

ENGINE

ON-VEHICLE INSPECTION

1. INSPECT AIR CLEANER FILTER ELEMENT

- Remove the air filter.
- Visually check that the air filter is not excessively damaged or oily.
If necessary, replace the air filter.

2. INSPECT IGNITION TIMING

- Set the vehicle to inspection mode (see page [IN-34](#)).
- Warm up the engine.
- Connect the intelligent tester to the DLC3.
- Turn the power switch ON (IG).
- Select the following items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / IGN ADVANCE

Standard ignition timing:

8 to 12° @ BTDC

NOTICE:

- Turn all the electrical systems OFF.
- Inspect the engine idle speed with the cooling fan OFF.

HINT:

Refer to the intelligent tester operator's manual if you need help selecting the DATA LIST.

- Check that the ignition timing advances immediately when the engine speed is increased.

3. INSPECT ENGINE IDLE SPEED

- Set the vehicle to inspection mode (see page [IN-34](#)).
- Warm up the engine.
- Connect the intelligent tester to the DLC3.
- Turn the power switch ON (IG).
- Select the following items:
DIAGNOSIS / ENHANCED OBD II / DATA LIST / PRIMARY / ENGINE SPD

Standard idle speed:

950 to 1,050 rpm (P range)

NOTICE:

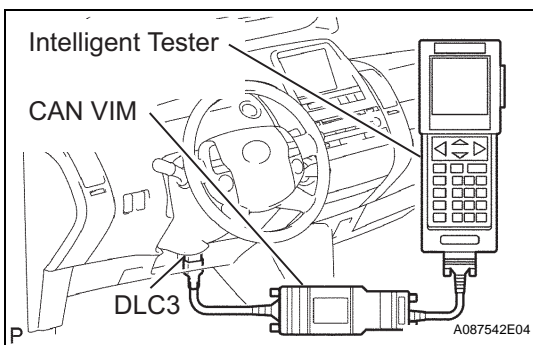
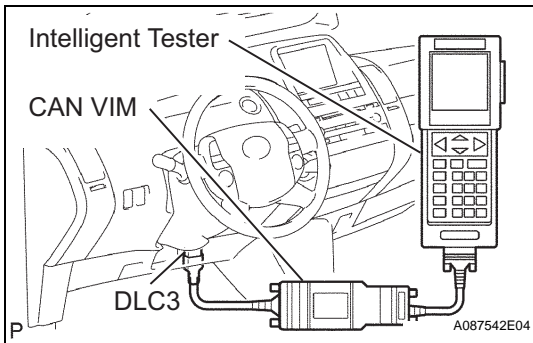
- Turn all the electrical systems OFF.
- Inspect the engine idle speed with the cooling fan OFF.

HINT:

Refer to the intelligent tester operator's manual if you need help selecting the DATA LIST.

4. INSPECT COMPRESSION

- Remove the windshield wiper link (see page [WW-13](#)).
- Remove the front cowl top panel outer.

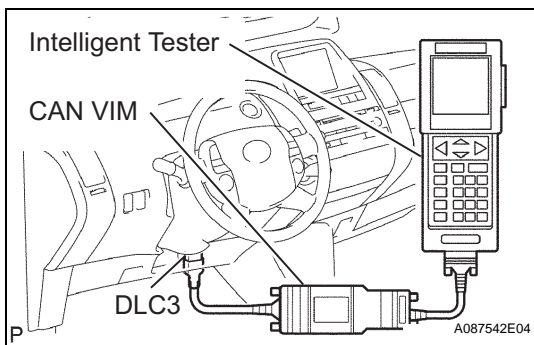
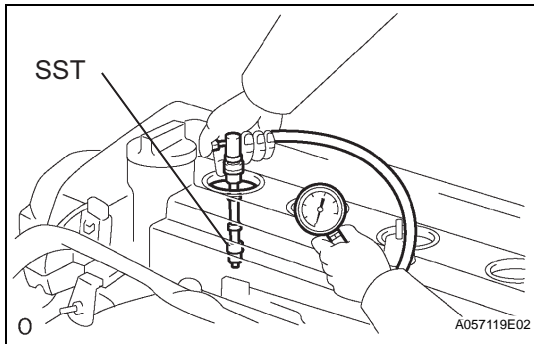


- (c) Set the vehicle to inspection mode (see page [IN-34](#)).
- (d) Warm up the engine.
- (e) Remove the air cleaner assembly.
- (f) Disconnect all the fuel injector connectors.
- (g) Disconnect the 4 ignition coil connectors and remove the 4 bolts. Then remove the 4 ignition coils.

NOTICE:

If inspecting the compression with the ignition coil connector disconnected, a DTC will be detected. After the inspection, check the DTC.

- (h) Remove all the spark plugs.
- (i) Connect SST (attachment) to a compression gauge.
SST 09992-00500
- (j) Install the compression gauge with SST into the spark plug hole.



- (k) Connect the intelligent tester to the DLC3.
- (l) Turn the power switch ON (IG).
- (m) Select the following items:
DIAGNOSIS / OBD/MOBD / HV ECU / ACTIVE TEST / COMPRESS TEST
- (n) Turn the power switch ON (IG) while depressing the brake pedal. Then, measure the compression pressure of each cylinder.

Standard compression pressure:

882 kPa (9.0 kgf/cm², 128 psi)

Minimum pressure:

686 kPa (7.0 kgf/cm², 99 psi)

Difference between each cylinder:

98 kPa (1.0 kgf/cm², 14 psi) or less

NOTICE:

- Measure the compression pressure as quickly as possible.
- After performing all the procedures, be sure to clear DTCs stored in the memory. Then check that the normal code is output.

If the compression pressure is low, pour a light coat of engine oil into the cylinder block, and then measure the compression pressure again.

HINT:

- If the compression increases after pouring engine oil, the piston ring may be damaged.
- If the compression does not change after pouring engine oil, defects may be occurring around the valve.

- (o) Install all the spark plugs.

Torque: 18 N*m (184 kgf*cm, 13 ft.*lbf)

- (p) Install the 4 ignition coil connectors.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
- (q) Connect the 4 ignition coil connectors.
- (r) Connect all the fuel injector connectors.
- (s) Install the air cleaner assembly.
- (t) Install the front cowl top panel outer.
- (u) Install the windshield wiper link (see page [WW-15](#)).

5. INSPECT CO/HC

- (a) Set the vehicle to inspection mode (see page [IN-34](#)).
- (b) Run the engine at 2,500 rpm for approximately 180 seconds.
- (c) Insert a CO/HC meter testing probe at least 40 cm (1.3 ft.) into the tailpipe during idling.
- (d) Immediately check the CO/HC concentration at idle and 2,500 rpm.

HINT:

When performing the 2 mode (2,500 rpm and idle) test, check that the CO/HC concentration complies with local regulations.

- (e) If the CO/HC concentration does not comply with regulations, troubleshoot in the order given below.
 - (1) Check the heated oxygen sensor operation (see page [ES-392](#)).
 - (2) See the table below for possible causes, and then inspect the applicable causes and repair it if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignition: <ul style="list-style-type: none"> – Incorrect timing – Plugs are contaminated, plugs are shorted or plug gaps are incorrect 2. Incorrect valve clearance 3. Leaks in intake and exhaust valves 4. Leaks in cylinders
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: <ul style="list-style-type: none"> – Ventilation hoses – Intake manifold – Throttle body – IAC valve – Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged ventilation valve 3. Faulty SFI system: <ul style="list-style-type: none"> – Faulty pressure regulator – Defective ECT sensor – Defective mass air flow meter – Faulty ECM – Faulty injectors – Faulty throttle position sensor

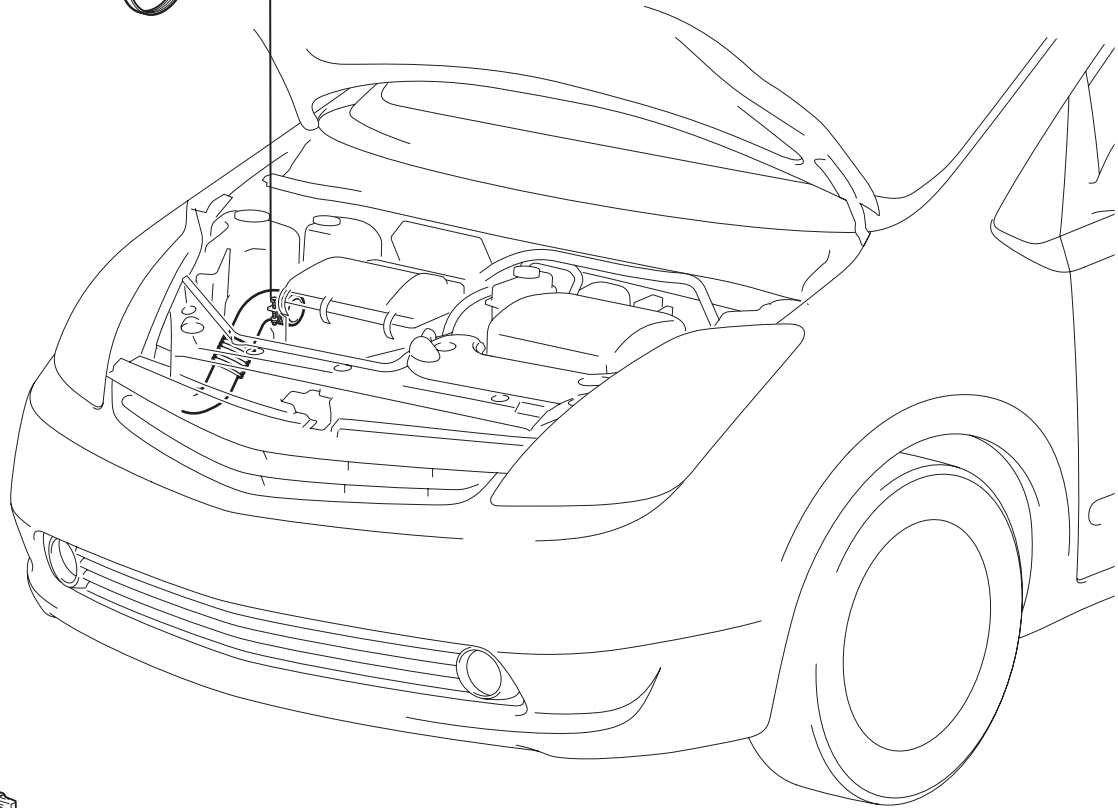
DRIVE BELT COMPONENTS

EM

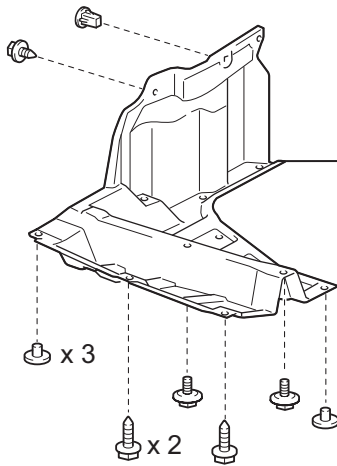
DRIVE BELT

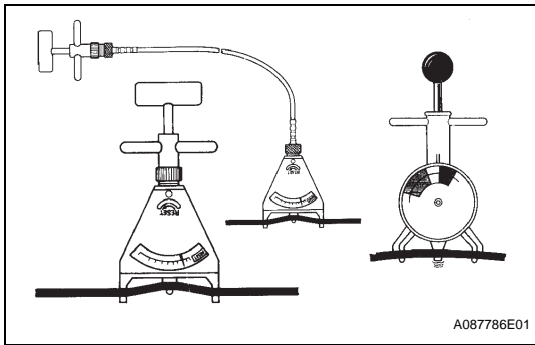


NO. 1 AIR CLEANER INLET



ENGINE UNDER COVER RH





ON-VEHICLE INSPECTION

1. CHECK DRIVE BELT TENSION

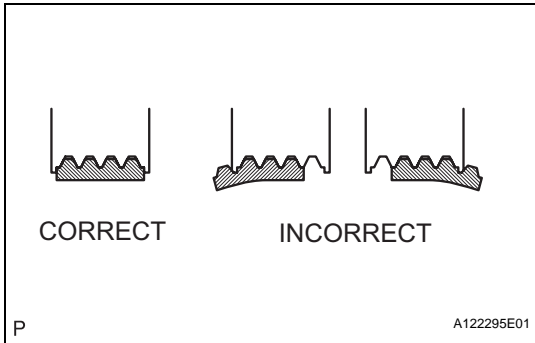
- (a) Using a belt tension gauge, measure the belt tension.

Belt tension gauge:
DENSO BTG-20 (95506-00020)

Borrroughs No. BT-33-73F

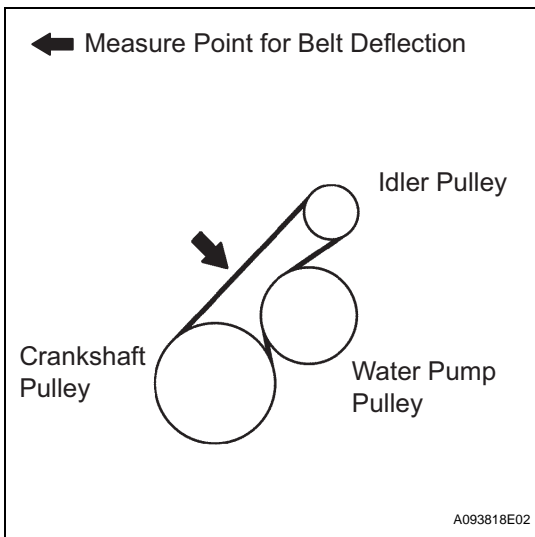
Standard drive belt tension

Item	Specified Condition
New belt	99 to 121 lbf
Used belt	55 to 77lbf



HINT:

- After installing the drive belt, check that it fits properly in the ribbed grooves. Check with your hands to confirm that the belt has not slipped out of the groove on the bottom of the crankshaft pulley.
- A "new belt" is a belt which has been used 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.



- (b) Reference:

Check the drive belt deflection.

- (1) When not using a belt tension gauge, measure the belt deflection.

Pressing force: 98 N (10 kgf, 22 lbf)

Standard belt deflection

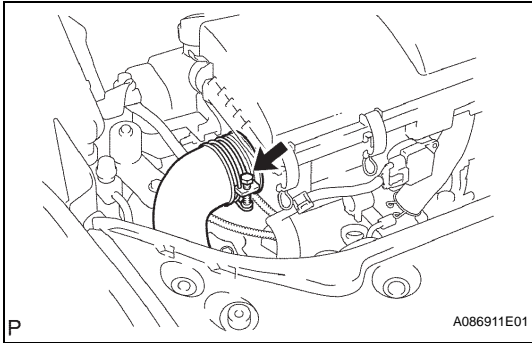
Item	Specified Condition
New belt	9.0 to 12.0 mm (0.35 to 0.47 in.)
Used belt	11 to 15 mm (0.43 to 0.59 in.)

NOTICE:

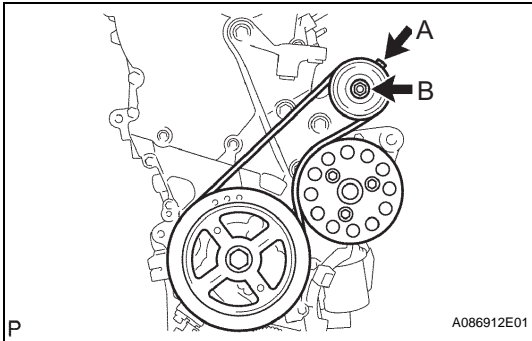
- Check the drive belt deflection at the specified point.
- When installing a new belt, set its tension value as specified.
- When inspecting a belt which has been used over 5 minutes, apply the specification for "Used belt".
- When reinstalling a belt which has been used over 5 minutes, adjust its deflection and tension to the intermediate value of each specification for "Used belt".
- Belt tension and deflection should be checked after 2 revolutions of engine cranking.
- When using a belt tension gauge, confirm the accuracy by using a master gauge first.

REMOVAL

1. REMOVE ENGINE UNDER COVER RH
2. REMOVE NO. 1 AIR CLEANER INLET
 - (a) Loosen the clamp, and disconnect the air cleaner inlet from the air cleaner case.



3. REMOVE DRIVE BELT
 - (a) Loosen nut A.
 - (b) Turn adjust bolt B, and then release the belt tension.
 - (c) Remove the belt.



INSTALLATION

1. INSTALL DRIVE BELT

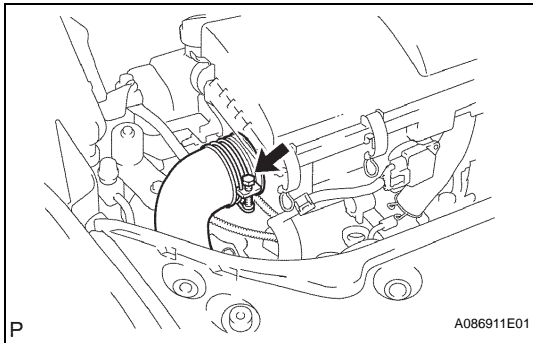
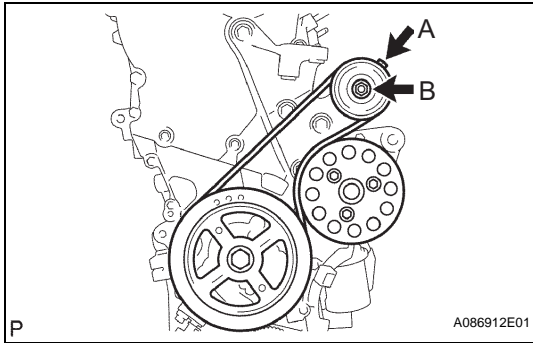
- Temporarily install the belt on each pulley.

2. ADJUST DRIVE BELT TENSION

- Turn adjust bolt B to adjust the belt tension.
- Tighten nut A.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

3. CHECK DRIVE BELT TENSION (See page [EM-5](#))



4. CONNECT NO. 1 AIR CLEANER INLET

- Connect the air cleaner inlet to the air cleaner case and tighten the clamp.

Torque: 3.0 N*m (31 kgf*cm, 27 in.*lbf)

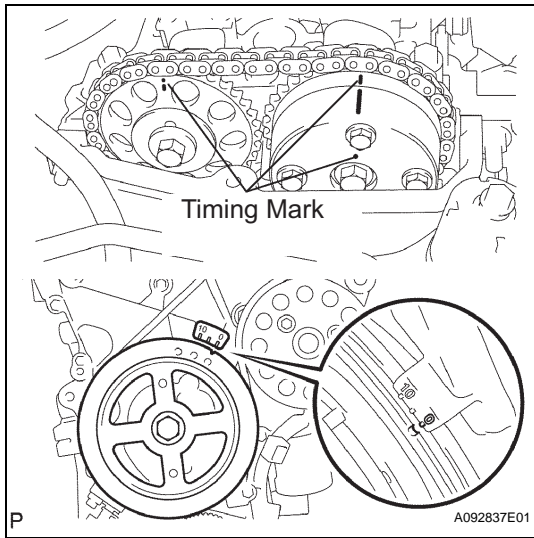
5. INSTALL ENGINE UNDER COVER RH

EM

VALVE CLEARANCE

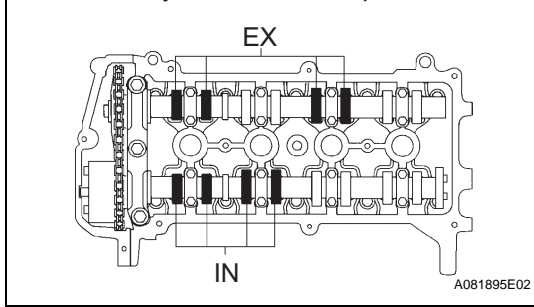
ADJUSTMENT

1. REMOVE REAR NO. 2 FLOOR BOARD (See page [CH-4](#))
2. REMOVE REAR DECK FLOOR BOX (See page [CH-4](#))
3. REMOVE REAR NO. 3 FLOOR BOARD (See page [CH-4](#))
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
5. REMOVE ENGINE UNDER COVER RH
6. REMOVE WIPER ARM HEAD CAP
7. REMOVE FRONT WIPER ARM LH (See page [WW-13](#))
8. REMOVE FRONT WIPER ARM RH (See page [WW-13](#))
9. REMOVE HOOD TO COWL TOP SEAL (See page [WW-13](#))
10. REMOVE COWL TOP VENTILATOR LOUVER LH (See page [WW-13](#))
11. REMOVE COWL TOP VENTILATOR LOUVER RH (See page [WW-13](#))
12. REMOVE WINDSHIELD WIPER LINK ASSEMBLY (See page [WW-13](#))
13. REMOVE FRONT COWL TOP PANEL OUTER (See page [FU-12](#))
14. REMOVE RADIATOR SUPPORT OPENING COVER (See page [CO-6](#))
15. REMOVE AIR CLEANER ASSEMBLY (See page [EM-28](#))
16. DISCONNECT BRAKE MASTER CYLINDER RESERVOIR (See page [EM-29](#))
17. REMOVE RESERVOIR BRACKET (See page [EM-29](#))
18. REMOVE CYLINDER HEAD COVER (See page [EM-30](#))
19. INSPECT VALVE CLEARANCE
HINT:
Inspect and adjust the valve clearance when the engine is cold.



- (a) Set the No. 1 cylinder to TDC/compression.
- (1) Turn the crankshaft pulley until its timing notch and timing mark 0 of the chain cover are aligned.
 - (2) Check that both timing marks on the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration. If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

No. 1 Cylinder TDC/Compression



- (b) Check the valves indicated in the illustration.
- (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

Standard valve clearance (Cold)

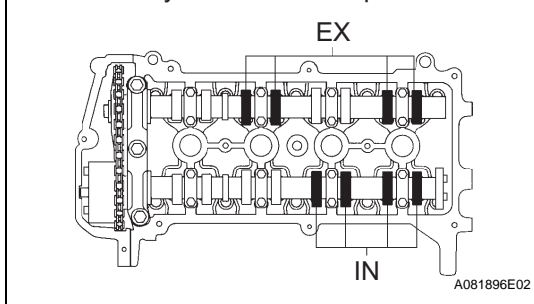
Item	Specified Condition
Intake	0.17 to 0.23 mm (0.007 to 0.009 in.)
Exhaust	0.27 to 0.33 mm (0.011 to 0.013 in.)

- (2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.
- (c) Turn the crankshaft 1 complete revolution until its timing notch and timing mark 0 of the chain cover are aligned.
- (d) Check the valves indicated in the illustration.
- (1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

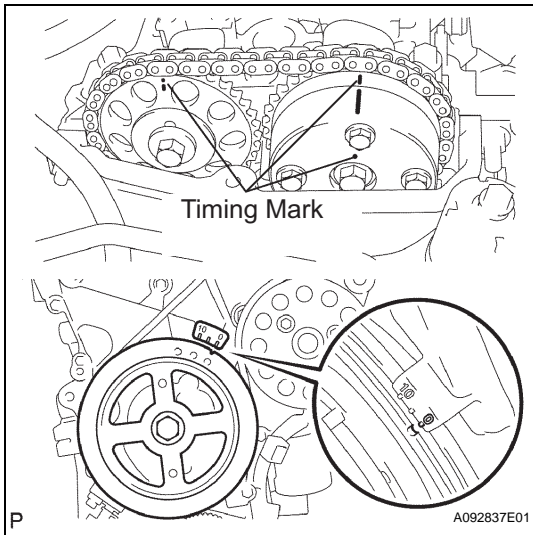
Standard valve clearance (Cold)

Item	Specified Condition
Intake	0.17 to 0.23 mm (0.007 to 0.009 in.)
Exhaust	0.27 to 0.33 mm (0.011 to 0.013 in.)

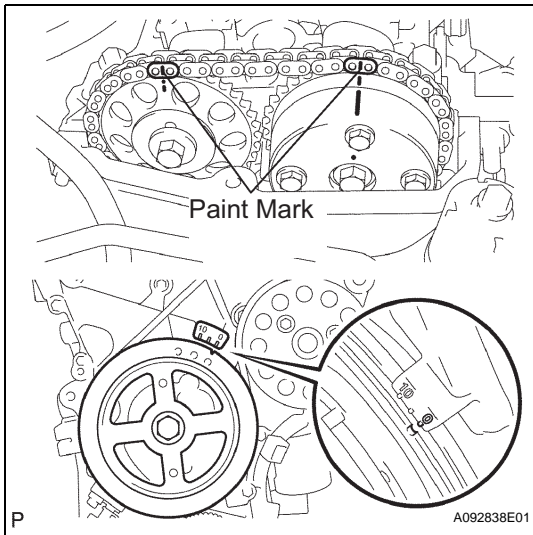
No. 4 Cylinder TDC/Compression



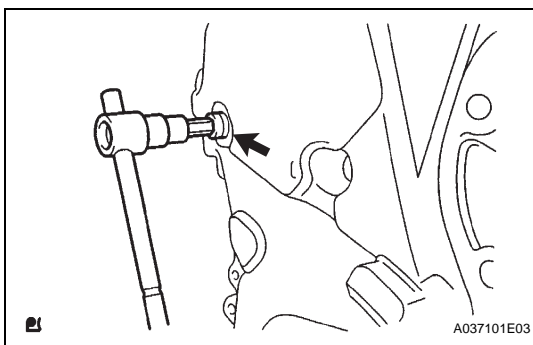
- (2) Record any out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

**20. ADJUST VALVE CLEARANCE**

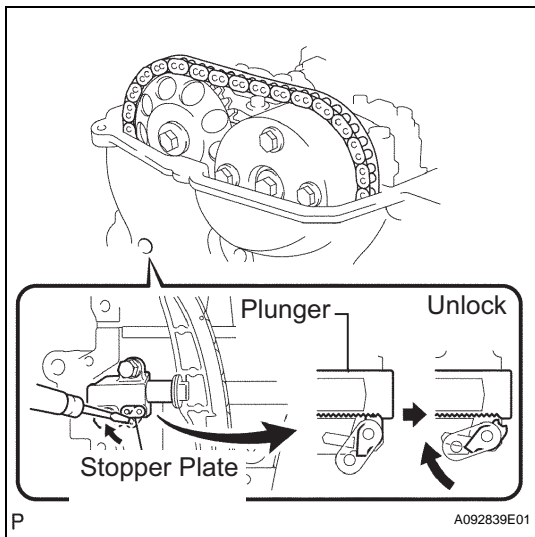
- (a) Set the No. 1 cylinder to TDC/compression.
- (1) Turn the crankshaft pulley until its timing notch and timing mark 0 of the chain cover are aligned.
 - (2) Check that both timing marks on the camshaft timing sprocket and valve timing controller assembly are facing upward as shown in the illustration.
If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.



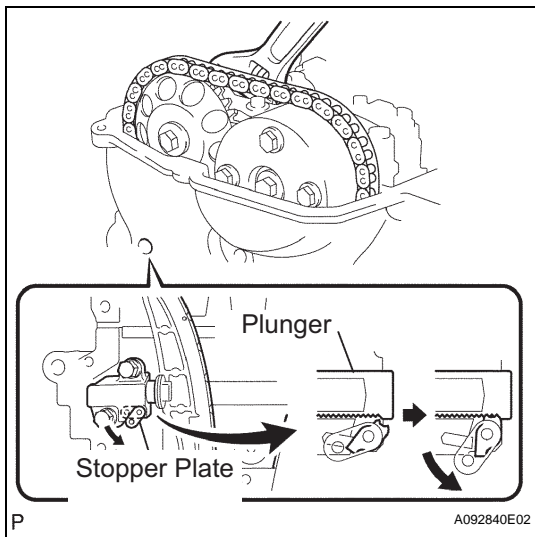
- (3) Put paint marks on the timing chain where the timing marks of the camshaft timing sprocket and the camshaft timing gear are located.



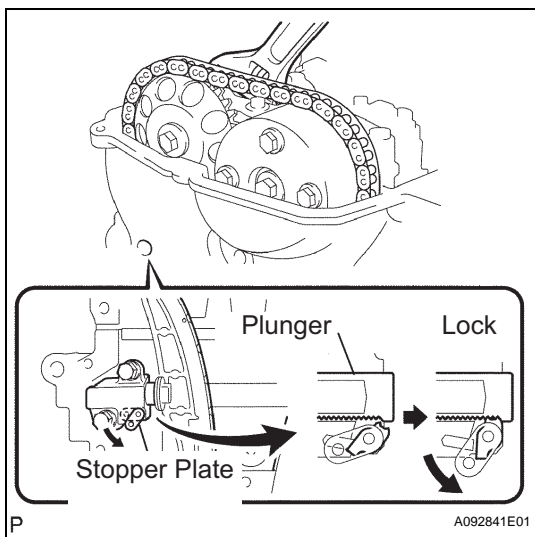
- (b) Using an 8 mm hexagon wrench, remove the screw plug.



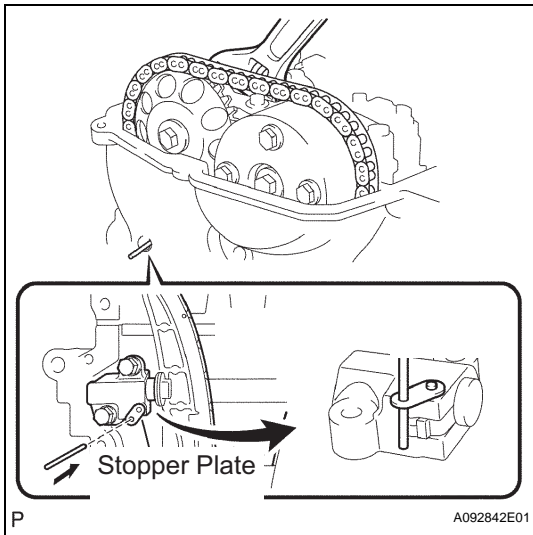
- (c) Insert a screwdriver into the service hole of the chain tensioner to hold the stopper plate of the chain tensioner at an upward position.
HINT:
 Lifting up the stopper plate of the chain tensioner unlocks the plunger.



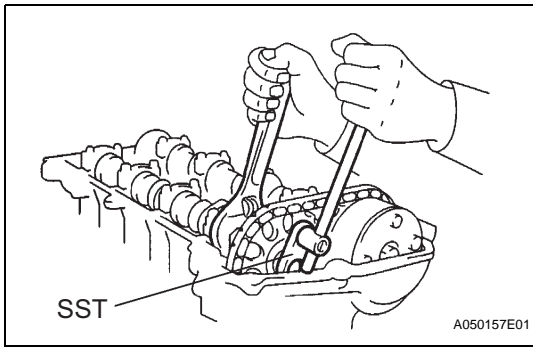
- (d) Keeping the stopper plate of the chain tensioner lifted, slightly rotate the hexagonal lobe of the No. 2 camshaft to the right with an adjustable wrench so the plunger of the chain tensioner is pushed.
HINT:
 When the camshaft No. 2 is slightly rotated to the right, the plunger is pushed.



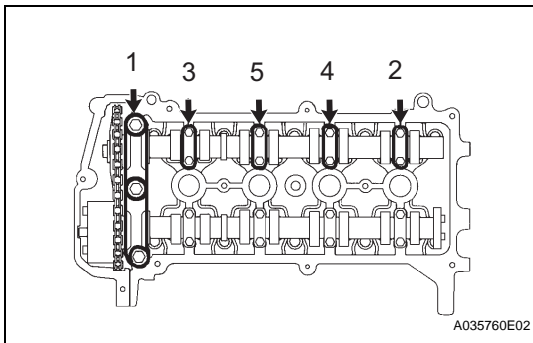
- (e) Keeping the adjustable wrench installed, remove the screwdriver with the plunger pushed.
NOTICE:
Do not move the adjustable wrench.
HINT:
 Removing the screwdriver lowers the stopper plate and locks the plunger.



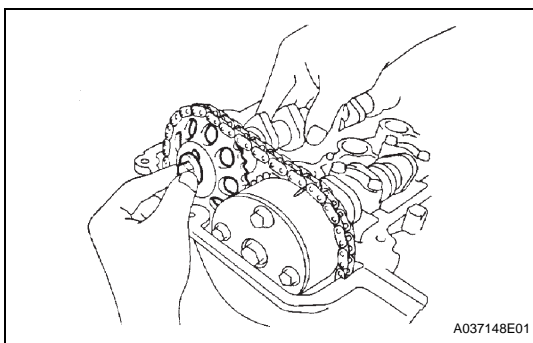
- (f) Insert a 3.0 mm (0.118 in.) diameter bar into the hole of the stopper plate with the stopper plate of the chain tensioner lowered and locked.
HINT:
 If a 3.0 mm (0.118 in.) diameter bar cannot be inserted into the hole of the stopper plate, rotate the No. 2 camshaft slightly to the left and right. Then a 3.0 mm (0.118 in.) diameter bar can be inserted easily.
- (g) Secure the 3.0 mm (0.118 in.) diameter bar with tape.



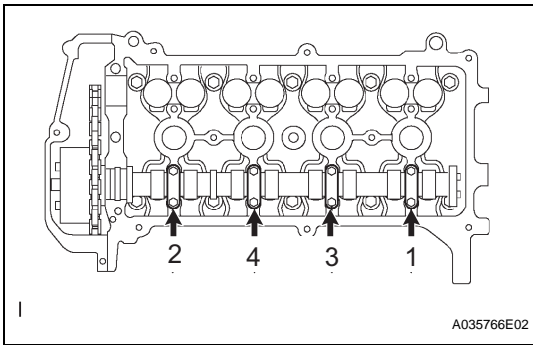
- (h) Hold the hexagonal lobe of the camshaft No. 2 with the adjustable wrench.
 (i) Using SST, loosen the bolt.
SST 09023-38400



- (j) Using several steps, uniformly loosen and remove the 11 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearing caps.
NOTICE:
Loosen each bolt uniformly, keeping the camshaft level.

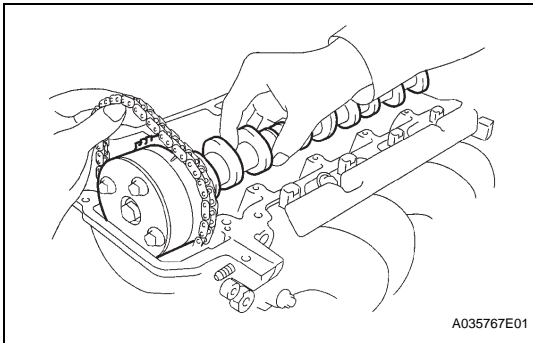


- (k) Remove the flange bolt with the No. 2 camshaft lifted up. Then detach the No. 2 camshaft and the camshaft timing sprocket.

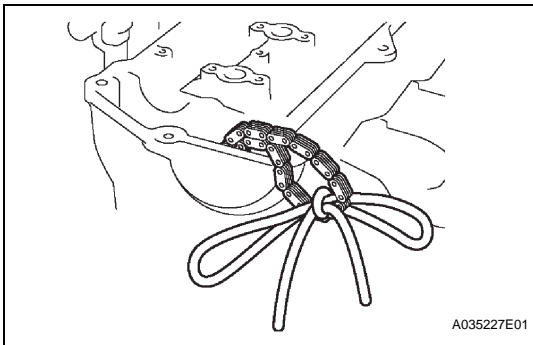


- (l) Using several steps, uniformly loosen and remove the 8 bearing cap bolts in the sequence shown in the illustration. Then remove the 4 bearing caps.

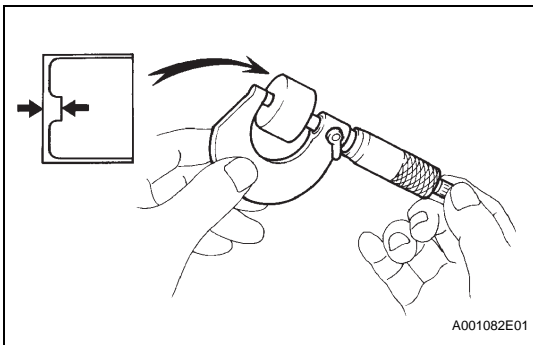
NOTICE:
Loosen each bolt uniformly, keeping the camshaft level.



- (m) Hold the timing chain with one hand, and remove the camshaft and the camshaft timing gear assembly.



- (n) Tie the timing chain with a string as shown in the illustration.
- NOTICE:**
Be careful not to drop anything inside the timing chain cover.



- (o) Remove the valve lifters.
- (p) Using a micrometer, measure the thickness of the removed lifter.
- (q) Calculate the thickness of a new lifter so that the valve clearance comes within the specified value.

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

New lifter thickness

Item	Thickness
Intake	$A = B + (C - 0.20 \text{ mm } (0.008 \text{ in.}))$
Exhaust	$A = B + (C - 0.30 \text{ mm } (0.012 \text{ in.}))$

- (r) Select a new lifter with the thickness as close to the calculated values as possible.

EXAMPLE: (Intake)

Measured valve clearance = 0.40 mm (0.0158 in.)
 $0.40 \text{ mm } (0.0158 \text{ in.}) - 0.20 \text{ mm } (0.0079 \text{ in.}) = 0.20 \text{ mm } (0.0079 \text{ in.})$

(Measured - Specification = Excess clearance)
 Used lifter measurement = 5.25 mm (0.2067 in.)

EM

$0.20 \text{ mm (0.0079 in.)} + 5.25 \text{ mm (0.2067 in.)} = 5.45 \text{ mm (0.2146 in.)}$

(Excess clearance + Used lifter = Ideal new lifter)

Closest new lifter = 5.45 mm (0.2146 in.)

Select No. 46 lifter (5.46 mm (0.2150 in.))

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 the New lifter thickness table below.

(1) Valve lifter selection chart (intake)

Measured Clearance mm (in.)

Installed Lifter Thickness mm (in.)

Measured 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)
0.000 - 0.030 (0.0000 - 0.0012)											06	06	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22
0.031 - 0.050 (0.0012 - 0.0020)								06	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24
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
0.071 - 0.090 (0.0028 - 0.0035)						06	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28
0.091 - 0.110 (0.0036 - 0.0043)					06	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30
0.111 - 0.130 (0.0044 - 0.0051)				06	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32
0.131 - 0.149 (0.0052 - 0.0059)			06	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34
0.150 - 0.250 (0.0059 - 0.0098)																											
0.251 - 0.270 (0.0099 - 0.0106)	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
0.271 - 0.290 (0.0107 - 0.0114)	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
0.291 - 0.310 (0.0115 - 0.0122)	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
0.311 - 0.330 (0.0122 - 0.0130)	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
0.331 - 0.350 (0.0130 - 0.0138)	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
0.351 - 0.370 (0.0138 - 0.0146)	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
0.371 - 0.390 (0.0146 - 0.0154)	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
0.391 - 0.410 (0.0154 - 0.0161)	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
0.411 - 0.430 (0.0162 - 0.0169)	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
0.431 - 0.450 (0.0170 - 0.0177)	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
0.451 - 0.470 (0.0178 - 0.0185)	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
0.471 - 0.490 (0.0185 - 0.0193)	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
0.491 - 0.510 (0.0193 - 0.0201)	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
0.511 - 0.530 (0.0201 - 0.0209)	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
0.531 - 0.550 (0.0209 - 0.0217)	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
0.551 - 0.570 (0.0217 - 0.0224)	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	74
0.571 - 0.590 (0.0225 - 0.0232)	44	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
0.591 - 0.610 (0.0233 - 0.0240)	46	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	74
0.611 - 0.630 (0.0241 - 0.0248)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74
0.631 - 0.650 (0.0248 - 0.0256)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74
0.651 - 0.670 (0.0256 - 0.0264)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74
0.671 - 0.690 (0.0264 - 0.0272)	54	56	58	60	62	64	66	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.691 - 0.710 (0.0272 - 0.0280)	56	58	60	62	64	66	68	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.711 - 0.730 (0.0280 - 0.0287)	58	60	62	64	66	68	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.731 - 0.750 (0.0288 - 0.0295)	60	62	64	66	68	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.751 - 0.770 (0.0296 - 0.0303)	62	64	66	68	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.771 - 0.790 (0.0304 - 0.0311)	64	66	68	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.791 - 0.810 (0.0311 - 0.0319)	66	68	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.811 - 0.830 (0.0319 - 0.0327)	68	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.831 - 0.850 (0.0327 - 0.0335)	70	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.851 - 0.870 (0.0335 - 0.0343)	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.871 - 0.890 (0.0343 - 0.0350)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.891 - 0.910 (0.0351 - 0.0358)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
0.911 - 0.930 (0.0359 - 0.0366)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74

EM

(2) Valve lifter selection chart (intake) (continued).

Measured Clearance mm (in.)

Installed Lifter Clearance mm (in.)

	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)	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							
0.031 - 0.050 (0.0012 - 0.0020)		24	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							
0.051 - 0.070 (0.0020 - 0.0028)			26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58	60							
0.071 - 0.090 (0.0028 - 0.0035)				28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58	60	62						
0.091 - 0.110 (0.0036 - 0.0043)					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			
0.111 - 0.130 (0.0044 - 0.0051)						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		
0.131 - 0.149 (0.0052 - 0.0059)							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	
0.150 - 0.250 (0.0059 - 0.0098)																																			
0.251 - 0.270 (0.0099 - 0.0106)																																			
0.271 - 0.290 (0.0107 - 0.0114)																																			
0.291 - 0.310 (0.0115 - 0.0122)																																			
0.311 - 0.330 (0.0122 - 0.0130)																																			
0.331 - 0.350 (0.0130 - 0.0138)																																			
0.351 - 0.370 (0.0138 - 0.0146)																																			
0.371 - 0.390 (0.0146 - 0.0154)																																			
0.391 - 0.410 (0.0154 - 0.0161)																																			
0.411 - 0.430 (0.0162 - 0.0169)																																			
0.431 - 0.450 (0.0170 - 0.0177)																																			
0.451 - 0.470 (0.0178 - 0.0185)																																			
0.471 - 0.490 (0.0185 - 0.0193)																																			
0.491 - 0.510 (0.0193 - 0.0201)																																			
0.511 - 0.530 (0.0201 - 0.0209)																																			
0.531 - 0.550 (0.0209 - 0.0217)																																			
0.551 - 0.570 (0.0217 - 0.0224)																																			
0.571 - 0.590 (0.0225 - 0.0232)																																			



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A116734E01

New lifter thickness

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

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
10	5.100 mm (0.2008 in.)	34	5.340 mm (0.2102 in.)	58	5.580 mm (0.2197 in.)
12	5.120 mm (0.2016 in.)	36	5.360 mm (0.2110 in.)	60	5.600 mm (0.2205 in.)
14	5.140 mm (0.2024 in.)	38	5.380 mm (0.2118 in.)	62	5.620 mm (0.2213 in.)
16	5.160 mm (0.2031 in.)	40	5.400 mm (0.2126 in.)	64	5.640 mm (0.2220 in.)
18	5.180 mm (0.2039 in.)	42	5.420 mm (0.2134 in.)	66	5.660 mm (0.2228 in.)
20	5.200 mm (0.2047 in.)	44	5.440 mm (0.2142 in.)	68	5.680 mm (0.2236 in.)
22	5.220 mm (0.2055 in.)	46	5.460 mm (0.2150 in.)	70	5.700 mm (0.2244 in.)
24	5.240 mm (0.2063 in.)	48	5.480 mm (0.2157 in.)	72	5.720 mm (0.2252 in.)
26	5.260 mm (0.2071 in.)	50	5.500 mm (0.2165 in.)	74	5.740 mm (0.2260 in.)
28	5.280 mm (0.2079 in.)	52	5.520 mm (0.2173 in.)	-	-

Standard intake valve clearance (Cold):**0.17 to 0.23 mm (0.007 to 0.009 in.)****EXAMPLE:**

A 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0158 in.).

Replace the 5.250 mm (0.2067 in.) lifter with a new No. 46 lifter.

(4) Valve selection chart (exhaust) (continued).

	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)	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
0.031 - 0.050 (0.0012 - 0.0020)	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
0.051 - 0.070 (0.0020 - 0.0028)	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
0.071 - 0.090 (0.0028 - 0.0035)	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
0.091 - 0.110 (0.0036 - 0.0043)	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
0.111 - 0.130 (0.0044 - 0.0051)	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
0.131 - 0.150 (0.0052 - 0.0059)	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
0.151 - 0.170 (0.0059 - 0.0067)	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
0.171 - 0.190 (0.0067 - 0.0075)	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
0.191 - 0.210 (0.0075 - 0.0083)	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
0.211 - 0.230 (0.0083 - 0.0091)	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
0.231 - 0.249 (0.0091 - 0.0098)	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
0.250 - 0.350 (0.0098 - 0.0138)																												
0.351 - 0.370 (0.0138 - 0.0146)	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	
0.371 - 0.390 (0.0146 - 0.0154)	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	74	
0.391 - 0.410 (0.0154 - 0.0161)	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	74	74	
0.411 - 0.430 (0.0162 - 0.0169)	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	
0.431 - 0.450 (0.0170 - 0.0177)	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	74	74	
0.451 - 0.470 (0.0178 - 0.0185)	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	
0.471 - 0.490 (0.0185 - 0.0193)	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	
0.491 - 0.510 (0.0193 - 0.0201)	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.511 - 0.530 (0.0201 - 0.0209)	62	64	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.531 - 0.550 (0.0209 - 0.0217)	64	66	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.551 - 0.570 (0.0217 - 0.0224)	66	68	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.571 - 0.590 (0.0225 - 0.0232)	68	70	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.591 - 0.610 (0.0233 - 0.0240)	70	72	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.611 - 0.630 (0.0241 - 0.0248)	72	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.631 - 0.650 (0.0248 - 0.0256)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.651 - 0.670 (0.0256 - 0.0264)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	
0.671 - 0.690 (0.0264 - 0.0272)	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	

EM

New lifter thickness

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

Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness
10	5.100 mm (0.2008 in.)	34	5.340 mm (0.2102 in.)	58	5.580 mm (0.2197 in.)
12	5.120 mm (0.2016 in.)	36	5.360 mm (0.2110 in.)	60	5.600 mm (0.2205 in.)
14	5.140 mm (0.2024 in.)	38	5.380 mm (0.2118 in.)	62	5.620 mm (0.2213 in.)
16	5.160 mm (0.2031 in.)	40	5.400 mm (0.2126 in.)	64	5.640 mm (0.2220 in.)
18	5.180 mm (0.2039 in.)	42	5.420 mm (0.2134 in.)	66	5.660 mm (0.2228 in.)
20	5.200 mm (0.2047 in.)	44	5.440 mm (0.2142 in.)	68	5.680 mm (0.2236 in.)
22	5.220 mm (0.2055 in.)	46	5.460 mm (0.2150 in.)	70	5.700 mm (0.2244 in.)
24	5.240 mm (0.2063 in.)	48	5.480 mm (0.2157 in.)	72	5.720 mm (0.2252 in.)
26	5.260 mm (0.2071 in.)	50	5.500 mm (0.2165 in.)	74	5.740 mm (0.2260 in.)
28	5.280 mm (0.2079 in.)	52	5.520 mm (0.2173 in.)	-	-

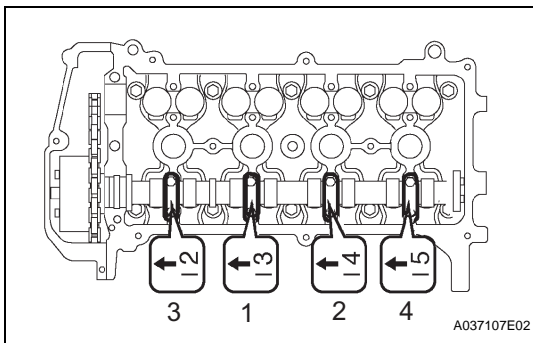
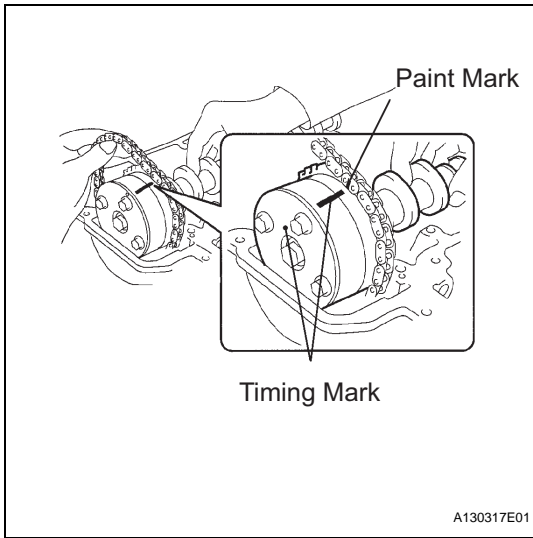
**Standard exhaust valve clearance (Cold):
0.27 to 0.33 mm (0.011 to 0.013 in.)**

EXAMPLE:

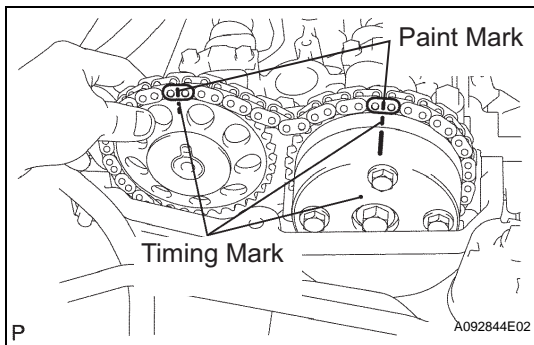
A 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.440 mm (0.0173 in.).

Replace the 5.340 mm (0.2102 in.) lifter with a new No. 48 lifter.

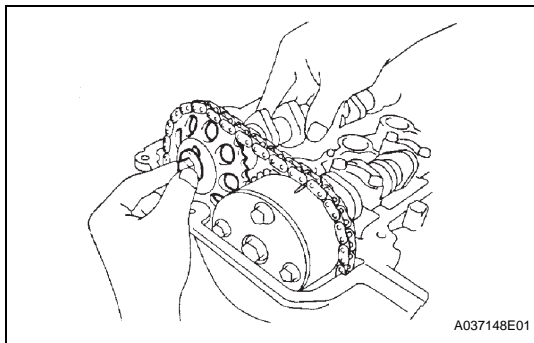
- (s) Reinstall the selected valve lifters.
- (t) Apply a light coat of engine oil to the camshaft journals.
- (u) Install the timing chain onto the camshaft timing gear with the paint mark and the timing mark aligned as shown in the illustration.



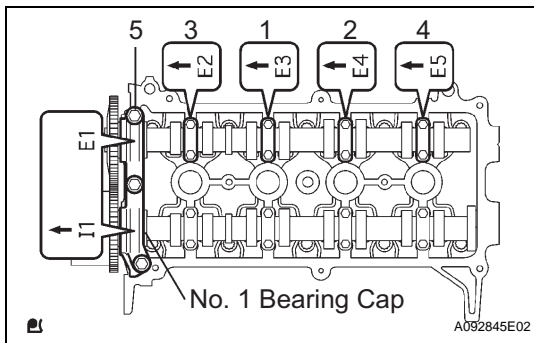
- (v) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.
Torque: 13 N*m (130 kgf*cm, 9.6 ft.*lbf)
NOTICE:
Tighten each bolt uniformly, keeping the camshaft level.



- (w) Hold the timing chain, and align the timing mark on the camshaft timing sprocket with the paint mark of the timing chain.



- (x) Align the alignment pin hole on the camshaft timing sprocket with the alignment pin of the camshaft, and install the sprocket into the camshaft.
 (y) Temporarily install the timing sprocket bolt.



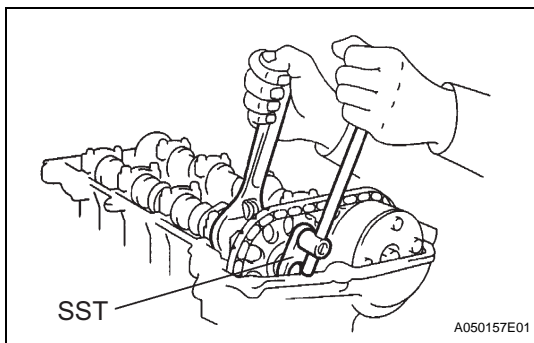
- (z) Examine the front marks and numbers, and tighten the bolts in the sequence shown in the illustration.

Torque: 13 N*m (133 kgf*cm, 9 ft.*lbf)

NOTICE:

Tighten each bolt uniformly, keeping the camshaft level.

- (aa) Install the No. 1 bearing cap.
Torque: 23 N*m (235 kgf*cm, 17 ft.*lbf)

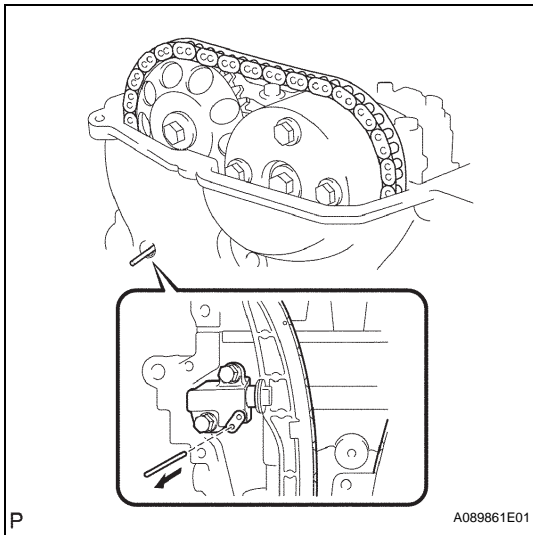


- (ab) Hold the hexagonal lobe of the No. 2 camshaft with the adjustable wrench.

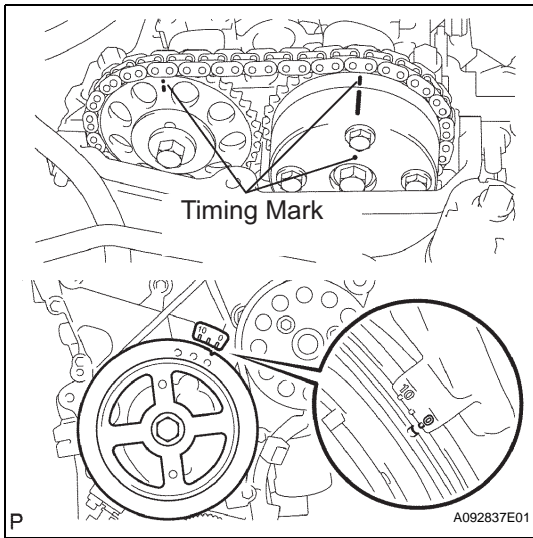
- (ac) Using SST, tighten the bolt.

SST 09023-38400

Torque: 64 N*m (653 kgf*cm, 47 ft.*lbf)

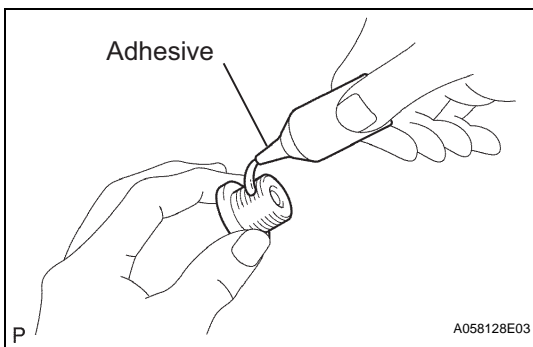


(ad) Remove the bar from the timing chain tensioner.



(ae) Turn the crankshaft pulley until its timing notch and timing mark 0 of the chain cover are aligned.

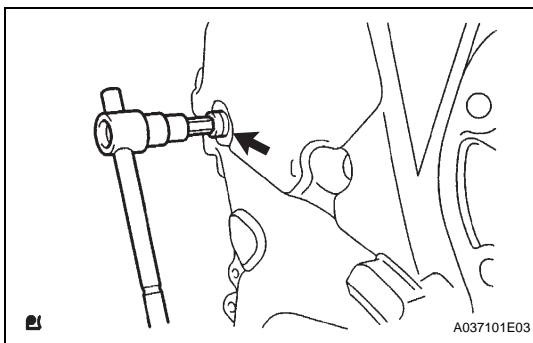
(af) Check that all the pairs of the timing marks are aligned.



(ag) Apply seal packing to 2 or 3 threads of the screw plug end.

Seal packing:

Toyota Genuine Adhesive 1324, Three Bond 1324 or Equivalent



(ah) Using an 8 mm hexagon wrench, install the screw plug.

Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

21. **INSTALL CYLINDER HEAD COVER** (See page [EM-39](#))

22. **INSTALL RESERVOIR BRACKET** (See page [EM-40](#))

23. **INSTALL BRAKE MASTER CYLINDER RESERVOIR** (See page [EM-40](#))

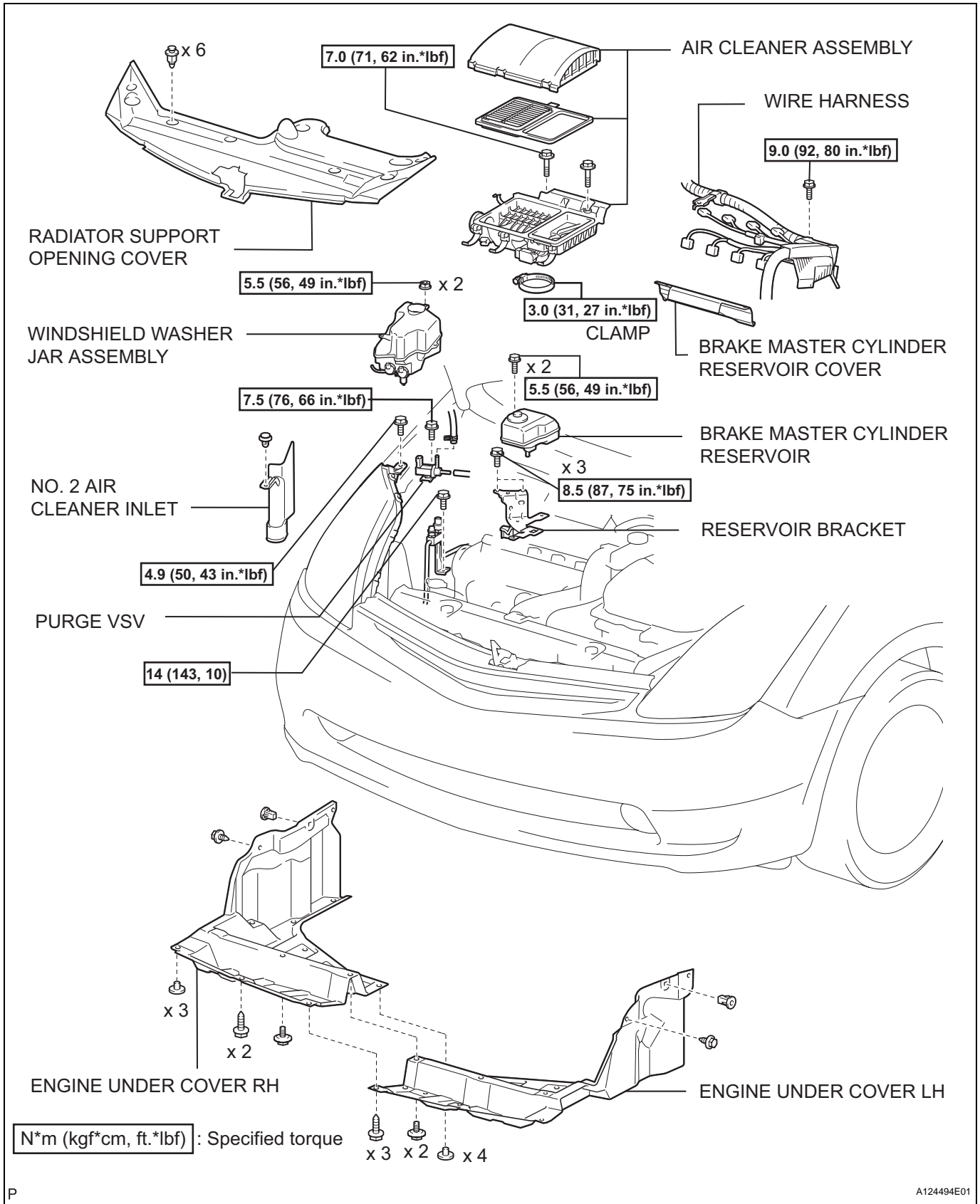
24. **INSTALL AIR CLEANER ASSEMBLY** (See page [EM-41](#))

25. INSTALL FRONT COWL TOP PANEL OUTER (See page [FU-19](#))
26. INSTALL WINDSHIELD WIPER LINK ASSEMBLY (See page [WW-16](#))
27. INSTALL COWL TOP VENTILATOR LOUVER RH
28. INSTALL COWL TOP VENTILATOR LOUVER LH
29. INSTALL HOOD TO COWL TOP SEAL
30. INSTALL FRONT WIPER ARM LH (See page [WW-16](#))
31. INSTALL FRONT WIPER ARM RH (See page [WW-16](#))
32. INSTALL WIPER ARM HEAD CAP
33. CHECK ENGINE OIL LEAKS
34. INSTALL RADIATOR SUPPORT OPENING COVER (See page [CO-9](#))
35. REMOVE ENGINE UNDER COVER RH
36. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page [CH-7](#))
37. INSTALL REAR NO. 3 FLOOR BOARD (See page [CH-8](#))
38. INSTALL REAR DECK FLOOR BOX (See page [CH-8](#))
39. INSTALL NO. 2 REAR FLOOR BOARD (See page [CH-8](#))
40. PERFORM INITIALIZATION
 - (a) Perform initialization (see page [IN-32](#)).

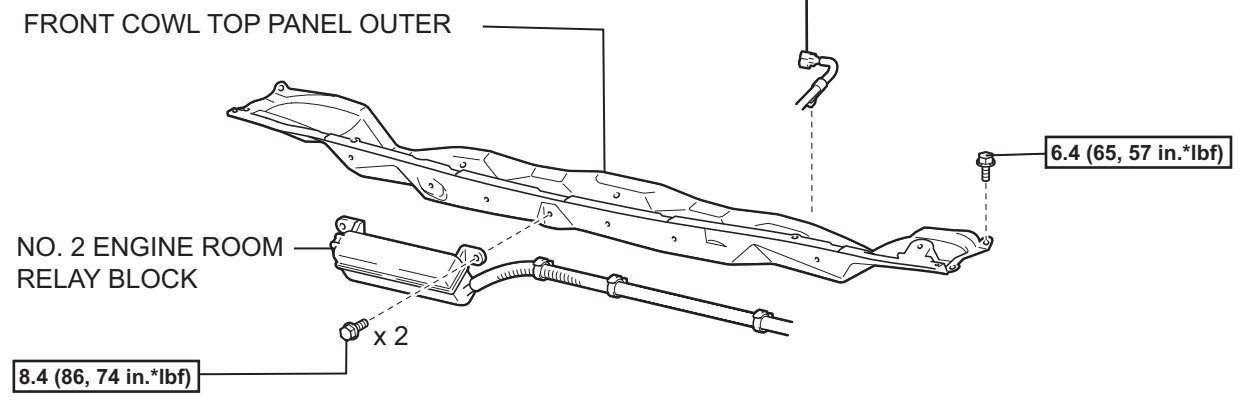
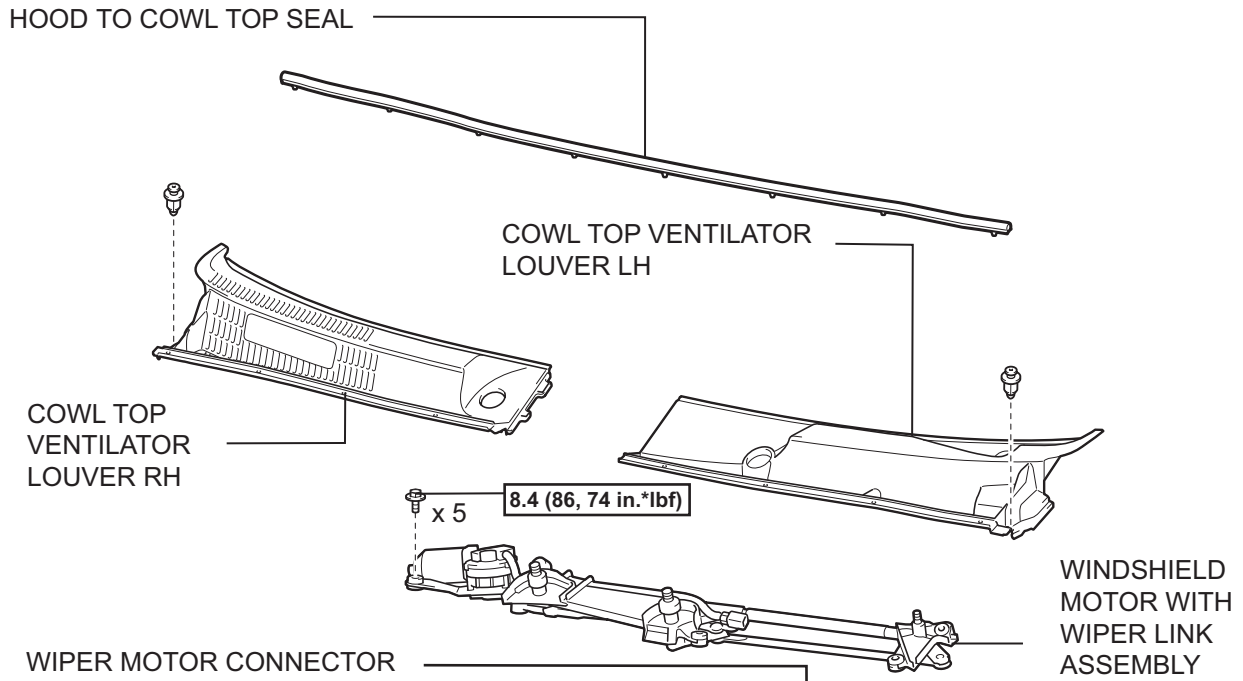
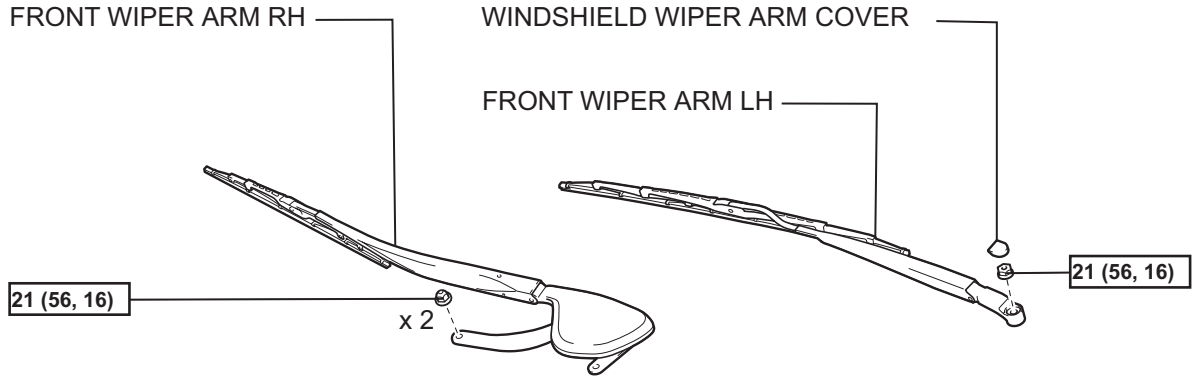
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.

TIMING CHAIN

COMPONENTS

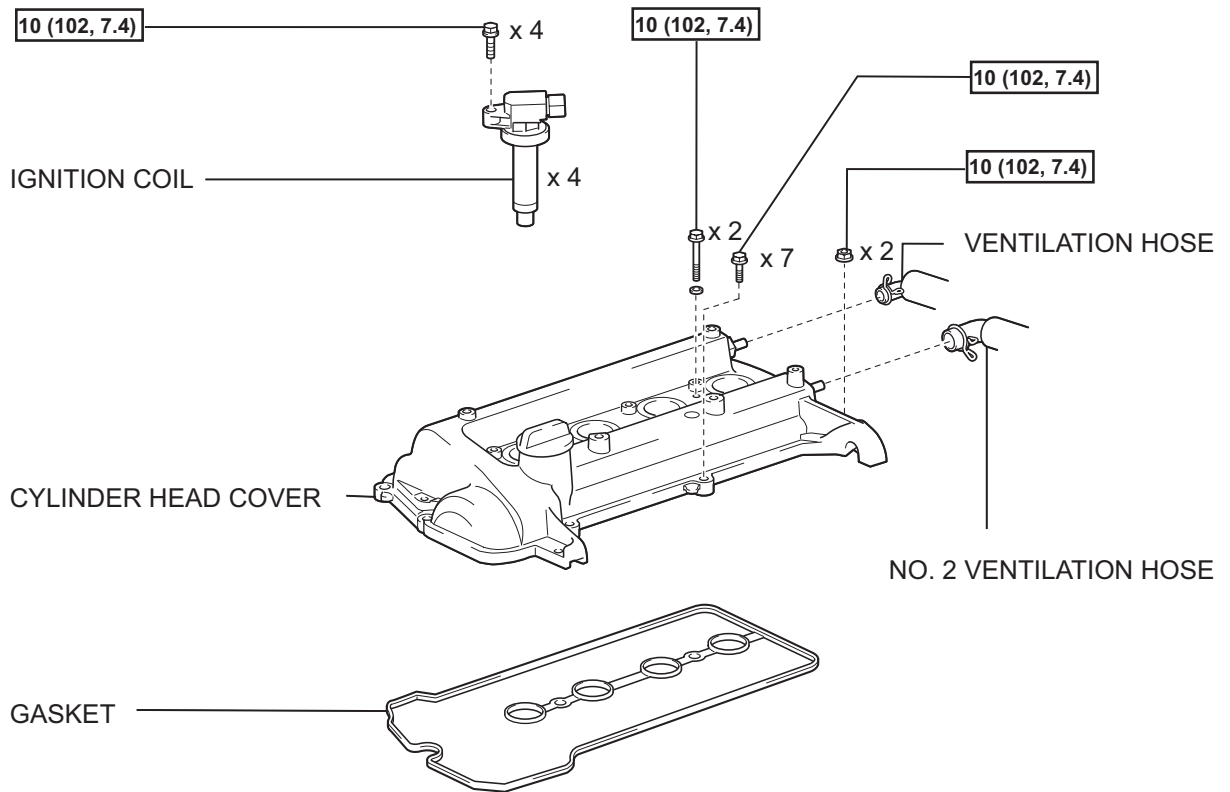


EM

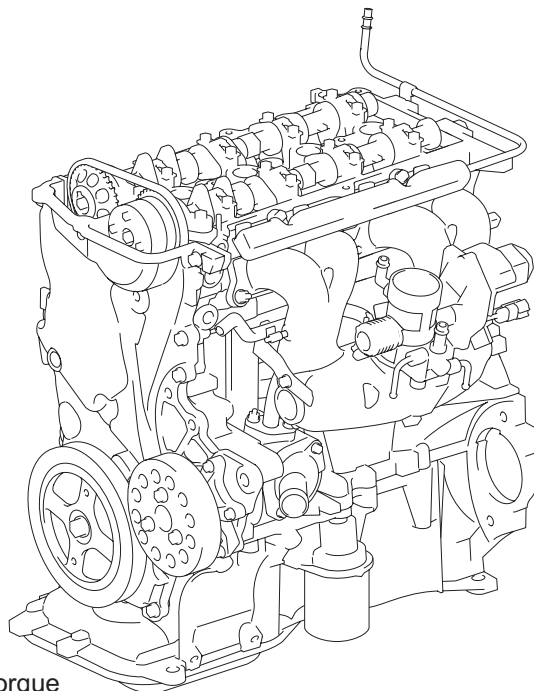


N*m (kgf*cm, ft.*lbf) : Specified torque

EM

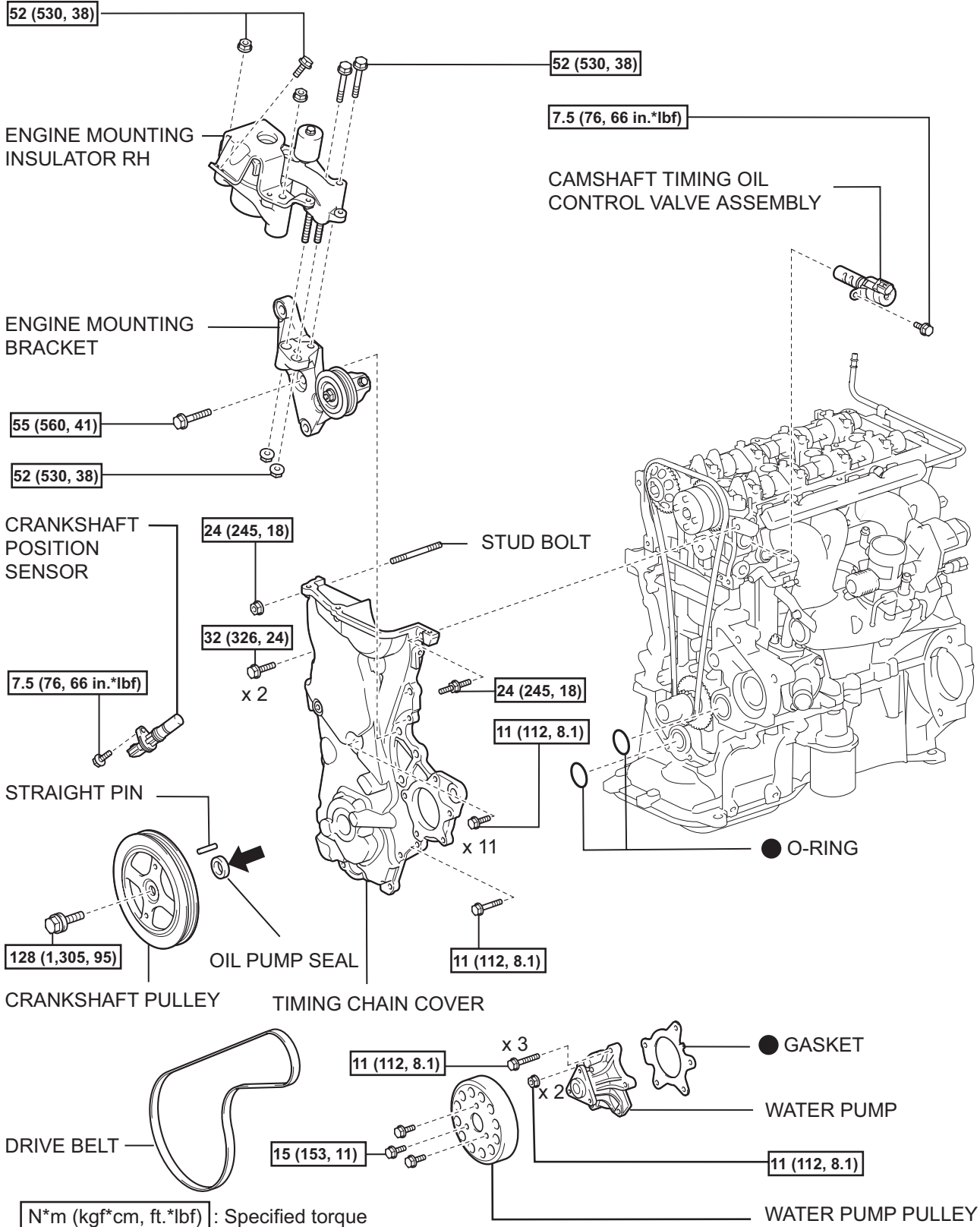


EM



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

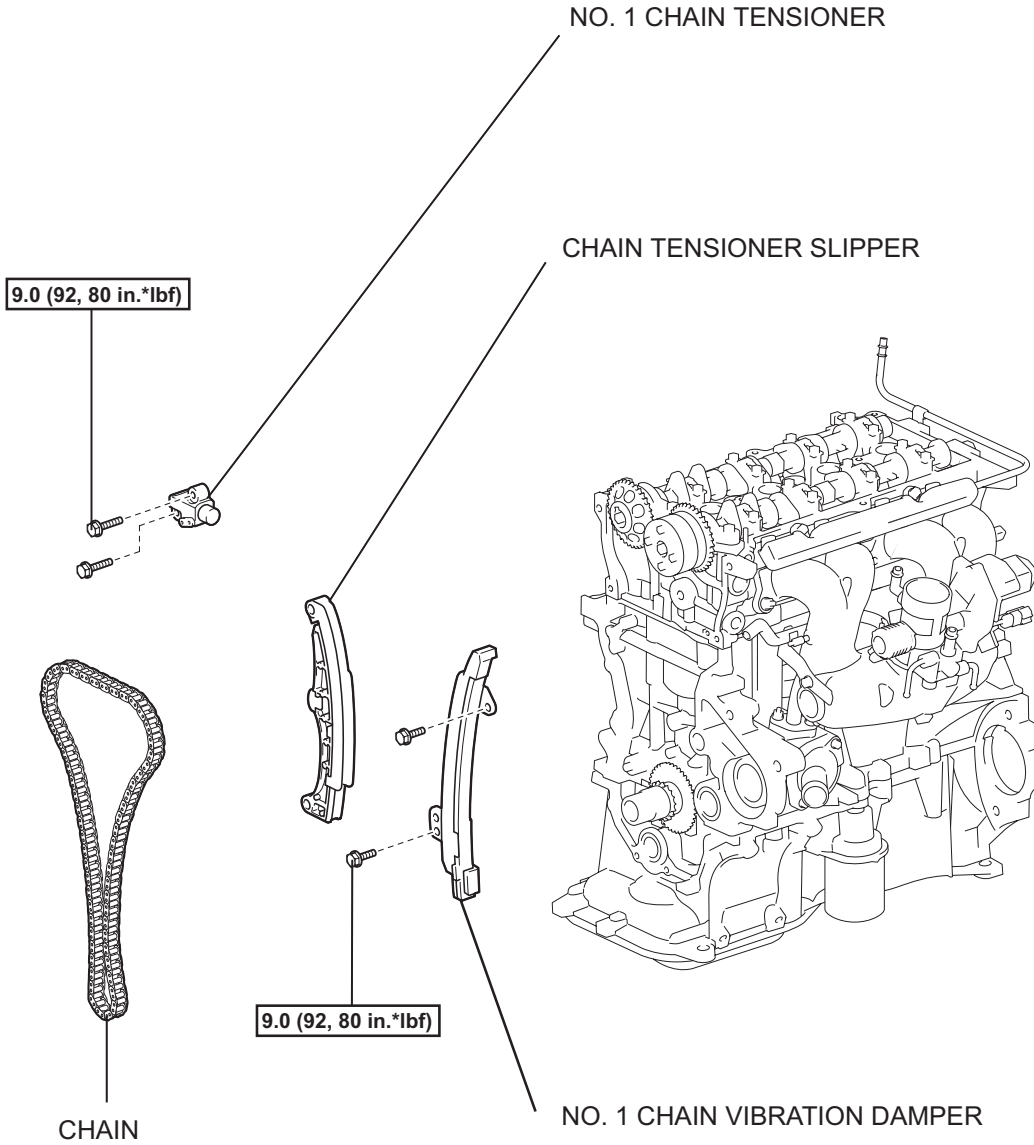
EM



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

● Non-reusable part

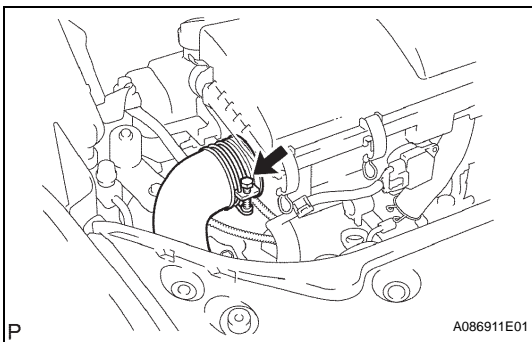
← Grease application



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

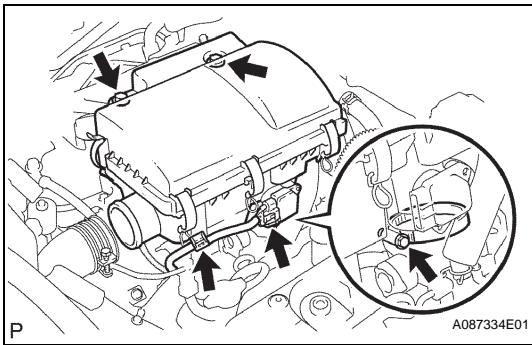
REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (See page [CH-4](#))
2. REMOVE REAR DECK FLOOR BOX (See page [CH-4](#))
3. REMOVE REAR NO. 3 FLOOR BOARD (See page [CH-4](#))
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
 Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
5. REMOVE RADIATOR SUPPORT OPENING COVER
6. REMOVE FRONT WHEELS
7. REMOVE NO. 3 ENGINE UNDER COVER
8. REMOVE NO. 4 CENTER ENGINE UNDER COVER
9. DRAIN ENGINE COOLANT (See page [CO-6](#))
10. DRAIN ENGINE OIL (See page [LU-4](#))
11. REMOVE WIPER ARM HEAD CAP
12. REMOVE FRONT WIPER ARM LH (See page [WW-13](#))
13. REMOVE FRONT WIPER ARM RH (See page [WW-13](#))
14. REMOVE HOOD TO COWL TOP SEAL (See page [WW-13](#))
15. REMOVE COWL TOP VENTILATOR LOUVER LH (See page [WW-13](#))
16. REMOVE COWL TOP VENTILATOR LOUVER RH (See page [WW-13](#))
17. REMOVE WINDSHIELD MOTOR WITH WIPER LINK ASSEMBLY (See page [WW-13](#))
18. REMOVE FRONT COWL TOP PANEL OUTER (See page [FU-12](#))
19. REMOVE AIR CLEANER ASSEMBLY
 - (a) Loosen the clamp, then disconnect the No. 1 air cleaner inlet from the air cleaner case.



P

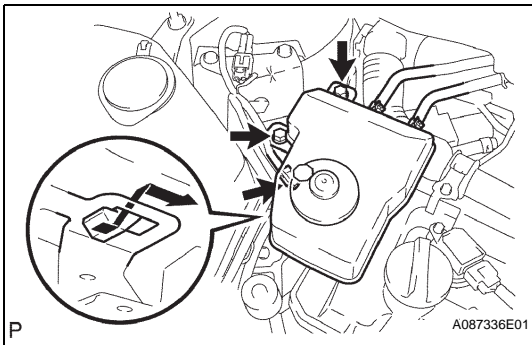
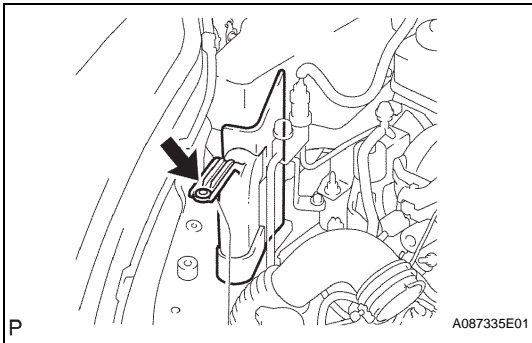
A086911E01



- (b) Disconnect the intake air flow meter connector, then remove the wire harness clamp.
- (c) Loosen the clamp, then remove the 2 bolts and air cleaner assembly.

20. REMOVE NO. 2 AIR CLEANER INLET

- (a) Remove the clip and No. 2 air cleaner inlet.



21. DISCONNECT BRAKE MASTER CYLINDER RESERVOIR

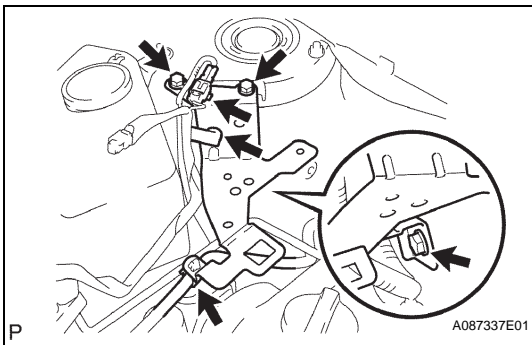
- (a) Disconnect the connector.
- (b) Remove the 2 bolts.
- (c) Separate the claw fitting, then suspend the brake master cylinder reservoir with rope.

NOTICE:

Be careful of the angle of the brake master cylinder reservoir when suspending to prevent air from coming into the hose.

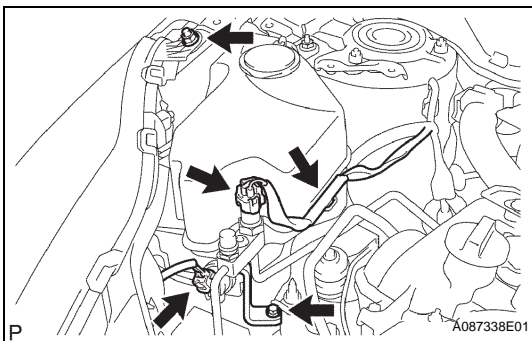
22. REMOVE RESERVOIR BRACKET

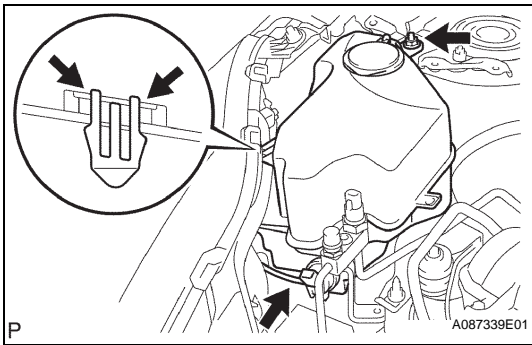
- (a) Disconnect the hose from the brake master cylinder reservoir bracket.
- (b) Remove the 3 bolts and wire harness clamp, then remove the brake master cylinder reservoir bracket.



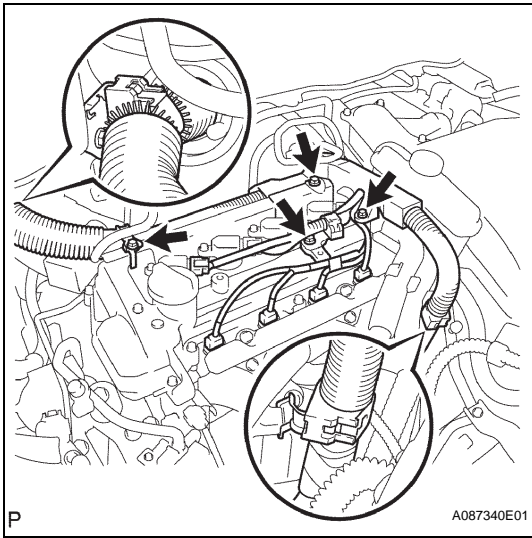
23. REMOVE WINDSHIELD WASHER JAR ASSEMBLY

- (a) Loosen the bolt which holds the headlight RH.
- (b) Disconnect the connector and remove the wire harness clamp.
- (c) Remove the bolt and bracket.



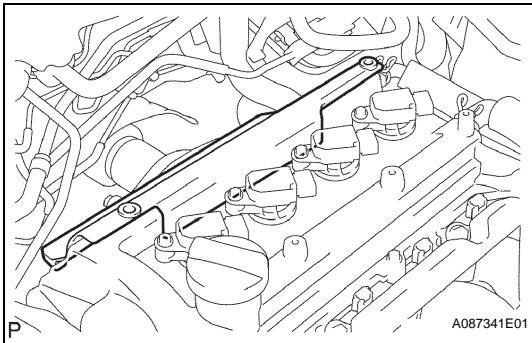


- (d) Remove the nut.
- (e) Slightly lift the headlight RH and separate the claw fitting, then remove the washer jar assembly.
- (f) Disconnect the hose from the washer jar assembly.

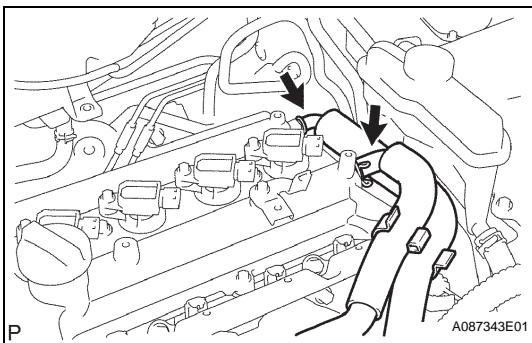


24. REMOVE CYLINDER HEAD COVER

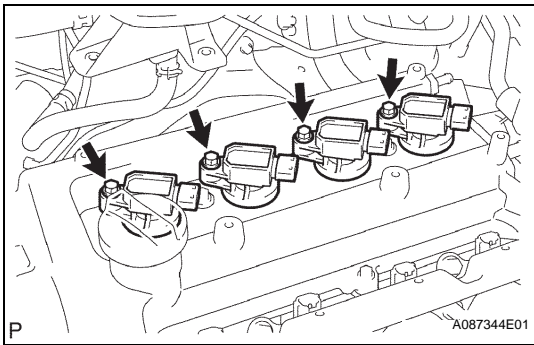
- (a) Disconnect the fuel injector connector and ignition coil connector.
- (b) Remove the 3 bolts and wire harness clamp, then disconnect the wire harness.



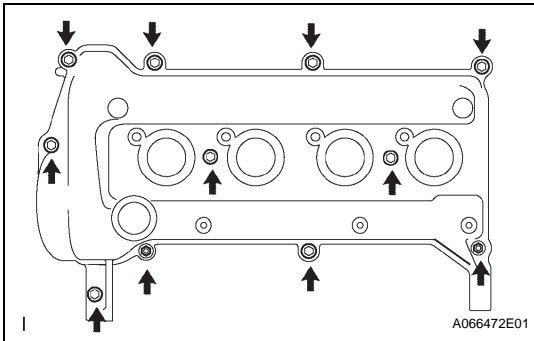
- (c) Remove the brake master cylinder reservoir cover.



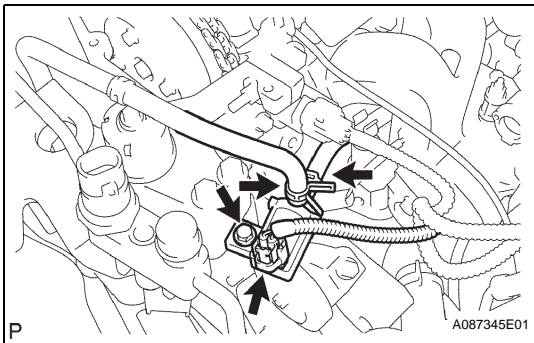
- (d) Disconnect the ventilation hose and ventilation hose No. 2.



- (e) Remove the bolt and ignition coil.



- (f) Remove the 9 bolts and 2 nuts, then remove the cylinder head cover.

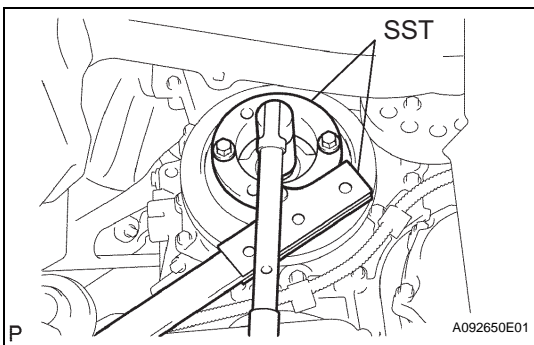


25. REMOVE PURGE VSV

- (a) Disconnect the connector and hose.
 (b) Remove the bolt and purge VSV.

26. REMOVE DRIVE BELT (See page EM-6)

27. REMOVE WATER PUMP (See page CO-11)



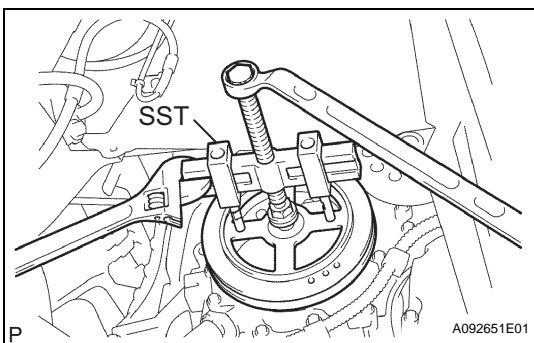
28. REMOVE CRANKSHAFT PULLEY

- (a) Using SST, hold the crankshaft pulley and loosen the crankshaft bolt.

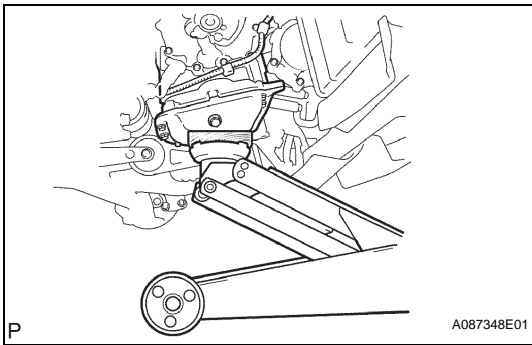
SST 09213-58013 (91111-50845), 09330-00021

NOTICE:

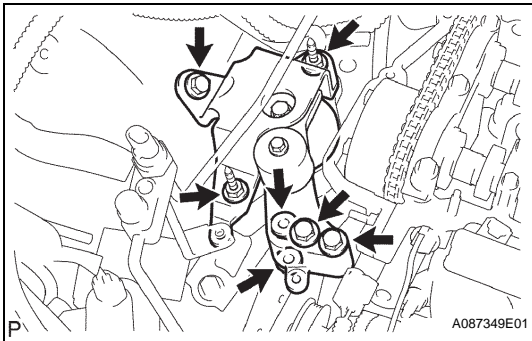
When installing SST, be careful that the bolt which holds SST does not interfere with the chain cover.



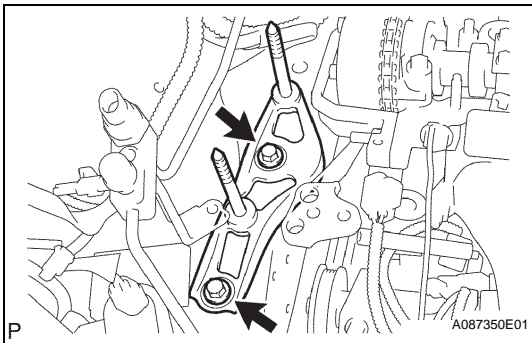
- (b) Loosen the crankshaft bolt until 2 to 3 threads of the bolt are tightened to the crankshaft.
 (c) Using SST, remove the crankshaft damper.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
 (d) Remove the crankshaft bolt.

**29. REMOVE ENGINE MOUNTING INSULATOR RH**

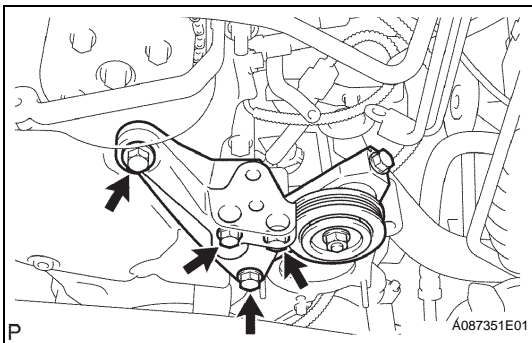
- (a) Put a wooden block on a jack. Support the oil pan with the jack.



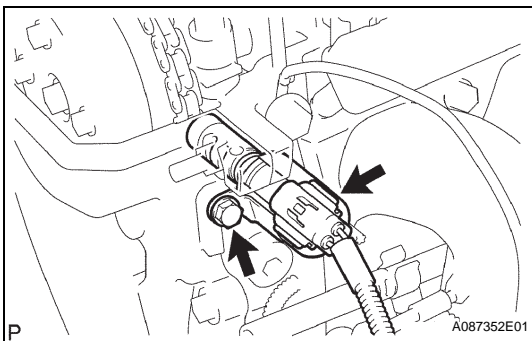
- (b) Remove the 3 bolts and 4 nuts, then remove the engine mounting insulator RH.

**30. REMOVE ENGINE MOUNTING SPACER**

- (a) Remove the 2 bolts and engine mounting spacer.

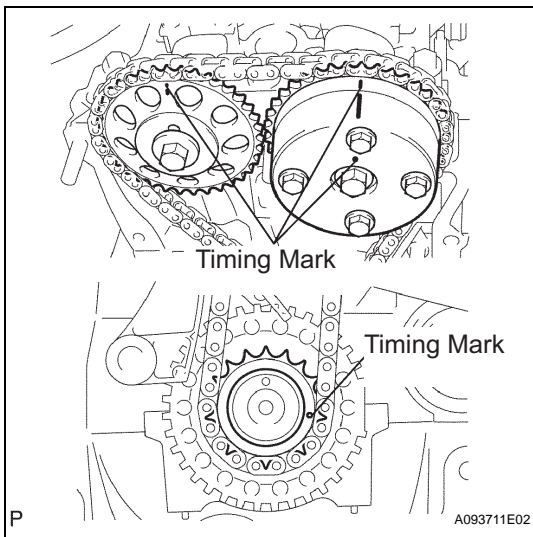
**31. REMOVE ENGINE MOUNTING BRACKET**

- (a) Remove the 4 bolts and engine mounting bracket.

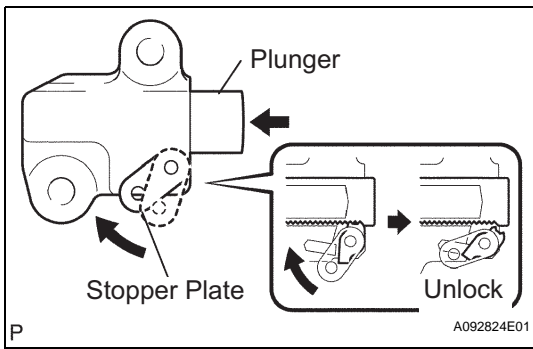
**32. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY**

- (a) Disconnect the connector.
 (b) Remove the bolt and camshaft timing oil control valve assembly.

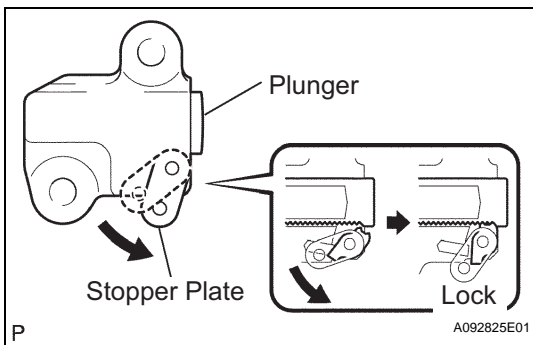
33. REMOVE CRANKSHAFT POSITION SENSOR (See page [ES-443](#))**34. REMOVE TIMING CHAIN COVER (See page [LU-15](#))****35. REMOVE OIL PUMP SEAL (See page [EM-138](#))**

**36. SET NO. 1 CYLINDER TO TDC / COMPRESSION**

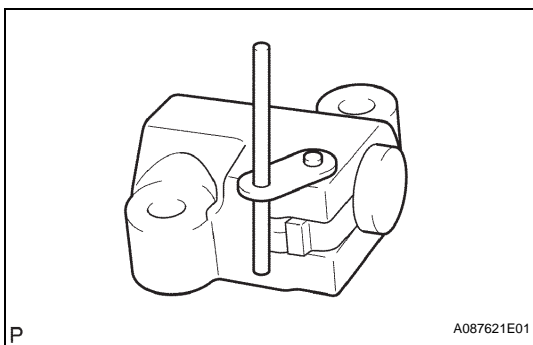
- (a) Install the washer to the crankshaft bolt, then install the bolt to the crankshaft.
- (b) Turn the crankshaft clockwise so it is positioned as illustrated.

**37. REMOVE NO. 1 CHAIN TENSIONER**

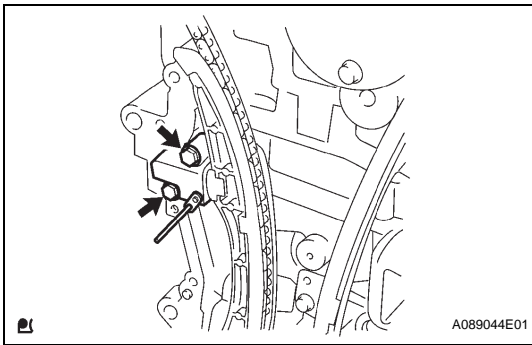
- (a) Lift up the stopper plate, then unlock the plunger.
- (b) Push in the plunger to the end with the plunger unlocked.



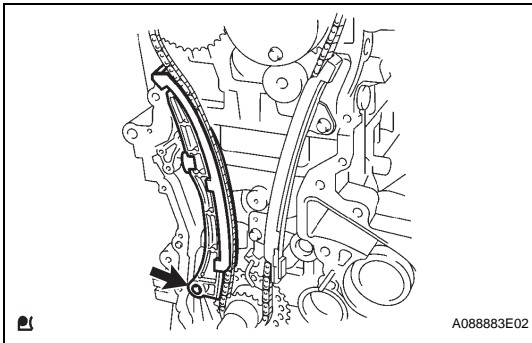
- (c) Lower the stopper plate with the plunger pushed to the end, then lock the plunger.



- (d) Insert a 3.0 mm (0.118 in.) diameter bar into the hole of the stopper plate with the plunger locked.
HINT:
If the stopper plate is not completely lowered and a 3.0 mm (0.118 in.) diameter bar cannot be inserted, unlock and pull out the plunger slightly. Then the stopper plate will be completely lowered and a 3.0 mm (0.118 in.) diameter bar can be inserted easily.

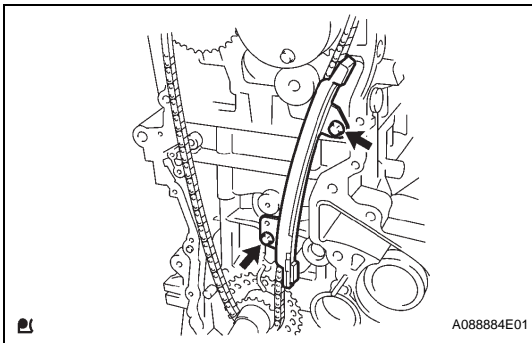


(e) Remove the 2 bolts and chain tensioner.



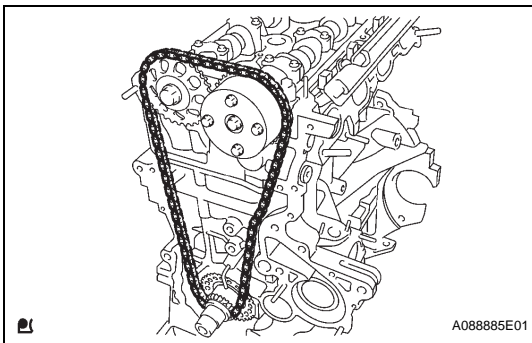
38. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the bolt and tensioner slipper.



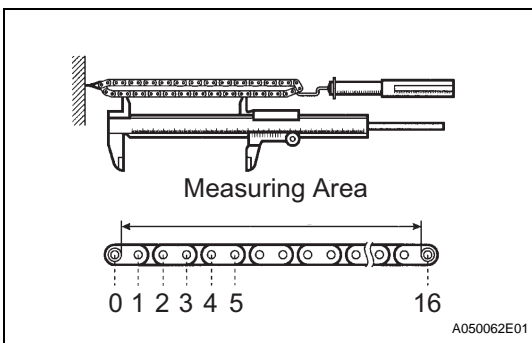
39. REMOVE NO. 1 CHAIN VIBRATION DAMPER

(a) Remove the 2 bolts and chain vibration damper.



40. REMOVE CHAIN

(a) Remove the chain from the engine.



INSPECTION

1. INSPECT CHAIN

(a) Using a spring scale, pull the timing chain with a force of 140 N (14.3 kgf, 31.5 lbf) and measure the length of it.

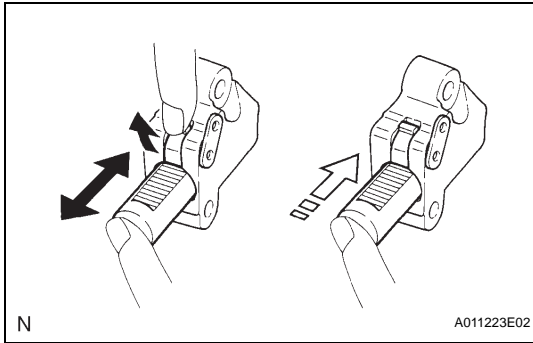
Maximum chain elongation:

124.2 mm (4.890 in.)

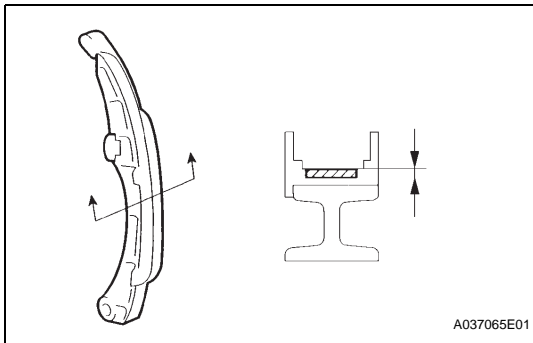
If the elongation is greater than the maximum, replace the chain.

HINT:

Perform the measurements at 3 or more random places to obtain the average length.

**2. INSPECT NO. 1 CHAIN TENSIONER**

- (a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.
- (b) Release the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.

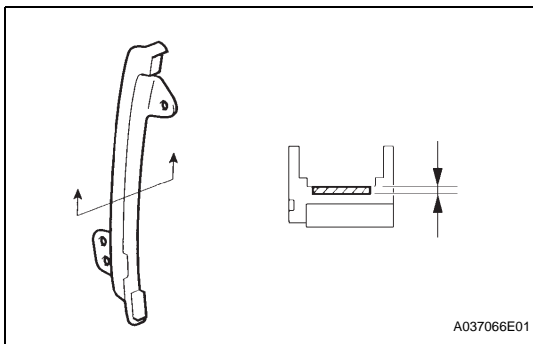
**3. INSPECT CHAIN TENSIONER SLIPPER**

- (a) Measure the chain tensioner slipper wear.

Maximum wear:

1.0 mm (0.039 in.)

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

**4. INSPECT NO. 1 CHAIN VIBRATION DAMPER**

- (a) Measure the vibration damper wear.

Maximum wear:

1.0 mm (0.039 in.)

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

INSTALLATION

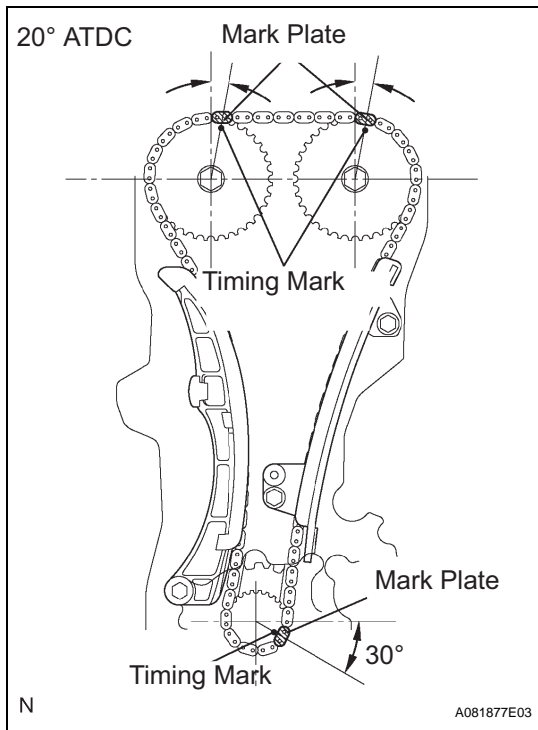
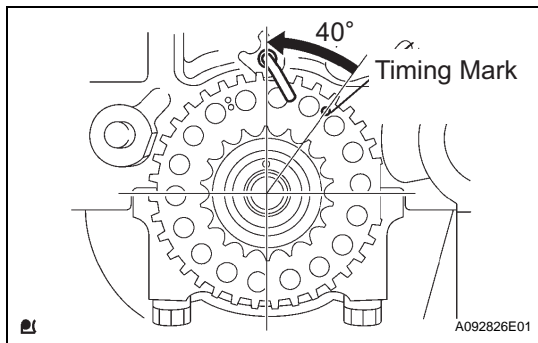
1. INSTALL CHAIN

- (a) Set the position of the No. 1 cylinder to 20° ATDC.

NOTICE:

To prevent the pistons from hitting against valves, the following procedures must be performed in the order below.

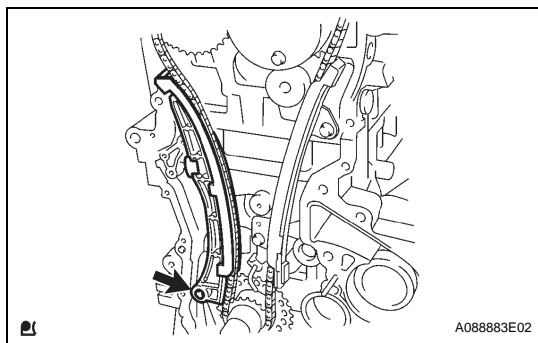
- (1) Set the crankshaft between 40 to 140° ATDC.
 - (2) Set the cams of the intake and exhaust timing sprockets to 20° ATDC.
 - (3) Reset the crankshaft to 20° ATDC.
- (b) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



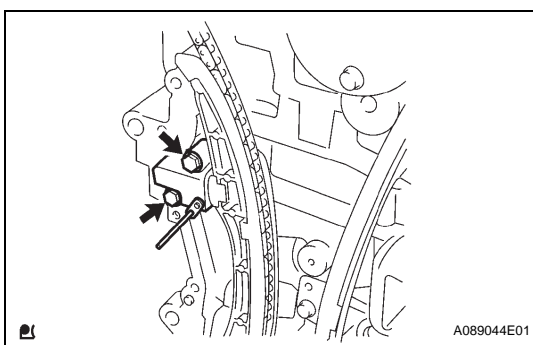
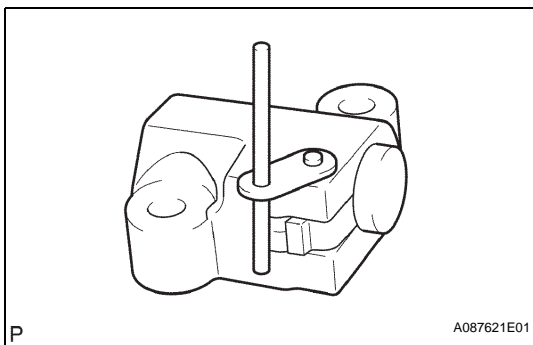
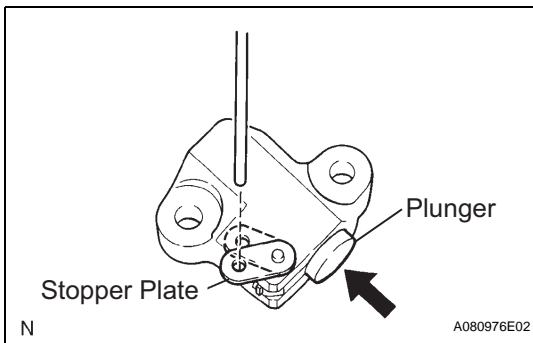
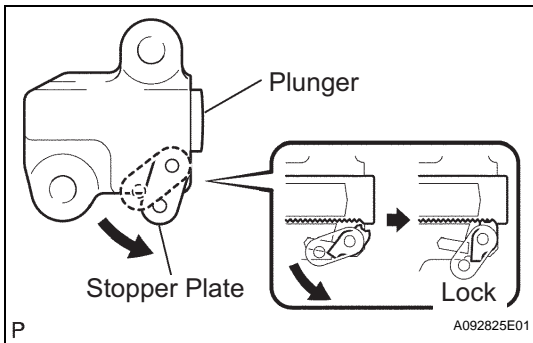
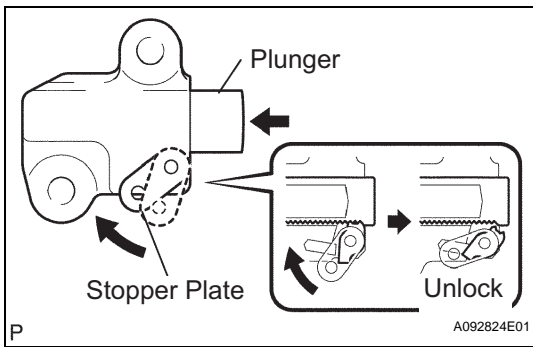
- (c) Align the timing marks of the camshaft timing sprocket, camshaft timing gear and crankshaft timing sprocket with each mark plate (colored in yellow) of the timing chain.

HINT:

To prevent the exhaust camshaft from springing back, turn it using a wrench and set it at the mark on the chain.



- (d) Install the chain tensioner slipper with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



- (e) Install the chain tensioner with the 2 bolts.
- (1) Lift up the stopper plate, then unlock the plunger.
 - (2) Push in the plunger to the end with the plunger unlocked.

- (3) Lower the stopper plate with the plunger pushed to the end, then lock the plunger.

- (4) Insert a 3.0 mm (0.118 in.) diameter bar into the hole of the stopper plate with the plunger locked.

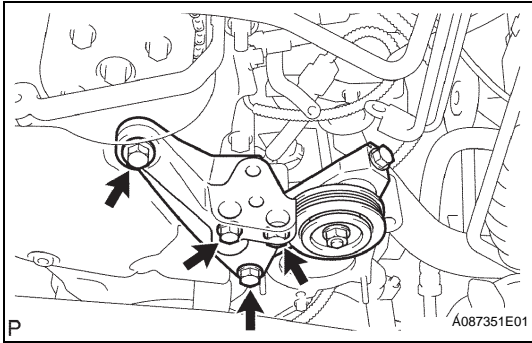
HINT:

If the stopper plate is not completely lowered and a 3.0 mm (0.118 in.) diameter bar cannot be inserted, unlock and pull out the plunger slightly. Then the stopper plate will be completely lowered and a 3.0 mm (0.118 in.) diameter bar can be inserted easily.

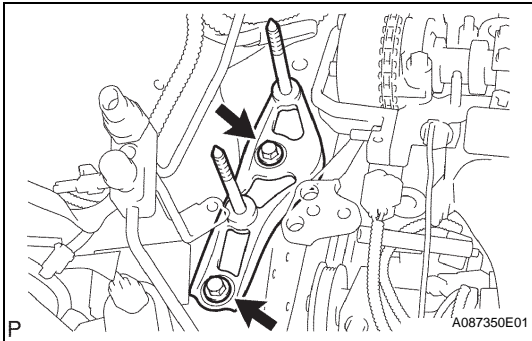
- (5) Install the chain tensioner with the 2 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
 - (6) Remove the bar from the chain tensioner.
- (f) Check the tension between the intake and exhaust camshaft timing sprockets.

2. **INSTALL OIL PUMP SEAL (See page LU-17)**
3. **INSTALL TIMING CHAIN COVER (See page LU-19)**
4. **INSTALL CRANKSHAFT POSITION SENSOR (See page ES-443)**

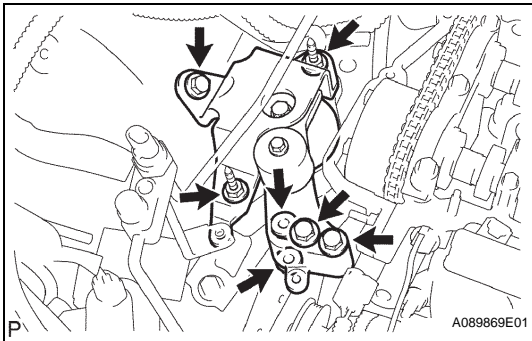
5. **INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY** (See page [ES-438](#))



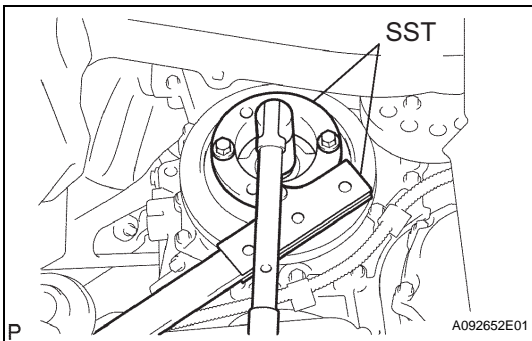
6. **INSTALL ENGINE MOUNTING BRACKET**
 (a) Install the engine mounting bracket with the 4 bolts.
Torque: 55 N*m (561 kgf*cm, 41 in.*lbf)



7. **INSTALL ENGINE MOUNTING SPACER**
 (a) Install the engine mounting spacer with the 2 bolts.
Torque: 55 N*m (561 kgf*cm, 41 in.*lbf)



8. **INSTALL ENGINE MOUNTING INSULATOR RH**
 (a) Install the engine mounting insulator RH with the 3 bolts and 4 nuts.
Torque: 52 N*m (530 kgf*cm, 38 in.*lbf)

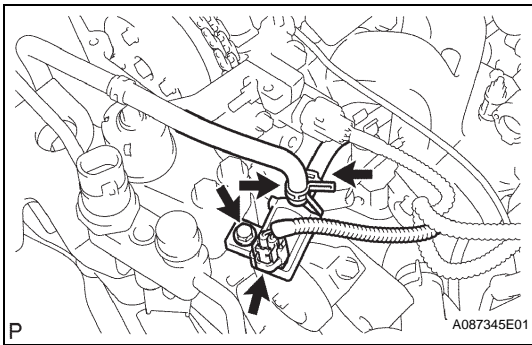


9. **INSTALL CRANKSHAFT PULLEY**
 (a) Align the hole of the crankshaft damper with the straight pin, then install the crankshaft damper.
 (b) Using SST, hold the crankshaft damper and tighten the crankshaft bolt.
SST 09213-58013 (91111-50845), 09330-00021
Torque: 128 N*m (1,305 kgf*cm, 95 in.*lbf)
NOTICE:
When installing SST, be careful that the bolt which holds SST does not interfere with the chain cover.

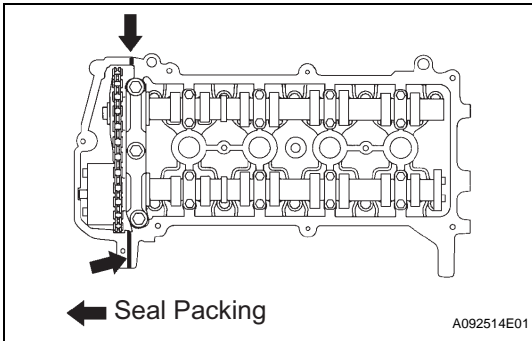
10. **INSTALL WATER PUMP** (See page [CO-11](#))

11. **INSTALL DRIVE BELT** (See page [EM-6](#))

12. **CHECK DRIVE BELT TENSION** (See page [EM-6](#))

**13. INSTALL PURGE VSV**

- (a) Install the purge VSV with the bolt.
- (b) Connect the hose and connector.

**14. INSTALL CYLINDER HEAD COVER**

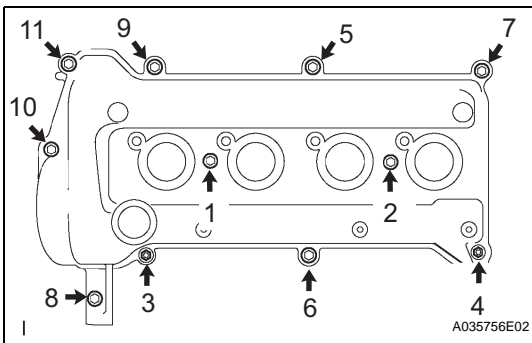
- (a) Apply seal packing to the 2 locations shown in the illustration, then install the cylinder head cover.

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

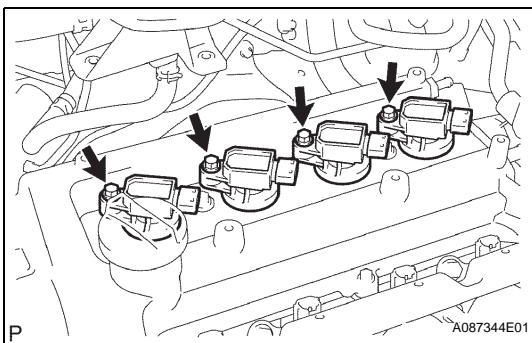
NOTICE:

- Remove any oil from the contact surface.
- Install the cylinder head cover within 3 minutes after applying seal packing.
- Do not start the engine within 2 hours of installing.

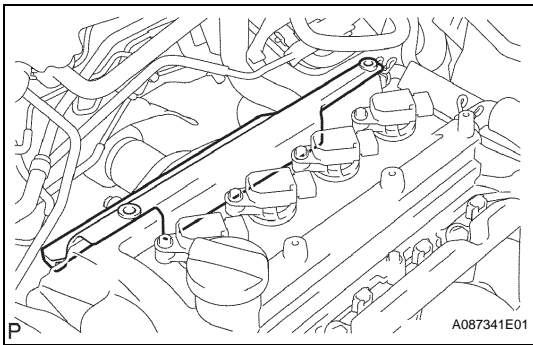


- (b) Install the cylinder head cover with the 9 bolts and 2 nuts.
- (c) Using several steps, tighten the bolts and nuts to the specified torque in the sequence shown in the illustration.

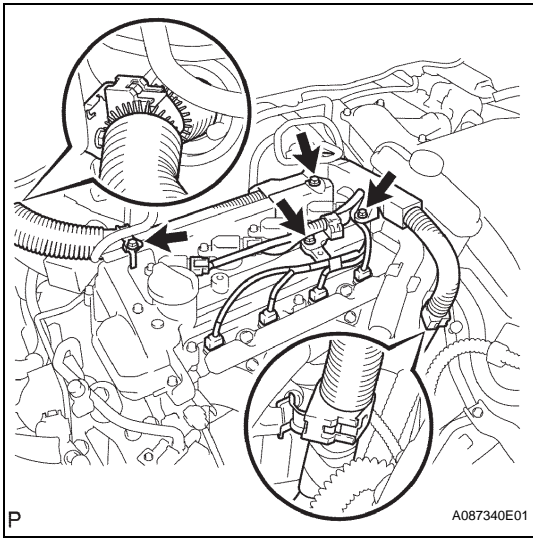
Torque: 10 N*m (102 kgf*cm, 74 in.*lbf)



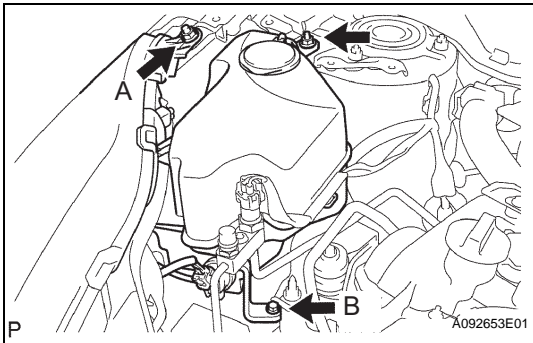
- (d) Install the ignition coil with the bolt.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)



- (e) Install the brake master cylinder reservoir cover to the cylinder head cover.

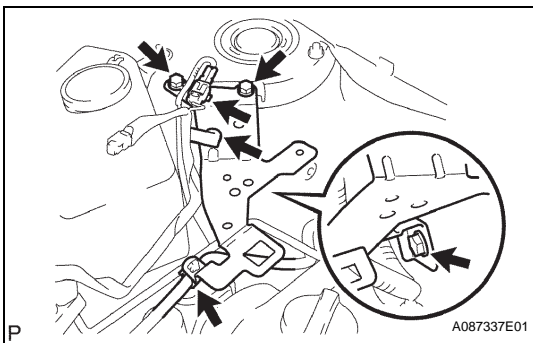


- (f) Install the wire harness and brake master cylinder reservoir cover with the 3 bolts.
Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)
 (g) Connect the fuel injector connector and ignition coil connector.



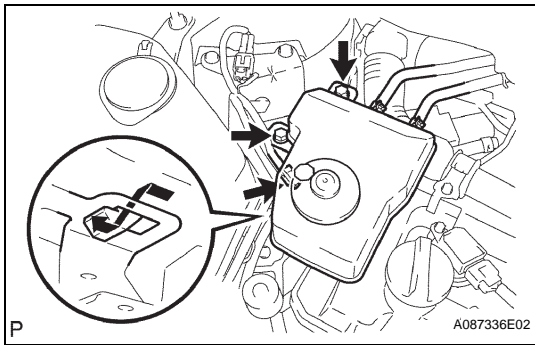
15. INSTALL WINDSHIELD WASHER JAR

- (a) Install the windshield washer with the 2 bolts and nut.
Torque: 4.9 N*m (50 kgf*cm, 43 in.*lbf) for bolt A
14 N*m (143 kgf*cm, 10 in.*lbf) for bolt B
5.5 N*m (56 kgf*cm, 49 in.*lbf) for nut
 (b) Connect the 2 connectors and wire harness.



16. INSTALL RESERVOIR BRACKET

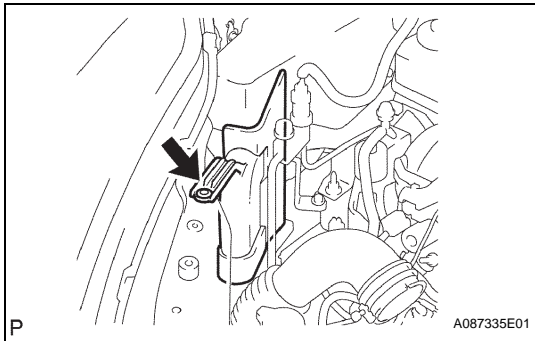
- (a) Install the reservoir bracket with the 3 bolts and connect the wire harness clamp.
Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

**17. INSTALL BRAKE MASTER CYLINDER RESERVOIR**

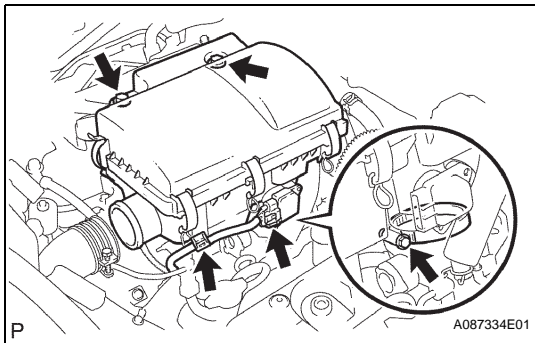
- (a) Attach the claw and install the master cylinder reservoir with the 2 bolts.

Torque: 8.5 N*m (87 kgf*cm, 75 in.*lbf)

- (b) Connect the connector.

**18. INSTALL NO. 2 AIR CLEANER INLET**

- (a) Install the air cleaner inlet with the clip.

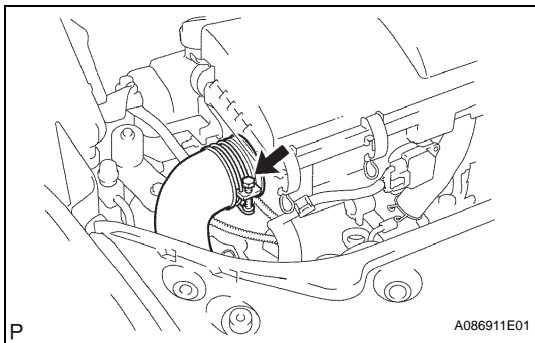
**19. INSTALL AIR CLEANER ASSEMBLY**

- (a) Install the air cleaner with the 2 bolts and tighten the clamp.

Torque: 7.0 N*m (71 kgf*cm, 62 in.*lbf) for bolt
3.0 N*m (31 kgf*cm, 27 in.*lbf) for clamp

- (b) Connect the MAF meter connector and clamp.

- (c) Connect the No. 1 air inlet, and then tighten the clamp.

**20. INSTALL FRONT COWL TOP PANEL OUTER****21. INSTALL WINDSHIELD WIPER MOTOR AND WIPER LINK ASSEMBLY (See page [WW-16](#))****22. INSTALL COWL TOP VENTILATOR LOUVER RH****23. INSTALL COWL TOP VENTILATOR LOUVER LH****24. INSTALL HOOD TO COWL TOP SEAL****25. INSTALL FRONT WIPER ARM LH (See page [WW-16](#))****26. INSTALL FRONT WIPER ARM RH (See page [WW-16](#))****27. INSTALL WIPER ARM HEAD CAP****28. ADD ENGINE OIL (See page [LU-4](#))****29. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL (See page [CH-7](#))****30. INSTALL REAR NO. 3 FLOOR BOARD (See page [CH-8](#))**

31. INSTALL REAR DECK FLOOR BOARD (See page [CH-8](#))
32. INSTALL REAR NO. 2 FLOOR BOARD (See page [CH-8](#))
33. ADD ENGINE COOLANT (See page [CO-7](#))
34. CHECK FOR ENGINE COOLANT LEAKS (See page [CO-2](#))
35. INSTALL RADIATOR SUPPORT OPENING COVER
36. INSTALL NO. 4 CENTER ENGINE UNDER COVER
37. INSTALL NO. 3 ENGINE UNDER COVER
38. INSTALL FRONT WHEELS
39. PERFORM INITIALIZATION
 - (a) Perform initialization (see page [IN-32](#)).

NOTICE:

Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.