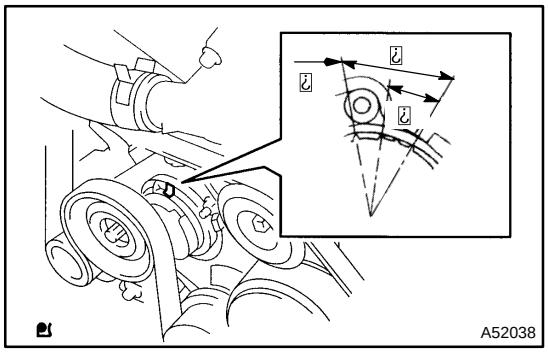
ENGINE

14070-01

ADJUSTMENT

1. **INSPECT COOLANT (See page 16-1)**
2. **INSPECT ENGINE OIL (See page 17-1)**
3. **INSPECT BATTERY SPECIFIC GRAVITY (See page 19-14)**
4. **INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSY [17801 / 98-21]**

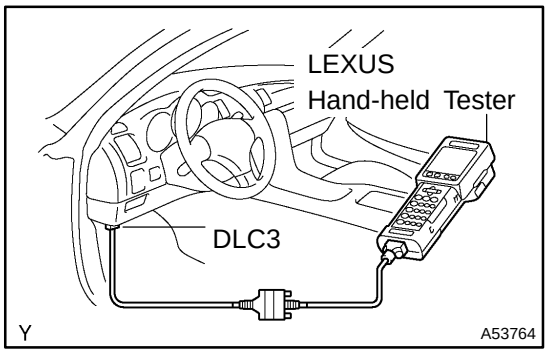


5. **INSPECT FAN AND GENERATOR V BELT [16361A / 98-18]**

HINT:
Use of the automatic tensioner has made the tension and flexibility measurements unnecessary.

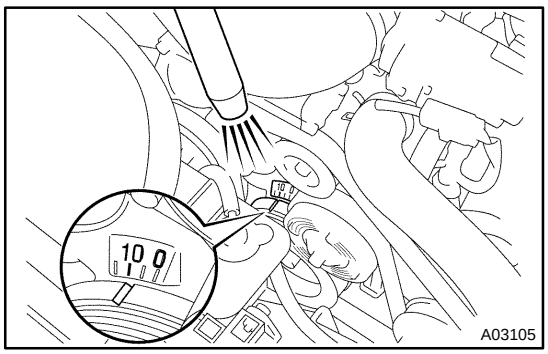
(a) Check that the indicator mark on the automatic tensioner is within the A range as shown in the illustration.
(b) When the mark is out of the standard range, exchange the V belt with new one.

6. **INSPECT V-RIBBED BELT TENSIONER ASSY [16620 / 98-15] (See page 14-7)**
7. **WARM UP ENGINE**

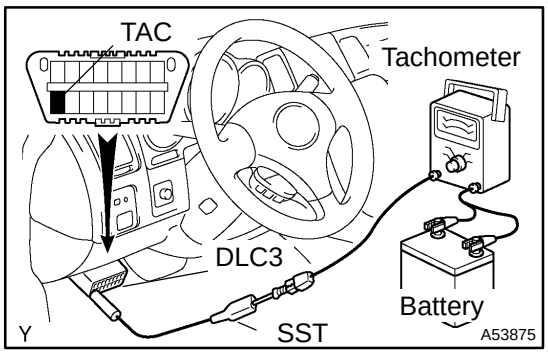


8. **INSPECT IGNITION TIMING**

(a) When using LEXUS hand-held tester:
(1) Connect a LEXUS hand-held tester to the DLC3.
(2) Please refer to the LEXUS hand-held tester operator's manual for further details.
(3) Start the engine at idle.



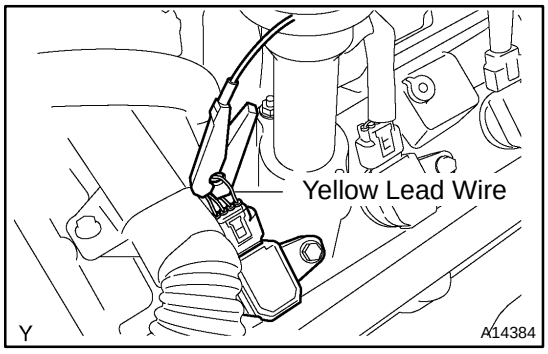
(4) Using a timing light, check the ignition timing.
Ignition timing: 8 - 12˚ BTDC @ idle
(Transmission in neutral position)
(5) Disconnect the LEXUS hand-held tester from the DLC3.



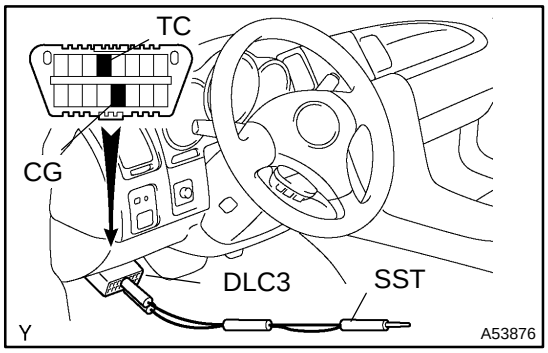
(b) When not using LEXUS hand-held tester:

(1) Using SST, connect tachometer probe to terminal TAC of the DLC3.

SST 09843-18030



(2) Connect the tester probe of a timing light to the yellow lead wire of the ignition coil connector for No. 1 cylinder.



(3) Using SST, connect terminals TC and CG of the DLC3.

SST 09843-18040

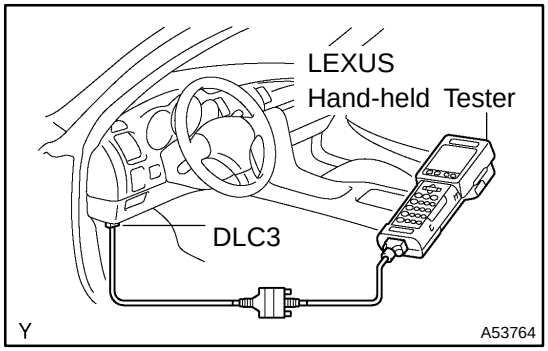
(4) Using a timing light, check the ignition timing.

Ignition timing: 8 - 12˚ BTDC @ idle
(Transmission in neutral position)

(5) Remove the SST from the DLC3.

(6) Disconnect the timing light from the engine.

(7) Disconnect the tachometer from the DLC3.



9. INSPECT ENGINE IDLE SPEED

(a) When using LEXUS hand-held tester:

(1) Connect a LEXUS hand-held tester to the DLC3.

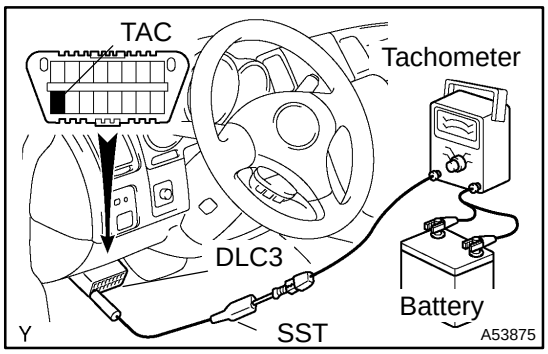
(2) Please refer to the LEXUS hand-held tester operator's manual for further details.

(3) Race the engine at 2,500 rpm for approx. 90 seconds.

(4) Check the idle speed.

Idle speed (w/ Cooling fan OFF): 750 ± 50 rpm

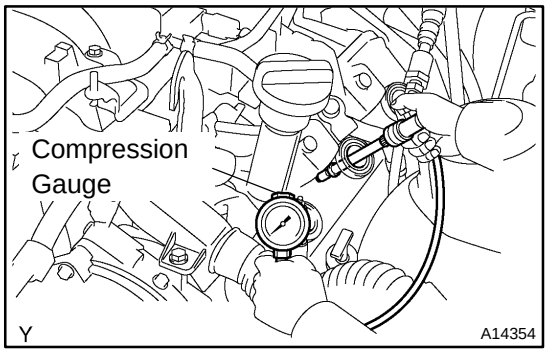
(5) Disconnect the LEXUS hand-held tester from the DLC3.



(b) When not using LEXUS hand-held tester:
  (1) Using SST, connect tachometer probe to terminal TAC of the DLC3.
  SST 09843-18030
  (2) Please refer to the LEXUS hand-held tester operator's manual for further details.
  (3) Race the engine at 2,500 rpm for approx. 90 seconds.
  (4) Check the idle speed.
  Idle speed (w/ Cooling fan OFF): 750 ± 50 rpm
  (5) Remove the SST from the DLC3.
  (6) Disconnect the tachometer from the DLC3.

10. INSPECT COMPRESSION

(a) Remove the V-bank cover.
(b) Remove the air cleaner inlet and intake air pipe.
(c) Disconnect the throttle control motor connector.
(d) Remove the oil level gauge guide.
(e) Remove the 8 ignition coils.
(f) Remove the 8 spark plugs.
(g) Disconnect the 8 injector connectors.
(h) Inspect the cylinder compression pressure.
  (1) Insert a compression gauge into the spark plug hole.
  (2) Fully open the throttle forcibly by hand.
  (3) While cranking the engine, measure the compression pressure.



HINT:
Always use a fully charged battery to obtain engine speed of 250 rpm or more.
  (4) Repeat steps (1) through (3) for each cylinder.

NOTICE:
This measurement must be done in as short a time as possible.

Compression pressure:
1,226 kPa (12.5 kgf/cm^2, 178 psi) or more
Minimum pressure: 981 kPa (10.0 kgf/cm^2, 142 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

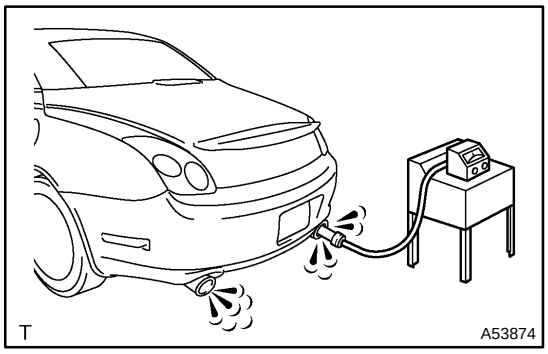
  (5) If the cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.
  ★ If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
  ★ If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.
(i) Connect the 8 injector connectors.
(j) Install the 8 spark plugs.

(k) Install the 8 ignition coils.
(l) Install the oil level gauge guide.
(m) Connect the throttle control motor connector.
(n) Install the air cleaner inlet and intake air pipe.
(o) Install the V-bank cover.

11. INSPECT CO/HC

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

(a) Start engine.
(b) Hold the engine at 2,500 rpm for approx. 180 seconds



(c) Insert CO/HC meter testing probe at least 40 cm (1.3 ft) into tailpipe during idling.
(d) Immediately check CO/HC concentration at idle and/or 2,500 rpm.

HINT:
★ Complete the measuring within 3 minutes.
★ When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

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 05-62 and 05-66).
(2) See the table below for possible causes, then inspect and correct the applicable causes if necessary.

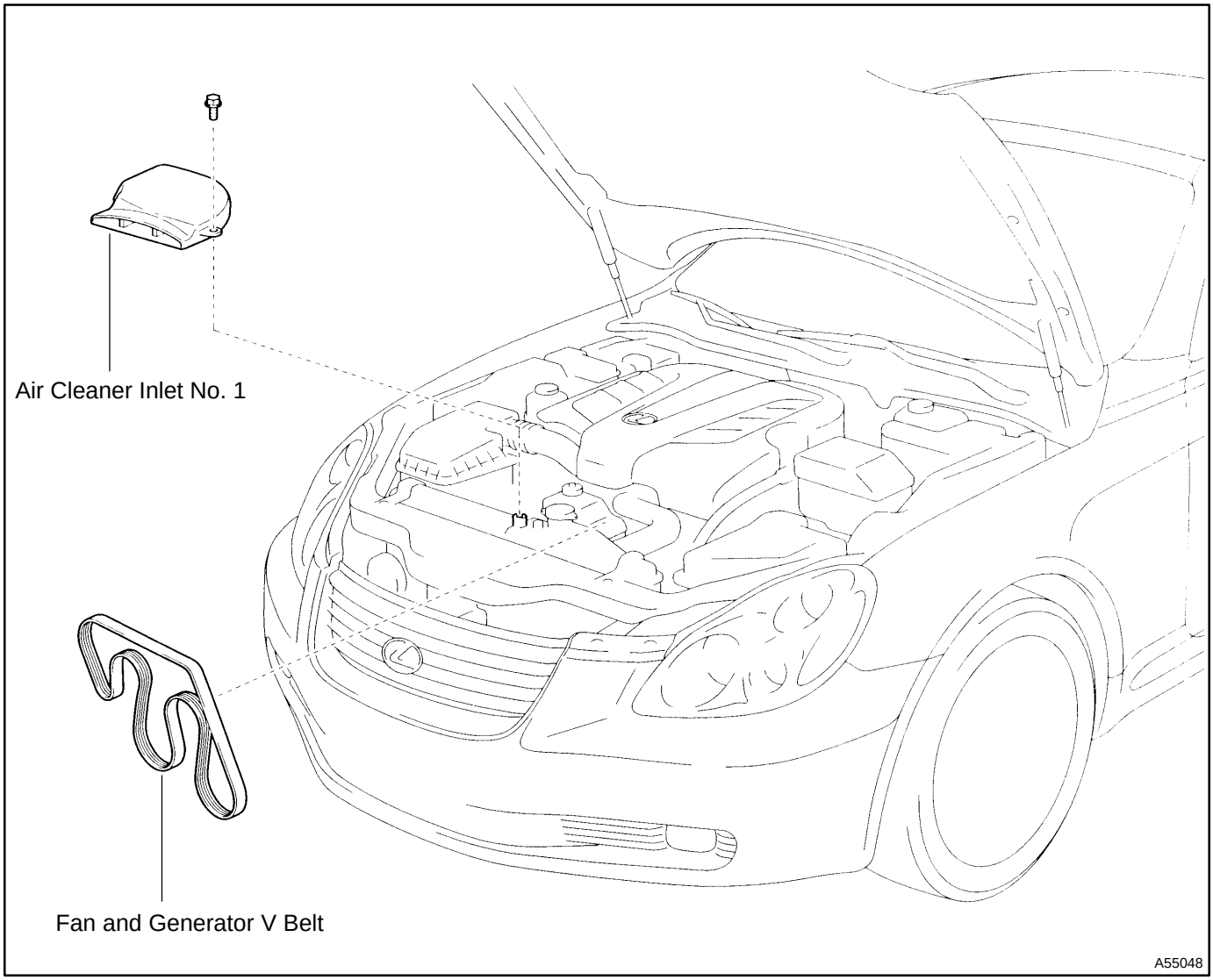
CO	HC	Symptom	Causes
Normal	High	Rough idle	1. Faulty ignitions: ★Incorrect timing ★Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinder
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: ★PCV hose ★Intake manifold ★Throttle body 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Faulty SFI system: ★Faulty pressure regulator ★Defective ECT sensor ★Faulty ECM ★Faulty injector ★Faulty throttle position sensor ★MAF sensor

12. DRIVING TEST

FAN AND GENERATOR V BELT

COMPONENTS

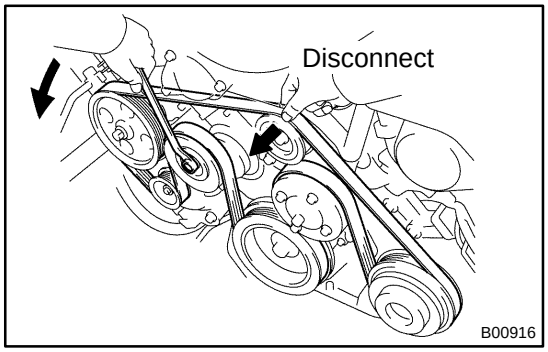
14071-01



14072-01

REPLACEMENT

1. REMOVE AIR CLEANER INLET NO.1
[17751 / 98-21]



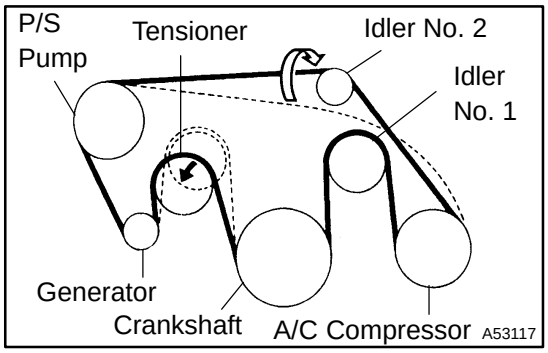
2. REMOVE FAN AND GENERATOR V BELT
[16361A / 98-18]

(a) Loosen the belt tension by turning the belt tensioner counterclockwise, and remove the V belt.

HINT:
The tension pulley has a left-hand thread.

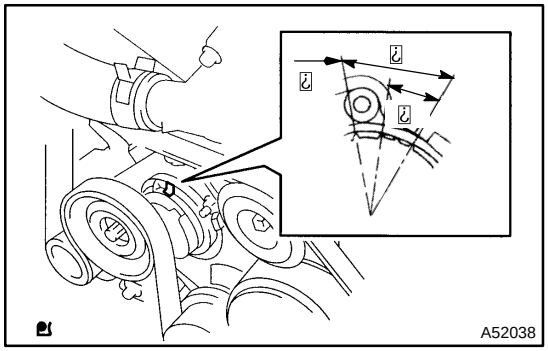
3. INSPECT V-RIBBED BELT TENSIONER ASSY
[16620 / 98-15]

(a) Remove the V belt from the tensioner pulley. Then check that nothing gets caught the tensioner by turning it clockwise and counterclockwise.
(b) When a malfunction exists, replace the tensioner.



4. INSTALL FAN AND GENERATOR V BELT
[16361A / 98-18]

(a) Set the V belt to everything except the idler pulley No. 2, as shown in the illustration.
(b) Loosen the V belt by turning the belt tensioner counterclockwise.
(c) Then set the V belt to the idler pulley.



(d) After a new belt has been installed, check that the mark is within the B range as shown in the illustration.

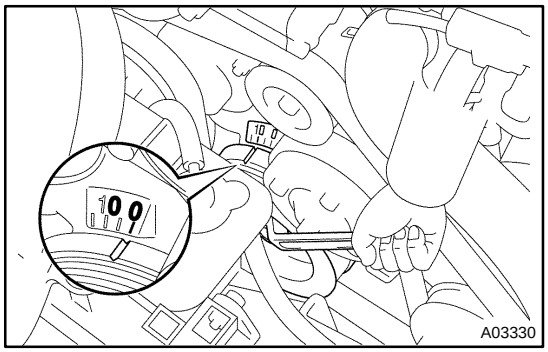
5. INSTALL AIR CLEANER INLET NO.1
[17751 / 98-21]

VALVE CLEARANCE

14073-01

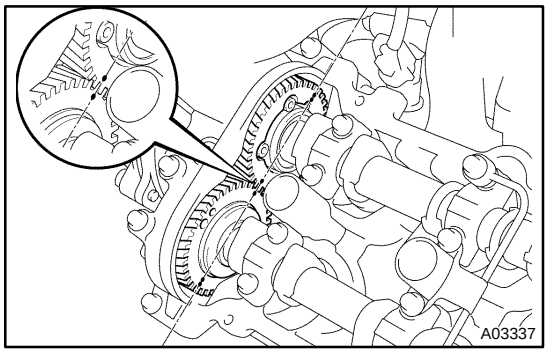
ADJUSTMENT

1. **REMOVE CYLINDER HEAD COVER SUB-ASSY [11201 / 98-5] (See page 14-129)**
2. **REMOVE CYLINDER HEAD COVER SUB-ASSY LH [11202 / 98-5] (See page 14-133)**



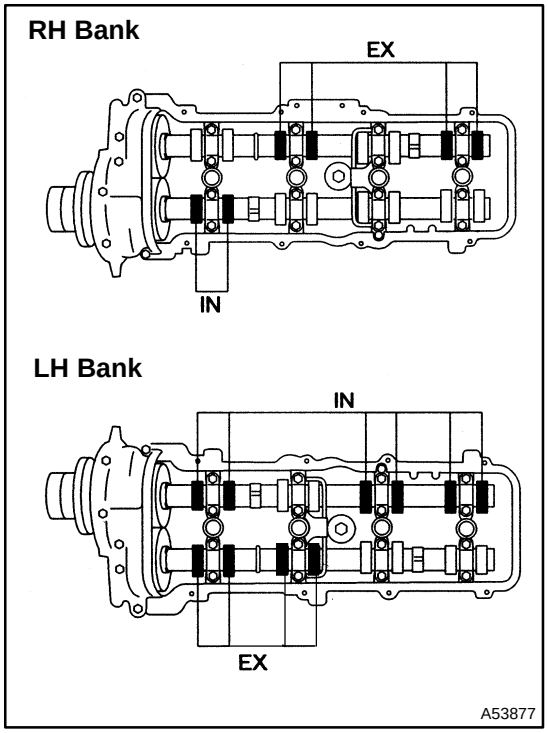
3. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft damper, and align its groove with timing mark ”0” of the timing belt No. 1 cover.



(b) Check that the timing marks (1 dot mark) of the intake and exhaust camshaft gears on the LH bank are aligned.

If not, turn the crankshaft 1 revolution (360°) and align the mark as above.



4. INSPECT VALVE CLEARANCE

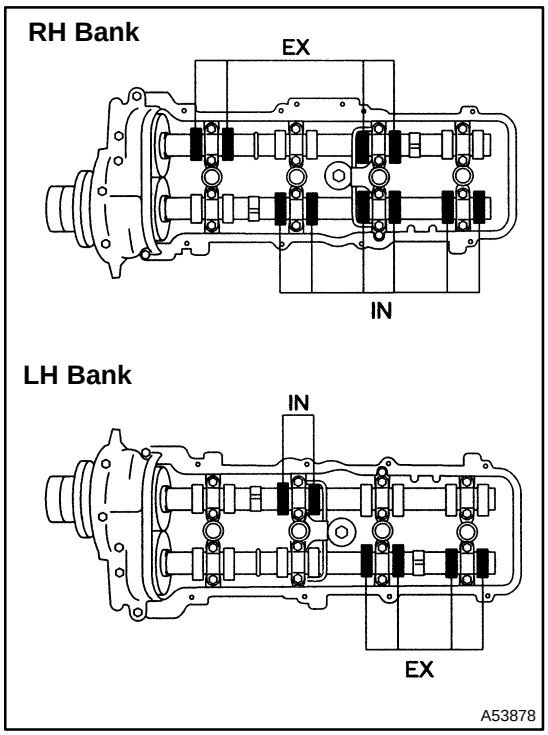
(a) Check the only the valves indicated.

(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

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

Valve clearance (Cold):

Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)

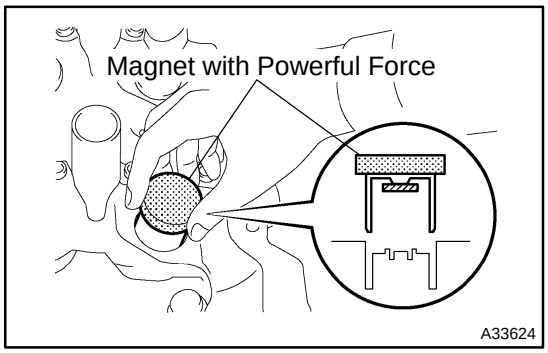


(b) Turn the crankshaft 1 revolution (360°) and align the mark as above (See procedure in step 3).

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

5. REMOVE CAMSHAFT
[13511 / 98-12] (See page 14-160)

6. REMOVE NO.3 CAMSHAFT SUB-ASSY
[13053 / 98-12] (See page 14-171)



7. ADJUST VALVE CLEARANCE

(a) Using a magnet with powerful force, remove the valve lifter and adjusting shim.

NOTICE:

★ **Since shims might drop inside the cylinder head, the operation should be performed slowly.**

★ **Shims should be classified by the installation.**

(b) Determine the replacement adjusting shim size according to the these Formula or Charts:

(1) Using a micrometer, measure the thickness of the removed shim.

(2) Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

T = Thickness of removed shim
A = Measured valve clearance
N = Thickness of new shim

Intake	N = T + (A - 0.20 mm (0.008 in.))
Exhaust	N = T + (A - 0.30 mm (0.012 in.))

(c) Select a new shim with a thickness as close as possible to the calculated value.

HINT:
Shims are available in 41 increments of 0.020 mm (0.0008 in.), from 2.00 mm (0.0787 in.) to 2.80 mm (0.1102).

(d) Reinstall a new adjusting shim to the spring retainer.

(e) Reinstall the valve lifter.

8. **INSTALL NO.3 CAMSHAFT SUB-ASSY**
[13053 / 98-12] (See page 14-171)
9. **INSTALL CAMSHAFT**
[13511 / 98-12] (See page 14-160)
10. **INSTALL CYLINDER HEAD COVER SUB-ASSY LH**
[11202 / 98-5] (See page 14-133)
11. **INSTALL CYLINDER HEAD COVER SUB-ASSY**
[11201 / 98-5] (See page 14-129)

Adjusting Shim Selection Chart (Intake)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000–0.030 (0.0000–0.0012)							00	00	00	00	02	02	04	04	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	56	58	60	62
0.031–0.050 (0.0012–0.0020)						00	00	00	00	02	04	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	60	62	64
0.051–0.070 (0.0020–0.0028)					00	00	00	00	02	04	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	62	64	66
0.071–0.090 (0.0028–0.0035)				00	00	00	00	02	04	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	64	66	68
0.091–0.110 (0.0036–0.0043)			00	00	00	00	02	04	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	66	68	70
0.111–0.130 (0.0044–0.0051)		00	00	00	00	02	04	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	70	72
0.131–0.149 (0.0052–0.0059)		00	00	00	02	04	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	72	74
0.150–0.250 (0.0059–0.0098)
0.251–0.270 (0.0099–0.0106)	06	08	10	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	70	72	74	76	78	80	80	80
0.271–0.290 (0.0107–0.0114)	08	10	12	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	76	78	80	80	80
0.291–0.310 (0.0115–0.0122)	10	12	14	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	70	72	74	76	78	80	80	80
0.311–0.330 (0.0122–0.0130)	12	14	16	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	72	74	76	78	80	80	80
0.331–0.350 (0.0130–0.0138)	14	16	18	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	76	78	80	80	80
0.351–0.370 (0.0138–0.0146)	16	18	20	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	76	76	78	80	80	80
0.371–0.390 (0.0146–0.0154)	18	20	22	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	76	76	78	78	80	80	80
0.391–0.410 (0.0154–0.0161)	20	22	24	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	76	76	78	78	80	80	80	80
0.411–0.430 (0.0162–0.0169)	22	24	26	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	76	76	78	78	80	80	80	80	80
0.431–0.450 (0.0170–0.0177)	24	26	28	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	76	76	78	78	80	80	80	80	80	80
0.451–0.470 (0.0178–0.0185)	26	28	30	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	76	76	78	78	80	80	80	80	80	80	80
0.471–0.490 (0.0185–0.0193)	28	30	32	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	76	76	78	78	80	80	80	80	80	80	80
0.491–0.510 (0.0193–0.0201)	30	32	34	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	76	76	78	78	80	80	80	80	80	80	80	80
0.511–0.530 (0.0201–0.0209)	32	34	36	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	76	76	78	78	80	80	80	80	80	80	80
0.531–0.550 (0.0209–0.0217)	34	36	38	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	76	76	78	78	80	80	80	80	80	80	80
0.551–0.570 (0.0217–0.0224)	36	38	40	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	76	76	78	78	80	80	80	80	80	80	80
0.571–0.590 (0.0225–0.0232)	38	40	42	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.591–0.610 (0.0233–0.0240)	40	42	44	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.611–0.630 (0.0241–0.0248)	42	44	46	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.631–0.650 (0.0248–0.0256)	44	46	48	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.651–0.670 (0.0256–0.0264)	46	48	50	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.671–0.690 (0.0264–0.0272)	48	50	52	54	56	58	60	62	64	66	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.691–0.710 (0.0272–0.0280)	50	52	54	56	58	60	62	64	66	68	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.711–0.730 (0.0280–0.0287)	52	54	56	58	60	62	64	66	68	70	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.731–0.750 (0.0288–0.0295)	54	56	58	60	62	64	66	68	70	72	74	76	76	78	78	80	80	80	80	80	80	80
0.751–0.770 (0.0296–0.0303)	56	58	60	62	64	66	68	70	72	74	76	78	78	80	80	80	80	80	80	80
0.771–0.790 (0.0304–0.0311)	58	60	62	64	66	68	70	72	74	76	78	80	80	80	80	80	80	80
0.791–0.810 (0.0311–0.0319)	60	62	64	66	68	70	72	74	76	78	80	80	80	80	80	80
0.811–0.830 (0.0319–0.0327)	62	64	66	68	70	72	74	76	78	80	80	80	80	80
0.831–0.850 (0.0327–0.0335)	64	66	68	70	72	74	76	78	80	80	80	80
0.851–0.870 (0.0335–0.0343)	66	68	70	72	74	76	78	80	80	80
0.871–0.890 (0.0343–0.0350)	68	70	72	74	76	78	80	80	80
0.891–0.910 (0.0351–0.0358)	70	72	74	76	78	80	80	80
0.911–0.930 (0.0359–0.0366)	72	74	76	78	80	80	80
0.931–0.950 (0.0367–0.0374)	74	76	78	80	80	80
0.951–0.970 (0.0374–0.0382)	76	78	80	80	80
0.971–0.990 (0.0382–0.0390)	78	80	80	80
0.991–1.010 (0.0390–0.0398)	80	80	80
1.011–1.030 (0.0398–0.0406)	80	80
1.031–1.050 (0.0406–0.0413)	80

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

EXAMPLE:
The 2,300 mm (0.0906 in.) shim is installed, and the measured clearance is 0.440 mm (0.0173 in.). Replace the 2,300 mm (0.0906 in.) shim with a No. 44 shim.

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness	Shim No.	Thickness
00	2.000 (0.0787)	28	2.280 (0.0898)	56	2.560 (0.1008)
02	2.020 (0.0795)	30	2.300 (0.0906)	58	2.580 (0.1016)
04	2.040 (0.0803)	32	2.320 (0.0913)	60	2.600 (0.1024)
06	2.060 (0.0811)	34	2.340 (0.0921)	62	2.620 (0.1031)
08	2.080 (0.0819)	36	2.360 (0.0929)	64	2.640 (0.1039)
10	2.100 (0.0827)	38	2.380 (0.0937)	66	2.660 (0.1047)
12	2.120 (0.0835)	40	2.400 (0.0945)	68	2.680 (0.1055)
14	2.140 (0.0843)	42	2.420 (0.0953)	70	2.700 (0.1063)
16	2.160 (0.0850)	44	2.440 (0.0961)	72	2.720 (0.1071)
18	2.180 (0.0858)	46	2.460 (0.0969)	74	2.740 (0.1079)
20	2.200 (0.0866)	48	2.480 (0.0976)	76	2.760 (0.1087)
22	2.220 (0.0874)	50	2.500 (0.0984)	78	2.780 (0.1094)
24	2.240 (0.0882)	52	2.520 (0.0992)	80	2.800 (0.1102)
26	2.260 (0.0890)	54	2.540 (0.1000)		

A03111

Adjusting Shim Selection Chart (Exhaust)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)
0.000-0.030 (0.0000-0.0012)												00	00	00	00	00	00	00	00	00
0.031-0.050 (0.0012-0.0020)											00	00	00	00	00	00	00	02	02	04
0.051-0.070 (0.0020-0.0028)										00	00	00	00	00	00	02	02	04	04	06
0.071-0.090 (0.0028-0.0035)									00	00	00	00	00	02	02	04	04	06	06	08
0.091-0.110 (0.0036-0.0043)								00	00	00	00	02	02	04	04	06	06	08	08	10
0.111-0.130 (0.0044-0.0051)							00	00	00	00	02	04	04	06	06	08	08	10	10	12
0.131-0.150 (0.0052-0.0059)						00	00	00	00	02	04	06	06	08	08	10	10	12	12	14
0.151-0.170 (0.0059-0.0067)					00	00	00	00	02	04	06	08	08	10	10	12	12	14	14	16
0.171-0.190 (0.0067-0.0075)				00	00	00	00	02	04	06	08	10	10	12	12	14	14	16	16	18
0.191-0.210 (0.0075-0.0083)			00	00	00	00	02	04	06	08	10	12	12	14	14	16	16	18	18	20
0.211-0.230 (0.0083-0.0091)		00	00	00	00	02	04	06	08	10	12	14	14	16	16	18	18	20	20	22
0.231-0.249 (0.0091-0.0098)		00	00	00	02	04	06	08	10	12	14	16	16	18	18	20	20	22	22	24
0.250-0.350 (0.0098-0.0138)																				
0.351-0.370 (0.0138-0.0146)	06	08	10	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36
0.371-0.390 (0.0146-0.0154)	08	10	12	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38
0.391-0.410 (0.0154-0.0161)	10	12	14	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40
0.411-0.430 (0.0162-0.0169)	12	14	16	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42
0.431-0.450 (0.0170-0.0177)	14	16	18	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44
0.451-0.470 (0.0178-0.0185)	16	18	20	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46
0.471-0.490 (0.0185-0.0193)	18	20	22	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48
0.491-0.510 (0.0193-0.0201)	20	22	24	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50
0.511-0.530 (0.0201-0.0209)	22	24	26	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52
0.531-0.550 (0.0209-0.0217)	24	26	28	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54
0.551-0.570 (0.0217-0.0224)	26	28	30	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56
0.571-0.590 (0.0225-0.0232)	28	30	32	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58
0.591-0.610 (0.0233-0.0240)	30	32	34	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60
0.611-0.630 (0.0241-0.0248)	32	34	36	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62
0.631-0.650 (0.0248-0.0256)	34	36	38	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64
0.651-0.670 (0.0256-0.0264)	36	38	40	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66
0.671-0.690 (0.0264-0.0272)	38	40	42	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68
0.691-0.710 (0.0272-0.0280)	40	42	44	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70
0.711-0.730 (0.0280-0.0287)	42	44	46	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72
0.731-0.750 (0.0288-0.0295)	44	46	48	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74
0.751-0.770 (0.0296-0.0303)	46	48	50	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74	76
0.771-0.790 (0.0304-0.0311)	48	50	52	54	56	58	60	62	64	66	68	70	70	72	72	74	74	76	76	78
0.791-0.810 (0.0311-0.0319)	50	52	54	56	58	60	62	64	66	68	70	72	72	74	74	76	76	78	78	80
0.811-0.830 (0.0319-0.0327)	52	54	56	58	60	62	64	66	68	70	72	74	74	76	76	78	78	80	80	80
0.831-0.850 (0.0327-0.0335)	54	56	58	60	62	64	66	68	70	72	74	76	76	78	78	80	80	80	80	80
0.851-0.870 (0.0335-0.0343)	56	58	60	62	64	66	68	70	72	74	76	78	78	80	80	80	80	80	80	80
0.871-0.890 (0.0343-0.0350)	58	60	62	64	66	68	70	72	74	76	78	80	80	80	80	80	80	80		
0.891-0.910 (0.0351-0.0358)	60	62	64	66	68	70	72	74	76	78	80	80	80	80	80	80				
0.911-0.930 (0.0359-0.0366)	62	64	66	68	70	72	74	76	78	80	80	80	80	80						
0.931-0.950 (0.0367-0.0374)	64	66	68	70	72	74	76	78	80	80	80	80								
0.951-0.970 (0.0374-0.0382)	66	68	70	72	74	76	78	80	80	80										
0.971-0.990 (0.0382-0.0390)	68	70	72	74	76	78	80	80	80											
0.991-1.010 (0.0390-0.0398)	70	72	74	76	78	80	80	80												
1.011-1.030 (0.0398-0.0406)	72	74	76	78	80	80	80													
1.031-1.050 (0.0406-0.0413)	74	76	78	80	80	80														
1.051-1.070 (0.0414-0.0421)	76	78	80	80	80															
1.071-1.090 (0.0422-0.0429)	78	80	80	80																
1.091-1.110 (0.0430-0.0437)	80	80	80																	
1.111-1.130 (0.0437-0.0445)	80	80																		
1.131-1.150 (0.0445-0.0453)	80																			

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)
0.000-0.030 (0.0000-0.0012)	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20
0.031-0.050 (0.0012-0.0020)	04	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	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)	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)	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)	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32
0.131-0.150 (0.0052-0.0059)	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34
0.151-0.170 (0.0059-0.0067)	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36
0.171-0.190 (0.0067-0.0075)	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38
0.191-0.210 (0.0075-0.0083)	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40
0.211-0.230 (0.0083-0.0091)	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42
0.231-0.249 (0.0091-0.0098)	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44
0.250-0.350 (0.0098-0.0138)																				
0.351-0.370 (0.0138-0.0146)	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)	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)	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)	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)	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)	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)	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)	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)	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)	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)	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	76
0.571-0.590 (0.0225-0.0232)	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	78
0.591-0.610 (0.0233-0.0240)	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80
0.611-0.630 (0.0241-0.0248)	62	64	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80
0.631-0.650 (0.0248-0.0256)	64	66	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80
0.651-0.670 (0.0256-0.0264)	66	68	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80
0.671-0.690 (0.0264-0.0272)	68	70	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80		
0.691-0.710 (0.0272-0.0280)	70	72	72	74	74	76	76	78	78	80	80	80	80	80	80	80				
0.711-0.730 (0.0280-0.0287)	72	74	74	76	76	78	78	80	80	80	80	80	80	80						
0.731-0.750 (0.0288-0.0295)	74	76	76	78	78	80	80	80	80	80	80	80								
0.751-0.770 (0.0296-0.0303)	76	78	78	80	80	80	80	80	80	80										
0.771-0.790 (0.0304-0.0311)	78	80	80	80	80	80	80	80												
0.791-0.810 (0.0311-0.0319)	80	80	80	80	80	80														
0.811-0.830 (0.0319-0.0327)	80	80	80	80																
0.831-0.850 (0.0327-0.0335)	80	80																		

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000-0.030 (0.0000-0.0012)	22	22	24	24	26	26	28	28	30	30	32	34	36	38	40	42	44	46	48	50	52
0.031-0.050 (0.0012-0.0020)	24	26	26	28	28	30	30	32	32	34	34	36	38	40	42	44	46	48	50	52	54
0.051-0.070 (0.0020-0.0028)	26	28	28	30	30	32	32	34	34	36	36	38	40	42	44	46	48	50	52	54	56
0.071-0.090 (0.0028-0.0035)	28	30	30	32	32	34	34	36	36	38	38	40	42	44	46	48	50	52	54	56	58
0.091-0.110 (0.0036-0.0043)	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54	56	58	60
0.111-0.130 (0.0044-0.0051)	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58	60	62
0.131-0.150 (0.0052-0.0059)	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58	60	62	64
0.151-0.170 (0.0059-0.0067)	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60	62	64	66
0.171-0.190 (0.0067-0.0075)	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62	64	66	68
0.191-0.210 (0.0075-0.0083)	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64	66	68	70
0.211-0.230 (0.0083-0.0091)	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68	70	72
0.231-0.249 (0.0091-0.0098)	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68	70	72	74
0.250-0.350 (0.0098-0.0138)																					
0.351-0.370 (0.0138-0.0146)	56	58	58	60	60	62	62	64	64	66	66	68	70	72	74	76	78	80	80	80	
0.371-0.390 (0.0146-0.0154)	58	60	60	62	62	64	64	66	66	68	68	70	72	74	76	78	80	80	80		
0.391-0.410 (0.0154-0.0161)	60	62	62	64	64	66	66	68	68	70	70	72	74	76	78	80	80	80			
0.411-0.430 (0.0162-0.0169)	62	64	64	66	66	68	68	70	70	72	72	74	76	78	80	80	80				
0.431-0.450 (0.0170-0.0177)	64	66	66	68	68	70	70	72	72	74	74	76	78	80	80	80					
0.451-0.470 (0.0178-0.0185)	66	68	68	70	70	72	72	74	74	76	76	78	80	80	80						
0.471-0.490 (0.0185-0.0193)	68	70	70	72	72	74	74	76	76	78	78	80	80	80							
0.491-0.510 (0.0193-0.0201)	70	72	72	74	74	76	76	78	78	80	80	80	80								
0.511-0.530 (0.0201-0.0209)	72	74	74	76	76	78	78	80	80	80	80	80									
0.531-0.550 (0.0209-0.0217)	74	76	76	78	78	80	80	80	80	80	80										
0.551-0.570 (0.0217-0.0224)	76	78	78	80	80	80	80	80	80	80											
0.571-0.590 (0.0225-0.0232)	78	80	80	80	80	80	80	80													
0.591-0.610 (0.0233-0.0240)	80	80	80	80	80	80															
0.611-0.630 (0.0241-0.0248)	80	80	80	80																	
0.631-0.650 (0.0248-0.0256)	80	80																			

New shim thickness

mm (in.)

Shim No.	Thickness	Shim No.	Thickness	Shim No.	Thickness
00	2.000 (0.0787)	28	2.280 (0.0898)	56	2.560 (0.1008)
02	2.020 (0.0795)	30	2.300 (0.0906)	58	2.580 (0.1016)
04	2.040 (0.0803)	32	2.320 (0.0913)	60	2.600 (0.1024)
06	2.060 (0.0811)	34	2.340 (0.0921)	62	2.620 (0.1031)
08	2.080 (0.0819)	36	2.360 (0.0929)	64	2.640 (0.1039)
10	2.100 (0.0827)	38	2.380 (0.0937)	66	2.660 (0.1047)
12	2.120 (0.0835)	40	2.400 (0.0945)	68	2.680 (0.1055)
14	2.140 (0.0843)	42	2.420 (0.0953)	70	2.700 (0.1063)
16	2.160 (0.0850)	44	2.440 (0.0961)	72	2.720 (0.1071)
18	2.180 (0.0858)	46	2.460 (0.0969)	74	2.740 (0.1079)
20	2.200 (0.0866)	48	2.480 (0.0976)	76	2.760 (0.1087)
22	2.220 (0.0874)	50	2.500 (0.0984)	78	2.780 (0.1094)
24	2.240 (0.0882)	52	2.520 (0.0992)	80	2.800 (0.1102)
26	2.260 (0.0890)	54	2.540 (0.1000)		

Exhaust valve clearance (Cold):
0.15 - 0.25 mm (0.006 - 0.010 in.)

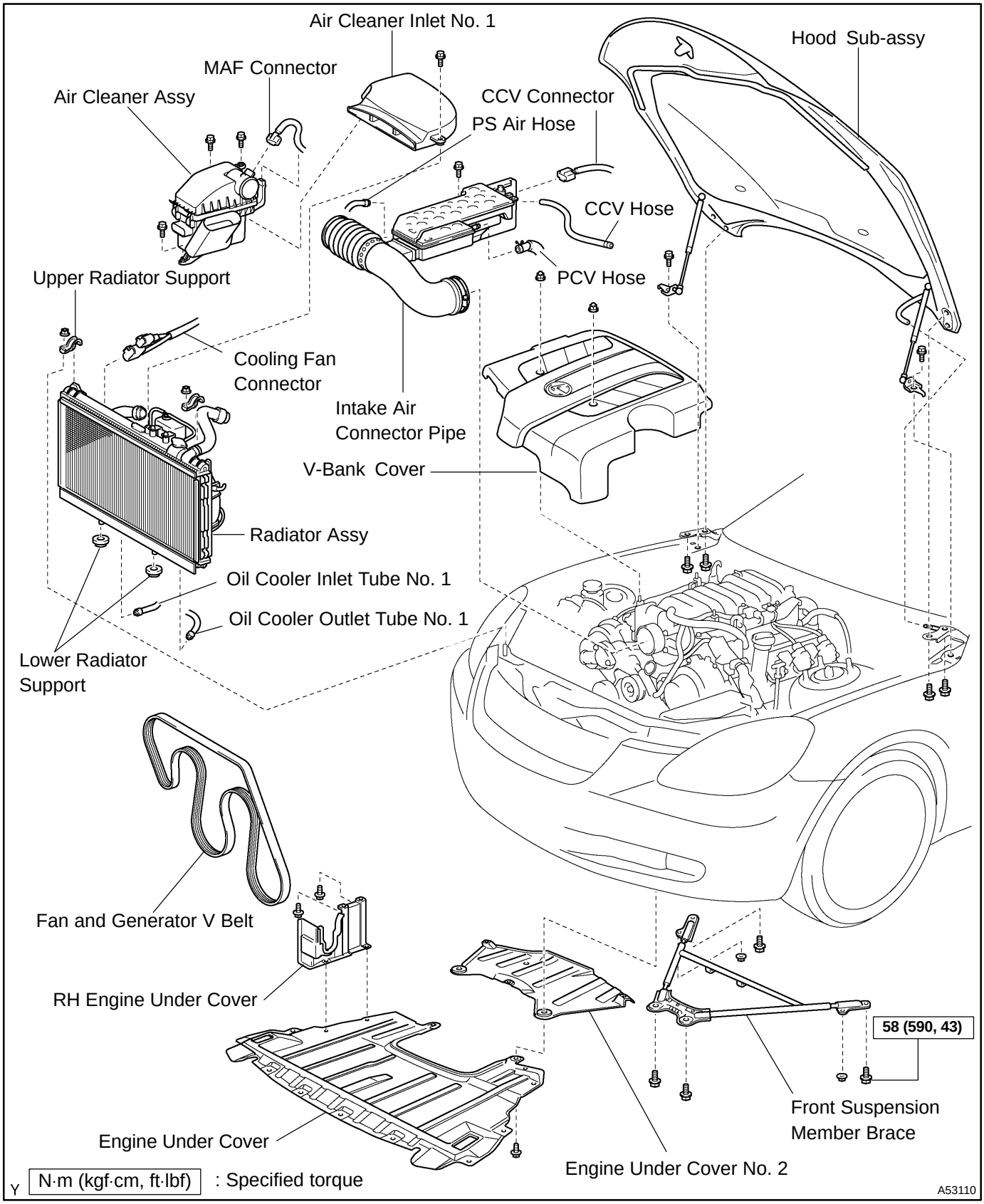
EXAMPLE:
The 2,300 mm (0.0906 in.) shim is installed, and the measured clearance is 0.440 mm (0.0173 in.). Replace the 2,300 mm (0.0906 in.) shim with a No. 44 shim.

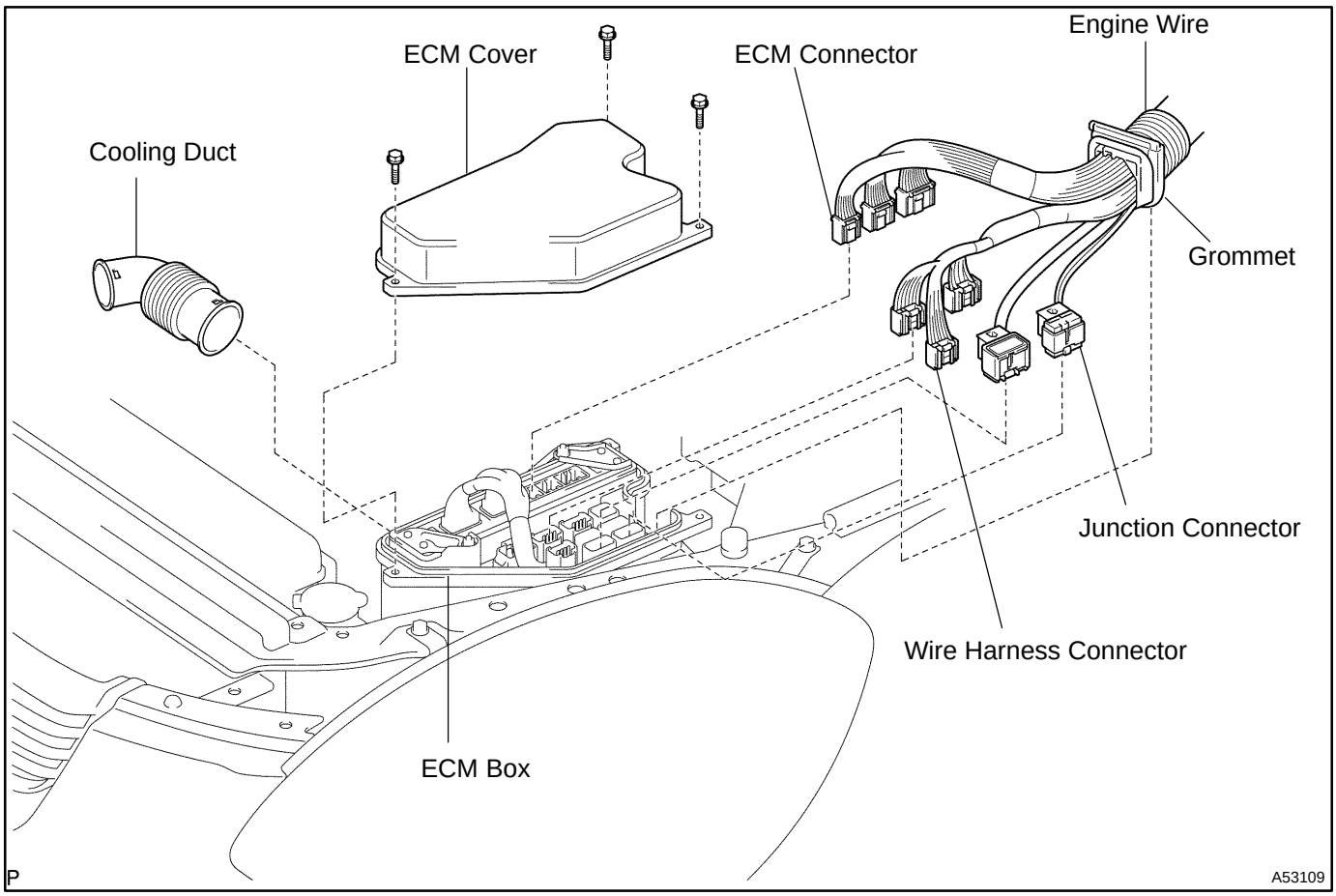
A03112

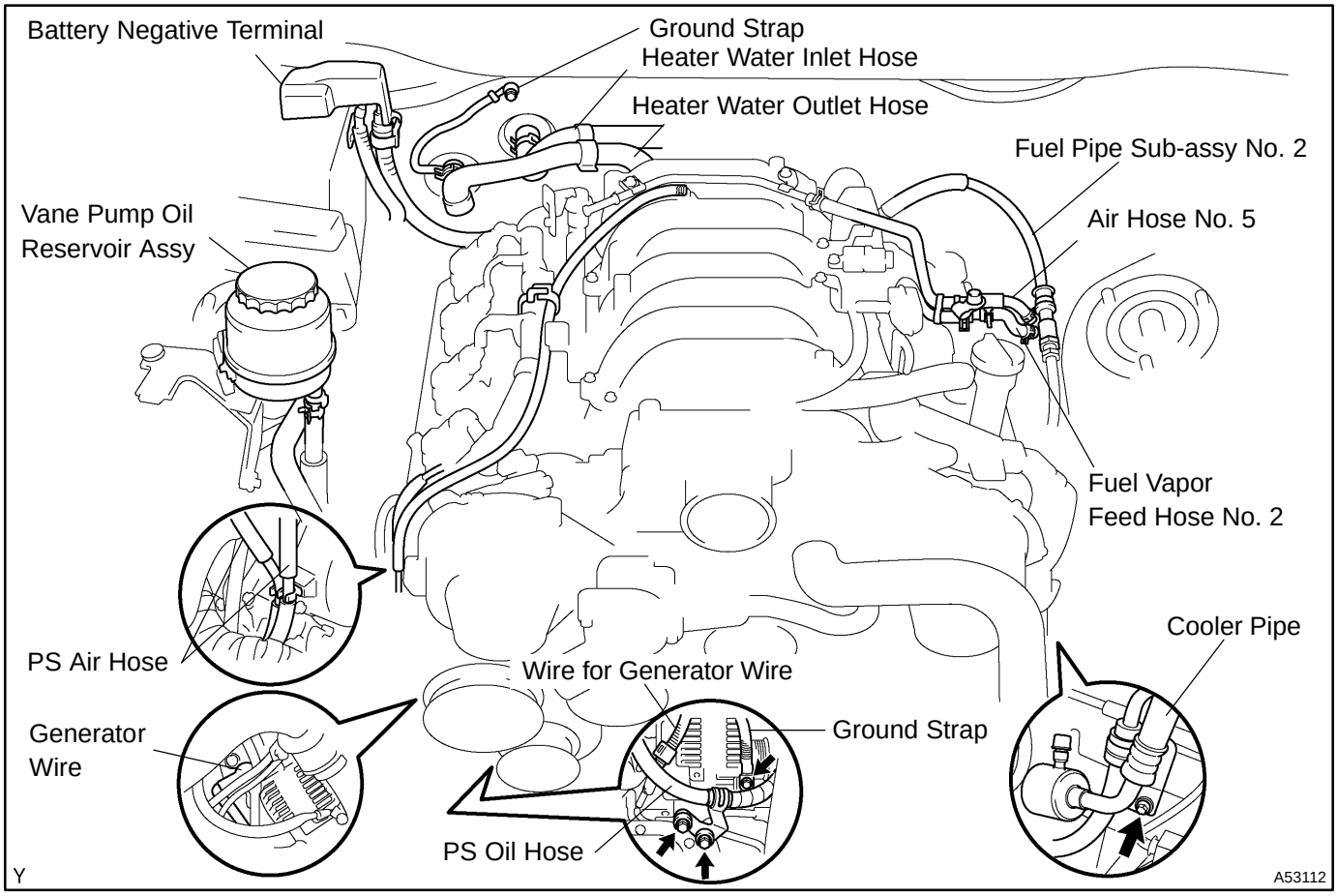
ENGINE ASSY

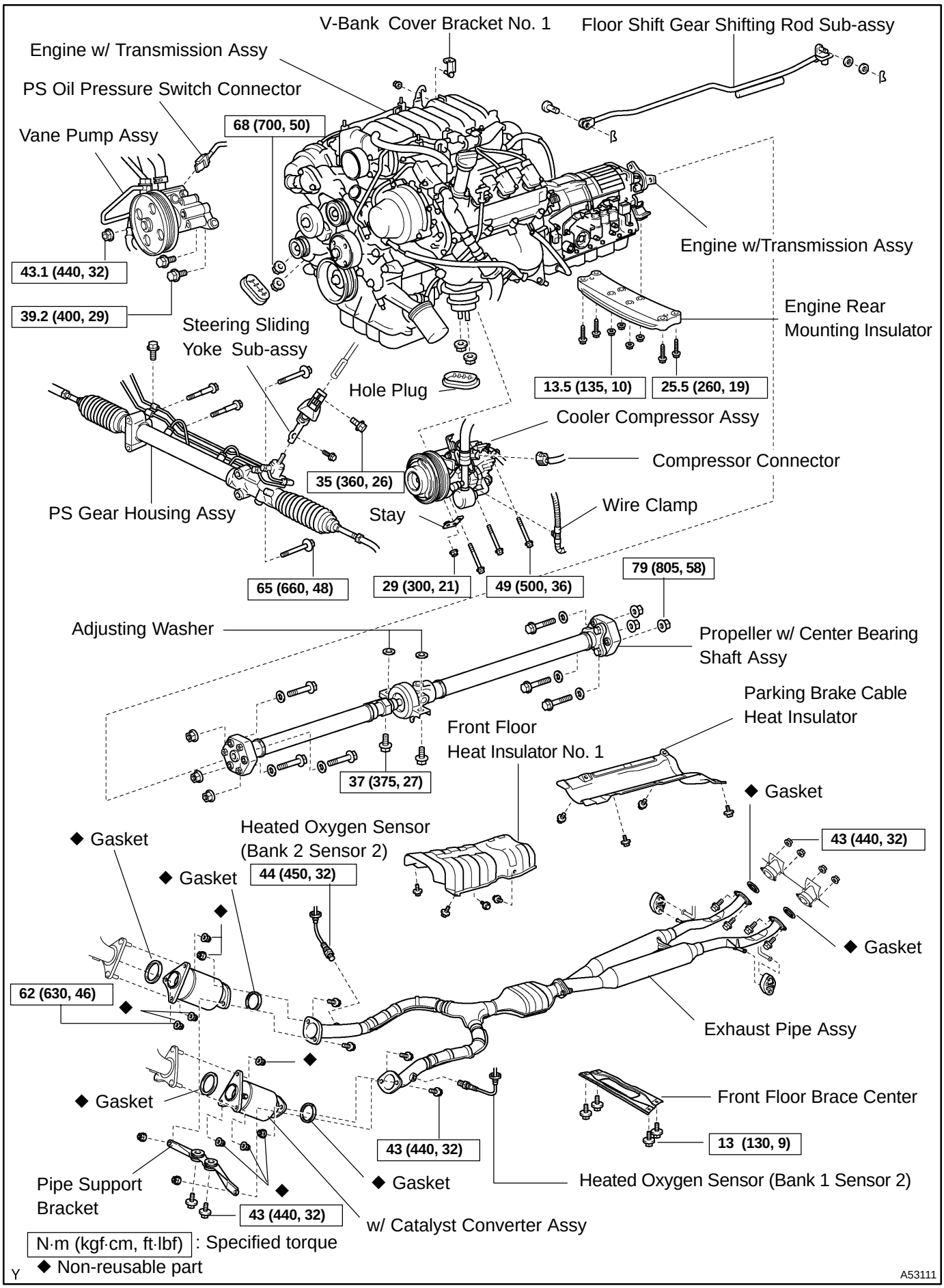
COMPONENTS

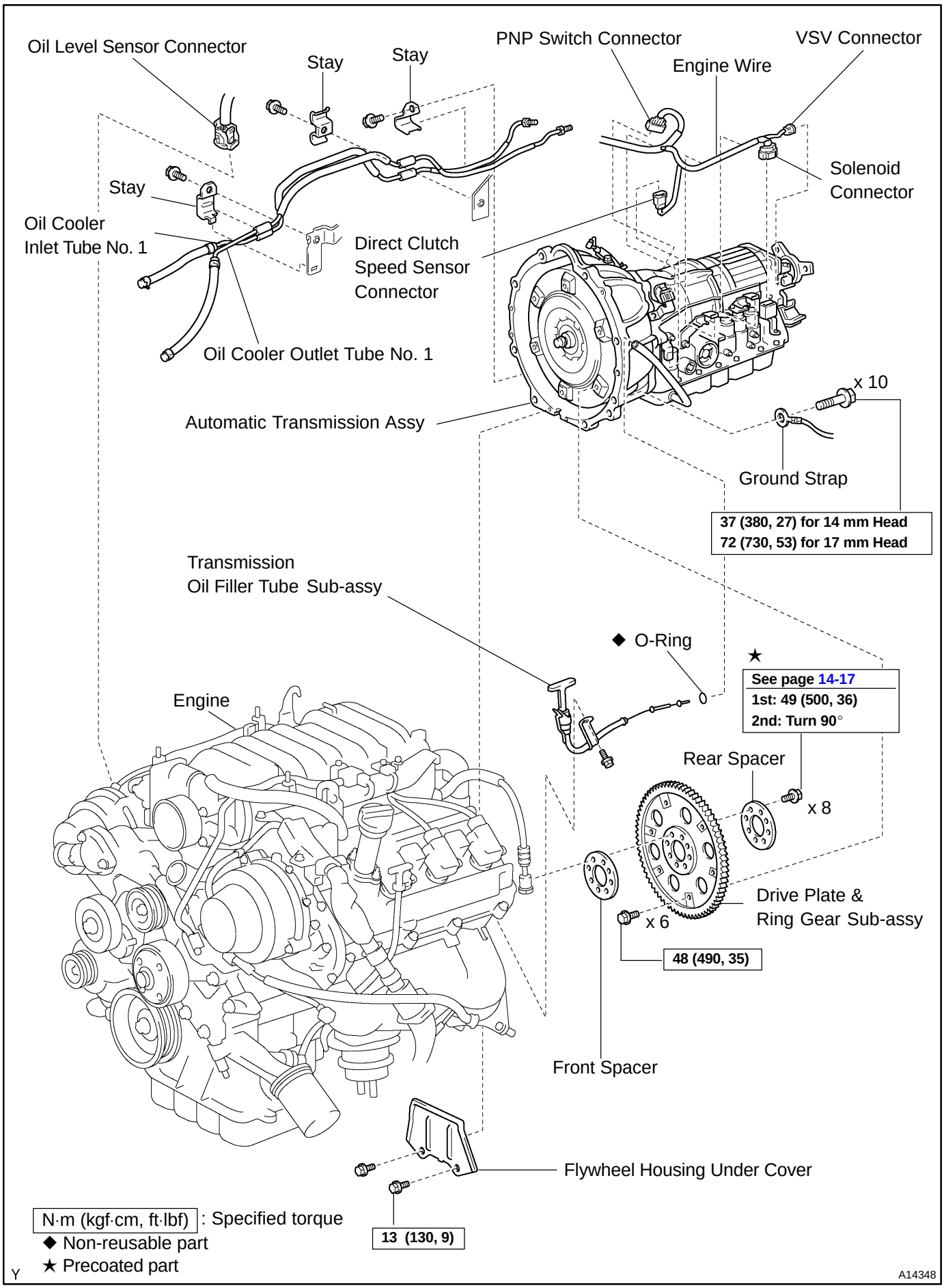
14074-02




ECM Cover
ECM Connector
Engine Wire
Cooling Duct
Grommet
Junction Connector
Wire Harness Connector
ECM Box
P
A53109


Battery Negative Terminal
Ground Strap
Heater Water Inlet Hose
Heater Water Outlet Hose
Fuel Pipe Sub-assy No. 2
Vane Pump Oil Reservoir Assy
Air Hose No. 5
Fuel Vapor Feed Hose No. 2
PS Air Hose
Cooler Pipe
Wire for Generator Wire
Generator Wire
Ground Strap
PS Oil Hose
Y
A53112


V-Bank Cover Bracket No. 1
Floor Shift Gear Shifting Rod Sub-assy
Engine w/ Transmission Assy
PS Oil Pressure Switch Connector
68 (700, 50)
Vane Pump Assy
43.1 (440, 32)
39.2 (400, 29)
Engine w/Transmission Assy
Engine Rear Mounting Insulator
13.5 (135, 10)
25.5 (260, 19)
Steering Sliding Yoke Sub-assy
Hole Plug
Cooler Compressor Assy
Compressor Connector
35 (360, 26)
PS Gear Housing Assy
Stay
Wire Clamp
65 (660, 48)
29 (300, 21)
49 (500, 36)
79 (805, 58)
Adjusting Washer
Propeller w/ Center Bearing Shaft Assy
Parking Brake Cable Heat Insulator
Front Floor Heat Insulator No. 1
37 (375, 27)
◆ Gasket
Heated Oxygen Sensor (Bank 2 Sensor 2)
◆ Gasket
44 (450, 32)
43 (440, 32)
◆ Gasket
◆ Gasket
62 (630, 46)
Exhaust Pipe Assy
◆ Gasket
Front Floor Brace Center
13 (130, 9)
43 (440, 32)
Pipe Support Bracket
◆ Gasket
Heated Oxygen Sensor (Bank 1 Sensor 2)
43 (440, 32)
w/ Catalyst Converter Assy
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
Y
A53111


Oil Level Sensor Connector
Stay
Stay
PNP Switch Connector
Engine Wire
VSV Connector
Solenoid Connector
Stay
Oil Cooler Inlet Tube No. 1
Direct Clutch Speed Sensor Connector
Oil Cooler Outlet Tube No. 1
Automatic Transmission Assy
x 10
Ground Strap
37 (380, 27) for 14 mm Head
72 (730, 53) for 17 mm Head
Transmission Oil Filler Tube Sub-assy
◆ O-Ring
★
See page 14-17
1st: 49 (500, 36)
2nd: Turn 90°
Engine
Rear Spacer
x 8
Drive Plate & Ring Gear Sub-assy
x 6
48 (490, 35)
Front Spacer
Flywheel Housing Under Cover
13 (130, 9)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
Y
A14348

14075-01

REMOVAL AND INSTALLATION

1. WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-1)
2. SEPARATE BATTERY NEGATIVE TERMINAL
3. REMOVE HOOD SUB-ASSY
[53301 / 98-70]
4. REMOVE V-BANK COVER
[11259 / 98-5]
5. REMOVE AIR CLEANER INLET NO.1
[17751 / 98-21]
6. REMOVE INTAKE AIR CONNECTOR PIPE
[17875 / 98-21]
7. REMOVE AIR CLEANER ASSY
[17700 / 98-21]
8. REMOVE ENGINE UNDER COVER
[51441D / 98-65]
9. REMOVE ENGINE UNDER COVER NO.2
[51442E / 98-65]
10. DRAIN ENGINE OIL
11. DRAIN COOLANT (See page 16-2)
12. DRAIN AUTOMATIC TRANSMISSION FLUID
13. REMOVE RADIATOR ASSY (See page 16-4)
14. SEPARATE FUEL PIPE SUB-ASSY NO.2
[23802B / 98-27] (See page 11-1)
15. REMOVE FAN AND GENERATOR V BELT
[16361A / 98-18] (See page 14-7)
16. SEPARATE ENGINE WIRE
(a) Disconnect the engine wire from the ECM box.
(b) Remove the nut, and disconnect the generator wire from the generator.
(c) Disconnect the wire for generator wire from the wire clamp on generator.
(d) Remove the bolt, and disconnect the ground cable from the stay on generator.
(e) Remove the 2 bolts, and disconnect the PS oil hose from the No. 1 oil pan.
(f) Remove the bolt, and disconnect the ground strap from the body.
17. SEPARATE AIR HOSE NO.5
[17345D / 98-22]
18. SEPARATE FUEL VAPOR FEED HOSE NO.2
[23827A / 98-22]
19. SEPARATE HEATER WATER INLET HOSE A
[87245A / 98-158]
20. SEPARATE HEATER WATER OUTLET HOSE A(FROM HEATER UNIT)
[87246A / 98-158]
21. SEPARATE VANE PUMP OIL RESERVOIR ASSY
[44360 / 98-50]
22. SEPARATE VANE PUMP ASSY
(a) Disconnect the 2 PS air hoses.
(b) Remove the 2 screws and RH engine under cover.
(c) Disconnect the PS oil pressure switch connector.
(d) Remove the 2 bolts and nut, and disconnect the vane pump from the engine.
(e) Support the vane pump securely.

23. SEPARATE COOLER COMPRESSOR ASSY
[88320 / 98-161]
(a) Disconnect the compressor connector.
(b) Disconnect the wire clamp from the wire bracket on the compressor.
(c) Remove the bolt, nut and stay.
(d) Remove the bolt, and disconnect the wire bracket from the compressor.
(e) Remove the bolt, and disconnect the compressor from the engine.
(f) Support the cooler compressor securely.

24. REMOVE FRONT FLOOR BRACE CENTER
[57533A / 98-65]

25. REMOVE EXHAUST PIPE ASSY (See page 15-5)

26. REMOVE FRONT SUSPENTION MEMBER BRACE SUB-ASSY RH
[51403A / 98-65]

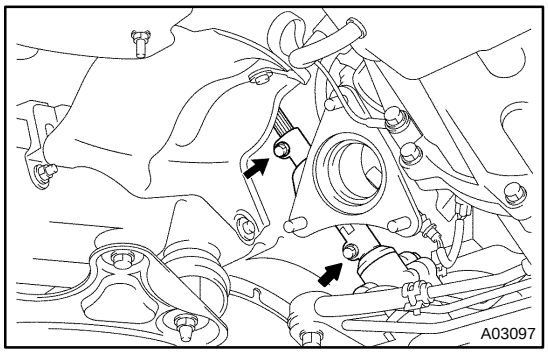
27. REMOVE W/CATALYST CONVERTER ASSY
[17400 / 98-20] (See page 15-5)

28. REMOVE FRONT FLOOR HEAT INSULATOR NO.1
[58151 / 98-80]

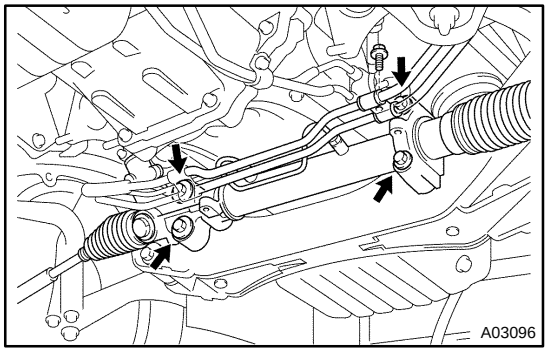
29. REMOVE PARKING BRAKE CABLE HEAT INSULATOR
[46439 / 98-55]

30. REMOVE PROPELLER W/CENTER BEARING SHAFT ASSY
[37100 / 98-43] (See page 30-4)
SST 09922-10010

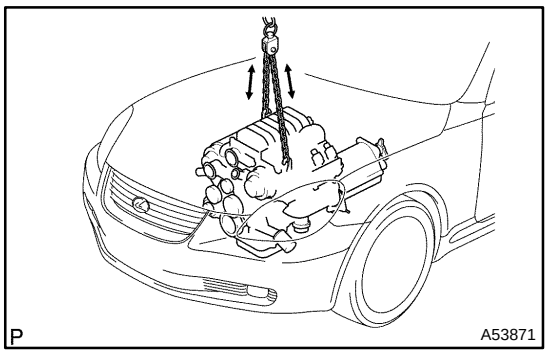
31. REMOVE FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSY
[33702B / 98-29]



32. REMOVE STEERING SLIDING YOKE SUB-ASSY
[45209 / 98-49]
(a) Check the steering wheel at the straight-ahead position.
(b) Remove the 2 bolts and sliding yoke from the steering intermediate shaft.



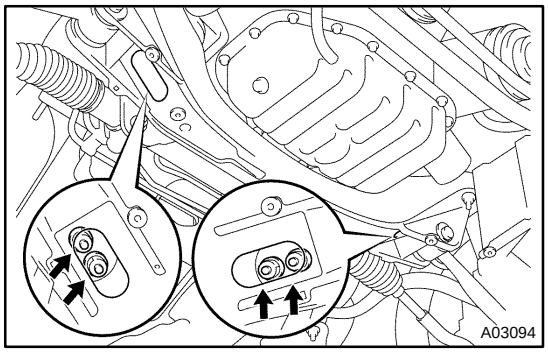
33. SEPARATE POWER STEERING GEAR HOSING ASSY
(a) Remove the bolt, and disconnect the 2 PS oil tubes from the front frame.
(b) Remove the 4 bolts, and disconnect the PS gear housing from the front frame.
(c) Suspend the PS gear housing securely.



34. REMOVE ENGINE W/TRANSMISSION ASSEMBLY

(a) Remove the nut and No. 1 V-bank cover bracket from the No. 2 engine hanger.

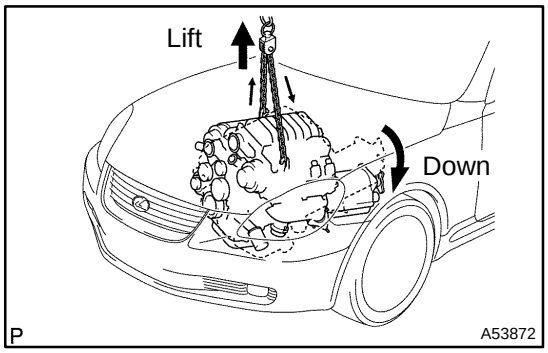
(b) Attach the engine chain hoist to the engine hangers.



(c) Remove the 2 hole plugs.

(d) Remove the 4 nuts holding the engine mounting insulator to the front suspension crossmember.

(e) Remove the 4 bolts, 4 nuts and rear engine mounting member.



(f) Lift the engine out of the vehicle slowly and carefully.

HINT:

Make sure the engine is clear of all wiring, hose and cable.

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

35. SEPARATE ENGINE WIRE

(a) Disconnect the engine wire from the transmission.
  (1) Disconnect the VSV connector.
  (2) Disconnect the PNP switch connector.
  (3) Disconnect the solenoid connector.
  (4) Disconnect the direct clutch speed sensor connector.
  (5) Disconnect the engine wire from the 3 wire clamps.
  (6) Disconnect the oil level sensor connector.

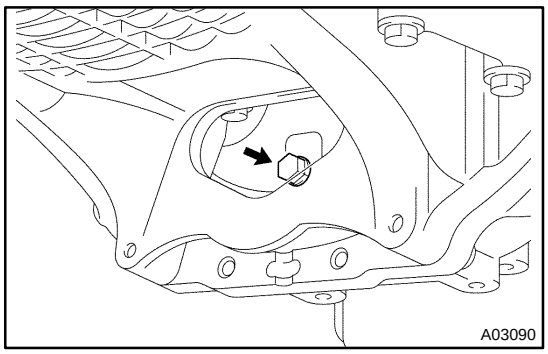
36. REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSY [98-303 / 98-32]

37. REMOVE OIL COOLER OUTLET TUBE NO.1 [32922 / 98-42]

38. REMOVE OIL COOLER INLET TUBE NO.1 [32921 / 98-42]

39. REMOVE AUTOMATIC TRANSMISSION ASSY [35000 / 98-30]

(a) Remove the torque converter clutch bolts.
  (1) Remove the 2 bolts and flywheel housing under cover.



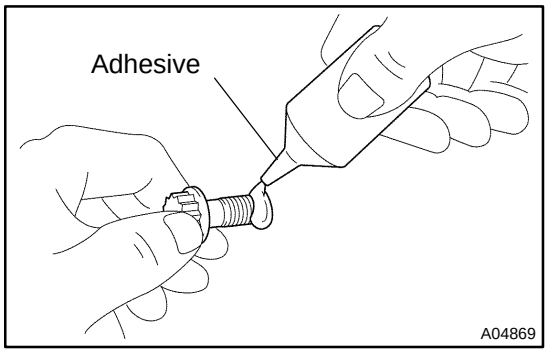
(2) Turn the crankshaft pulley bolt to gain access to each bolt.
(3) Hold the crankshaft pulley bolt with a wrench, and remove the 6 bolts.

(b) Remove the 10 bolts and ground strap.
(c) Remove the transmission together with the torque converter clutch from the engine.

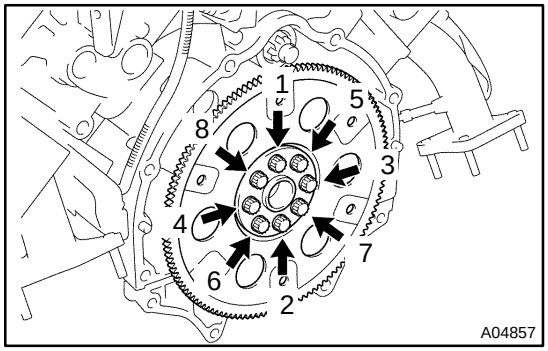
40. REMOVE DRIVE PLATE & RING GEAR SUB-ASSY [32101 / 98-31]

41. INSTALL DRIVE PLATE & RING GEAR SUB-ASSY [32101 / 98-31]

HINT:
The mounting bolts are tightened in 2 progressive steps (step (c) and (e))
If any one of the mounting bolts is broken or deformed, replace it.

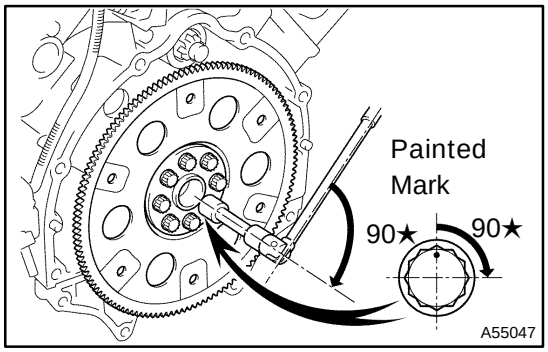


(a) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent

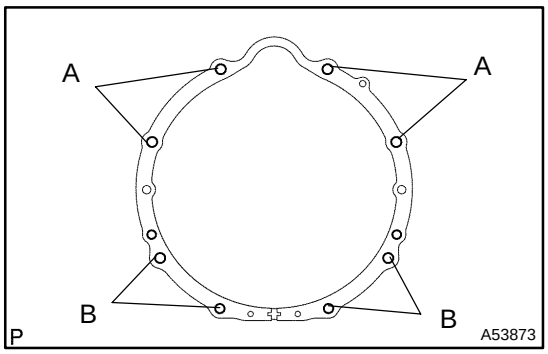


(b) Install the front spacer, drive plate and rear spacer on the crankshaft.
(c) Install and uniformly tighten the 8 mounting bolts in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any one of the mounting bolts does not meet the torque specification, replace the mounting bolt.



(d) Mark the mounting bolt with paint.
(e) Retighten the mounting bolt by 90★in the numerical order shown.
(f) Check that the painted mark is now at a 90★angle to (e).



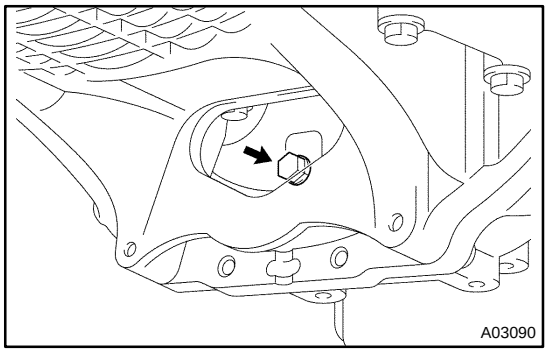
42. INSTALL AUTOMATIC TRANSMISSION ASSY [35000 / 98-30]

(a) Check the torque converter clutch installation (See page 40-21).

(b) Attach the transmission to the engine.

(c) Install the ground strap and 10 bolts

Torque:
Bolt A: 72 N·m (730 kgf·cm, 53 ft·lbf) for 17 mm head
Bolt B: 37 N·m (380 kgf·cm, 27 ft·lbf) for 14 mm head



(d) Install the torque converter clutch bolts.

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

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

(2) Hold the crankshaft pulley bolt with a wrench, and install the 6 bolt evenly.

Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:
First install the black colored bolt, install the other bolt.

(3) Install the flywheel housing under cover with the 2 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

43. INSTALL OIL COOLER INLET TUBE NO.1 [32921 / 98-42]

44. INSTALL OIL COOLER OUTLET TUBE NO.1 [32922 / 98-42]

45. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSY [98-303 / 98-32]

46. CONNECT ENGINE WIRE

(a) Connect the engine wire to the transmission.

(1) Connect the VSV connector.

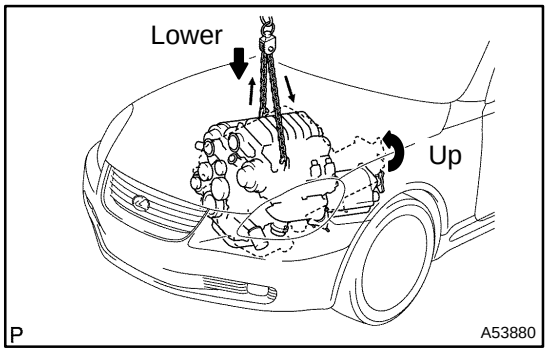
(2) Connect the PNP switch connector.

(3) Connect the solenoid connector.

(4) Connect the direct clutch speed sensor connector.

(5) Connect the engine wire from the 3 wire clamps.

(6) Connect the oil level sensor connector.

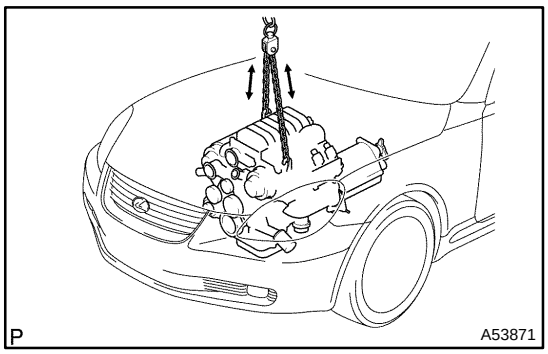


47. INSTALL ENGINE W/TRANSMISSION ASSEMBLY

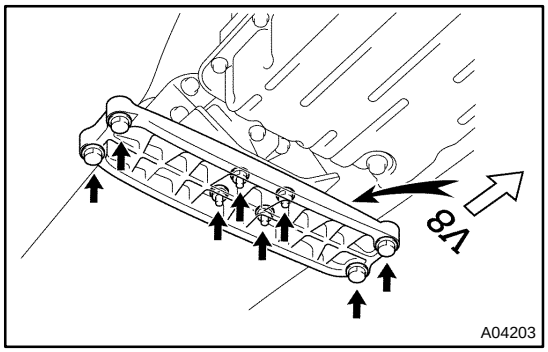
(a) Attach the engine chain hoist to the engine hangers.

(b) Slowly lower the engine and transmission assembly into the engine compartment.

(c) Insert the stud bolts of the front engine mounting brackets into the stud bolt holes of the front suspension crossmember.

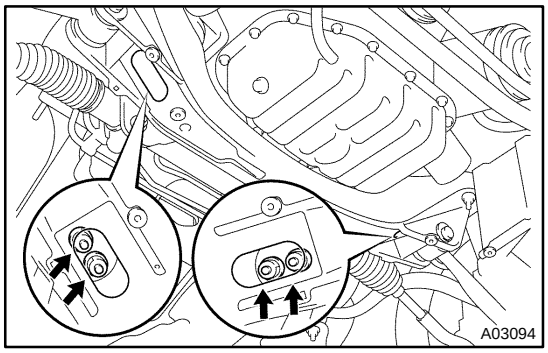


(d) Keep the engine level.

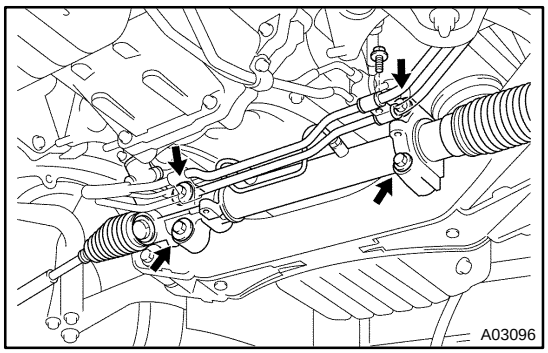


(e) Install the rear engine mounting member with the 4 bolts and 4 nuts.
Torque:
25.5 N·m (260 kgf·cm, 19 ft·lbf) for bolts
13.5 N·m (135 kgf·cm, 10 ft·lbf) for nuts

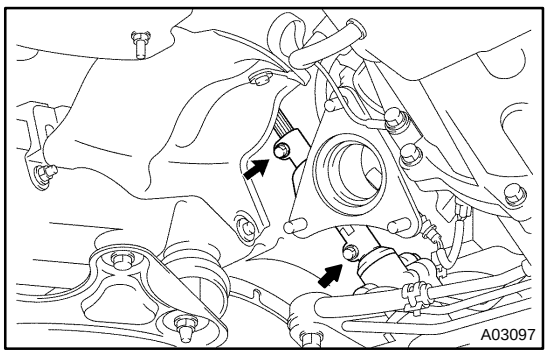
NOTICE:
Be careful of installation direction.



(f) Install the 4 nuts holding the engine mounting brackets to the front suspension crossmember.
Torque: 68 N·m (700 kgf·cm, 50 ft·lbf)
(g) Install the 2 hole plugs.
(h) Remove the engine chain hoist.
(i) Install the V-bank cover bracket No. 1 to the engine hanger No. 2 with the nut.



48. INSTALL POWER STEERING GEAR HOSING ASSY
(a) Connect the sliding yoke to the PS gear housing and intermediate shaft.
(b) Install the PS gear housing with the 4 bolts.
Torque: 65 N·m (660 kgf·cm, 48 ft·lbf)
(c) Install the 2 PS oil tube with the bolt.



49. INSTALL STEERING SLIDING YOKE SUB-ASSY [45209 / 98-49]
(a) Tighten the 2 bolts for sliding yoke.
Torque: 35 N·m (360 kgf·cm, 26 ft·lbf)

50. INSTALL FLOOR SHIFT GEAR SHIFTING ROD SUB-ASSY
[33702B / 98-29]

51. INSTALL PROPELLER W/CENTER BEARING SHAFT ASSY
[37100 / 98-43] (See page 30-4)

52. INSTALL PARKING BRAKE CABLE HEAT INSULATOR
[46439 / 98-55]

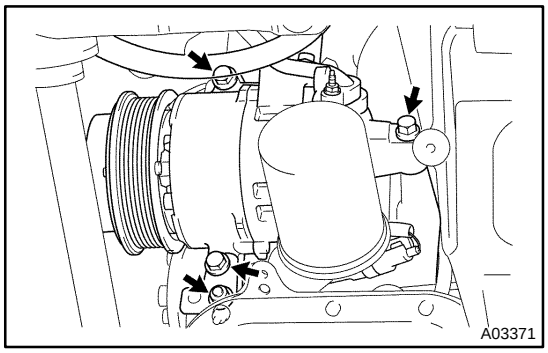
53. INSTALL FRONT FLOOR HEAT INSULATOR NO.1
[58151 / 98-80]

54. INSTALL W/CATALYST CONVERTER ASSY
[17400 / 98-20] (See page 15-5)

55. INSTALL FRONT SUSPENTION MEMBER BRACE SUB-ASSY RH
[51403A / 98-65]
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf) for nuts

56. INSTALL EXHAUST PIPE ASSY (See page 15-5)

57. INSTALL FRONT FLOOR BRACE CENTER
[57533A / 98-65]

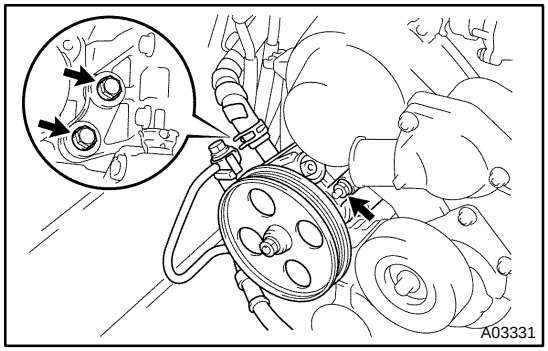


58. INSTALL COOLER COMPRESSOR ASSY
[88320 / 98-161]

(a) Install the cooler compressor, stay and wire bracket with the 3 bolts and nut.
Torque:
49 N·m (500 kgf·cm, 36 ft·lbf) for bolts
29 N·m (300 kgf·cm, 21 ft·lbf) for nut

(b) Connect the compressor connector.

(c) Install the wire clamp.



59. INSTALL VANE PUMP ASSY

(a) Install the vane pump with the 2 bolts and nut. Alternately tighten the bolts and nut.
Torque:
39.2 N·m (400 kgf·cm, 29 ft·lbf) for bolts
43.1 N·m (440 kgf·cm, 32 ft·lbf) for nut

(b) Connect the PS oil pressure switch connector.

(c) Install the RH engine under cover with the 2 screws.

(d) Connect the 2 PS air hoses to the vane pump.

60. INSTALL VANE PUMP OIL RESERVOIR ASSY
[44360 / 98-50]

61. INSTALL HEATER WATER OUTLET HOSE A(FROM HEATER UNIT)
[87246A / 98-158]

62. INSTALL HEATER WATER INLET HOSE A
[87245A / 98-158]

63. INSTALL FUEL VAPOR FEED HOSE NO.2
[23827A / 98-22]

64. INSTALL AIR HOSE NO.5
[17345D / 98-22]

65. CONNECT ENGINE WIRE

(a) Connect the engine wire from the ECM box.
(b) Install the nut, and connect the generator wire to the generator.
(c) Connect the wire for generator wire to the wire clamp on generator.
(d) Install the bolt, and disconnect the ground cable to the stay on generator.
(e) Install the 2 bolt, and connect the PS oil hose to the No. 1 oil pan.
(f) Install the 2 bolts, and connect the ground strap to the body.

66. INSTALL FAN AND GENERATOR V BELT
[16361A / 98-18] (See page 14-7)

67. INSTALL FUEL PIPE SUB-ASSY NO.2
[23802B / 98-27] (See page 11-1)

68. INSTALL RADIATOR ASSY (See page 16-4)

69. INSTALL ENGINE UNDER COVER NO.2
[51442E / 98-65]

70. INSTALL ENGINE UNDER COVER
[51441D / 98-65]

71. INSTALL AIR CLEANER ASSY

72. INSTALL INTAKE AIR CONNECTOR PIPE
[17875 / 98-21]

73. INSTALL AIR CLEANER INLET NO.1
[17751 / 98-21]

74. INSTALL V-BANK COVER
[11259 / 98-5]

75. INSTALL HOOD SUB-ASSY
[53301 / 98-70] (See page 75-1)

76. INSTALL BATTERY NEGATIVE TERMINAL

77. ADD AUTOMATIC TRANSMISSION FLUID

78. ADD COOLANT (See page 16-2)

79. ADD ENGINE OIL

80. INSPECT CHECK ENGINE COOLANT LEAK (See page 16-2)

81. INSPECT FUEL LEAK (See page 11-1)

82. INSPECT AUTOMATIC TRANSMISSION FLUID (See page 40-1)

83. INSPECT ENGINE OIL LEAKS

84. DRIVING TEST

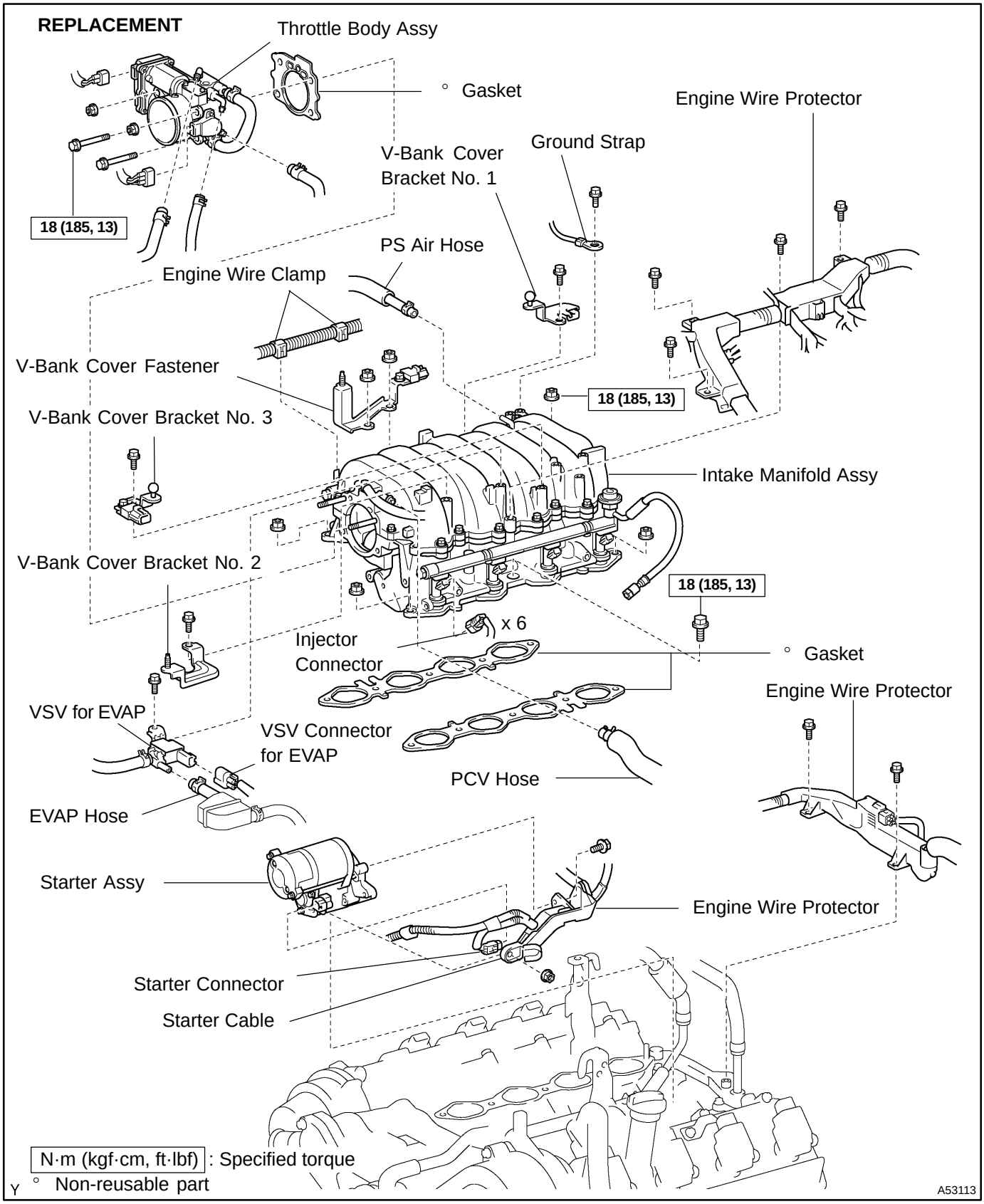
85. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT (See page 26-8)

86. ADJUST ENGINE (See page 14-1)

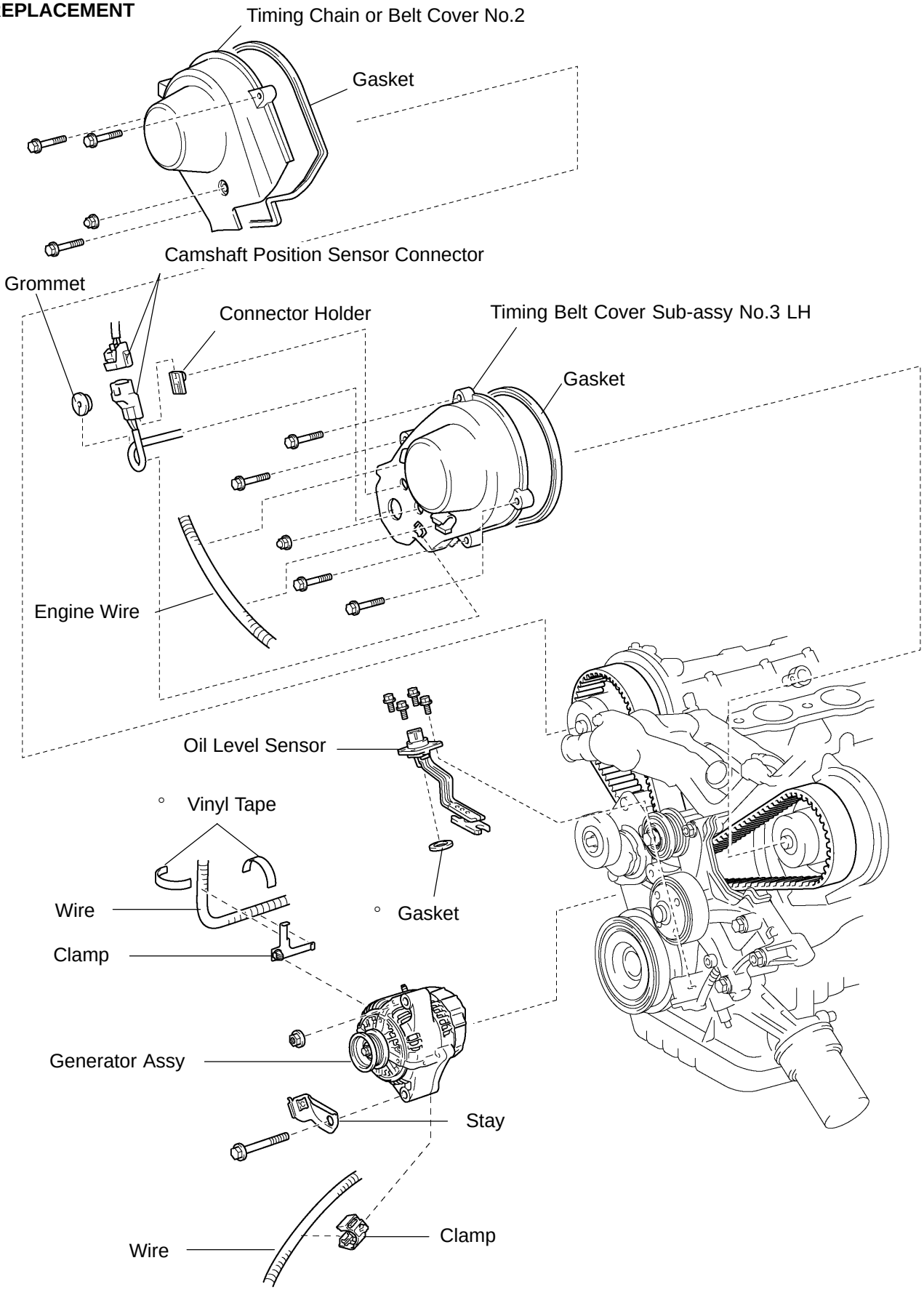
PARTIAL ENGINE ASSY

COMPONENTS

14078-03



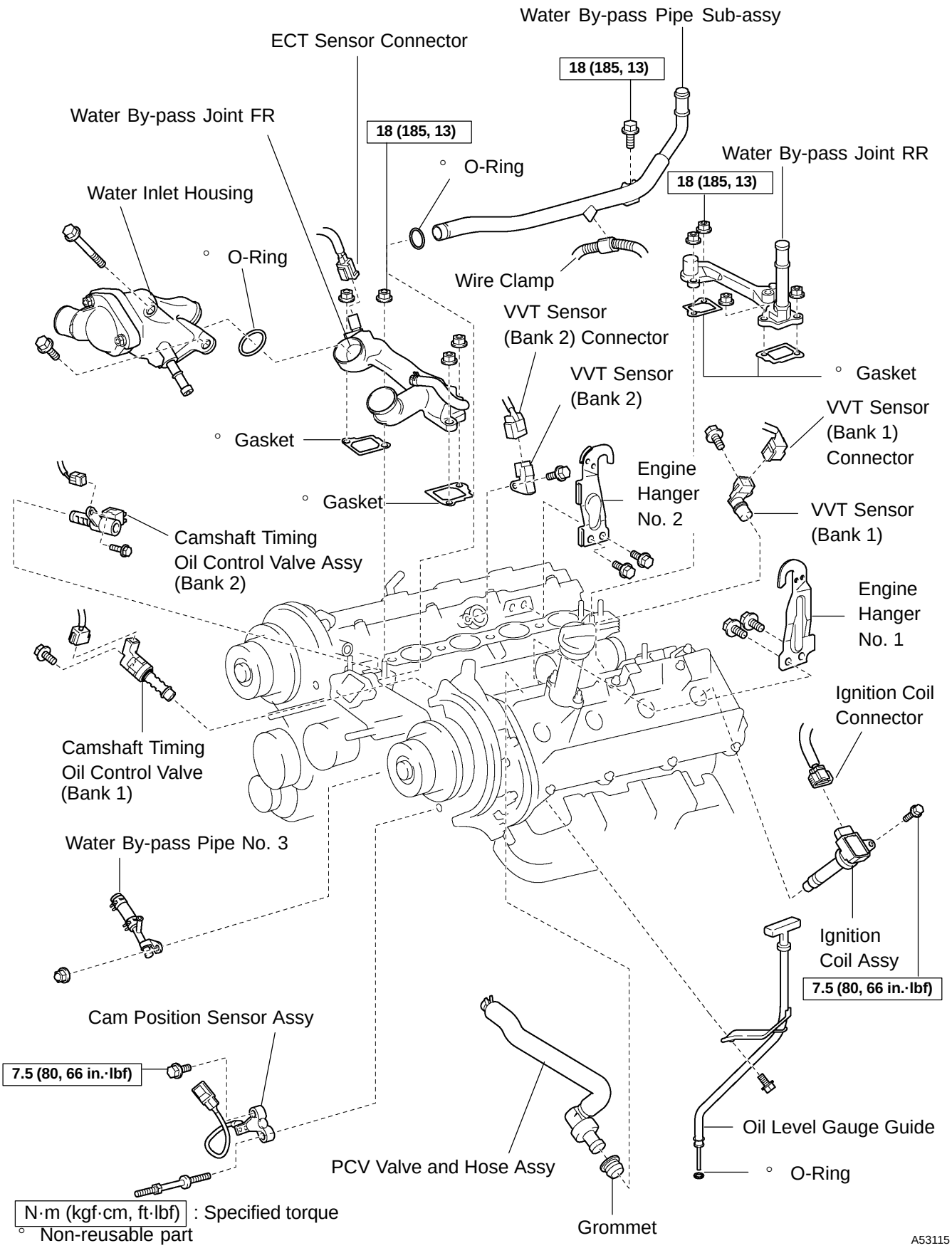
REPLACEMENT



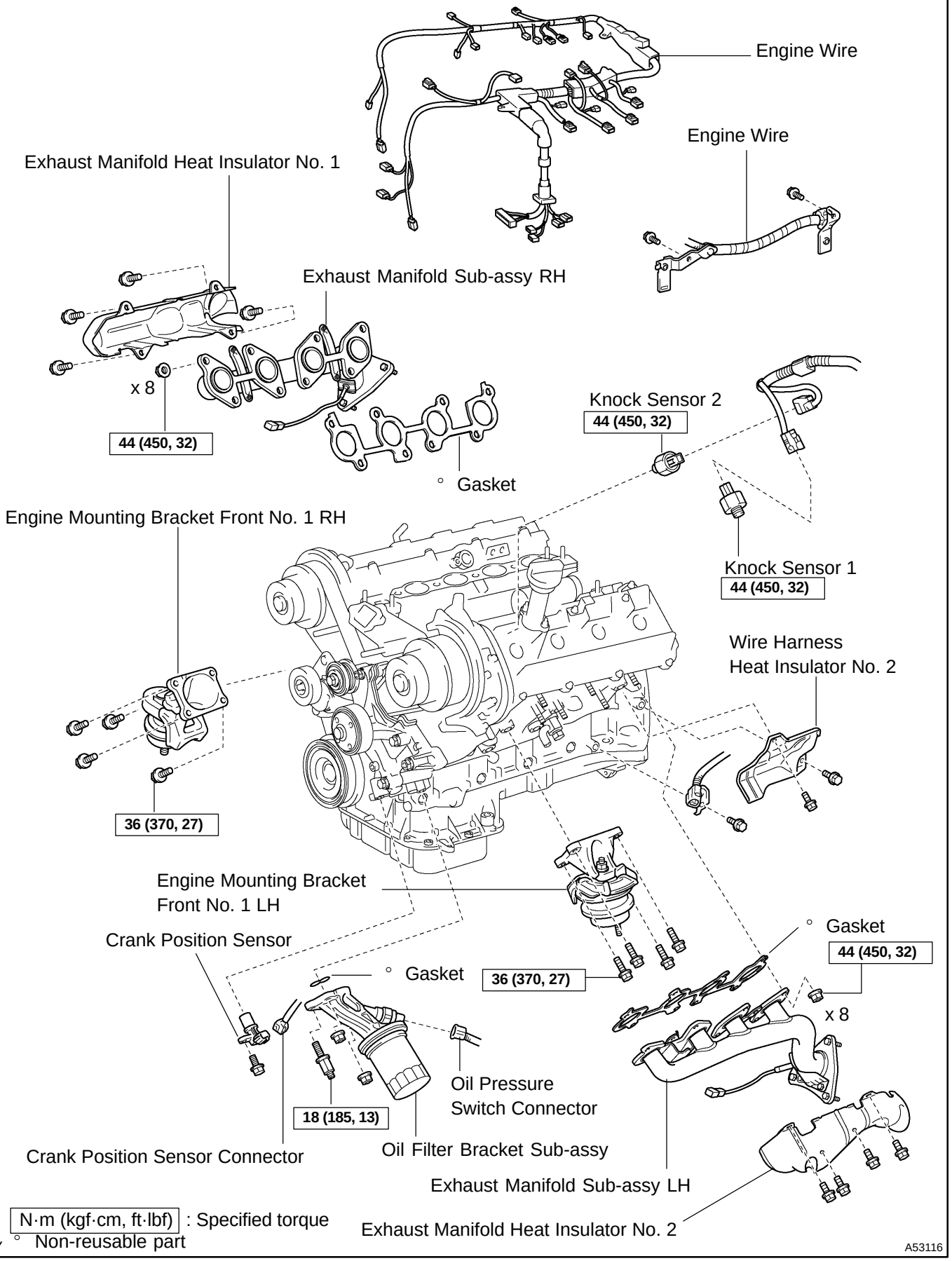
Y ° Non-reusable part

A53114

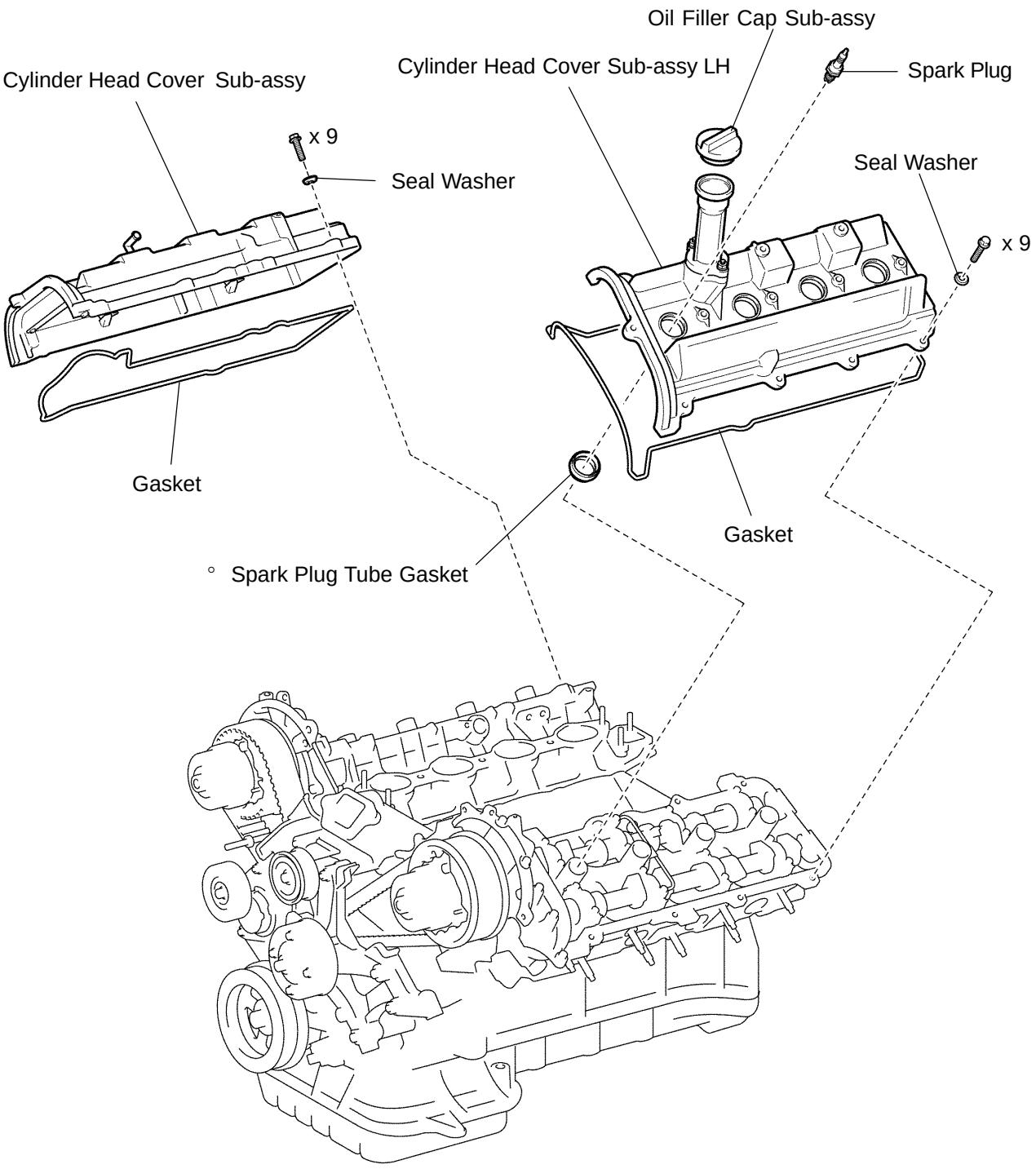
REPLACEMENT



REPLACEMENT



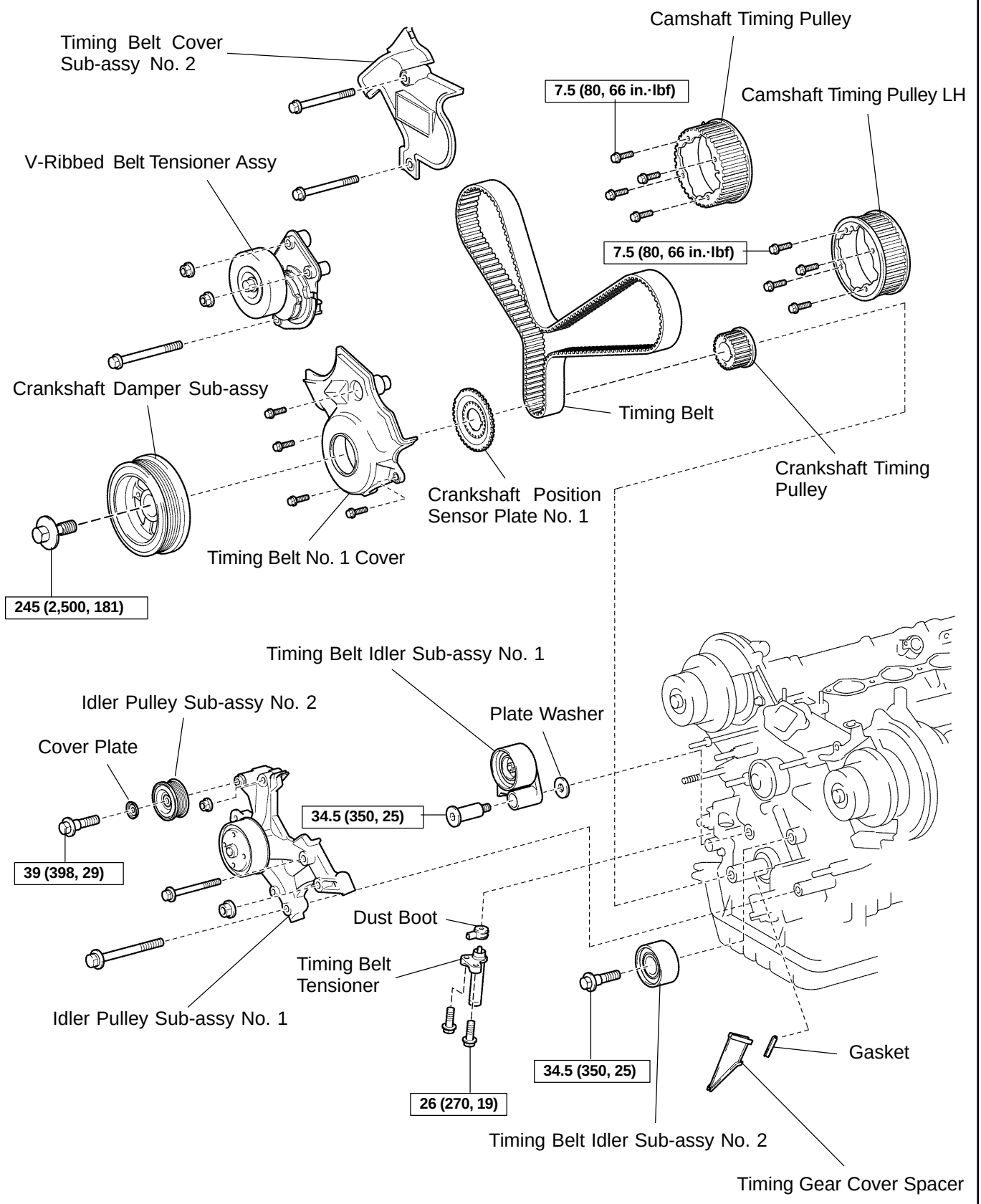
OVERHAUL



P ° Non-reusable part

A54479

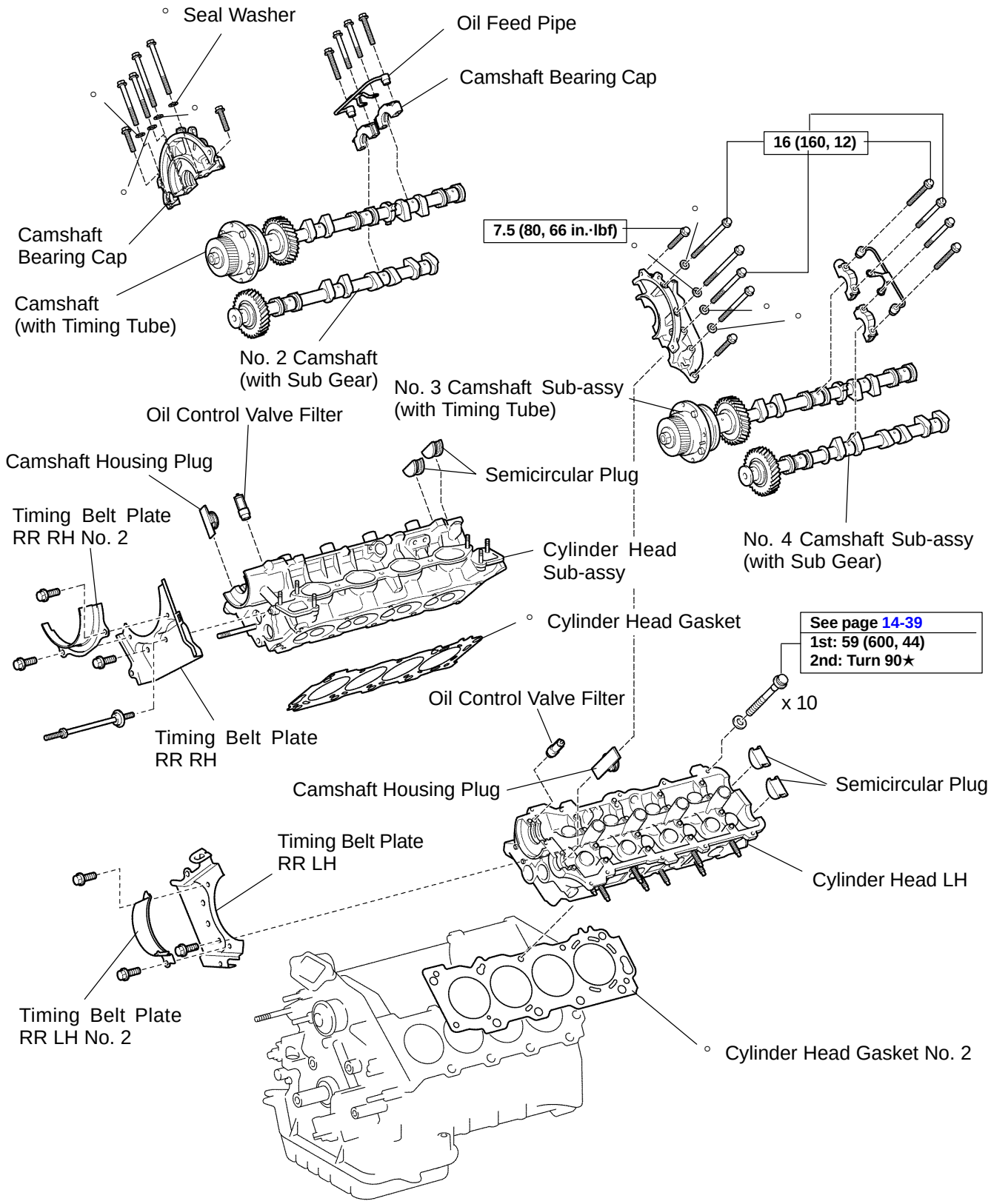
OVERHAUL



N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part

P A53964

OVERHAUL

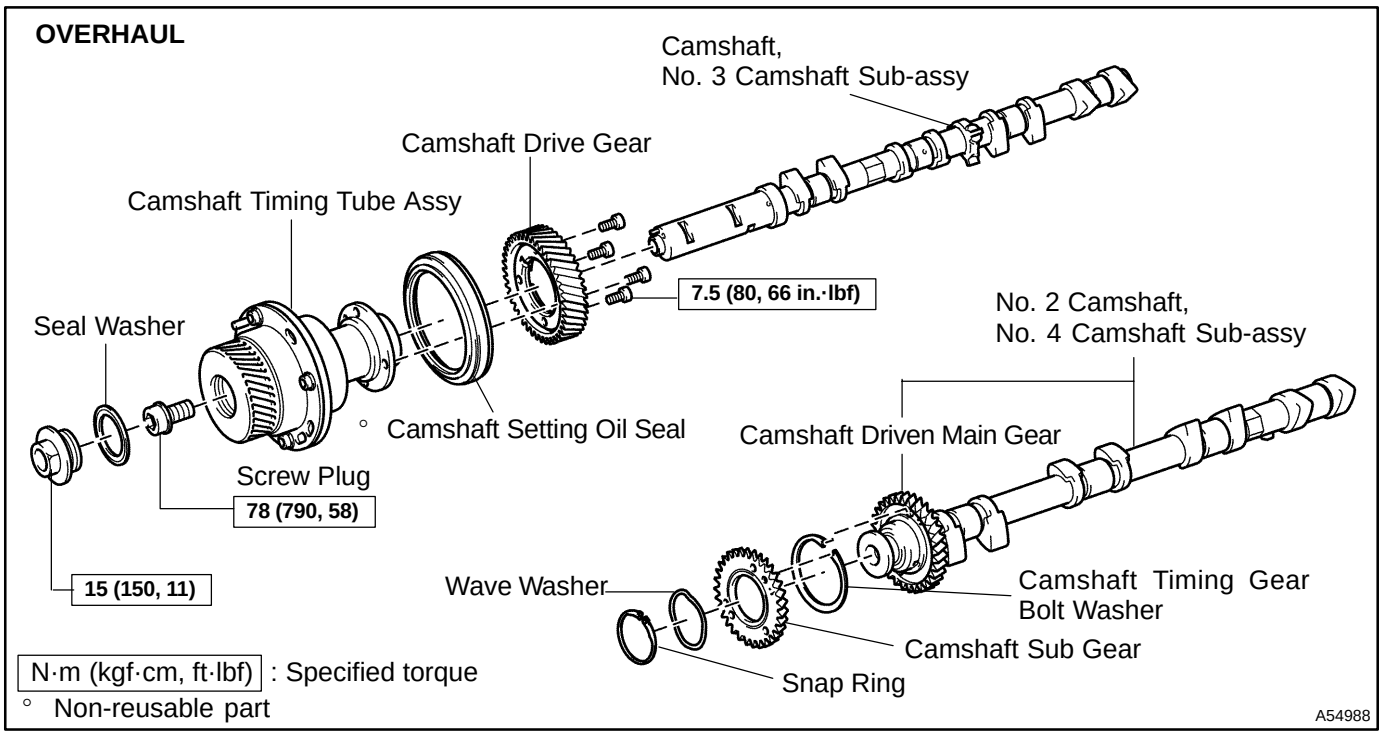


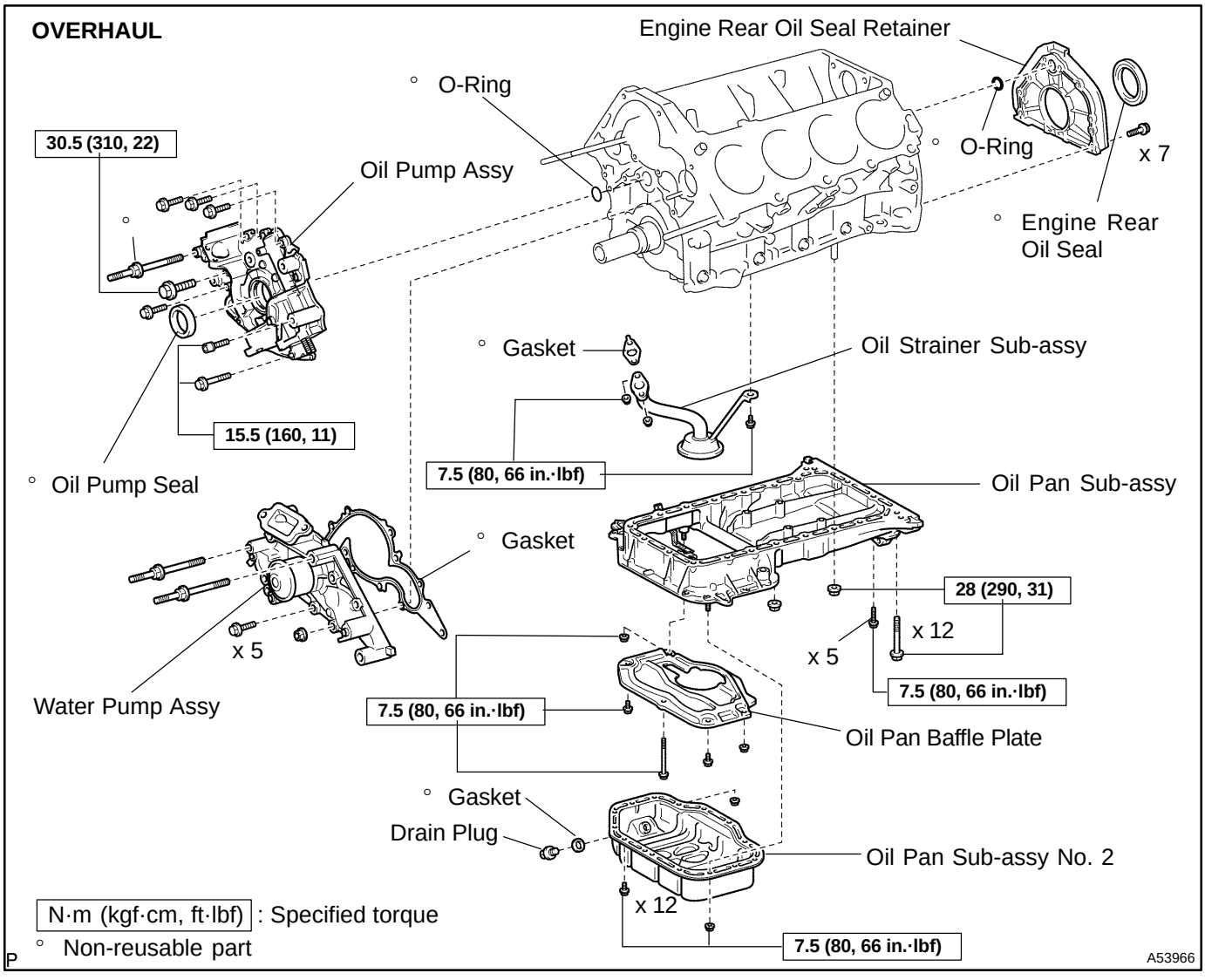
N·m (kgf·cm, ft·lbf) : Specified torque

° Non-reusable part

P

A53965


OVERHAUL
Camshaft,
No. 3 Camshaft Sub-assy
Camshaft Drive Gear
Camshaft Timing Tube Assy
7.5 (80, 66 in.·lbf)
Seal Washer
No. 2 Camshaft,
No. 4 Camshaft Sub-assy
Camshaft Setting Oil Seal
Camshaft Driven Main Gear
Screw Plug
78 (790, 58)
15 (150, 11)
Wave Washer
Camshaft Timing Gear
Bolt Washer
Camshaft Sub Gear
Snap Ring
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
A54988


OVERHAUL
Engine Rear Oil Seal Retainer
O-Ring
O-Ring
x 7
30.5 (310, 22)
Oil Pump Assy
Engine Rear
Oil Seal
Gasket
Oil Strainer Sub-assy
15.5 (160, 11)
7.5 (80, 66 in.·lbf)
Oil Pump Seal
Oil Pan Sub-assy
Gasket
28 (290, 31)
x 12
x 5
x 5
7.5 (80, 66 in.·lbf)
Water Pump Assy
7.5 (80, 66 in.·lbf)
Oil Pan Baffle Plate
Gasket
Drain Plug
Oil Pan Sub-assy No. 2
x 12
7.5 (80, 66 in.·lbf)
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
A53966

14079-02

REPLACEMENT

1. INSTALL ENGINE STAND

2. REMOVE THROTTLE BODY ASSY
[22210 / 98-27] (See page 10-5)

3. REMOVE INTAKE MANIFOLD ASSY

(a) Disconnect the VSV connector for EVAP.
(b) Disconnect the EVAP hose from the VSV for EVAP.
(c) Remove the bolt, disconnect the VSV for EVAP from the upper intake manifold.
(d) Remove the bolt and V-bank cover bracket No. 2.
(e) Remove the bolt and V-bank cover bracket No. 3.
(f) Disconnect the VSV connector for ACIS.
(g) Remove the bolt and V-bank cover bracket No. 1.
(h) Remove the bolt and V-bank cover fastener.
(i) Remove the 4 bolts, and disconnect the engine wire protector (LH side) from upper intake manifold and camshaft bearing cap.
(j) Disconnect the 2 wire clamps on the engine wire (RH side) from the brackets on the RH delivery pipe.
(k) Remove the 2 bolts, and disconnect the engine wire protector (rear side) from the rear water bypass joint and RH cylinder head.
(l) Disconnect the 8 injector connectors.
(m) Remove the 6 bolts, 4 nuts, the intake manifold assy and 2 gaskets.

4. REMOVE STARTER ASSY
[28100 / 98-26] (See page 19-4)

5. REMOVE GENERATOR ASSY
[27020 / 98-25] (See page 19-18)

6. REMOVE TIMING BELT COVER SUB-ASSY N0.3 LH
[11308C / 98-8]

(a) Remove the cap nut and disconnect the water by-pass pipe No.3 from the timing belt cover.
(b) Disconnect the 2 water by-pass hoses from the water by-pass pipe No.3.
(c) Disconnect the engine wire from the 2 wire clamps.
(d) Disconnect the camshaft position sensor connector.
(e) Disconnect the camshaft position sensor wire from the wire clamp on the timing belt cover.
(f) Remove the wire grommet from the timing belt cover.
(g) Remove the 4 bolts.
(h) Disconnect the timing belt cover from the timing plate and camshaft bearing cap.
(i) Disconnect the wire clamp for the sensor from the timing belt cover.
(j) Remove the connector holder from the sensor connector.
(k) Remove the timing belt cover.

7. REMOVE TIMING CHAIN OR BELT COVER NO.2
[11304 / 98-8]

(a) Disconnect the 2 PS air hoses from the clamp on the timing belt cover No. 2.
(b) Remove the cap nut, 3 bolts, timing belt cover No. 2 and gasket.

8. REMOVE WATER INLET HOUSING
[16323 / 98-16] (See page 16-1 1)

9. REMOVE WATER BY-PASS JOINT FR
[16355 / 98-16]

(a) Disconnect the ECT sensor connector.
(b) Remove the 4 nuts, water by-pass joint and 2 gaskets.

10. REMOVE WATER BY-PASS JOINT RR
[16356 / 98-16]

(a) Disconnect the heater inlet hose from the water by-pass joint.
(b) Remove the 4 nuts, water by-pass joint and 2 gaskets.

11. REMOVE WATER BY-PASS PIPE SUB-ASSY
[16206 / 98-16]

(a) Disconnect the heater outlet hose from the water by-pass pipe.
(b) Disconnect the wire clamp (for knock sensor 1, 2) from bracket of the water by-pass pipe.
(c) Remove the bolt.
(d) Pull out the water by-pass pipe from the water pump.
(e) Remove the O-ring from the water by-pass pipe.

12. REMOVE OIL LEVEL GAGE GUIDE
[11452 / 98-7]

13. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5] (RH BANK)

14. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5] (LH BANK)

15. REMOVE CAM POSITION SENSOR ASSY
[19300C / 98-8]

16. REMOVE VVT SENSOR

17. REMOVE KNOCK CONTROL SENSOR
[89615B / 98-7]

18. REMOVE ENGINE HANGER NO.1

19. REMOVE ENGINE HANGER NO.2

20. REMOVE IGNITION COIL ASSY
[19500 / 98-24]

21. REMOVE OIL FILTER BRACKET SUB-ASSY
[15609 / 98-14]

(a) Disconnect the oil pressure switch connector.
(b) Remove the stud bolt, 2 nuts and oil filter bracket with gasket.

22. REMOVE CRANK POSITION SENSOR
[15100R / 98-13]

23. REMOVE ENGINE OIL LEVEL SENSOR
[89491C / 98-7]

24. REMOVE ENGINE WIRE

25. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1
[17167 / 98-19]

26. REMOVE EXHAUST MANIFOLD SUB-ASSY RH
[17104 / 98-19]

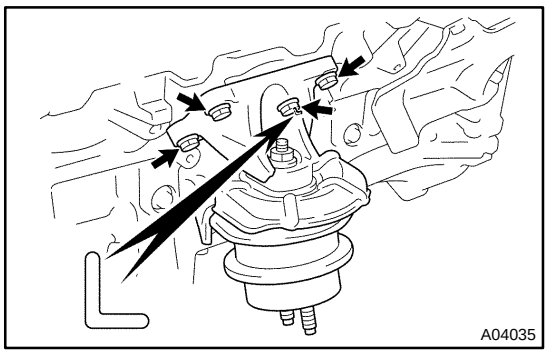
27. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.2
[17168 / 98-19]

28. REMOVE EXHAUST MANIFOLD SUB-ASSY LH
[17105 / 98-19]

29. REMOVE WIRING HARNESS HEAT INSULATOR NO.2
[82916 / 98-121]

30. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 RH
[12311 / 98-9]

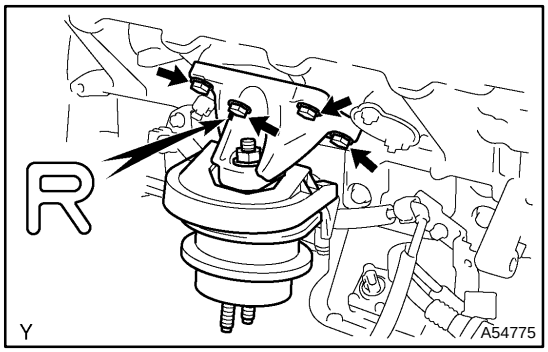
31. REMOVE ENGINE MOUNTING BRACKET FRONT NO.1 LH
[12315 / 98-9]



32. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 LH
[12315 / 98-9]

(a) Install the mounting bracket with the 4 bolts
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)

HINT:
The LH mounting bracket is marked with ”L”.

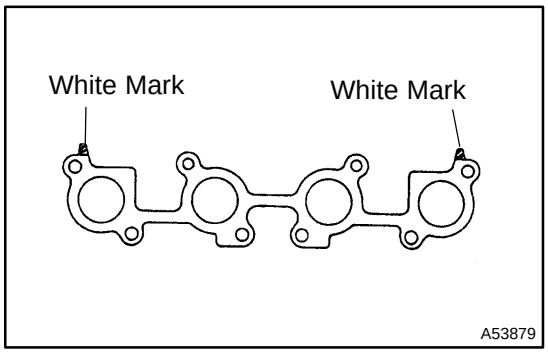


33. INSTALL ENGINE MOUNTING BRACKET FRONT NO.1 RH
[12311 / 98-9]

(a) Install the mounting bracket with the 4 bolts
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)

HINT:
The RH mounting bracket is marked with ”R”.

34. INSTALL WIRING HARNESS HEAT INSULATOR NO.2
[82916 / 98-121]



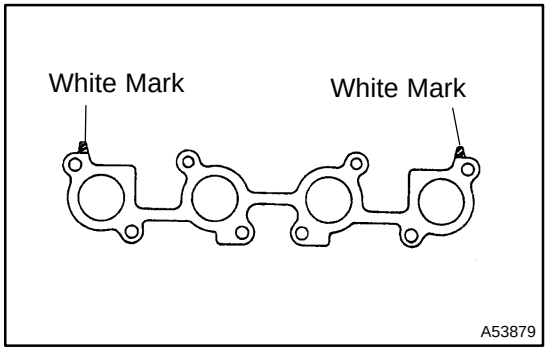
35. INSTALL EXHAUST MANIFOLD SUB-ASSY LH
[17105 / 98-19]

(a) Place a new gasket on the cylinder head with the white mark facing the manifold side.

NOTICE:
Be careful of the installation direction.

(b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several passes.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

36. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.2
[17168 / 98-19]



37. INSTALL EXHAUST MANIFOLD SUB-ASSY RH
[17104 / 98-19]

(a) Place a new gasket on the cylinder head with the white mark facing the manifold side.

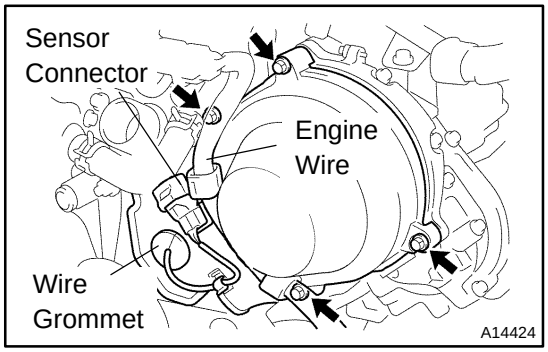
NOTICE:
Be careful of the installation direction.

(b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several passes.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

38. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1
[17167 / 98-19]
39. INSTALL ENGINE WIRE
40. INSTALL ENGINE OIL LEVEL SENSOR
[89491C / 98-7]
41. INSTALL CRANK POSITION SENSOR
[15100R / 98-13] (See page 18-4)
42. INSTALL OIL FILTER BRACKET SUB-ASSY
[15609 / 98-14]
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
43. INSTALL IGNITION COIL ASSY
[19500 / 98-24]
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)
44. INSTALL ENGINE HANGER NO.2
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)
45. INSTALL ENGINE HANGER NO.1
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)
46. INSTALL KNOCK CONTROL SENSOR
[89615B / 98-7]
Torque: 44 N·m (450 kgf·cm, 33 ft·lbf)
47. INSTALL VVT SENSOR
48. INSTALL CAM POSITION SENSOR ASSY
[19300C / 98-8]
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)
49. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5] (RH BANK) (See page 10-8)
50. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5] (LH BANK) (See page 10-10)
51. INSTALL OIL LEVEL GAGE GUIDE
[11452 / 98-7]
52. INSTALL WATER BY-PASS PIPE SUB-ASSY
[16206 / 98-16]
(a) Install a new O-ring to the water by-pass pipe.
(b) Apply soapy water to the O-ring.
(c) Push in the water by-pass pipe end into the pipe hole of the water pump.
(d) Install the water by-pass pipe with the bolt.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(e) Install the wire clamp to the bracket of the water by-pass pipe.
53. INSTALL WATER BY-PASS JOINT RR
[16356 / 98-16]
(a) Install 2 new gaskets and the water by-pass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
54. INSTALL WATER BY-PASS JOINT FR
[16355 / 98-16]
(a) Install 2 new gaskets and the water by-pass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(b) Connect the ECT sensor connector.
55. INSTALL WATER INLET HOUSING
[16323 / 98-16] (See page 16-1 1)

56. INSTALL TIMING CHAIN OR BELT COVER NO.2
[11304 / 98-8]

(a) Install the gasket to the timing belt cover.
(b) Install the timing belt cover with the cap nut and 3 bolts.
(c) Connect the 2 PS air hoses to the clamp on the timing belt cover.

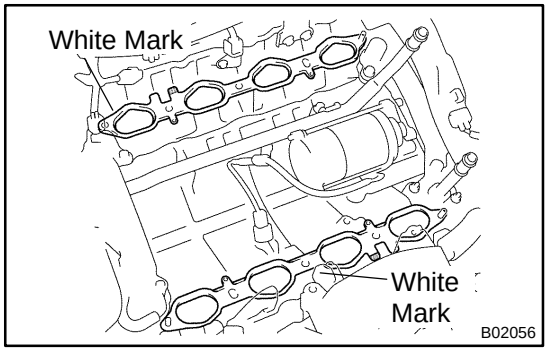


57. INSTALL TIMING BELT COVER SUB-ASSY N0.3 LH
[11308C / 98-8]

(a) Install the gasket to the timing belt cover.
(b) Run the camshaft position sensor wire through the timing belt cover hole.
(c) Install the timing belt cover with the 4 bolts.
(d) Install the wire grommet to the timing belt cover.
(e) Install the sensor connector to the sensor holder.
(f) Connect the sensor connector.
(g) Install the sensor wire to the wire clamp on the timing belt cover.
(h) Install the engine wire to the 2 wire clamps on the timing belt cover.
(i) Connect the 2 water by-pass hoses to the water by-pass pipe No.3.
(j) Install the No.3 water by-pass pipe to the timing belt cover No. 3 LH with the cap nut.

58. INSTALL GENERATOR ASSY
[27020 / 98-25] (See page 19-18)

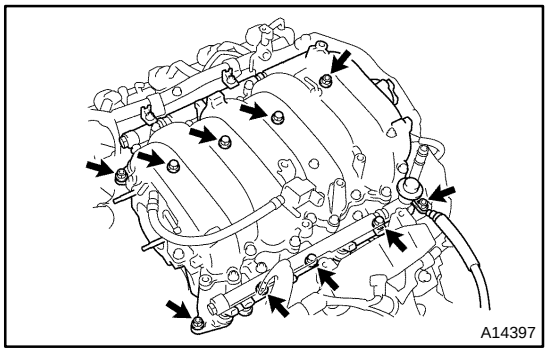
59. INSTALL STARTER ASSY
[28100 / 98-26] (See page 19-4)



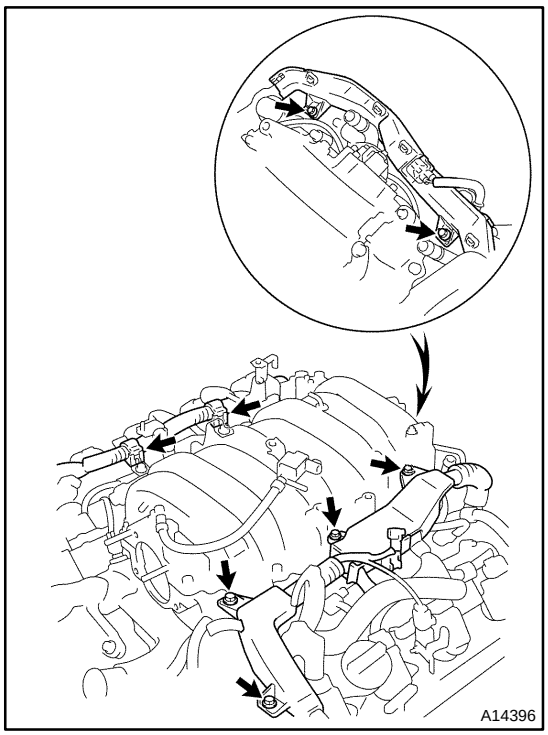
60. INSTALL INTAKE MANIFOLD ASSY

(a) Place 2 new gaskets on the cylinder heads with the white mark facing outward.

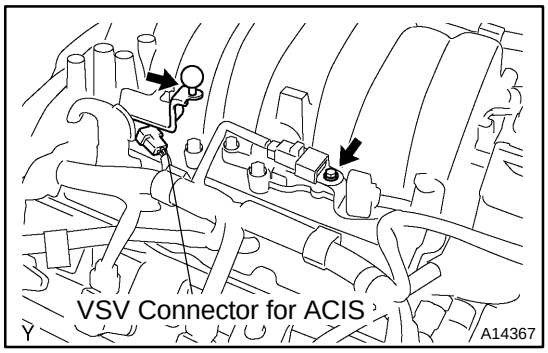
NOTICE:
Be careful of the installation direction.



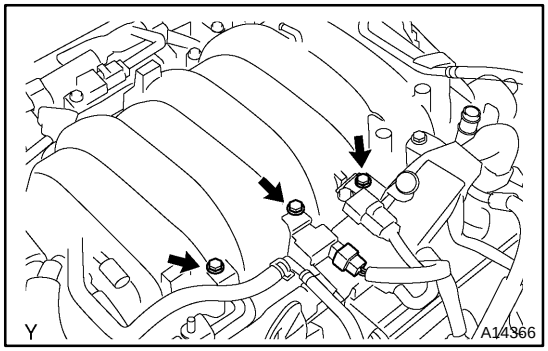
(b) Install the intake manifold assy with the 6 bolts and 4 nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(c) Connect the 8 injector connectors.



(d) Install the engine wire protector (rear side) with the 2 bolts.
(e) Install the engine wire protector (LH side) with the 4 bolts.
(f) Install the 2 wire clamps on the engine wire (RH side) to the brackets on the RH delivery pipe.



(g) Install the V-bank cover fastener with bolt.
(h) Install the V-bank cover bracket No. 1 with bolt.
(i) Connect the VSV connector for ACIS.



(j) Install the V-bank cover bracket No. 3 with bolt.
(k) Install the V-bank cover bracket No. 2 with bolt.
(l) Connect the VSV for EVAP to the intake manifold with the bolt.
(m) Connect the EVAP hose to the VSV for EVAP.
(n) Connect the VSV connector for EVAP.

61. INSTALL THROTTLE BODY ASSY [22210 / 98-27] (See page 10-5)
62. REMOVE ENGINE STAND

1407A-01

OVERHAUL

1. REMOVE SPARK PLUG
[19100P / 98-24]

2. REMOVE OIL FILLER CAP SUB-ASSY
[12108 / 98-5]

3. REMOVE CYLINDER HEAD COVER SUB-ASSY
[11201 / 98-5]

(a) Remove the 9 bolts, 9 seal washers, cylinder head cover and gasket.

4. REMOVE IDLER PULLEY SUB-ASSY NO.2
[16604 / 98-15]

(a) Remove the pulley bolt, cover plate and idler pulley.

5. REMOVE TIMING BELT COVER SUB-ASSY NO.2
[11303B / 98-8]

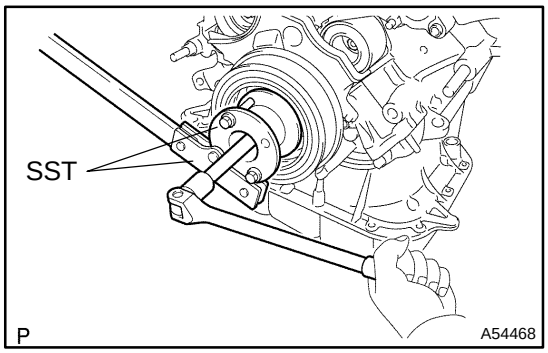
(a) Remove the 2 bolts and timing belt cover.

6. REMOVE V-RIBBED BELT TENSIONER ASSY
[16620 / 98-15]

(a) Remove the bot, 2 nuts and belt tensioner.

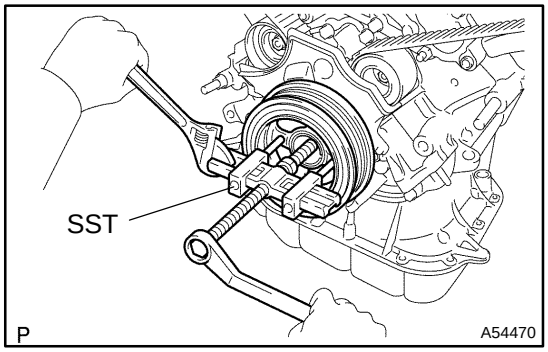
7. REMOVE IDLER PULLEY ASSY
[16630G / 98-15]

(a) Remove the 2 bots, 2 nuts and idler pulley.



8. REMOVE CRANKSHAFT DAMPER SUB-ASSY
[13407 / 98-11]

(a) Using SST, remove the damper bolt.
SST 09213-70010, 09330-00021



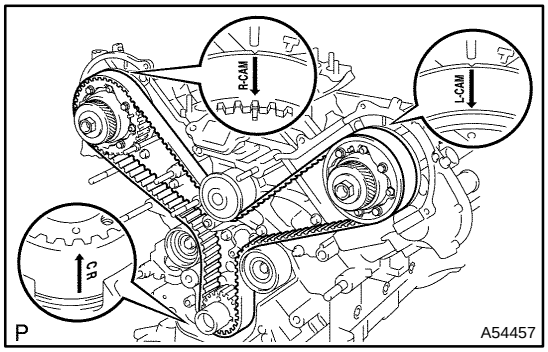
(b) Using SST, remove the crankshaft damper.
SST 09950- 50012 (09951- 05010, 09952- 05010, 09953-05010, 09953-05020, 09954-05020)

9. REMOVE TIMING BELT NO.1 COVER
[11322A / 98-8]

(a) Remove the 4 bots and timing belt cover.

10. REMOVE TIMING GEAR COVER SPACER
[11348 / 98-8]

11. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1 [19315 / 98-11]

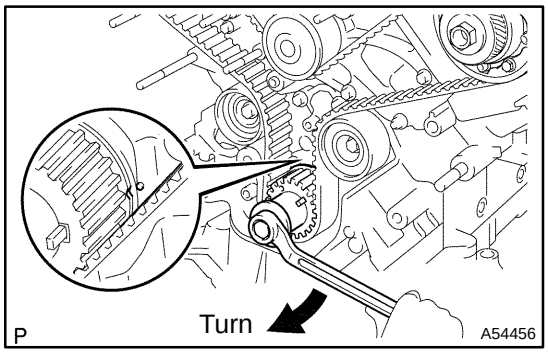


12. REMOVE TIMING BELT [13568 / 98-12]

(a) If re-using the timing belt, check the installation marks on the timing belt.

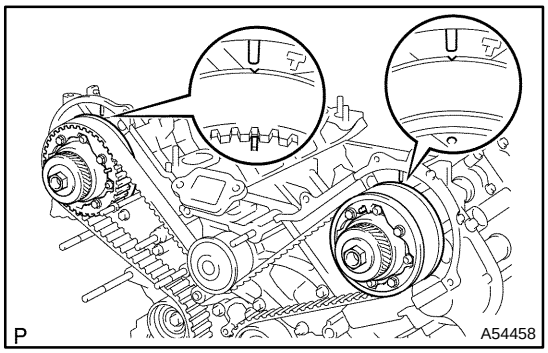
(1) Check that there are 3 installation marks on the timing belt by turning the crankshaft as shown in the illustration.

If the installation marks have disappeared, place a new installation mark on the timing belt before removing each part.



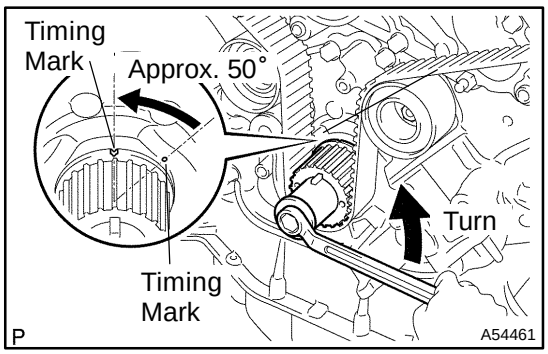
(b) Set the No. 1 cylinder to approx. 50° BTDC/compression.

(1) Using the crankshaft damper bolt, turn the crankshaft to align the timing marks of the crankshaft timing pulley and oil pump body.



(2) Check that the timing marks of the camshaft timing pulleys and timing belt plates aligned.

If not, turn the crankshaft 1 revolution (360˚).

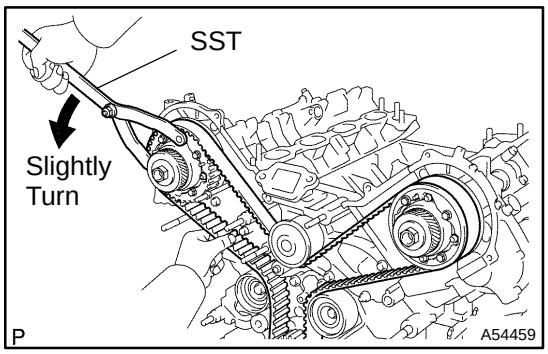


(3) Using the crankshaft damper bolt, turn the crankshaft counterclockwise by approx. 50˚.

NOTICE:

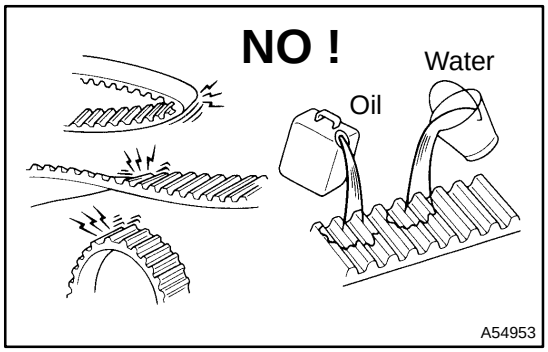
If the timing belt is disengaged, having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft timing pulley (steps 19 and 20) and camshaft (steps 21 and 22), causing damage. So always set the crankshaft pulley at the correct angle.

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



(d) Using SST, loosen the tension between the camshaft timing pulley (RH bank) and crankshaft timing pulley by slightly turning the camshaft timing pulley counterclockwise.
SST 09960-10010 (09962-01000, 09963-00350)

(e) Disconnect the timing belt from the timing belt idler No. 1, and remove the timing belt.



13. INSPECT TIMING BELT
[13568 / 98-12]

NOTICE:

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

If there are any defects, as shown in the illustrations, check these points:

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

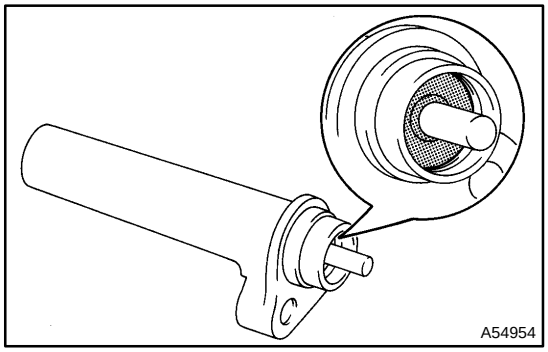
(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.

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

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

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

If necessary, replace the timing belt.



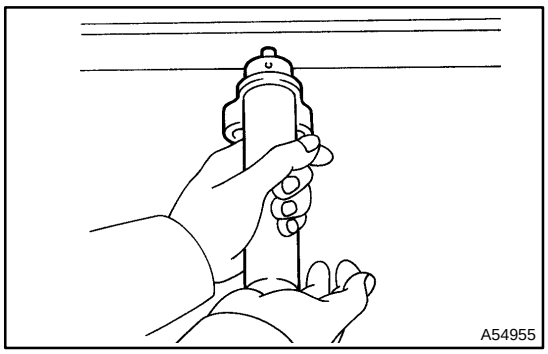
14. INSPECT TIMING BELT TENSIONER

(a) Visually check the seal portion of the tensioner for oil leakage.

HINT:

If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right.

If leakage is found, replace the tensioner.

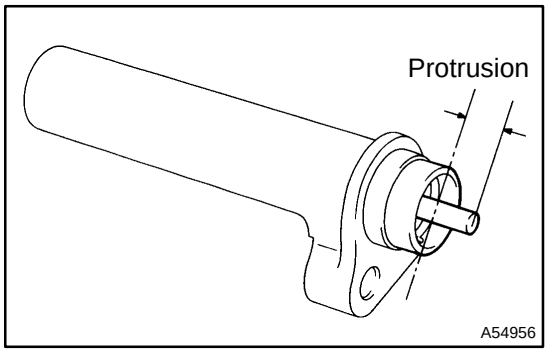


(b) Hold the tensioner with both hands and push the push rod strongly as shown to check that it doesn't move.

If the push rod moves, replace the tensioner.

NOTICE:

Never hold the tensioner push rod facing downward.



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

Protrusion: 9.5 - 10.5 mm (0.374 - 0.413 in.)

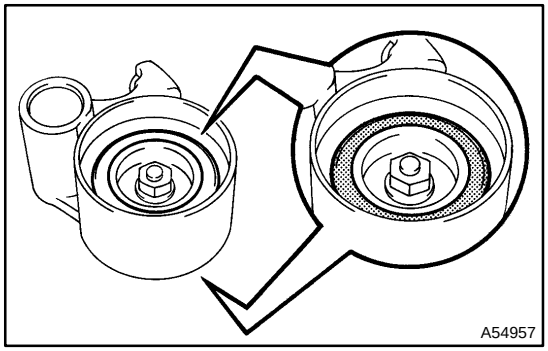
If the protrusion is not as specified, replace the tensioner.

15. REMOVE TIMING BELT IDLER SUB-ASSY NO.1
[13505 / 98-12]

(a) Using a 10 mm hexagon wrench, remove the bolt, idler and plate washer.

16. REMOVE TIMING BELT IDLER SUB-ASSY NO.2
[13502 / 98-12]

(a) Remove the bolt and idler.



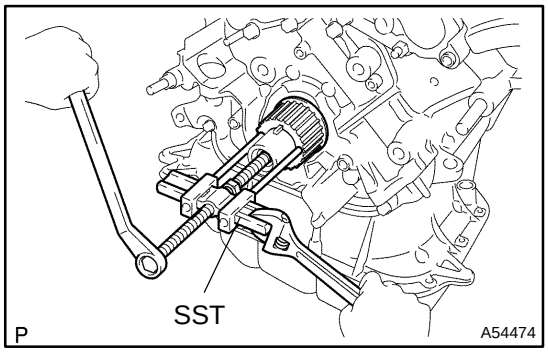
17. INSPECT TIMING BELT IDLER

(a) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler pulley.

(b) Check that the idler pulley turns smoothly.

If necessary, replace the idler.



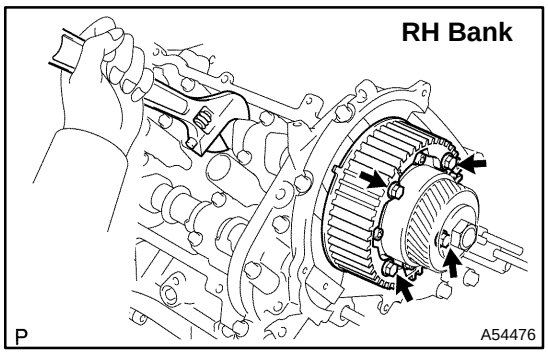
18. REMOVE CRANKSHAFT TIMING PULLEY
[13521P / 98-11]

(a) Using SST, remove the timing pulley.

SST 09950- 50012 (09951- 05010, 09952- 05010, 09953-05010, 09953-05020, 09954-05010)

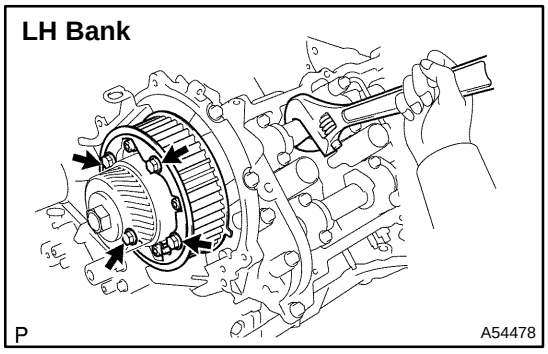
NOTICE:

Do not turn the timing pulley.



19. REMOVE CAMSHAFT TIMING PULLEY
[13523P / 98-12]

(a) Remove the 4 bolts and timing pulley.



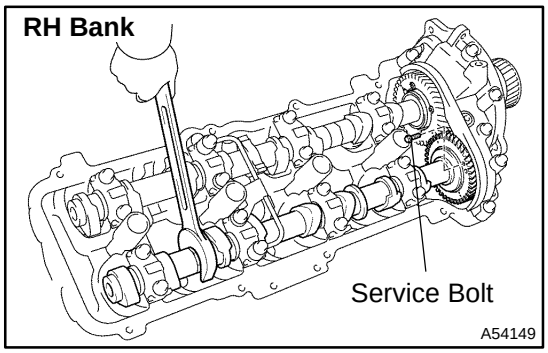
20. REMOVE CAMSHAFT TIMING PULLEY SUB-ASSY LH
[13056 / 98-12]

(a) Remove the 4 bolts and timing pulley.

21. REMOVE CAMSHAFT
[13511 / 98-12]

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Remove the camshafts of the RH bank.

(1) Boring the service bolt hole of the sub gear upward by turning the hexagon wrench head portion of the No. 2 camshaft with a wrench.

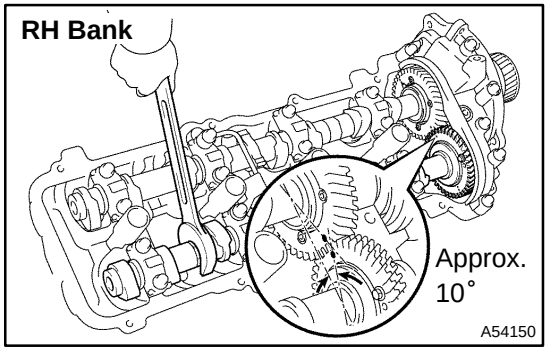
(2) Secure the sub gear to the main gear with a service bolt.

Recommended service bolt:

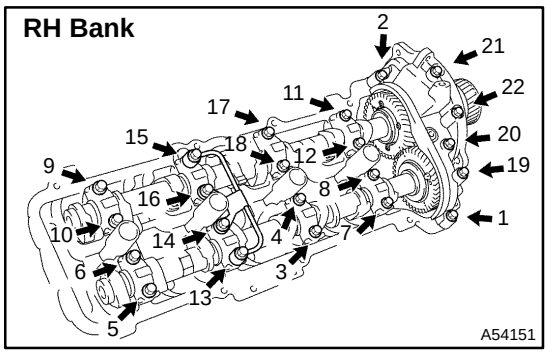
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm (0.63 - 0.79 in.)

HINT:

When removing the camshafts, make sure that the torsional spring force of the sub gear has been eliminated by the above operation.



(3) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon wrench head portion of the No. 2 camshaft with a wrench.



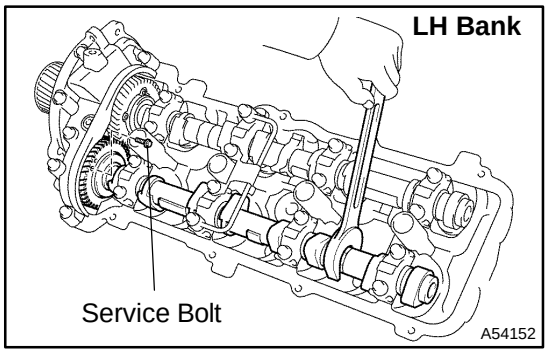
(4) Uniformly loosen the 22 bearing cap bolts in several passes, in the sequence shown.

(5) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, oil control valve filter and 2 camshafts.

22. REMOVE NO.3 CAMSHAFT SUB-ASSY [13053 / 98-12]

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Remove the camshafts of the LH bank.

(1) Boring the service bolt hole of the sub gear upward by turning the hexagon wrench head portion of the No. 4 camshaft with a wrench.

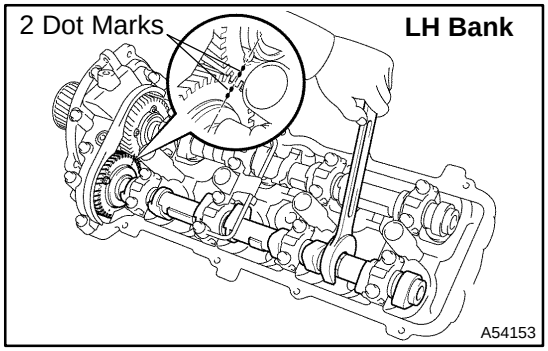
(2) Secure the sub gear to the main gear with a service bolt.

Recommended service bolt:

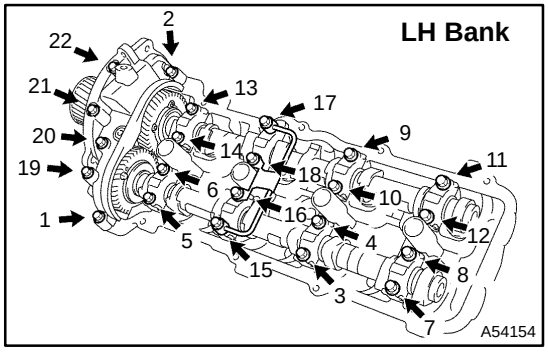
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm (0.63 - 0.79 in.)

HINT:

When removing the camshaft, make sure that the torsional spring force of the sub gear has been eliminated by the above operation.



(3) Align the timing mark (2 dot marks) of the camshaft drive gear by turning the hexagon wrench head portion of the No. 4 camshaft with a wrench.



(4) Uniformly loosen the 22 bearing cap bolts in several passes, in the sequence shown.

(5) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, oil control valve filter and 2 camshafts.

23. REMOVE SEMICIRCULAR PLUG
[11183 / 98-5]

24. REMOVE TIMING BELT PLATE RR RH NO.2
[11343 / 98-8]

(a) Remove the 2 bolts and timing belt plate.

25. REMOVE TIMING BELT PLATE RR RH
[11341 / 98-8]

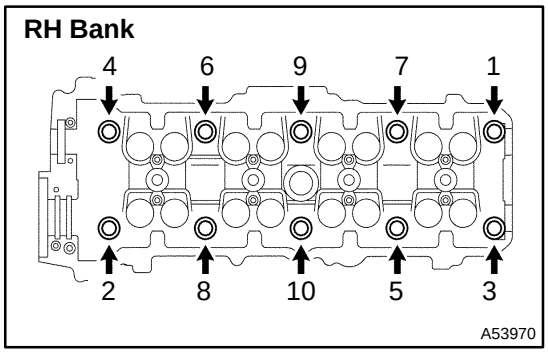
(a) Remove the bolt, stud bolt and timing belt plate.

26. REMOVE TIMING BELT PLATE RR LH NO.2
[11344 / 98-8]

(a) Remove the 2 bolts and timing belt plate.

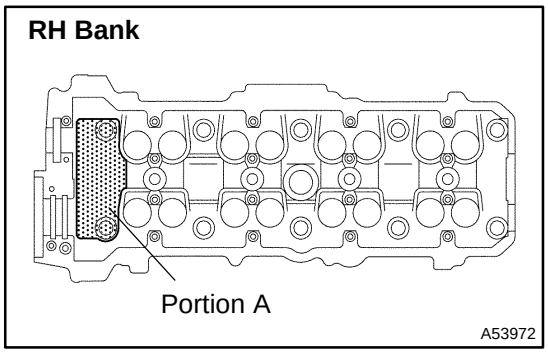
27. REMOVE TIMING BELT PLATE RR LH
[11342 / 98-8]

(a) Remove the bolt and timing belt plate.



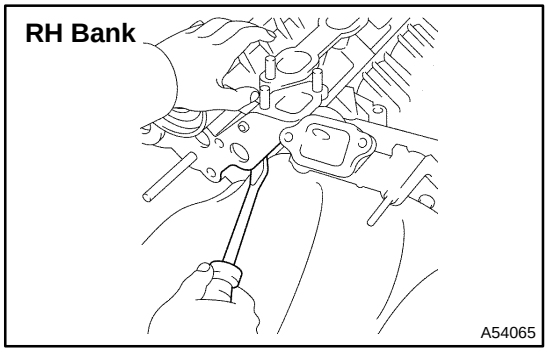
28. REMOVE CYLINDER HEAD SUB-ASSY
[11101 / 98-5]

(a) Uniformly loosen the 10 cylinder head bolts on one side of each cylinder head in several passes, in the sequence shown.



NOTICE:

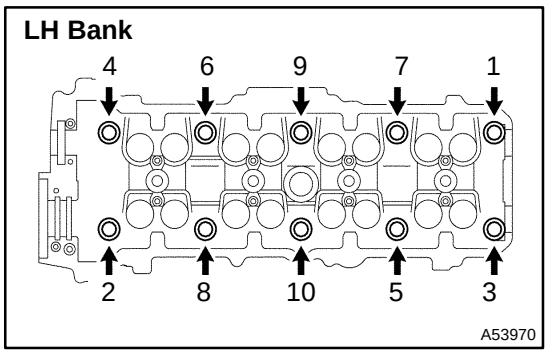
- ★ **Cylinder head warpage or cracking could result from removing bolts in incorrect order.**
- ★ **Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.**



(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

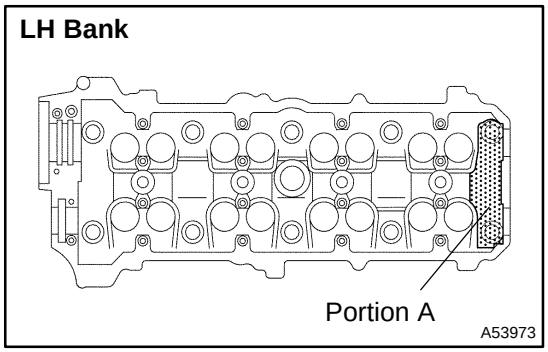
HINT:
If the cylinder head is lift off, pry between the cylinder head and cylinder block with a screwdriver.

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



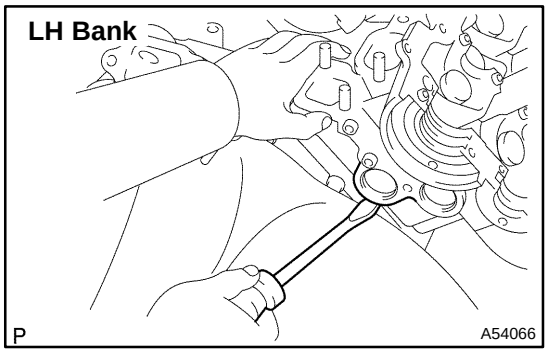
29. REMOVE CYLINDER HEAD LH
[11102 / 98-5]

(a) Uniformly loosen the 10 cylinder head bolts on one side of each cylinder head in several passes, in the sequence shown.



NOTICE:

- ★ **Cylinder head warpage or cracking could result from removing bolts in incorrect order.**
- ★ **Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.**



(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

HINT:

If the cylinder head is lift off, pry between the cylinder head and cylinder block with a screwdriver.

NOTICE:

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

30. REMOVE WATER PUMP ASSY
[16100 / 98-15]

(a) Remove the 5 bolts, 2 stud bolts and nut, water pump and gasket.

31. REMOVE OIL PAN SUB-ASSY NO.2
[12102A / 98-7] (See page 17-7)

32. REMOVE OIL PAN BAFFLE PLATE
[12121 / 98-7]

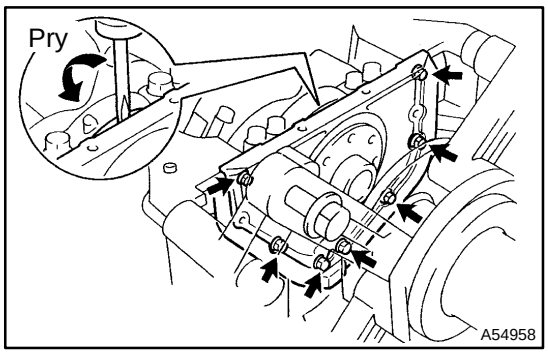
(a) Remove the 3 bolts, 2 nuts and baffle plate.

33. REMOVE OIL PAN SUB-ASSY
[12101 / 98-7] (See page 17-7)

34. REMOVE OIL STRAINER SUB-ASSY
[15104 / 98-13]

(a) Remove the bolt, 2 nuts, oil strainer and gasket.

35. REMOVE OIL PUMP ASSY
[15100 / 98-13] (See page 17-7)

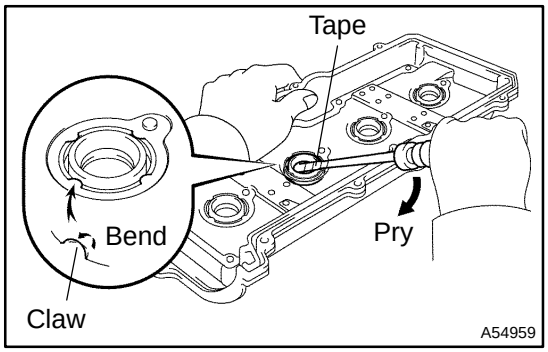


36. REMOVE ENGINE REAR OIL SEAL RETAINER [11381 / 98-8]

(a) Remove the 7 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and crankshaft bearing cap.

(c) Remove the O-ring.



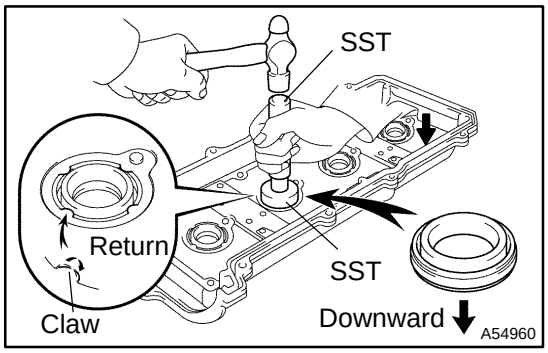
37. REMOVE SPARK PLUG TUBE GASKET [11193 / 98-5]

(a) Bend the 4 ventilation case claws installed on the cylinder head cover to an angle of 90° or more.

(b) Using a screwdriver, pry out the gasket.

NOTICE:

Be careful not to damage the cylinder head cover. Tape the screwdriver tip.



38. INSTALL SPARK PLUG TUBE GASKET [11193 / 98-5]

(a) Using SST and a hammer, tap in a new gasket until its surface is flush with the upper edge of the cylinder head cover.

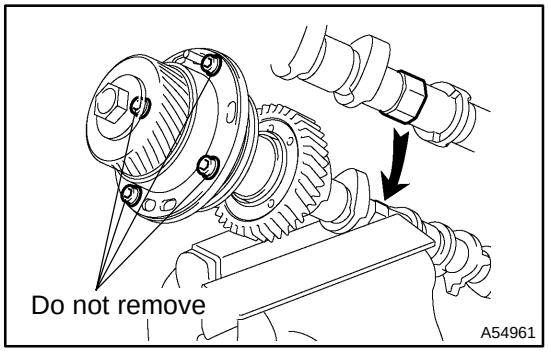
SST 09950- 60010 (09551- 00240, 09951- 00440, 09952-06010), 09950-70010 (09951-07100)

NOTICE:

Be careful of the installation direction.

(b) Apply a light coat of MP grease to the gasket lip.

(c) Return the 4 ventilation case claws to its original position.



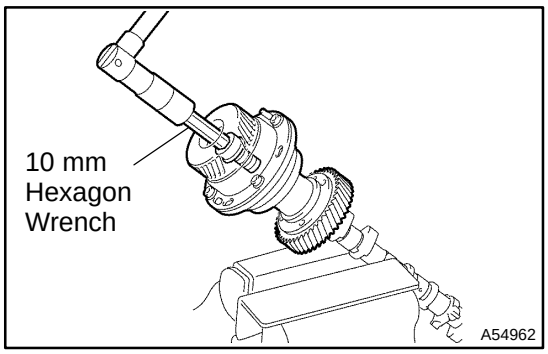
39. REMOVE CAMSHAFT TIMING TUBE ASSY [13050A / 98-12]

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

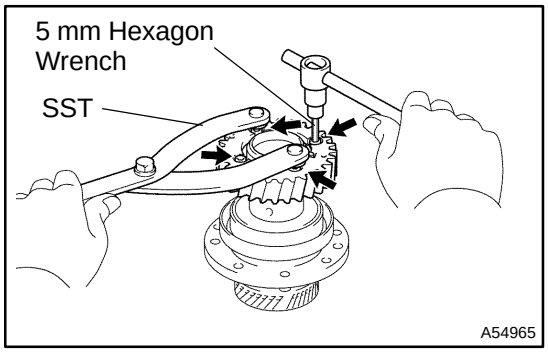
NOTICE:

★ **Be careful not to damage the camshaft.**

★ **The 4 bolts shown in the illustration determine the backlash of the gear in the timing tube, so do not remove them. If any of the 4 bolts are removed, install a new timing tube assy.**

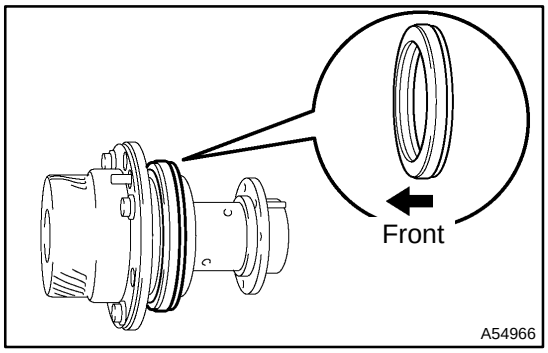


(b) Remove the screw plug and seal washer.
(c) Using a 10 mm hexagon wrench, and remove the bolt.
(d) Pull out the timing tube and drive gear assembly from the camshaft.



(e) Using SST and a 5 mm hexagon wrench, and remove the 4 bolts, drive gear and oil seal.
SST 09960-10010 (09962-01000, 09963-00500)

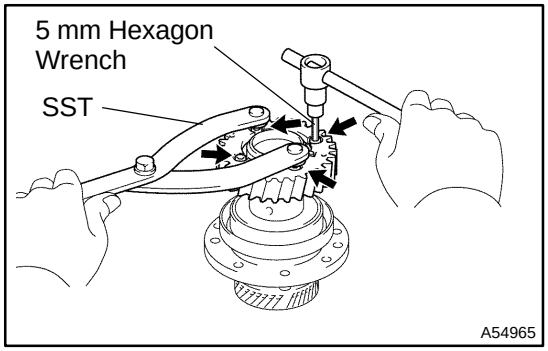
NOTICE:
Be careful not to damage the timing tube.



40. INSTALL CAMSHAFT SETTING OIL SEAL [11151B / 98-5]

(a) Place a new oil seal to the timing tube.

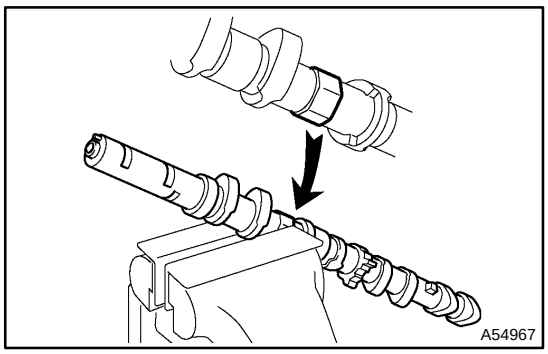
NOTICE:
Be careful of the installation direction.



41. INSTALL CAMSHAFT TIMING TUBE ASSY [13050A / 98-12]

(a) Align the timing tube knock pin with the knock pin groove of the drive gear, and temporarily install the drive gear with the 4 bolts.
(b) Using SST and a 5 mm hexagon wrench, uniformly tighten the 4 bolts in several passes.
SST 09960-10010 (09962-01000, 09963-00500)
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

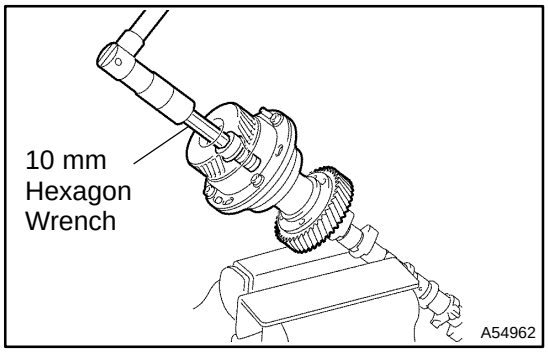
NOTICE:
Be careful not to damage the timing tube.



(c) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:

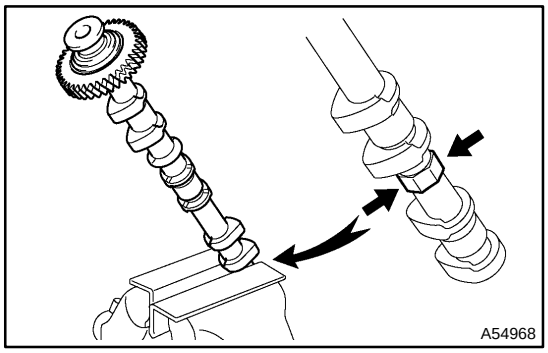
Be careful not to damage the camshaft.



(d) Align the camshaft knock pin with the knock pin groove of the timing tube, and push the timing tube by hand until you feel it touch the bottom.

(e) Using a 10 mm hexagon wrench, install the bolt.
Torque: 78 N·m (790 kgf·cm, 58 ft·lbf)

(f) Install the seal washer and screw plug.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

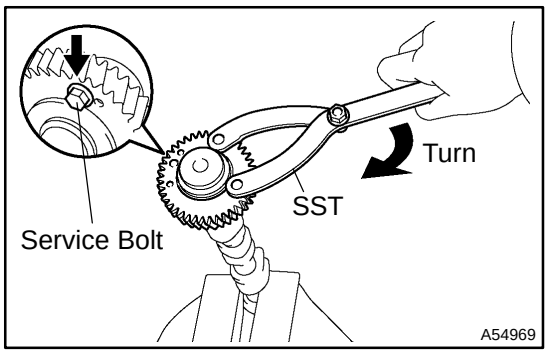


42. REMOVE CAMSHAFT SUB GEAR
[13529 / 98-12]

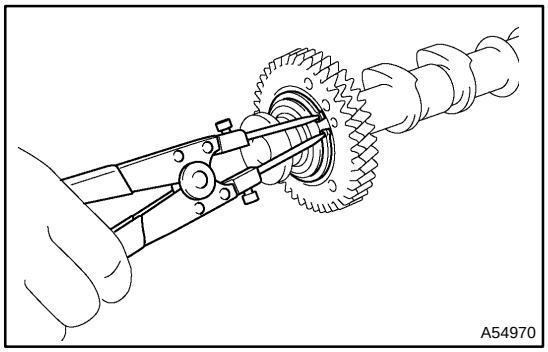
(a) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.



(b) Using SST, turn the sub gear clockwise, and remove the service bolt.
SST 09960-10010 (09962-01000, 09963-00500)

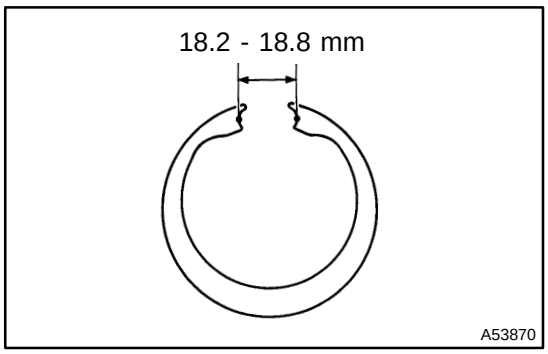


(c) Using snap ring pliers, remove the snap ring.

(d) Remove the wave washer, sub gear and gear bolt washer.

HINT:

Arrange the driven sub gears and gear bolt washers (RH and LH sides).

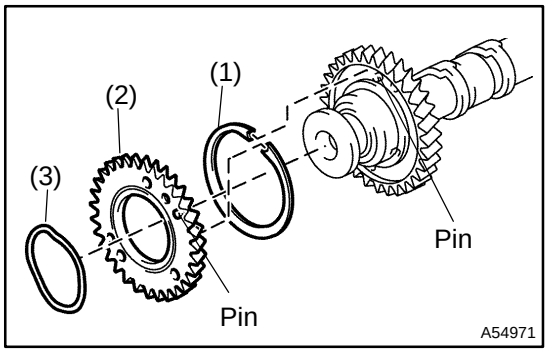


43. INSPECT CAMSHAFT TIMING GEAR BOLT WASHER [13579 / 98-12]

(a) Using vernier calipers, measure the free distance between the washer ends.

Free distance: 18.2 - 18.8 mm (0.712 - 0.740 in.)

If the free distance is not as specified, replace the washer.

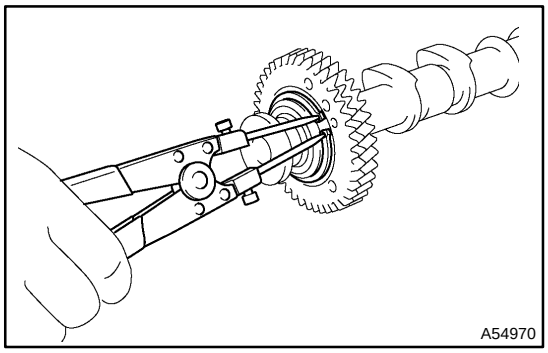


44. INSTALL CAMSHAFT SUB GEAR [13529 / 98-12]

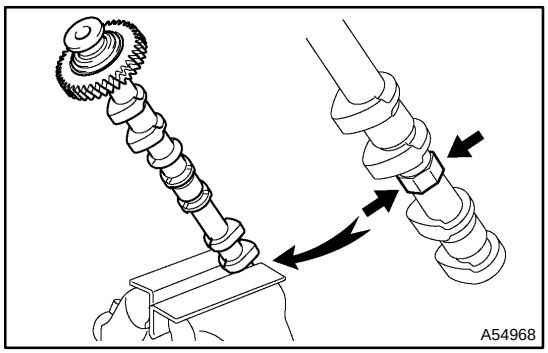
(a) Install the gear bolt washer (1), sub gear (2) and wave washer (3).

HINT:

Attach the pins on the gears to the gear bolt washer ends.



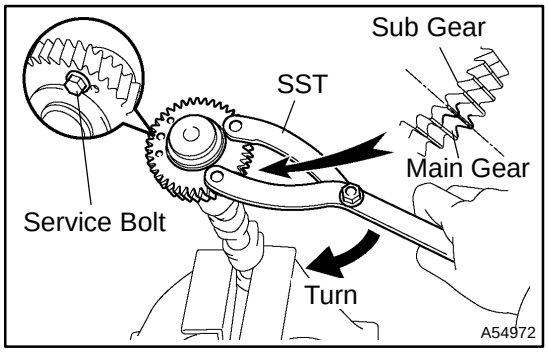
(b) Using snap ring pliers, install the snap ring.



(c) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:

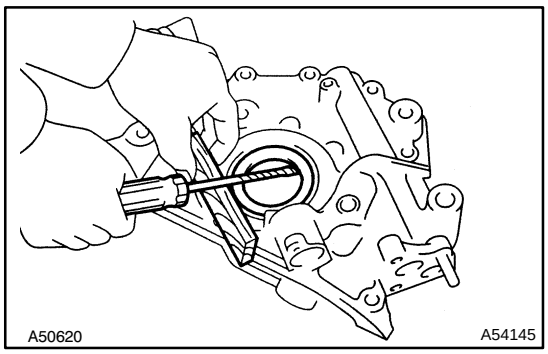
Be careful not to damage the camshaft.



(d) Using SST, align the holes of the driven main gear and sub gear by turning the sub gear clockwise, and temporarily install a service bolt.

SST 09960-10010 (09962-01000, 09963-00500)

(e) Align the gear teeth of the driven main gear and sub gear, and tighten the service bolt.

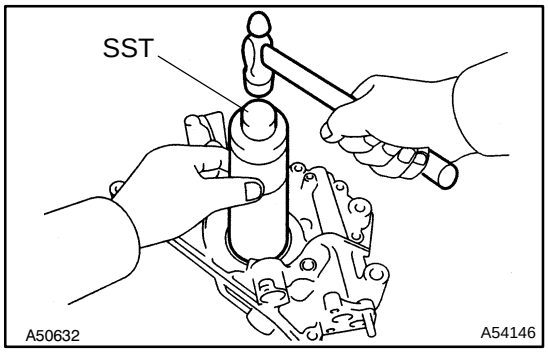


45. REMOVE OIL PUMP SEAL
[15100C / 98-13]

(a) Using a screwdriver, pry out the oil seal.

NOTICE:

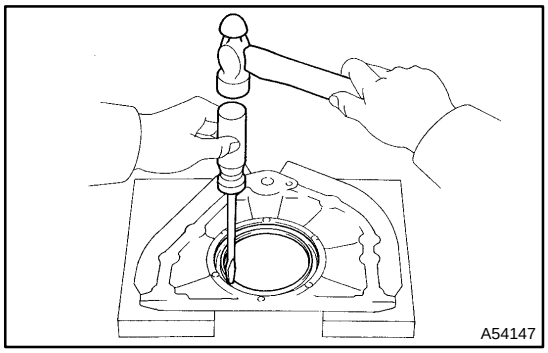
Be careful not to damage the oil pump body. Tape the screwdriver tip.



46. INSTALL OIL PUMP SEAL
[15100C / 98-13]

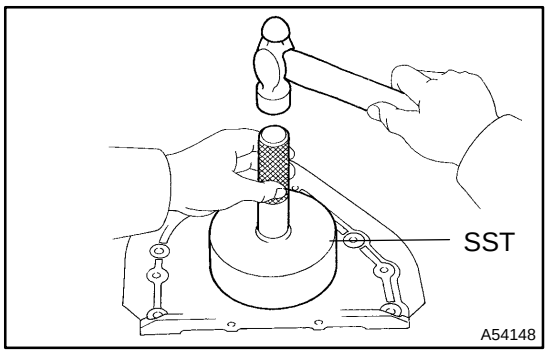
(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09316-6001 1 (09316-00011)

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



47. REMOVE ENGINE REAR OIL SEAL
[11381A / 98-8]

(a) Using a screwdriver and hammer, tap out the oil seal.



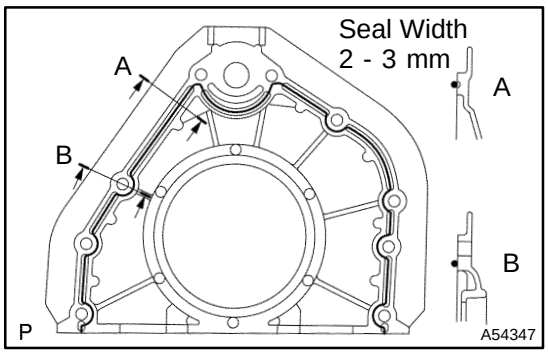
48. INSTALL ENGINE REAR OIL SEAL
[11381A / 98-8]

(a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-56010

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

49. INSTALL ENGINE REAR OIL SEAL RETAINER
[11381 / 98-8]

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



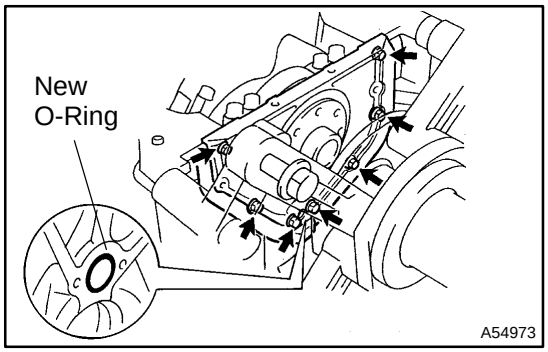
(b) Apply seal packing to the oil seal retainer as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

(1) Install a nozzle that has been cut to a 3 - 4 mm (0.12 - 0.16 in.) opening.

(2) Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

(3) Immediately remove nozzle from the tube and reinstall cap.



(c) Install a new O-ring to the cylinder block.

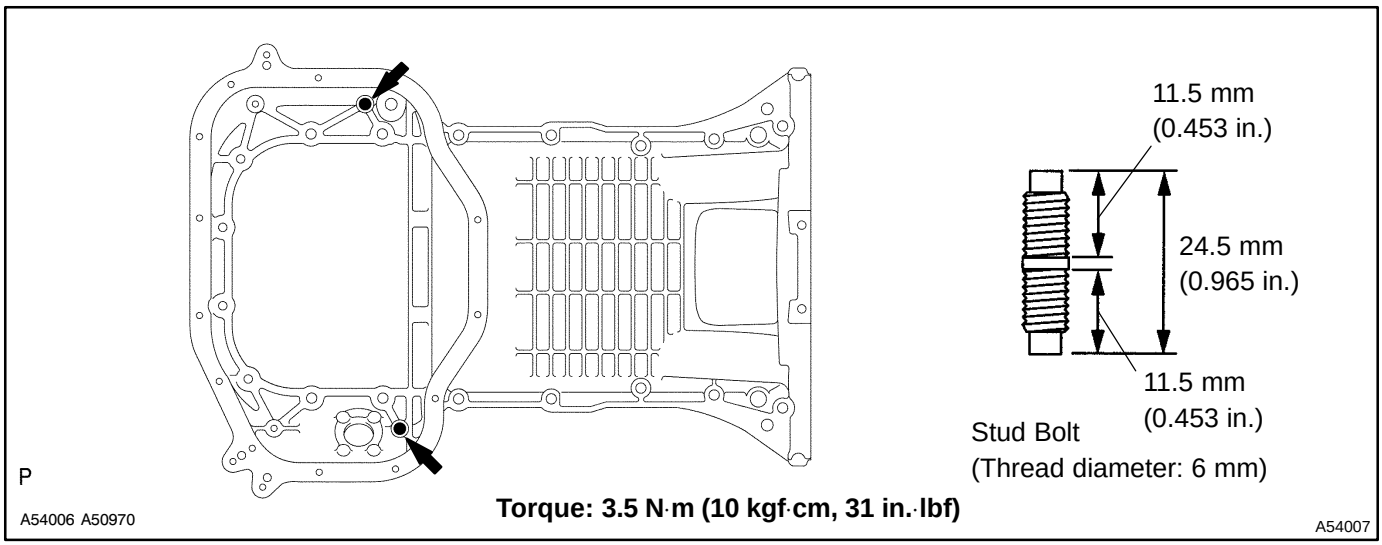
(d) Install the oil seal retainer with the 7 bolts.

Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)

50. INSTALL OIL PUMP ASSY
[15100 / 98-13] (See page 17-7)

51. INSTALL OIL STRAINER SUB-ASSY
[15104 / 98-13] (See page 17-7)

52. INSTALL OIL PAN STUD BOLT
[11421 / 98-7]

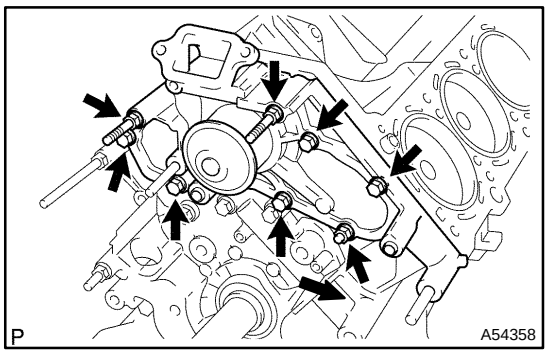


Torque: 3.5 N·m (10 kgf·cm, 31 in.·lbf)

53. INSTALL OIL PAN SUB-ASSY
[12101 / 98-7] (See page 17-7)

54. INSTALL OIL PAN BAFFLE PLATE
[12121 / 98-7] (See page 17-7)

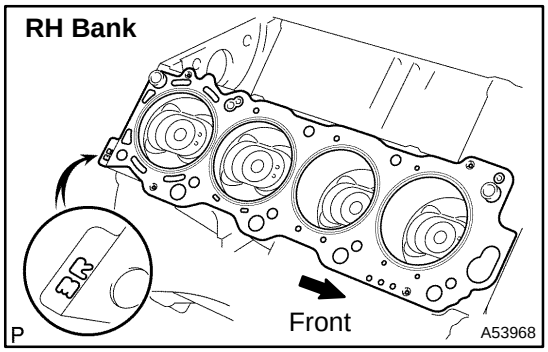
55. INSTALL OIL PAN SUB-ASSY NO.2
[12102A / 98-7] (See page 17-7)



56. INSTALL WATER PUMP ASSY
[16100 / 98-15]

(a) Install a new gasket and water pump with the 5 bolts, 2 stud bolts and nut. Uniformly tighten the bolts, stud bolts and nut in several passes.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

HINT:
Use bolts 30 mm (1.18 in.) in length.



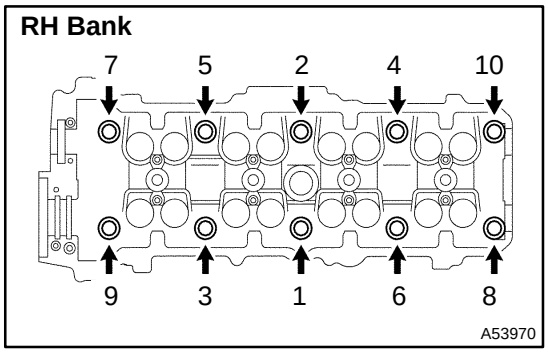
57. INSTALL CYLINDER HEAD SUB-ASSY
[11101 / 98-5]

(a) Place a new cylinder head gasket on the cylinder block.

HINT:
On the rear side of the cylinder head gasket are marks to distinguish the RH and LH banks, a ”3R” mark for the RH bank

NOTICE:
Be careful of the installation direction.

(b) Place the cylinder head on the cylinder head gasket.

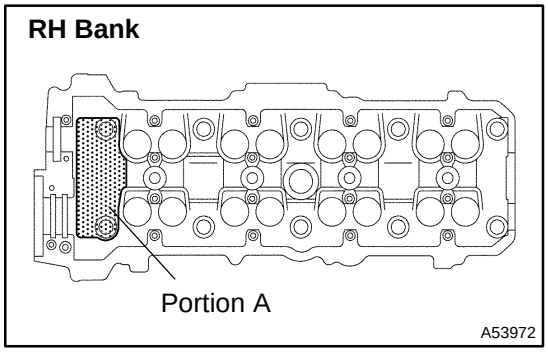


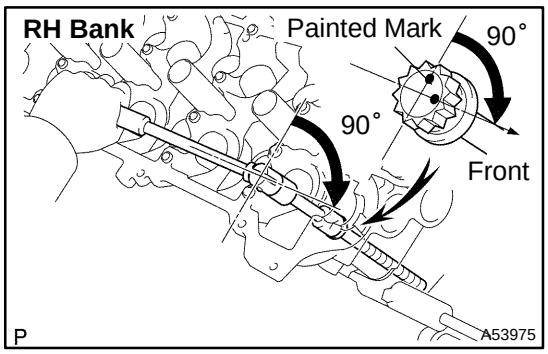
(c) Install the cylinder head bolts.

HINT:
- ★ The cylinder head bolts are tightened in 2 progressive steps (steps (3) and (5)).
- ★ If any cylinder head bolt is broken or deformed, replace it.
  (1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
  (2) Install the plate washer to the cylinder head bolt.
  (3) Install and uniformly tighten the 10 cylinder head bolts on one side of the cylinder head in several passes in the sequence shown.
  Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

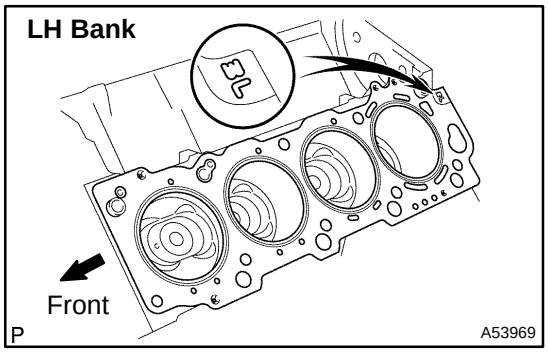
If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

NOTICE:
Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.





(4) Mark the front of the cylinder head bolt head with paint.
(5) Retighten the cylinder head bolts by 90° in the numerical order shown.
(6) Check that the painted mark is now at a 90° angle to front.



58. INSTALL CYLINDER HEAD LH
[11102 / 98-5]

(a) Place a new cylinder head gasket on the cylinder block.

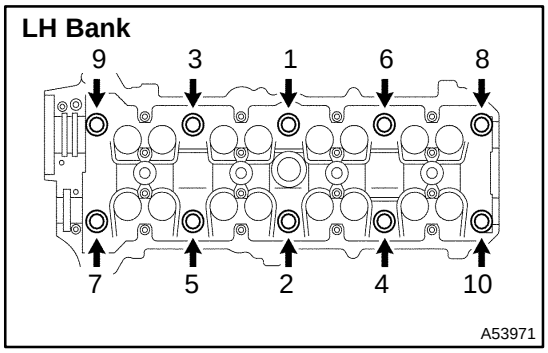
HINT:

On the rear side of the cylinder head gasket are marks to distinguish the RH and LH banks, a "3L" mark for the LH bank

NOTICE:

Be careful of the installation direction.

(b) Place the cylinder head on the cylinder head gasket.



(c) Install the cylinder head bolts.

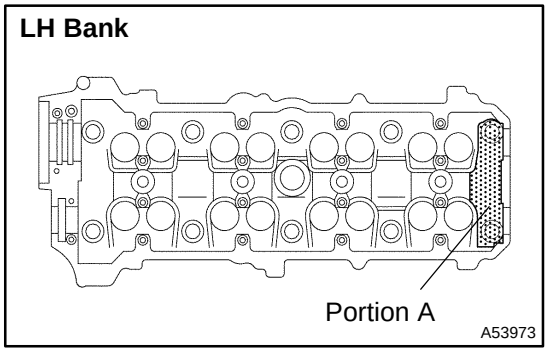
HINT:

★ The cylinder head bolts are tightened in 2 progressive steps (steps (3) and (5)).
★ If any cylinder head bolt is broken or deformed, replace it.

(1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
(2) Install the plate washer to the cylinder head bolt.
(3) Install and uniformly tighten the 10 cylinder head bolts on one side of the cylinder head in several passes in the sequence shown

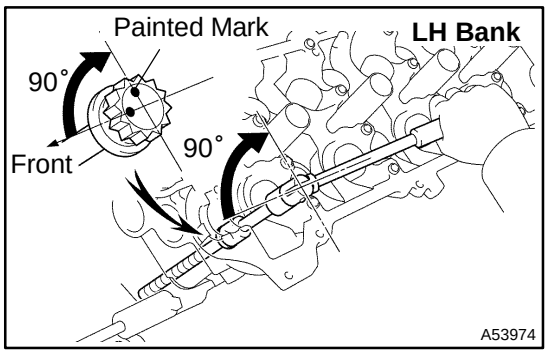
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



NOTICE:

Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.

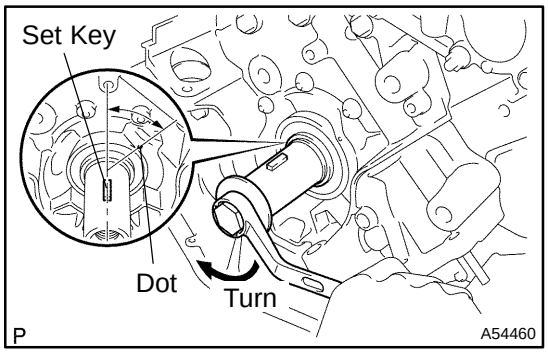


(4) Mark the front of the cylinder head bolt head with paint.
(5) Retighten the cylinder head bolts by 90˚ in the numerical order shown.
(6) Check that the painted mark is now at a 90˚ angle to front.

59. INSTALL CAMSHAFT
[13511 / 98-12]

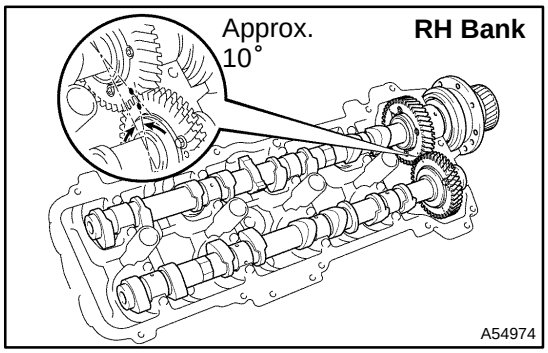
NOTICE:
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

(a) Set the crankshaft position.
(1) Using the crankshaft damper bolt, turn the crankshaft, and set the set key of the crankshaft at the position of 90° counterclockwise from the timing mark (dot) of the oil pump body.



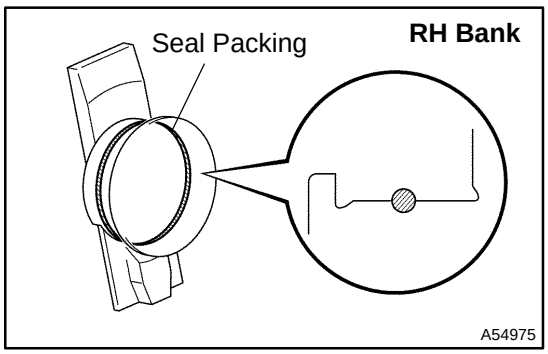
NOTICE:
Having the crankshaft at the wrong angle can cause the piston head and valve head to come into contact with each other when you install the camshaft, causing damage. So always set the crankshaft at the correct angle.

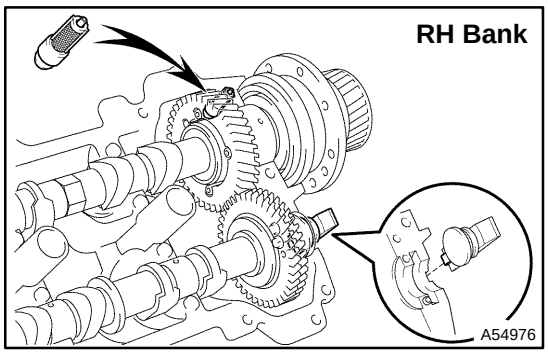
(b) Install the camshafts of the RH bank.
(1) Apply MP grease to the thrust portion of the camshafts.
(2) Align the timing marks (1 dot mark) of the camshaft drive and driven main gears, and place the 2 camshafts.
(3) Set the timing mark (1 dot mark) of the camshaft drive and driven main gears at approx. 10˚ angle.



(4) Apply seal packing to the camshaft housing plug.
★ Remove the old packing (FIPG) material.
★ Apply seal packing to the housing plug.

Seal packing: Part No. 08826-00080 or equivalent



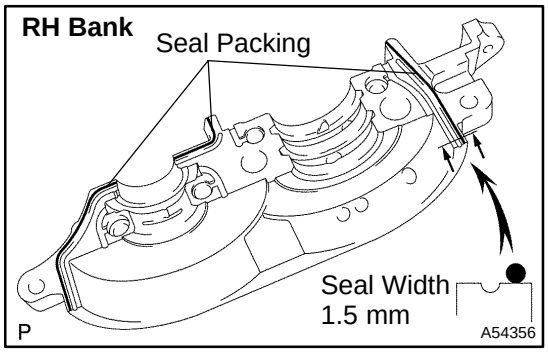


(5) Install the camshaft housing plug to the cylinder head as shown in the illustration.

(6) Install the oil control valve filter to the cylinder head.

NOTICE:

Be careful of the installation direction.



(7) Apply seal packing to the front bearing cap.

★ Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head.

Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and groove.

Thoroughly clean all components to remove all the loose material.

Using a non- residue solvent, clean both sealing surfaces.

★ Apply seal packing to the bearing cap as shown in the illustration.

Install a nozzle that has been cut to a 1.5 - 2.0 mm (0.059 - 0.79 in.) opening.

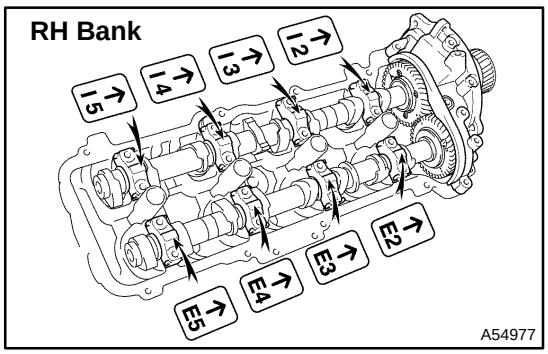
Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

Immediately remove nozzle from the tube and reinstall cap.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.

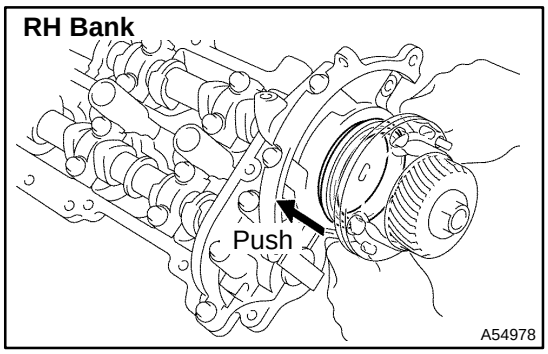


(8) Install the front bearing cap.

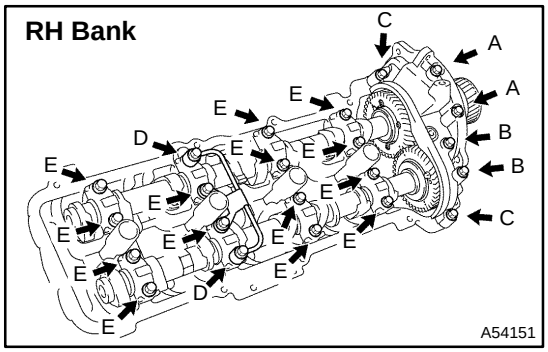
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(9) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



(10) Push in the camshaft setting oil seal.



(11) Install a new seal washer to the bearing cap bolt (A and B).

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

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolt (A), (B) and (C).

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A with seal washer

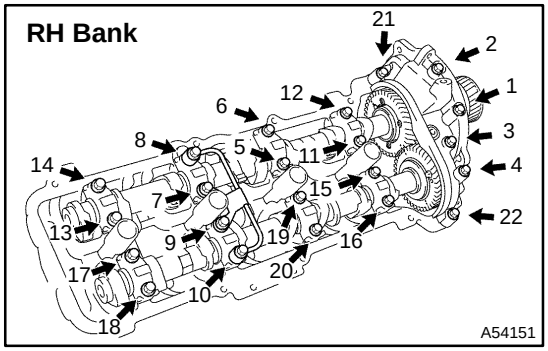
72 mm (2.83 in.) for B with seal washer

25 mm (0.98 in.) for C

52 mm (2.05 in.) for D

38 mm (1.50 in.) for E

(13) Install the oil feed pipe and the 22 bearing cap bolts as shown in the illustration.

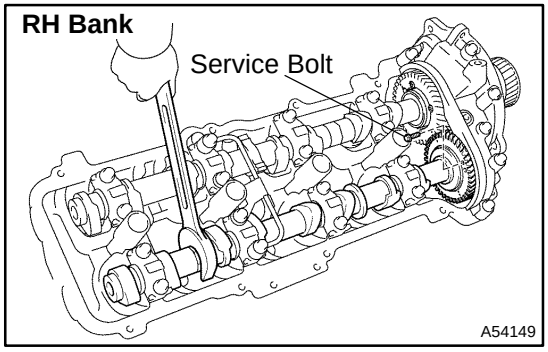


(14) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

Torque:

7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolt C

16 N·m (160 kgf·cm, 12 ft·lbf) for others

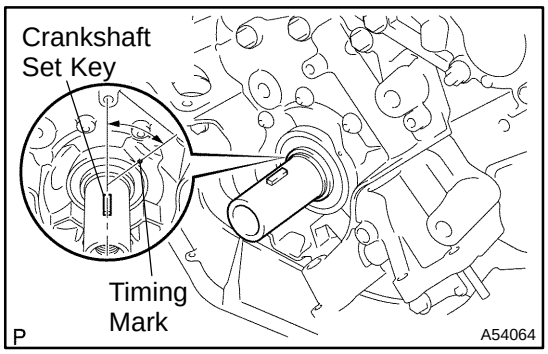


(15) Remove the service bolt.

60. INSTALL NO.3 CAMSHAFT SUB-ASSY [13053 / 98-12]

NOTICE:

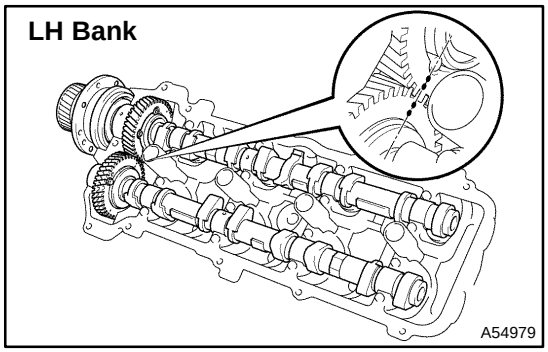
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Check the set key of the crankshaft is at the position of 90° counterclockwise from the timing mark (dot) of the oil pump body.

NOTICE:

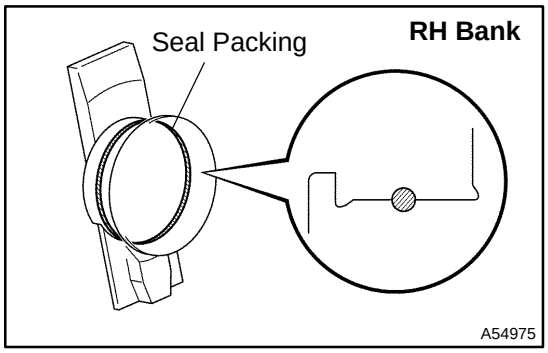
Having the crankshaft at the wrong angle can cause the piston head and valve head to come into contact with each other when you install the camshaft, causing damage. So always set the crankshaft at the correct angle.



(b) Install the camshafts of the LH bank.

(1) Apply MP grease to the thrust portion of the camshafts.

(2) Align the timing marks (2 dot marks) of the camshaft drive and driven main gears, and place the 2 camshafts.

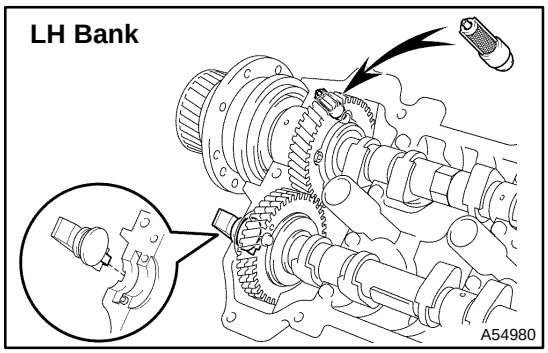


(3) Apply seal packing to the camshaft housing plug.

★ Remove the old packing (FIPG) material.

★ Apply seal packing to the housing plug.

Seal packing: Part No. 08826-00080 or equivalent

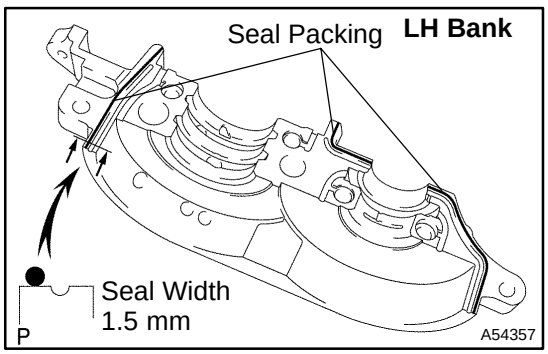


(4) Install the camshaft housing plug to the cylinder head as shown in the illustration.

(5) Install the oil control valve filter to the cylinder head.

NOTICE:

Be careful of the installation direction.



(6) Apply seal packing to the front bearing cap.

★ Remove any old packing (FIPG) material and be care not to drop any oil on the contact surfaces of the bearing cap and cylinder head.
Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and groove.
Thoroughly clean all components to remove all the loose material.

Using a non- residue solvent, clean both sealing surfaces.

★ Apply seal packing to the bearing cap as shown in the illustration.

Install a nozzle that has been cut to a 1.5 - 2.0 mm (0.059 - 0.79 in.) opening.

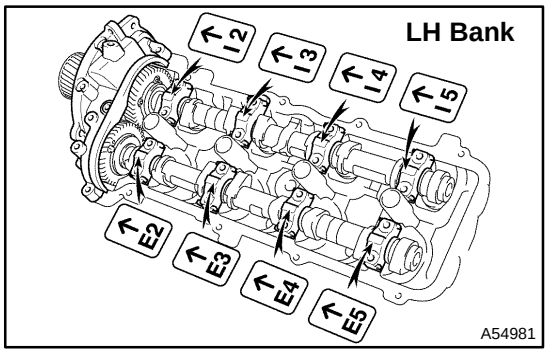
Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

Immediately remove nozzle from the tube and reinstall cap.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.

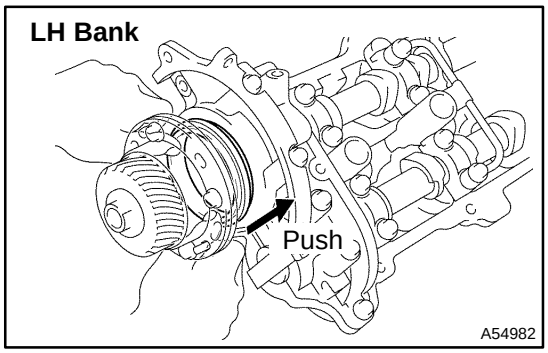


(7) Install the front bearing cap.

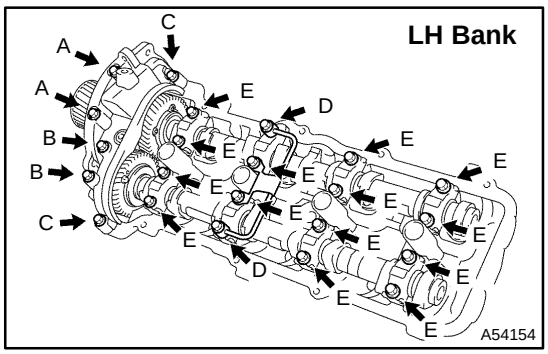
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(8) Install the other bearing cap in the sequence shown with the arrow mark facing forward.



(9) Push in the camshaft setting oil seal.



(10) Install a new seal washer to the bearing cap bolt (A and B).

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

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolt (A), (B) and (C).

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A with seal washer

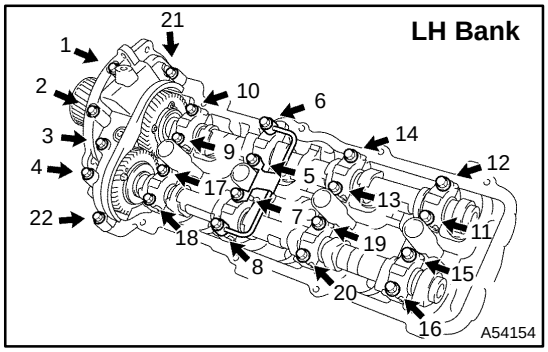
72 mm (2.83 in.) for B with seal washer

25 mm (0.98 in.) for C

52 mm (2.05 in.) for D

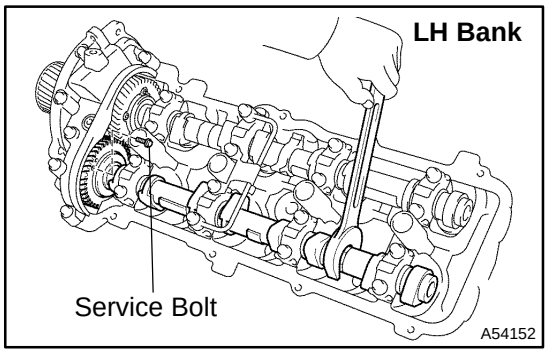
38 mm (1.50 in.) for E

(12) Install the oil feed pipe and the 22 bearing cap bolts as shown in the illustration.



(13) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

Torque:
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolt C
16 N·m (160 kgf·cm, 12 ft·lbf) for others



(14) Remove the service bolt.

61. INSTALL TIMING BELT PLATE RR RH
[11341 / 98-8]

(a) Install the timing belt plate with the bolt and stud bolt.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

62. INSTALL TIMING BELT PLATE RR RH NO.2
[11343 / 98-8]

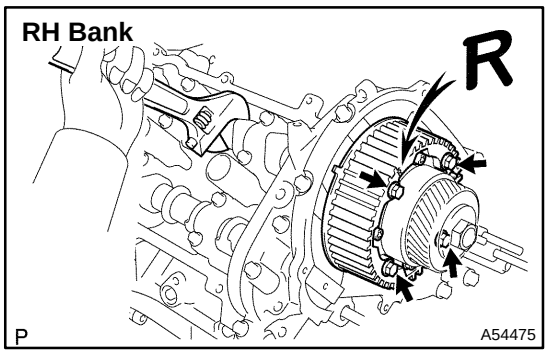
(a) Install the timing belt plate with the 2 bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

63. INSTALL TIMING BELT PLATE RR LH
[11342 / 98-8]

(a) Install the timing belt plate with the bolt.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

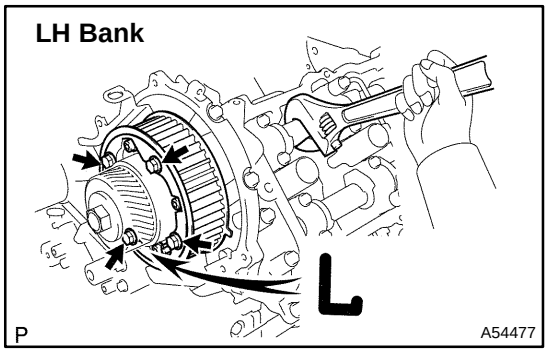
64. INSTALL TIMING BELT PLATE RR LH NO.2
[11344 / 98-8]

(a) Install the timing belt plate with the 2 bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



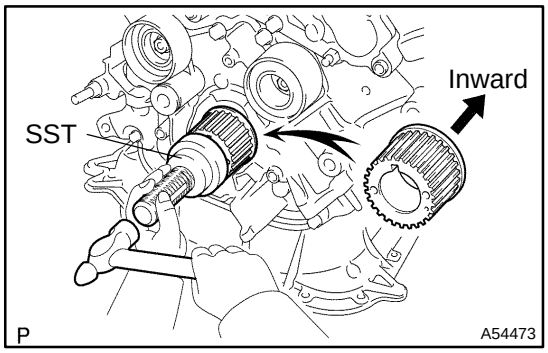
65. INSTALL CAMSHAFT TIMING PULLEY
[13523P / 98-12]

(a) Align the camshaft timing tube knock pin with the knock pin groove of the timing pulley.
(b) Attach the timing pulley to the camshaft timing tube, facing the ”R” mark forward.
(c) Hold the hexagon wrench head portion of the camshaft, install the 4 pulley bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



66. INSTALL CAMSHAFT TIMING PULLEY SUB-ASSY LH
[13056 / 98-12]

(a) Align the camshaft timing tube knock pin with the knock pin groove of the timing pulley.
(b) Attach the timing pulley to the camshaft timing tube, facing the ”L” mark forward.
(c) Hold the hexagon wrench head portion of the camshaft, install the 4 pulley bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

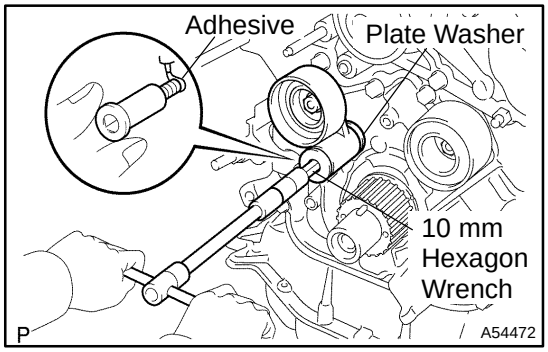


67. INSTALL CRANKSHAFT TIMING PULLEY
[13521P / 98-11]

(a) Align the timing pulley set key with the key groove of the pulley.
(b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward.
SST 09223-4601 1

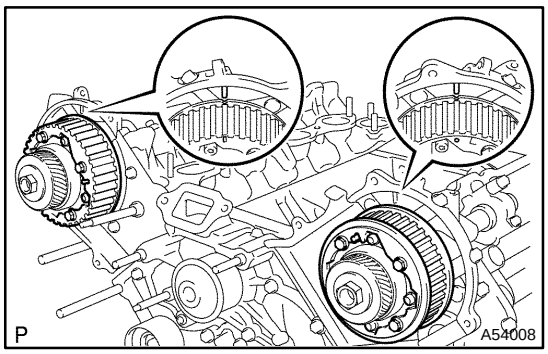
68. INSTALL TIMING BELT IDLER SUB-ASSY NO.2
[13502 / 98-12]

(a) Install the idler with the bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)
(b) Check that the idler moves smoothly.



69. INSTALL TIMING BELT IDLER SUB-ASSY NO.1
[13505 / 98-12]

(a) Apply adhesive 2 or 3 threads of the pivot bolt.
Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent
(b) Using a 10 mm hexagon wrench, install the plate washer and idler with the pivot bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)
(c) Check that the idler bracket moves smoothly.

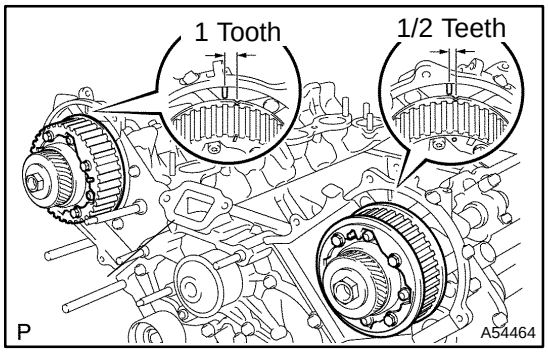


70. INSTALL TIMING BELT
[13568 / 98-12]

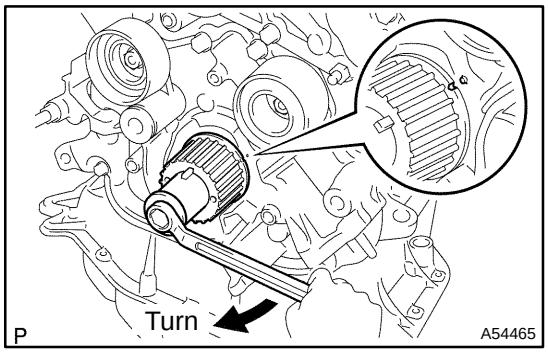
NOTICE:

The engine should be cold.

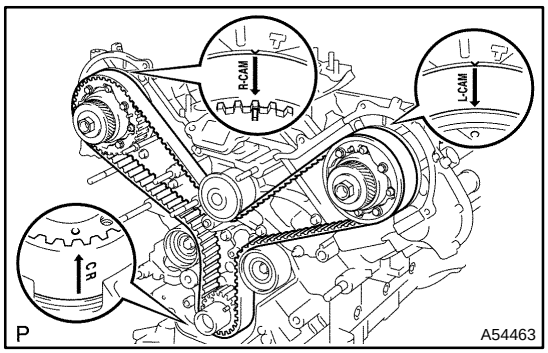
(a) Set the No. 1 cylinder to TDC/compression.
  (1) Turn the hexagon wrench head portion of the camshaft to align the timing marks of the camshaft timing pulleys and timing belt plates aligned.



HINT:
Setting positions of the camshaft timing pulleys by turning them slightly clockwise makes it easy to install the timing belt:
Camshaft timing pulley of LH bank: 1/2 teeth
Camshaft timing pulley of RH bank: 1 tooth



  (2) Using the crankshaft damper bolt, turn the crankshaft to align the timing marks of the crankshaft timing pulley and oil pump body.



(b) Install the timing belt.
  (1) Remove any oil or water on the each pulley, and keep them clean.

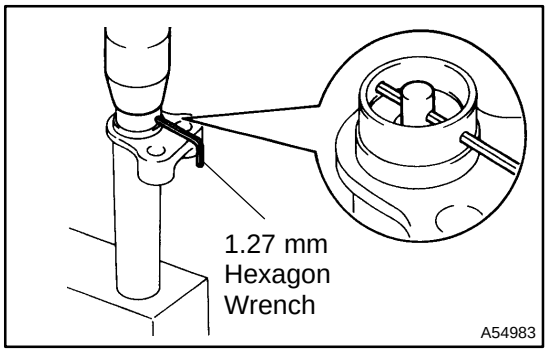
NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

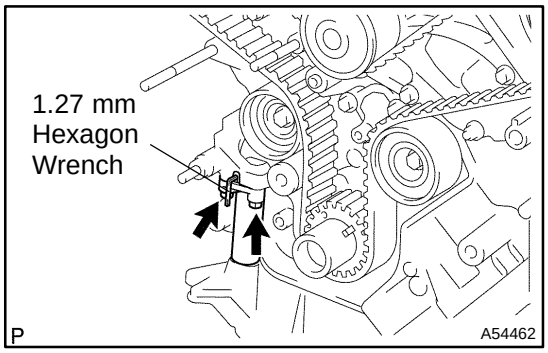
  (2) Face the front mark (arrow) on the timing belt forward.
  (3) Connect the timing belt to the crankshaft timing pulley.
    ★ Align the installation mark on the timing belt with the timing mark of the crankshaft timing pulley.
  (4) Connect the timing belt to the idler No. 2.
  (5) Connect the timing belt to the camshaft timing pulley LH.
    ★ Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley.
  (6) Connect the timing belt to the water pump pulley.

(7) Connect the timing belt to the camshaft timing pulley (RH bank).
★ Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley.

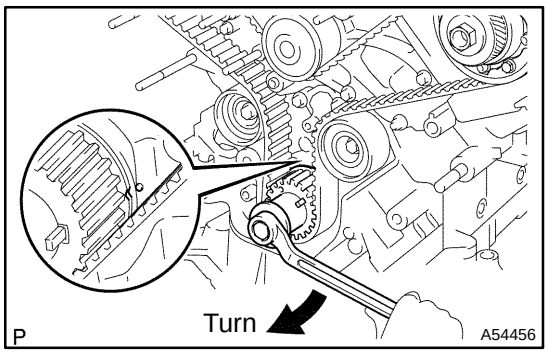
(8) Connect the timing belt to the idler No. 1.



(c) Set the belt tensioner.
(1) Using a press, slowly press in the push rod using 981 - 9,807 N (100 - 1,000 kgf, 220 - 2,205 lbf) of pressure.
(2) Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.
(3) Release the press.
(4) Install the dust boot to the belt tensioner.

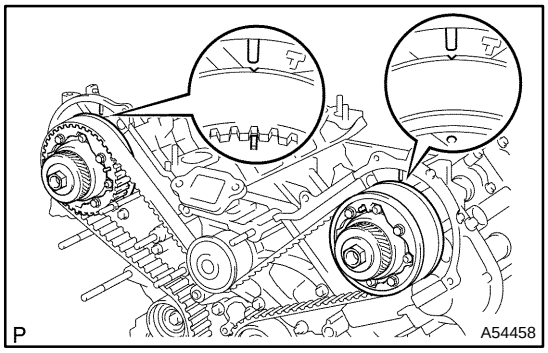


(d) Install the belt tensioner.
(1) Temporarily install the belt tensioner with the 2 bolts.
(2) Alternately tighten the 2 bolts.
Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)
(3) Using pliers, remove the 1.27 mm hexagon wrench from the belt tensioner.



(e) Check the valve timing.
(1) Using the crankshaft damper bolt, slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.

NOTICE:
Always turn the crankshaft pulley clockwise.



(2) Check that each pulley aligns with the timing marks as shown in the illustration.

If the timing marks do not align, remove the timing belt and reinstall it.

71. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1
[19315 / 98-11]

(a) Install the sensor plate, facing the cup side outward.

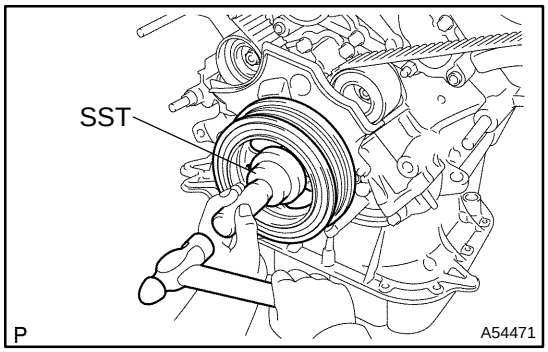
72. INSTALL TIMING GEAR COVER SPACER
[11348 / 98-8]

(a) Install the gasket to the cover spacer.

(b) Install the cover spacer.

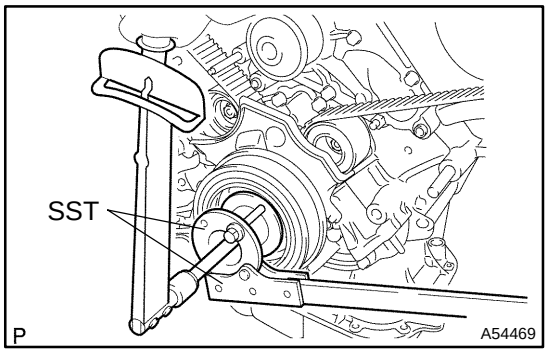
73. INSTALL TIMING BELT NO.1 COVER
[11322A / 98-8]

(a) Install the timing belt cover with the 4 bolts.



74. INSTALL CRANKSHAFT DAMPER SUB-ASSY
[13407 / 98-11]

(a) Using SST and a hammer, tap in the crankshaft damper.
SST 09223-4601 1

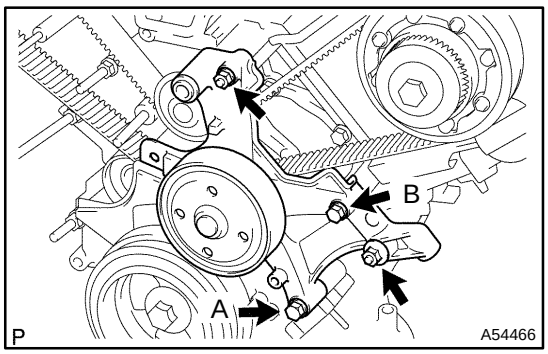


(b) Using SST, install the damper bolt.
SST 09213-70010, 09330-00021
Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

(c) Align the pulley set key with the key groove of the crankshaft damper.

75. INSPECT VALVE CLEARANCE (See page 14-8)

76. ADJUST VALVE CLEARANCE (See page 14-8)



77. INSTALL IDLER PULLEY ASSY
[16630G / 98-15]

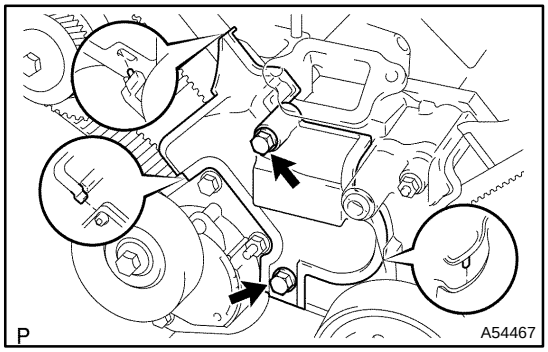
(a) Install the idler pulley with the 2 bolts and 2 nuts.
Torque:
16 N·m (160 kgf·cm, 12 ft·lbf) for 12 mm head
32 N·m (330 kgf·cm, 24 ft·lbf) for 14 mm head

HINT:
Each bolt length is indicated in the illustration.
Bolt Length:
106 mm (4.17 in.) for 12 mm head (A)
114 mm (4.49 in.) for 14 mm head (B)

78. INSTALL V-RIBBED BELT TENSIONER ASSY
[16620 / 98-15]

(a) Install the belt tensioner with the bolt and 2 nuts.
Torque: 15.5 N·m (160 kgf·cm, 11 ft·lbf)

HINT:
Use a bolt 106 mm (4.18 in.) in length.



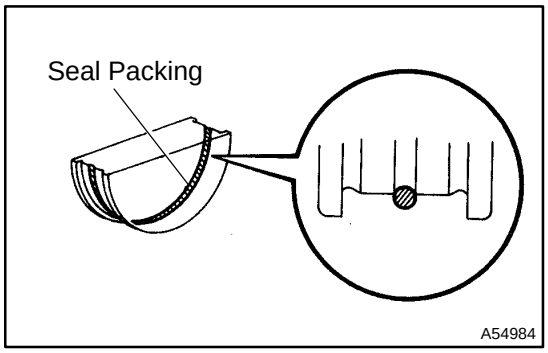
79. INSTALL TIMING BELT COVER SUB-ASSY NO.2 [11303B / 98-8]

(a) Fit the timing belt cover, matching the claws and pin with each part.
(b) Install the timing belt cover with the 2 bolts.
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

HINT:
Use bolts 106 mm (4.17 in.) in length.

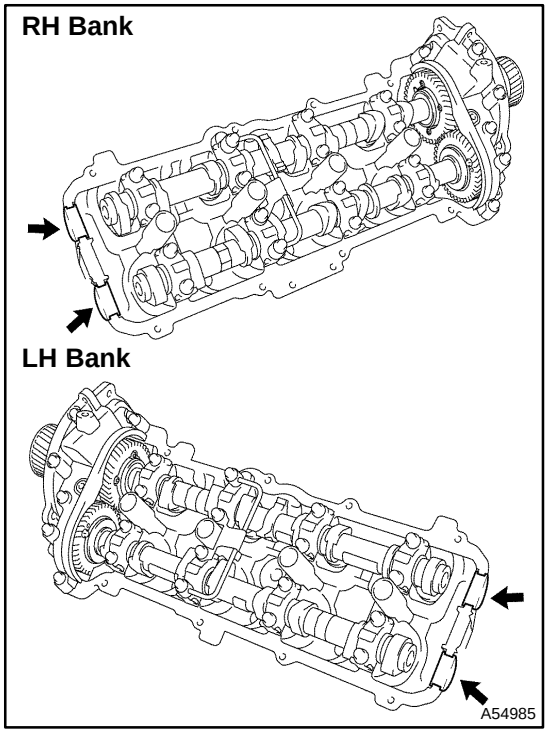
80. INSTALL IDLER PULLEY SUB-ASSY NO.2 [16604 / 98-15]

(a) Install the idler pulley and cover plate with the bolt.
Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)

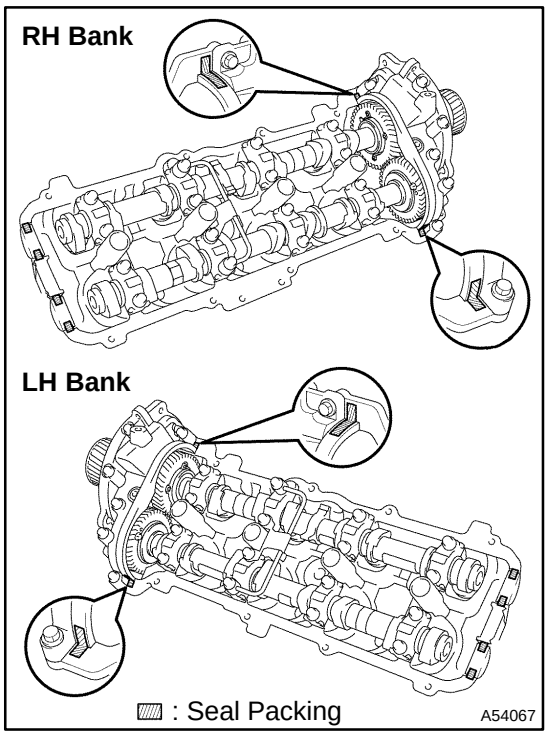


81. INSTALL SEMICIRCULAR PLUG [11183 / 98-5]

(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to the semicircular plug grooves.
Seal packing: Part No. 08826-00080 or equivalent



(c) Install the 4 semicircular plugs to the cylinder heads a shown in the illustration.



82. INSTALL CYLINDER HEAD COVER SUB-ASSY [11201 / 98-5]

(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to the cylinder heads as shown in the illustration.
Seal packing: Part No. 08826-00080 or equivalent
(c) Install the gasket to the cylinder head cover.
(d) Install the seal washer to the bolt.
(e) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several passes.
Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)

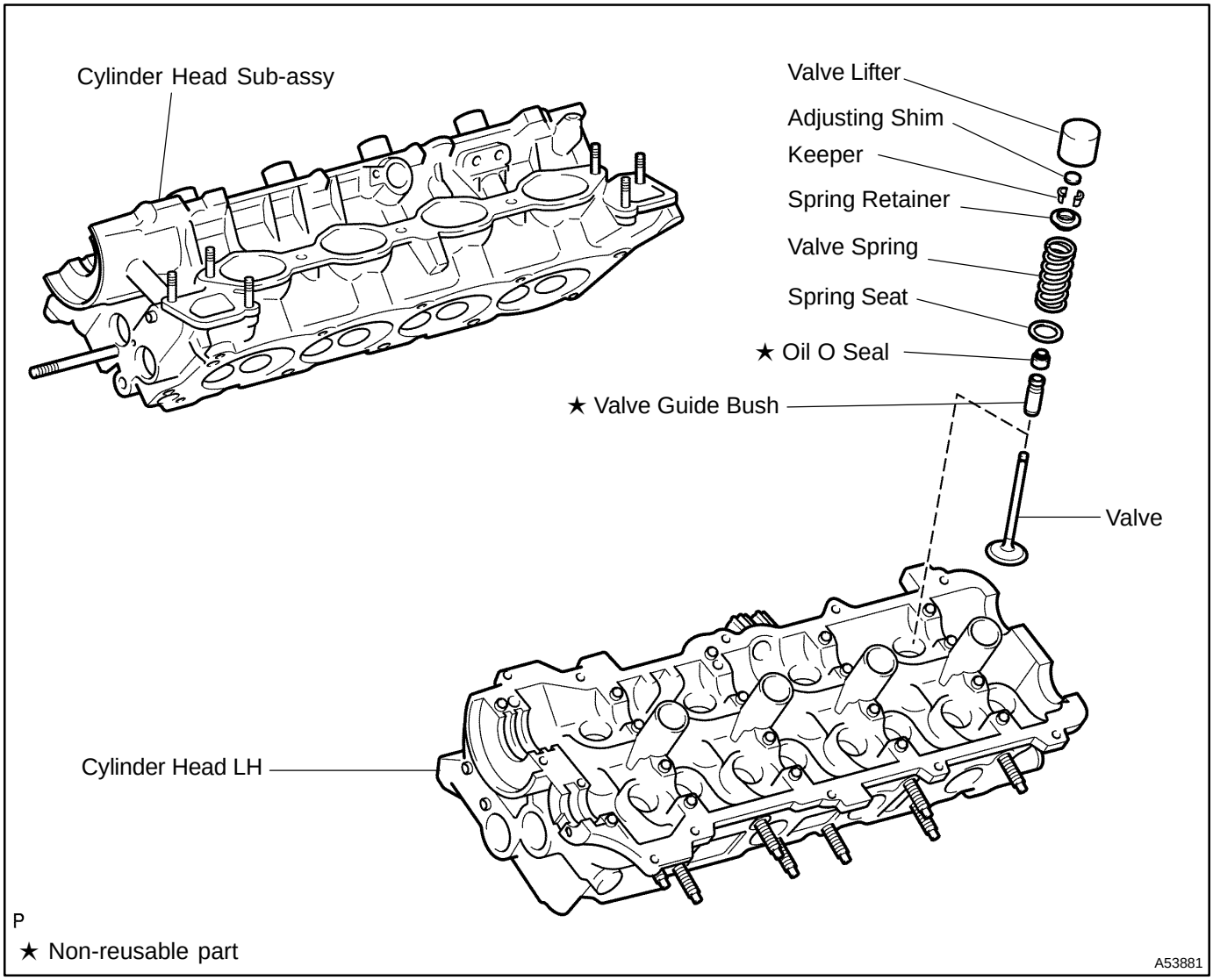
83. INSTALL OIL FILLER CAP SUB-ASSY [12108 / 98-5]

84. INSTALL SPARK PLUG [19100P / 98-24]

CYLINDER HEAD ASSY

COMPONENTS

1407B-01



1407C-01

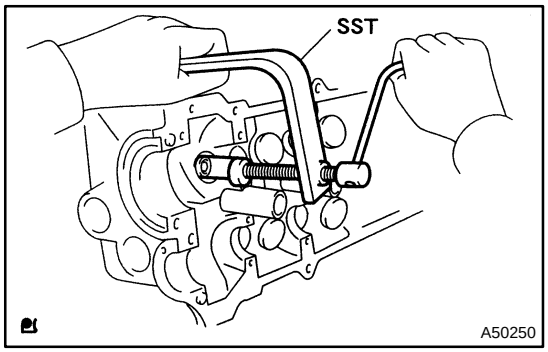
OVERHAUL

1. REMOVE VALVE LIFTER
[13751 / 98-12]

(a) Remove the valve lifter and adjusting shim.

HINT:

Arrange the valve lifters and shims in correct order.



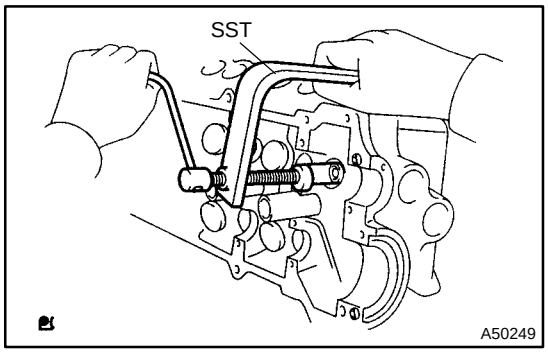
2. REMOVE INTAKE VALVE
[13711 / 98-12]

(a) Using SST, compress the compression spring and remove the 2 keepers.
SST 09202-70020 (09202-00010)

(b) Remove the spring retainer, compression spring, valve and spring seat.

HINT:

Arrange the valves, compression springs, spring seats and spring retainers incorrect order.



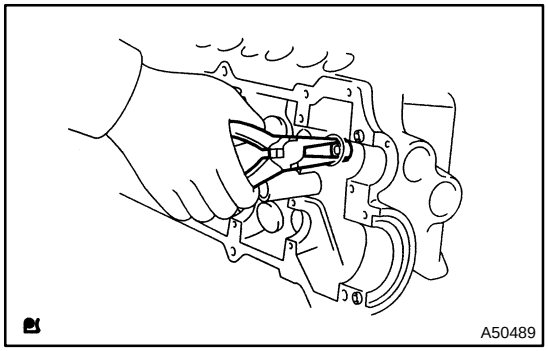
3. REMOVE EXHAUST VALVE
[13715 / 98-12]

(a) Using SST, compress the compression spring and remove the 2 keepers.
SST 09202-70020 (09202-00010)

(b) Remove the spring retainer, compression spring, valve and spring seat.

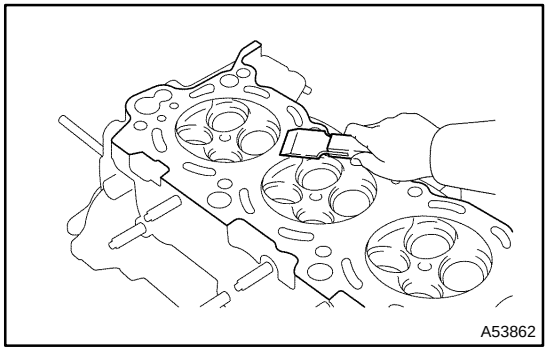
HINT:

Arrange the valves, compression springs, spring seats and spring retainers incorrect order.



4. REMOVE VALVE STEM OIL O SEAL OR RING
[13711A / 98-12]

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

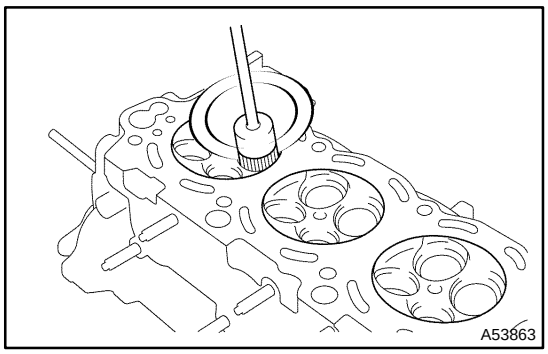


5. INSPECT CYLINDER HEAD SUB-ASSY
[11101 / 98-5]

(a) Clean the cylinder head.
(1) Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

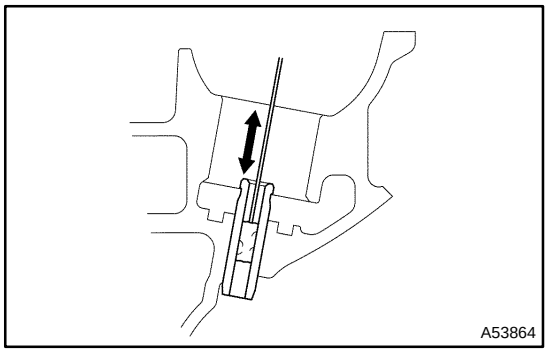
NOTICE:

Be careful not to scratch the cylinder block contact surface.

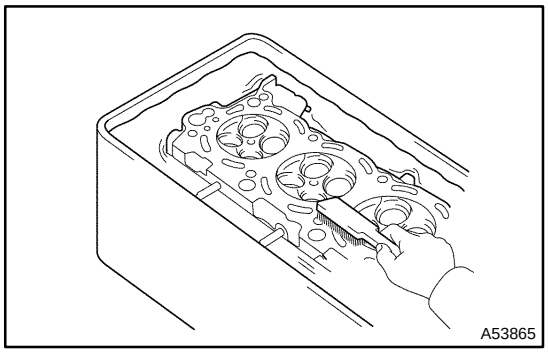


(2) Using a wire brush, remove all the carbon from the combustion chambers.

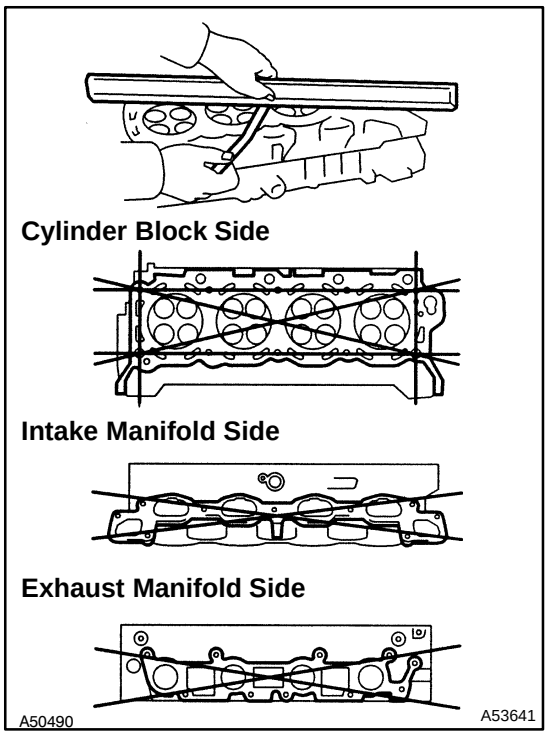
NOTICE:
Be careful not to scratch the cylinder block contact surface.



(3) Using a valve guide bushing brush and solvent, clean all the guide bushes.



(4) Using a soft brush and solvent, thoroughly clean the cylinder head.

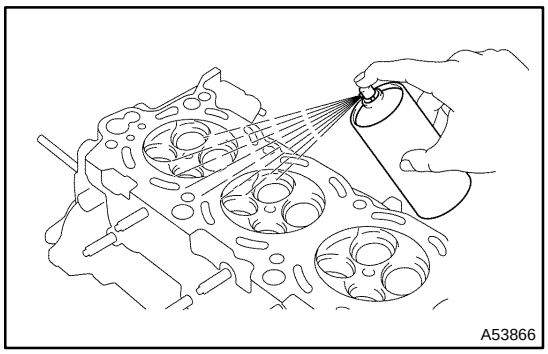


(b) Inspect for flatness.

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

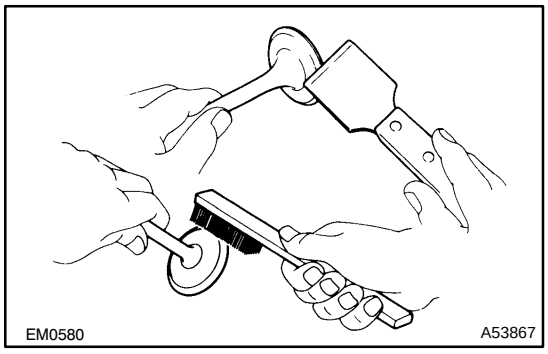
Maximum warpage: 0.10 mm (0.0039 in.)

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



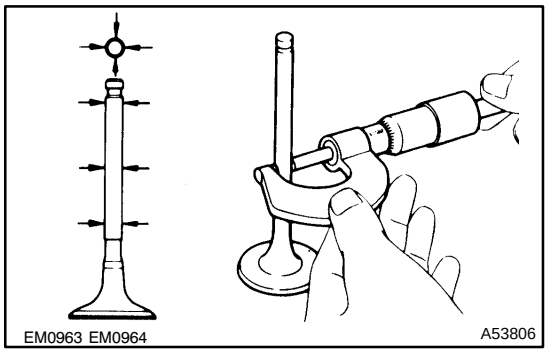
(c) Inspect for cracks.
(1) Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

If cracked, replace the cylinder head.

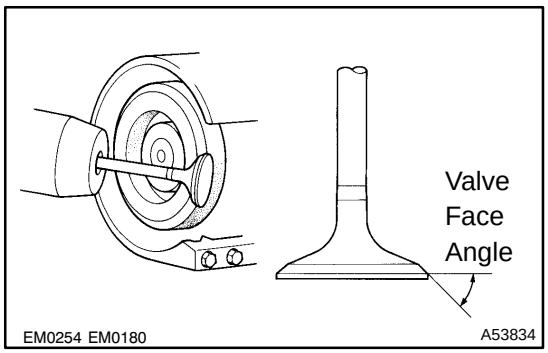


6. INSPECT INTAKE VALVE
[13711 / 98-12]

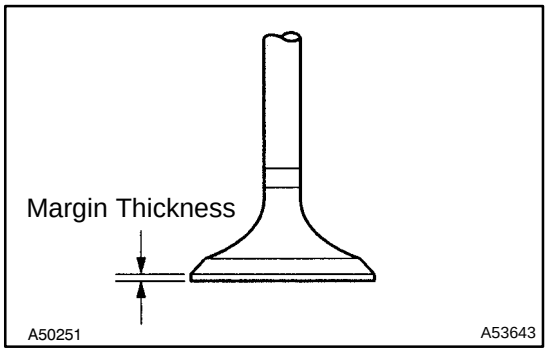
(a) Clean the valves.
(1) Using a gasket scraper, chip off any carbon from the valve head.
(2) Using a wire brush, thoroughly clean the valve.



(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.470 - 5.485 mm (0.2154 - 2.2159 in.)

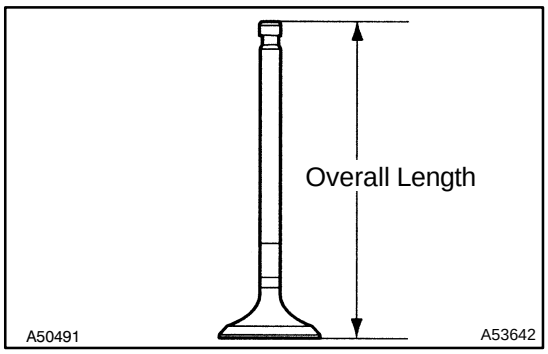


(c) Check the valve face angle.
(1) Grind the valve enough to remove pits and carbon.
(2) Check that the valve is ground to the correct valve face angle.
Valve face angle: 44.5°

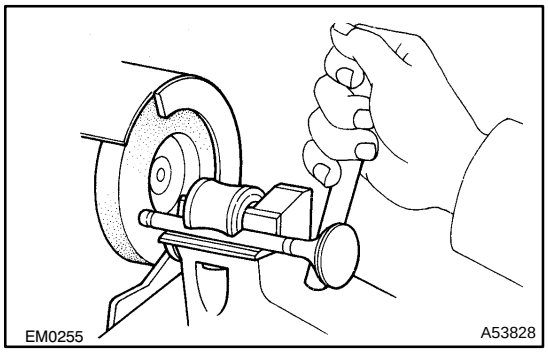


(d) Check the valve head margin thickness.
Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.5 mm (0.020 in.)

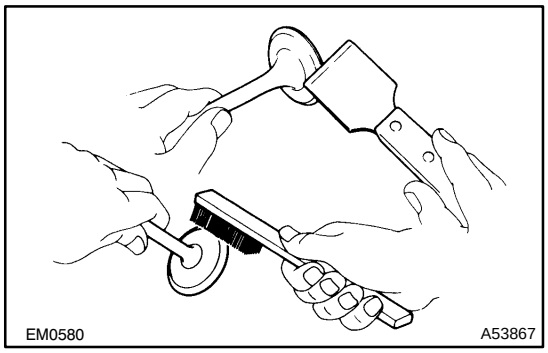
If the margin thickness is less than minimum, replace the valve.



(e) Check the valve overall length.
Standard overall length:
94.80 - 95.30 mm (3.7323 - 3.7520 in.)
Minimum overall length: 94.55 mm (3.7224 in.)
If the overall length is less than minimum, replace the valve.

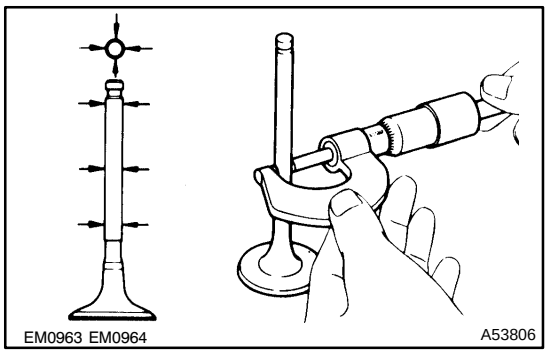


(f) Check the surface of the valve stem tip for wear.
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.
NOTICE:
Do not grind off more than minimum.

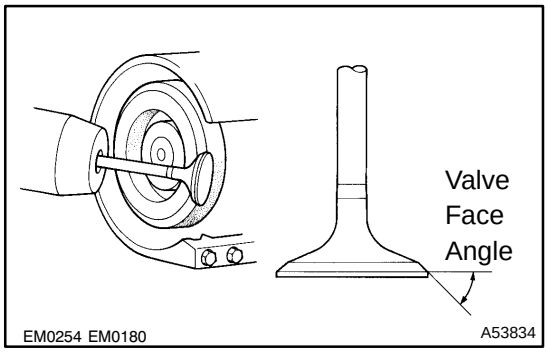


7. INSPECT EXHAUST VALVE
[13715 / 98-12]

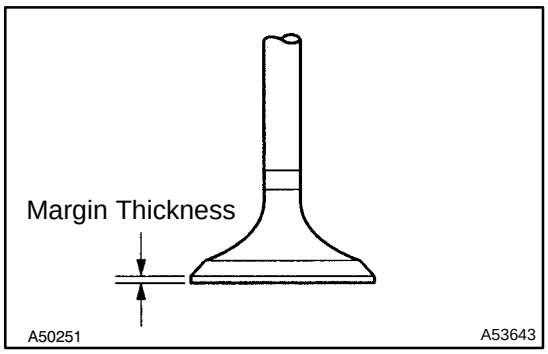
(a) Clean the valves.
(1) Using a gasket scraper, chip off any carbon from the valve head.
(2) Using a wire brush, thoroughly clean the valve.



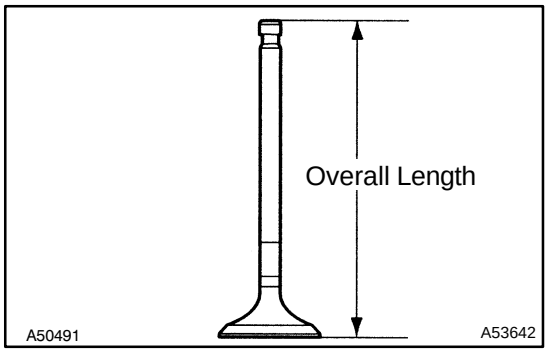
(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
5.465 - 5.480 mm (0.2152 - 2.2157 in.)



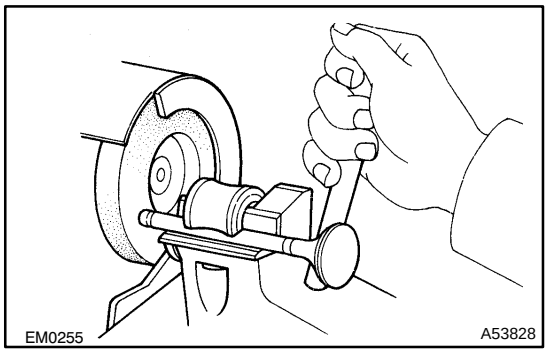
(c) Check the valve face angle.
(1) Grind the valve enough to remove pits and carbon.
(2) Check that the valve is ground to the correct valve face angle.
Valve face angle: 44.5°



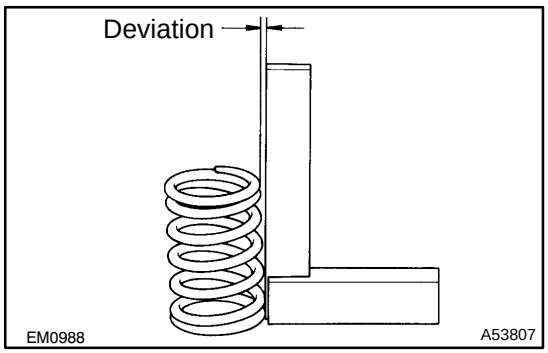
(d) Check the valve head margin thickness.
Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



(e) Check the valve overall length.
Standard overall length:
94.85 - 95.35 mm (3.7342 - 3.7539 in.)
Minimum overall length: 94.60 mm (3.7244 in.)
If the overall length is less than minimum, replace the valve.

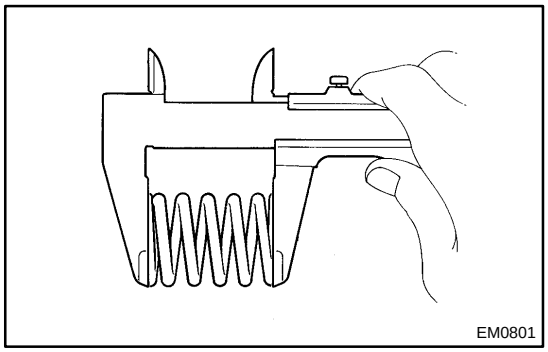


(f) Check the surface of the valve stem tip for wear.
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.
NOTICE:
Do not grind off more than minimum.

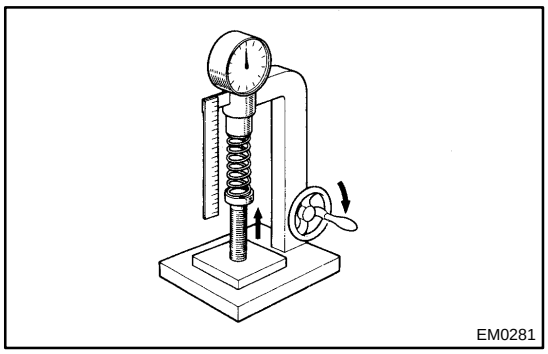


8. INSPECT INNER COMPRESSION SPRING [13711B / 98-12]

(a) Using a steel square, measure the deviation of the spring.
Maximum deviation: 2.0 mm (0.079 in.)
If the deviation is greater than maximum, replace the spring.

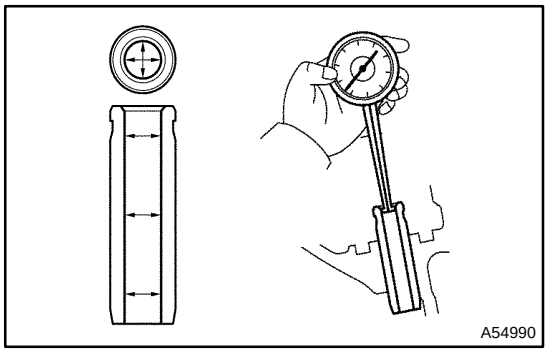


(b) Using vernier calipers, measure the free length of the spring.
Free length: 54.05 - 54.15 mm (2.1279 - 2.1319 in.)
If the free length is not as specified, replace the spring.


EM0281

(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.
Installed tension:
210 - 226 N (20.8 - 23.0 kgf, 45.9 - 50.7 lbf)
at 35.04 mm (1.3795 in.)

If the installed tension is not as specified, replace the valve spring.

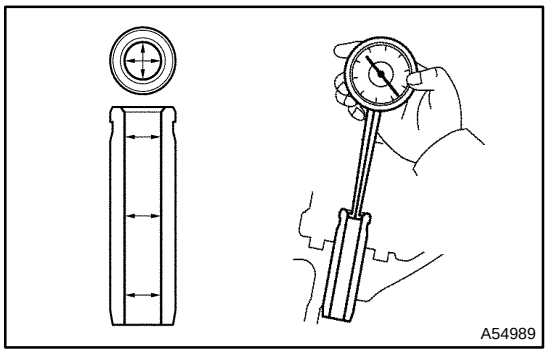

A54990

9. INSPECT INTAKE VALVE GUIDE BUSH
[11122 / 98-5]

(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bush inside diameter:
5.510 - 5.530 mm (0.2169 - 0.2177 in.)

(b) Subtract the valve stem diameter measurement (See step 6) from the guide bush inside diameter measurement.
Standard oil clearance:
0.025 - 0.060 mm (0.0010 - 0.0024 in.)
Maximum oil clearance: 0.08 mm (0.0031 in.)

If the clearance is greater than maximum, replace the valve and guide bush (See steps 11 and 13).

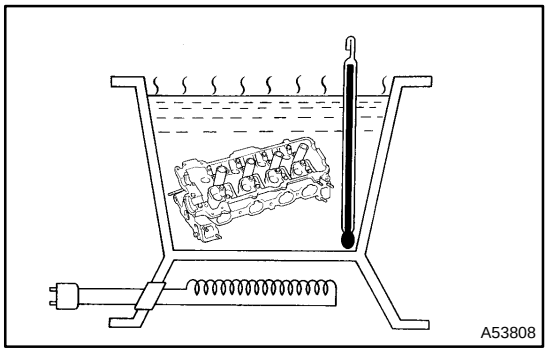

A54989

10. INSPECT EXHAUST VALVE GUIDE BUSH
[11126 / 98-5]

(a) Using a caliper gauge, measure the inside diameter of the guide bush.
Bush inside diameter:
5.510 - 5.530 mm (0.2169 - 0.2177 in.)

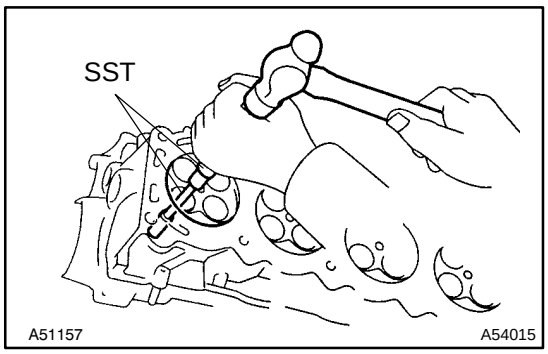
(b) Subtract the valve stem diameter measurement (See step 7) from the guide bush inside diameter measurement.
Standard oil clearance:
0.030 - 0.065 mm (0.0012 - 0.0026 in.)
Maximum oil clearance: 0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and guide bush (See steps 12 and 14).

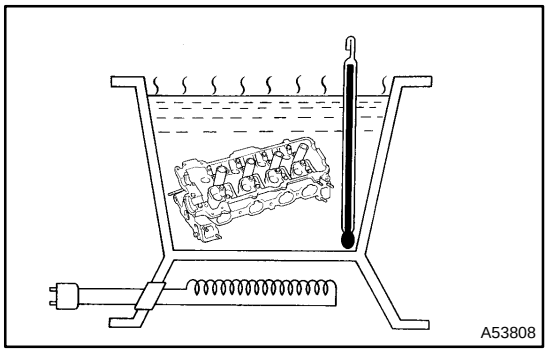

A53808

11. REMOVE INTAKE VALVE GUIDE BUSH
[11122 / 98-5]

(a) Gradually heat the cylinder head to 80 - 100˚C (176 - 212˚F).

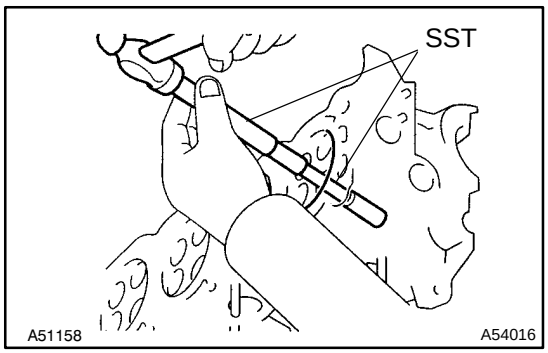


(b) Using SST and a hammer, tap out the guide bush.
SST 09201-01055, 09950-70010 (09951-07100)

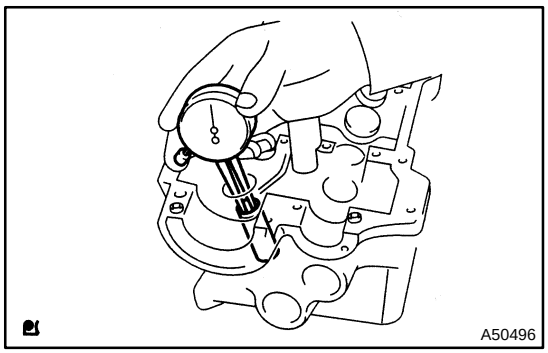


12. REMOVE EXHAUST VALVE GUIDE BUSH [11126 / 98-5]

(a) Gradually heat the cylinder head to 80 - 100˚C (176 - 212˚F).



(b) Using SST and a hammer, tap out the guide bush.
SST 09201-01055, 09950-70010 (09951-07100)



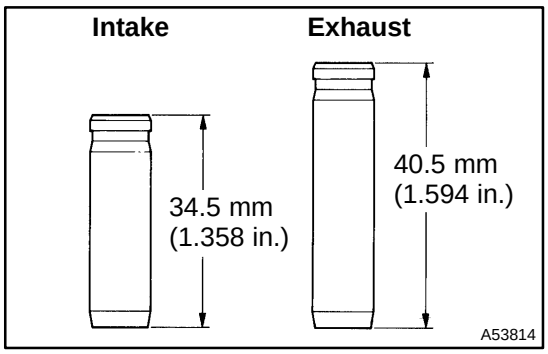
13. INSTALL INTAKE VALVE GUIDE BUSH [11122 / 98-5]

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

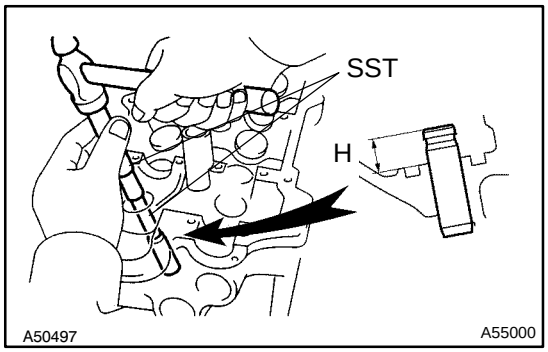
(b) Select a new guide bush (STD or O/S 0.05).

Bush bore diameter	Bush size
10.285 - 10.306 mm (0.4049 - 0.4057 in.)	Use STD
10.335 - 10.356 mm (0.4068 - 0.4077 in.)	Use O/S 0.05

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to this dimension of 10.335 - 10.356 mm (0.4068 - 0.4077 in.).
If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

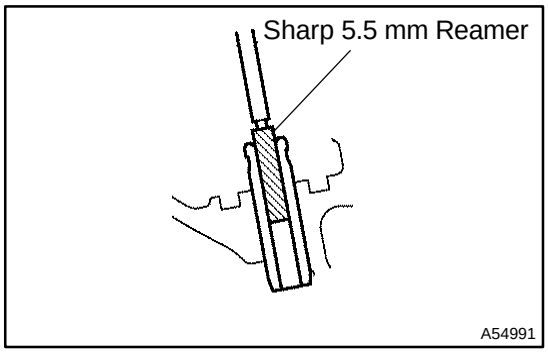


HINT:
Different the bushes are used for the intake and exhaust.

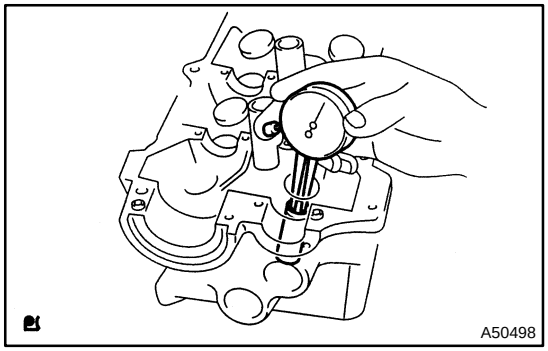


(c) Gradually heat the cylinder head to 80 - 100˚C (176 - 212˚F).

(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-01055, 09950-70010 (09951-07100)
Protrusion height (H): 9.2 - 9.8 mm (0.362 - 0.386 in.)



(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance (See step 9) between the guide bush and valve stem.



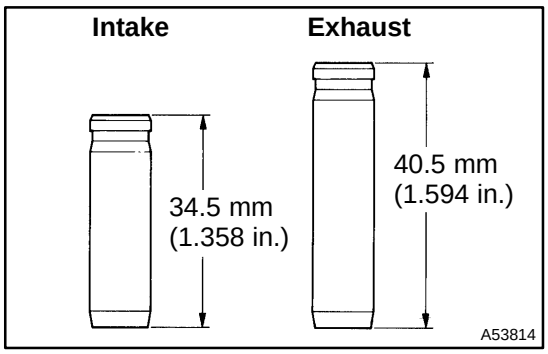
14. INSTALL EXHAUST VALVE GUIDE BUSH
[11126 / 98-5]

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

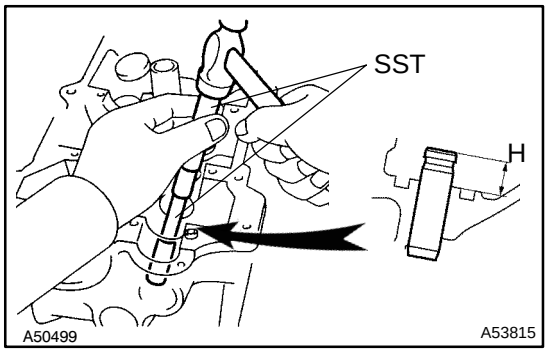
(b) Select a new guide bush (STD or O/S 0.05).

Bush bore diameter	Bush size
10.285 - 10.306 mm (0.4049 - 0.4057 in.)	Use STD
10.335 - 10.356 mm (0.4068 - 0.4077 in.)	Use O/S 0.05

If the bush bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bush bore to this dimension of 10.335 - 10.356 mm (0.4068 - 0.4077 in.).
If the bush bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.

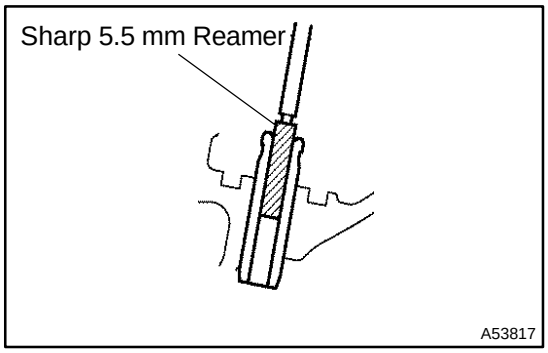


HINT:
Different the bushes are used for the intake and exhaust.

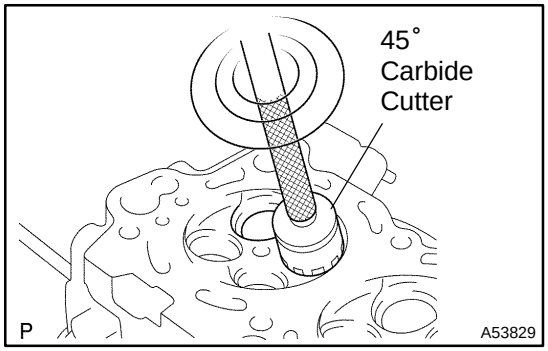


(c) Gradually heat the cylinder head to 80 - 100˚C (176 - 212˚F).

(d) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201-01055, 09950-70010 (09951-07100)
Protrusion height (H): 8.2 - 8.8 mm (0.323 - 0.346 in.)

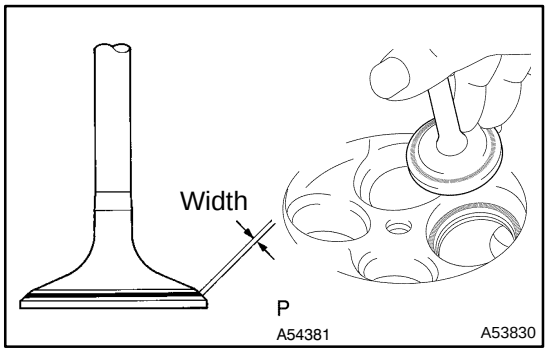


(e) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard specified clearance (See step 10) between the guide bush and valve stem.



15. INSPECT INTAKE VALVE SEAT
[11131 / 98-5]

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



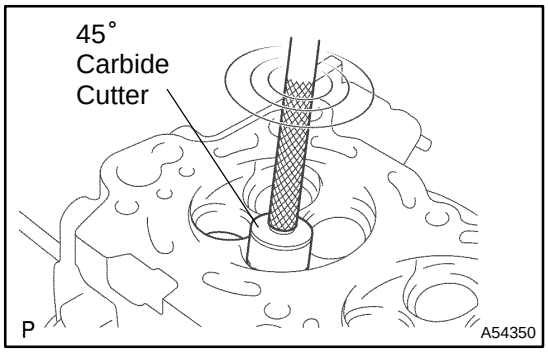
(b) Check the valve seating position.
(1) Apply a light coat of prussian blue (or white lead) to the valve face.
(2) Lightly press the valve against the seat. Do not rotate valve.

(c) Check the valve face and seat for the following:
(1) If blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.

(2) If blue appears 360˚ around the valve seat, the guide and face are concentric. If not, resurface the seat.

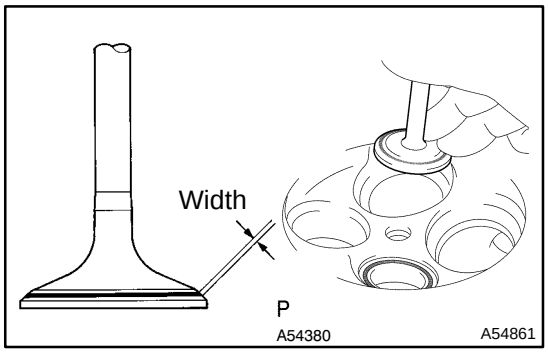
(3) Check that the seat contact is in the middle of the valve face with these width:

Width: 1.0 - 1.4 mm (0.039 - 0.055 in.)



16. INSPECT EXHAUST VALVE SEAT
[11135 / 98-5]

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



(b) Check the valve seating position.

(1) Apply a light coat of prussian blue (or white lead) to the valve face.

(2) Lightly press the valve against the seat. Do not rotate valve.

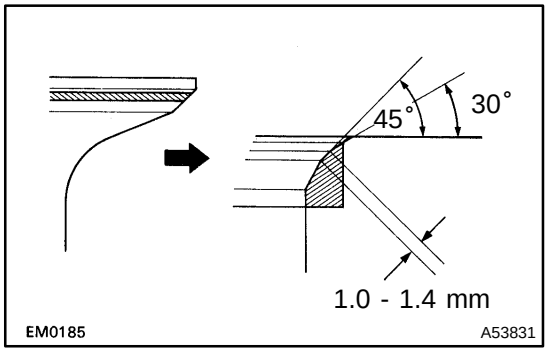
(c) Check the valve face and seat for the following:

(1) If blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.

(2) If blue appears 360˚ around the valve seat, the guide and face are concentric. If not, resurface the seat.

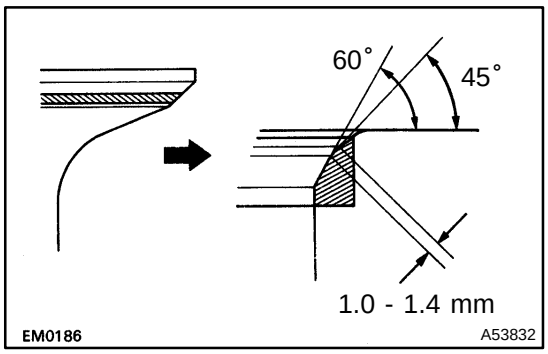
(3) Check that the seat contact is in the middle of the valve face with these width:

Width: 1.0 - 1.4 mm (0.039 - 0.055 in.)

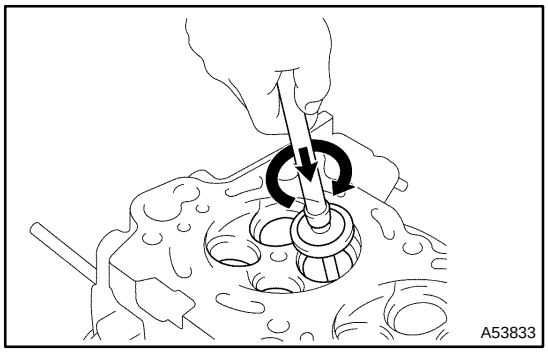


17. REPAIR INTAKE VALVE SEAT
[11131 / 98-5]

(a) If the seating is too high on the valve face:
Use 30˚ and 45˚ cutters to correct the seat.

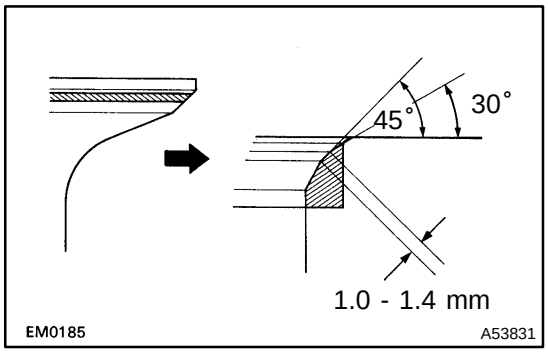


(b) If the seating is too low on the valve face:
Use 60° and 45° cutters to correct the seat.



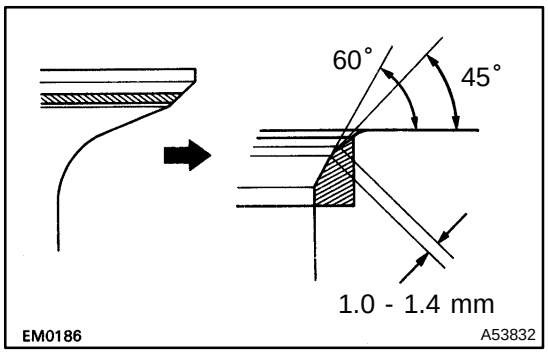
(c) Hand-lap the valve and valve seat with an abrasive compound.

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

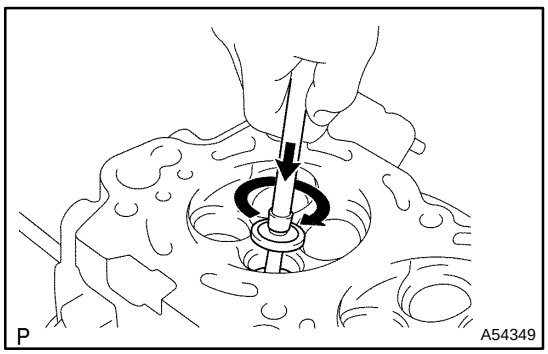


18. REPAIR EXHAUST VALVE SEAT
[11135 / 98-5]

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

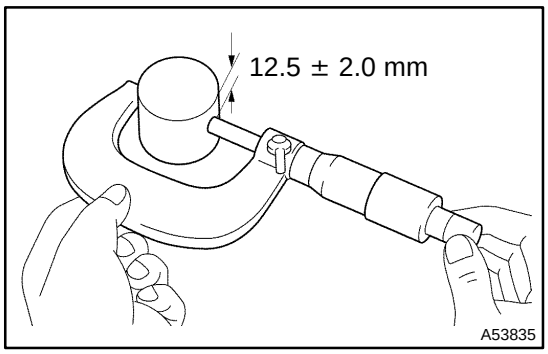


(b) If the seating is too low on the valve face:
Use 60° and 45° cutters to correct the seat.



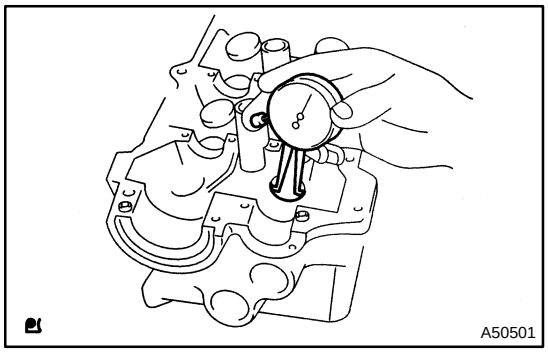
(c) Hand-lap the valve and valve seat with an abrasive compound.

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



19. INSPECT VALVE LIFTER
[13751 / 98-12]

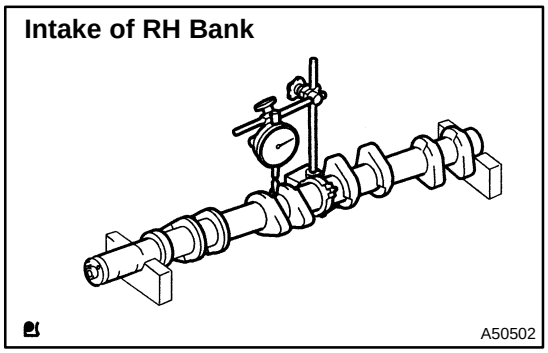
(a) Using a micrometer, measure the lifter diameter at the 12.5 ± 2.0 mm (0.492 ± 0.079 in.) from the top surface.
Lifter diameter:
30.968 - 30.976 mm (1.2192 - 1.2195 in.)



(b) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Lifter bore diameter:
31.000 - 31.016 mm (1.2205 - 1.2211 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.024 - 0.048 mm (0.0009 - 0.0018 in.)
Maximum oil clearance: 0.07 mm (0.0028 in.)

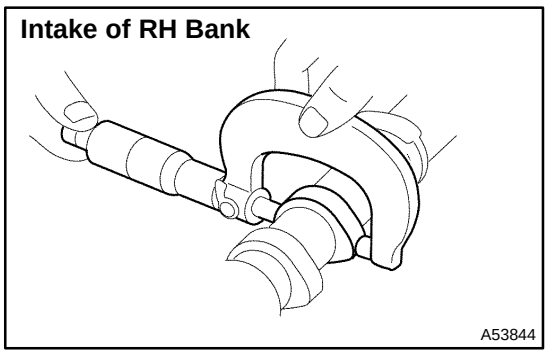
If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.



20. INSPECT CAMSHAFT
[13511 / 98-12]

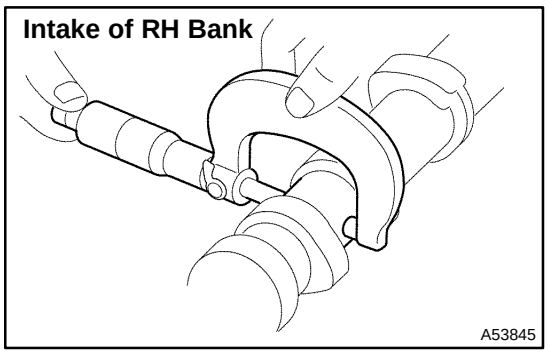
(a) Inspect the circle runout.
(1) Place the camshaft on V-blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout: 0.08 mm (0.0031 in.)

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

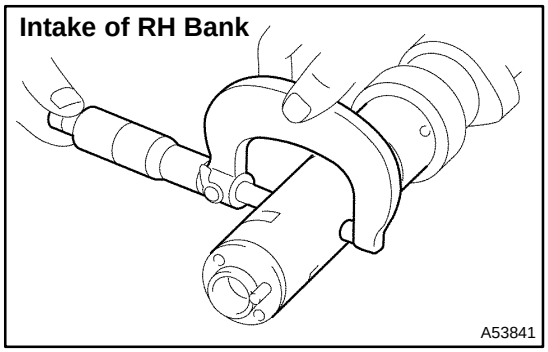


(b) Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
42.610 - 42.710 mm (1.6776 - 1.6815 in.)
Minimum cam lobe height: 42.46 mm (1.6717 in.)

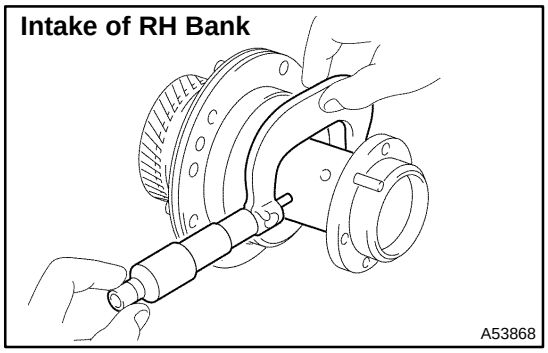
If the cam lobe height is less than minimum, replace the camshaft.



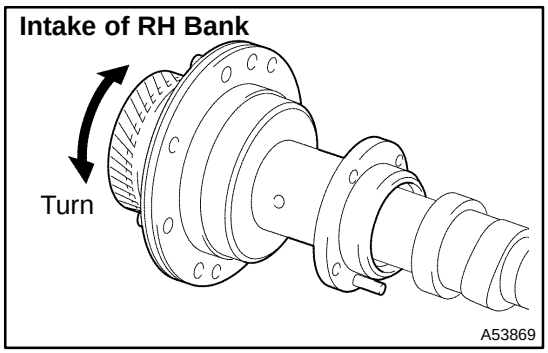
(c) Inspect the journal diameter of the camshaft.
(1) Using a micrometer, measure the journal diameter of the camshaft for the camshaft bearing.
Journal diameter:
26.954 - 26.970 mm (1.0612 - 1.0618 in.)
If the journal diameter is not as specified, check the oil clearance.



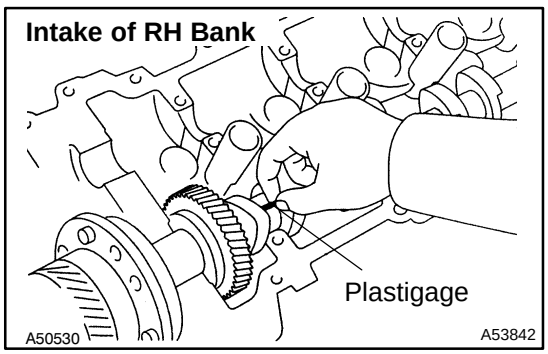
(2) Using a micrometer, measure the journal diameter for the camshaft timing tube.
Journal diameter:
30.984 - 31.000 mm (1.2198 - 1.2205 in.)



(d) Inspect the journal diameter of the camshaft timing tube.
(1) Using a micrometer, measure the journal diameter.
Journal diameter:
39.955 - 39.964 mm (1.5730 - 1.5734 in.)
If the journal diameter is not as specified, check the oil clearance.



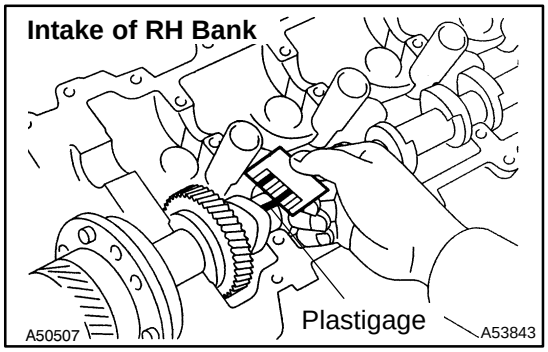
(e) Install the camshaft timing tube to the camshaft, and check the timing tube turn smoothly.
If necessary, replace the timing tube and camshaft.



(f) Check the oil clearance.
(1) Install the camshaft timing tube to the camshaft (See page 14-39).
(2) Clean the bearing caps and journals.
(3) Check that bearings for flaking and scoring.
If the bearings are damaged, replace the bearing caps and cylinder head as a set.
(4) Place the camshaft on the cylinder head.
(5) Lay a strip of Plastigage across each of the journals.
(6) Install the bearing caps (See page 14-39).

NOTICE:
Do not turn the camshaft.

(7) Remove the bearing caps.



(8) Measure the Plastigage at its widest point.

Standard oil clearance:

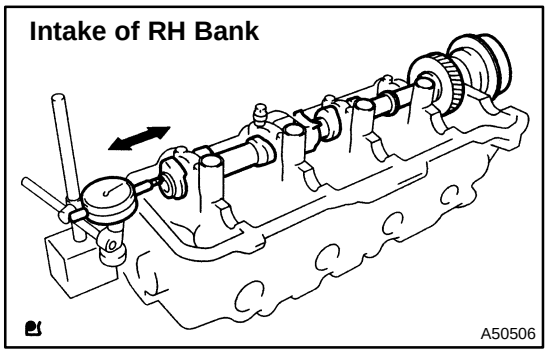
Camshaft journal	0.030 - 0.067 mm (0.0012 - 0.0026 in.)
Camshaft timing tube journal	0.036 - 0.057 mm (0.0014 - 0.0022 in.)

Maximum oil clearance:

Camshaft journal	0.100 mm (0.0039 in.)
Camshaft timing tube journal	0.075 mm (0.0030 in.)

If the oil clearance is greater than maximum, replace the camshaft and timing tube. If necessary, replace the bearing caps and cylinder head as a set.

(9) Completely remove the Plastigage.
(10) Remove the camshaft.
(11) Remove the camshaft timing tube from the camshaft.

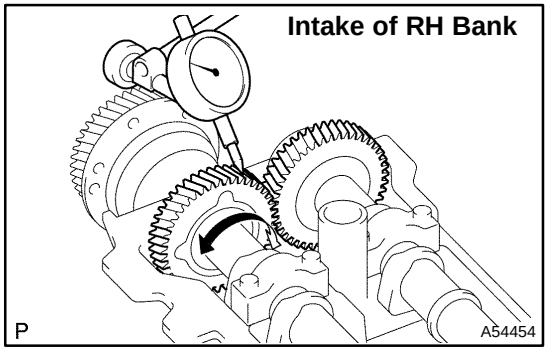


(g) Check the thrust clearance.
(1) Install the camshaft timing tube to the camshaft (See page 14-39).
(2) Install the camshaft (See page 14-39).
(3) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:
0.060 - 0.100 mm (0.0024 - 0.0039 in.)
Maximum thrust clearance: 0.13 mm (0.0051 in.)

If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(4) Remove the camshaft.
(5) Remove the camshaft timing tube from the camshaft.

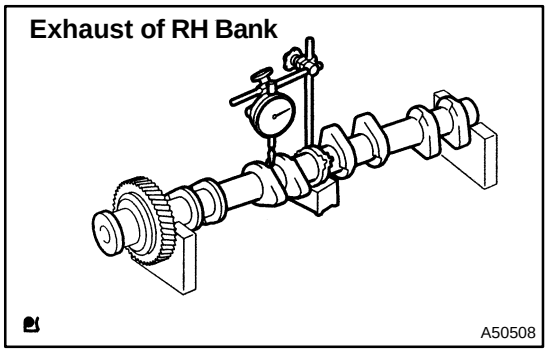


(h) Check the gear backlash.
(1) Install the drive gear to the camshaft timing tube (See page 14-39).
(2) Install the camshaft timing tube to the camshaft (See page 14-39).
(3) Install the camshaft and No. 2 camshaft without installing the camshaft sub-gear and front bearing cap (See page 14-39).
(4) Using a dial indicator, measure the backlash.

Standard backlash:
0.020 - 0.200 mm (0.0008 - 0.0079 in.)
Maximum backlash: 0.30 mm (0.0188 in.)

If the backlash is greater than maximum, replace the drive gear and No. 2 camshaft.

(i) Remove the camshaft and No. 2 camshaft.
(j) Remove the camshaft timing tube from the camshaft.
(k) Remove the drive gear from the camshaft timing tube.

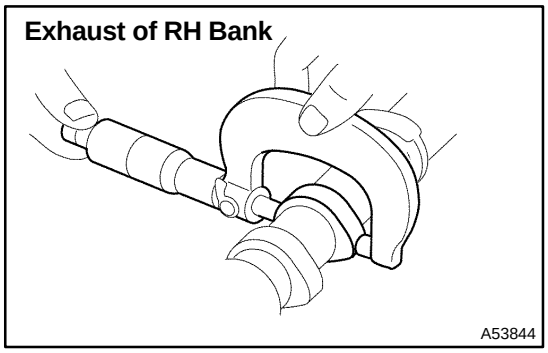


21. INSPECT NO.2 CAMSHAFT
[13512 / 98-12]

(a) Inspect the circle runout.
(1) Place the camshaft on V-blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.08 mm (0.0031 in.)

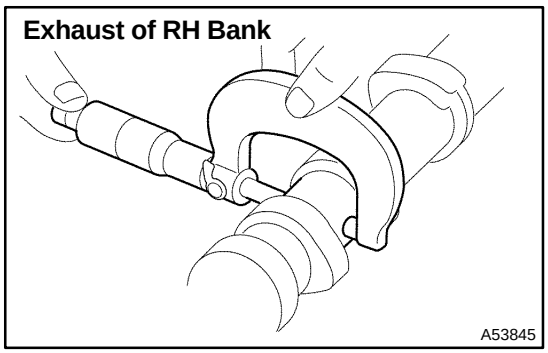
If the circle runout is greater than maximum, replace the No. 2 camshaft.



(b) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:
42.630 - 42.730 mm (1.6783 - 1.6823 in.)
Minimum cam lobe height: 42.48 mm (1.6724 in.)

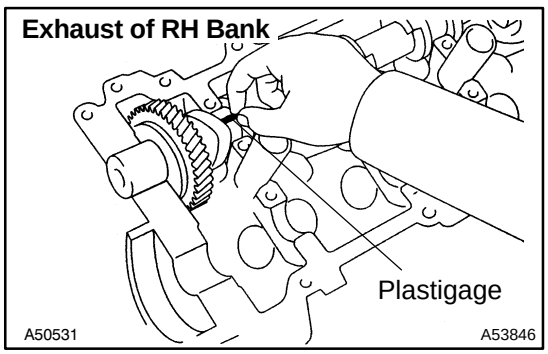
If the cam lobe height is less than minimum, replace the No. 2 camshaft.



(c) Using a micrometer, measure the journal diameter.

Journal diameter:
26.954 - 26.970 mm (1.0612 - 1.0618 in.)

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



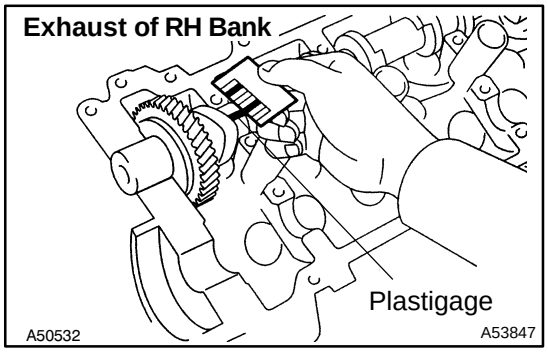
(d) Check the oil clearance.
(1) Clean the bearing caps and journals.
(2) Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.

(3) Place the No. 2 camshaft on the cylinder head.
(4) Lay a strip of Plastigage across each of the journals.
(5) Install the bearing caps (See page 14-39).

NOTICE:
Do not turn the No. 2 camshaft.

(6) Remove the bearing caps.



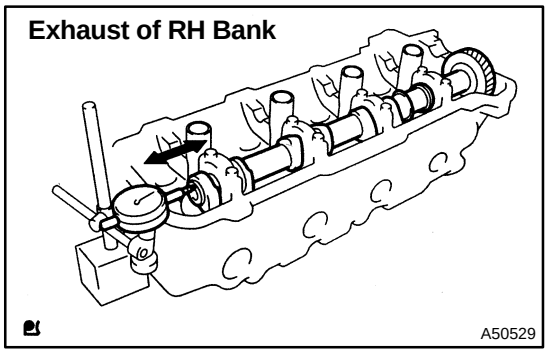
(7) Measure the Plastigage at its widest point.

Standard oil clearance:
0.030 - 0.067 mm (0.0012 - 0.0026 in.)
Maximum oil clearance: 0.100 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace the No. 2 camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(8) Completely remove the Plastigage.

(9) Remove the No. 2 camshaft.



(e) Check the thrust clearance.

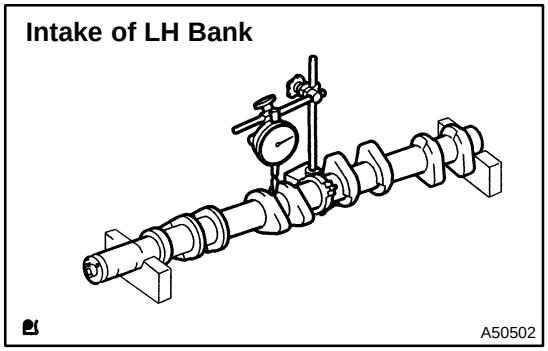
(1) Install the camshaft (See page 14-39).

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

Standard thrust clearance:
0.030 - 0.075 mm (0.0012 - 0.0030 in.)
Maximum thrust clearance: 0.12 mm (0.0047 in.)

If the thrust clearance is greater than maximum, replace the No. 2 camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(3) Remove the No. 2 camshaft.



22. INSPECT NO.3 CAMSHAFT SUB-ASSY
[13053 / 98-12]

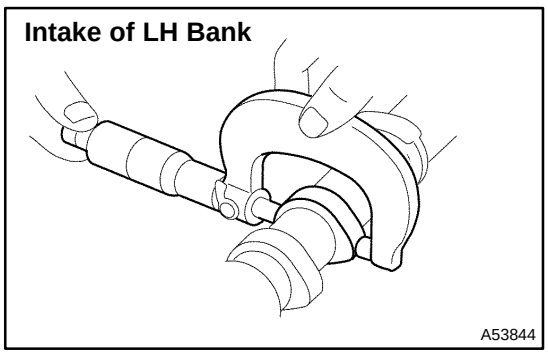
(a) Inspect the circle runout.

(1) Place the camshaft on V-blocks.

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

Maximum circle runout: 0.08 mm (0.0031 in.)

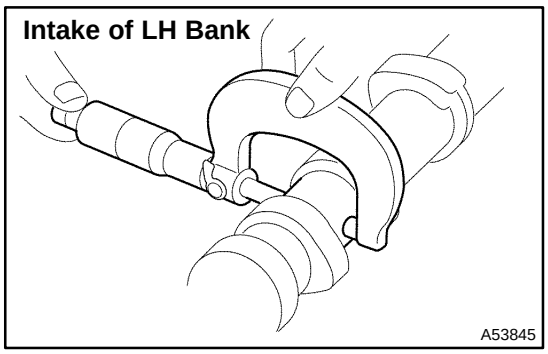
If the circle runout is greater than maximum, replace the No. 3 camshaft.



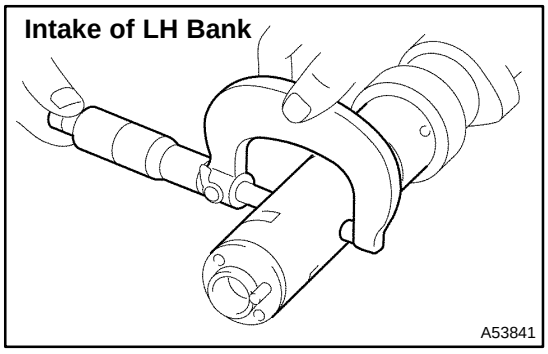
(b) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:
42.610 - 42.710 mm (1.6776 - 1.6815 in.)
Minimum cam lobe height: 42.46 mm (1.6717 in.)

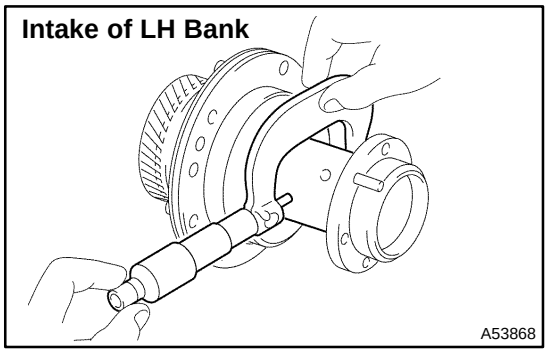
If the cam lobe height is less than minimum, replace the No. 3 camshaft.



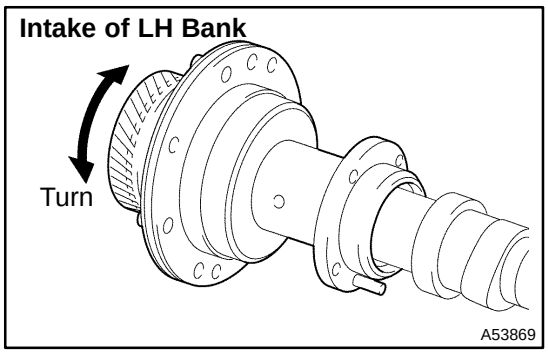
(c) Inspect the journal diameter of the camshaft.
(1) Using a micrometer, measure the journal diameter of the No. 3 camshaft for the camshaft bearing.
Journal diameter:
26.954 - 26.970 mm (1.0612 - 1.0618 in.)
If the journal diameter is not as specified, check the oil clearance.



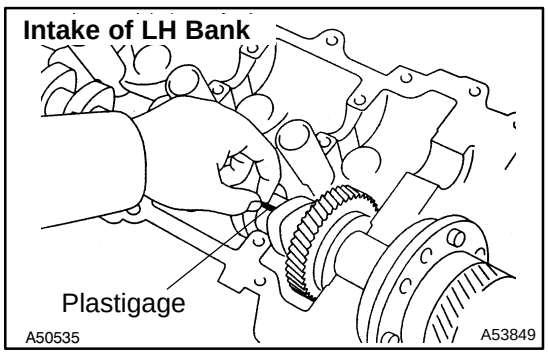
(2) Using a micrometer, measure the journal diameter for the camshaft timing tube.
Journal diameter:
30.984 - 31.000 mm (1.2198 - 1.2205 in.)



(d) Inspect the journal diameter of the camshaft timing tube.
(1) Using a micrometer, measure the journal diameter.
Journal diameter:
39.955 - 39.964 mm (1.5730 - 1.5734 in.)
If the journal diameter is not as specified, check the oil clearance.



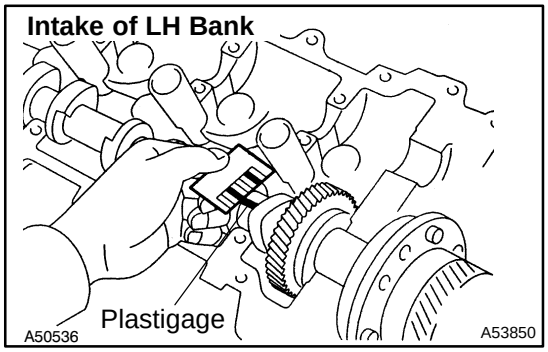
(e) Install the timing tube to the No. 3 camshaft, and check the timing tube turn smoothly.
If necessary, replace the timing tube and No. 3 camshaft.



(f) Check the oil clearance.
(1) Install the camshaft timing tube to the No. 3 camshaft (See page 14-39).
(2) Clean the bearing caps and journals.
(3) Check that bearings for flaking and scoring.
If the bearings are damaged, replace the bearing caps and cylinder head as a set.
(4) Place the No. 3 camshaft on the cylinder head.
(5) Lay a strip of Plastigage across each of the journals.
(6) Install the bearing caps (See page 14-39).

NOTICE:
Do not turn the camshaft.

(7) Remove the bearing caps.



(8) Measure the Plastigage at its widest point.

Standard oil clearance:

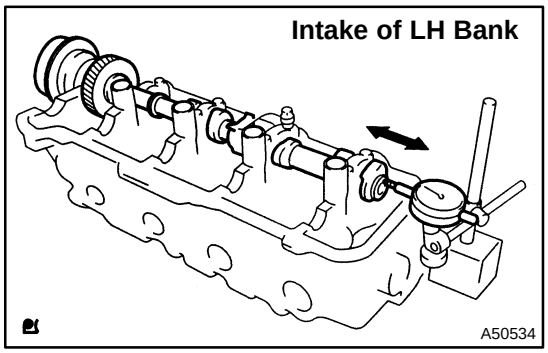
Camshaft journal	0.030 - 0.067 mm (0.0012 - 0.0026 in.)
Camshaft timing tube journal	0.036 - 0.057 mm (0.0014 - 0.0022 in.)

Maximum oil clearance:

Camshaft journal	0.100 mm (0.0039 in.)
Camshaft timing tube journal	0.075 mm (0.0030 in.)

If the oil clearance is greater than maximum, replace the No. 3 camshaft and timing tube. If necessary, replace the bearing caps and cylinder head as a set.

(9) Completely remove the Plastigage.
(10) Remove the camshaft.
(11) Remove the camshaft timing tube from the No. 3 camshaft.

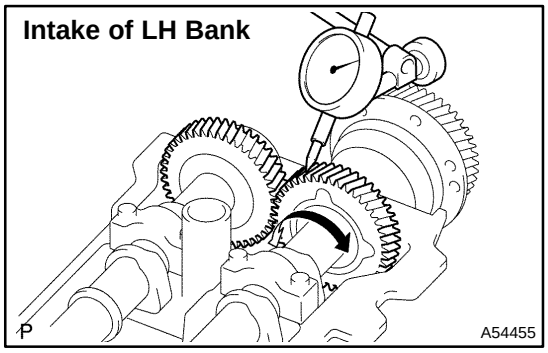


(g) Check the thrust clearance.
(1) Install the camshaft timing tube to the No. 3 camshaft (See page 14-39).
(2) Install the No. 3 camshaft (See page 14-39).
(3) Using a dial indicator, measure the thrust clearance while moving the No. 3 camshaft back and forth.

Standard thrust clearance:
0.060 - 0.100 mm (0.0024 - 0.0039 in.)
Maximum thrust clearance: 0.13 mm (0.0051 in.)

If the thrust clearance is greater than maximum, replace the No. 3 camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(4) Remove the No. 3 camshaft.
(5) Remove the camshaft timing tube from the No. 3 camshaft.

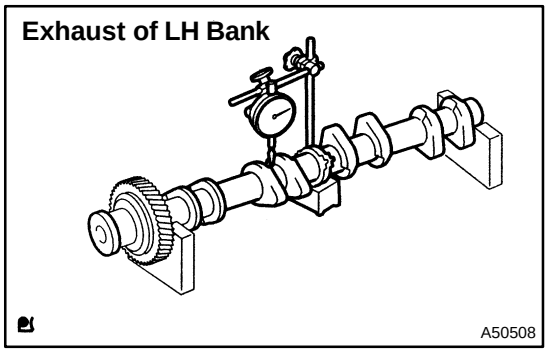


(h) Check the gear backlash.
(1) Install the drive gear to the camshaft timing tube (See page 14-39).
(2) Install the camshaft timing tube to the No. 3 camshaft (See page 14-39).
(3) Install the No. 3 camshaft and No. 4 camshaft without installing the camshaft sub-gear and front bearing cap (See page 14-39).
(4) Using a dial indicator, measure the backlash.

Standard backlash:
0.020 - 0.200 mm (0.0008 - 0.0079 in.)
Maximum backlash: 0.30 mm (0.0188 in.)

If the backlash is greater than maximum, replace the drive gear and No. 4 camshaft.

(i) Remove the No. 3 camshaft and No. 4 camshaft.
(j) Remove the camshaft timing tube from the No. 3 camshaft.
(k) Remove the drive gear from the camshaft timing tube.

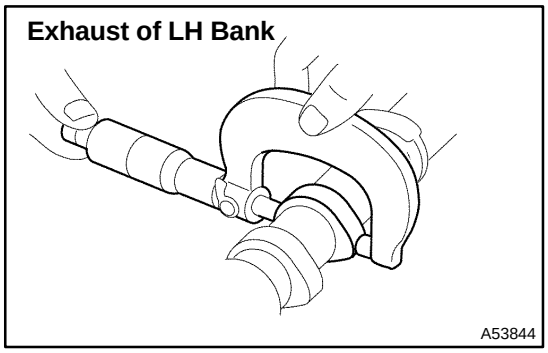


23. INSPECT NO.4 CAMSHAFT SUB-ASSY
[13054 / 98-12]

(a) Inspect the circle runout.
(1) Place the camshaft on V-blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.08 mm (0.0031 in.)

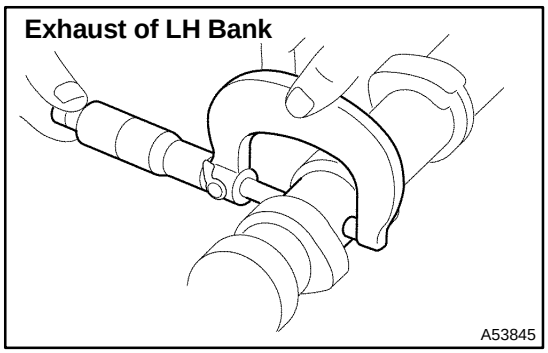
If the circle runout is greater than maximum, replace the No. 4 camshaft.



(b) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:
42.630 - 42.730 mm (1.6783 - 1.6823 in.)
Minimum cam lobe height: 42.48 mm (1.6724 in.)

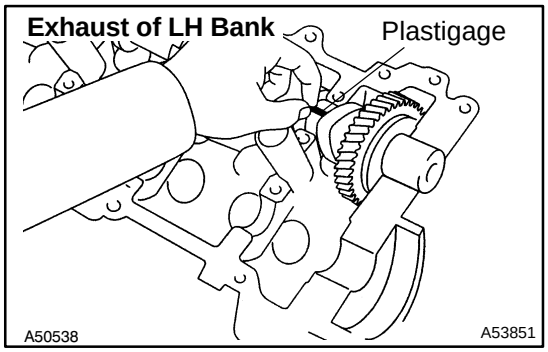
If the cam lobe height is less than minimum, replace the No. 4 camshaft.



(c) Using a micrometer, measure the journal diameter.

Journal diameter:
26.954 - 26.970 mm (1.0612 - 1.0618 in.)

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



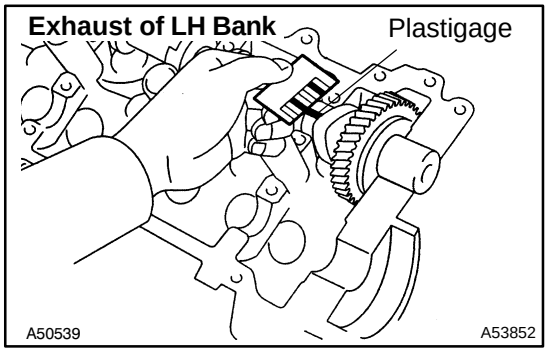
(d) Check the oil clearance.
(1) Clean the bearing caps and journals.
(2) Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.

(3) Place the No. 4 camshaft on the cylinder head.
(4) Lay a strip of Plastigage across each of the journals.
(5) Install the bearing caps (See page 14-39).

NOTICE:
Do not turn the No. 4 camshaft.

(6) Remove the bearing caps.



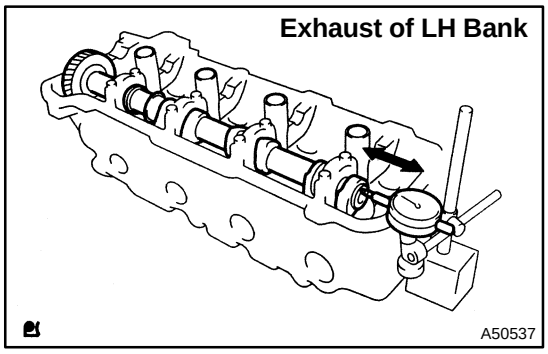
(7) Measure the Plastigage at its widest point.

Standard oil clearance:
0.030 - 0.067 mm (0.0012 - 0.0026 in.)
Maximum oil clearance: 0.100 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace the No. 4 camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(8) Completely remove the Plastigage.

(9) Remove the No. 4 camshaft.



(e) Check the thrust clearance.

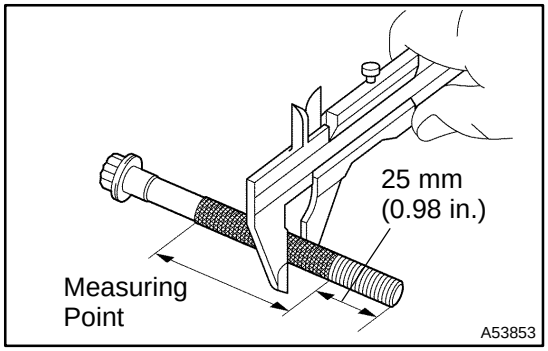
(1) Install the camshaft (See page 14-39).

(2) Using a dial indicator, measure the thrust clearance while moving the No. 4 camshaft back and forth.

Standard thrust clearance:
0.030 - 0.075 mm (0.0012 - 0.0030 in.)
Maximum thrust clearance: 0.12 mm (0.0047 in.)

If the thrust clearance is greater than maximum, replace the No. 4 camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(3) Remove the No. 4 camshaft.

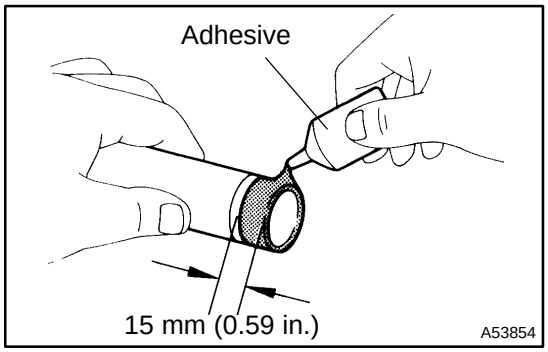


24. INSPECT CYLINDER HEAD SET BOLT
[11101A / 98-5]

(a) Using vernier calipers, measure the thread outside diameter of the bolt.

Standard outside diameter:
9.770 - 9.960 mm (0.3846 - 0.3921 in.)
Minimum outside diameter: 9.70 mm (0.3819 in.)

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

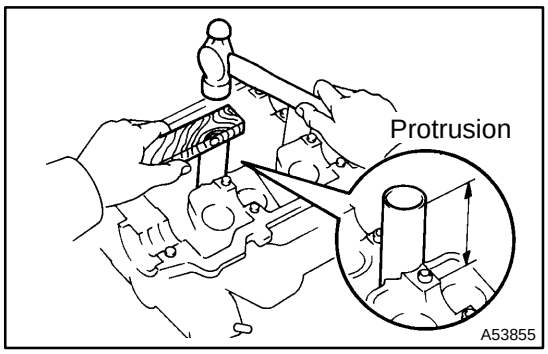


25. INSTALL SPARK PLUG TUBE

HINT:
When using a new cylinder head, spark plug tubes must be installed.

(a) Apply adhesive to the end of the spark plug tube.

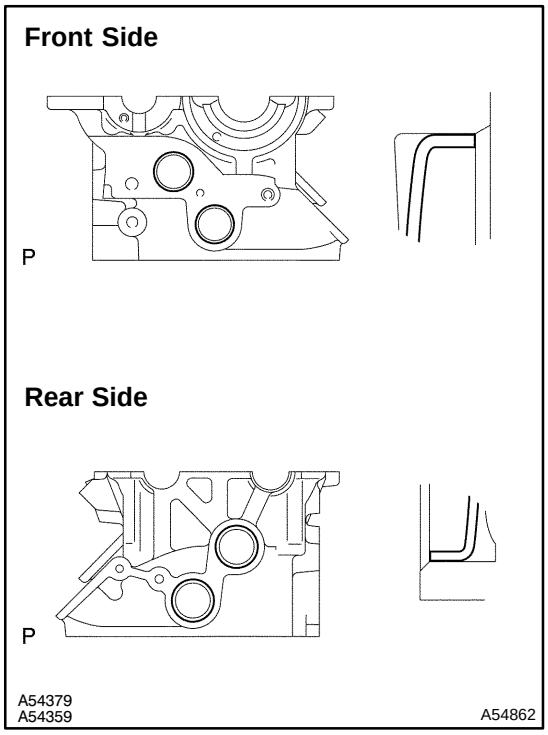
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



(b) Using a wooden block and hammer, tap in a new spark tube until there is 48.4 - 49.6 mm (1.906 - 1.953 in.) protruding from the camshaft bearing cap installation surface of the cylinder head.

NOTICE:

Avoid tapping a new spark plug tube in too far by measuring the amount of the protrusion while tapping.



26. INSTALL TIGHT PLUG NO.1
[11116A / 98-5]

(a) Apply adhesive to the end of the spark plug tube.

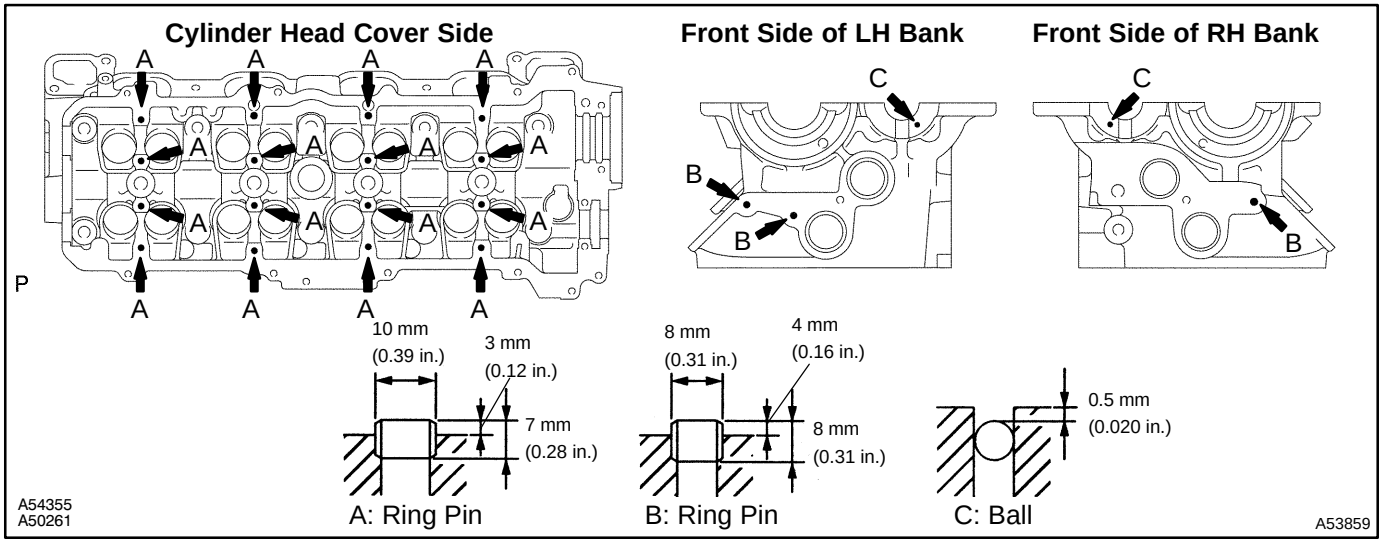
Adhesive:

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

(b) Using SST and a hammer, tap in a new tight plug as shown in the illustration.

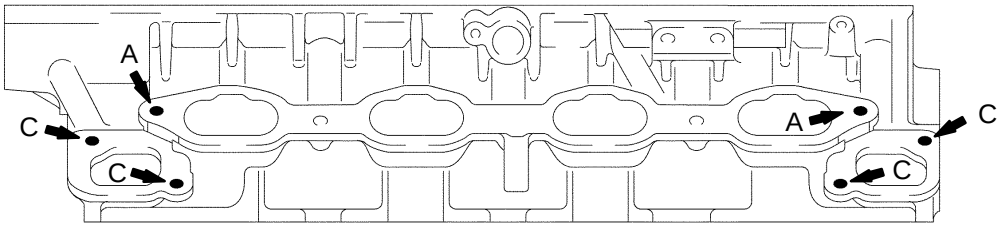
SST 09950- 60010 (0951- 00200), 09950- 70010 (09951-07100)

27. INSTALL RING W/HEAD PIN
[11155A / 98-5]

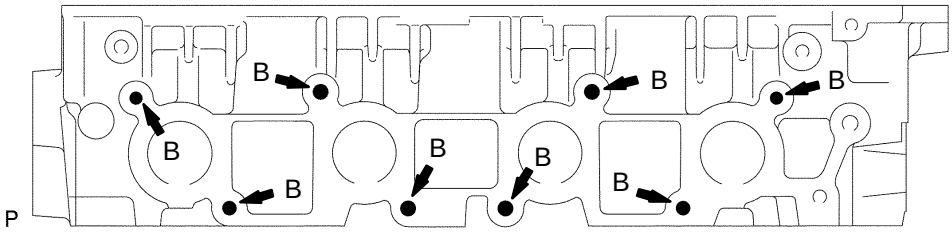


28. INSTALL STUD BOLT

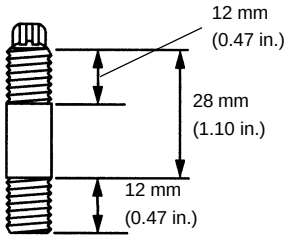
Intake Manifold Side



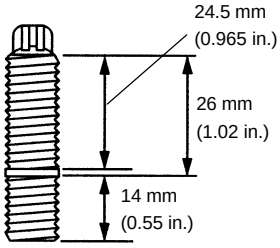
Exhaust Manifold Side



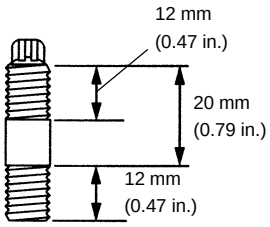
A: Stud Bolt
(Thread diameter: 8 mm)



B: Stud Bolt
(Thread diameter: 10 mm)

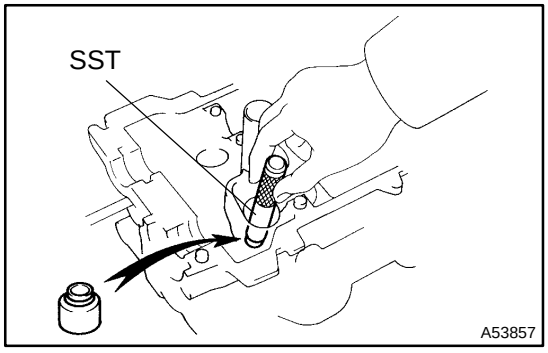


C: Stud Bolt
(Thread diameter: 8 mm)



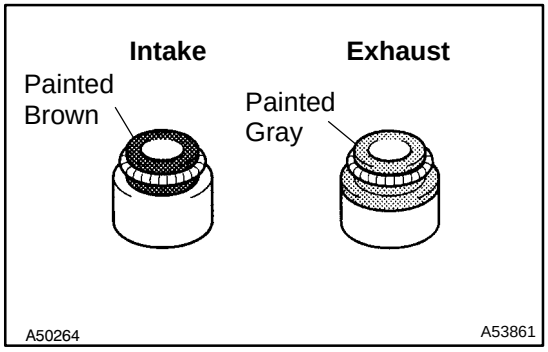
Torque:
9.0 N·m (90 kgf·cm, 80 in.·lbf) for A, C
14.7 N·m (150 kgf·cm, 11 ft·lbf) for B

A54354
A50262
A53860

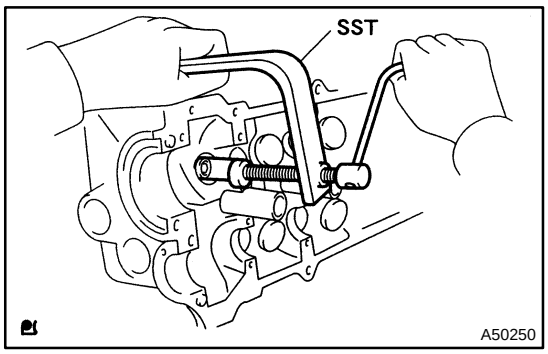


29. INSTALL VALVE STEM OIL O SEAL OR RING [13711A / 98-12]

(a) Using SST, push in a new oil seal.
SST 09201-41020



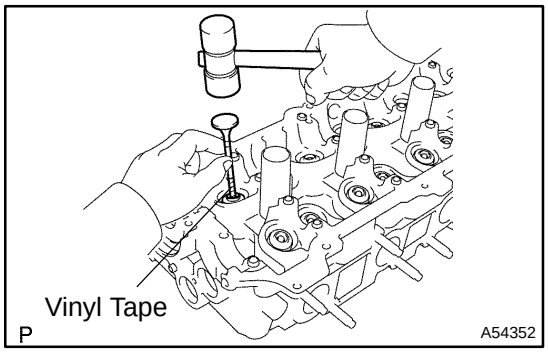
HINT:
The oil seal for intake is brown and the oil seal for exhaust is gray.



30. INSTALL INTAKE VALVE
[13711 / 98-12]

(a) Install the valve, spring seat, compression spring and spring retainer.

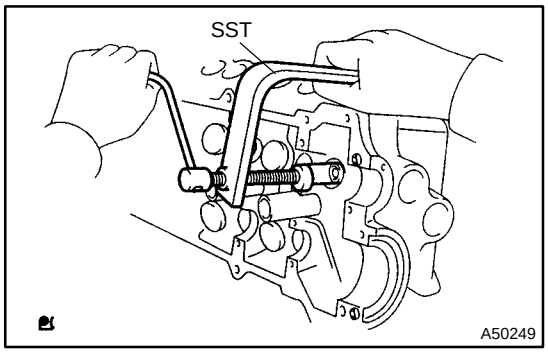
(b) Using SST, compress the compression spring and place the 2 keepers around the valve stem.
SST 09202-70020 (09202-00010)



(c) Using a plastic-faced hammer and the valve stem (not in use) tip wound with vinyl tape, lightly tap the valve stem tip to assure proper fit.

NOTICE:

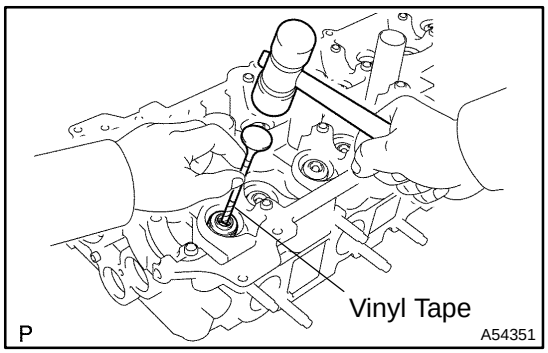
Be careful not do damage the valve stem tip.



31. INSTALL EXHAUST VALVE
[13715 / 98-12]

(a) Install the valve, spring seat, compression spring and spring retainer.

(b) Using SST, compress the compression spring and place the 2 keepers around the valve stem.
SST 09202-70020 (09202-00010)



(c) Using a plastic-faced hammer and the valve stem (not in use) tip wound with vinyl tape, lightly tap the valve stem tip to assure proper fit.

NOTICE:

Be careful not do damage the valve stem tip.

32. INSTALL VALVE LIFTER
[13751 / 98-12]

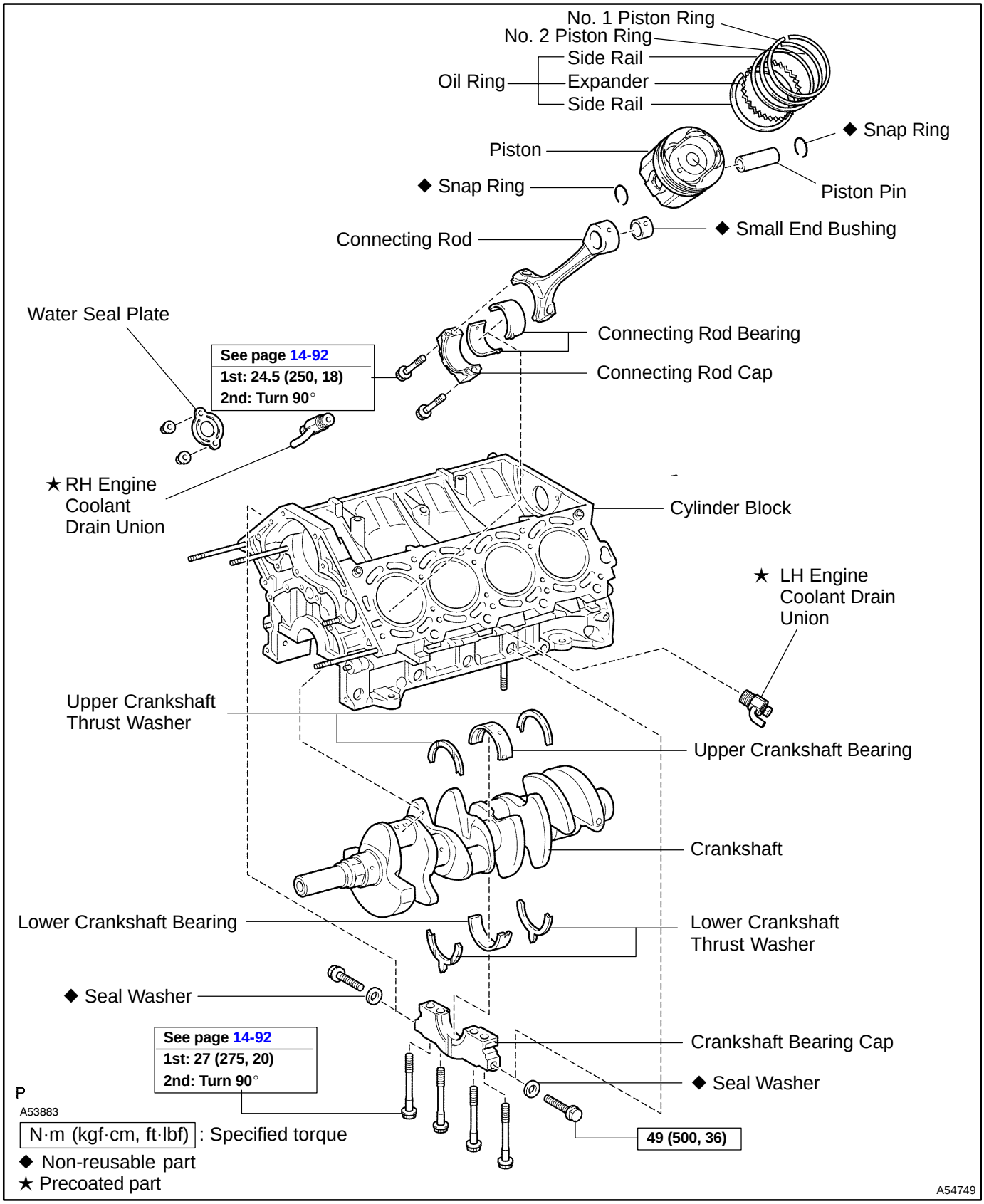
(a) Install the valve lifter and shim.

(b) Check that the valve lifter rotates smoothly by hand.

CYLINDER BLOCK

COMPONENTS

14076-01



14077-01

OVERHAUL

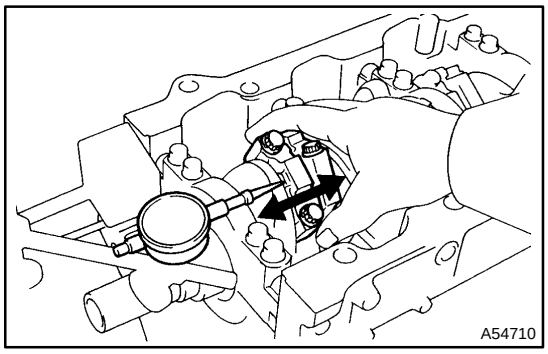
HINT:

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

1. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSY
[11415 / 98-7]

2. REMOVE WATER SEAL PLATE
[11492C / 98-7]

(a) Remove the 2 nuts.
(b) Pry out the seal plate.


A54710

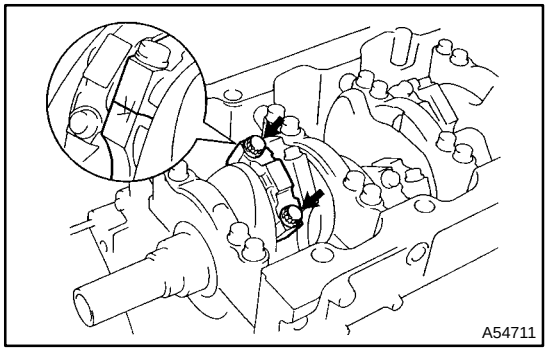
3. INSPECT CONNECTING ROD THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:
0.160 - 0.290 mm (0.0063 - 0.0138 in.)
Maximum thrust clearance: 0.35 mm (0.0138 in.)

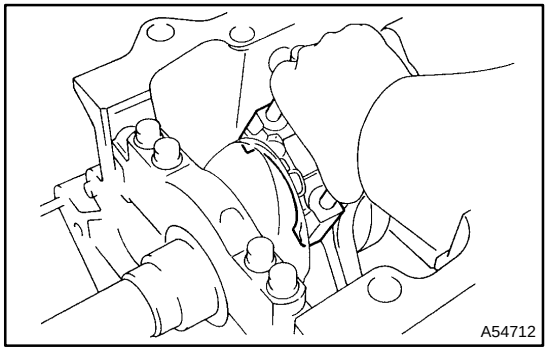
If the thrust clearance is greater than maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

Connecting rod thickness:
22.880 - 22.920 mm (0.9008 - 0.9024 in.)


A54711

4. INSPECT CONNECTING ROD OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and cap ensure correct reassembly.
(b) Remove the 2 connecting rod cap bolts.


A54712

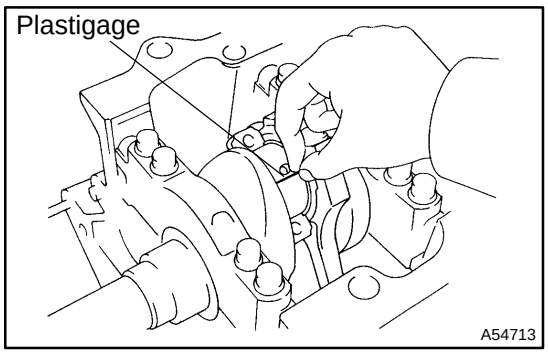
(c) Using the removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:

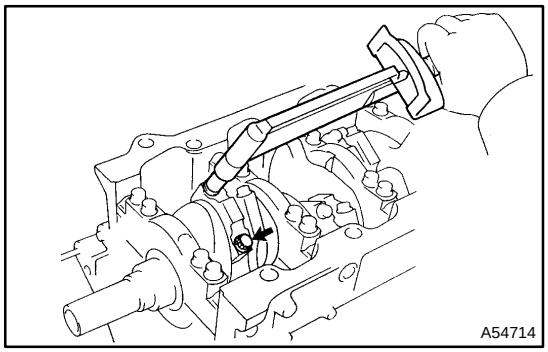
Keep the lower bearing inserted with the connecting rod cap.

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

If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.

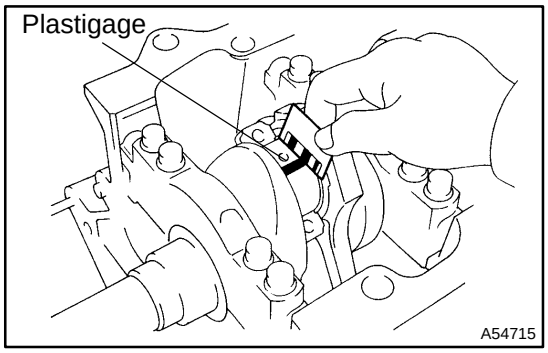


(f) Lay a strip of Plastigage across the crank pin.



(g) Install the connecting rod cap with the 2 bolts (See step 30).

(h) Remove the 2 bolts, connecting rod cap and lower bearing (See steps (b) and (c) above).



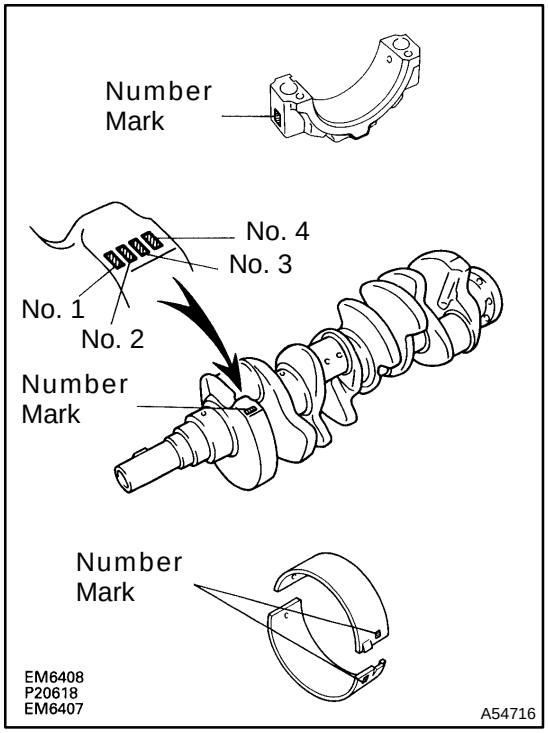
(i) Measure the Plastigage at its widest point.

Standard oil clearance:

0.021 - 0.047 mm (0.0008 - 0.0019 in.)

Maximum oil clearance: 0.065 mm (0.0026 in.)

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



HINT:

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 connecting rod cap and crankshaft, then selecting the bearing with the same number as the total. There are 6 sizes of standard bearings, marked 2, 3, 4, 5, 6 and 7.

Item	Number Mark
Connecting rod	2 2 2 2 2 2 2 2 2 2
Crankshaft	2 2 2 2 2 2 2 2 2 2 2 2
Use bearing	2 2 2 2 2 2

EXAMPLE:

Connecting rod cap ”3” + Crankshaft ”1” =

Total number 4 (Use bearing ”4”)

Reference

Connecting rod big end inside diameter:

Mark 1	55.000 - 55.006 mm (2.1654 - 2.1656 in.)
Mark 2	55.006 - 55.012 mm (2.1656 - 2.1658 in.)

Mark 3	55.012 - 55.018 mm (2.1658 - 2.1661 in.)
Mark 4	55.018 - 55.024 mm (2.1661 - 2.1663 in.)

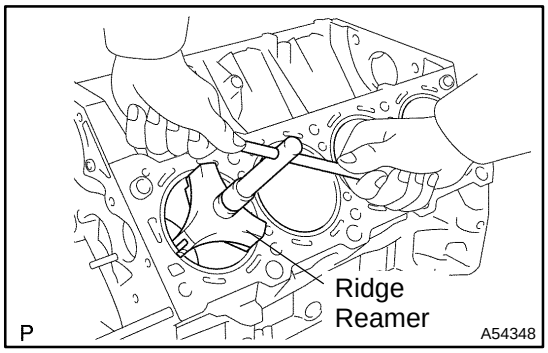
Crankshaft crank pin diameter:

Mark 1	51.994 - 52.000 mm (2.0470 - 2.0472 in.)
Mark 2	51.988 - 51.994 mm (2.0468 - 2.0470 in.)
Mark 3	51.982 - 51.988 mm (2.0465 - 2.0468 in.)

Standard sized bearing center wall thickness:

Mark 2	1.487 - 1.490 mm (0.0585 - 0.0587 in.)
Mark 3	1.490 - 1.493 mm (0.0587 - 0.0588 in.)
Mark 4	1.493 - 1.496 mm (0.0588 - 0.0589 in.)
Mark 5	1.496 - 1.499 mm (0.0589 - 0.0590 in.)
Mark 6	1.499 - 1.502 mm (0.0590 - 0.0591 in.)
Mark 7	1.502 - 1.505 mm (0.0591 - 0.0593 in.)

(j) Completely remove the Plastigage.



5. REMOVE PISTON AND CONNECTING ROD

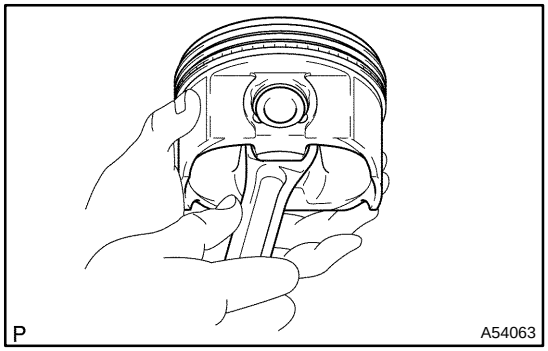
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

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

HINT:

★ Keep the bearings, connecting rod and cap together.

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

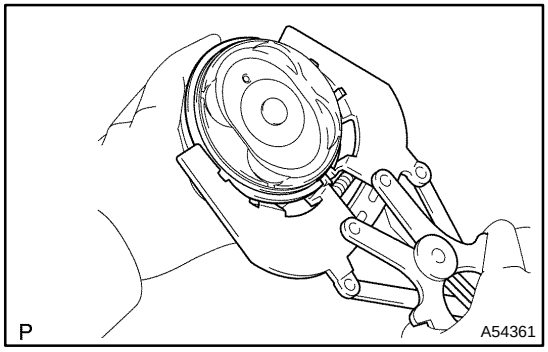


6. REMOVE W/PIN PISTON SUB-ASSY [13101 / 98-11]

(a) Check fit between the piston and piston pin.

(1) Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.

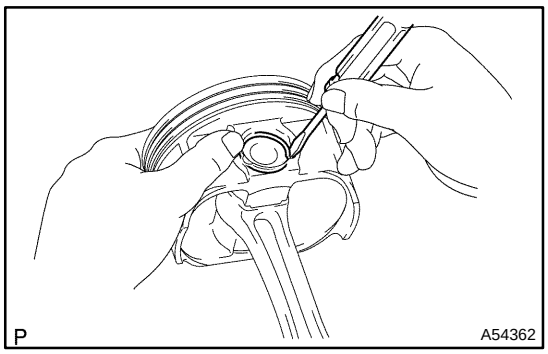


(b) Using a piston ring expander, remove the 2 compression rings.

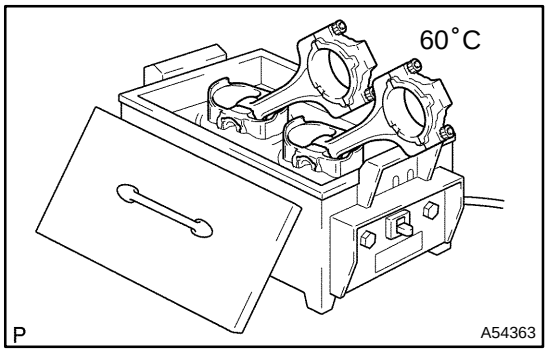
(c) Remove the 2 side rails and oil ring by hand.

HINT:

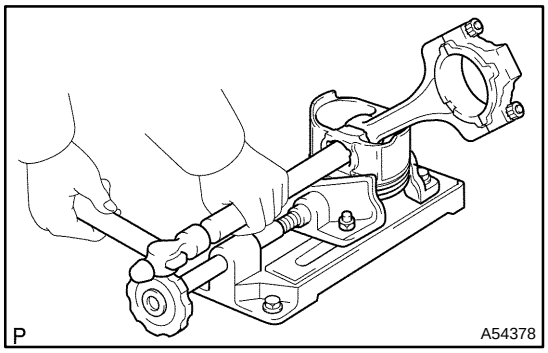
Arrange the piston rings in correct order only.



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



(e) Gradually heat the piston to approx. 60˚C (140˚F).

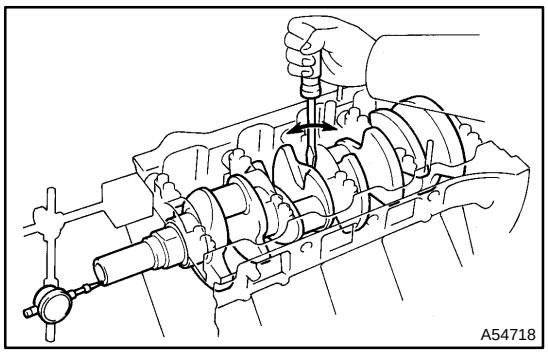


(f) Using a plastic-faced hammer and brass bar, lightly tap out the piston pin and pin and remove the connecting rod.

HINT:

★ The piston and pin are a matched set.

★ Arrange the pistons, pins, rings, connecting rods and bearings in correct order.



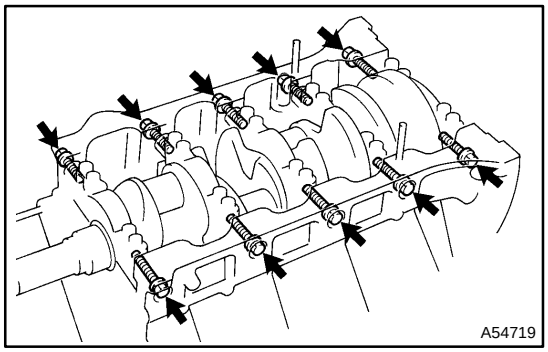
7. INSPECT CRANKSHAFT THRUST CLEARANCE

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

Standard thrust clearance:
0.020 - 0.220 mm (0.0008 - 0.0087 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)

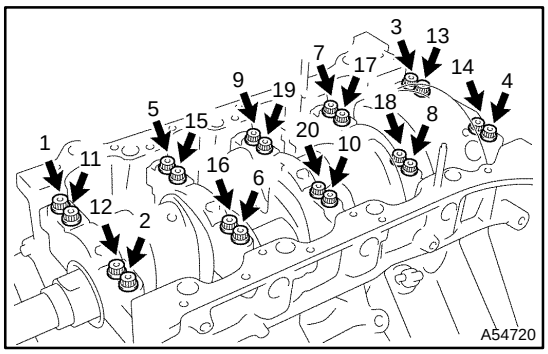
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:
2.440 - 2.490 mm (0.0961 - 0.0980 in.)

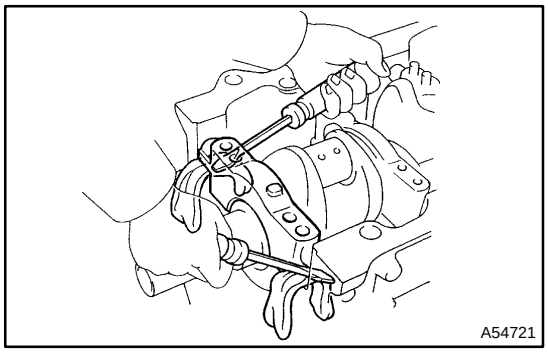


8. INSPECT CRANKSHAFT OIL CLEARANCE

(a) Remove the 10 crankshaft bearing cap bolts.



(b) Uniformly loosen and remove the 20 crankshaft bearing cap bolts in several passes, in the sequence shown.



(c) Using 2 screwdrivers, pry out the crankshaft bearing cap, and remove the 5 crankshaft bearing caps, 5 lower bearings and 2 lower thrust washers (No. 3 crankshaft bearing cap only).

NOTICE:

Be careful not to damage the cylinder block.

HINT:

★ Keep the lower bearing and bearing cap together.

★ Arrange the bearing caps and lower thrust washers in correct order.

(d) Lift out the crankshaft.

(e) Remove the 2 upper thrust washers.

HINT:

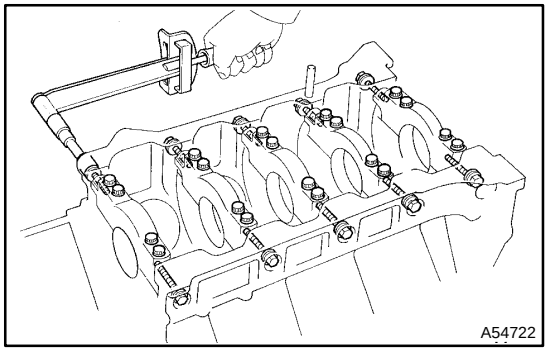
★ Arrange the upper thrust washers in correct order.

★ Keep the upper bearings together with the cylinder block.

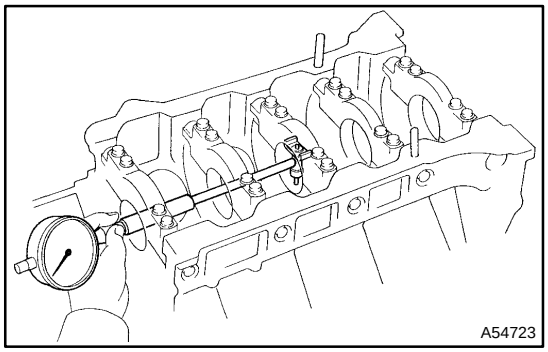
(f) Clean each crankshaft journal and bearing.

(g) Check each crankshaft journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(h) Install the 10 crankshaft bearings and 5 crankshaft bearing caps with the 30 bolts (See step 26). Do not install the crankshaft.



(i) Using a cylinder gauge, measure the inside diameter of the crankshaft bearing.

Bearing inside diameter:

66.986 - 67.000 mm (2.6372 - 2.6378 in.)

(j) Measure the diameter of the crankshaft journal (See step 17).

(k) Subtract the crankshaft journal diameter measurement from the crankshaft bearing inside diameter measurement.

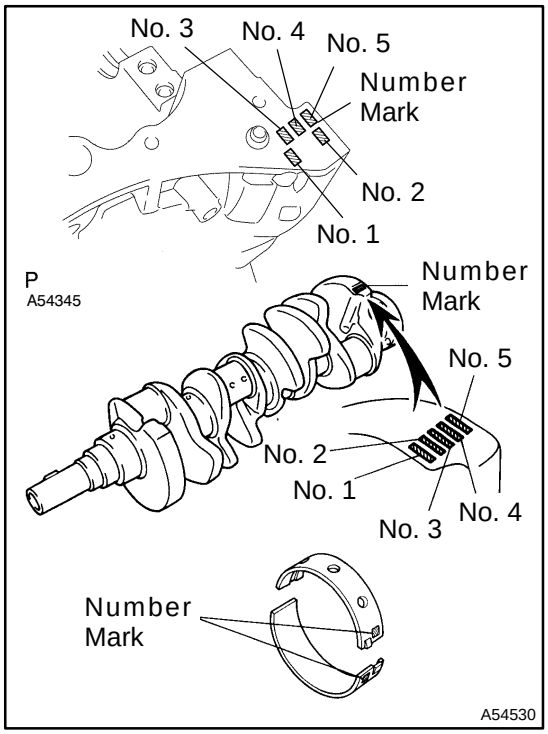
Standard clearance:

No. 1 and No. 5	0.017 - 0.033 mm (0.0007 - 0.0013 in.)
Others	0.029 - 0.045 mm (0.0011 - 0.0018 in.)

Maximum clearance:

No. 1 and No. 5	0.043 mm (0.0017 in.)
Others	0.055 mm (0.0022 in.)

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



HINT:
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, then refer to the table below for the appropriate bearing number. There are 5 sizes of the standard bearings. For No. 1 and No. 5 position bearings, use bearings marked 3, 4, 5, 6 and 7. For others position bearings, use bearings marked 1, 2, 3, 4 and 5.

No. 1, No. 5:

-		Use bearing	
	(A) + (B)	Upper	Lower
Cylinder block (A) + Crankshaft (B)	0 - 5	3	3
	6 - 8	3	4
	9 - 11	4	4
	12 - 14	4	5
	15 - 17	5	5
	18 - 20	5	6
	21 - 23	6	6
	24 - 26	6	7
	27 - 28	7	7

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06” =
Total number 14 (Use bearing ”4” (Upper), ”5” (Lower))

Others:

-		Use bearing	
	(A) + (B)	Upper	Lower
Cylinder block (A) + Crankshaft (B)	0 - 5	1	1
	6 - 8	1	2
	9 - 11	2	2
	12 - 14	2	3
	15 - 17	3	3
	18 - 20	3	4
	21 - 23	4	4
	24 - 26	4	5
	27 - 28	5	5

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06” =
Total number 14 (Use bearing ”2” (Upper), ”3” (Lower))

Reference

Cylinder block crankshaft journal bore diameter (A):

Mark 00	72.000 mm (2.8346 in.)
Mark 01	72.001 mm (2.8347 in.)
Mark 02	72.002 mm (2.8347 in.)
Mark 03	72.003 mm (2.8348 in.)
Mark 04	72.004 mm (2.8348 in.)
Mark 05	72.005 mm (2.8348 in.)
Mark 06	72.006 mm (2.8349 in.)
Mark 07	72.007 mm (2.8349 in.)
Mark 08	72.008 mm (2.8350 in.)
Mark 09	72.009 mm (2.8350 in.)
Mark 10	72.010 mm (2.8350 in.)
Mark 11	72.011 mm (2.8351 in.)
Mark 12	72.012 mm (2.8351 in.)
Mark 13	72.013 mm (2.8352 in.)
Mark 14	72.014 mm (2.8352 in.)
Mark 15	72.015 mm (2.8352 in.)
Mark 16	72.016 mm (2.8353 in.)

Crankshaft crankshaft journal diameter (B):

Mark 00	67.000 mm (2.6378 in.)
Mark 01	66.999 mm (2.6378 in.)
Mark 02	66.998 mm (2.6377 in.)
Mark 03	66.997 mm (2.6377 in.)
Mark 04	66.996 mm (2.6376 in.)
Mark 05	66.995 mm (2.6376 in.)
Mark 06	66.994 mm (2.6376 in.)
Mark 07	66.993 mm (2.6375 in.)
Mark 08	66.992 mm (2.6375 in.)
Mark 09	66.991 mm (2.6374 in.)
Mark 10	66.990 mm (2.6374 in.)
Mark 11	66.989 mm (2.6374 in.)
Mark 12	66.988 mm (2.6373 in.)

Standard bearing center wall thickness:

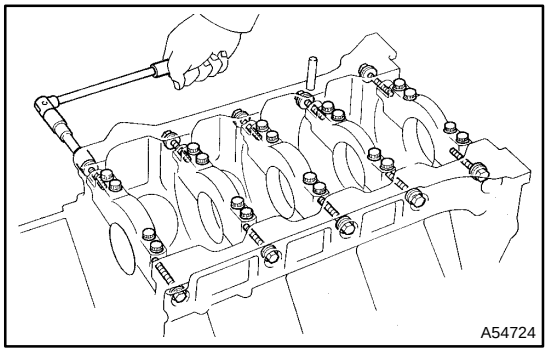
No. 1 and No. 5

Mark 3	2.492 - 2.495 mm (0.0981 - 0.0982 in.)
Mark 4	2.495 - 2.498 mm (0.0982 - 0.0983 in.)
Mark 5	2.498 - 2.501 mm (0.0983 - 0.0985 in.)
Mark 6	2.501 - 2.504 mm (0.0985 - 0.0986 in.)
Mark 7	2.504 - 2.507 mm (0.0986 - 0.0987 in.)

Others

Mark 1	2.486 - 2.489 mm (0.0979 - 0.0980 in.)
Mark 2	2.489 - 2.492 mm (0.0980 - 0.0981 in.)
Mark 3	2.492 - 2.495 mm (0.0981 - 0.0982 in.)

Mark 4	2.495 - 2.498 mm (0.0982 - 0.0983 in.)
Mark 5	2.498 - 2.501 mm (0.0983 - 0.0985 in.)



(l) Remove the 10 bolts, 20 nuts, 5 crankshaft bearing caps and 5 lower crankshaft bearing (See steps (a) to (c) above).

(m) Remove the 5 upper crankshaft bearings from the cylinder block.

HINT:

Arrange the bearing caps, bearings and thrust washers in correct order.

9. INSPECT CYLINDER BLOCK SUB-ASSY [11401 / 98-7]

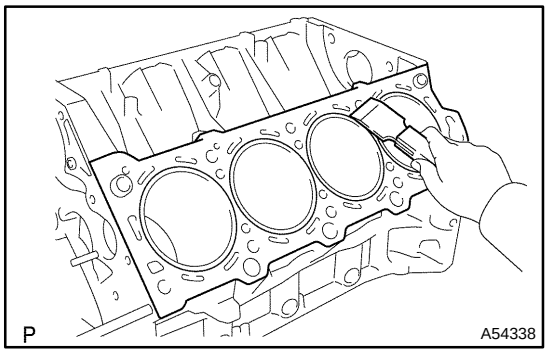
(a) Clean the cylinder block.

(1) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

(2) Using a soft brush and solvent, thoroughly clean the cylinder block.

NOTICE:

If the cylinder is washed at high temperatures, the cylinder liner sticks out beyond the cylinder block, so always wash the cylinder block at a temperature of 45˚ or less.

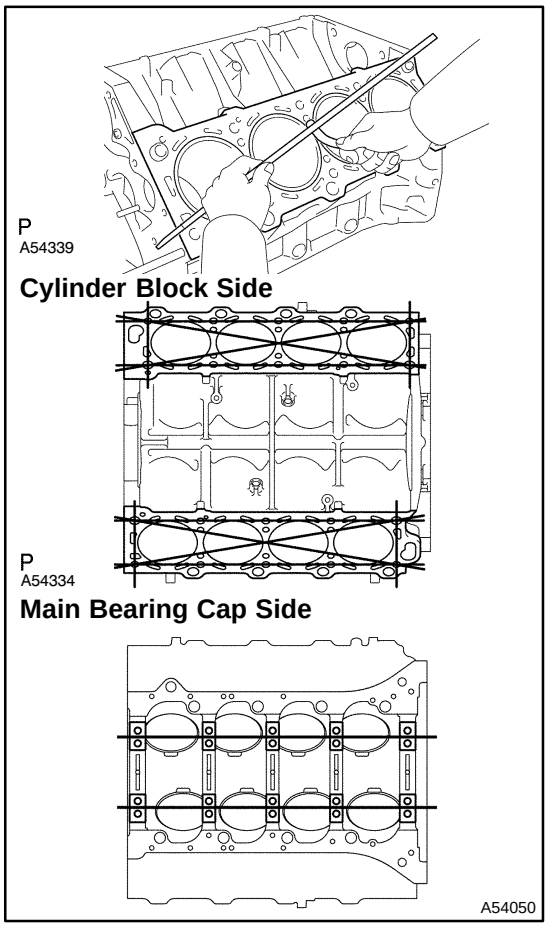


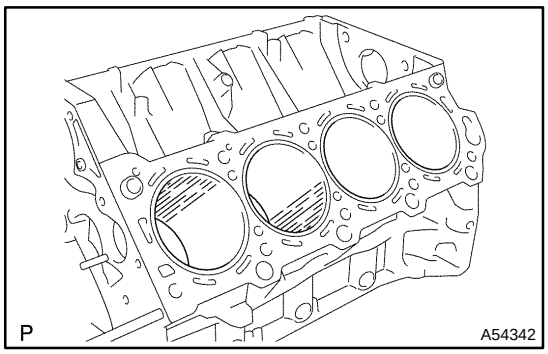
(b) Inspect for flatness.

(1) Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head and main bearing cap for warpage.

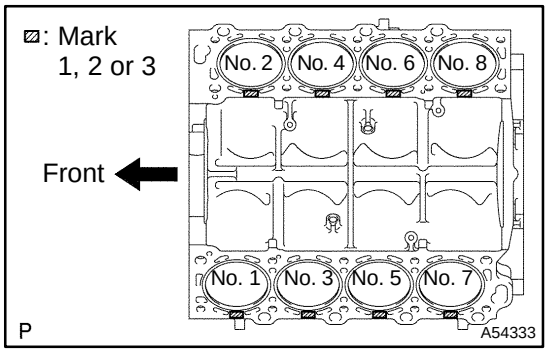
Maximum warpage: 0.07 mm (0.0028 in.)

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

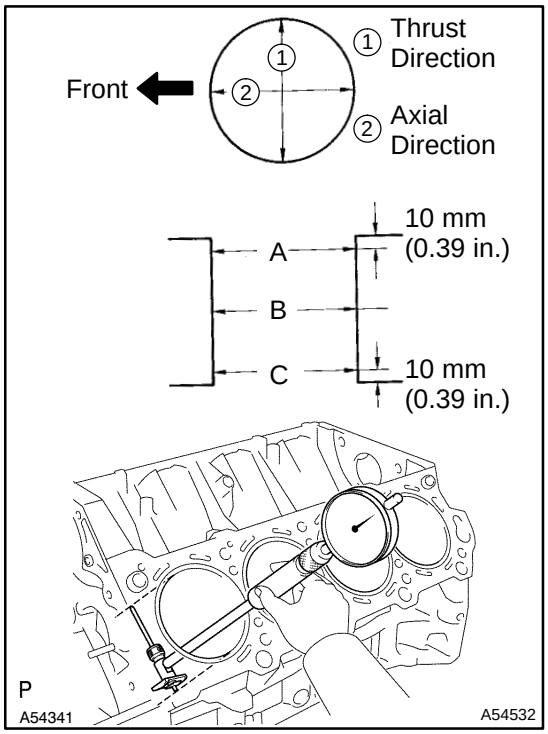




(c) Visually check the cylinder for vertical scratches.
If deep scratches are present, replace the cylinder block sub-assy.



(d) Inspect the cylinder bore diameter.
HINT:
There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.
If deep scratches are present, replace the cylinder block sub-assy.



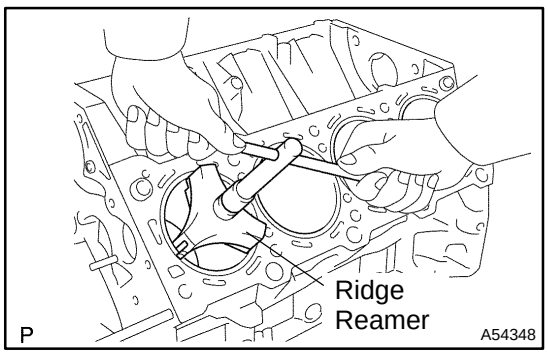
(1) Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

Standard diameter:

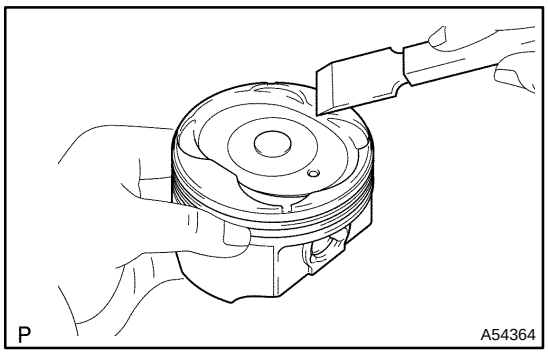
Mark 1	91.000 - 91.008 mm (3.5827 - 3.5830 in.)
Mark 2	91.008 - 91.021 mm (3.5830 - 3.5835 in.)
Mark 3	91.021 - 91.029 mm (3.5835 - 3.5838 in.)

Maximum diameter: 91.229 mm (3.5917 in.)

If the diameter is greater than maximum, replace the cylinder block sub-assy.



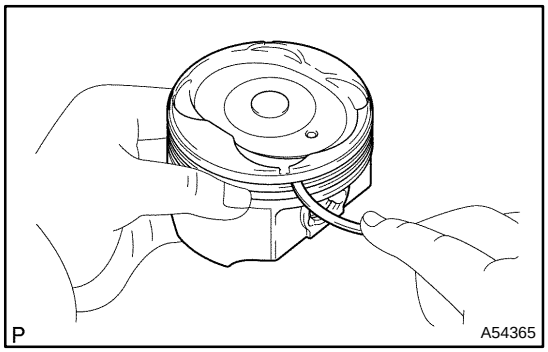
(e) Remove the cylinder ridge.
If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



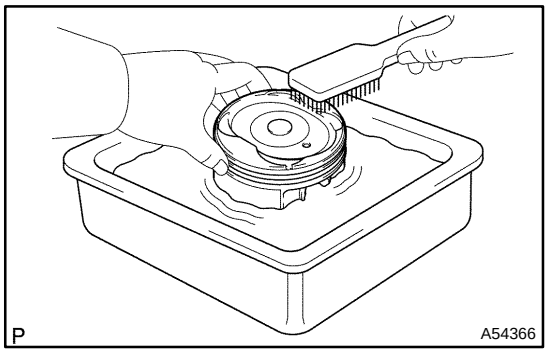
10. INSPECT W/PIN PISTON SUB-ASSY
[13101 / 98-11]

(a) Clean the piston.

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

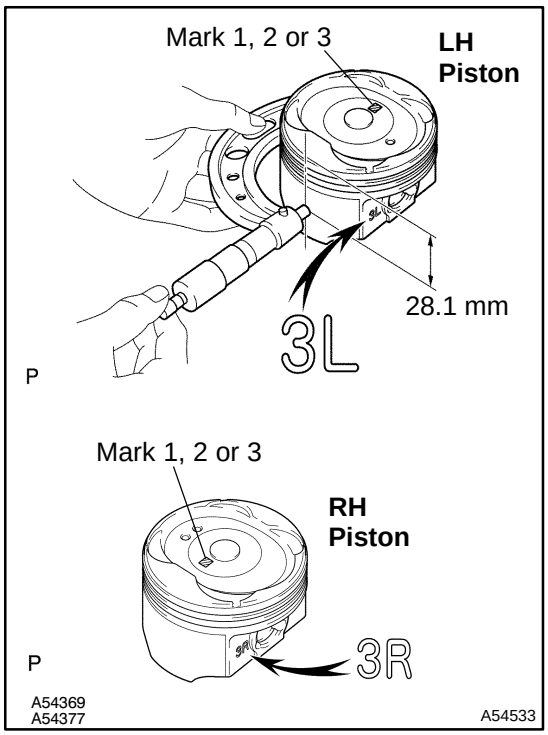


(2) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



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

NOTICE:
Do not use a wire brush.



(b) Inspect the piston oil clearance.

HINT:
There are 3 sizes of the standard piston diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the piston top.

(1) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 28.1 mm (1.106 in.) from the piston head.

Piston diameter:

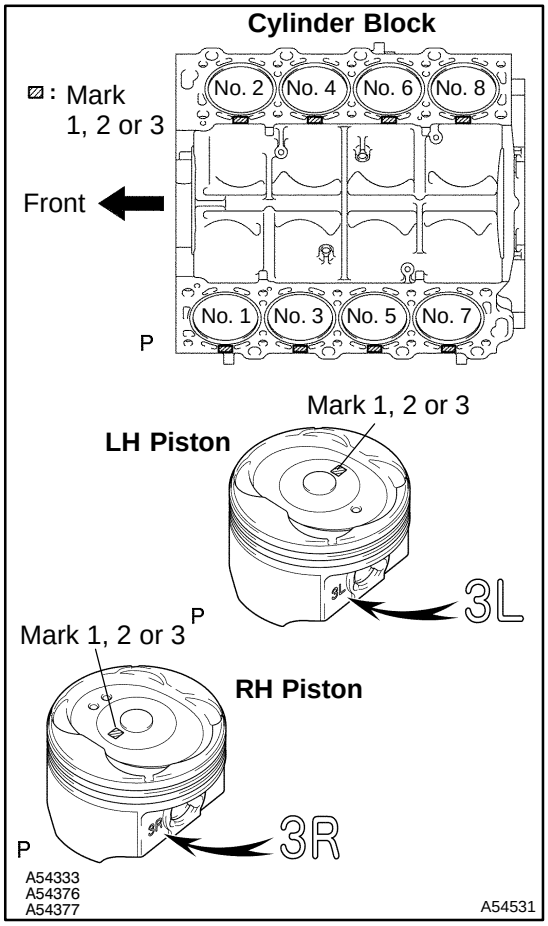
Mark 1	90.910 - 90.920 mm (3.5791 - 3.5795 in.)
Mark 2	90.920 - 90.928 mm (3.5795 - 3.5798 in.)
Mark 3	90.928 - 90.938 mm (3.5798 - 3.5802 in.)

(2) Measure the cylinder bore diameter in the thrust directions (See step 2 above).

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

Standard oil clearance:
0.080 - 0.101 mm (0.0031 - 0.0040 in.)
Maximum oil clearance: 0.121 mm (0.0048 in.)

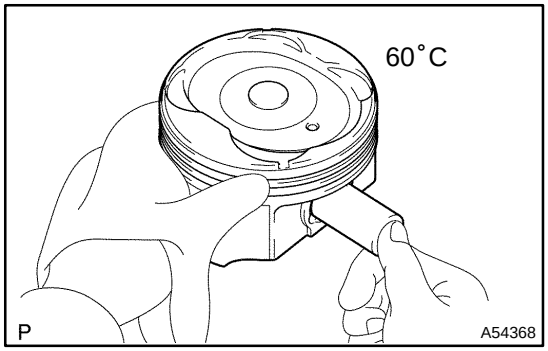
If the oil clearance is greater than maximum, replace all the 8 pistons. If necessary, replace the cylinder block sub-assy.



HINT:

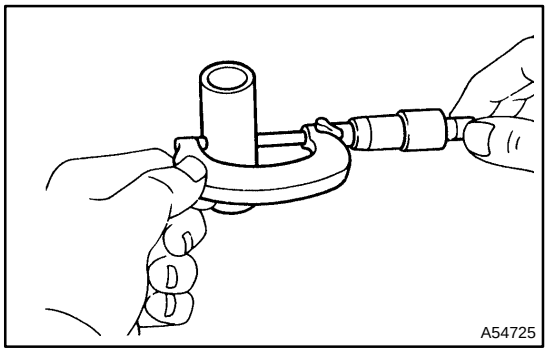
Use a new cylinder block:

- ★ Use a piston with the same number mark as the cylinder diameter marked on the cylinder block.
- ★ The shape of the piston varies for the LH and RH banks. The LH piston is marked with ”3L”, the RH piston with ”3R”.



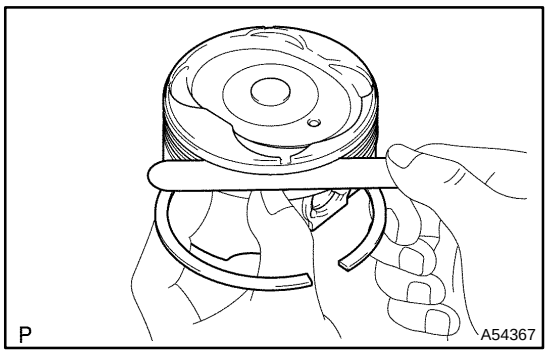
(c) Inspect the piston pin fit.

(1) At 60˚C (140˚F), you should be able to push the piston pin into the piston pin hole with your thumb.



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

Piston pin diameter:
21.997 - 22.006 mm (0.8660 - 0.8664 in.)



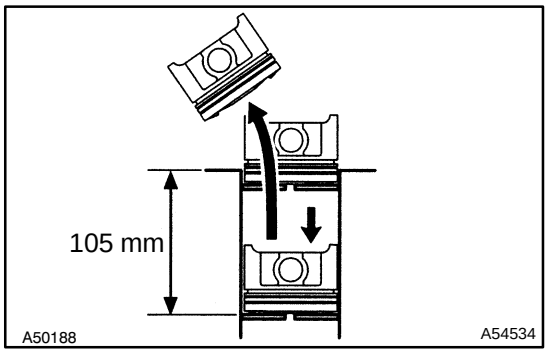
11. INSPECT PISTON RING SET
[98-111 / 98-11]

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

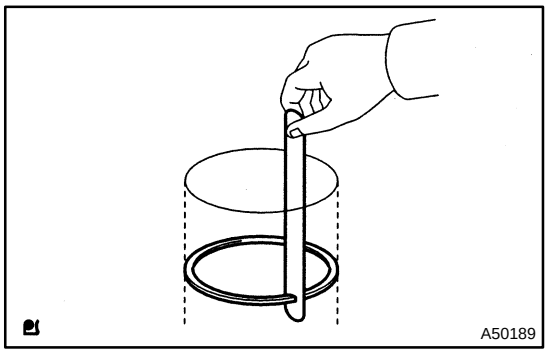
Ring groove clearance:

No.1	0.030 - 0.080 mm (0.0012 - 0.0031 in.)
No.2	0.020 - 0.060 mm (0.0008 - 0.0024 in.)

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



(b) Inspect the piston ring end gap.
(1) Insert the piston ring into the cylinder bore.
(2) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



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

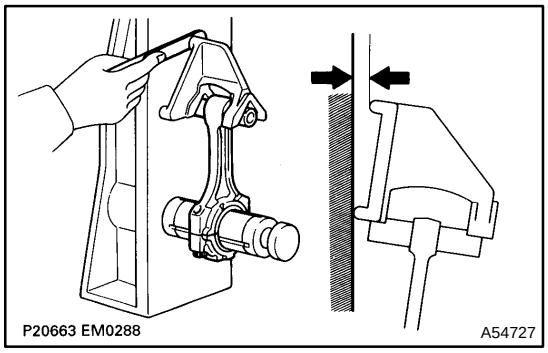
Standard end gap:

No. 1	0.300 - 0.500 mm (0.0118 - 0.0197 in.)
No. 2	0.400 - 0.600 mm (0.0157 - 0.0236 in.)
Oil (Side rail)	0.150 - 0.500 mm (0.0059 - 0.0197 in.)

Maximum end gap:

No. 1	1.10 mm (0.0433 in.)
No. 2	1.20 mm (0.0472 in.)
Oil (Side rail)	1.10 mm (0.0433 in.)

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

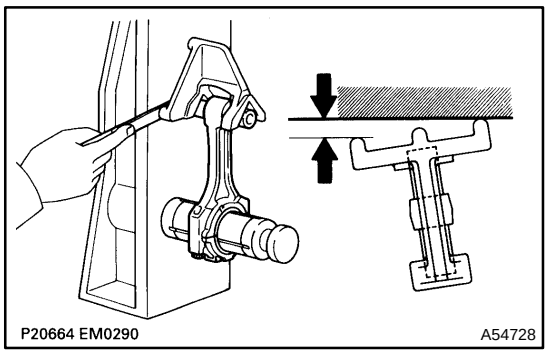


12. INSPECT CONNECTING ROD SUB-ASSY
[13201 / 98-11]

(a) Using a rod aligner and feeler gauge, check the connecting rod alignment.
(1) Check for bend.

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

If bend is greater than maximum, replace the connecting rod sub-assy .

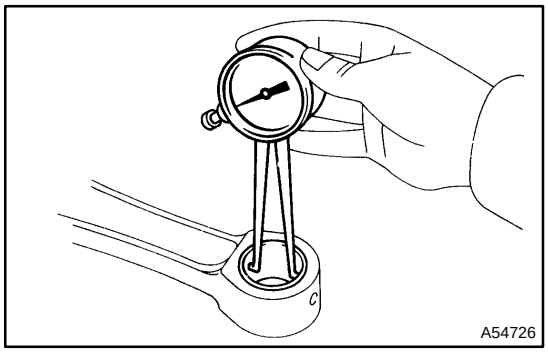


(2) Check for twist

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

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



13. INSPECT PISTON PIN OIL CLEARANCE

(a) Inspect the piston pin oil clearance.

(1) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter:

22.005 - 22.014 mm (0.8663 - 0.8667 in.)

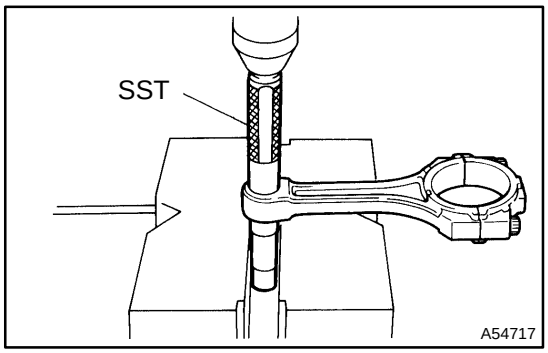
(2) Subtract the piston pin diameter measurement (See step 10) from the bush inside diameter measurement.

Standard oil clearance:

0.005 - 0.011 mm (0.0002 - 0.0004 in.)

Maximum oil clearance: 0.05 mm (0.0020 in.)

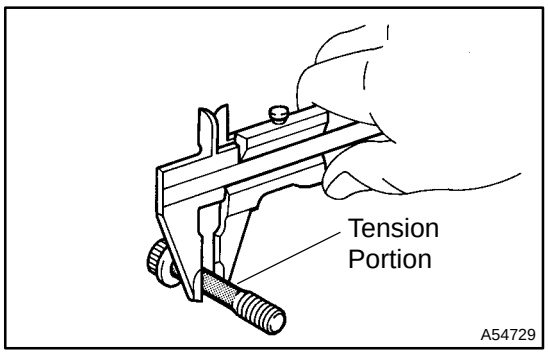
If the oil clearance is greater than maximum, replace the bush. If necessary, replace the piston and piston pin as a set.



14. REMOVE CONNECTING ROD SMALL END BUSH [13201A / 98-11]

(a) Using SST and a press, press out the bush.

SST 09222-30010



15. INSPECT CONNECTING ROD BOLT [13265 / 98-11]

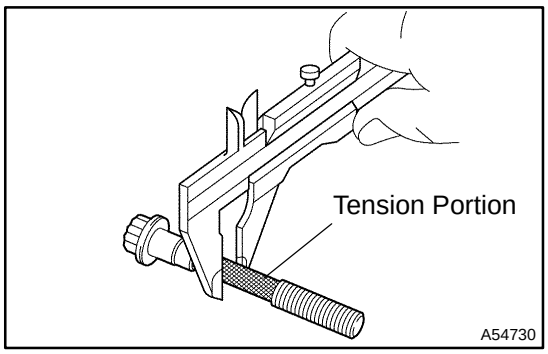
(a) Using vernier calipers, measure the tension portion of the connecting rod bolt.

Standard diameter:

7.200 - 7.300 mm (0.2835 - 0.2874 in.)

Minimum diameter: 7.00 mm (0.2756 in.)

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

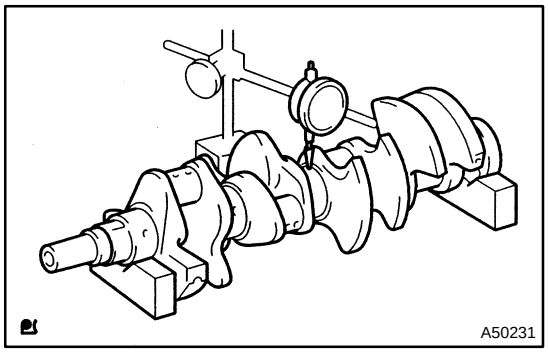


16. INSPECT CRANKSHAFT BEARING CAP BOLT

(a) Using vernier calipers, measure the tension portion diameter of the main bearing cap bolt.

Standard diameter:
7.500 - 7.600 mm (0.2953 - 0.2992 in.)
Minimum diameter: 7.20 mm (0.2835 in.)

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

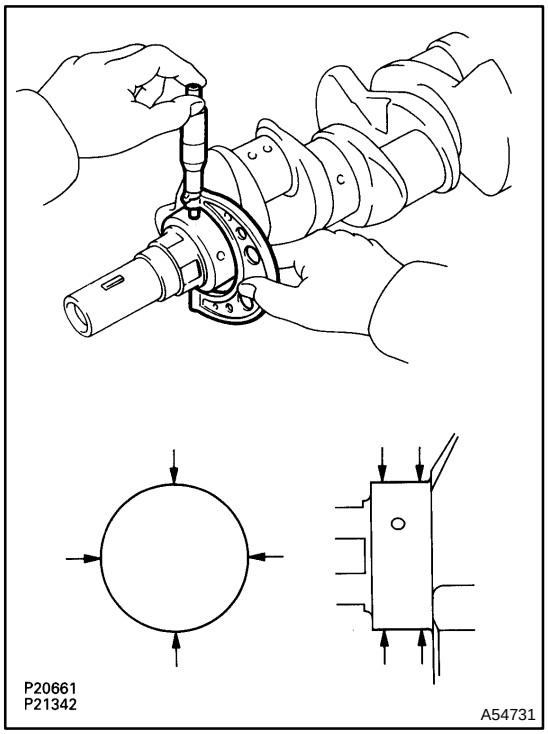


17. INSPECT CRANKSHAFT
[13411 / 98-11]

(a) Inspect for circle runout.
  (1) Place the crankshaft on V-blocks.
  (2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.08 mm (0.0031 in.)

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



(b) Inspect the main journals and crank pins.
  (1) Using a micrometer, measure the diameter of each main journal and crank pin.

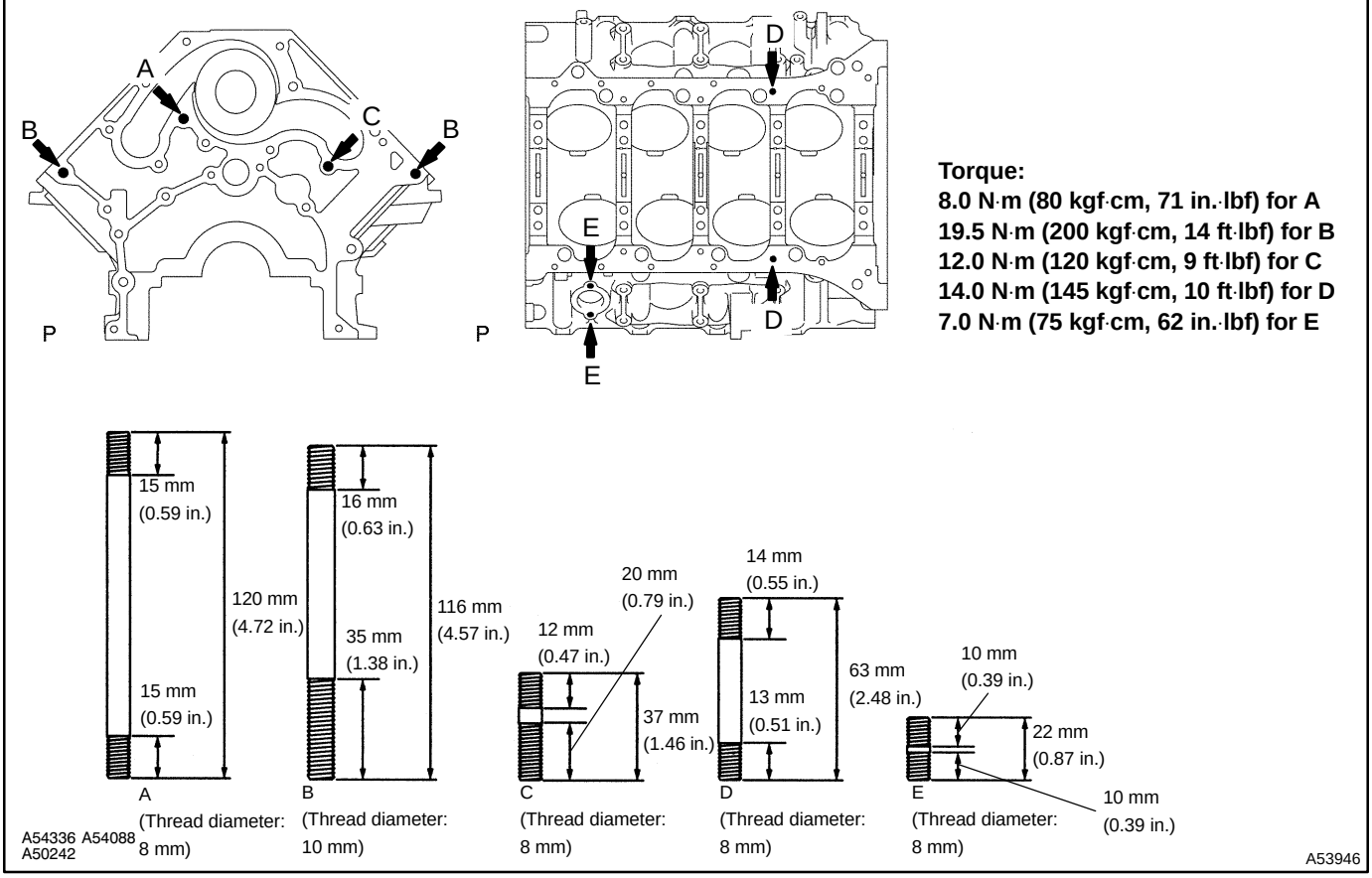
Main journal diameter:
66.988 - 67.000 mm (2.6373 - 2.6378 in.)
Crank pin diameter:
51.982 - 52.000 mm (2.0465 - 2.0472 in.)

If the diameter is not as specified, check the oil clearance (See steps 4 and 8). If necessary, replace the crankshaft.
  (2) Check each main journal and crank pin for taper and out-of-round as shown.

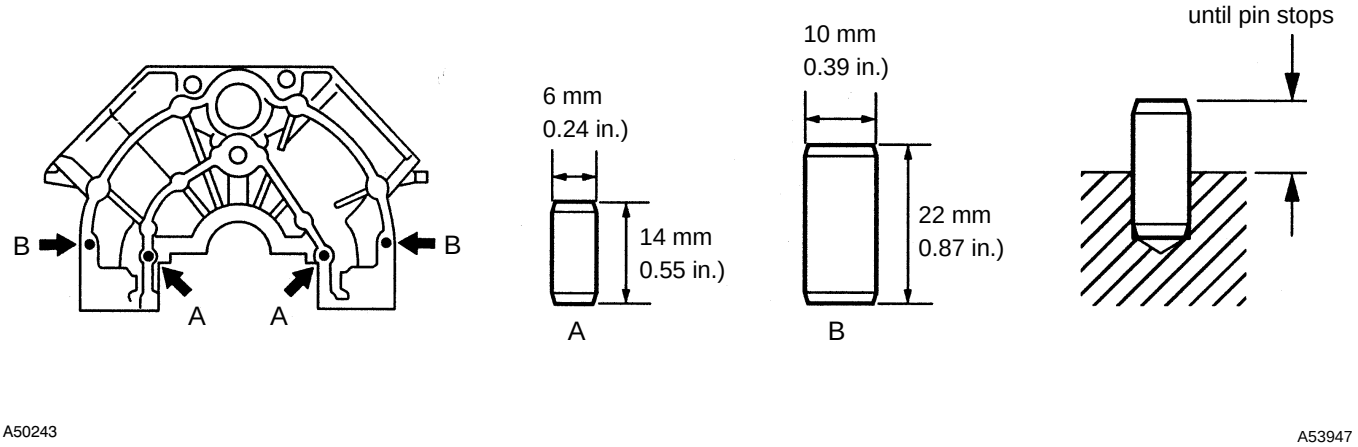
Maximum taper and out-of-round:
0.02 mm (0.0008 in.)

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

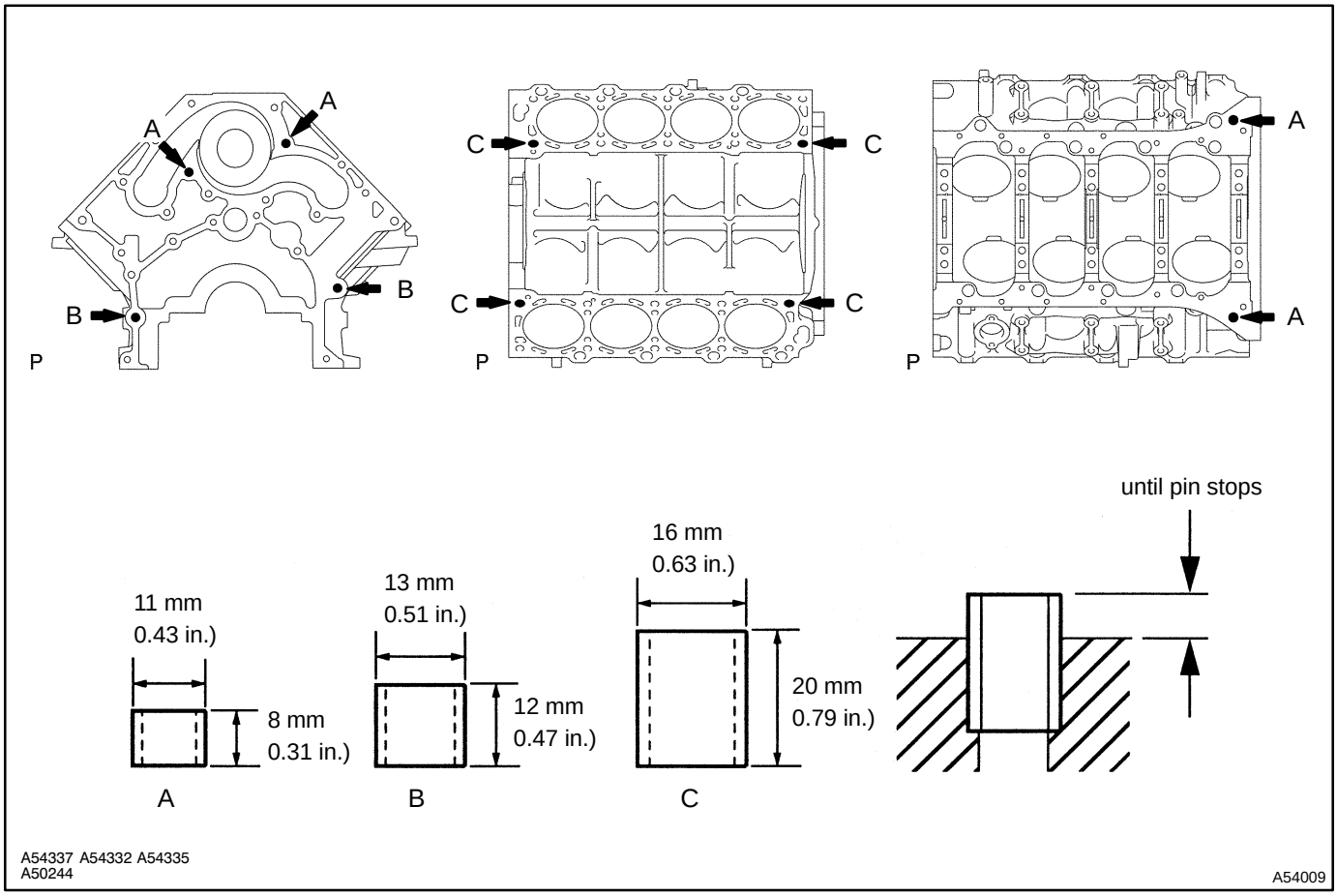
18. INSTALL STUD BOLT

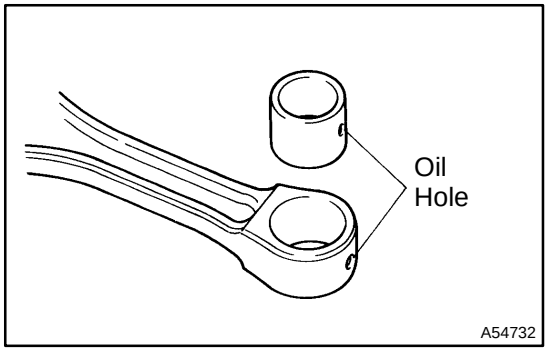


19. INSTALL STRAIGHT PIN



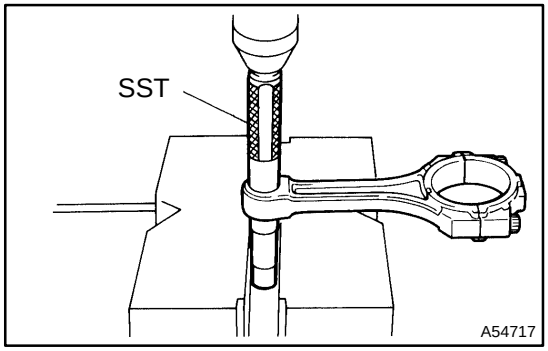
20. INSTALL RING PIN



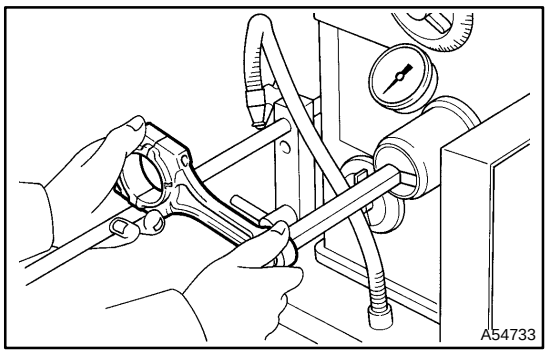


21. INSTALL CONNECTING ROD SMALL END BUSH [13201A / 98-11]

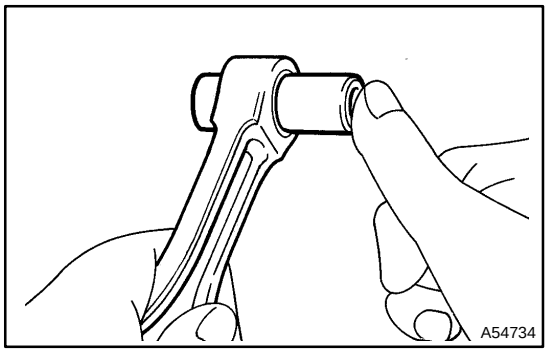
(a) Align the oil holes of a new bushing and the connecting rod.



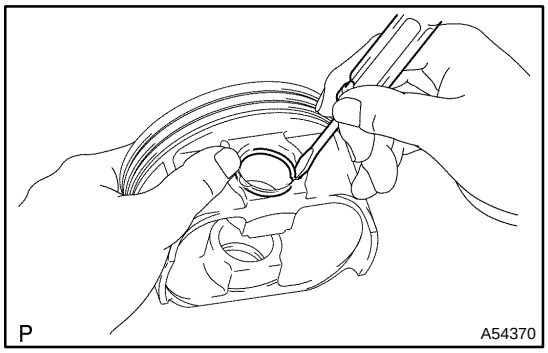
(b) Using SST and a press, press in the bushing.
SST 09222-30010



(c) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (See step 13) between the bushing and piston pin.

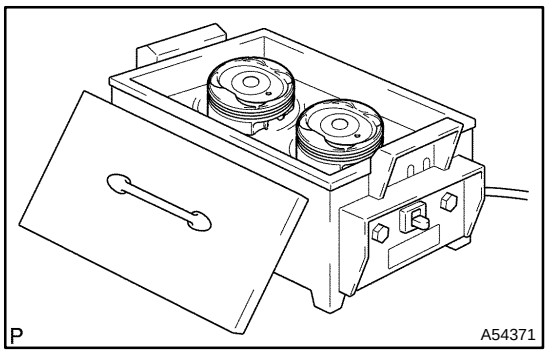


(d) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.

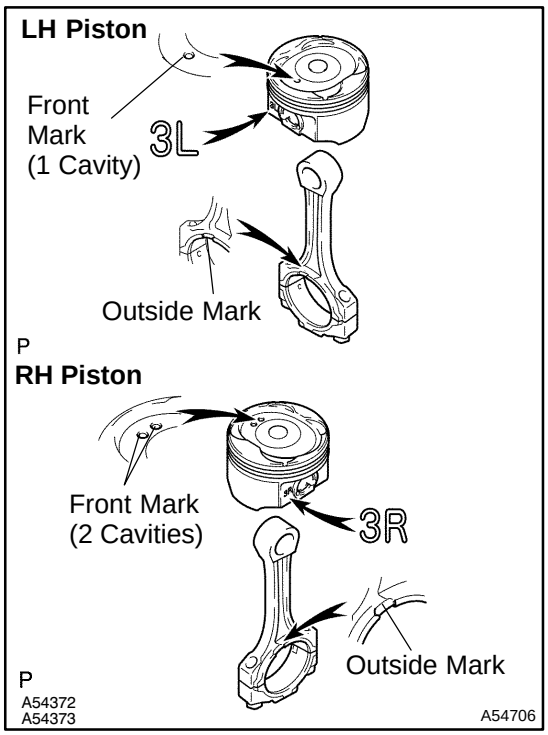


22. INSTALL W/PIN PISTON SUB-ASSY [13101 / 98-11]

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



(b) Gradually heat the piston to about 60˚C (140˚F).



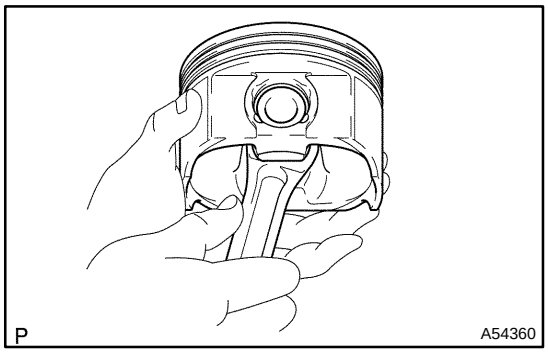
(c) Coat the piston pin with engine oil.

(d) Position the piston front mark with respect to the outside mark on the connecting rod as shown in the diagram.

NOTICE:

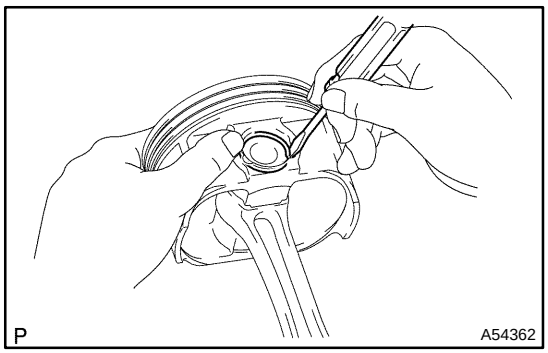
The installation directions of the piston and connecting rod are different for the LH and RH banks. The LH piston is marked with "3L", the RH piston with "3R".

(e) Align the piston pin holes of the piston and connecting rod, and push in the piston pin with your thumb.

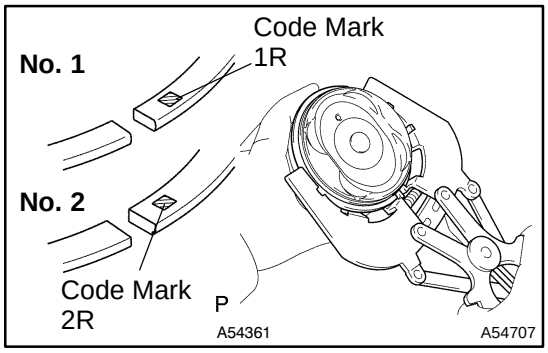


(f) Check fit between the piston and piston pin.

(1) Try to move the piston back and forth on the piston pin.



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

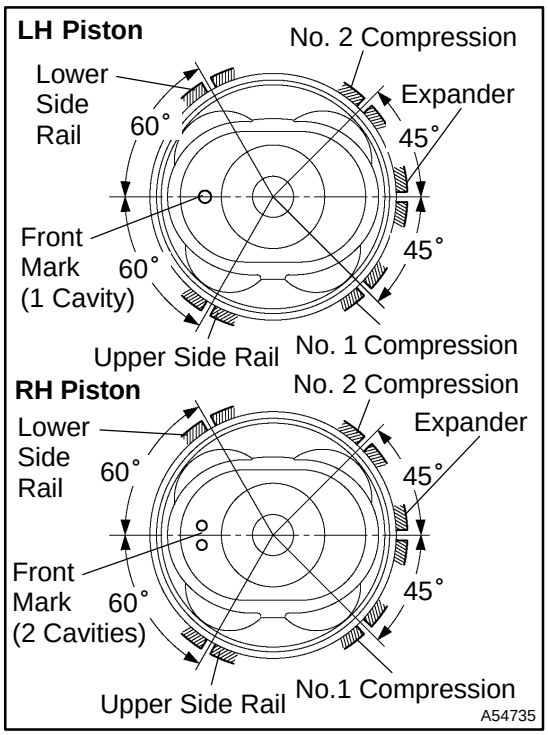


(h) Install the oil ring expander and 2 side rails by hand.

(i) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

Code mark:

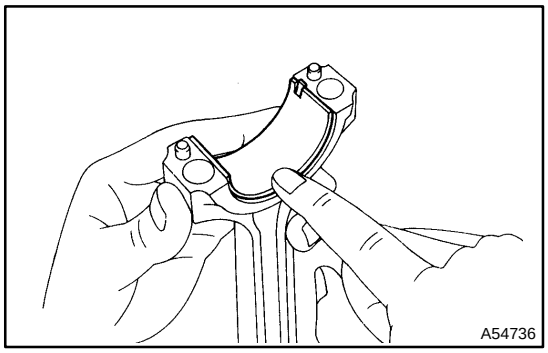
No. 1	1R
No. 2	2R



(j) Position the piston rings so that the ring ends are as shown.

NOTICE:

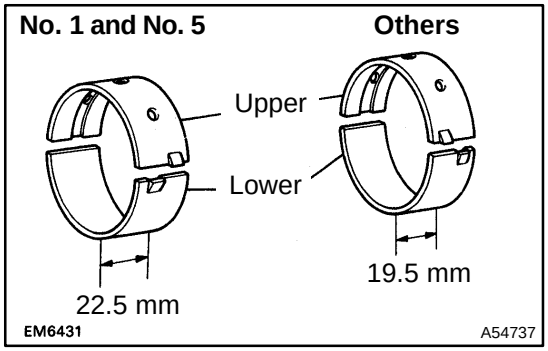
Do not align the ring ends.



23. INSTALL CONNECTING ROD BEARING
[13041 / 98-11]

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.

(b) Install the bearings in the connecting rod and connecting rod cap.



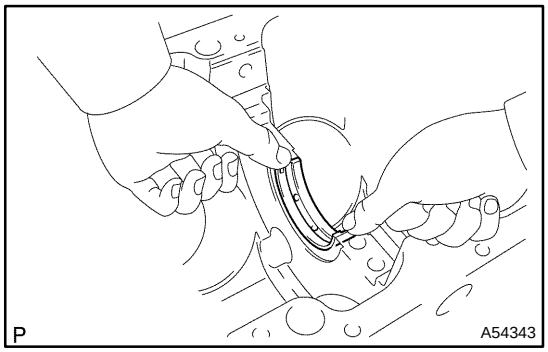
24. INSTALL CRANKSHAFT BEARING
[11711 / 98-11]

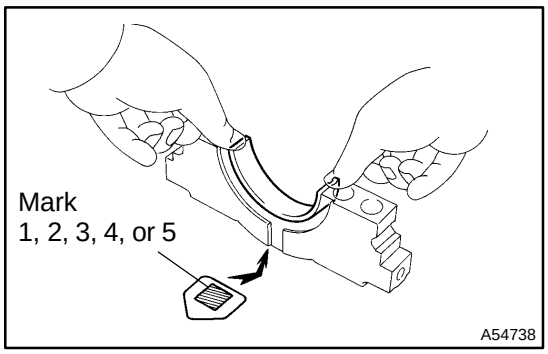
HINT:

★ Main bearings come in widths of 19.5 mm (0.768 in.) and 22.5 mm (0.886 in.). Install the 22.5 mm (0.886 in.) bearings in the No. 1 and No. 5 cylinder block journal positions with the crankshaft bearing cap. Install the 19.5 mm (0.768 in.) bearings in the other positions.

★ Upper bearings have an oil groove and oil holes; lower bearings do not.

(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.

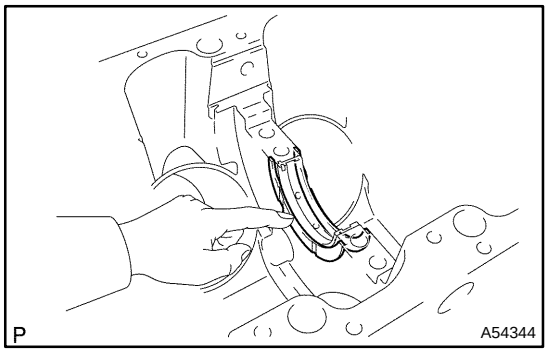




(b) Align the bearing claw with the claw groove of the crankshaft bearing cap, and push in the 5 lower bearings.

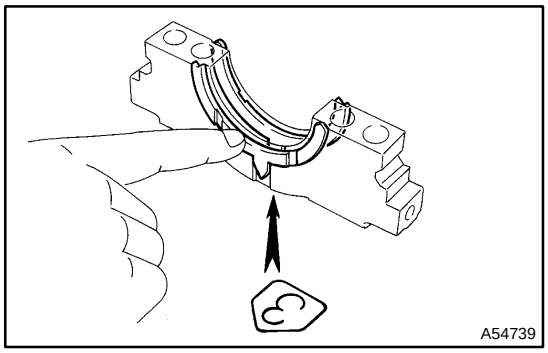
HINT:

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

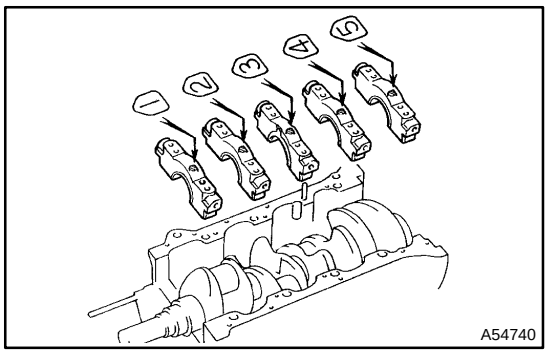


25. INSTALL CRANKSHAFT THRUST WASHER SET [11011 / 98-11]

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



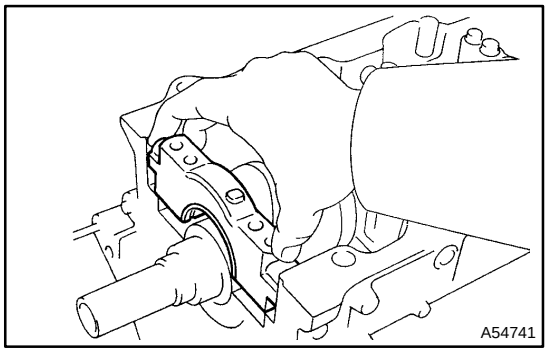
(b) Install the 2 thrust washers on the No. 3 bearing cap with the grooves facing outward.



26. INSTALL CRANKSHAFT [13411 / 98-11]

(a) Place the crankshaft on the cylinder block.

(b) Install the 5 crankshaft bearing caps in their proper locations.

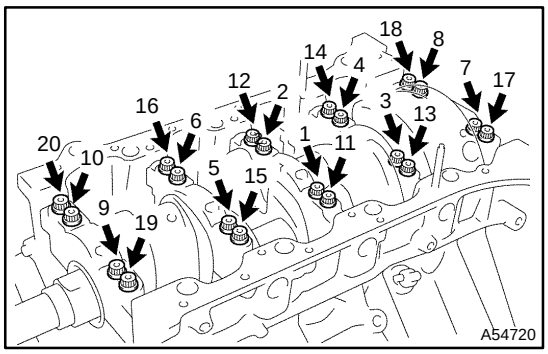


HINT:

Place the bearing caps level and let them return to their original position by their own weight.

NOTICE:

Do not install the bearing cap by tapping it.



(c) Install the crankshaft bearing cap bolts.

HINT:

★ The bearing cap bolts are tightened in 2 progressive steps (steps (2) and (4)).

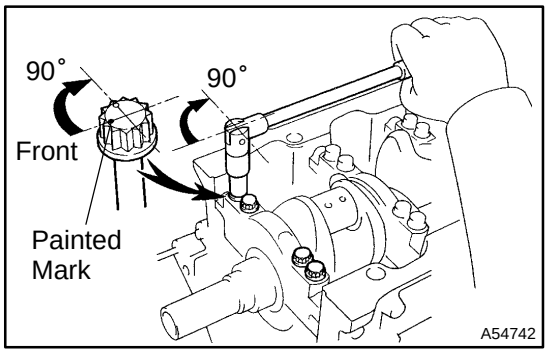
★ If any one of the bearing cap bolts is broken or deformed, replace it.

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

(2) Install and uniformly tighten the 20 crankshaft bearing cap bolts in several passes, in the sequence shown.

Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

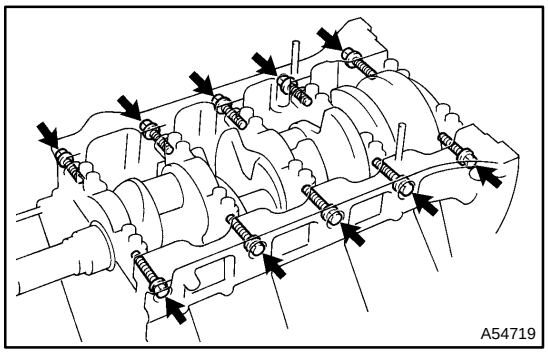
If any one of the bearing cap bolts does not meet the torque specification, replace the bearing cap bolt.



(3) Mark the front of the crankshaft bearing cap bolt with paint.

(4) Retighten the crankshaft bearing cap bolts by 90˚ in the numerical order shown.

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



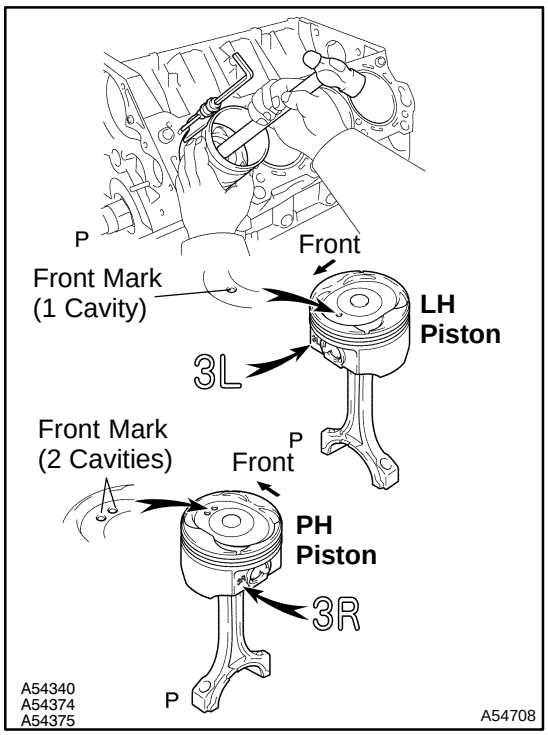
(6) Install a new seal washer to the crankshaft bearing cap bolt.

(7) Install and uniformly tighten the 10 crankshaft bearing cap bolts.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(d) Check that the crankshaft turns smoothly.

(e) Check the crankshaft thrust clearance (See step 7).

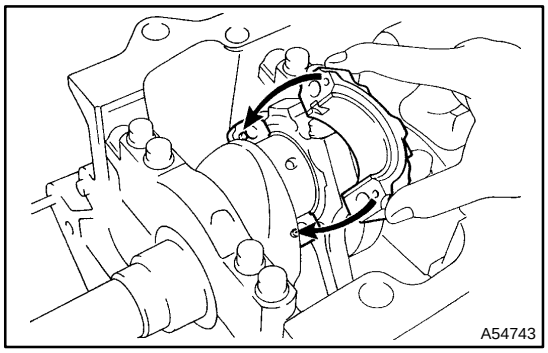


27. INSTALL PISTON AND CONNECTING ROD

(a) 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:

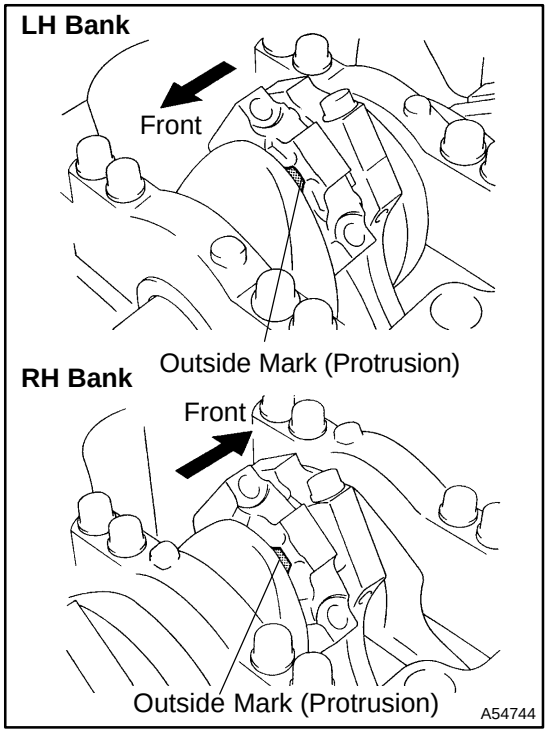
The shape of the piston varies for the LH and RH banks. The LH piston is marked with "3L", the RH piston with "3R".



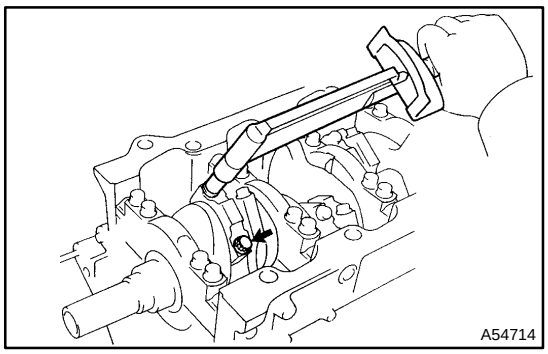
(b) Place the connecting rod cap on the connecting rod.

(1) Match the numbered connecting rod cap with the connecting rod.

(2) Align the pin groove of the connecting rod cap with the pins of the connecting rod, and install the connecting rod cap.



(3) Check that the outside mark of the connecting rod cap is facing in correct direction.



(c) Install the connecting rod cap bolts.

HINT:

★ The connecting rod cap bolts are tightened in 2 progressive steps (steps (2) and (4)).

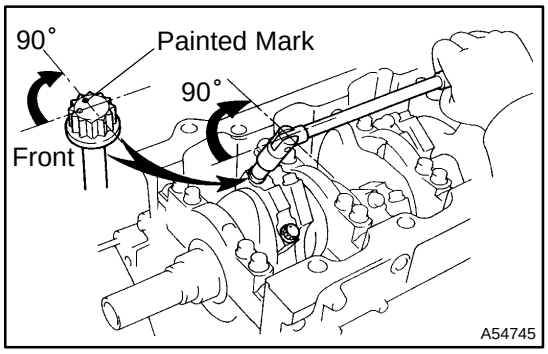
★ If any one of the connecting rod cap bolts is broken or deformed, replace it.

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

(2) Install and alternately tighten the 2 connecting rod cap bolts in several passes.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

If any one of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.



(3) Mark the front of the connecting cap bolt with paint.

(4) Retighten the cap bolts 90˚ as shown.

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

(d) Check that the crankshaft turns smoothly.

(e) Check the connecting rod thrust clearance (See step 3).

28. INSTALL WATER SEAL PLATE

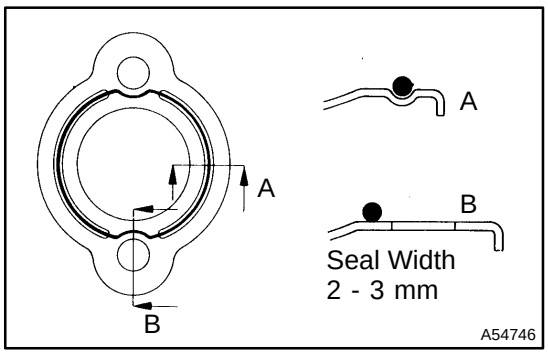
[11492C / 98-7]

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

★ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.

★ Thoroughly clean all components to remove all the loose material.

★ Using a non-residue solvent, clean both sealing surfaces.



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

Seal packing: Part No. 08826-00080 or equivalent

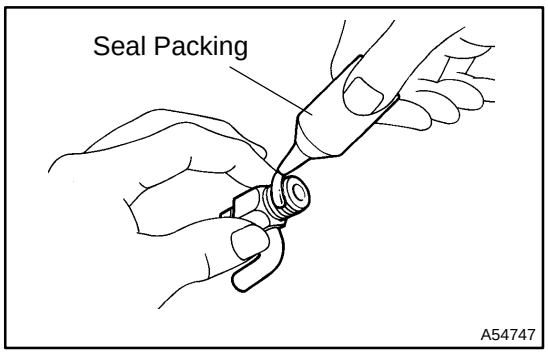
★ Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

★ Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

★ Immediately remove nozzle from the tube and reinstall cap.

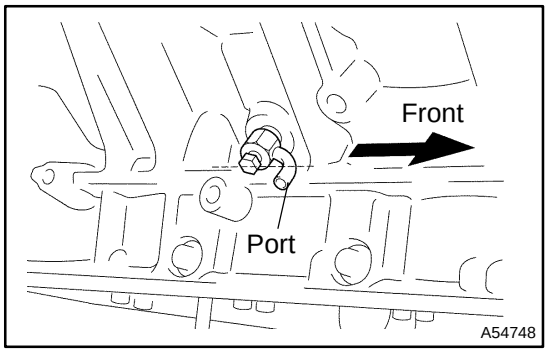
(c) Install the seal plate with the 2 nuts. Alternately tighten the nuts in several passes.

Torque: 14 N·m (145 kgf·cm, 10 ft·lbf)



29. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSY
[11415 / 98-7]

(a) Apply seal packing to 2 or 3 threads.
Seal packing: Part No. 08826-00100 or equivalent



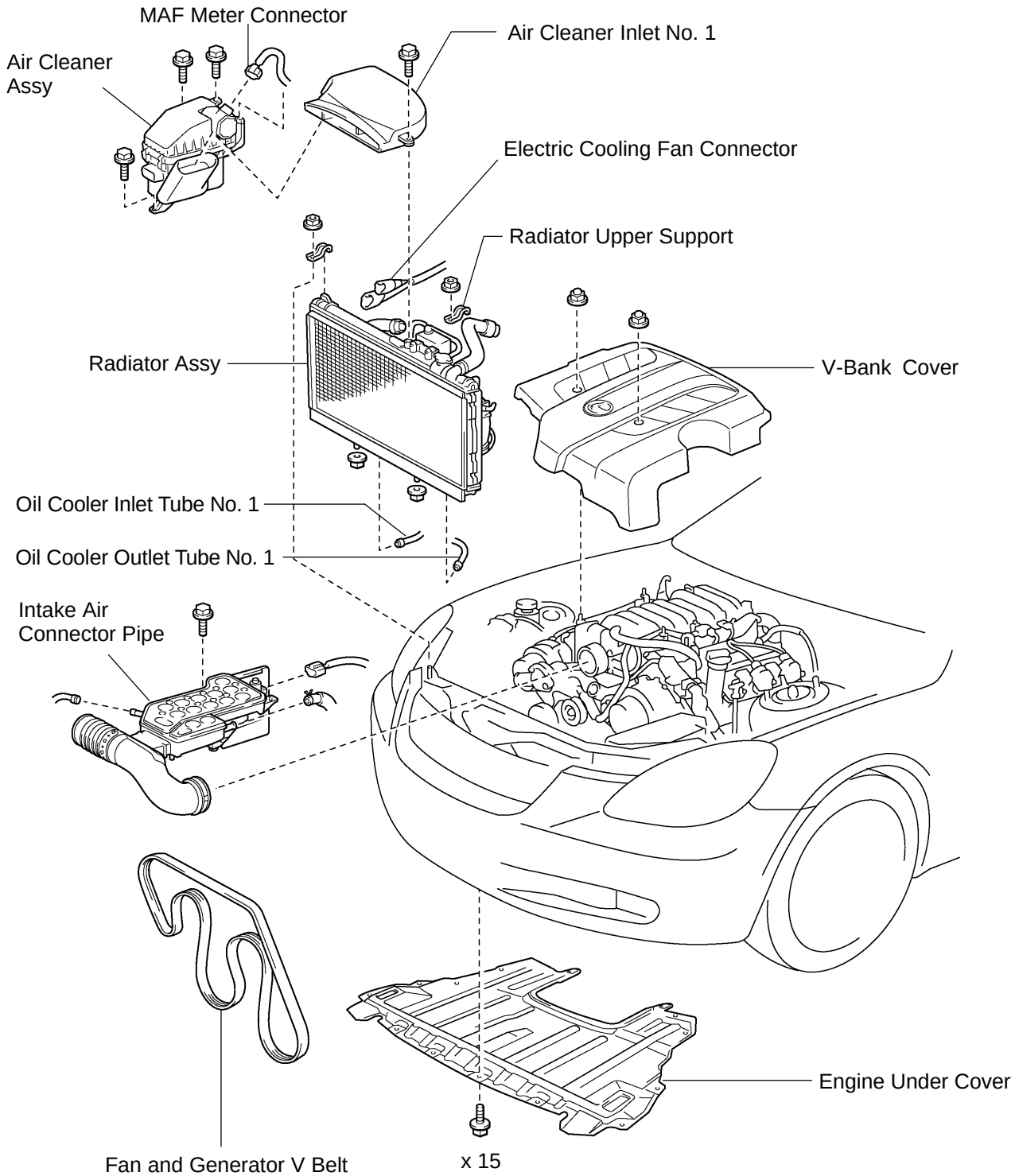
(b) Install the RH and LH drain unions.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

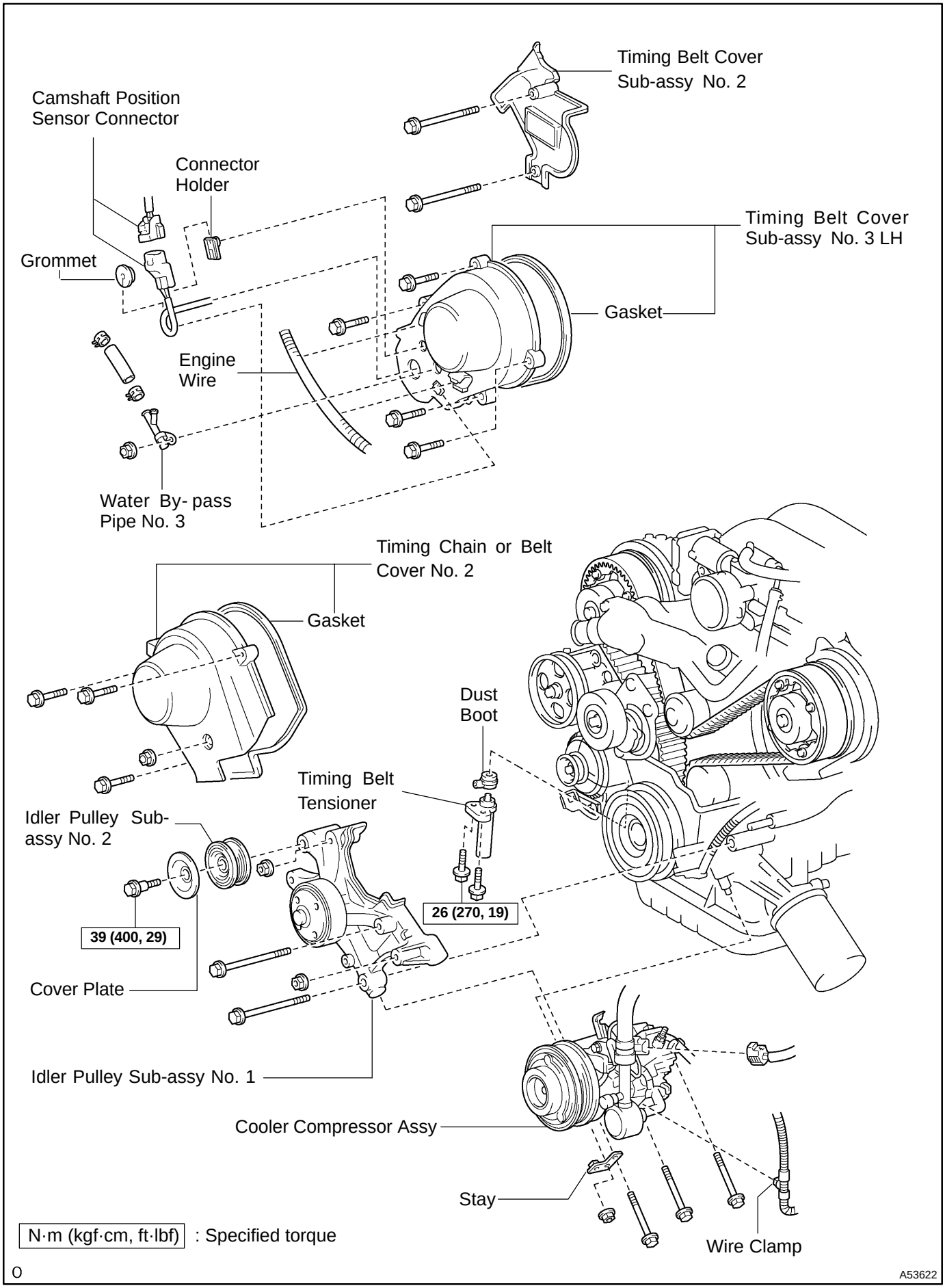
HINT:
After applying the specified torque, rotate the drain union clockwise until its drain port is facing forward.

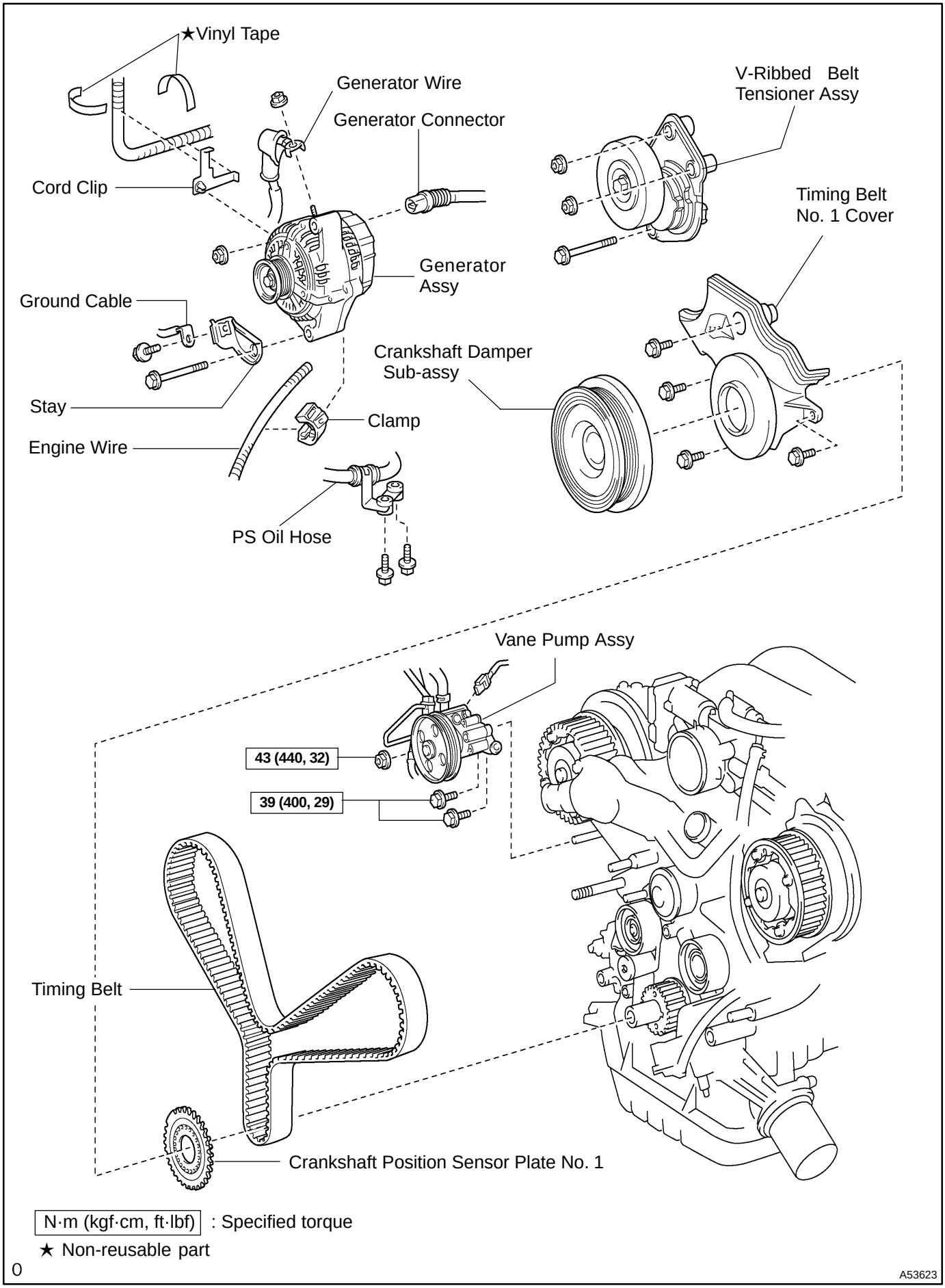
TIMING BELT

COMPONENTS

1406J-02



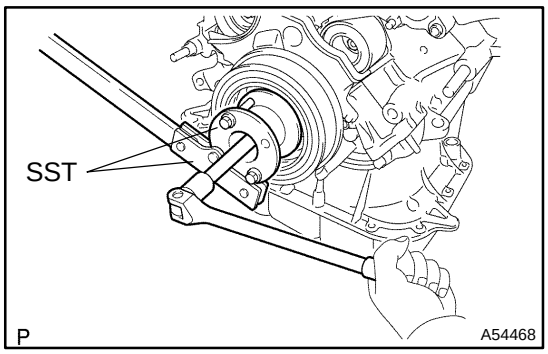

Timing Belt Cover Sub-assy No. 2
Camshaft Position Sensor Connector
Connector Holder
Timing Belt Cover Sub-assy No. 3 LH
Grommet
Gasket
Engine Wire
Water By- pass Pipe No. 3
Timing Chain or Belt Cover No. 2
Gasket
Dust Boot
Timing Belt Tensioner
Idler Pulley Sub-assy No. 2
26 (270, 19)
39 (400, 29)
Cover Plate
Idler Pulley Sub-assy No. 1
Cooler Compressor Assy
Stay
Wire Clamp
N·m (kgf·cm, ft·lbf) : Specified torque
A53622


★Vinyl Tape
Generator Wire
Generator Connector
V-Ribbed Belt Tensioner Assy
Cord Clip
Timing Belt No. 1 Cover
Generator Assy
Ground Cable
Crankshaft Damper Sub-assy
Stay
Clamp
Engine Wire
PS Oil Hose
Vane Pump Assy
43 (440, 32)
39 (400, 29)
Timing Belt
Crankshaft Position Sensor Plate No. 1
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A53623

1406I-02

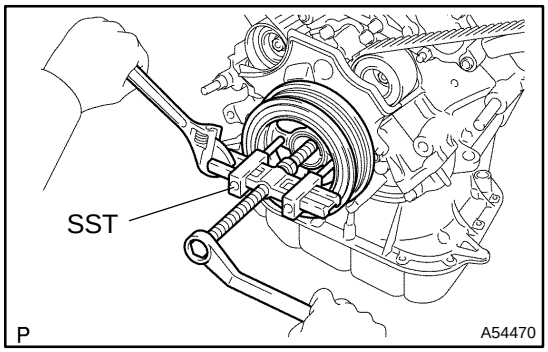
REPLACEMENT

1. SEPARATE BATTERY NEGATIVE TERMINAL
2. REMOVE AIR CLEANER INLET NO.1
[17751 / 98-21]
3. DRAIN ENGINE COOLANT
4. REMOVE V-BANK COVER
[11259 / 98-5]
5. REMOVE INTAKE AIR CONNECTOR PIPE
[17875 / 98-21]
6. REMOVE ENGINE UNDER COVER
[51441D / 98-65]
7. SEPARATE RADIATOR HOSE NO.1
[16571C / 98-16]
8. SEPARATE RADIATOR HOSE NO.2
[16572D / 98-16]
9. SEPARATE OIL COOLER INLET TUBE NO.1
[32921 / 98-42]
10. SEPARATE OIL COOLER OUTLET TUBE NO.1
[32922 / 98-42]
11. REMOVE AIR CLEANER ASSY
[17700 / 98-21]
12. REMOVE RADIATOR ASSY
[16400 / 98-16]
(a) Remove the 2 nuts and 2 upper radiator support.
(b) Lift out the radiator and cooling fan assembly.
13. REMOVE FAN AND GENERATOR V BELT
[16361A / 98-18] (See page 14-7)
14. REMOVE VANE PUMP ASSY
[44320 / 98-50]
(a) Remove the 2 bolts and nut, and the vane pump assembly.
HINT:
Vane pump assembly should be removed with the hoses connected and then hung with a rope or wire in the body's side.
15. REMOVE GENERATOR ASSY
[27020 / 98-25] (See page 19-18)
16. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH
HINT:
The cooler compressor together with the magnetic clutch should be removed with the low-pressure and high-pressure hoses connected and then hung with a rope or wire in the body's side.
17. REMOVE TIMING CHAIN OR BELT COVER NO.2
[11304 / 98-8]
18. REMOVE TIMING BELT COVER SUB-ASSY N0.3 LH
[11308C / 98-8]
19. REMOVE TIMING BELT COVER SUB-ASSY NO.2
[11303B / 98-8]
20. REMOVE V-RIBBED BELT TENSIONER ASSY
[16620 / 98-15]
21. REMOVE IDLER PULLEY ASSY
[16630G / 98-15]



22. REMOVE CRANKSHAFT DAMPER SUB-ASSY [13407 / 98-11]

(a) Using SST, remove the pulley bolt.
SST 09213-7001 1, 09330-00021

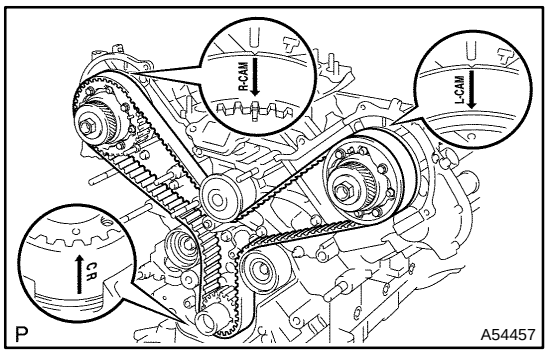


(b) Using SST, remove the crankshaft pulley.
SST 09950- 50012 (09951- 05010, 09952- 05010, 09953-05010, 09953-05020, 09954-05020)

23. REMOVE TIMING BELT NO.1 COVER [11322A / 98-8]

(a) Remove the 4 bots and timing belt cover.

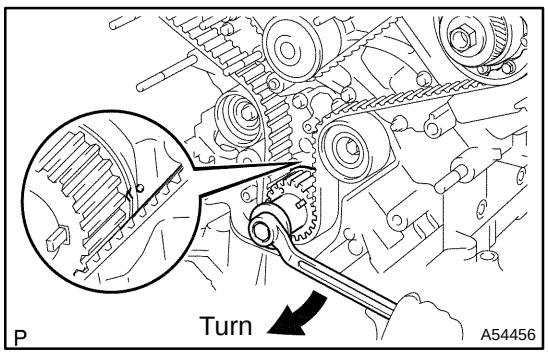
24. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1 [19315 / 98-11]



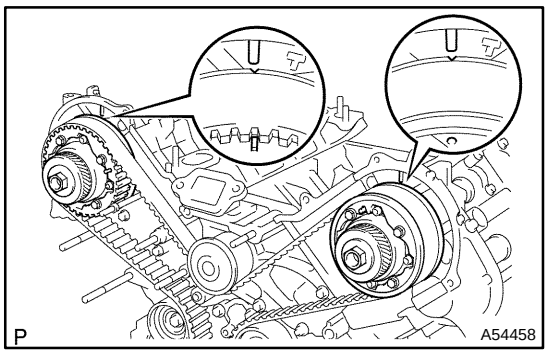
25. REMOVE TIMING BELT [13568 / 98-12]

(a) If re-using the timing belt, check the installation marks on the timing belt.
(1) Check that there are 3 installation marks on the timing belt by turning the crankshaft as shown in the illustration.

If the installation marks have disappeared, place a new installation mark on the timing belt before removing each part.

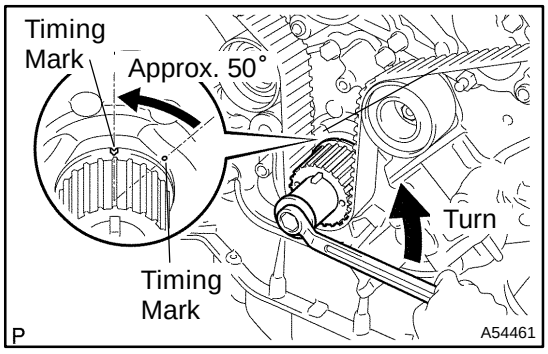


(b) Set the No. 1 cylinder to approx. 50° BTDC/compression.
(1) Using the crankshaft damper bolt, turn the crankshaft to align the timing marks of the crankshaft timing pulley and oil pump body.



(2) Check that the timing marks of the camshaft timing pulleys and timing belt plates aligned.

If not, turn the crankshaft 1 revolution (360˚).

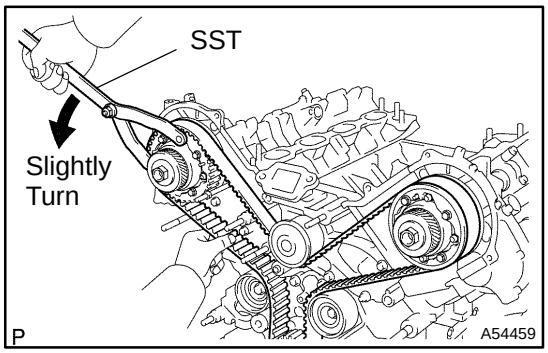


(3) Using the crankshaft damper bolt, turn the crankshaft counterclockwise by approx. 50˚.

NOTICE:

If the timing belt is disengaged, having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft timing pulley and camshaft, causing damage. So always set the crankshaft pulley at the correct angle.

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



(d) Using SST, loosen the tension between the camshaft timing pulley (RH bank) and crankshaft timing pulley by slightly turning the camshaft timing pulley (RH bank) counterclockwise.

SST 09960-10010 (09962-01000, 09963-00350)

(e) Disconnect the timing belt from the timing belt idler No. 1, and remove the timing belt.

26. INSTALL TIMING BELT
[13568 / 98-12]

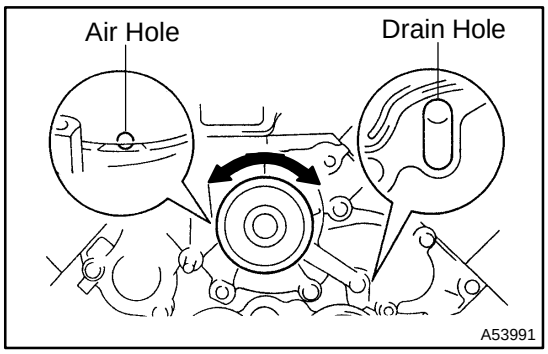
(a) Check the timing belt idler No. 1 and No. 2.

(1) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler.

(2) Check that the idler turns smoothly.

If necessary, replace the idler.



(b) Check the water pump.
(1) Visually check the air hole and water hole for coolant leakage.

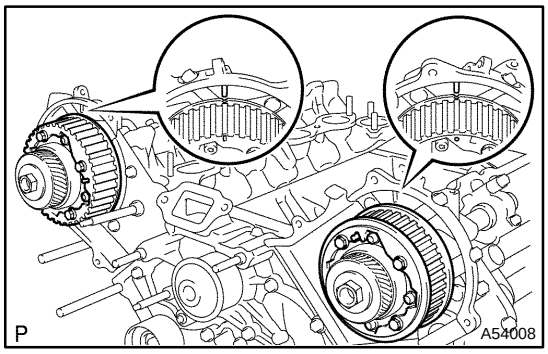
If leakage is found, replace the water pump and timing belt.

(2) Turn the pulley, and check that the water pump bearing moves smoothly and quietly.

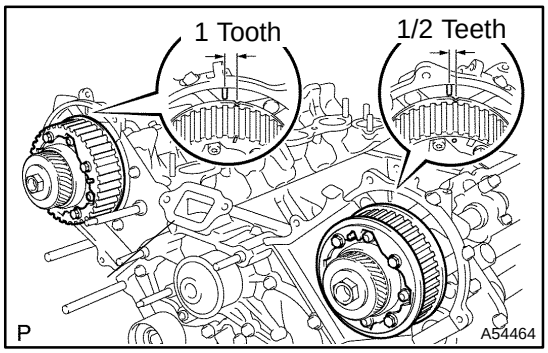
If necessary, replace the water pump.

(c) Remove any oil or water on the crankshaft pulley, oil pump pulley, water pump pulley, idler No.1 and idler No.2, and keep them clean.

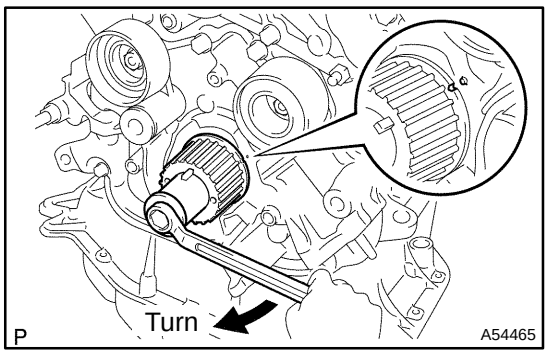
NOTICE:
Only wipe the pulleys; do not use any cleansing agent.



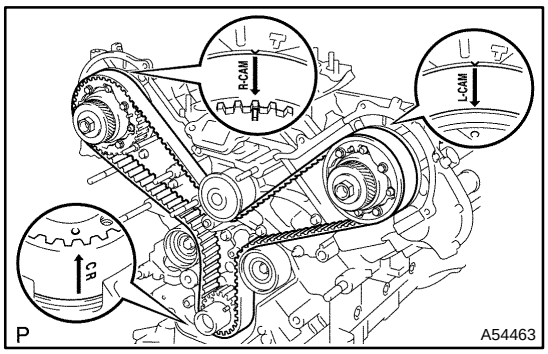
(d) Set the No. 1 cylinder to TDC/compression.
(1) Turn the hexagon wrench head portion of the camshaft to align the timing marks of the camshaft timing pulleys and timing belt plates aligned.



HINT:
Setting positions of the camshaft timing pulleys by turning them slightly clockwise makes it easy to install the timing belt:
Camshaft timing pulley of LH bank: 1/2 teeth
Camshaft timing pulley of RH bank: 1 tooth



(2) Using the crankshaft damper bolt, turn the crankshaft to align the timing marks of the crankshaft timing pulley and oil pump body.



(e) Install the timing belt.

(1) Remove any oil or water on the each pulley, and keep them clean.

NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(2) Face the front mark (arrow) on the timing belt forward.

(3) Connect the timing belt to the crankshaft timing pulley.

★ Align the installation mark on the timing belt with the timing mark of the crankshaft timing pulley.

(4) Connect the timing belt to the idler No. 2.

(5) Connect the timing belt to the camshaft timing pulley (LH.bank).

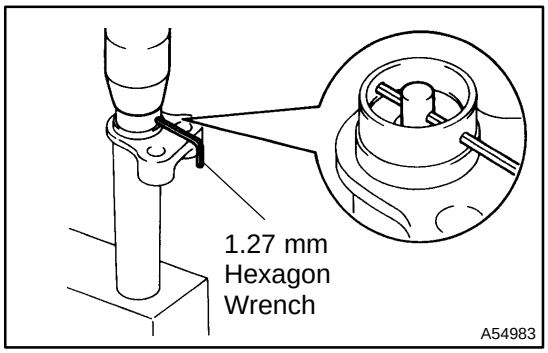
★ Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley.

(6) Connect the timing belt to the water pump pulley.

(7) Connect the timing belt to the camshaft timing pulley (RH bank).

★ Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley.

(8) Connect the timing belt to the idler No.1.



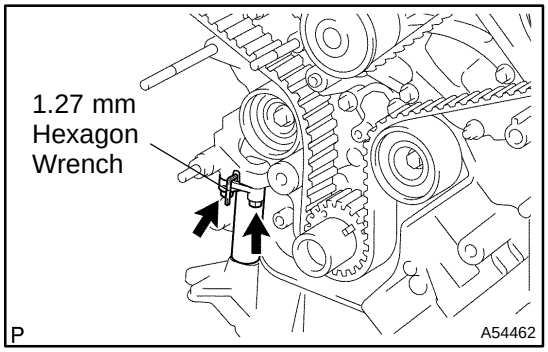
(f) Set the belt tensioner.

(1) Using a press, slowly press in the push rod using 981 - 9,807 N (100 - 1,000 kgf, 220 - 2,205 lbf) of pressure.

(2) Align the holes of the push rod and housing, pass a 1.27 mm hexagon wrench through the holes to keep the setting position of the push rod.

(3) Release the press.

(4) Install the dust boot to the belt tensioner.



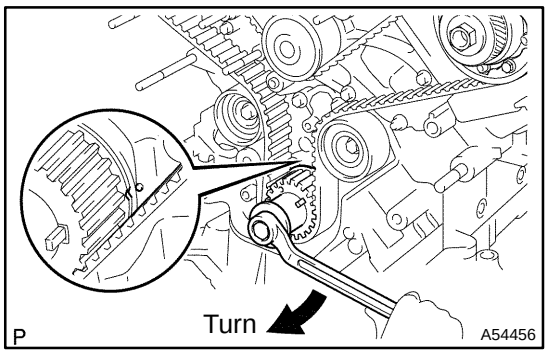
(g) Install the belt tensioner.

(1) Temporarily install the belt tensioner with the 2 bolts.

(2) Alternately tighten the 2 bolts.

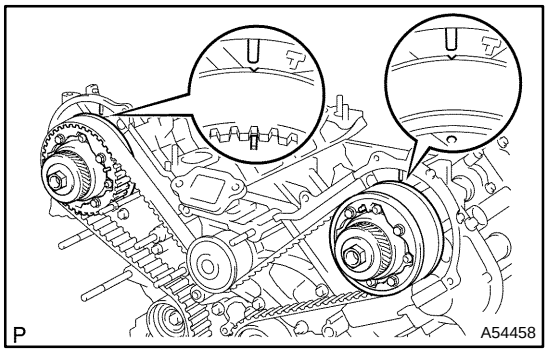
Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)

(3) Using pliers, remove the 1.27 mm hexagon wrench from the belt tensioner.



(h) Check the valve timing.
(1) Using the crankshaft damper bolt,slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.

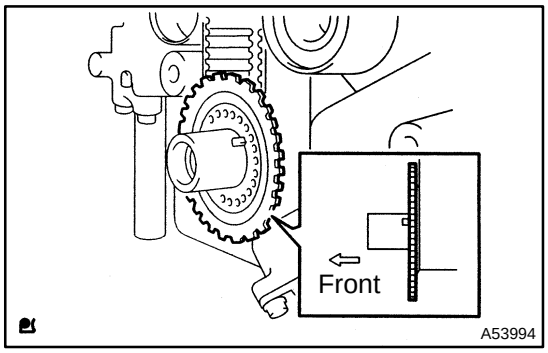
NOTICE:
Always turn the crankshaft pulley clockwise.



(2) Check that each pulley aligns with the timing marks as shown in the illustration.

If the timing marks do not align, remove the timing belt and reinstall it.

(3) Remove the crankshaft damper bolt.



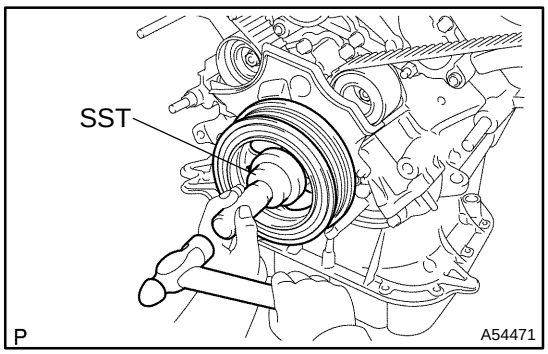
27. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1
[19315 / 98-11]

(a) Install the crank angle sensor plate as shown in the illustration.

NOTICE:
Take care not to install it in the wrong direction.

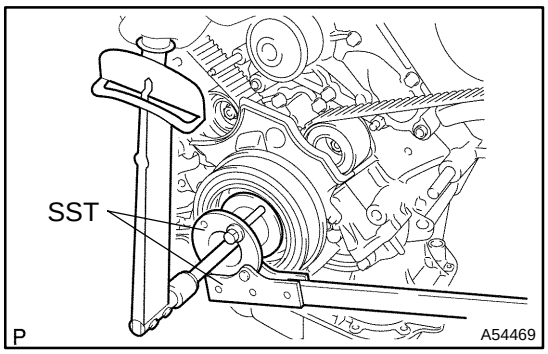
28. INSTALL TIMING BELT NO.1 COVER
[11322A / 98-8]

(a) Install the timing belt cover with the 4 bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



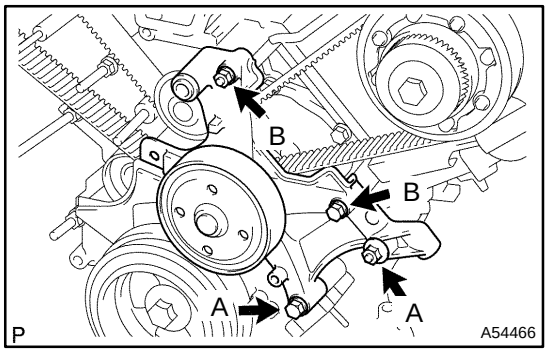
29. INSTALL CRANKSHAFT DAMPER SUB-ASSY
[13407 / 98-11]

(a) Using SST and a hammer, tap in the crankshaft damper.
SST 09223-4601 1



(b) Using SST, install the damper bolt.
SST 09213-7001 1, 09330-00021
Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

(c) Align the damper set key with the key groove of the crankshaft damper.



30. INSTALL IDLER PULLEY ASSY
[16630G / 98-15]

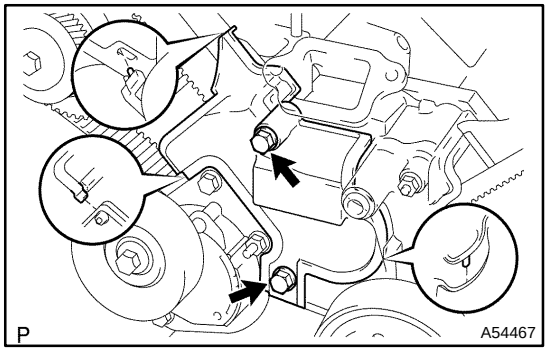
(a) Install the idler with the 2 bolts and 2 nuts.
Torque:
16 N·m (160 kgf·cm, 12 ft·lbf) for 12 mm head
32 N·m (330 kgf·cm, 24 ft·lbf) for 14 mm head

HINT:
Each bolt length is indicated in the illustration.
Bolt Length:
106 mm (4.17 in.) for 12 mm head (A)
114 mm (4.49 in.) for 14 mm head (B)

31. INSTALL V-RIBBED BELT TENSIONER ASSY
[16620 / 98-15]

(a) Install the belt tensioner with the bolt and 2 nuts.
Torque: 15.5 N·m (160 kgf·cm, 11 ft·lbf)

HINT:
Use a bolt 106 mm (4.18 in.) in length.



32. INSTALL TIMING BELT COVER SUB-ASSY NO.2
[11303B / 98-8]

(a) Fit the timing belt cover, matching the claws and pin with each part.

(b) Install the timing belt cover with the 2 bolts.
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

HINT:
Use bolts 106 mm (4.17 in.) in length.

33. INSTALL TIMING BELT COVER SUB-ASSY N0.3 LH
[11308C / 98-8]
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

34. INSTALL TIMING CHAIN OR BELT COVER NO.2
[11304 / 98-8]
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

35. INSTALL COMPRESSOR AND MAGNETIC CLUTCH

(a) Install the cooler compressor, stay and wire bracket with the 3 bolts and nut.
Torque:
49 N·m (500 kgf·cm, 36ft·lbf) for bolts
29 N·m (300 kgf·cm, 21 ft·lbf) for nuts

36. INSTALL GENERATOR ASSY
[27020 / 98-25] (See page 19-18)

37. INSTALL VANE PUMP ASSY
[44320 / 98-50]

(a) Install the vane pump assembly with the 2 bolts and nut. Alternately tighten the bolts and nut.
Torque:
39.2 N·m (400 kgf·cm, 29 ft·lbf) for bolts
43.1 N·m (440 kgf·cm, 32 ft·lbf) for nuts

38. INSTALL FAN AND GENERATOR V BELT
[16361A / 98-18] (See page 14-7)

39. INSTALL RADIATOR ASSY
[16400 / 98-16]

(a) Install the radiator and cooling fan assembly with the 2 upper radiator supports and 2 nuts.
Torque: 13.5 N·m (135 kgf·cm, 10 ft·lbf)

40. INSTALL AIR CLEANER ASSY
[17700 / 98-21]
Torque: 5.0 N·m (50 kgf·cm, 41 in.·lbf)

41. INSTALL AIR CLEANER INLET NO.1
[17751 / 98-21]
Torque: 5.0 N·m (50 kgf·cm, 41 in.·lbf)

42. INSTALL INTAKE AIR CONNECTOR PIPE
[17875 / 98-21]
Torque: 5.0 N·m (50 kgf·cm, 41 in.·lbf)

43. INSTALL V-BANK COVER
[11259 / 98-5]
Torque: 5.0 N·m (50 kgf·cm, 41 in.·lbf)

44. REFILL ENGINE COOLANT (See page 16-2)

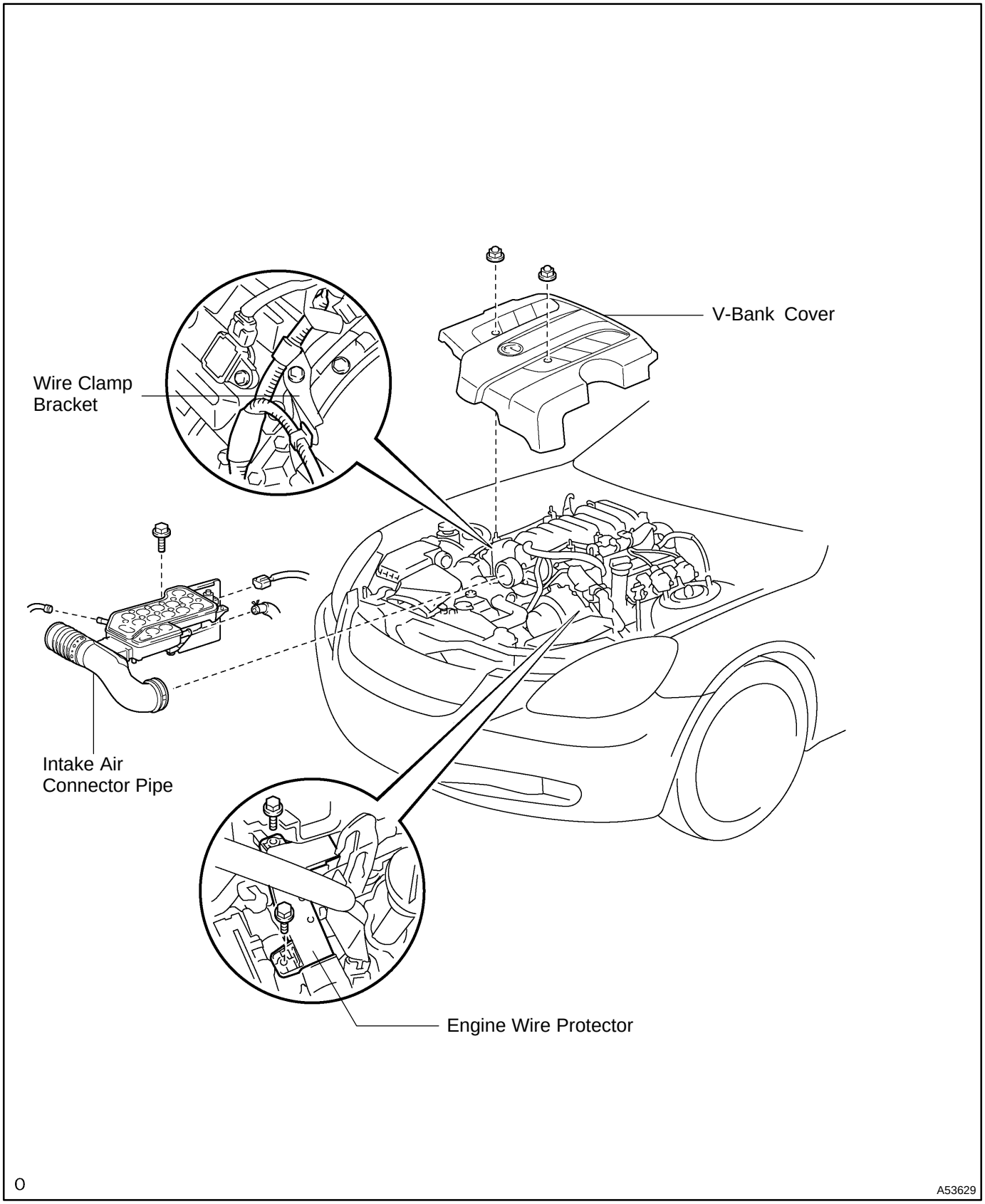
45. CHECK ENGINE COOLANT LEAK (See page 16-2)

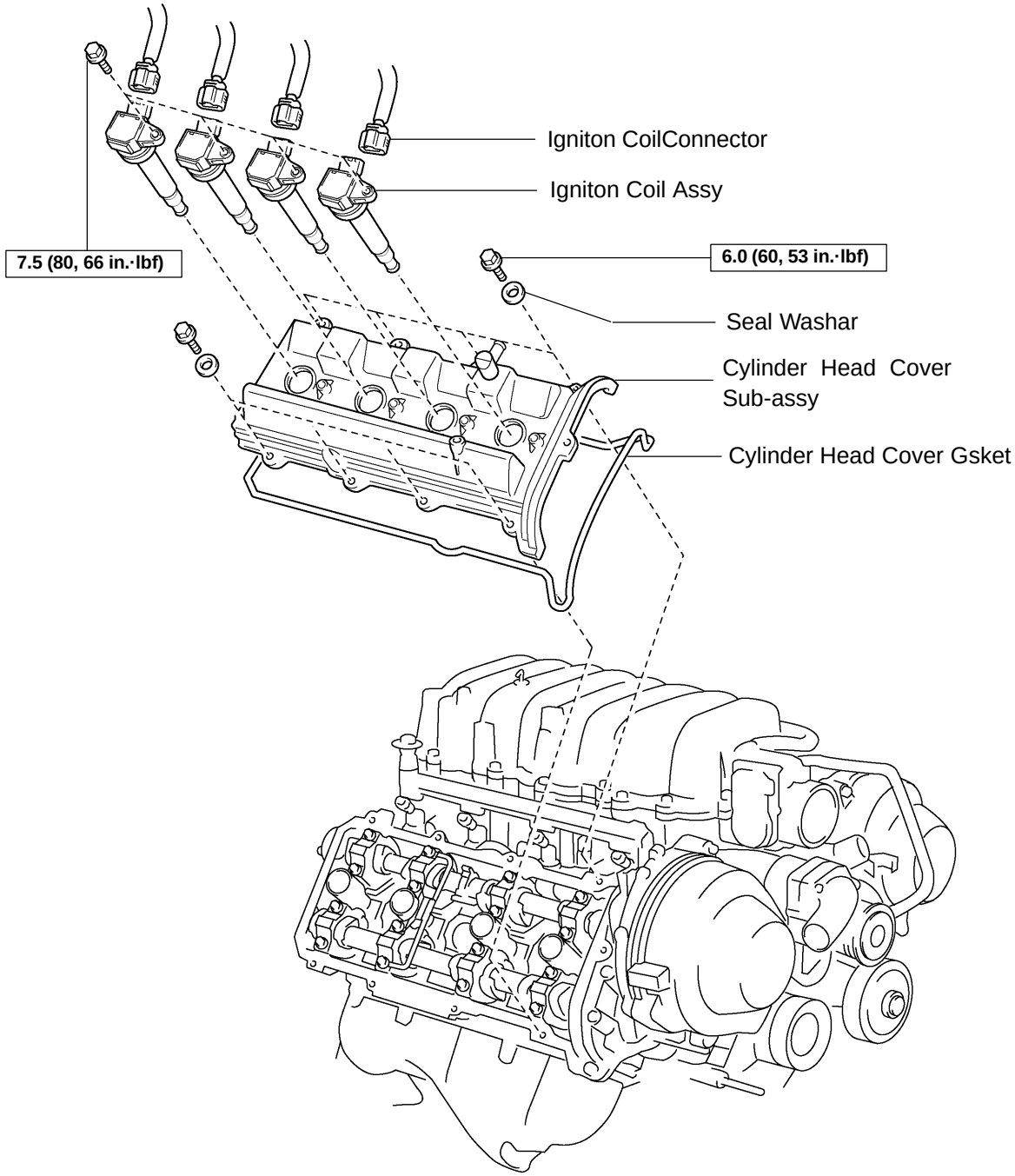
46. INSTALL ENGINE UNDER COVER
[51441D / 98-65]

CYLINDER HEAD COVER GASKET

COMPONENTS

1406K-02




Igniton CoilConnector
Igniton Coil Assy
7.5 (80, 66 in.·lbf)
6.0 (60, 53 in.·lbf)
Seal Washar
Cylinder Head Cover Sub-assy
Cylinder Head Cover Gsket
A53631

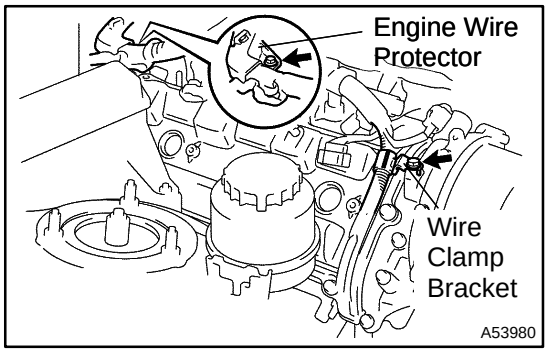
1406L-02

REPLACEMENT

1. REMOVE V-BANK COVER
[11259 / 98-5]

2. REMOVE INTAKE AIR CONNECTOR PIPE
[17875 / 98-21]

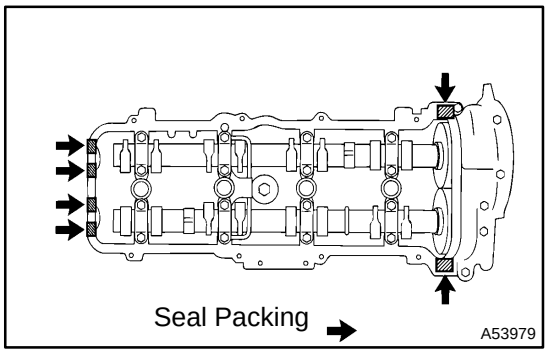
3. REMOVE IGNITION COIL ASSY
[19500 / 98-24]



4. REMOVE CYLINDER HEAD COVER SUB-ASSY
[11201 / 98-5]

(a) Remove the bolt, and disconnect the wire clamp bracket from the camshaft bearing cap.
(b) Remove the bolt, and disconnect the engine wire protector from the cylinder head.
(c) Remove the 9 bolts, 9 seal washers and cylinder head cover.

5. REMOVE CYLINDER HEAD COVER GASKET
[11213 / 98-5]



6. INSTALL CYLINDER HEAD COVER SUB-ASSY
[11201 / 98-5]

(a) Apply seal packing to the cylinder heads as shown in the illustration.
Seal packing: Part No. 08826-00080 or equivalent

NOTICE:
- ★ **Remove any oil from the contact surface.**
- ★ **Install the oil pan within 5 minutes after applying seal packing.**
- ★ **Do not start the engine within 2 hours after installing.**

(b) Install the gasket to the cylinder head cover.
(c) Install the seal washer to the bolt.
(d) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several passes.
Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)
(e) Install the wire clamp bracket on the engine wire to the cylinder head.
(f) Install the wire clamp bracket on the engine wire to the camshaft bearing cap.

7. INSTALL IGNITION COIL ASSY
[19500 / 98-24]
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

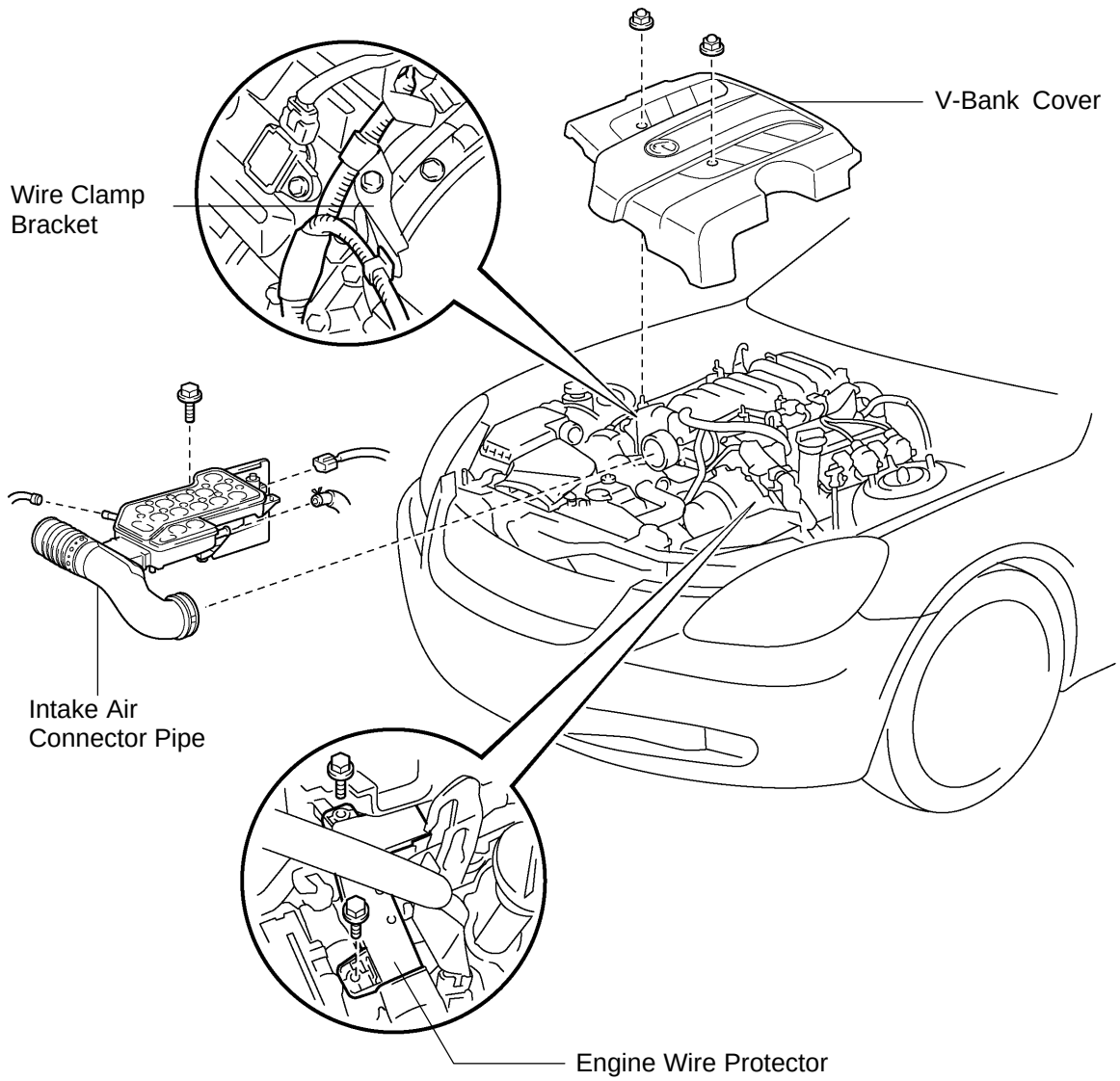
8. INSTALL INTAKE AIR CONNECTOR PIPE
[17875 / 98-21]
Torque: 5.0 N·m (50 kgf·cm, 41 in.·lbf)

9. INSTALL V-BANK COVER
[11259 / 98-5]
Torque: 5.0 N·m (50 kgf·cm, 41 in.·lbf)

CYLINDER HEAD COVER GASKET NO.2

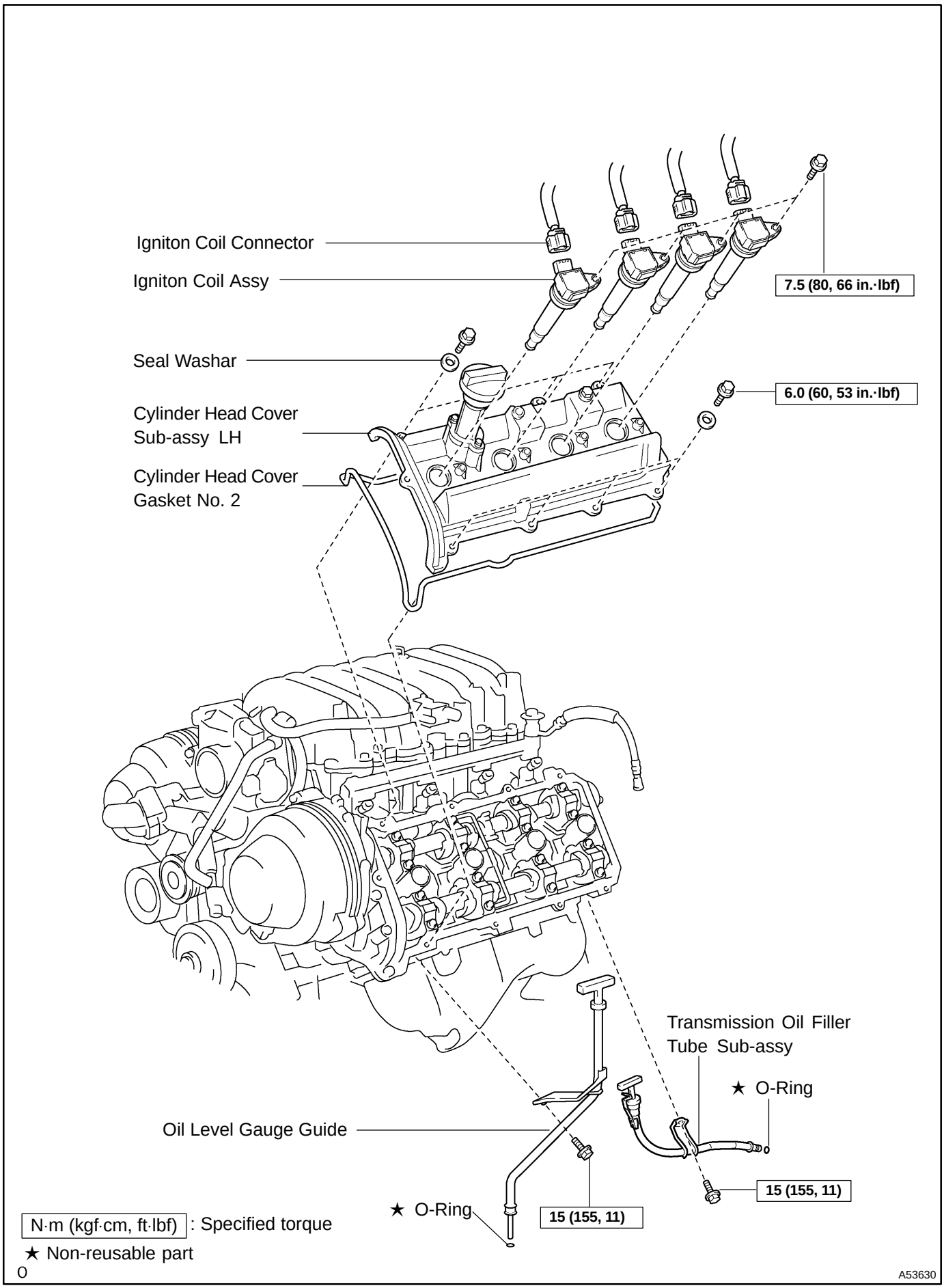
1406M-02

COMPONENTS



O

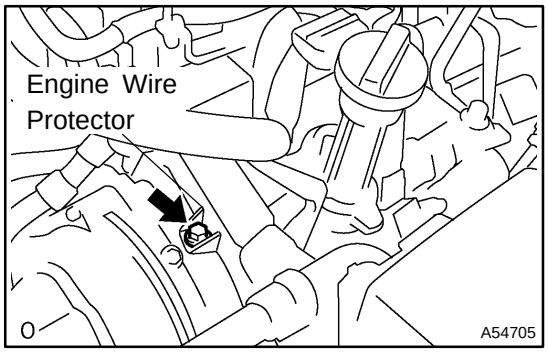
A53629


Igniton Coil Connector
Igniton Coil Assy
Seal Washar
Cylinder Head Cover Sub-assy LH
Cylinder Head Cover Gasket No. 2
7.5 (80, 66 in.·lbf)
6.0 (60, 53 in.·lbf)
Transmission Oil Filler Tube Sub-assy
★ O-Ring
Oil Level Gauge Guide
15 (155, 11)
★ O-Ring
15 (155, 11)
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A53630

1406N-02

REPLACEMENT

1. **REMOVE V-BANK COVER**
   [11259 / 98-5]
2. **REMOVE OIL LEVEL GAUGE GUIDE**
   [11452 / 98-7]
3. **REMOVE TRANSMISSION OIL FILLER TUBE SUB-ASSY**
   [35013 / 98-32]
4. **REMOVE IGNITION COIL ASSY**
   [19500 / 98-24]

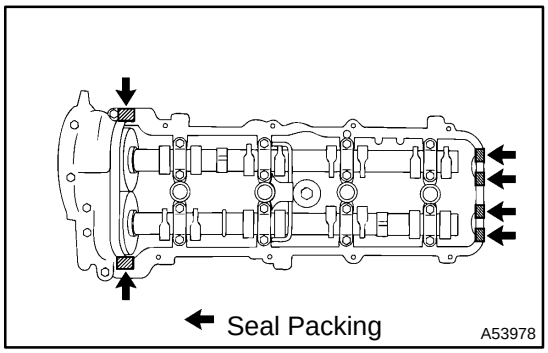


5. **REMOVE CYLINDER HEAD COVER SUB-ASSY LH**
   [11202 / 98-5]

(a) Remove the bolt, and disconnect the wire clamp bracket from the camshaft bearing cap.

(b) Remove the 9 bolts, 9 seal washers and cylinder head cover.

6. **REMOVE CYLINDER HEAD COVER GASKET NO.2**
   [11214 / 98-5]



7. **INSTALL CYLINDER HEAD COVER SUB-ASSY LH**
   [11202 / 98-5]

(a) Apply seal packing to the cylinder heads as shown in the illustration.
Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

- ★ **Remove any oil from the contact surface.**
- ★ **Install the oil pan within 5 minutes after applying seal packing.**
- ★ **Do not start the engine within 2 hours after installing.**

(b) Install the gasket to the cylinder head cover.

(c) Install the seal washer to the bolt.

(d) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several passes.
Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)

(e) Install the wire clamp bracket on the engine wire to the camshaft bearing cap.

8. **INSTALL IGNITION COIL ASSY**
   [19500 / 98-24]
   Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

9. INSTALL TRANSMISSION OIL FILLER TUBE SUB-ASSY
[35013 / 98-32]

(a) Install a new O-ring to the dipstick guide.
(b) Apply soapy water to the O-ring.
(c) Connect the dipstick guide end to the dipstick tube of the oil pan.
(d) Install the dipstick guide with the bolt.
(e) Install the dipstick.
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

10. INSTALL OIL LEVEL GAUGE GUIDE
[11452 / 98-7]

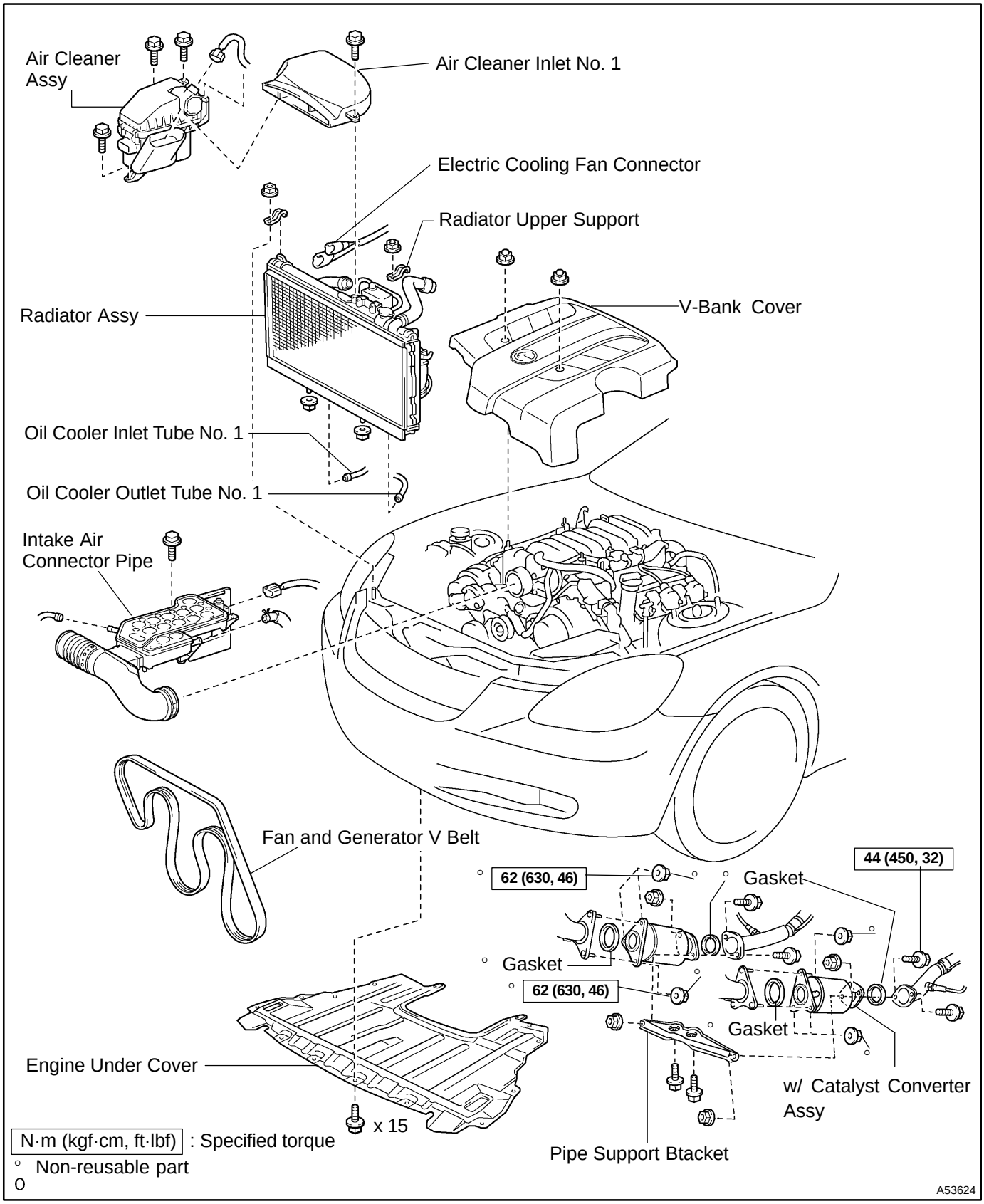
(a) Install a new O-ring to the dipstick guide.
(b) Apply soapy water to the O-ring.
(c) Connect the dipstick guide end to the dipstick tube of the oil pan.
(d) Install the dipstick guide with the bolt.
(e) Install the dipstick.
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

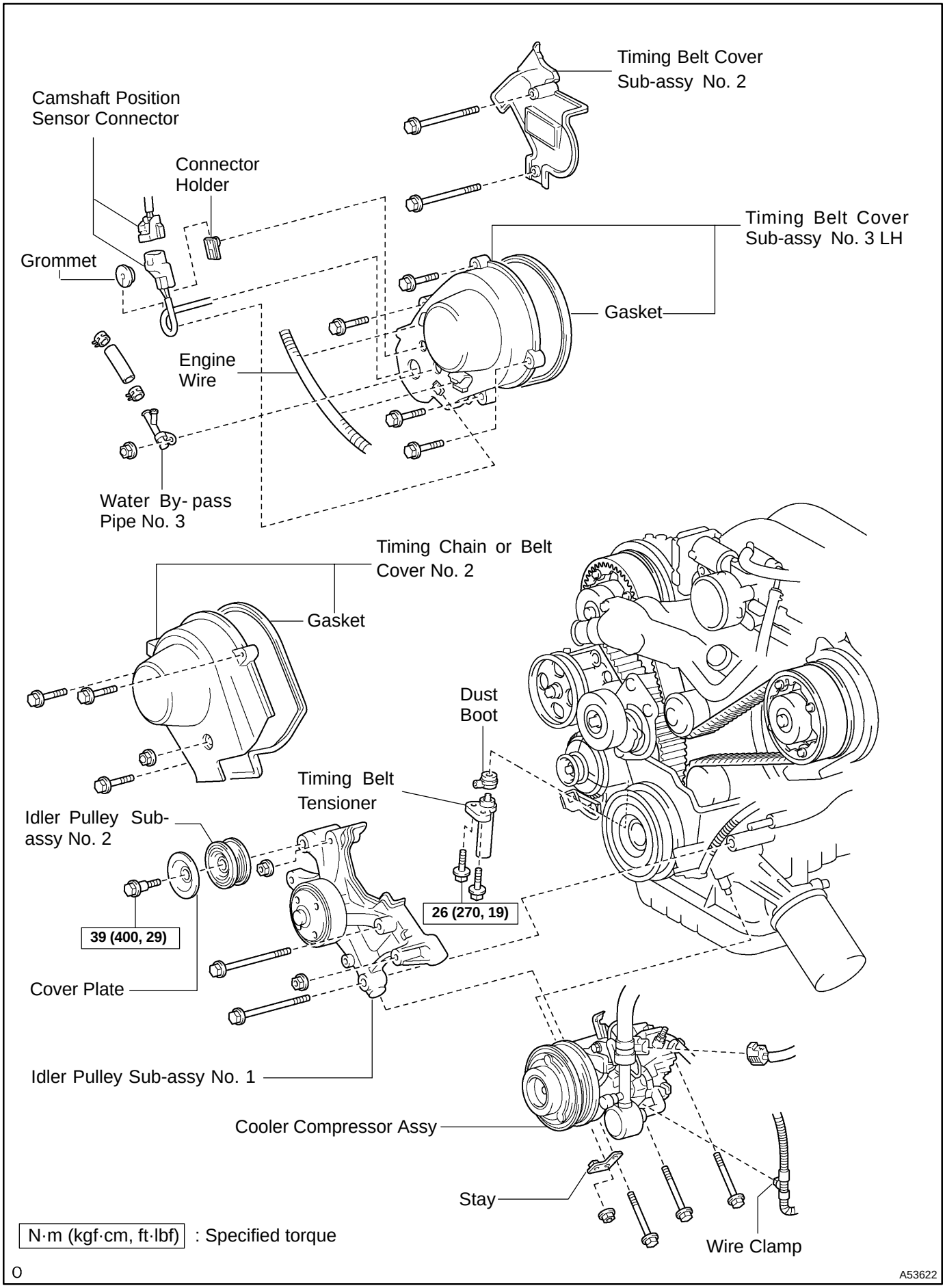
11. INSTALL V-BANK COVER
[11259 / 98-5]

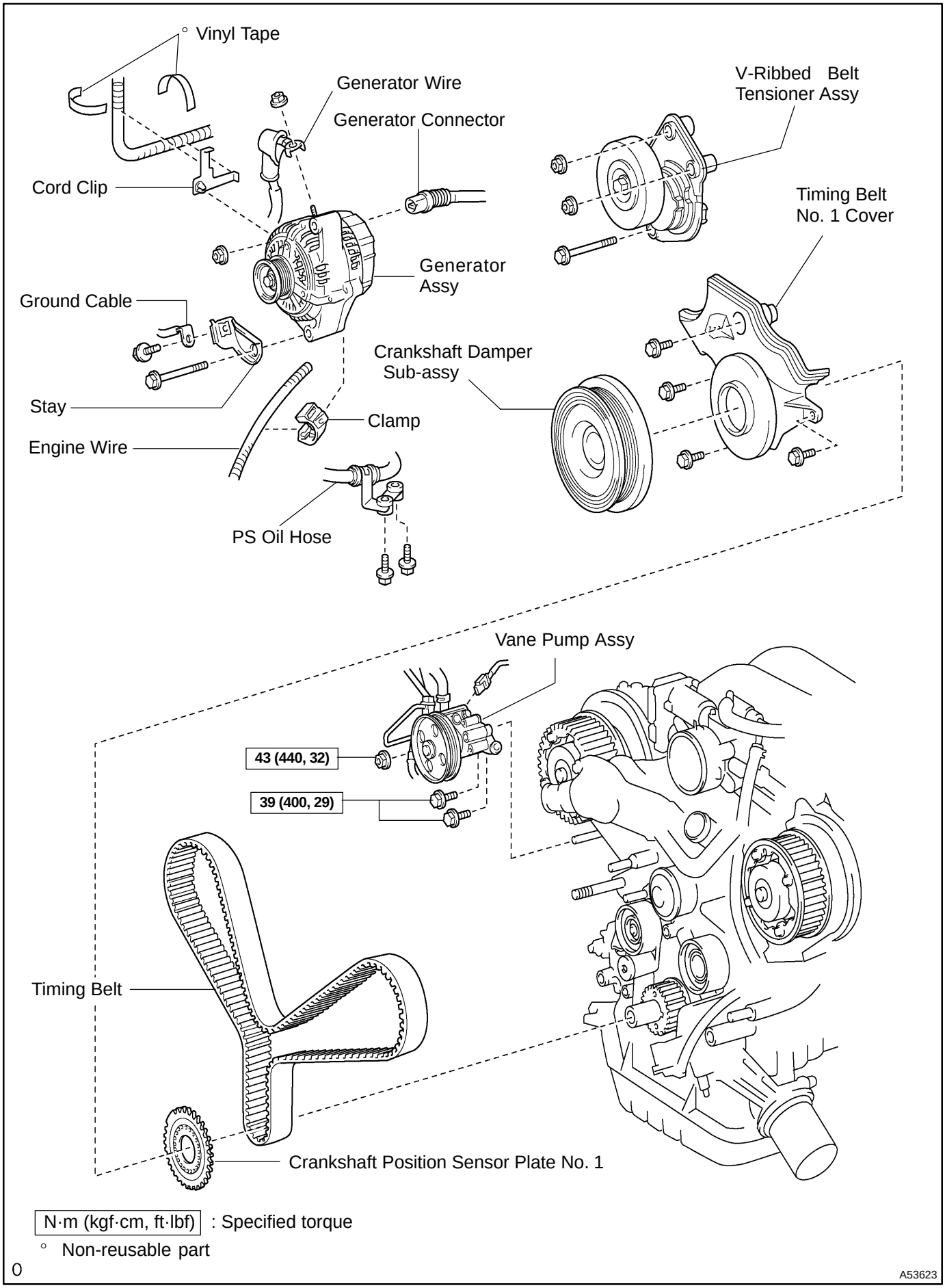
CYLINDER HEAD GASKET

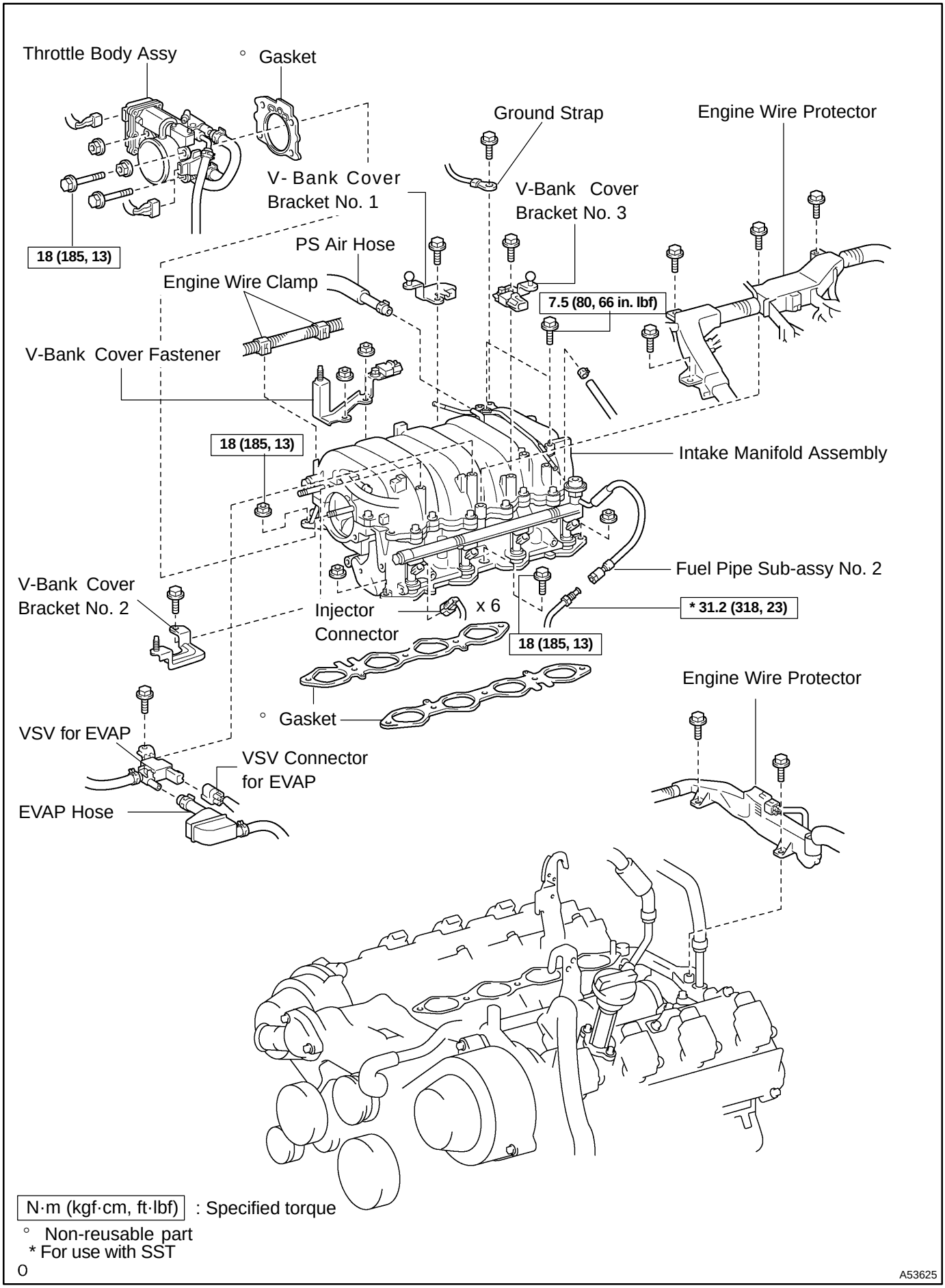
COMPONENTS

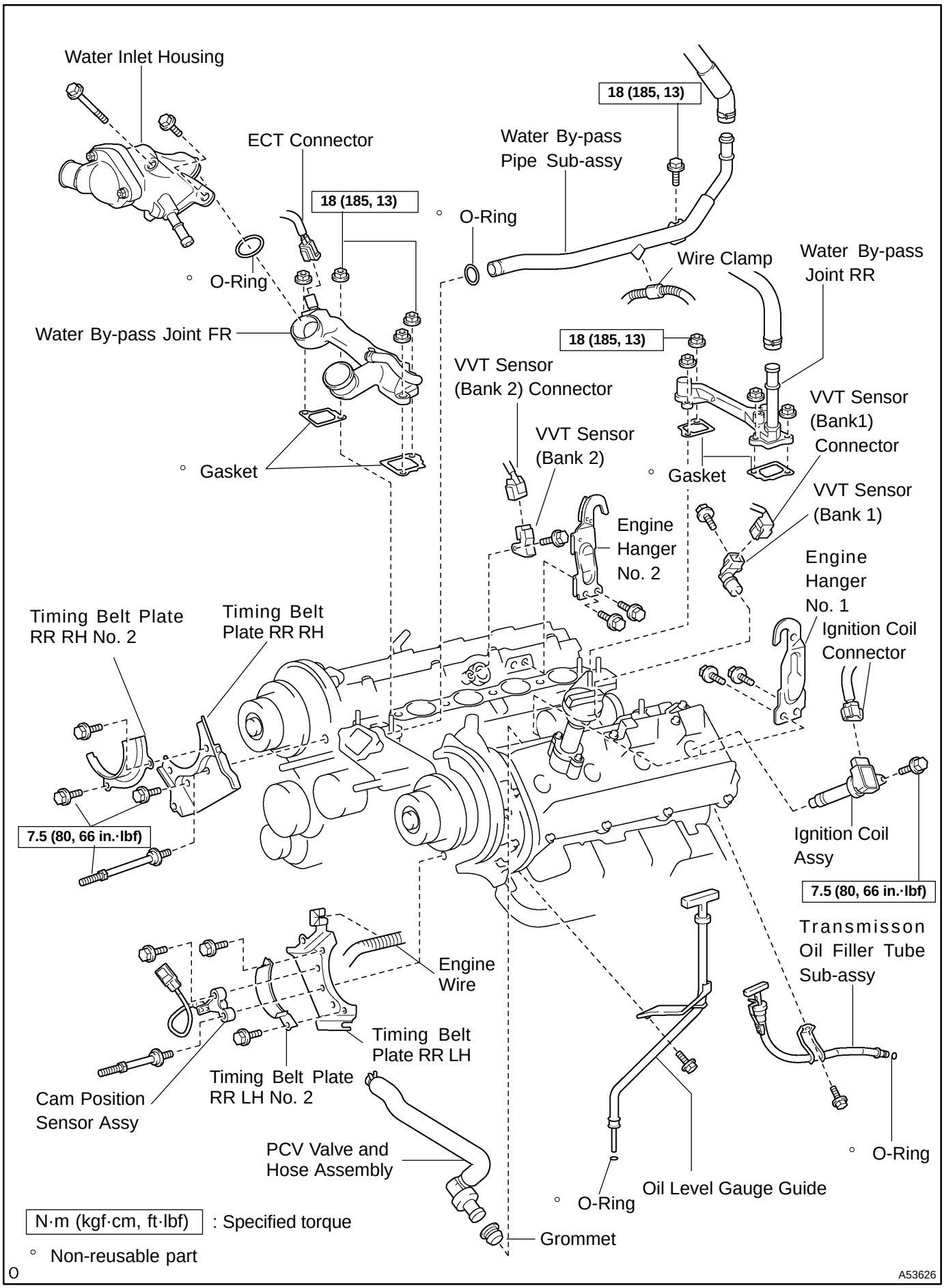
1406O-02

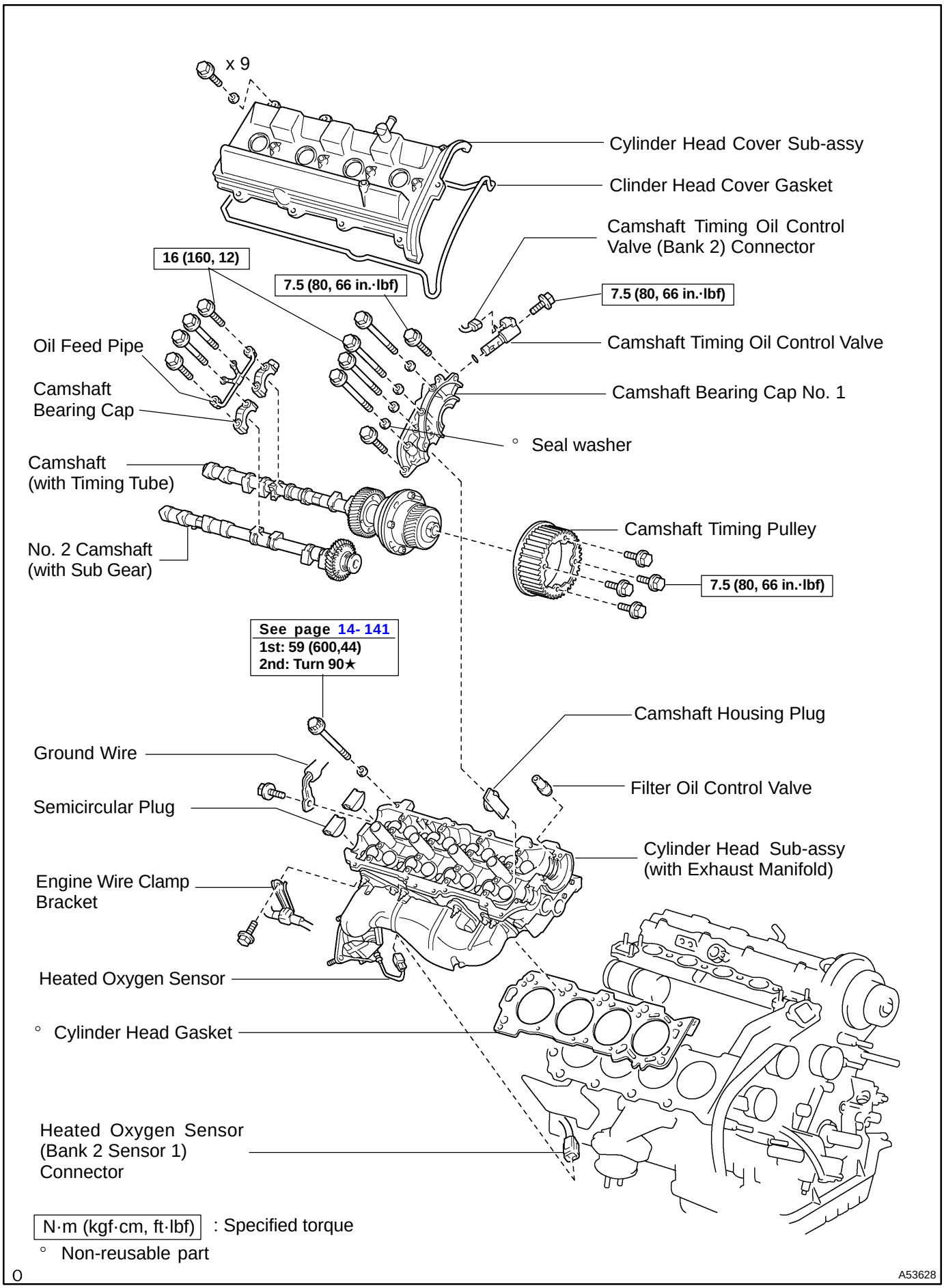



Timing Belt Cover Sub-assy No. 2
Camshaft Position Sensor Connector
Connector Holder
Timing Belt Cover Sub-assy No. 3 LH
Grommet
Gasket
Engine Wire
Water By- pass Pipe No. 3
Timing Chain or Belt Cover No. 2
Gasket
Dust Boot
Timing Belt Tensioner
Idler Pulley Sub-assy No. 2
26 (270, 19)
39 (400, 29)
Cover Plate
Idler Pulley Sub-assy No. 1
Cooler Compressor Assy
Stay
Wire Clamp
N·m (kgf·cm, ft·lbf) : Specified torque
O
A53622


° Vinyl Tape
Generator Wire
Generator Connector
V-Ribbed Belt Tensioner Assy
Cord Clip
Timing Belt No. 1 Cover
Generator Assy
Ground Cable
Crankshaft Damper Sub-assy
Stay
Clamp
Engine Wire
PS Oil Hose
Vane Pump Assy
43 (440, 32)
39 (400, 29)
Timing Belt
Crankshaft Position Sensor Plate No. 1
N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part
0
A53623


Throttle Body Assy
° Gasket
Ground Strap
Engine Wire Protector
V- Bank Cover Bracket No. 1
V-Bank Cover Bracket No. 3
18 (185, 13)
PS Air Hose
Engine Wire Clamp
7.5 (80, 66 in. lbf)
V-Bank Cover Fastener
18 (185, 13)
Intake Manifold Assembly
Fuel Pipe Sub-assy No. 2
V-Bank Cover Bracket No. 2
Injector Connector
x 6
* 31.2 (318, 23)
18 (185, 13)
Engine Wire Protector
° Gasket
VSV for EVAP
VSV Connector for EVAP
EVAP Hose
N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part
* For use with SST
A53625

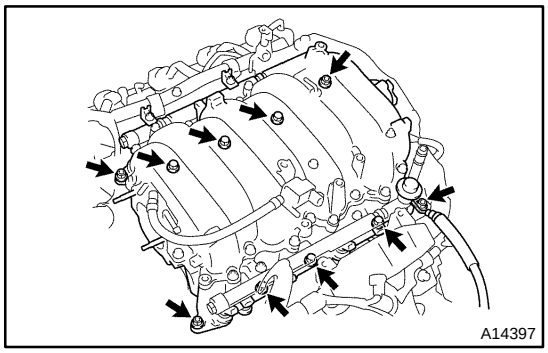

Water Inlet Housing
ECT Connector
18 (185, 13)
O-Ring
O-Ring
Water By-pass Joint FR
Gasket
18 (185, 13)
Water By-pass Pipe Sub-assy
O-Ring
Wire Clamp
Water By-pass Joint RR
18 (185, 13)
VVT Sensor (Bank 2) Connector
VVT Sensor (Bank 2)
Gasket
VVT Sensor (Bank1) Connector
VVT Sensor (Bank 1)
Engine Hanger No. 2
Engine Hanger No. 1
Ignition Coil Connector
Timing Belt Plate RR RH No. 2
Timing Belt Plate RR RH
7.5 (80, 66 in.·lbf)
Ignition Coil Assy
7.5 (80, 66 in.·lbf)
Transmisson Oil Filler Tube Sub-assy
Engine Wire
Timing Belt Plate RR LH
Timing Belt Plate RR LH No. 2
Cam Position Sensor Assy
PCV Valve and Hose Assembly
O-Ring
O-Ring
Oil Level Gauge Guide
Grommet
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
A53626


x 9
Cylinder Head Cover Sub-assy
Clinder Head Cover Gasket
Camshaft Timing Oil Control Valve (Bank 2) Connector
16 (160, 12)
7.5 (80, 66 in.·lbf)
7.5 (80, 66 in.·lbf)
Oil Feed Pipe
Camshaft Timing Oil Control Valve
Camshaft Bearing Cap
Camshaft Bearing Cap No. 1
° Seal washer
Camshaft (with Timing Tube)
Camshaft Timing Pulley
No. 2 Camshaft (with Sub Gear)
7.5 (80, 66 in.·lbf)
See page 14-141
1st: 59 (600,44)
2nd: Turn 90★
Camshaft Housing Plug
Ground Wire
Filter Oil Control Valve
Semicircular Plug
Cylinder Head Sub-assy (with Exhaust Manifold)
Engine Wire Clamp Bracket
Heated Oxygen Sensor
° Cylinder Head Gasket
Heated Oxygen Sensor (Bank 2 Sensor 1) Connector
N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part
A53628

1406P-02

REPLACEMENT

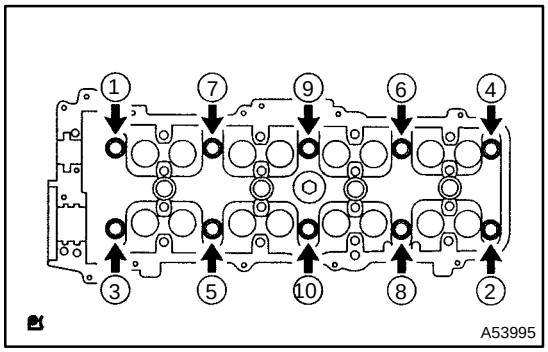
1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-4)**
2. **REMOVE CAMSHAFT**
   [13511 / 98-12] (See page 14-160)
3. **REMOVE THROTTLE BODY ASSY**
   [22210 / 98-27] (See page 10-5)
4. **REMOVE V-BANK COVER BRACKET NO.1**
   [11254 / 98-5]
5. **REMOVE V-BANK COVER BRACKET NO.2**
   [11256 / 98-5]
6. **REMOVE V-BANK COVER BRACKET NO.3**
   [11257 / 98-5]
7. **REMOVE V-BANK COVER FASTENER**
   [11258A / 98-5]
8. **REMOVE VACUUM SWITCHING VALVE ASSY**
   [17650 / 98-22]
9. **SEPARATE FUEL PIPE SUB-ASSY NO.2**
   [23802B / 98-27] (See page 11-1)



10. **REMOVE INTAKE MANIFOLD ASSY**

(a) Remove the 6 bolts, 4 nuts, the upper, lower intake manifold assembly and 2 gaskets.

11. **REMOVE WATER BY-PASS JOINT RR**
    [16356 / 98-16]
12. **REMOVE WATER INLET HOUSING**
    [16323 / 98-16]
13. **REMOVE WATER BY-PASS JOINT FR**
    [16355 / 98-16]
14. **REMOVE W/CATALYST CONVERTER ASSY**
    [17400 / 98-20] (See page 15-5)



15. **REMOVE CYLINDER HEAD SUB-ASSY**
    [11101 / 98-5]

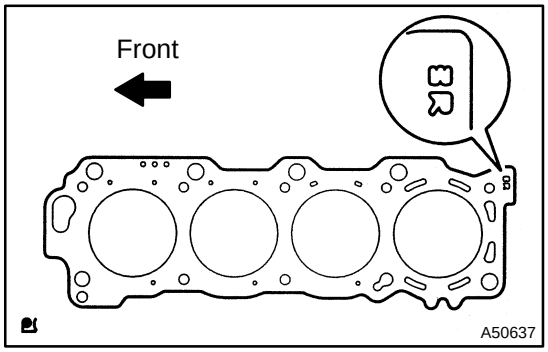
(a) Uniformly loosen and remove the sequence shown. Remove the 10 cylinder head bolts and plate washers.

NOTICE:

Be careful not to drop washers into the cylinder head.

(b) Remove cylinder head together with the RH manifold.

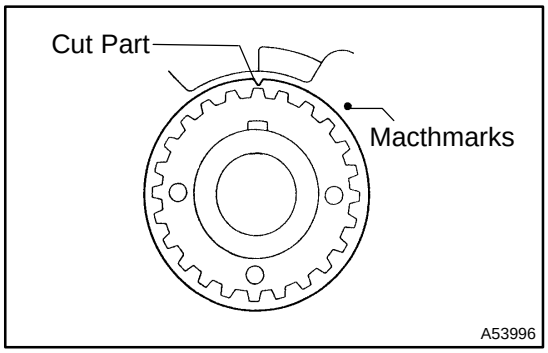
16. REMOVE CYLINDER HEAD GASKET [11115 / 98-5]



17. INSTALL CYLINDER HEAD GASKET [11115 / 98-5]

(a) Place a new cylinder head gasket in position on the cylinder block.

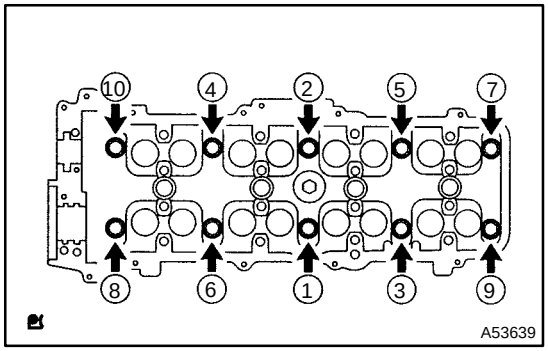
NOTICE:
Be careful of the installation direction.



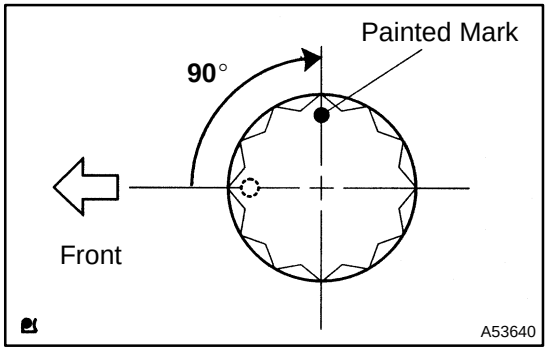
18. INSTALL CYLINDER HEAD SUB-ASSY [11101 / 98-5]

(a) Check that the cut part of the crankshaft timing pulley is in the position shown in the illustration, and that the piston is below the TDC of compression.
(b) Install the cylinder head with manifold RH to the cylinder block.
(c) Apply a light coat of engine oil on the threads and under the head of the cylinder head bolts.
(d) Insert the bolt and washer engaged each other into the cylinder head.

NOTICE:
Be careful not to drop washers into the cylinder head.



(e) Install and uniformly tighten the 10 cylinder head bolts, and plate washers, in the sequence shown.
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)



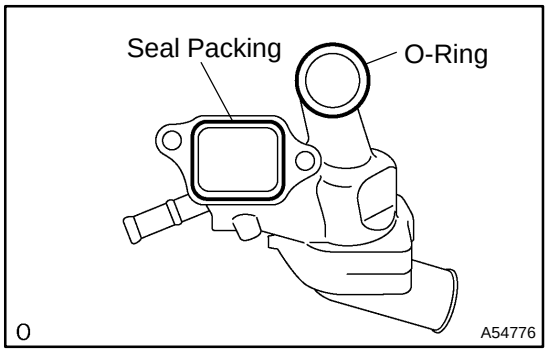
(f) Mark the front of the cylinder head bolt head with paint.
(g) Retighten the cylinder head bolts by 90° in the numerical order shown.
(h) Check that the painted mark is now at a 90° angle to front.

19. INSTALL W/CATALYST CONVERTER ASSY
[17400 / 98-20] (See page 15-5)

20. INSTALL WATER BY-PASS JOINT FR
[16355 / 98-16]

(a) Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Connect the ECT connector.



21. INSTALL WATER INLET HOUSING
[16323 / 98-16]

(a) Install a new O-ring to the water inlet housing.

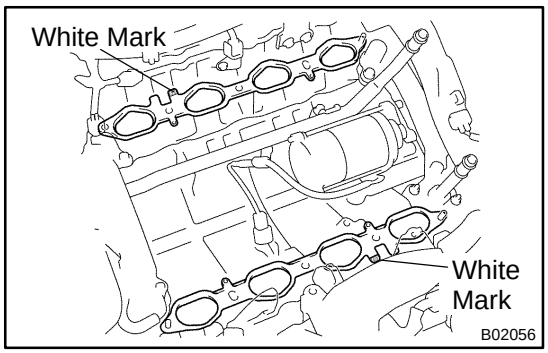
(b) Apply soapy water on the O-ring.

(c) Apply seal packing to the sealing groove of water inlet housing as shown in the illustration.
Seal packing:
Part No. 08826 - 00100 or equivalent
- ★ Install a nozzle that has been cut to a 2 -3 mm (0.08 - 0.12 in.) opening.
- ★ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.

(d) Install the water inlet and housing assembly with the 2 bolts. Alternately tighten the bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

22. INSTALL WATER BY-PASS JOINT RR
[16356 / 98-16]

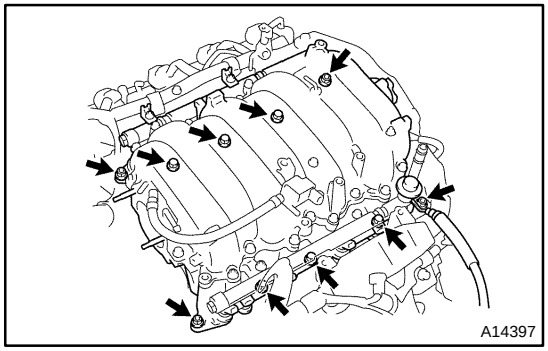
(a) Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



23. INSTALL INTAKE MANIFOLD ASSY

(a) Place 2 new gaskets on the cylinder heads with the white mark facing outward.

NOTICE:
Be careful of the installation direction.



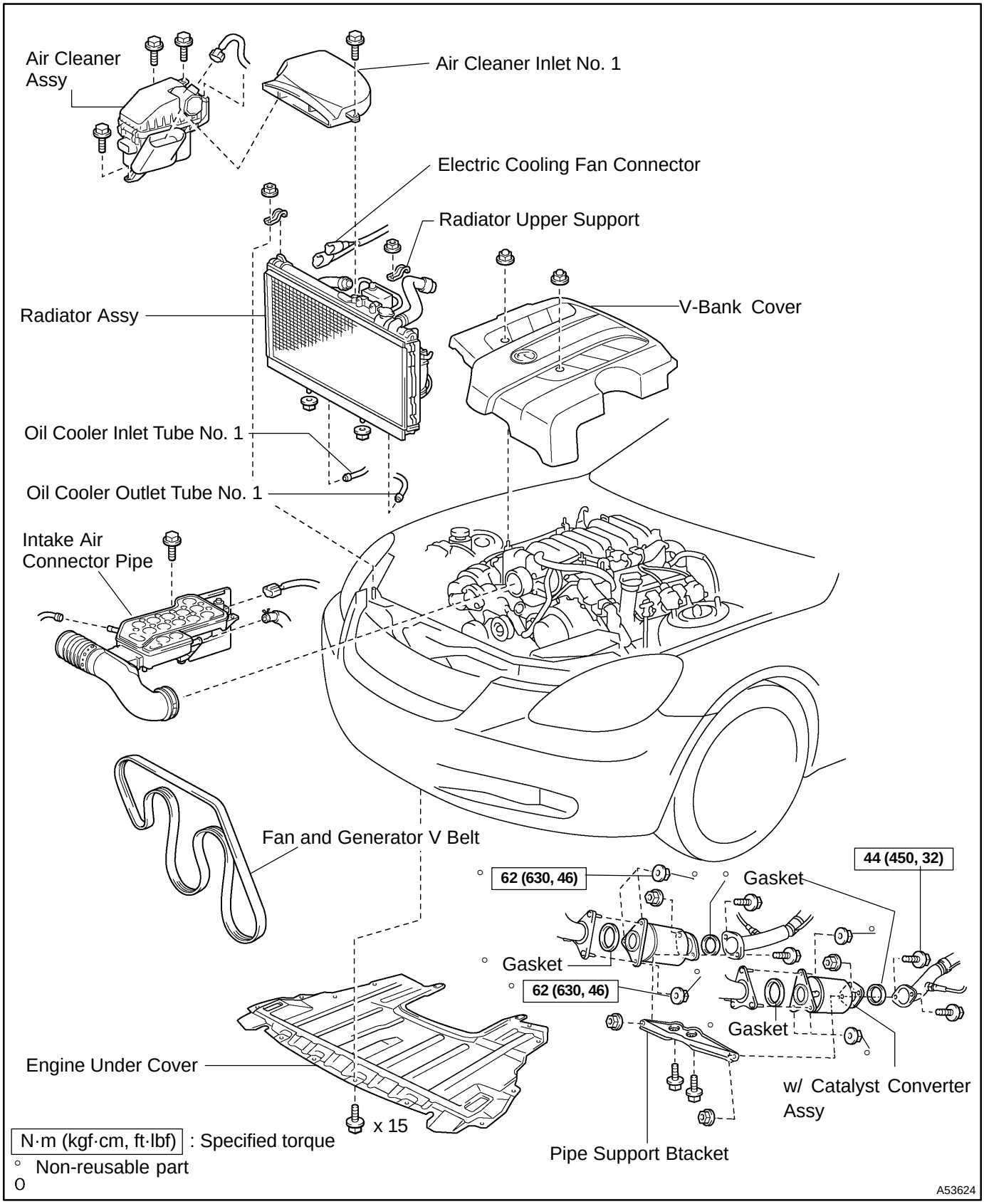
(b) Install the upper and lower intake manifolds assembly with the 6 bolts and 4 nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

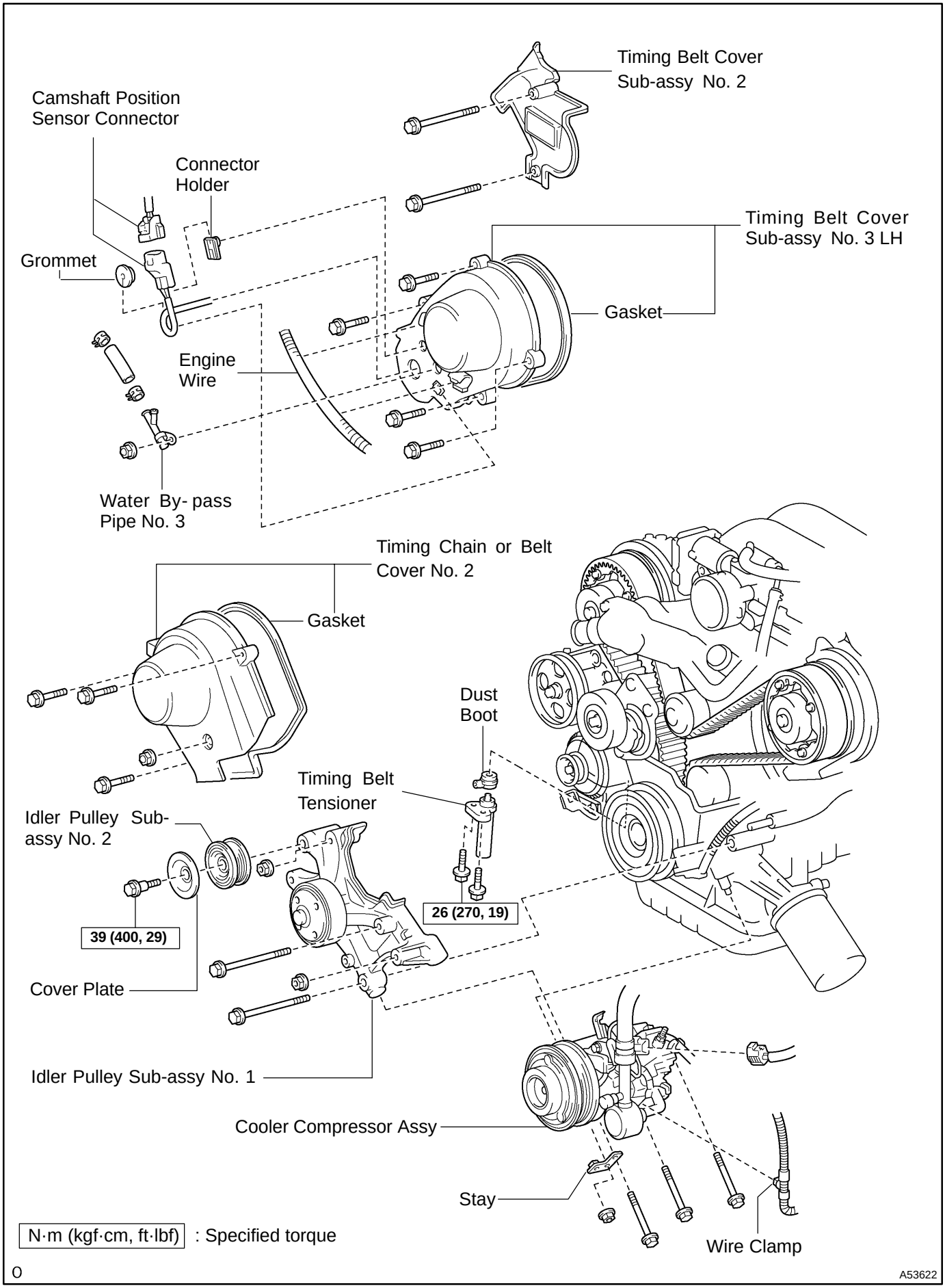
24. INSTALL FUEL PIPE SUB-ASSY NO.2
[23802B / 98-27] (See page 11-1)
25. INSTALL VACUUM SWITCHING VALVE ASSY
[17650 / 98-22]
26. INSTALL V-BANK COVER FASTENER
[11258A / 98-5]
27. INSTALL V-BANK COVER BRACKET NO.3
[11257 / 98-5]
28. INSTALL V-BANK COVER BRACKET NO.2
[11256 / 98-5]
29. INSTALL V-BANK COVER BRACKET NO.1
[11254 / 98-5]
30. INSTALL THROTTLE BODY ASSY
[22210 / 98-27] (See page 10-5)
31. INSTALL CAMSHAFT
[13511 / 98-12] (See page 14-160)

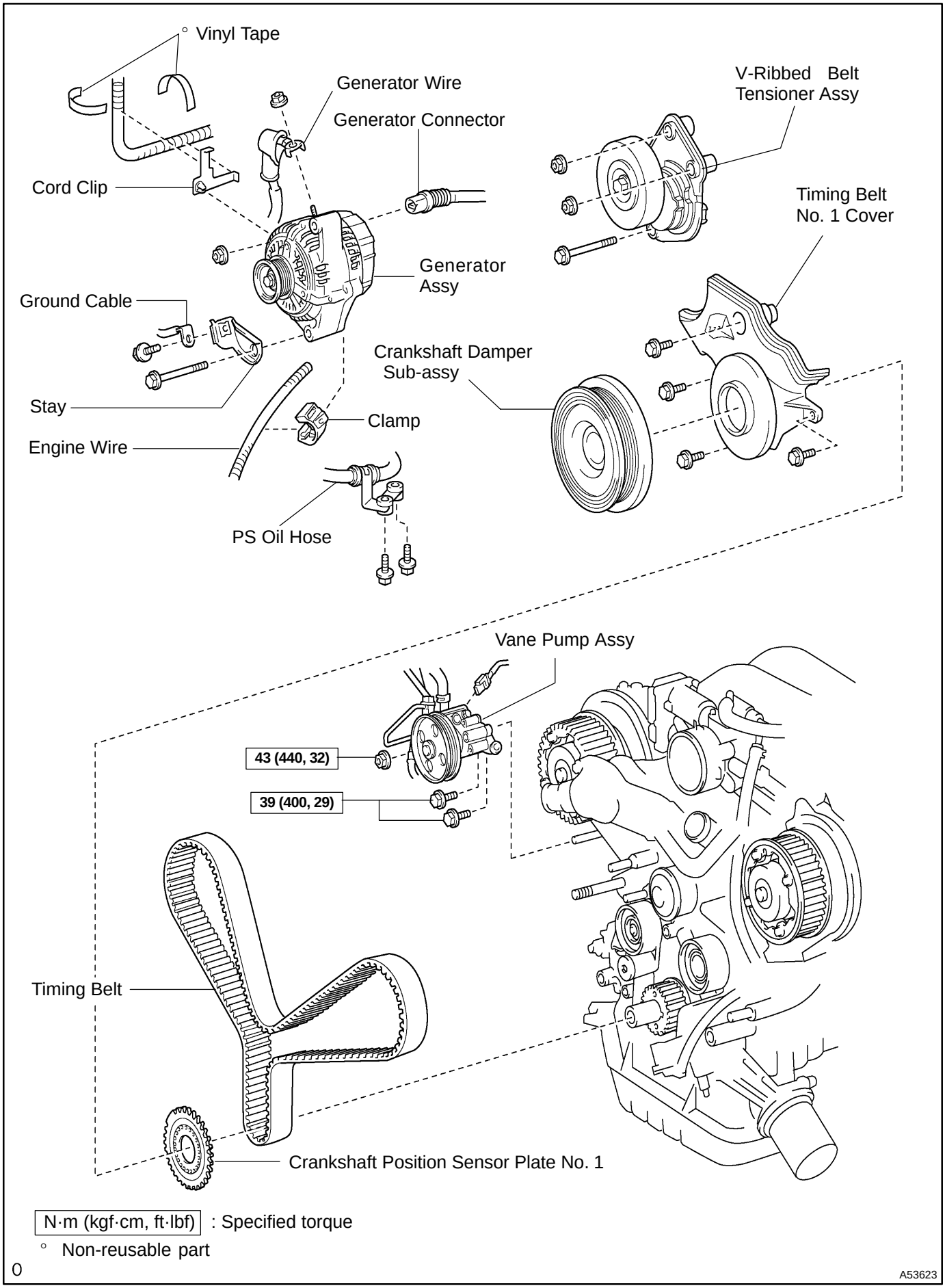
CYLINDER HEAD GASKET NO.2

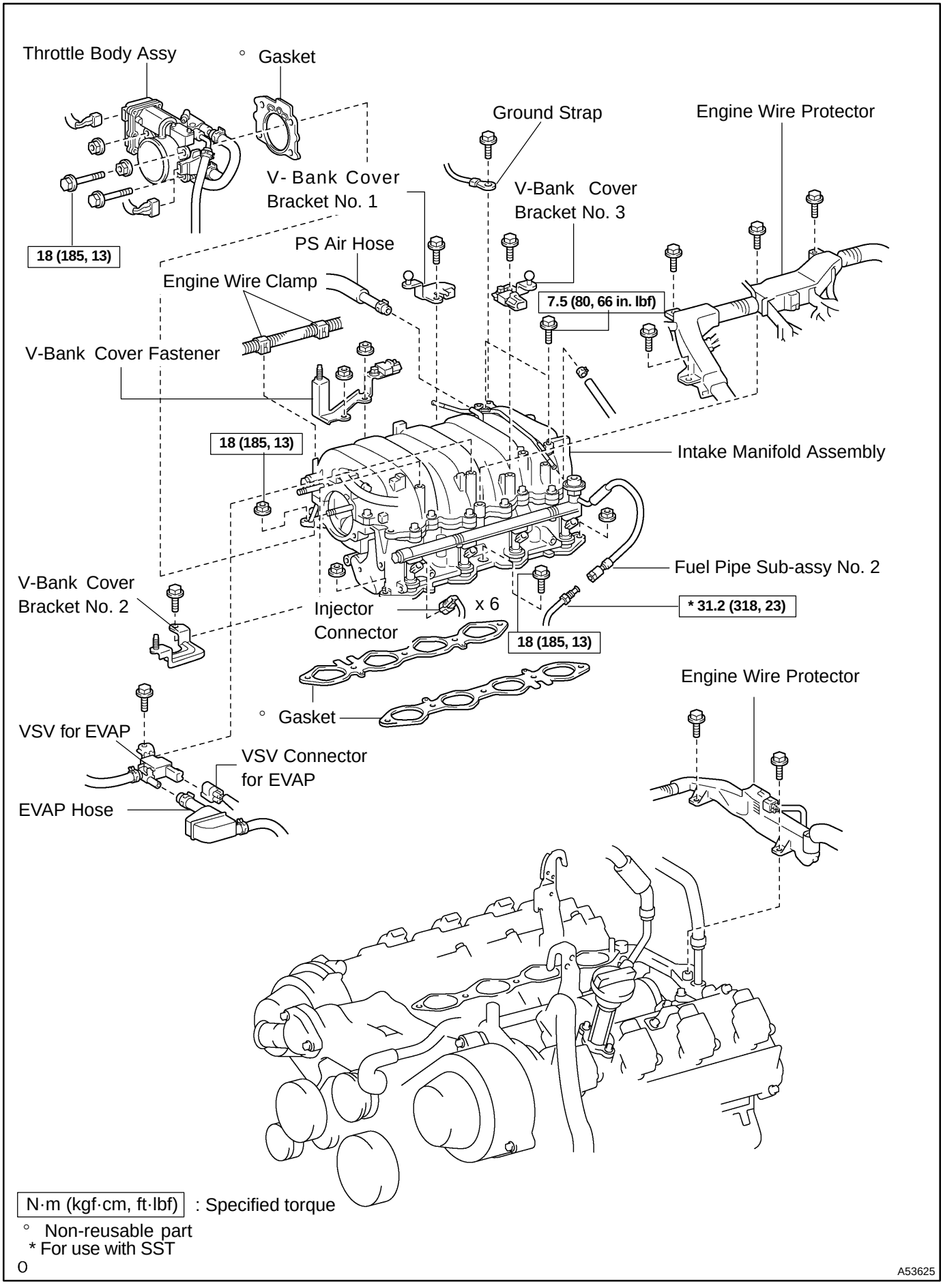
COMPONENTS

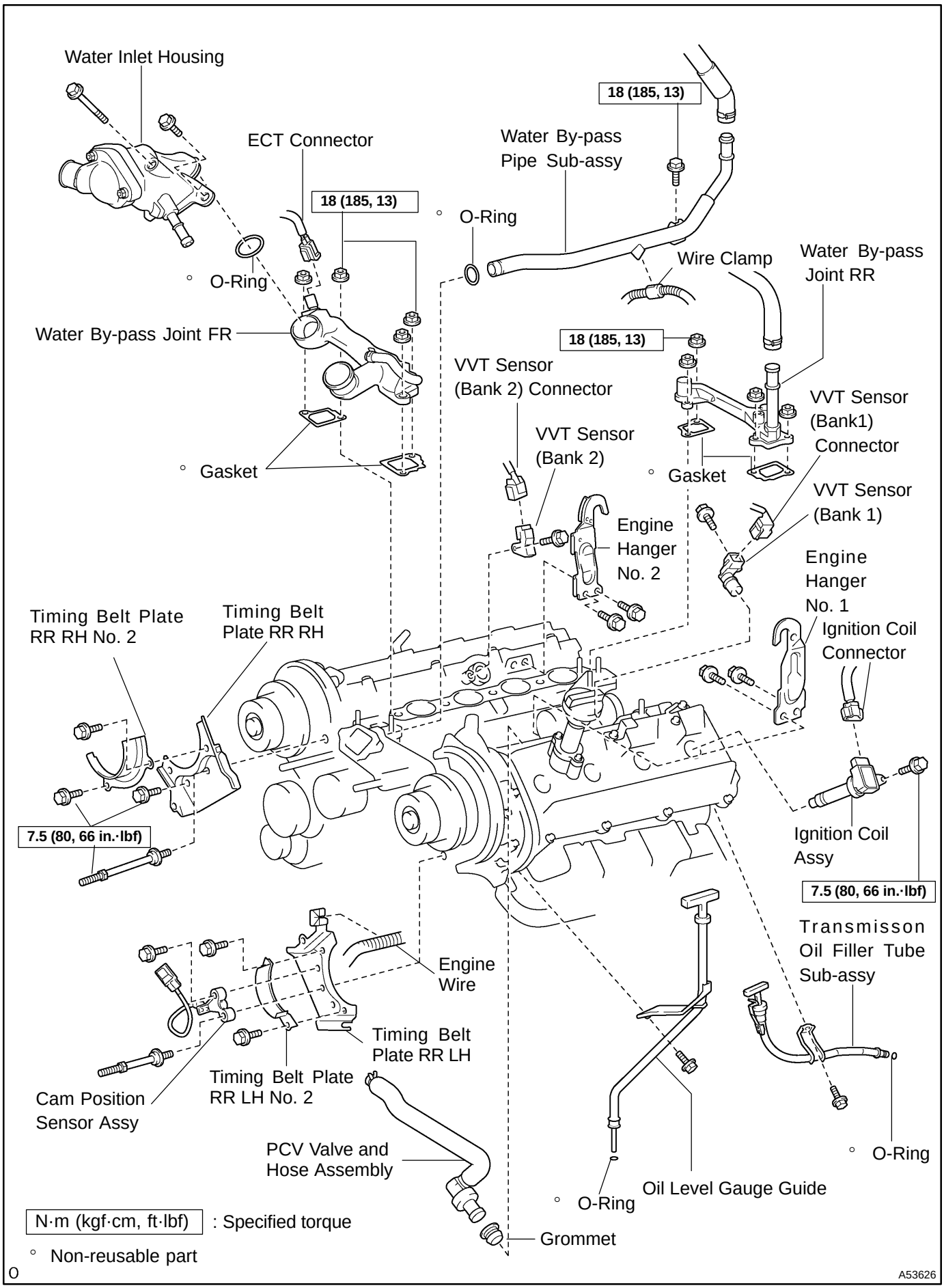
1406Q-02

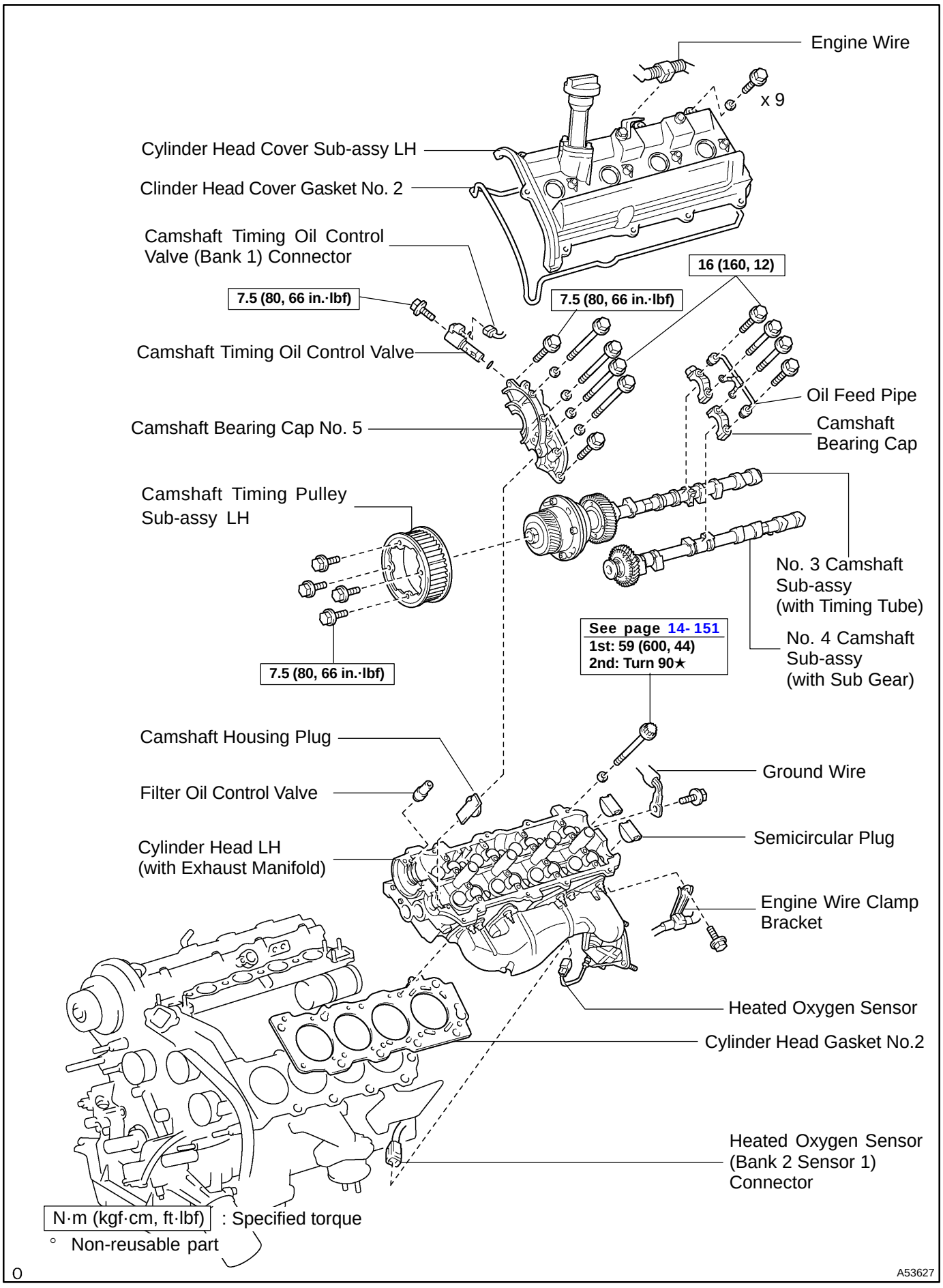



Timing Belt Cover Sub-assy No. 2
Camshaft Position Sensor Connector
Connector Holder
Timing Belt Cover Sub-assy No. 3 LH
Grommet
Gasket
Engine Wire
Water By- pass Pipe No. 3
Timing Chain or Belt Cover No. 2
Gasket
Dust Boot
Timing Belt Tensioner
Idler Pulley Sub-assy No. 2
26 (270, 19)
39 (400, 29)
Cover Plate
Idler Pulley Sub-assy No. 1
Cooler Compressor Assy
Stay
Wire Clamp
N·m (kgf·cm, ft·lbf) : Specified torque
A53622


° Vinyl Tape
Generator Wire
Generator Connector
V-Ribbed Belt Tensioner Assy
Cord Clip
Timing Belt No. 1 Cover
Generator Assy
Ground Cable
Crankshaft Damper Sub-assy
Stay
Clamp
Engine Wire
PS Oil Hose
Vane Pump Assy
43 (440, 32)
39 (400, 29)
Timing Belt
Crankshaft Position Sensor Plate No. 1
N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part
A53623


Throttle Body Assy
° Gasket
Ground Strap
Engine Wire Protector
V- Bank Cover Bracket No. 1
V-Bank Cover Bracket No. 3
18 (185, 13)
PS Air Hose
Engine Wire Clamp
7.5 (80, 66 in. lbf)
V-Bank Cover Fastener
18 (185, 13)
Intake Manifold Assembly
Fuel Pipe Sub-assy No. 2
V-Bank Cover Bracket No. 2
Injector Connector
x 6
* 31.2 (318, 23)
18 (185, 13)
Engine Wire Protector
° Gasket
VSV for EVAP
VSV Connector for EVAP
EVAP Hose
N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part
* For use with SST
A53625

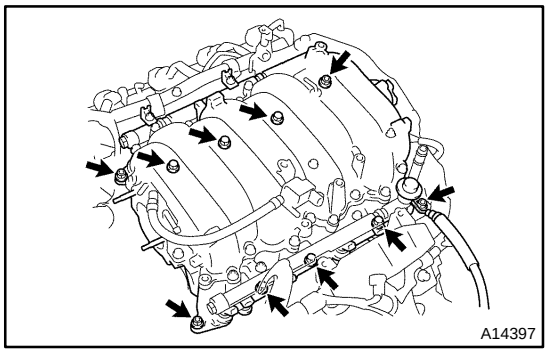

Water Inlet Housing
ECT Connector
18 (185, 13)
O-Ring
O-Ring
Water By-pass Joint FR
Gasket
18 (185, 13)
Water By-pass Pipe Sub-assy
O-Ring
Wire Clamp
Water By-pass Joint RR
18 (185, 13)
VVT Sensor (Bank 2) Connector
VVT Sensor (Bank 2)
Gasket
VVT Sensor (Bank1) Connector
VVT Sensor (Bank 1)
Engine Hanger No. 2
Engine Hanger No. 1
Ignition Coil Connector
Timing Belt Plate RR RH No. 2
Timing Belt Plate RR RH
7.5 (80, 66 in.·lbf)
Ignition Coil Assy
7.5 (80, 66 in.·lbf)
Transmisson Oil Filler Tube Sub-assy
Engine Wire
Timing Belt Plate RR LH
Timing Belt Plate RR LH No. 2
Cam Position Sensor Assy
PCV Valve and Hose Assembly
O-Ring
O-Ring
Oil Level Gauge Guide
Grommet
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
A53626


Engine Wire
x 9
Cylinder Head Cover Sub-assy LH
Clinder Head Cover Gasket No. 2
Camshaft Timing Oil Control Valve (Bank 1) Connector
16 (160, 12)
7.5 (80, 66 in.·lbf)
7.5 (80, 66 in.·lbf)
Camshaft Timing Oil Control Valve
Oil Feed Pipe
Camshaft Bearing Cap No. 5
Camshaft Bearing Cap
Camshaft Timing Pulley Sub-assy LH
No. 3 Camshaft Sub-assy (with Timing Tube)
See page 14-151
1st: 59 (600, 44)
2nd: Turn 90★
No. 4 Camshaft Sub-assy (with Sub Gear)
7.5 (80, 66 in.·lbf)
Camshaft Housing Plug
Ground Wire
Filter Oil Control Valve
Semicircular Plug
Cylinder Head LH (with Exhaust Manifold)
Engine Wire Clamp Bracket
Heated Oxygen Sensor
Cylinder Head Gasket No.2
Heated Oxygen Sensor (Bank 2 Sensor 1) Connector
N·m (kgf·cm, ft·lbf) : Specified torque
° Non-reusable part
A53627

1406R-02

REPLACEMENT

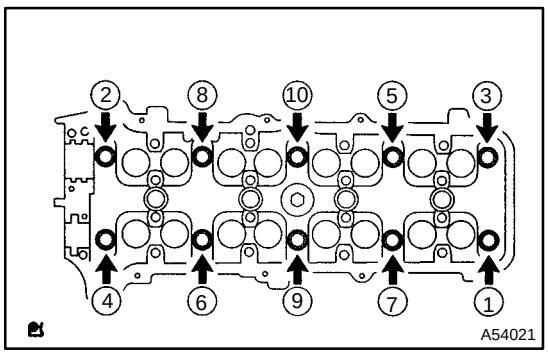
1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-4)**
2. **REMOVE NO.3 CAMSHAFT SUB-ASSY**
   [13053 / 98-12] (See page 14-171)
3. **REMOVE THROTTLE BODY ASSY**
   [22210 / 98-27] (See page 10-5)
4. **REMOVE V-BANK COVER BRACKET NO.1**
   [11254 / 98-5]
5. **REMOVE V-BANK COVER BRACKET NO.2**
   [11256 / 98-5]
6. **REMOVE V-BANK COVER BRACKET NO.3**
   [11257 / 98-5]
7. **REMOVE V-BANK COVER FASTENER**
   [11258A / 98-5]
8. **REMOVE VACUUM SWITCHING VALVE ASSY**
   [17650 / 98-22]
9. **SEPARATE FUEL PIPE SUB-ASSY NO.2**
   [23802B / 98-27] (See page 11-1)



10. **REMOVE INTAKE MANIFOLD ASSEMBLY**

(a) Remove the 6 bolts, 4 nuts, the upper, lower intake manifold assembly and 2 gaskets.

11. **REMOVE WATER BY-PASS JOINT RR**
    [16356 / 98-16]
12. **REMOVE WATER INLET HOUSING**
    [16323 / 98-16]
13. **REMOVE WATER BY-PASS JOINT FR**
    [16355 / 98-16]
14. **REMOVE W/CATALYST CONVERTER ASSY**
    [17400 / 98-20] (See page 15-5)



15. **REMOVE CYLINDER HEAD LH**
    [11102 / 98-5]

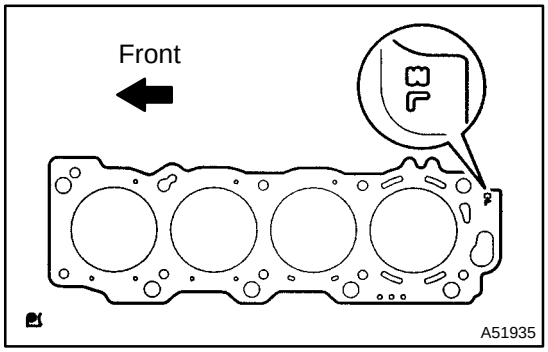
(a) Uniformly loosen and remove the sequence shown. Remove the 10 cylinder head bolts and plate washers.

NOTICE:

Be careful not to drop washers into the cylinder head.

(b) Remove cylinder head together with the LH manifold.

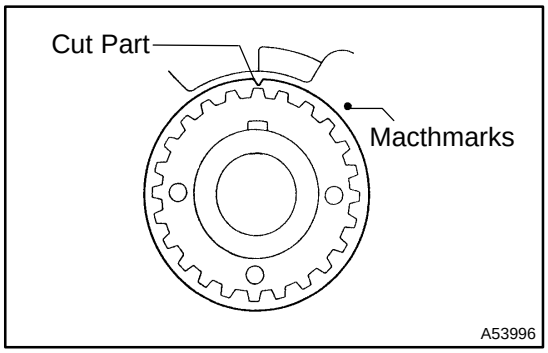
16. REMOVE CYLINDER HEAD GASKET NO.2
[11116 / 98-5]



17. INSTALL CYLINDER HEAD GASKET NO.2
[11116 / 98-5]

(a) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:
Be careful of the installation direction.



18. INSTALL CYLINDER HEAD LH
[11102 / 98-5]

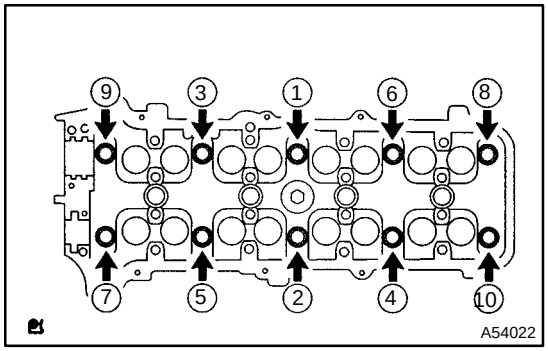
(a) Check that the cut part of the crankshaft timing pulley is in the position shown in the illustration, and that the piston is below the TDC of compression.

(b) Install the cylinder head with manifold RH to the cylinder block.

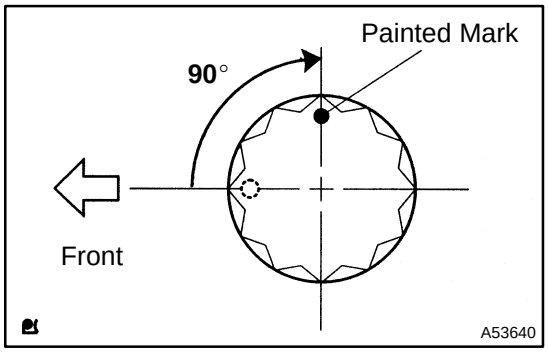
(c) Apply a light coat of engine oil on the threads and under the head of the cylinder head bolts.

(d) Insert the bolt and washer engaged each other into the cylinder head.

NOTICE:
Be careful not to drop washers into the cylinder head.



(e) Install and uniformly tighten the 10 cylinder head bolts, and plate washers, in the sequence shown.
Torque: 59 N·m (600 kgf·cm, 44 ft·lbf)



(f) Mark the front of the cylinder head bolt head with paint.

(g) Retighten the cylinder head bolts by 90° in the numerical order shown.

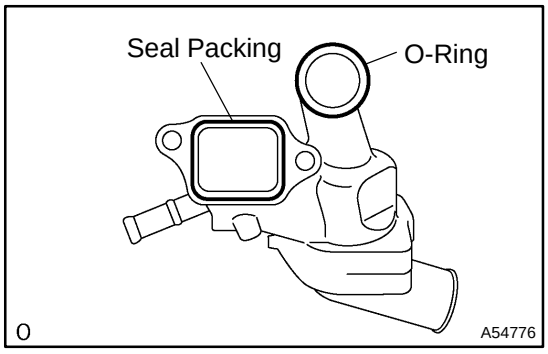
(h) Check that the painted mark is now at a 90° angle to front.

19. INSTALL W/CATALYST CONVERTER ASSY
[17400 / 98-20] (See page 15-5)

20. INSTALL WATER BY-PASS JOINT FR
[16355 / 98-16]

(a) Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Connect the ECT connector.



21. INSTALL WATER INLET HOUSING
[16323 / 98-16]

(a) Install a new O-ring to the water inlet housing.

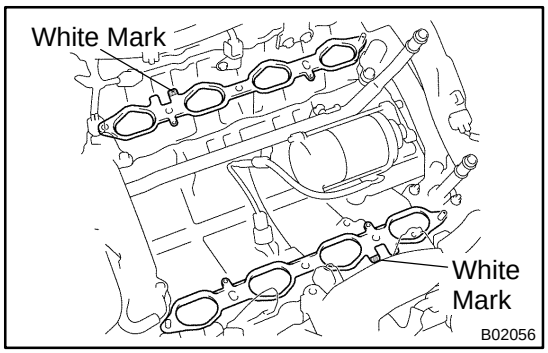
(b) Apply soapy water on the O-ring.

(c) Apply seal packing to the sealing groove of water inlet housing as shown in the illustration.
Seal packing:
Part No. 08826 - 00100 or equivalent
- ★ Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- ★ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.

(d) Install the water inlet and housing assembly with the 2 bolts. Alternately tighten the bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

22. INSTALL WATER BY-PASS JOINT RR
[16356 / 98-16]

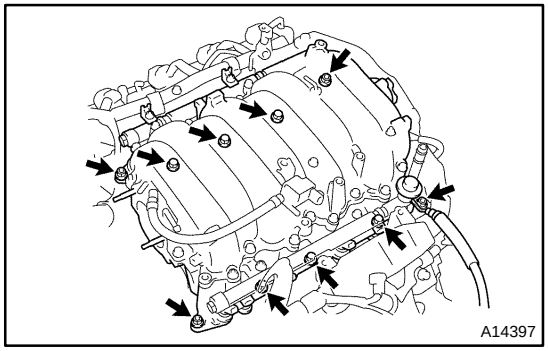
(a) Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



23. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Place 2 new gaskets on the cylinder heads with the white mark facing outward.

NOTICE:
Be careful of the installation direction.



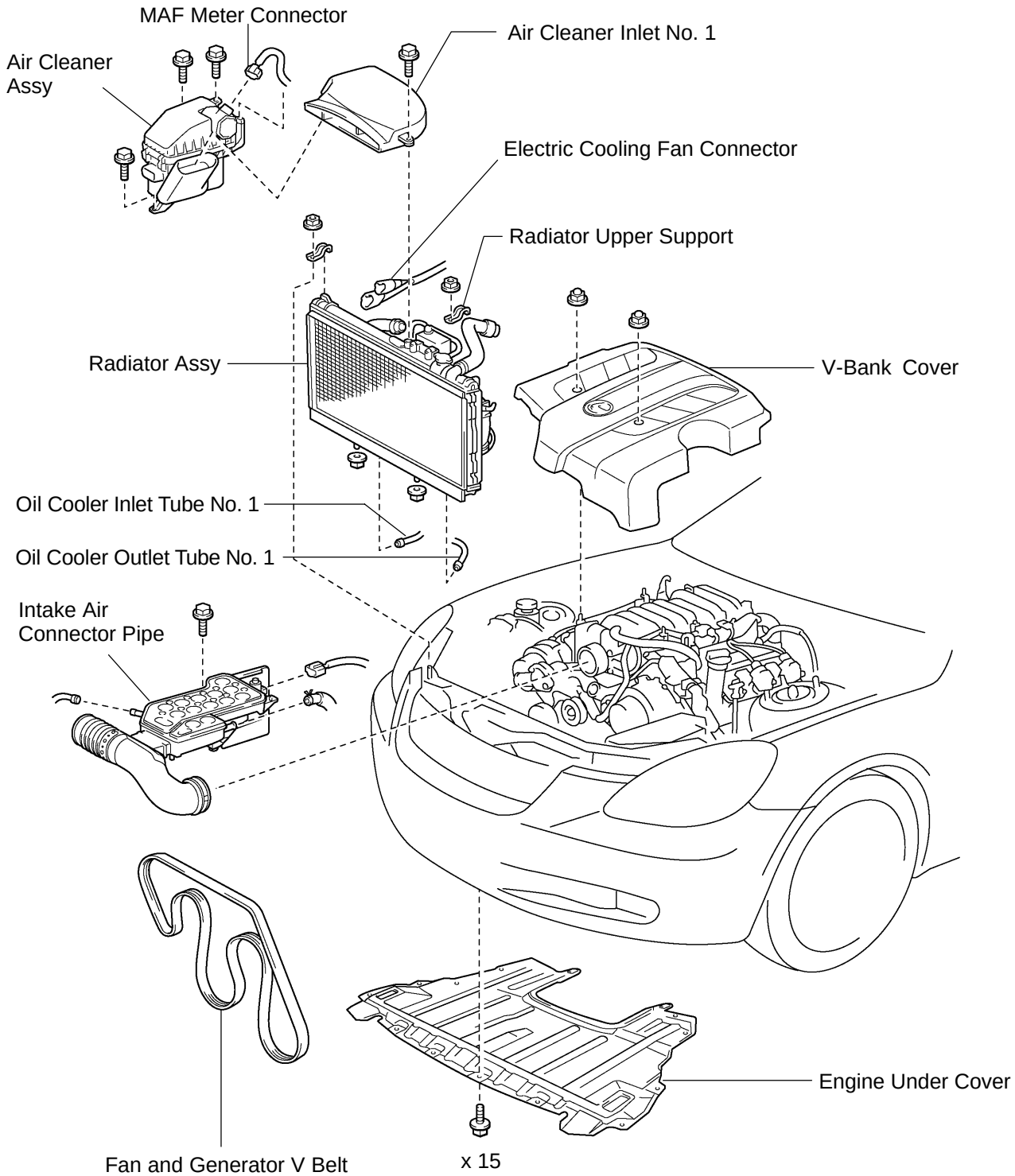
(b) Install the upper and lower intake manifolds assembly with the 6 bolts and 4 nuts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

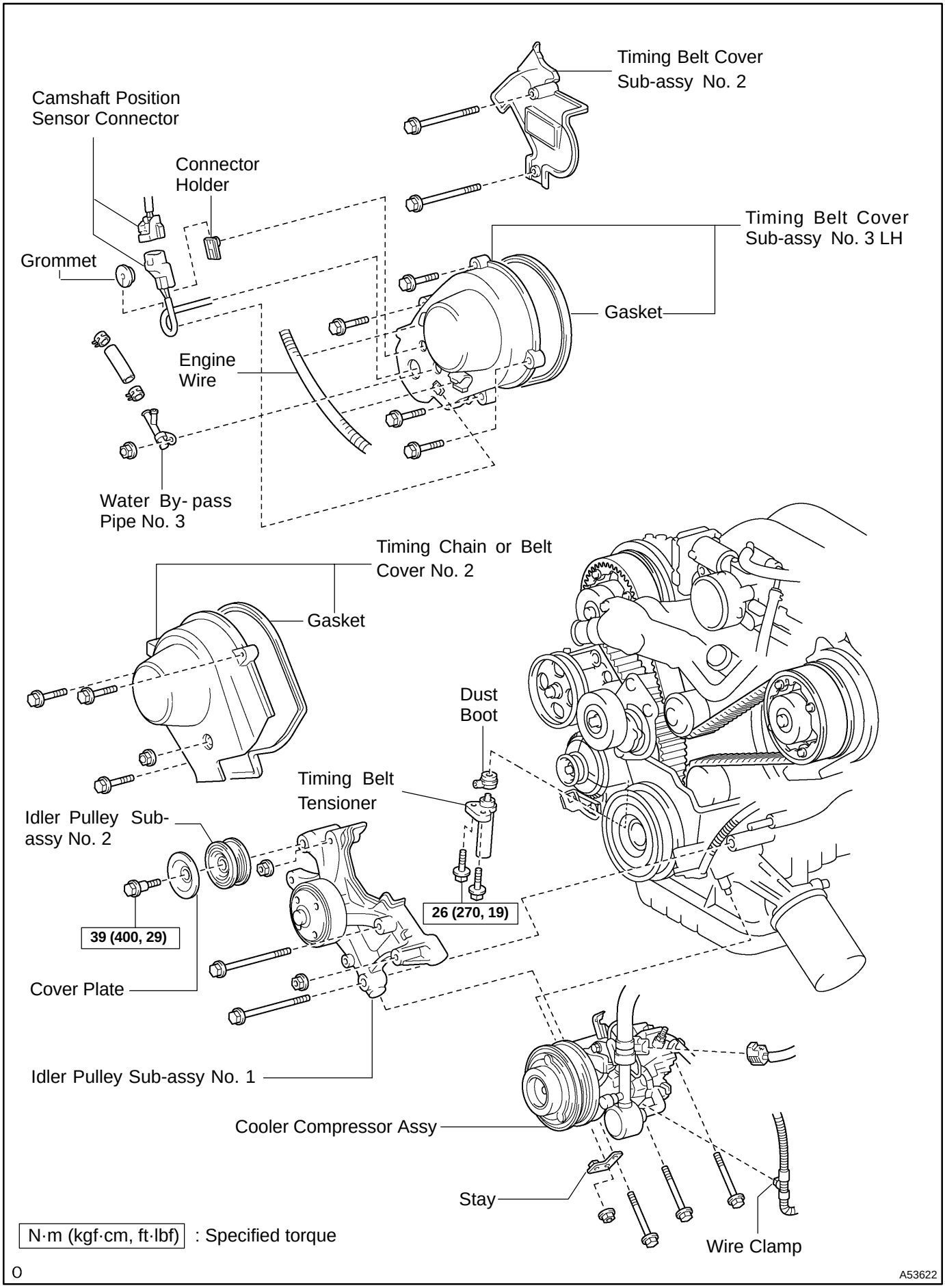
24. INSTALL FUEL PIPE SUB-ASSY NO.2
[23802B / 98-27] (See page 11-1)
25. INSTALL VACUUM SWITCHING VALVE ASSY
[17650 / 98-22]
26. INSTALL V-BANK COVER FASTENER
[11258A / 98-5]
27. INSTALL V-BANK COVER BRACKET NO.3
[11257 / 98-5]
28. INSTALL V-BANK COVER BRACKET NO.2
[11256 / 98-5]
29. INSTALL V-BANK COVER BRACKET NO.1
[11254 / 98-5]
30. INSTALL THROTTLE BODY ASSY
[22210 / 98-27] (See page 10-5)
31. INSTALL NO.3 CAMSHAFT SUB-ASSY
[13053 / 98-12] (See page 14-171)

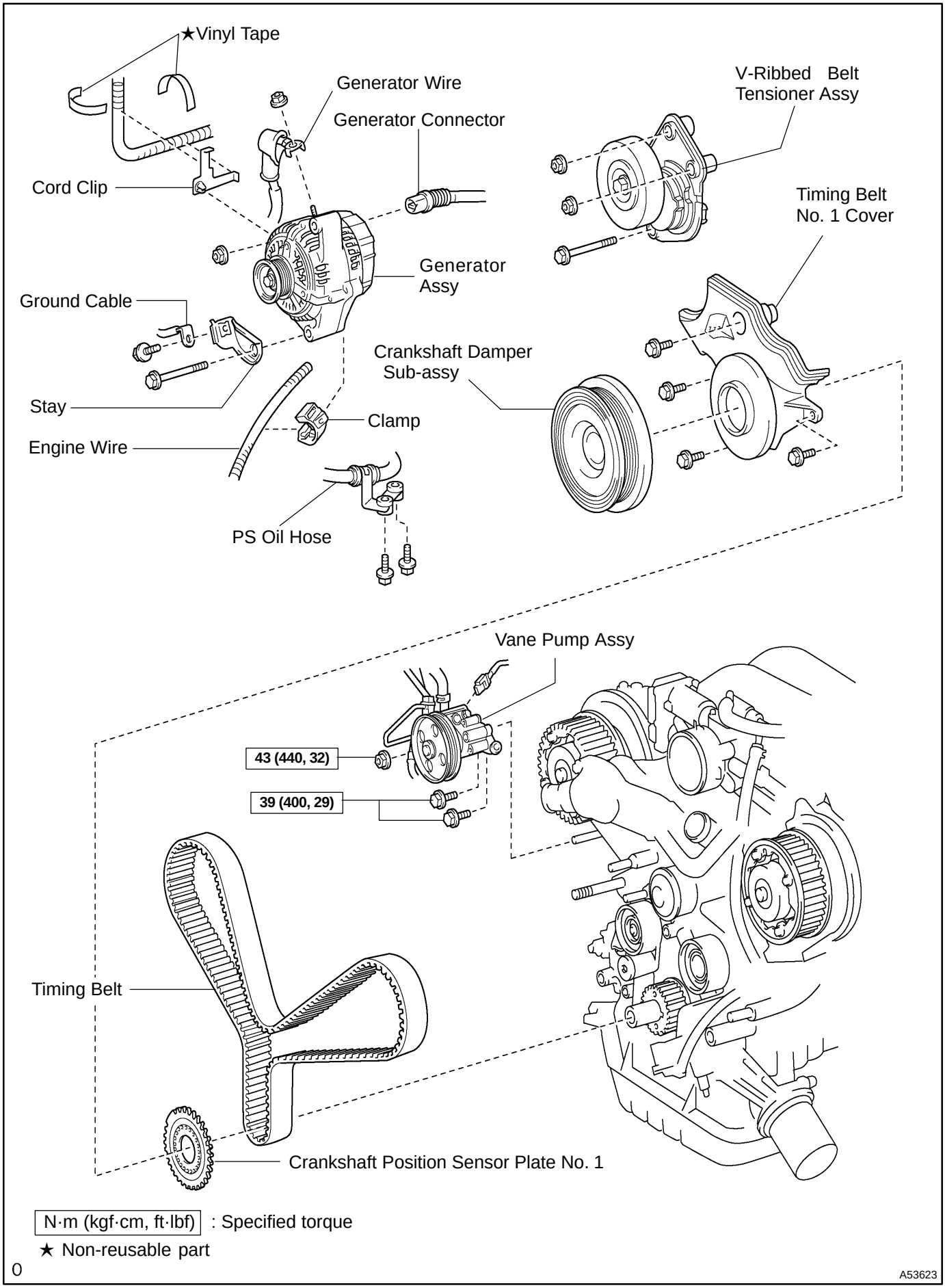
CAMSHAFT

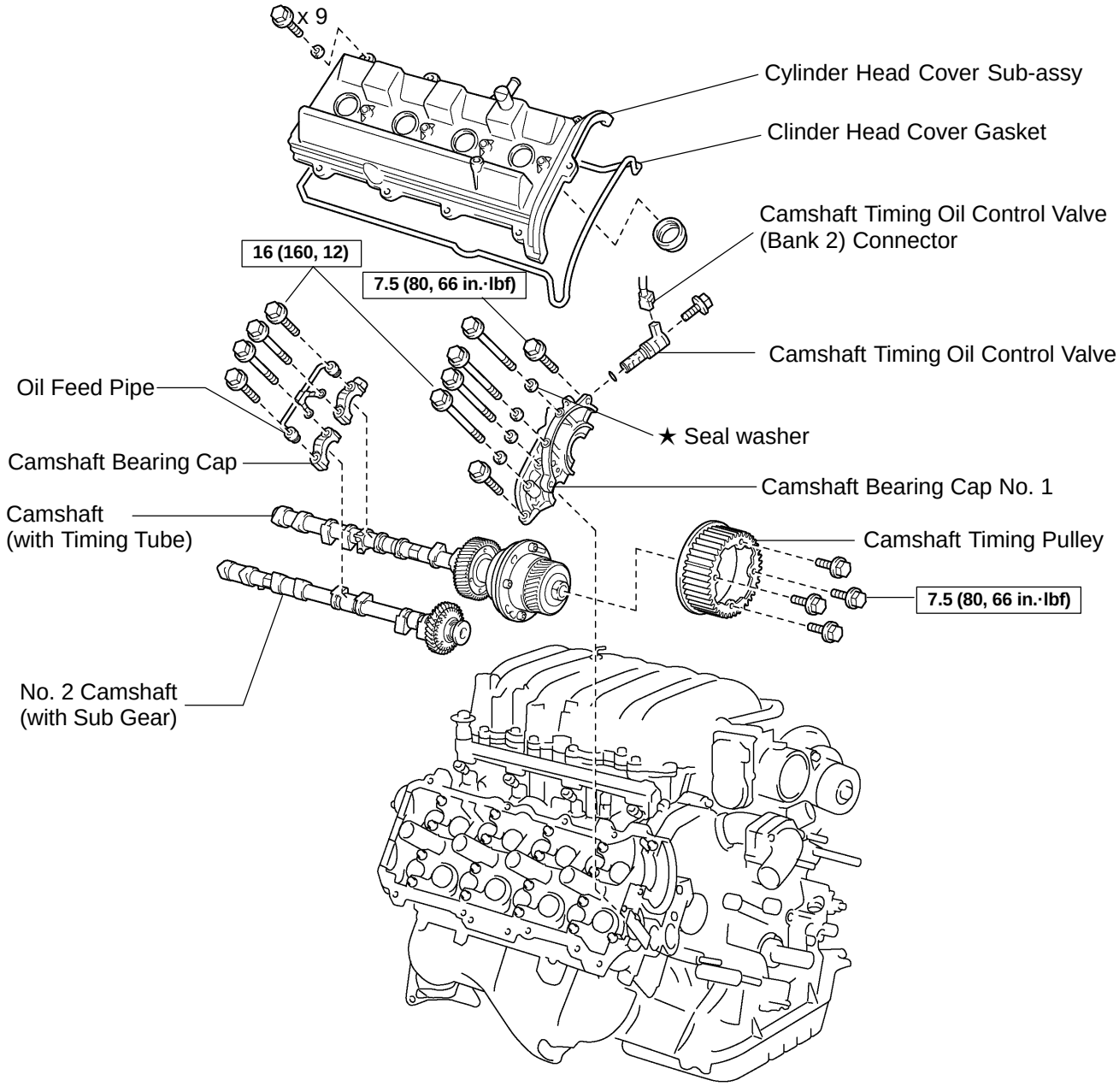
COMPONENTS

1406S-02



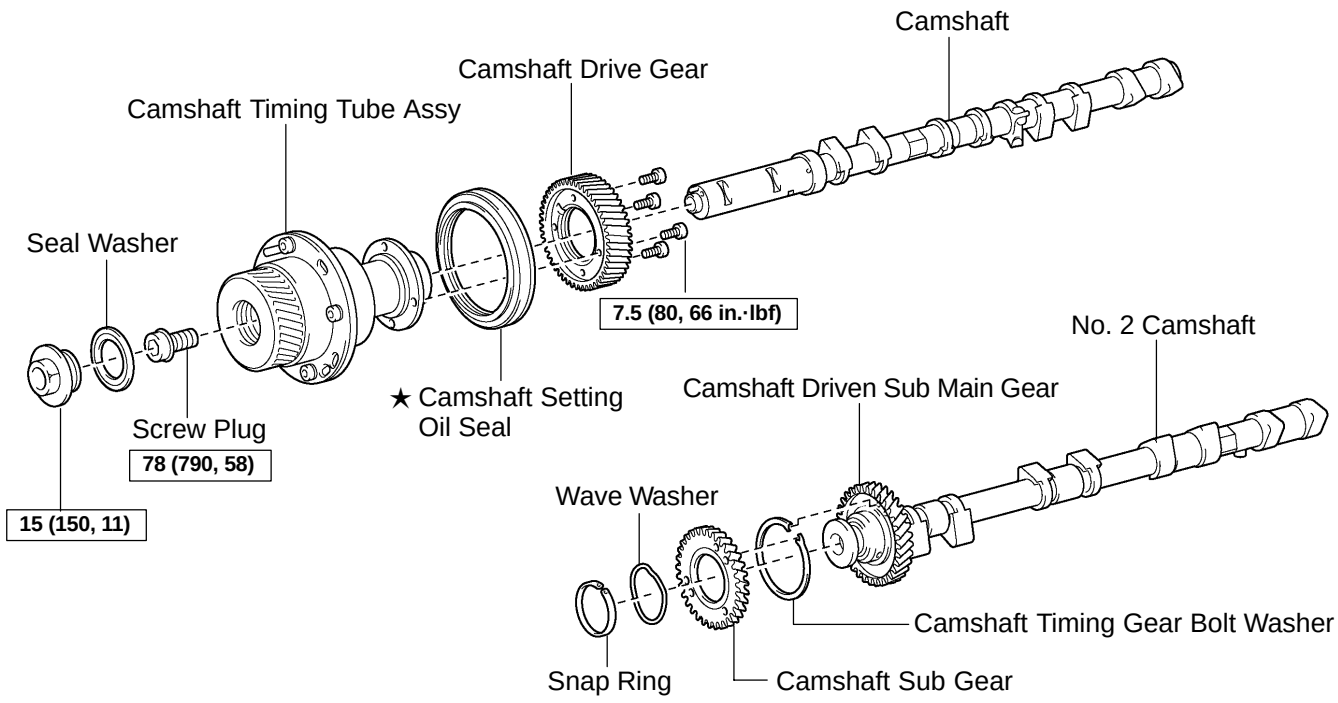

Timing Belt Cover Sub-assy No. 2
Camshaft Position Sensor Connector
Connector Holder
Timing Belt Cover Sub-assy No. 3 LH
Grommet
Gasket
Engine Wire
Water By- pass Pipe No. 3
Timing Chain or Belt Cover No. 2
Gasket
Dust Boot
Timing Belt Tensioner
Idler Pulley Sub-assy No. 2
26 (270, 19)
39 (400, 29)
Cover Plate
Idler Pulley Sub-assy No. 1
Cooler Compressor Assy
Stay
Wire Clamp
N·m (kgf·cm, ft·lbf) : Specified torque
A53622


★Vinyl Tape
Generator Wire
Generator Connector
V-Ribbed Belt Tensioner Assy
Cord Clip
Timing Belt No. 1 Cover
Generator Assy
Ground Cable
Crankshaft Damper Sub-assy
Stay
Clamp
Engine Wire
PS Oil Hose
Vane Pump Assy
43 (440, 32)
39 (400, 29)
Timing Belt
Crankshaft Position Sensor Plate No. 1
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A53623



N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part

A53633



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

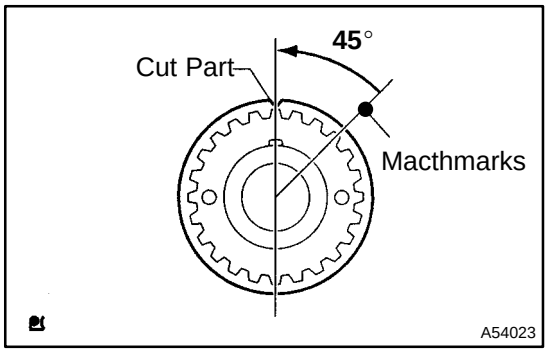
★ Non-reusable part

A53634

1406T-02

REPLACEMENT

1. **REMOVE TIMING BELT**
   [13568 / 98-12] (See page 14-1 19)
2. **REMOVE CYLINDER HEAD COVER SUB-ASSY**
   [11201 / 98-5] (See page 14-129)



3. **PISTON & VALVE BREAKE PREVENT WORK**

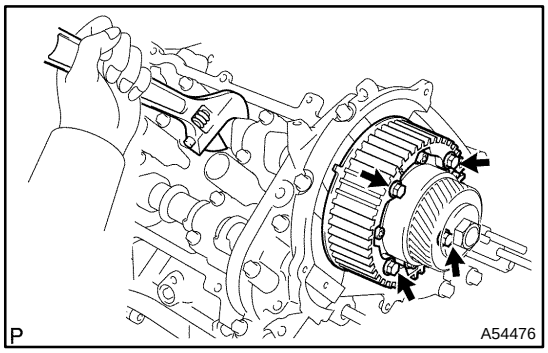
(a) Turn the crankshaft timing pulley covnterclockwise by 45° and match the cut part with the illustrated position.

HINT:

Positioning the No.1 cylinder in 45°BTDC does not make the valve and piston interfere each other even when the valve is full open.

NOTICE:

Be sure to match the cut part by timing it countercockwise.



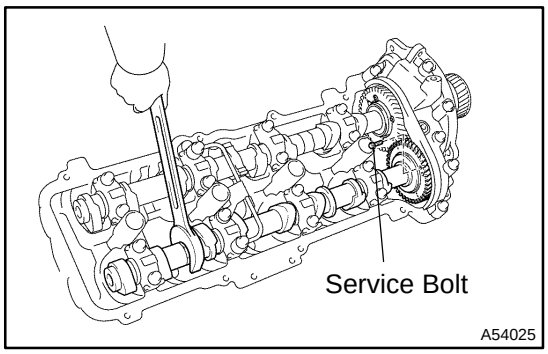
4. **REMOVE CAMSHAFT TIMING PULLEY**
   [13523P / 98-12]

(a) Remove the 4 bolts and timing pulley.

5. **REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**
   [11101J / 98-5]
6. **REMOVE CAMSHAFT**
   [13511 / 98-12]

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Boring the service bolt hole of the sub-gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

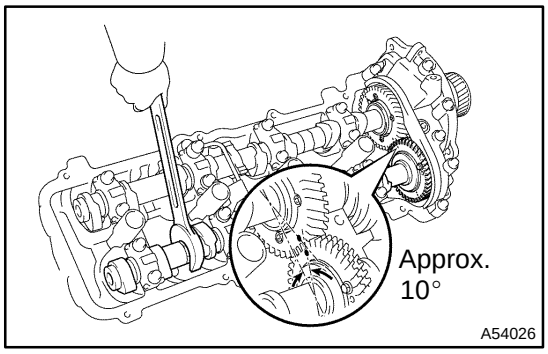
(b) Secure the sub-gear to the main gear with a service bolt.

Recommended service bolt:

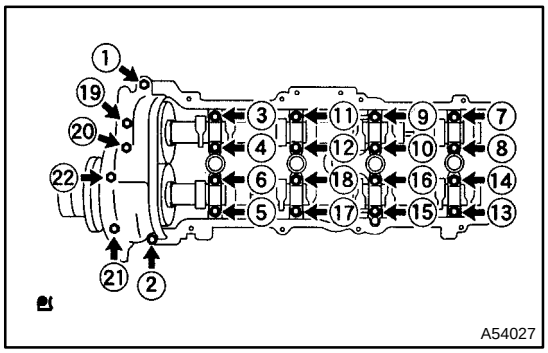
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm (0.63 - 0.79 in.)

HINT:

When removing the camshaft, make sure that the torsional spring force of the sub-gear has been eliminated by the above operation.



(c) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

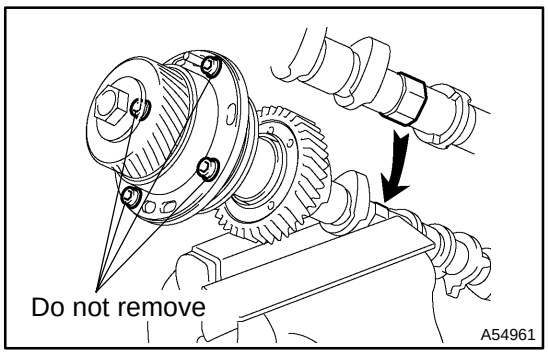


(d) Uniformly loosen the 22 bearing cap bolts in several passes, in the sequence shown.

(e) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, oil control valve filter and 2 camshafts.

NOTICE:

- ★ **Do not pry the camshaft with a tool or the likes by applying excessise fore to it.**
- ★ **Do not damage the reception part of the thrust in the cylinder head side.**

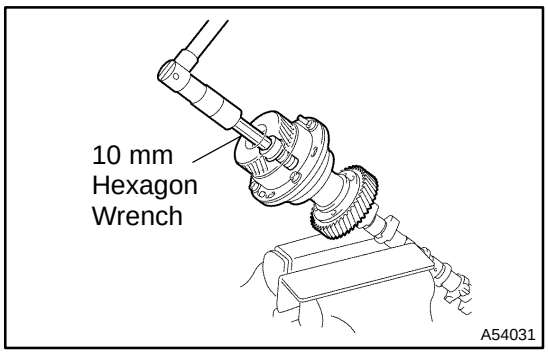


(f) Mount the hexagon wrench head portion of the intake camshaft in a vise.

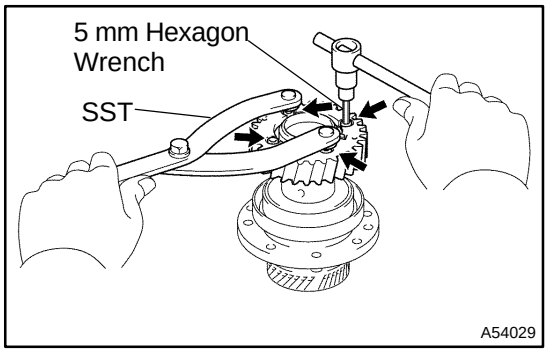
NOTICE:

- ★ **Be careful not to damage the camshaft.**
- ★ **The 4 bolts shown in the illustration determine the backlash of the gear in the timing tube, so do not remove them. If any of the 4 bolts are removed, install a new timing tube assembly.**

(g) Remove the screw plug and seal washer.



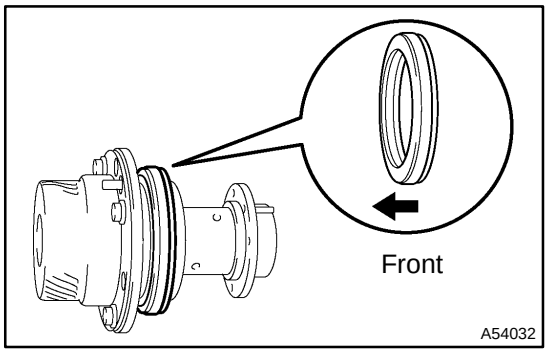
(h) Using a 10 mm hexagon wrench, and remove the bolt.
(i) Pull out the timing tube and drive gear assembly from the camshaft.



(j) Using SST and a 5 mm hexagon wrench, and remove the 4 bolts, drive gear and oil seal.

NOTICE:
Be careful not to damage the timing tube.

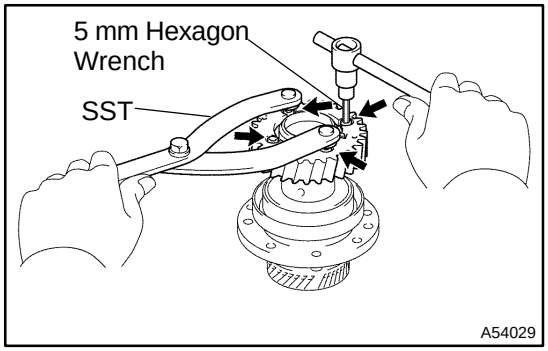
SST 09960-10010 (09962-01000, 09963-00500)



7. INSTALL CAMSHAFT
[13511 / 98-12]

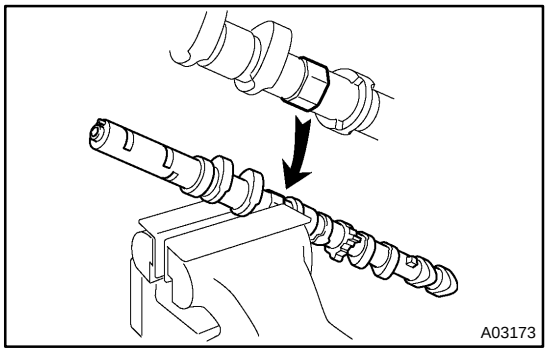
(a) Insert a new oil seal into the camshaft timing tube untill it reaches the stopper.

NOTICE:
★ **Be careful of the installation direction.**
★ **Do not turn over the oil seal lip.**



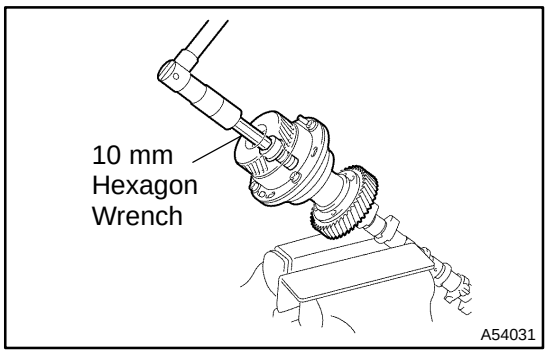
(b) Align the timing tube knock pin with the knock pin groove of the drive gear, and temporarily install the drive gear with the 4 bolts.
(c) Using SST and a 5 mm hexagon wrench, uniformly tighten the 4 bolts in several passes.
SST 09960-10010 (09962-01000, 09963-00500)
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

NOTICE:
Be careful not to damage the timing tube.



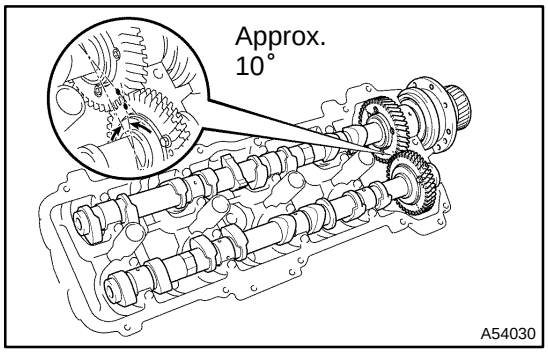
(d) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:
Be careful not to damage the camshaft.

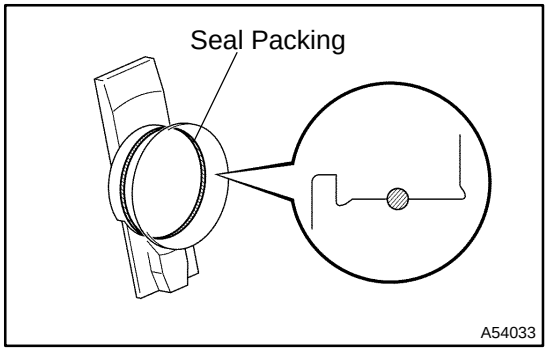


(e) Align the camshaft knock pin with the knock pin groove of the timing tube, and push the timing tube by hand until you feel it touch the bottom.
(f) Using a 10 mm hexagon wrench, install the bolt.
Torque: 78 N·m (790 kgf·cm, 58 ft·lbf)
(g) Install the seal washer and screw plug.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)
(h) Install the camshaft No.1 with timing tube assembly and the camshaft No.2.

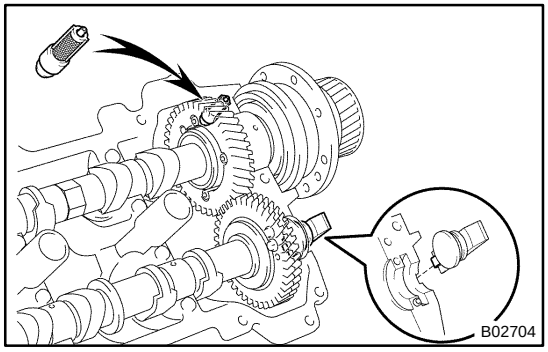
NOTICE:
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(1) Apply engine oil to the cam and gear of the camshaft and also the journal of the cylinder head.
(2) Align the timing marks (1 dot mark) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.
(3) Set the timing mark (1 dot mark) of the camshaft drive and driven main gears at approx. 10° angle.

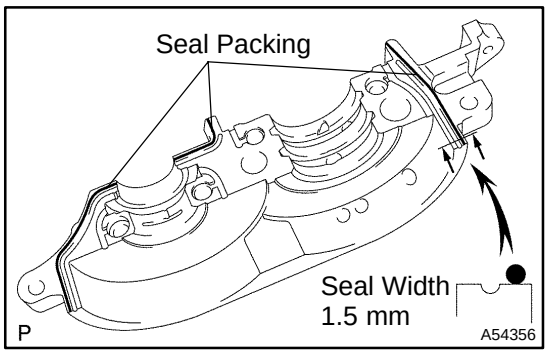


(4) Apply seal packing to the camshaft housing plug.
★ Remove the old packing (FIPG) material.
★ Apply seal packing to the housing plug.
Seal packing: Part No. 08826-00080 or equivalent



(5) Install the camshaft housing plug to the cylinder head as shown in the illustration.
(6) Install the oil control valve filter to the cylinder head.

NOTICE:
Be careful of the installation direction.



(7) Apply seal packing to the front bearing cap.

★ Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head.

Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and groove.

Thoroughly clean all components to remove all the loose material.

Using a non- residue solvent, clean both sealing surfaces.

★ Apply seal packing to the bearing cap as shown in the illustration.

Install a nozzle that has been cut to a 1.5mm (0.059 in.) opening.

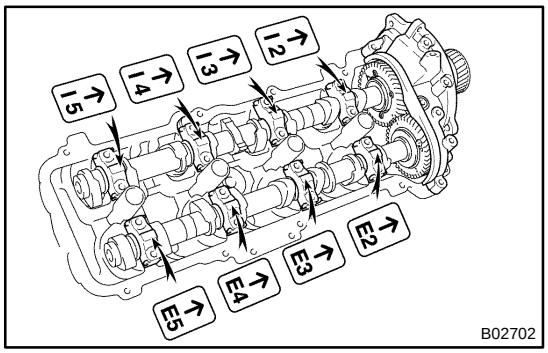
Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

Immediately remove nozzle from the tube and reinstall cap.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.

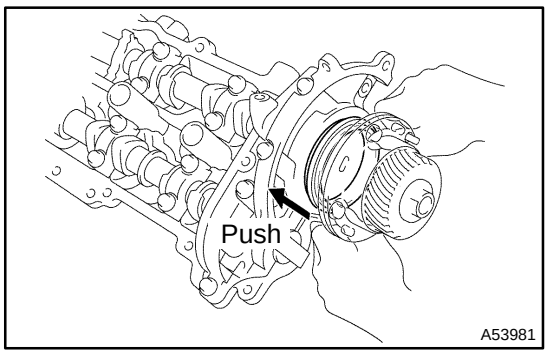


(8) Install the front bearing cap.

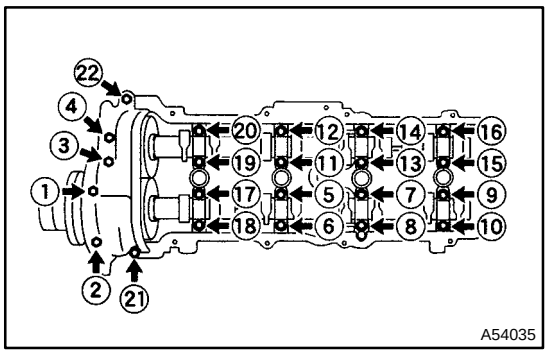
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(9) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



(10) Push in the camshaft oil seal.



(11) Install 4 new seal washers to the bearing cap bolts (1 - 4).

(12) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts (5 - 22).

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolts (1 - 4).

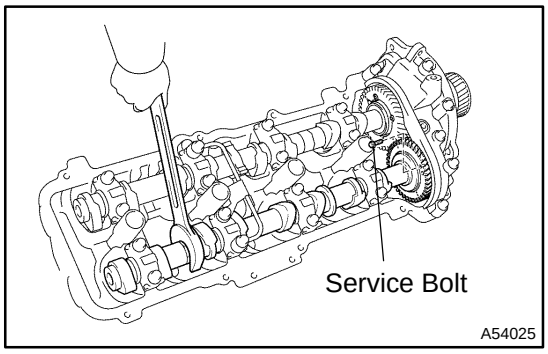
(13) Install the oil feed pipe with the 22 bearing cap bolts.

(14) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

Torque:

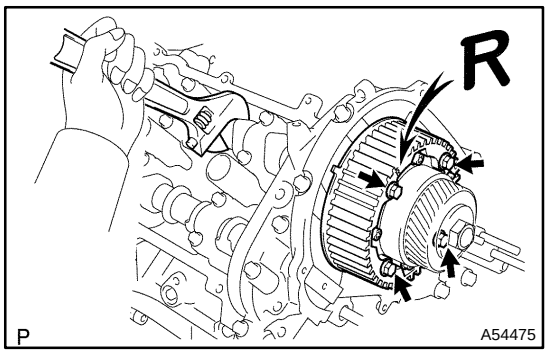
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolts 21 and 22

16 N·m (160 kgf·cm, 12 ft·lbf) for others



(15) Remove the service bolt.

8. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5]



9. INSTALL CAMSHAFT TIMING PULLEY
[13523P / 98-12]

(a) Align the camshaft timing tube knock pin with the knock pin groove of the timing pulley.

(b) Attach the timing pulley to the camshaft timing tube, facing the "R" mark forward.

(c) Hold the hexagon wrench head portion of the camshaft, install the 4 pulley bolts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

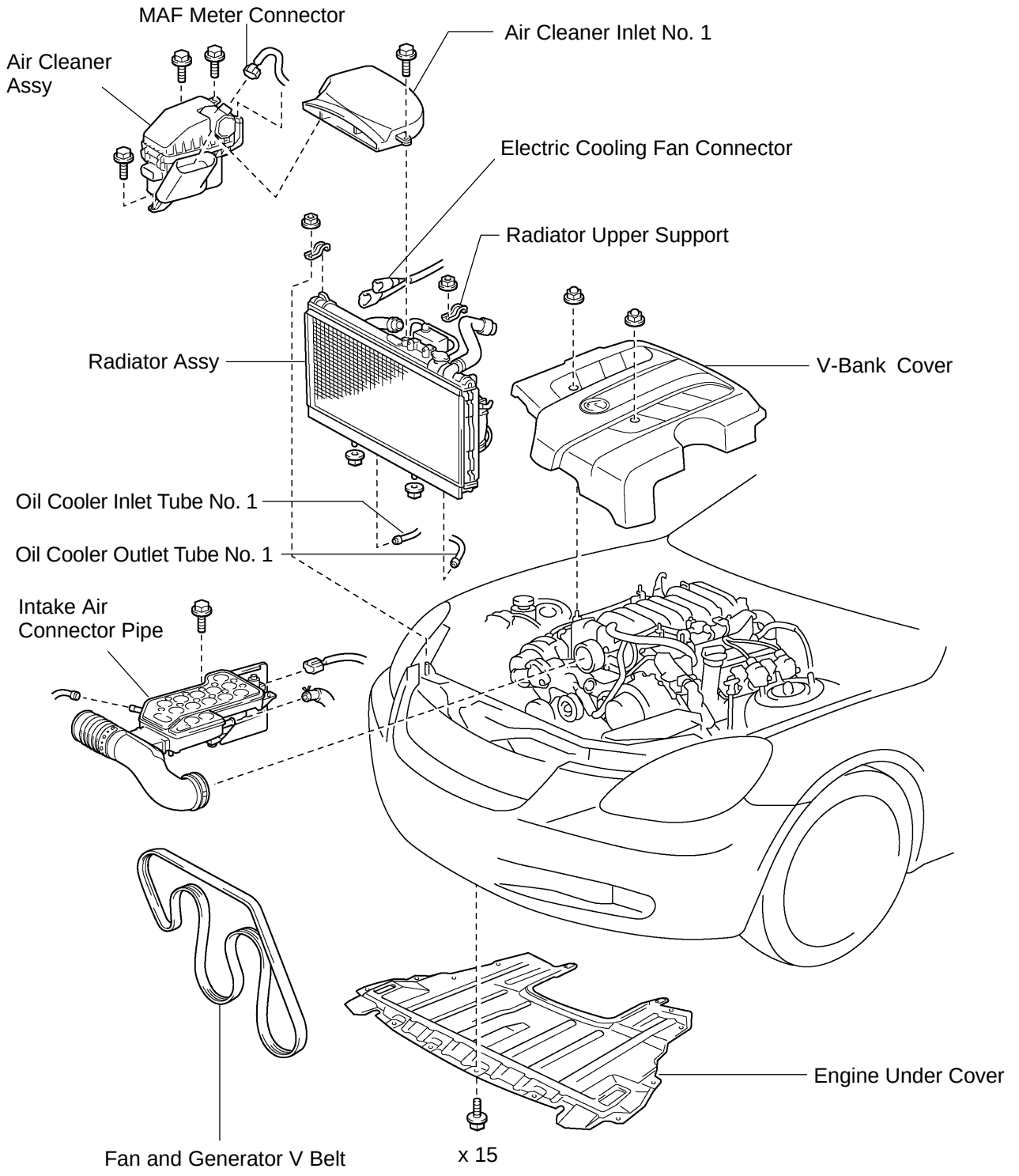
10. INSTALL CYLINDER HEAD COVER SUB-ASSY
[11201 / 98-5] (See page 14-129)

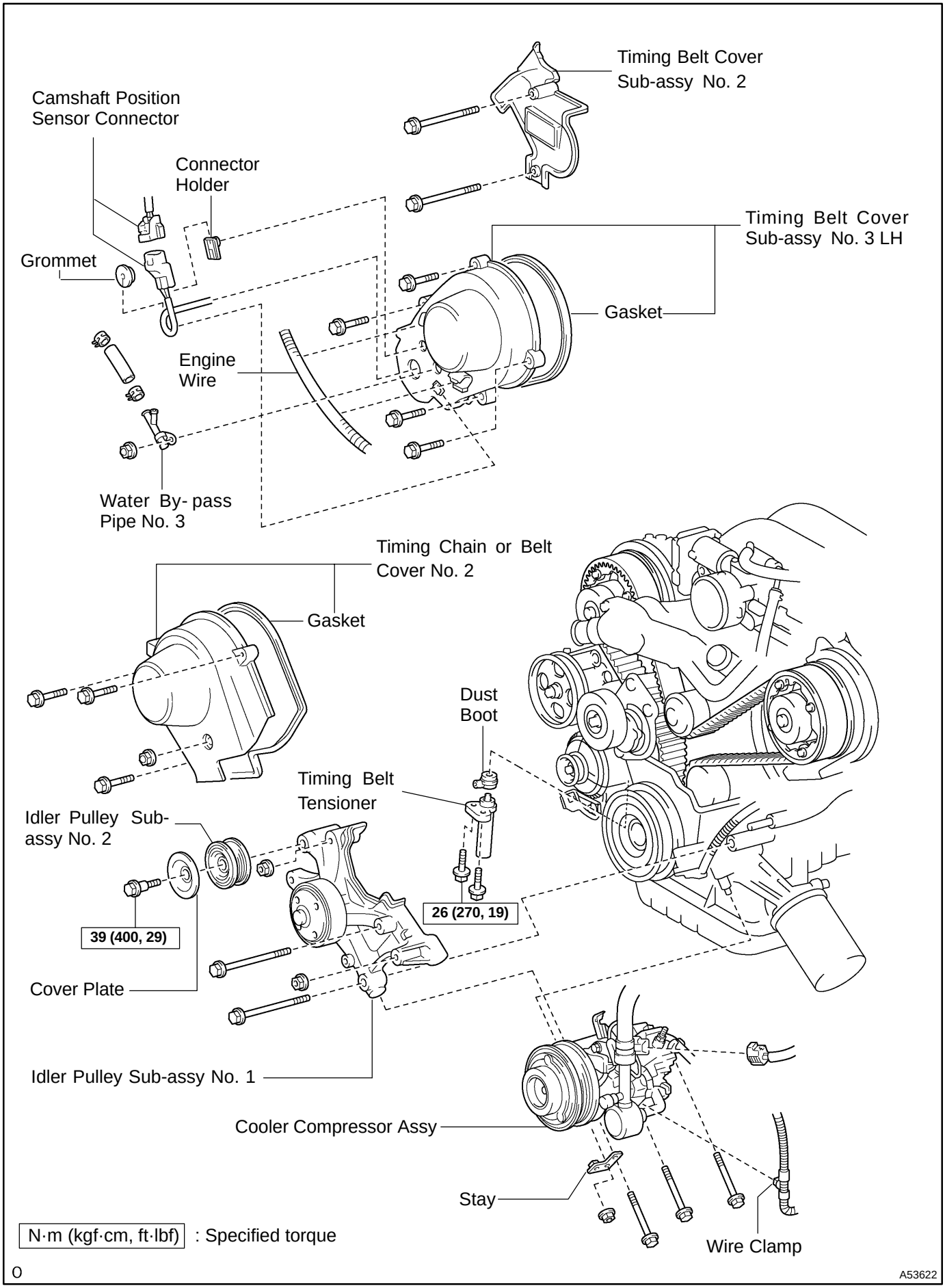
11. INSTALL TIMING BELT
[13568 / 98-12] (See page 14-1 19)

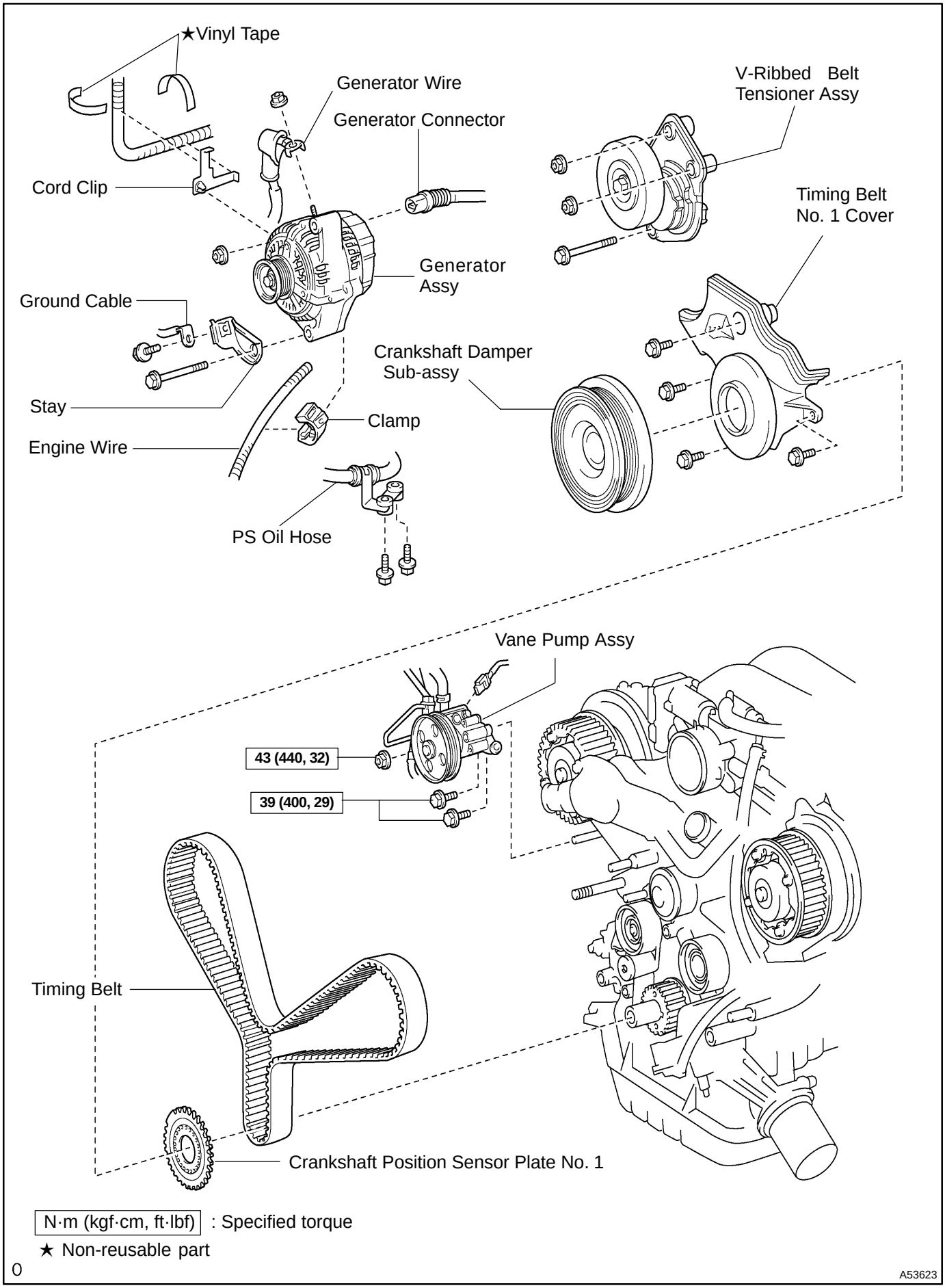
NO.3 CAMSHAFT SUB-ASSY

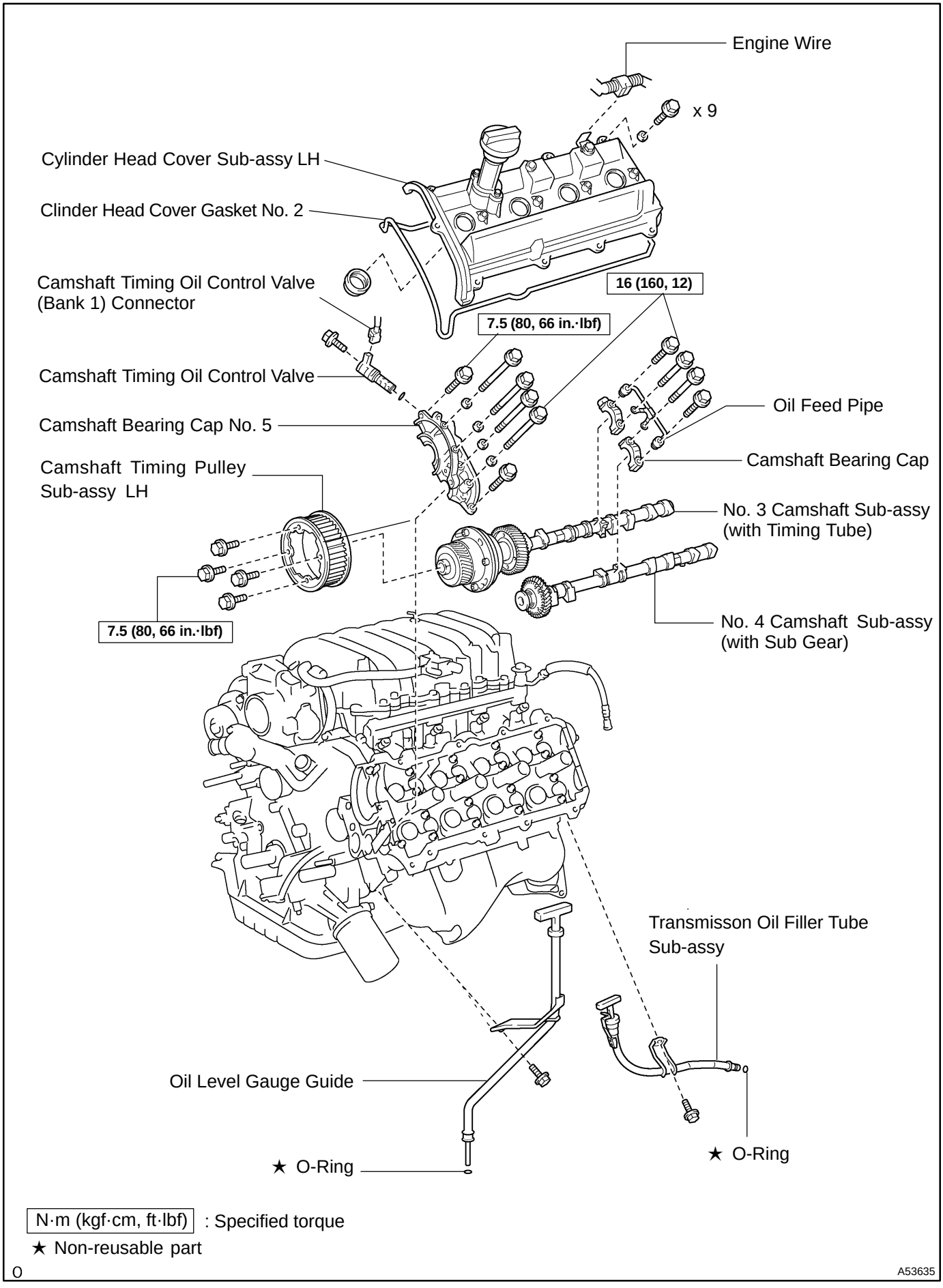
COMPONENTS

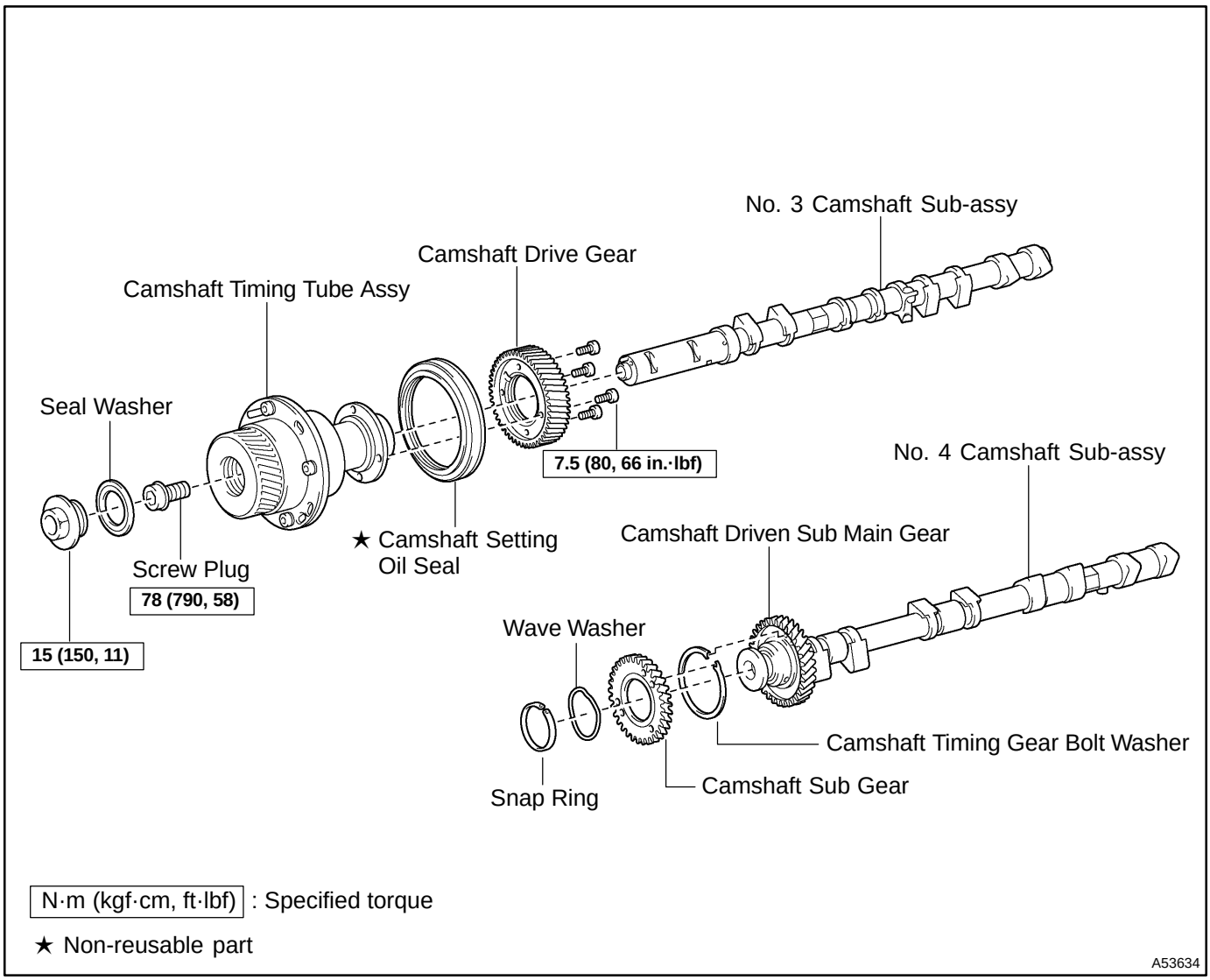
1406U-02




Timing Belt Cover Sub-assy No. 2
Camshaft Position Sensor Connector
Connector Holder
Timing Belt Cover Sub-assy No. 3 LH
Grommet
Gasket
Engine Wire
Water By- pass Pipe No. 3
Timing Chain or Belt Cover No. 2
Gasket
Dust Boot
Timing Belt Tensioner
Idler Pulley Sub-assy No. 2
26 (270, 19)
39 (400, 29)
Cover Plate
Idler Pulley Sub-assy No. 1
Cooler Compressor Assy
Stay
Wire Clamp
N·m (kgf·cm, ft·lbf) : Specified torque
A53622


★Vinyl Tape
Generator Wire
Generator Connector
V-Ribbed Belt Tensioner Assy
Cord Clip
Timing Belt No. 1 Cover
Generator Assy
Ground Cable
Crankshaft Damper Sub-assy
Stay
Clamp
Engine Wire
PS Oil Hose
Vane Pump Assy
43 (440, 32)
39 (400, 29)
Timing Belt
Crankshaft Position Sensor Plate No. 1
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A53623


Engine Wire
x 9
Cylinder Head Cover Sub-assy LH
Clinder Head Cover Gasket No. 2
Camshaft Timing Oil Control Valve (Bank 1) Connector
16 (160, 12)
7.5 (80, 66 in.·lbf)
Camshaft Timing Oil Control Valve
Camshaft Bearing Cap No. 5
Oil Feed Pipe
Camshaft Bearing Cap
Camshaft Timing Pulley Sub-assy LH
No. 3 Camshaft Sub-assy (with Timing Tube)
7.5 (80, 66 in.·lbf)
No. 4 Camshaft Sub-assy (with Sub Gear)
Transmisson Oil Filler Tube Sub-assy
Oil Level Gauge Guide
★ O-Ring
★ O-Ring
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A53635

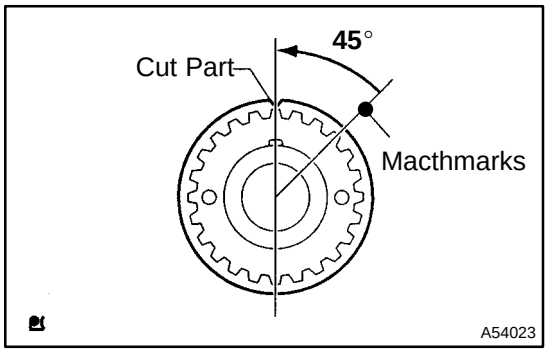

No. 3 Camshaft Sub-assy
Camshaft Drive Gear
Camshaft Timing Tube Assy
Seal Washer
7.5 (80, 66 in.·lbf)
No. 4 Camshaft Sub-assy
★ Camshaft Setting Oil Seal
Camshaft Driven Sub Main Gear
Screw Plug
78 (790, 58)
15 (150, 11)
Wave Washer
Camshaft Timing Gear Bolt Washer
Camshaft Sub Gear
Snap Ring
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A53634

1406V-02

REPLACEMENT

1. REMOVE TIMING BELT
[13568 / 98-12] (See page 14-1 19)

2. REMOVE CYLINDER HEAD COVER SUB-ASSY LH
[11202 / 98-5] (See page 14-133)



3. PISTON & VALVE BREAKE PREVENT WORK

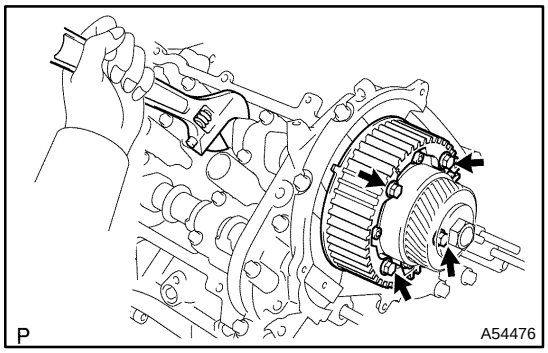
(a) Turn the crankshaft timing pulley counterclockwise by 45° and match the cut part with the illustrated position.

HINT:

Positioning the No.1 cylinder in 45°BTDC does not make the valve and piston interfere each other even when the valve is full open.

NOTICE:

Be sure to match the cut part by timing it countercockwise.



4. REMOVE CAMSHAFT TIMING PULLEY SUB-ASSY LH
[13056 / 98-12]

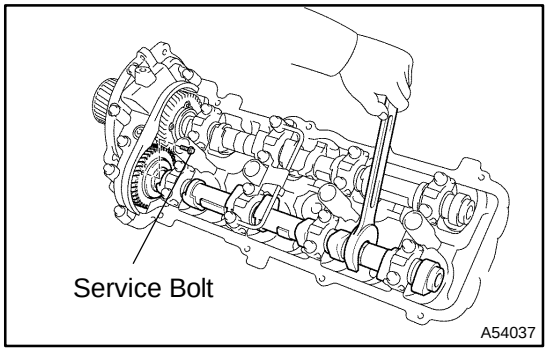
(a) Remove the 4 bolts and timing pulley.

5. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5]

6. REMOVE NO.3 CAMSHAFT SUB-ASSY
[13053 / 98-12]

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Boring the service bolt hole of the sub-gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

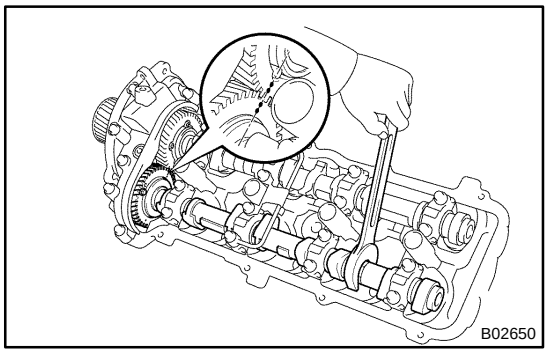
(b) Secure the sub-gear to the main gear with a service bolt.

Recommended service bolt:

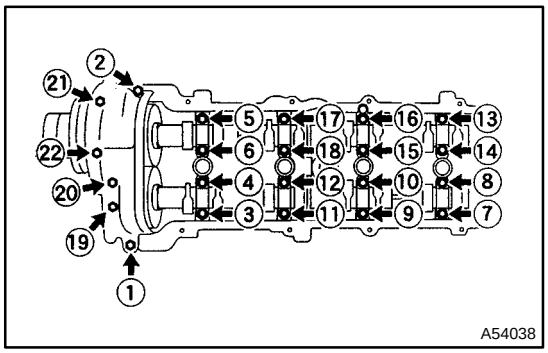
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm (0.63 - 0.79 in.)

HINT:

When removing the camshaft, make sure that the torsional spring force of the sub-gear has been eliminated by the above operation.



(c) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

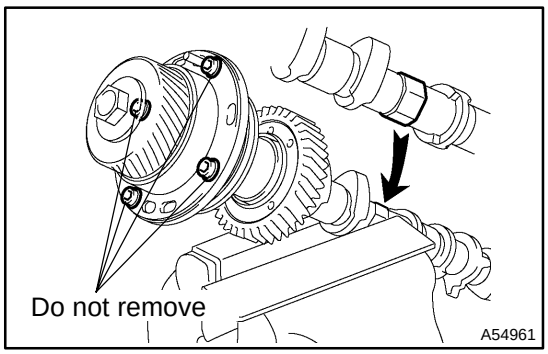


(d) Uniformly loosen the 22 bearing cap bolts in several passes, in the sequence shown.

(e) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, oil control valve filter and 2 camshafts.

NOTICE:

- ★ **Do not pry the camshaft with a tool or the likes by applying excessise fore to it.**
- ★ **Do not damage the reception part of the thrust in the cylinder head side.**

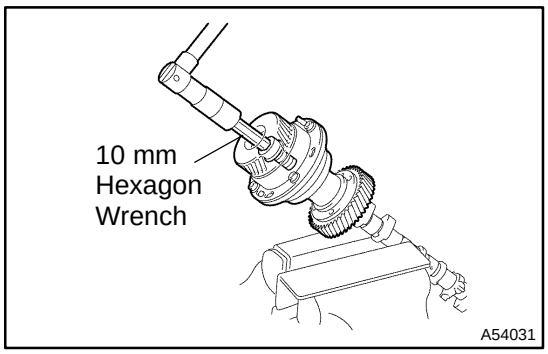


(f) Mount the hexagon wrench head portion of the intake camshaft in a vise.

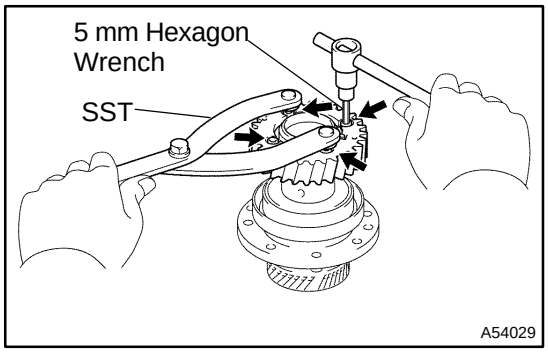
NOTICE:

- ★ **Be careful not to damage the camshaft.**
- ★ **The 4 bolts shown in the illustration determine the backlash of the gear in the timing tube, so do not remove them. If any of the 4 bolts are removed, install a new timing tube assembly.**

(g) Remove the screw plug and seal washer.



(h) Using a 10 mm hexagon wrench, and remove the bolt.
(i) Pull out the timing tube and drive gear assembly from the camshaft.

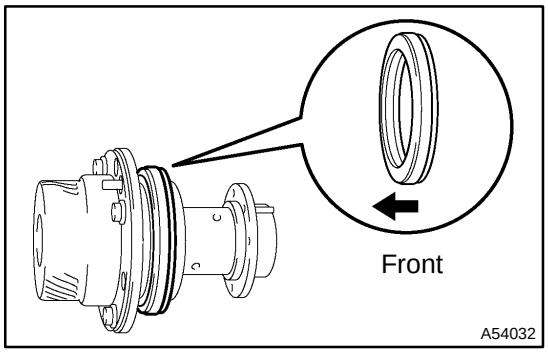


(j) Using SST and a 5 mm hexagon wrench, and remove the 4 bolts, drive gear and oil seal.

NOTICE:

Be careful not to damage the timing tube.

SST 09960-10010 (09962-01000, 09963-00500)

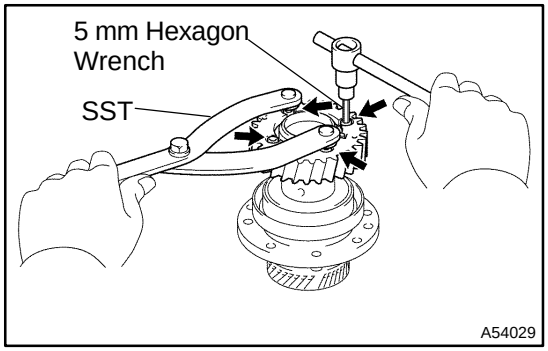


7. INSTALL NO.3 CAMSHAFT SUB-ASSY
[13053 / 98-12]

(a) Insert a new oil seal into the camshaft timing tube untill it reaches the stopper.

NOTICE:

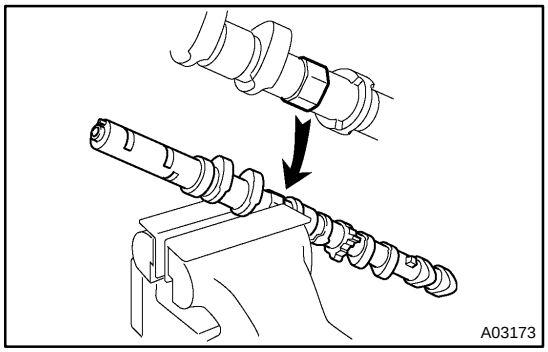
★ **Be careful of the installation direction.**
★ **Do not turn over the oil seal lip.**



(b) Align the timing tube knock pin with the knock pin groove of the drive gear, and temporarily install the drive gear with the 4 bolts.
(c) Using SST and a 5 mm hexagon wrench, uniformly tighten the 4 bolts in several passes.
SST 09960-10010 (09962-01000, 09963-00500)
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

NOTICE:

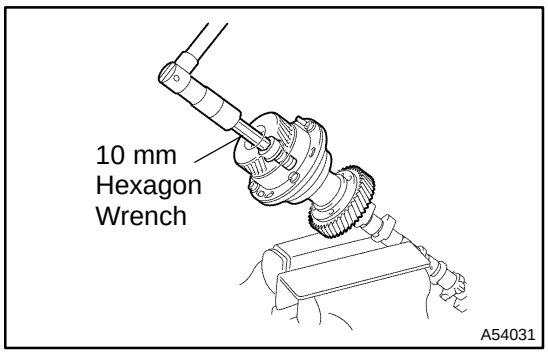
Be careful not to damage the timing tube.



(d) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:

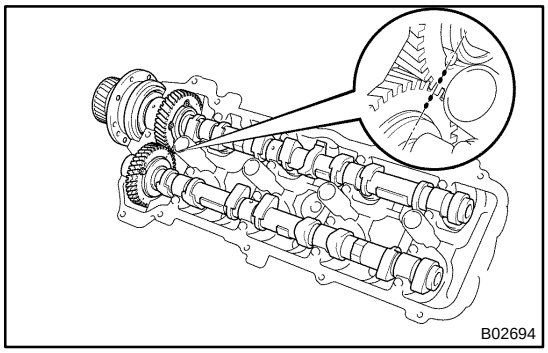
Be careful not to damage the camshaft.



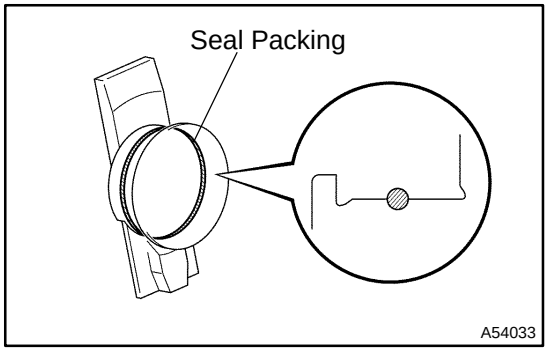
(e) Align the camshaft knock pin with the knock pin groove of the timing tube, and push the timing tube by hand until you feel it touch the bottom.
(f) Using a 10 mm hexagon wrench, install the bolt.
Torque: 78 N·m (790 kgf·cm, 58 ft·lbf)
(g) Install the seal washer and screw plug.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)
(h) Install the camshaft No.1 with timing tube assembly and the camshaft No.2.

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

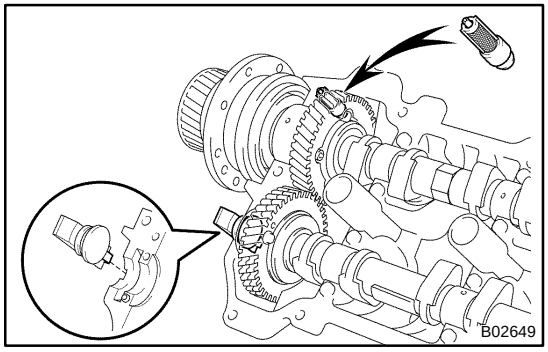


(1) Apply engine oil to the cam and gear of the camshaft and also the journal of the cylinder head.
(2) Align the timing marks (1 dot mark) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.
(3) Set the timing mark (1 dot mark) of the camshaft drive and driven main gears at approx. 10° angle.



(4) Apply seal packing to the camshaft housing plug.
★ Remove the old packing (FIPG) material.
★ Apply seal packing to the housing plug.

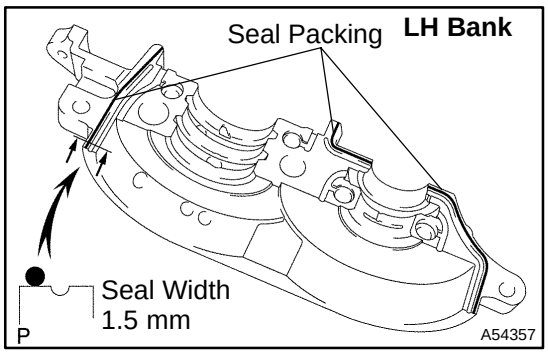
Seal packing: Part No. 08826-00080 or equivalent



(5) Install the camshaft housing plug to the cylinder head as shown in the illustration.
(6) Install the oil control valve filter to the cylinder head.

NOTICE:

Be careful of the installation direction.



(7) Apply seal packing to the front bearing cap.

★ Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head.

Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and groove.

Thoroughly clean all components to remove all the loose material.

Using a non- residue solvent, clean both sealing surfaces.

★ Apply seal packing to the bearing cap as shown in the illustration.

Install a nozzle that has been cut to a 1.5mm (0.059 in.) opening.

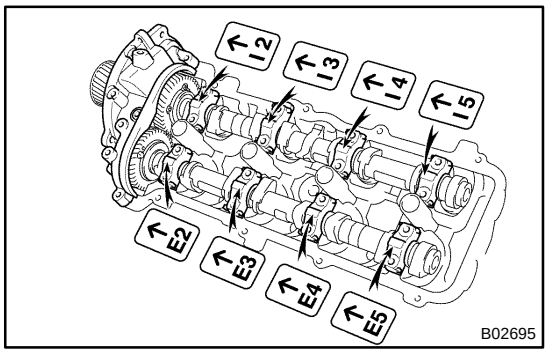
Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

Immediately remove nozzle from the tube and reinstall cap.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.

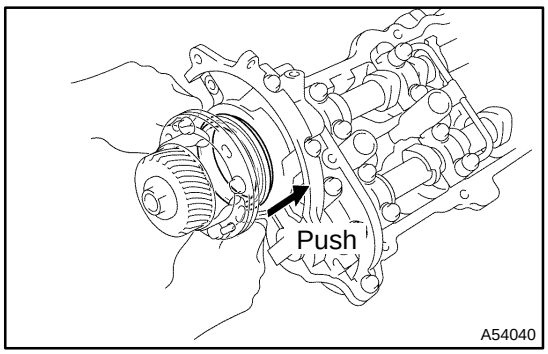


(8) Install the front bearing cap.

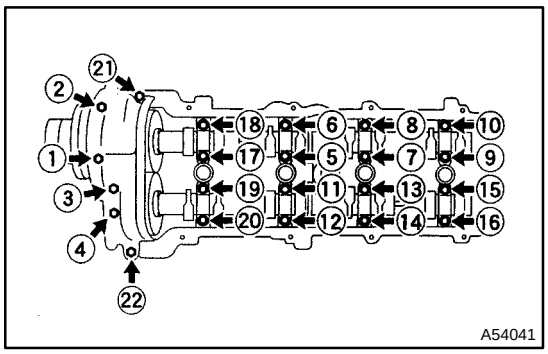
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(9) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



(10) Push in the camshaft oil seal.



(11) Install 4 new seal washers to the bearing cap bolts (1 - 4).

(12) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts (5 - 22).

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolts (1 - 4).

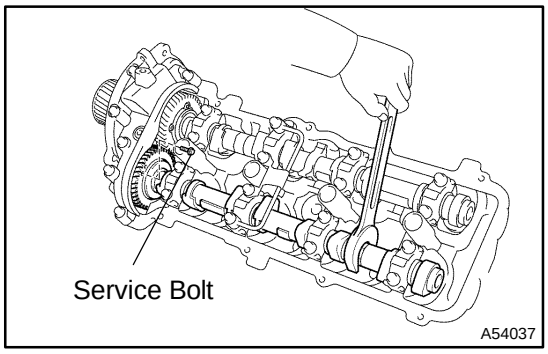
(13) Install the oil feed pipe and the 22 bearing cap bolts.

(14) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

Torque:

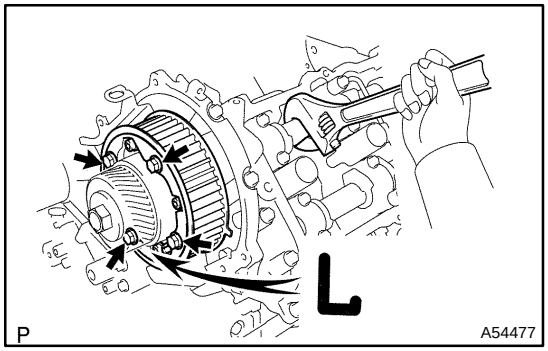
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolts 21 and 22

16 N·m (160 kgf·cm, 12 ft·lbf) for others



(15) Remove the service bolt.

8. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY
[11101J / 98-5]



9. INSTALL CAMSHAFT TIMING PULLEY SUB-ASSY LH
[13056 / 98-12]

(a) Align the camshaft timing tube knock pin with the knock pin groove of the timing pulley.

(b) Attach the timing pulley to the camshaft timing tube, facing the ”L” mark forward.

(c) Hold the hexagon wrench head portion of the camshaft, install the 4 pulley bolts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

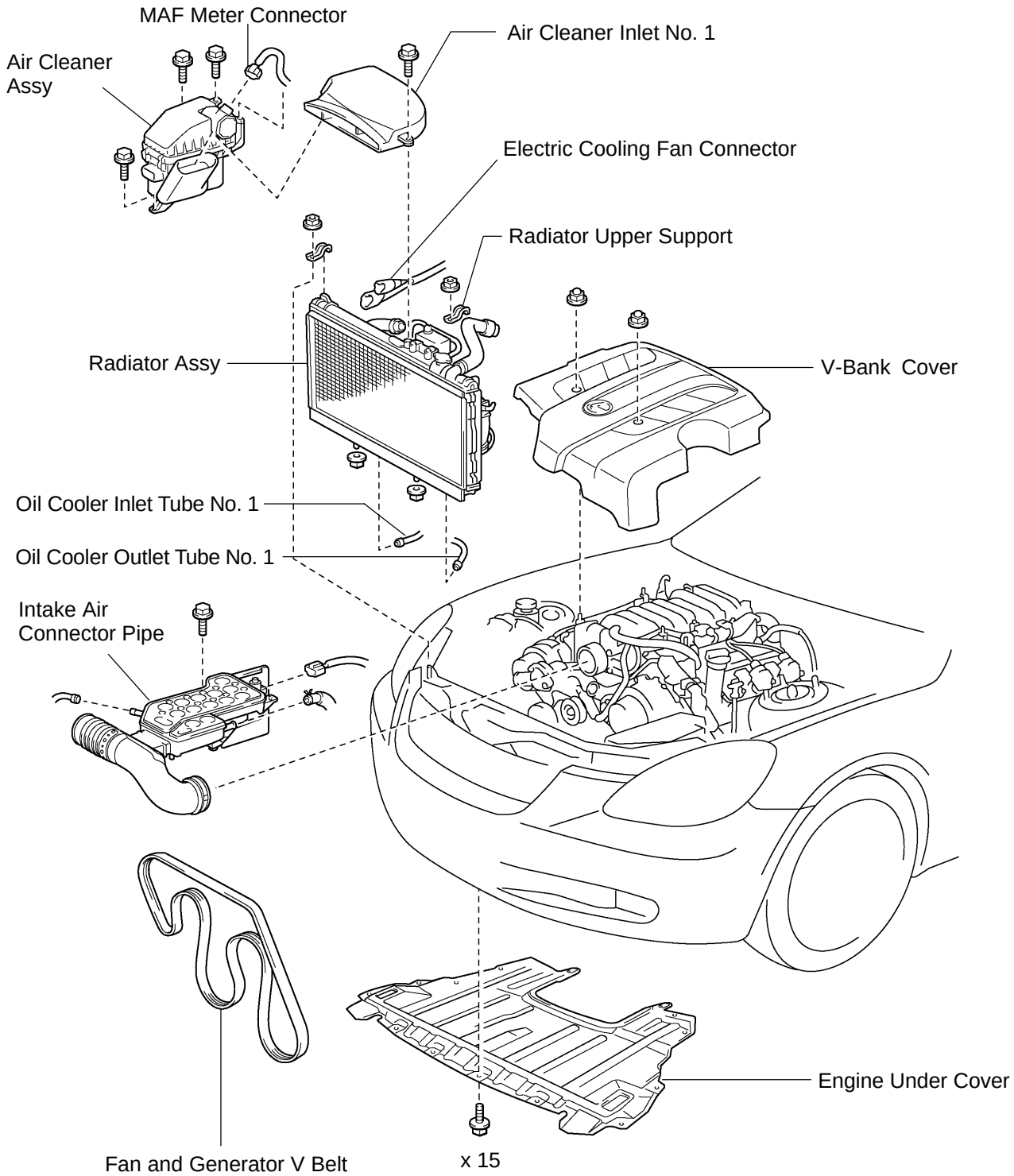
10. INSTALL CYLINDER HEAD COVER SUB-ASSY LH
[11202 / 98-5] (See page 14-133)

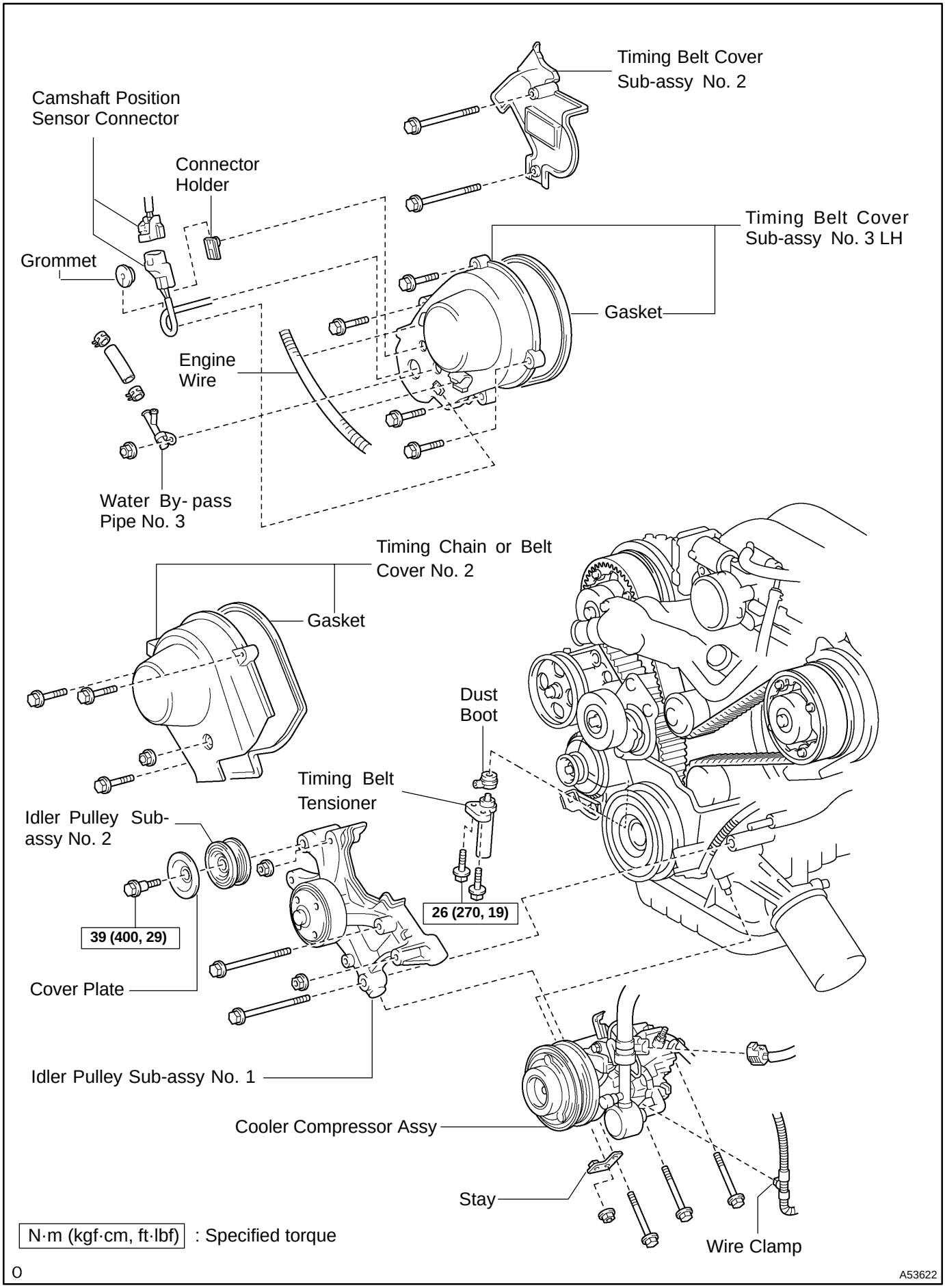
11. INSTALL TIMING BELT
[13568 / 98-12] (See page 14-1 19)

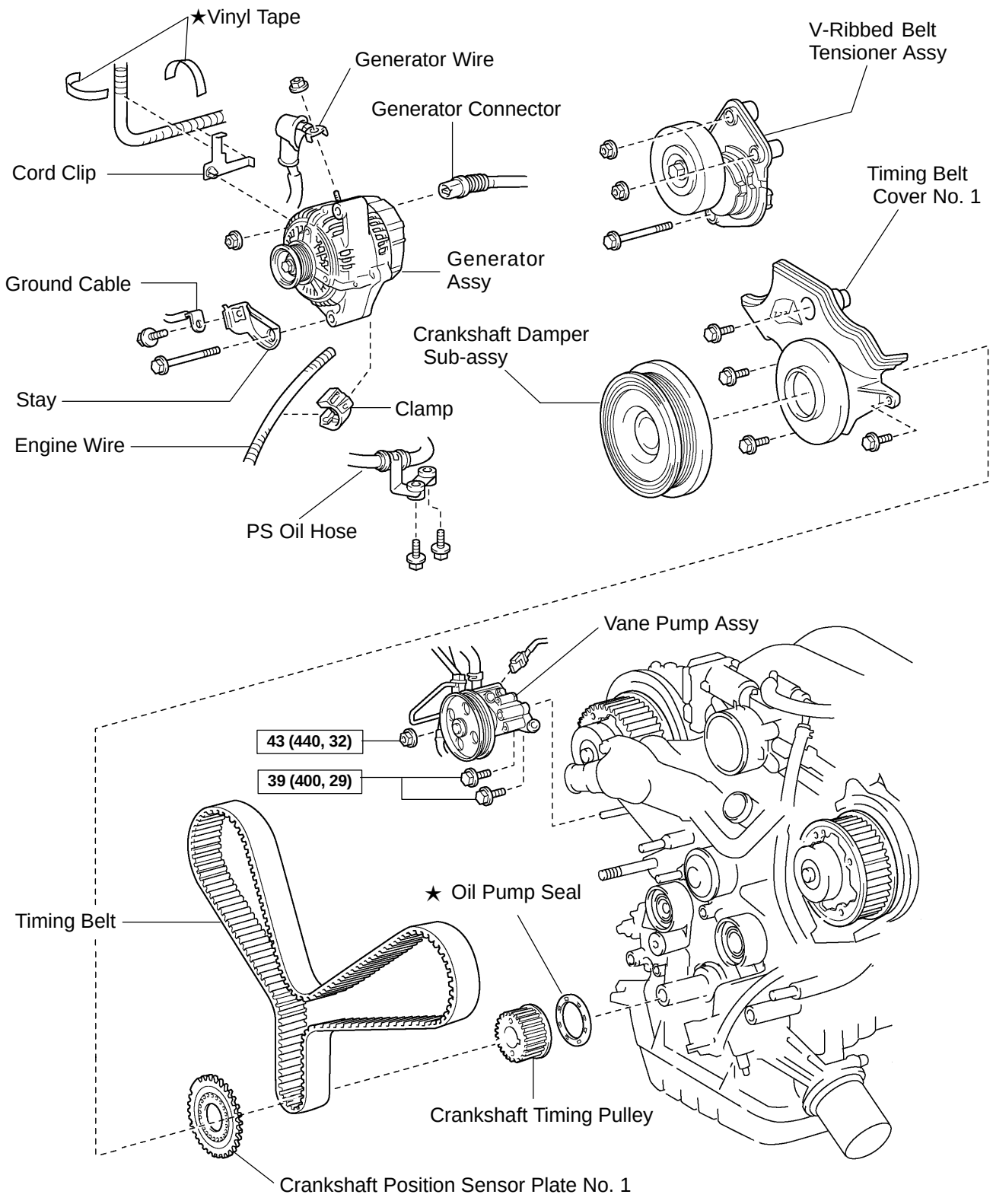
OIL PUMP SEAL

COMPONENTS

1406W-02




Timing Belt Cover Sub-assy No. 2
Camshaft Position Sensor Connector
Connector Holder
Timing Belt Cover Sub-assy No. 3 LH
Grommet
Gasket
Engine Wire
Water By- pass Pipe No. 3
Timing Chain or Belt Cover No. 2
Gasket
Dust Boot
Timing Belt Tensioner
Idler Pulley Sub-assy No. 2
26 (270, 19)
39 (400, 29)
Cover Plate
Idler Pulley Sub-assy No. 1
Cooler Compressor Assy
Stay
Wire Clamp
N·m (kgf·cm, ft·lbf) : Specified torque
A53622



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

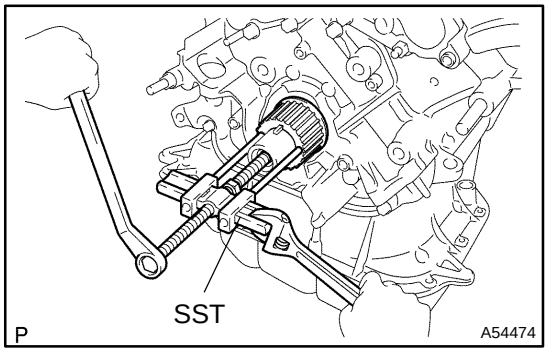
★ Non-reusable part

A54084

1406X-02

REPLACEMENT

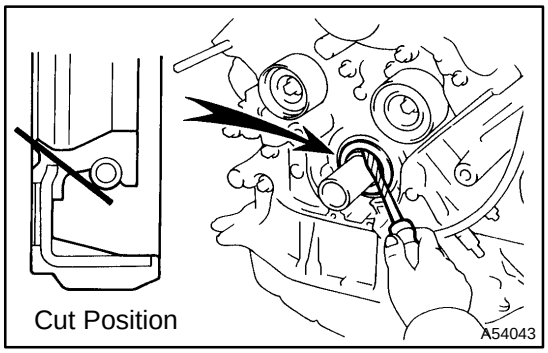
1. REMOVE TIMING BELT
[13568 / 98-12] (See page 14-1 19)



2. REMOVE CRANKSHAFT TIMING PULLEY
[13521P / 98-11]

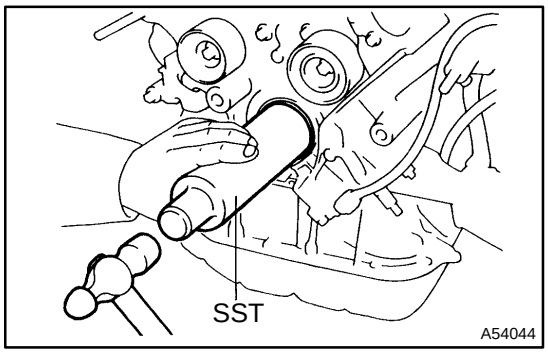
(a) Using SST, remove the crankshaft timing pulley.
SST 09950- 50012 (09951- 05010, 09952- 05010, 09953-05010, 09953-05020, 09954-05010)

NOTICE:
Do not turn the timing pulley.



3. REMOVE OIL PUMP SEAL
[15100C / 98-13]

(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver with taping its tip, pry out the oil seal.
(c) After the removal, check if the crankshaft is not damaged. If it is damaged, mend it with a sandpaper (#400).



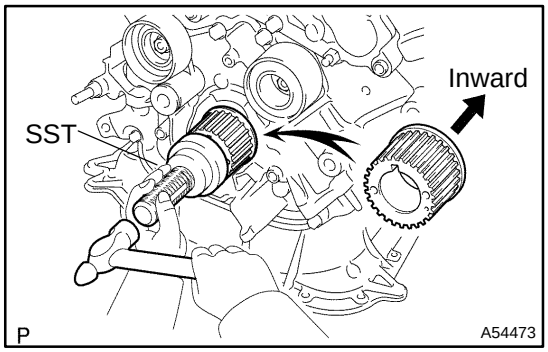
4. INSTALL OIL PUMP SEAL
[15100C / 98-13]

(a) Apply MP grease to a new oil seal lip.

NOTICE:
Keep the lip off foreign materials.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump edge.
SST 09316-6001 1 (09316-00011)

NOTICE:
★ **Wipe off extra grease on the crankshaft.**
★ **Be careful not to tap the oil seal slantingly.**



5. INSTALL CRANKSHAFT TIMING PULLEY
[13521P / 98-11]

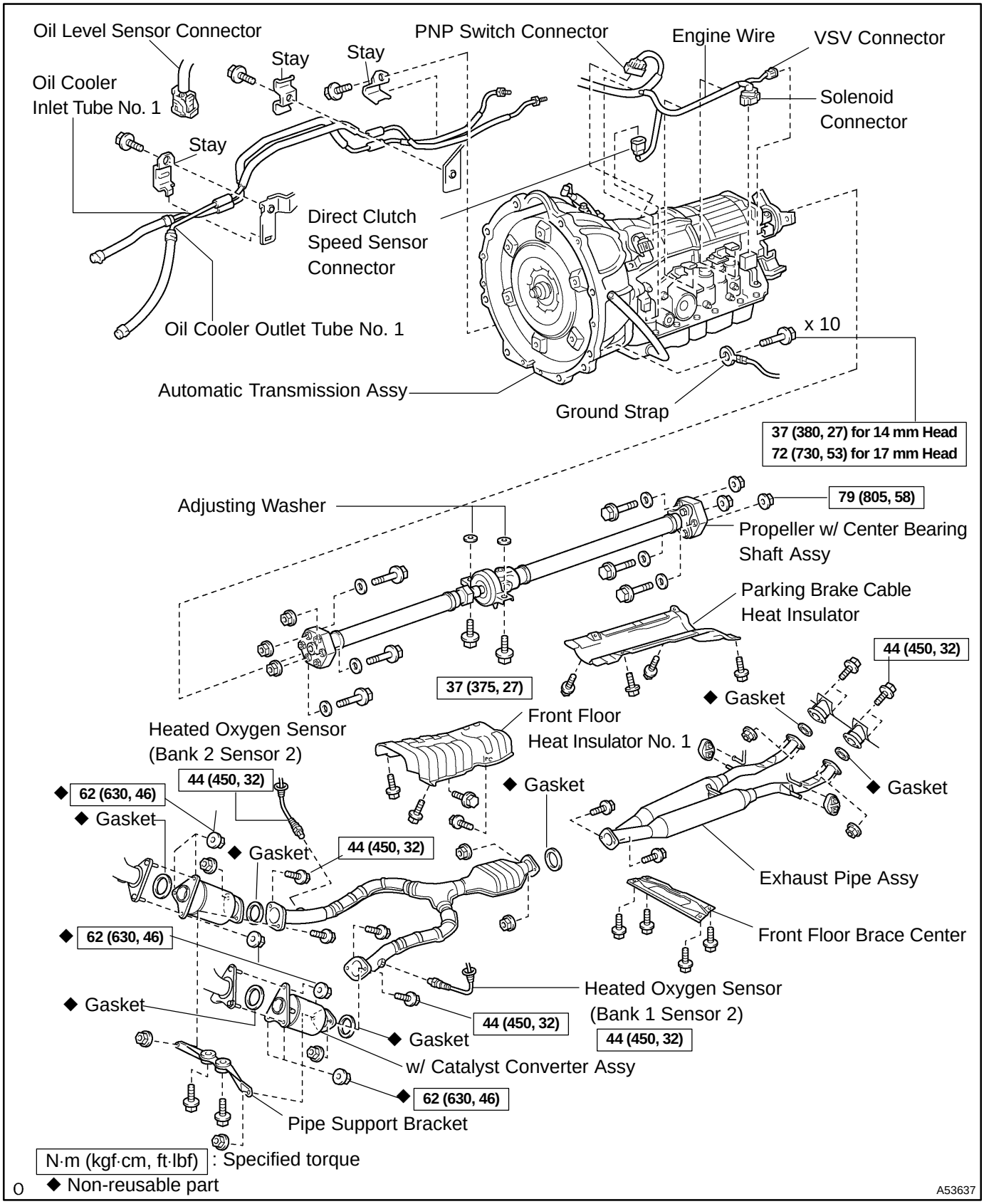
(a) Align the timing pulley set key with the key groove of the pulley.
(b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward.
SST 09223-4601 1

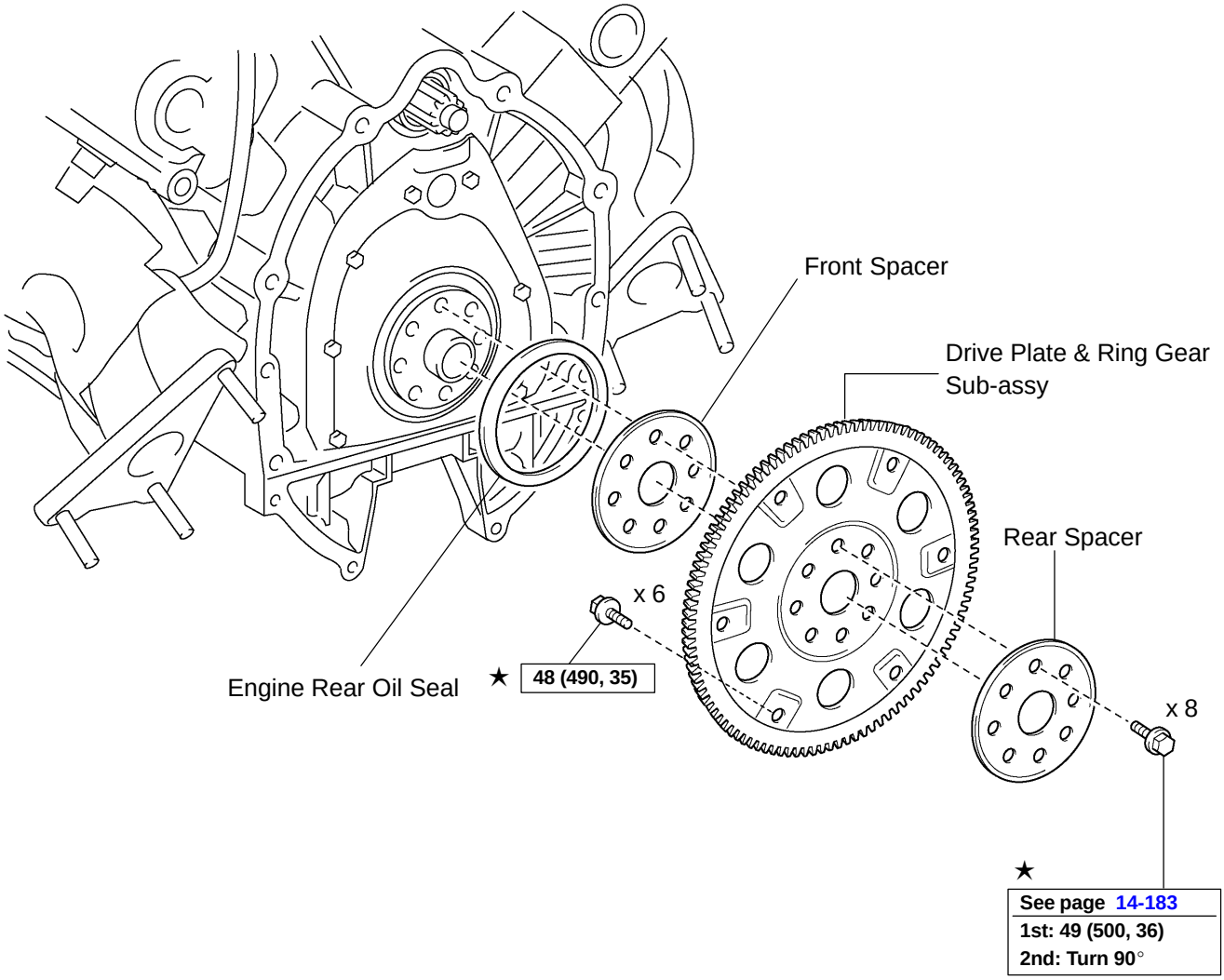
6. INSTALL TIMING BELT
[13568 / 98-12] (See page 14-1 19)

ENGINE REAR OIL SEAL

COMPONENTS

1406Y-03

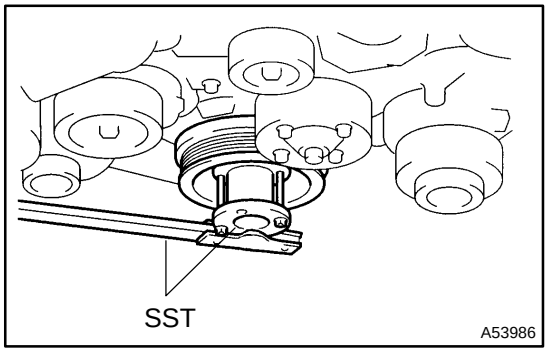



Front Spacer
Drive Plate & Ring Gear Sub-assy
Rear Spacer
x 6
x 8
Engine Rear Oil Seal
★
48 (490, 35)
★
See page 14-183
1st: 49 (500, 36)
2nd: Turn 90°
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
A53636

1406Z-03

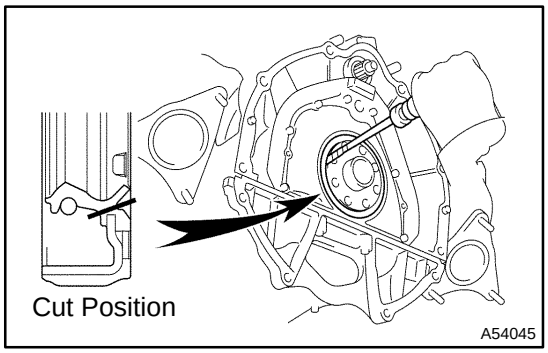
REPLACEMENT

1. REMOVE AUTOMATIC TRANSMISSION ASSY
[35000 / 98-30] (See page 40-12)



2. REMOVE DRIVE PLATE & RING GEAR SUB-ASSY
[32101 / 98-31]

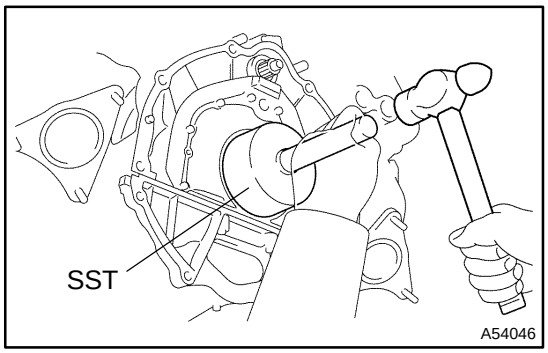
(a) Hold the crankshaft damper with SST, then remove the drive plate and ring gear sub-assembly.
SST 09213-7001 1, 09330-00021



3. REMOVE ENGINE REAR OIL SEAL
[11381A / 98-8]

(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver with taping its tip, pry out the oil seal.

NOTICE:
After the removal, check if the crankshaft is not damaged. If it is damaged, mend it with a sandpaper (#400).



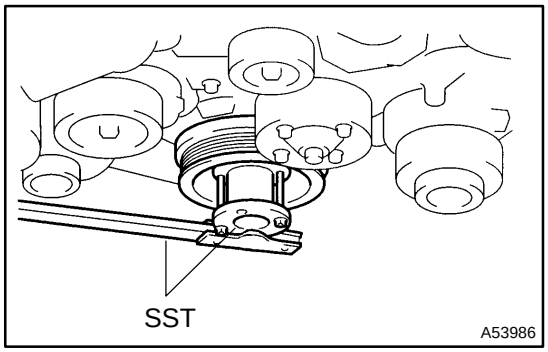
4. INSTALL ENGINE REAR OIL SEAL
[11381A / 98-8]

(a) Apply MP grease to a new oil seal lip.

NOTICE:
Keep the lip off foreign materials.

(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

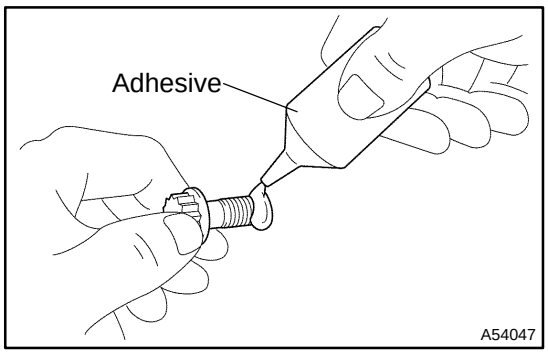
NOTICE:
★ **Be careful not to tap the oil seal slantingly.**
★ **Wipe off extra grease on the crankshaft.**
SST 09223-56010



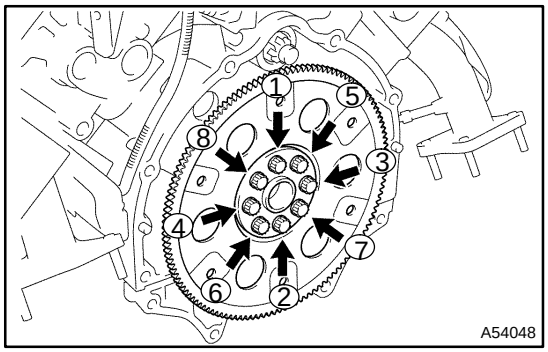
5. INSTALL DRIVE PLATE & RING GEAR SUB-ASSY
[32101 / 98-31]

(a) Hold the crankshaft with SST.
SST 09213-7001 1, 09330-00021

HINT:
★ The mounting bolts are tightened in 2 progressive steps (steps (c) and (e)).
★ If any one of the mounting bolts is broken or deformed, replace it.

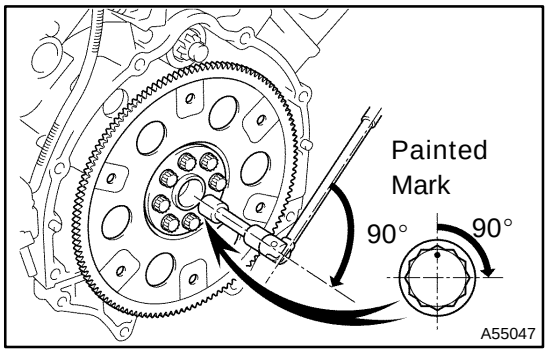


(b) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



(c) Install the front spacer, drive plate and rear spacer on the crankshaft.
(d) Install and uniformly tighten the 8 mounting bolts in several passes, in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any one of the mounting bolts does not meet the torque specification, replace the mounting bolt.



(e) Mark the mounting bolt with paint.
(f) Retighten the mounting bolts by 90° in the numerical order shown.
(g) Check that the painted mark is now at a 90° angle to (e).

6. INSTALL AUTOMATIC TRANSMISSION ASSY
[35000 / 98-30] (See page 40-12)