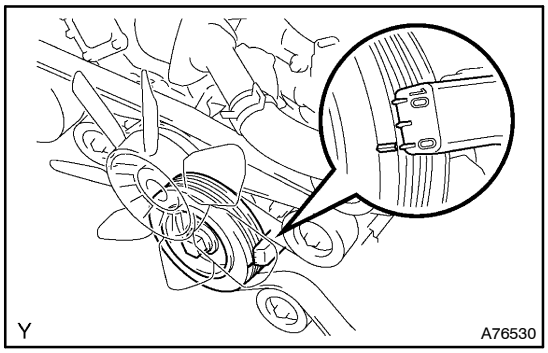
VALVE CLEARANCE (1GR–FE)

1415S–02

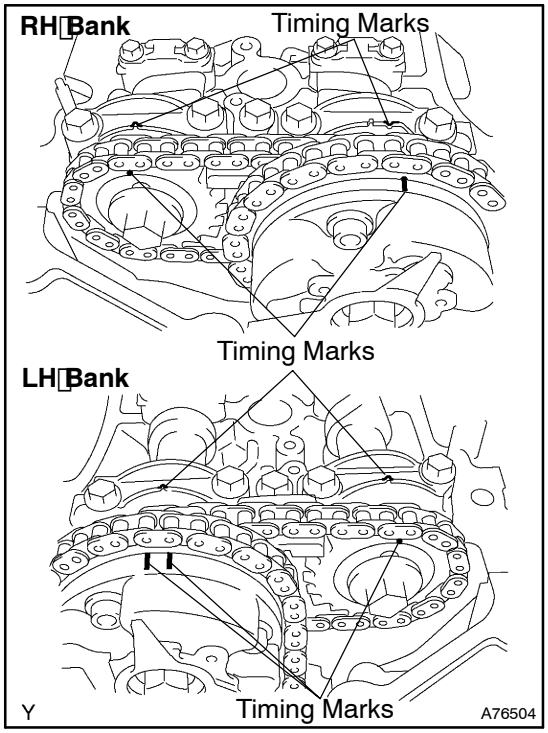
ADJUSTMENT

1. DRAIN ENGINE COOLANT (See page 16–5)
2. REMOVE V–BANK COVER (See page 10–7)
3. DISCONNECT VENTILATION HOSE NO.2 (See page 10–7)
4. REMOVE AIR CLEANER ASSY (See page 10–7)
5. REMOVE INTAKE AIR SURGE TANK (See page 14–58)
6. REMOVE IGNITION COIL ASSY
7. REMOVE CYLINDER HEAD COVER SUB–ASSY RH (See page 14–58)
8. REMOVE CYLINDER HEAD COVER SUB–ASSY LH (See page 14–58)



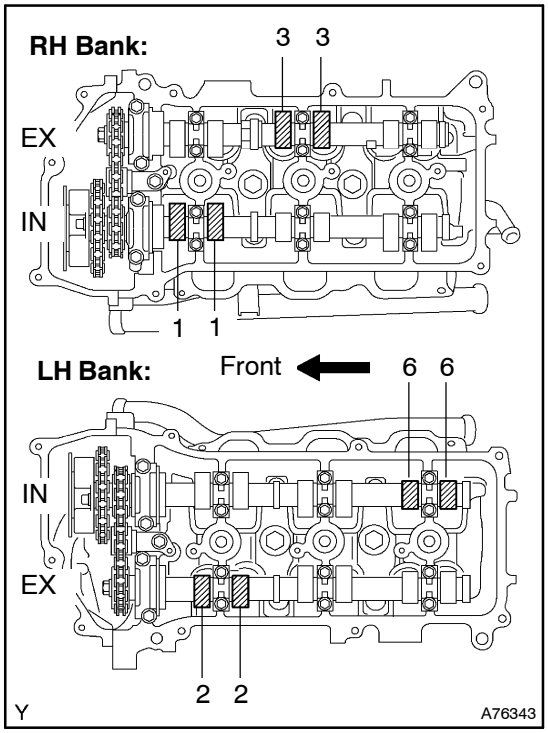
9. **SET NO. 1 CYLINDER TO TDC/COMPRESSION**

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



(b) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.

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



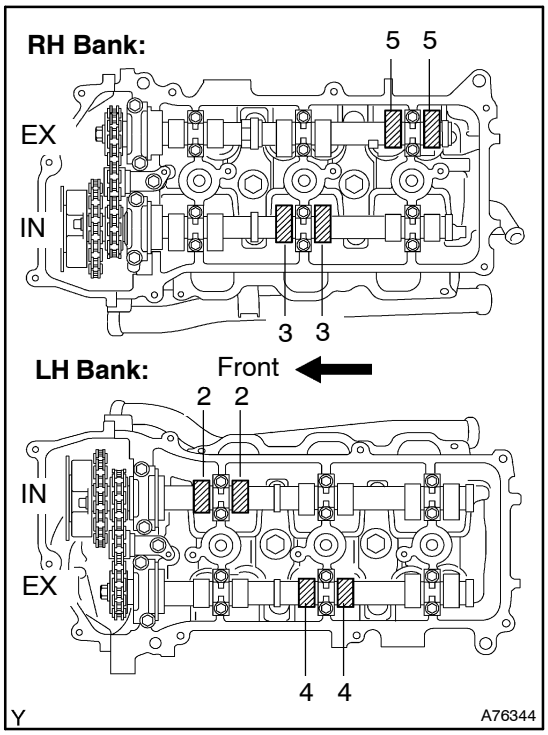
10. INSPECT VALVE CLEARANCE

(a) Check the valves indicated in the illustration.

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

Valve clearance (Cold):
Intake 0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust 0.29 to 0.39 mm (0.011 to 0.015 in.)

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

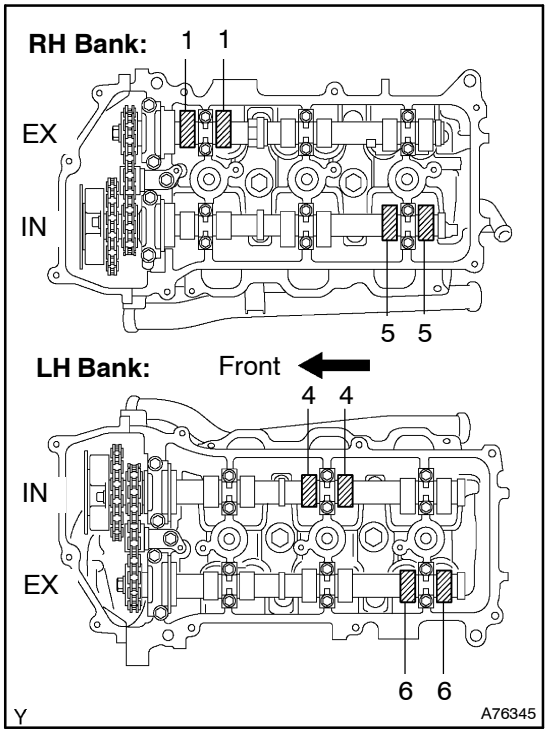


(b) Turn the crankshaft 2/3 of a revolution (240°), and check the valves indicated in the illustration.

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

Valve clearance (Cold):
Intake 0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust 0.29 to 0.39 mm (0.011 to 0.015 in.)

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

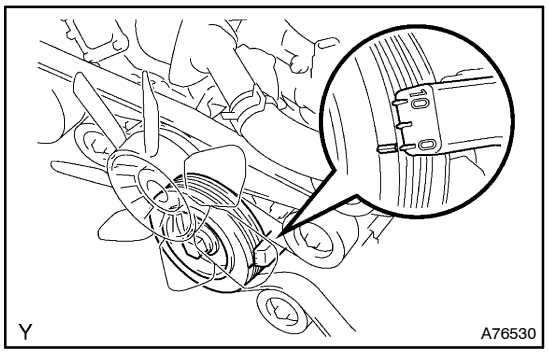


(c) Turn the crankshaft 2/3 of a revolution (240°), and check the valves indicated in the illustration.

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

Valve clearance (Cold):
Intake 0.15 to 0.25 mm (0.006 to 0.010 in.)
Exhaust 0.29 to 0.39 mm (0.011 to 0.015 in.)

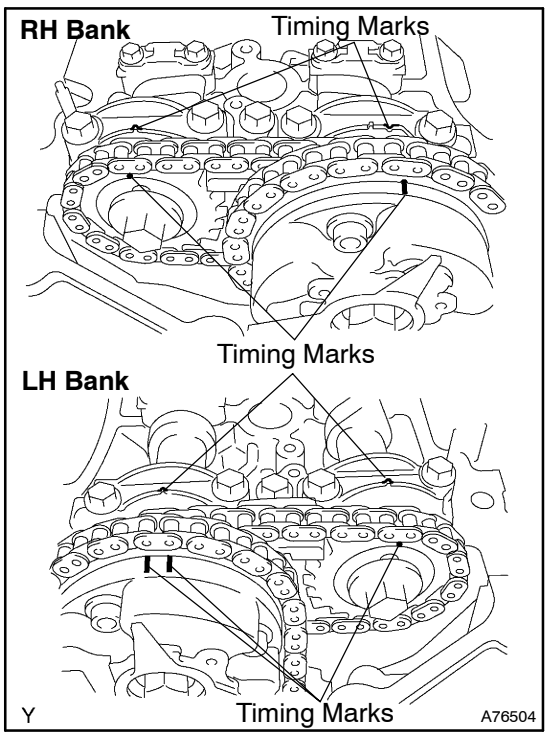
(2) Record the out–of–specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.



11. ADJUST VALVE CLEARANCE

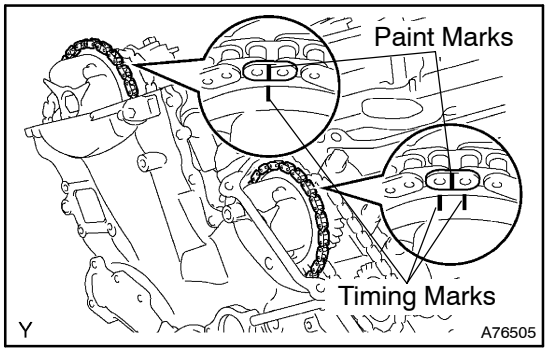
(a) Set No. 1 cylinder to TDC/compression.

(1) Turn the crankshaft pulley, and align the notch with the timing mark ”0” of the timing chain cover.



(2) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.

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



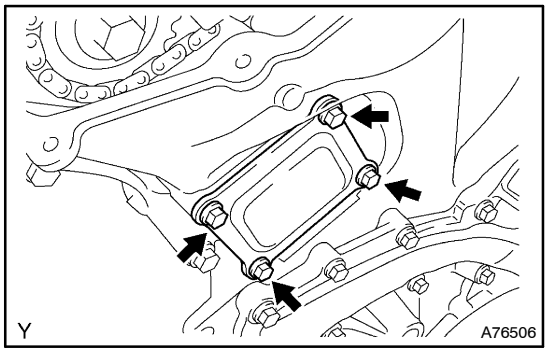
(3) Place paint marks on the No. 1 chain links that correspond with the timing marks of the camshaft timing gears.

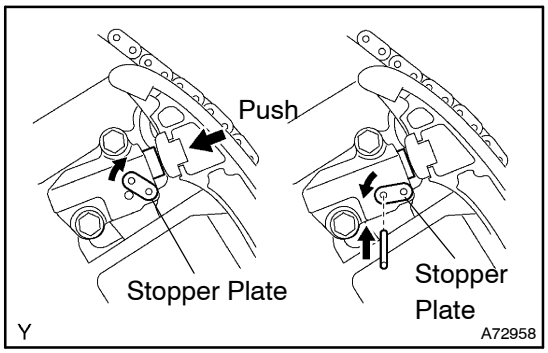
(b) Remove the chain tensioner assy No. 1.

NOTICE:

- **Never rotate the crankshaft with the chain tensioner removed.**
- **When rotating the camshaft with the timing chain removed, turn the crankshaft counterclockwise 40° from the TDC first.**

(1) Remove the 4 bolts, timing chain cover plate and gasket.





(2) While rotating the stopper plate of the tensioner upward, push in the plunger of the chain tensioner as shown in the illustration.

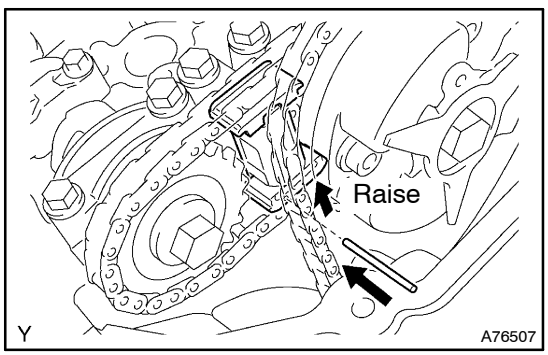
(3) While rotating the stopper plate of the tensioner downward, insert a bar of ϕ 3.5 mm (0.138 in.) into the holes in the stopper plate and tensioner to fix the stopper plate.

(4) Remove the 2 bolts and chain tensioner.

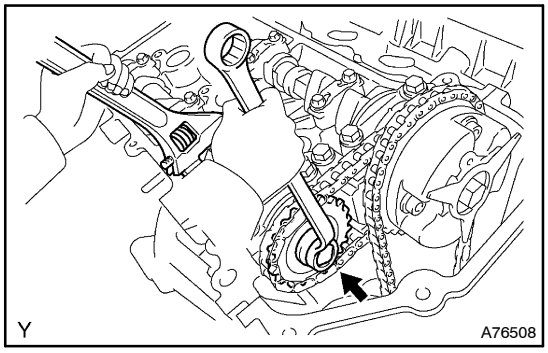
(c) Remove the No. 2 camshaft.

NOTICE:

As 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 which are received 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) While raising up the chain tensioner No. 2, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to fix it.

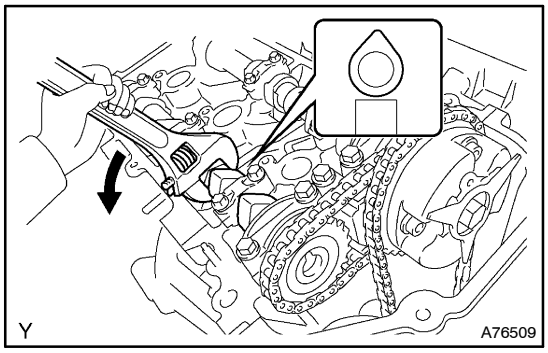


(2) Hold the hexagonal portion of the No. 2 camshaft with a wrench, and remove the camshaft timing gear set bolt.

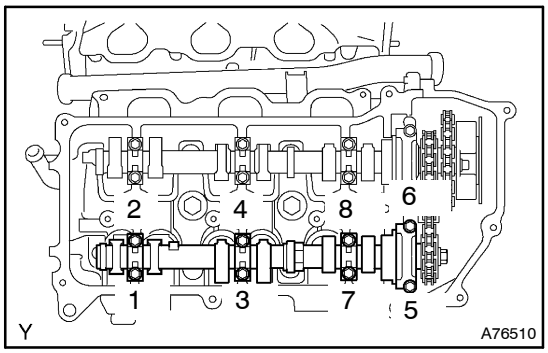
NOTICE:

Be careful not to damage the cylinder head and valve lifter with the wrench.

(3) Separate the camshaft timing gear from the No. 2 camshaft.

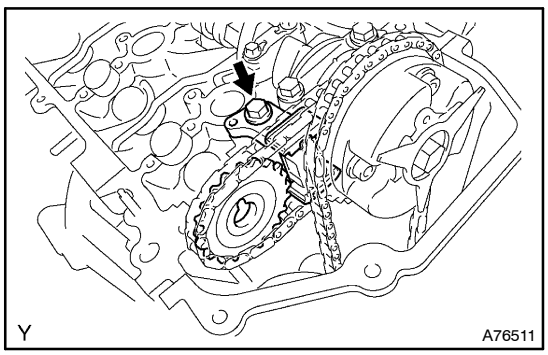


(4) Rotate the camshaft counterclockwise using the wrench so that the cam lobes of No. 1 cylinder faces upward as shown in the illustration.



(5) Using several steps, loosen and remove the 8 bearing cap bolts uniformly in the sequence as shown in the illustration.

(6) Remove the 4 bearing caps and No. 2 camshaft.



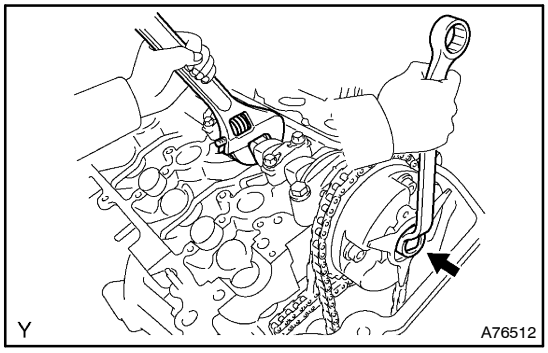
(d) Remove the chain tensioner assy No. 2.

(1) Remove the chain tensioner No. 2 bolt, and then remove the chain tensioner No. 2 and camshaft timing gear.

(e) Remove the camshaft.

NOTICE:

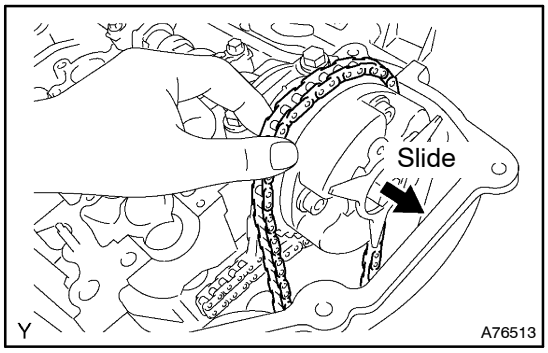
As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head which are received the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following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



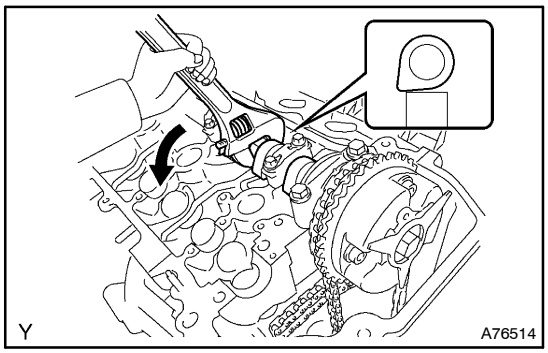
(1) Hold the hexagonal portion of the No. 1 camshaft with a wrench, and loosen the camshaft timing gear set bolt.

NOTICE:

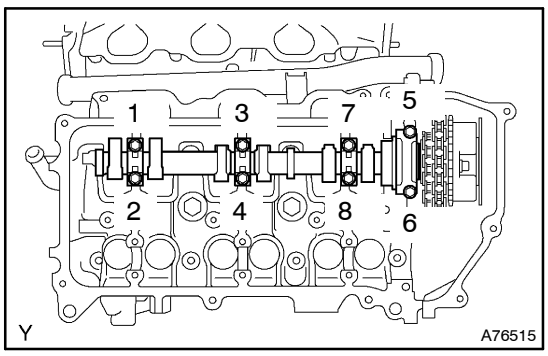
- **Be careful not to damage the cylinder head and valve lifter with the wrench.**
- **Do not disassemble the camshaft timing gear assembly.**



(2) Slide the camshaft timing gear and separate the No. 1 chain from the camshaft timing gear.

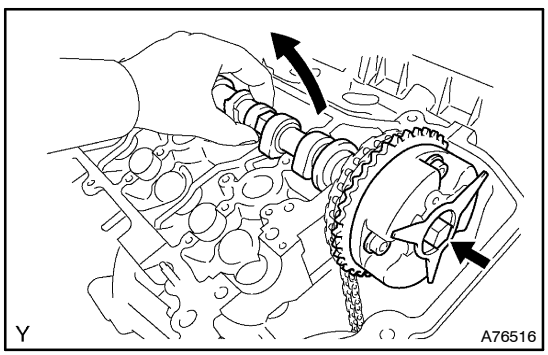


(3) Rotate the No. 1 camshaft counterclockwise using the wrench so that the cam lobes of No. 1 cylinder faces upward as shown in the illustration.

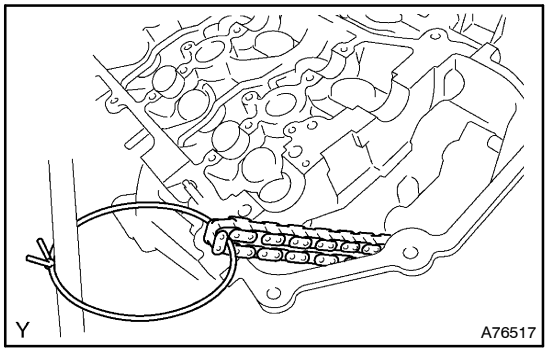


(4) Using several steps, loosen and remove the 8 bearing cap bolts uniformly in the sequence as shown in the illustration.

(5) Remove the 4 bearing caps.



(6) Remove the camshaft timing gear set bolt with the No. 1 camshaft lifted up, and then remove the No. 1 camshaft and camshaft timing gear w/ No. 2 chain.



(7) Tie the No. 1 chain with a string as shown in the illustration.

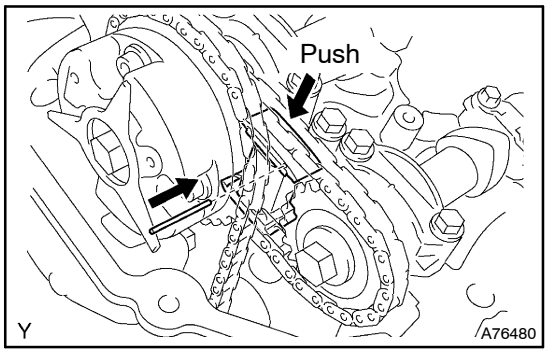
NOTICE:

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

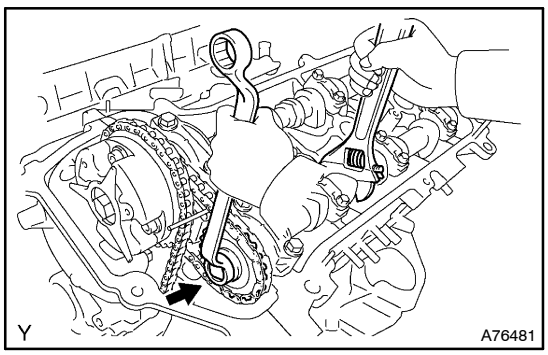
(f) Remove the No. 4 camshaft sub–assy.

NOTICE:

As 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 which are received 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) While pushing down the chain tensioner No. 3, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to fix it.

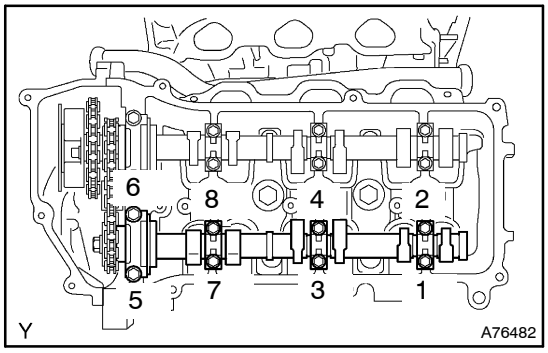


(2) Hold the hexagonal portion of the No. 4 camshaft with a wrench, and remove the camshaft timing gear set bolt.

NOTICE:

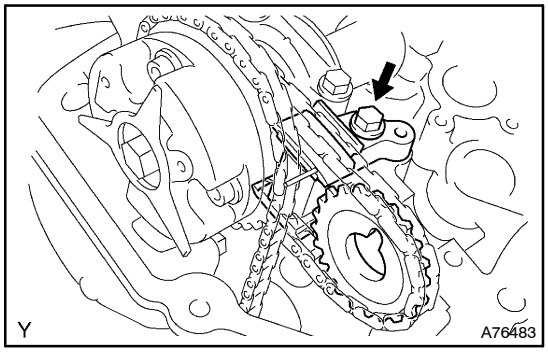
Be careful not to damage the cylinder head and valve lifter with the wrench.

(3) Separate the camshaft timing gear from the No. 4 camshaft.



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

(5) Remove the 4 bearing caps and No. 4 camshaft.

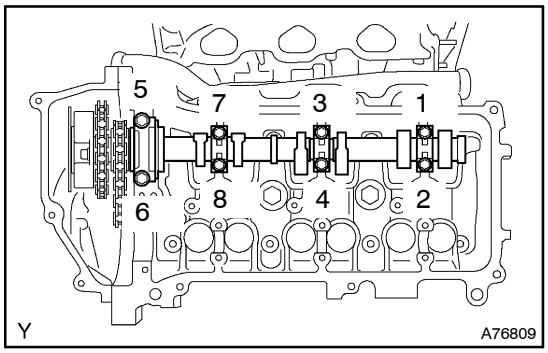


(g) Remove the chain tensioner assy No. 3.
  (1) Remove the chain tensioner No. 3 bolt, and then remove the chain tensioner No. 3 and camshaft timing gear.

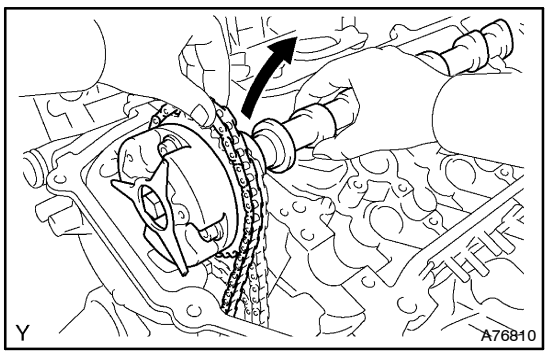
(h) Remove the No. 3 camshaft sub–assy.

NOTICE:

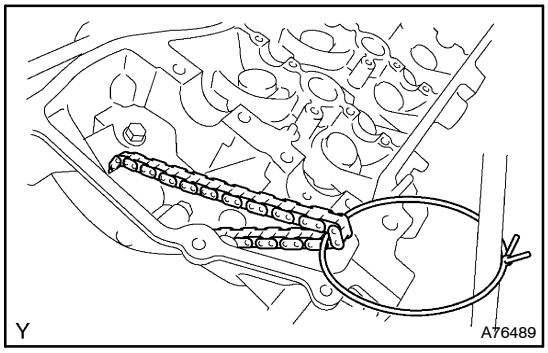
As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head which received the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following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



  (1) Using several steps, loosen and remove the 8 bearing cap bolts uniformly in the sequence as shown in the illustration.
  (2) Remove the 4 bearing caps.



  (3) Hold the No. 1 chain, and remove the No. 3 camshaft, camshaft timing gear and No. 2 chain.

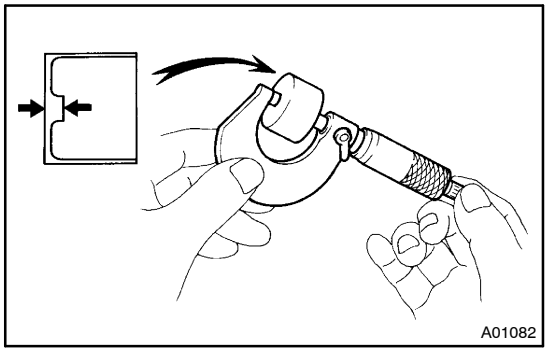


  (4) Tie the No. 1 chain with a string as shown in the illustration.

NOTICE:

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

(i) Remove the valve lifters.



(j) Determine the replacement valve lifter size according to these Formula or Charts:

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

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

T: Thickness of removed lifter

A: Measured valve clearance

N: Thickness of new lifter

Intake:

N = T + (A – 0.20 mm (0.008 in.))

Exhaust:

N = T + (A – 0.34 mm (0.013 in.))

(3) Select a new lifter with a thickness as close as possible to the calculated value.

HINT:

Lifters are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 mm (0.1992 in.) to 5.740 mm (0.2260 in.).

Valve Lifter Selection Chart (Intake)

Measure clearance mm (in.) \ Installed lifter thickness mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.220 (0.2051)	5.230 (0.2055)	5.240 (0.2059)	5.250 (0.2063)	5.260 (0.2067)	5.270 (0.2071)	5.280 (0.2075)	5.290 (0.2079)	5.300 (0.2083)	5.310 (0.2087)	5.320 (0.2091)	5.330 (0.2094)	5.340 (0.2098)	5.350 (0.2102)	5.360 (0.2106)	5.370 (0.2110)	5.380 (0.2114)	5.390 (0.2118)	5.400 (0.2122)	5.410 (0.2126)	5.420 (0.2130)	5.430 (0.2134)	5.440 (0.2138)	5.450 (0.2142)	5.460 (0.2146)	5.470 (0.2150)	5.480 (0.2154)	5.490 (0.2157)	5.500 (0.2161)	5.510 (0.2165)	5.520 (0.2169)	5.530 (0.2173)	5.540 (0.2177)	5.550 (0.2181)	5.560 (0.2185)	5.570 (0.2189)	5.580 (0.2193)	5.590 (0.2197)	5.600 (0.2201)	5.620 (0.2205)	5.640 (0.2213)	5.660 (0.2220)	5.680 (0.2228)	5.700 (0.2236)	5.720 (0.2244)	5.740 (0.2252)	5.760 (0.2260)
0.000 - 0.020 (0.0000 - 0.0008)												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
0.021 - 0.040 (0.0008 - 0.0016)											06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58
0.041 - 0.060 (0.0016 - 0.0024)									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
0.061 - 0.080 (0.0024 - 0.0031)								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
0.081 - 0.100 (0.0032 - 0.0039)							08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60	62	64
0.101 - 0.120 (0.0040 - 0.0047)						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
0.121 - 0.140 (0.0048 - 0.0055)					08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68
0.141 - 0.149 (0.0056 - 0.0059)				06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.251 - 0.270 (0.0099 - 0.0106)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	70	72								
0.271 - 0.290 (0.0107 - 0.0114)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72								
0.291 - 0.310 (0.0115 - 0.0122)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72								
0.311 - 0.330 (0.0122 - 0.0130)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72									
0.331 - 0.350 (0.0130 - 0.0138)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74										
0.351 - 0.370 (0.0138 - 0.0146)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74												
0.371 - 0.390 (0.0146 - 0.0154)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74														
0.391 - 0.410 (0.0154 - 0.0161)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																
0.411 - 0.430 (0.0162 - 0.0169)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																		
0.431 - 0.450 (0.0170 - 0.0177)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																				
0.451 - 0.470 (0.0178 - 0.0185)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																					
0.471 - 0.490 (0.0185 - 0.0193)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																						
0.491 - 0.510 (0.0193 - 0.0201)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																							
0.511 - 0.530 (0.0201 - 0.0209)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																								
0.531 - 0.550 (0.0209 - 0.0217)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																									
0.551 - 0.570 (0.0217 - 0.0224)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																									
0.571 - 0.590 (0.0225 - 0.0232)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																									
0.591 - 0.610 (0.0233 - 0.0240)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74																									
0.611 - 0.630 (0.0241 - 0.0248)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74																									
0.631 - 0.650 (0.0248 - 0.0256)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74																									
0.651 - 0.670 (0.0256 - 0.0264)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74																									
0.671 - 0.690 (0.0264 - 0.0272)	54	56	58	60	62	64	66	68	70	70	72	72	74																									
0.691 - 0.710 (0.0272 - 0.0280)	56	58	60	62	64	66	68	70	72	72	74																									
0.711 - 0.730 (0.0280 - 0.0287)	58	60	62	64	66	68	70	72	74																											
0.731 - 0.750 (0.0288 - 0.0295)	60	62	64	66	68	70	72																													
0.751 - 0.770 (0.0296 - 0.0303)	62	64	66	68	70	72																														
0.771 - 0.790 (0.0304 - 0.0311)	64	66	68	70	72																															
0.791 - 0.810 (0.0311 - 0.0319)	66	68	70	72																																
0.811 - 0.830 (0.0319 - 0.0327)	68	70	72																																	
0.831 - 0.850 (0.0327 - 0.0335)	70	72																																		
0.851 - 0.870 (0.0335 - 0.0343)	72																																			

Intake valve clearance (Cold):
0.15 to 0.25 mm (0.0059 to 0.0098 in.)

EXAMPLE:
The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0158 in.). Replace the 5.250 mm (0.2067 in.) lifter with a new No. 46 lifter.

New Lifter Thickness mm (in.)

No.	Thickness	No.	Thickness	No.	Thickness
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)		

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Valve Lifter Selection Chart (Exhaust)

Measure clearance mm (in.) \ Installed lifter thickness mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	5.590 (0.2201)	5.600 (0.2205)	5.620 (0.2213)	5.640 (0.2220)	5.660 (0.2228)	5.680 (0.2236)	5.700 (0.2244)	5.720 (0.2252)	5.740 (0.2260)
0.000 - 0.020 (0.0000 - 0.0008)																										06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	30	32	34	36	38	40	42
0.021 - 0.040 (0.0008 - 0.0016)																									06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	32	34	36	38	40	42	44
0.041 - 0.060 (0.0016 - 0.0024)																								06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	34	36	38	40	42	44	46
0.061 - 0.080 (0.0024 - 0.0031)																					06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	36	38	40	42	44	46	48
0.081 - 0.100 (0.0032 - 0.0039)																			06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	38	40	42	44	46	48	50
0.101 - 0.120 (0.0040 - 0.0047)																	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	40	42	44	46	48	50	52
0.121 - 0.140 (0.0048 - 0.0055)															06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	42	44	46	48	50	52	54
0.141 - 0.160 (0.0056 - 0.0063)													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
0.161 - 0.180 (0.0063 - 0.0071)											06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58
0.181 - 0.200 (0.0071 - 0.0079)									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
0.201 - 0.220 (0.0079 - 0.0087)								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
0.221 - 0.240 (0.0087 - 0.0094)							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
0.241 - 0.260 (0.0095 - 0.0102)						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
0.261 - 0.280 (0.0103 - 0.0110)					08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68
0.281 - 0.289 (0.0111 - 0.0114)				06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.391 - 0.410 (0.0154 - 0.0161)	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	62	62	64	64	66	66	68	70	72							
0.411 - 0.430 (0.0162 - 0.0169)	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							
0.431 - 0.450 (0.0170 - 0.0177)	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								
0.451 - 0.470 (0.0178 - 0.0185)	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									
0.471 - 0.490 (0.0185 - 0.0193)	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										
0.491 - 0.510 (0.0193 - 0.0201)	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												
0.511 - 0.530 (0.0201 - 0.0209)	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														
0.531 - 0.550 (0.0209 - 0.0217)	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																
0.551 - 0.570 (0.0217 - 0.0224)	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																	
0.571 - 0.590 (0.0225 - 0.0232)	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																		
0.591 - 0.610 (0.0233 - 0.0240)	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																			
0.611 - 0.630 (0.0241 - 0.0248)	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																				
0.631 - 0.650 (0.0248 - 0.0256)	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																					
0.651 - 0.670 (0.0256 - 0.0264)	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																						
0.671 - 0.690 (0.0264 - 0.0272)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																						
0.691 - 0.710 (0.0272 - 0.0280)	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																						
0.711 - 0.730 (0.0280 - 0.0287)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74																						
0.731 - 0.750 (0.0288 - 0.0295)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74																						
0.751 - 0.770 (0.0296 - 0.0303)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74																						
0.771 - 0.790 (0.0304 - 0.0311)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74																						
0.791 - 0.810 (0.0311 - 0.0319)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74																						
0.811 - 0.830 (0.0319 - 0.0327)	54	56	58	60	62	64	66	68	70	70	72	72	74																								
0.831 - 0.850 (0.0327 - 0.0335)	56	58	60	62	64	66	68	70	72	72	74																										
0.851 - 0.870 (0.0335 - 0.0343)	58	60	62	64	66	68	70	72	74																												
0.871 - 0.890 (0.0343 - 0.0350)	60	62	64	66	68	70	72																														
0.891 - 0.910 (0.0351 - 0.0358)	62	64	66	68	70	72																															
0.911 - 0.930 (0.0359 - 0.0366)	64	66	68	70	72																																
0.931 - 0.950 (0.0367 - 0.0374)	66	68	70	72																																	
0.951 - 0.970 (0.0374 - 0.0382)	68	70	72																																		
0.971 - 0.990 (0.0382 - 0.0390)	70	72																																			
0.991 - 1.010 (0.0390 - 0.0398)	72																																				

Exhaust valve clearance (Cold):
0.29 to 0.39 mm (0.0114 to 0.0154 in.)

EXAMPLE:
The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.480 mm (0.0189 in.). Replace the 5.340 mm (0.2102 in.) lifter with a new No. 48 lifter.

New Lifter Thickness mm (in.)

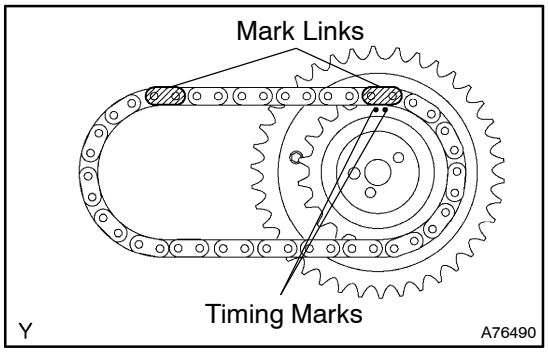
No.	Thickness	No.	Thickness	No.	Thickness
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)		

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(k) Install the No. 3 camshaft sub–assy.

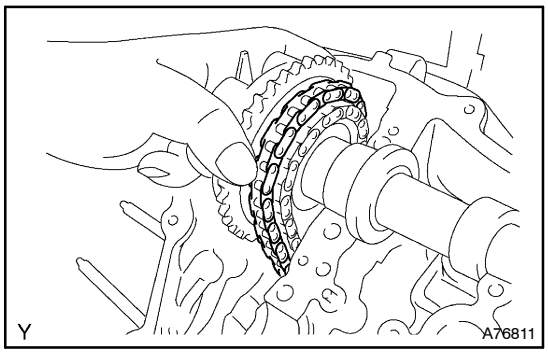
NOTICE:

As 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 which are received 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.

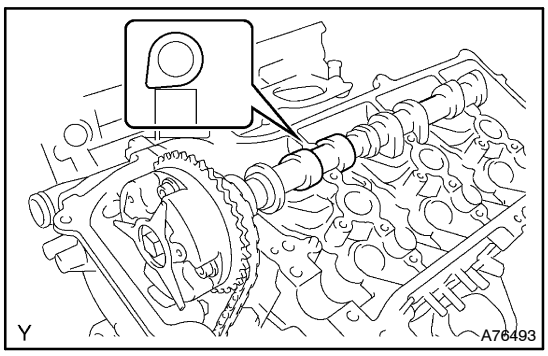


(1) Align the mark link (yellow) with the timing mark (2 dot marks) of the camshaft timing gear as shown in the illustration.

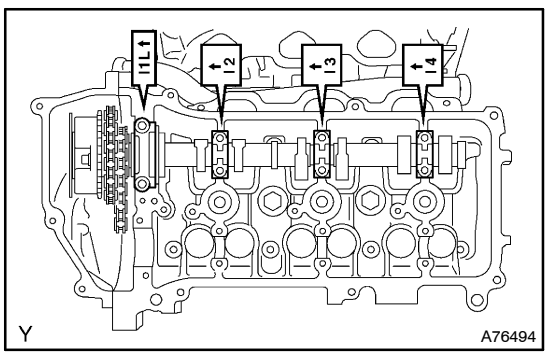
(2) Apply new engine oil to the thrust portion and journal of the camshafts.



(3) Temporarily put the No. 1 chain on the No. 2 chain of the camshaft timing gear.

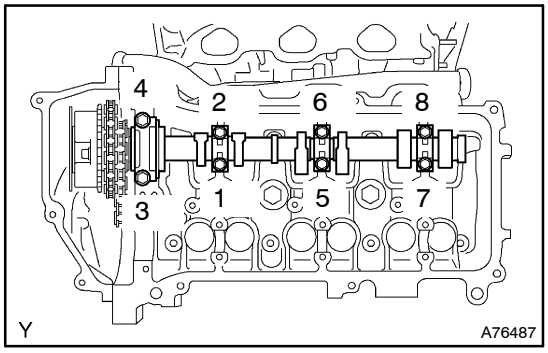


(4) Set the No. 3 camshaft onto the LH cylinder head with the cam lobes of the No. 2 cylinder faces downward as shown in the illustration.



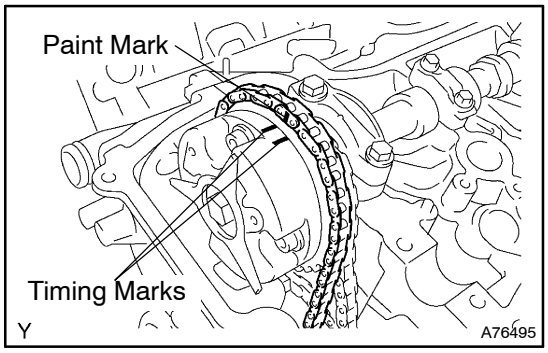
(5) Install the 4 bearing caps in their proper locations.

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

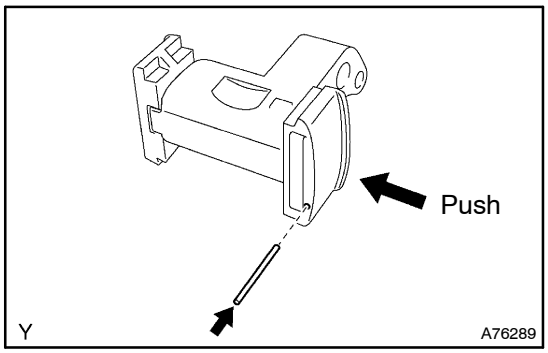


(7) Install the 8 bearing cap bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

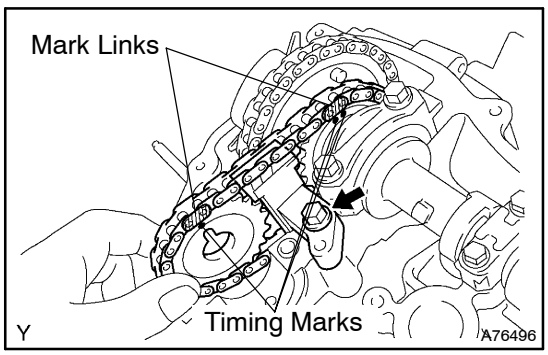
Torque:
9.0 N·m (92 kgf·cm, 80 in.·lbf) for 10 mm (0.39 in.) head
24 N·m (245 kgf·cm, 18 ft·lbf) for 12 mm (0.47 in.) head



(8) Align the paint mark of the No. 1 chain with the timing marks of the camshaft timing gear.



(l) Install the chain tensioner assy No. 3.
(1) While pushing in the tensioner, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to hold it.



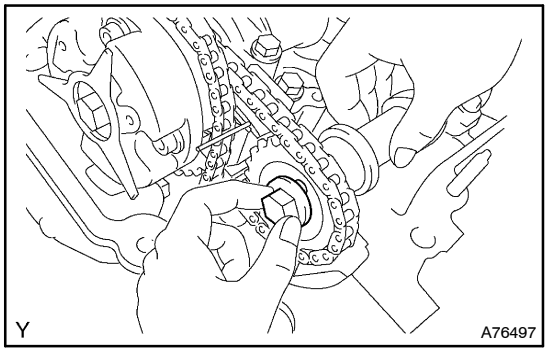
(2) Temporarily install the camshaft timing gear and chain tensioner No. 3 and align the mark links (yellow) with the timing marks (1 dot mark and 2 dot marks) of the camshaft timing gears.
(3) Tighten the chain tensioner No. 3 bolt.

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

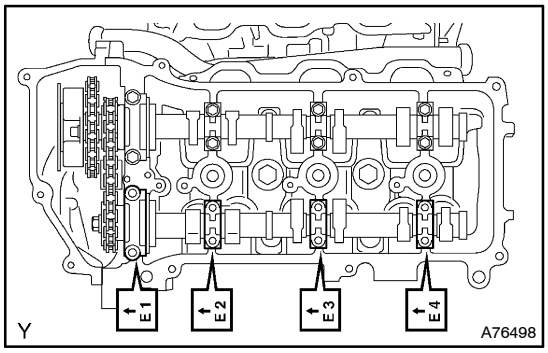
(m) Install the No. 4 camshaft sub–assy.

NOTICE:

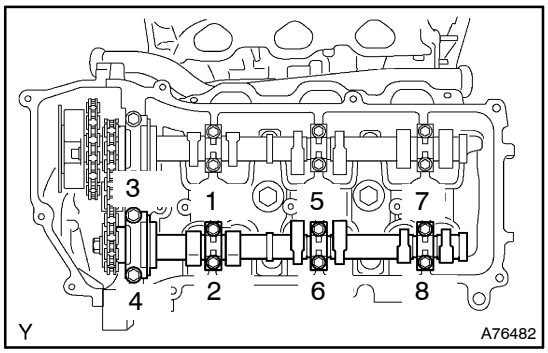
As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head which are received the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following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



(1) Align the knock pin hole in the camshaft timing gear with the knock pin of he No. 4 camshaft, and insert the No. 4 camshaft into the camshaft timing gear.
(2) Temporarily install the camshaft timing gear set bolt.

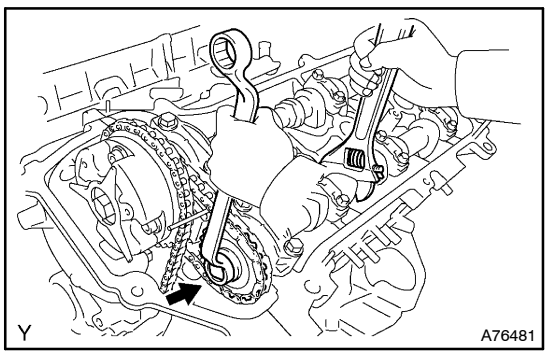


(3) Install the 4 bearing caps in their proper locations.
(4) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.



(5) Install the 8 bearing cap bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

Torque:
9.0 N·m (92 kgf·cm, 80 in.·lbf) for 10 mm (0.39 in.) head
24 N·m (245 kgf·cm, 18 ft·lbf) for 12 mm (0.47 in.) head



(6) Hold the hexagonal portion of the No. 4 camshaft with a wrench, and tighten the camshaft timing gear set bolt.

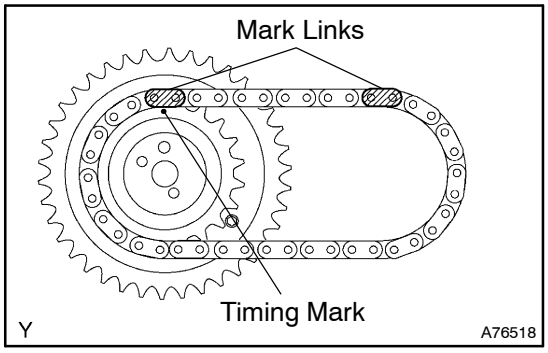
Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

(7) Remove the pin from the chain tensioner No. 3.

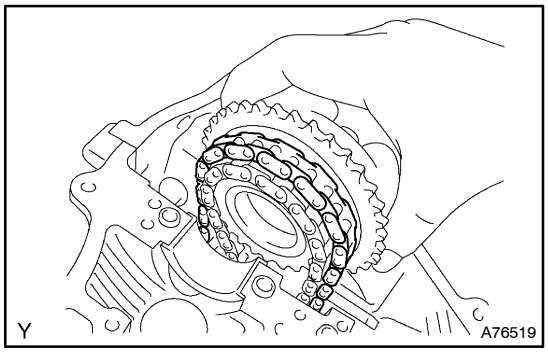
(n) Install the camshaft.

NOTICE:

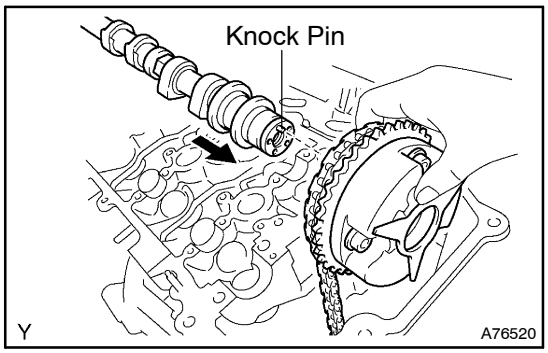
As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head which are received the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following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



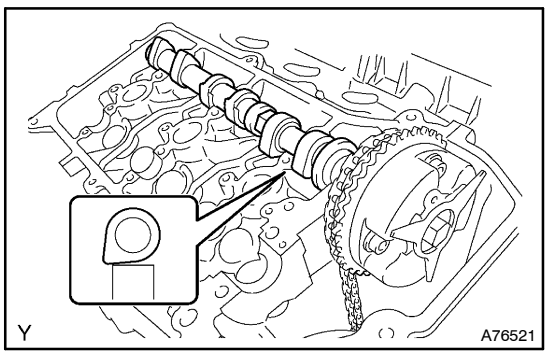
(1) Align the mark link (yellow) with the timing mark (1 dot mark) of the camshaft timing gear as shown in the illustration.
(2) Apply new engine oil to the thrust portion and journal of the camshafts.



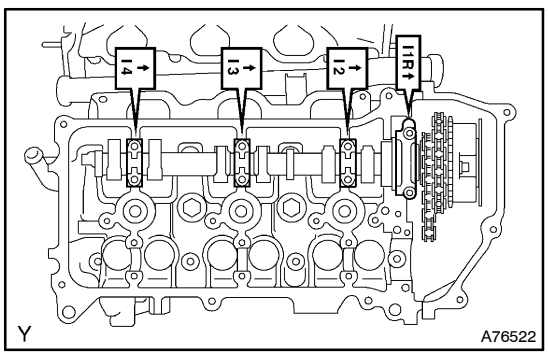
(3) Temporarily put the No. 1 chain on the No. 2 chain of the camshaft timing gear.



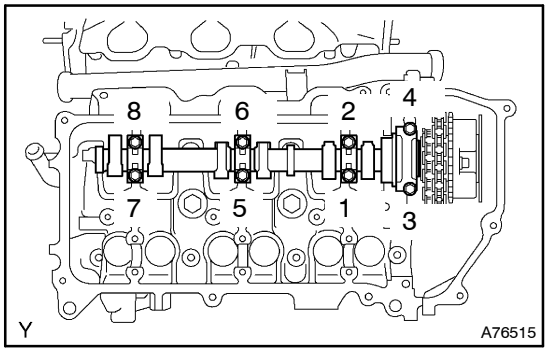
(4) Align the knock pin hole in the camshaft timing gear with the knock pin of the No. 1 camshaft, and insert the No. 1 camshaft into the camshaft timing gear.
(5) Temporarily install the camshaft timing gear set bolt.



(6) Set the No. 1 camshaft onto the RH cylinder head with the cam lobes of the No. 1 cylinder faces downward as shown in the illustration.

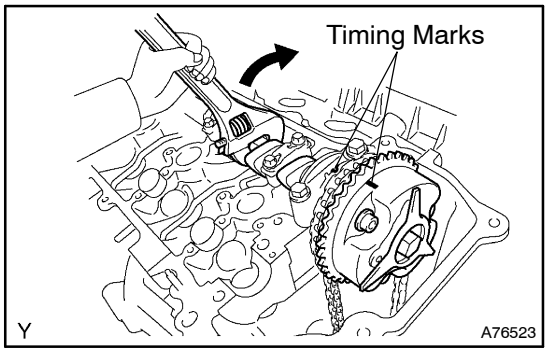


(7) Install the 4 bearing caps in their proper locations.
(8) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

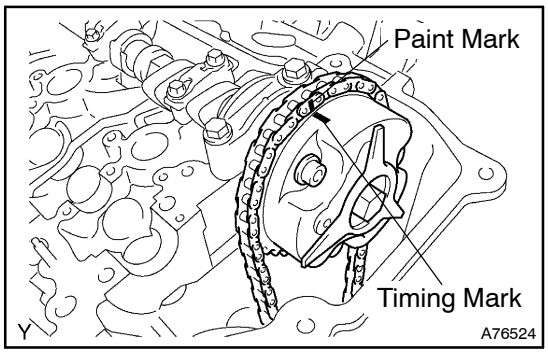


(9) Install the 8 bearing cap bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

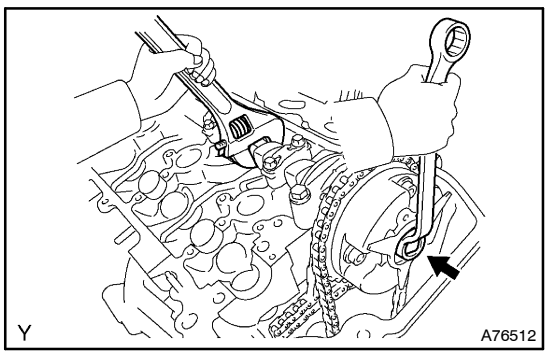
Torque:
9.0 N·m (92 kgf·cm, 80 in.·lbf) for 10 mm (0.39 in.) head
24 N·m (245 kgf·cm, 18 ft·lbf) for 12 mm (0.47 in.) head



(10) Rotate the No. 1 camshaft clockwise using hexagonal portion of the No. 1 camshaft so that the timing mark of the camshaft timing gear is aligned with the timing marks of the camshaft bearing cap.

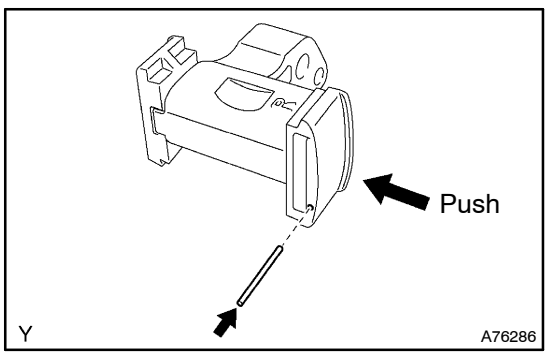


(11) Align the paint mark of the No. 1 chain with the timing mark of the camshaft timing gear.

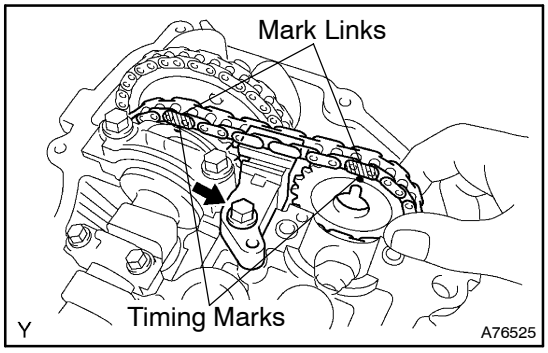


(12) Hold the hexagonal portion of the No. 1 camshaft with a wrench, and tighten the camshaft timing gear set bolt.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)



(o) Install the chain tensioner assy No. 2.
(1) While pushing in the tensioner, insert a pin of ϕ 1.0 mm (0.039 in.) into the hole to fix it.



(2) Temporarily install the camshaft timing gear and chain tensioner No. 2 and align the mark links (yellow) with the timing marks (1 dot mark) of the camshaft timing gears.

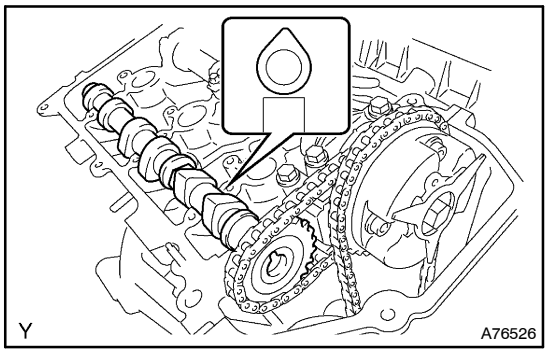
(3) Tighten the chain tensioner No. 2 bolt.

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

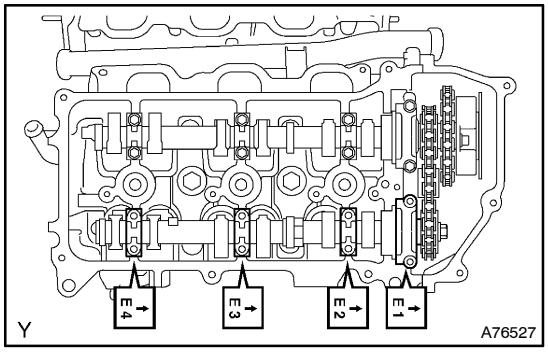
(p) Install the No. 2 camshaft.

NOTICE:

As 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 which are received 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.

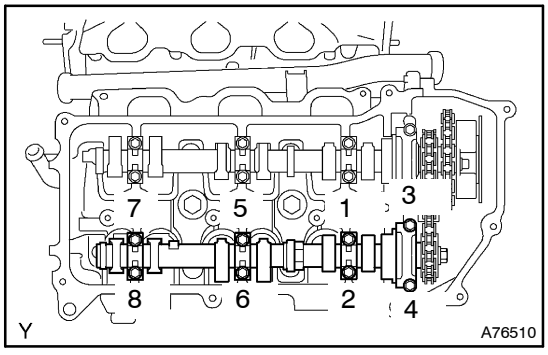


(1) Set the No. 2 camshaft onto the RH cylinder head with the cam lobes of No. 1 cylinder faces upward as shown in the illustration.



(2) Install the 4 bearing caps in their proper locations.

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

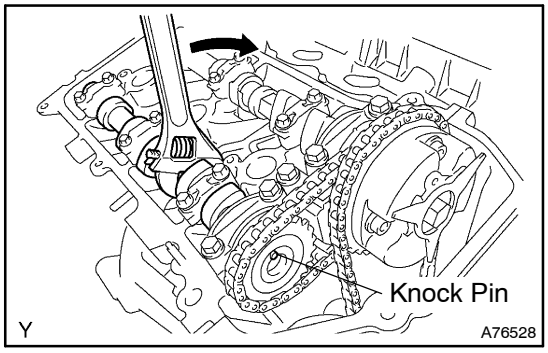


(4) Install the 8 bearing cap bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

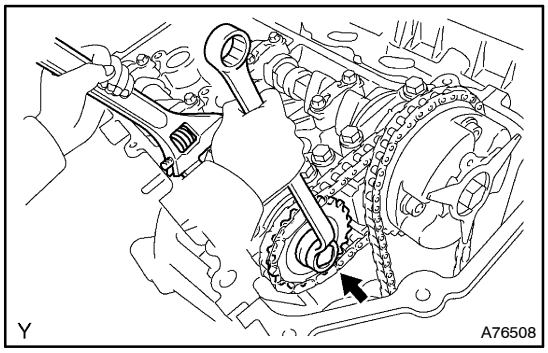
Torque:

9.0 N·m (92 kgf·cm, 80 in.·lbf) for 10 mm (0.39 in.) head

24 N·m (245 kgf·cm, 18 ft·lbf) for 12 mm (0.47 in.) head



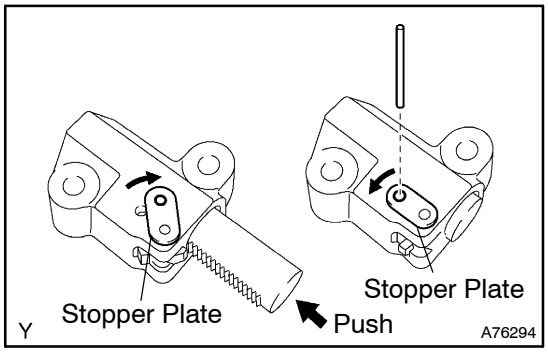
(5) Rotate the No. 2 camshaft clockwise using the wrench so that the knock pin of the No. 2 camshaft is aligned with the knock pin hole of the camshaft timing gear.



(6) Hold the hexagonal portion of the No. 2 camshaft with a wrench, and install the camshaft timing gear set bolt.

Torque: 100 N·m (1,020 kgf·cm, 74 ft·lbf)

(7) Remove the pin from the chain tensioner No. 2.



(q) Install the chain tensioner assy No. 1.

(1) While turning the stopper plate of the tensioner clockwise, push in the plunger of the tensioner as shown in the illustration.

(2) While turning the stopper plate of the tensioner counterclockwise, insert a bar of ϕ 3.5 mm (0.138 in.) into the holes in the stopper plate and tensioner to fix the stopper plate.

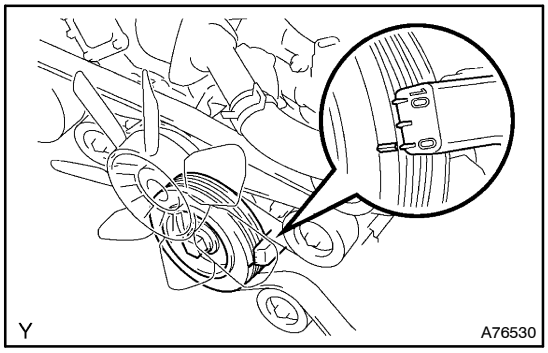
(3) Install the chain tensioner with the 2 bolts.

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

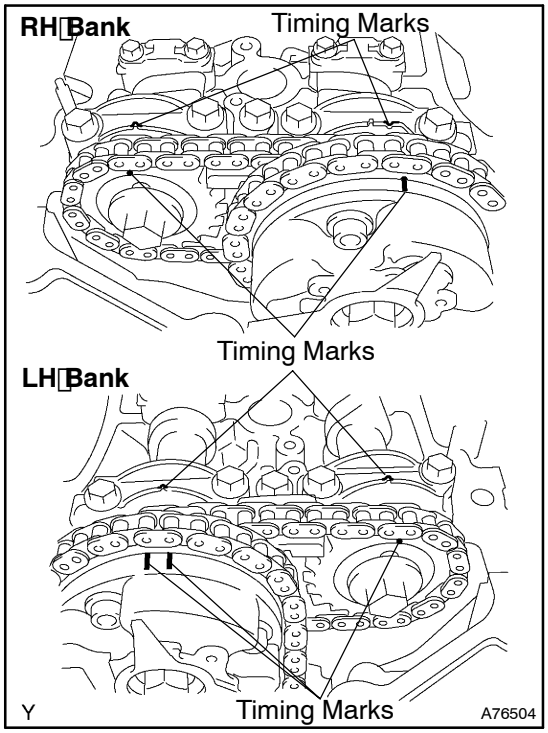
(4) Remove the bar from the chain tensioner.

(5) Install a new gasket and the timing chain cover plate with the 4 bolts.

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



(6) Turn the crankshaft pulley 2 complete revolutions slowly, and align the notch with the timing mark ”0” of the timing chain cover.



(7) Check that the timing marks of the camshaft timing gears are aligned with the timing marks of the bearing cap as shown in the illustration.

12. INSTALL CYLINDER HEAD COVER SUB–ASSY LH (See page 14–58)
13. INSTALL CYLINDER HEAD COVER SUB–ASSY RH (See page 14–58)
14. INSTALL IGNITION COIL ASSY
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)
15. INSTALL INTAKE AIR SURGE TANK (See page 14–58)
16. INSTALL AIR CLEANER ASSY (See page 10–7)
17. CONNECT VENTILATION HOSE NO.2
18. ADD ENGINE COOLANT (See page 16–5)
19. CHECK FOR ENGINE COOLANT LEAKS (See page 16–1)
20. INSTALL V–BANK COVER
(a) Install the V–bank cover with the 2 nuts.
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)
21. INSPECT IGNITION TIMING (See page 14–1)
SST 09843–18040