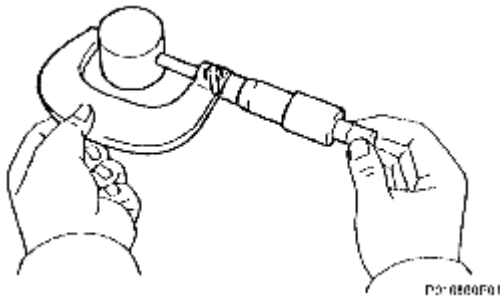


Fig. 172: Measuring Lifter Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Standard lifter bore diameter: 31.009 to 31.025 mm (1.2208 to 1.2215 in.)

- c. Subtract the lifter diameter measurement from the lifter bore diameter measurement.

Standard oil clearance: 0.033 to 0.059 mm (0.0013 to 0.0023 in.)

Maximum oil clearance: 0.070 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder

head.

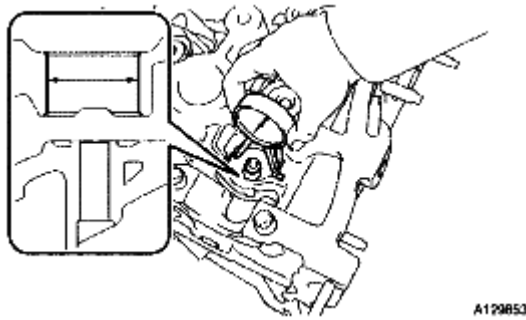


Fig. 173: Measuring Lifter Bore Diameter Of Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. INSPECT CYLINDER HEAD SET BOLT

- a. Using vernier calipers, measure the length of the head bolts from the seat to the end.

Standard bolt length: 141.3 to 142.7 mm (5.563 to 5.618 in.)

Maximum bolt length: 144.2 mm (5.677 in.)

If the bolt length is greater than the maximum, replace the cylinder head set bolt.

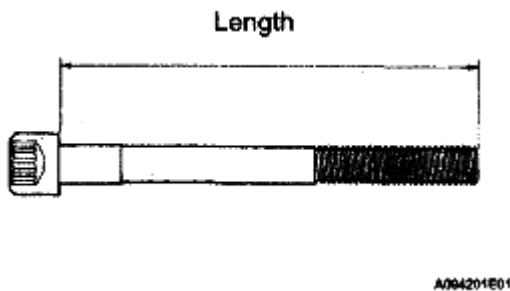


Fig. 174: Measuring Length Of Head Bolts From Seat To End
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPLACEMENT

1. REMOVE INTAKE VALVE GUIDE BUSH

- a. Heat the cylinder head to 80 to 100°C (176 to 212°F).
- b. Place the cylinder head on wooden blocks.
- c. Using SST and a hammer, tap out the guide bush.

SST 09202-70020(09202-00010)

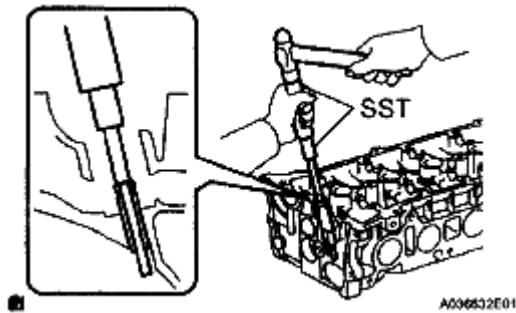


Fig. 175: Tapping Out Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. REMOVE EXHAUST VALVE GUIDE BUSH

- Heat the cylinder head to 80 to 100°C (176 to 212°F).
- Place the cylinder head on wooden blocks.
- Using SST and a hammer, tap out the guide bush.

SST 09202-70020 (09202-00010)

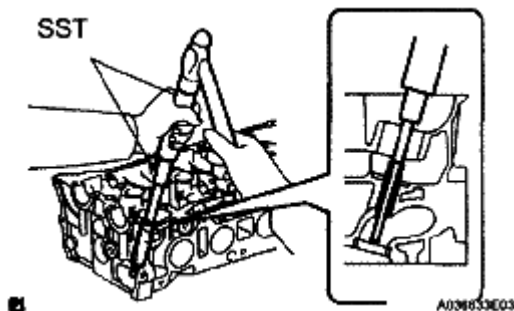


Fig. 176: Tapping Out Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL INTAKE VALVE GUIDE BUSH

- Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Cylinder bore diameter: 10.285 to 10.306 mm (0.4049 to 0.4057 in.)

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

BUSH BORE DIAMETER

Bush size	Bush bore diameter
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)



Fig. 177: Measuring Bush Bore Diameter Of Cylinder Head
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the cylinder head bush bore diameter is greater than 10.306 mm (0.4057 in.), machine the bush bore to a dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) and install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

- b. Heat the cylinder head to 80 to 100°C (176 to 212°F).
- c. Place the cylinder head on wooden blocks.
- d. Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

Protrusion height: 9.6 to 10.0 mm (0.3779 to 0.3937 in.)

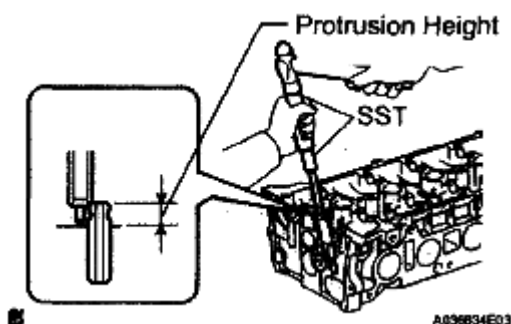
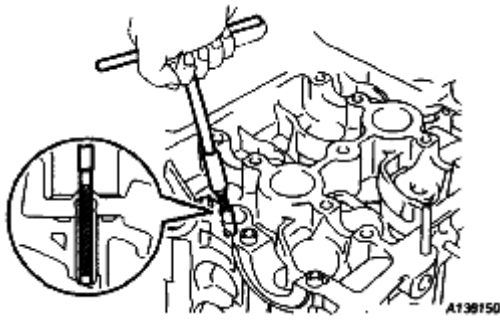


Fig. 178: Tapping In Guide Bush To Specified Protrusion Height
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance: 0.025 to 0.060 mm (0.0010 to 0.0024 in.)

**Fig. 179: Reaming Guide Bush**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL EXHAUST VALVE GUIDE BUSH

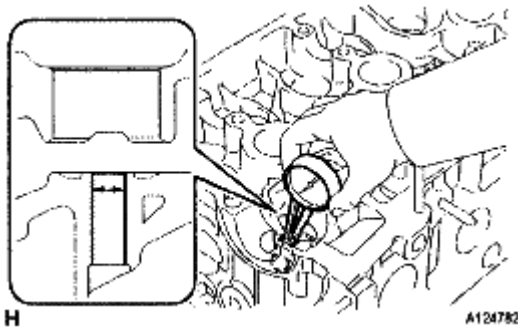
- a. Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Cylinder bore diameter: 10.285 to 10.306 mm (0.4049 to 0.4057 in.)

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

BUSH BORE DIAMETER

Bush size	Bush bore diameter
Use STD	10.285 to 10.306 mm (0.4049 to 0.4057 in.)
Use O/S 0.05	10.335 to 10.356 mm (0.4069 to 0.4077 in.)

**Fig. 180: Measuring Bush Bore Diameter Of Cylinder Head**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the cylinder head bush bore diameter is greater than 10.306 mm (0.4057 in.), machine the bush bore to a dimension of 10.335 to 10.356 mm (0.4069 to 0.4077 in.) and install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

- b. Heat the cylinder head to 80 to 100°C (176 to 212°F).
- c. Place the cylinder head on wooden blocks.
- d. Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

Protrusion height: 9.6 to 10.0 mm (0.3779 to 0.3937 in.)

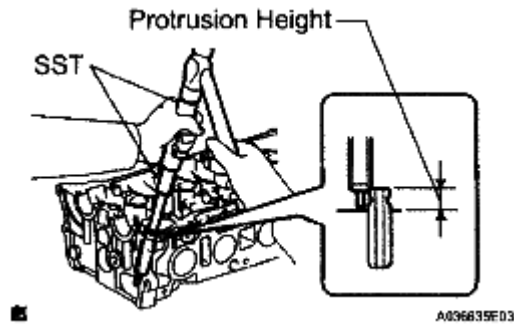


Fig. 181: Tapping In Guide Bush To Specified Protrusion Height
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance between the guide bush and valve stem.

Standard oil clearance: 0.025 to 0.060 mm (0.0010 to 0.0024 in.)

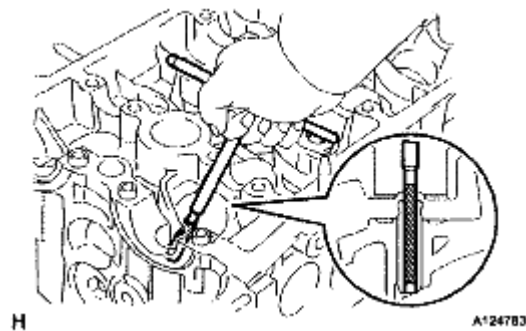


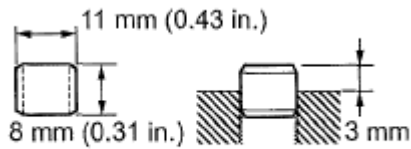
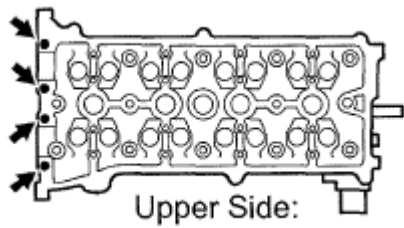
Fig. 182: Reaming Valve Guide Bush
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY

1. INSTALL RING PIN

- a. Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

Protrusion height: 3 mm (0.12 in.)



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Fig. 183: Identifying Protrusion Height

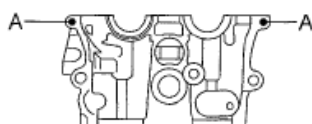
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL STUD BOLT

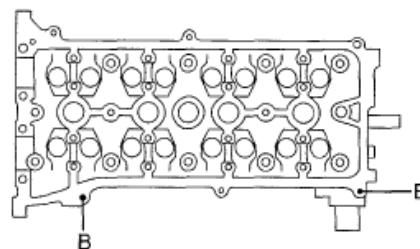
NOTE: If the stud bolt is deformed or the threads are damaged, replace it.

- a. Using E5 and E7 "TORX" sockets, install the stud bolts.

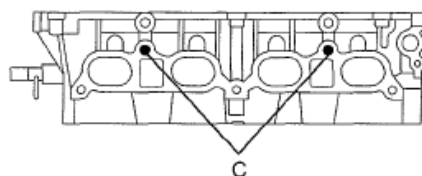
Front Side:



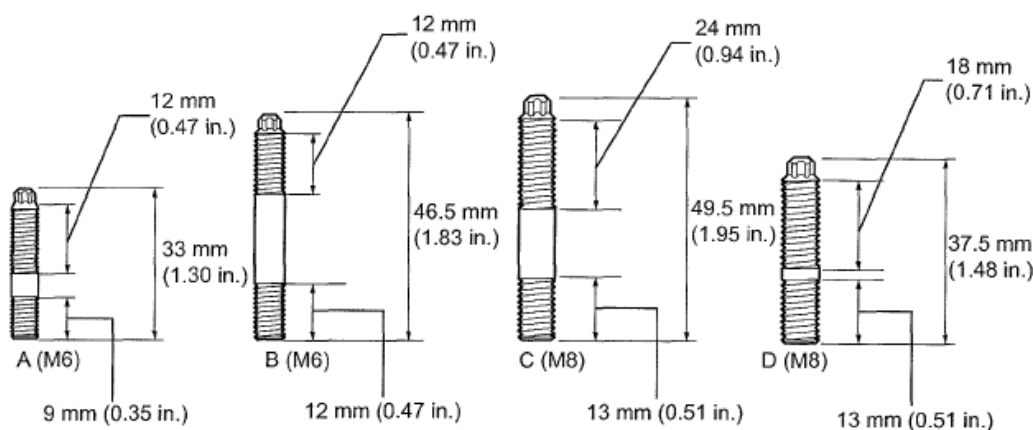
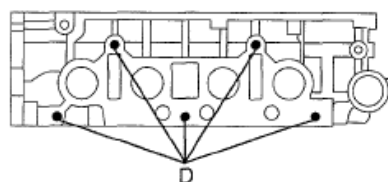
Upper Side:



Intake Side:



Exhaust Side:



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Fig. 184: Stud Bolts Specifications Chart
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque:

Bolt A

5.0 N*m (51 kgf*cm, 44 in.*lbf)

Bolt B

5.0 N*m (51 kgf*cm, 44 in.*lbf)

Bolt C

9.5 N*m (97 kgf*cm, 84 in.*lbf)

Bolt D

9.5 N*m (97 kgf*cm, 84 in.*lbf)

3. INSTALL NO. 1 STRAIGHT HEAD SCREW PLUG

- a. Using a 14 mm straight hexagon wrench, install 2 new gaskets and the 2 straight screw plugs.

Torque: 86 N*m (877 kgf*cm, 64 ft.*lbf)

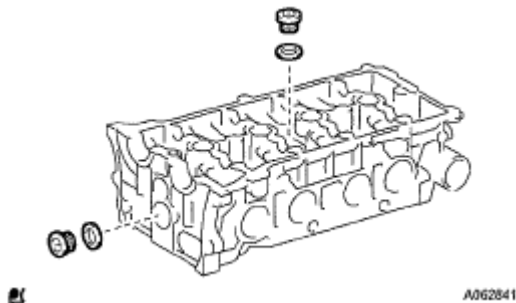


Fig. 185: Identifying Gaskets And Straight Screw Plugs
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL VALVE SPRING SEAT

- a. Install the valve spring seats into the cylinder head.



Fig. 186: Identifying Valve Spring Seats
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSTALL VALVE STEM OIL O SEAL OR RING

- a. Apply a light coat of engine oil to a new oil seal.

NOTE: Pay close attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal into the exhaust side or installing the exhaust oil seal into the intake side can cause installation problems later.

HINT:

The intake valve oil seal is gray and the exhaust valve oil seal is black.

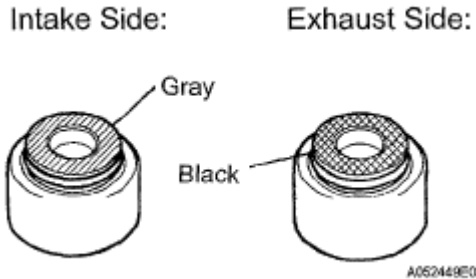


Fig. 187: Identifying Light Coat Of Engine Oil
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using SST, push in the oil seal.

SST 09201-41020

NOTE: Failure to use SST will cause the seal to be damaged or improperly seated.

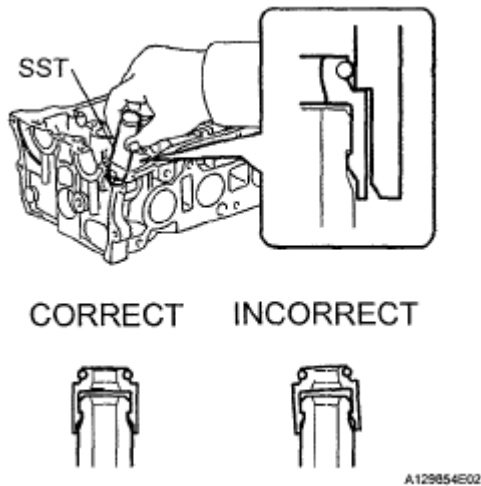


Fig. 188: Pushing In Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL INTAKE VALVE

- a. Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.
- b. Install the valve, compression spring and spring retainer to the cylinder head.

NOTE: Install the same parts in the same combination to the original locations.

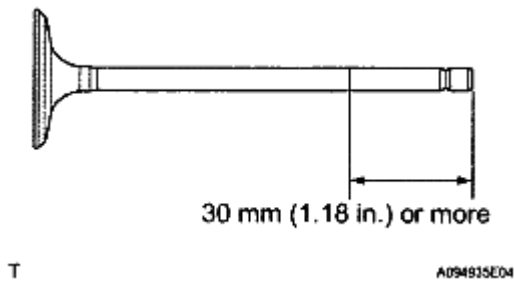


Fig. 189: Identifying Tip Area Of Intake Valve
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using SST, and wooden blocks, compress the spring and install the 2 retainer locks.

SST 09202-70020 (09202-00010)

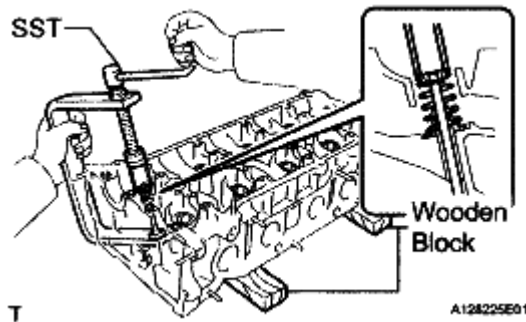


Fig. 190: Compressing Spring
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTE: Be careful not to damage the valve stem tip.

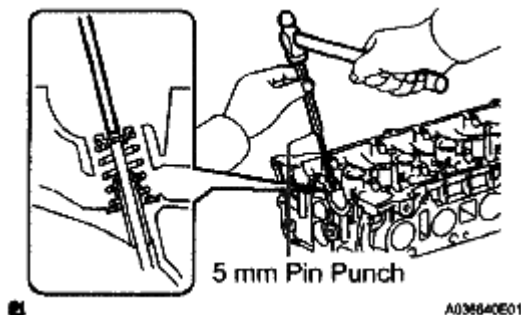


Fig. 191: Tapping Valve Stem Tip To Ensure Proper Fit
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL EXHAUST VALVE

- a. Apply a sufficient coat of engine oil to the tip area of the intake valve shown in the illustration.
- b. Install the valve, compression spring and spring retainer to the cylinder head.

NOTE: **Install the same parts in the same combination to the original locations.**

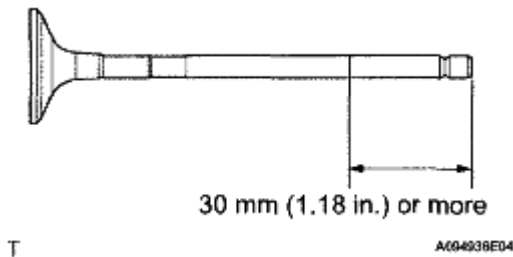


Fig. 192: Identifying Tip Area Of Intake Valve Shown
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using SST, and wooden blocks, compress the spring and install the 2 retainer locks.

SST 09202-70020 (09202-00010)

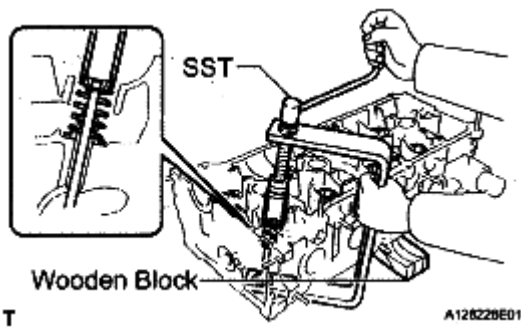


Fig. 193: Compressing Spring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using a 5 mm pin punch and plastic hammer, lightly tap the valve stem tip to ensure a proper fit.

NOTE: **Be careful not to damage the valve stem tip.**

8. INSTALL VALVE LIFTER

- a. Apply a light coat of engine oil.

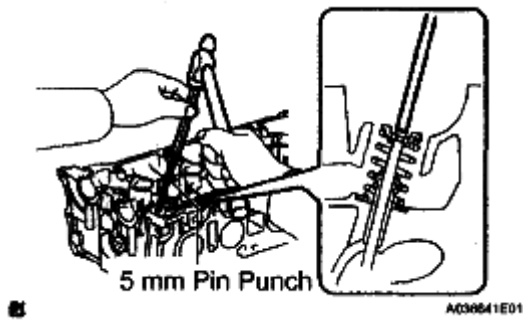


Fig. 194: Tapping Valve Stem Tip To Ensure Proper Fit
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Assemble the valve lifter and the tip of the valve stem.

NOTE: Install the same parts in the same combination to the original locations.

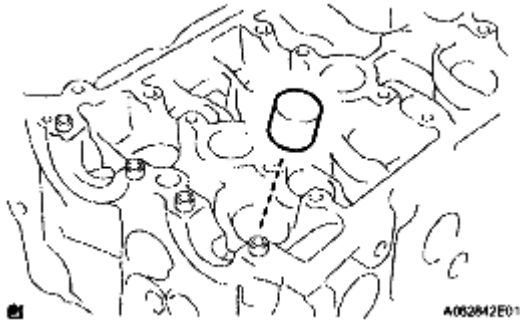


Fig. 195: Identifying Valve Lifter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REPAIR

1. INSPECT VALVE SEATS

- a. Apply a light coat of prussian blue to the valve face.
- b. Lightly press the valve face against the valve seat.
- c. Check the valve face and valve seat according to the following procedure:
 1. If prussian blue appears 360° around the valve face, the valve face is concentric. If not, replace valve.
 2. If prussian blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.

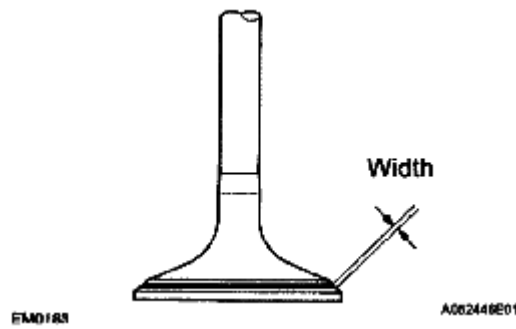


Fig. 196: Checking Valve Face With Width
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. Check that the valve seat contact is in the middle of the valve face with the width between 1.0 to 1.4 mm (intake side (0.039 to 0.055 in.)).
4. Check that the valve face with the width between 1.2 to 1.6 mm (Exhaust side (0.047 to 0.063 in.)).

2. REPAIR VALVE SEATS

NOTE:

- Repair the seat while checking the seating position.
- Keep the lip free from foreign matter.

- a. Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.

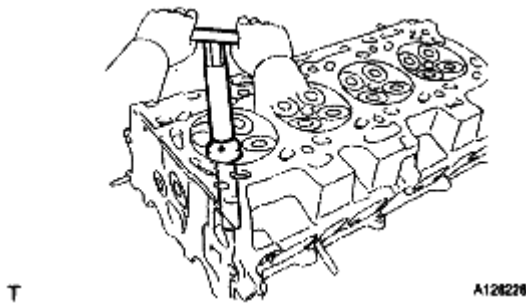


Fig. 197: Resurfacing Valve Seat
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using 30° to 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Valve Seat Width

VALVE SEAT WIDTH SPECIFICATION

Item	Specified Condition

Intake Side	1.0 to 1.4 mm (0.039 to 0.055 in.)
Exhaust Side	1.2 to 1.6 mm (0.047 to 0.063 in.)

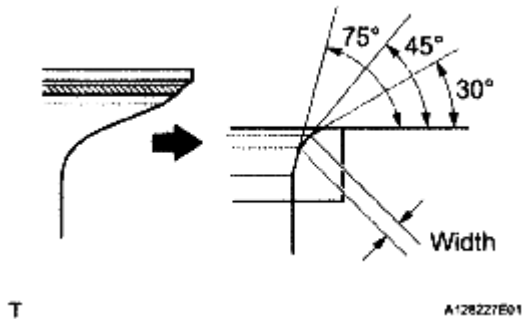
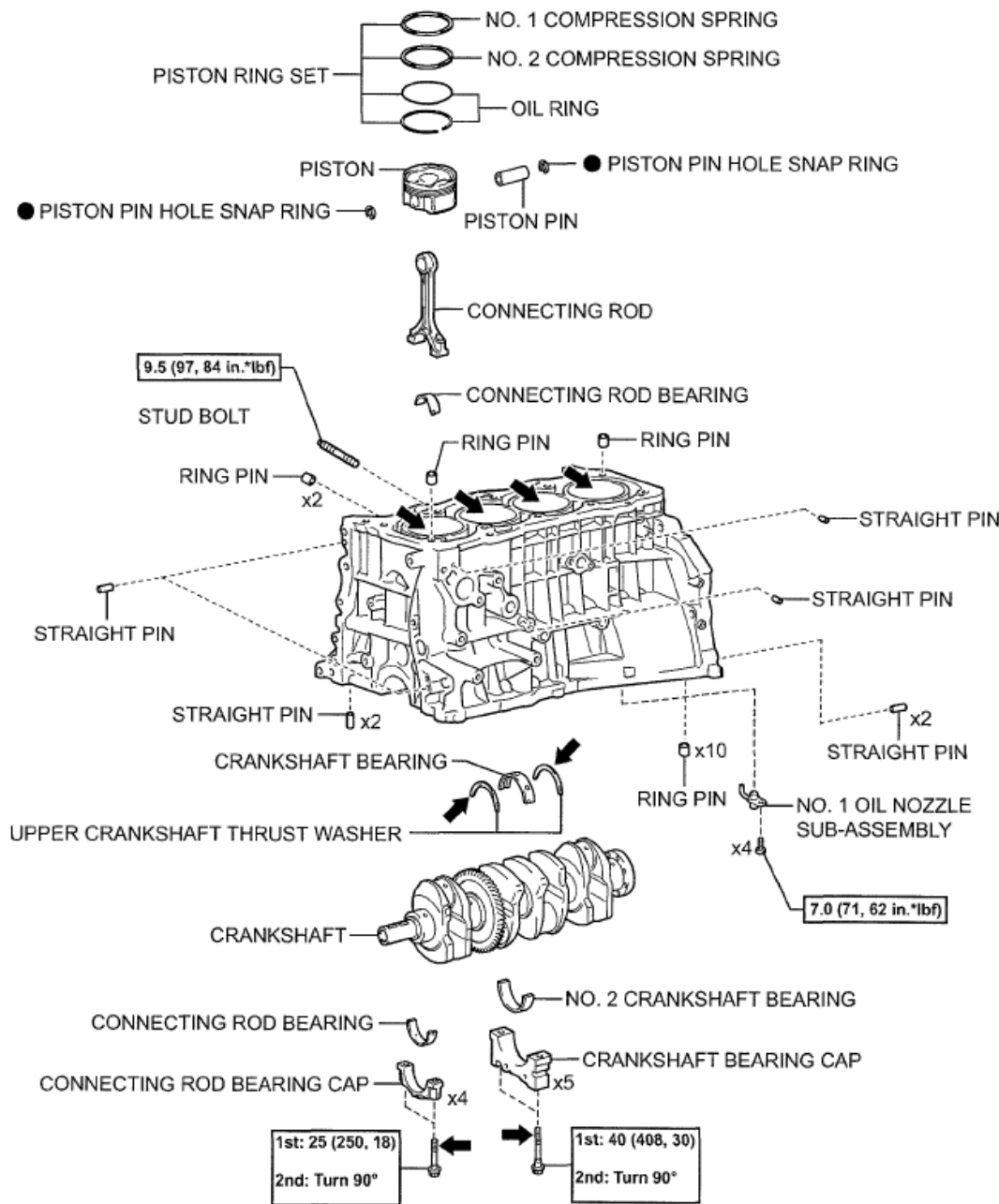


Fig. 198: Identifying Correct Valve Seat
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Handrub the valve and valve seat with an abrasive compound.
- d. Check the valve seating position.

CYLINDER BLOCK

COMPONENTS



N*m (kgf*cm, ft*lbf) : Specified torque ● Non-reusable part ← Engine oil

Fig. 199: Identifying Cylinder Block Components With Torque Specifications
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. **INSPECT CONNECTING ROD THRUST CLEARANCE** (See [INSPECTION](#))
2. **INSPECT CONNECTING ROD OIL CLEARANCE** (See [INSPECTION](#))
3. **REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD**
 - a. Check that the matchmarks on the connecting rod and cap are aligned to ensure the correct

reassembly.

HINT:

The matchmarks on the connecting rods and caps are provided for ensuring the correct reassembly.

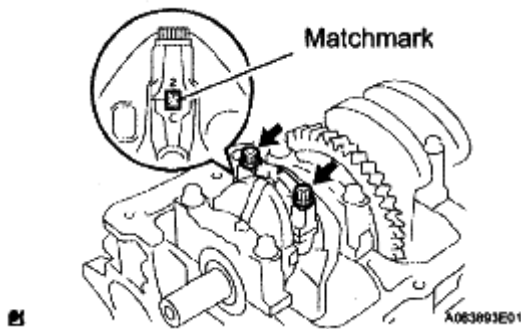


Fig. 200: Checking That Matchmarks On Connecting Rod And Cap Are Aligned To Ensure Correct Reassembly

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a 12 mm socket wrench, uniformly loosen the 2 bolts.
- c. Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:

Keep the lower bearing inserted in the connecting rod cap.

- d. Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

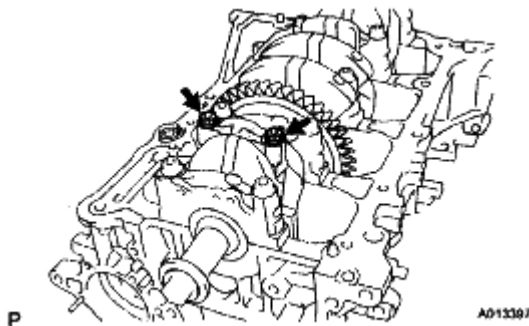


Fig. 201: Locating Connecting Rod Cap Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- Keep the bearing, connecting rod and cap together.

- Arrange the piston and connecting rod assemblies in the correct order.

4. REMOVE CONNECTING ROD BEARING

- Remove the connecting rod bearings.

HINT:

Arrange the removed parts in the correct order.

5. REMOVE PISTON RING SET

- Using a piston ring expander, remove the 2 compression rings.
- Remove the oil ring rail and oil ring expander by hand

HINT:

Arrange the removed parts in the correct order.

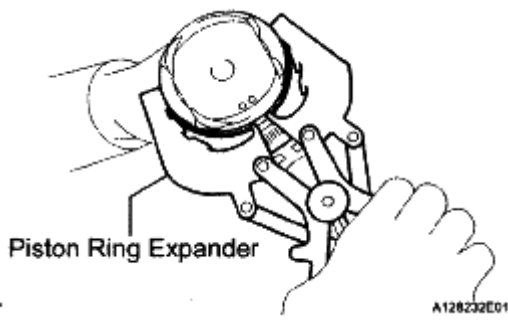


Fig. 202: Removing Piston Ring With Piston Ring Expander
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE PISTON PIN HOLE SNAP RING

- Using a screwdriver, pry out the 2 snap rings.

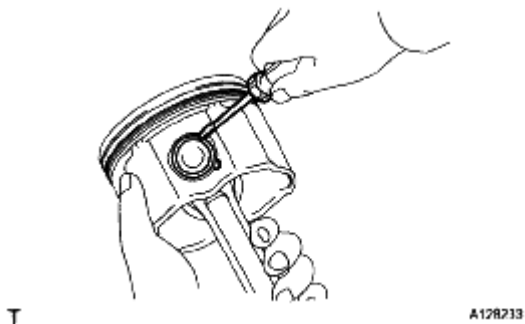


Fig. 203: Prying Out Snap Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE PISTON

- a. Gradually heat the piston to between 80 and 90°C (176 and 194°F).

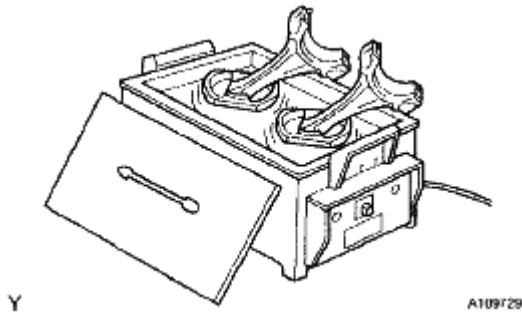


Fig. 204: Heating Piston

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a plastic 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, pin, rings, connecting rods and bearings in the correct order.

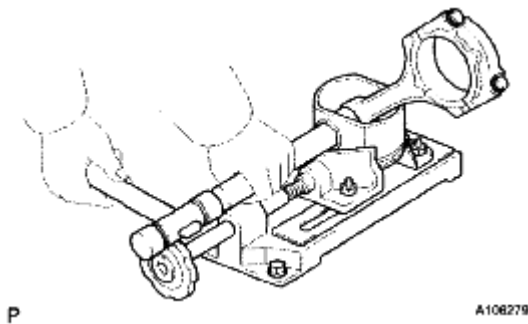


Fig. 205: Tapping Out Piston Pin And Connecting Rod

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSPECT CRANKSHAFT THRUST CLEARANCE (See INSPECTION)

9. REMOVE CRANKSHAFT

- a. Uniformly loosen and remove the 10 main bearing cap bolts in the sequence shown in the illustration.

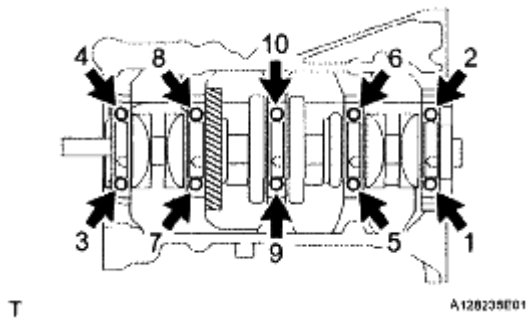


Fig. 206: Identifying Main Bearing Cap Bolts In Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Use 2 removed main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.

NOTE: Insert the bolts into one of the caps. Ease the cap out by gently pulling up and applying force toward the front and back side of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.

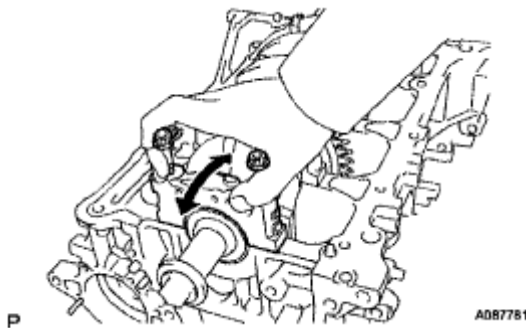


Fig. 207: Removing Main Bearing Caps And Lower Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

HINT:

- Keep the lower bearing and main bearing cap.
- Arrange the main bearing caps in the correct order.

- c. Lift out the crankshaft.

10. REMOVE UPPER CRANKSHAFT THRUST WASHER

- a. Remove the upper thrust washers from the cylinder block.

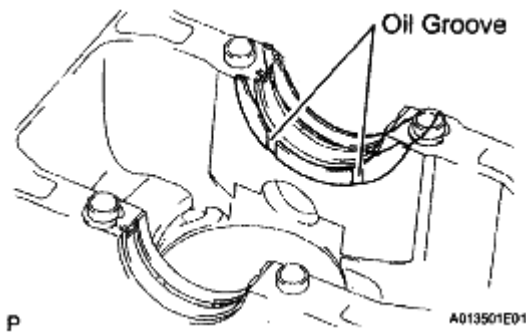


Fig. 208: Identifying Oil Grooves

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. REMOVE CRANKSHAFT BEARING

- a. Remove the 5 crankshaft bearings from the cylinder block.

HINT:

Arrange the removed parts in the correct order.

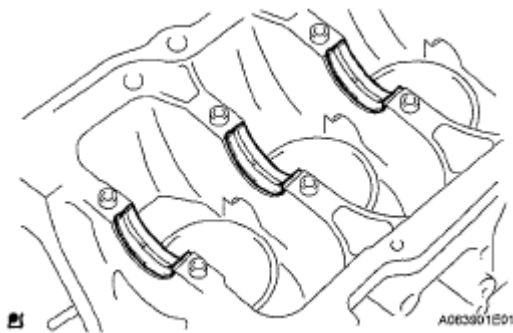


Fig. 209: Identifying Crankshaft Bearings

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. REMOVE NO. 2 CRANKSHAFT BEARING

- a. Remove the 5 No. 2 crankshaft bearings from the 5 main bearing caps.

HINT:

Arrange the removed parts in the correct order.

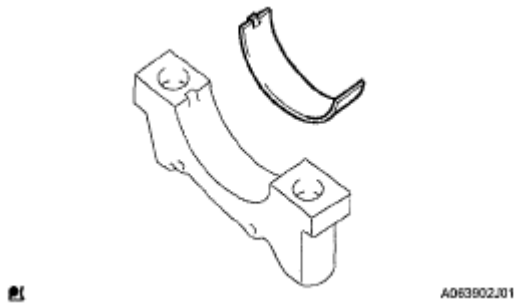


Fig. 210: Identifying No. 2 Crankshaft Bearings
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY

- a. Using a 5 mm hexagon wrench, remove the bolts and oil nozzles.

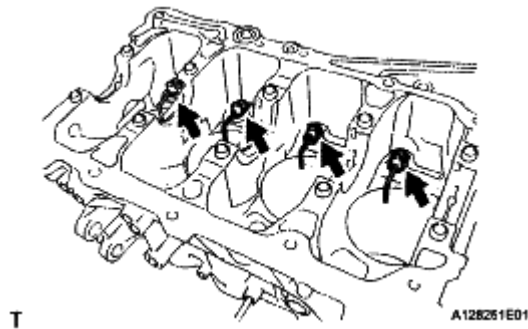


Fig. 211: Locating Bolts And Oil Nozzles
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. REMOVE STUD BOLT

15. REMOVE RING PIN

16. REMOVE STRAIGHT PIN

INSPECTION

1. INSPECT CONNECTING ROD THRUST CLEARANCE

- a. Install the connecting rod cap (See **REASSEMBLY**).
- b. Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance: 0.160 to 0.362 mm (0.0063 to 0.0143 in.)

Maximum thrust clearance: 0.362 mm (0.0143 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.



Fig. 212: Measuring Thrust Clearance While Moving Connecting Rod Back And Forth
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT CONNECTING ROD OIL CLEARANCE

- a. Clean the crank pin and bearing.
- b. Check the crank pin and bearing for pitting and scratches.
- c. Lay a strip of Plastigage on the crank pin.

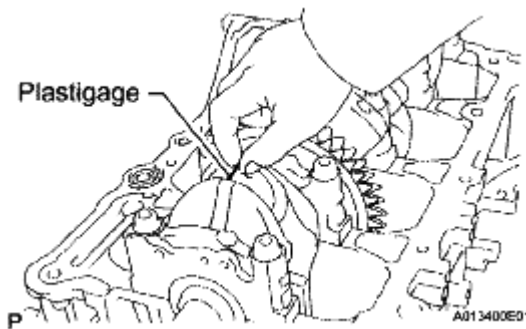


Fig. 213: Laying Strip Of Plastigage On Crank Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Check that the front mark of the connecting rod cap is facing forward.
- e. Install the connecting rod cap (See **REASSEMBLY**).

NOTE: Do not turn the crankshaft.

- f. Remove the 2 bolts and connecting rod cap (See **DISASSEMBLY**).

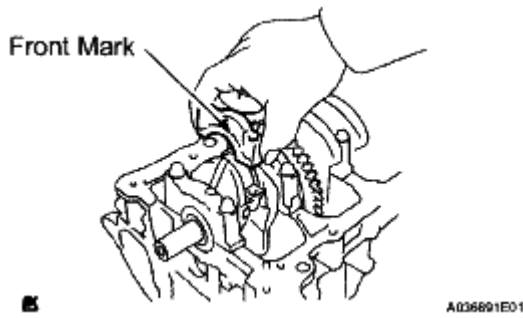


Fig. 214: Checking That Front Mark Of Connecting Rod Cap Is Facing Forward
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Measure the Plastigage at its widest point.

Standard oil clearance: 0.032 to 0.063 mm (0.0013 to 0.0025 in.)

Maximum oil clearance: 0.063 mm (0.0025 in.)

NOTE: Completely remove the Plastigage after the measurement.

If the oil clearance is greater than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing's standard thickness is indicated by a 1, 2, or 3 mark on its surface.

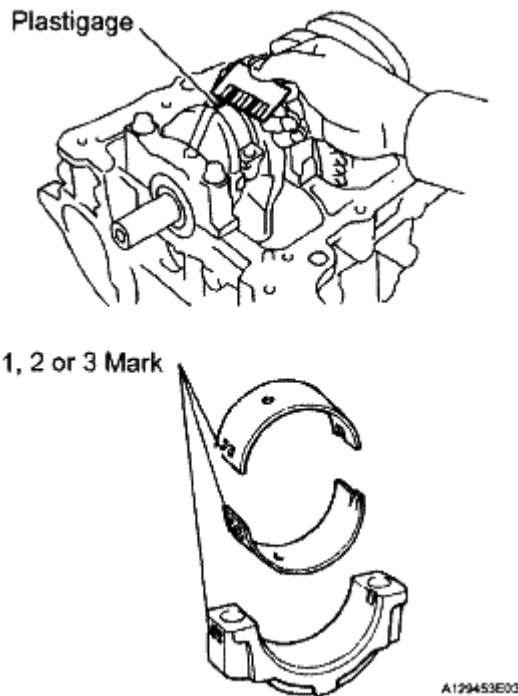


Fig. 215: Measuring Plastigage At Its Widest Point
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard connecting rod large end bore diameter

STANDARD CONNECTING ROD LARGE END BORE DIAMETER

Mark	Specified Condition
Mark 1	51.000 to 51.007 mm (2.0079 to 2.0082 in.)
Mark 2	51.008 to 51.013 mm (2.0082 to 2.0084 in.)
Mark 3	51.014 to 51.020 mm (2.0084 to 2.0087 in.)

Standard connecting rod bearing thickness

STANDARD CONNECTING ROD BEARING THICKNESS

Mark	Specified Condition
Mark 1	1.485 to 1.488 mm (0.0585 to 0.0586 in.)
Mark 2	1.489 to 1.491 mm (0.0586 to 0.0587 in.)
Mark 3	1.492 to 1.494 mm (0.0587 to 0.0588 in.)

Standard crankshaft pin diameter

STANDARD CRANKSHAFT PIN DIAMETER

Mark	Specified Condition
Mark 1	47.990 to 48.000 (1.8894 to 1.8898 in.)
Mark 2	47.990 to 48.000 (1.8894 to 1.8898 in.)

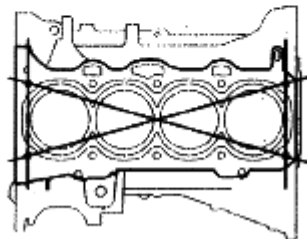
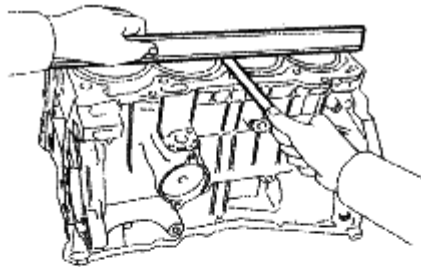
Mark 3 | 47.990 to 48.000 (1.8894 to 1.8898 in.)

3. INSPECT CYLINDER BLOCK FOR WARPAGE

- a. Using a precision straightedge and feeler gauge, measure the warpage of the surface that is in contact with the cylinder head gasket.

Maximum warpage: 0.05 mm (0.0020 in.)

If the warpage is greater than the maximum, replace the cylinder block.



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Fig. 216: Inspecting Cylinder Block For Warpage
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

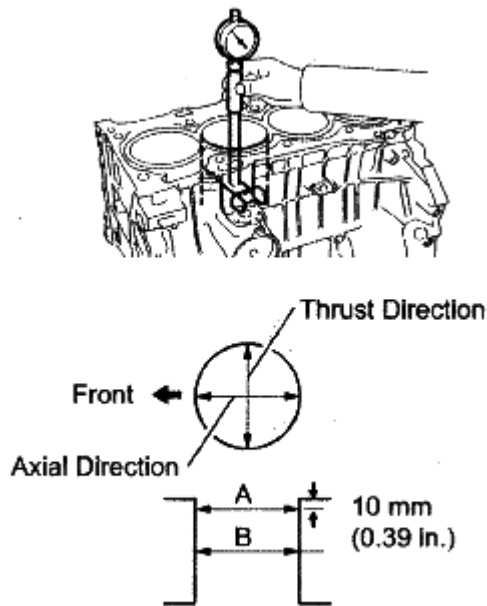
4. INSPECT CYLINDER BORE

- a. Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

Standard diameter: 88.500 to 88.513 mm (3.4843 to 3.4847 in.)

Maximum diameter: 88.633 mm (3.4894 in.)

If the average diameter of the 4 positions is greater than the maximum, replace the cylinder block.



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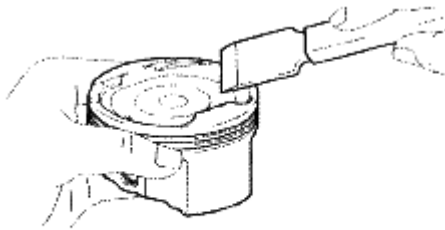
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Fig. 217: Measuring Cylinder Bore Diameter At Positions A And B In Thrust And Axial Directions

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. INSPECT PISTON

- a. Using a gasket scraper, remove the carbon from the piston top.



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Fig. 218: Removing Carbon From Piston Top

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

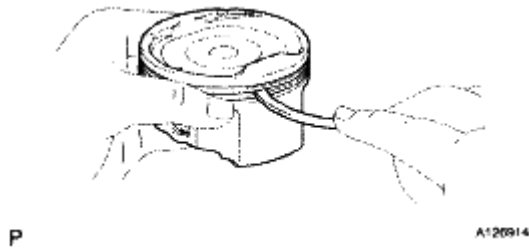


Fig. 219: Cleaning Piston Ring Grooves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

NOTE: Do not use a wire brush.

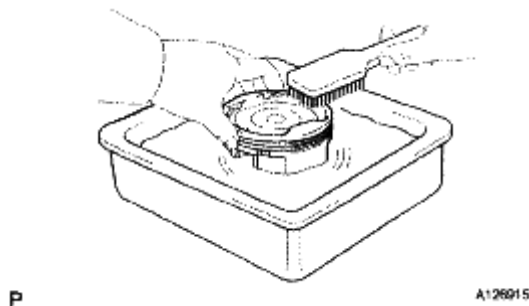


Fig. 220: Cleaning Piston
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at the piston 44.3 mm (1.7441 in.) from the piston head.

Standard piston diameter: 88.469 to 88.479 mm (3.4830 to 3.4834 in.)

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

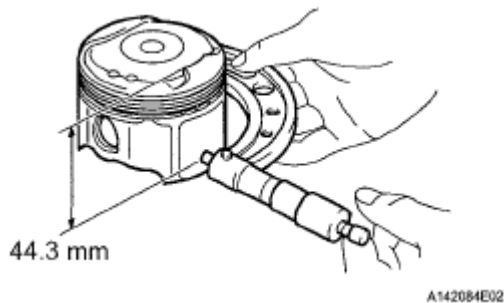


Fig. 221: Measuring Piston Diameter At Right Angles To Piston Pin Hole, And At Piston 44.3 mm (1.7441 in.) From Piston Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSPECT PISTON OIL CLEARANCE

- a. Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance: 0.021 to 0.044 mm (0.0008 to 0.0017 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

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

7. INSPECT RING GROOVE CLEARANCE

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

Standard ring groove clearance

RING GROOVE SPECIFICATION CHART

Item	Specified Condition
No. 1 Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)
No. 2 Ring	0.020 to 0.060 mm (0.0008 to 0.0024 in.)
Oil Ring	0.020 to 0.070 mm (0.0008 to 0.0028 in.)

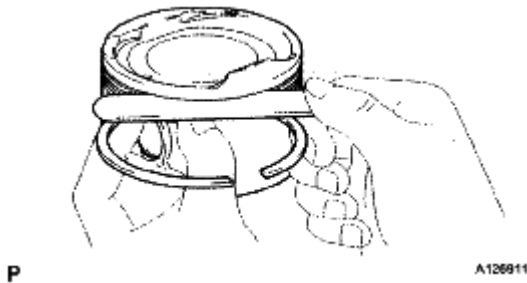


Fig. 222: Measuring Clearance Between Piston Ring And Wall Of Ring Groove
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

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

8. INSPECT PISTON RING END GAP

- a. Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.

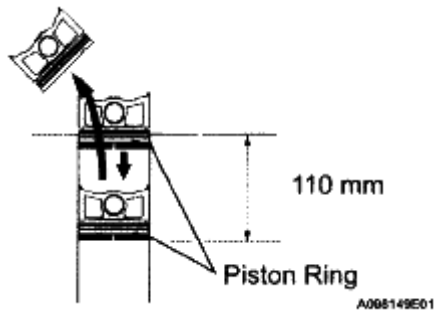


Fig. 223: Pushing Piston Ring Little Beyond Bottom Of Ring Travel, 110 mm (4.33 in.) From Top Of Cylinder Block

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a feeler gauge, measure the end gap.

Standard end gap

STANDARD END GAP

Item	Specified Condition
No. 1 Ring	0.24 to 0.31 mm (0.0094 to 0.0122 in.)
No. 2 Ring	0.33 to 0.43 mm (0.0130 to 0.0169 in.)
Oil Ring	0.10 to 0.30 mm (0.0040 to 0.0119 in.)

Maximum end gap

MAXIMUM END GAP

Item	Specified Condition
No. 1 Ring	0.89 mm (0.0350 in.)
No. 2 Ring	1.37 mm (0.0539 in.)
Oil Ring	0.73 mm (0.0287 in.)

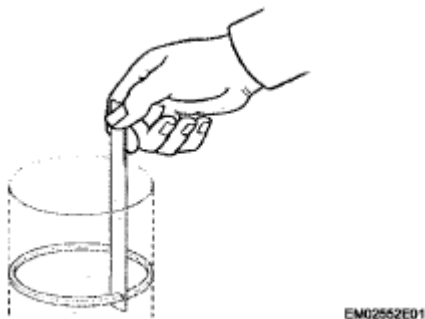


Fig. 224: Measuring End Gap Using Feeler Gauge

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than

the maximum with a new piston ring, replace the cylinder block.

9. INSPECT PISTON PIN OIL CLEARANCE

- a. Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter: 22.001 to 22.010 mm (0.8662 to 0.8665 in.)

PISTON PIN SPECIFICATION

Item	Specified Condition
A	22.001 to 22.004 mm (0.8662 to 0.8663 in.)
B	22.005 to 22.007 mm (0.8663 to 0.8664 in.)
C	22.008 to 22.010 mm (0.8665 to 0.8665 in.)

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



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Fig. 225: Measuring Piston Pin Bore Diameter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter: 21.997 to 22.006 mm (0.8660 to 0.8664 in.)

PISTON PIN SPECIFICATION

Item	Specified Condition
A	21.997 to 22.000 mm (0.8660 to 0.8661 in.)
B	22.001 to 22.003 mm (0.8662 to 0.8663 in.)
C	22.004 to 22.006 mm (0.8663 to 0.8664 in.)

If the diameter is not as specified, replace the piston pin.

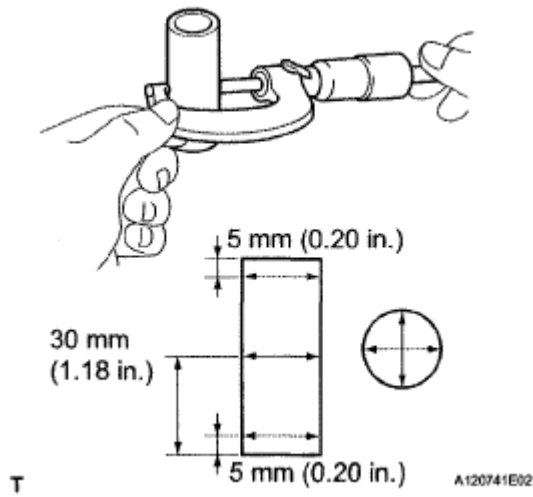


Fig. 226: Measuring Piston Pin Diameter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using a caliper gauge, measure the connecting rod small end bore diameter.

Standard connecting rod small end bore diameter: 22.005 to 22.014 mm (0.8663 to 0.8667 in.)

CONNECTING ROD SPECIFICATION

Item	Specified Condition
A	22.005 to 22.008 mm (0.8663 to 0.8665 in.)
B	22.009 to 22.011 mm (0.8665 to 0.8666 in.)
C	22.012 to 22.014 mm (0.8666 to 0.8667 in.)

If the diameter is not as specified, replace the connecting rod.

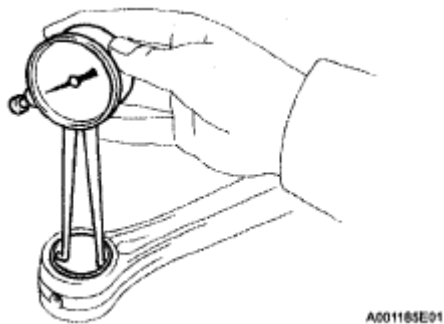


Fig. 227: Measuring Connecting Rod Small End Bore Diameter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

Standard oil clearance: 0.001 to 0.007 mm (0.00004 to 0.0003 in.)

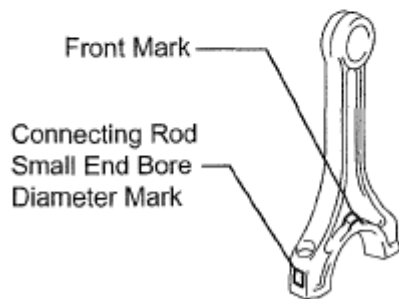
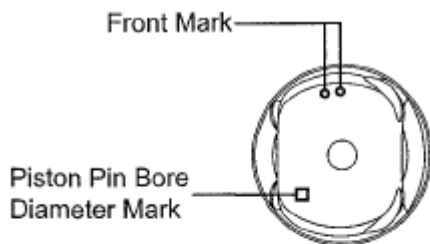
Maximum oil clearance: 0.010 mm (0.0004 in.)

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the piston and piston pin as a set.

- e. Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance: 0.005 to 0.011 mm (0.0002 to 0.0004 in.)**Maximum oil clearance: 0.011 mm (0.0004 in.)**

If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.



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Fig. 228: Identifying Connecting Rod Front Mark
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. INSPECT CONNECTING ROD BOLT

- a. Using vernier calipers, measure the tension portion diameter of the bolt.

Standard diameter: 7.2 to 7.3 mm (0.283 to 0.287 in.)**Minimum diameter: 7.0 mm (0.276 in.)**

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

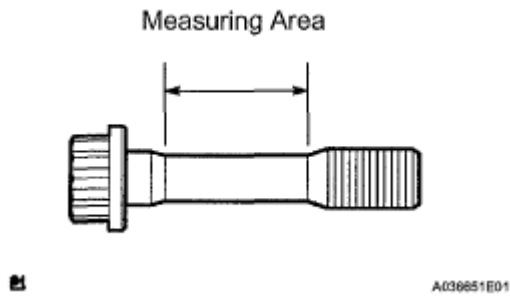


Fig. 229: Measuring Tension Portion Diameter Of Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. INSPECT CONNECTING ROD SUB-ASSEMBLY

- a. Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.
 1. Check for misalignment.

Maximum misalignment: 0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the misalignment is greater than the maximum, replace the connecting rod.

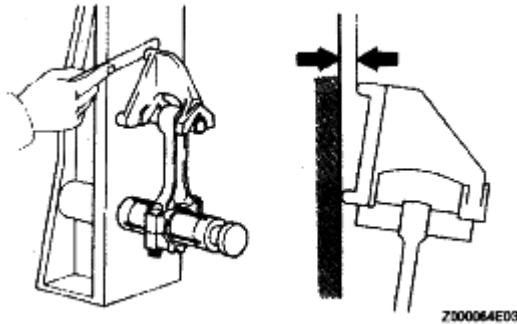


Fig. 230: Checking Connecting Rod Alignment
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. Check for twist.

Maximum twist: 0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If the twist is greater than the maximum, replace the connecting rod.

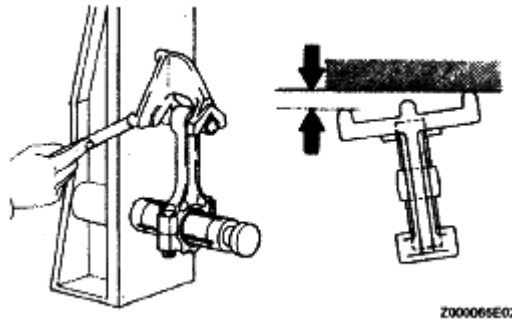


Fig. 231: Checking Connecting Rod For Twist
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. INSPECT CRANKSHAFT

- a. Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

Maximum circle runout: 0.03 mm (0.0012 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

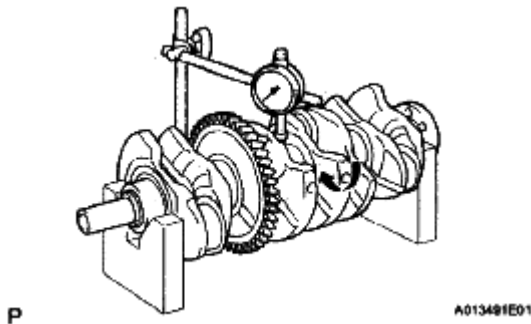


Fig. 232: Measuring Circle Runout
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a micrometer, measure the diameter of each main journal.

Standard diameter: 54.988 to 55.000 mm (2.1649 to 2.1654 in.)

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

- c. Check each main journal for taper and distortion as shown in the illustration.

Maximum taper and distortion: 0.003 mm (0.0001 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.

Standard diameter (Reference)

CRANKSHAFT JOURNAL SPECIFICATION

Mark	Specified Condition
0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

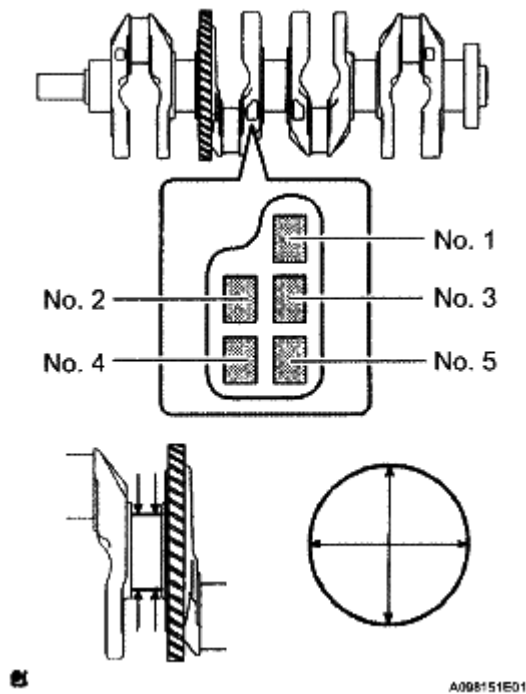


Fig. 233: Checking Each Main Journal For Taper And Distortion
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Using a micrometer, measure the diameter of each crank pin.

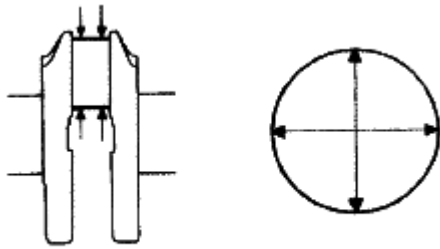
Standard diameter: 47.990 to 48.000 mm (1.8894 to 1.8898 in.)

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

- e. Inspect each crank pin for taper and distortion as shown in the illustration.

Maximum taper and distortion: 0.003 mm (0.0001 in.)

If the taper and distortion are greater than the maximum, replace the crankshaft.



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Fig. 234: Inspecting Each Crank Pin For Taper And Distortion
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSPECT CRANKSHAFT THRUST CLEARANCE

- Install the main bearing cap (See **REASSEMBLY**).
- Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance: 0.04 to 0.24 mm (0.0016 to 0.0095 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

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

HINT:

The thrust washer thickness is 1.93 to 1.98 mm (0.0760 to 0.0780 in.).

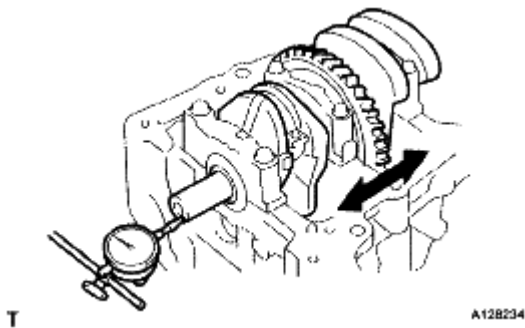


Fig. 235: Measuring Thrust Clearance While Prying Crankshaft Back And Forth With Screwdriver
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSPECT CRANKSHAFT OIL CLEARANCE

- Check the crank journal and bearing for pitting and scratches.
- Install the crankshaft bearing (See **REASSEMBLY**).
- Place the crankshaft on the cylinder block.
- Lay a strip of Plastigage across each journal.

- e. Examine the front marks and numbers and install the bearing caps on the cylinder block.

HINT:

A number is marked on each main bearing cap to indicate the installation position.

- f. Install the main bearing cap (See **DISASSEMBLY**).

NOTE: Do not turn the crankshaft.

- g. Remove the main bearing caps (See **DISASSEMBLY**).

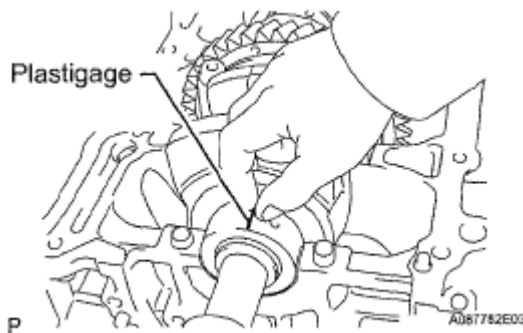


Fig. 236: Laying Strip Of Plastigage Across Each Journal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- h. Measure the Plastigage at its widest point.

Standard oil clearance: 0.017 to 0.040 mm (0.0007 to 0.0016 in.)

Maximum oil clearance: 0.060 mm (0.0024 in.)

NOTE: Remove the Plastigage completely after the measurement.

If the oil clearance is greater than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.

HINT:

- If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.
- EXAMPLE: Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

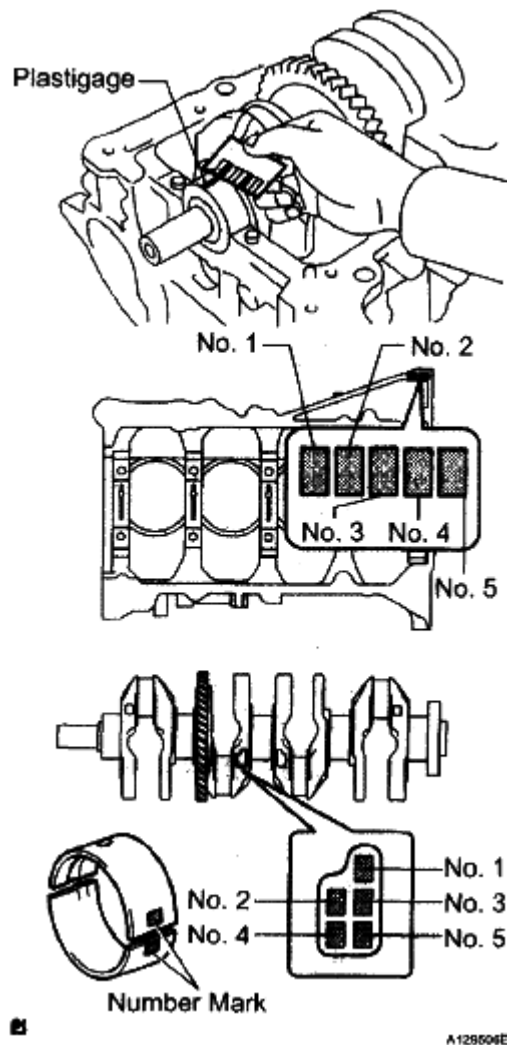


Fig. 237: Measuring Plastigage At Its Widest Point
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

CYLINDER BLOCK REFERENCE CHART

Cylinder block + Crankshaft	0 to 2	3 to 5	6 to 8	9 to 11
Bearing to be used	"1"	"2"	"3"	"4"

Standard cylinder block journal bore diameter

STANDARD CYLINDER BLOCK JOURNAL BORE DIAMETER

Mark	Specified Condition
0	59.000 to 59.002 mm (2.3228 to 2.3229 in.)
1	59.003 to 59.004 mm (2.3230 to 2.3230 in.)
2	59.005 to 59.006 mm (2.3230 to 2.3231 in.)
3	59.007 to 59.009 mm (2.3231 to 2.3232 in.)

4	59.010 to 59.011 mm (2.3232 to 2.3233 in.)
5	59.012 to 59.013 mm (2.3233 to 2.3234 in.)
6	59.014 to 59.016 mm (2.3234 to 2.3235 in.)

Standard crankshaft journal diameter

STANDARD CRANKSHAFT JOURNAL DIAMETER

Mark	Specified Condition
0	54.999 to 55.000 mm (2.1653 to 2.1654 in.)
1	54.997 to 54.998 mm (2.1652 to 2.1653 in.)
2	54.995 to 54.996 mm (2.1652 to 2.1652 in.)
3	54.993 to 54.994 mm (2.1651 to 2.1651 in.)
4	54.991 to 54.992 mm (2.1650 to 2.1650 in.)
5	54.988 to 54.990 mm (2.1649 to 2.1650 in.)

Standard bearing center wall thickness

STANDARD BEARING CENTER WALL THICKNESS

Mark	Specified Condition
1	1.993 to 1.996 mm (0.0785 to 0.0786 in.)
2	1.997 to 1.999 mm (0.0786 to 0.0787 in.)
3	2.000 to 2.002 mm (0.0787 to 0.0788 in.)
4	2.003 to 2.005 mm (0.0789 to 0.0789 in.)

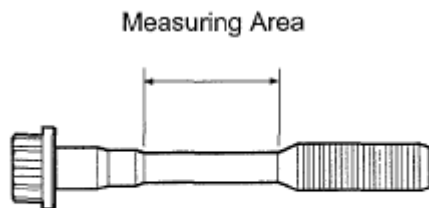
15. INSPECT CRANKSHAFT BEARING CAP SET BOLT

- Using vernier calipers, measure the tension portion diameter of the bolts.

Standard diameter: 7.3 to 7.5 mm (0.287 to 0.295 in.)

Minimum diameter: 7.2 mm (0.284 in.)

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



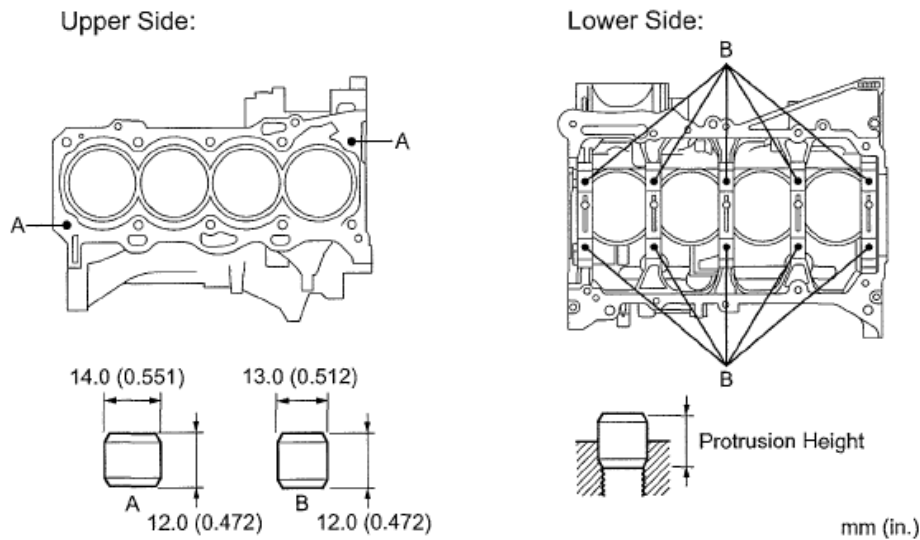
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Fig. 238: Measuring Tension Portion Diameter Of Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY**1. INSTALL RING PIN**

- a. Using a plastic hammer, tap in the ring pins.



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Fig. 239: Identifying Ring Pins

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Protrusion**PROTRUSION CHART**

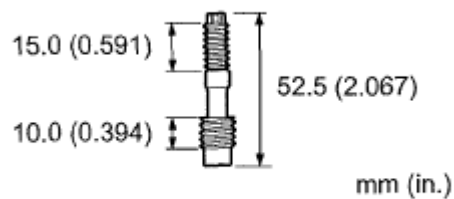
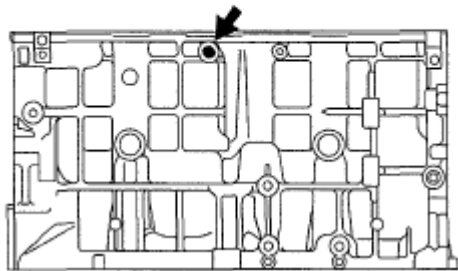
Item	Protrusion
A	6 mm (0.236 in.)
B	5 mm (0.197 in.)

2. INSTALL STUD BOLT

- a. Using a E7 "TORX" socket wrench, install the stud bolt as shown in the illustration.

Torque: 9.5 N*m (97 kgf*cm, 84 in.*lbf)

RH Side:



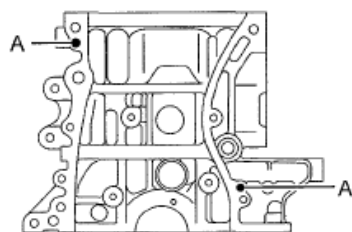
A136298E02

Fig. 240: Identifying Stud Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

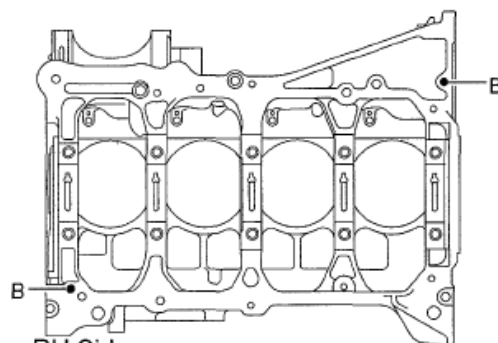
3. INSTALL STRAIGHT PIN

- a. Using a plastic hammer, tap in the straight pins.

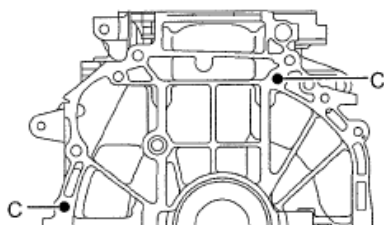
Front Side:



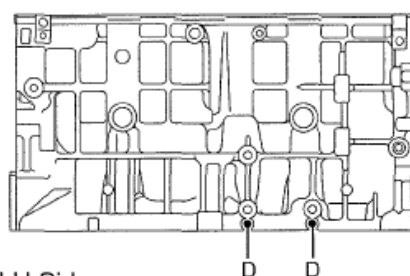
Lower Side:



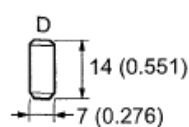
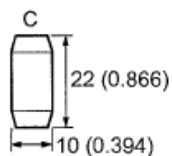
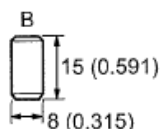
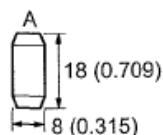
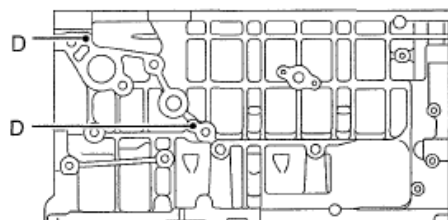
Rear Side:



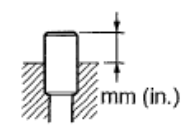
RH Side:



LH Side:



Protrusion Height



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Fig. 241: Identifying Straight Pins

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Standard Protrusion

PROTRUSION CHART

Item	Protrusion
A	8 mm (0.315 in.)
B	7.5 mm (0.295 in.)
C	12 mm (0.472 in.)
D	5 mm (0.197 in.)

4. INSPECT CRANKSHAFT OIL CLEARANCE (See INSPECTION)**5. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY**

- a. Using a 5 mm hexagon wrench, install the oil nozzles with the bolts.

Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf)

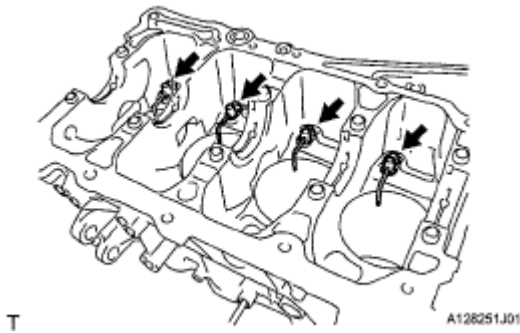


Fig. 242: Locating Oil Nozzles And Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSTALL PISTON

- a. Using a screwdriver, install a new snap ring at one end of the piston pin hole.

HINT:

Make sure that the end gap on the snap ring is not aligned with the pin hole cutout portion of the piston.

- b. Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).

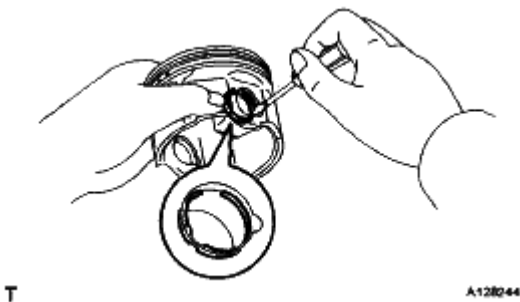


Fig. 243: Installing Snap Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Align the front marks on the piston and connecting rod, and push in the piston with your thumb.
- d. Using a screwdriver, install a new snap ring on the other end of the piston pin hole.

HINT:

Make sure that the end gap on the snap ring is not aligned with the pin hole cutout portion of the piston.

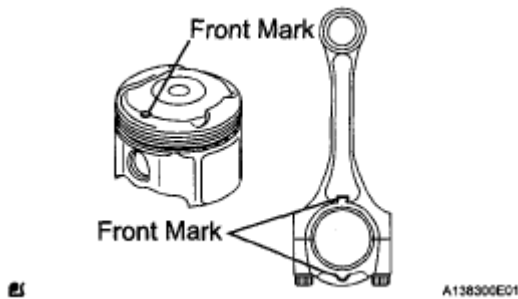


Fig. 244: Identifying Front Marks On Piston And Connecting Rod
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

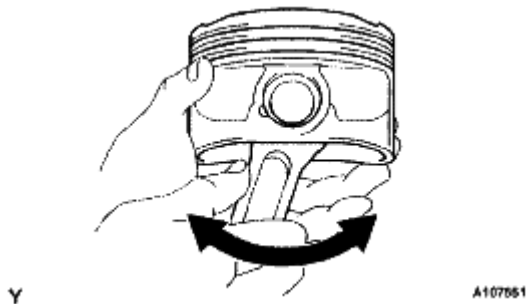


Fig. 245: Checking Fitting Condition Between Piston And Piston Pin
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL PISTON RING SET

- a. Install the oil ring expander and oil ring rail by hand.

NOTE:

- Install the expander and oil ring so that their ring ends are at opposite sides.
- Securely install the expander into the inner groove of the oil ring.

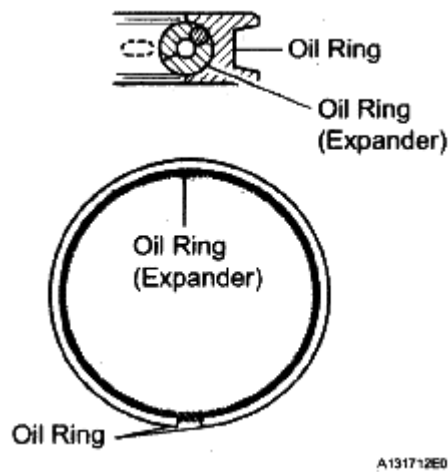


Fig. 246: Identifying Oil Ring Expander And Oil Ring Rail
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.

NOTE: Install the compression ring No. 2 with the code mark (2N and 2A) facing upward.

HINT:

Supply part compression springs (No. 1 and No. 2) do not have paint marks.

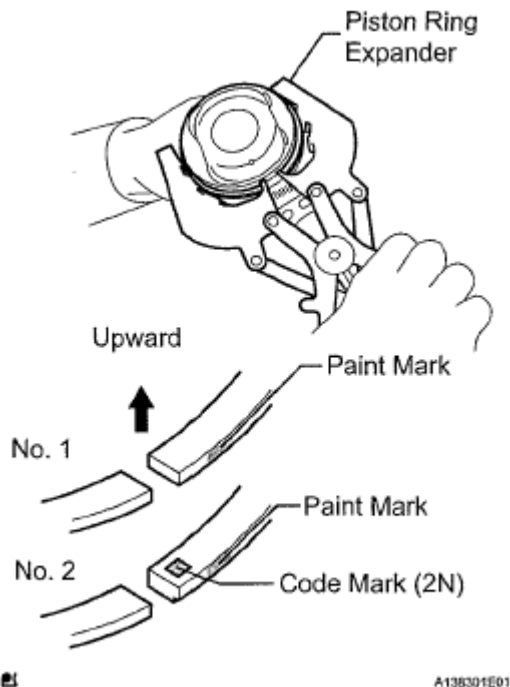
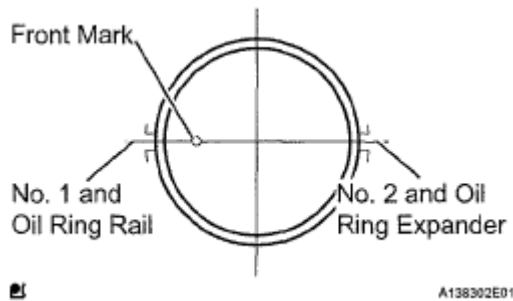


Fig. 247: Installing Compression Rings

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Position the piston rings so that the ring ends are as shown in the illustration.

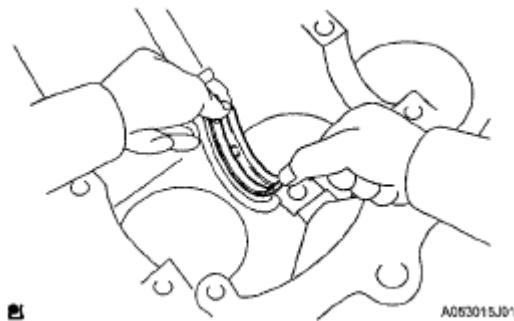
**Fig. 248: Identifying Piston Rings End Position**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSTALL CRANKSHAFT BEARING

- a. Install the upper bearing with an oil groove on the cylinder block.

NOTE: Do not apply engine oil to the bearings or the contact surfaces.

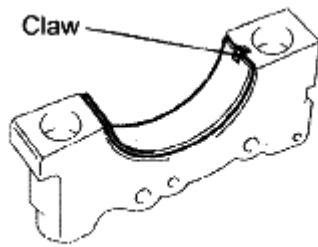
**Fig. 249: Installing Upper Bearing With An Oil Groove On Cylinder Block**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSTALL NO. 2 CRANKSHAFT BEARING

- a. Install the No. 2 crankshaft bearing on the bearing cap.

NOTE: Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oils.



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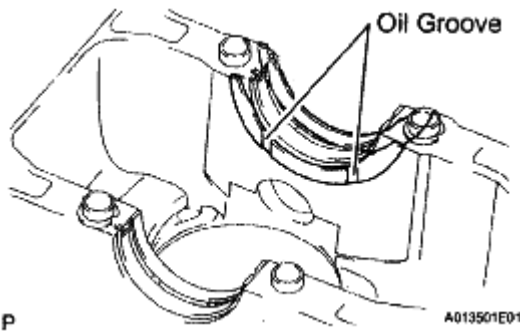
Fig. 250: Installing No. 2 Crankshaft Bearing On Bearing Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. INSTALL UPPER CRANKSHAFT THRUST WASHER

- a. Install the 2 thrust washers under the No. 3 journal of the cylinder block with the oil grooves facing outward.

NOTE: Make sure to install the proper thrust washers.

- b. Apply engine oil to the crankshaft thrust washer.



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Fig. 251: Identifying Oil Grooves
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. INSTALL CRANKSHAFT

- a. Apply engine oil to the crankshaft bearing and install the crankshaft on the cylinder block.
- b. Apply engine oil to the No. 2 crankshaft bearing.
- c. Examine the front marks and install the bearing caps on the cylinder block.
- d. Apply a light coat of engine oil to the threads and under the bearing cap bolts.

NOTE: The main bearing cap bolts are tightened in 2 progressive steps.

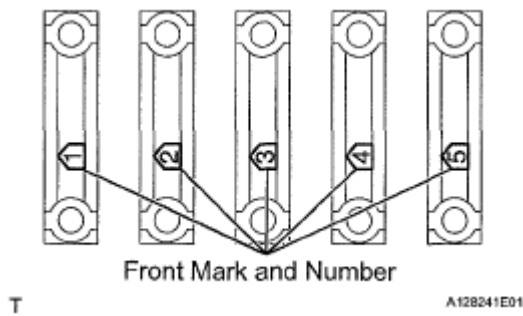


Fig. 252: Identifying Front Marks And Number

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Install and uniformly tighten the 10 main bearing cap bolts in the sequence shown in the illustration.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

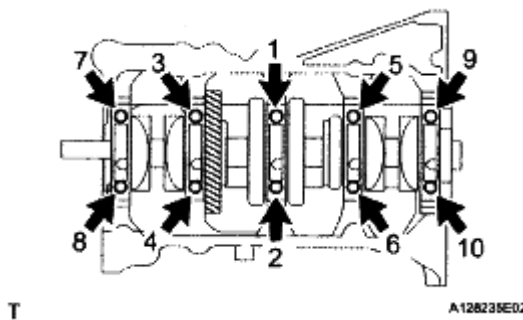


Fig. 253: Identifying Main Bearing Cap Bolts Tightening Sequence

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Make the front of the bearing cap bolts with paint.
- g. Further tighten the bearing cap bolts by 90° in the numerical order shown in the illustration.
- h. Check that the paint mark is now at a 90° angle to the front.
- i. Check that the crankshaft turns smoothly.
- j. Check the crankshaft thrust clearance. (See **INSPECTION**)

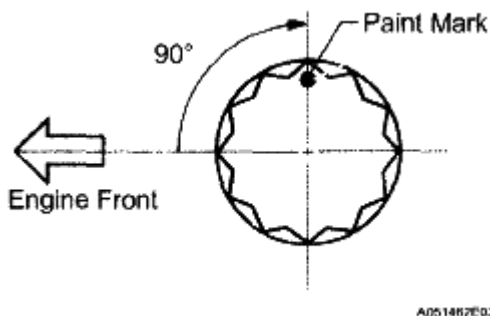


Fig. 254: Tightening Bearing Cap Bolts By 90°

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

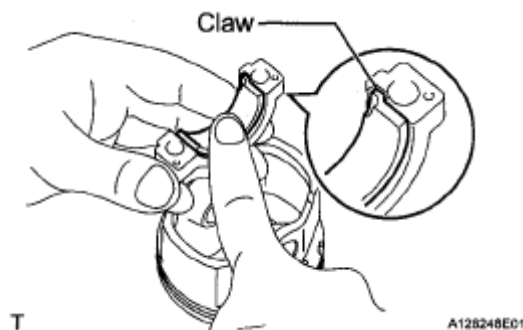
12. INSTALL CONNECTING ROD BEARING

- a. Align the bearing claw with the groove on the connecting rod or connecting cap.

NOTE: Do not apply engine oil to the bearings and the contact surfaces.

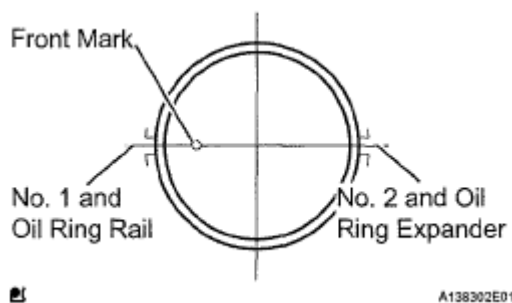
13. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

NOTE: The connecting rod cap bolts are tightened in 2 progressive steps.

**Fig. 255: Installing Connecting Rod Bearing**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- a. Apply engine oil to the cylinder walls, the pistons, and the surfaces of connecting rod bearings.
- b. Check the position of the piston ring ends.

**Fig. 256: Checking Position Of Piston Ring Ends**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. 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.

NOTE: Match the numbered connecting rod cap with the connecting rod.

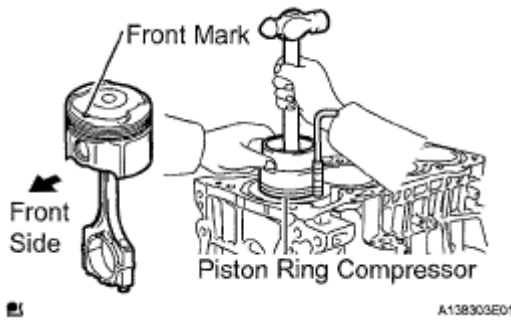


Fig. 257: Installing Piston And Connecting Rod
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Check that the protrusion on the connecting rod cap is facing in the correct direction.

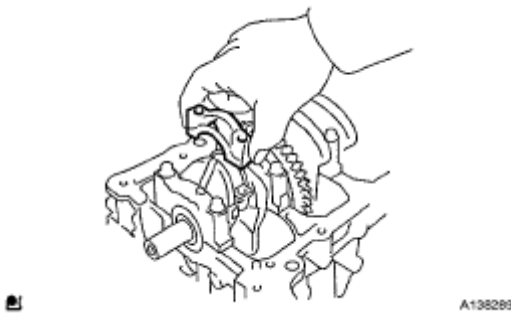


Fig. 258: Checking That Protrusion On Connecting Rod Cap Is Facing In Correct Direction
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.

NOTE: The connecting cap bolts should be tightened in 2 progressive steps.

- f. Install and alternately tighten the bolts of the connecting rod cap in several steps.

Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

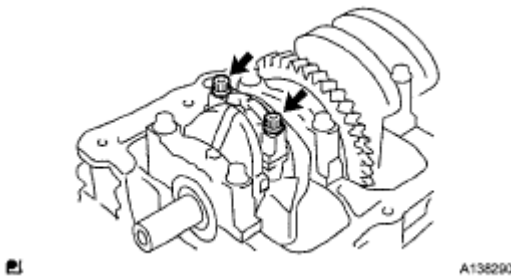
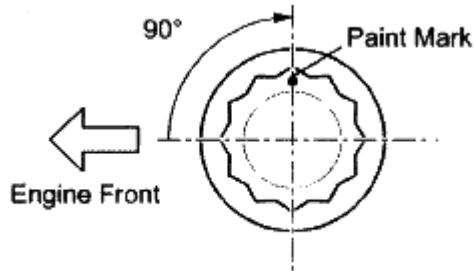


Fig. 259: Locating Connecting Rod Cap Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Mark the front of the connecting rod cap bolts with paint.
- h. Retighten the cap bolts by 90° as shown in the illustration.



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Fig. 260: Tightening Cap Bolts An Additional 90°
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- i. Check the crankshaft turns smoothly.
- j. Check the connecting rod thrust clearance. (See **INSPECTION**)

FRONT CRANKSHAFT OIL SEAL

COMPONENTS

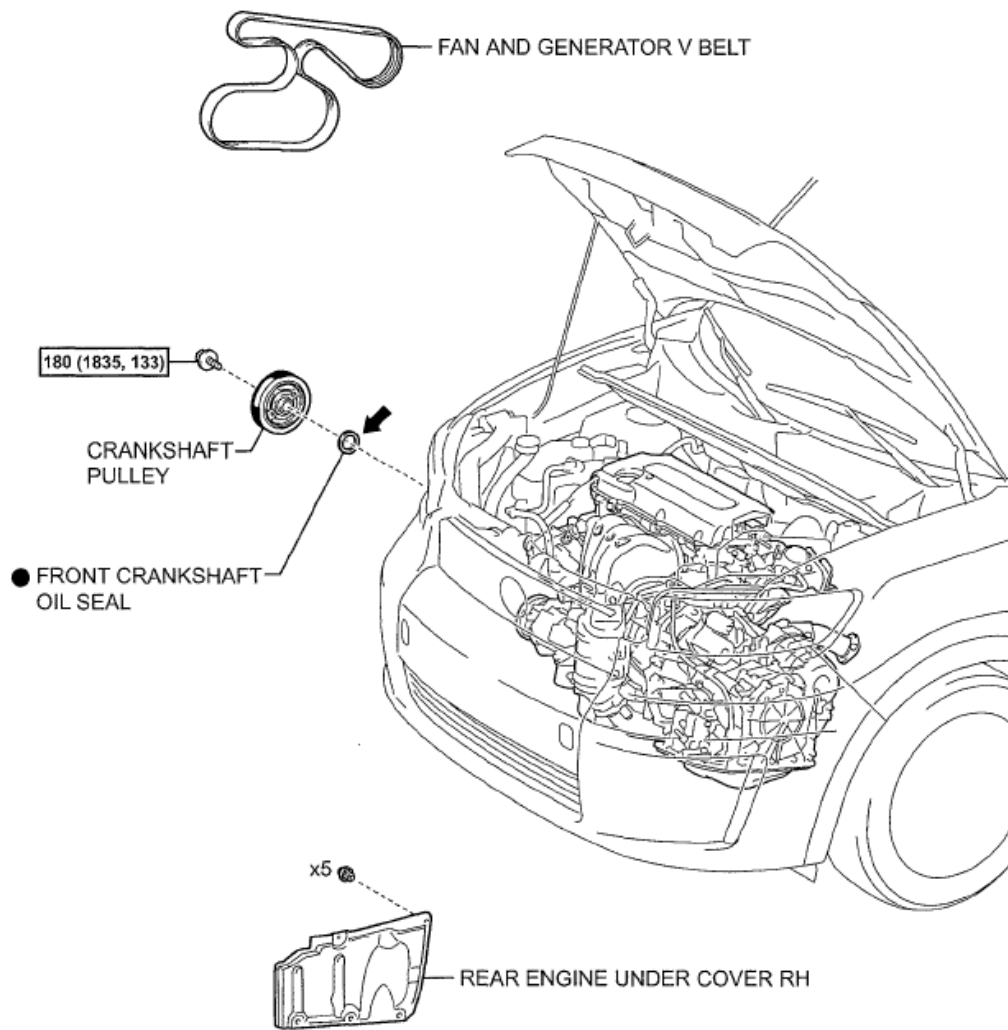


Fig. 261: Identifying Front Crankshaft Oil Seal Components With Torque Specification
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE FRONT WHEEL RH
2. REMOVE REAR ENGINE UNDER COVER RH
3. REMOVE FAN AND GENERATOR V BELT (See ON-VEHICLE INSPECTION)
4. REMOVE CRANKSHAFT PULLEY
 - a. Using SST, hold the pulley in place and loosen the pulley bolt.

SST 09213-54015 (91651-60855), 09330-00021

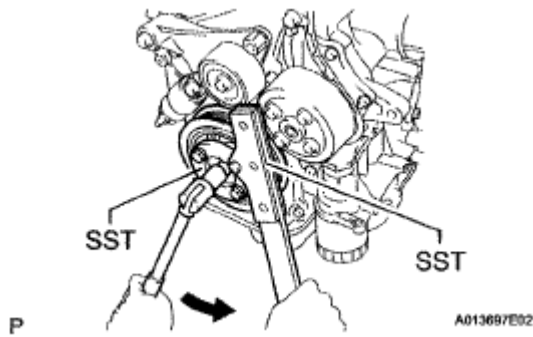


Fig. 262: Loosening Pulley Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using SST, remove the crankshaft pulley.

SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021), 09950-40011 (09957-04010)

HINT:

If necessary, remove the pulley and pulley bolt using SST.

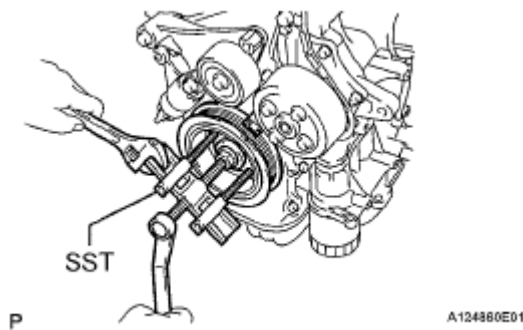


Fig. 263: Removing Crankshaft Pulley

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

5. REMOVE FRONT CRANKSHAFT OIL SEAL

- a. Using a knife, cut off the lip of the oil seal.
b. Using a screwdriver, pry out the oil seal.

NOTE: Do not damage the surface of the oil seal press fit hole and crankshaft.

HINT:

Tape the screwdriver tip before use.

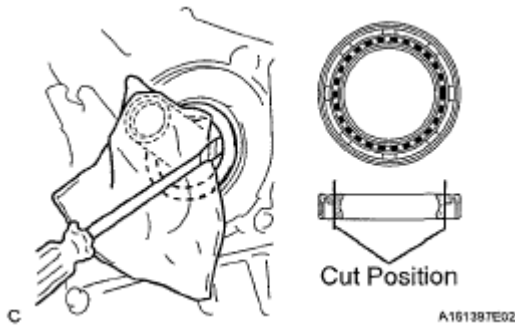


Fig. 264: Prying Out Oil Seal

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL FRONT CRANKSHAFT OIL SEAL

- Apply MP grease to the lip of a new oil seal.
- Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223-22010

NOTE:

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.

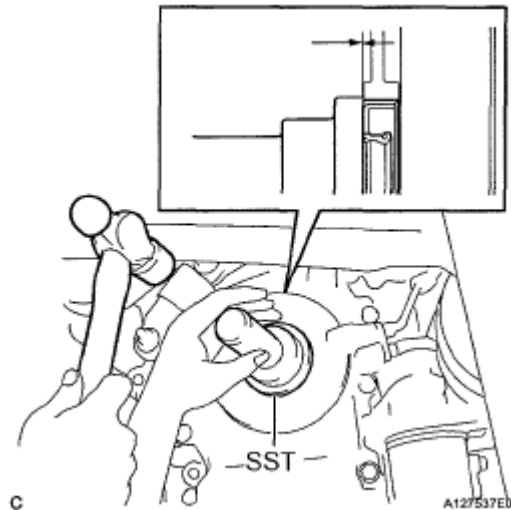


Fig. 265: Tapping In Oil Seal Until Its Surface Is Flush With Rear Oil Seal Retainer Edge

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL CRANKSHAFT PULLEY

- a. Using SST, fix the pulley in place and tighten the bolt.

SST 09213-54015 (91651-60855), 09330-00021

Torque: 180 N*m (1835 kgf*cm, 133 ft.*lbf)

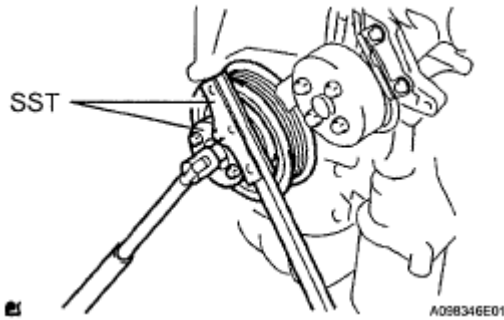


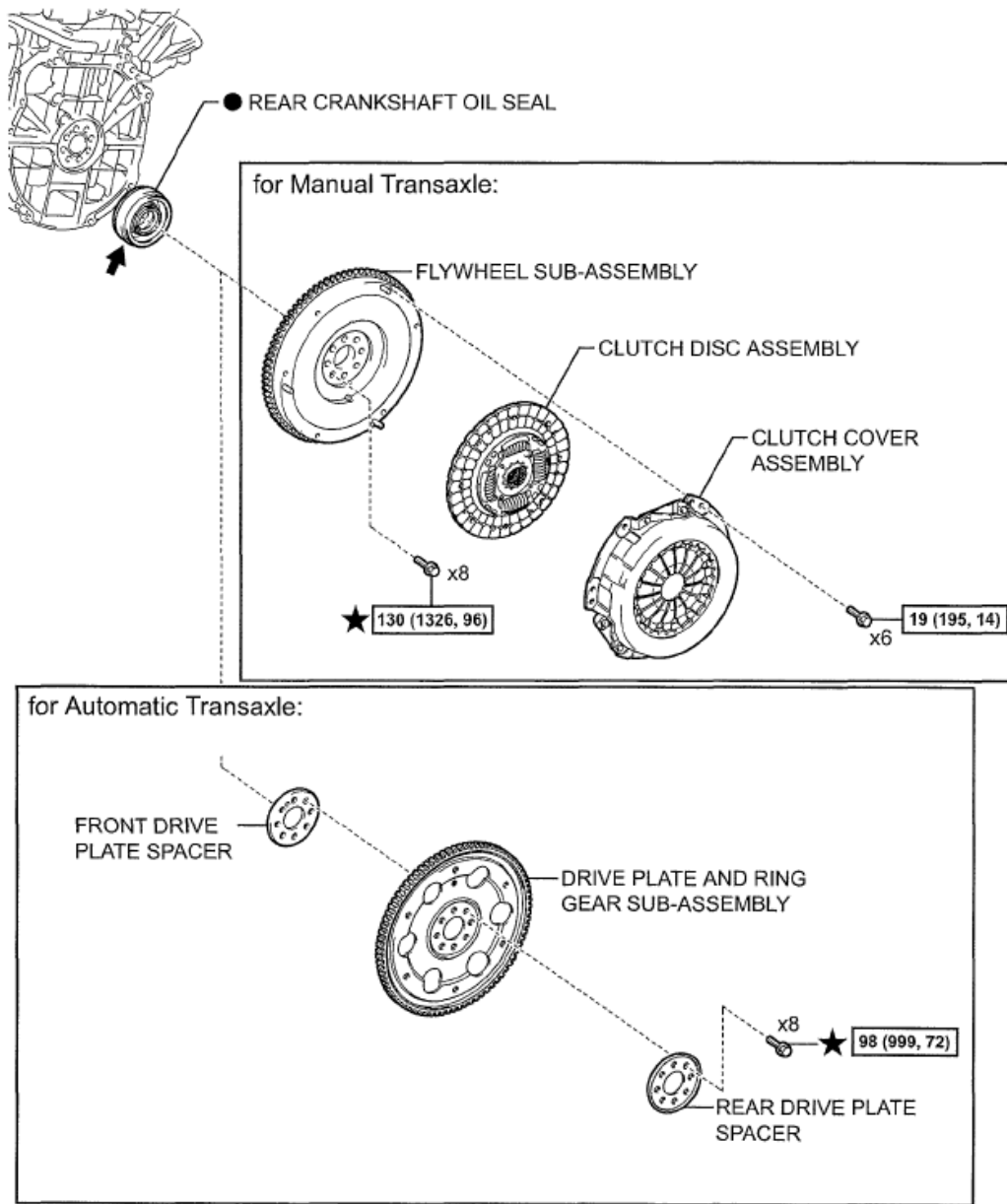
Fig. 266: Tightening Crankshaft Pulley Bolt

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. **INSTALL FAN AND GENERATOR V BELT** (See ON-VEHICLE INSPECTION)
4. **INSPECT FOR ENGINE OIL LEAK**
5. **INSPECT ENGINE OIL LEVEL** (See ON-VEHICLE INSPECTION)
6. **INSTALL REAR ENGINE UNDER COVER RH**
7. **INSTALL FRONT WHEEL RH**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

REAR CRANKSHAFT OIL SEAL**COMPONENTS**



N*m (kgf*cm, ft*lb) : Specified torque

● Non-reusable part

← MP Grease

★ Precoated part

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Fig. 267: Identifying Rear Crankshaft Oil Seal Components With Torque Specifications
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)

(See **REMOVAL**)

2. REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)

(See **REMOVAL**)

3. REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See **REMOVAL)****4. REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle)****5. REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)**

- a. Using SST, hold the crankshaft.

SST 09213-54015 (91651-60855), 09330-00021

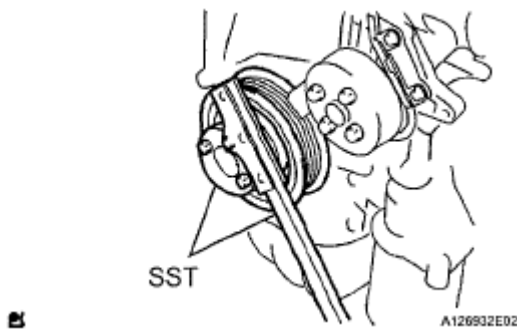


Fig. 268: Holding Crankshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 8 bolts, rear drive plate spacer, drive plate and front drive plate spacer.

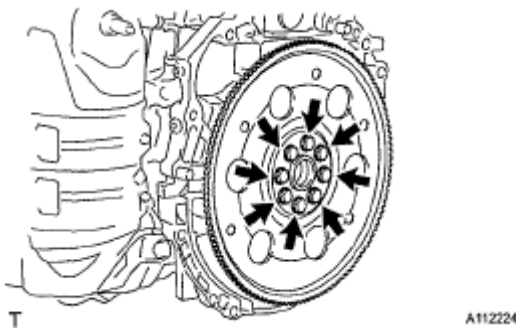


Fig. 269: Locating Drive Plate Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)

- a. Using SST, hold the crankshaft.

SST 09213-54015 (91651-60855), 09330-00021

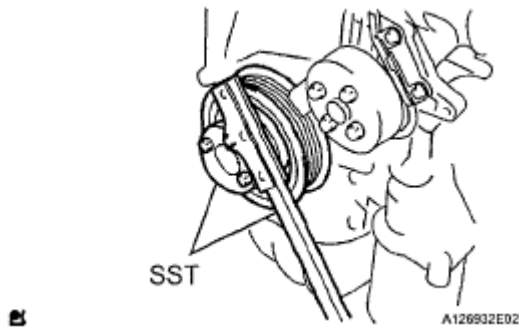


Fig. 270: Holding Crankshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the 8 bolts and flywheel.

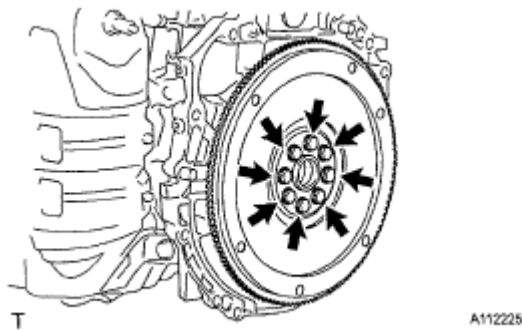


Fig. 271: Locating Flywheel Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE REAR CRANKSHAFT OIL SEAL

- a. Using a knife, cut off the lip of the oil seal.
- b. Using a screwdriver, pry out the oil seal.

NOTE: After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

HINT:

Tape the screwdriver tip before use.

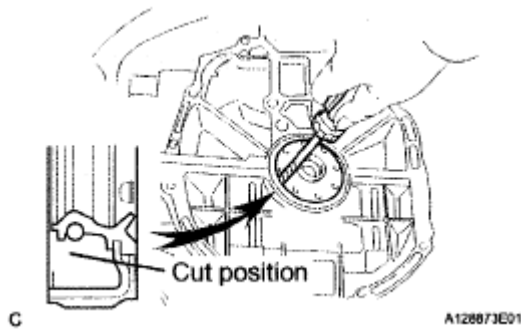


Fig. 272: Removing Rear Crankshaft Oil Seal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL REAR CRANKSHAFT OIL SEAL

- Apply MP grease to the lip of a new oil seal.
- 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, 09950-70010 (09951-07100)

NOTE:

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.

2. INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle)

- Clean the 8 bolts and 8 bolt holes.
- Apply adhesive to 2 or 3 threads of the 8 bolts.

Adhesive: Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

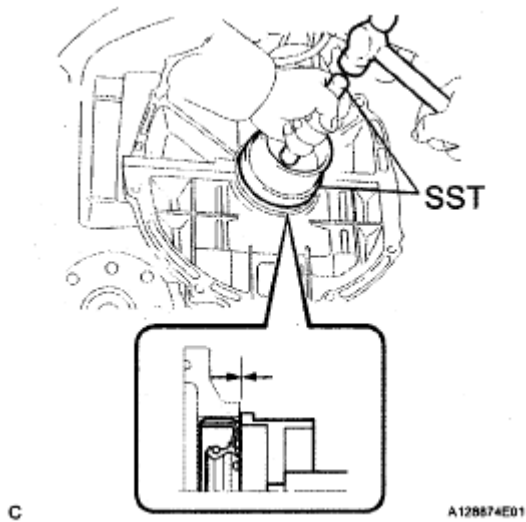


Fig. 273: Tapping In Oil Seal Until Its Surface Is Flush With Rear Oil Seal Retainer Edge
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using SST, hold the crankshaft.

SST 09213-54015 (91651-60855), 09330-00021

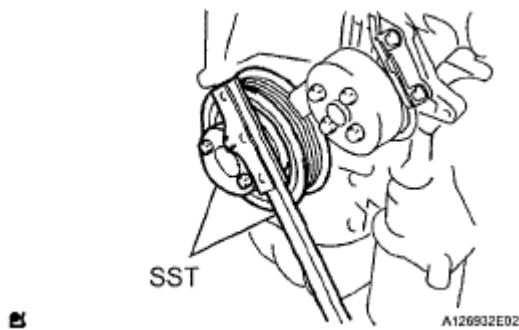


Fig. 274: Holding Crankshaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Install the front drive plate spacer.

HINT:

Align the pin of the front spacer with the pin hole of the crankshaft.

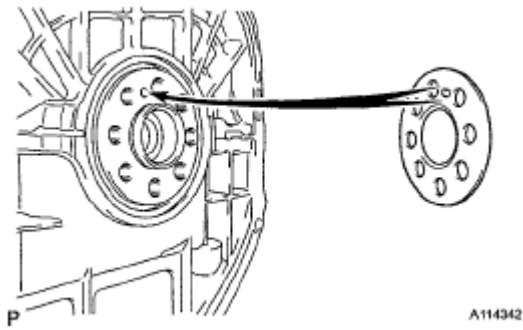


Fig. 275: Aligning Pin With Pin Hole

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Install the drive plate and rear drive plate spacer onto the crankshaft.

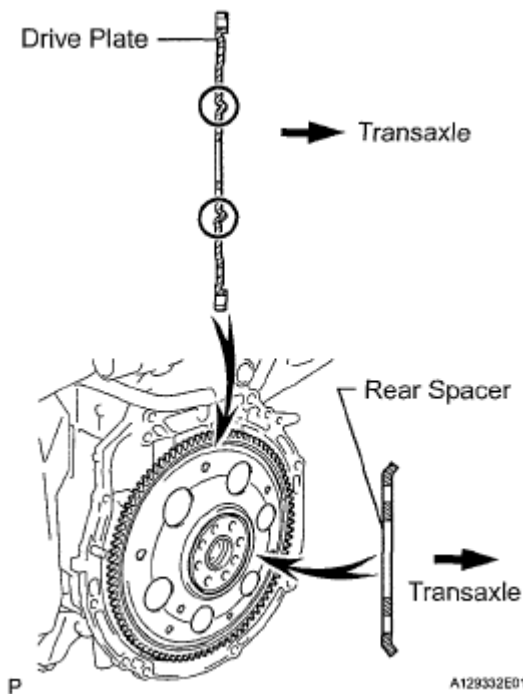


Fig. 276: Installing Drive Plate And Rear Drive Plate Spacer Onto Crankshaft

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. In several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 98 N*m (999 kgf*cm, 72 ft.*lbf)

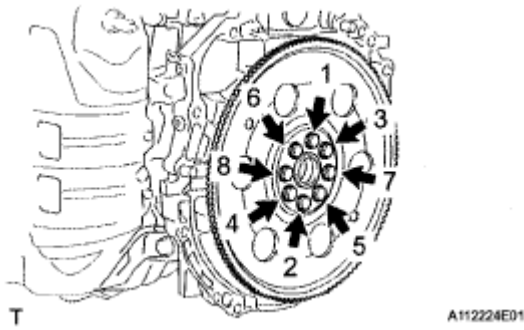


Fig. 277: Identifying Flywheel Bolts Tightening Sequence
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle)

- a. Clean the 8 bolts and 8 bolt holes.
- b. Apply adhesive to 2 or 3 threads of the 8 bolts.

Adhesive: Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

- c. Using SST, hold the crankshaft.

SST 09213-54015 (91651-60855), 09330-00021

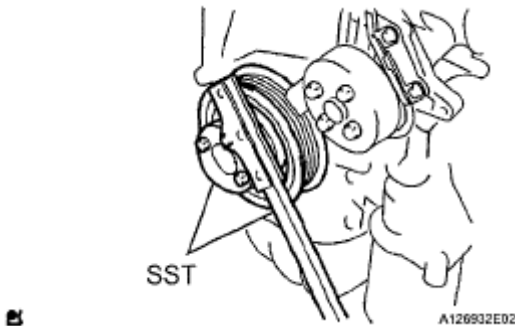


Fig. 278: Holding Crankshaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. In several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 130 N*m (1326 kgf*cm, 96 ft.*lbf)

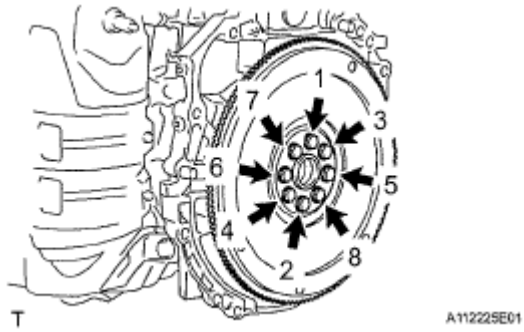


Fig. 279: Identifying Flywheel Bolts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

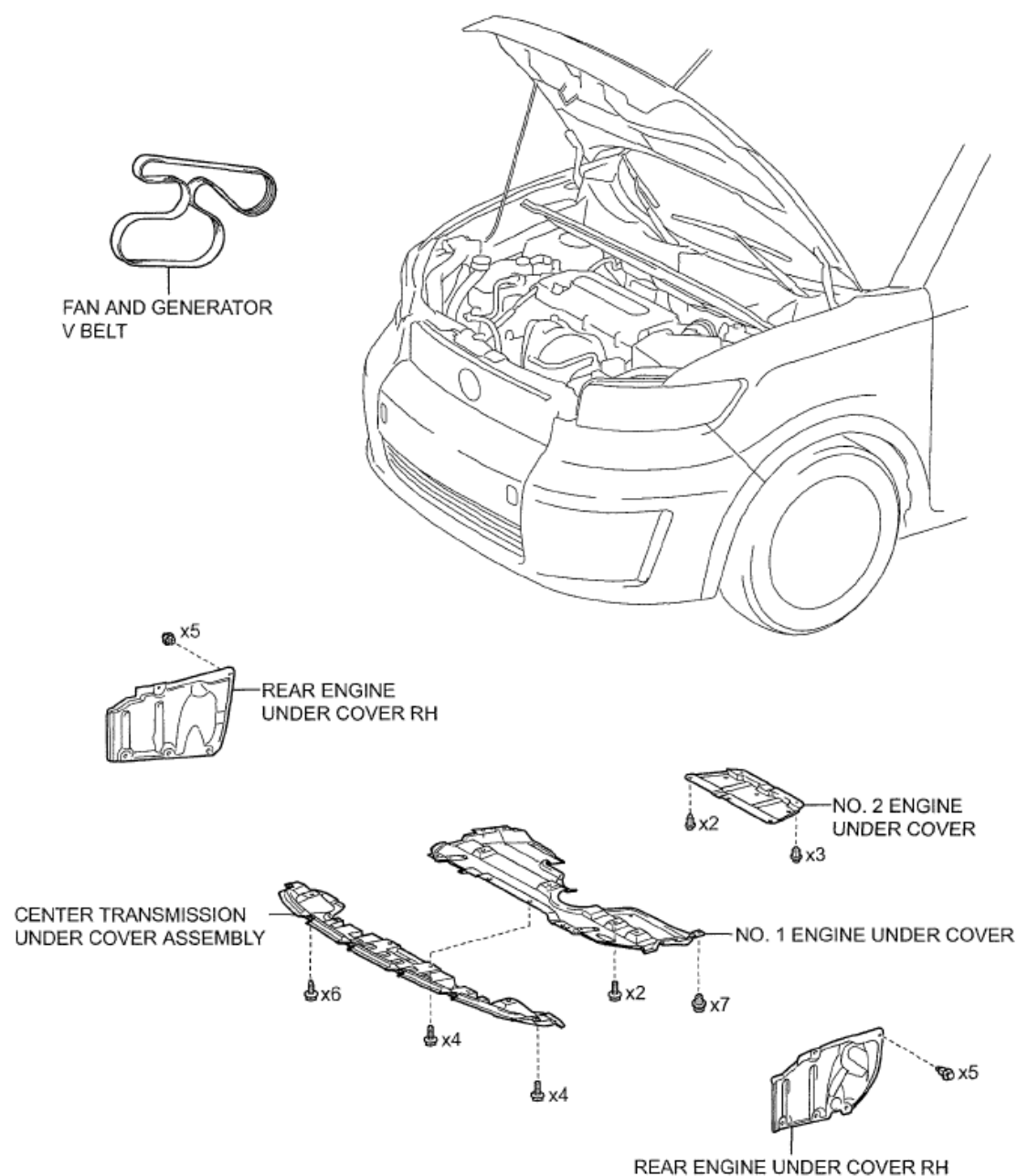
4. **INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**
5. **INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**
6. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle)**

(See INSTALLATION)
7. **INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle)**

(See INSTALLATION)

ENGINE ASSEMBLY

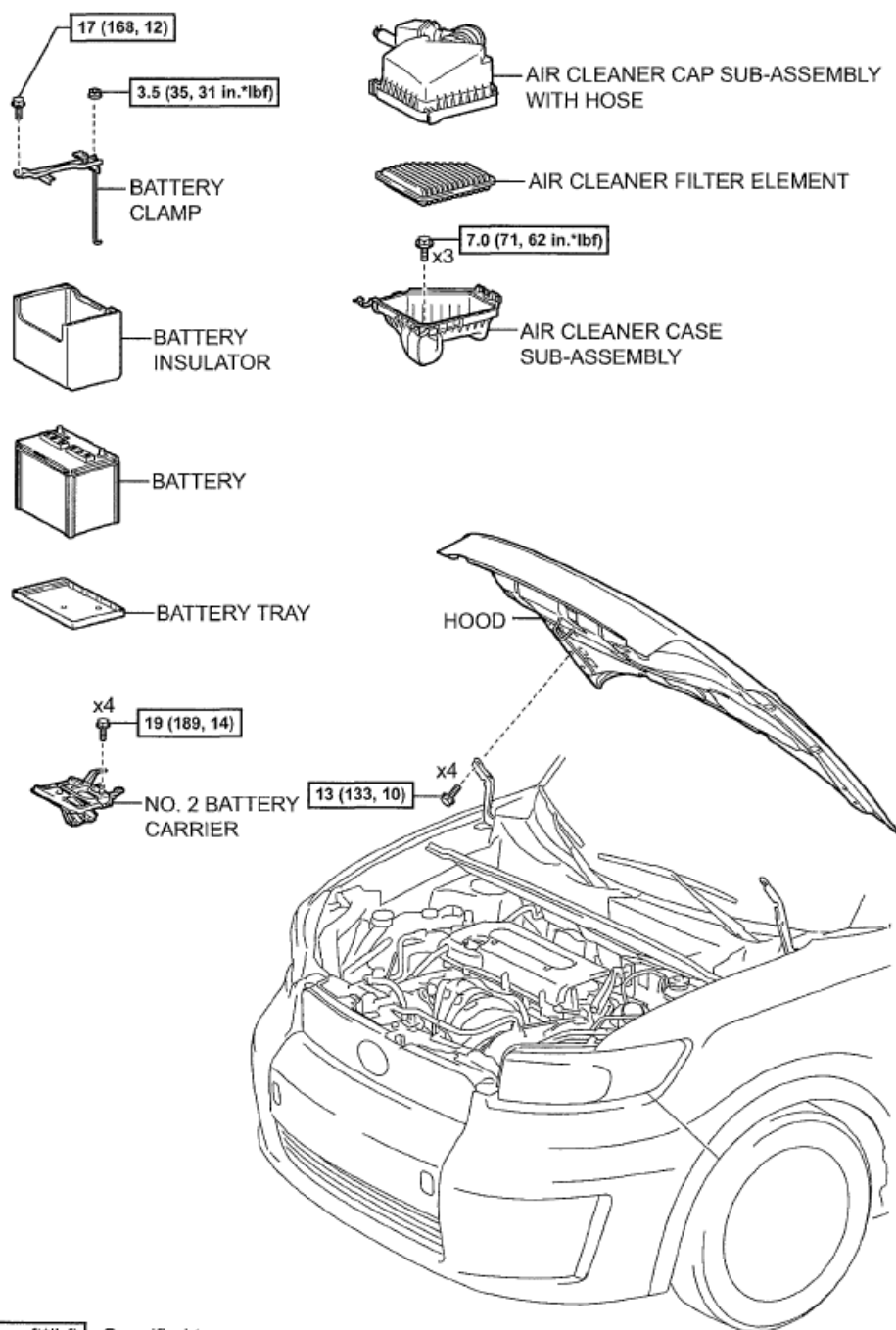
COMPONENTS



P

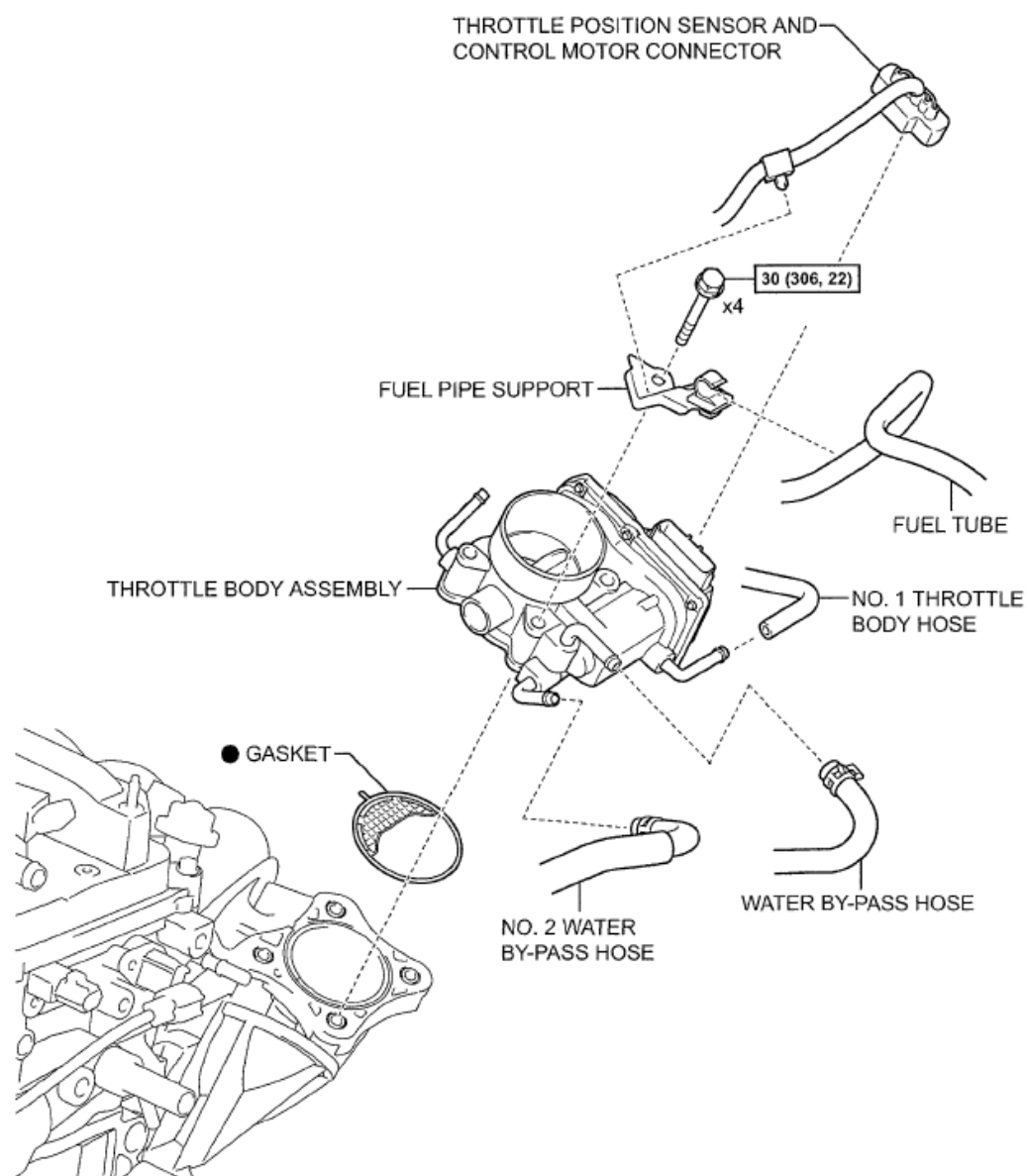
A156842E01

Fig. 280: Identifying Engine Assembly Replacement Components (1 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



A155543E01

Fig. 281: Identifying Engine Assembly Replacement Components With Torque Specifications (2 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lb) : Specified torque

● Non-reusable part

P

A124603E10

Fig. 282: Identifying Engine Assembly Replacement Components With Torque Specification (3 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

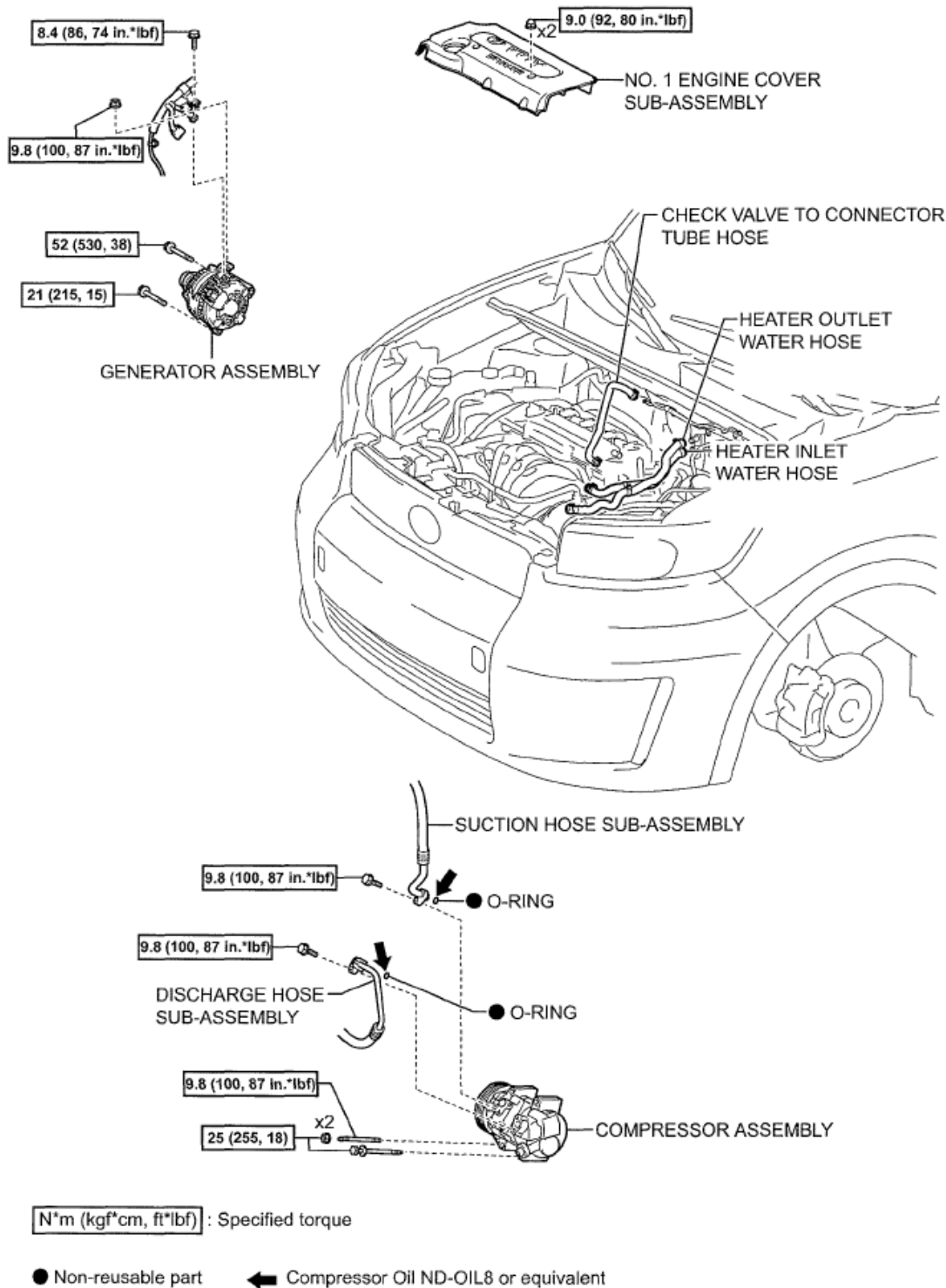
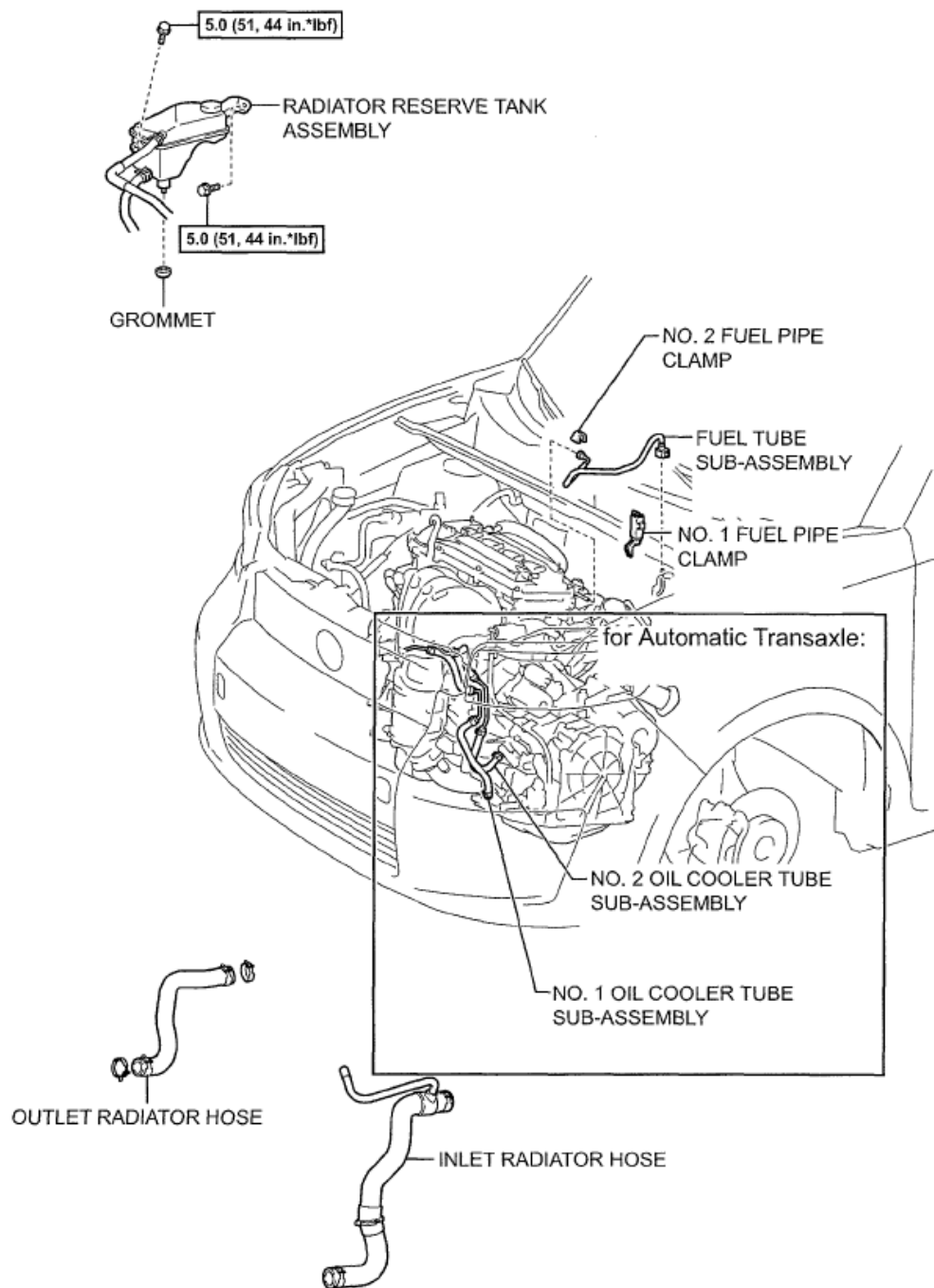


Fig. 283: Identifying Engine Assembly Replacement Components With Torque Specifications (4 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

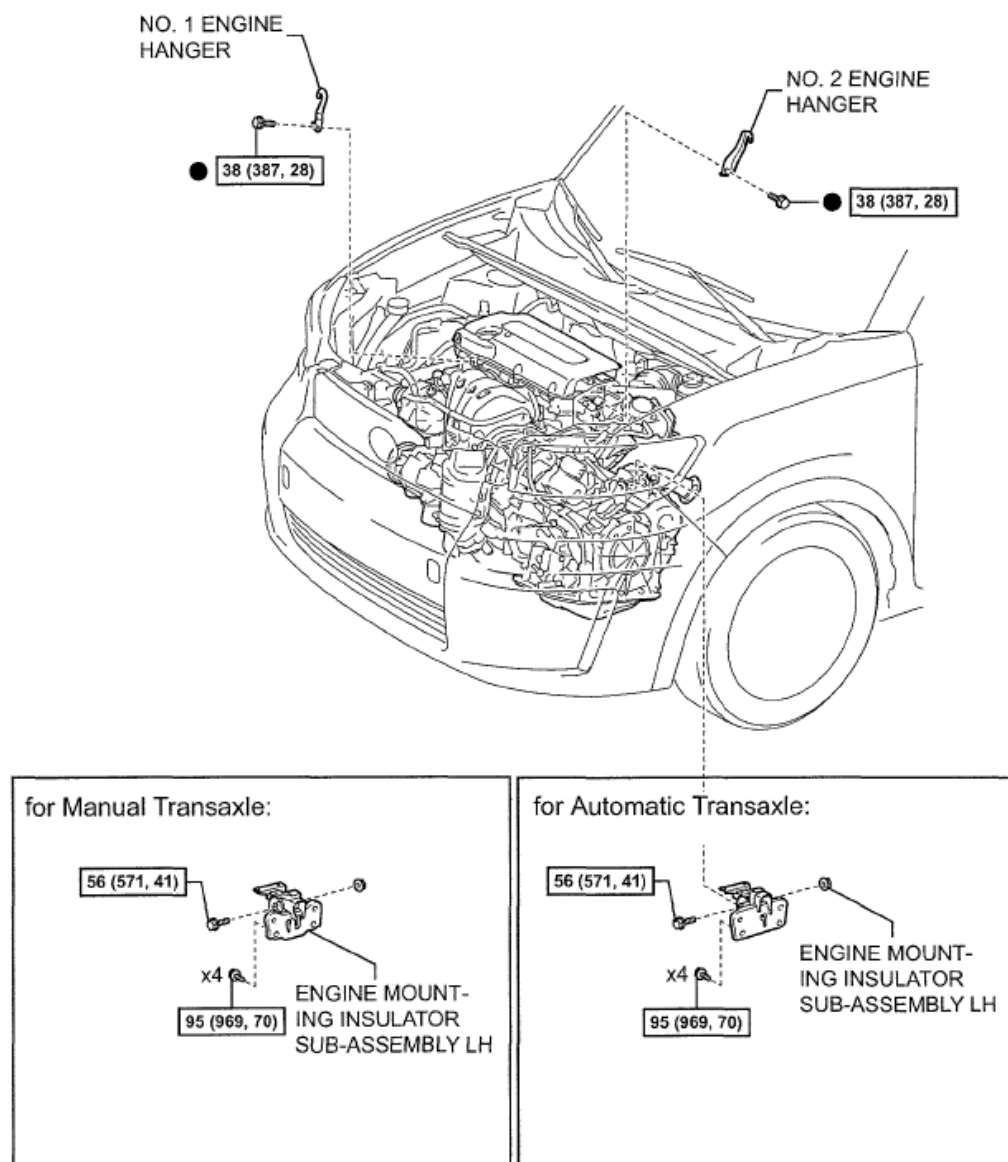


N*m (kgf*cm, ft*lbf) : Specified torque

P

A156845E01

Fig. 284: Identifying Engine Assembly Replacement Components With Torque Specifications (5 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



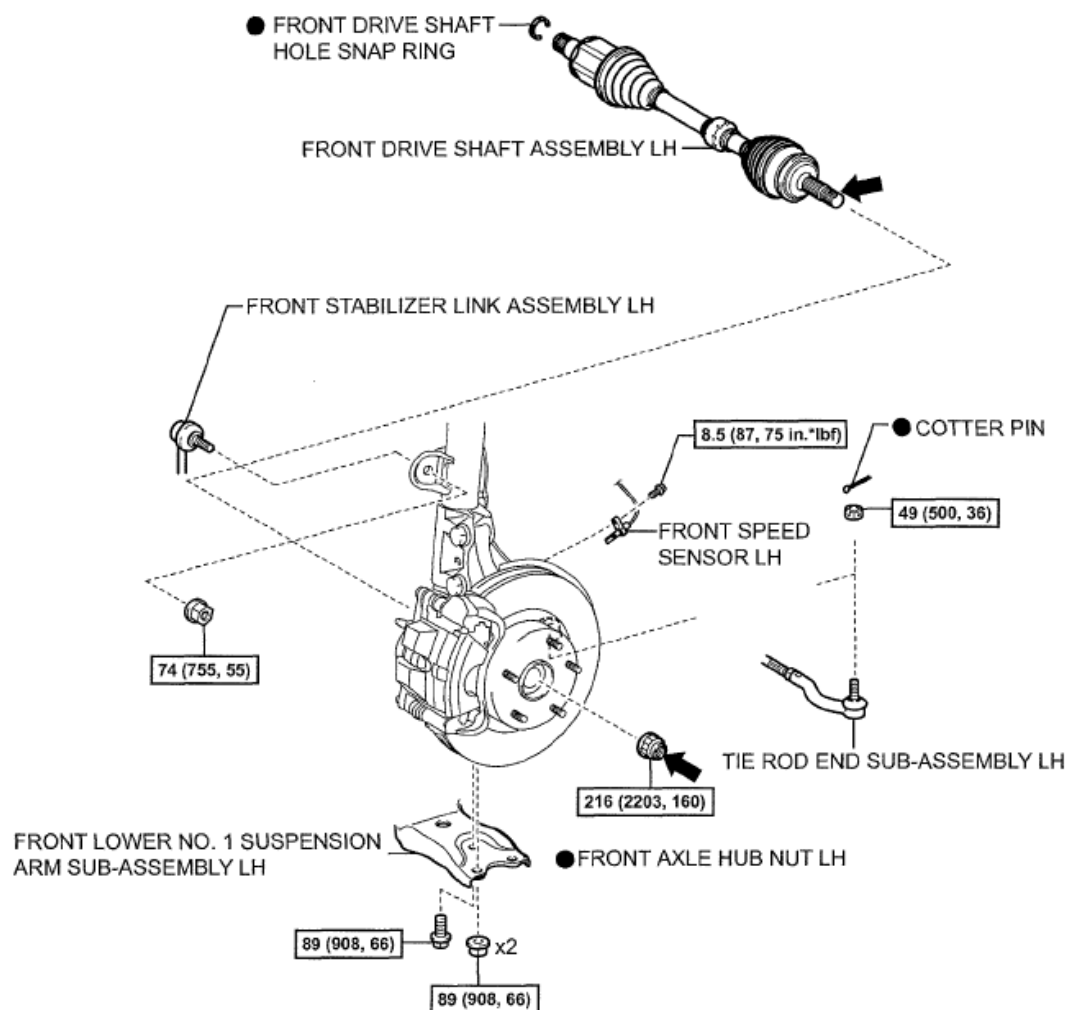
N*m (kgf*cm, ft*lb): Specified torque

● Non-reusable part

P

A156831E01

Fig. 286: Identifying Engine Assembly Replacement Components With Torque Specifications (7 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lbf) : Specified torque

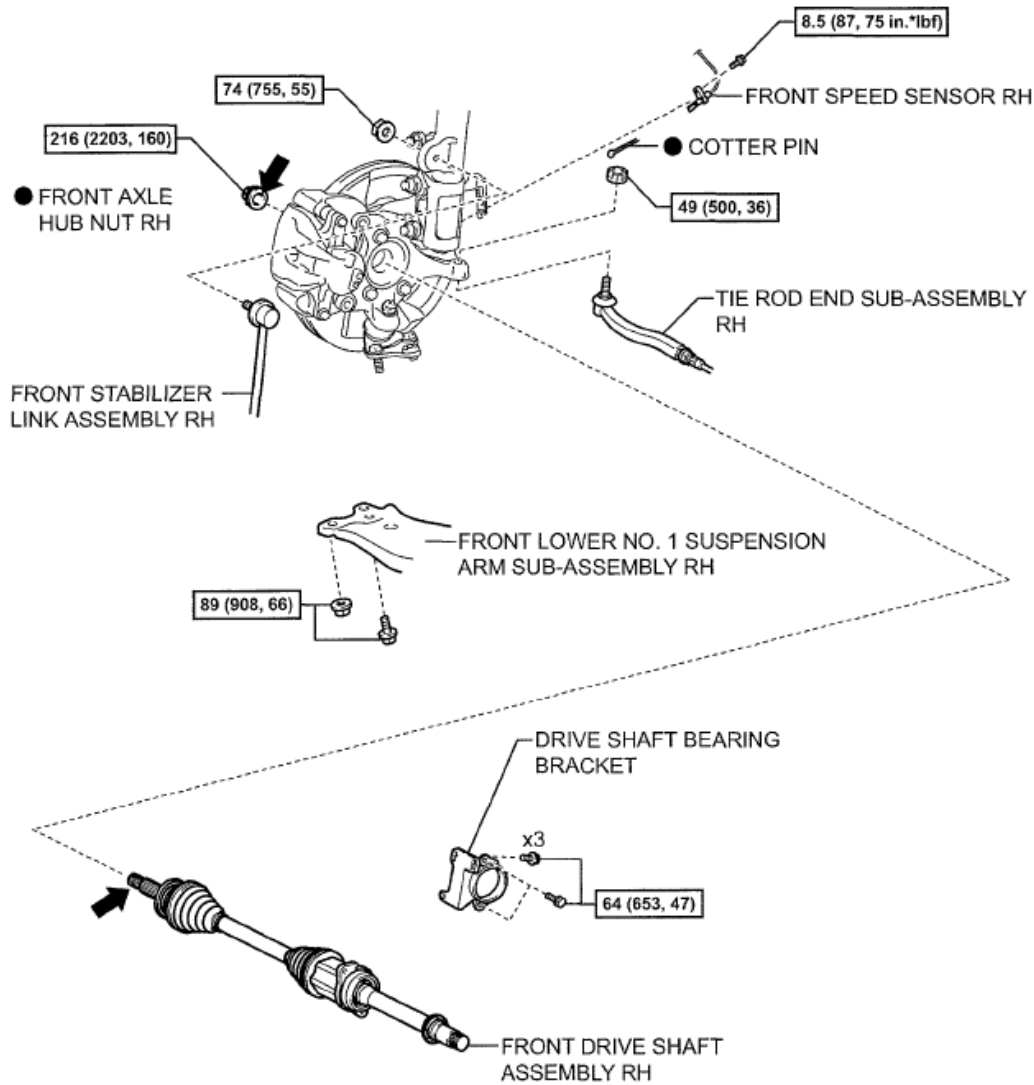
● Non-reusable part

➡ Do not apply lubricants to the threaded parts.

P

C158173E02

Fig. 287: Identifying Engine Assembly Replacement Components With Torque Specifications (8 Of 13)
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lbf) : Specified torque

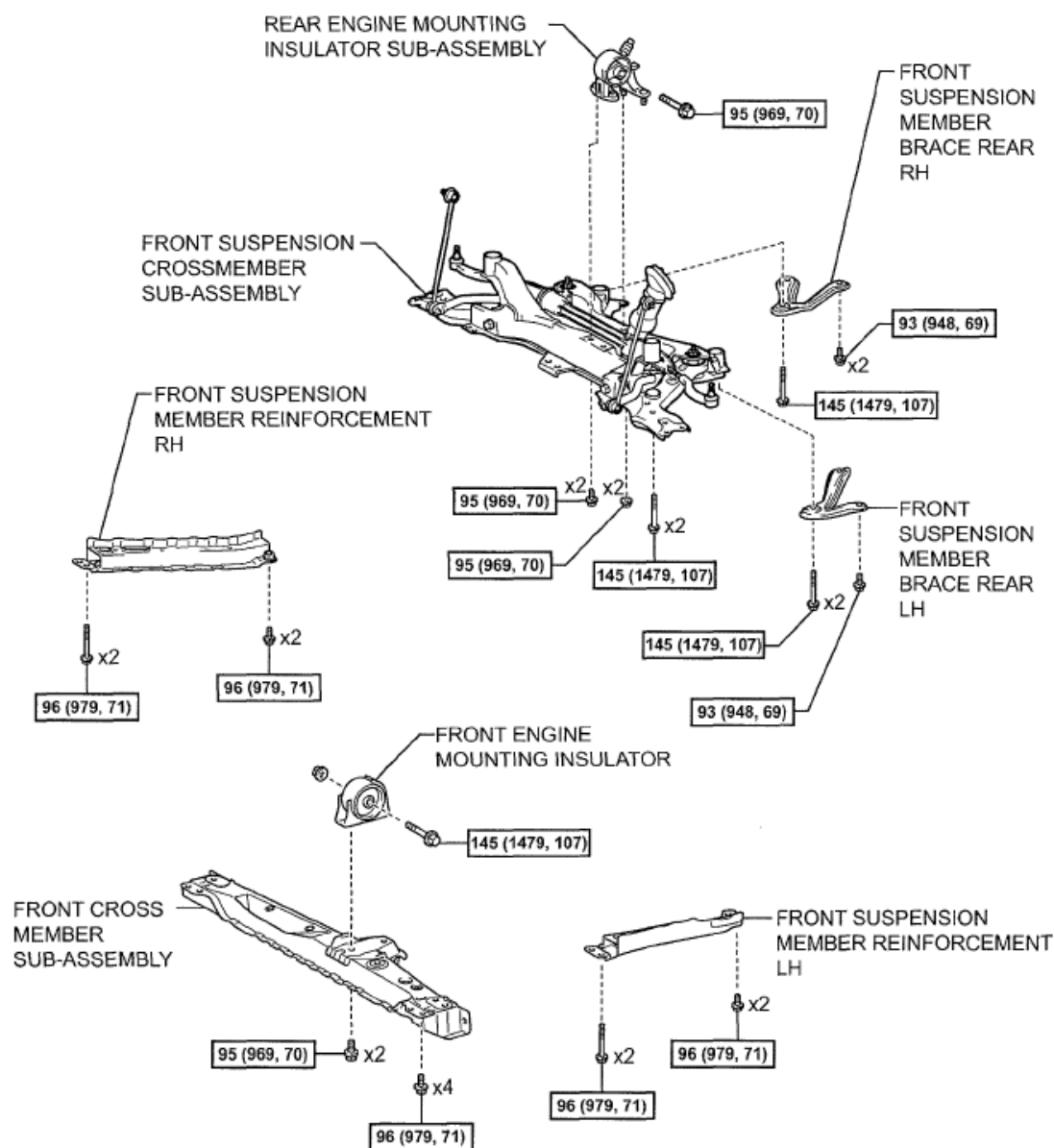
● Non-reusable part

⬅ Do not apply lubricants to the threaded parts.

P

A156873E01

Fig. 288: Identifying Engine Assembly Replacement Components With Torque Specifications (9 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

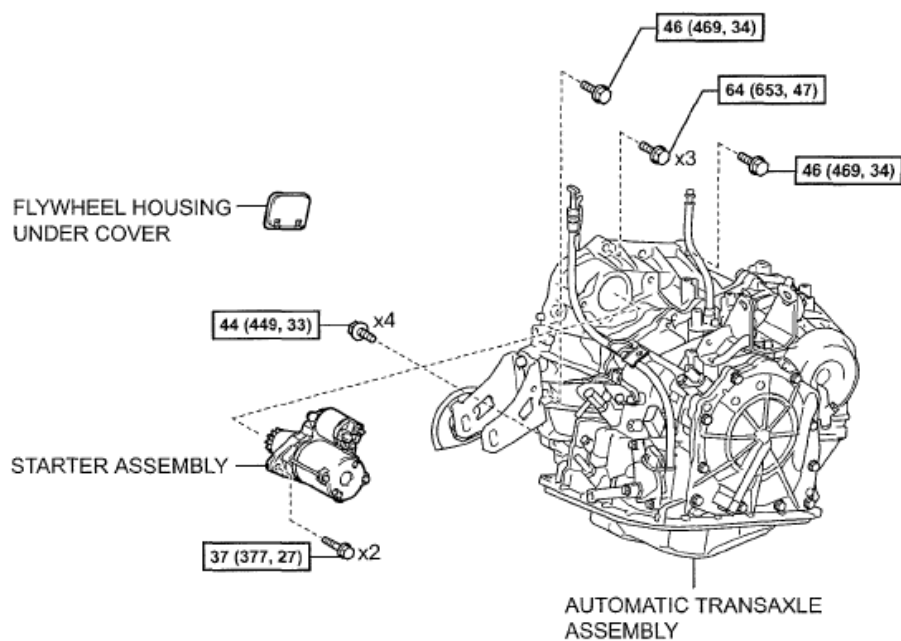


N*m (kgf*cm, ft*lb) : Specified torque

A155804E01

Fig. 289: Identifying Engine Assembly Replacement Components With Torque Specifications (10 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for Automatic Transaxle:



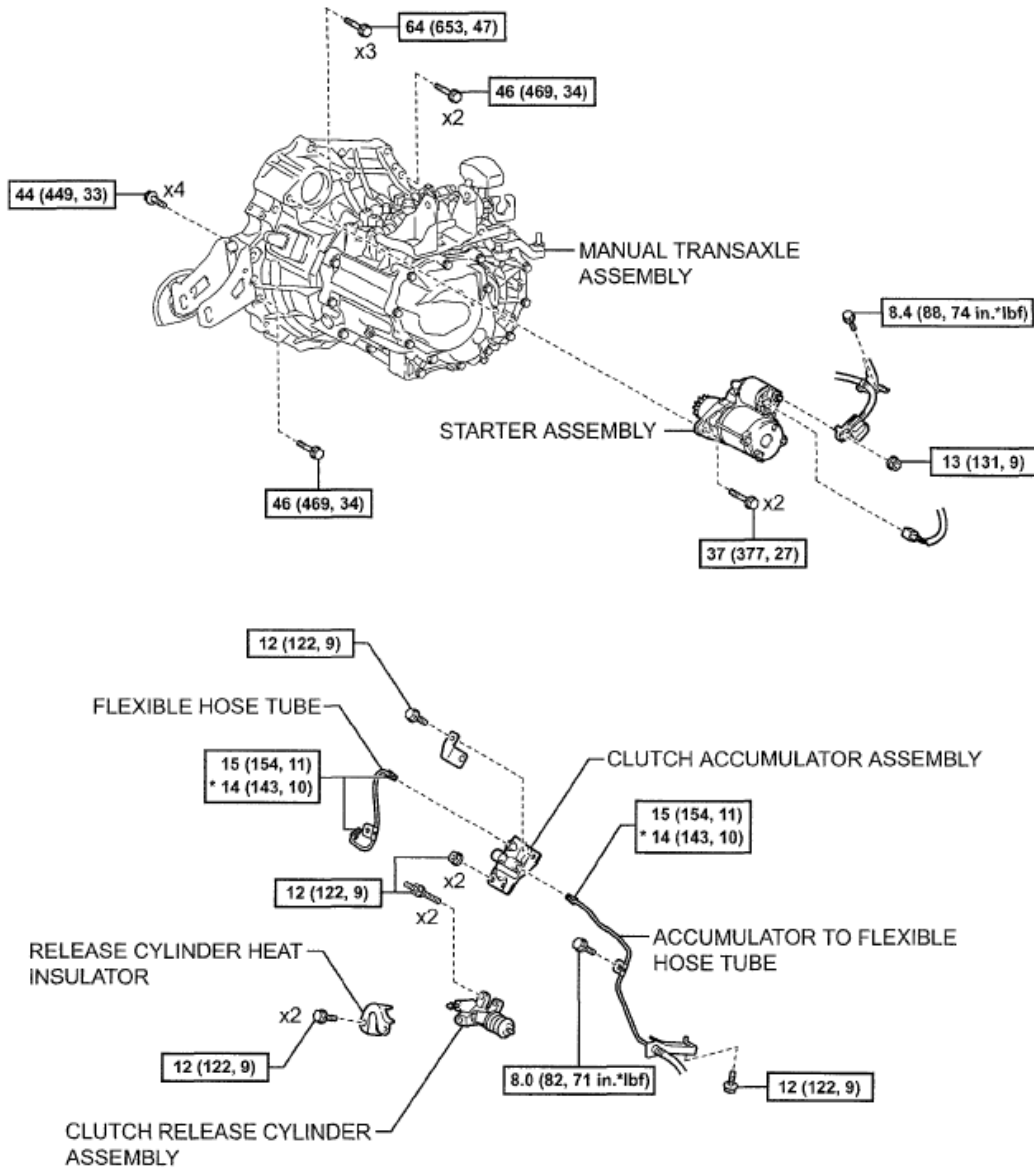
N*m (kgf*cm, ft*lb) : Specified torque

P

A156888E01

Fig. 290: Identifying Engine Assembly Replacement Components With Torque Specifications (11 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for Manual Transaxle:



N*m (kgf*cm, ft*lbf) : Specified torque

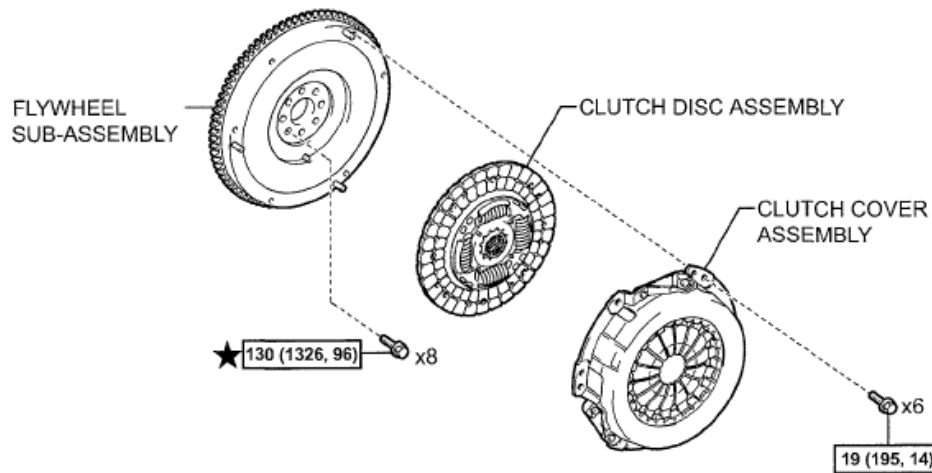
* For use with union nut wrench

P

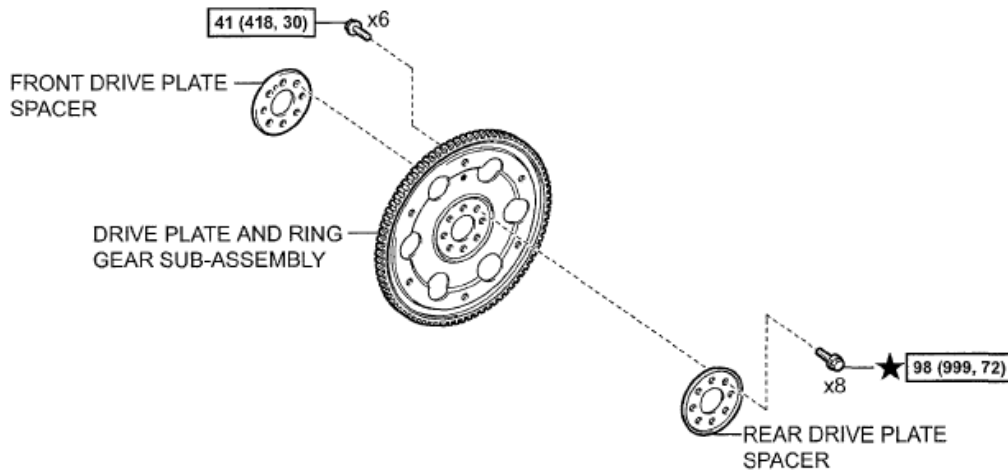
A155867E01

Fig. 291: Identifying Engine Assembly Replacement Components With Torque Specifications (12 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

for Manual Transaxle:



for Automatic Transaxle:



$\boxed{\text{N}^{\circ}\text{m (kgf}^{\circ}\text{cm, ft}^{\circ}\text{lbf)}}$: Specified torque

$\star$ Precoated part

A15889E01

Fig. 292: Identifying Engine Assembly Replacement Components With Torque Specifications (13 Of 13)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. **PLACE FRONT WHEELS FACING STRAIGHT AHEAD**
2. **SECURE STEERING WHEEL** (See **REMOVAL**)
3. **REFRIGERANT FROM REFRIGERATION SYSTEM** (See **REPLACEMENT**)
4. **DISCHARGE FUEL SYSTEM PRESSURE** (See **REMOVAL**)

5. **REMOVE BATTERY** (See REMOVAL)
6. **REMOVE HOOD** (See REMOVAL)
7. **REMOVE FRONT WHEELS**
8. **REMOVE CENTER TRANSMISSION UNDER COVER ASSEMBLY**
9. **REMOVE NO. 1 ENGINE UNDER COVER**
10. **REMOVE NO. 2 ENGINE UNDER COVER**
11. **REMOVE REAR ENGINE UNDER COVER LH**
12. **REMOVE REAR ENGINE UNDER COVER RH**
13. **SEPARATE CENTER EXHAUST PIPE ASSEMBLY**
 - a. Remove the 2 bolts and separate the center exhaust pipe.
 - b. Remove the gasket.
14. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
 - a. Disconnect the heated oxygen sensor connector.
 - b. Remove the 2 bolts and 2 compression springs and remove the front exhaust pipe.
15. **REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY** (See REMOVAL)
16. **DRAIN ENGINE COOLANT** (See REPLACEMENT)
17. **DRAIN AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)** (See REMOVAL)
18. **DRAIN MANUAL TRANSAXLE OIL (for Manual Transaxle)** (See REMOVAL)
19. **SEPARATE RADIATOR RESERVE TANK ASSEMBLY** (See REMOVAL)
20. **REMOVE AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE** (See REMOVAL)
21. **REMOVE AIR CLEANER CASE SUB-ASSEMBLY** (See REMOVAL)
22. **REMOVE NO. 2 BATTERY CARRIER** (See REMOVAL)
23. **REMOVE THROTTLE BODY ASSEMBLY** (See REMOVAL)
24. **REMOVE FAN AND GENERATOR V BELT** (See ON-VEHICLE INSPECTION)
25. **REMOVE GENERATOR ASSEMBLY** (See REMOVAL)
26. **SEPARATE SUCTION HOSE SUB-ASSEMBLY** (See REMOVAL)
27. **SEPARATE DISCHARGE HOSE SUB-ASSEMBLY** (See REMOVAL)
28. **REMOVE COMPRESSOR ASSEMBLY** (See REMOVAL)
29. **DISCONNECT OUTLET RADIATOR HOSE** (See REMOVAL)
30. **DISCONNECT INLET RADIATOR HOSE** (See REMOVAL)
31. **DISCONNECT NO. 1 OIL COOLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)**
32. **DISCONNECT NO. 2 OIL COOLER TUBE SUB-ASSEMBLY (for Automatic Transaxle)**
33. **DISCONNECT HEATER OUTLET WATER HOSE** (See REMOVAL)
34. **DISCONNECT HEATER INLET WATER HOSE** (See REMOVAL)
35. **REMOVE FUEL TUBE SUB-ASSEMBLY**

NOTE: Do not forcibly bend, kink or twist the fuel main tube.

- a. Remove the fuel tube from the fuel hose clamp.
- b. Remove the No. 2 fuel pipe clamp.
- c. Wipe off any dirt on the fuel tube connector.
- d. Hold the fuel tube connector, and then install SST.

SST 09268-21010

- e. Turn SST to align the retainer inside the fuel tube connector with the chamfered part of SST.



Fig. 293: Turning SST To Align Retainer Inside Fuel Tube Connector
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Insert SST into the fuel tube and hold it. Then push the fuel tube connector toward SST.
- g. Mount the retainer of the fuel tube connector onto the chamfered part of SST.
- h. Slide SST and the fuel tube connector together towards the fuel tube until they make a "click" sound, and then disconnect the fuel tube.
- i. Drain the fuel remaining inside the fuel tube.
- j. Cover the fuel tube and fuel pipe with a plastic bag to protect the disconnected part.

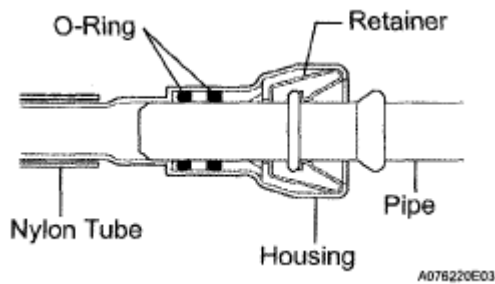


Fig. 294: Identifying O-Ring, Retainer, And Nylon Tube
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- k. Release the claw and remove the No. 1 fuel pipe clamp.

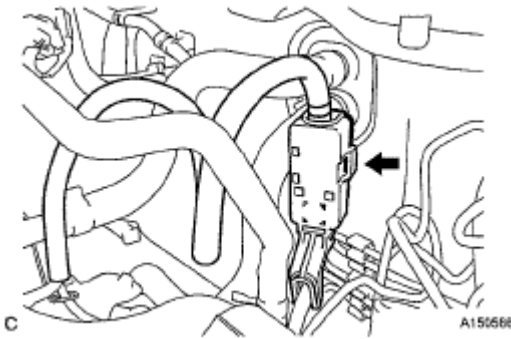


Fig. 295: Locating No. 1 Fuel Pipe Clamp
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- l. Pinch the retainer as illustrated, then pull the fuel tube connector out of the pipe.

NOTE:

- Remove any dirt and foreign matter from the fuel tube connector before performing this work.
- Do not allow any scratches or foreign matter on the parts when disconnecting, as the fuel tube connector has O-rings that seal the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, kink or twist the nylon tube.
- Protect the disconnected parts by covering them with vinyl bags after disconnecting the fuel tube.
- If the fuel tube connector and pipe are stuck, push and pull to release them.

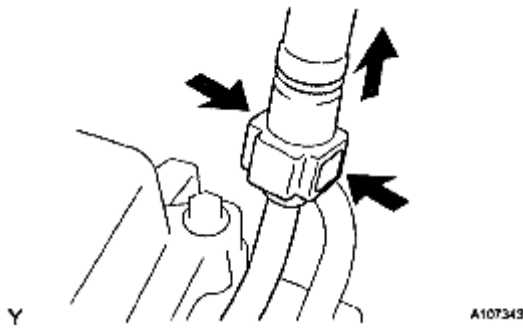


Fig. 296: Pinching Retainer

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

36. DISCONNECT CHECK VALVE TO CONNECTOR TUBE HOSE

- a. Disconnect the check valve to connector tube hose.

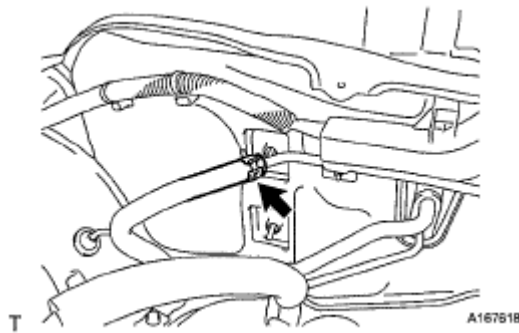


Fig. 297: Locating Check Valve To Connector Tube Hose

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

37. REMOVE CLUTCH ACCUMULATOR ASSEMBLY (for Manual Transaxle)

(See REMOVAL)

38. SEPARATE CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)

(See REMOVAL)

39. SEPARATE ACCUMULATOR TO FLEXIBLE HOSE TUBE (for Manual Transaxle) (See REMOVAL)

40. SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle) (See REMOVAL)

41. SEPARATE TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle) (See REMOVAL)

42. REMOVE STARTER ASSEMBLY (for Automatic Transaxle) (See DISASSEMBLY)

43. REMOVE STARTER ASSEMBLY (for Manual Transaxle) (See REMOVAL)

44. REMOVE COLUMN HOLE COVER SILENCER SHEET (See REMOVAL)

45. **SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY** (See **REMOVAL**)
46. **REMOVE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See **REMOVAL**)
47. **SEPARATE ECM**
 - a. Pull up the lever and disconnect the ECM connector.
48. **SEPARATE ENGINE WIRE**
 - a. Remove the engine room relay block cover.

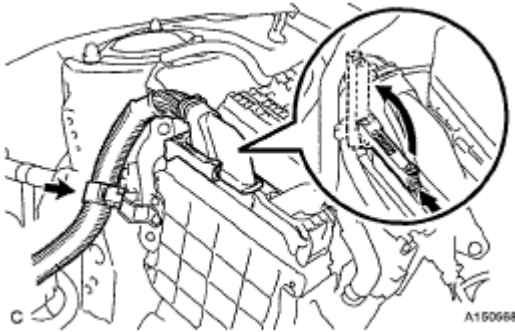


Fig. 298: Locating Engine Room Relay Block Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the nut and disconnect the 2 engine wire connectors.
- c. Remove the bolt and engine wire cover. Then disconnect the engine wire from the engine wire cover.

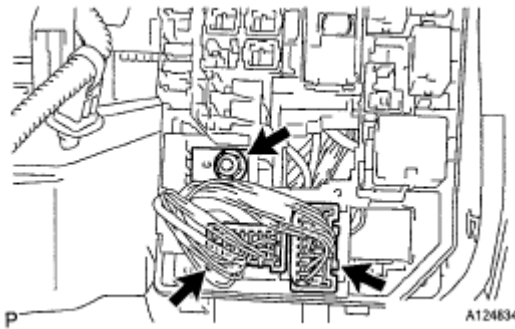


Fig. 299: Locating Engine Wire Connectors And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Remove the nut from the positive battery terminal to disconnect the engine wire.
- e. Disconnect the ground cable connector.
- f. Disconnect the ground cable from the clamp located near the starter.
- g. Remove the bolt and ground cable located near the starter.

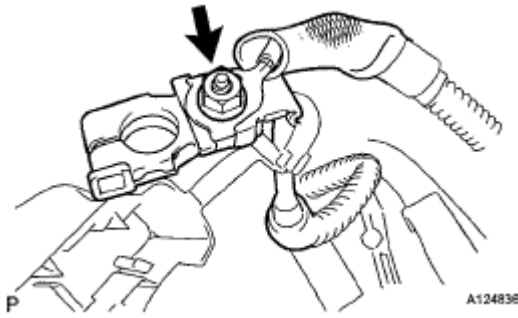


Fig. 300: Locating Positive Battery Terminal Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

49. **REMOVE FRONT AXLE HUB NUT LH** (See REMOVAL)
50. **REMOVE FRONT AXLE HUB NUT RH**

HINT:

Perform the same procedure for the LH side.

51. **SEPARATE FRONT SPEED SENSOR LH** (See REMOVAL)
52. **SEPARATE FRONT SPEED SENSOR RH**

HINT:

Perform the same procedure for the LH side.

53. **SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH** (See REMOVAL)
54. **SEPARATE FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

55. **SEPARATE TIE ROD END SUB-ASSEMBLY LH** (See REMOVAL)
56. **SEPARATE TIE ROD END SUB-ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

57. **SEPARATE FRONT STABILIZER LINK ASSEMBLY LH** (See REMOVAL)
58. **SEPARATE FRONT STABILIZER LINK ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

59. **SEPARATE FRONT AXLE ASSEMBLY LH** (See **REMOVAL**)

60. **SEPARATE FRONT AXLE ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

61. **REMOVE FRONT DRIVE SHAFT ASSEMBLY LH** (See **REMOVAL**)

62. **REMOVE FRONT DRIVE SHAFT ASSEMBLY RH** (See **REMOVAL**)

63. **SEPARATE TORQUE CONVERTER CLUTCH ASSEMBLY (for Automatic Transaxle)** (See **REMOVAL**)

64. **SUSPEND ENGINE ASSEMBLY**

- a. Install the No. 1 and No. 2 engine hangers with the new bolts as shown in the illustration.

Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)

Part No.

PART NO. REFERENCE CHART

Item	Part No.
No. 1 engine hanger	12281-28010
No. 2 engine hanger	12282-28010
Bolt	91512-61020

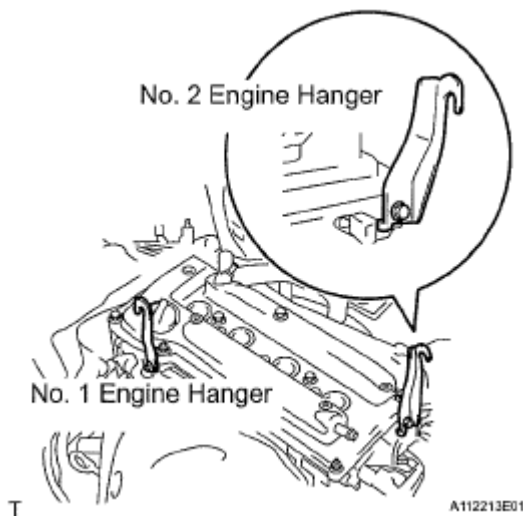


Fig. 301: Identifying No. 1 And No. 2 Engine Hangers With Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Attach the sling device to the engine hangers and chain block.

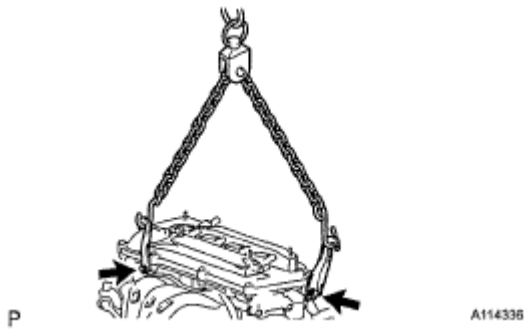


Fig. 302: Attaching Sling Device To Engine Hangers And Chain Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

65. REMOVE FRONT SUSPENSION MEMBER REINFORCEMENT LH

- a. Remove the 4 bolts and front suspension member reinforcement LH.

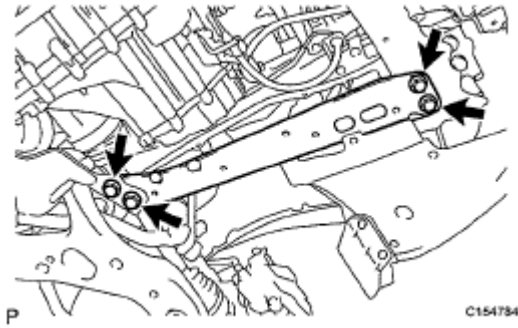


Fig. 303: Locating Front Suspension Member Reinforcement
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

66. REMOVE FRONT SUSPENSION MEMBER REINFORCEMENT RH

HINT:

Perform the same procedure for the LH side.

67. REMOVE FRONT SUSPENSION MEMBER BRACE REAR LH

- a. Remove the 3 bolts and front suspension member rear brace LH.

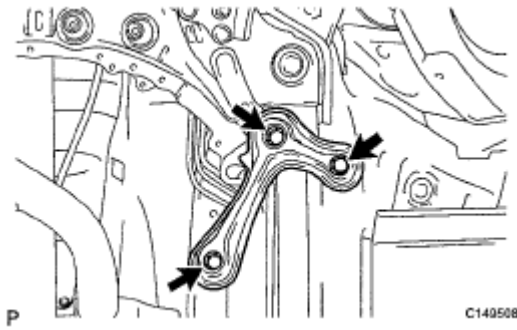


Fig. 304: Locating Front Suspension Member Rear Brace
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

68. REMOVE FRONT SUSPENSION MEMBER BRACE REAR RH

HINT:

Perform the same procedure for the LH side.

69. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

- Support the front suspension crossmember with a transmission jack.
- Remove the 4 bolts, 2 nuts, and front suspension crossmember sub-assembly.

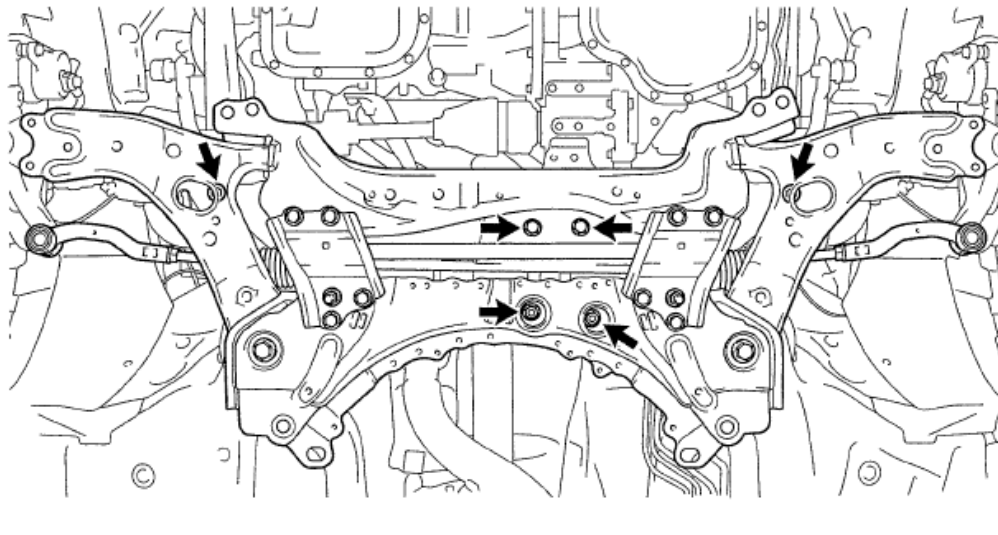


Fig. 305: Locating Front Suspension Crossmember Sub-Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

70. REMOVE FRONT CROSS MEMBER SUB-ASSEMBLY

- Remove the bolt and nut.
- Separate the engine mounting insulator front from the engine mounting bracket front.

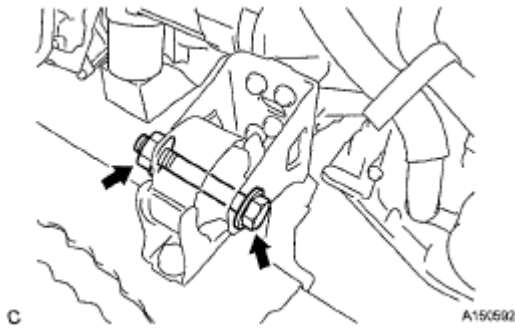


Fig. 306: Locating Engine Mounting Insulator Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 2 bolts and front engine mounting insulator.

HINT:

Only perform this procedure when replacement of the engine mounting insulator is necessary.

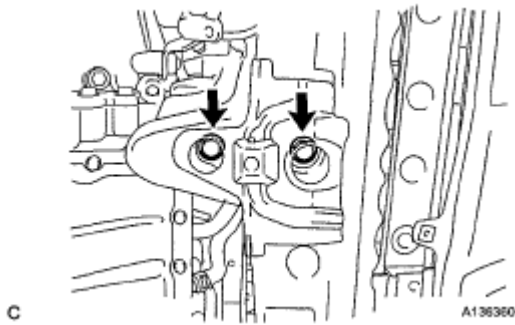


Fig. 307: Locating Front Engine Mounting Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Remove the 4 bolts and front crossmember.

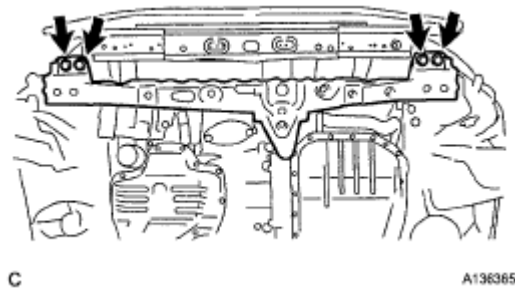


Fig. 308: Locating Front Crossmember Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

71. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH (See REMOVAL)

72. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY LH

- a. Remove the through bolt and nut.
- b. Remove the 4 bolts and engine mounting insulator LH.

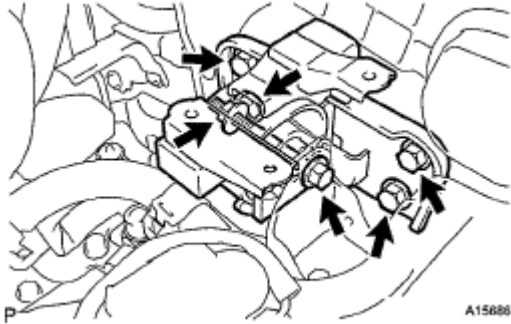


Fig. 309: Locating Engine Mounting Insulator LH Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

73. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

- a. Set the engine lifter.

NOTE: Place the engine on wooden blocks or equivalent so that the engine is level.

- b. Carefully remove the engine with transaxle from the vehicle.

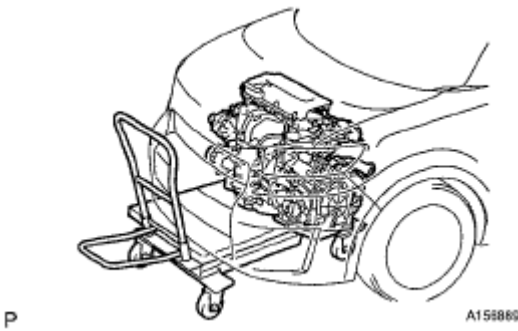


Fig. 310: Identifying Engine Lifter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

74. REMOVE REAR ENGINE MOUNTING INSULATOR SUB-ASSEMBLY

- a. Remove the bolt and nut, and separate the rear engine mounting insulator.

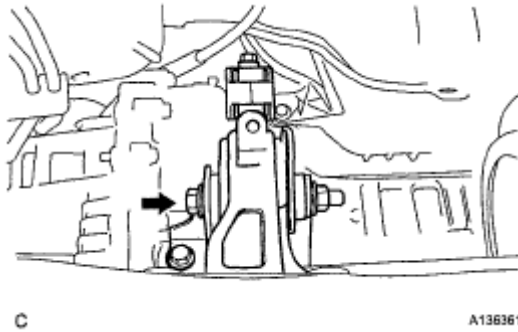


Fig. 311: Locating Rear Engine Mounting Insulator Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

75. REMOVE DRIVE SHAFT BEARING BRACKET

- a. Remove the 3 bolts and bracket.

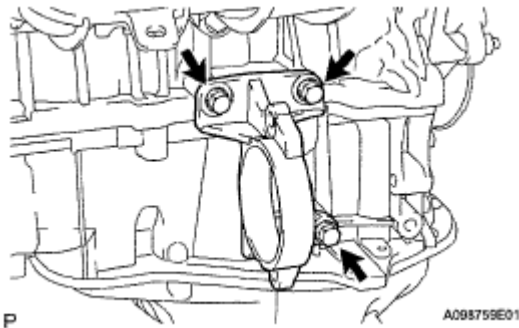


Fig. 312: Locating Bracket And Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

76. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle) (See REMOVAL)**
77. **REMOVE MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle) (See REMOVAL)**
78. **REMOVE CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See REMOVAL)**
79. **REMOVE CLUTCH DISC ASSEMBLY (for Manual Transaxle)**
80. **REMOVE DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) (See REMOVAL)**
81. **REMOVE FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) (See REMOVAL)**

INSTALLATION

1. **INSTALL DRIVE PLATE AND RING GEAR SUB-ASSEMBLY (for Automatic Transaxle) (See INSTALLATION)**
2. **INSTALL FLYWHEEL SUB-ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**
3. **INSTALL CLUTCH DISC ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**
4. **INSTALL CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**

5. **INSPECT AND ADJUST CLUTCH COVER ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**
6. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (for Automatic Transaxle) (See INSTALLATION)**
7. **INSTALL MANUAL TRANSAXLE ASSEMBLY (for Manual Transaxle) (See INSTALLATION)**
8. **INSTALL DRIVE SHAFT BEARING BRACKET**
 - a. Install the bracket with the 3 bolts.

Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

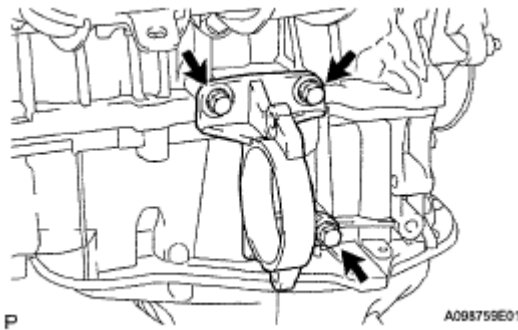


Fig. 313: Locating Bracket And Bolts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. **INSTALL REAR ENGINE MOUNTING INSULATOR SUB-ASSEMBLY**
 - a. Install the rear engine mounting insulator to the engine mounting bracket with the through bolt.

Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

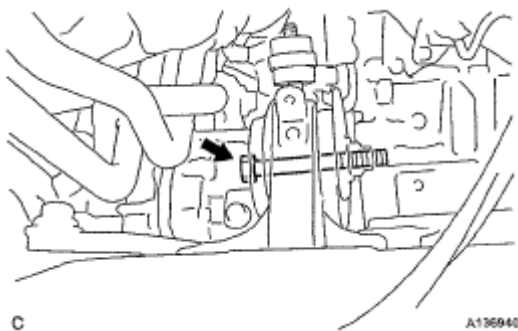


Fig. 314: Locating Rear Engine Mounting Insulator Bracket With Bolt
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE**
 - a. Set the engine assembly with transaxle and front suspension crossmember on the engine lifter.
 - b. Operate the engine lifter and lift the engine assembly with transaxle and front suspension crossmember to the position where the engine mounting insulator RH and LH can be installed.

CAUTION: Do not raise the engine more than necessary. If the engine is raised excessively, the vehicle may also be lifted up.

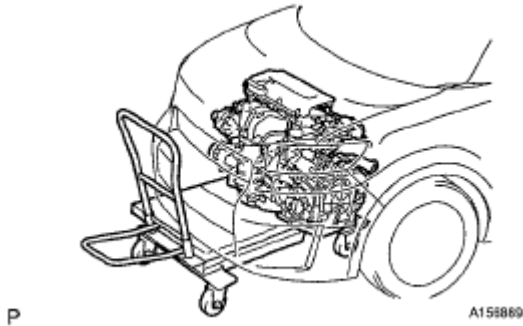


Fig. 315: Identifying Engine Lifter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Make sure that the engine is clear of all wiring and hoses.
- While raising the engine into the vehicle, do not allow it to contact the vehicle.

11. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY LH

- a. Install the engine mounting insulator LH with the 4 bolts.

Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

- b. Install the engine mounting insulator LH with the through bolt and nut.

HINT:

Install the through bolt by tightening the nut.

Torque: 56 N*m (571 kgf*cm, 41 ft.*lbf)

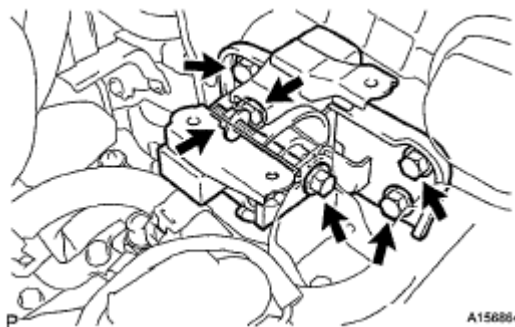


Fig. 316: Identifying Engine Mounting Insulator Bolts And Nut

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. **INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH** (See **INSTALLATION**)
13. **INSTALL FRONT CROSS MEMBER SUB-ASSEMBLY**
 - a. Install the front crossmember with the 4 bolts.

Torque: 96 N*m (979 kgf*cm, 71 ft.*lbf)

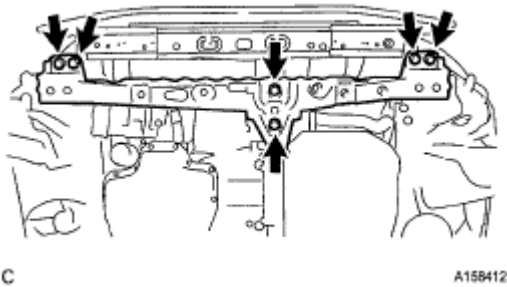


Fig. 317: Identifying Front Crossmember Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the front engine mounting insulator with the 2 bolts.

Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

HINT:

Only perform this procedure when replacement of the engine mounting insulator is necessary.

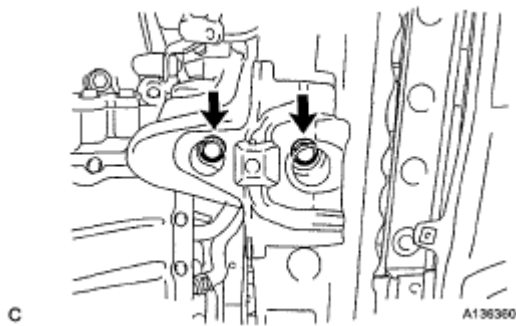


Fig. 318: Locating Front Engine Mounting Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Install the engine mounting insulator front to the engine mounting bracket front with the bolt and nut.

Torque: 145 N*m (1479 kgf*cm, 107 ft.*lbf)

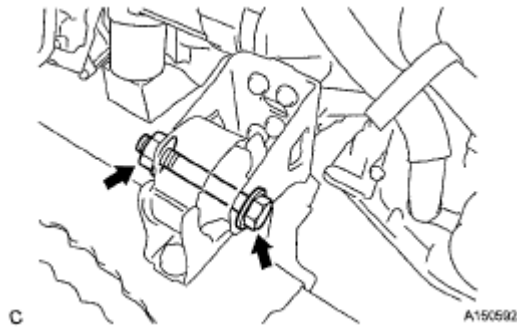


Fig. 319: Locating Engine Mounting Insulator Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY

- Support the front suspension crossmember with a transmission jack.
- While inserting SST into the reference holes on the front suspension crossmember RH and LH alternately, tighten 2 bolts A, 2 bolts B, and 2 nuts on the RH and LH sides to the respective specified torque in several steps.

SST 09670-00020

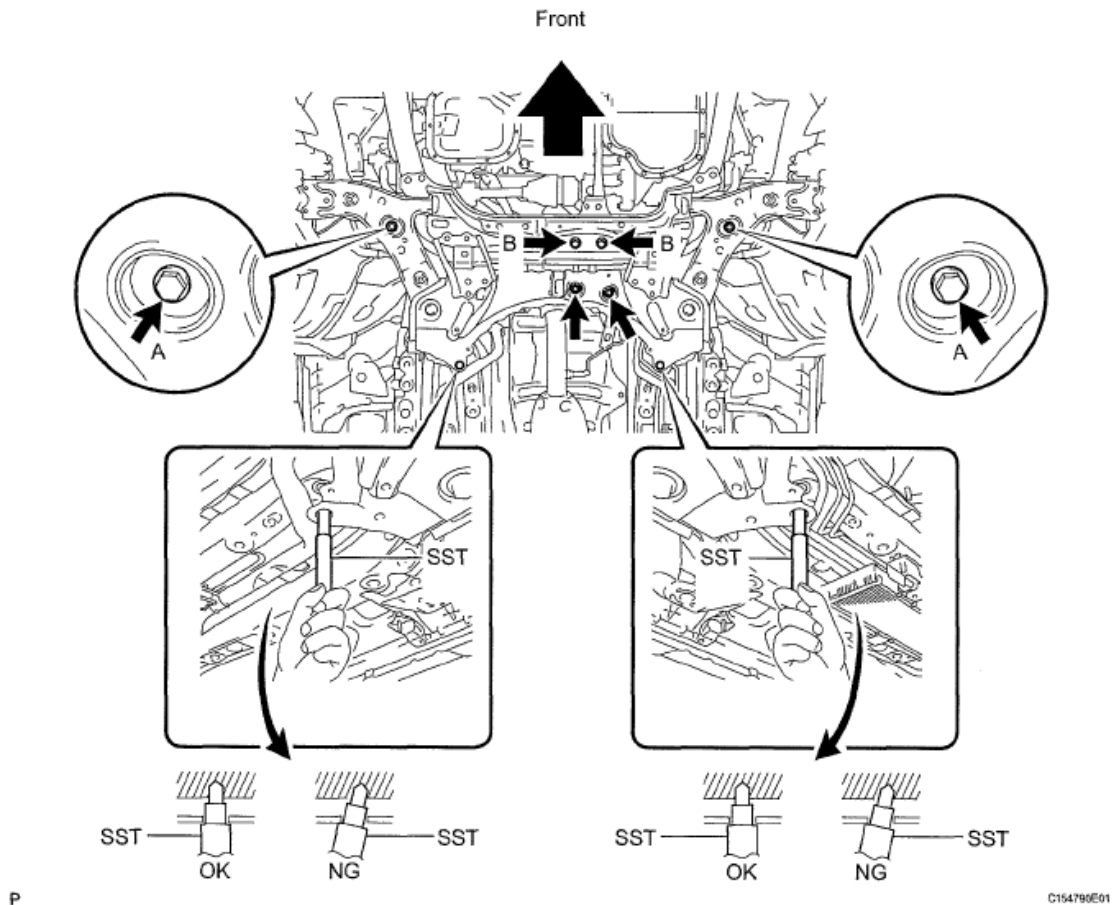


Fig. 320: Locating Front Suspension Crossmember Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

Torque:

Bolt A

145 N*m (1479 kgf*cm, 107 ft.*lbf)

Bolt B

95 N*m (969 kgf*cm, 70 ft.*lbf)

Nut

95 N*m (969 kgf*cm, 70 ft.*lbf)

15. INSTALL FRONT SUSPENSION MEMBER BRACE REAR LH

- a. Install the front suspension member rear brace LH with the 3 bolts.

Torque:

Bolt A

145 N*m (1479 kgf*cm, 107 ft.*lbf)

Bolt B

93 N*m (948 kgf*cm, 69 ft.*lbf)

16. INSTALL FRONT SUSPENSION MEMBER BRACE REAR RH

HINT:

Perform the same procedure for the LH side.

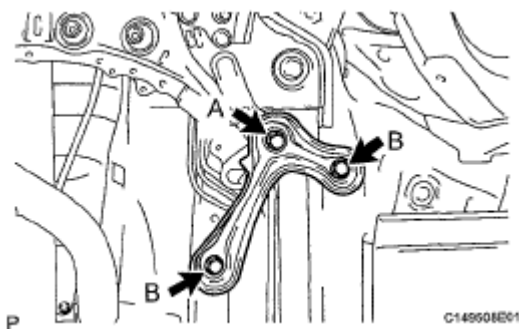


Fig. 321: Locating Front Suspension Member Rear Brace LH Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. INSTALL FRONT SUSPENSION MEMBER REINFORCEMENT LH

- a. Install the front suspension member reinforcement LH with the 4 bolts.

Torque: 96 N*m (979 kgf*cm, 71 ft.*lbf)

NOTE: Temporarily tighten bolts A and B, and then fully tighten the 4 bolts in the order of C, B, D, and A.

18. INSTALL FRONT SUSPENSION MEMBER REINFORCEMENT RH

HINT:

Perform the same procedure for the LH side.

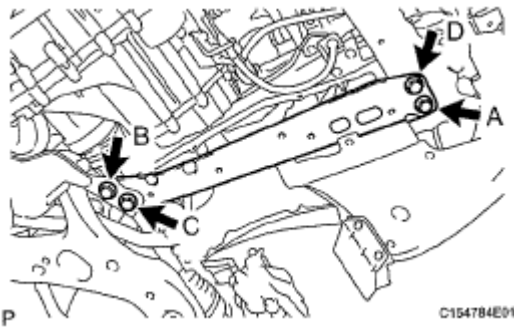


Fig. 322: Locating Front Suspension Member Reinforcement LH With Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. **INSTALL TORQUE CONVERTER CLUTCH ASSEMBLY (for Automatic Transaxle) (See INSTALLATION)**
20. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See INSTALLATION)**
21. **INSTALL FRONT DRIVE SHAFT ASSEMBLY RH (See INSTALLATION)**
22. **INSTALL FRONT AXLE ASSEMBLY LH (See INSTALLATION)**
23. **INSTALL FRONT AXLE ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

24. **INSTALL FRONT STABILIZER LINK ASSEMBLY LH (See INSTALLATION)**
25. **INSTALL FRONT STABILIZER LINK ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

26. **INSTALL TIE ROD END SUB-ASSEMBLY LH** (See **INSTALLATION**)
27. **INSTALL TIE ROD END SUB-ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

28. **INSTALL FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY LH** (See **INSTALLATION**)
29. **INSTALL FRONT LOWER NO. 1 SUSPENSION ARM SUB-ASSEMBLY RH**

HINT:

Perform the same procedure for the LH side.

30. **INSTALL FRONT SPEED SENSOR LH** (See **INSTALLATION**)
31. **INSTALL FRONT SPEED SENSOR RH**

HINT:

Perform the same procedure for the LH side.

32. **INSTALL FRONT AXLE HUB NUT LH** (See **INSTALLATION**)
33. **INSTALL FRONT AXLE HUB NUT RH**

HINT:

Perform the same procedure for the LH side.

34. **CONNECT ENGINE WIRE**

- a. Install the ground cable with the bolt located near the starter.

Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

- b. Connect the ground cable to the clamp located near the starter.
- c. Connect the ground cable connector.
- d. Connect the engine wire to the positive battery terminal with the nut.

Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

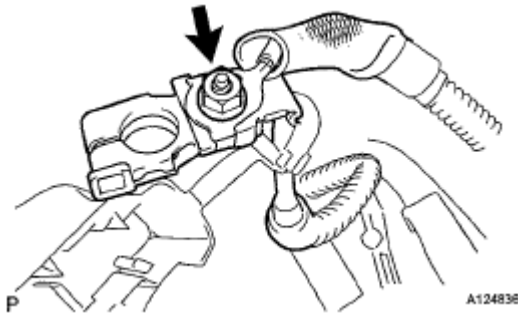


Fig. 323: Locating Positive Battery Terminal Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Connect the 2 engine wire connectors and install the nut.
- f. Install the engine room relay block cover.
- g. Attach the clamp of the engine wire cover.
- h. Install the engine wire cover to with the bolt.

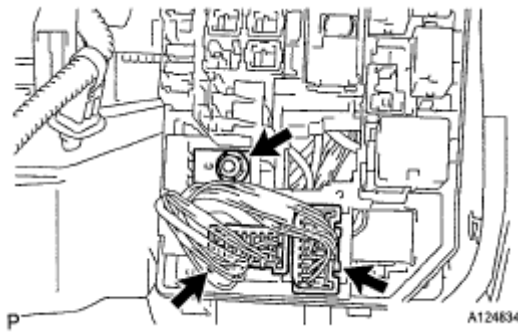


Fig. 324: Locating Engine Wire Connectors And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

35. CONNECT ECM

- a. Connect the connector to the engine control computer with the clamp and lock lever.

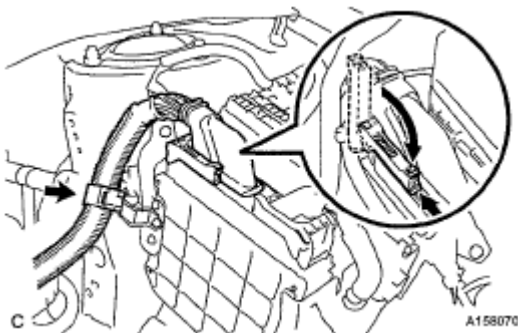


Fig. 325: Locating Engine Control Computer With Clamp And Lock Lever
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

36. **INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY** (See INSTALLATION)
37. **INSTALL NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY** (See INSTALLATION)
38. **INSTALL COLUMN HOLE COVER SILENCER SHEET** (See INSTALLATION)
39. **INSTALL STARTER ASSEMBLY (for Automatic Transaxle)** (See INSTALLATION)
40. **INSTALL STARTER ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
41. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Automatic Transaxle)** (See INSTALLATION)
42. **INSTALL TRANSMISSION CONTROL CABLE ASSEMBLY (for Manual Transaxle)** (See INSTALLATION)
43. **INSTALL ACCUMULATOR TO FLEXIBLE HOSE TUBE (for Manual Transaxle)** (See INSTALLATION)
44. **INSTALL CLUTCH RELEASE CYLINDER ASSEMBLY (for Manual Transaxle)**
(See INSTALLATION)
45. **INSTALL CLUTCH ACCUMULATOR ASSEMBLY (for Manual Transaxle)**
(See INSTALLATION)
46. **CONNECT CHECK VALVE TO CONNECTOR TUBE HOSE**
 - a. Connect the check valve to connector tube hose.

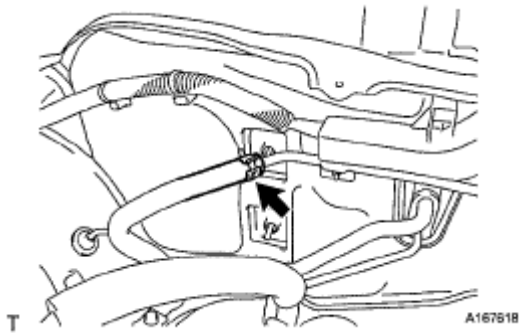


Fig. 326: Locating Check Valve To Connector Tube Hose
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

47. **INSTALL FUEL TUBE SUB-ASSEMBLY**
 - a. Connect the fuel tube connector and fuel pipe.

CAUTION: Align the fuel tube connector with the pipe, then push the fuel tube connector in until the retainer makes a "click" sound. If the connection is tight, apply a small amount of engine oil to the tip of the pipe. After connecting, pull the pipe and connector to make sure that they are securely connected.

- b. Engage the claw and install the No. 1 fuel pipe clamp.
- c. Install the No. 2 fuel pipe clamp.

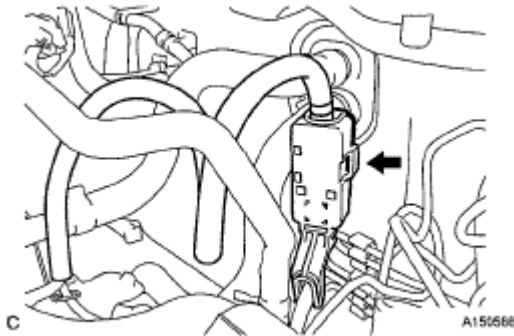


Fig. 327: Locating No. 1 Fuel Pipe Clamp

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- 48. **CONNECT HEATER INLET WATER HOSE** (See INSTALLATION)
- 49. **CONNECT HEATER OUTLET WATER HOSE** (See INSTALLATION)
- 50. **CONNECT NO. 2 OIL COOLER TUBE SUB-ASSEMBLY** (for Automatic Transaxle)
- 51. **CONNECT NO. 1 OIL COOLER TUBE SUB-ASSEMBLY** (for Automatic Transaxle)
- 52. **INSTALL COMPRESSOR ASSEMBLY** (See INSTALLATION)
- 53. **CONNECT DISCHARGE HOSE SUB-ASSEMBLY** (See INSTALLATION)
- 54. **CONNECT SUCTION HOSE SUB-ASSEMBLY** (See INSTALLATION)
- 55. **INSTALL GENERATOR ASSEMBLY** (See INSTALLATION)
- 56. **INSTALL FAN AND GENERATOR V BELT** (See ON-VEHICLE INSPECTION)
- 57. **INSTALL THROTTLE BODY ASSEMBLY** (See INSTALLATION)
- 58. **INSTALL NO. 2 BATTERY CARRIER** (See INSTALLATION)
- 59. **INSTALL AIR CLEANER CASE SUB-ASSEMBLY** (See INSTALLATION)
- 60. **INSTALL AIR CLEANER CAP SUB-ASSEMBLY WITH HOSE** (See INSTALLATION)
- 61. **INSTALL RADIATOR RESERVE TANK ASSEMBLY** (See INSTALLATION)
- 62. **INSTALL FRONT EXHAUST PIPE ASSEMBLY**
 - a. Using vernier calipers, measure the free length of the compression spring.

Minimum length: 41.5 mm (1.634 in.)

If the length is not as specified, replace the compression spring.

- b. Install the new exhaust pipe gasket to the exhaust manifold converter.
- c. Install the front exhaust pipe with the 2 compression springs and 2 bolts.

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

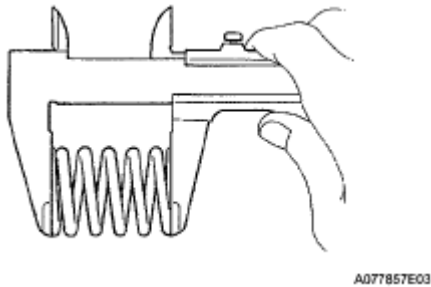


Fig. 328: Measuring Free Length Of Compression Spring
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

63. INSTALL CENTER EXHAUST PIPE ASSEMBLY

- a. Install the new gasket onto the front exhaust pipe.
- b. Install the center exhaust pipe with the 2 bolts.

Torque: 43 N*m (438 kgf*cm, 32 ft.*lbf)

64. **ADD AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)** (See INSTALLATION)
65. **INSPECT AUTOMATIC TRANSAXLE FLUID (for Automatic Transaxle)** (See ON-VEHICLE INSPECTION)
66. **ADD MANUAL TRANSAXLE OIL (for Manual Transaxle)**
67. **INSPECT AND ADJUST MANUAL TRANSAXLE OIL (for Manual Transaxle)** (See ON-VEHICLE INSPECTION)
68. **INSTALL BATTERY** (See INSTALLATION)
69. **ADD ENGINE COOLANT** (See REPLACEMENT)
70. **CHARGE REFRIGERANT** (See REPLACEMENT)
71. **WARM UP ENGINE** (See REPLACEMENT)
72. **ADD CLUTCH FLUID (for Manual Transaxle)**
73. **BLEED CLUTCH LINE (for Manual Transaxle)** (See BLEEDING)
74. **INSPECT FOR CLUTCH FLUID LEAK (for Manual Transaxle)**
75. **INSPECT CLUTCH FLUID LEVEL IN RESERVOIR (for Manual Transaxle)**
76. **INSPECT FOR FUEL LEAK** (See FUEL SYSTEM)
77. **INSPECT FOR ENGINE COOLANT LEAK** (See ON-VEHICLE INSPECTION)
78. **INSPECT REFRIGERANT LEAK** (See REPLACEMENT)
79. **INSPECT FOR AUTOMATIC TRANSAXLE FLUID LEAK (for Automatic Transaxle)**
80. **INSPECT SHIFT LEVER POSITION (for Automatic Transaxle)** (See ON-VEHICLE INSPECTION)
81. **ADJUST SHIFT LEVER POSITION (for Automatic Transaxle)** (See INSTALLATION)
82. **INSPECT EXHAUST GAS LEAK**
83. **INSTALL REAR ENGINE UNDER COVER LH**
84. **INSTALL REAR ENGINE UNDER COVER RH**

- 85. **INSTALL NO. 2 ENGINE UNDER COVER**
- 86. **INSTALL NO. 1 ENGINE UNDER COVER**
- 87. **INSTALL CENTER TRANSMISSION UNDER COVER ASSEMBLY**
- 88. **INSTALL FRONT WHEELS**

Torque: 103 N*m (1050 kgf*cm, 76 ft.*lbf)

- 89. **INSTALL HOOD** (See INSTALLATION)
- 90. **INSPECT HOOD** (See ADJUSTMENT)
- 91. **ADJUST HOOD** (See ADJUSTMENT)
- 92. **INSPECT ENGINE IDLING SPEED** (See ON-VEHICLE INSPECTION)
- 93. **INSPECT CO/HC** (See ON-VEHICLE INSPECTION)
- 94. **INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY** (See INSTALLATION)
- 95. **INSPECT AND ADJUST FRONT WHEEL ALIGNMENT**
 - a. Inspect and adjust the front wheel alignment (see ADJUSTMENT).
- 96. **INSPECT ABS SPEED SENSOR SIGNAL**

ENGINE UNIT

COMPONENTS

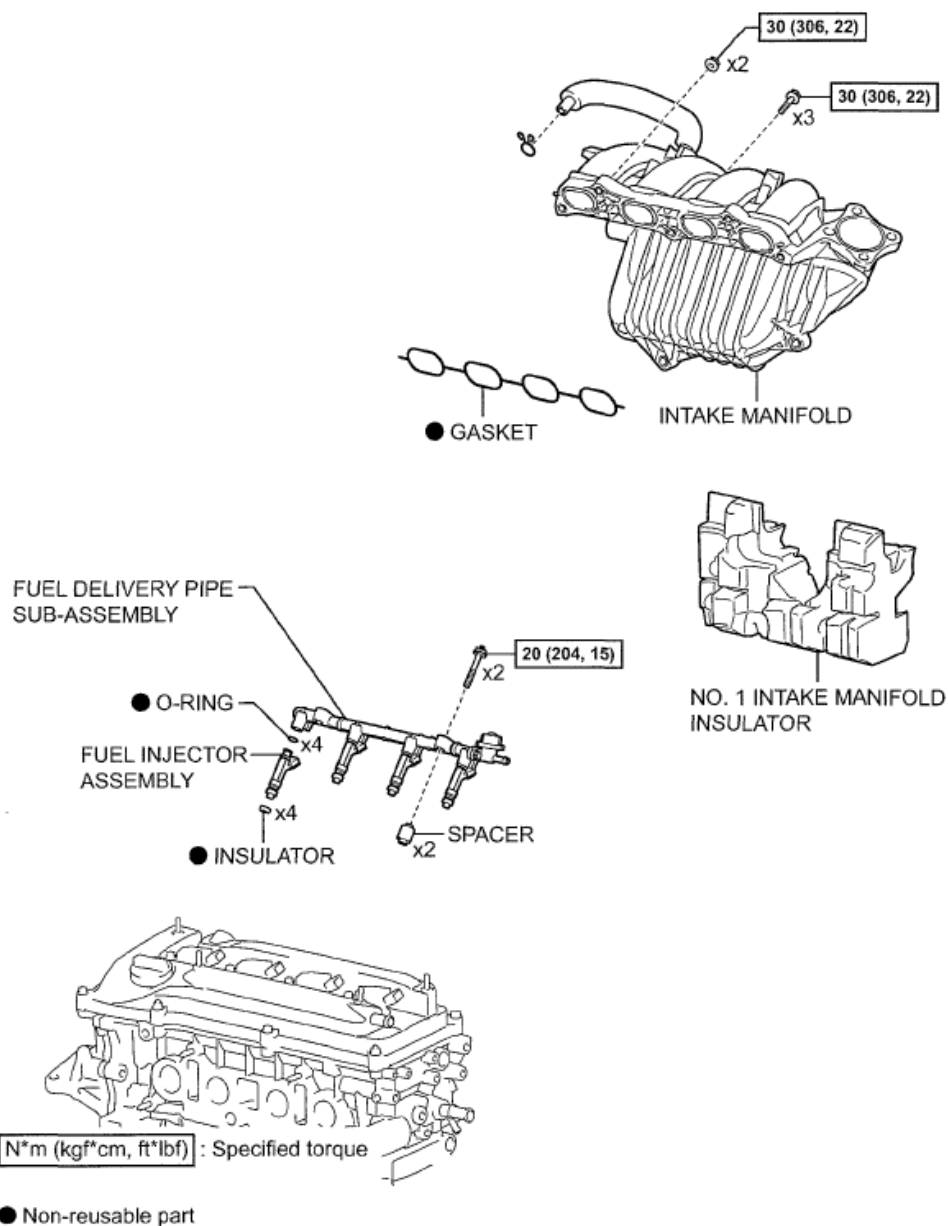
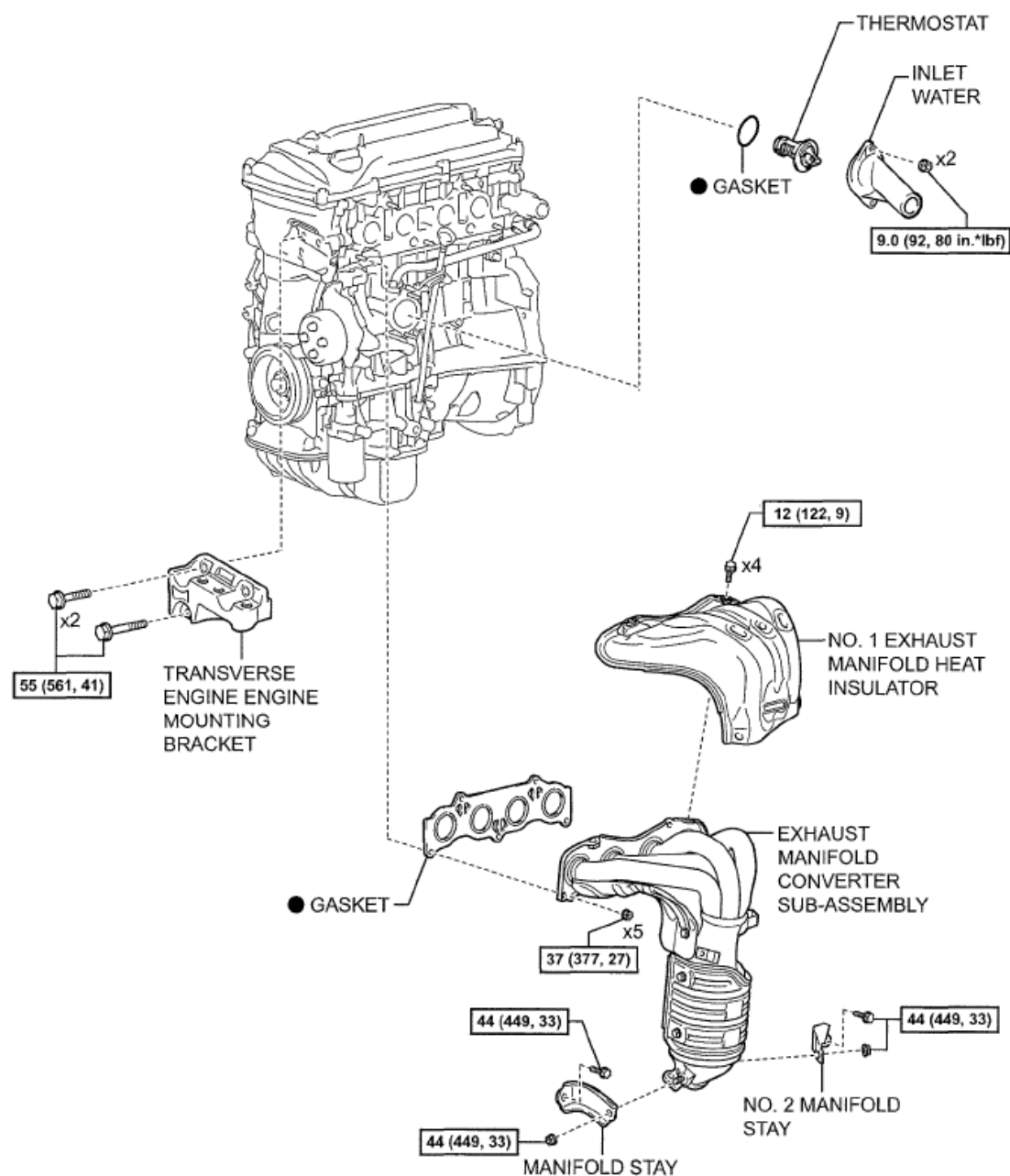


Fig. 329: Identifying Engine Unit Components With Torque Specifications (1 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

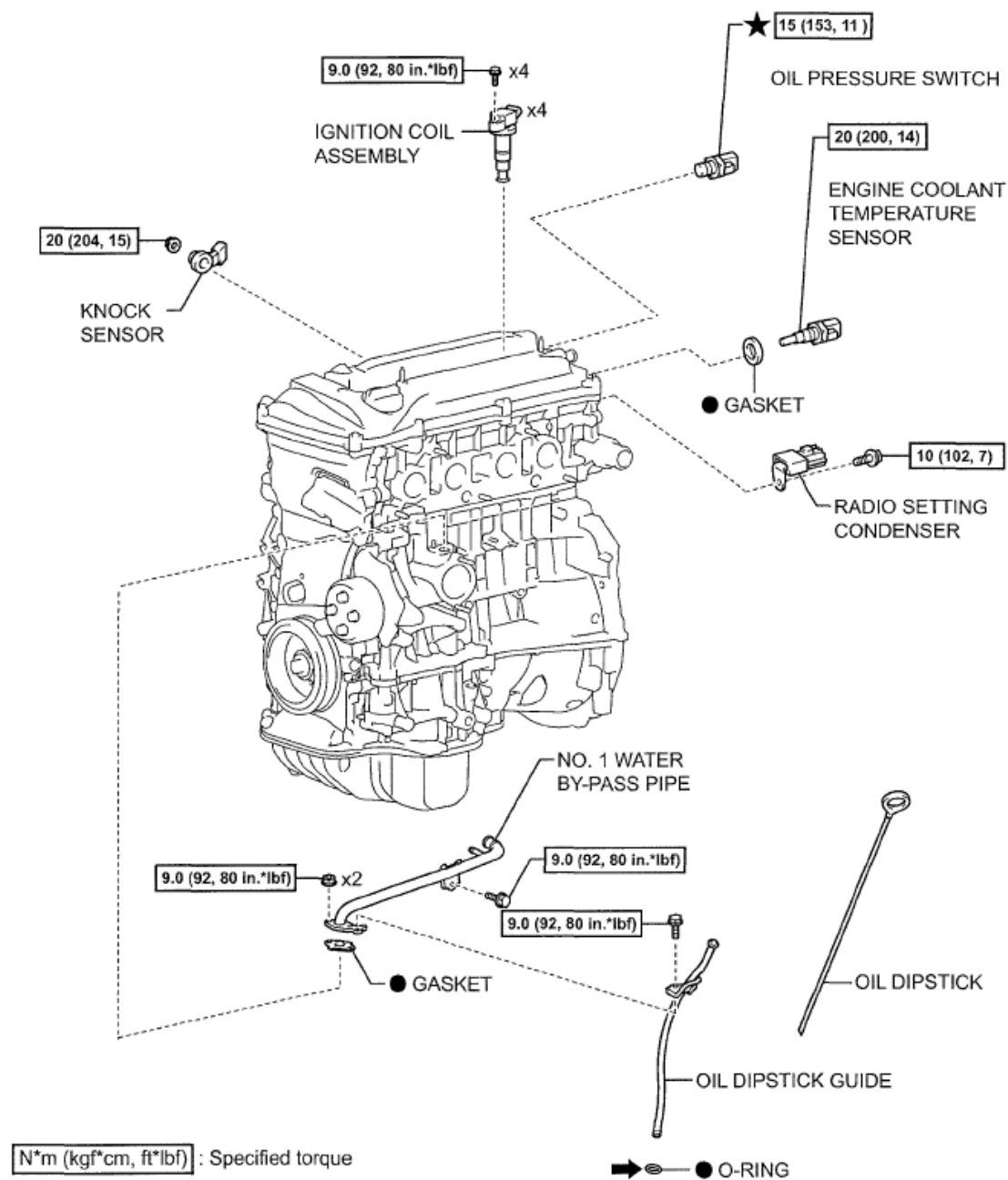


N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

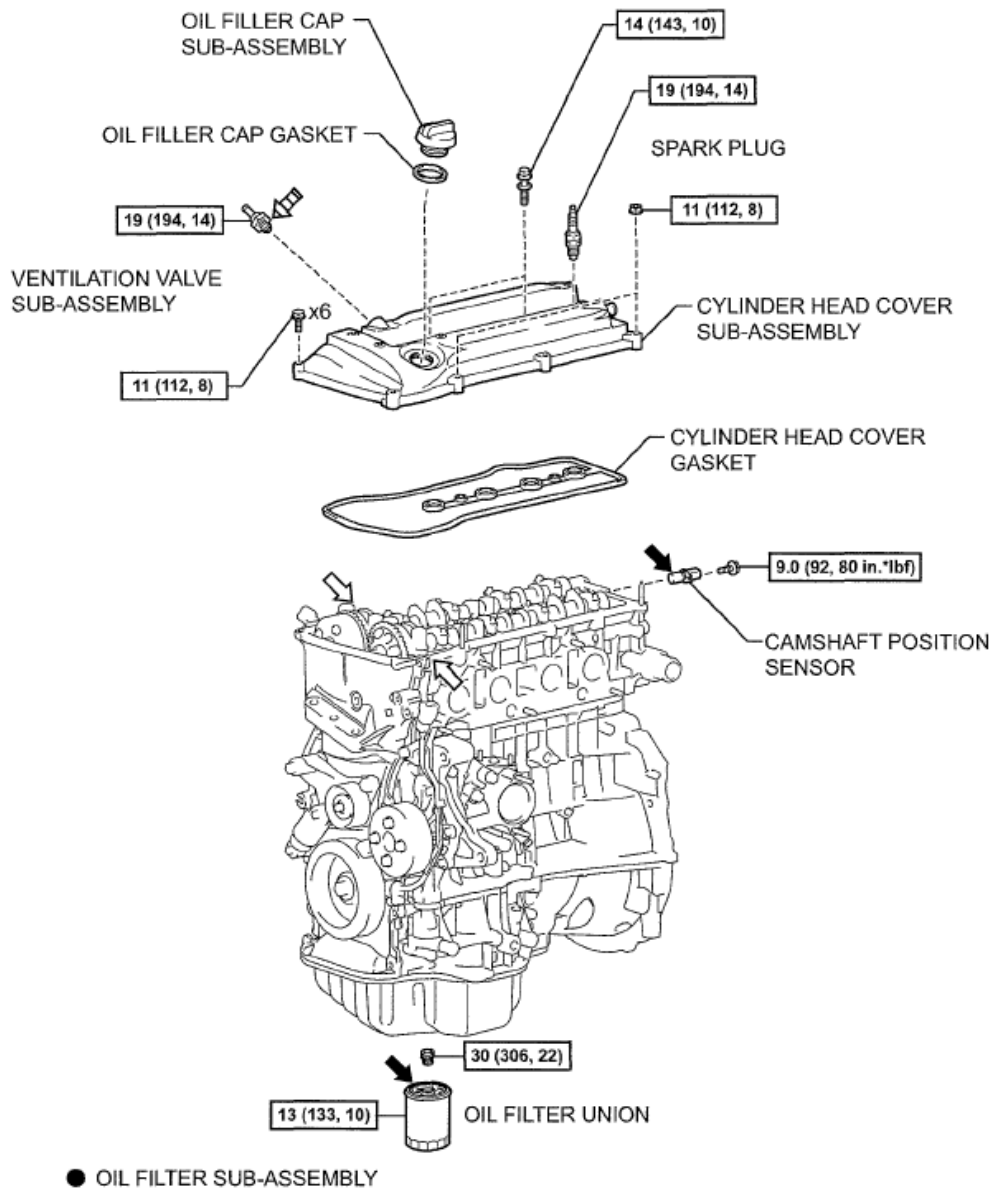
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Fig. 330: Identifying Engine Unit Components With Torque Specifications (2 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



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Fig. 331: Identifying Engine Unit Components With Torque Specifications (3 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

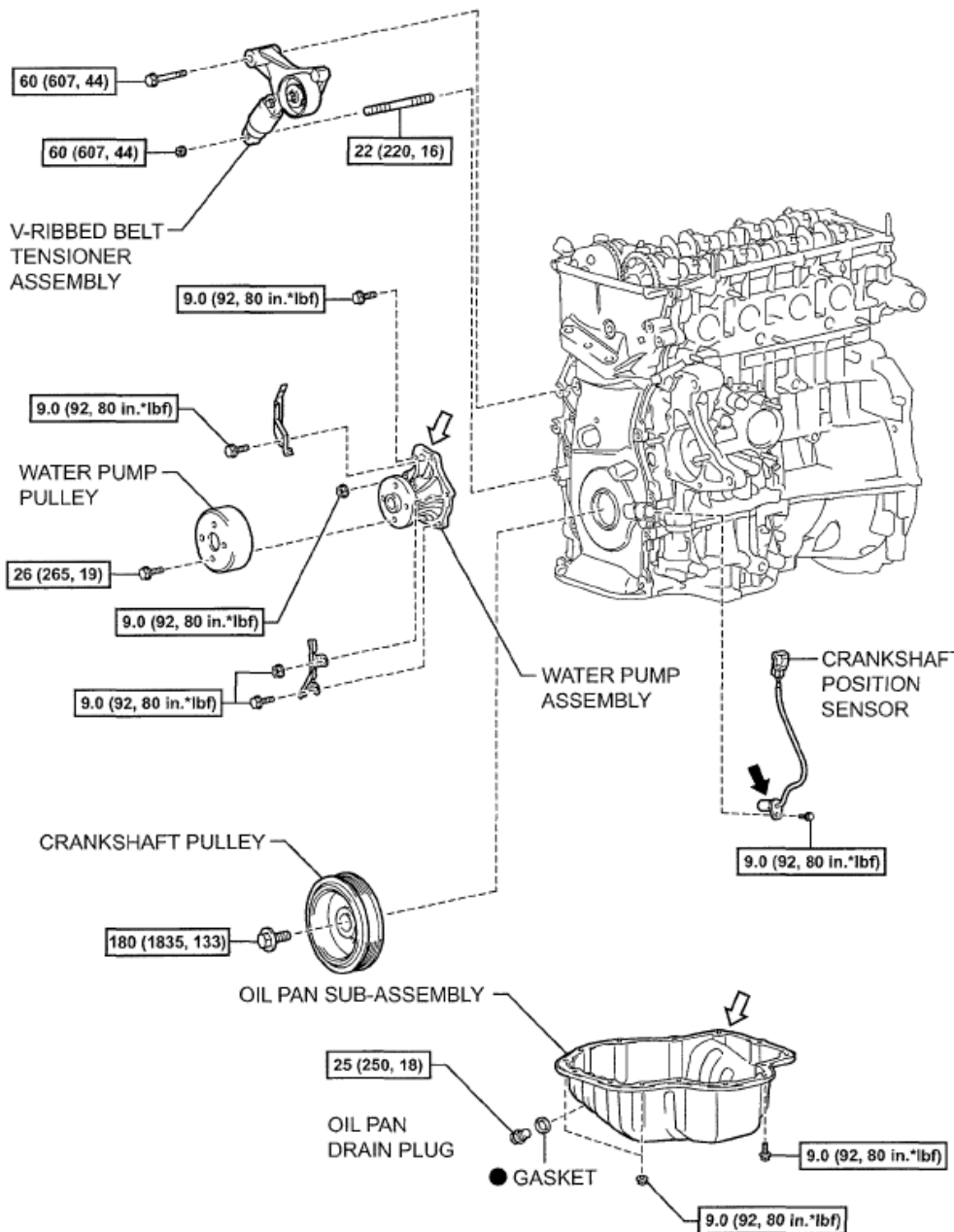


N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part ➡ Engine oil ↩ Seal packing ⬅ Adhesive

A156878E01

Fig. 332: Identifying Engine Unit Replacement Components With Torque Specifications (4 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

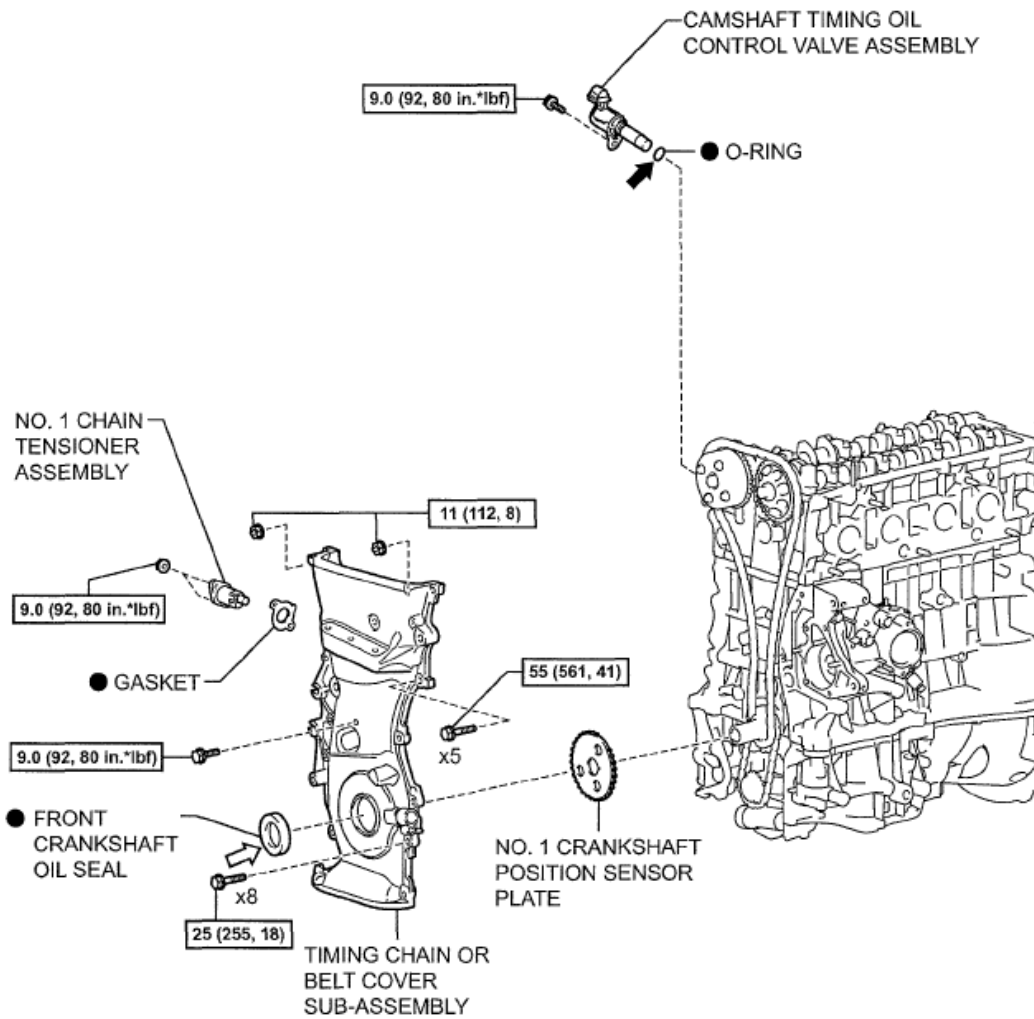
← Engine oil

↶ Seal packing

P

A156879E01

Fig. 333: Identifying Engine Unit Replacement Components With Torque Specifications (5 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

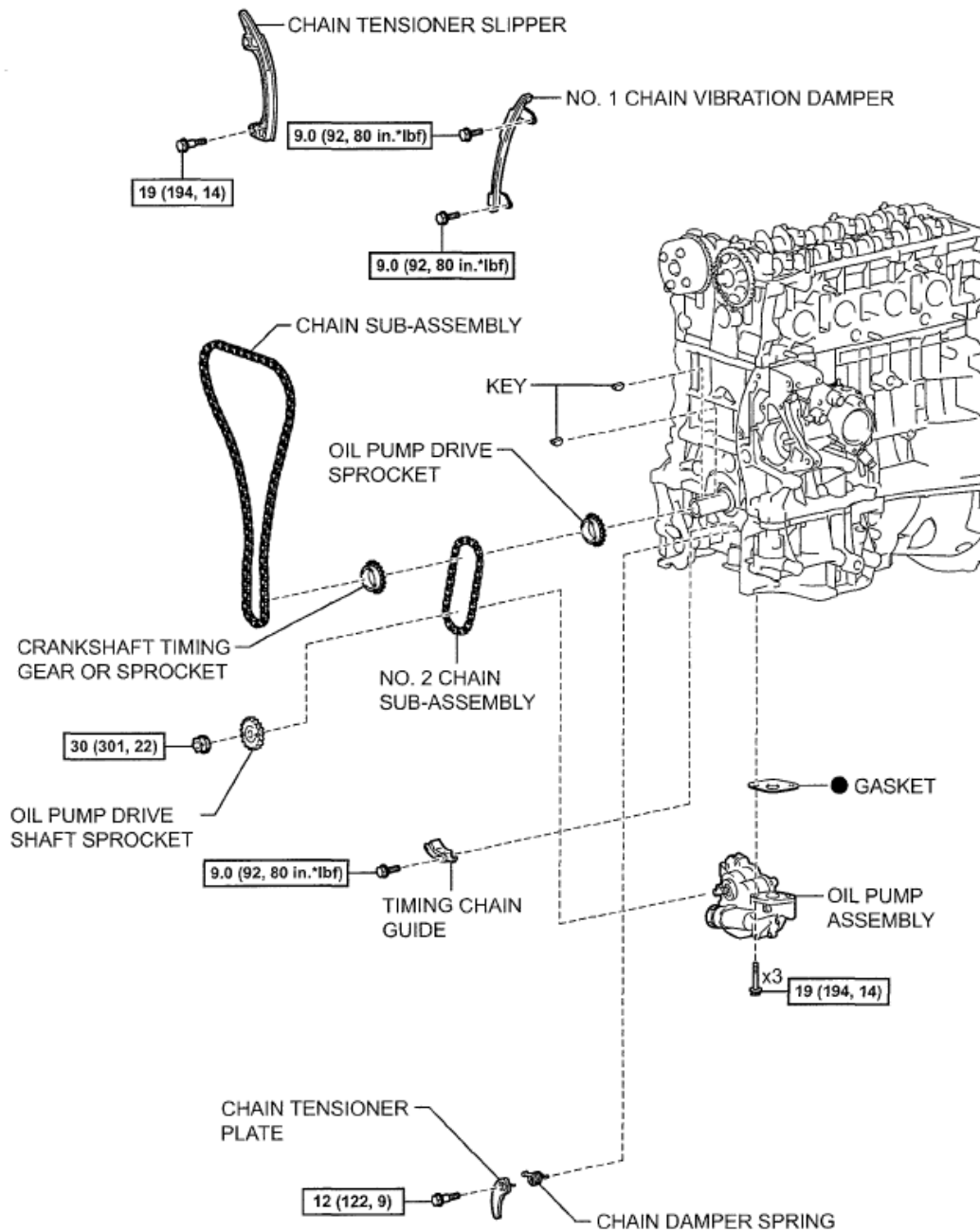
← Engine oil

↩ MP grease

P

A156880E91

Fig. 334: Identifying Engine Unit Replacement Components With Torque Specifications (6 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lb) : Specified torque

● Non-reusable part

P

A156881E01

Fig. 335: Identifying Engine Unit Replacement Components With Torque Specifications (7 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

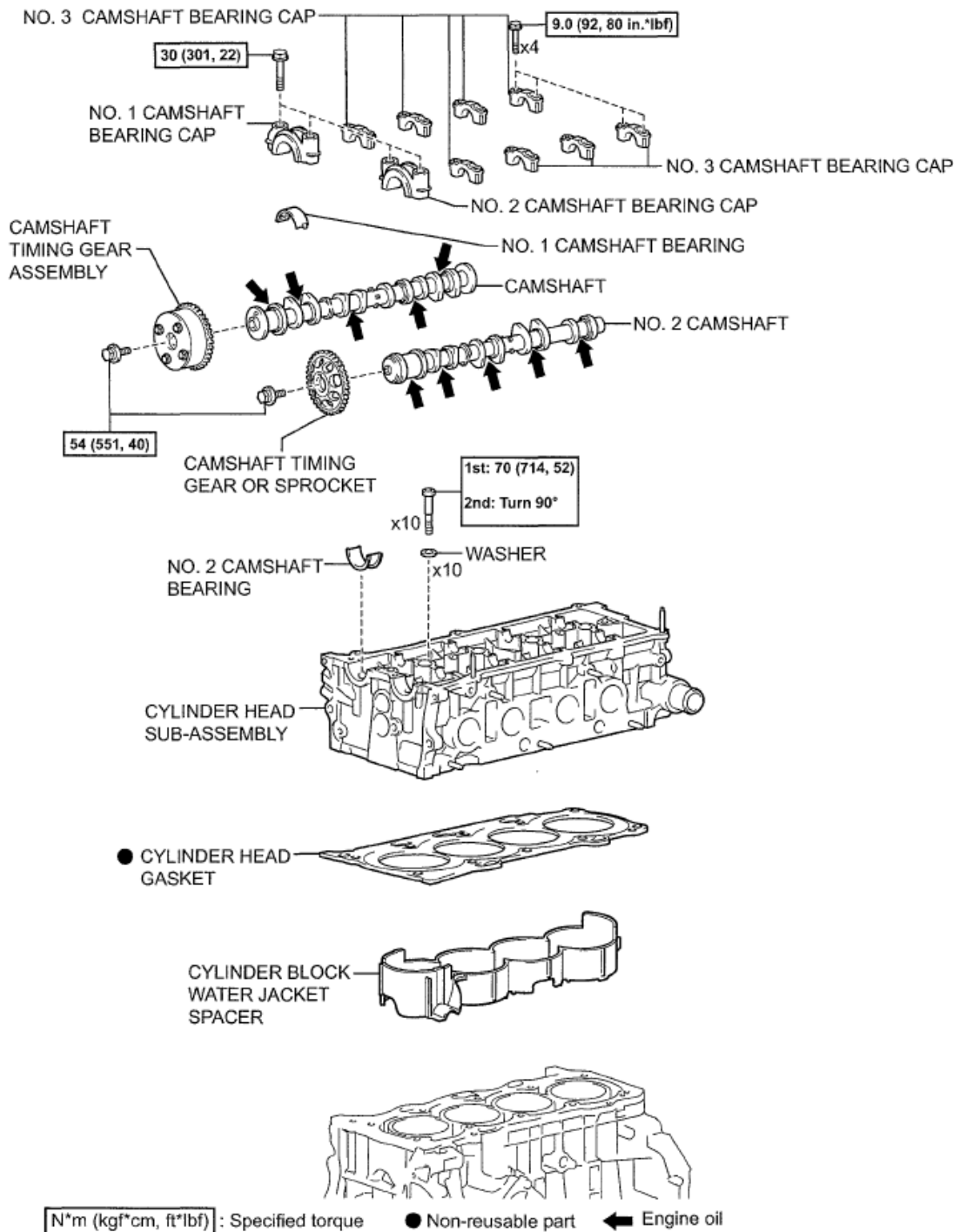


Fig. 336: Identifying Engine Unit Replacement Components With Torque Specifications (8 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

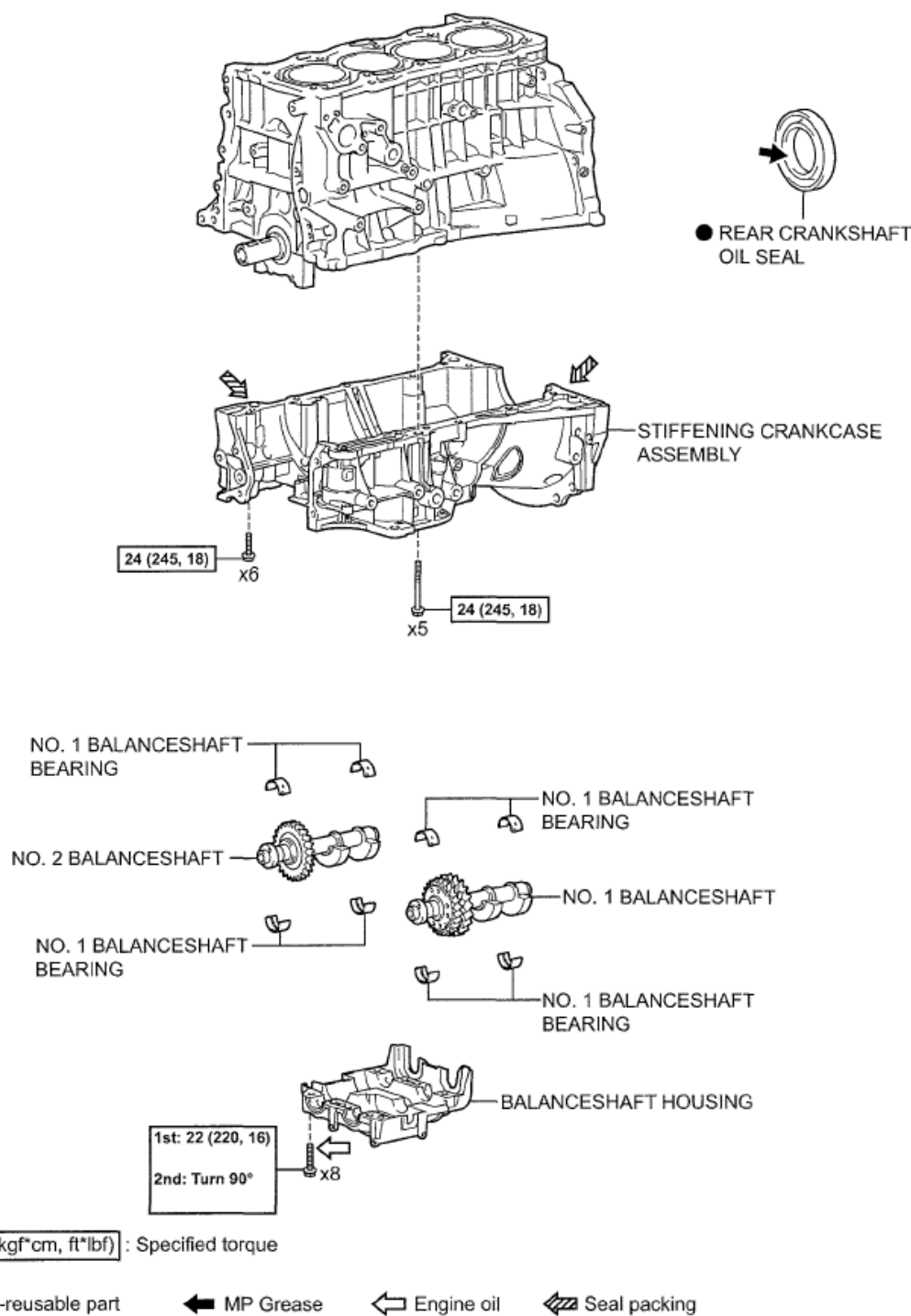
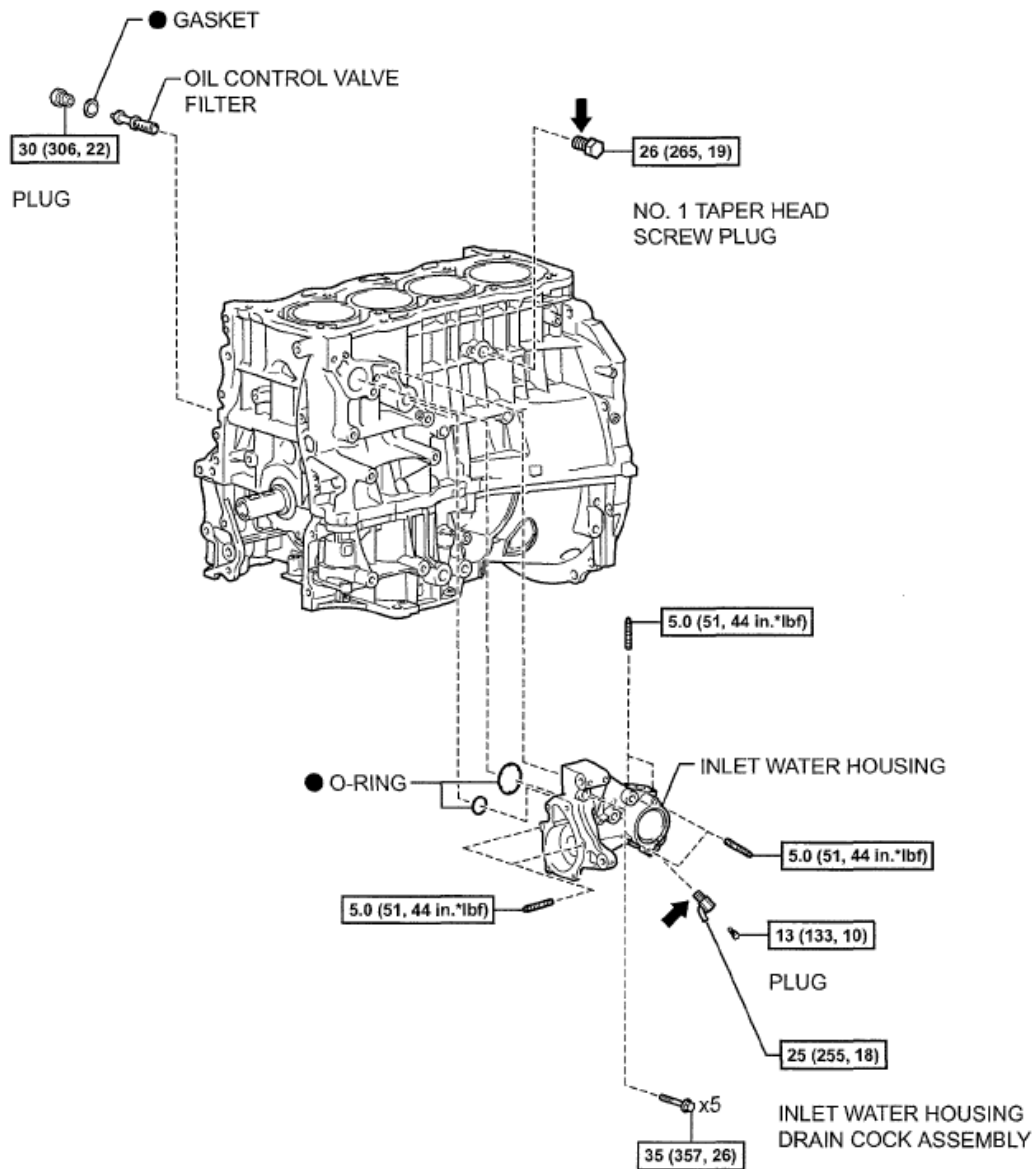


Fig. 337: Identifying Engine Unit Replacement Components With Torque Specifications (9 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.



N*m (kgf*cm, ft*lbf) : Specified torque

● Non-reusable part

← Adhesive

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Fig. 338: Identifying Engine Unit Replacement Components With Torque Specifications (10 Of 10)
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REMOVAL

1. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY (See [REMOVAL](#))
2. REMOVE FUEL INJECTOR ASSEMBLY (See [REMOVAL](#))
3. DISCONNECT NO. 2 VENTILATION HOSE (See [REMOVAL](#))

4. REMOVE INTAKE MANIFOLD

- a. Disconnect the camshaft timing oil control valve connector.
- b. Remove the wire harness clamp.
- c. Remove the 5 bolts, 2 nuts and intake manifold.

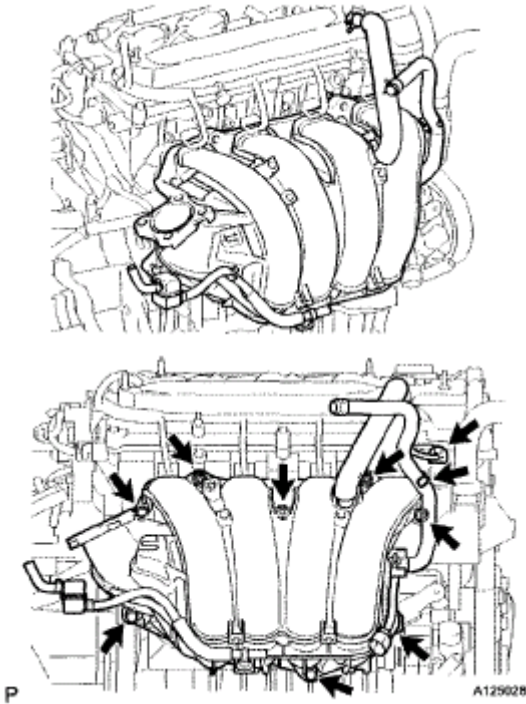


Fig. 339: Locating Intake Manifold Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Remove the gasket from the intake manifold.

5. REMOVE NO. 1 INTAKE MANIFOLD INSULATOR (See REMOVAL)

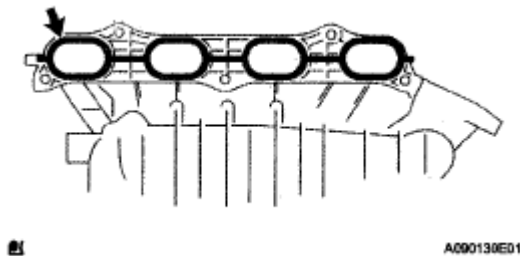


Fig. 340: Locating Intake Manifold Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

- a. Remove the 4 bolts and No. 1 exhaust manifold heat insulator.

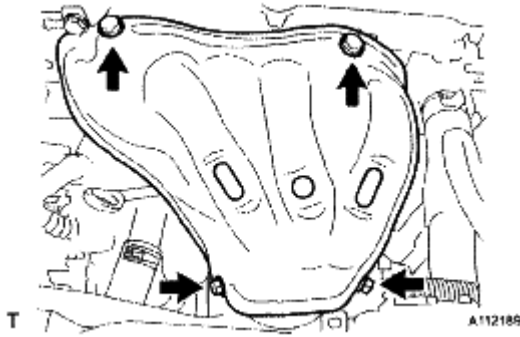


Fig. 341: Locating No. 1 Exhaust Manifold Heat Insulator Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. REMOVE MANIFOLD STAY

- a. Remove the bolt and nut, then remove the manifold stay.

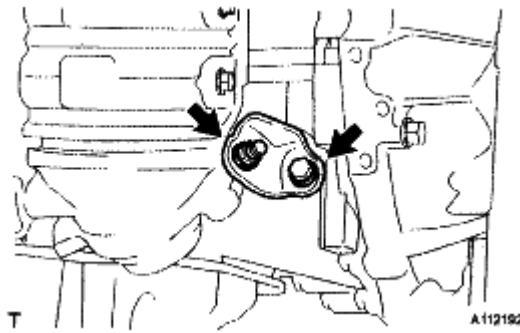


Fig. 342: Locating Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. REMOVE NO. 2 MANIFOLD STAY

- a. Remove the bolt and nut, then remove the No. 2 manifold stay.

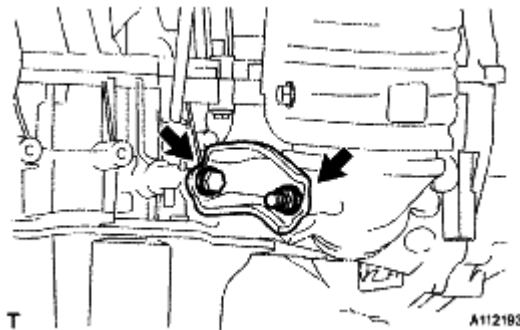


Fig. 343: Locating No. 2 Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

- a. Remove the 5 nuts and exhaust manifold converter.
- b. Remove the gasket.

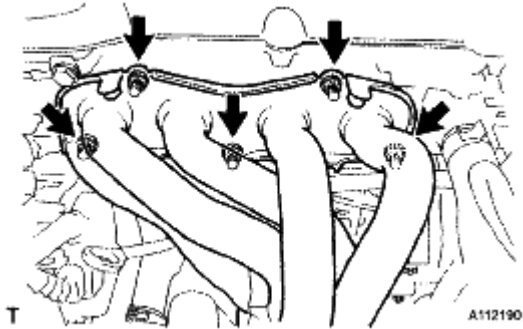


Fig. 344: Locating Exhaust Manifold Converter Nuts And Gasket
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. REMOVE INLET WATER (See REMOVAL)
11. REMOVE THERMOSTAT
12. REMOVE TRANSVERSE ENGINE MOUNTING BRACKET (See REMOVAL)
13. REMOVE OIL DIPSTICK
14. REMOVE OIL DIPSTICK GUIDE (See REMOVAL)
15. REMOVE NO. 1 WATER BY-PASS PIPE
 - a. Remove the bolt and 2 nuts, then remove the No. 1 water by-pass pipe.
 - b. Remove the gasket.

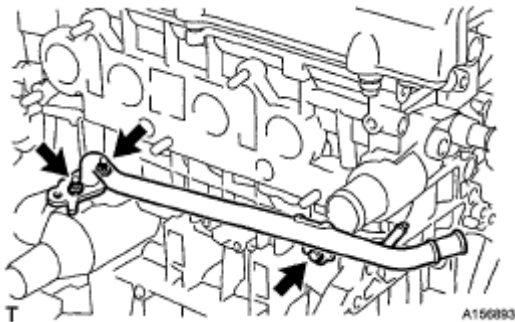


Fig. 345: Locating No. 1 Water By-Pass Pipe Bolts And Nuts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. REMOVE IGNITION COIL ASSEMBLY (See REMOVAL)
17. REMOVE KNOCK SENSOR (See REMOVAL)
18. REMOVE OIL PRESSURE SWITCH (See REMOVAL)
19. REMOVE ENGINE COOLANT TEMPERATURE SENSOR (See REMOVAL)
20. REMOVE RADIO SETTING CONDENSER
 - a. Remove the bolt and radio setting condenser.

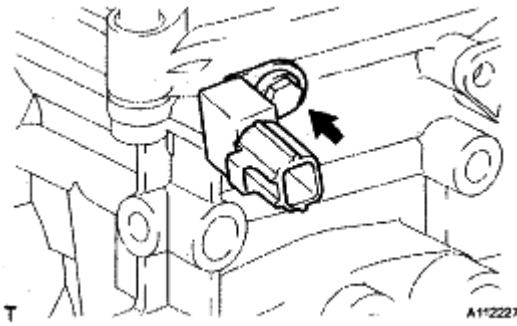


Fig. 346: Locating Radio Setting Condenser Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

DISASSEMBLY

1. REMOVE OIL FILLER CAP SUB-ASSEMBLY

- a. Remove the oil filler cap from the cylinder head cover.

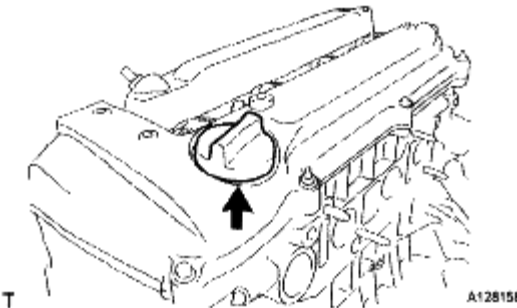


Fig. 347: Locating Oil Filler Cap From Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. REMOVE OIL FILLER CAP GASKET

- a. Remove the oil filler cap gasket from the oil filler cap.

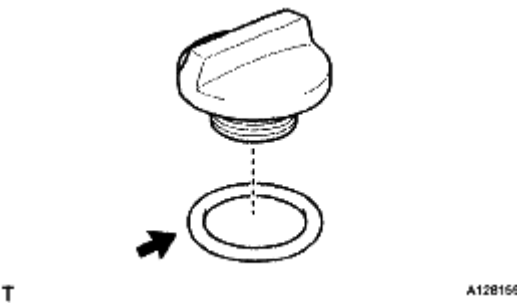


Fig. 348: Locating Oil Filler Cap Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. REMOVE VENTILATION VALVE SUB-ASSEMBLY

- a. Using a 22 mm deep socket wrench, remove the ventilation valve from the cylinder head cover.

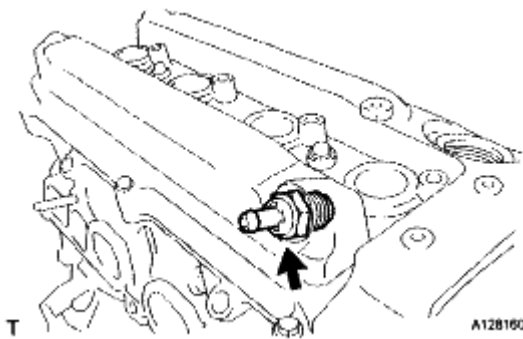


Fig. 349: Locating Ventilation Valve From Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. **REMOVE SPARK PLUG** (See REMOVAL)
5. **REMOVE OIL FILTER SUB-ASSEMBLY** (See REPLACEMENT)
6. **REMOVE OIL FILTER UNION**
 - a. Using a 12 mm socket hexagon wrench, remove the oil filter union.

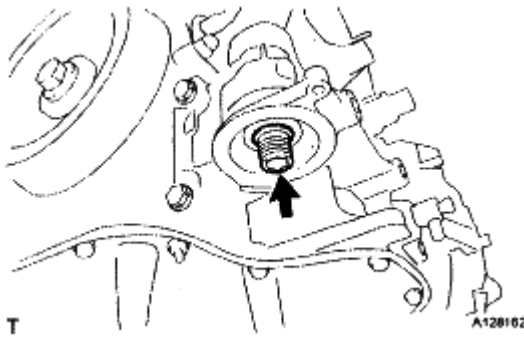


Fig. 350: Locating Oil Filter Union
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**
 - a. Remove the 8 bolts and 2 nuts, remove the cylinder head cover.

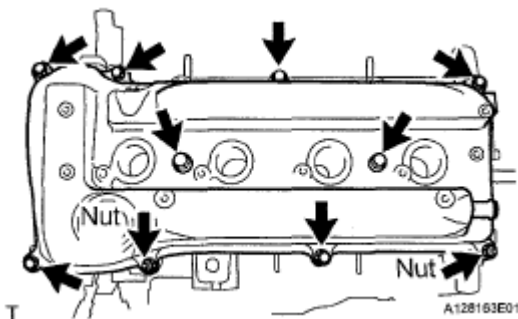


Fig. 351: Locating Cylinder Head Cover Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. REMOVE CYLINDER HEAD COVER GASKET

- a. Remove cylinder head cover gasket from the cylinder head cover.

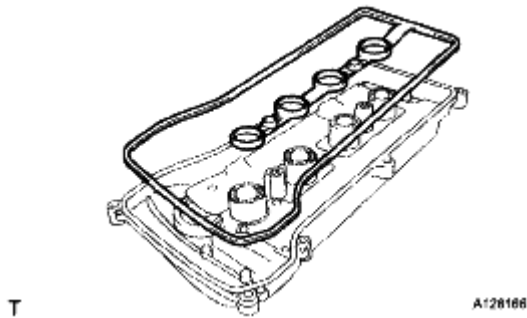


Fig. 352: Identifying Cylinder Head Cover Gasket From Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See REMOVAL)

10. REMOVE CRANKSHAFT POSITION SENSOR

- a. Disengage the wire harness from the harness clamp bracket.
- b. Remove the bolt and crankshaft position sensor.

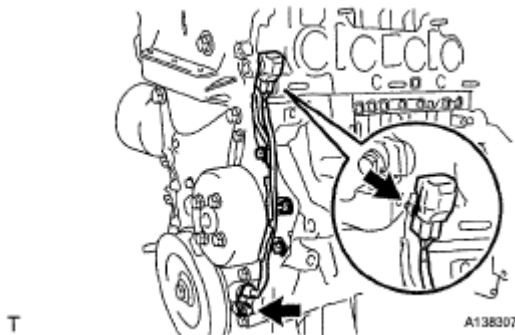


Fig. 353: Locating Crankshaft Position Sensor Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. REMOVE CAMSHAFT POSITION SENSOR

- a. Remove the bolt and camshaft position sensor.

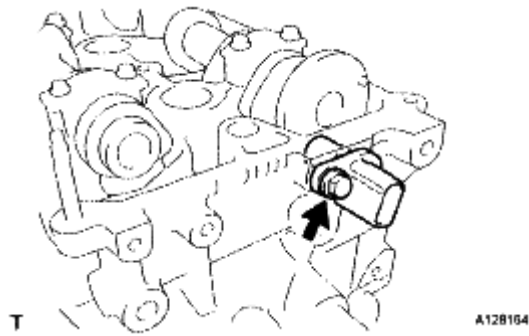


Fig. 354: Locating Camshaft Position Sensor Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. SET NO. 1 CYLINDER TO TDC / COMPRESSION (See REMOVAL)
13. REMOVE CRANKSHAFT PULLEY (See REMOVAL)
14. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
 - a. Remove the bolt and camshaft timing oil control valve from the cylinder head.

NOTE: The camshaft timing oil control valve may be damaged when loosening the cylinder head bolt if the camshaft timing oil control valve is not removed.

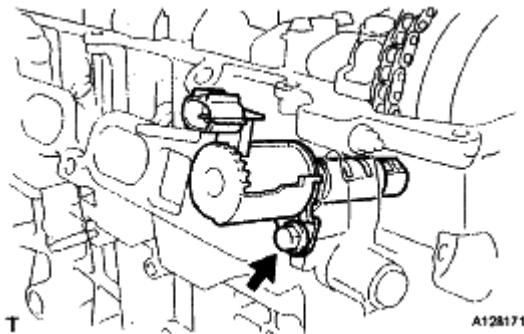


Fig. 355: Locating Camshaft Timing Oil Control Valve Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See REMOVAL)
16. REMOVE WATER PUMP PULLEY (See REMOVAL)
17. REMOVE WATER PUMP ASSEMBLY (See REMOVAL)
18. REMOVE OIL PAN DRAIN PLUG
 - a. Remove the oil pan drain plug from the oil pan.

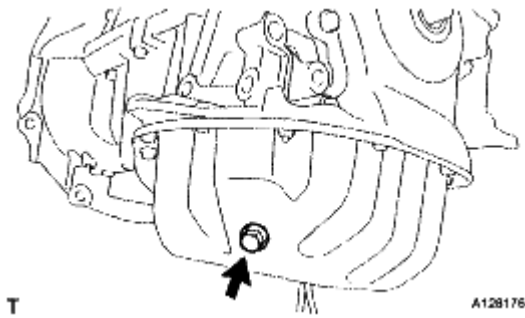


Fig. 356: Locating Oil Pan Drain Plug From Oil Pan
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. REMOVE OIL PAN SUB-ASSEMBLY

- a. Remove the 12 bolts and 2 nuts.

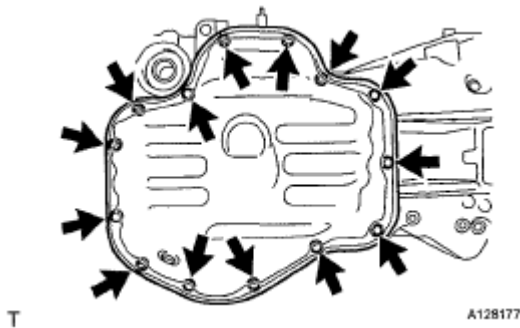


Fig. 357: Locating Oil Pan Sub-Assembly Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Insert the blade of oil pan seal cutter between the crankcase, chain cover and oil pan, then cut through the applied sealer and remove the oil pan.

NOTE: Be careful not to damage the contact surface of the crankcase, chain cover and oil pan.

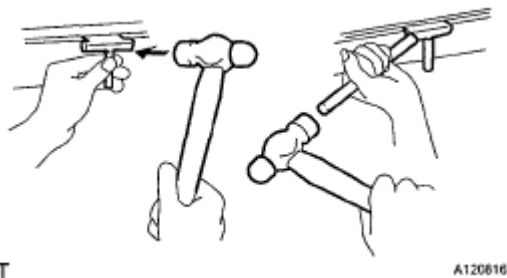


Fig. 358: Inserting Blade Of Oil Pan Seal Cutter Between Crankcase
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

20. **REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY** (See **REMOVAL**)

21. **REMOVE FRONT CRANKSHAFT OIL SEAL**

- a. Using a screwdriver with its tip wrapped in protective tape, remove the oil seal.

NOTE: Be careful not to damage the timing chain case oil seal.

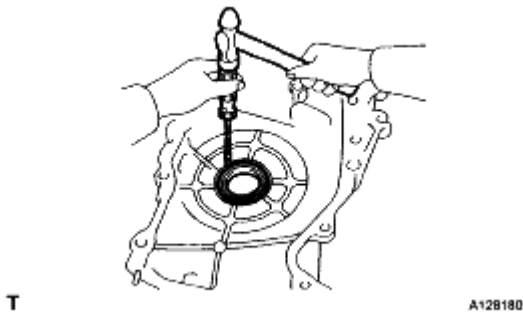


Fig. 359: Removing Oil Seal

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

22. **REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE** (See **REMOVAL**)

23. **REMOVE TIMING CHAIN GUIDE** (See **REMOVAL**)

24. **REMOVE CHAIN TENSIONER SLIPPER** (See **REMOVAL**)

25. **REMOVE NO. 1 CHAIN VIBRATION DAMPER** (See **REMOVAL**)

26. **REMOVE CHAIN SUB-ASSEMBLY**

27. **REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET** (See **REMOVAL**)

28. **REMOVE NO. 2 CHAIN SUB-ASSEMBLY** (See **REMOVAL**)

29. **REMOVE NO. 2 CAMSHAFT**

- a. Using several steps, uniformly loosen and remove the No. 2 and 4 No. 3 bearing caps in the sequence shown in the illustration.

NOTE: Uniformly loosen the bolts while keeping the camshaft level.

HINT:

Arrange the removed parts in the correct order.

- b. Remove the No. 2 camshaft.

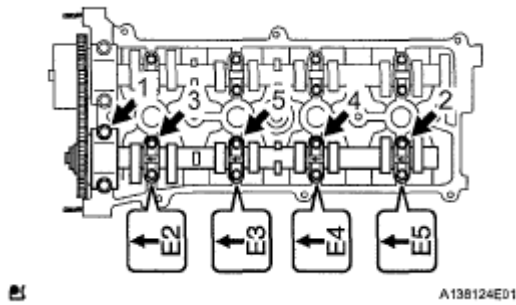


Fig. 360: Locating No. 2 And 4 No. 3 Bearing Caps
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

30. REMOVE CAMSHAFT

- a. Using several steps, uniformly loosen and remove the No. 1 and 4 No. 3 bearing caps in the sequence shown in the illustration.

NOTE: Uniformly loosen the bolts while keeping the camshaft level.

HINT:

Arrange the removed parts in the correct order.

- b. Remove the camshaft.

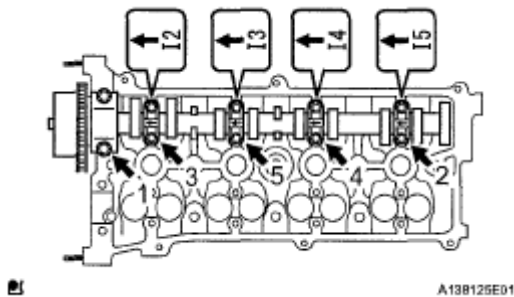


Fig. 361: Locating No. 1 And 4 No. 3 Bearing Caps
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

31. REMOVE NO. 1 CAMSHAFT BEARING

- a. Remove the camshaft bearing from the No. 1 camshaft bearing cap.

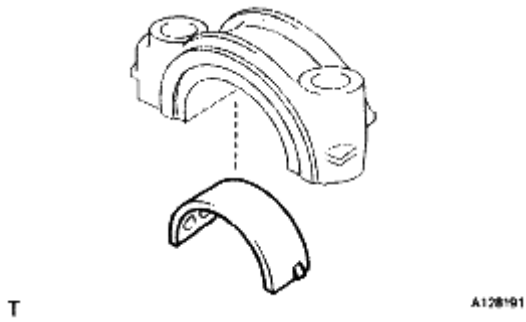


Fig. 362: Identifying Camshaft Bearing From No. 1 Camshaft Bearing Cap
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

32. REMOVE NO. 2 CAMSHAFT BEARING

- a. Remove the No. 2 camshaft bearing from the cylinder head.

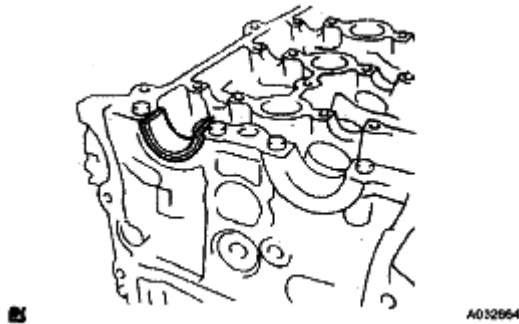


Fig. 363: Identifying No. 2 Camshaft Bearing From Cylinder Head
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

33. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

- a. Clamp the camshaft in a vise, and make sure that the camshaft timing gear or sprocket does not rotate.

NOTE:

- Do not overtighten the vise.
- Do not damage the camshaft.

- b. Remove the bolt and camshaft timing gear or sprocket.

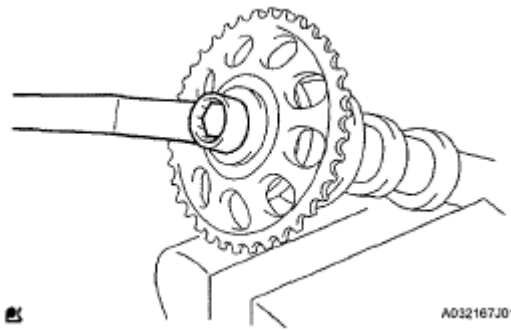


Fig. 364: Identifying Camshaft Timing Gear Or Sprocket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

34. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY (See REMOVAL)
35. REMOVE CYLINDER HEAD SUB-ASSEMBLY (See REMOVAL)
36. REMOVE CYLINDER HEAD GASKET

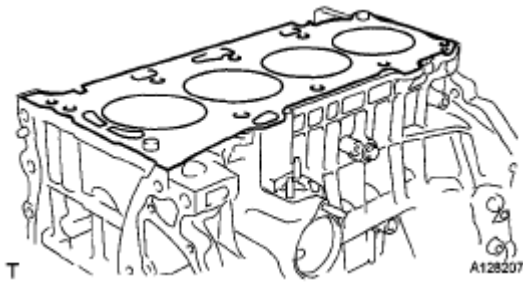


Fig. 365: Identifying Cylinder Head Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

37. REMOVE CYLINDER BLOCK WATER JACKET SPACER
 - a. Using needle nose pliers, remove the cylinder block water jacket spacer from the water jacket.

NOTE: Before turning the cylinder block upside down, make sure that the water jacket spacer is removed, as it will fall out.

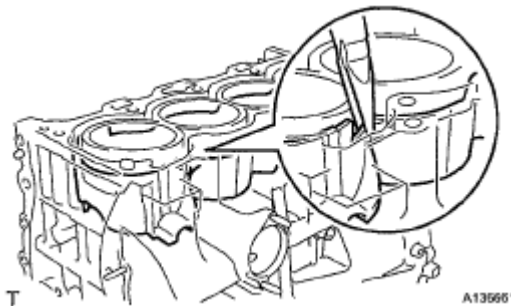


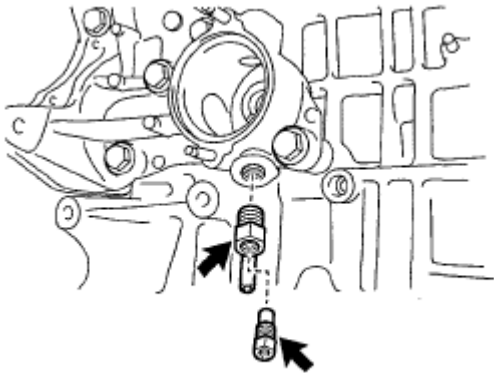
Fig. 366: Identifying Cylinder Block Water Jacket Spacer From Water Jacket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

38. REMOVE INLET WATER HOUSING DRAIN COCK ASSEMBLY

- a. Remove the plug from the drain cock.
- b. Remove the drain cock from the inlet water housing.

39. REMOVE INLET WATER HOUSING

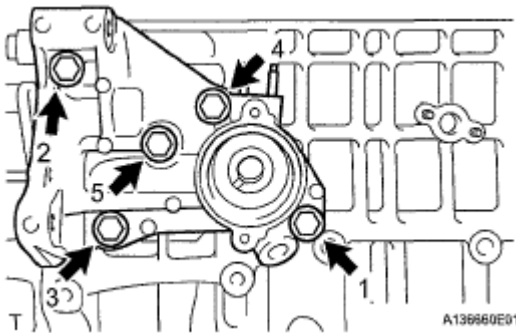
- a. Using a E5 "TORX" socket wrench, remove the 6 stud bolts from the inlet water housing.



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Fig. 367: Locating Stud Bolts From Inlet Water Housing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using several steps, uniformly loosen and remove the 5 bolts and inlet water housing in the sequence shown in the illustration.



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Fig. 368: Locating Inlet Water Housing Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Remove the 2 O-rings from the inlet water housing.

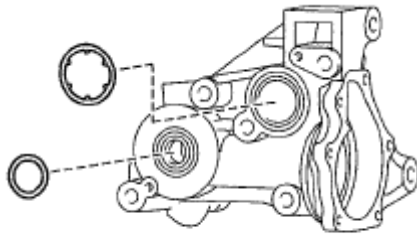


Fig. 369: Identifying Inlet Water Housing O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

40. REMOVE OIL CONTROL VALVE FILTER

- a. Using a socket hexagon wrench 8, remove the plug, gasket and oil control valve filter.

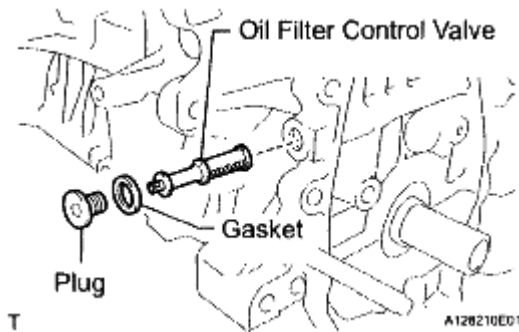


Fig. 370: Identifying Oil Control Valve Filter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

41. REMOVE NO. 1 TAPER HEAD SCREW PLUG

- a. Remove the No. 1 taper head screw plug.

42. REMOVE OIL PUMP ASSEMBLY (See REMOVAL)

43. INSPECT BALANCE SHAFT THRUST CLEARANCE (See INSPECTION)

44. INSPECT BALANCE SHAFT OIL CLEARANCE (See INSPECTION)

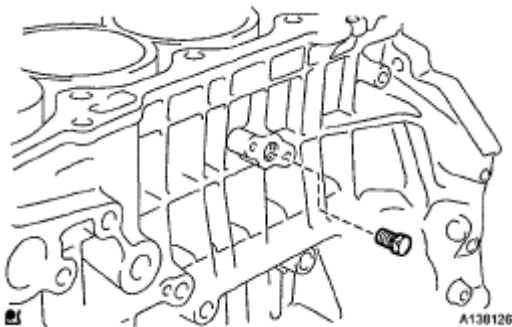


Fig. 371: Identifying No. 1 Taper Head Screw Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

45. REMOVE NO. 1 AND NO. 2 BALANCESHAFTS

- a. Remove the No. 1 and No. 2 balancershafts.

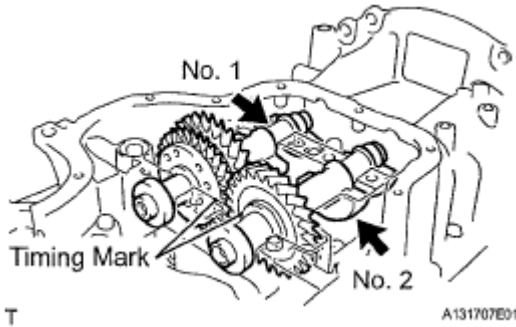


Fig. 372: Identifying No. 1 And No. 2 Balancershafts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

46. REMOVE NO. 1 BALANCESHAFT BEARING

- a. Remove the 8 No. 1 balancershaft bearings in the shown in the illustration.

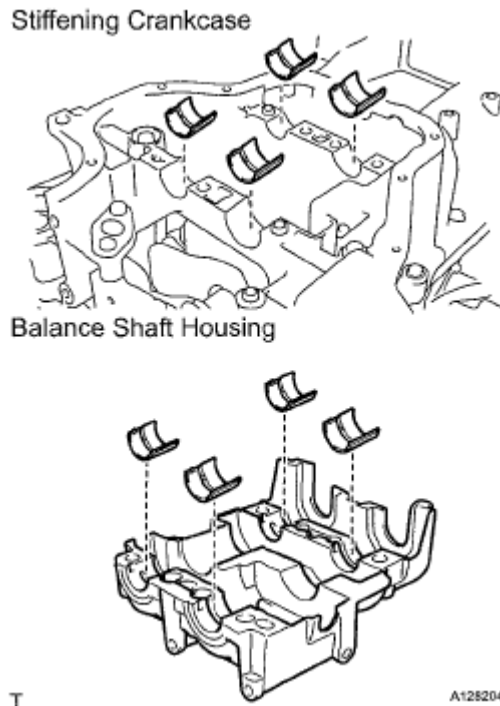


Fig. 373: Identifying No. 1 Balancershaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

47. REMOVE REAR CRANKSHAFT OIL SEAL (See REMOVAL)**48. REMOVE STIFFENING CRANKCASE ASSEMBLY**

- a. Using several steps, uniformly loosen and remove the 11 bolts and in the sequence shown in the

illustration.

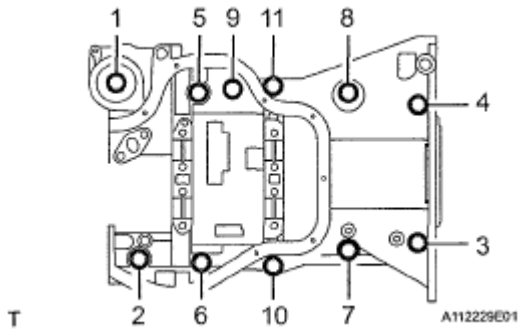


Fig. 374: Identifying Stiffening Crankcase Assembly Bolts Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Remove the crankcase by prying the portions between the crankcase and cylinder block.

NOTE: Be careful not to damage the contact surfaces of the crankcase and cylinder block.

- c. Remove the O-ring.

INSPECTION

1. INSPECT BALANCESHAFT THRUST CLEARANCE

- a. Install the balanceshafts (See REASSEMBLY).

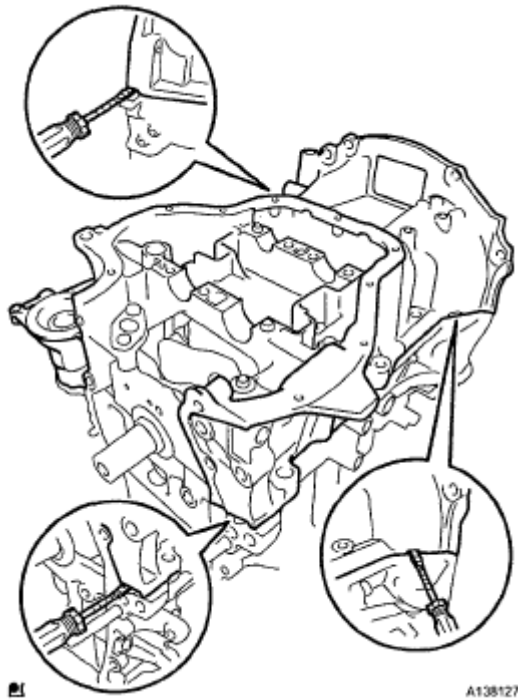


Fig. 375: Removing Crankcase By Prying Portions Between Crankcase And Cylinder Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a dial indicator, measure the thrust clearance while moving the balancershaft back and forth.

Standard thrust clearance: 0.05 to 0.09 mm (0.0020 to 0.0035 in.)

Maximum thrust clearance: 0.09 mm (0.0035 in.)

If the thrust clearance is greater than the maximum, replace the balancershaft housing and bearings.
If necessary, replace the balancershaft.

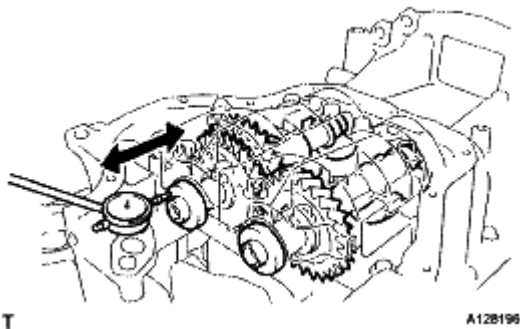


Fig. 376: Measuring Thrust Clearance
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSPECT BALANCESHAFT OIL CLEARANCE

- a. Clean each bearing and journal.

- b. Check each bearing and journal for pitting and scratches.

If a bearing or journal is damaged, replace the bearings. If necessary, replace the balancershaft.

- c. Place the No. 1 and No. 2 balancershafts onto the crankcase.
d. Lay a strip of Plastigage across each journal.
e. Install the balancershaft housing (See **REASSEMBLY**).

NOTE: Do not turn the balancershafts.

- f. Remove the balancershafts (See **REMOVAL**).

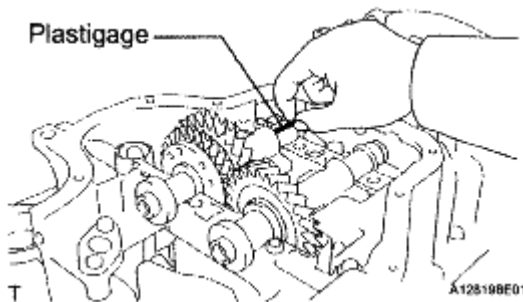


Fig. 377: Laying Strip Of Plastigage

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Measure the Plastigage at its widest point.

Standard oil clearance: 0.004 to 0.049 mm (0.0002 to 0.0019 in.)

Maximum oil clearance: 0.049 mm (0.0019 in.)

NOTE: Remove the Plastigage completely after the measurement.

If the oil clearance is greater than the maximum, replace the bearing. If necessary, replace the balancershaft.

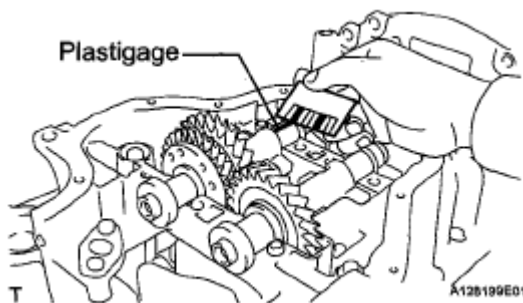


Fig. 378: Measuring Plastigage At Widest Point

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- h. If replacing a bearing, select a new one with the same number.

Standard balancerhaft housing journal bore diameter

STANDARD BALANCESHAFT HOUSING JOURNAL BORE DIAMETER

Item	Specified Condition
Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
Mark 2	26.007 to 26.012 mm (1.0239 to 1.0241 in.)
Mark 3	26.013 to 26.018 mm (1.0241 to 1.0243 in.)

Standard bearing center wall thickness

STANDARD BEARING CENTER WALL THICKNESS

Item	Specified Condition
Mark 1	1.486 to 1.489 mm (0.05850 to 0.05862 in.)
Mark 2	1.490 to 1.492 mm (0.05866 to 0.05874 in.)
Mark 3	1.493 to 1.495 mm (0.0588 to 0.0589 in.)

Standard balancerhaft journal diameter

STANDARD BALANCESHAFT JOURNAL DIAMETER

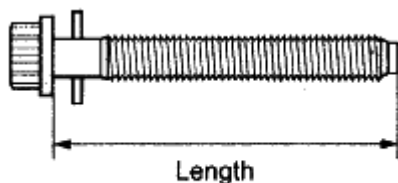
Item	Specified Condition
Mark 1	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Mark 2	22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Mark 3	22.985 to 23.000 mm (0.9049 to 0.9055 in.)

- i. Inspect the balancerhaft housing bolts.
- Using vernier calipers, measure the length of the bolts from the seat to the end.

Standard bolt length: 58.3 to 59.7 mm (2.295 to 2.350 in.)

Maximum bolt length: 60.3 mm (2.374 in.)

If the bolt length is greater than the maximum, replace the balancerhaft housing bolt.



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Fig. 379: Measuring Length Of Bolts From Seat To End
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

3. INSPECT CHAIN SUB-ASSEMBLY

- Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.
- Using vernier calipers, measure the length of 15 links.

Maximum chain elongation: 114.5 mm (4.508 in.)

NOTE: Perform the measurement at 3 random places. Use the average of the measurements.

If the elongation is greater than the maximum, replace the chain.

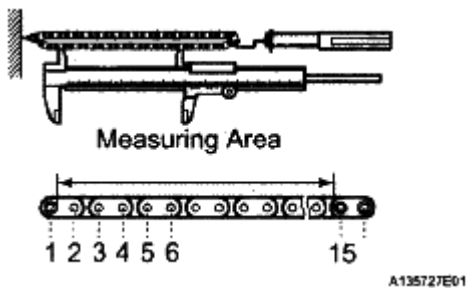


Fig. 380: Measuring Chain Sub-Assembly
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSPECT NO. 2 CHAIN SUB-ASSEMBLY

- Pull the chain with a force of 140 N (14.3 kgf, 31.5 lbf) as shown in the illustration.
- Using vernier calipers, measure the length of 15 links.

Maximum chain elongation: 102.2 mm (4.024 in.)

NOTE: Perform the measurement at 3 random places. Use the average of the measurements.

If the elongation is greater than the maximum, replace the No. 2 chain.

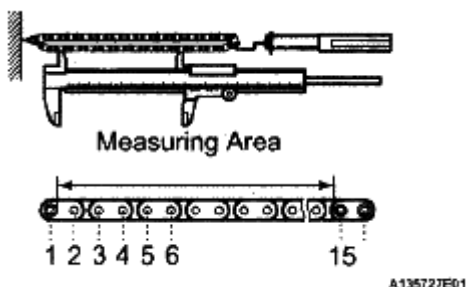


Fig. 381: Measuring Chain Sub-Assembly

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

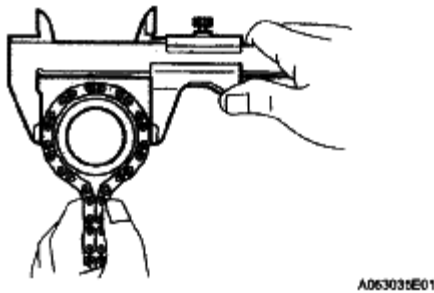
5. INSPECT OIL PUMP DRIVE GEAR

- a. Wrap the chain around the sprocket.
- b. Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain): 48.2 mm (1.898 in.)

NOTE: **The vernier calipers must be in contact with the chain rollers when measuring.**

If the diameter is less than the minimum, replace the chain and sprocket.

**Fig. 382: Measuring Sprocket Diameter**

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

6. INSPECT OIL PUMP DRIVE SHAFT GEAR

- a. Wrap the chain around the sprocket.
- b. Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain): 48.2 mm (1.898 in.)

NOTE: **The vernier calipers must be in contact with the chain rollers when measuring.**

If the diameter is less than the minimum, replace the chain and sprocket.

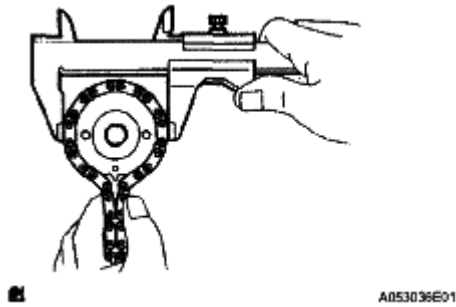


Fig. 383: Measuring Sprocket Diameter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

- a. Wrap the chain around the sprocket.
- b. Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain): 97.3 mm (3.831 in.)

NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

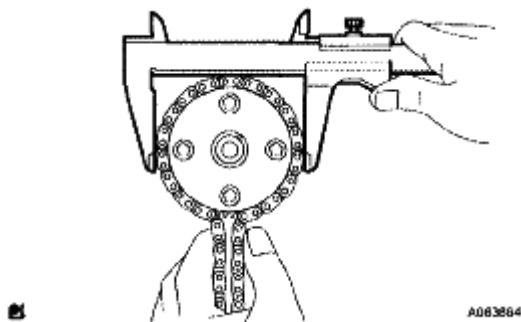


Fig. 384: Measuring Sprocket Diameter

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSPECT CAMSHAFT TIMING GEAR OR SPROCKET

- a. Wrap the chain around the sprocket.
- b. Using vernier calipers, measure the sprocket diameter with the chain wrapped around.

Minimum gear diameter (with chain): 97.3 mm (3.831 in.)

NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and sprocket.

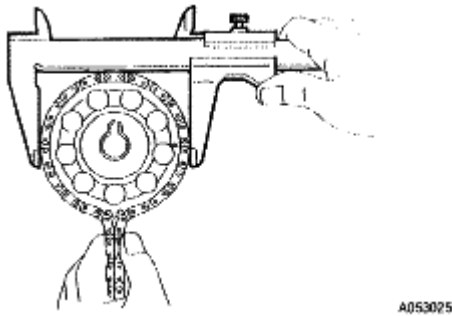


Fig. 385: Measuring Sprocket Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSPECT CRANKSHAFT TIMING GEAR OR SPROCKET

- a. Wrap the chain around the timing sprocket.
- b. Using vernier calipers, measure the timing gear diameter with the chain wrapped around.

Minimum gear diameter (with chain): 51.6 mm (2.031 in.)

NOTE: The vernier calipers must be in contact with the chain rollers when measuring.

If the gear diameter is less than the minimum, replace the chain sub-assembly and crankshaft timing sprocket.

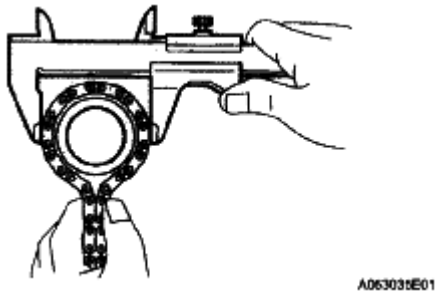


Fig. 386: Measuring Sprocket Diameter Of Crankshaft Timing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

10. INSPECT CHAIN TENSIONER SLIPPER

- a. Using vernier calipers, measure the tensioner slipper wear.

Maximum wear: 1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the chain tensioner slipper.

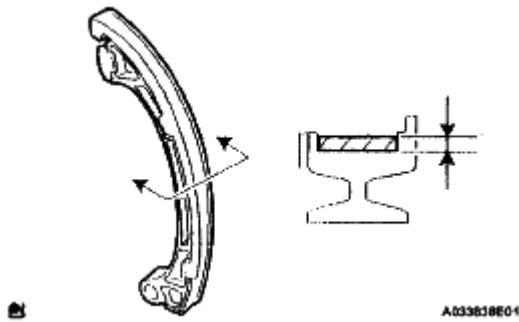


Fig. 387: Measuring Tensioner Slipper Wear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

11. INSPECT NO. 1 CHAIN VIBRATION DAMPER

- a. Using vernier calipers, measure the vibration damper wear.

Maximum wear: 1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the No. 1 chain vibration damper.

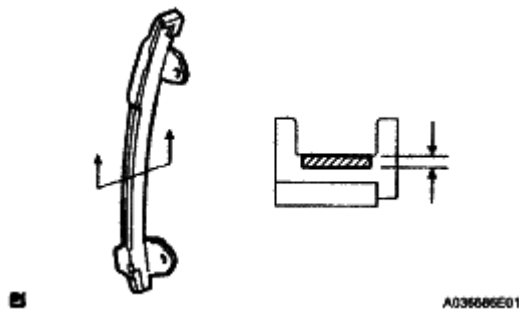


Fig. 388: Measuring Vibration Damper Wear
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

12. INSPECT CHAIN TENSIONER PLATE

- a. Using vernier calipers, measure the vibration damper wear.

Maximum wear: 0.5 mm (0.020 in.)

If the wear is greater than the maximum, replace the chain tensioner plate.

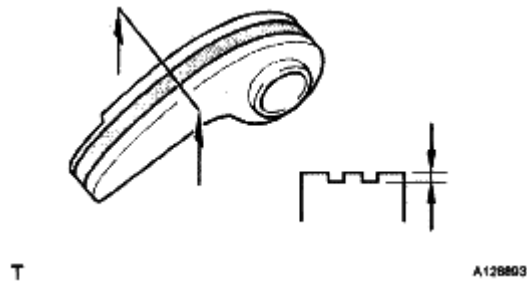


Fig. 389: Measuring Vibration Damper Wear
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSPECT NO. 1 CHAIN TENSIONER ASSEMBLY

- Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.
- Release the ratchet pawl, then check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

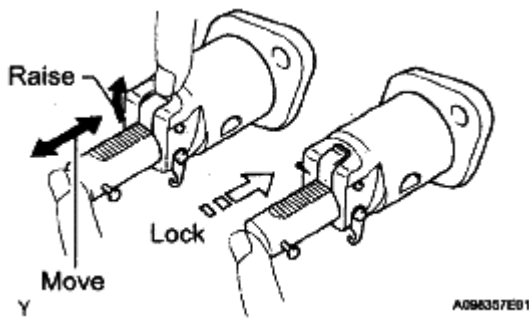


Fig. 390: Inspecting No. 1 Chain Tensioner
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSPECT CAMSHAFT

- Inspect the camshaft for runout.
 - Place the camshaft on V-blocks.
 - Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.03 mm (0.0012 in.)

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

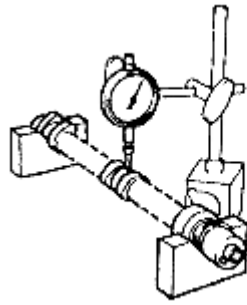


Fig. 391: Measuring Circle Runout At Center Journal
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Inspect the cam lobes.
1. Using a micrometer, measure the cam lobe heights.

Standard cam lobe height: 47.306 to 47.406 mm (1.8624 to 1.8664 in.)

Minimum cam lobe height: 47.196 mm (1.8581 in.)

If any of the cam lobe heights are less than the minimum, replace the camshaft.

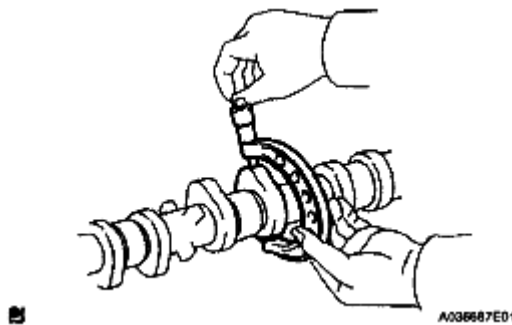


Fig. 392: Measuring Cam Lobe Heights
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Inspect the camshaft journals.
1. Using a micrometer, measure the journal diameter.

Standard journal diameter

JOURNAL DIAMETER

Journal Position	Specified Condition
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Others	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

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

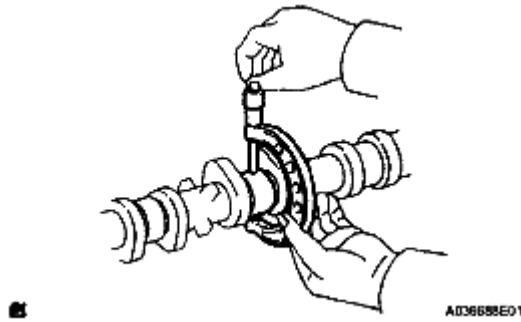


Fig. 393: Measuring Journal Diameter
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. INSPECT NO. 2 CAMSHAFT

- a. Inspect the camshaft for runout.
 1. Place the camshaft on V-blocks.
 2. Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.03 mm (0.0012 in.)

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

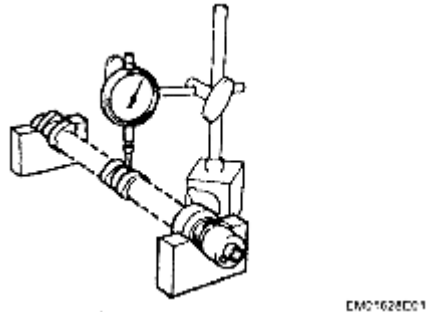


Fig. 394: Measuring Circle Runout At Center Journal
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Inspect the cam lobes.
 1. Using a micrometer, measure the cam lobe heights.

Standard cam lobe height: 45.983 to 46.083 mm (1.8104 to 1.8143 in.)

Minimum cam lobe height: 45.873 mm (1.8060 in.)

If any of the cam lobe heights are less than the minimum, replace the camshaft.

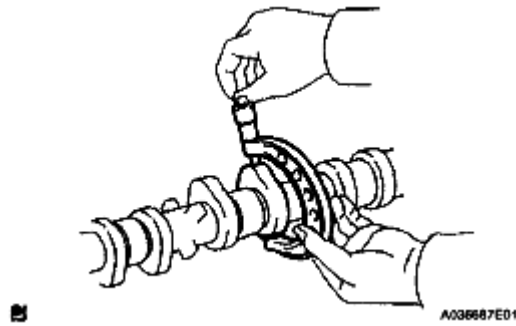


Fig. 395: Measuring Cam Lobe Heights
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Inspect the camshaft journals.
 - 1. Using a micrometer, measure the journal diameter.

Standard journal diameter

JOURNAL DIAMETER

Journal Position	Specified Condition
No. 1	35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Others	22.959 to 22.975 mm (0.9039 to 0.9045 in.)

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

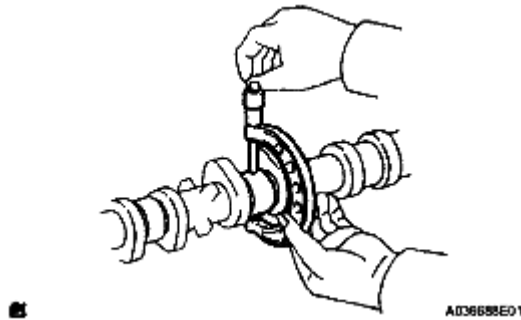


Fig. 396: Measuring Journal Diameter of Camshaft
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

REASSEMBLY

1. INSTALL NO. 1 BALANCESHAFT BEARING

- a. Align the bearing claw with the claw groove, and push in the 8 bearings.

NOTE: Do not apply engine oil to the contact surfaces of the balancershaft bearing and balancershaft housing.

- b. Apply a light coat of the engine oil to the bearings.

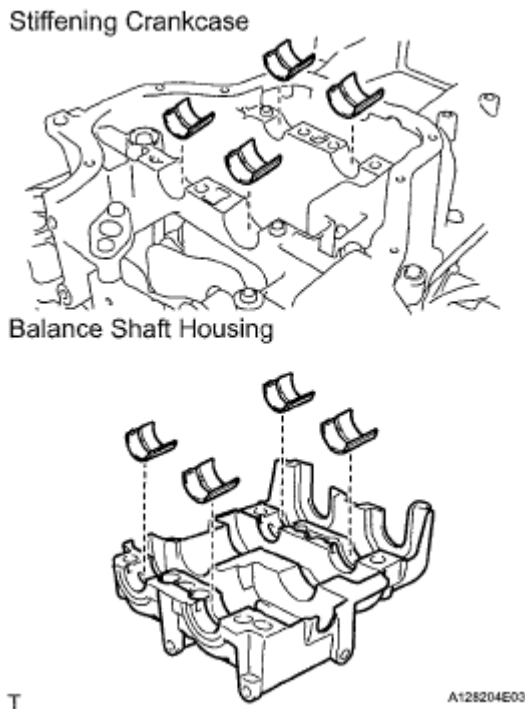


Fig. 397: Identifying No. 1 Balanceshaft Bearings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. INSTALL NO. 1 AND NO. 2 BALANCESHAFTS

- a. Rotate the No. 1 driven gear of the No. 1 balancershaft in the rotating direction until it hits the stopper.

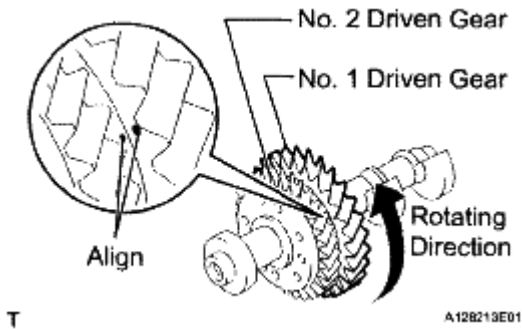


Fig. 398: Rotating No. 1 Driven Gear Of No. 1 Balanceshaft In Rotating Direction
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Confirm that the timing marks on the No. 1 and No. 2 balancershaft are aligned.

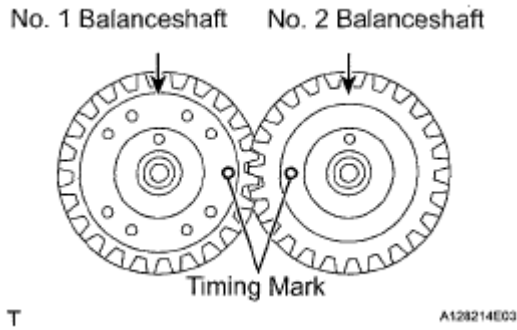


Fig. 399: Identifying Timing Marks On No. 1 And No. 2 Balancershaft
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Align the timing marks on the No. 1 and No. 2 balancershafts as shown in the illustration.
- d. Place the No. 1 and No. 2 balancershafts onto the crankcase.
- e. Apply a light coat of engine oil to the threads and under the heads of the bolts.

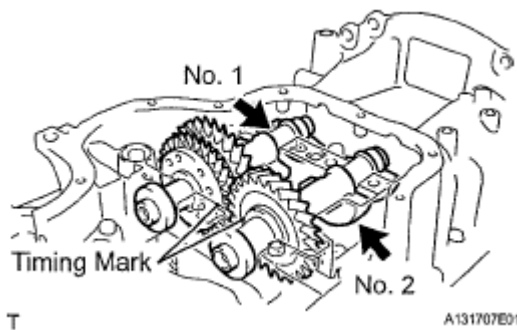


Fig. 400: Identifying No. 1 And No. 2 Balancershafts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Using several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)

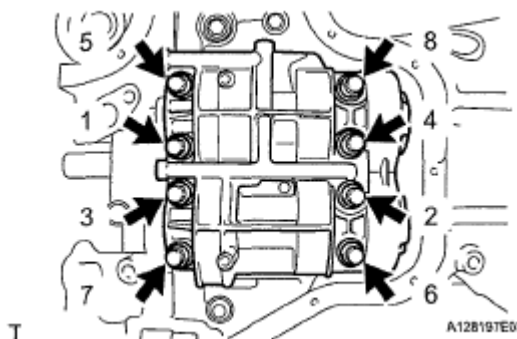


Fig. 401: Identifying Tightening Sequence Of Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Mark the front of the bolts with paint.

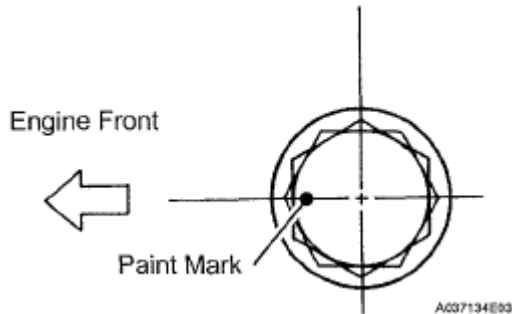


Fig. 402: Identifying Paint Mark

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- h. Further tighten the bolts by 90° as shown in the illustration.
i. Check that the paint mark is now at a 90° angle to the front.

3. INSTALL STIFFENING CRANKCASE ASSEMBLY

- a. Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and crankcase.
b. Place a new O-ring on the cylinder block as shown in the illustration.

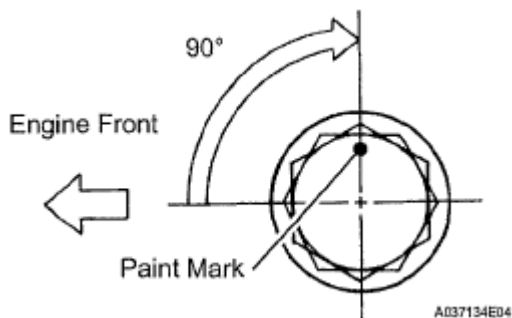


Fig. 403: Identifying Paint Mark

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. With the No. 1 crank pin of the crankshaft placed at the 6 o'clock position, install the No. 1 and No. 2 balancershafts and align the adjusting holes as shown in the illustration.

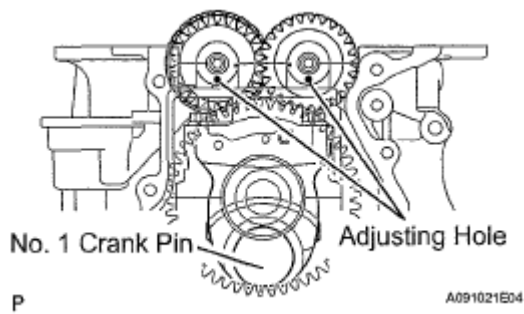


Fig. 404: Aligning Adjusting Holes

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Apply a continuous bead of seal packing (Diameter 2.5 to 3.0 mm (0.098 to 0.118 in.)) as shown in the illustration.

Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTE:

- Remove any oil from the contact surface.
- Install the crankcase within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the crankcase.

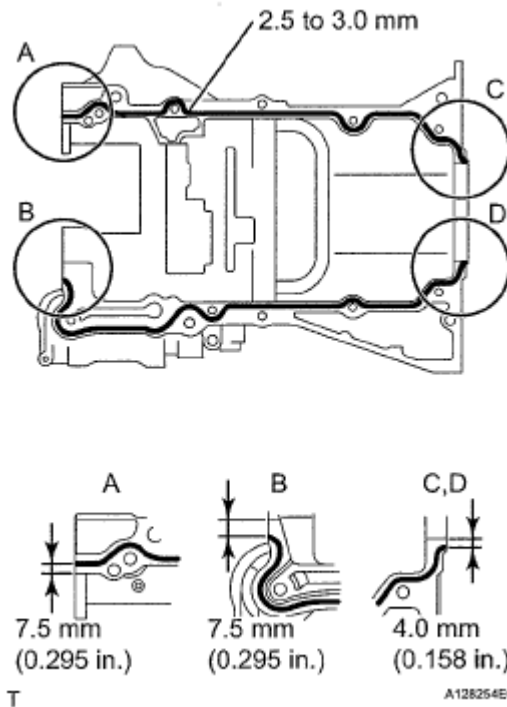


Fig. 405: Applying Bead Of Seal Packing

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- e. Temporarily install the crankcase with the 11 bolts.

BOLT LENGTH SPECIFICATION

Item	Bolt Length
A	122 mm (4.80 in.)
B	45 mm (1.77 in.)

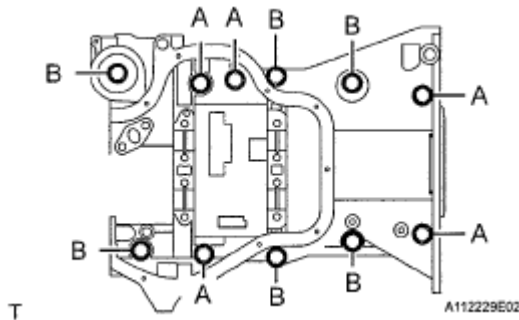


Fig. 406: Identifying Crankcase Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- f. Uniformly tighten the bolts.

Torque: 24 N*m (245 kgf*cm, 18 ft.*lbf)

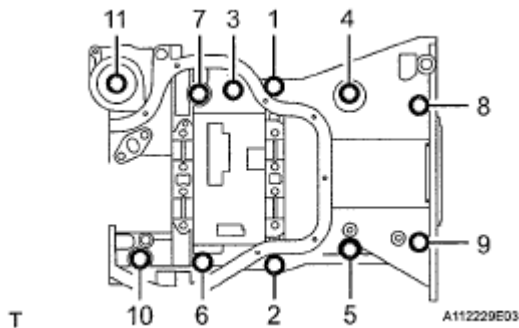


Fig. 407: Identifying Tightening Sequence Of Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- g. Confirm that the timing marks on the balancershafts are aligned when the key groove the is placed at the 6 o'clock position, as shown in the illustration.

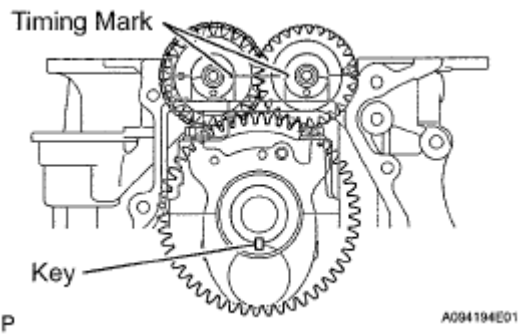


Fig. 408: Identifying Timing Marks On Balanceshafts
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

4. INSTALL OIL PUMP ASSEMBLY (See INSTALLATION)
5. INSTALL REAR CRANKSHAFT OIL SEAL (See INSTALLATION)
6. INSTALL NO. 1 TAPER HEAD SCREW PLUG
 - a. Apply adhesive to 2 or 3 threads of the plug, and install it.

Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

Adhesive: Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

NOTE:

- Install the plug within 3 minutes of applying adhesive.
- Do not add coolant for at least an hour after installing the plug.

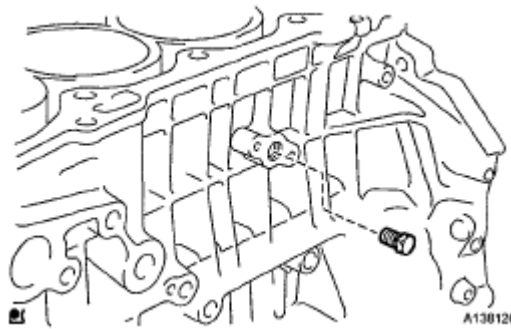


Fig. 409: Identifying No. 1 Taper Head Screw Plug
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL OIL CONTROL VALVE FILTER
 - a. Check that there are no foreign objects on the mesh part of the oil control valve filter,
 - b. Using a 8 mm socket hexagon wrench, install a new gasket and the oil control valve filter with the plug.

Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

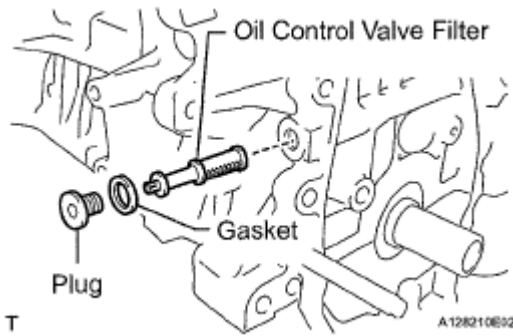


Fig. 410: Identifying Oil Control Valve Filter With Plug
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

8. INSTALL INLET WATER HOUSING

- a. Install the 2 new O-rings onto the inlet water housing.

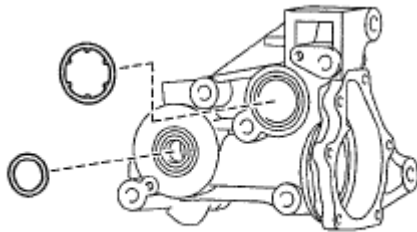


Fig. 411: Identifying Inlet Water Housing O-Rings
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using several steps, uniformly install and tighten the 5 bolts in the sequence shown in the illustration.

Torque: 35 N*m (357 kgf*cm, 26 ft.*lbf)

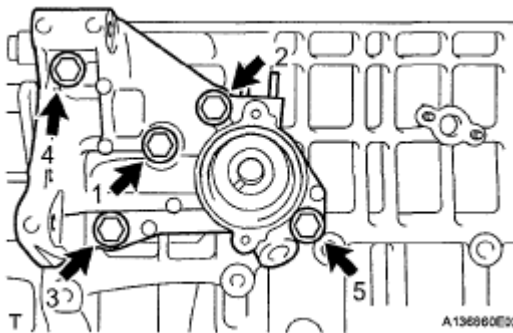


Fig. 412: Identifying Inlet Water Housing Bolts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Using E5 "TORX" socket wrench, remove the 6 stud bolts from the inlet water housing.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

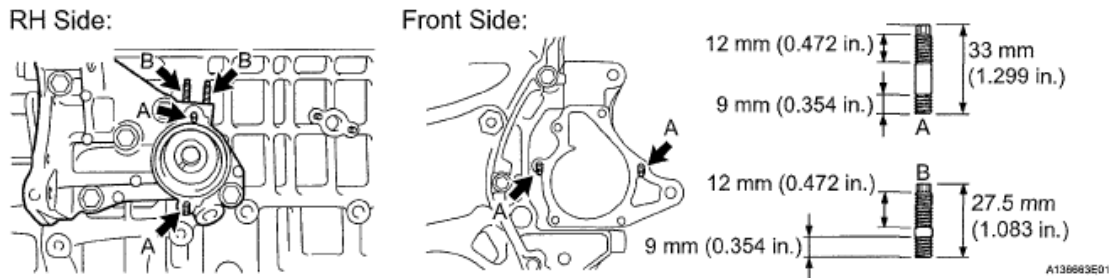


Fig. 413: Identifying Inlet Water Housing Stud Bolts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

9. INSTALL INLET WATER HOUSING DRAIN COCK ASSEMBLY

- a. Apply adhesive to 2 or 3 threads of the drain cock.

Adhesive: Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

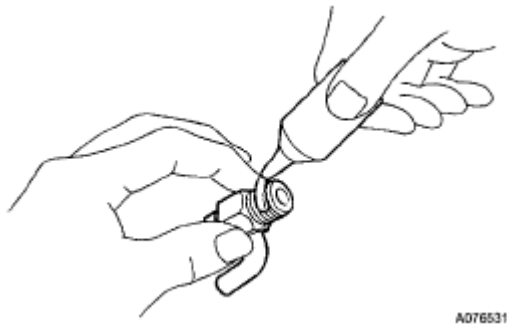


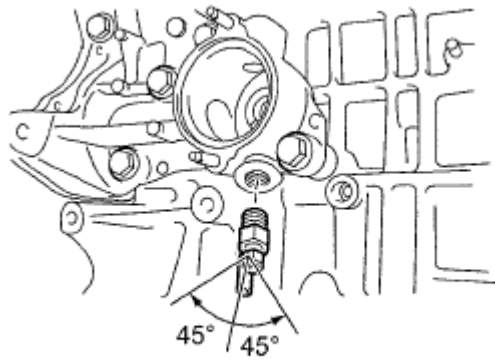
Fig. 414: Applying Adhesive To Threads Of Drain Cock
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. After tightening the drain cock to the specified torque, further tighten it one turn or less to set the drain cock pipe as specified in the illustration.

Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)

NOTE:

- Install the drain cock within 3 minutes of applying adhesive.
- Do not add coolant for at least an hour after installing the drain cock.
- Do not turn the drain cock by more than 1 revolution (360°) after tightening the drain cock to the specified torque.
- Do not loosen the drain cock after setting it correctly.



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Fig. 415: Identifying Plug Onto Water Drain Cock
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Install the plug onto the water drain cock.

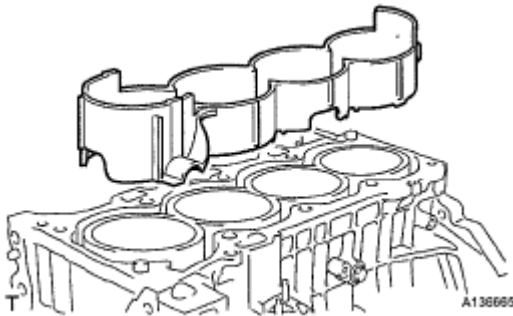
Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

10. INSTALL CYLINDER BLOCK WATER JACKET SPACER

- a. Install the cylinder block water jacket spacer into the cylinder block as shown in the illustration.

11. INSTALL CYLINDER HEAD GASKET (See REMOVAL)

12. INSTALL CYLINDER HEAD SUB-ASSEMBLY (See REMOVAL)



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Fig. 416: Identifying Cylinder Block Water Jacket Spacer Into Cylinder Block
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

- a. Apply a light coat of engine oil onto the new O-ring.

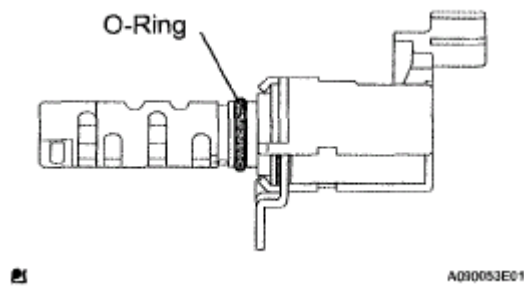


Fig. 417: Identifying Camshaft Timing Oil Control Valve Assembly O-Ring
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the camshaft timing oil control valve with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

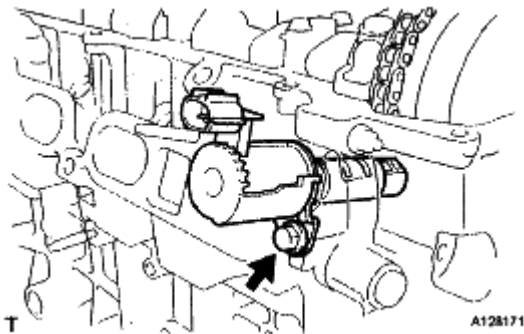


Fig. 418: Locating Camshaft Timing Oil Control Valve Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. **INSTALL CAMSHAFT TIMING GEAR ASSEMBLY** (See INSTALLATION)
15. **INSTALL CAMSHAFT TIMING GEAR OR SPROCKET**
 - a. Clamp the camshaft in a vise, then install the camshaft timing sprocket with the bolt.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

16. **INSTALL NO. 1 CAMSHAFT BEARING**

- a. Clean the installation surfaces and the inner and outer surfaces of the bearing.

NOTE: **Keep the installation surfaces and the back surfaces of the bearing free of engine oil.**

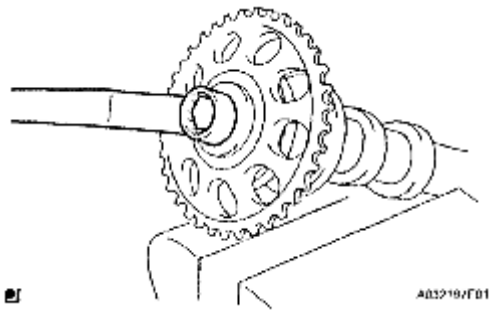


Fig. 419: Identifying Camshaft Bearing

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Align the claws and install No. 1 camshaft bearing onto No. 1 camshaft bearing cap.

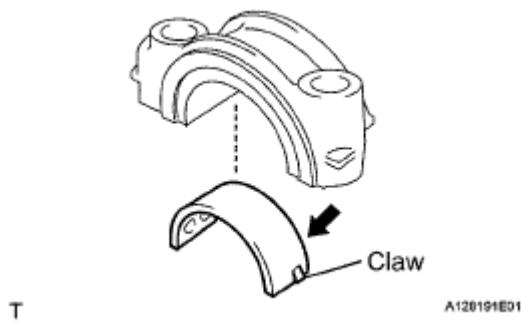


Fig. 420: Aligning Claws

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

17. INSTALL NO. 2 CAMSHAFT BEARING

- a. Clean the installation surfaces and the inner and outer surfaces of the bearing.

NOTE: Keep the installation surfaces and the back surfaces of the bearing free of engine oil.

- b. Install the No. 2 camshaft bearing onto the cylinder head.

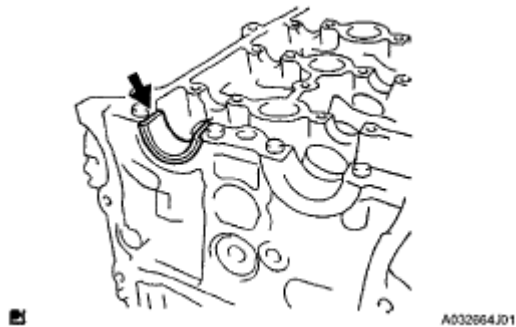


Fig. 421: Identifying No. 2 Camshaft Bearing Onto Cylinder Head

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. INSTALL CAMSHAFT

- a. Apply a light coat of engine oil to the journal portion.
- b. Place the camshaft on the cylinder head with the No. 1 cam lobes facing the directions shown in the illustration.
- c. Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.

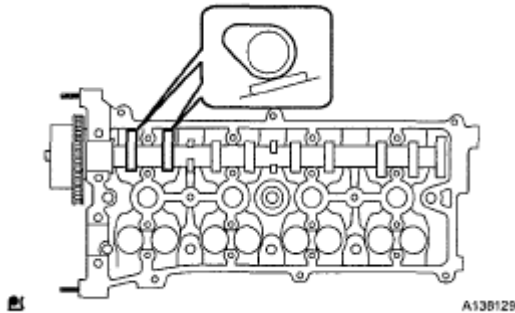


Fig. 422: Placing Camshaft On Cylinder Head

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- d. Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

Torque:

No. 1 bearing cap

30 N*m (301 kgf*cm, 22 ft.*lbf)

No. 3 bearing cap

9.0 N*m (92 kgf*cm, 80 in.*lbf)

NOTE:

- Determine the thrust direction of the camshaft by checking the location of the No. 1 bearing cap. Then tighten the bolts.
- Install the camshaft with the timing with the timing mark of the camshaft timing gear on top.

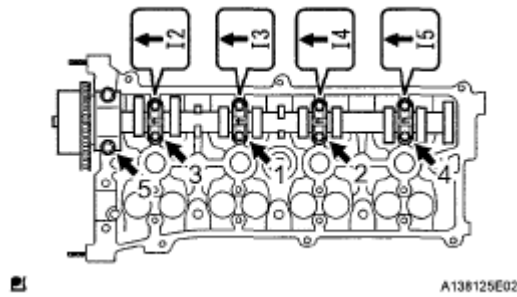


Fig. 423: Identifying Camshaft With Timing Mark And Numbers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

19. INSTALL NO. 2 CAMSHAFT

- Apply a light coat of engine oil to the journal portion.
- Place the camshaft on the cylinder head with the No. 2 cam lobes facing the directions shown in the illustration.

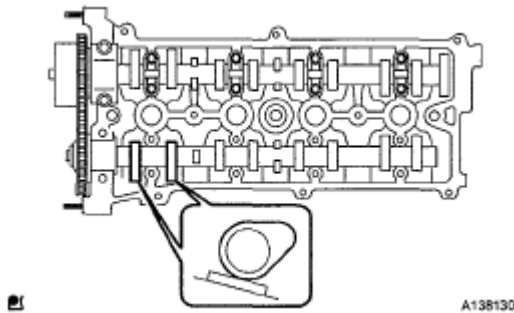


Fig. 424: Identifying No. 2 Cam Lobes Position
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.
- Examine the front marks and numbers, and check that the order is as shown in the illustration. Then install the bearing caps onto the cylinder head.

Torque:

No. 2 bearing cap

30 N*m (301 kgf*cm, 22 ft.*lbf)

No. 3 bearing cap

9.0 N*m (92 kgf*cm, 80 in.*lbf)

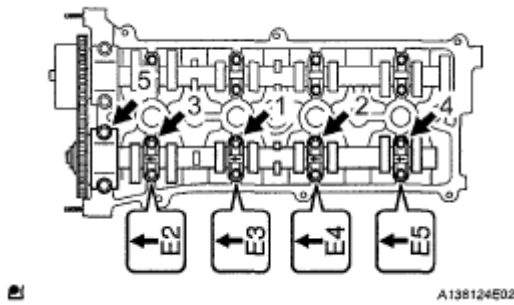


Fig. 425: Locating Front Marks And Numbers
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

NOTE:

- Determine the thrust direction of the camshaft by checking the location of the No. 2 bearing cap. Then tighten the bolts.
- Install the camshaft with the timing with the timing mark of the camshaft timing gear on top.

20. INSTALL NO. 2 CHAIN SUB-ASSEMBLY (See INSTALLATION)
21. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET (See INSTALLATION)
22. INSTALL NO. 1 CHAIN VIBRATION DAMPER (See INSTALLATION)
23. INSTALL CHAIN SUB-ASSEMBLY (See INSTALLATION)
24. INSTALL CHAIN TENSIONER SLIPPER (See INSTALLATION)
25. INSTALL TIMING CHAIN GUIDE (See INSTALLATION)
26. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE (See INSTALLATION)
27. INSTALL FRONT CRANKSHAFT OIL SEAL
 - a. Apply MP grease to the tip of a oil seal.

NOTE: Keep the lip free of foreign objects.

- b. Using SST and a hammer, tap in the new oil seal until its surface is flush with the timing chain cover edge.

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NOTE: Do not tap the oil seal at an angle.

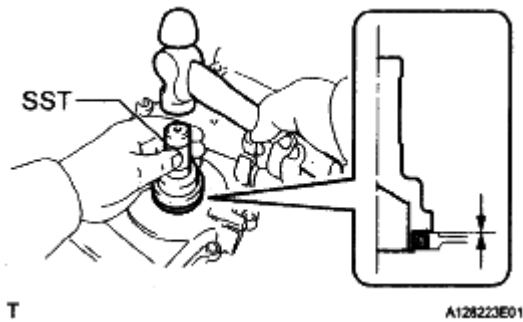


Fig. 426: Tapping Oil Seal

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

28. **INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY** (See **INSTALLATION**)
29. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY** (See **INSTALLATION**)
30. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY** (See **INSTALLATION**)
31. **INSTALL CRANKSHAFT POSITION SENSOR**
 - a. Apply a light coat of engine oil onto the O-ring.

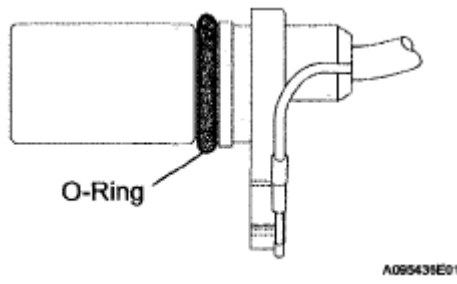


Fig. 427: Applying Light Coat Of Engine Oil Onto O-Ring

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the crankshaft position sensor with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

- c. Install the wire harness onto the harness clamp bracket.

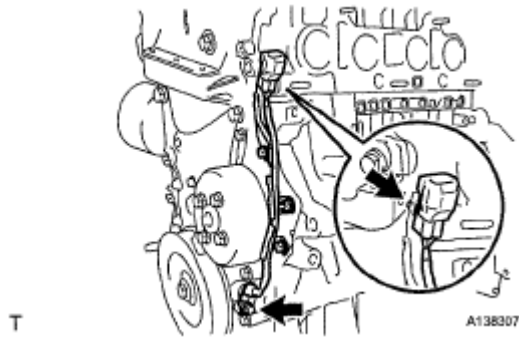


Fig. 428: Locating Crankshaft Position Sensor Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

32. INSTALL OIL PAN SUB-ASSEMBLY

- Remove any old packing material from the contact surface.
- Apply a continuous bead of seal packing (Diameter 3.0 to 4.0 mm (0.118 to 0.157 in.)) to the oil pan mating surface as shown in the illustration.

Seal packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not expose the seal to engine oil within 2 hours of installation.
- Do not start the engine for at least 2 hours after the installation

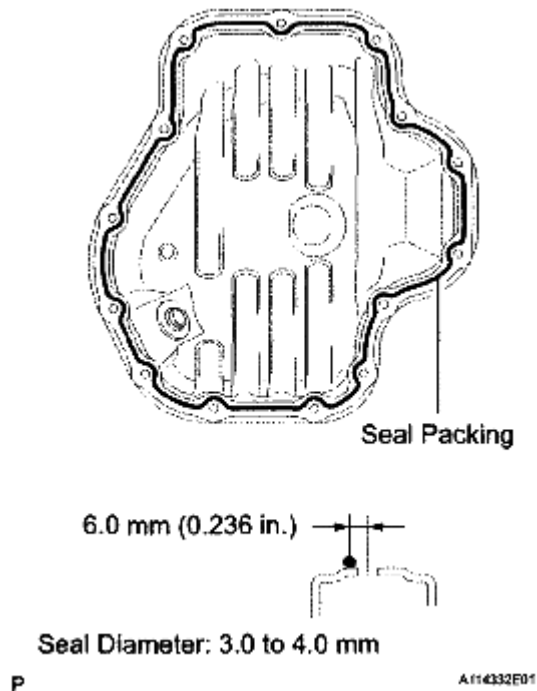


Fig. 429: Applying Bead Of Seal Packing
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Uniformly tighten the 12 bolts and 2 nuts in the sequence shown in the illustration.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

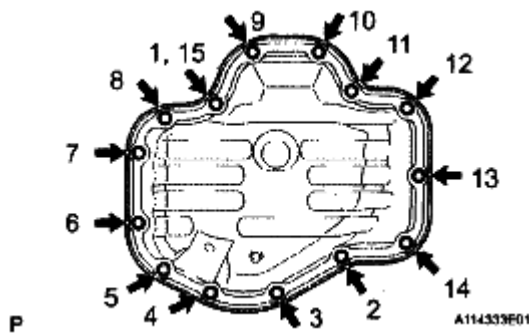


Fig. 430: Identifying Bolts And Nuts Tightening Sequence
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

33. INSTALL OIL PAN DRAIN PLUG

- a. Install the oil drain plug with a new gasket.

Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

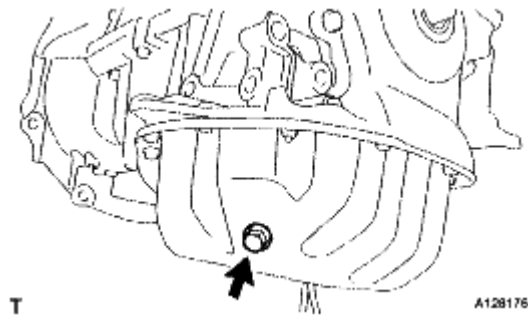


Fig. 431: Locating Oil Pan Drain Plug From Oil Pan
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

34. **INSTALL WATER PUMP ASSEMBLY** (See INSTALLATION)
35. **INSTALL WATER PUMP PULLEY** (See INSTALLATION)
36. **INSTALL CRANKSHAFT PULLEY** (See INSTALLATION)
37. **INSPECT VALVE CLEARANCE** (See ADJUSTMENT)
38. **ADJUST VALVE CLEARANCE** (See ADJUSTMENT)
39. **INSTALL CAMSHAFT POSITION SENSOR**
 - a. Apply a light coat of engine oil onto the O-ring.

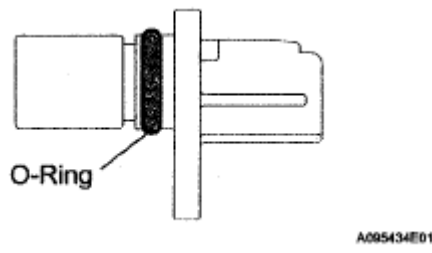


Fig. 432: Applying Light Coat Of Engine Oil Onto O-Ring
 Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Install the camshaft position sensor with the bolt.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

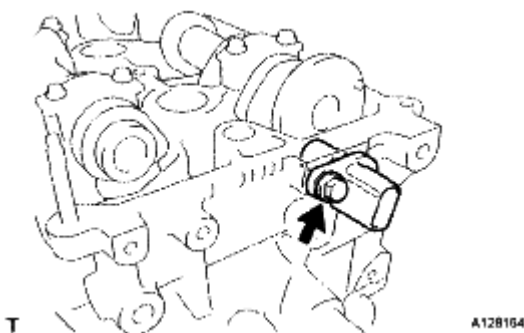


Fig. 433: Locating Camshaft Position Sensor Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

40. INSTALL CYLINDER HEAD COVER GASKET

- a. Install the cylinder head cover gasket onto the cylinder head cover.

41. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

- a. Remove any old packing material from the contact surface.

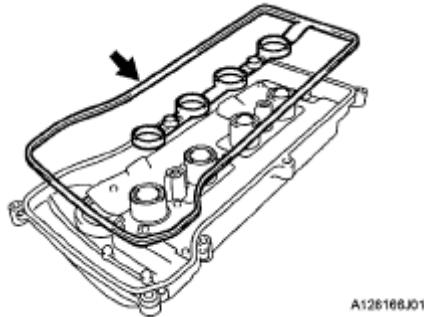


Fig. 434: Identifying Packing Material From Contact Surface
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Apply seal packing to the 2 locations shown in the illustration.

Seal Packing: Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes of applying seal packing.
- Do not add engine oil for at least 2 hours after installing the oil pan.

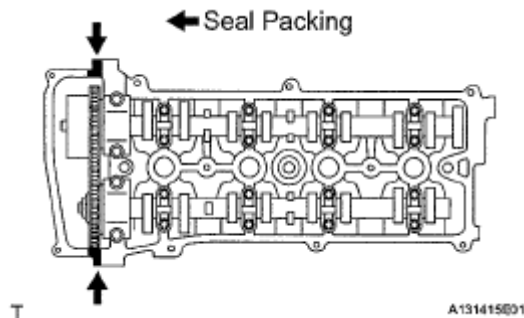


Fig. 435: Identifying Seal Packing Applying Locations
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- c. Install the cylinder head cover with the 8 bolts and 2 nuts.

Torque:

Bolt A

11 N*m (112 kgf*cm, 8 ft.*lbf)

Bolt B

14 N*m (143 kgf*cm, 10 ft.*lbf)

Nut

11 N*m (112 kgf*cm, 8 ft.*lbf)

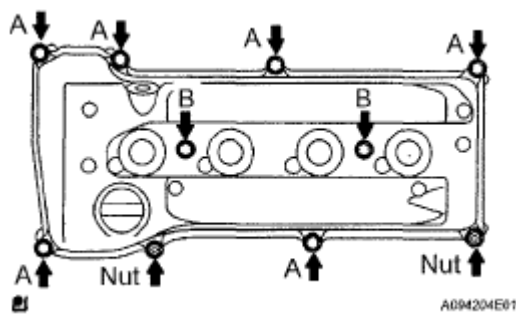


Fig. 436: Identifying Cylinder Head Cover With Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

42. INSTALL OIL FILTER UNION

- a. Using a 12 mm socket hexagon wrench, install the oil filter union.

Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

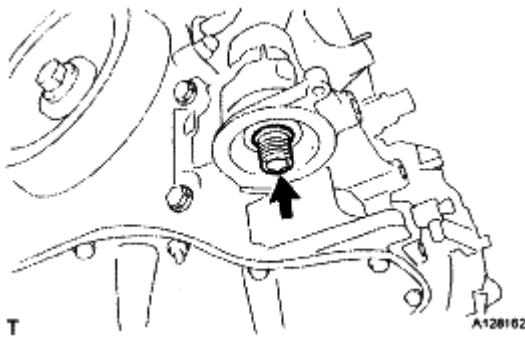


Fig. 437: Locating Oil Filter Union
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

43. **INSTALL OIL FILTER SUB-ASSEMBLY** (See REPLACEMENT)
44. **INSTALL SPARK PLUG** (See INSTALLATION)
45. **INSTALL VENTILATION VALVE SUB-ASSEMBLY**

- a. Apply adhesive to the threads of the ventilation valve.

Adhesive: Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

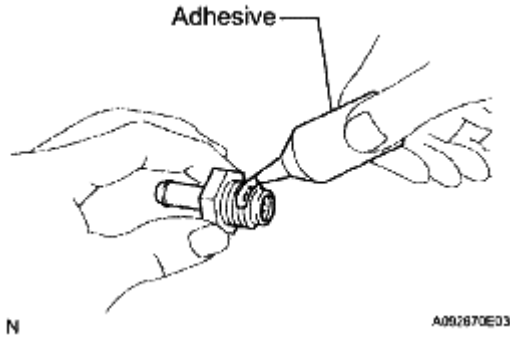


Fig. 438: Applying Adhesive To Threads Of Ventilation Valve
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

- b. Using a deep socket wrench 22 mm, install the ventilation valve onto the cylinder head cover.

Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

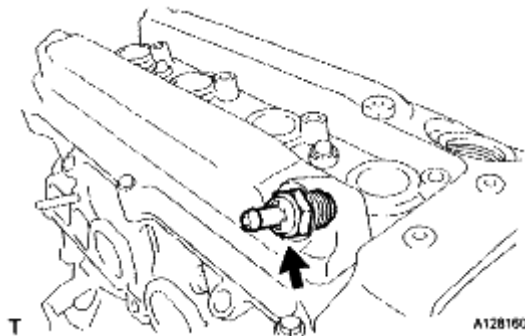


Fig. 439: Locating Ventilation Valve From Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

46. INSTALL OIL FILLER CAP GASKET

- a. Install the oil filler cap gasket onto the oil filler cap.

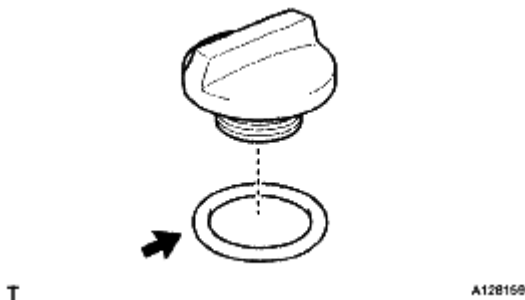


Fig. 440: Locating Oil Filler Cap Gasket
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

47. INSTALL OIL FILLER CAP SUB-ASSEMBLY

- a. Install the oil filler cap onto the cylinder head cover.

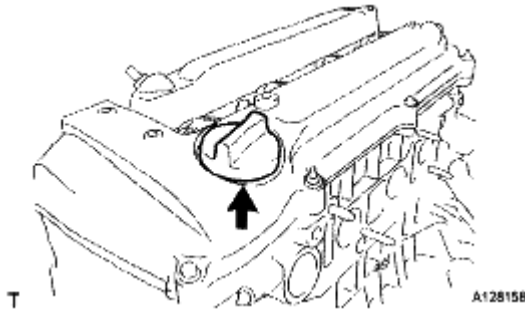


Fig. 441: Locating Oil Filler Cap From Cylinder Head Cover
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

INSTALLATION

1. INSTALL RADIO SETTING CONDENSER

- a. Install the condenser with the bolt.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

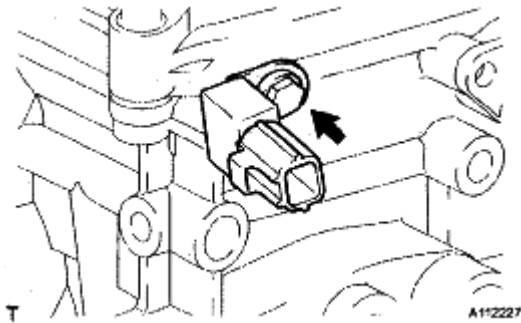


Fig. 442: Locating Radio Setting Condenser Bolt
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

2. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR** (See INSTALLATION)
3. **INSTALL OIL PRESSURE SWITCH** (See INSTALLATION)
4. **INSTALL KNOCK SENSOR** (See INSTALLATION)
5. **INSTALL IGNITION COIL ASSEMBLY** (See INSTALLATION)
6. **INSTALL NO. 1 WATER BY-PASS PIPE**
 - a. Install a new gasket and the pipe with the bolt and 2 nuts.

Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

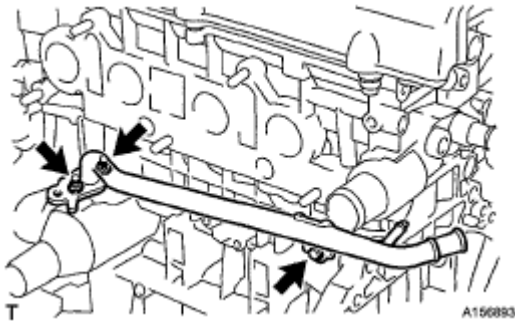


Fig. 443: Locating No. 1 Water By-Pass Pipe Bolts And Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

7. INSTALL OIL DIPSTICK GUIDE (See INSTALLATION)
8. INSTALL OIL DIPSTICK
9. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET (See INSTALLATION)
10. INSTALL THERMOSTAT (See INSTALLATION)
11. INSTALL INLET WATER (See INSTALLATION)
12. INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY
 - a. Install a new gasket onto the cylinder head.
 - b. Temporarily tighten the exhaust manifold converter with the 5 nuts.
 - c. Tighten the 5 nuts in the sequence shown in the illustration.

Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)

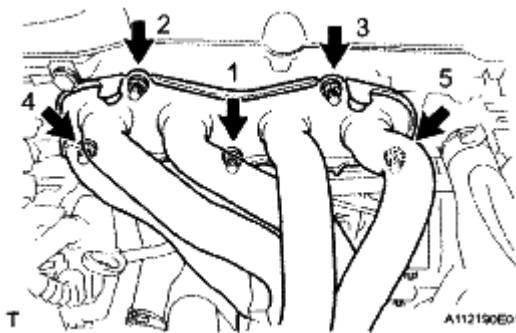


Fig. 444: Locating Exhaust Manifold Converter Nuts
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

13. INSTALL NO. 2 MANIFOLD STAY
 - a. Install the No. 2 manifold stay with the bolt and nut.

Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

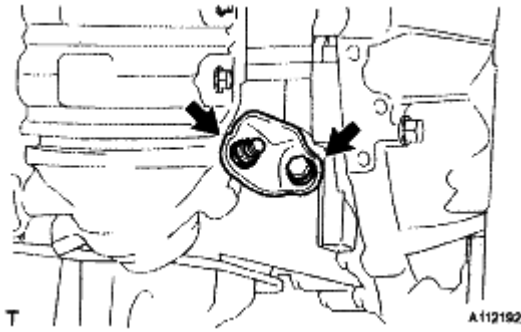


Fig. 445: Locating Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

14. INSTALL MANIFOLD STAY

- a. Install the manifold stay with the bolt and nut.

Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)

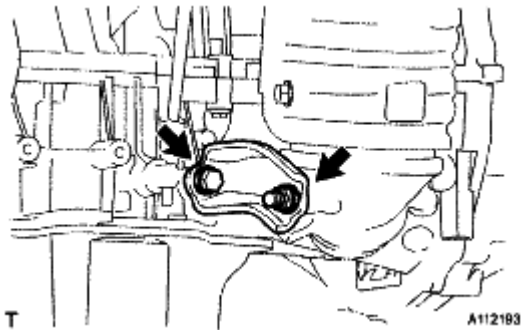


Fig. 446: Locating No. 2 Manifold Stay Bolt And Nut
Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

15. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

- a. Install the exhaust manifold heat insulator with the 4 bolts.

Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

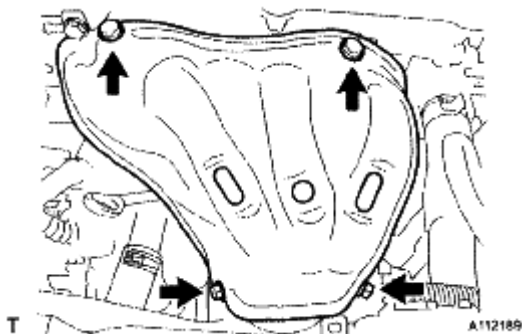
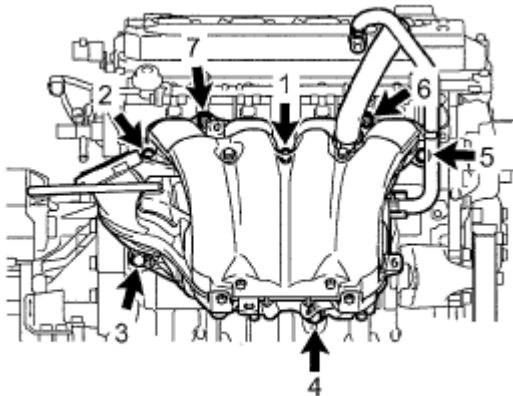


Fig. 447: Locating No. 1 Exhaust Manifold Heat Insulator Bolts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

16. **INSTALL NO. 1 INTAKE MANIFOLD INSULATOR** (See INSTALLATION)
17. **INSTALL INTAKE MANIFOLD**
 - a. Install the new gasket onto the intake manifold.
 - b. Install the intake manifold with the 5 bolts and 2 nuts.

Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)



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Fig. 448: Locating Intake Manifold With Bolts And Nuts

Courtesy of TOYOTA MOTOR SALES, U.S.A., INC.

18. **CONNECT NO. 2 VENTILATION HOSE** (See INSTALLATION)
19. **INSTALL FUEL INJECTOR ASSEMBLY** (See INSTALLATION)
20. **INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY** (See INSTALLATION)