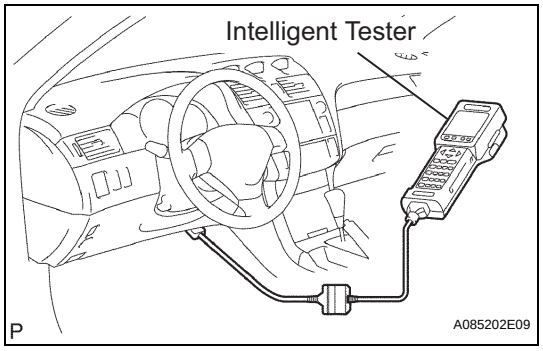
ENGINE

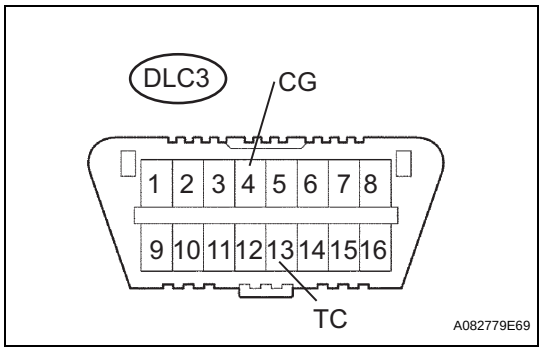
INSPECTION

1. **INSPECT ENGINE COOLANT**
2. **INSPECT ENGINE OIL**
3. **INSPECT BATTERY**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY**
5. **INSPECT SPARK PLUG**
6. **INSPECT IGNITION TIMING**

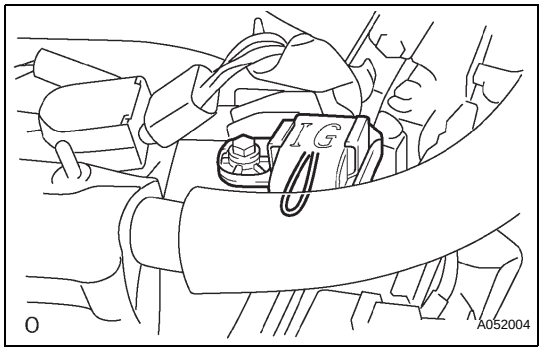
(a) Warm up the engine.



(b) When using the intelligent tester:
Check the ignition timing.
(1) Connect the intelligent tester to the DLC3.
(2) Enter DATA LIST MODE on the intelligent tester.
Ignition timing:
8 to 12° BTDC @ idle
HINT:
Please refer to the intelligent tester operator's manual for help on selecting the DATA LIST.



(c) When not using the intelligent tester:
Check the ignition timing.
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.
SST 09843-18040
NOTICE:
- **Confirm the terminal numbers before connecting them. Connection with a wrong terminal can damage the engine.**
- **Turn off all electrical systems before connecting the terminals.**
- **Perform this inspection after the cooling fan motor is turned off.**

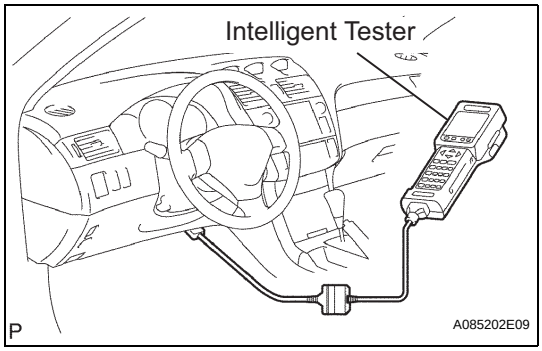


(2) Remove the cylinder head cover No. 2.
(3) Pull out the wire harness as shown in the illustration. Connect the clip of the timing light to the engine.
NOTICE:
- **Use a timing light which can detect the first signal.**
- **After checking, be sure to tape the wire harness.**

(4) Check the ignition timing at idle.
Ignition timing:
8 to 12° BTDC @ idle
NOTICE:
When checking the ignition timing, the transmission should be in the neutral position.

HINT:
After engine rpm is kept at 1,000 to 1,300 rpm for 5 seconds, check that it returns to idle speed.

(5) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.
(6) Check the ignition timing at idle.
Ignition timing:
5 to 15° BTDC @ idle
(7) Confirm that ignition timing moves to the advanced angle side when the engine rpm is increased.
(8) Remove the timing light.

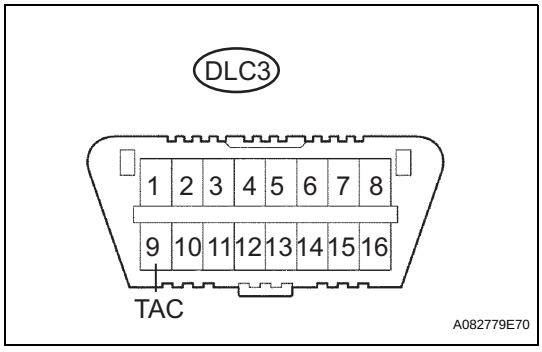


7. INSPECT ENGINE IDLE SPEED

(a) Warm up the engine.
(b) When using the intelligent tester:
Check the idle speed.
(1) Connect the intelligent tester to the DLC3.
HINT:
Please refer to the intelligent tester operator's manual for further details.
(2) Enter DATA LIST MODE on the intelligent tester.
Idle speed

Item	Specified Condition
M/T	650 to 750 rpm
A/T	610 to 710 rpm

NOTICE:
- **When checking the idle speed, the transmission should be in the neutral position.**
- **Check idle speed with the cooling fan off.**
- **Switch off all accessories and air conditioning before connecting the intelligent tester.**

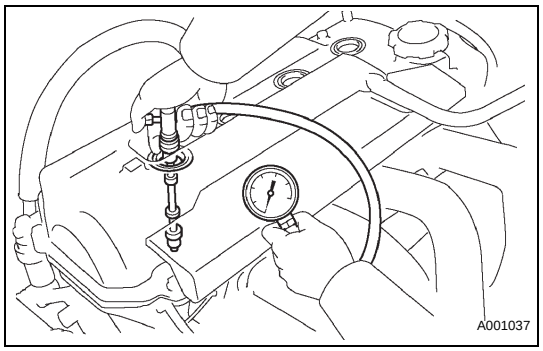


(c) When not using the intelligent tester:
Check the idle speed.
(1) Using SST, connect tachometer tester probe to terminal 9 (TAC) of the DLC3.
SST 09843-18030
(2) Check the idle speed.
Idle speed

Item	Specified Condition
M/T	650 to 750 rpm
A/T	610 to 710 rpm

8. INSPECT COMPRESSION

(a) Warm up and stop the engine.
(b) Disconnect the injector connectors.
(c) Remove the ignition coils.
(d) Remove the spark plugs.



(e) Check the cylinder compression pressure.
(1) Insert a compression gauge into the spark plug hole.
(2) Fully open the throttle.
(3) While cranking the engine, measure the compression pressure.
Compression pressure:
1.360 MPa (13.9 kgf/cm^2, 198 psi)
Minimum pressure:
0.98 MPa (10 kgf/cm^2, 142 psi)
Difference between each cylinder:
100 kPa (1.0 kgf/cm^2, 14 psi)
NOTICE:
- **Always use a fully charged battery to obtain an engine speed of 250 rpm or more.**
- **Check the other cylinders' compression pressure in the same way.**
- **This measurement must be done as quickly as possible.**

(4) 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.

9. INSPECT CO/HC
(a) Start the engine.
(b) Rev the engine at 2,500 rpm for approximately 180 seconds.
(c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into the tailpipe during idling.
(d) Immediately check CO/HC concentration at idle and/or 2,500 rpm.
HINT:
- Complete the measuring within 3 minutes.
- Check regulations and restrictions in your area when performing 2 mode CO/HC concentration testing (engine check at both idle speed and at 2,500 rpm).

(e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
(1) Check A/F sensor and heated oxygen sensor operation (See page).

EM

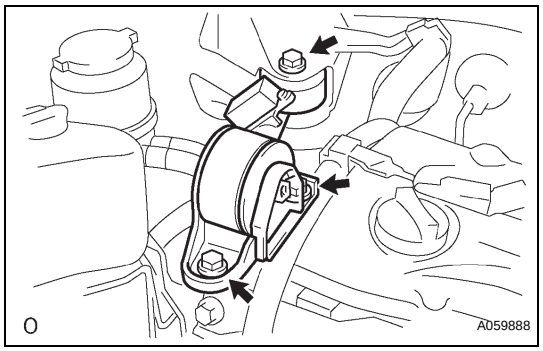
(2) See the table below for possible causes, and then inspect and repair.

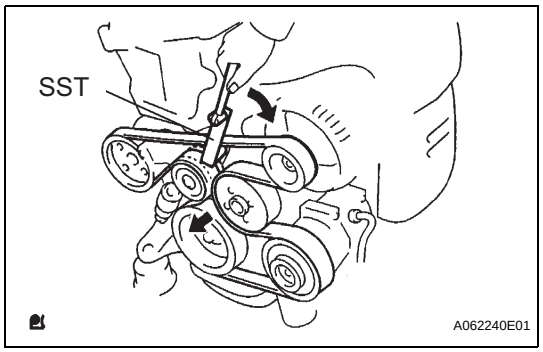
CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: – Incorrect timing – Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (fluctuating HC reading)	1. Vacuum leaks: – PCV hoses – Intake manifold – Throttle body – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI system: – Faulty pressure regulator – Defective ECT – Defective MAF meter – Faulty ECM – Faulty injectors – Faulty throttle position sensor

DRIVE BELT

REMOVAL

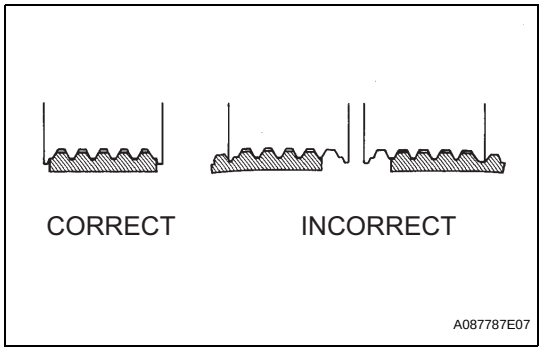
1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE ENGINE COVER SUB-ASSEMBLY NO.1**
4. **REMOVE ENGINE MOVING CONTROL ROD W/ BRACKET**
   (a) Remove the 3 bolts and control rod.
5. **REMOVE ENGINE MOUNTING STAY NO.2 RH**
6. **REMOVE ENGINE MOUNTING BRACKET NO.2 RH**





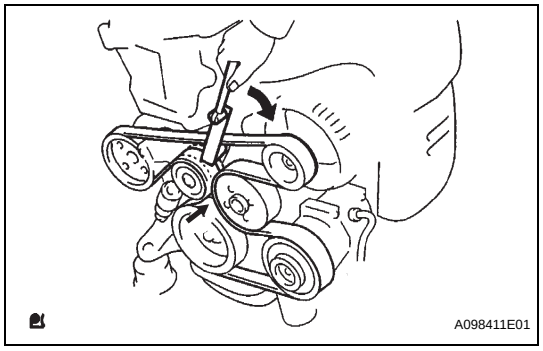
7. **REMOVE FAN AND GENERATOR V BELT**
   (a) Slowly turn the belt tensioner clockwise for more than 3 seconds, and remove the drive belt by using SST.
   SST 09249-63010

INSPECTION

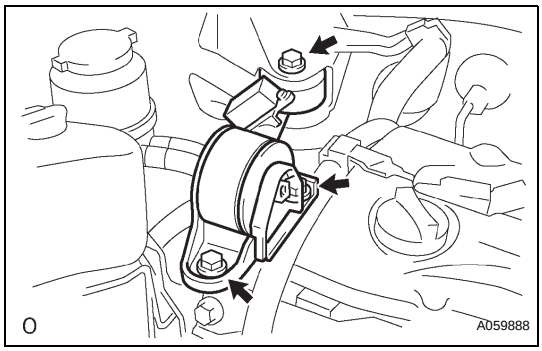


1. **INSPECT V-RIBBED BELT**
   HINT:
   - After installing the drive belt, check that it fits properly in the ribbed grooves. Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the crank pulley.
   - A "new belt" is a belt which has been used for less than 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.

INSTALLATION



1. **INSTALL FAN AND GENERATOR V BELT**
   (a) Slowly turn the belt tensioner clockwise for more than 3 seconds, and install the drive belt by using SST.
   SST 09249-63010
2. **INSTALL ENGINE MOUNTING BRACKET NO.2 RH**
   Torque: 52 N*m (531 kgf*cm, 38 ft.*lbf)



3. **INSTALL ENGINE MOUNTING STAY NO.2 RH**
   Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

4. **INSTALL ENGINE MOVING CONTROL ROD W/ BRACKET**
   (a) Install the engine control rod with the 3 bolts.
   Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

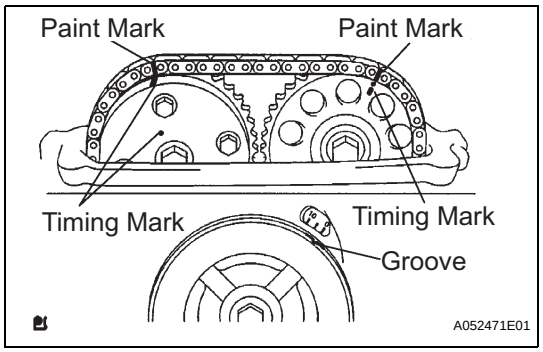
5. **INSTALL FRONT WHEEL RH**
   Torque: 103 N*m (1,050 kgf*cm, 76 ft.*lbf)

ADJUSTMENT

1. ADJUST VALVE CLEARANCE

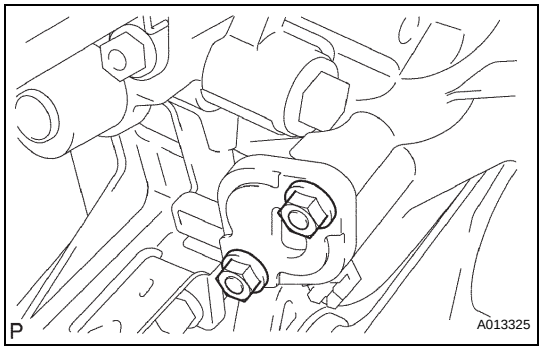
NOTICE:

Be sure not to turn the crankshaft without the chain tensioner.

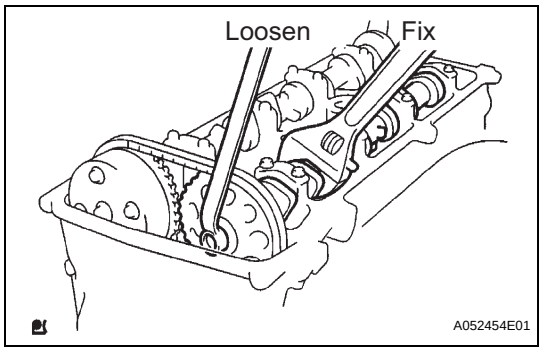


(a) Turn the crankshaft clockwise 1 revolution (360°) and set the No.1 cylinder to the TDC/compression.

(b) Place paint marks on the timing chain and camshaft timing gear/sprocket.



(c) Remove the 2 bolts and chain tensioner.

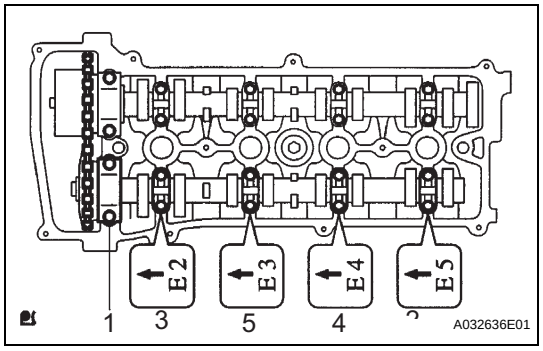


(d) Remove the No.2 camshaft.

(1) Fix the camshaft with a wrench and then loosen the sproket bolt.

NOTICE:

Be careful not to damage the valve lifter.



(2) Uniformly loosen and remove the No.2 camshaft's 10 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearing caps.

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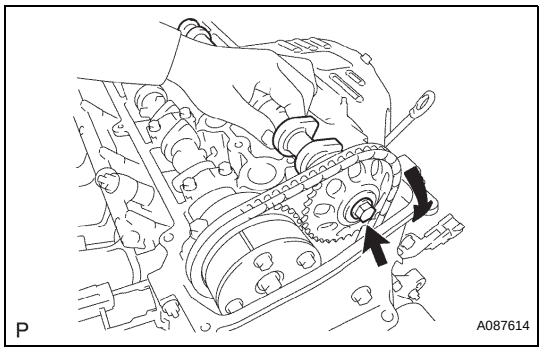
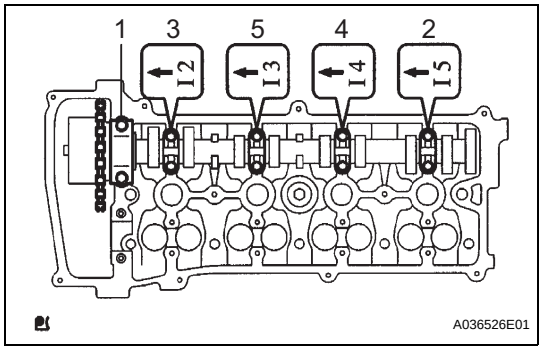
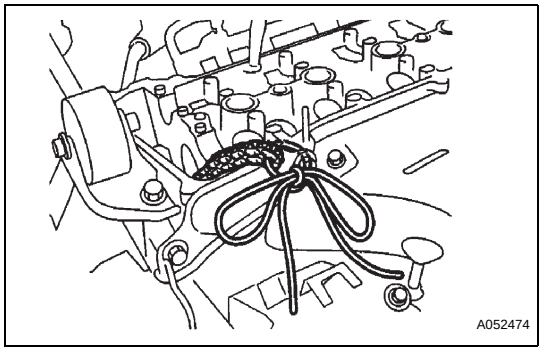


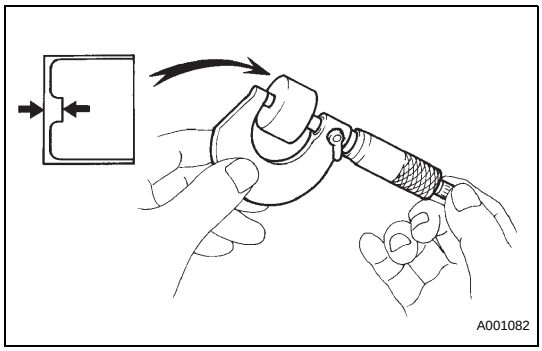
(3) Raise the No.2 camshaft and remove it. Then remove the sprocket bolt.
(4) Remove the camshaft timing sprocket and the timing chain from the No.2 camshaft.
(5) Remove the camshaft timing sprocket from the timing chain.



(e) Remove the camshaft.
(1) Uniformly loosen and remove the camshaft's 10 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearing caps.
(2) Remove the camshaft.



(f) Tie the timing chain with a string.
NOTICE:
Be careful not to drop anything inside the timing chain cover.
(g) Remove the valve lifters.



(h) Adjust the valve clearance.
(1) Using a micrometer, measure the thickness of the removed lifter.
(2) Calculate the thickness of a new lifter so that the valve clearance comes within the specified value.

A	Thickness of new lifter
B	Thickness of used lifter
C	Thickness of used lifter

Valve clearance

Item	Specified Condition
Intake	**A = B + (C - 0.24 mm (0.0094 in.))**
Exhaust	**A = B + (C - 0.35 mm (0.0138 in.))**

EXAMPLE: (Intake)
Measured valve clearance = 0.44 mm (0.0173 in.)
0.44 mm (0.0173 in.) - 0.24 mm (0.0094 in.) = 0.20 mm (0.0079 in.)
(Measured - Specification = Excess clearance)

Used shim measurement = 5.30 mm (0.2087 in.)
0.20 mm (0.0079 in.) + 5.30 mm (0.2087 in.) = 5.50 mm (0.2165 in.)
(Excess clearance + Used shim = Ideal new shim)
Closest new shim = 5.50 mm (0.2165 in.) = Shim No."50"

(3) 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 mm (0.1992 in.) to 5.740 mm (0.2260 in.).
- Refer to valve lifter selection chart on the following 2 pages.

EM

Valve Lifter Selection Chart (Intake)

Measure clearance mm (in.) \ Installed lifter thickness mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	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 (0.2252)	5.740 (0.2260)
0.000–0.030 (0.0000–0.0012)													06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58
0.031–0.050 (0.0012–0.0020)									06	06	08	08	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58	60
0.051–0.070 (0.0020–0.0028)								06	08	08	08	10	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58	60	62
0.071–0.090 (0.0028–0.0035)							06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60	62	64
0.091–0.110 (0.0036–0.0043)						06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66
0.111–0.130 (0.0044–0.0051)					06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68
0.131–0.150 (0.0052–0.0059)				06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68	70
0.151–0.170 (0.0059–0.0067)			06	08	10	12	14	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	60	62	64	66	68	70	72
0.171–0.189 (0.0067–0.0074)		06	08	10	12	14	16	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	60	62	64	66	68	70	72	
0.190–0.290 (0.0075–0.0114)																																																								
0.291–0.310 (0.0115–0.0122)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74		
0.311–0.330 (0.0122–0.0130)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74	74			
0.331–0.350 (0.0130–0.0138)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74	74					
0.351–0.370 (0.0138–0.0146)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	74	74						
0.371–0.390 (0.0146–0.0154)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74							
0.391–0.410 (0.0154–0.0161)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74									
0.411–0.430 (0.0162–0.0169)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74											
0.431–0.450 (0.0170–0.0177)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74													
0.451–0.470 (0.0178–0.0185)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74															
0.471–0.490 (0.0185–0.0193)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																	
0.491–0.510 (0.0193–0.0201)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																			
0.511–0.530 (0.0201–0.0209)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																					
0.531–0.550 (0.0209–0.0217)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.551–0.570 (0.0217–0.0224)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																									
0.571–0.590 (0.0225–0.0232)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																											
0.591–0.610 (0.0233–0.0240)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																													
0.611–0.630 (0.0241–0.0248)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																															
0.631–0.650 (0.0248–0.0256)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																																	
0.651–0.670 (0.0256–0.0264)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74																																			
0.671–0.690 (0.0264–0.0272)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74																																					
0.691–0.710 (0.0272–0.0280)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74																																							
0.711–0.730 (0.0280–0.0287)	54	56	58	60	62	64	66	68	70	70	72	72	74	74																																								
0.731–0.750 (0.0288–0.0295)	56	58	60	62	64	66	68	70	72	72	74	74																																									
0.751–0.770 (0.0296–0.0303)	58	60	62	64	66	68	70	72	74	74																																											
0.771–0.790 (0.0304–0.0311)	60	62	64	66	68	70	72	74																																													
0.791–0.810 (0.0311–0.0319)	62	64	66	68	70	72	74																																													
0.811–0.830 (0.0319–0.0327)	64	66	68	70	72	74																																														
0.831–0.850 (0.0327–0.0335)	66	68	70	72	74																																															
0.851–0.870 (0.0335–0.0343)	68	70	72	74																																															
0.871–0.890 (0.0343–0.0350)	70	72	74																																															
0.891–0.910 (0.0351–0.0358)	72	74																																															
0.911–0.930 (0.0359–0.0366)	74																																																

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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)	-	-

Intake valve clearance (Cold):
0.19 to 0.29 mm (0.008 to 0.011 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.

EM

EM

Valve Lifter Selection Chart (Exhaust)

Installed lifter thickness mm (in.) / Measure clearance mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	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 (0.2252)	5.740 (0.2260)
0.000–0.030 (0.0000–0.0012)																							06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	34	36	38	40	42	44
0.031–0.050 (0.0012–0.0020)																					06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	36	38	40	42	44	46
0.051–0.070 (0.0020–0.0028)																			06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	38	40	42	44	46	48
0.071–0.090 (0.0028–0.0035)																	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	40	42	44	46	48	50
0.091–0.110 (0.0036–0.0043)															06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	42	44	46	48	50	52
0.111–0.130 (0.0044–0.0051)													06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54
0.131–0.150 (0.0052–0.0059)											06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56
0.151–0.170 (0.0059–0.0067)									06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58
0.171–0.190 (0.0067–0.0075)								06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60
0.191–0.210 (0.0075–0.0083)							06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62
0.211–0.230 (0.0083–0.0091)						06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64
0.231–0.250 (0.0091–0.0098)					06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66
0.251–0.270 (0.0099–0.0106)				06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.271–0.290 (0.0107–0.0114)			06	08	10	12	14	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	60	62	64	66	68	70
0.291–0.299 (0.0115–0.0118)		06	08	10	12	14	16	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	62	64	66	68	70	72
0.300–0.400 (0.0118–0.0157)																																																							
0.401–0.420 (0.0158–0.0165)	12	14	16	18	20	22	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	68	70	72	74	74	74	
0.421–0.440 (0.0166–0.0173)	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	70	72	74	74	74		
0.441–0.460 (0.0174–0.0181)	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74	74	74			
0.461–0.480 (0.0181–0.0189)	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	74	74	74				
0.481–0.500 (0.0189–0.0197)	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74					
0.501–0.520 (0.0197–0.0205)	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74						
0.521–0.540 (0.0205–0.0213)	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	74							
0.541–0.560 (0.0213–0.0220)	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74								
0.561–0.580 (0.0221–0.0228)	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74										
0.581–0.600 (0.0229–0.0236)	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74												
0.601–0.620 (0.0237–0.0244)	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74														
0.621–0.640 (0.0244–0.0252)	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																
0.641–0.660 (0.0252–0.0260)	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																		
0.661–0.680 (0.0260–0.0268)	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																				
0.681–0.700 (0.0268–0.0276)	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																						
0.701–0.720 (0.0276–0.0283)	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																								
0.721–0.740 (0.0284–0.0291)	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																										
0.741–0.760 (0.0292–0.0299)	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																												
0.761–0.780 (0.0300–0.0307)	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																														
0.781–0.800 (0.0307–0.0315)	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																																
0.801–0.820 (0.0315–0.0323)	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74																																		
0.821–0.840 (0.0323–0.0331)	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	74	74	74	74																																				
0.841–0.860 (0.0331–0.0339)	56	58	60	62	64	66	68	70	70	72	72	74	74	74	74	74	74																																						
0.861–0.880 (0.0339–0.0346)	58	60	62	64	66	68	70	72	72	74	74	74	74	74	74																																								
0.881–0.900 (0.0347–0.0354)	60	62	64	66	68	70	72	74	74	74	74	74	74																																										
0.901–0.920 (0.0355–0.0362)	62	64	66	68	70	72	74	74	74	74	74																																												
0.921–0.940 (0.0363–0.0370)	64	66	68	70	72	74	74	74	74																																														
0.941–0.960 (0.0370–0.0378)	66	68	70	72	74	74	74																																																
0.961–0.980 (0.0378–0.0386)	68	70	72	74	74	74																																																	
0.981–1.000 (0.0386–0.0394)	70	72	74	74	74																																																		
1.001–1.020 (0.0394–0.0402)	72	74	74	74																																																			
1.021–1.040 (0.0402–0.0409)	74	74	74																																																				
1.041–1.060 (0.0410–0.0417)	74	74																																																					
1.061–1.080 (0.0418–0.0425)	74																																																						

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New Lifter Thickness

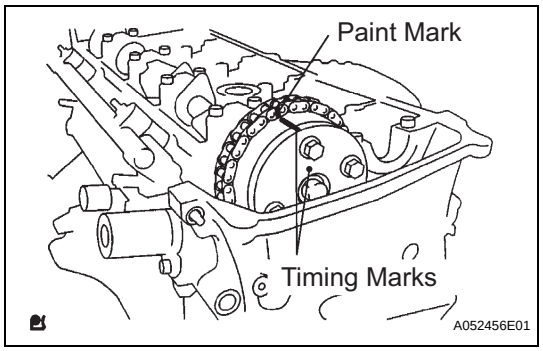
Lifter No.	Thickness (mm (in.))	Lifter No.	Thickness (mm (in.))	Lifter No.	Thickness (mm (in.))
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (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)	-	-

Exhaust valve clearance (Cold):
0.30 to 0.40 mm (0.012 to 0.016 in.)

EXAMPLE:

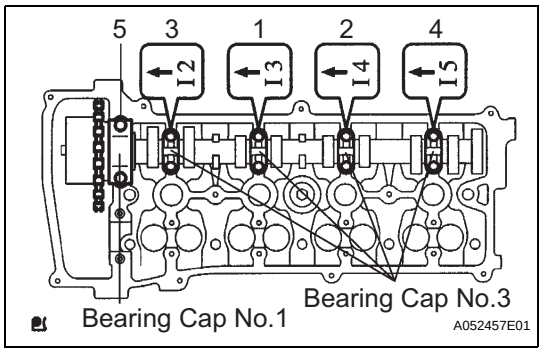
The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.440 mm (0.0173 in.).

Replace the 5.340 mm (0.2102 in.) lifter with a new No.44 lifter.



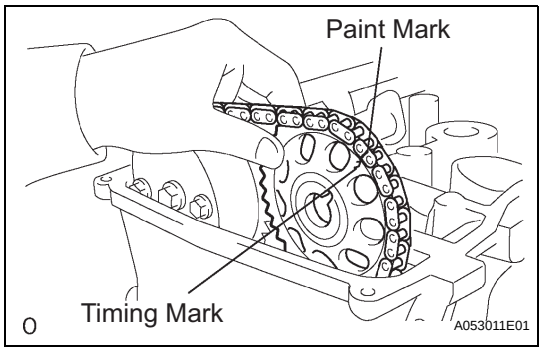
(i) Install the camshaft.

(1) Install the timing chain on the camshaft timing gear, with the paint mark aligned with the timing marks on the camshaft timing gear.



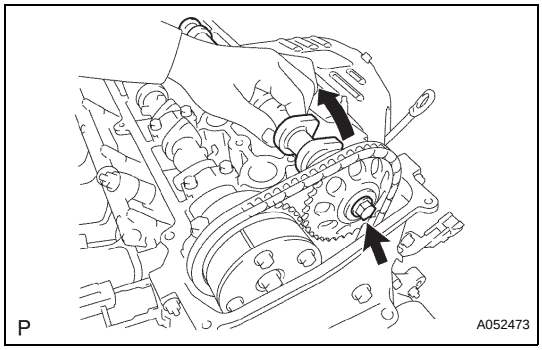
(2) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.

Torque: Bearing cap No.1
30 N*m (306 kgf*cm, 22 ft.*lbf)
Bearing cap No.3
9.0 N*m (92 kgf*cm, 80 in.*lbf)

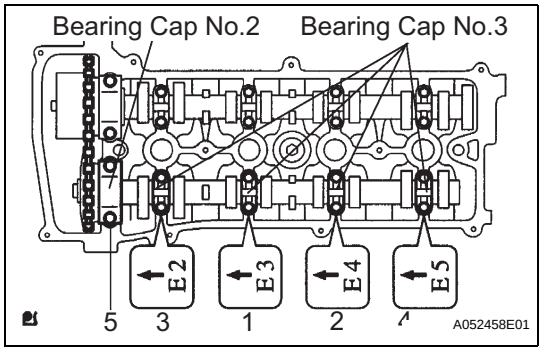


(j) Install the No.2 camshaft.

(1) Put the No.2 camshaft on the cylinder head with the paint mark of the chain aligned with the timing mark on the camshaft timing sprocket.

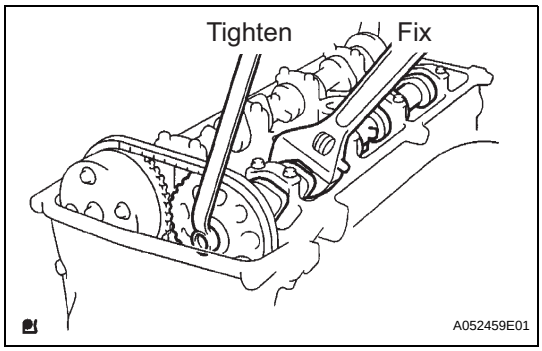


(2) Raise the No.2 camshaft and temporarily tighten the sprocket bolt.



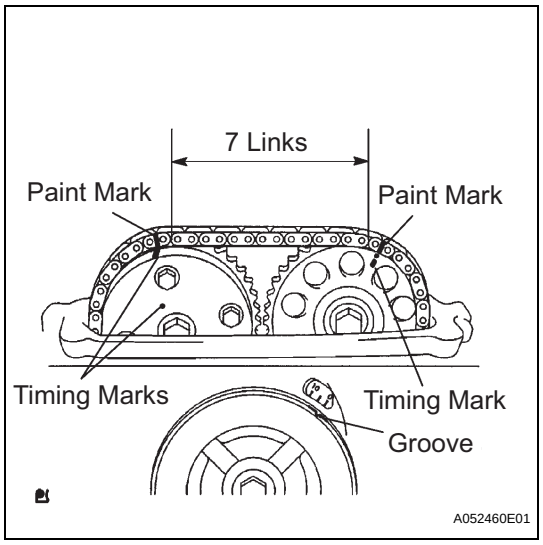
(3) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.

Torque: Bearing cap No.2
30 N*m (306 kgf*cm, 22 ft.*lbf)
Bearing cap No.3
9.0 N*m (92 kgf*cm, 80 in.*lbf)

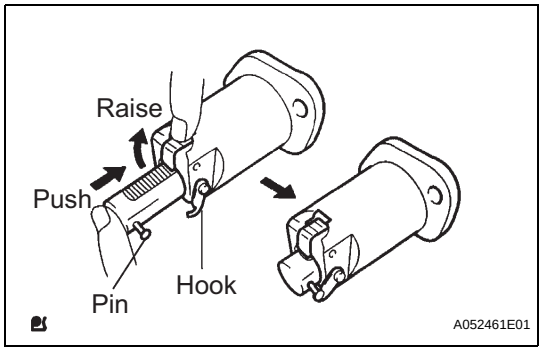


(4) Fix the camshaft with a wrench, then tighten the sprocket bolt.

Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)
NOTICE:
Be careful not to damage the valve lifter.

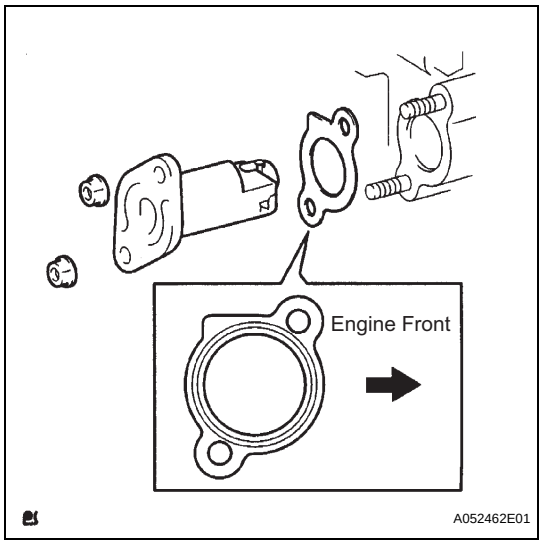


(k) Check that the timing chain paint marks are aligned with the camshaft timing sprocket timing mark and the camshaft timing gear timing mark. Also check the alignment of the pulley groove and chain cover timing mark 0.



(l) Install the chain tensioner.

(1) Raise the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.

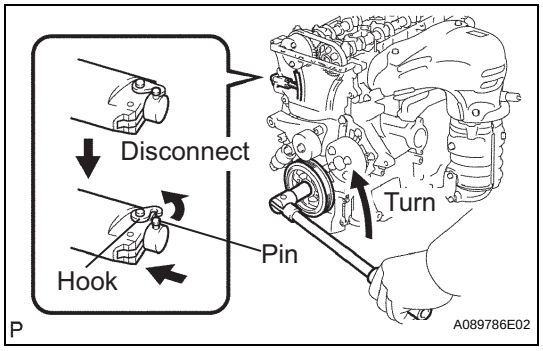


(2) Install a new gasket and the chain tensioner with the 2 nuts.

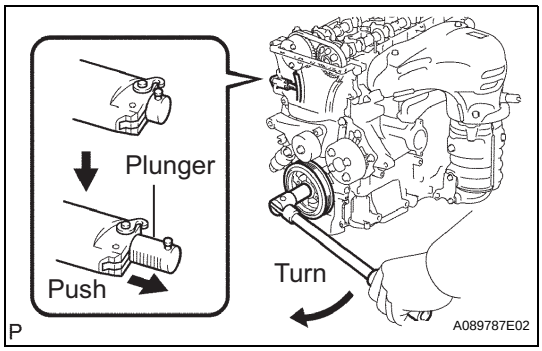
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

NOTICE:

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

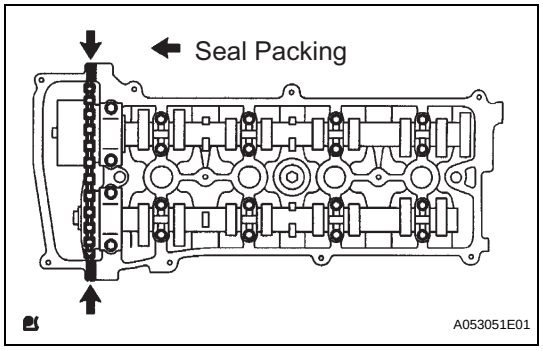


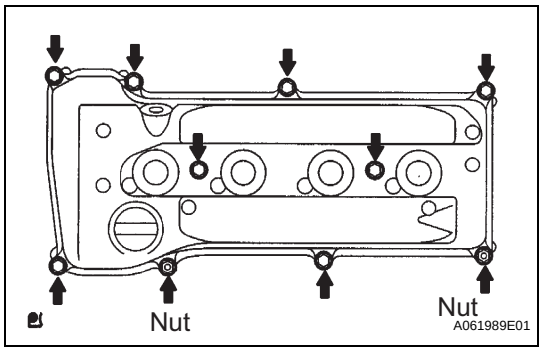
(3) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin from the hook.



(4) Turn the crankshaft clockwise, and check that the chain tensioner slipper is pushed by the plunger.

INSTALLATION





1. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the 2 locations shown in the illustration.

Seal packing:

Part No. 08826-00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 5 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing the cylinder head cover.**

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

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

2. INSTALL SPARK PLUG

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

3. INSTALL FRONT WHEEL RH

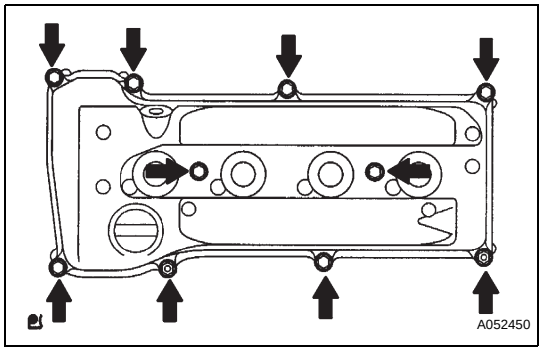
4. INSPECT OIL LEAK

EM

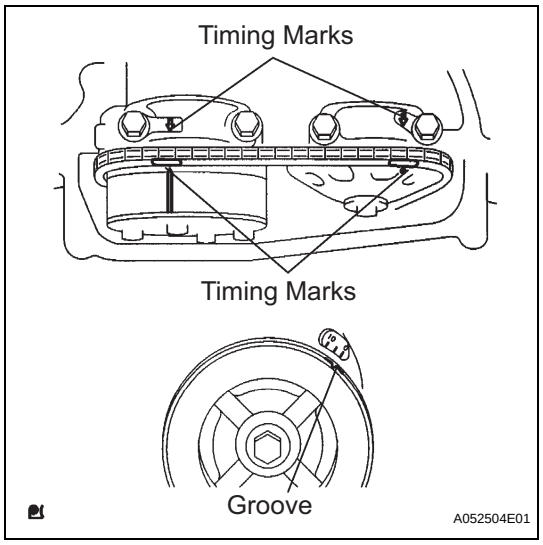
VALVE CLEARANCE

REMOVAL

1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE ENGINE NO.1 COVER SUB-ASSEMBLY**
4. **REMOVE SPARK PLUG**
5. **REMOVE VENTILATION HOSE**
6. **REMOVE VENTILATION HOSE NO.2**
7. **REMOVE ENGINE WIRE**
8. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**
   (a) Remove the bolt and disconnect the engine wire harness clamp.
   (b) Remove the 8 bolts, 2 nuts, cylinder head cover and gasket.



9. **SET NO.1 CYLINDER TO TDC/COMPRESSION**
   (a) Turn the crankshaft pulley, and align its groove with timing mark 0 of the timing chain cover.
   (b) Check that the timing marks of the camshaft timing gear and sprocket are aligned with the timing marks of bearing caps No.1 and No.2, as shown in the illustration.

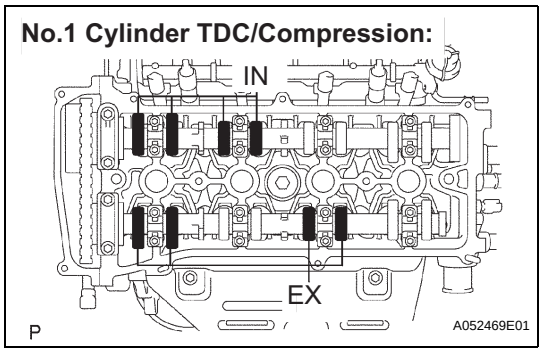


EM

INSPECTION

1. INSPECT VALVE CLEARANCE

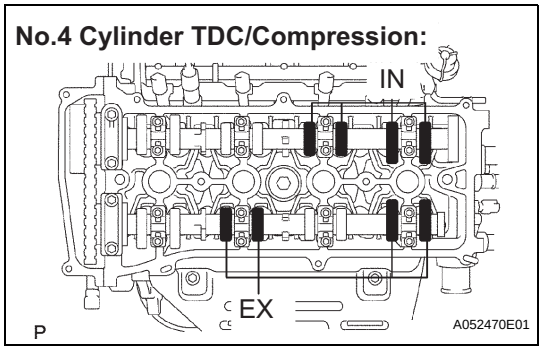
HINT:
Inspect and adjust the valve clearance when the engine is cold.



(a) Check only the valves indicated on the left.
  (1) Using a feeler gauge, measure the clearance between each valve lifter and camshaft.
  (2) Record valve clearance measurements that are out of the specified range. These measurements will be used later to determine the size of the adjustment shim to be installed.
  Valve clearance (Cold)

Item	Specified Condition
Intake	0.19 to 0.29 mm (0.008 to 0.011 in.)
Exhaust	0.30 to 0.40 mm (0.012 to 0.016 in.)

(b) Turn the crankshaft clockwise 1 revolution (360°) and set the No. 4 cylinder to TDC/compression.



(c) Check only the valves indicated on the left.
  (1) Using a feeler gauge, measure the clearance between each valve lifter and camshaft.
  (2) Record valve clearance measurements that are out of the specified range. These measurements will be used later to determine the size of the adjustment shim to be installed.
  Valve clearance (Cold)

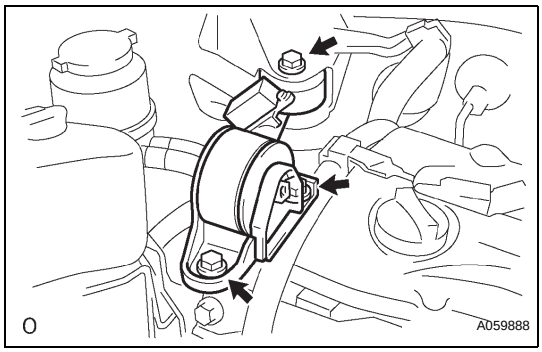
Item	Specified Condition
Intake	0.19 to 0.29 mm (0.008 to 0.011 in.)
Exhaust	0.30 to 0.40 mm (0.012 to 0.016 in.)

EM

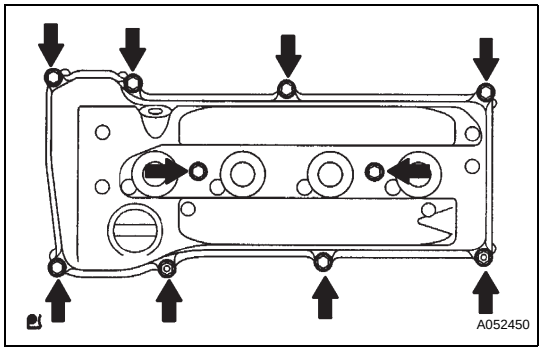
TIMING CHAIN

REMOVAL

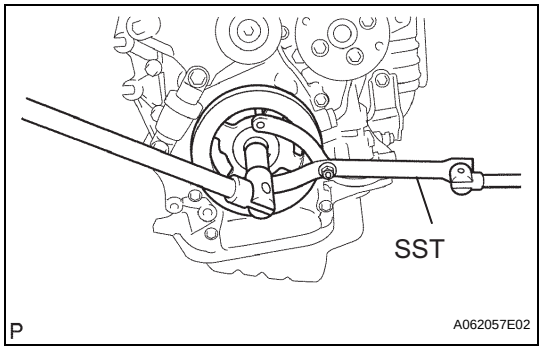
1. **REMOVE HOOD SUB-ASSEMBLY**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FRONT FENDER APRON SEAL RH**
6. **DRAIN ENGINE OIL**
   (a) Install a new gasket and the drain plug after draining engine oil.
   Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
7. **REMOVE FRONT EXHAUST PIPE ASSEMBLY**
8. **REMOVE ENGINE MOVING CONTROL ROD W/ BRACKET**
   (a) Remove the 3 bolts and control rod.



9. **REMOVE ENGINE MOUNTING STAY NO.2 RH**
10. **REMOVE ENGINE MOUNTING BRACKET NO.2 RH**
11. **REMOVE FAN AND GENERATOR V BELT (See page EM-5)**
12. **REMOVE NO.1 ENGINE COVER SUB-ASSEMBLY**
13. **REMOVE ENGINE WIRE**
14. **REMOVE GENERATOR ASSEMBLY**
15. **REMOVE VANE PUMP ASSEMBLY (See page PS-8)**
16. **REMOVE IGNITION COIL ASSEMBLY**
17. **DISCONNECT VENTILATION HOSE**
18. **DISCONNECT VENTILATION HOSE NO.2**
19. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**
    (a) Remove the bolt and disconnect the engine wire harness clamp.
    (b) Remove the 8 bolts and 2 nuts, and disconnect the cylinder head cover.

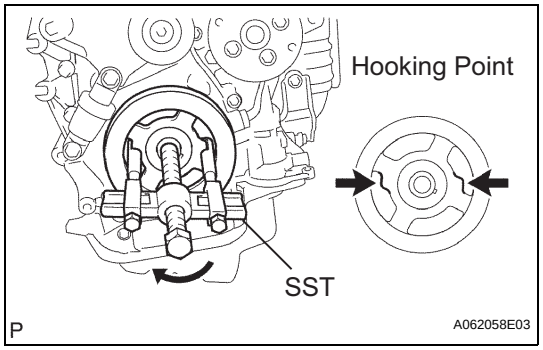


20. **SET NO.1 CYLINDER TO TDC/COMPRESSION (See page EM-7)**



21. REMOVE CRANKSHAFT PULLEY

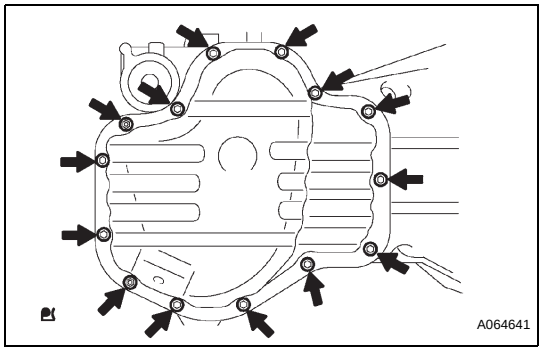
(a) Using SST, fix the pulley and loosen the bolt.
SST 09960-10010 (09962-01000, 09963-01000)



(b) Using SST, remove the bolt and pulley.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04041, 09957-04010, 91111-51014)

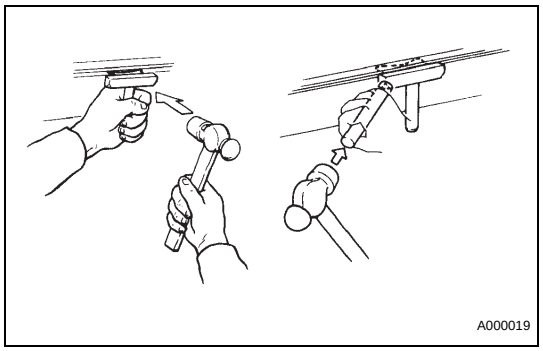
22. REMOVE CRANKSHAFT POSITION SENSOR

EM

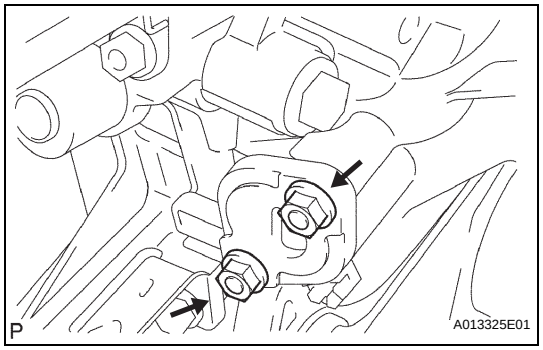


23. REMOVE OIL PAN SUB-ASSEMBLY

(a) Remove the 12 bolts and 2 nuts.

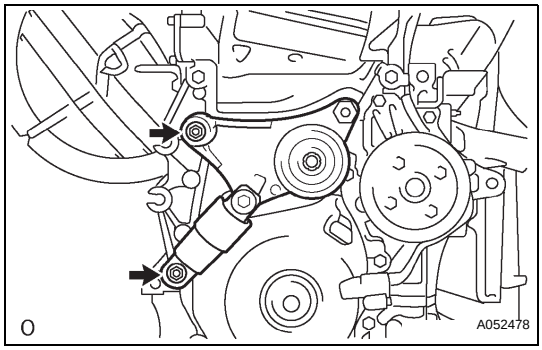


(b) Insert the blade of SST between the crankcase and oil pan. Cut through the sealer and remove the oil pan.
SST 09032-00100
NOTICE:
Be careful not to damage the contact surface of the cylinder block and oil pan.



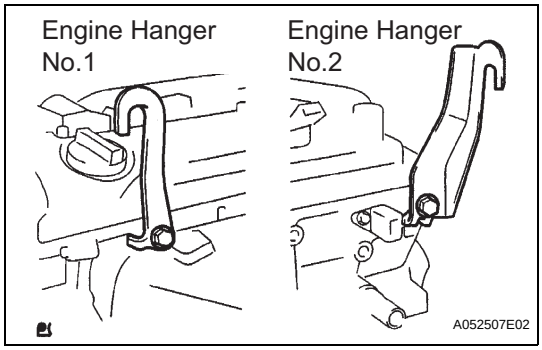
24. REMOVE NO.1 CHAIN TENSIONER ASSEMBLY

(a) Remove the 2 nuts, tensioner and gasket.
NOTICE:
Do not revolve the crankshaft without the tensioner.



25. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY

(a) Remove the bolt, nut and tensioner.

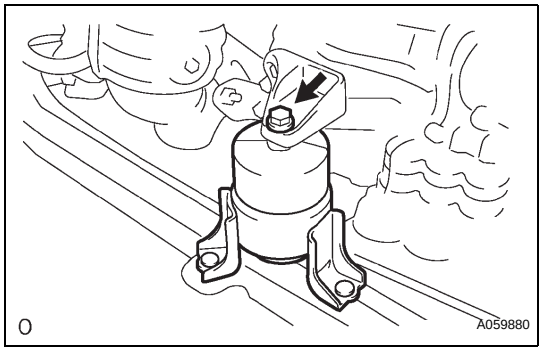


26. INSTALL ENGINE HANGERS

(a) Install the engine hanger No. 1 and No. 2 with the bolts as shown in the illustration.
Parts No.:

Engine hanger No. 1	12281-28010
Engine hanger No. 2	12282-28010
Bolt	91512-61020

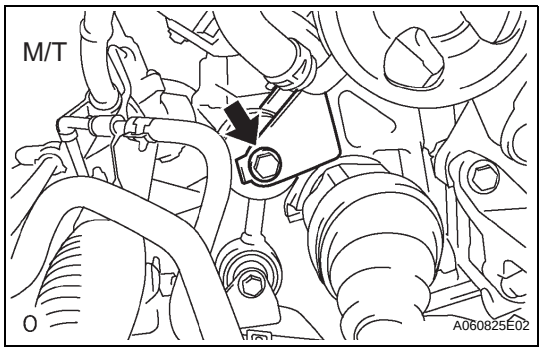
Torque: 38 N*m (387 kgf*cm, 28 ft.*lbf)



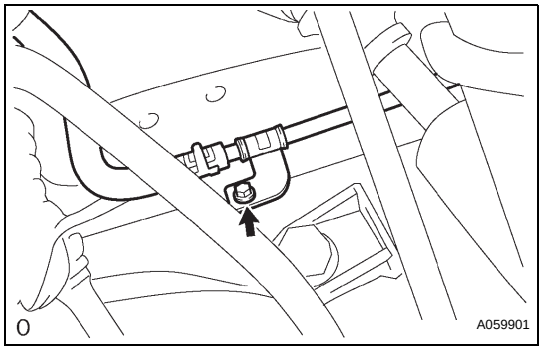
27. REMOVE ENGINE MOUNTING INSULATOR

(a) Attach the engine chain hoist to the engine hangers.
CAUTION:
Do not attempt to hang the engine by hooking the chain to any other part.

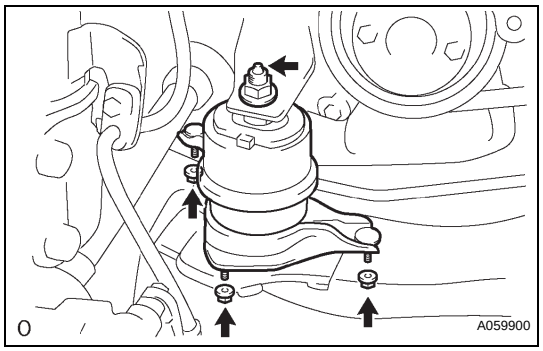
(b) Remove the bolt and disconnect the engine mounting insulator FR.



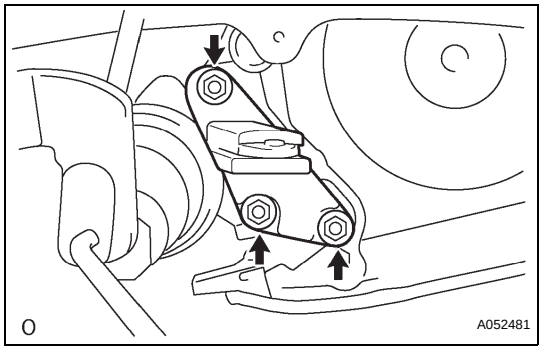
(c) M/T:
Remove the bolt and disconnect the engine lateral control rod.



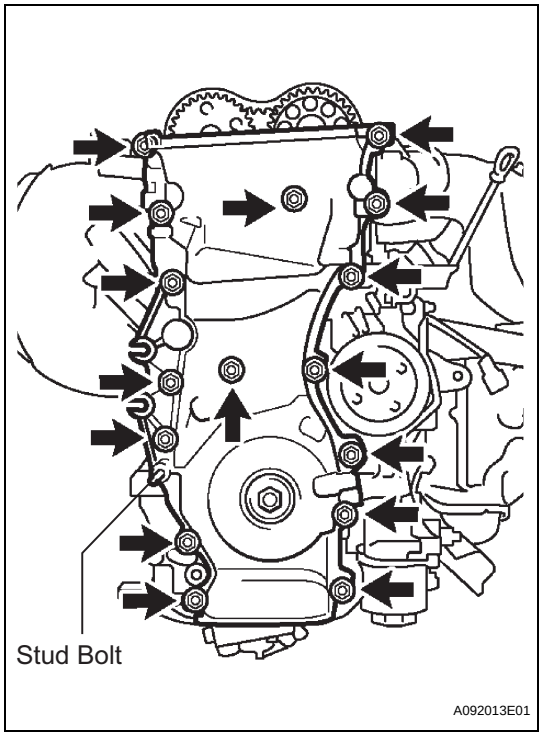
(d) Remove the bolt and disconnect the steering gear return hose clamp from the frame.



(e) Remove the 4 nuts from the engine mounting insulator RH.
(f) Raise the engine and remove the engine mounting insulator RH.



28. REMOVE ENGINE MOUNTING BRACKET RH
(a) Remove the 3 bolts and engine mounting bracket.



29. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY
(a) Remove the stud bolt for the drive belt tensioner from the cylinder block.
(b) Remove the 14 bolts and 2 nuts.
(c) Pry out the timing chain cover with a screwdriver.
NOTICE:
Be careful not to damage the contact surfaces of the timing chain cover, cylinder block and cylinder head.

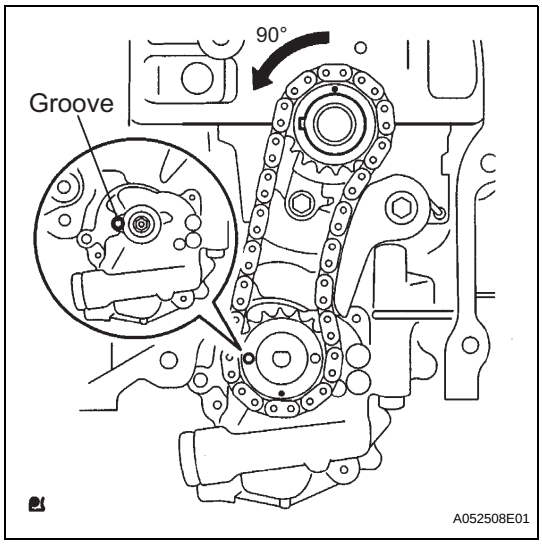
30. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

31. REMOVE CHAIN TENSIONER SLIPPER

32. REMOVE CHAIN VIBRATION DAMPER NO.1

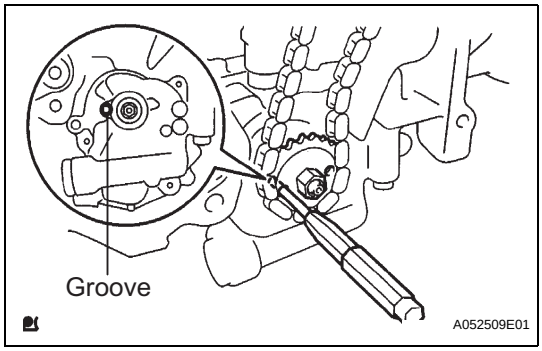
33. REMOVE CHAIN SUB-ASSEMBLY

34. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

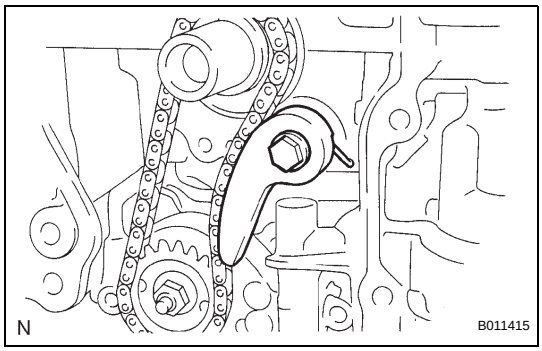


35. REMOVE NO.2 CHAIN SUB-ASSEMBLY

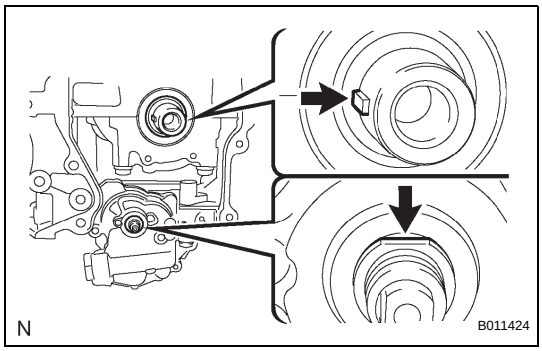
(a) Turn the crankshaft counterclockwise by 90°, and align an adjusting hole of the oil pump driven sprocket with the groove of the oil pump.



(b) Put a bar (ϕ 4 mm (0.16 in.)) in the adjusting hole of the oil pump driven sprocket to temporarily lock the sprocket in position. Remove the nut.



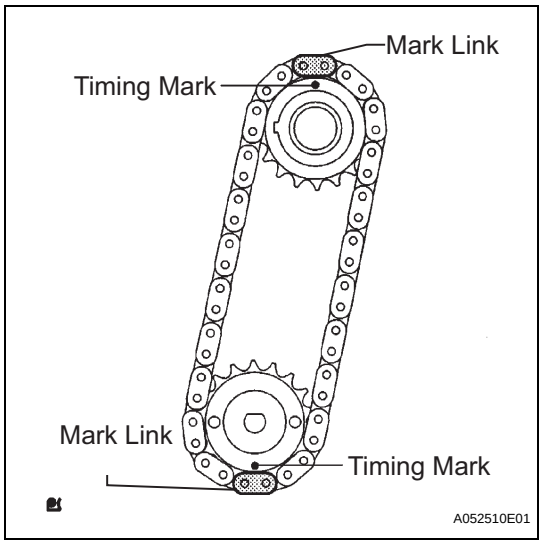
(c) Remove the bolt, chain tensioner plate and spring.
(d) Remove the chain tensioner, oil pump driven sprocket and chain.



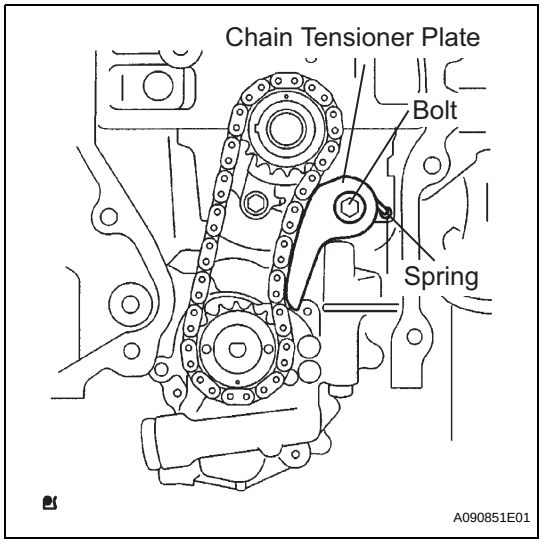
INSTALLATION

1. INSTALL NO.2 CHAIN SUB-ASSEMBLY

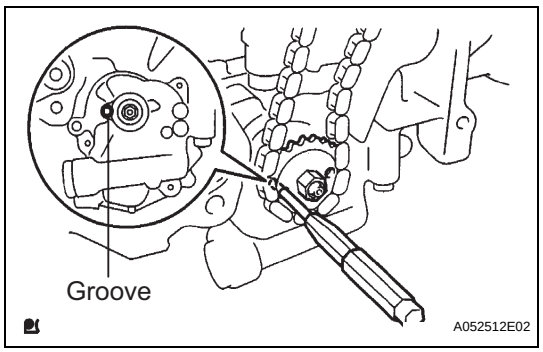
(a) Set the crankshaft key into the left horizontal position.
(b) Turn the cutout of the oil pump drive shaft to the top.



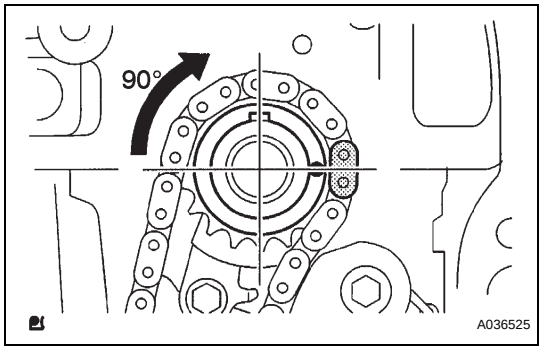
(c) Align the mark links (yellow colored links) with the timing marks of the sprocket as shown in the illustration.
(d) Insert the sprockets with chain to the crankshaft and oil pump shaft.
(e) Temporarily tighten the oil pump driven sprocket with the nut.



(f) Insert the damper spring into the adjusting hole, and install the chain tensioner plate with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

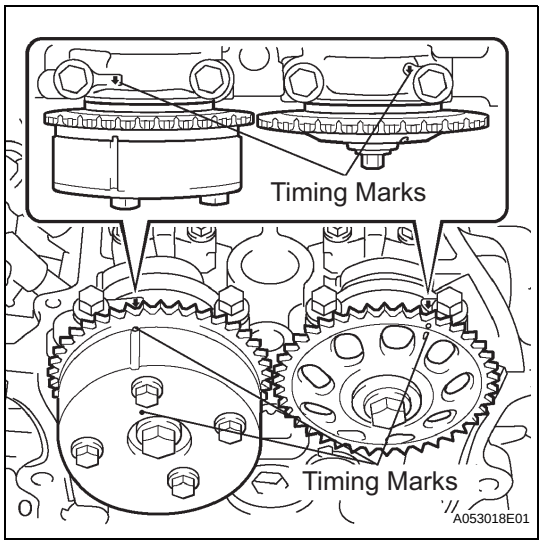


(g) Align the adjusting hole of the oil pump driven sprocket with the groove of the oil pump.
(h) Put a bar (ϕ 4 mm (0.16 in.)) in the adjusting hole of the oil pump driven sprocket to temporarily lock the sprocket in position. Install the nut.
Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)



(i) Rotate the crankshaft counterclockwise by 90°, and align the crankshaft key to the top.

2. INSTALL CHAIN VIBRATION DAMPER NO.1
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

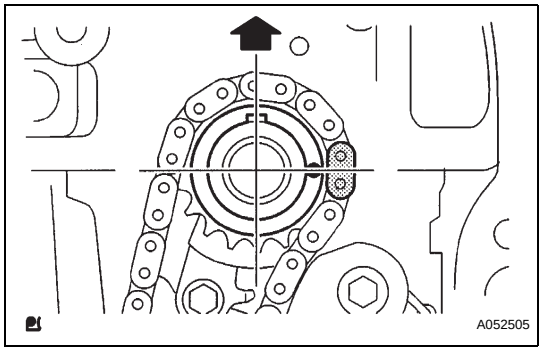


3. INSTALL CHAIN SUB-ASSEMBLY

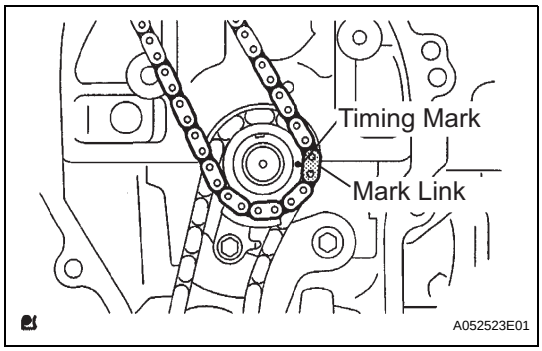
(a) Set the No.1 cylinder to TDC/compression.

(1) Align the timing marks of the camshaft timing gear/sprocket and bearing caps (No. 1 and No. 2).

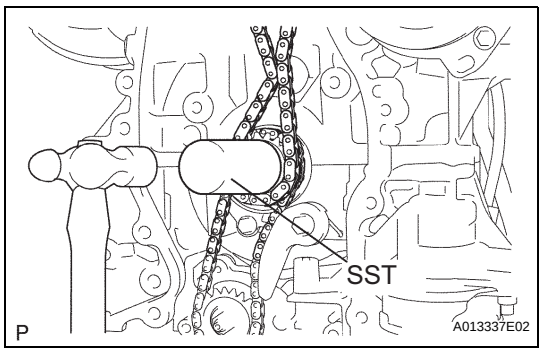
EM



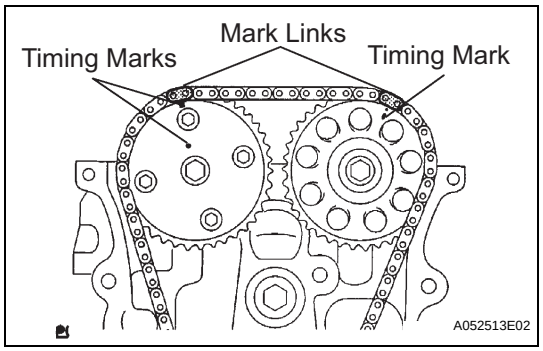
(2) Using the crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.



(b) Align the mark link (gold or orange colored link) with the timing mark of the crankshaft timing sprocket.

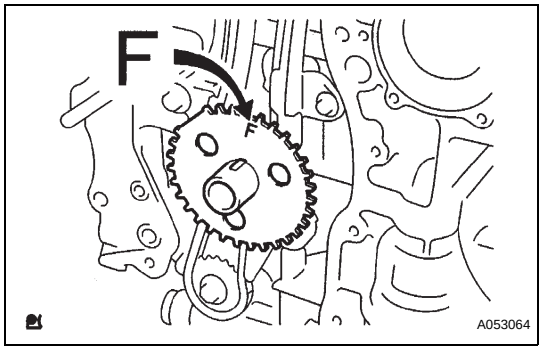


(c) Using SST, tap in the sprocket.
SST 09309-37010



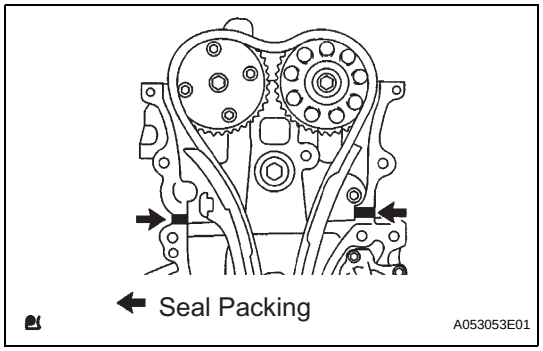
(d) Align the mark links (gold or yellow colored links) with the timing marks of the camshaft timing gear and camshaft timing sprocket. Install the chain.

4. INSTALL CHAIN TENSIONER SLIPPER
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)



5. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the sensor plate with the F mark facing forward.



6. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.

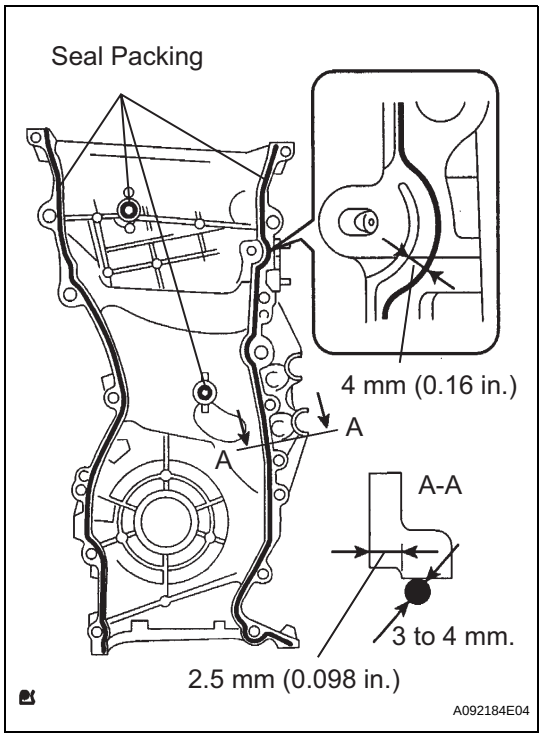
(b) Apply seal packing (diameter: 2 mm (0.08 in.)) as shown in the illustration.

Seal packing:
Part No. 08826-00080 or equivalent

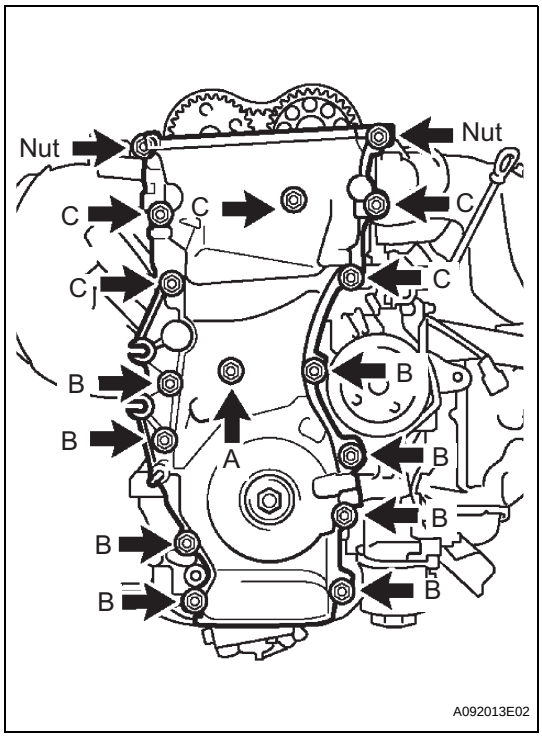
NOTICE:

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

EM

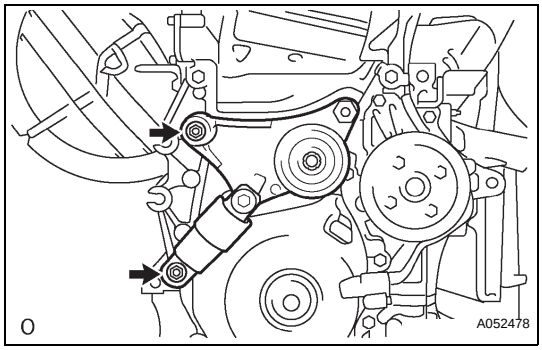


(c) Apply seal packing in a continuous bead (diameter: 3 to 4 mm (0.12 to 0.16 in.)) as shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent



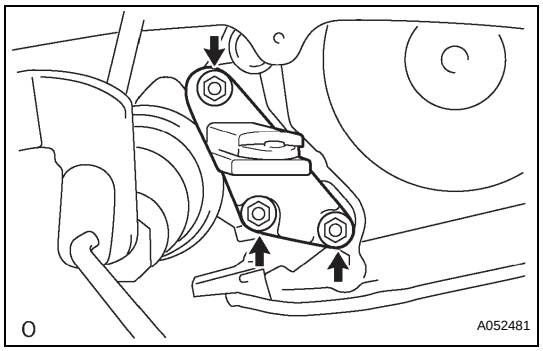
(d) Install the timing chain cover with the 14 bolts and 2 nuts.
Torque: Bolt A
9.0 N*m (92 kgf*cm, 80 in.*lbf)
Bolt B
21 N*m (214 kgf*cm, 15 ft.*lbf)
Bolt C
43 N*m (438 kgf*cm, 32 ft.*lbf)
Nut
9.0 N*m (92 kgf*cm, 80 in.*lbf)

(e) Install the stud bolt to the drive belt tensioner.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



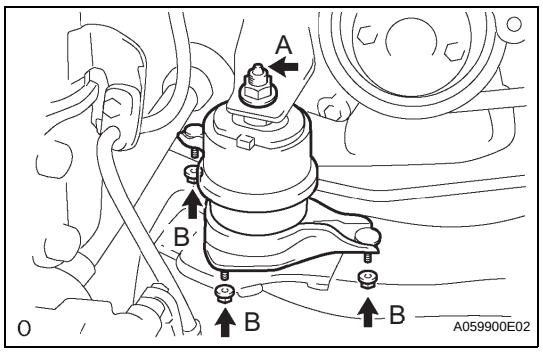
7. INSTALL V-RIBBED BELT TENSIONER ASSEMBLY

(a) Install the tensioner with the bolt and nut.
Torque: 59.5 N*m (607 kgf*cm, 44 ft.*lbf)



8. INSTALL ENGINE MOUNTING BRACKET RH

(a) Install the engine mounting bracket with the 3 bolts.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

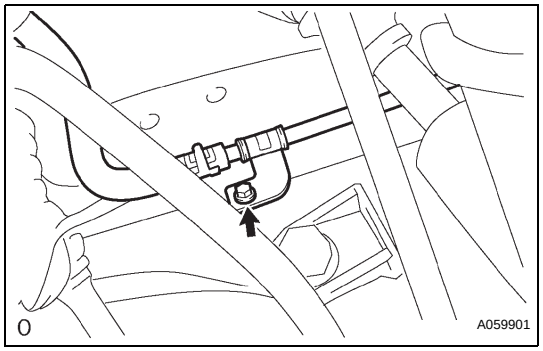


9. INSTALL ENGINE MOUNTING INSULATOR

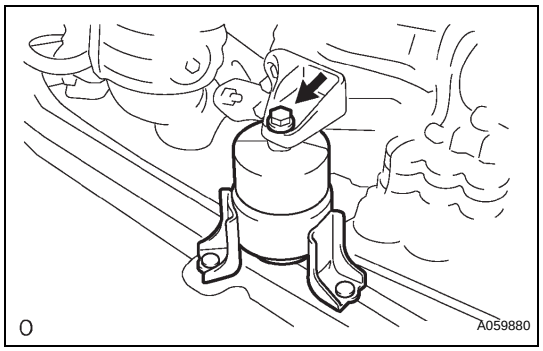
(a) Raise the engine and install the engine mounting insulator RH.

(b) Install the engine mounting insulator RH with the 4 nuts.
Torque: Nut A
95 N*m (969 kgf*cm, 70 ft.*lbf)
Nut B
87 N*m (888 kgf*cm, 64 ft.*lbf)

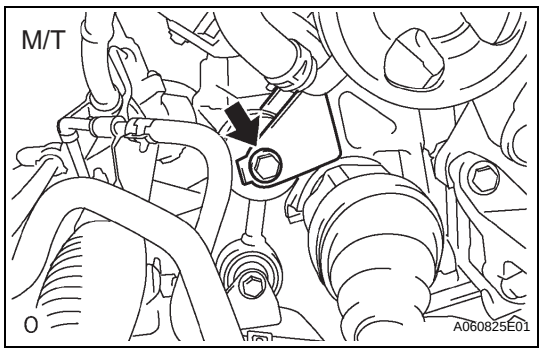
EM



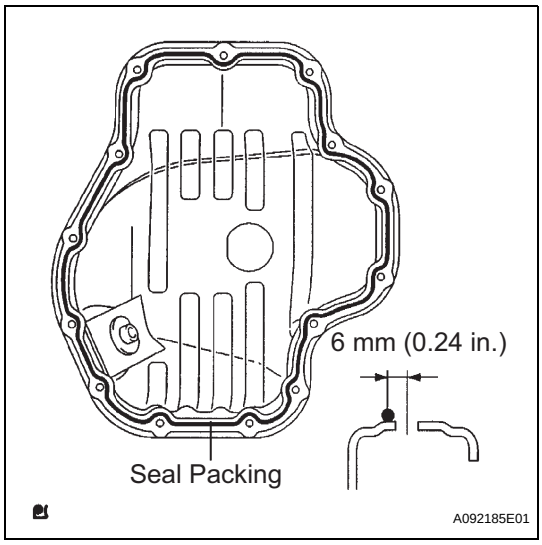
(c) Install the steering gear return hose clamp to the frame with the bolt.
Torque: 8.0 N*m (80 kgf*cm, 69 in.*lbf)



(d) Install the engine mounting insulator FR with the bolt.
Torque: 87 N*m (888 kgf*cm, 64 ft.*lbf)



(e) M/T:
Install the engine lateral control rod with the bolt.
Torque: 89 N*m (910 kgf*cm, 66 ft.*lbf)



10. INSTALL OIL PAN SUB-ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the cylinder block and oil pan.

(b) Apply seal packing in a continuous bead (diameter: 3 to 4 mm (0.12 to 0.16 in.)) as shown in the illustration, and install the oil pan.

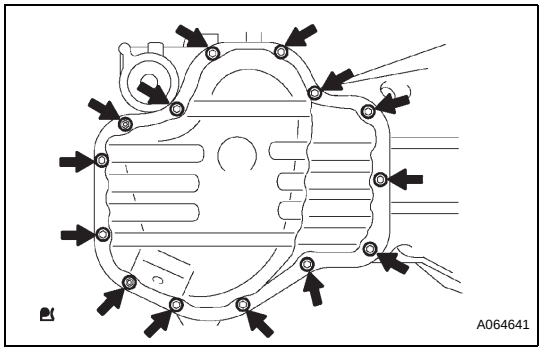
Seal packing:

Part No. 08826-00080 or equivalent

NOTICE:

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

EM



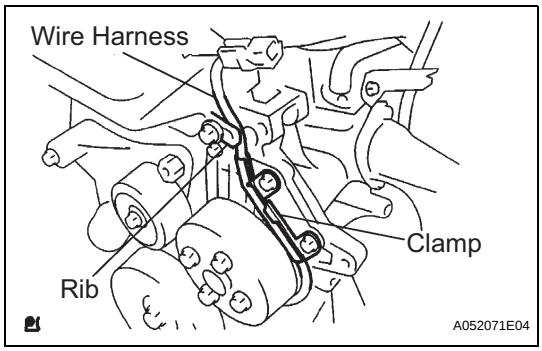
(c) Install the oil pan with the 12 bolts and 2 nuts.

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

11. INSTALL NO.1 CHAIN TENSIONER ASSEMBLY

HINT:

See page

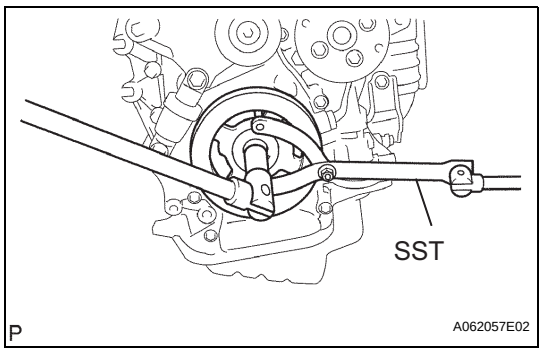


12. INSTALL CRANKSHAFT POSITION SENSOR

(a) Install the sensor with the bolt.

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

(b) Confirm that the wire harness of the sensor is placed as shown in the illustration.



13. INSTALL CRANKSHAFT PULLEY

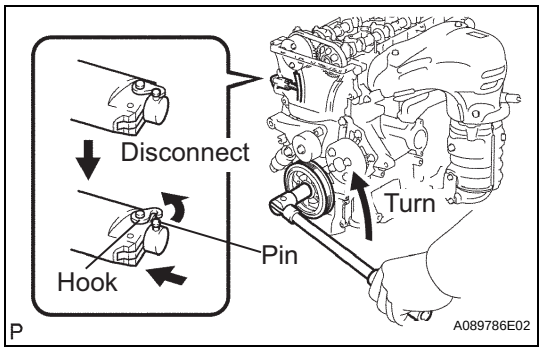
(a) Install the crankshaft pulley.

(1) Align the pulley set key with the key groove of the pulley, and side on the pulley.

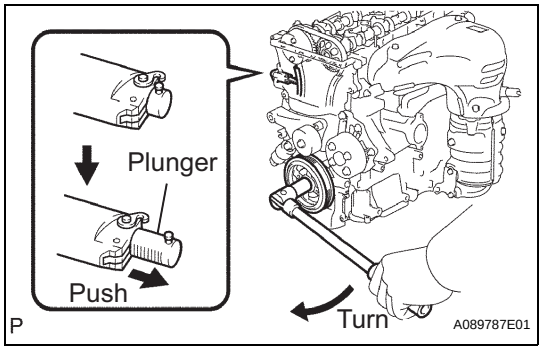
(2) Using SST, install the pulley bolt.

SST 09960-10010 (09962-01000, 09963-01000)

Torque: 170 N*m (1,733 kgf*cm, 125 ft.*lbf)

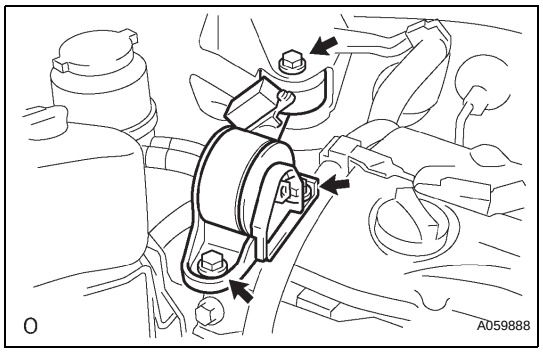


(b) Turn the crankshaft counterclockwise and disconnect the plunger knock pin from the hook.



(c) Turn the crankshaft clockwise and check that the slipper is pushed by the plunger.

14. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (See page EM-17)**
15. **INSTALL IGNITION COIL ASSEMBLY**
    Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
16. **INSTALL VANE PUMP ASSEMBLY (See page PS-14)**
17. **INSTALL GENERATOR ASSEMBLY (See page CH-14)**
18. **INSTALL ENGINE WIRE**
19. **INSTALL FAN AND GENERATOR V BELT (See page EM-5)**
20. **INSTALL ENGINE MOUNTING BRACKET NO.2 RH**
    Torque: 52 N*m (531 kgf*cm, 38 ft.*lbf)
21. **INSTALL ENGINE MOUNTING STAY NO.2 RH**
    Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



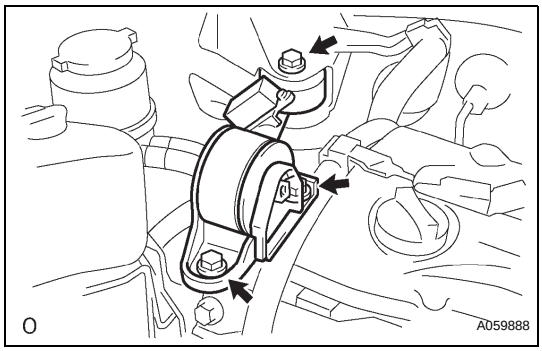
22. **INSTALL ENGINE MOVING CONTROL ROD W/ BRACKET**
    (a) Install the engine mounting control rod with the 3 bolts.
    Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)
23. **INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-4)**
24. **INSTALL FRONT WHEEL RH**
25. **INSTALL HOOD SUB-ASSEMBLY**
    Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)
26. **ADD ENGINE OIL**
27. **CHECK ENGINE OIL LEAKS**

EM

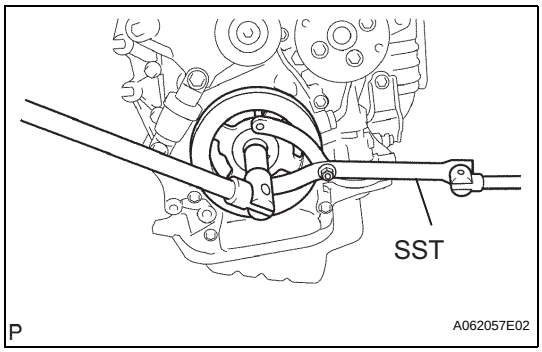
TIMING GEAR

REMOVAL

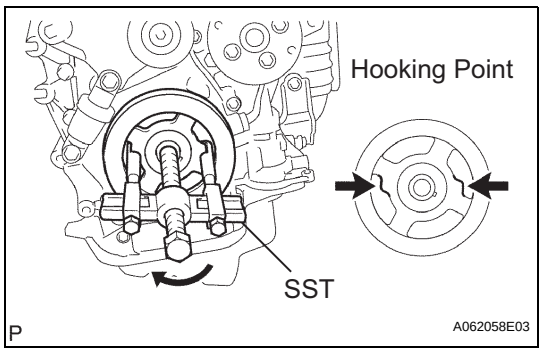
1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE ENGINE COVER SUB-ASSEMBLY NO.1**
4. **REMOVE ENGINE MOVING CONTROL ROD W/ BRACKET**
   (a) Remove the 3 bolts and control rod.
5. **REMOVE ENGINE MOUNTING STAY NO.2 RH**
6. **REMOVE ENGINE MOUNTING BRACKET NO.2 RH**
7. **REMOVE FAN AND GENERATOR V BELT (See page EM-5)**



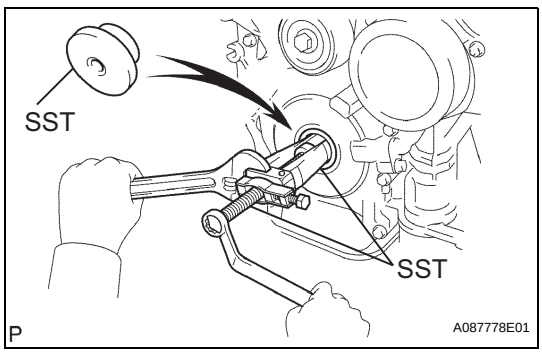
8. **REMOVE CRANKSHAFT PULLEY**
   (a) Using SST, loosen the pulley bolt.
   SST 09960-10010 (09962-01000, 09963-01000)



   (b) Using SST, remove the pulley bolt and pulley.
   SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09955-04041, 09957-04010, 09954-04010, 91111-51014)



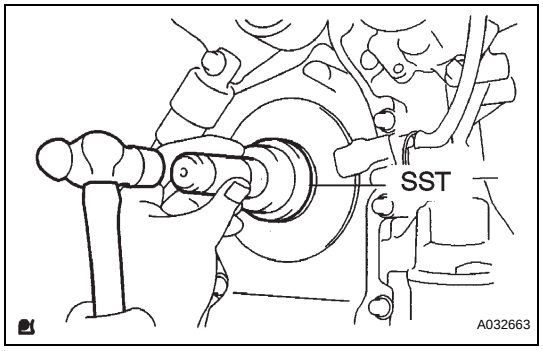
9. **REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL**
   (a) Using SST, remove the oil seal.
   SST 09308-10010, 09950-60010 (09951-00200)



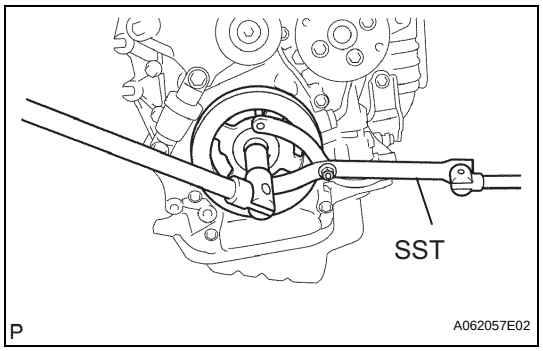
INSTALLATION

1. **INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL**
   (a) Apply MP grease to a new oil seal lip.
   NOTICE:
   Keep the lip free from foreign matter.

   (b) 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
   NOTICE:
   Wipe off extra grease from the crankshaft.



2. **INSTALL CRANKSHAFT PULLEY**
   (a) Align the pulley set key with the key groove of the pulley.



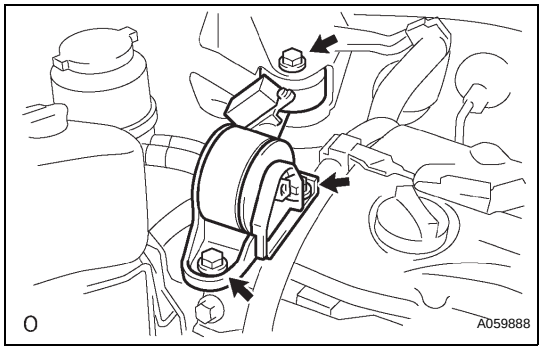
   (b) Using SST, install the pulley bolt.
   SST 09960-10010 (09962-01000, 09963-01000)
   Torque: 170 N*m (1,733 kgf*cm, 125 ft.*lbf)

3. **INSTALL FAN AND GENERATOR V BELT (See page EM-5)**

4. **INSTALL ENGINE MOUNTING BRACKET NO.2 RH**
   Torque: 52 N*m (531 kgf*cm, 38 ft.*lbf)

5. **INSTALL ENGINE MOUNTING STAY NO.2 RH**
   Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

6. **INSTALL ENGINE MOVING CONTROL ROD W/ BRACKET**
   (a) Install the control rod with the 3 bolts.
   Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)



7. **INSTALL FRONT WHEEL RH**

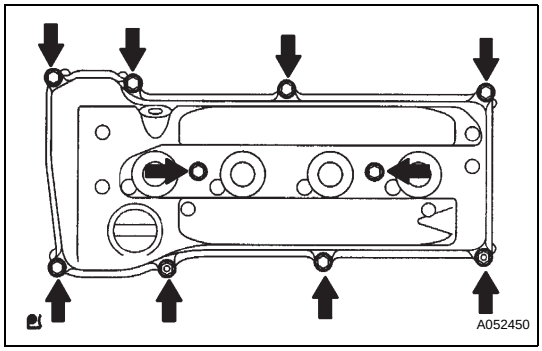
8. **CHECK FOR ENGINE OIL LEAKS**

EM

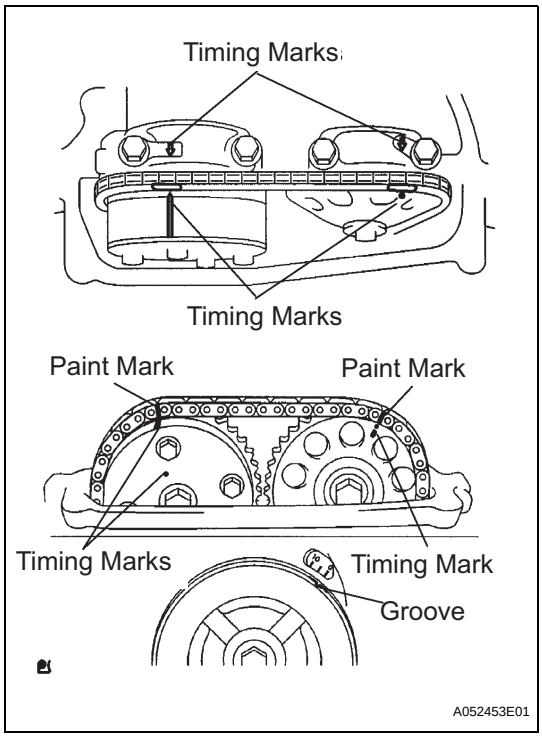
CAMSHAFT

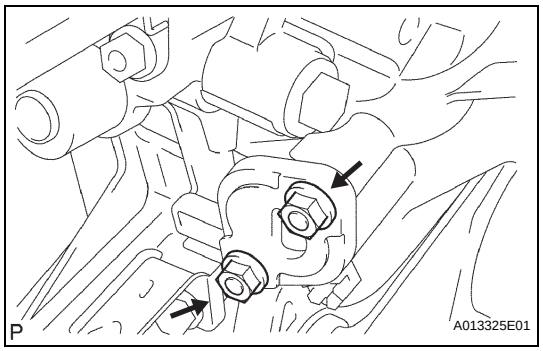
REMOVAL

1. **REMOVE FRONT WHEEL RH**
2. **REMOVE FRONT FENDER APRON SEAL RH**
3. **REMOVE ENGINE COVER SUB-ASSEMBLY NO.1**
4. **REMOVE SPARK PLUG**
5. **REMOVE VENTILATION HOSE**
6. **REMOVE VENTILATION HOSE NO.2**
7. **REMOVE ENGINE WIRE**
8. **REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**
   (a) Remove the bolt and disconnect the engine wire harness clamp.
   (b) Remove the bolts, 2 nuts, cylinder head cover and gasket.



9. **SET NO.1 CYLINDER TO TDC/COMPRESSION**
   (a) Turn the crankshaft pulley, and align its groove with the timing mark 0 of the timing chain cover.
   (b) Check that the timing marks of the camshaft timing gear and camshaft timing sprocket are aligned with the timing marks of the bearing caps as shown in the illustration.
   (c) Place paint marks on the timing chain.

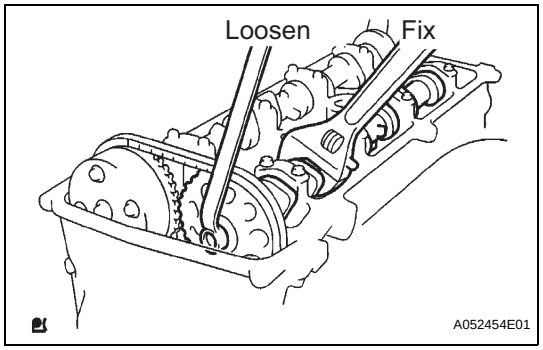




10. REMOVE NO.1 CHAIN TENSIONER ASSEMBLY

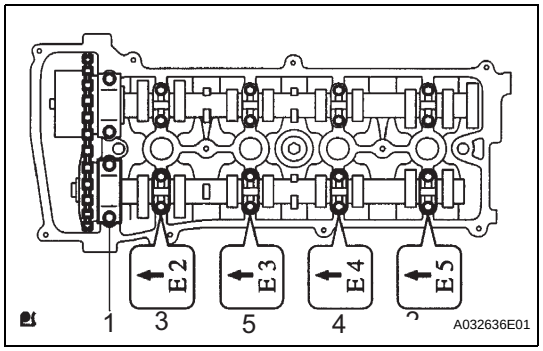
(a) Remove the 2 nuts, tensioner and gasket.

NOTICE:
Do not revolve the crankshaft without the tensioner.

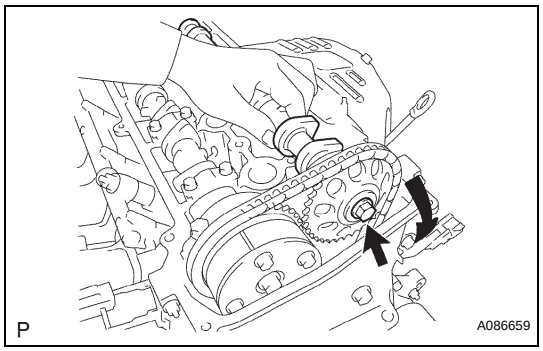


11. REMOVE NO.2 CAMSHAFT

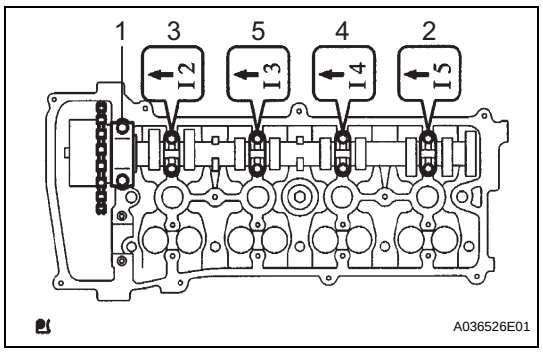
(a) Fix the camshaft with a wrench, and then loosen the bolt.



(b) Loosen and remove the bearing cap bolts on No. 2 camshaft in the sequence shown in the illustration in several passes, and remove the 5 bearing caps.

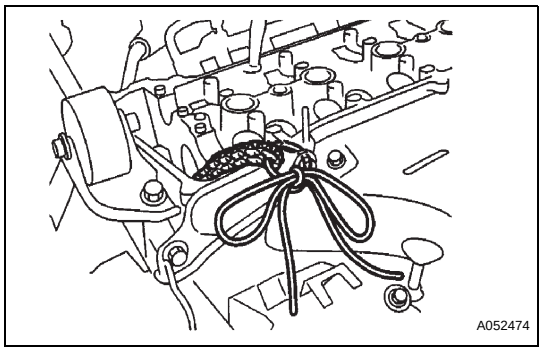


(c) Raise the No. 2 camshaft and remove it. Then remove the sprocket bolt.
(d) Disconnect the camshaft timing sprocket (with the timing chain) from the No. 2 camshaft.
(e) Remove the camshaft timing sprocket from the timing chain.

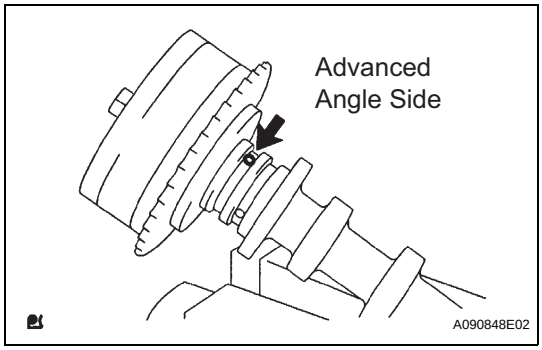


12. REMOVE CAMSHAFT

(a) Loosen the bearing cap bolts on camshaft in the sequence shown in the illustration in several passes, and remove the caps.
(b) Remove the camshaft.



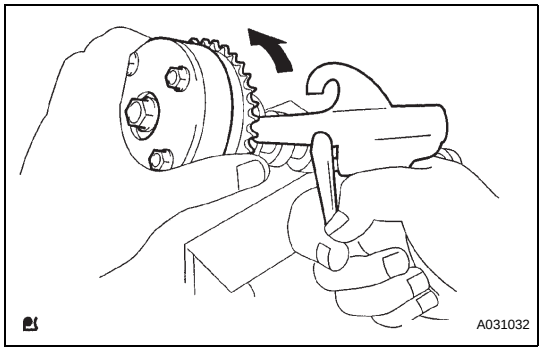
(c) Tie the timing chain with a string.
NOTICE:
Do not drop anything inside the timing chain cover.



13. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

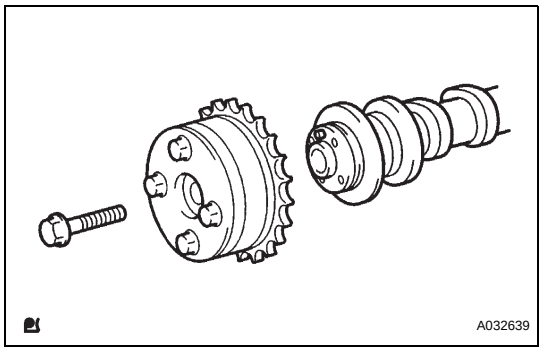
(a) Fix the No. 1 camshaft with a vise, and make sure that the camshaft timing gear does not rotate.

(b) Cover all the paths with vinyl tape except the advanced side path shown in the illustration.

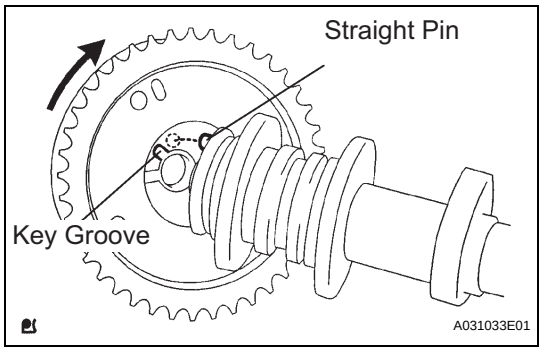


(c) Using an air gun, apply about 150 kPa (1.5 kgf/cm, 21 psi) of air pressure to the port on the advanced angle side.
CAUTION:
Some oil spraying will occur. Contain the spray with a shop rag.
HINT:
This operation releases the lock pin for the extreme retarded angle lock.

(d) Under the condition above, check that the camshaft timing gear can be turned by hand to the advanced angle side (counterclockwise), the direction of the arrow in the illustration.
Standard:
Can be turned
HINT:
The camshaft timing gear will turn to the advanced angle side without applying force by hand depending on the force of the air pressure applied. Also, if applying pressure to the oil path is difficult as a result of air leakage from the port, the lock pin may be difficult to release.



(e) Remove the fringe bolt from the camshaft timing gear.
NOTICE:
- **Be sure not to remove the other 4 bolts.**
- **If planning to reuse the camshaft timing gear assembly, release the straight pin lock first, and then install the gear.**



INSTALLATION

1. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

(a) Put the camshaft timing gear against the camshaft .

(b) Turn the camshaft timing gear (in the direction shown in the illustration) while pushing it lightly against the camshaft. Push further at the position where the pin gets into the groove.

NOTICE:

Be sure not to turn the camshaft timing gear to the retarded angle side (to the right direction).

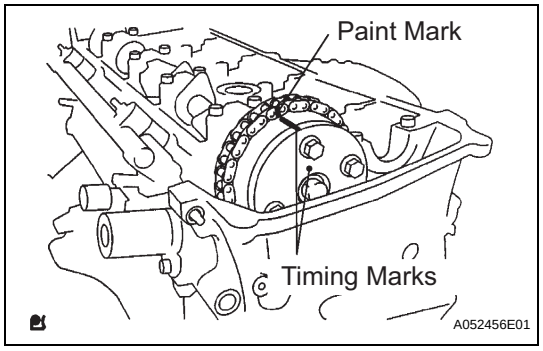
(c) Check that there is no clearance between the gear's fringe and the camshaft.

(d) Tighten the fringe bolt with the camshaft timing gear fixed.

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

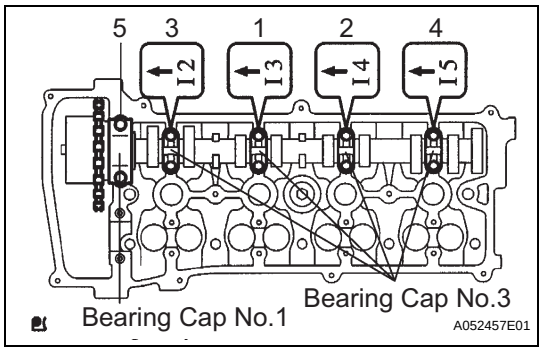
(e) Check that the camshaft timing gear can move to the retarded angle side (to the right direction) and is locked at the extreme retarded angle.

EM



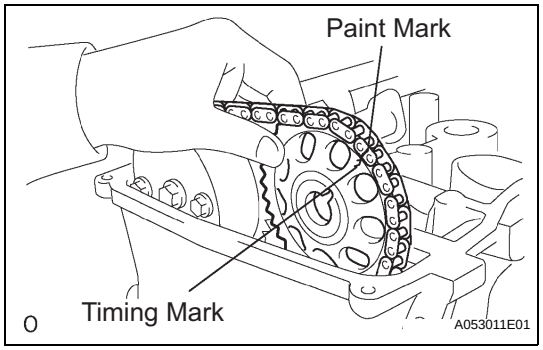
2. INSTALL CAMSHAFT

(a) Install the timing chain on the camshaft timing gear, with the painted mark of the link aligned with the timing marks of the camshaft timing gear.



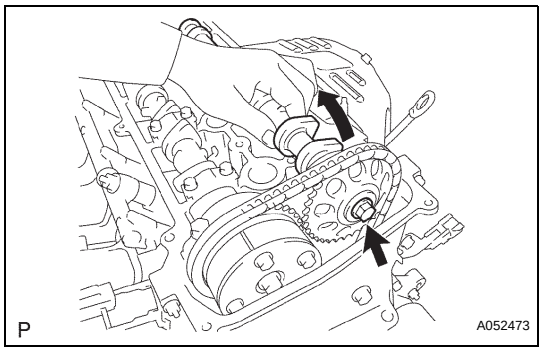
(b) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.

Torque: Bearing cap No.1
30 N*m (301 kgf*cm, 22 ft.*lbf)
Bearing cap No.3
9.0 N*m (92 kgf*cm, 80 in.*lbf)

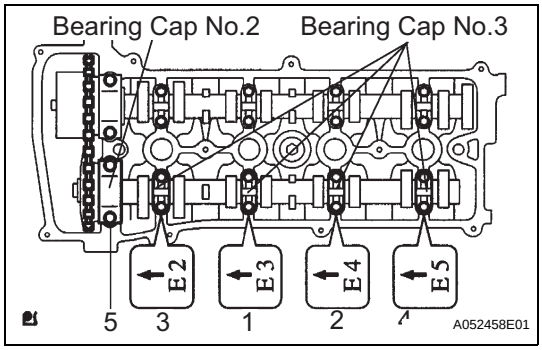


3. INSTALL NO.2 CAMSHAFT

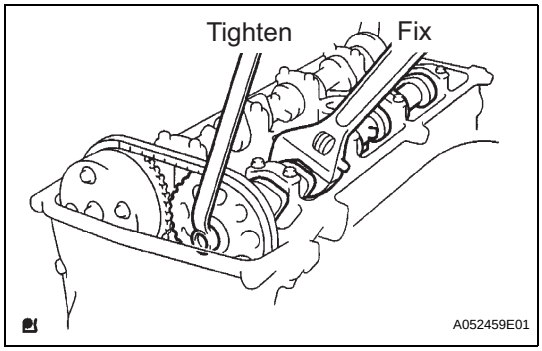
(a) Put the camshaft on the cylinder head with the painted mark of the link of chain aligned with the timing mark of the camshaft timing sprocket.



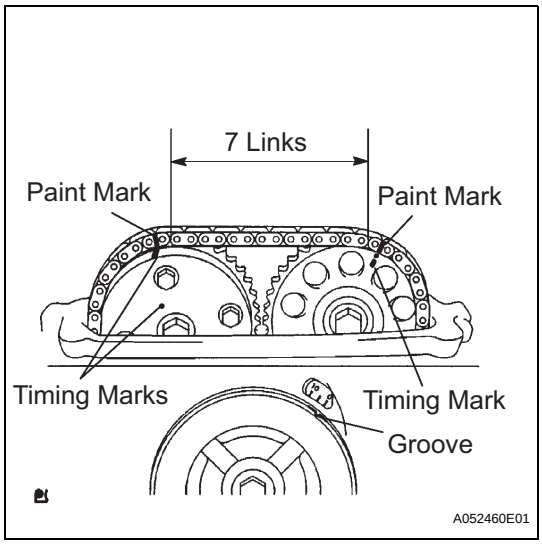
(b) Raise the camshaft and temporarily tighten the sprocket bolt.



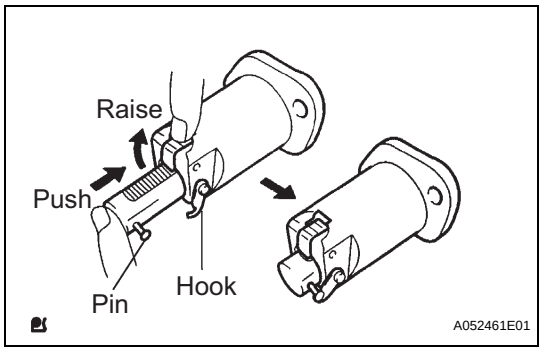
(c) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.
Torque: Bearing cap No.2
30 N*m (301 kgf*cm, 22 ft.*lbf)
Bearing cap No.3
9.0 N*m (92 kgf*cm, 80 in.*lbf)



(d) Fix the camshaft with a wrench, and then tighten the sprocket bolt.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)
NOTICE:
Be careful not to damage the valve lifter.

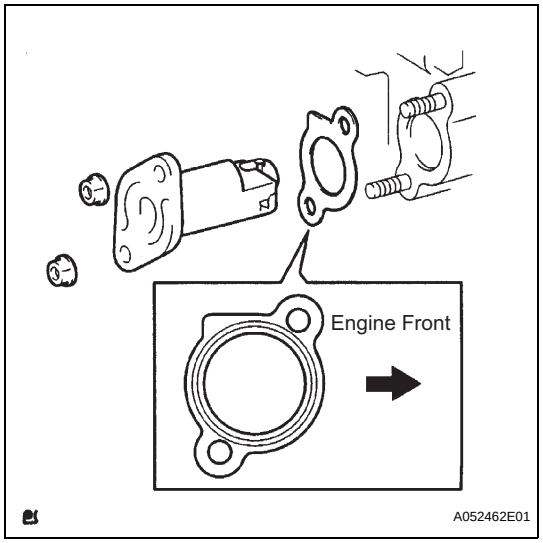


(e) As shown in the illustration, check the paint marks of the timing chain, camshaft timing gear and camshaft timing sprocket and the alignment of the pulley groove with timing mark of the chain cover.

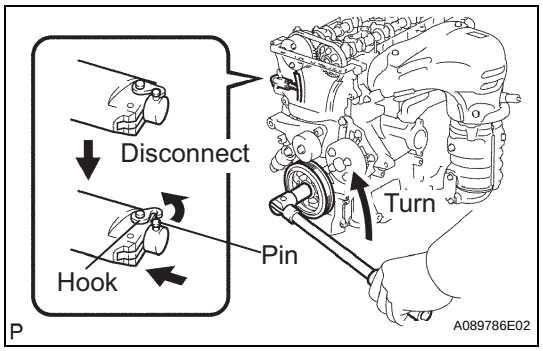


4. INSTALL NO.1 CHAIN TENSIONER ASSEMBLY

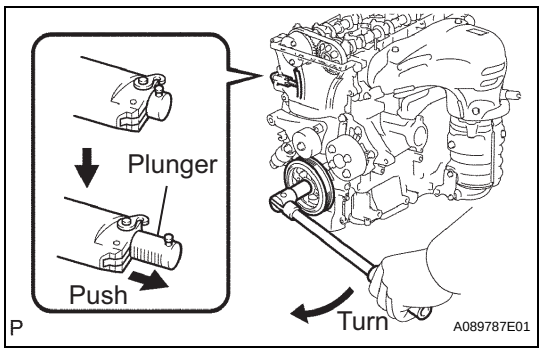
(a) Raise the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.



(b) Install a new gasket and the chain tensioner with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
When installing the tensioner, set the hook again if the hook releases the plunger.

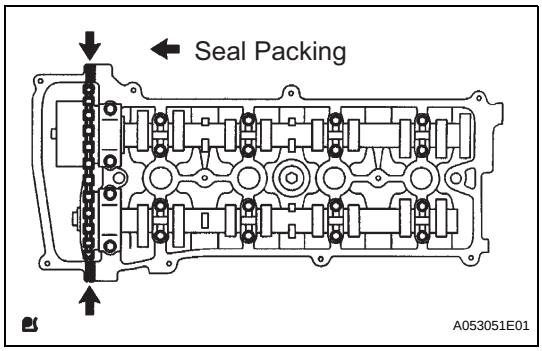


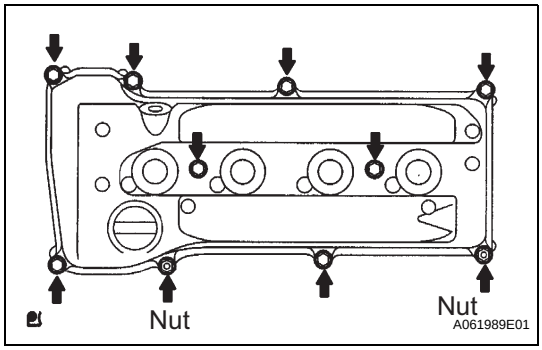
(c) Turn the crankshaft counterclockwise and check that the plunger knock pin is disconnected from the hook.



(d) Turn the crankshaft clockwise and check that the slipper is pushed by the plunger.

EM





5. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to 2 locations as shown in the illustration.

Seal packing:
Part No. 08826-00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 5 minutes after applying seal packing.**
- **Do not apply engine oil for at least 2 hours after installing.**

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

Torque: 11 N*m (110 kgf*cm, 8 ft.*lbf)

6. CONNECT ENGINE WIRE

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

8. INSTALL FRONT WHEEL RH

9. CHECK ENGINE OIL LEAKS

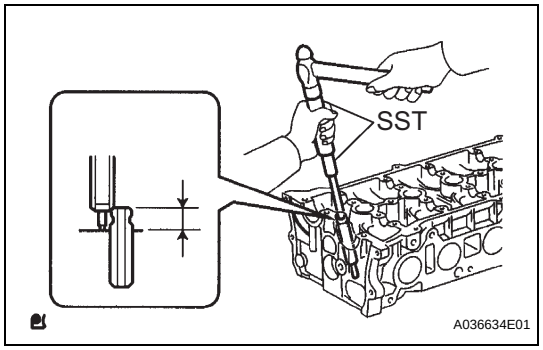
EM

REASSEMBLY

1. INSTALL INTAKE VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)

(b) Install the STD bush if the diameter is within the specified diameter.
Specified diameter:
10.333 to 10.344 mm (0.4068 to 0.4072 in.)



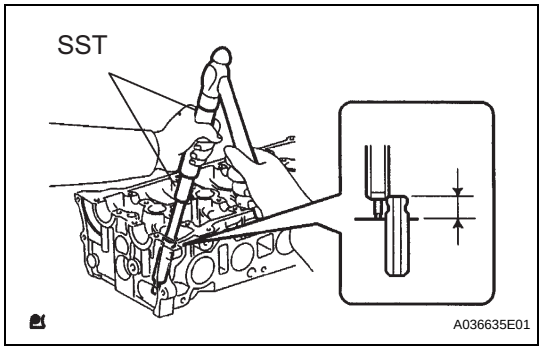
(c) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)
Protrusion height:
9.6 to 10.0 mm (0.3779 to 0.3937 in.)

(d) 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.)

2. INSTALL EXHAUST VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Diameter:
10.285 to 10.306 mm (0.4049 to 0.4057 in.)

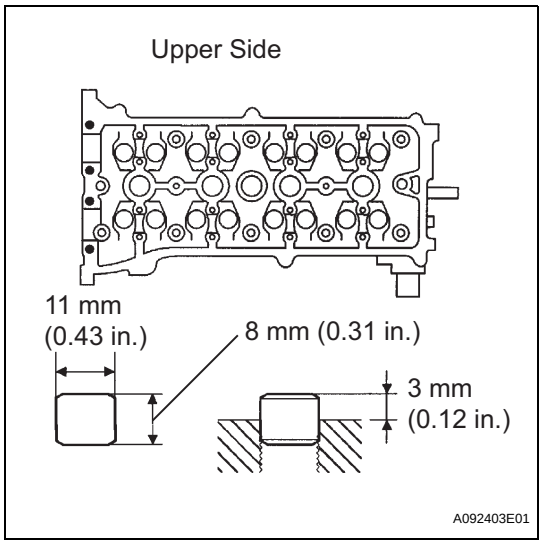
(b) Install the STD bush if the diameter is within the specified diameter.
Specified diameter:
10.333 to 10.344 mm (0.4068 to 0.4072 in.)



(c) 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.)

(d) 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:
0.030 to 0.065 mm (0.0012 to 0.0026 in.)

EM



3. INSTALL RING W/HEAD 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.)

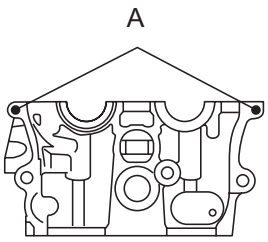
4. INSTALL STUD BOLT

(a) Install stud bolt.

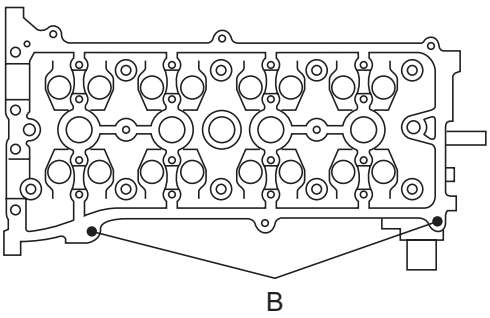
Torque: Bolt A
5 N*m (51 kgf*cm, 44 in.*lbf)
Bolt B
5 N*m (51 kgf*cm, 44 in.*lbf)
Bolt C
10 N*m (97 kgf*cm, 7 ft.*lbf)
Bolt D
10 N*m (97 kgf*cm, 7 ft.*lbf)

EM

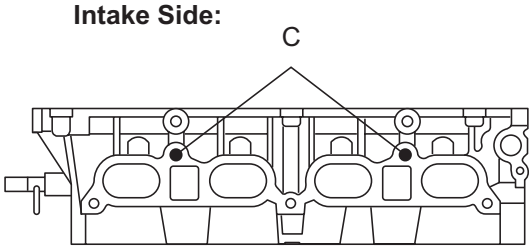
Front Side:



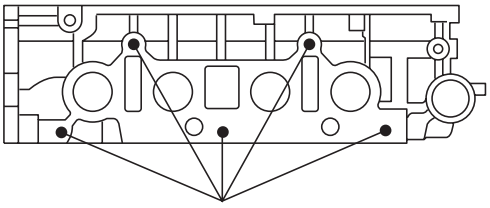
Upper Side:

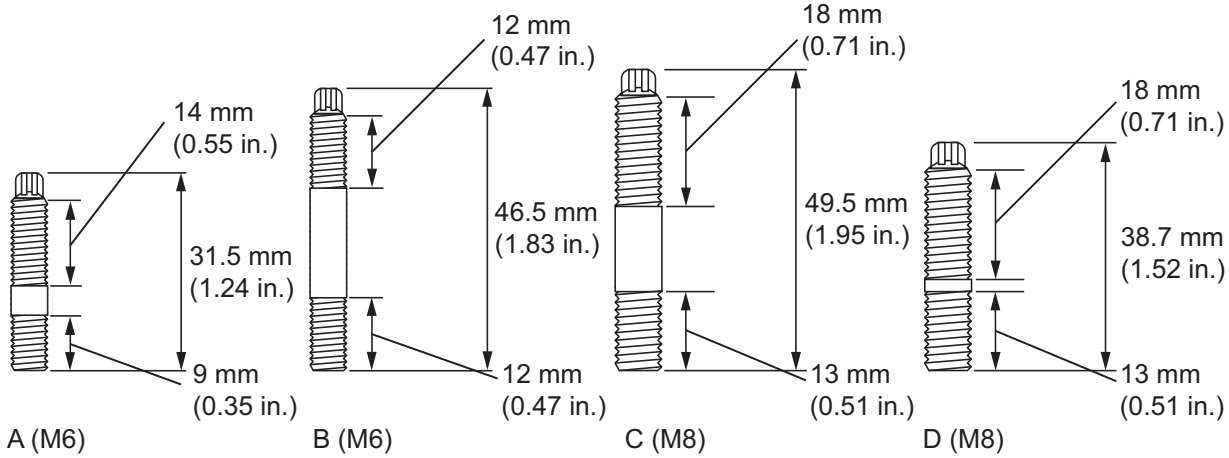


Intake Side:



Exhaust Side:





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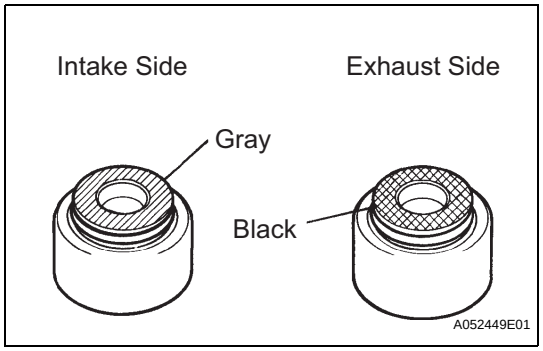
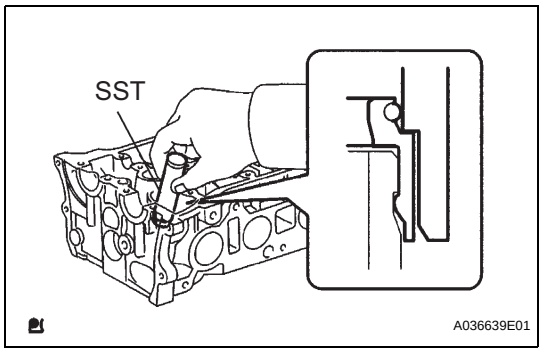


5. INSTALL VALVE SPRING SEAT

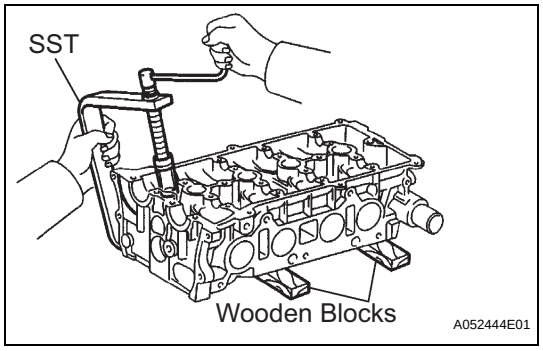
6. INSTALL VALVE STEM OIL SEAL

(a) Apply a light coat of engine oil on a new oil seal.
NOTICE:
Pay close attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal into the exhaust or installing the exhaust oil seal to the intake can cause installation problems later.
HINT:
The intake valve oil seal is gray and the exhaust valve oil seal is black.



(b) Using SST, push in the oil seal.
SST 09201-41020
NOTICE:
Failure to use SST will cause the seal to be damaged or improperly seated.

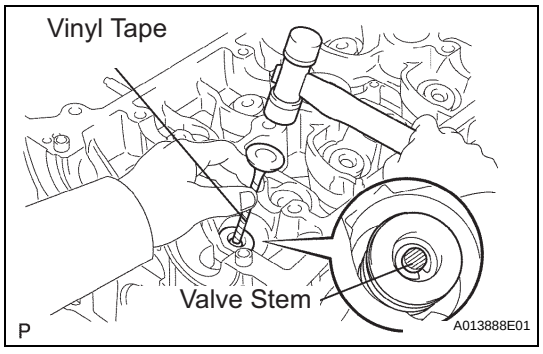
EM



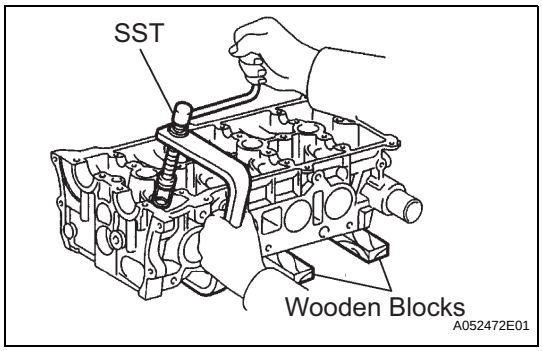
7. INSTALL INTAKE VALVE

(a) Install the valve, spring and retainer to the cylinder head.

(b) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.
SST 09202-70020 (09202-00010)



(c) Using a plastic-faced hammer and a discarded valve with its tip wrapped in tape, lightly tap the installed valve to ensure that it is securely fit.
NOTICE:
Be careful not to damage the valve stem tip.



8. INSTALL EXHAUST VALVE

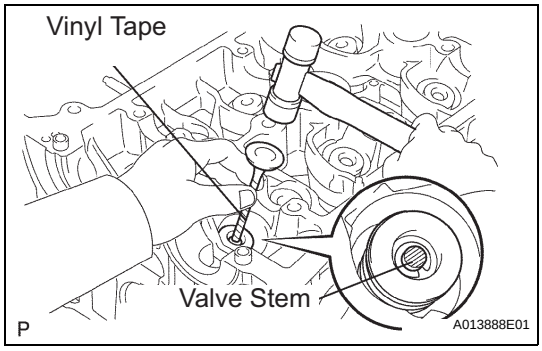
(a) Install the valve, spring and retainer to the cylinder head.

NOTICE:

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

(b) Using SST and wooden blocks, compress the spring and install the 2 retainer locks.

SST 09202-70020 (09202-00010)



(c) Using a plastic-faced hammer and a discarded valve with its tip wrapped in tape, lightly tap the installed valve to ensure that it is securely fit.

NOTICE:

Be careful not to damage the valve stem tip.

9. INSTALL VALVE LIFTER

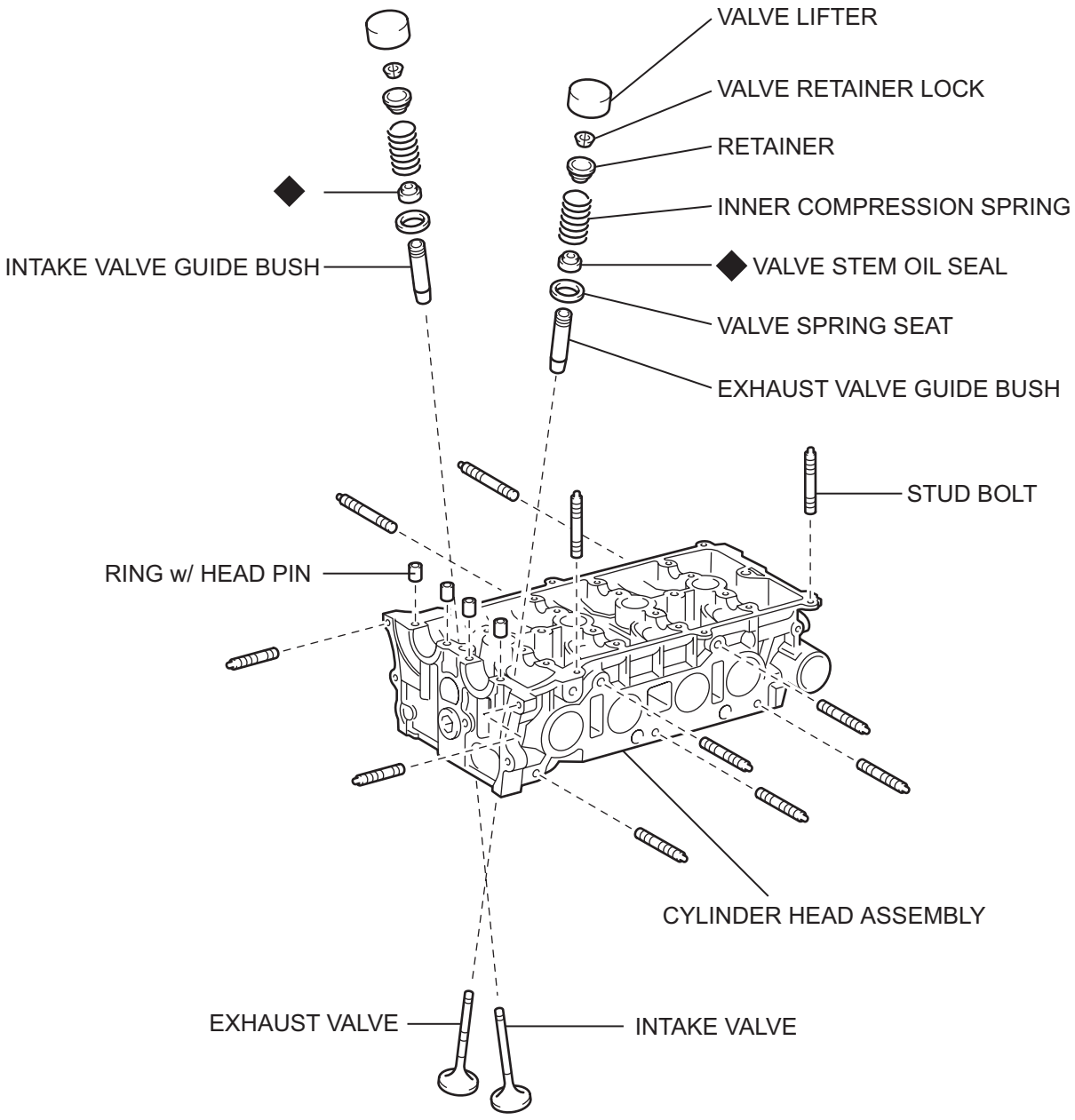
(a) Assemble the valve lifter and the tip of the valve stem with a light coat of engine oil applied.

NOTICE:

Install the valve lifters in their original places.

CYLINDER HEAD

COMPONENTS

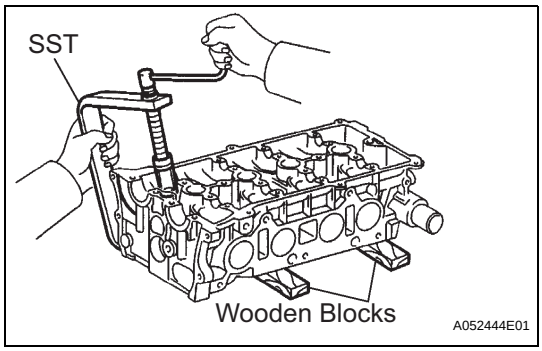


EM

DISASSEMBLY

1. REMOVE VALVE LIFTER

HINT:
Arrange the valve lifters in the correct order.

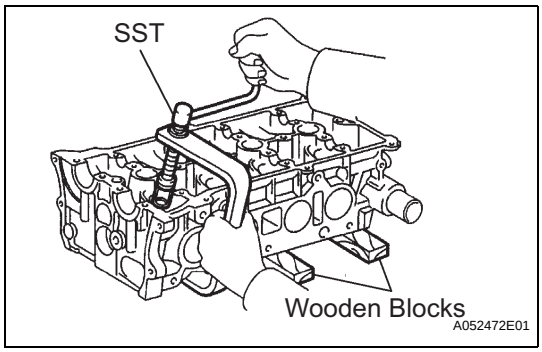


2. REMOVE INTAKE VALVE

(a) Using SST and wooden blocks, compress and remove the valve retainer locks.
SST 09202-70020 (09202-00010)

(b) Remove the retainer, valve spring and valve.
HINT:
Arrange the removed parts in the correct order.

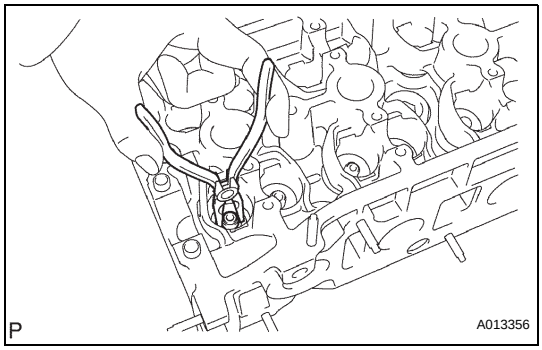
EM



3. REMOVE EXHAUST VALVE

(a) Using SST and wooden blocks, compress and remove the valve retainer locks.
SST 09202-70020 (09202-00010)

(b) Remove the retainer, valve spring and valve.
HINT:
Arrange the removed parts in the correct order.

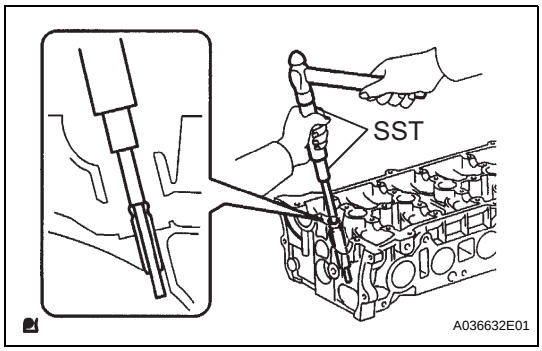


4. REMOVE VALVE STEM OIL SEAL

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

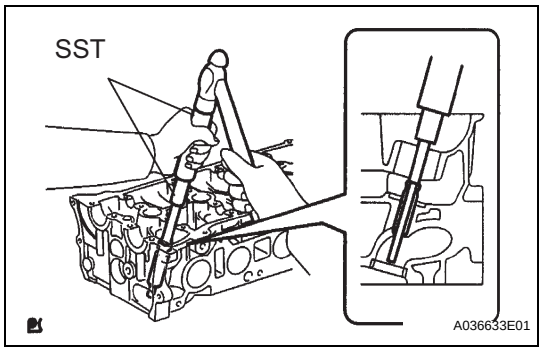
5. REMOVE VALVE SPRING SEAT

6. REMOVE STUD BOLT



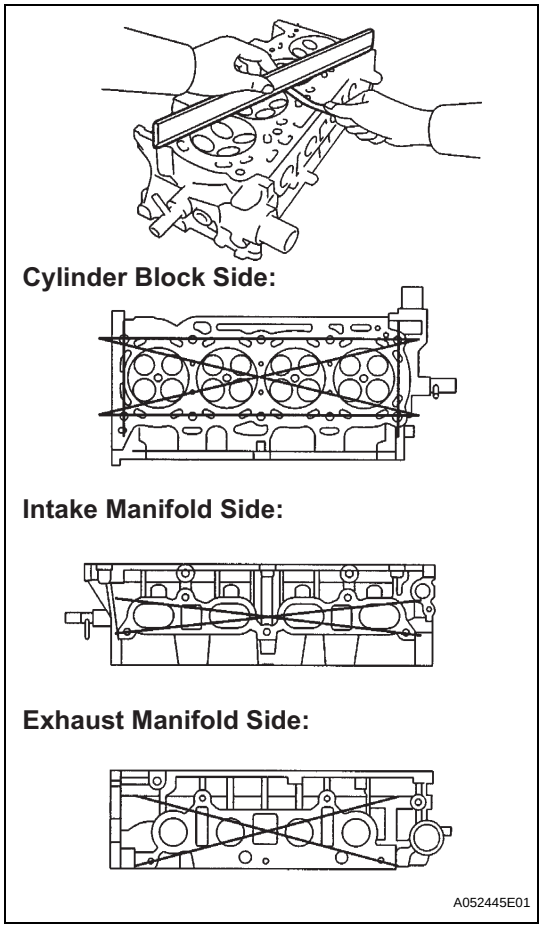
7. REMOVE INTAKE VALVE GUIDE BUSH

(a) Using SST and a hammer, tap out the guide bush.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)



8. REMOVE EXHAUST VALVE GUIDE BUSH

(a) Using SST and a hammer, tap out the guide bush.
SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)



INSPECTION

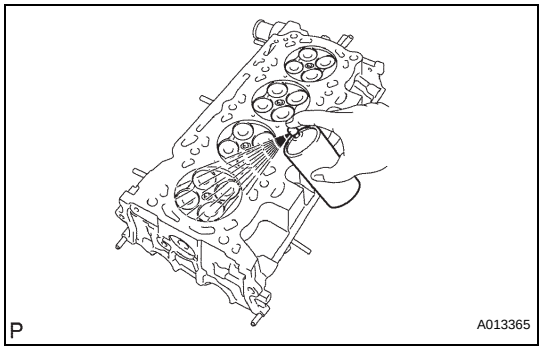
1. INSPECT CYLINDER HEAD FOR FLATNESS

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

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.)

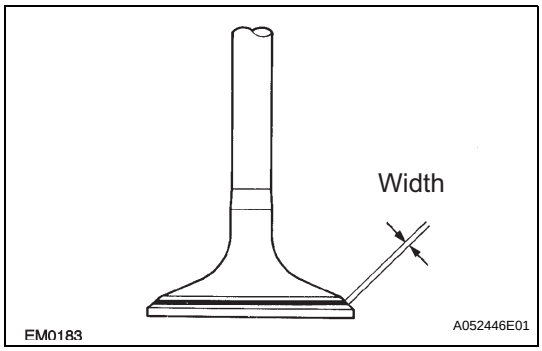
If the warpage is greater than the maximum, replace the cylinder head.

EM



2. INSPECT CYLINDER HEAD FOR CRACKS

(a) Using a dye penetrate, check the intake ports, exhaust ports and cylinder surface for cracks.
If cracked, replace the cylinder head.



3. INSPECT VALVE SEATS

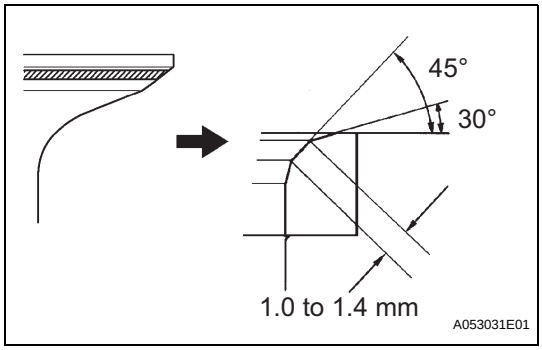
(a) Apply a light coat of prussian blue (or white lead) to the valve face.
(b) Lightly press the valve face against the valve seat.
(c) Check the valve face and valve seat according to the following procedure.
  (1) If blue appears 360° around the valve face, the valve face is concentric. If not, replace the valve.
  (2) If blue appears 360° around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
  (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 (0.039 to 0.055 in.).

EM

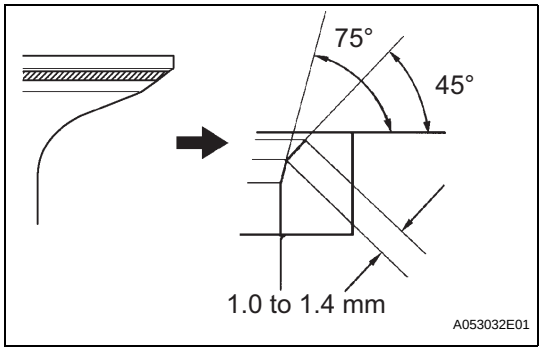
4. REPAIR VALVE SEATS

NOTICE:
Keep the lip free from foreign matter.

(a) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



(b) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.
(c) Handrub the valve and valve seat with an abrasive compound.
(d) Check the valve seating position.

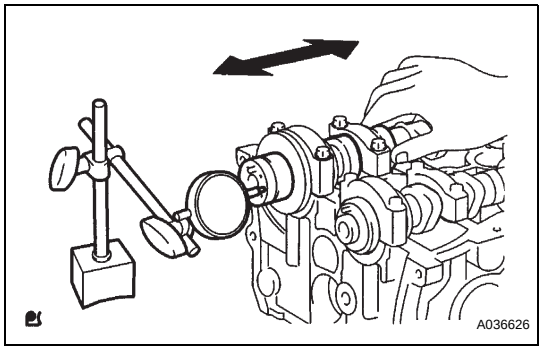


5. INSPECT CAMSHAFT THRUST CLEARANCE

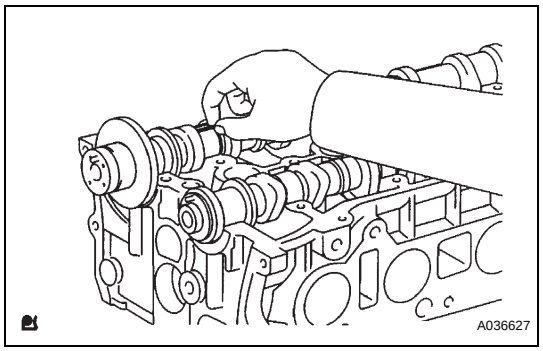
(a) Install the camshafts.
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

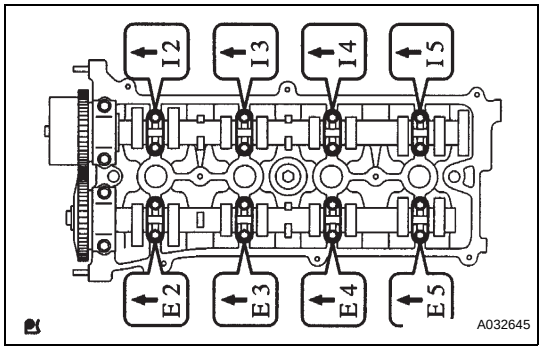
Specified thrust clearance

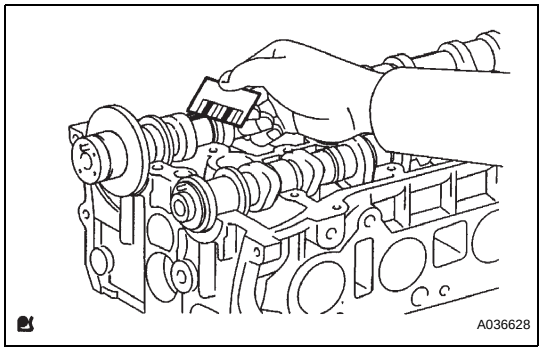
Item	Specified Condition
Intake	0.040 to 0.110 mm (0.0016 to 0.0043 in.)
Exhaust	0.080 to 0.150 mm (0.0032 to 0.0059 in.)



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







6. 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.

Torque: Bearing cap No.1
30 N*m (301 kgf*cm, 22 ft.*lbf)
Bearing cap No.2
30 N*m (301 kgf*cm, 22 ft.*lbf)
Bearing cap No.3
9.0 N*m (92 kgf*cm, 80 in.*lbf)

NOTICE:
Do not turn the camshaft.

(e) Remove the bearing caps, and measure the plastigage at its widest point.

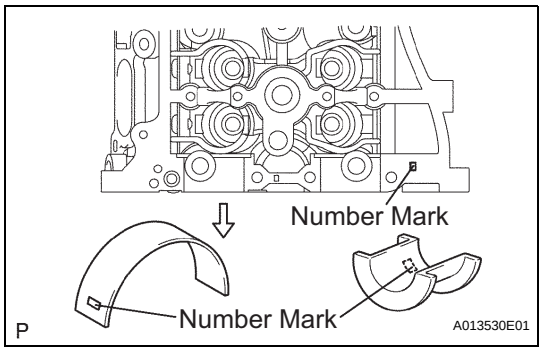
Specified oil clearance

Item	Specified Condition
Camshaft No. 1 journal bearing mark 1	0.007 to 0.070 mm (0.0003 to 0.0028 in.)
Camshaft No. 1 journal bearing mark 2	0.008 to 0.070 mm (0.0003 to 0.0028 in.)
Camshaft No. 1 journal bearing mark 3	0.008 to 0.070 mm (0.0003 to 0.0028 in.)
Other journals	0.025 to 0.100 mm (0.0010 to 0.0039 in.)
No. 2 camshaft No. 1 journal	0.040 to 0.100 mm (0.0016 to 0.0039 in.)
Other journals	0.025 to 0.100 mm (0.0010 to 0.0039 in.)

NOTICE:
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.

EM



(1) Check the number mark shown in the illustration.

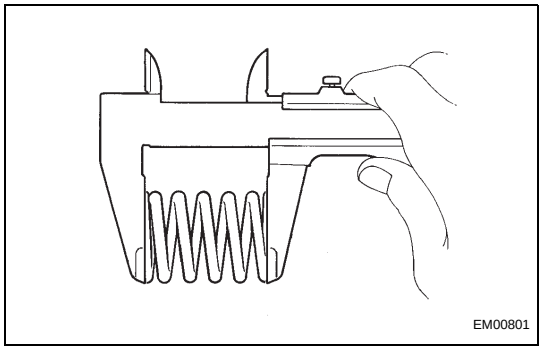
Cylinder head journal bore diameter

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

Standard bearing center wall thickness

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

Camshaft journal diameter:
35.971 to 35.985 mm (1.4162 to 1.4167 in.)

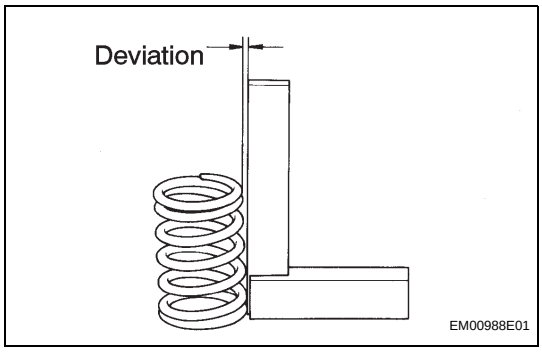


7. INSPECT INNER COMPRESSION SPRING

(a) Using a vernier caliper, measure the free length of the valve spring.

Free length:
45.7 mm (1.799 in.)

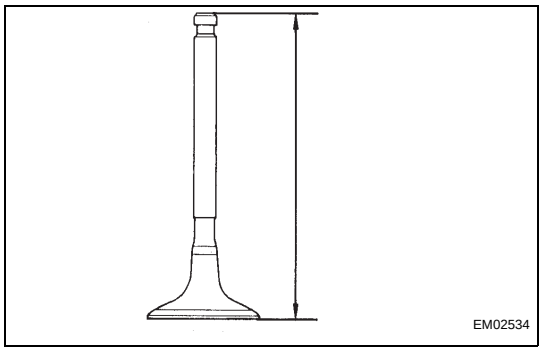
If the free length is not as specified, replace the valve spring.



(b) Using steel squares, 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.

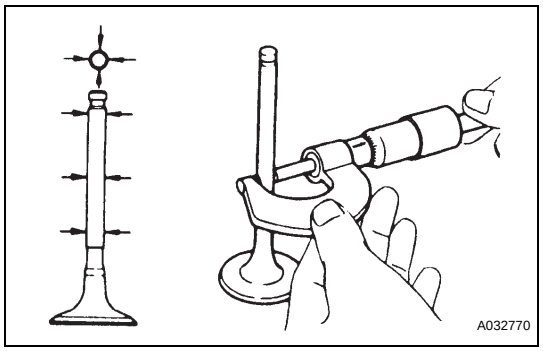


8. INSPECT INTAKE VALVE

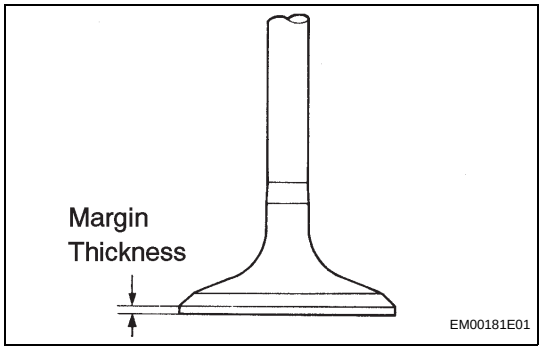
(a) Using a vernier caliper, measure the valve's overall length.

Specified overall length:
101.21 to 101.71 mm (3.9846 to 4.0043 in.)

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

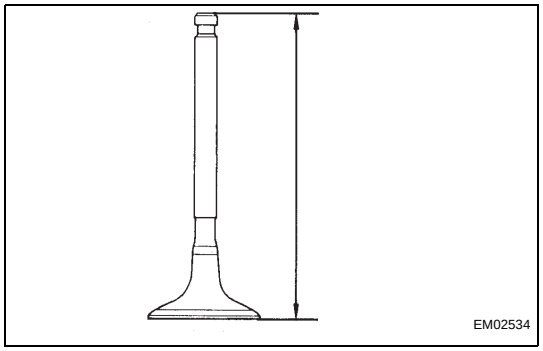


(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.470 to 5.485 mm (0.2154 to 0.2159 in.)



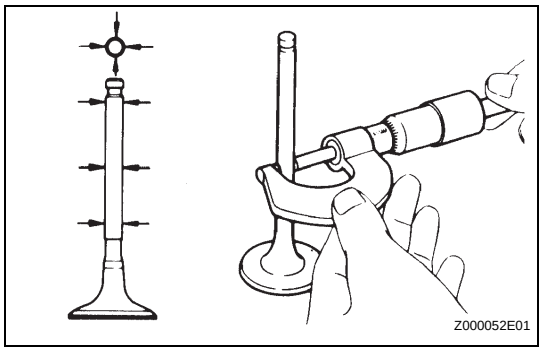
(c) Using a vernier caliper, measure the valve head margin thickness.
Specified margin thickness:
0.50 to 1.45 mm (0.0197 to 0.0571 in.)
If the margin thickness is less than the minimum, replace the valve.

EM

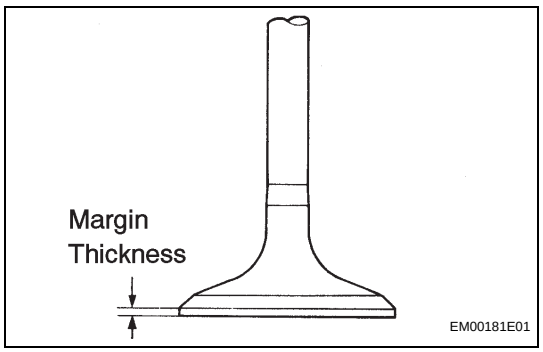


9. INSPECT EXHAUST VALVE

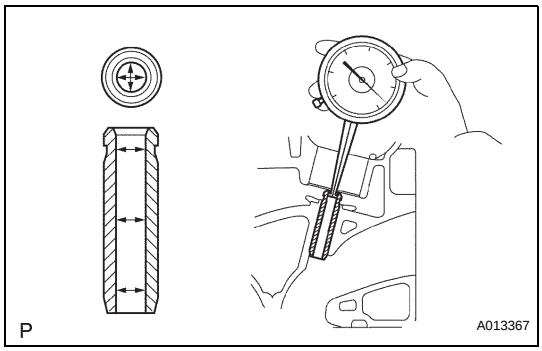
(a) Using a vernier caliper, measure the valve's overall length.
Specified overall length:
100.70 to 101.15 mm (3.9646 to 3.9823 in.)
If the overall length is less than the minimum, replace the valve.



(b) 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.)



(c) Using a vernier caliper, measure the valve head margin thickness.
Specified margin thickness:
0.50 to 1.60 mm (0.0197 to 0.0630 in.)
If the margin thickness is less than the minimum, replace the valve.



10. INSPECT INTAKE VALVE GUIDE BUSH

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

Bushing inside diameter:

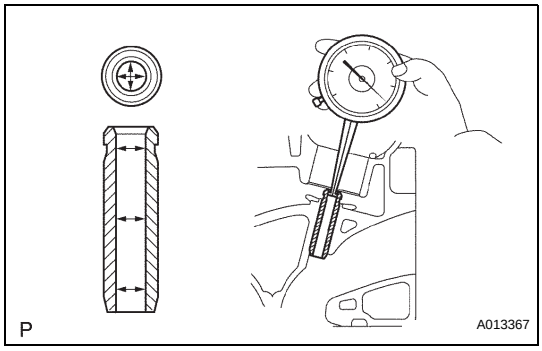
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

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

Specified oil clearance:

0.025 to 0.080 mm (0.0010 to 0.0031 in.)

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



11. INSPECT EXHAUST VALVE GUIDE BUSH

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

Bushing inside diameter:

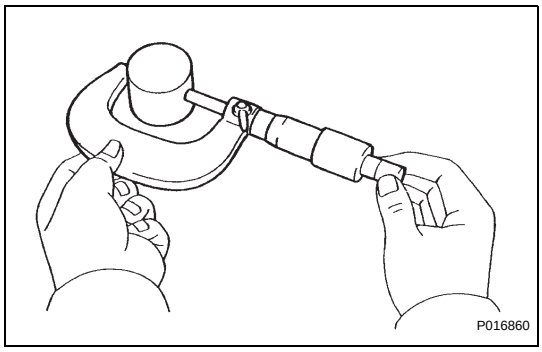
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

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

Specified oil clearance:

0.030 to 0.100 mm (0.0012 to 0.0039 in.)

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

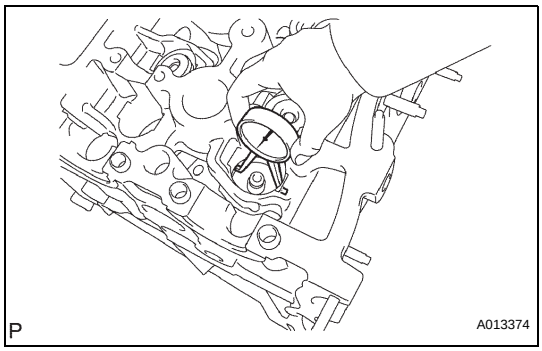


12. INSPECT VALVE LIFTER

(a) Using a micrometer, measure the lifter diameter.

Lifter diameter:

30.966 to 30.976 mm (1.2191 to 1.2195 in.)



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

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.

Specified oil clearance:

0.033 to 0.070 mm (0.0013 to 0.0028 in.)

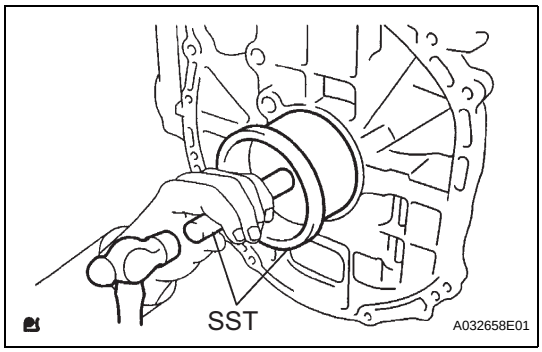
If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.

INSTALLATION

1. INSTALL ENGINE REAR OIL SEAL

(a) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip free from foreign matter.

(b) 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)
NOTICE:
Wipe off extra grease from the crankshaft.

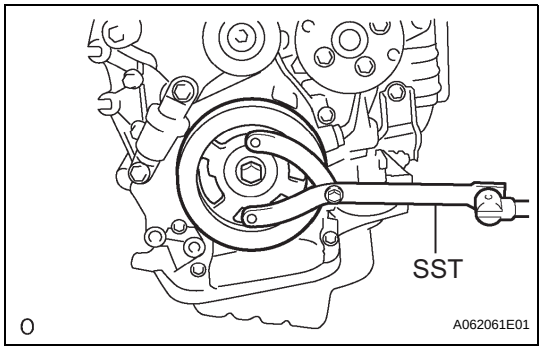


2. INSTALL DRIVE PLATE & RING GEAR SUB-ASSEMBLY (A/T)

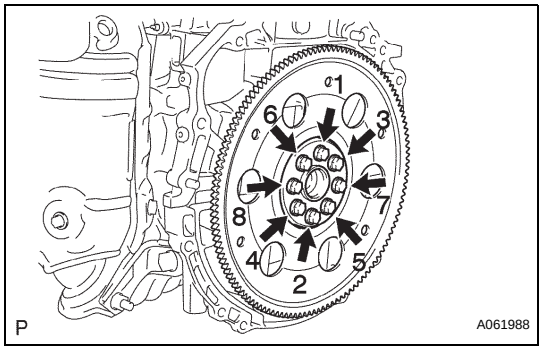
(a) Using SST, fix the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)

(b) Clean the bolt and the bolt hole.

(c) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND or equivalent



(d) Install the front spacer, drive plate and rear spacer with 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 98 N*m (1,000 kgf*cm, 72 ft.*lbf)

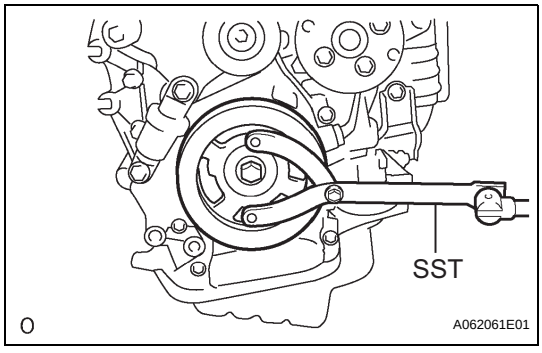


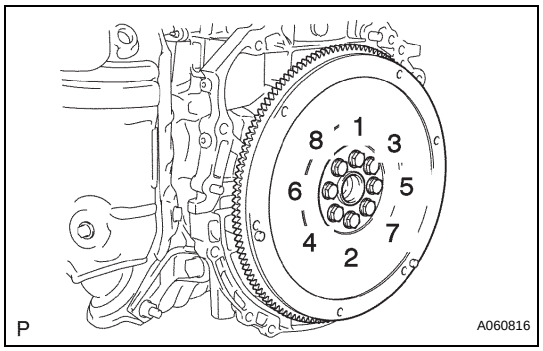
3. INSTALL FLYWHEEL SUB-ASSEMBLY

(a) Using SST, fix the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)

(b) Clean the bolt and the bolt hole.

(c) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND or equivalent





(d) Install the flywheel with 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 130 N*m (1,330 kgf*cm, 96 ft.*lbf)

4. **INSTALL CLUTCH DISC ASSEMBLY (M/T) (See page CL-19)**

5. **INSTALL CLUTCH COVER ASSEMBLY (M/T) (See page CL-20)**

6. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (A/T)**
HINT:
Install the engine assembly w/ transaxle after installing the transaxle (See page AX-159).

7. **INSTALL MANUAL TRANSAXLE ASSEMBLY (M/T)**
HINT:
Install the engine assembly w/ transaxle after installing the transaxle (See page MX-56).

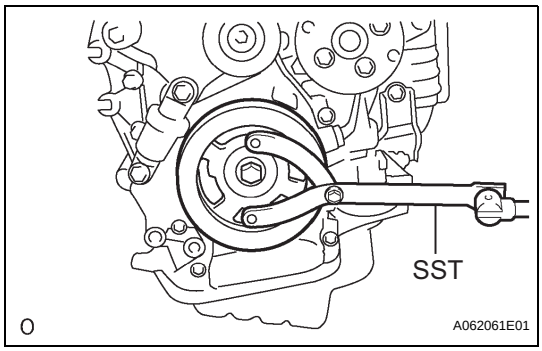
ENGINE REAR OIL SEAL

REMOVAL

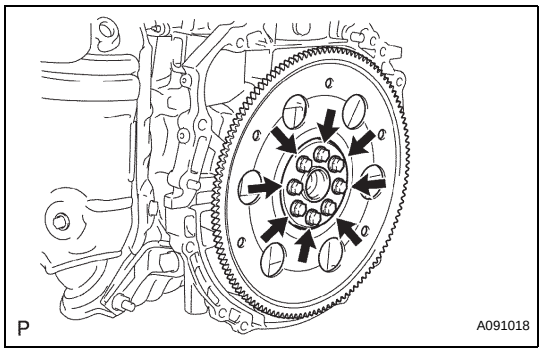
1. **SEPARATE AUTOMATIC TRANSAXLE ASSEMBLY (A/T)**
   HINT:
   Remove the transaxle after removing the engine assembly w/ transaxle (See page AX-156).

2. **SEPARATE MANUAL TRANSAXLE ASSEMBLY (M/T)**
   HINT:
   Remove the transaxle after removing the engine assembly w/ transaxle (See page MX-18).

3. **REMOVE DRIVE PLATE & RING GEAR SUB-ASSEMBLY (A/T)**
   (a) Using SST, fix the crankshaft.
   SST 09960-10010 (09962-01000, 09963-01000)



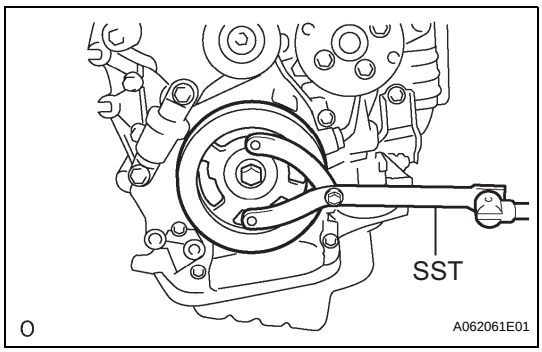
   (b) Remove the 8 bolts, rear spacer, drive plate and front spacer.

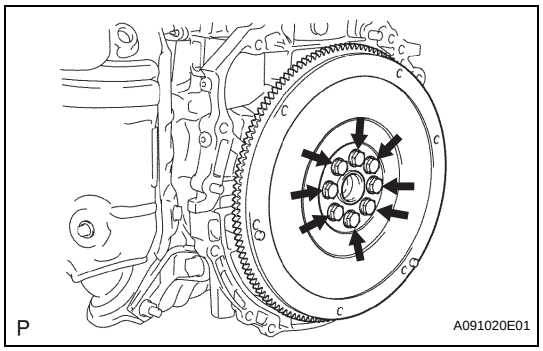


4. **REMOVE CLUTCH COVER ASSEMBLY (M/T) (See page CL-18)**

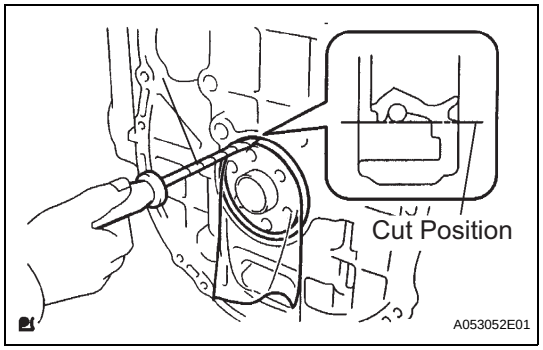
5. **REMOVE CLUTCH DISC ASSEMBLY (M/T) (See page CL-18)**

6. **REMOVE FLYWHEEL SUB-ASSEMBLY (M/T)**
   (a) Using SST, fix the crankshaft.
   SST 09960-10010 (09962-01000, 09963-01000)





(b) Remove the 8 bolts, rear spacer and flywheel.



7. REMOVE ENGINE REAR OIL SEAL

(a) Using a knife, cut through the oil seal lip.

(b) Using a screwdriver with its tip taped, pry out the oil seal.

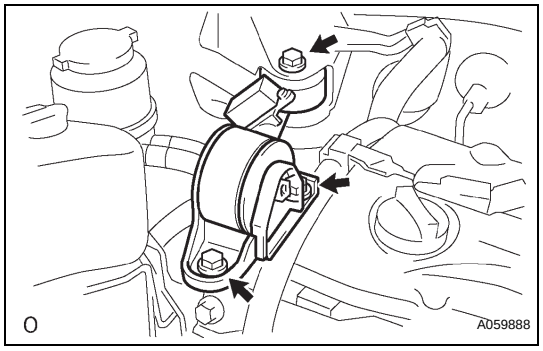
NOTICE:

After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.

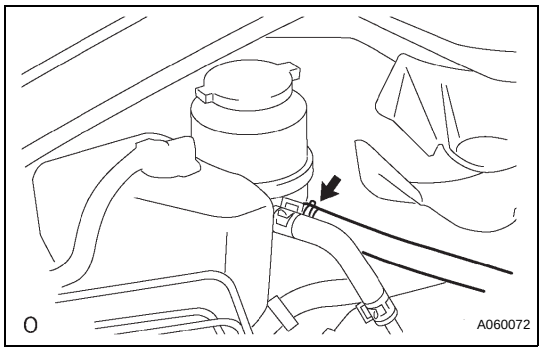
EM

REMOVAL

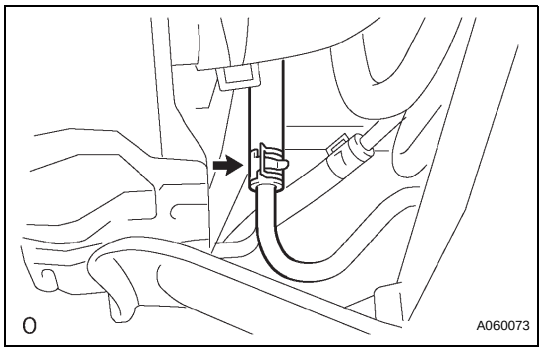
1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page FU-18)**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER LH**
4. **REMOVE ENGINE UNDER COVER RH**
5. **REMOVE FRONT FENDER APRON SEAL RH**
6. **DRAIN ENGINE OIL**
7. **DRAIN ENGINE COOLANT (See page CO-8)**
8. **DRAIN AUTOMATIC TRANSAXLE FLUID**
   (a) Using a 10 mm hexagon wrench, remove the drain plug and gasket. Drain automatic transaxle fluid.
   (b) Install a new gasket and the drain plug.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
9. **DRAIN MANUAL TRANSAXLE OIL**
   (a) Install a new gasket and the drain plug after draining transaxle oil.
   Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
10. **REMOVE BATTERY**
11. **REMOVE AIR CLEANER ASSEMBLY**
12. **REMOVE ENGINE NO.1 COVER SUB-ASSEMBLY**
13. **DISCONNECT RADIATOR HOSE INLET**
14. **DISCONNECT RADIATOR HOSE OUTLET**
15. **DISCONNECT OIL COOLER OUTLET HOSE NO.2**
16. **DISCONNECT OIL COOLER OUTLET HOSE NO.3**
17. **REMOVE ENGINE MOVING CONTROL ROD W/ BRACKET**
    (a) Remove the 3 bolts and the engine moving control rod w/bracket.



18. **REMOVE ENGINE MOUNTING STAY NO.2 RH**
19. **REMOVE ENGINE MOUNTING BRACKET NO.2 RH**
20. **REMOVE FAN AND GENERATOR V BELT (See page EM-5)**
21. **DISCONNECT OIL RESERVOIR TO PUMP HOSE NO.1**
    (a) Disconnect the oil reservoir to the pump hose No.1.



EM



22. DISCONNECT RETURN TUBE SUB-ASSEMBLY

(a) Disconnect the return tube sub-assembly.

23. DISCONNECT UNION TO CONNECTOR TUBE HOSE

24. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT (A/T)

25. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SHIFT (M/T)

26. DISCONNECT FLOOR SHIFT CABLE TRANSMISSION CONTROL SELECT (M/T)

27. REMOVE CLUTCH RELEASE CYLINDER ASSEMBLY (M/T)

(a) Remove the bolt and flexible hose.

(b) Remove the 2 bolts and clutch release cylinder.

EM

28. DISCONNECT HEATER INLET WATER HOSE

29. DISCONNECT HEATER OUTLET WATER HOSE

30. DISCONNECT FUEL TUBE SUB-ASSEMBLY (See page FU-12)

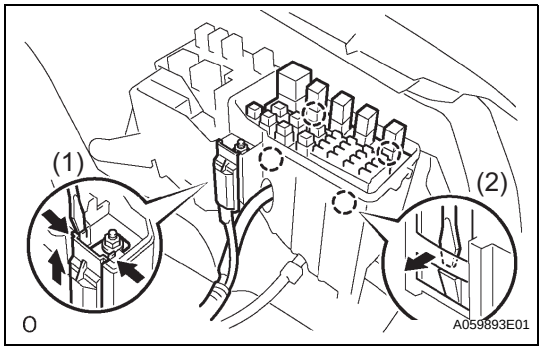
31. DISCONNECT ENGINE WIRE

(a) Disconnect the engine wire from the ECM and passenger side J/B.

(b) Disconnect the engine wire from the engine room J/B.

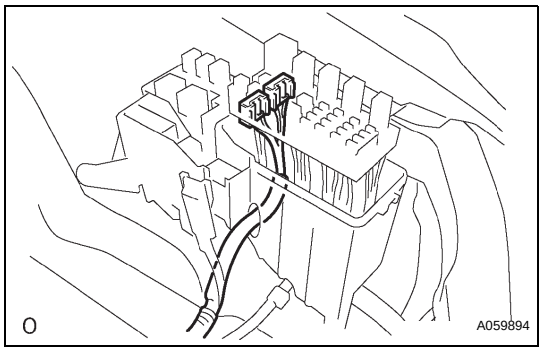
(1) Remove the nut and separate the wire harness.

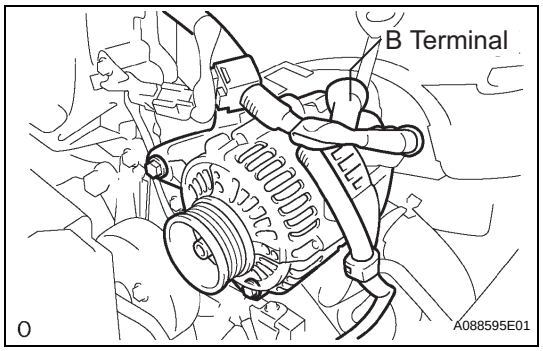
(2) Using a screwdriver, unlock the engine room J/B. Pull the engine room J/B upward.



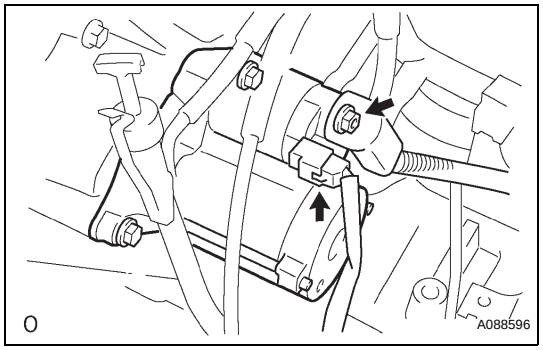
(3) Disconnect the engine wire connectors.

(c) Pull out the engine wire.





(d) Disconnect the B terminal of the generator.
(e) Remove the body ground.



32. REMOVE ENGINE WIRE NO.2
(a) Remove the starter connector.
(b) Remove the nut and disconnect terminal 30 of the starter.

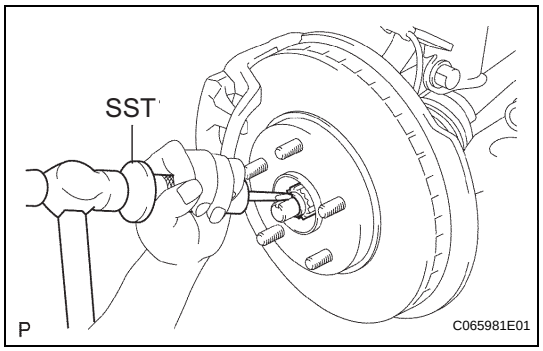
33. REMOVE GENERATOR ASSEMBLY

34. REMOVE COMPRESSOR AND MAGNETIC CLUTCH
HINT:
Hang up the hoses instead of detaching them.

35. REMOVE FRONT EXHAUST PIPE ASSEMBLY

36. REMOVE FRONT STABILIZER LINK ASSEMBLY LH
(a) Using a 6 mm socket hexagon wrench, fix the stud bolt.
(b) Remove the nut and disconnect the stabilizer link.

37. REMOVE FRONT STABILIZER LINK ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.



38. REMOVE FRONT AXLE HUB LH NUT
(a) Using SST and a hammer, strike the lock nut covering to remove it.
SST 09930-00010
NOTICE:
- **Set the drive shaft's groove so that it faces up. Then use the SST and hammer.**
- **Remove the covering from the lock nut completely or the screw of the drive shaft may be damaged.**
- **Do not sharpen the tip of the SST.**

(b) Using a 30 mm socket wrench, remove the lock nut.

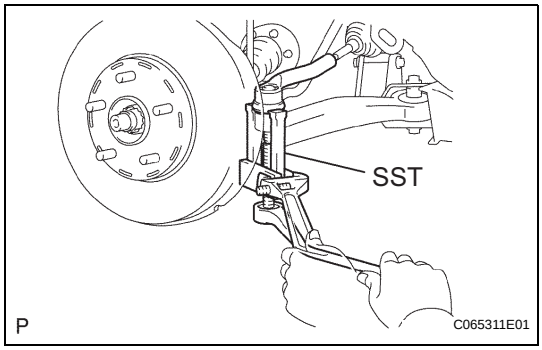
39. REMOVE FRONT AXLE HUB RH NUT
HINT:
Use the same procedures described for the LH side.

40. REMOVE SPEED SENSOR FRONT LH
(a) Remove the bolt and disconnect the speed sensor from the steering knuckle.
NOTICE:
Keep the speed sensor tip and connection free of foreign matter.

41. REMOVE SPEED SENSOR FRONT RH

HINT:

Use the same procedures described for the LH side.



42. DISCONNECT TIE ROD ASSEMBLY LH

(a) Remove the cotter pin and castle nut.

(b) Using SST, disconnect the tie rod end from the steering knuckle.

SST 09628-62011

NOTICE:

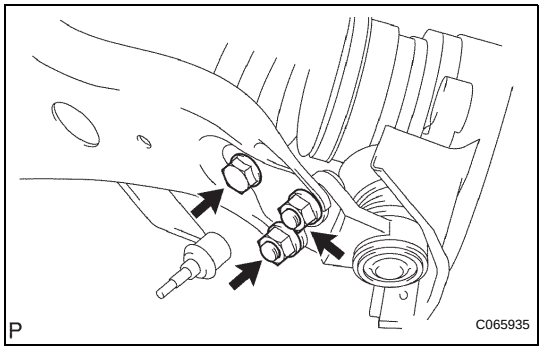
Be careful not to damage the cover of the ball joint.

43. DISCONNECT TIE ROD ASSEMBLY RH

HINT:

Use the same procedures described for the LH side.

EM



44. DISCONNECT FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 LH

(a) Remove the bolt and 2 nuts, as shown in the illustration.

(b) Using a plastic hammer, disconnect the drive shaft from the axle hub.

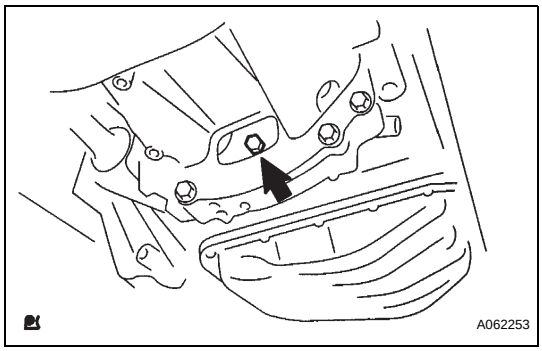
45. DISCONNECT FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 RH

HINT:

Use the same procedures described for the LH side.

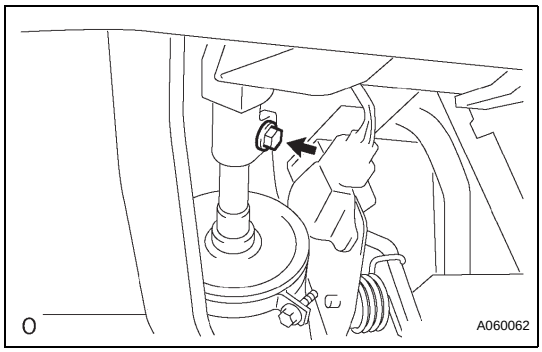
46. REMOVE DRIVE PLATE & TORQUE CONVERTER CLUTCH SETTING BOLT (A/T)

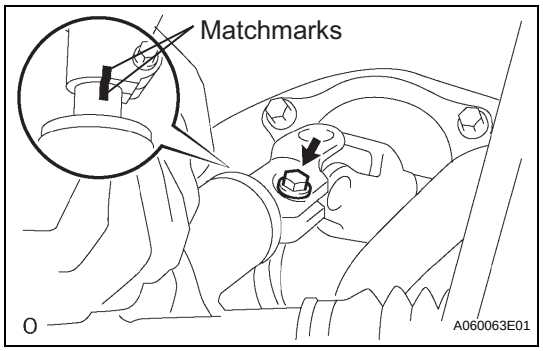
(a) Fix the crankshaft and remove the 6 setting bolts.



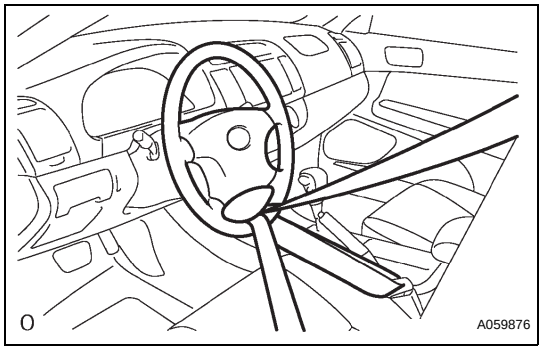
47. REMOVE STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Loosen the sliding yoke bolt.





(b) Place matchmarks on the intermediate shaft and control valve shaft.
(c) Remove the bolt and the steering intermediate shaft.

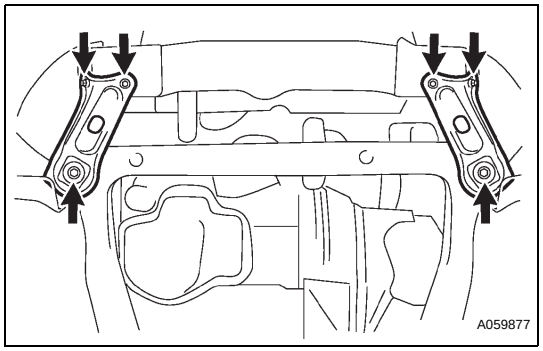


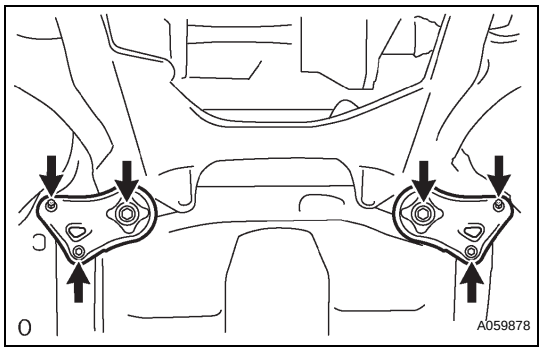
(d) To prevent the steering wheel from rotating, fix the wheel with the seat belt.
NOTICE:
If the steering wheel is not fixed, the spiral cable will be damaged.

EM

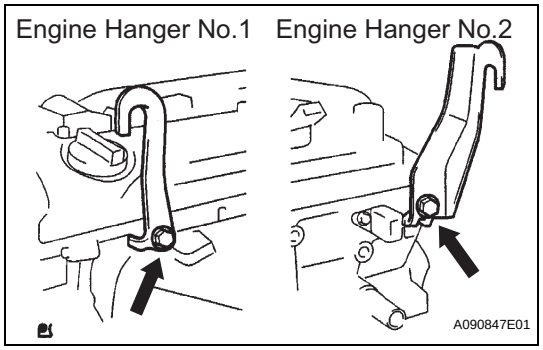
48. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine lifter.
(b) Remove the 4 bolts, 2 nuts and frame side rail plate RH and LH.





(c) Remove the 4 bolts, 2 nuts and front suspension member brace rear RH and LH.
(d) Carefully remove the engine assembly from the vehicle.

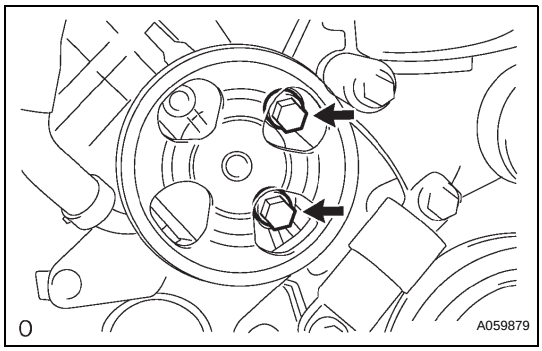


(e) Install the 2 engine hangers as shown in the illustration.
Parts No.:

Parts	Paarts No.
Engine hanger No. 1	12281-28010
Engine hanger No. 2	12282-28010
Bolt	91512-61020

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

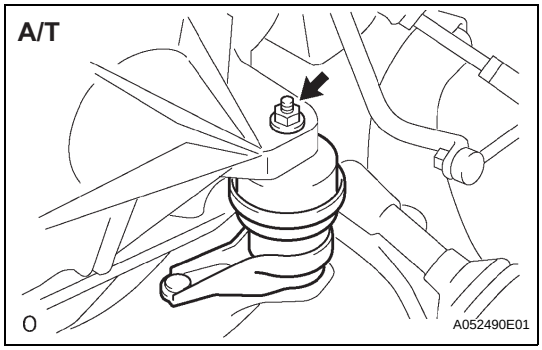
(f) Using a chain block and an engine sling device, hang the engine assembly.



49. REMOVE VANE PUMP ASSEMBLY

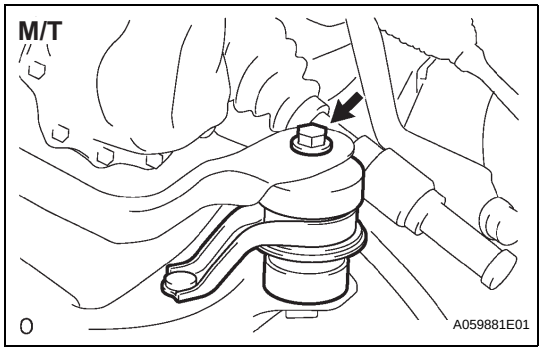
(a) Disconnect the PS oil pressure switch connector.

(b) Remove the 2 bolts and vane pump from the engine.

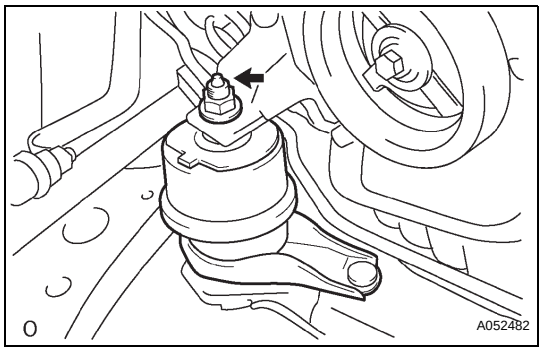


50. REMOVE FRONT FRAME ASSEMBLY

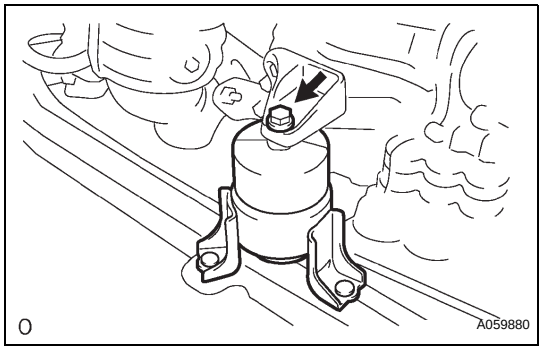
(a) A/T:
Remove the nut from the engine mounting insulator LH.



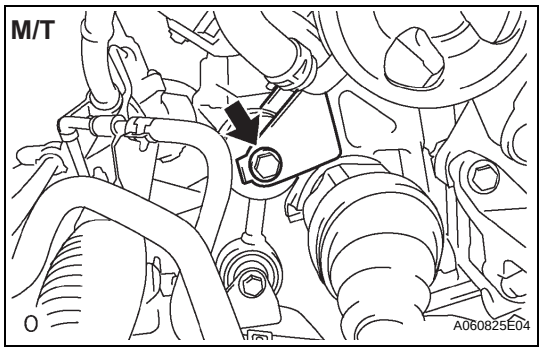
(b) M/T:
Remove the bolt from the engine mounting insulator LH.



(c) Remove the nut from the engine mounting insulator RH.



(d) Remove the bolt from the engine mounting insulator FR.



(e) M/T:
Remove the bolt from the engine lateral control rod.

(f) Raise the engine assembly and separate the front frame.

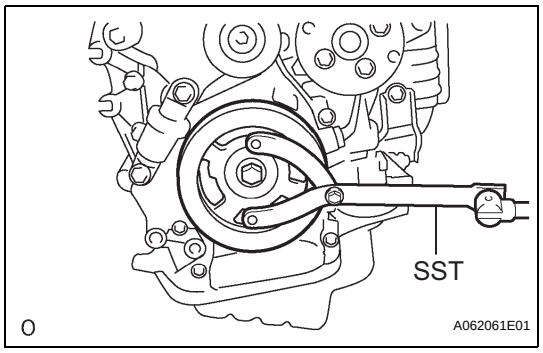
51. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-5)

52. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH (See page DS-6)

53. REMOVE STARTER ASSEMBLY (See page ST-5)

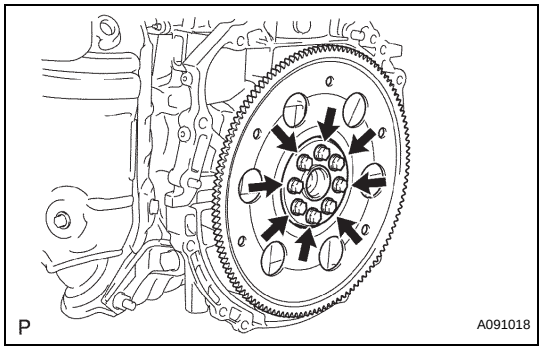
54. SEPARATE AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-158)

55. SEPARATE MANUAL TRANSAXLE ASSEMBLY (See page MX-21)



56. REMOVE DRIVE PLATE & RING GEAR SUB-ASSEMBLY

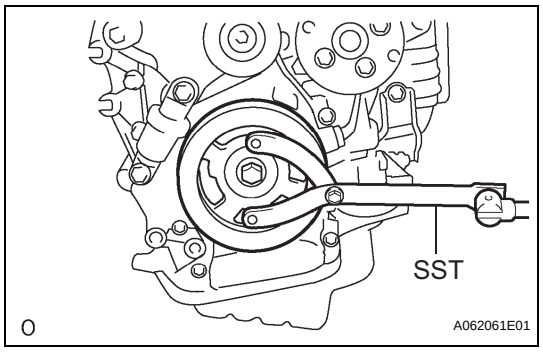
(a) Using SST, fix the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)



(b) Remove the 8 bolts, rear spacer, drive plate and front spacer.

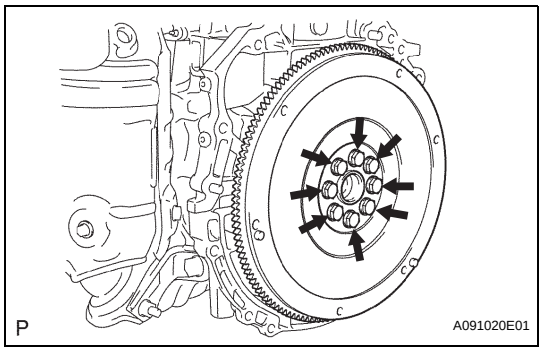
57. REMOVE CLUTCH COVER ASSEMBLY (See page CL-18)

58. REMOVE CLUTCH DISC ASSEMBLY (See page CL-18)



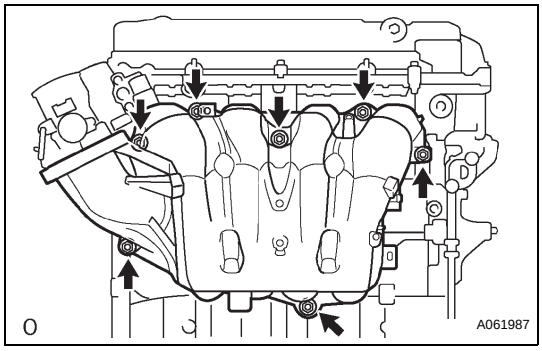
59. REMOVE FLYWHEEL SUB-ASSEMBLY

(a) Using SST, fix the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)



(b) Remove the 8 bolts, rear spacer and flywheel.

60. INSTALL ENGINE STAND



61. REMOVE INTAKE MANIFOLD

(a) Remove the 5 bolts, 2 nuts, intake manifold and gasket.

62. REMOVE VENTILATION HOSE

63. REMOVE VENTILATION HOSE NO.2

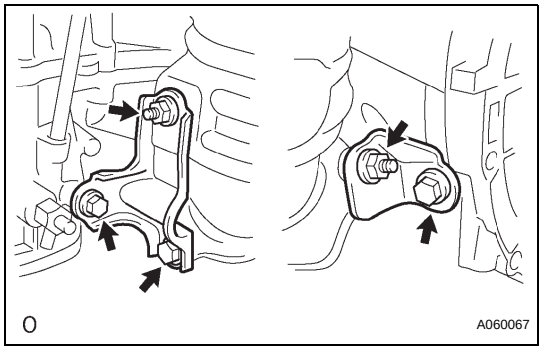
64. REMOVE ENGINE WIRE

65. REMOVE INTAKE MANIFOLD INSULATOR NO.1

66. REMOVE OIL LEVER GAGE SUB-ASSEMBLY

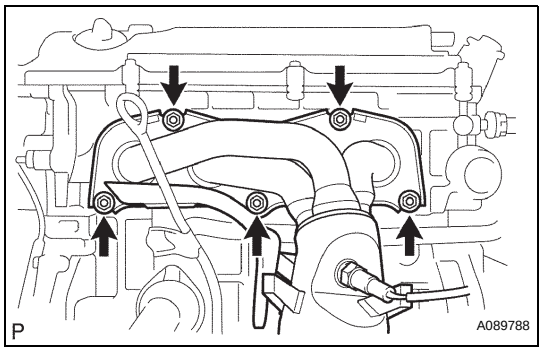
67. REMOVE OIL LEVEL GAGE GUIDE

68. REMOVE MANIFOLD CONVERTER INSULATOR NO.1



69. REMOVE EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY

(a) Remove the 3 bolts, 2 nuts, and the No. 1 and No. 2 exhaust manifold stays.

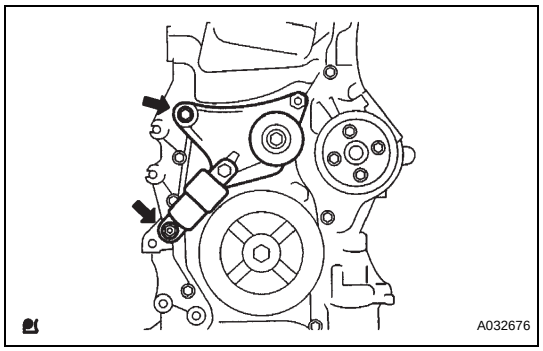


(b) Remove the 5 nuts, exhaust manifold converter and gasket.

70. REMOVE WATER INLET

71. REMOVE THERMOSTAT

72. REMOVE IGNITION COIL ASSEMBLY



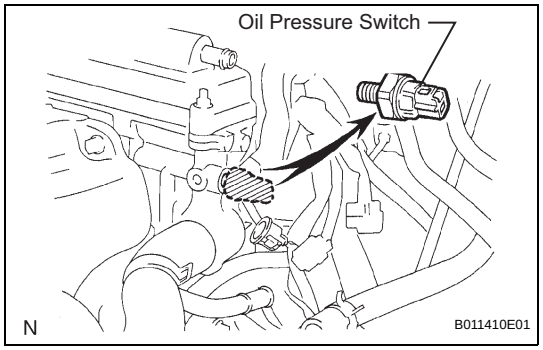
73. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY
(a) Remove the bolt, nut and belt tensioner.

74. REMOVE DRIVE SHAFT BEARING BRACKET

75. REMOVE ENGINE MOUNTING BRACKET RH

76. REMOVE FUEL DELIVERY PIPE W/INJECTOR (See page FU-12)

77. REMOVE WATER BY-PASS PIPE NO.1

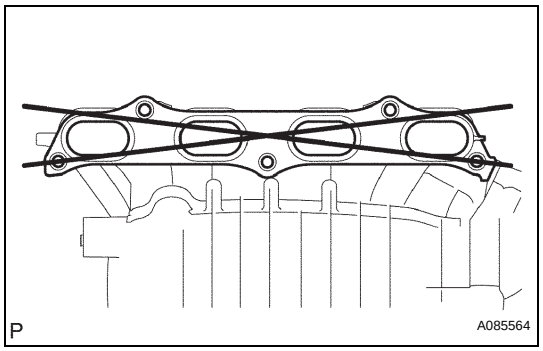


78. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY
(a) Remove the engine oil pressure switch assembly.

79. REMOVE KNOCK SENSOR
(a) Disconnect the sensor connector.
(b) Remove the nut and sensor.

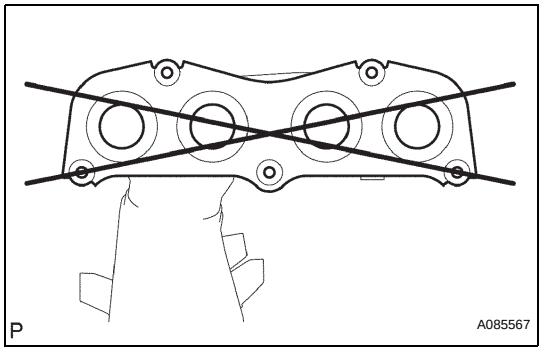
80. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

81. REPLACE PARTIAL ENGINE ASSEMBLY



INSPECTION

1. INSPECT INTAKE MANIFOLD
(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.20 mm (0.0079 in.)
If the warpage is greater than maximum, replace the manifold.

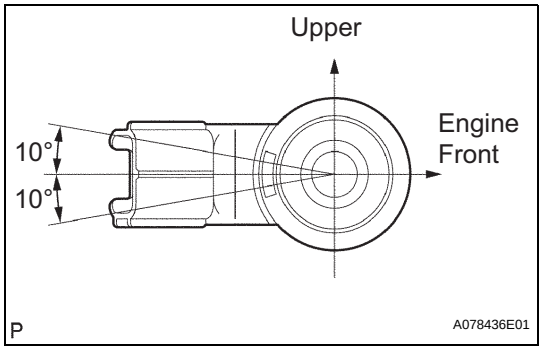


2. INSPECT EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY
(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.
Maximum warpage:
0.70 mm (0.0276 in.)
If the warpage is greater than the maximum, replace the manifold.

EM

INSTALLATION

1. **INSTALL ENGINE COOLANT TEMPERATURE SENSOR**
   (a) Install a new gasket to the sensor.
   (b) Install the sensor.
   Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



2. **INSTALL KNOCK SENSOR**
   (a) Install the sensor with the nut as shown in the illustration.
   Torque: 39 N*m (398 kgf*cm, 29 ft.*lbf)

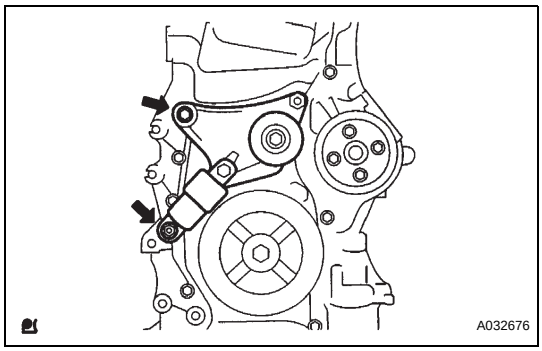
3. **INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY**
   (a) Clean the threads of the oil pressure switch. Apply adhesive to 2 or 3 threads of the oil.
   Adhesive:
   Part No. 08833-00080 THREE BOND 1344 or equivalent
   (b) Install the oil pressure switch.
   Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

4. **INSTALL WATER BY-PASS PIPE NO.1**
   (a) Install a new gasket and the by-pass pipe with the bolt and 2 nuts.
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

5. **INSTALL FUEL DELIVERY PIPE W/INJECTOR (See page FU-14)**

6. **INSTALL ENGINE MOUNTING BRACKET RH**
   Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

7. **INSTALL DRIVE SHAFT BEARING BRACKET**
   Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

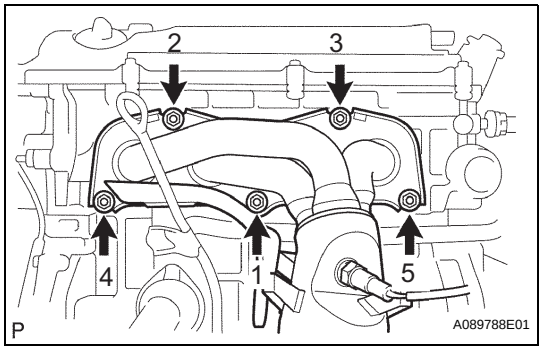


8. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY**
   (a) Install the belt tensioner with the bolt and nut.
   Torque: 59.5 N*m (607 kgf*cm, 44 ft.*lbf)

9. **INSTALL IGNITION COIL ASSEMBLY**
   Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

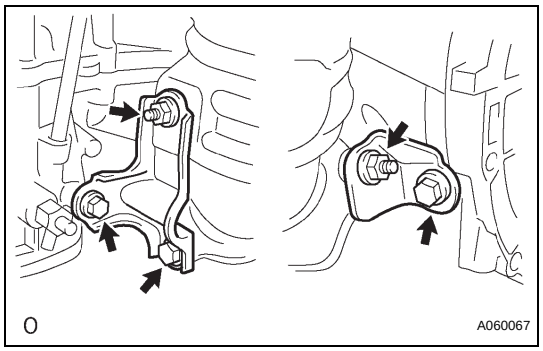
10. **INSTALL THERMOSTAT (See page CO-14)**

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



12. **INSTALL EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY**
    (a) Install a new gasket and the exhaust manifold converter with the 5 nuts. Uniformly tighten the 5 nuts in the sequence shown in the illustration.
    Torque: 37 N*m (378 kgf*cm, 27 ft.*lbf)

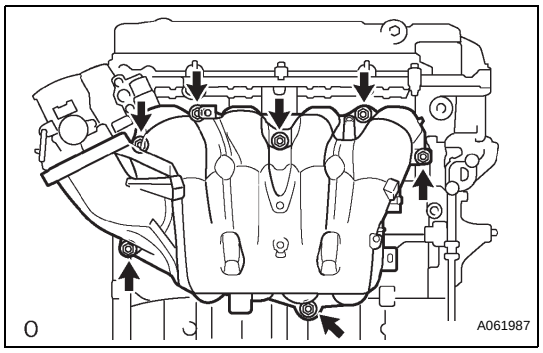
EM



(b) Install the No. 1 and No. 2 exhaust manifold stays with the 3 bolts and 2 nuts.
Torque: 44 N*m (449 kgf*cm, 32 ft.*lbf)

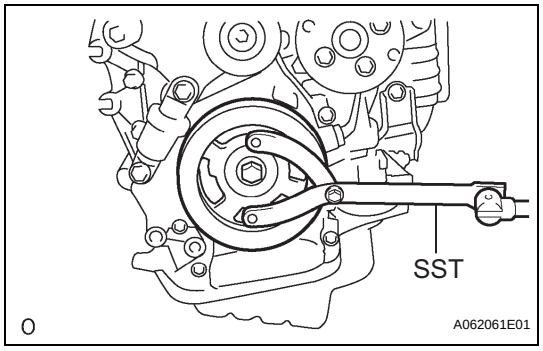
13. INSTALL MANIFOLD CONVERTER INSULATOR NO.1
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)

14. INSTALL OIL LEVEL GAGE GUIDE
(a) Apply a light coat of engine oil to the O-ring and install it to the guide.
(b) Install the oil level gage and guide with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

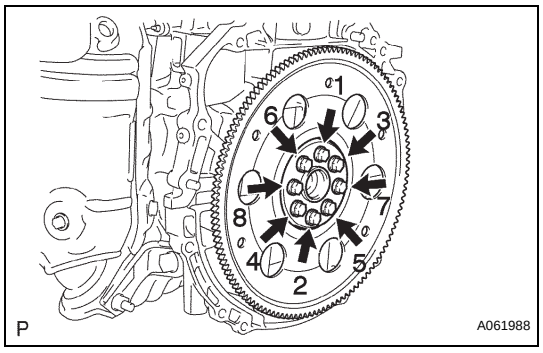


15. INSTALL INTAKE MANIFOLD
(a) Install a new gasket and the intake manifold with the 5 bolts and 2 nuts.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

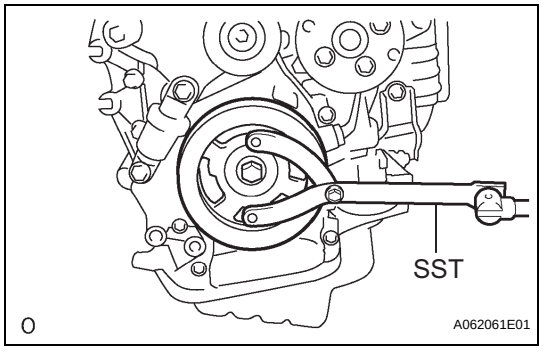
EM



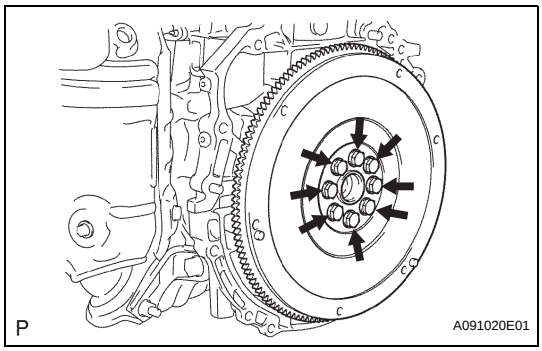
16. INSTALL DRIVE PLATE & RING GEAR SUB-ASSEMBLY
(a) Using SST, fix the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)
(b) Clean the bolt and the bolt hole.
(c) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND or equivalent.



(d) Install the front spacer, drive plate and rear spacer with the 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 98 N*m (1,000 kgf*cm, 72 ft.*lbf)



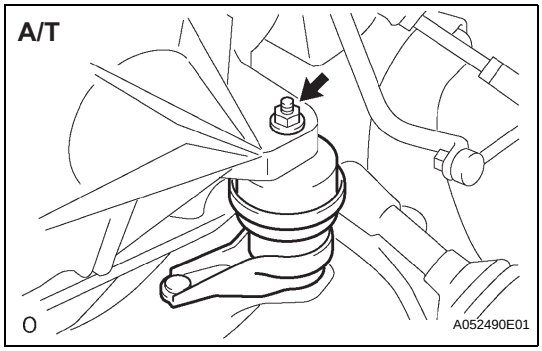
17. INSTALL FLYWHEEL SUB-ASSEMBLY
(a) Using SST, fix the crankshaft.
SST 09960-10010 (09962-01000, 09963-01000)
(b) Clean the bolt and the bolt hole.
(c) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND or equivalent.



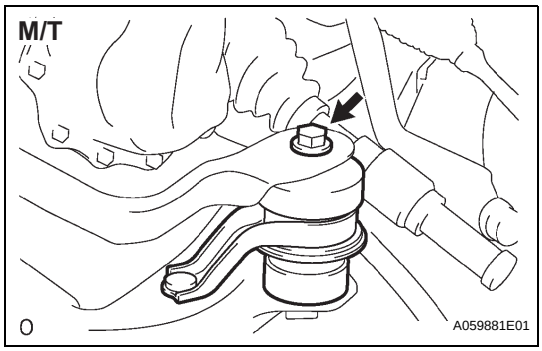
(d) Install the flywheel with the 8 bolts. Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 130 N*m (1,330 kgf*cm, 96 ft.*lbf)

18. **INSTALL CLUTCH DISC ASSEMBLY (See page CL-19)**
19. **INSTALL CLUTCH COVER ASSEMBLY (See page CL-20)**
20. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-160)**
21. **INSTALL MANUAL TRANSAXLE ASSEMBLY (See page MX-56)**
22. **INSTALL STARTER ASSEMBLY (See page ST-12)**
23. **INSTALL FRONT DRIVE SAHFT ASSEMBLY RH (See page DS-15)**
24. **INSTALL FRONT DRIVE SHAFT ASSEMBLY LH (See page DS-14)**
25. **INSTALL FRONT FRAME ASSEMBLY**

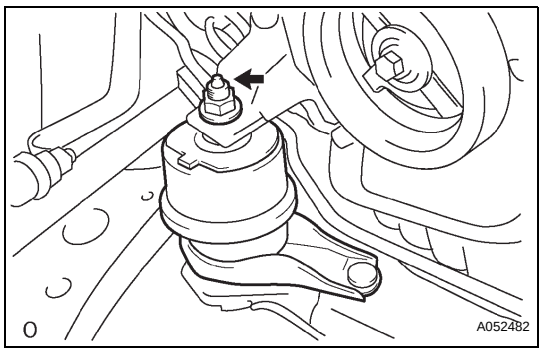
(a) A/T:
Install the engine mounting insulator LH with the nut.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)

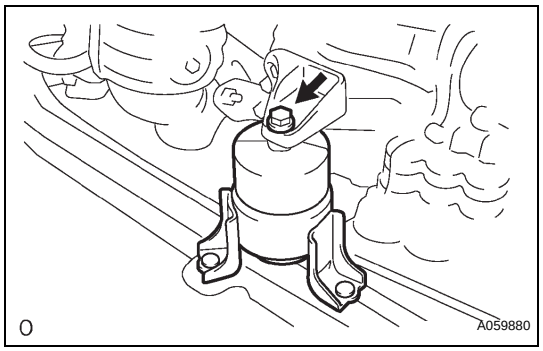


(b) M/T:
Install the engine mounting insulator LH with the bolt.
Torque: 143 N*m (1,459 kgf*cm, 105 ft.*lbf)

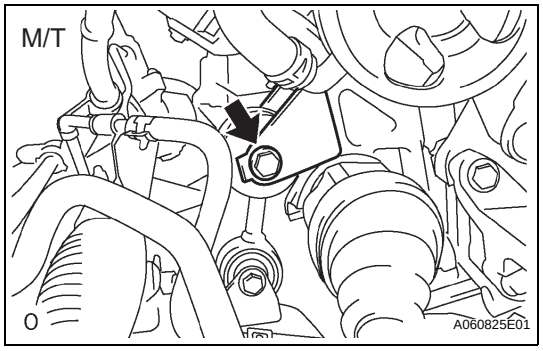


(c) Install the engine mounting insulator RH with the nut.
Torque: 95 N*m (969 kgf*cm, 70 ft.*lbf)



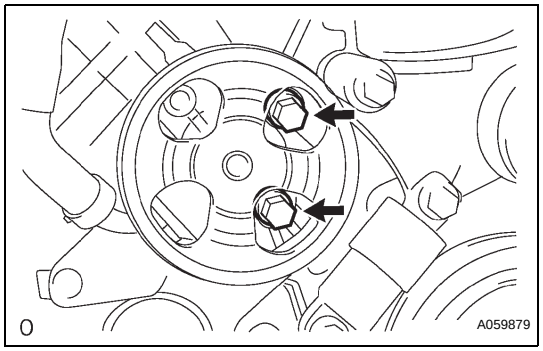


(d) Install the engine mounting insulator FR with the bolt.
Torque: 87 N*m (888 kgf*cm, 64 ft.*lbf)

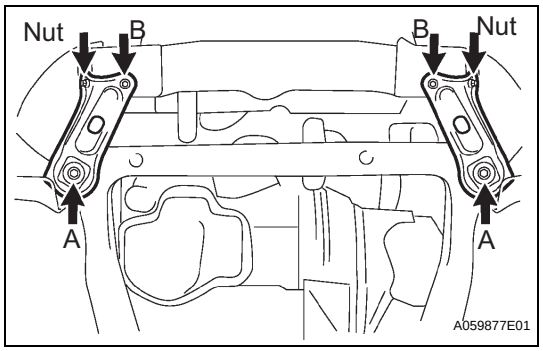


(e) M/T:
Install the engine lateral control rod with the bolt.
Torque: 89 N*m (910 kgf*cm, 66 ft.*lbf)

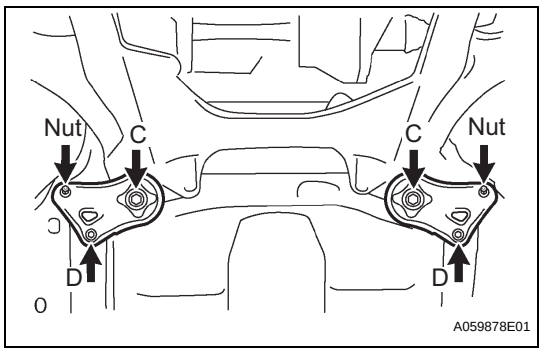
EM



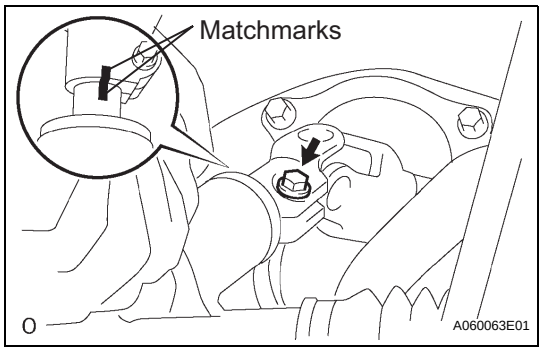
26. INSTALL VANE PUMP ASSEMBLY
(a) Install the vane pump to the engine with the 2 bolts.
Torque: 43 N*m (439 kgf*cm, 32 ft.*lbf)
(b) Connect the PS oil pressure switch connector.



27. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE
(a) Set the engine assembly with transaxle on the engine lifter.
(b) Install the engine assembly to the vehicle.
(c) Install the frame side plate LH and RH with the 4 bolts and 2 nuts.
Torque: Bolt A
85 N*m (867 kgf*cm, 63 ft.*lbf)
Bolt B and nut
32 N*m (326 kgf*cm, 24 ft.*lbf)

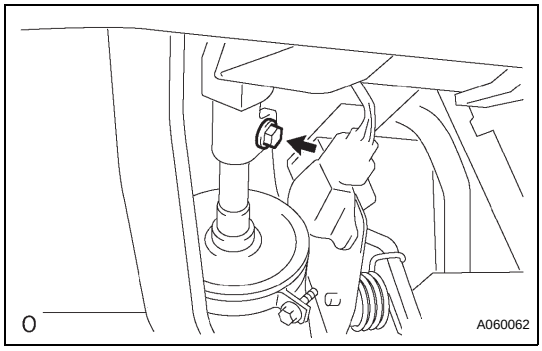


(d) Install the front suspension member brace rear RH and LH with the 4 bolts and 2 nuts.
Torque: Bolt C
85 N*m (867 kgf*cm, 63 ft.*lbf)
Bolt D and nut
32 N*m (326 kgf*cm, 24 ft.*lbf)

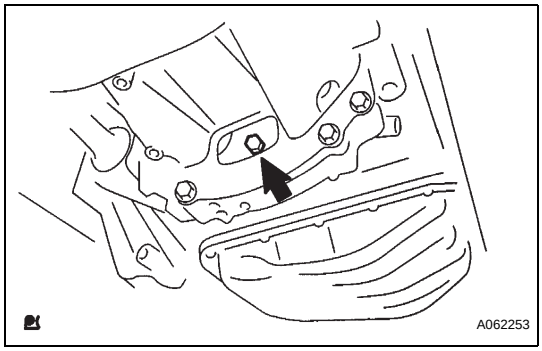


28. INSTALL STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Align the matchmarks on the intermediate shaft and control valve shaft.
Torque: 35 N*m (357 kgf*cm, 26 ft.*lbf)

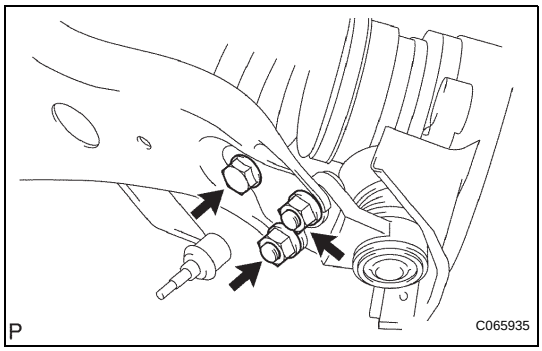


(b) Tighten the bolt.
Torque: 35 N*m (357 kgf*cm, 26 ft.*lbf)



29. INSTALL DRIVE PLATE & TORQUE CONVERTER CLUTCH SETTING BOLT

(a) Fix the crankshaft, and install the 6 setting bolts.
Torque: 41 N*m (418 kgf*cm, 30 ft.*lbf)



30. INSTALL FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 LH

(a) Install the drive shaft to the steering knuckle.
(b) Install the suspension lower arm with the bolt and 2 nuts.
Torque: 75 N*m (765 kgf*cm, 55 ft.*lbf)

31. INSTALL FRONT SUSPENSION ARM SUB-ASSEMBLY LOWER NO.1 RH

HINT:
Use the same procedures described for the LH side.

32. INSTALL TIE ROD ASSEMBLY LH

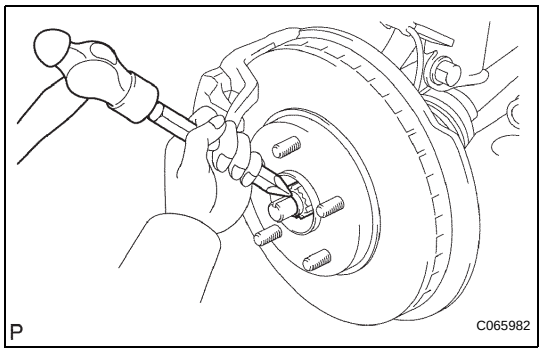
(a) Connect the tie rod end to the steering knuckle with the castle nut.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)
NOTICE:
- **Prevent lubricants from contacting the thread and taper portions.**
- **After tightening the castle nut, tighten it an additional 60°C so that a cotter pin can be inserted.**

(b) Insert a new cotter pin.

33. INSTALL TIE ROD ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

34. INSTALL SPEED SENSOR FRONT LH
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)

35. INSTALL SPEED SENSOR FRONT RH
Torque: 8.0 N*m (82 kgf*cm, 71 in.*lbf)



36. INSTALL FRONT AXLE HUB LH NUT
(a) Using a 30 mm socket wrench, install a new hub nut.
Torque: 294 N*m (3,000 kgf*cm, 217 ft.*lbf)
(b) Using a chisel and hammer, tapped the hub LH nut.

37. INSTALL FRONT AXLE HUB RH NUT
HINT:
Use the same procedures described for the LH side.

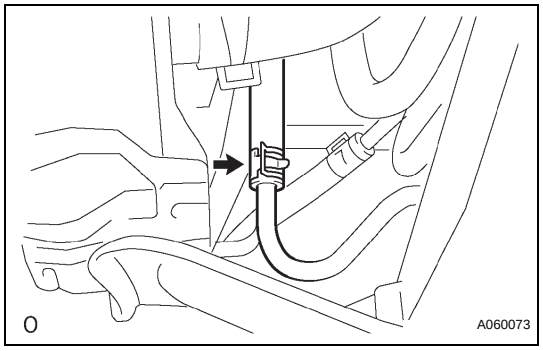
38. INSTALL FRONT STABILIZER LINK ASSEMBLY LH
(a) Using a 5 mm socket hexagon wrench, fix the stud bolt and install the nut.
Torque: 74 N*m (755 kgf*cm, 55 ft.*lbf)

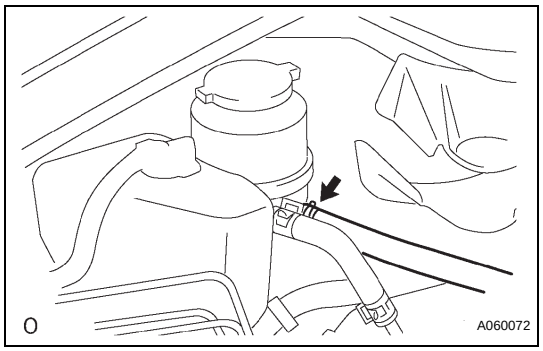
39. INSTALL FRONT STABILIZER LINK ASSEMBLY RH
HINT:
Use the same procedures described for the LH side.

40. INSTALL FRONT EXHAUST PIPE ASSEMBLY (See page EX-4)

41. CONNECT FUEL TUBE SUB-ASSEMBLY

42. INSTALL RETURN TUBE SUB-ASSEMBLY
(a) Install return tube sub-assembly.





43. INSTALL OIL RESERVOIR TO PUMP HOSE NO.1
(a) Install oil reservoir to pump hose No.1.

44. INSTALL COMPRESSOR AND MAGNETIC CLUTCH (See page AC-155)

45. INSTALL GENERATOR ASSEMBLY (See page CH-14)

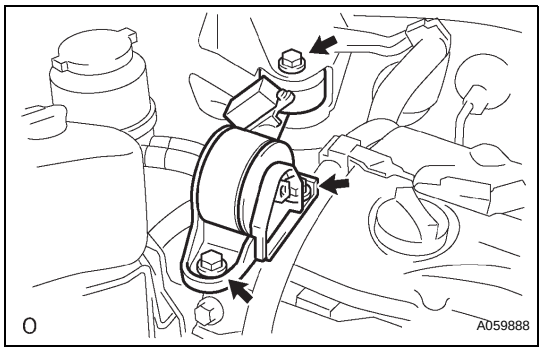
46. INSTALL FAN AND GENERATOR V BELT (See page EM-17)

47. CONNECT ENGINE WIRE NO.2

48. CONNECT ENGINE WIRE

49. INSTALL ENGINE MOUNTING BRACKET NO.2 RH
Torque: 52 N*m (531 kgf*cm, 38 ft.*lbf)

EM



50. INSTALL ENGINE MOUNTING STAY NO.2 RH
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

51. INSTALL ENGINE MOVING CONTROL ROD W/ BRACKET
(a) Install the engine mounting control rod with the 3 bolts.
Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

52. INSTALL AIR CLEANER ASSEMBLY
Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf)

53. ADD AUTOMATIC TRANSAXLE FLUID

54. ADD MANUAL TRANSAXLE OIL

55. ADD ENGINE OIL

56. ADD ENGINE COOLANT (See page CO-8)

57. ADD POWER STEERING FLUID

58. BLEED POWER STEERING FLUID

59. CHECK ENGINE OIL LEAKS

60. CHECK ENGINE COOLANT LEAKS (See page CO-9)

61. INSPECT FUEL LEAKAGE (See page FU-8)

62. INSTALL FRONT WHEEL

63. ADJUST FRONT WHEEL ALIGNMENT
HINT:
See page SP-9

64. INSPECT IDLE SPEED AND IGNITION TIMING
HINT:
See page EM-1

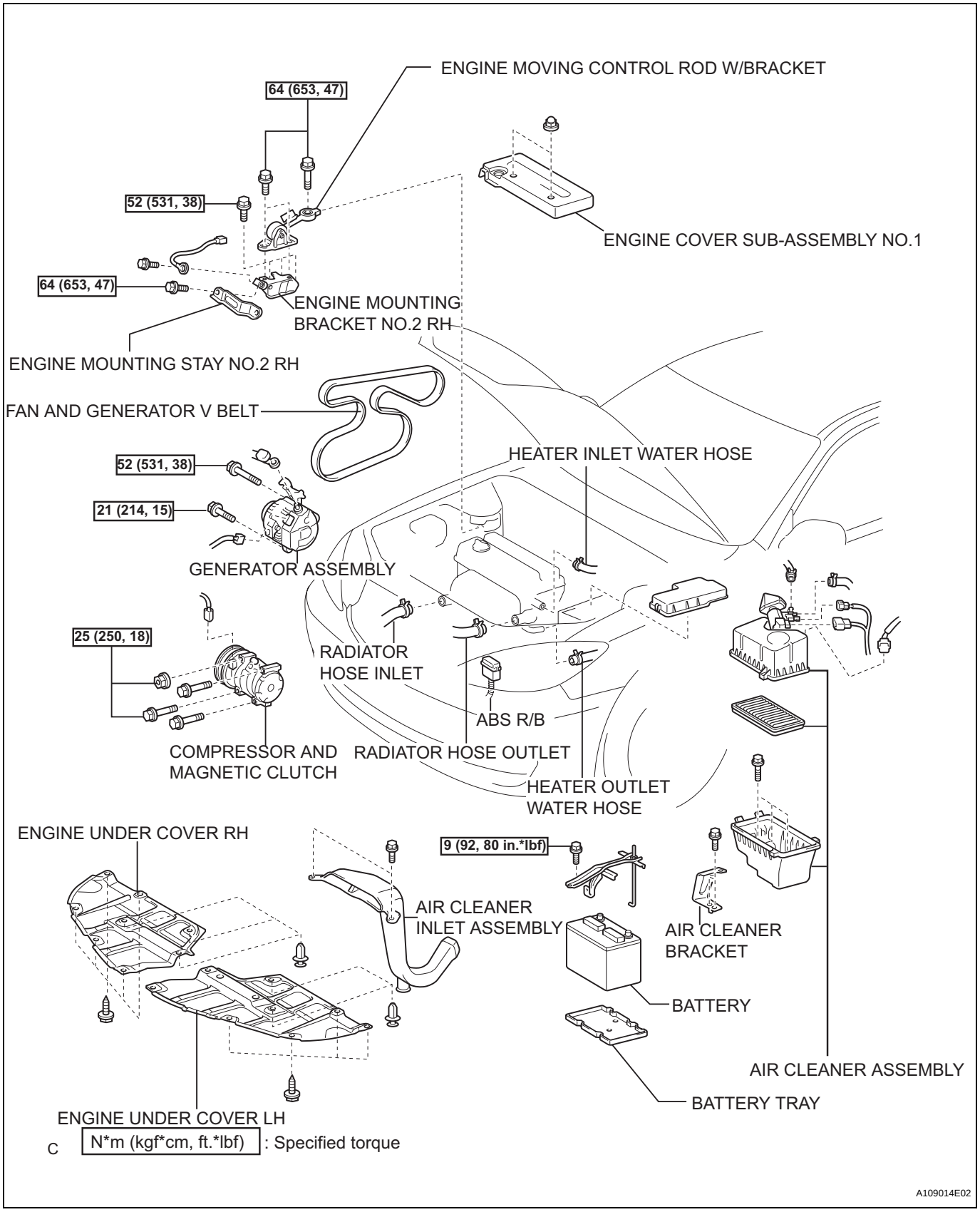
65. INSPECT CO/HC

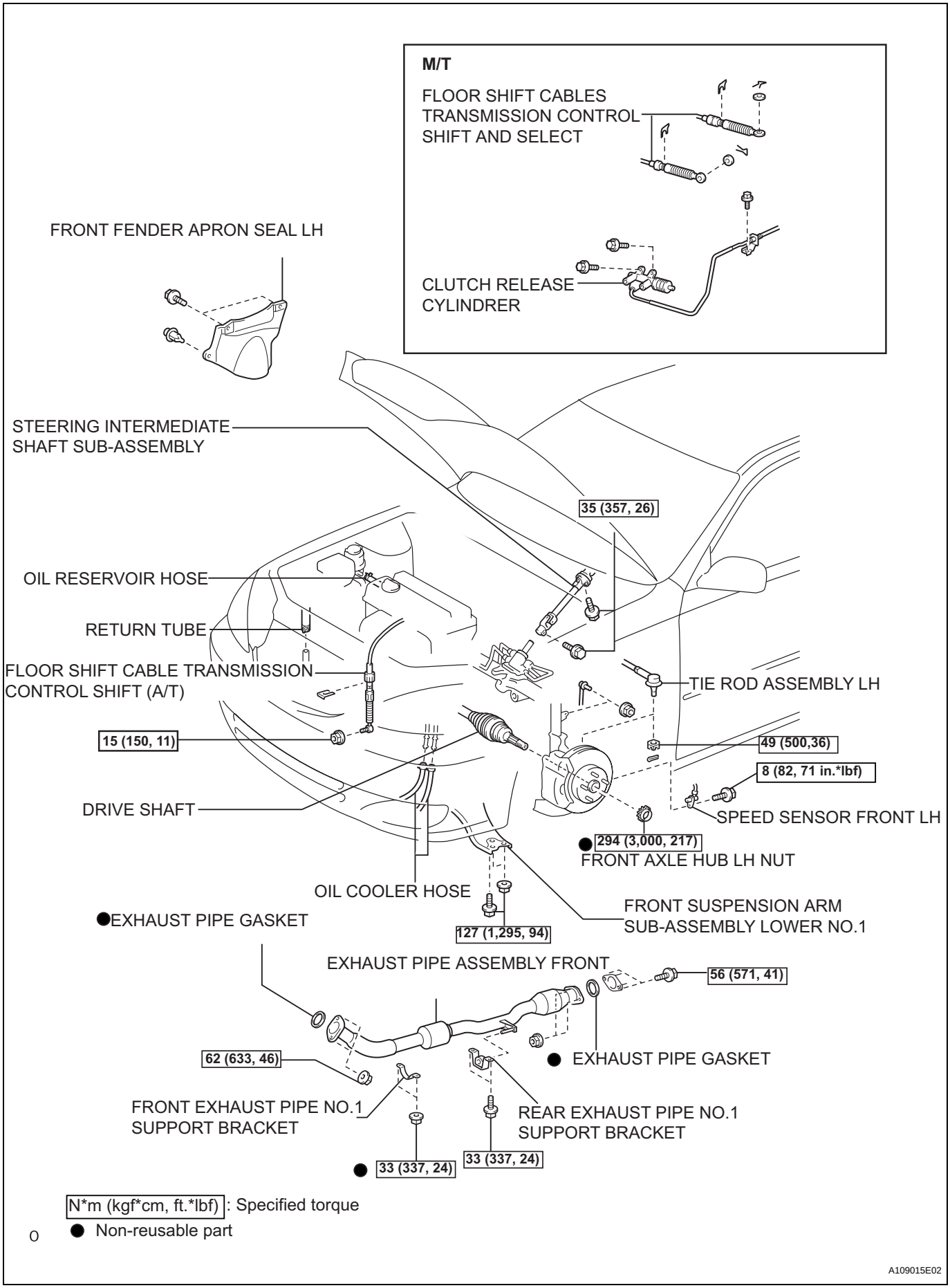
66. CHECK ABS SPEED SENSOR SIGNAL (W/ABS)
HINT:
See page BC-6

EM

ENGINE ASSEMBLY

COMPONENTS

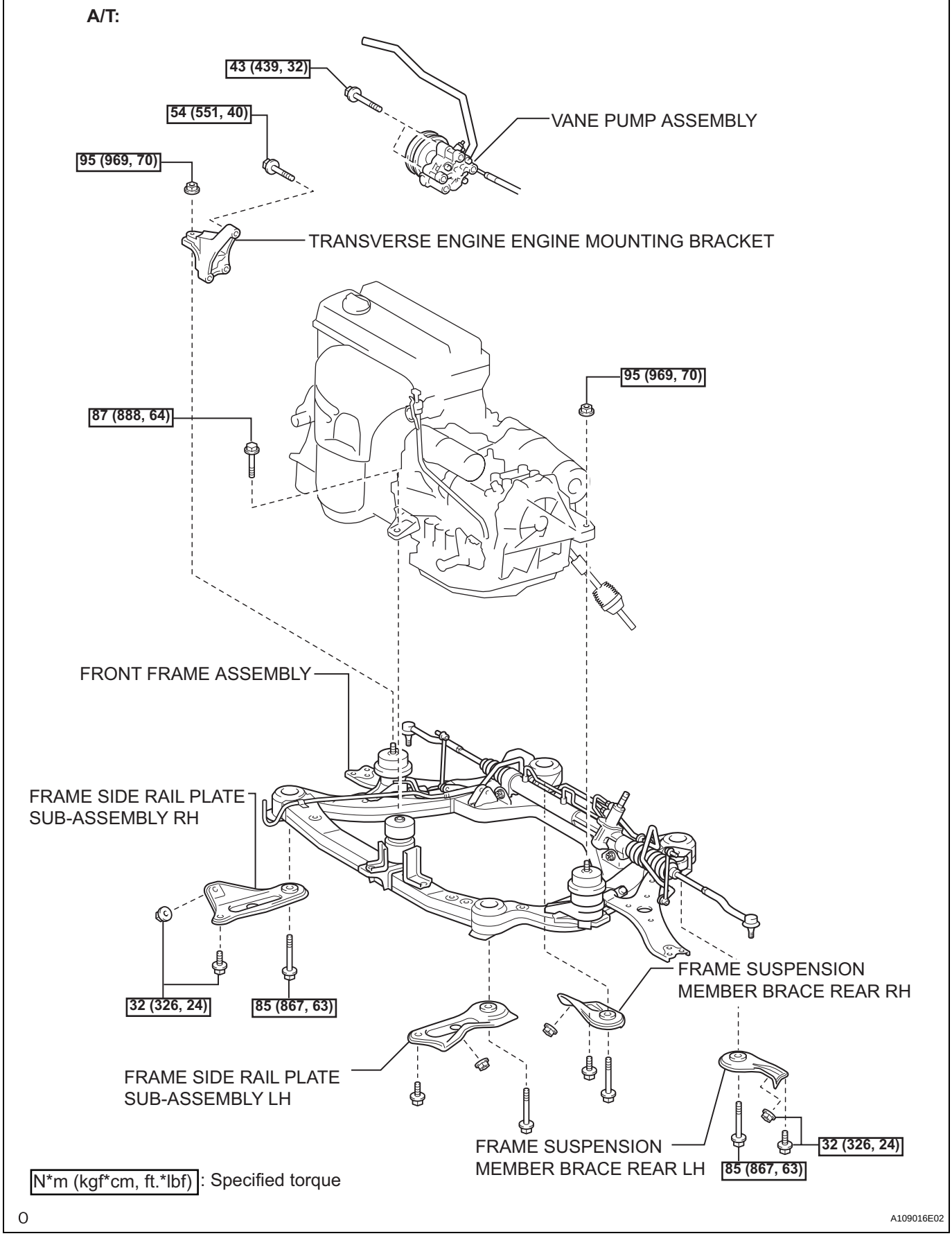


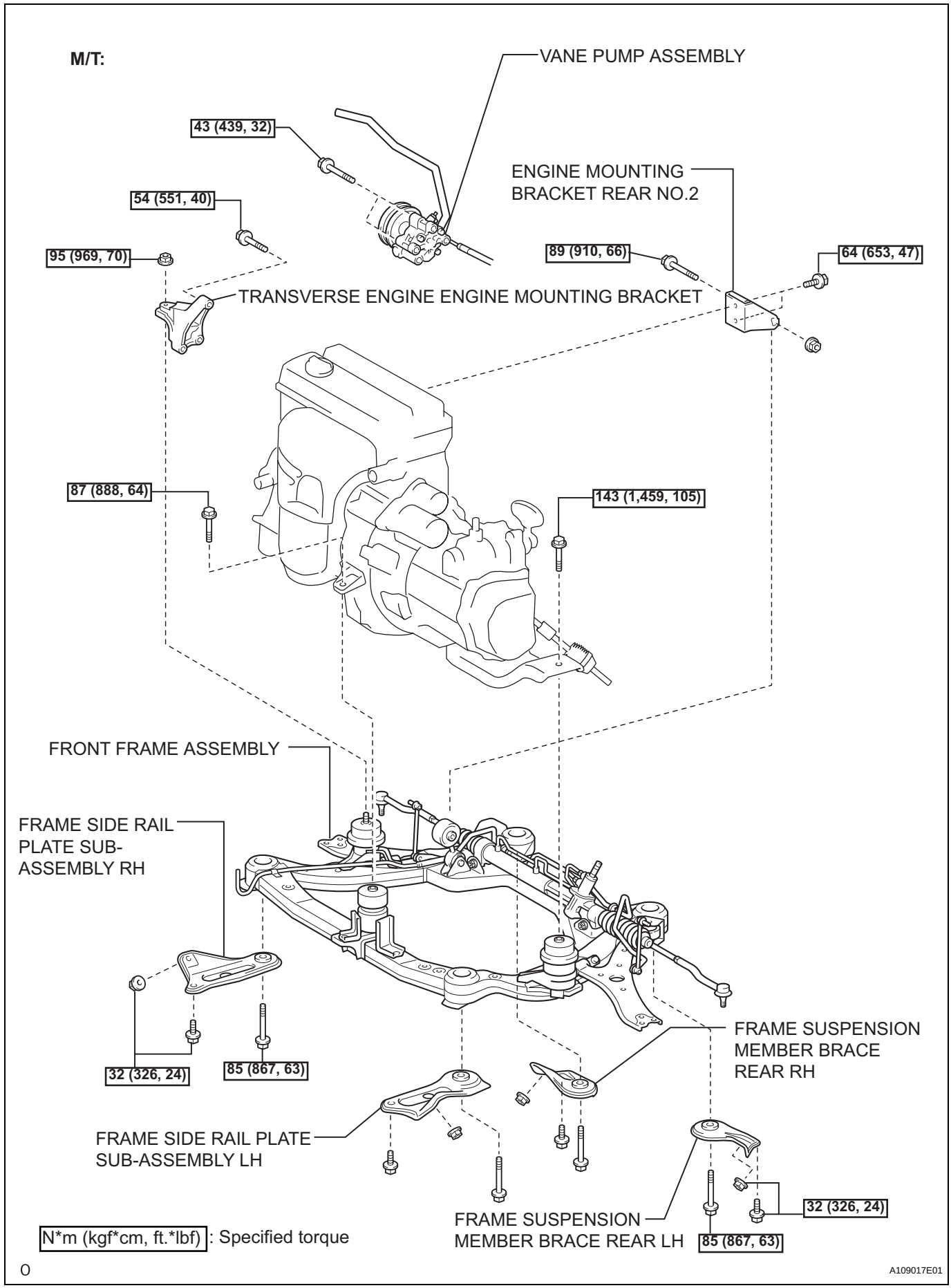


N*m (kgf*cm, ft.*lbf): Specified torque

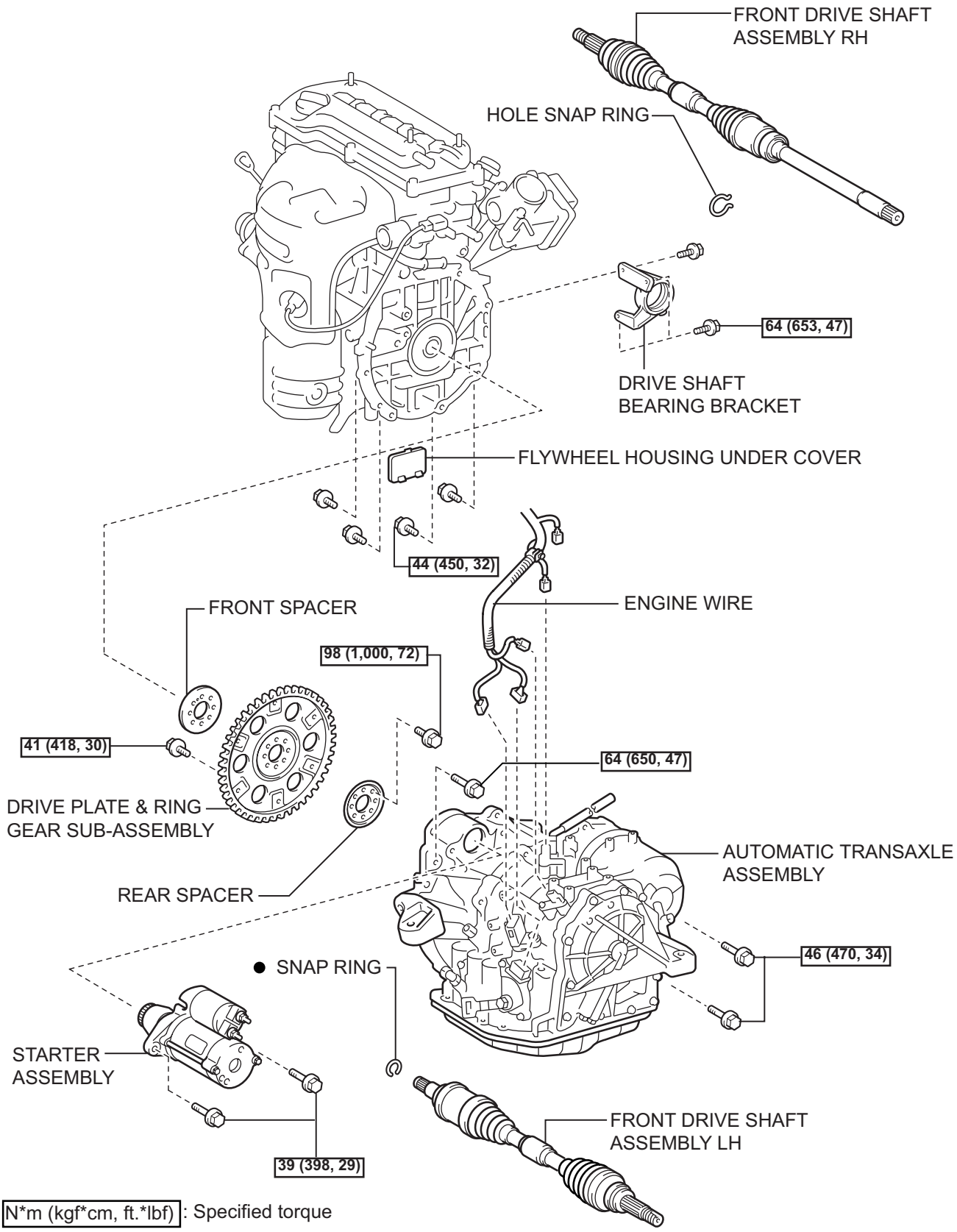
● Non-reusable part

A109015E02


A/T:
43 (439, 32)
54 (551, 40)
95 (969, 70)
VANE PUMP ASSEMBLY
TRANSVERSE ENGINE ENGINE MOUNTING BRACKET
95 (969, 70)
87 (888, 64)
FRONT FRAME ASSEMBLY
FRAME SIDE RAIL PLATE SUB-ASSEMBLY RH
32 (326, 24)
85 (867, 63)
FRAME SUSPENSION MEMBER BRACE REAR RH
FRAME SIDE RAIL PLATE SUB-ASSEMBLY LH
FRAME SUSPENSION MEMBER BRACE REAR LH
32 (326, 24)
85 (867, 63)
N*m (kgf*cm, ft.*lbf): Specified torque
A109016E02


M/T:
VANE PUMP ASSEMBLY
43 (439, 32)
ENGINE MOUNTING BRACKET REAR NO.2
54 (551, 40)
95 (969, 70)
89 (910, 66)
64 (653, 47)
TRANSVERSE ENGINE ENGINE MOUNTING BRACKET
87 (888, 64)
143 (1,459, 105)
FRONT FRAME ASSEMBLY
FRAME SIDE RAIL PLATE SUB-ASSEMBLY RH
FRAME SUSPENSION MEMBER BRACE REAR RH
32 (326, 24)
85 (867, 63)
FRAME SIDE RAIL PLATE SUB-ASSEMBLY LH
FRAME SUSPENSION MEMBER BRACE REAR LH
32 (326, 24)
85 (867, 63)
N*m (kgf*cm, ft.*lbf): Specified torque
A109017E01

A/T:

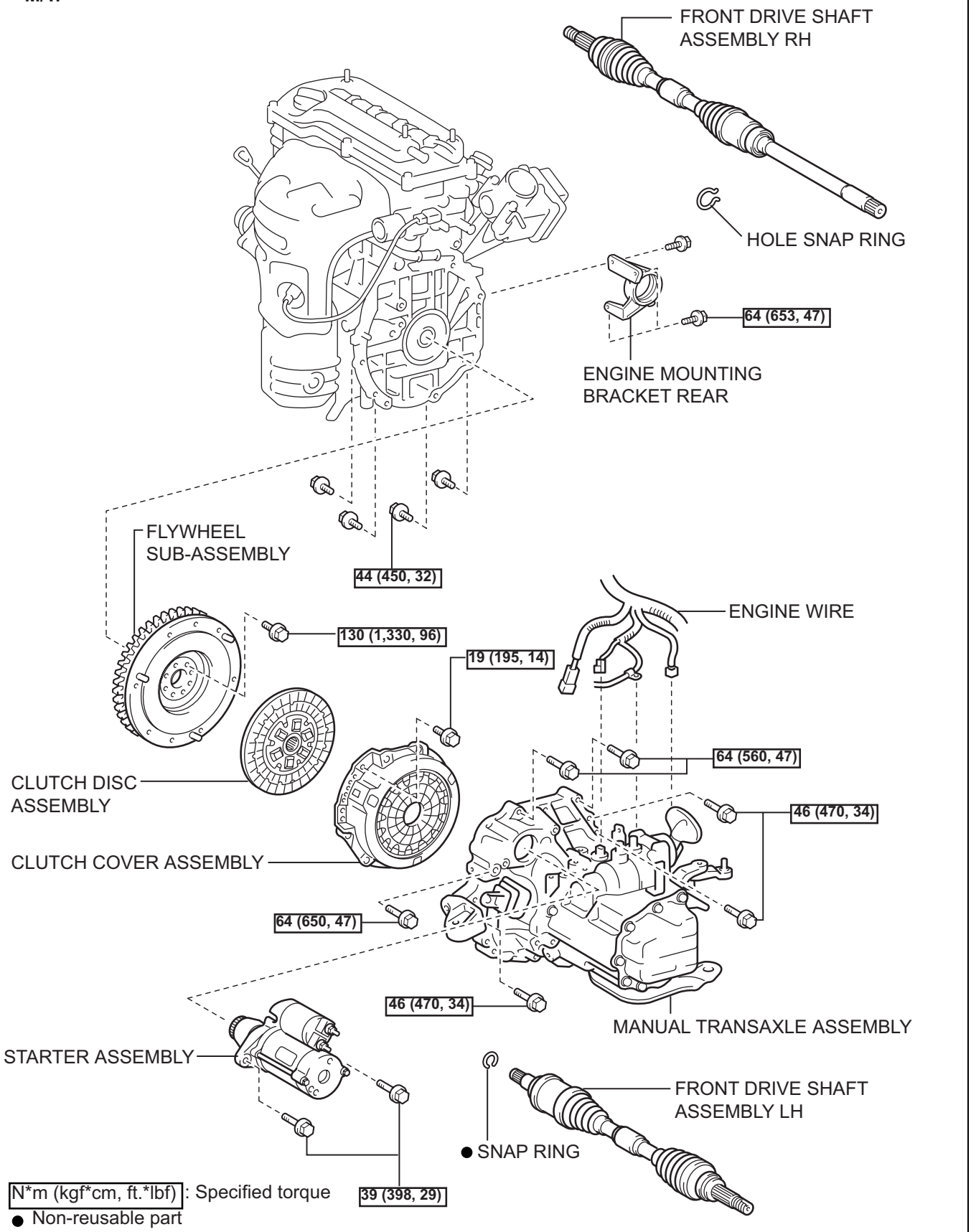


N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

A109018E01

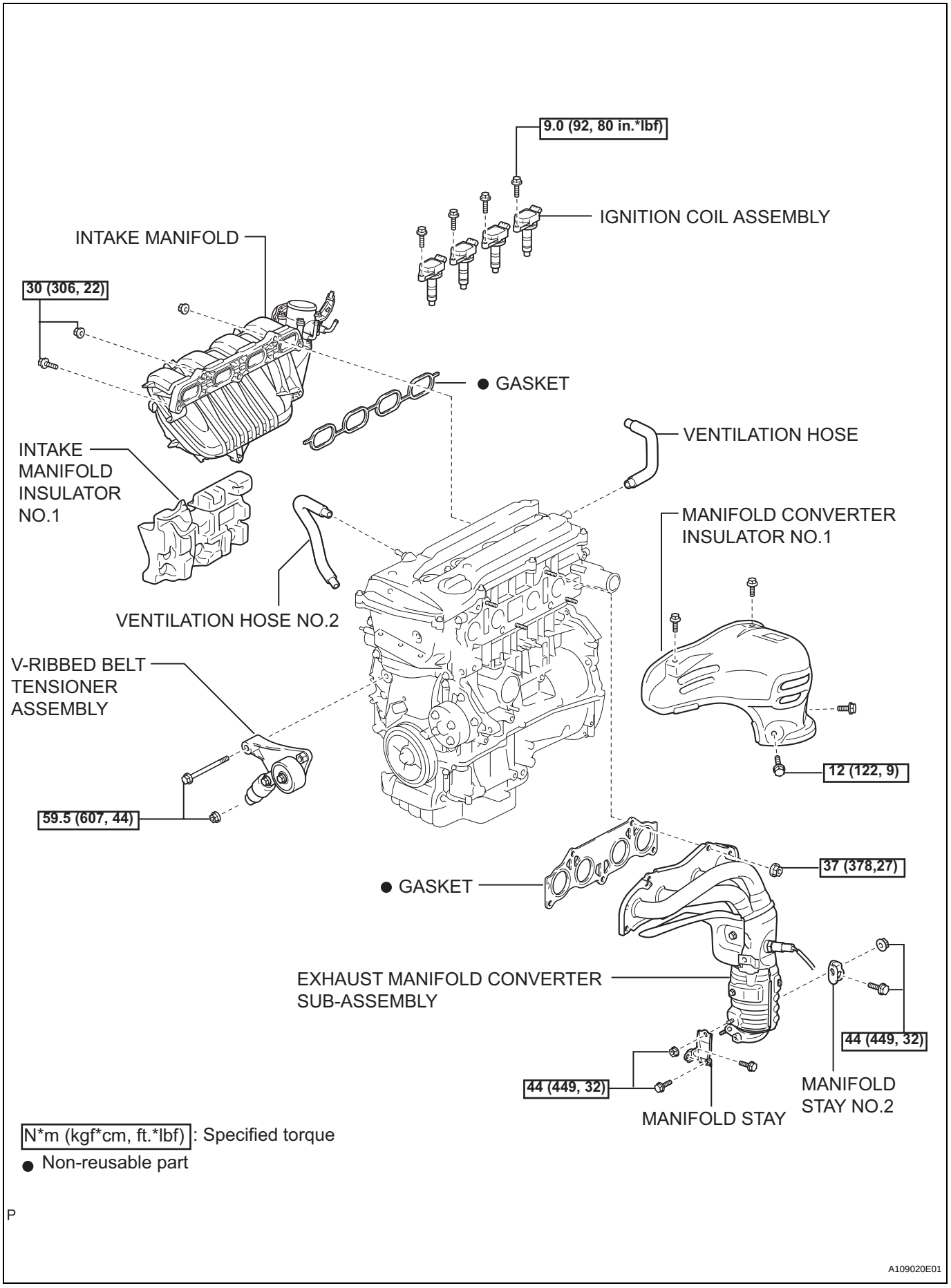
M/T:



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

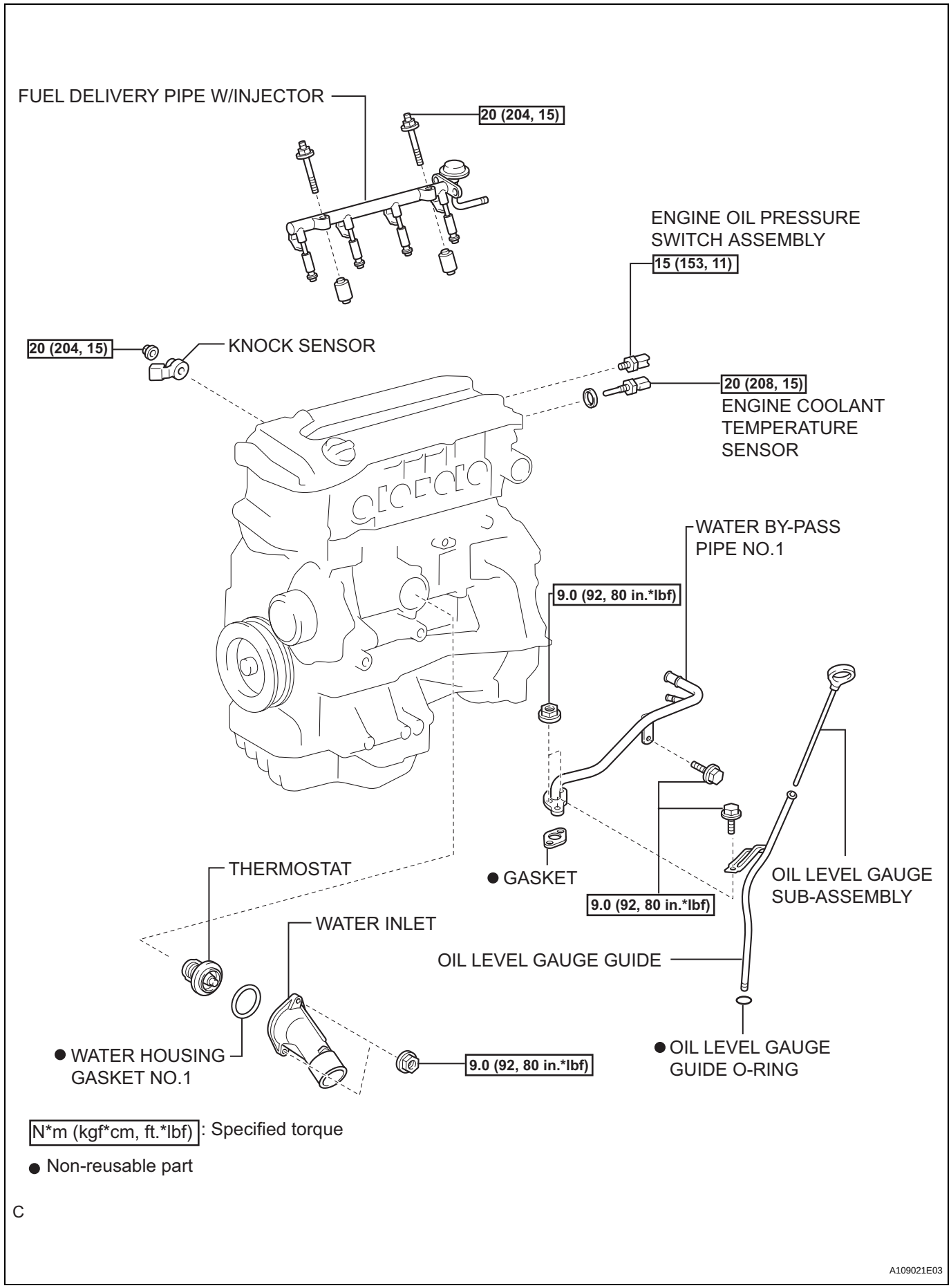
● Non-reusable part

A109019E01


9.0 (92, 80 in.*lbf)
IGNITION COIL ASSEMBLY
INTAKE MANIFOLD
30 (306, 22)
● GASKET
VENTILATION HOSE
INTAKE MANIFOLD INSULATOR NO.1
MANIFOLD CONVERTER INSULATOR NO.1
VENTILATION HOSE NO.2
V-RIBBED BELT TENSIONER ASSEMBLY
12 (122, 9)
59.5 (607, 44)
● GASKET
37 (378,27)
EXHAUST MANIFOLD CONVERTER SUB-ASSEMBLY
44 (449, 32)
44 (449, 32)
MANIFOLD STAY NO.2
MANIFOLD STAY
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
A109020E01

EM

P



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

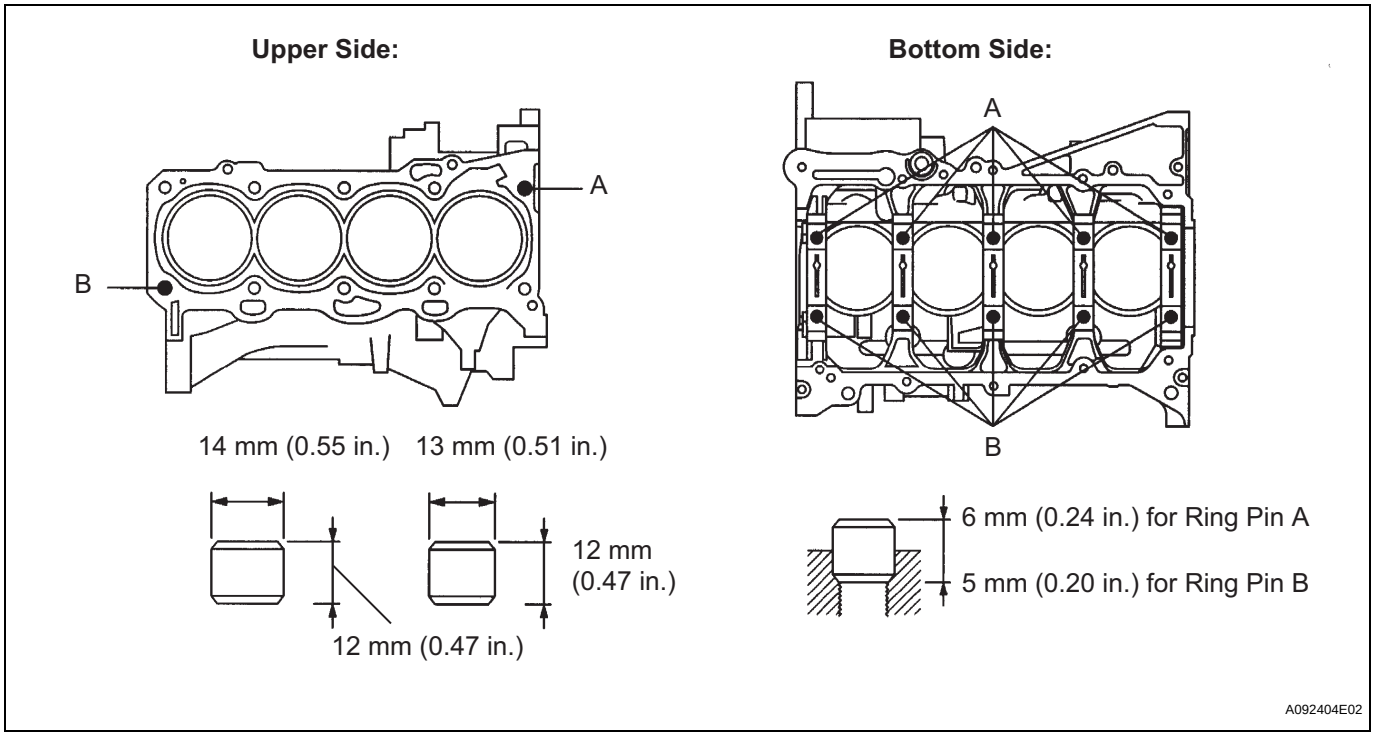
● Non-reusable part

C

REASSEMBLY

1. INSTALL RING PIN

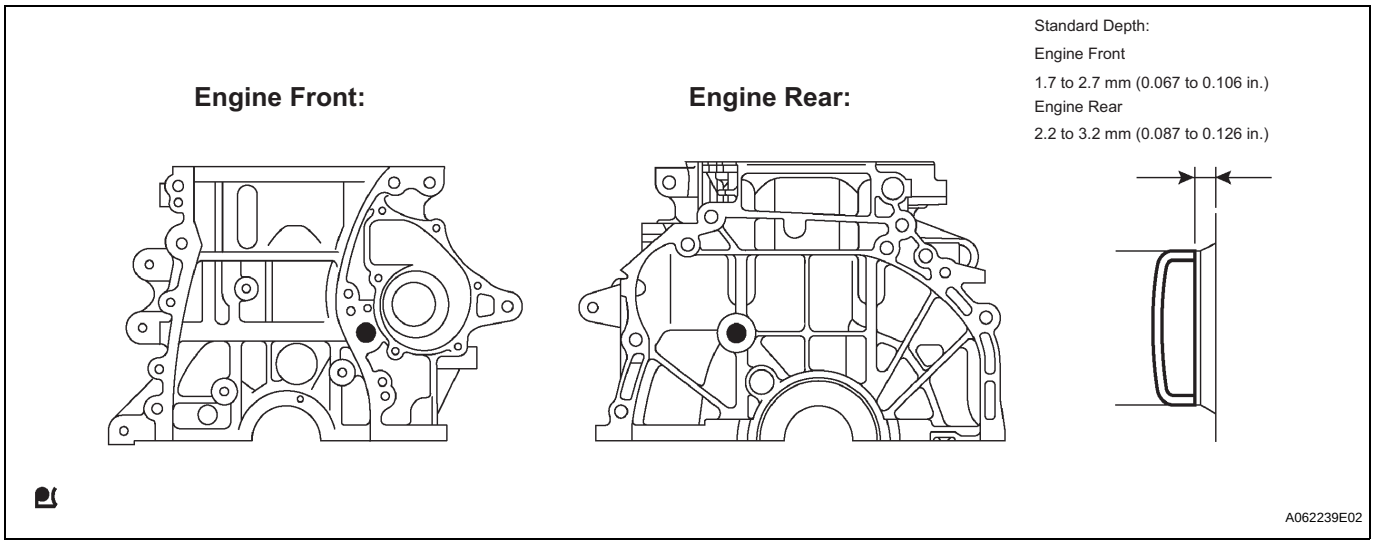
(a) Using a plastic-faced hammer, tap into the ring pin.



2. INSTALL TIGHT PLUG

(a) Apply adhesive around the tight plugs.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent.

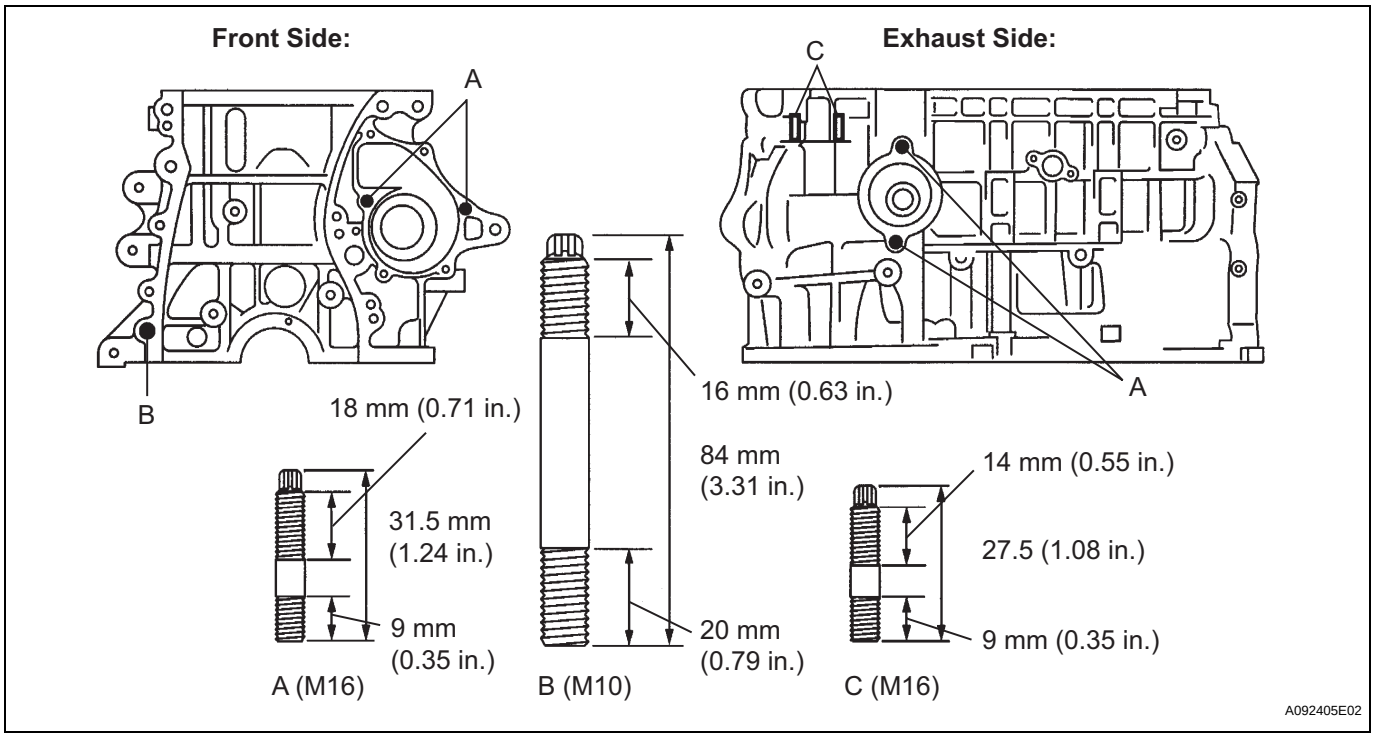
(b) Using SST, install new tight plugs as shown in the illustration.



SST 09950-60010 (09951-00200), 09950-70010 (09951-07100)

3. INSTALL STUD BOLT

(a) Install the stud bolts as shown in the illustration.

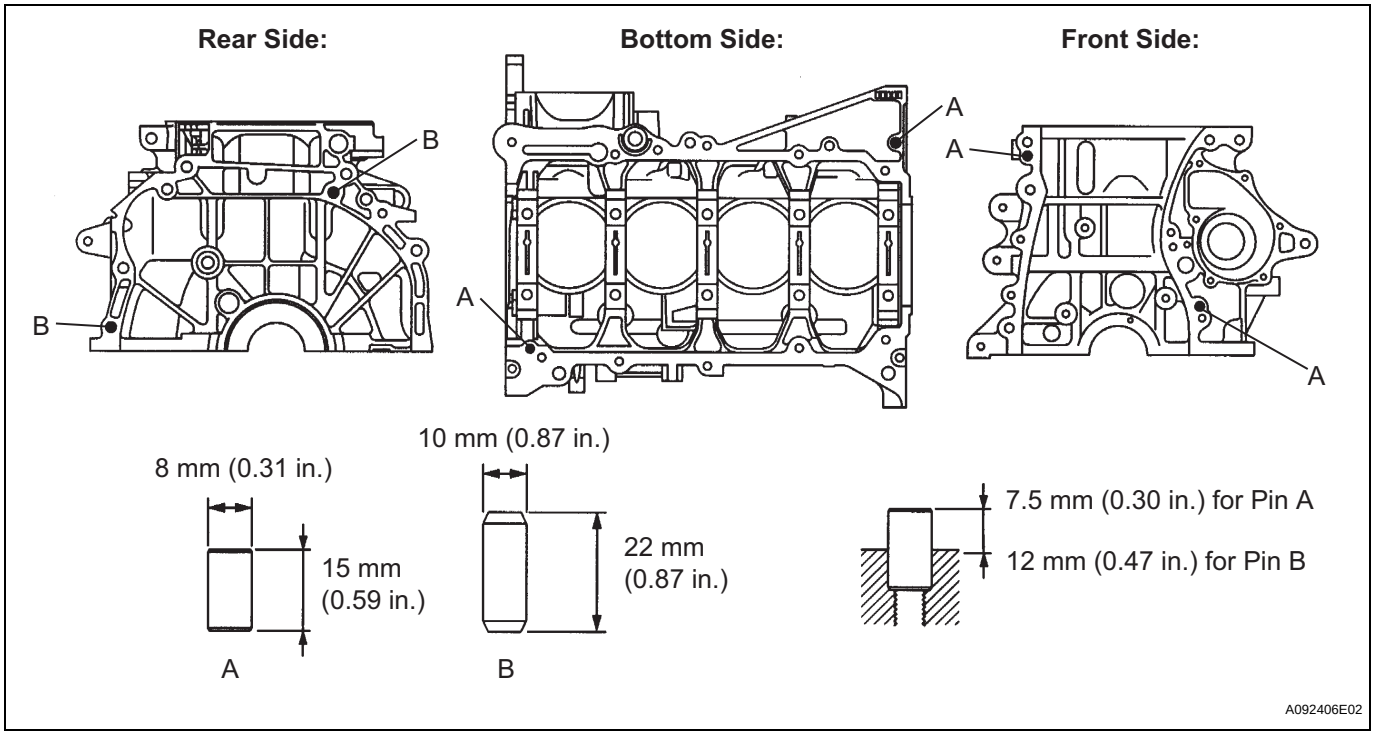


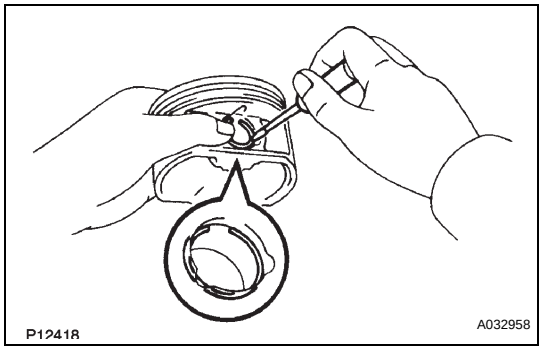
Torque: Stud Bolt A
5.0 N*m (51 kgf*cm, 44 in.*lbf)
Stud Bolt B
10 N*m (97 kgf*cm, 7 ft.*lbf)
Stud Bolt C
5.0 N*m (51 kgf*cm, 44 in.*lbf)

EM

4. INSTALL STRAIGHT PIN

(a) Using a plastic-faced hammer, tap into the straight pin.

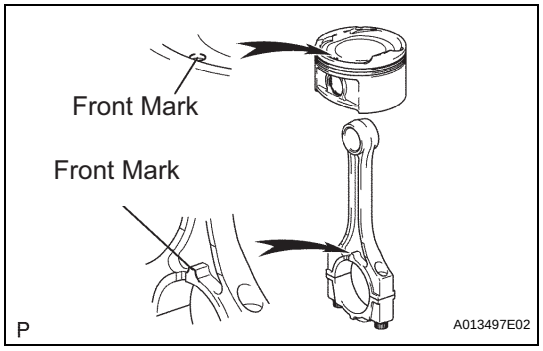




5. INSTALL PISTON

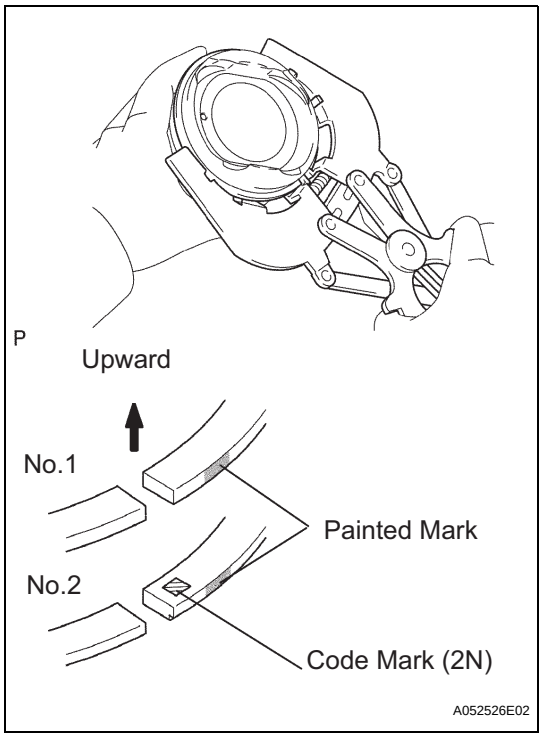
(a) Using a small screwdriver, install a new snap ring at one end of the piston pin hole.

(b) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).



(c) Align the front marks of the piston and connecting rod, and push in the piston with your thumb.

(d) Using a small screwdriver, install a new snap ring on the other end of the piston pin hole.



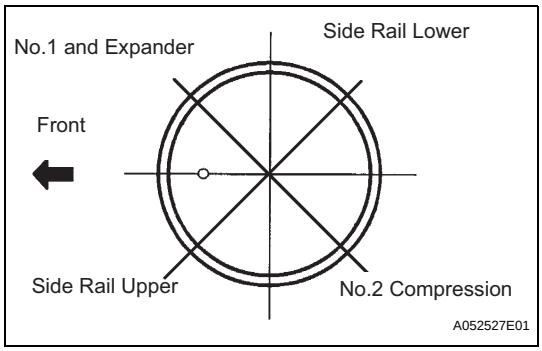
6. INSTALL PISTON RING SET

(a) Install the oil ring expander and 2 side rails by hand.

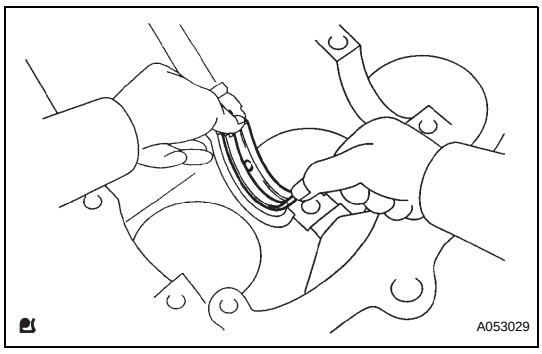
(b) Using a piston ring expander, install the 2 compression rings with the painted mark as shown in the illustration.

NOTICE:

Install the compression ring No. 2 with the code mark (2N) facing upward.



(c) Position the piston rings so that the ring ends are as shown in the illustration.

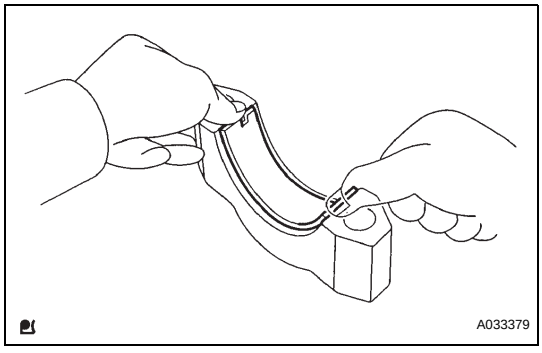


7. INSTALL CRANKSHAFT BEARING

(a) Install the upper bearing with an oil groove on the cylinder block.

NOTICE:

Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oils.

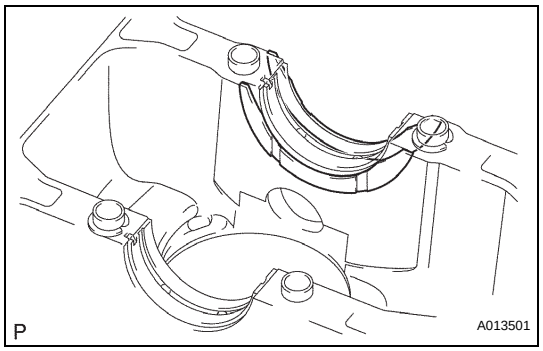


8. INSTALL CRANKSHAFT BEARING NO.2

(a) Install the lower bearing on bearing cap.

NOTICE:

Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oils.



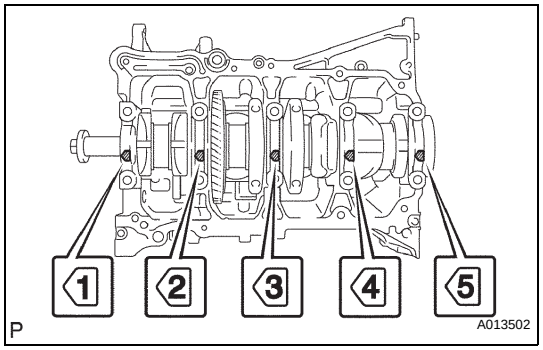
9. INSTALL CRANKSHAFT THRUST WASHER UPPER

(a) Install the 2 thrust washers under the No. 3 journal position of the cylinder block with the oil grooves facing outward.

10. INSTALL CRANKSHAFT

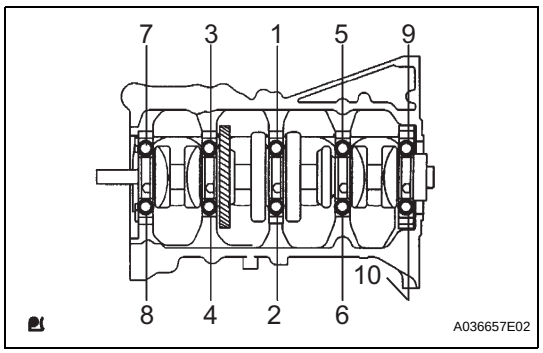
(a) Apply engine oil to upper bearing and install the crankshaft on the cylinder block.

(b) Apply engine oil to the lower bearing.

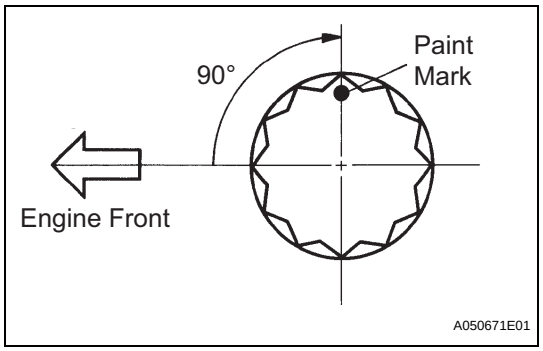


(c) Examine the front marks and install the bearing caps on the cylinder block.

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



(e) Uniformly install and tighten the 10 main bearing cap bolts in the sequence shown in the illustration.
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)

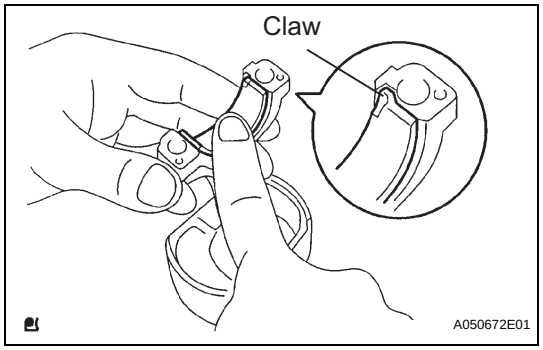


(f) Mark the front of the bearing cap bolts with paint.

(g) Retighten the bearing cap bolts by 90°in the numerical order shown in the illustration.

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

(i) Check that the crankshaft turns smoothly.



11. INSTALL CONNECTING ROD BEARING

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.
NOTICE:
Clean the backside of the bearing and the bearing surface of the connecting rod. The surface should be free of dust and oil.

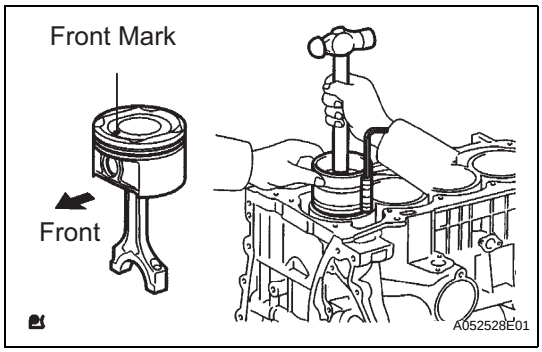
12. INSTALL PISTON

NOTICE:

The connecting rod cap bolts are tightened in 2 progressive steps.

(a) Apply engine oil to the cylinder walls, the pistons, and the surfaces of connecting rod bearings.

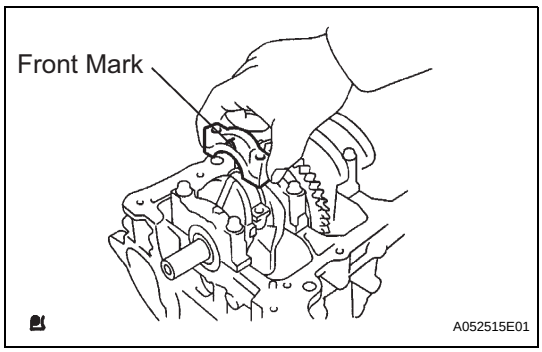
(b) Check the position of the piston ring ends.



(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.

NOTICE:

Match the numbered connecting rod cap with the connecting rod.



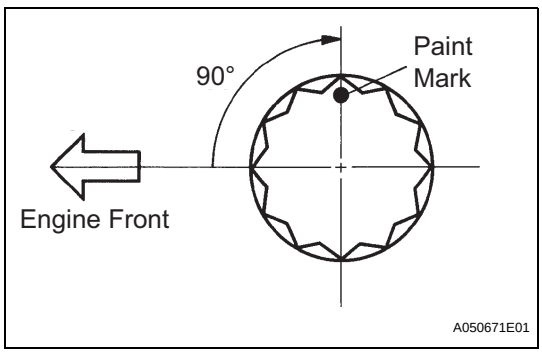
(d) Check that the protrusion of the connecting rod cap is facing in the correct direction.

(e) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.

(f) Using a 12 mm socket wrench, uniformly tighten the 2 bolts.

Torque: 25 N*m (250 kgf*cm, 18 ft.*lbf)

(g) Mark the front of the connecting cap bolts with paint.



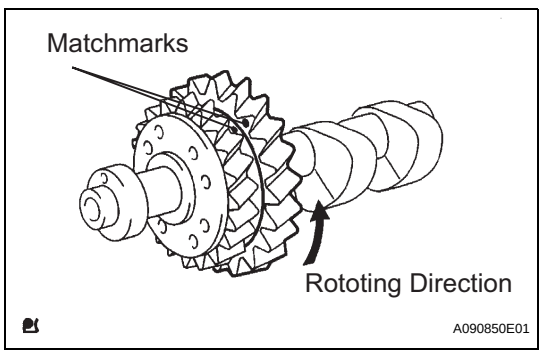
(h) Retighten the cap bolts by 90°as shown in the illustration.

(i) Check that the crankshaft turns smoothly.

13. INSTALL BALANCE SHAFT BEARING NO.1

(a) Install the bearings in the crankcase and balance shaft housing.

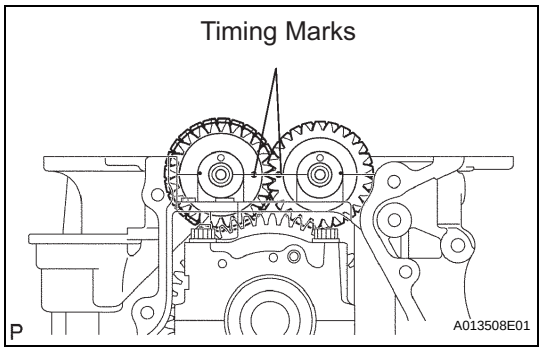
(b) Apply a light coat of engine oil on the bearings.



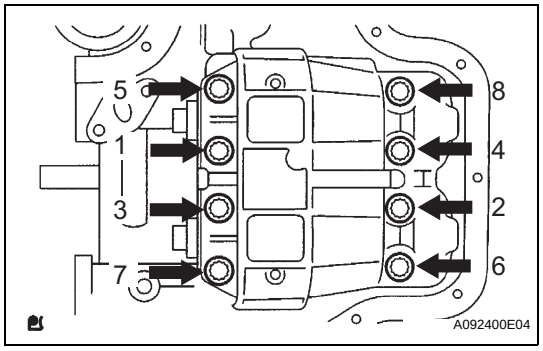
14. INSTALL BALANCE SHAFT NO.1 AND NO.2

(a) Rotate the driven gear No. 1 of balance shaft No. 1 in the rotating direction until it hits the stopper.

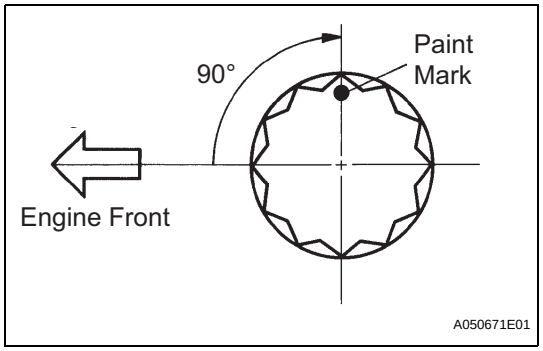
(b) Confirm that the matchmarks on driven gear No. 1 and No. 2 are matched.



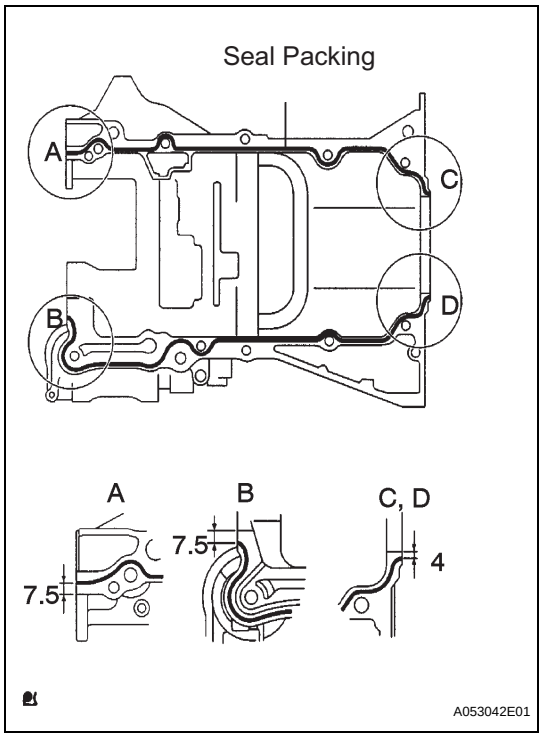
(c) Align the timing marks of the No. 1 and No. 2 balance shafts as shown in the illustration.
(d) Place the No. 1 and No. 2 balance shafts on the crankcase.
(e) Apply a light coat of engine oil under the heads of the balance shaft housing bolts.



(f) Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)
HINT:
The balance shaft housing bolts are tightened in 2 progressive steps.



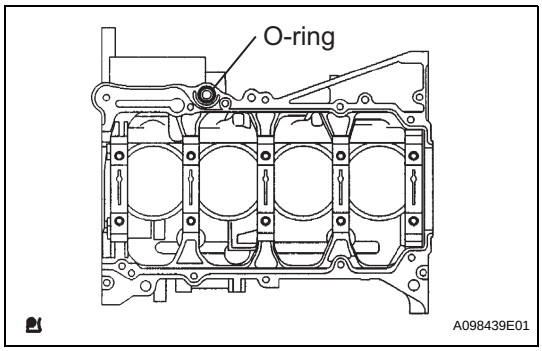
(g) Mark the front side of each balance shaft housing bolt head with paint.
(h) Retighten the bolts by 90°as shown in the illustration.
(i) Check that the painted marks are now at a 90°angle to the front.



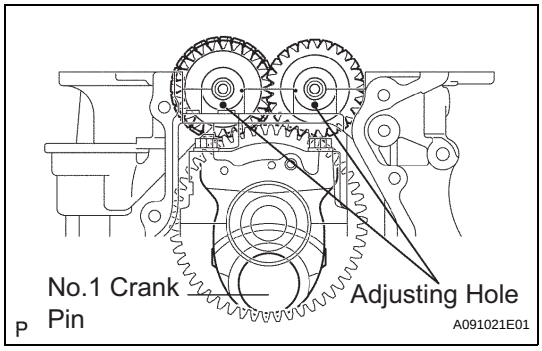
15. INSTALL STIFFENING CRANKCASE ASSEMBLY

(a) Apply seal packing in a continuous bead (diameter: 2.5 to 3 mm (0.098 to 0.118 in.)) to the places shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the crankcase within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

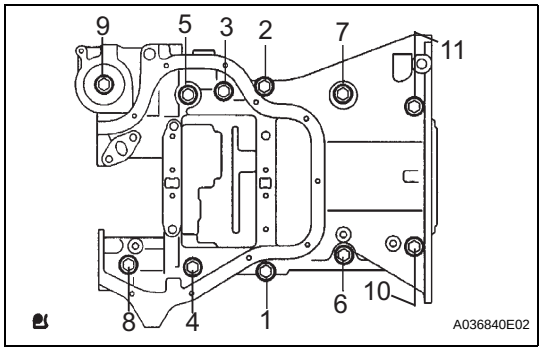
EM



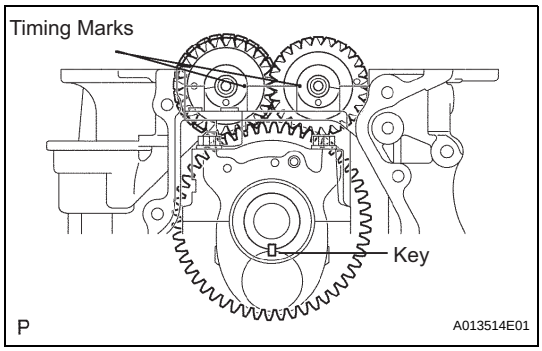
(b) Place a new O-ring on the cylinder block, as shown in the illustration.



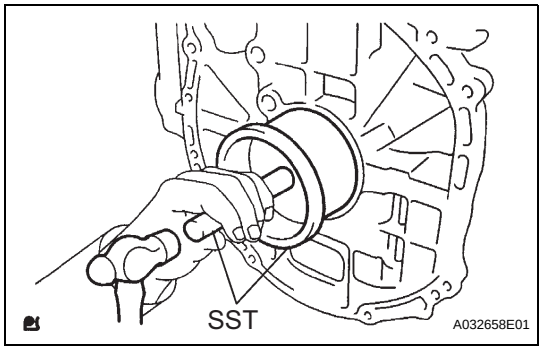
(c) With the No. 1 crank pin of the crankshaft placed at 6 o'clock, install the No. 1 and No. 2 balance shafts and the adjusting hole as shown in the illustration.



(d) Uniformly tighten the 11 bolts in the sequence shown in the illustration.
Torque: 33 N*m (332 kgf*cm, 24 ft.*lbf)



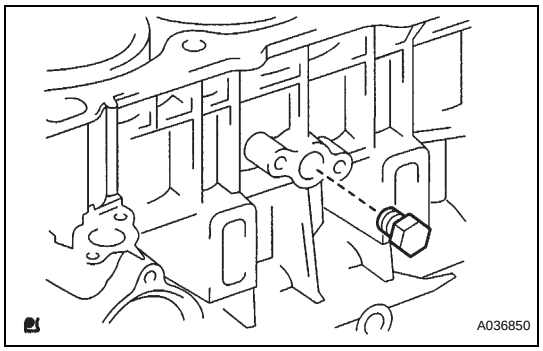
(e) Confirm that the timing marks of the balanceshafts are matched when the key groove is placed at 6 o'clock, as shown in the illustration.



16. INSTALL ENGINE REAR OIL SEAL

(a) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip free from foreign materials.

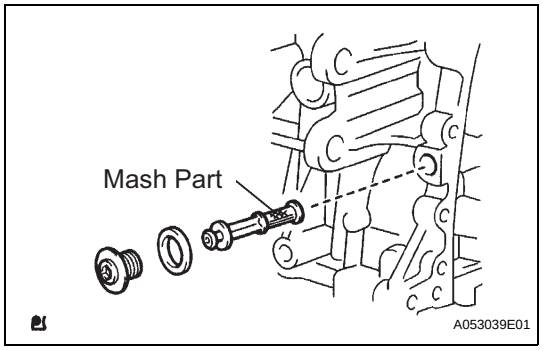
(b) Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-15030, 09950-70010 (09951-07100)
NOTICE:
Wipe off extra grease on the crankshaft.



17. INSTALL W/HEAD TAPER SCREW PLUG NO.1

(a) Apply adhesive to the threads of the plug and install it.

Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)



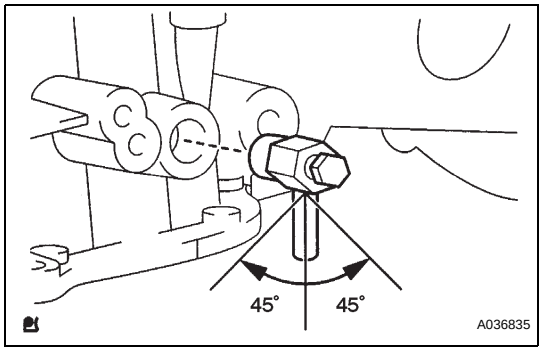
18. INSTALL OIL CONTROL VALVE FILTER

(a) Check that no foreign matter is on the mesh part of the filter.

(b) Using a 6 mm socket hexagon wrench, install a new gasket and the oil control valve filter with the screw plug.

Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

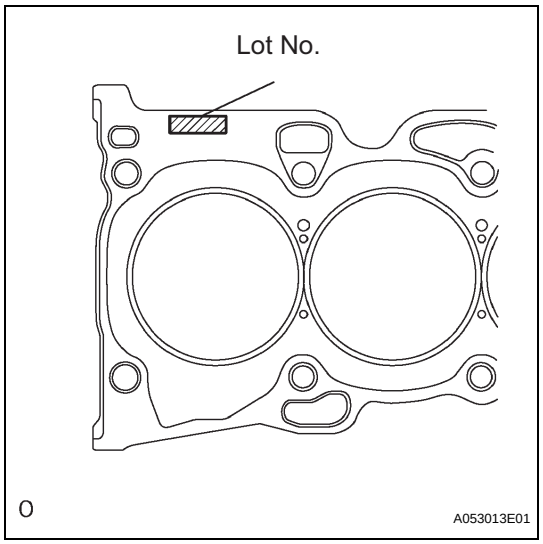
EM



19. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

(a) Install the water drain cock within the range shown in the illustration.

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



20. INSTALL CYLINDER HEAD GASKET

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

NOTICE:
- **Remove any oil from the contact surface.**
- **Be careful of the installation direction.**
- **To avoid damage to the gasket, place the cylinder head on the gasket carefully.**

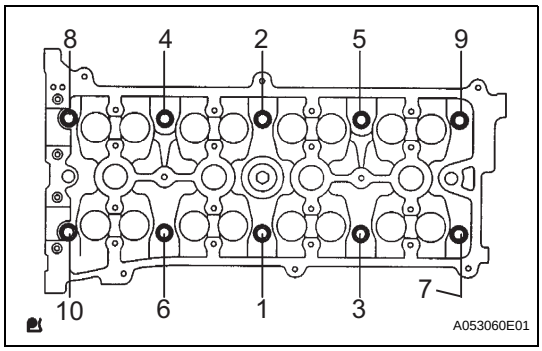
21. INSTALL CYLINDER HEAD SUB-ASSEMBLY

HINT:
The cylinder head bolts are tightened in 2 progressive steps.

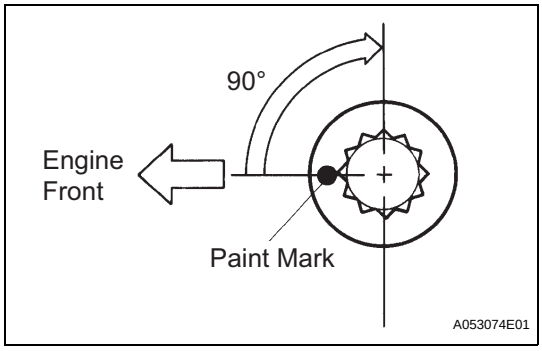
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install the 10 bolts and plate washers to the cylinder head.

NOTICE:
Do not drop the washers into the cylinder head.

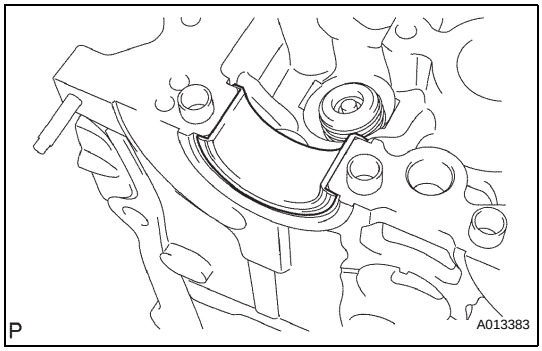


(c) Using a 10 mm bi-hexagon wrench, uniformly tighten the 10 bolts in the sequence shown in the illustration.
Torque: 79 N*m (806 kgf*cm, 58 ft.*lbf)

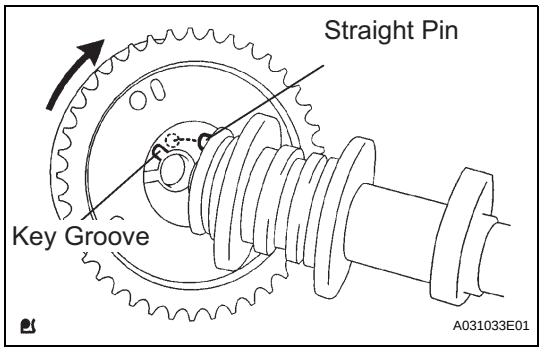


(d) Mark the front side of each cylinder head bolt with paint.
(e) Retighten the cylinder head bolts by 90° the sequence shown in the illustration.
(f) Check that the painted marks are now at a 90° angle to the front.

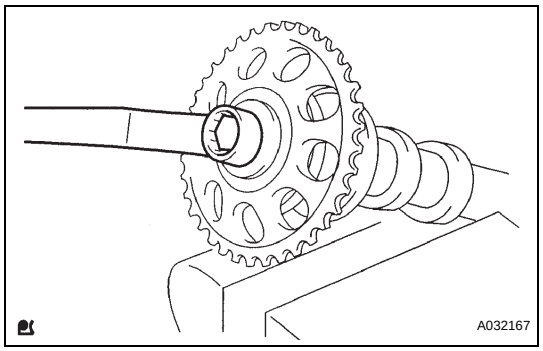
22. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



23. INSTALL CAMSHAFT BEARING NO.2
(a) Install the camshaft bering No.2.



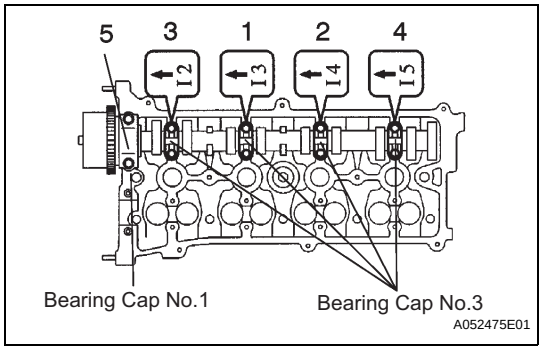
24. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY
(a) Put the camshaft timing gear against the camshaft.
(b) Turn the camshaft timing gear (in the direction shown in the illustration) while pushing it lightly against the camshaft. Push further at the position where the pin enters the groove.
NOTICE:
Be sure not to turn the camshaft timing gear to the retarded angle side (to the right direction).
(c) Check that there is no clearance between the gear's fringe and the camshaft.
(d) Tighten the fringe bolt with the camshaft timing gear fixed.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)
(e) Check that the camshaft timing gear can move to the retarded angle side (the right direction) and is locked at the extreme retarded angle position.



25. INSTALL CAMSHAFT TIMING SPROCKET

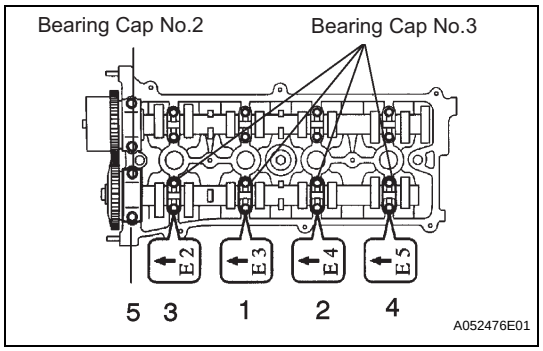
(a) Fix the camshaft with a vise, and install the sprocket with the bolt.
Torque: 54 N*m (551 kgf*cm, 40 ft.*lbf)

26. INSTALL CAMSHAFT BEARING NO.1



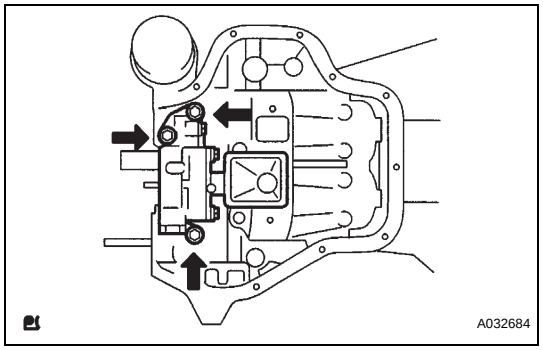
27. INSTALL CAMSHAFT

(a) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.
Torque:
Bearing cap No.1:
30 N*m (301 kgf*cm, 22 ft.*lbf)
Bearing cap No.3:
9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
- **Tighten the bolts after adjusting the position for the thrust direction of the camshaft by the bearing cap No. 1.**
- **Install the camshaft with its timing mark of the camshaft timing gear on top.**



28. INSTALL NO.2 CAMSHAFT

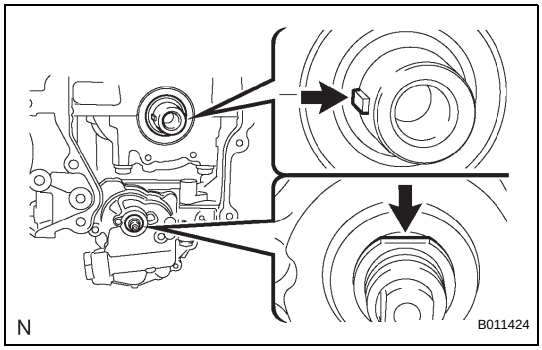
(a) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.
Torque:
Bearing cap No.2:
30 N*m (301 kgf*cm, 22 ft.*lbf)
Bearing cap No.3:
9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
- **Tighten the bolts after deciding the position for the thrust direction of the camshaft by the bearing cap No. 2.**
- **Install the camshaft with its timing mark of the camshaft timing gear on top.**



29. INSTALL OIL PUMP ASSEMBLY

(a) Install a new gasket and oil pump with the 3 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

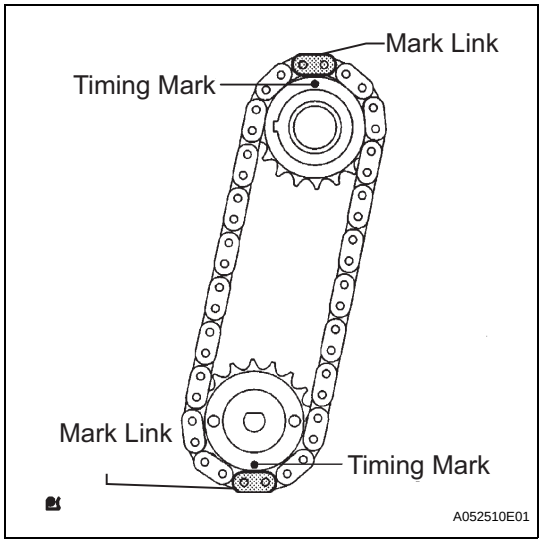
EM



30. INSTALL NO.2 CHAIN SUB-ASSEMBLY

(a) Set the crankshaft key into the left horizontal position.

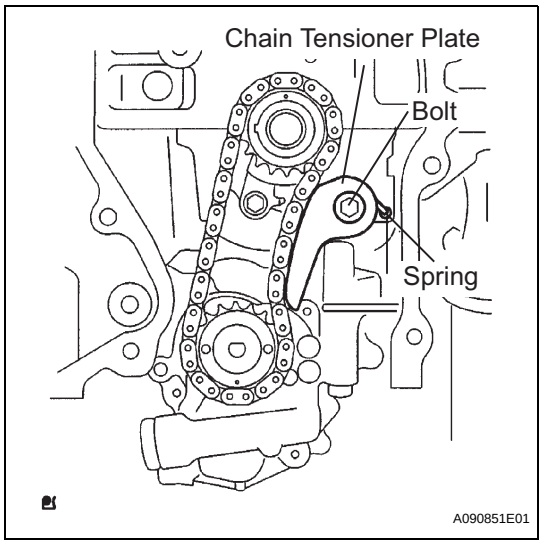
(b) Turn the cutout of the oil pump drive shaft to the top.



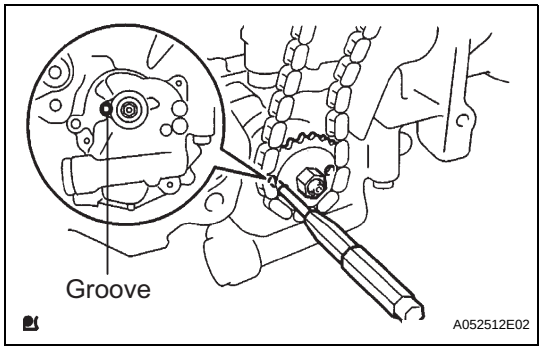
(c) Align the mark links (yellow colored links) with the timing marks of the sprockets as shown in the illustration.

(d) Insert the sprockets with chain to the crankshaft and oil pump shaft.

(e) Temporarily tighten the oil pump driven sprocket with the nut.

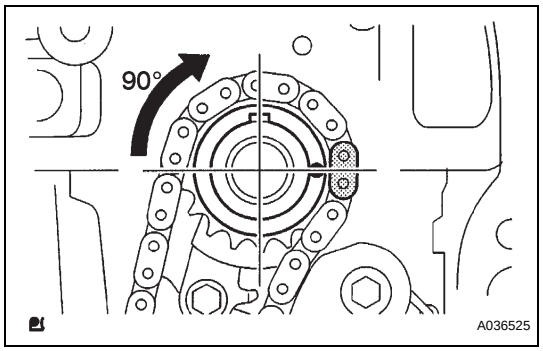


(f) Insert the damper spring into the adjusting hole, and install the chain tensioner plate with the bolt.
Torque: 12 N*m (122 kgf*cm, 9 ft.*lbf)



(g) Align the adjusting hole of the sprocket with the groove of the oil pump.

(h) Put a bar (ϕ4 mm (0.157 in.)) into the adjusting hole of the sprocket to temporarily lock the sprocket in position. Install the nut.
Torque: 30 N*m (301 kgf*cm, 22 ft.*lbf)

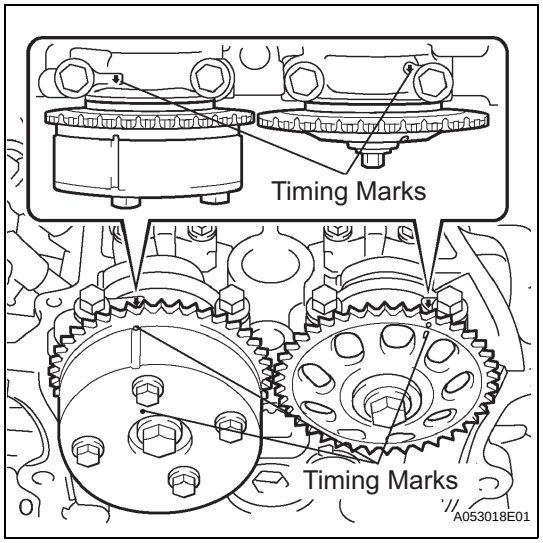


(i) Rotate the crankshaft clockwise by 90°and align the crankshaft key with the top.

31. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

32. INSTALL CHAIN VIBRATION DAMPER NO.1

(a) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

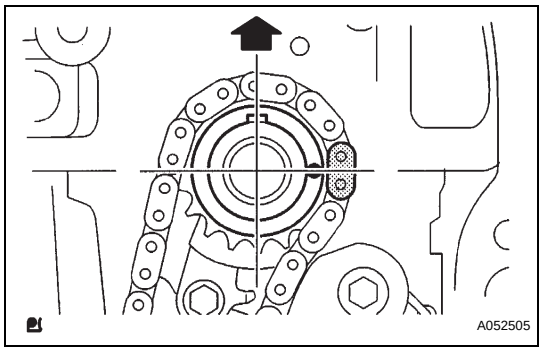


33. INSTALL CHAIN SUB-ASSEMBLY

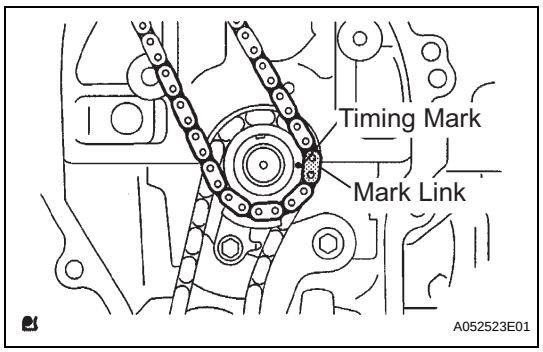
(a) Set the No. 1 cylinder to TDC/compression.

(1) Align the timing marks of the camshaft timing gear/sprocket and bearing caps (No. 1 and No. 2).

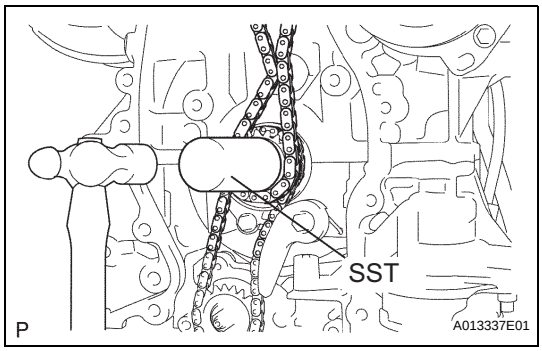
EM



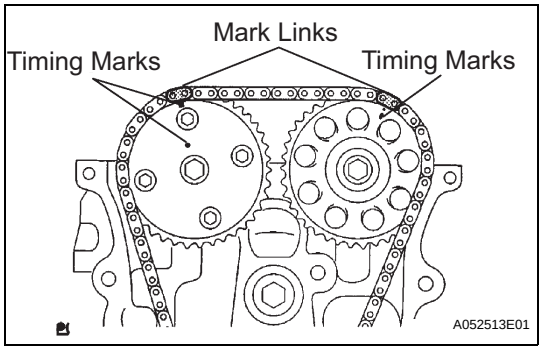
(2) Using the crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.



(b) Align the mark link (blue or orange colored link) with the timing mark of the crankshaft timing sprocket.



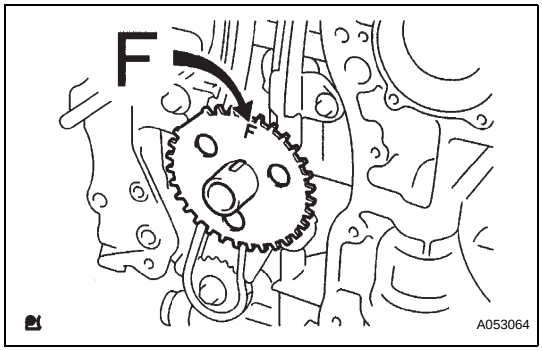
(c) Using SST, tap in the sprocket.
SST 09309-37010



(d) Align the mark links (gold or yellow colored links) with the timing marks of the camshaft timing gear and camshaft timing sprocket, and install the chain.

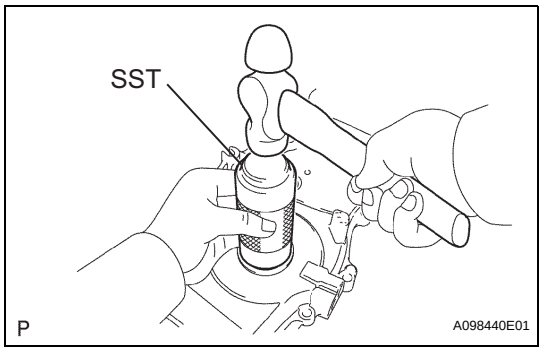
34. INSTALL CHAIN TENSIONER SLIPPER
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)

35. INSTALL TIMING CHAIN GUIDE
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



36. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the sensor plate with the F mark facing forward.



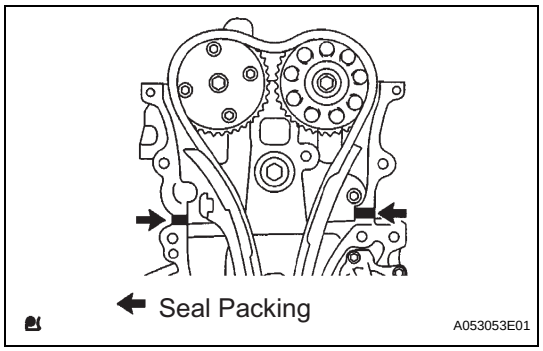
37. INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

(a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.
SST 09223-22010

(b) Apply a light coat of MP grease to the lip of the oil seal.
NOTICE:
Keep the gap between the timing chain cover edge and the oil seal free of foreign matter.

38. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.



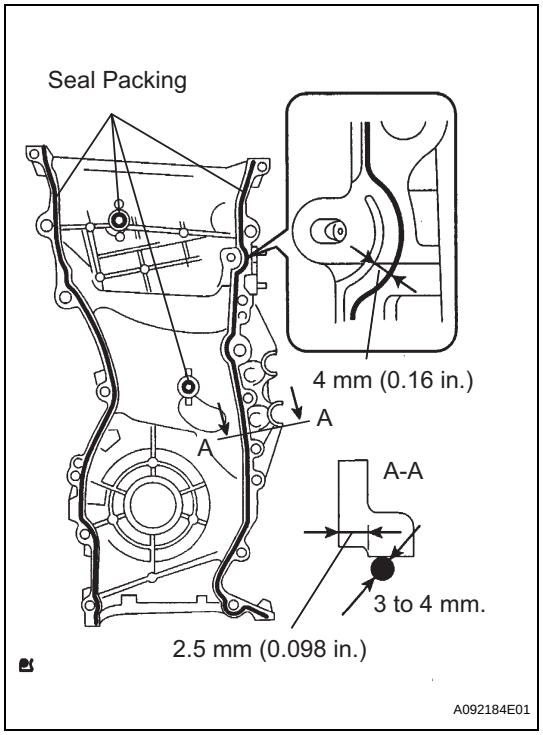
(b) Apply seal packing (diameter: 2 mm (0.09 in.)) as shown in the illustration.

Seal packing:

Part No. 08826-00080 or equivalent

NOTICE:

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

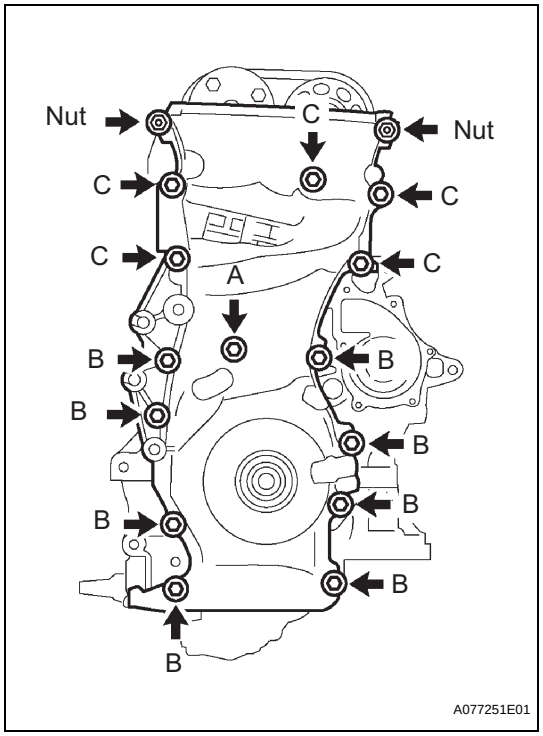


(c) Apply seal packing in a continuous bead (diameter: 3 to 4 mm (0.12 to 0.16 in.)) as shown in the illustration.

Seal packing:

Part No. 08826-00080 or equivalent

EM



(d) Install the timing chain cover with the 14 bolts and 2 nuts.

Torque: Bolt A

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

Bolt B

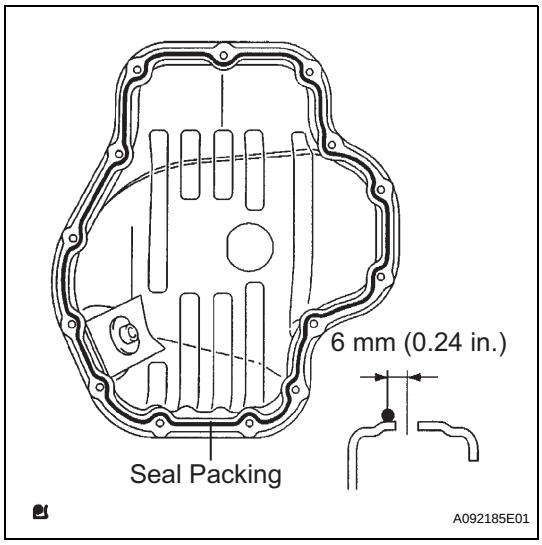
21 N*m (214 kgf*cm, 15 ft.*lbf)

Bolt C

43 N*m (438 kgf*cm, 32 ft.*lbf)

Bolt D

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



39. INSTALL OIL PAN SUB-ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.

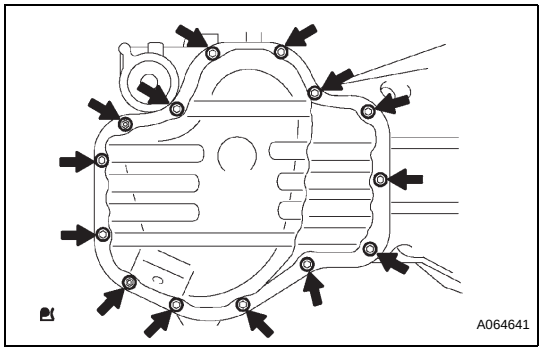
(b) Apply seal packing in a continuous bead (diameter: 3 mm to 4 mm (0.157 in.)) as shown in the illustration, and install the oil pan.

Seal packing:

Part No. 08826-00080 or equivalent

NOTICE:

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



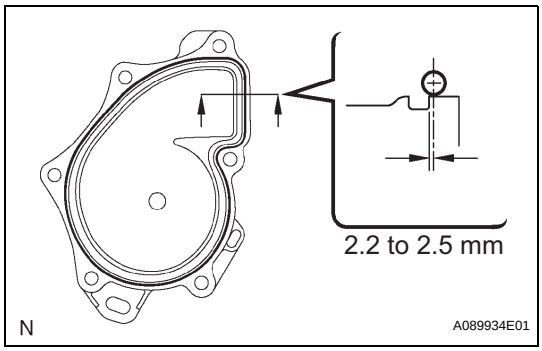
(c) Install the oil pan with the 12 bolts and 2 nuts.

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

40. INSTALL OIL PAN DRAIN PLUG

(a) Install a new gasket and oil pan drain plug with a new gasket.

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



41. INSTALL WATER PUMP ASSEMBLY

(a) Clean the contact surface of the cylinder block.

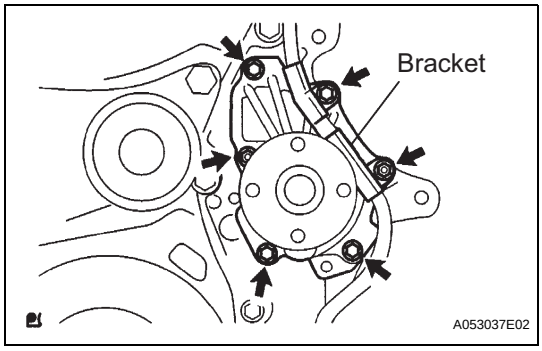
(b) Apply seal packing in a continuous bead (diameter: 2.2 to 2.5 mm (0.09 to 0.10 in.)) to the outside edge of the water pump.

Seal packing:

Part No. 08826-00100 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the water pump within 5 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**



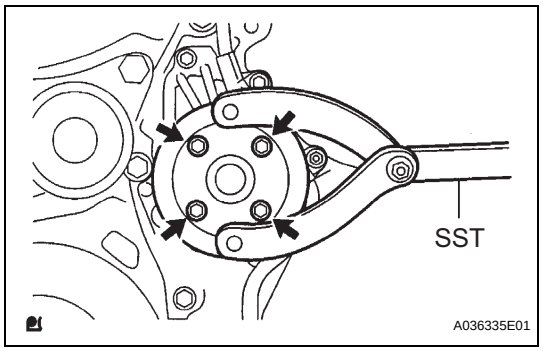
(c) Install the water pump and bracket with the 4 bolts and 2 nuts.

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

NOTICE:

Tighten the outside bolts and nuts with the clamp.

EM

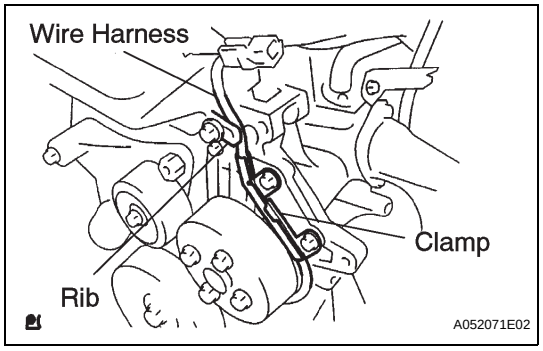


42. INSTALL WATER PUMP PULLEY

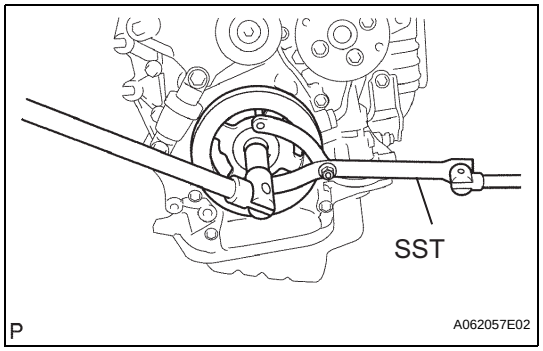
(a) Using SST, install the water pump pulley.
SST 09960-10010 (09962-01000, 09963-00700)
Torque: 26 N*m (265 kgf*cm, 19 ft.*lbf)

43. INSTALL CRANKSHAFT POSITION SENSOR

(a) Install the sensor with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)

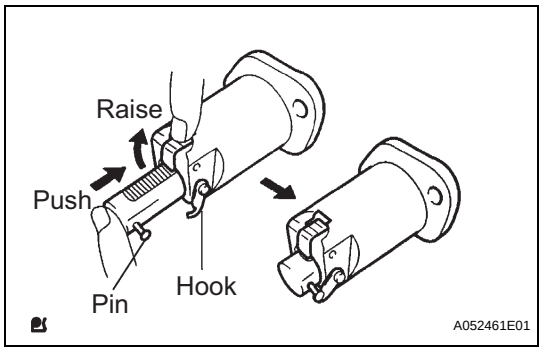


(b) Confirm that the wire harness of the sensor is placed as shown in the illustration.



44. INSTALL CRANKSHAFT PULLEY

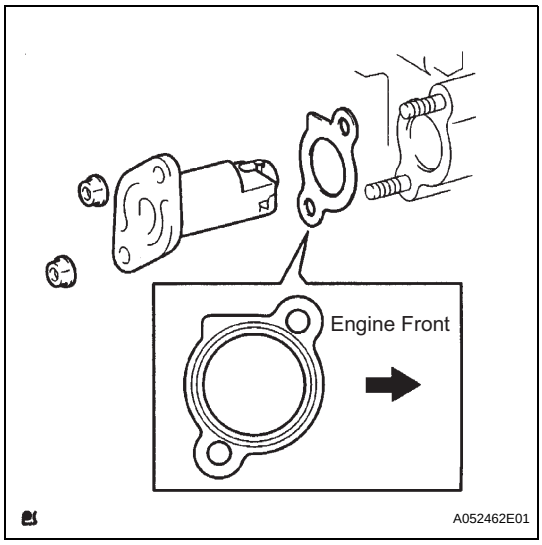
(a) Install the pulley.
(b) Using SST, tighten the bolt.
SST 09960-10010 (09962-01000, 09963-01000)
Torque: 170 N*m (1,733 kgf*cm, 125 ft.*lbf)



45. INSTALL NO.1 CHAIN TENSIONER ASSEMBLY

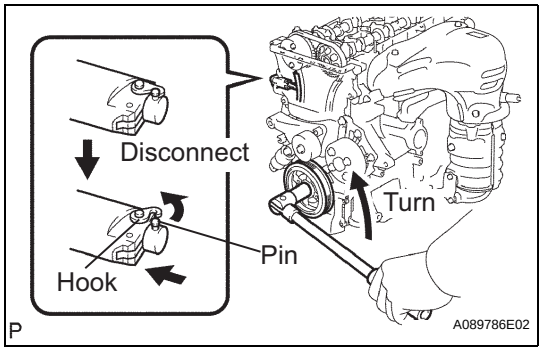
(a) Raise the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.

EM

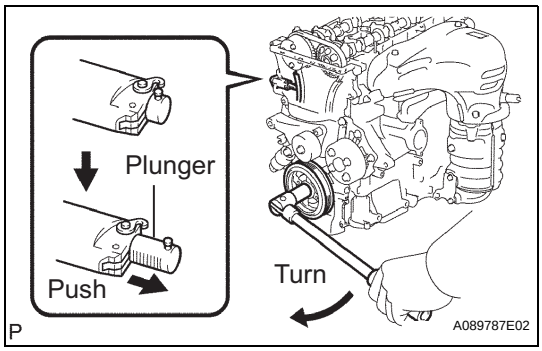


(b) Install a new gasket and the chain tensioner with the 2 nuts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
NOTICE:
If the hook is released while inserting, apply the hook again, and insert the chain tensioner.

EM



(c) Turn the crankshaft counterclockwise and check that the plunger knock pin is disconnected from the hook.



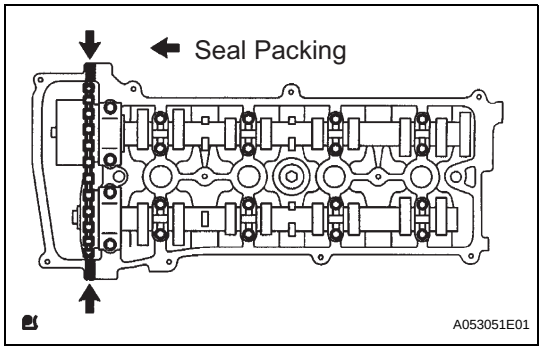
(d) Turn the crankshaft clockwise and check that the slipper is pushed by the plunger.

46. INSPECT VALVE CLEARANCE
HINT:
See page EM-7

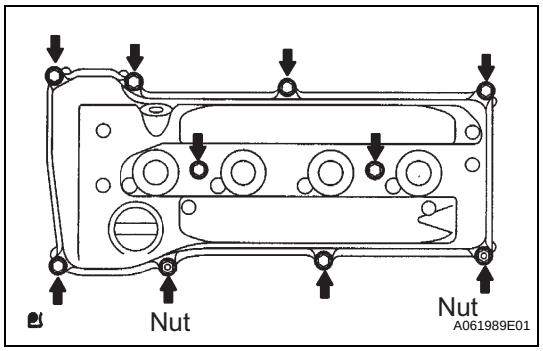
47. ADJUST VALVE CLEARANCE (See page EM-8)

48. INSTALL CYLINDER HEAD COVER GASKET
(a) Install the gasket to the cylinder head cover.

49. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY
(a) Remove any old packing (FIPG) material.



(b) Apply seal packing to the 2 locations shown in the illustration.
Seal packing:
Part No. 08826-00080 or equivalent
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 5 minutes after applying seal packing.**
- **Do not apply engine oil for at least 2 hours after installing.**



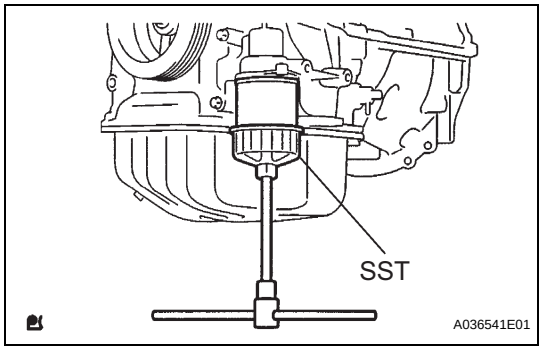
(c) Install the cylinder head cover with the 8 bolts and 2 nuts.
Torque: 11 N*m (112 kgf*cm, 8 ft.*lbf)

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

51. INSTALL VENTILATION VALVE SUB-ASSEMBLY
(a) Apply adhesive on the threads of the ventilation valve.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
Adhesive:
Part No. 08833-00070 THREE BOND 1324 or equivalent

52. INSTALL OIL FILLER CAP SUB-ASSEMBLY

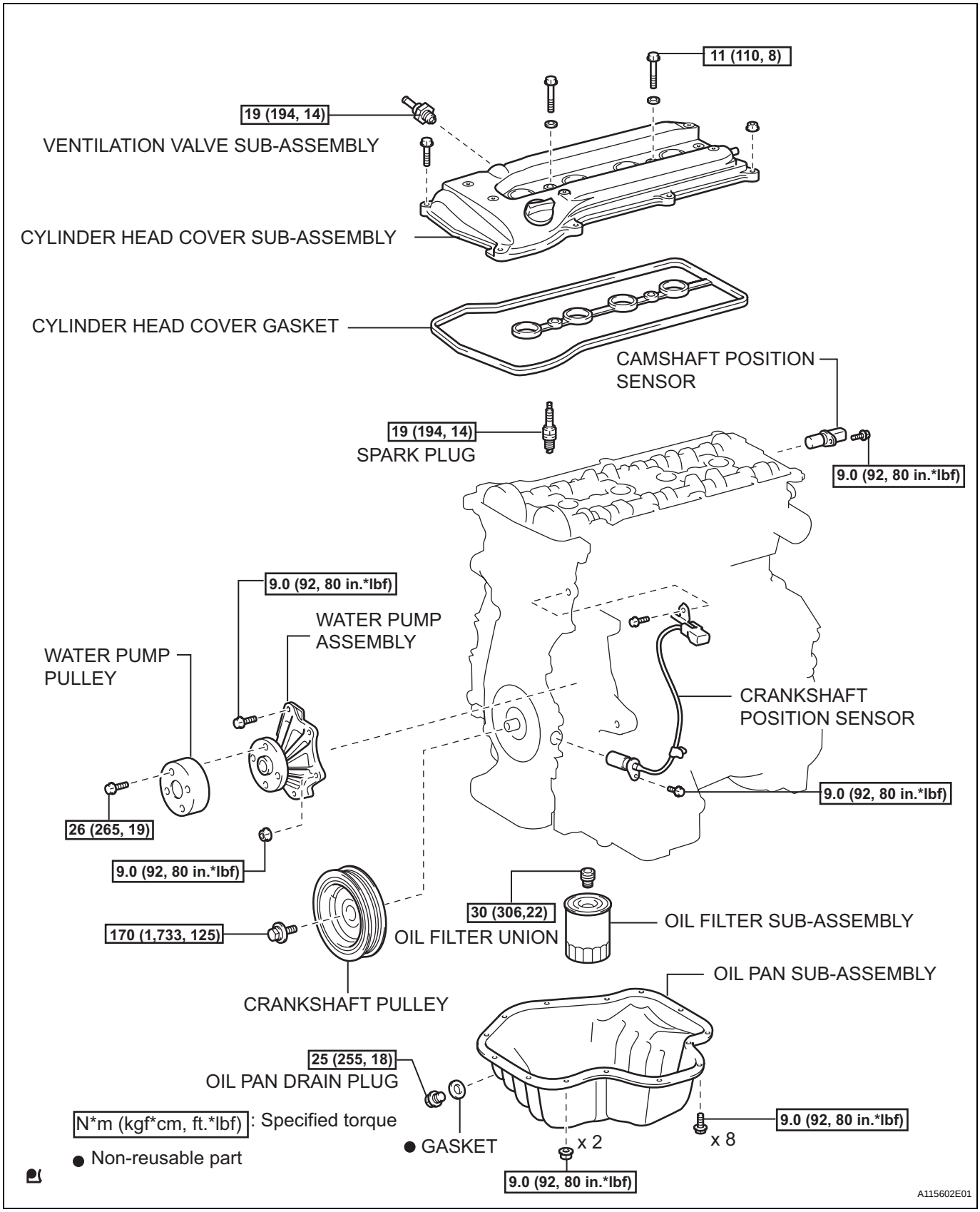
53. INSTALL OIL FILTER UNION
(a) Using a 12 mm hexagon wrench, install the oil filter union.
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

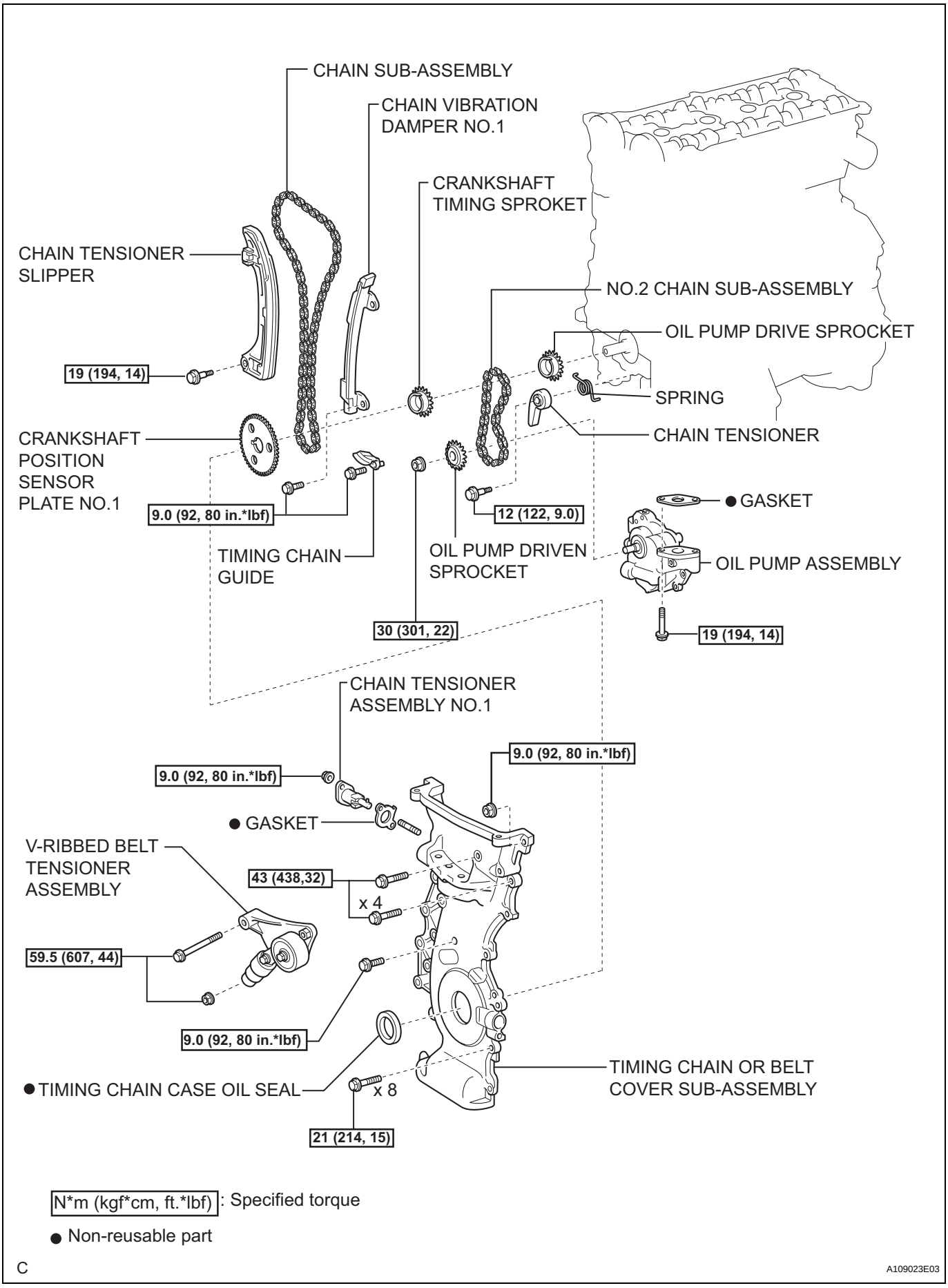


54. INSTALL OIL FILTER SUB-ASSEMBLY
(a) Check and clean the oil filter installation surface.
(b) Apply clean engine oil to the gasket of a new oil filter.
(c) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.
(d) Using SST, tighten it an additional 3/4 turn.
SST 09228-06501

ENGINE UNIT

COMPONENTS



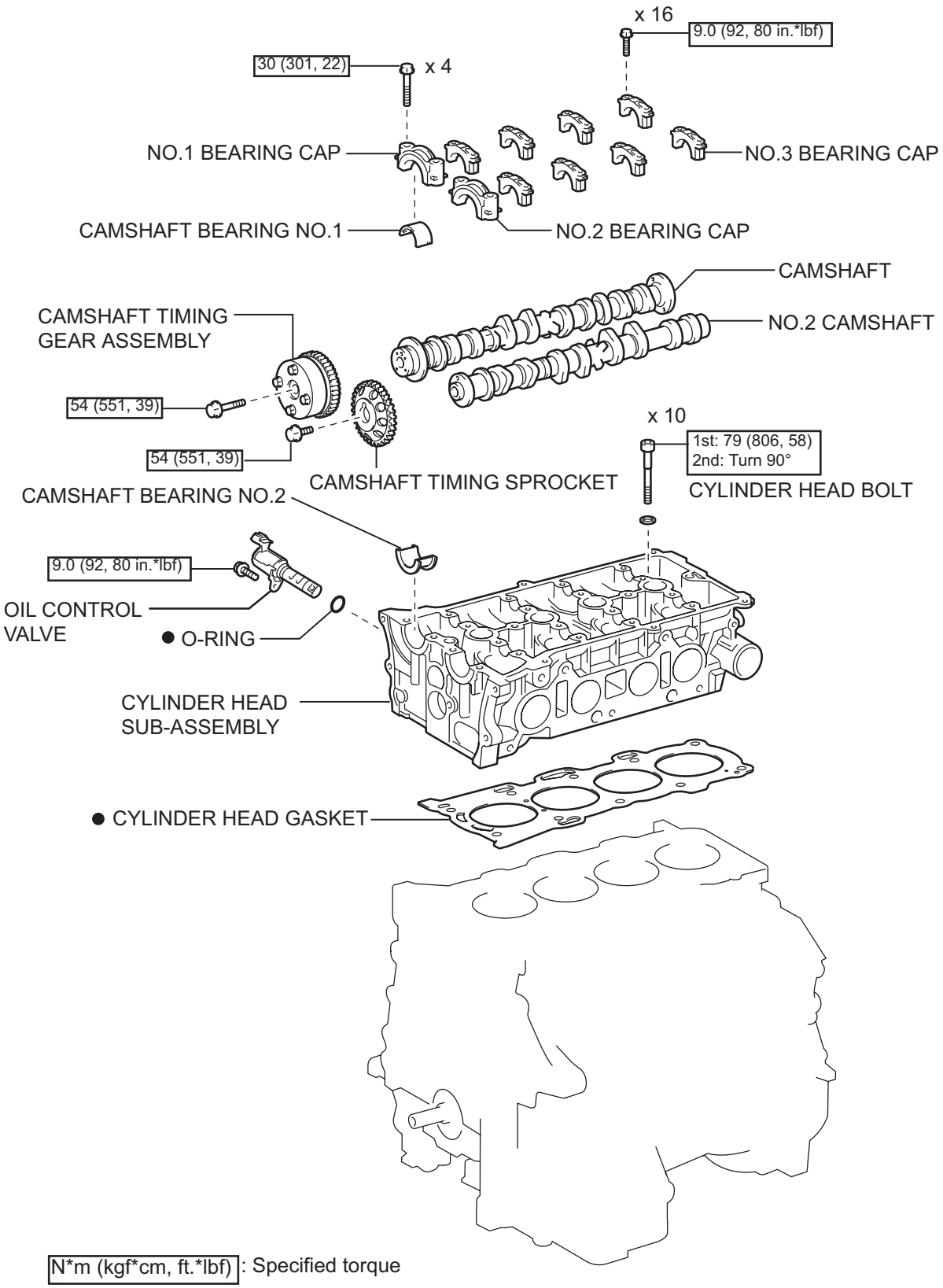


N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

C

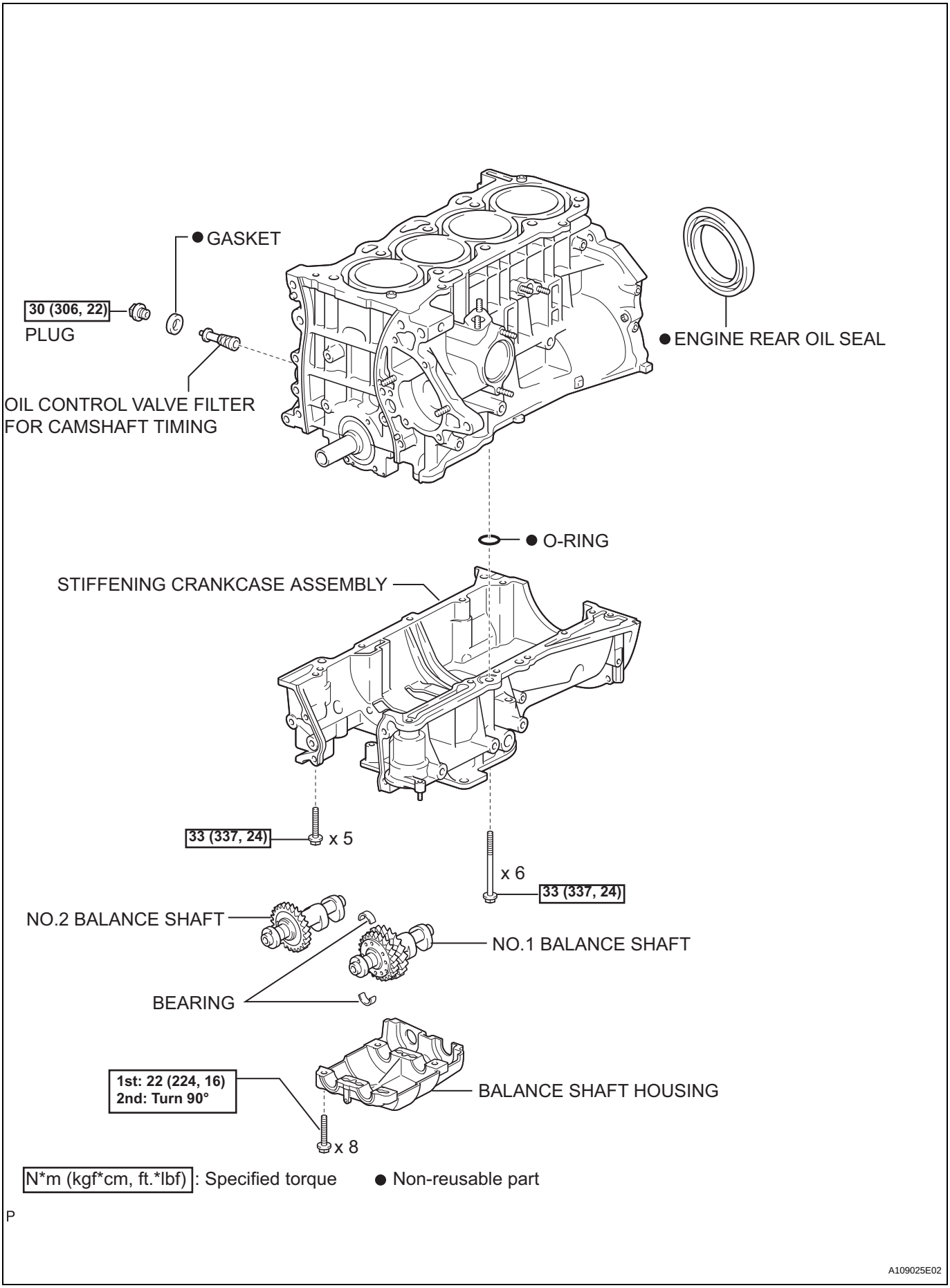
A109023E03



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

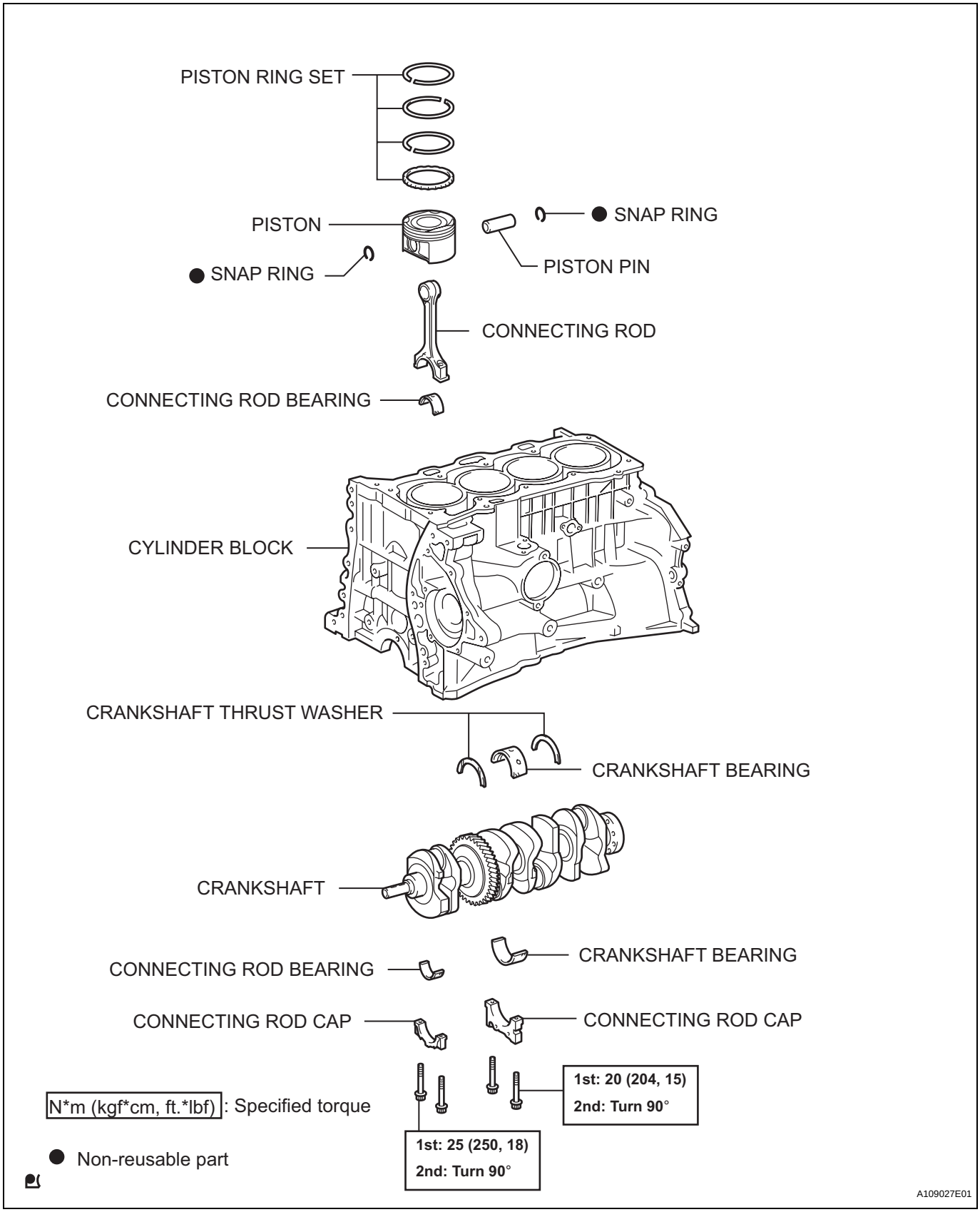
● Non-reusable part

A109024E01

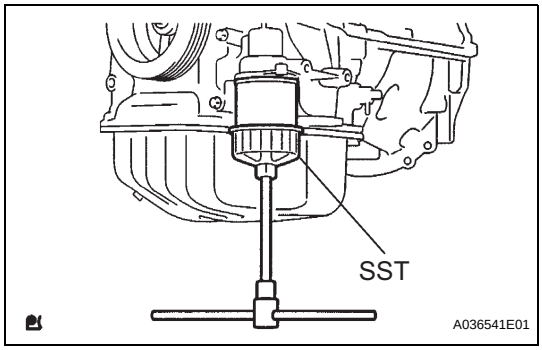


N*m (kgf*cm, ft.*lbf): Specified torque ● Non-reusable part

A109025E02


PISTON RING SET
PISTON
● SNAP RING
PISTON PIN
● SNAP RING
CONNECTING ROD
CONNECTING ROD BEARING
CYLINDER BLOCK
CRANKSHAFT THRUST WASHER
CRANKSHAFT BEARING
CRANKSHAFT
CRANKSHAFT BEARING
CONNECTING ROD BEARING
CONNECTING ROD CAP
CONNECTING ROD CAP
1st: 20 (204, 15)
2nd: Turn 90°
N*m (kgf*cm, ft.*lbf): Specified torque
1st: 25 (250, 18)
2nd: Turn 90°
● Non-reusable part
A109027E01

EM



DISASSEMBLY

1. REMOVE OIL FILTER SUB-ASSEMBLY

(a) Using SST, remove the oil filter.
SST 09228-06501

2. REMOVE OIL FILTER UNION

(a) Using a 12 mm hexagon wrench, remove the union.

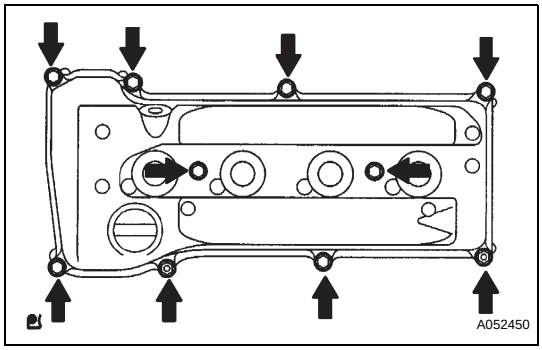
3. REMOVE OIL FILLER CAP SUB-ASSEMBLY

4. REMOVE VENTILATION VALVE SUB-ASSEMBLY

5. REMOVE SPARK PLUG

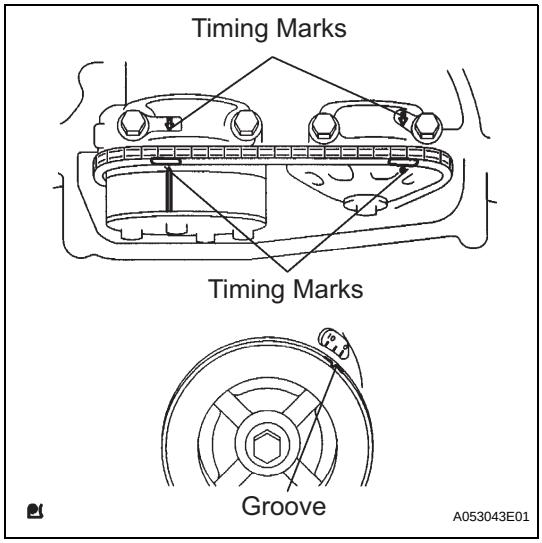
6. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

(a) Remove the 8 bolts, 2 nuts and cylinder head cover.



7. REMOVE CYLINDER HEAD COVER GASKET

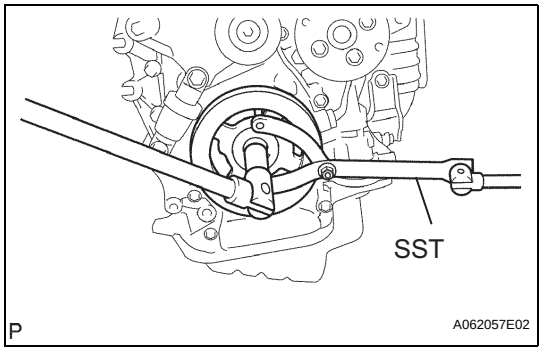
8. REMOVE CRANKSHAFT POSITION SENSOR



9. REMOVE CRANKSHAFT PULLEY

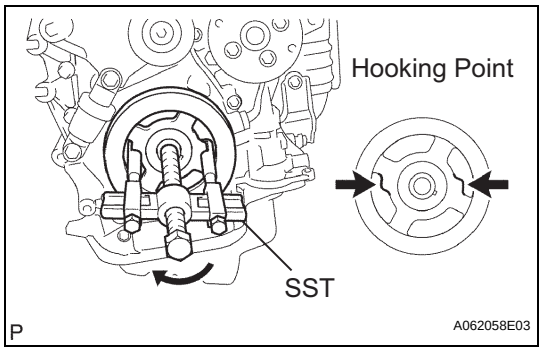
(a) Turn the crankshaft pulley and align its groove with timing mark 0 of the timing chain cover.

(b) Check that the timing marks of the camshaft timing gear and sprockets are aligned with the timing marks of bearing caps No. 1 and No. 2, as shown in the illustration.

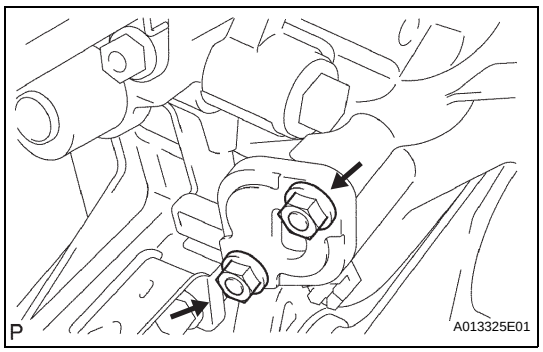


(c) Remove the crankshaft pulley.

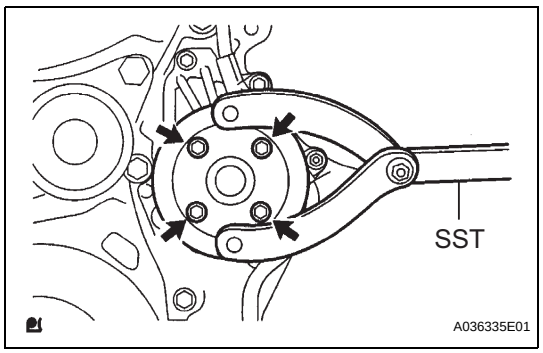
(1) Using SST, fix the pulley and loosen the bolt.
SST 09960-10010 (09962-01000, 09963-01000)



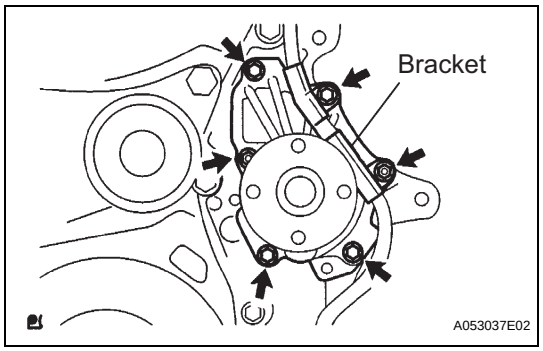
(2) Using SST, remove the bolt and pulley.
SST 09950-40011 (09951-04010, 09952-04010, 09953-04030, 09954-04010, 09955-04041, 09957-04010, 91111-51014)



10. REMOVE NO.1 CHAIN TENSIONER ASSEMBLY
(a) Remove the 2 nuts, chain tensioner and gasket.
NOTICE:
Do not turn the crankshaft without the chain tensioner.

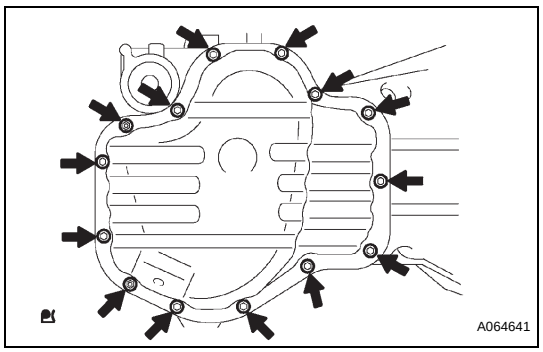


11. REMOVE WATER PUMP PULLEY
(a) Using SST, remove the water pump pulley.
SST 09960-10010 (09962-01000, 09963-00700)

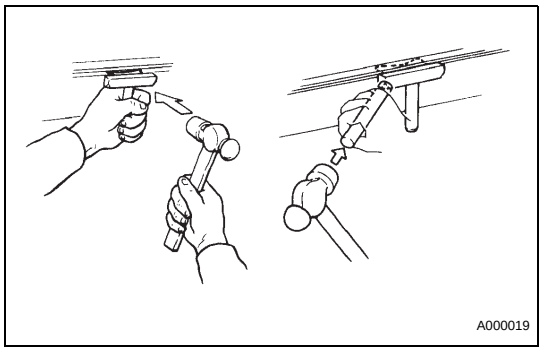


12. REMOVE WATER PUMP ASSEMBLY
(a) Remove the 4 bolts, 2 nuts, bracket and water pump.

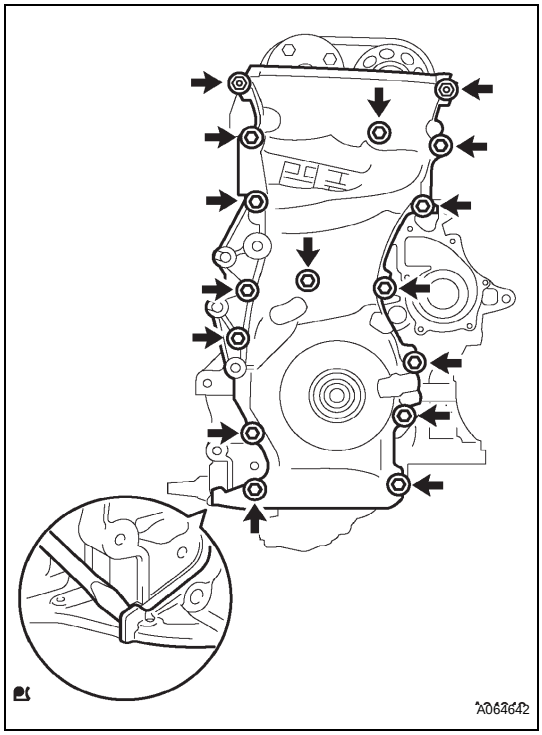
13. REMOVE OIL PAN DRAIN PLUG



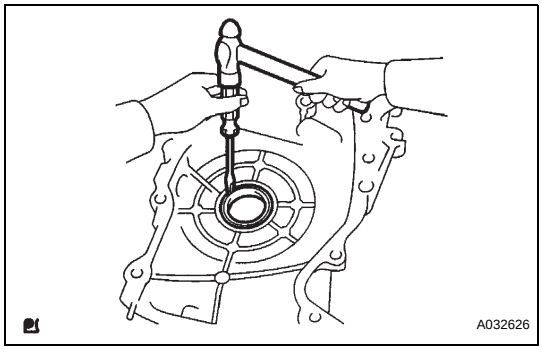
14. REMOVE OIL PAN SUB-ASSEMBLY
(a) Remove the 12 bolts and 2 nuts.



(b) Insert the blade of SST between the crankcase and oil pan. Cut off applied sealer and remove the oil pan.
SST 09032-00100
NOTICE:
Be careful not to damage the contact surface of the cylinder block and oil pan.



15. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY
(a) Remove the 14 bolts and 2 nuts.
(b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.
NOTICE:
Be careful not to damage the contact surfaces of the timing chain cover, cylinder block and cylinder head.



16. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL
(a) Using a screwdriver and a hammer, remove the oil seal.

17. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

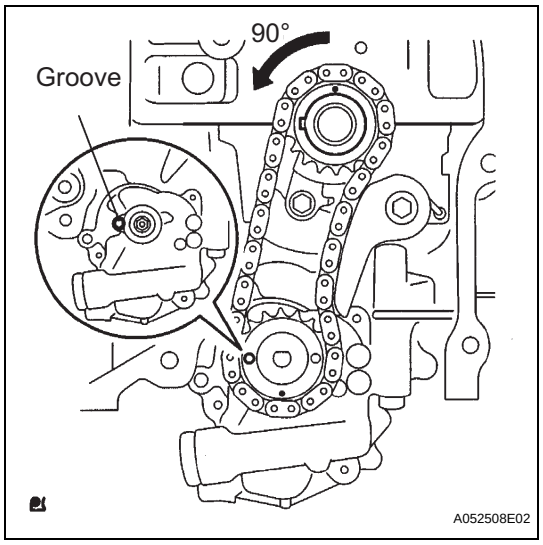
18. REMOVE TIMING CHAIN GUIDE

19. REMOVE CHAIN TENSIONER SLIPPER

20. REMOVE CHAIN VIBRATION DAMPER NO.1

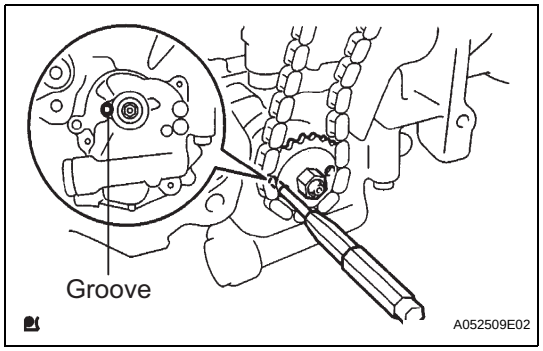
21. REMOVE CHAIN SUB-ASSEMBLY

22. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

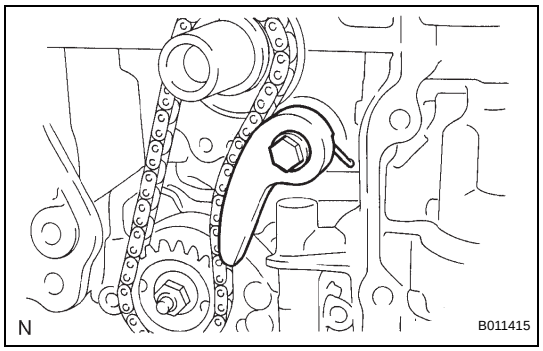


23. REMOVE NO.2 CHAIN SUB-ASSEMBLY

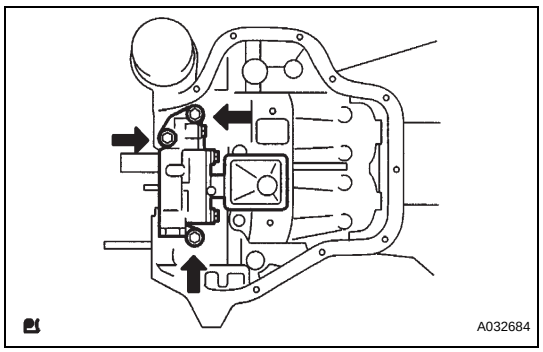
(a) Turn the crankshaft counterclockwise by 90° and align the adjusting hole of the oil pump driven sprocket with the groove of the oil pump.



(b) Put a bar (ϕ4 mm (0.157 in.)) in the adjusting hole of the oil pump driven sprocket to temporarily lock the sprocket in position. Remove the nut.



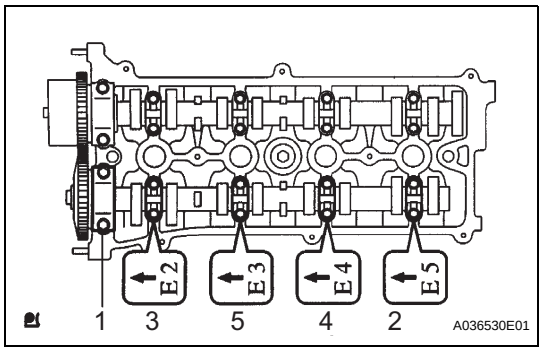
(c) Remove the bolt, chain tensioner plate and spring.
(d) Remove the oil pump drive sprocket, oil pump driven sprocket and chain.



24. REMOVE OIL PUMP ASSEMBLY

(a) Remove the 3 bolts, oil pump and gasket.

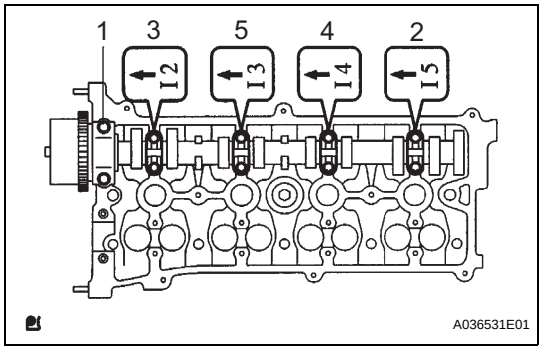
EM



25. REMOVE NO.2 CAMSHAFT

(a) Uniformly loosen and remove the camshaft's 10 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearings.

(b) Remove the camshaft.

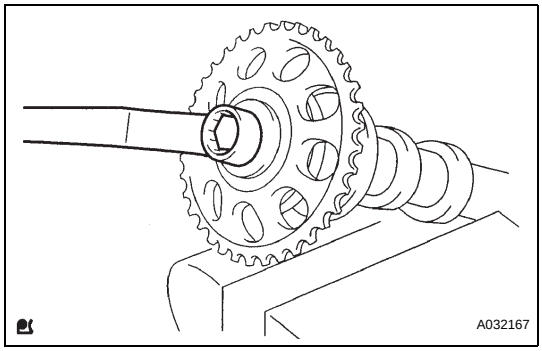


26. REMOVE CAMSHAFT

(a) Uniformly loosen and remove the camshaft's 10 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearings.

(b) Remove the camshaft.

27. REMOVE CAMSHAFT BEARING NO.1

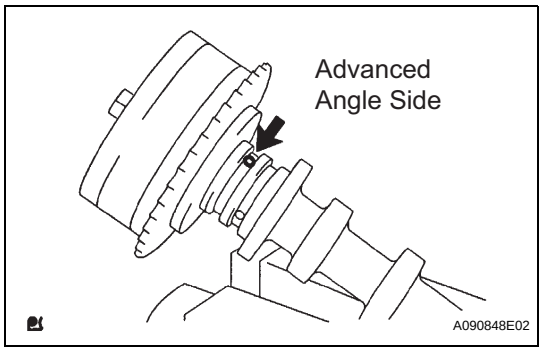


28. REMOVE CAMSHAFT TIMING SPROCKET

(a) Fix the camshaft in a vise and remove the camshaft timing sprocket.

NOTICE:

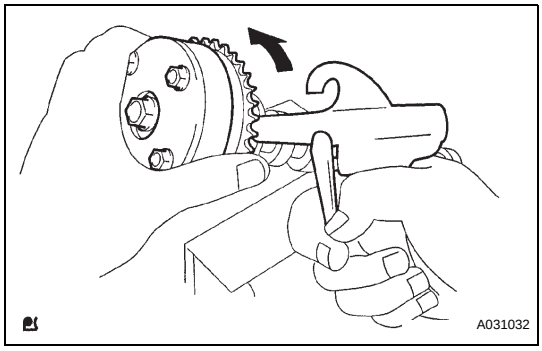
Be careful not to damage the camshaft.



29. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

(a) Fix the camshaft in a vise, and make sure that the camshaft timing gear does not move.

(b) Cover all the oil ports with vinyl tape except the advanced angle side shown in the illustration.



(c) Using an air gun, apply about 150 kPa (1.5 kgf/cm, 21 psi) of air pressure to the port on the advanced angle side.

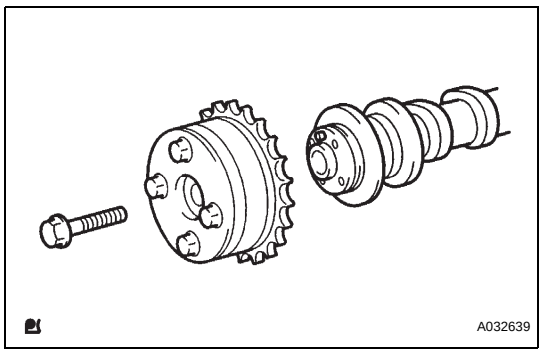
CAUTION:

Some oil spraying will occur. Contain the spray with a shop rag.

HINT:

This operation releases the lock pin for the extreme retarded angle lock.

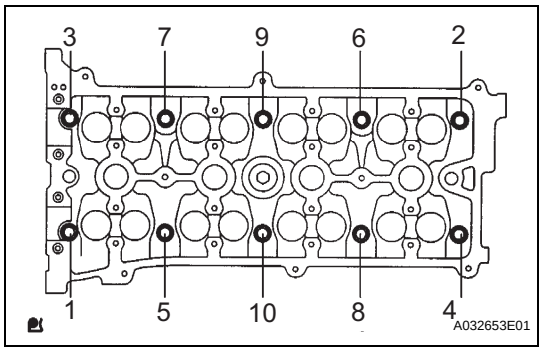
(d) Under the condition above, check that the camshaft timing gear can be turned by hand to the advanced angle side (counterclockwise), the direction of the arrow in the illustration.
Standard:
Can be turned
HINT:
The camshaft timing gear will turn to the advanced angle side without applying force by hand depending on the force of the air pressure applied. Also, if applying pressure to the oil path is difficult as a result of air leakage from the port, the lock-pin may be difficult to release.



(e) Remove the fringe bolt from the camshaft timing gear.
NOTICE:
- **Be sure not to remove the other 4 bolts.**
- **If planning to reuse the camshaft timing gear, release the straight pin lock first, and then install the gear.**

30. REMOVE CAMSHAFT BEARING NO.2

31. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



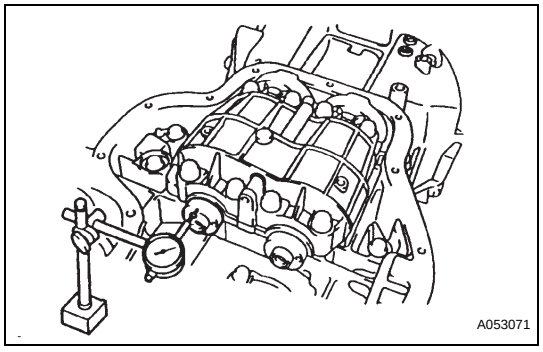
32. REMOVE CYLINDER HEAD SUB-ASSEMBLY
(a) Using a 10 mm bi-hexagon wrench, uniformly loosen the 10 bolts in the sequence shown in the illustration. Remove the 10 cylinder head bolts and plate washers.
NOTICE:
- **Be careful not to drop washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in an incorrect order.**

33. REMOVE CYLINDER HEAD GASKET

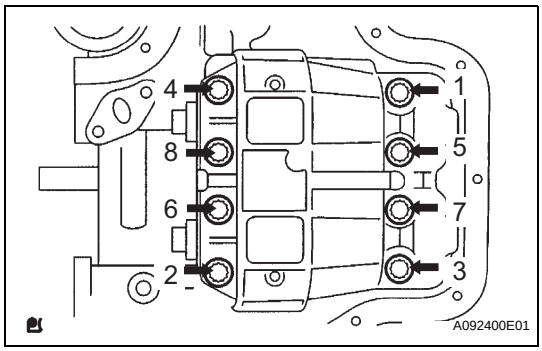
34. REMOVE CYLINDER BLOCK WATER COCK SUB-ASSEMBLY

35. REMOVE OIL CONTROL VALVE FILTER
(a) Using a 6 mm socket hexagon wrench, remove the plug and filter.

36. REMOVE W/HEAD TAPER SCREW PLUG NO.1



37. INSPECT BALANCE SHAFT THRUST CLEARANCE
(a) Using a dial indicator, measure the thrust clearance while moving the balance shaft back and forth.
Specified thrust clearance:
0.050 to 0.090 mm (0.0020 to 0.0035 in.)
If the thrust clearance is greater than the maximum, replace the balance shaft housing and bearings. If necessary, replace the balance shaft.



38. INSPECT BALANCESHAFT OIL CLEARANCE

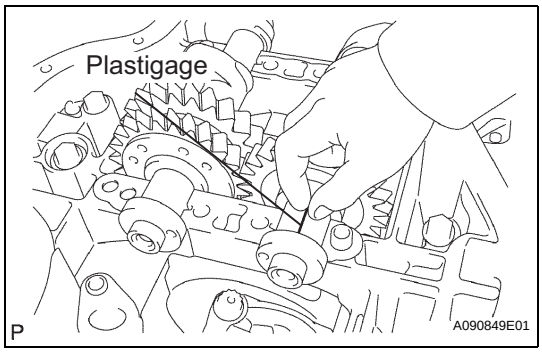
(a) Uniformly loosen and remove the 8 bolts in the sequence shown in the illustration.
NOTICE:
Be careful not to damage the contact surfaces of the balance shaft housing and crankcase.
HINT:
Keep the lower bearing and balance shaft housing together.

(b) Lift out the No. 1 and No. 2 balance shafts.
HINT:
Keep the upper bearing with the crankcase.

(c) Clean each bearing and journal.

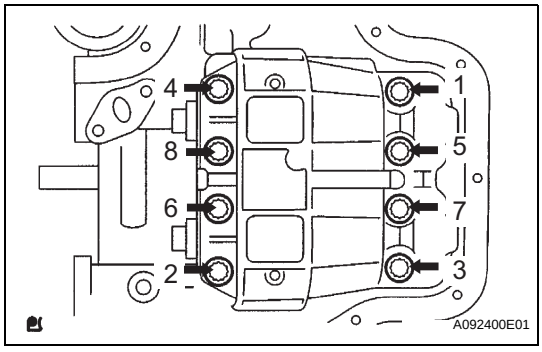
(d) Check each bearing and journal for pitting and scratches.
If a bearing or journal is damaged, replace the bearings. If necessary, replace the balance shaft.

(e) Place the No. 1 and No. 2 balance shafts on the crankcase.

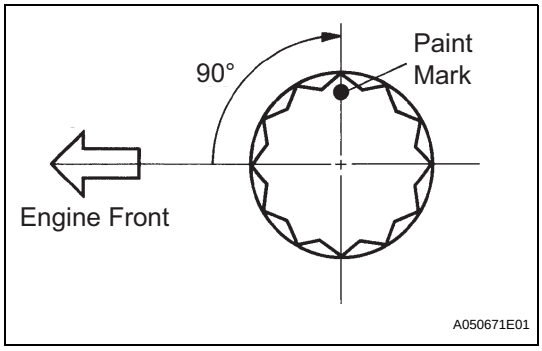


(f) Lay a strip of Plastigage across each journal, and install the balance shaft housing.

(g) Apply a light coat of engine oil on the threads and under the heads of the balance shaft housing bolts.



(h) Uniformly tighten the 8 bolts in the sequence shown in the illustration.
Torque: 22 N*m (220 kgf*cm, 16 ft.*lbf)
HINT:
The balance shaft housing bolts are tightened in 2 progressive steps.

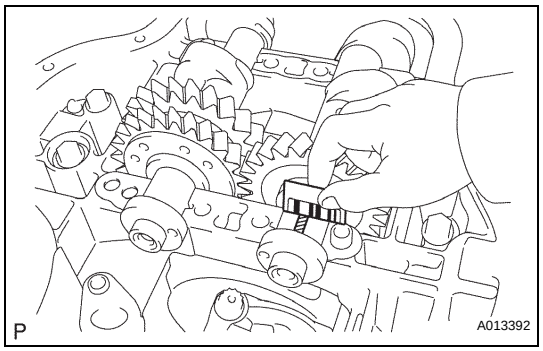


(i) Mark the front side of each balance shaft housing bolt head with paint.

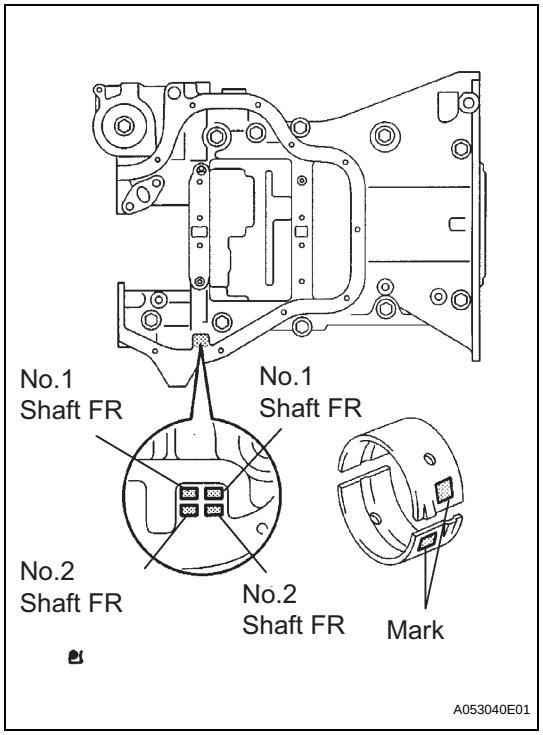
(j) Retighten the bolts by 90° as shown in the illustration.

(k) Check that the paint marks are now at a 90° angle to the front.

EM



(l) Remove the balance shaft housing, and measure the Plastigage at its widest point.
Specified oil clearance:
0.004 to 0.031 mm (0.0002 to 0.0012 in.)
If the clearance is greater than the maximum, replace the bearing. If necessary, replace the balance shaft.



(m) Completely remove the plastigage after the inspection.
HINT:
If replacing a bearing, replace it with one that has the same number as the stiffening crankcase. There are 3 sizes of standard bearings: 1, 2 and 3.
Balance shaft housing journal bore diameter

Mark 1	Mark 2	Mark 3
26.000 to 26.006 mm (1.0236 to 1.0239 in.)	26.006 to 26.012 mm (1.0239 to 1.0241 in.)	26.012 to 26.018 mm (1.0241 to 1.0243 in.)

Balance shaft journal diameter:
22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Standard bearing center wall thickness

Mark 1	Mark 2	Mark 3
1.486 to 1.489 mm (0.0585 to 0.0586 in.)	1.489 to 1.492 mm (0.0586 to 0.0587 in.)	1.492 to 1.495 mm (0.0587 to 0.0589 in.)

(n) Completely remove the Plastigage after the inspection.

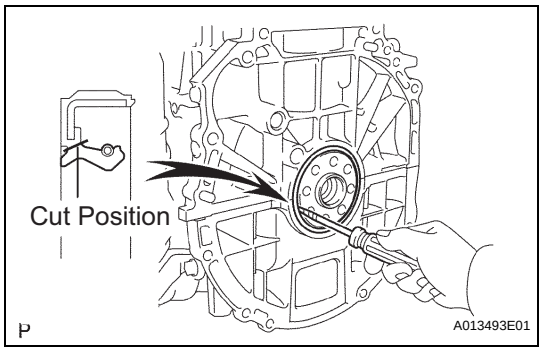
39. REMOVE BALANCESHAFT

40. REMOVE BALANCESHAFT BEARING NO.1

41. REMOVE ENGINE REAR OIL SEAL

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver with its tip taped, pry out the oil seal.
NOTICE:
After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400-grit sandpaper.



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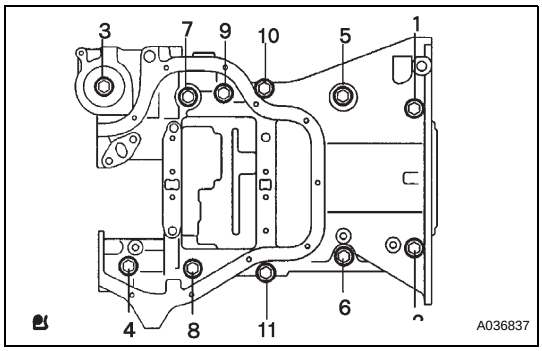
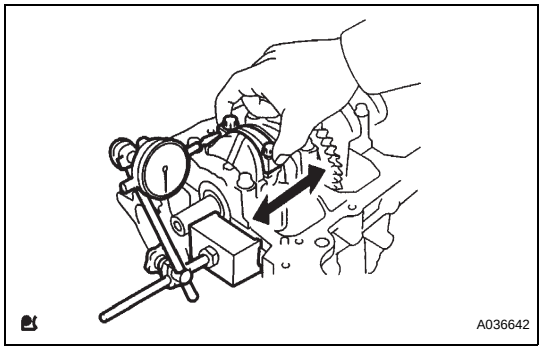


42. REMOVE STEERING CRANKCASE ASSEMBLY

(a) Uniformly loosen and remove the 11 bolts in the sequence shown in the illustration.

(b) Using a screwdriver, remove the crankcase by prying between the crankcase and cylinder block.
NOTICE:
Be careful not to damage the contact surfaces of the crankcase and cylinder block.

(c) Remove the O-ring from the cylinder block.

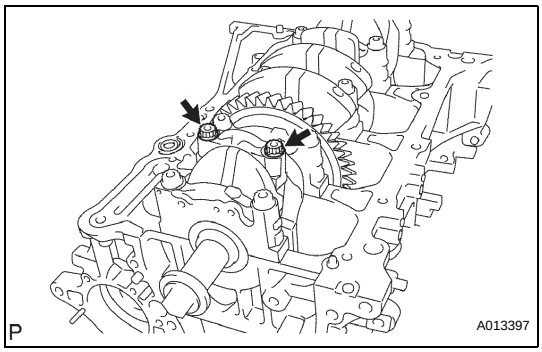


43. INSPECT CONNECTING ROD THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.
Specified thrust clearance:
0.160 to 0.362 mm (0.0063 to 0.0143 in.)
If the thrust clearance is greater than the maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

44. INSPECT CONNECTING ROD OIL CLEARANCE

HINT:
The connecting rod cap bolts are tightened in 2 progressive steps.



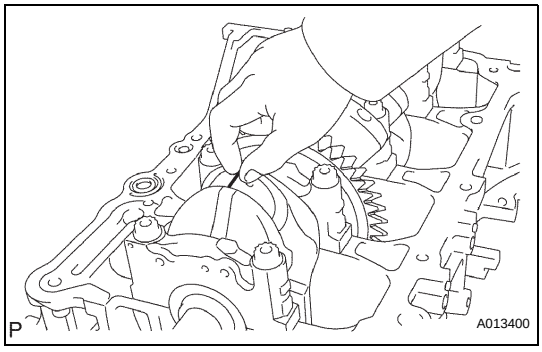
(a) Check that the matchmarks on the connecting rod and cap are aligned to ensure the correct reassembly.
HINT:
The matchmarks on the connecting rods and caps are for ensuring the correct reassembly.

(b) Using a 12 mm socket wrench, uniformly loosen the 2 bolts.

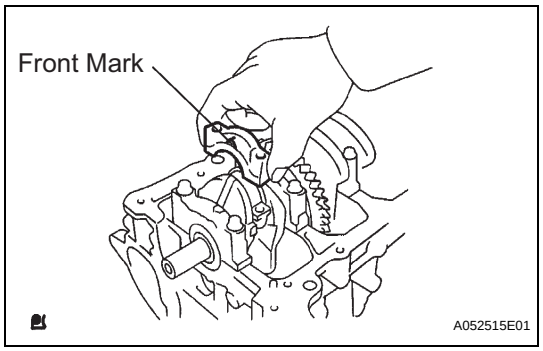
(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.
HINT:
Keep the lower bearing inserted to the connecting rod cap.

(d) Clean the crank pin and bearing.

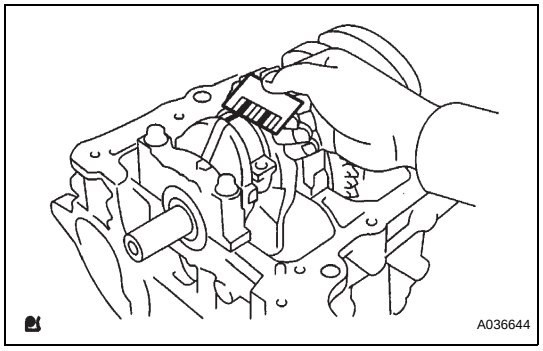
(e) Check the crank pin and bearing for pitting and scratches.



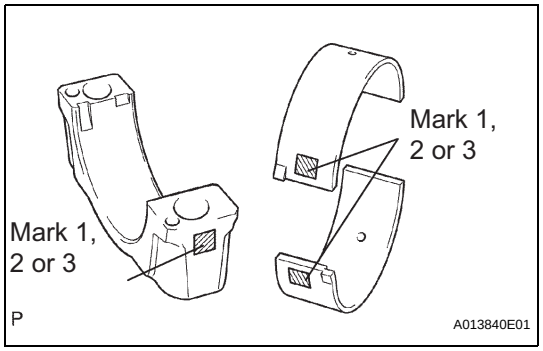
(f) Lay a strip of Plastigage on the crank pin.



(g) Check that the front mark of the connecting rod cap is facing in the correct direction.
(h) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.
(i) Install the connecting cap.
NOTICE:
Do not turn the crankshaft.
(j) Remove the 2 bolts and connecting rod cap.



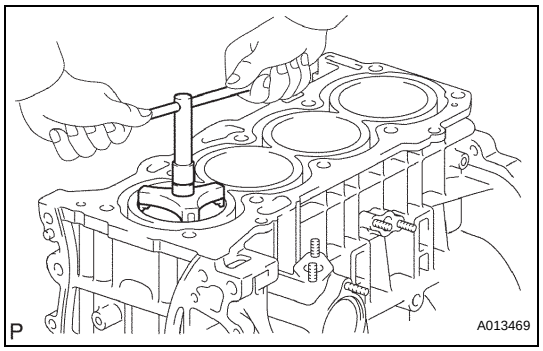
(k) Measure the Plastigage at its widest point.
Specified oil clearance:
0.024 to 0.080 mm (0.0009 to 0.0031 in.)
If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.
HINT:
If replacing a bearing, replace it with one that has the same number as the connecting rod. There are 3 sizes of standard bearings: 1, 2 and 3.



(1) Check the number mark shown in the illustration.
Standard bearing center wall thickness

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

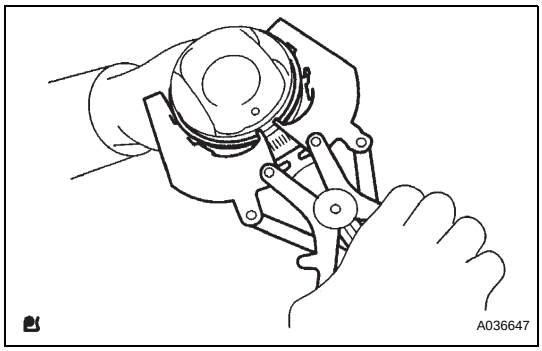
(l) Completely remove the Plastigage.



45. REMOVE PISTON AND CONNECTING ROD
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.
(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.
HINT:
- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

46. REMOVE CONNECTING ROD BEARING

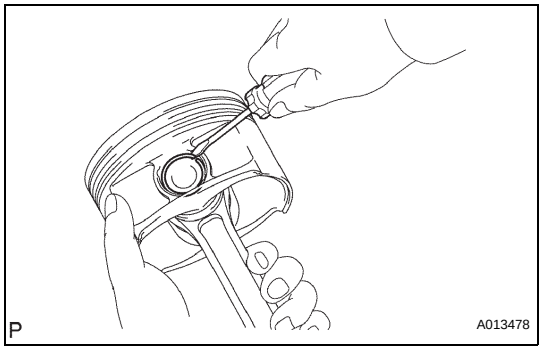
EM



47. REMOVE PISTON RING SET

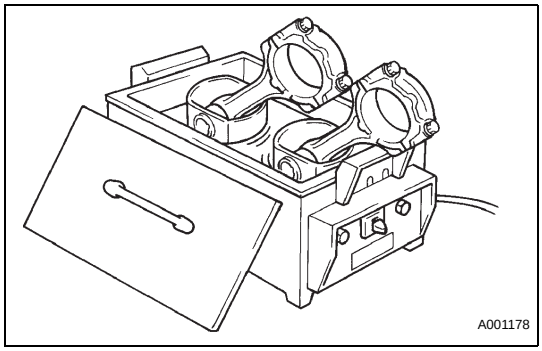
(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the 2 side rails and oil ring by hand.



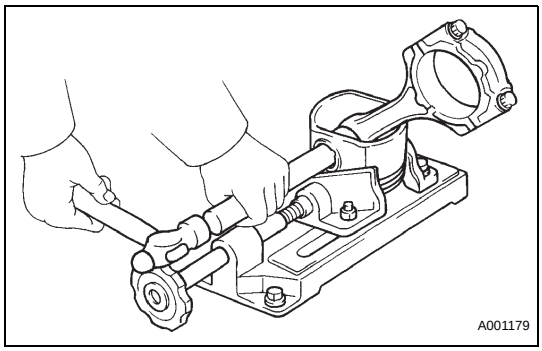
48. REMOVE PISTON PIN HOLE SNAP RING

(a) Using a small screwdriver, pry out the 2 snap rings.



49. REMOVE PISTON

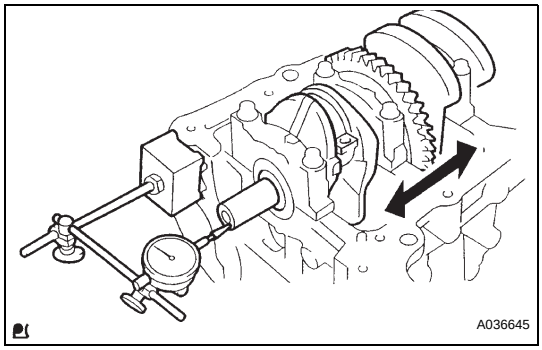
(a) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).



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

HINT:

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



50. INSPECT CRANKSHAFT THRUST CLEARANCE

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

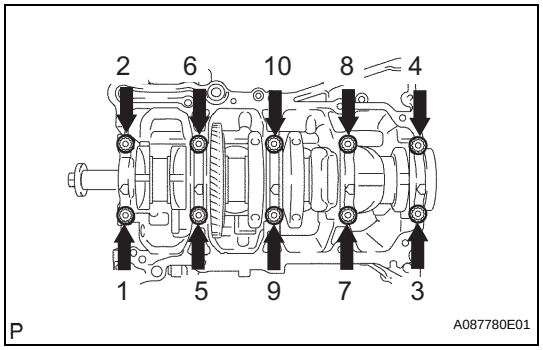
Specified thrust clearance:

0.040 to 0.300 mm (0.0016 to 0.0118 in.)

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

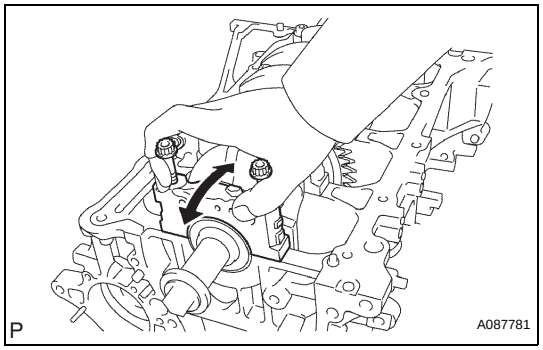
Thrust washer thickness:

1.930 to 1.980 mm (0.0760 to 0.0780 in.)



51. INSPECT CRANKSHAFT OIL CLEARANCE

(a) Uniformly loosen and remove the 10 main bearing cap bolt in the sequence shown in the illustration.

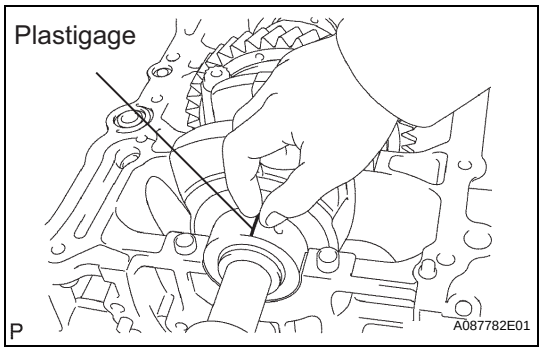


(b) Use 2 removed main bearing cap bolts to remove the 5 main bearing caps and 5 lower bearings.
NOTICE:
Insert the bolts into one of the caps. Ease the cap out by gently pulling up and applying force toward the front and back side of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.
HINT:
- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps in correct order.

(c) Lift out the crankshaft.
HINT:
Keep the upper bearings together with the cylinder block.

(d) Clean each main journal and bearing.

(e) Check each main journal and bearing for pitting and scratches.
If the journal or bearing is damaged, replace the bearings.
If necessary, replace the crankshaft.



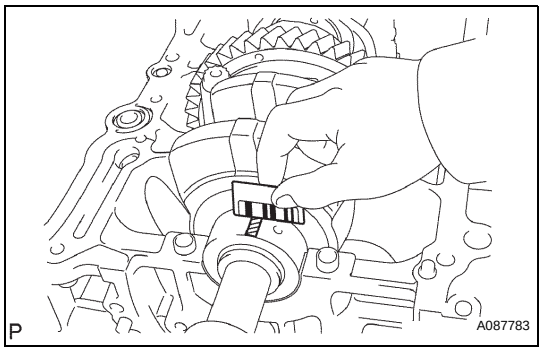
(f) Place the crankshaft on the cylinder block.

(g) Lay a strip of Plastigage across each journal.

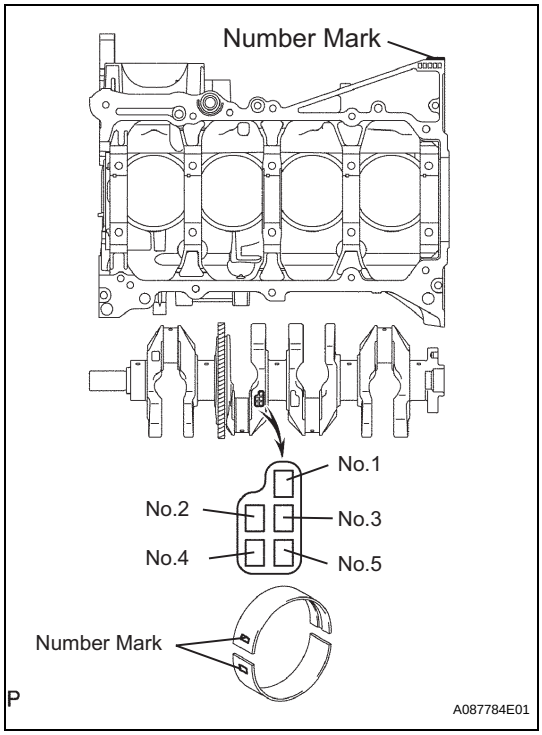
(h) Install the main bearing caps.
HINT:
Do not turn the crankshaft.

(i) Remove the main bearing cap.

EM



(j) Measure the Plastigage at its widest point.
Standard oil clearance:
0.008 to 0.024 mm (0.00031 to 0.00094 in.)
If the oil clearance is greater than the maximum, replace the bearings. If necessary, replace the crankshaft.



(k) If using a standard bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, and then selecting the bearing according to the chart below. There are 4 sizes of standard bearings: 1, 2, 3, and 4.

Cylinder block (A) + Crankshaft (B)	0 to 2	3 to 5	6 to 8	9 to 11
Use bearing	1	2	3	4

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

Item	Mark	Specified Condition
Cylinder block main journal bore diameter (A)	**0** **1** **2** **3** **4** **5** **6**	**59.000 to 59.002 mm (2.3228 to 2.3229 in.)** **59.002 to 59.004 mm (2.3229 to 2.3230 in.)** **59.004 to 59.006 mm (2.3230 to 2.3231 in.)** **59.006 to 59.009 mm (2.3231 to 2.3232 in.)** **59.009 to 59.011 mm (2.3232 to 2.3233 in.)** **59.011 to 59.013 mm (2.3233 to 2.3234 in.)** **59.013 to 59.016 mm (2.3234 to 2.3235 in.)**
Crankshaft main journal diameter (B)	**0** **1** **2** **3** **4** **5**	**54.998 to 55.000 mm (2.1653 to 2.1654 in.)** **54.996 to 54.998 mm (2.1652 to 2.1653 in.)** **54.994 to 54.996 mm (2.1651 to 2.1652 in.)** **54.992 to 54.994 mm (2.1650 to 2.1651 in.)** **54.990 to 54.992 mm (2.1650 to 2.1650 in.)** **54.988 to 54.990 mm (2.1649 to 2.1650 in.)**
Standard bearing center wall thickness	**1** **2** **3** **4**	**1.993 to 1.996 mm (0.0785 to 0.0786 in.)** **1.996 to 1.999 mm (0.0786 to 0.0787 in.)** **1.999 to 2.002 mm (0.0787 to 0.0788 in.)** **2.002 to 2.005 mm (0.0788 to 0.0789 in.)**

(l) Completely remove the Plastigage.

52. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

(b) Remove the 5 upper main bearings and 2 thrust washers from the cylinder block.
HINT:
Arrange the main bearings and thrust washers in the correct order.

53. REMOVE CRANKSHAFT THRUST WASHER UPPER

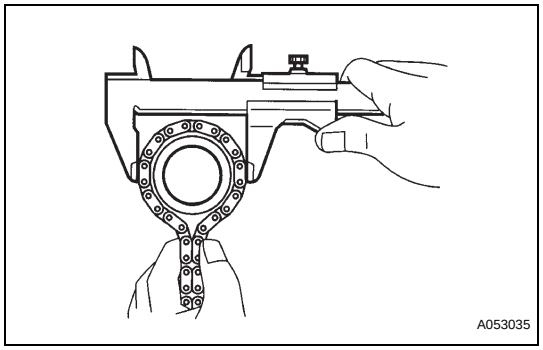
54. REMOVE CRANKSHAFT BEARING
HINT:
Arrange the bearings in the correct order.

55. REMOVE CRANKSHAFT BEARING NO.2
HINT:
Arrange the main bearings and thrust washers in the correct order.

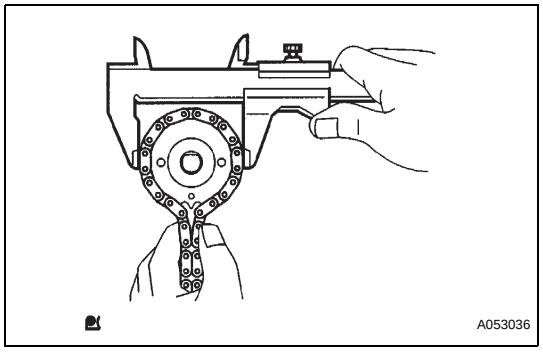
56. REMOVE STUD BOLT

57. CLEAN CYLINDER BLOCK
NOTICE:
If the cylinder is washed at high temperatures, the cylinder liner sticks out beyond the cylinder block. Always wash the cylinder block at a temperature of 45°C (113°F) or less.

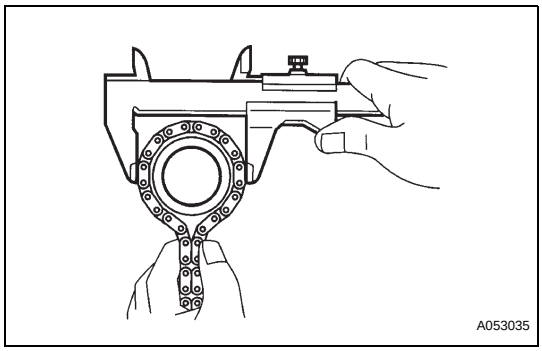
INSPECTION



1. INSPECT OIL PUMP DRIVE SPROCKET
(a) Wrap the chain around the drive sprocket.
(b) Using a vernier caliper, measure the drive sprocket diameter with the chain.
NOTICE:
The vernier caliper must contact the chain rollers for the measurement.
Minimum sprocket diameter (w/ chain):
48.2 mm (1.898 in.)
If the diameter is less than the minimum, replace the chain and sprocket.



2. INSPECT OIL PUMP DRIVEN SPROCKET
(a) Wrap the chain around the driven sprocket.
(b) Using a vernier caliper, measure the driven sprocket diameter with the chain.
NOTICE:
The vernier caliper must contact the chain rollers for the measurement.
Minimum sprocket diameter (w/ chain):
48.2 mm (1.898 in.)
If the diameter is less than the minimum, replace the chain and drive shaft gear.



3. INSPECT CRANKSHAFT TIMING GEAR OR SPROCKET

(a) Wrap the chain around the timing sprocket.

(b) Using a vernier caliper, measure the timing sprocket diameter with the chain.

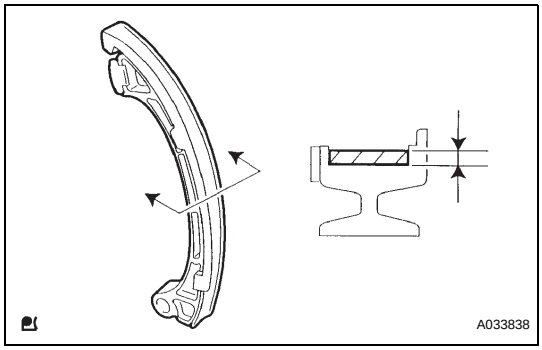
NOTICE:

The vernier caliper must contact the chain rollers for the measurement.

Minimum sprocket diameter (w/ chain):

51.6 mm (2.031 in.)

If the diameter is less than the minimum, replace the chain and timing gear.



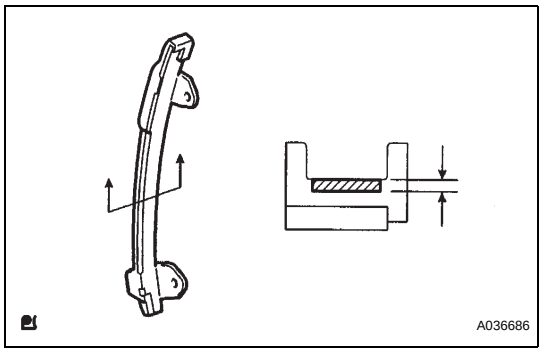
4. INSPECT CHAIN TENSIONER SLIPPER

(a) Measure the tensioner slipper wear.

Maximum wear:

1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the tensioner slipper.



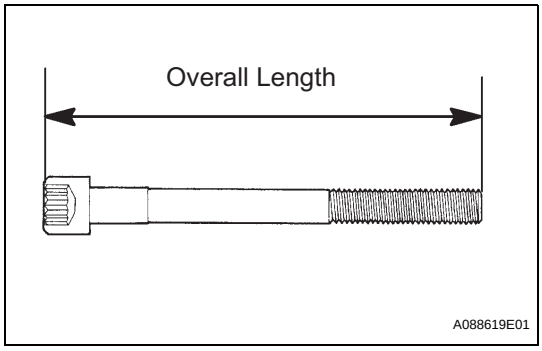
5. INSPECT CHAIN VIBRATION DAMPER NO.1

(a) Measure the vibration damper wear.

Maximum wear:

1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the vibration damper.



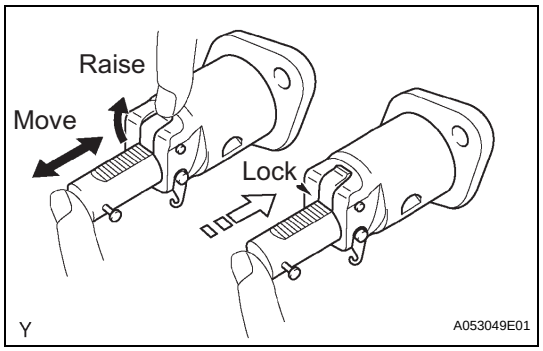
6. INSPECT CYLINDER HEAD SET BOLT

(a) Using a vernier caliper, measure the length of the head bolts from the seat to the end.

Specified bolt length:

161.3 to 164.2 mm (6.350 to 6.465 in.)

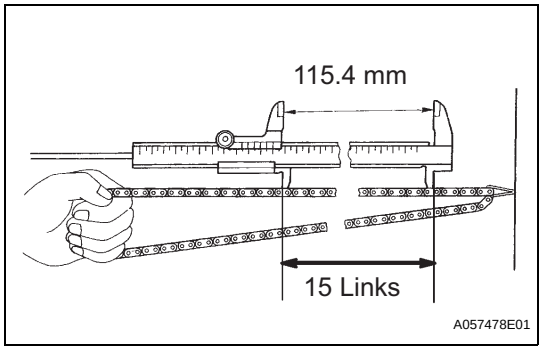
If the length is greater than the maximum, replace the bolt.



7. INSPECT NO.1 CHAIN TENSIONER ASSEMBLY

(a) Check that the plunger moves smoothly when the ratchet pawl is raised.

(b) Release the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushed.



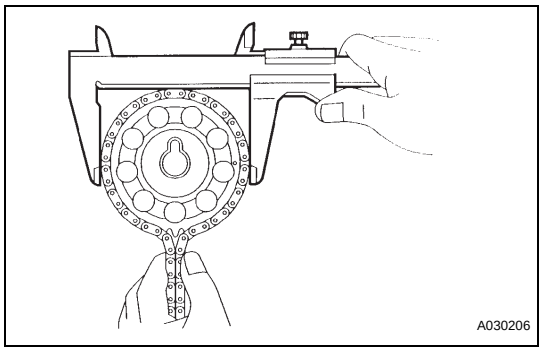
8. INSPECT CHAIN SUB-ASSEMBLY

(a) Using a vernier caliper, measure the length of 15 links with the chain fully stretched.

Maximum chain elongation:
115.4 mm (4.543 in.)

If the elongation is greater than the maximum, replace the chain.

NOTICE:
Make the same measurements pulling at 3 or more places selected at random. Average the measurements.



9. INSPECT CAMSHAFT TIMING GEAR OR SPROCKET

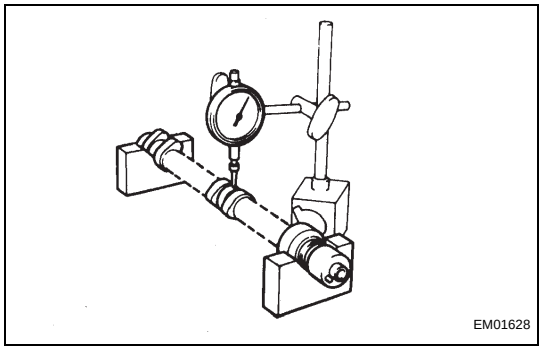
(a) Wrap the chain around the timing sprocket.

(b) Using a vernier caliper, measure the timing sprocket diameter with the chain.

Minimum sprocket diameter (w/chain):
97.3 mm (3.831 in.)

If the diameter is less than the minimum, replace the chain and timing gear.

NOTICE:
The vernier caliper must contact the chain rollers for the measurement.



10. INSPECT CAMSHAFT

(a) Check the camshaft for runout.

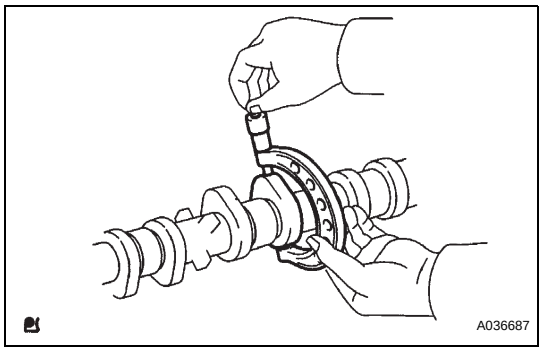
(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

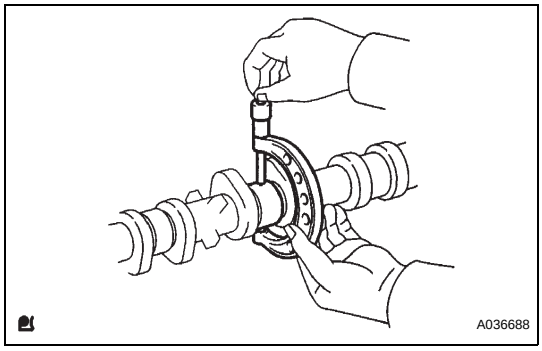
Maximum circle runout:
0.03 mm (0.0012 in.)

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

EM

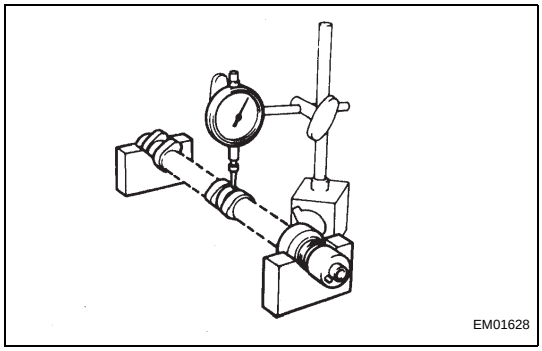


(b) Using a micrometer, measure the cam lobe height.
Specified cam lobe height:
46.599 to 46.809 mm (1.8346 to 1.8429 in.)
If the cam lobe height is less than the minimum, replace the camshaft.



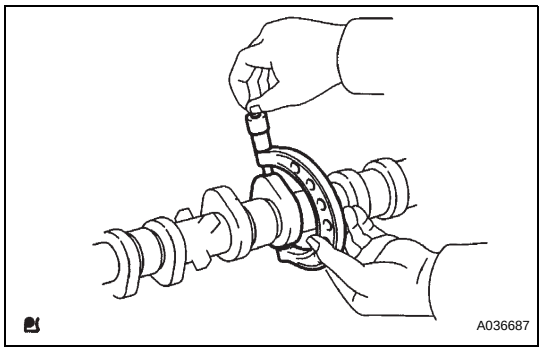
(c) Using a micrometer, measure the journal diameter.
No. 1 journal diameter:
35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other journal diameter:
22.959 to 22.975 mm (0.9039 to 0.9045 in.)
If the journal diameter is not as specified, check the oil clearance.

EM

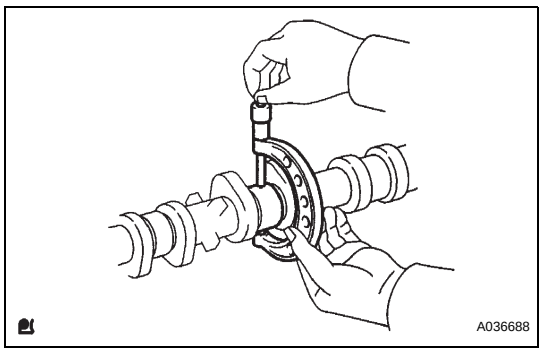


11. INSPECT NO.2 CAMSHAFT

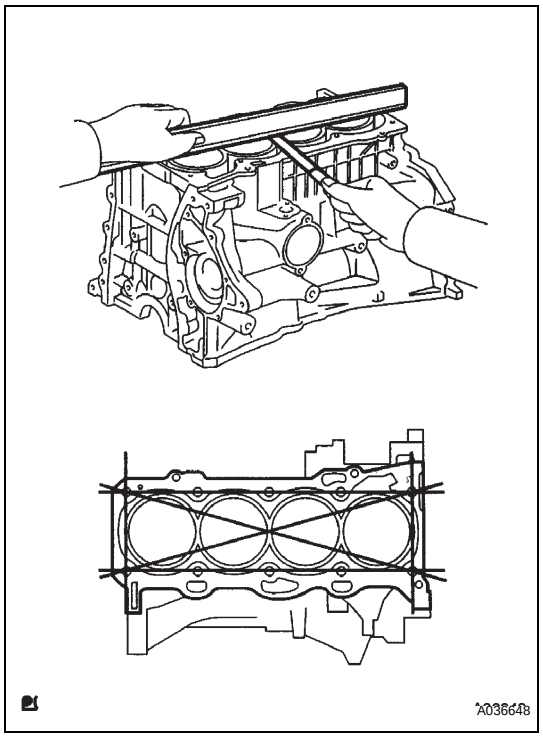
(a) Check the camshaft for runout.
(1) Place the camshaft on V-blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.03 mm (0.0012 in.)
If the circle runout is greater than the maximum, replace the camshaft.



(b) Using a micrometer, measure the cam lobe height.
Specified cam lobe height:
45.599 to 46.809 mm (1.8346 to 1.8429 in.)
If the cam lobe height is less than the minimum, replace the camshaft.



(c) Using a micrometer, measure the journal diameter.
No. 1 journal diameter:
35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other journal diameter:
22.959 to 22.975 mm (0.9039 to 0.9045 in.)
If the journal diameter is not as specified, check the oil clearance.



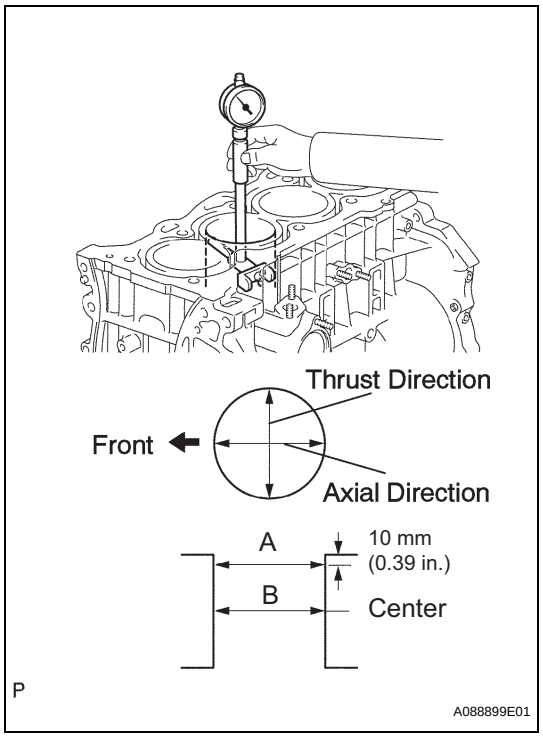
12. INSPECT CYLINDER BLOCK FOR FLATNESS

(a) Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head gasket for warpage.

Maximum warpage:

0.05 mm (0.0020 in.)

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



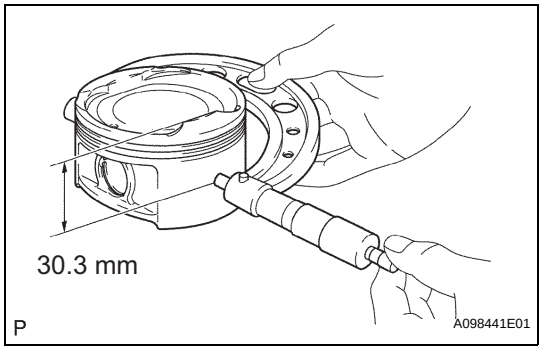
13. INSPECT CYLINDER BORE

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

Specified diameter:

88.500 to 88.633 mm (3.4843 to 3.4894 in.)

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



14. INSPECT PISTON DIAMETER

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.3 mm (1.193 in.) from the piston head.

Piston diameter:

88.439 to 88.449 mm (3.4818 to 3.4822 in.)

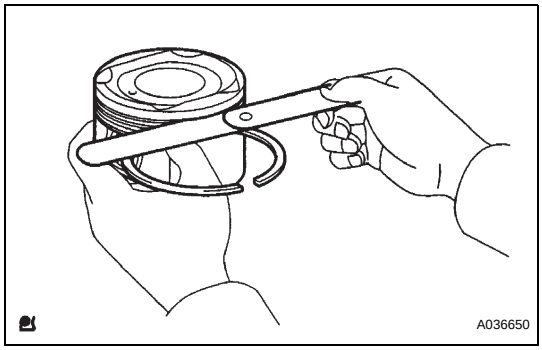
15. INSPECT PISTON CLEARANCE

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

Specified oil clearance:

0.051 to 0.100 mm (0.0020 to 0.0039 in.)

If the clearance is greater than the maximum, replace all the 4 pistons. If necessary, replace the cylinder block.



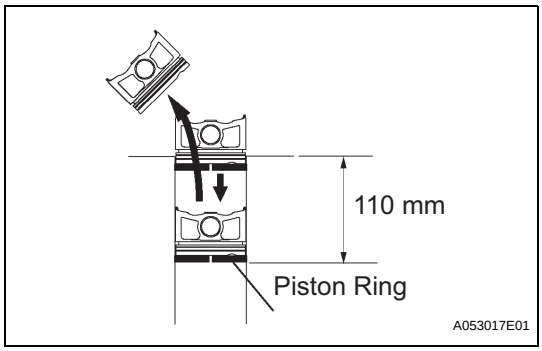
16. INSPECT PISTON RING GROOVE CLEARANCE

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

Ring groove clearance:

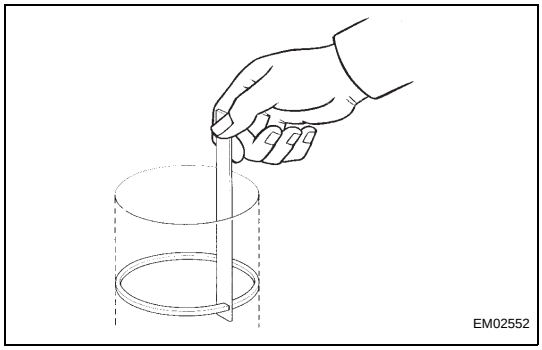
0.030 to 0.070 mm (0.0012 to 0.0028 in.)

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



17. 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.

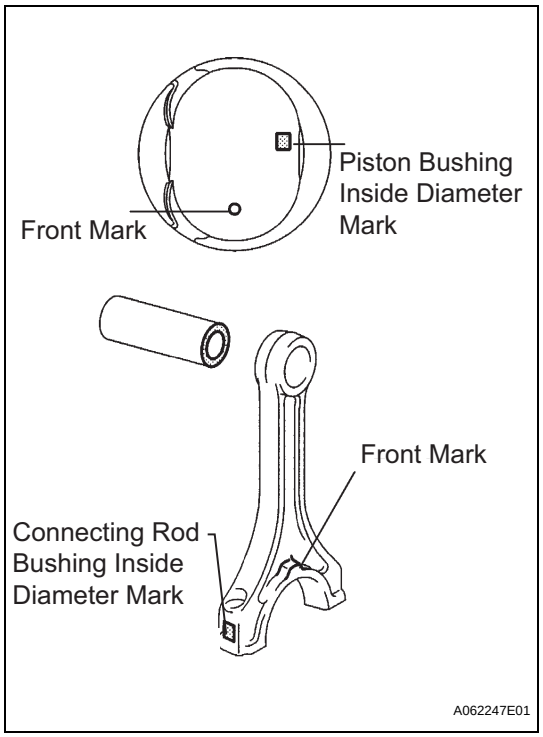


(b) Using a feeler gauge, measure the end gap.

Specified end gap

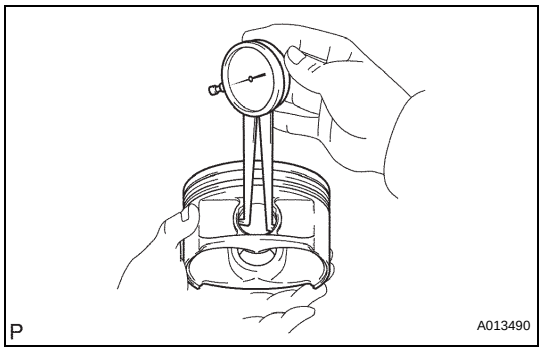
Item	Specified Condition
No. 1	0.22 to 0.892 mm (0.0087 to 0.0350 in.)
No. 2	0.50 to 1.35 mm (0.0197 to 0.0531 in.)
Oil (side rail)	0.10 to 0.73 mm (0.0039 to 0.0287 in.)

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



18. INSPECT PISTON PIN OIL CLEARANCE

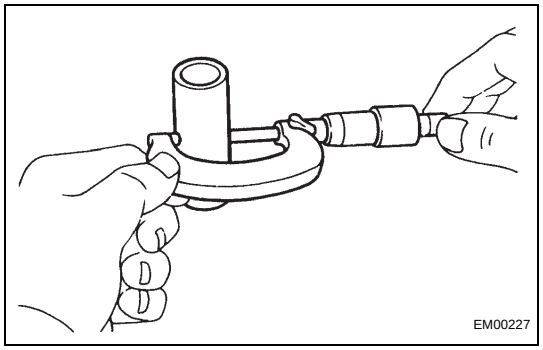
(a) Inspect piston pin oil clearance.



(1) Using a caliper gauge, measure the pin hole diameter of the piston.

Pin hole diameter:
22.001 to 22.010 mm (0.8662 to 0.8665 in.)
Pin hole diameter (Reference)

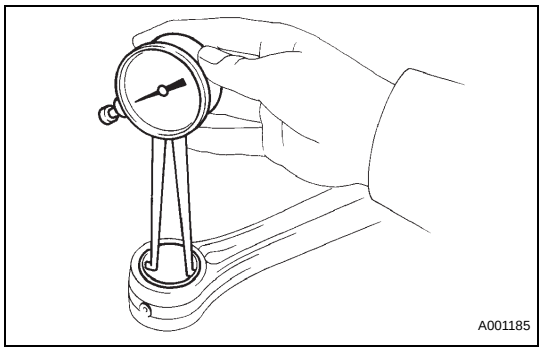
Mark	mm (in.)
A	22.001 to 22.004 (0.8662 to 0.8663)
B	22.004 to 22.007 (0.8663 to 0.8664)
C	22.007 to 22.010 (0.8664 to 0.8665)



(b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:
21.997 to 22.009 mm (0.8660 to 0.8665 in.)
Piston pin diameter (Reference)

Mark	mm (in.)
A	21.997 to 22.000 (0.8660 to 0.8661)
B	22.000 to 22.003 (0.8661 to 0.8663)
C	22.003 to 22.006 (0.8663 to 0.8664)
D	22.006 to 22.009 (0.8664 to 0.8665)



(c) Using a caliper gauge, measure the inside diameter of the connecting rod bush.

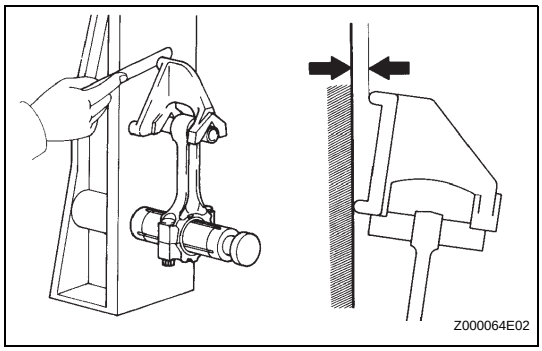
Bushing inside diameter:
22.005 to 22.014 mm (0.8663 to 0.8667 in.)
Bushing inside diameter

Mark	mm (in.)
A	22.005 to 22.008 (0.8663 to 0.8665)
B	22.008 to 22.011 (0.8665 to 0.8666)
C	22.011 to 22.014 (0.8666 to 0.8667)

EM

(d) Subtract the piston pin diameter measurement from the piton pin hole diameter measurement.
Specified oil clearance:
0.001 to 0.010 mm (0.00004 to 0.00039 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.

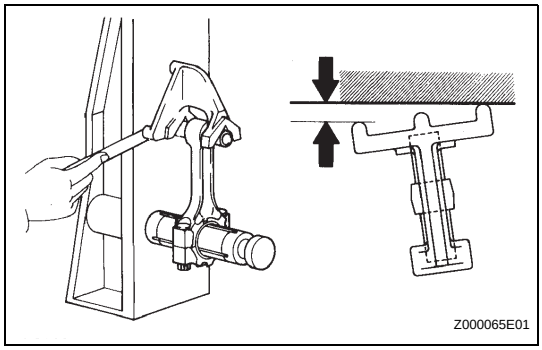
(e) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.
Specified oil clearance:
0.005 to 0.100 mm (0.0002 to 0.0020 in.)
If the oil clearance is greater than the maximum, replace the connecting rod. If necessary, replace the connecting rod and piston pin as a set.


Z000064E02

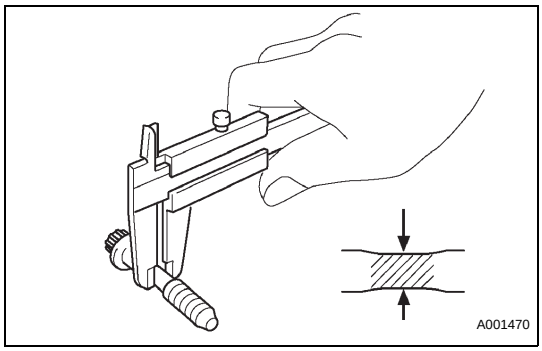
19. INSPECT CONNECTING ROD SUB-ASSEMBLY

(a) Using a rod aligner and feeler gauge, check the connecting rod alignment.

(1) Check for alignment deviation.
Maximum alignment deviation:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)
If the alignment deviation is greater than the maximum, replace the connecting rod assembly.

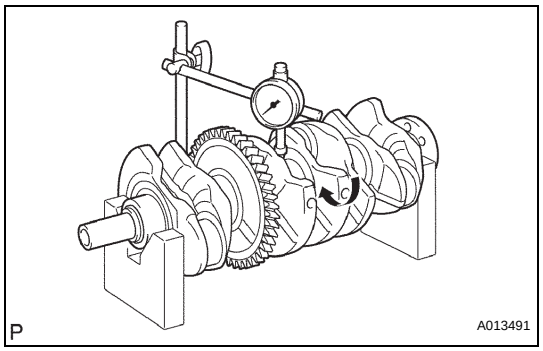

Z000065E01

(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 assembly.


A001470

20. INSPECT CONNECTING ROD BOLT

(a) Using a vernier caliper, measure the tension portion diameter of the bolt.
Specified diameter:
7.0 to 7.3 mm (0.276 to 0.287 in.)
If the diameter is less than the minimum, replace the bolt.



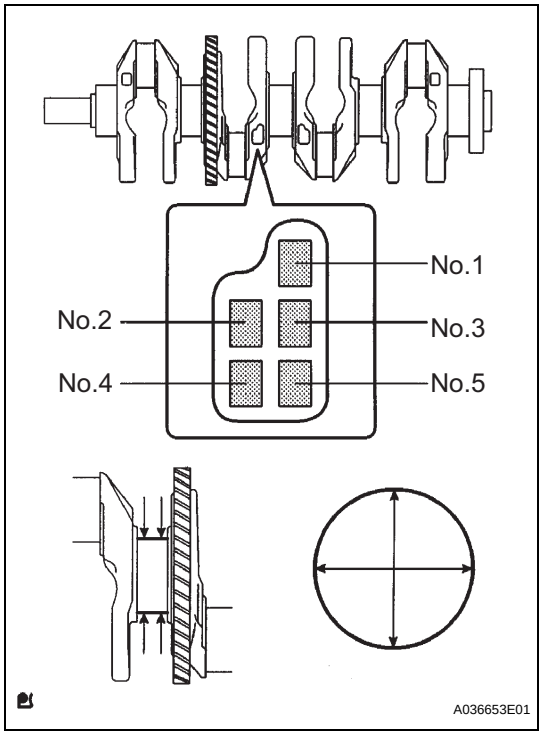
21. INSPECT CRANKSHAFT

(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 circle runout is greater than the maximum, replace the crankshaft.



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

Diameter:

54.988 to 55.000 (2.1648 to 2.06535 in.)

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

(c) Check each main journal for taper and out-of-round as shown in the illustration.

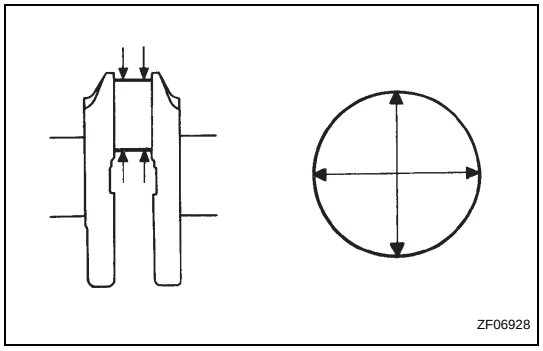
Maximum taper and out-of-round:

0.003 mm (0.0001 in.)

If the taper and out-of-round is greater than the maximum, replace the crankshaft.

Diameter (Reference)

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



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

Diameter:

47.990 to 48.000 mm (1.8894 to 1.8898 in.)

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

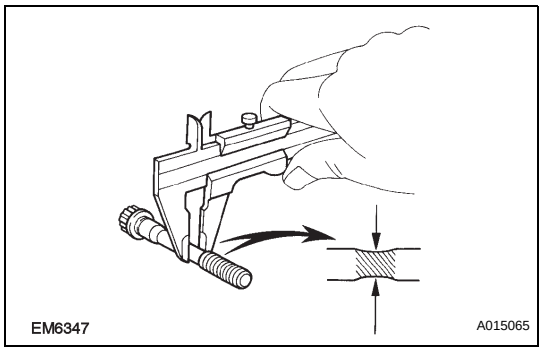
(e) Check each crank pin for taper and out-of-round as shown in the illustration.

Maximum taper and out-of-round:

0.003 mm (0.0001 in.)

If the taper and out-of-round is greater than the maximum, replace the crankshaft.

EM



22. INSPECT CRANKSHAFT BEARING CAP SET BOLT

(a) Using a vernier caliper, measure the tension portion diameter of the bolt.

Specified diameter:

7.2 to 7.6 mm (0.283 to 0.299 in.)

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