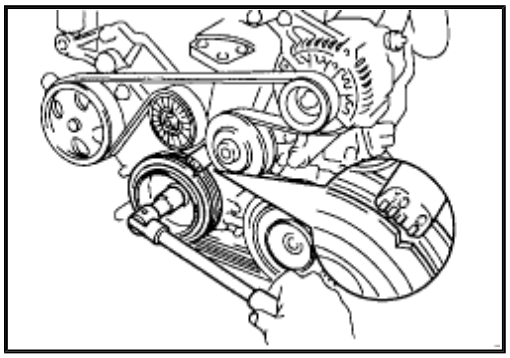
Adjustments

ADJUSTMENT

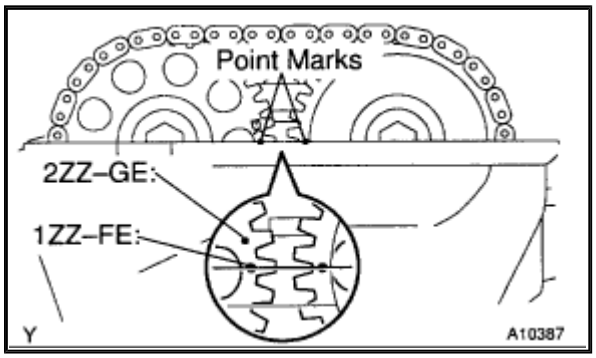
HINT: Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE CYLINDER HEAD COVER
2. SET NO. 1 CYLINDER TO TDC/COMPRESSION



ZOOM SIZED FOR PRINT

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



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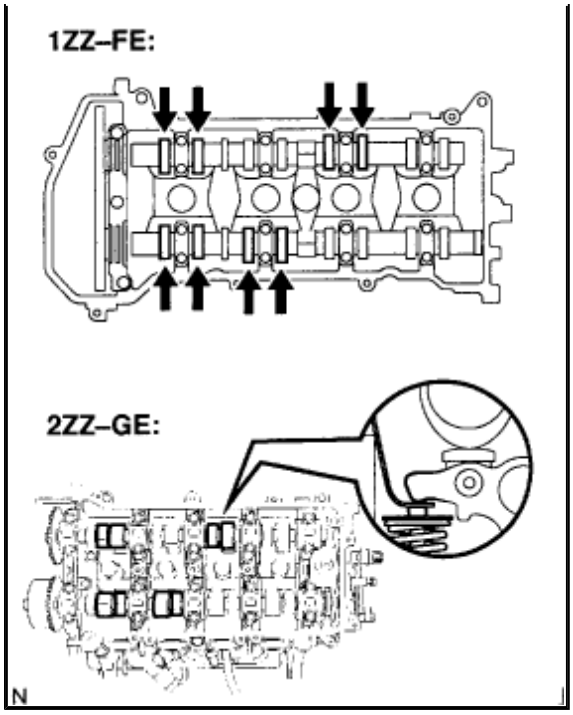
b. Check that the point marks of the camshaft timing sprockets are in straight line on the timing chain cover surface as shown in the illustration. If not, turn the crankshaft **1 revolution (360°)** and align the marks as above.

3. INSPECT VALVE CLEARANCE



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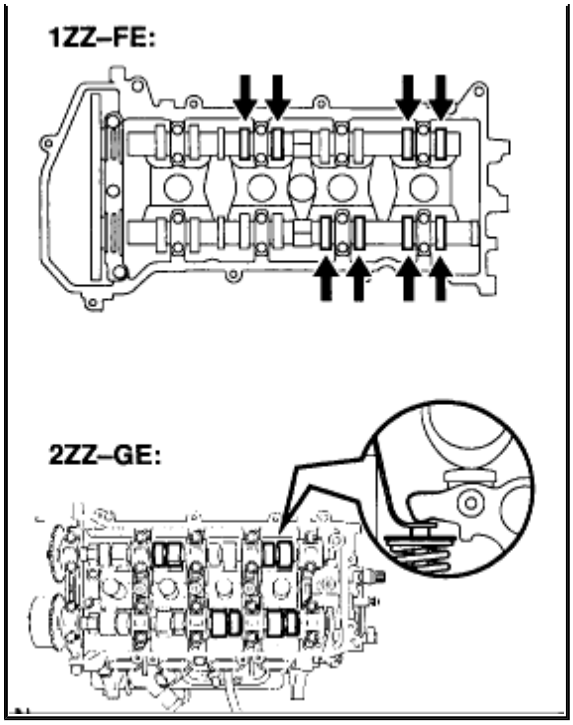
a. Check only the valves indicated.

- Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim. Valve clearance (Cold):

1ZZ-FE:
Intake: **0.15 - 0.25 mm (0.006 - 0.010 inch)**
Exhaust: **0.25 - 0.35 mm (0.010 - 0.014 inch)**
2ZZ-GE:
Intake: **0.15 - 0.25 mm (0.006 - 0.010 inch)**
Exhaust: **0.35 - 0.45 mm (0.014 - 0.018 inch)**



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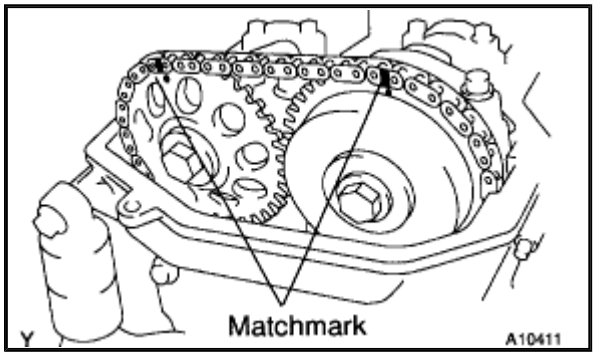
b. Turn the crankshaft **1 revolution (360°)** and align the mark as above (See procedure in step 2).
c. Check only the valves indicated as shown. Measure the valve clearance (See procedure in step (a)).

4. 1ZZ-FE: ADJUST VALVE CLEARANCE

a. Set the No. 1 cylinder to the TDC/compression (See procedure in step 2).



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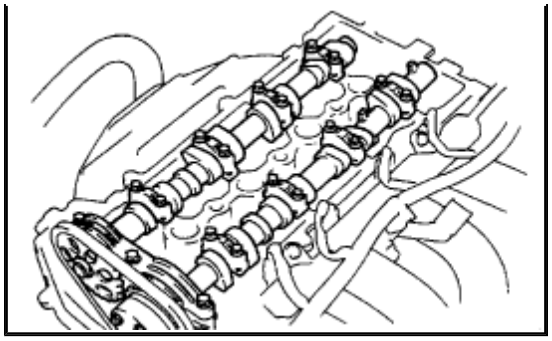
b. Place matchmarks on the timing chain and camshaft timing sprockets.
c. Remove the 2 bolts and chain tensioner.



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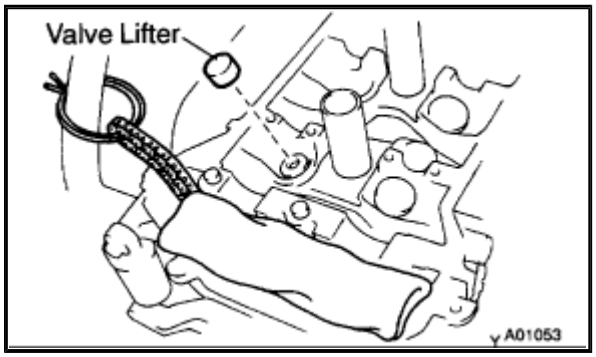
d. Remove the camshaft and timing sprocket assemblies.

1. 19 camshaft bearing cap bolts
2. 9 camshaft bearing caps (No. 1 & No. 3)
3. Exhaust camshaft and timing sprocket assembly
4. Intake camshaft and timing sprocket assembly **HINT:** When disconnect the timing chain from the camshaft timing sprocket, holding the timing chain.



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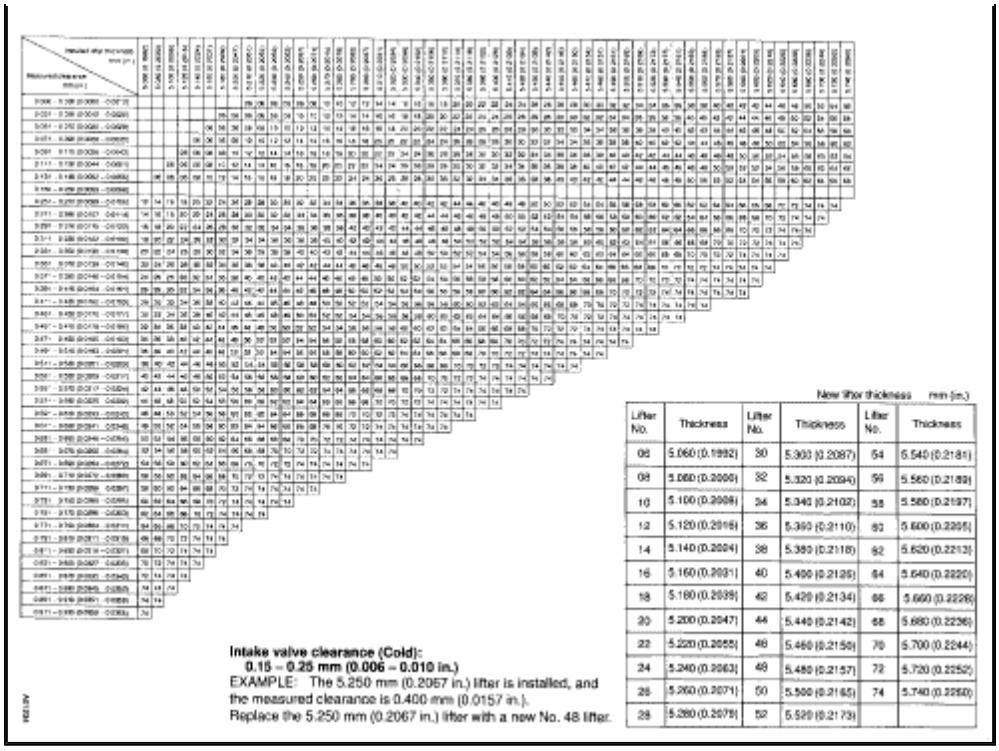
e. Tie the timing chain with a string as shown in the illustration. **NOTICE:**

- Be careful not to drop anything inside the timing chain cover.
- Do not allow the chain to come into contact with water or dust.

f. Remove the valve lifters.



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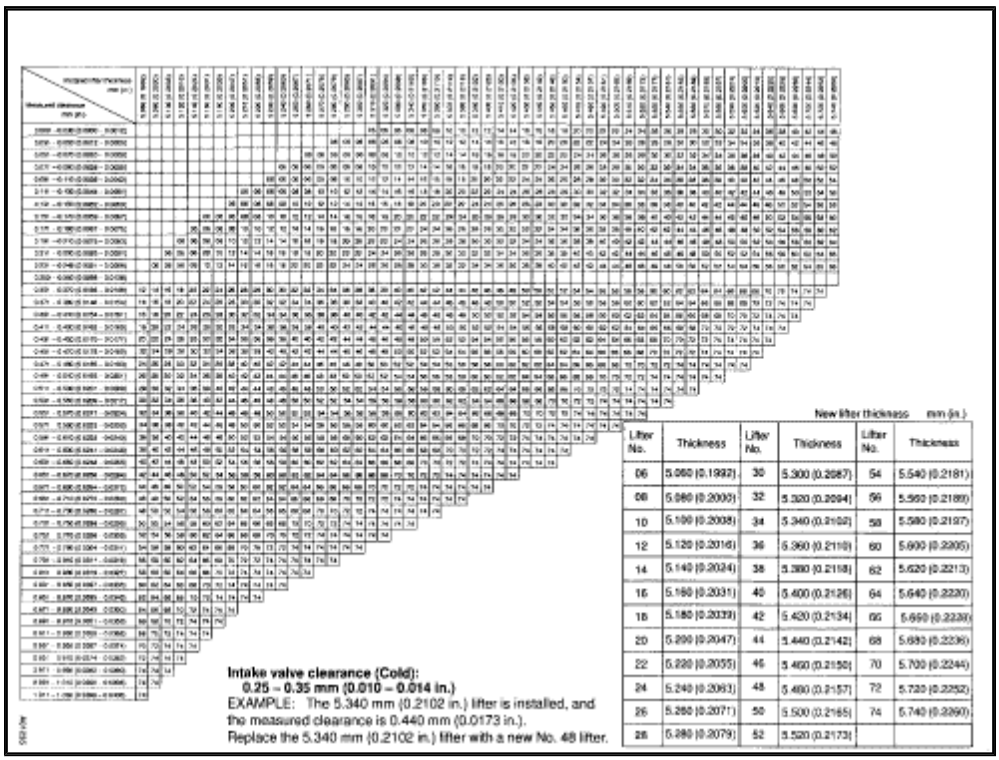
Valve Lifter Selection Chart (Intake)



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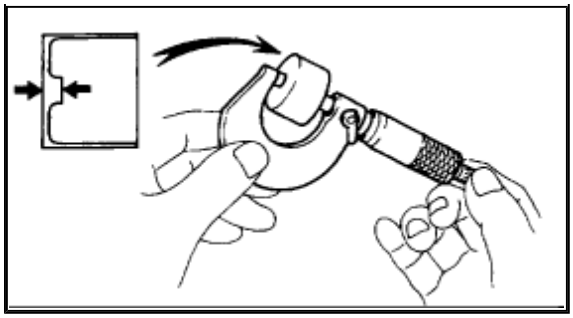
Valve Lifter Selection Chart (Exhaust)

g. Determine the replacement valve lifter size according to these Formula or Charts:



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- Using a micrometer, measure the thickness of the removed lifter.
- Calculate the thickness of a new lifter so the valve clearance comes within the specified value. T: Thickness of used lifter

A: Measured valve clearance
N: Thickness of new lifter
Intake:**N = T + (A - 0.20 mm (0.008 inch)**)
Exhaust:**N = T + (A - 0.30 mm (0.012 inch)**)

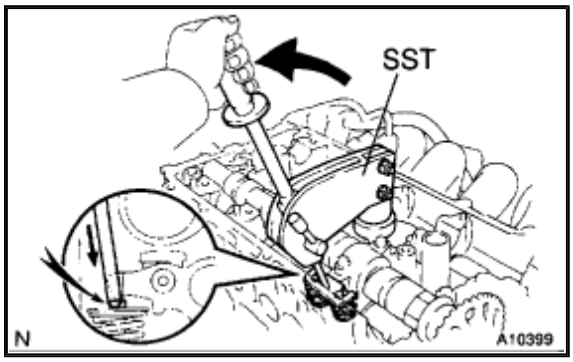
- Select a new lifter with a thickness as close as possible to the calculated values.

HINT: Lifter are available in 35 sizes in increments of **0.020 mm (0.0008 inch)** , from**5.060 mm (0.1992 inch)** to **5.740 mm (0.2260 inch)** .

5. 2ZZ-GE: ADJUST VALVE CLEARANCE

a. Remove the adjusting shim.

1. Turn the crankshaft so that the cam lobe of camshaft on the adjusting valve points upward.



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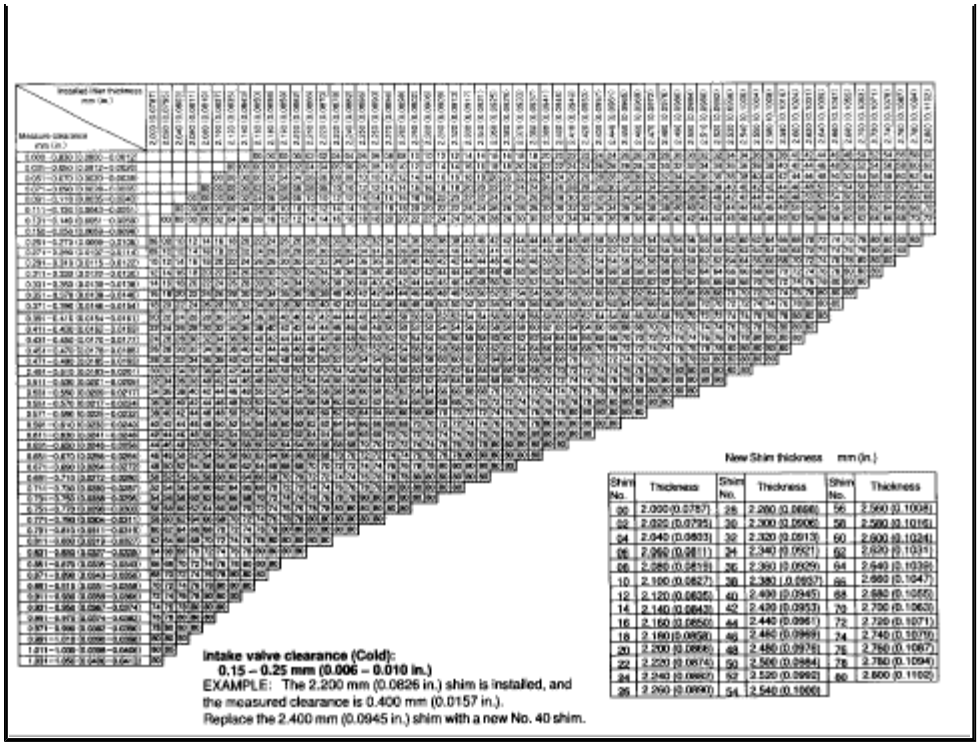
2. Using Special Service Tool **(SST)** , press down the valve.
3. Using (SST), remove the adjusting shim.



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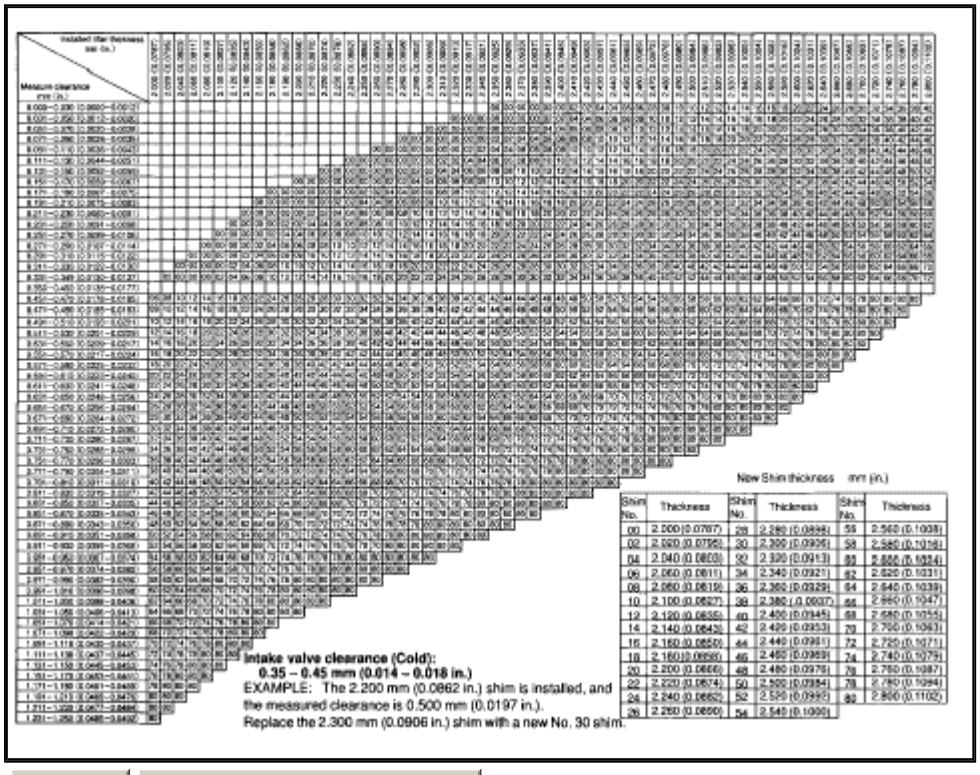
Valve Lifter Selection Chart (Intake)



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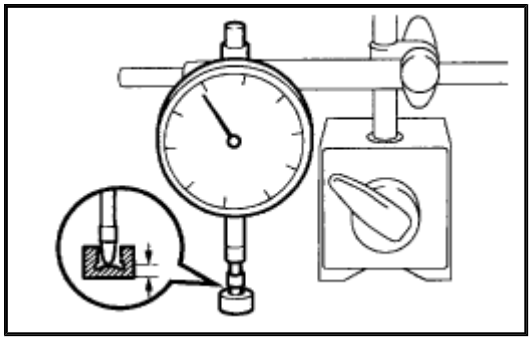
Valve Lifter Selection Chart (Exhaust)

4. Determine the replacement shim size according to these Formula or Charts:



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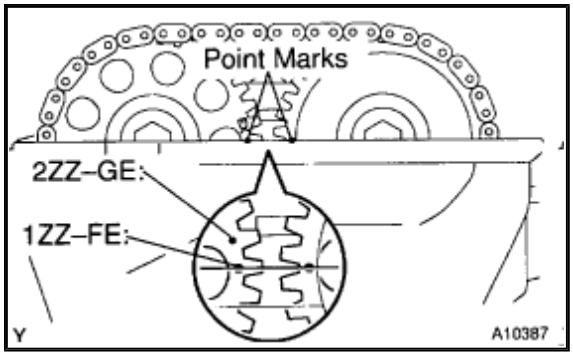
- Using dial indicator, measure the thickness of the removed shim.
- Calculate the thickness of a new shim so the valve clearance comes within the specified value. T: Thickness of used shim

A: Measured valve clearance
N: Thickness of new shim
Intake:**N = T + (A - 0.20 mm (0.008 inch)**)
Exhaust:**N = T + (A - 0.40 mm (0.016 inch)**)

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

HINT: Shim are available in 41 size in increments of **0.020 mm (0.0008 inch)** , from **2.000 mm (0.0787 inch)** to **2.800 mm (0.1102 inch)** .



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6. 1ZZ-FE: REINSTALL CAMSHAFT

    a. Reinstall the valve lifters.
    b. Align the crankshaft pulley groove with the timing mark "0" of the timing chain cover.
    c. Hold the timing chain, and place the intake camshaft and timing sprocket assembly.
    d. Align the matchmarks on the timing chain and camshaft timing sprocket.
    e. Reinstall the camshaft and timing sprocket assemblies.
    f. Check that the point marks of the camshaft timing sprockets are in straight line on the timing chain cover surface as shown in the illustration.
    g. Check that the matchmarks on the timing chain and camshaft timing sprockets.
    h. Install the chain tensioner.
    i. Recheck the valve clearance.
    j. Check the valve timing.

7. REINSTALL CYLINDER HEAD COVER