

ENGINE MECHANICAL

SECTION EM

EM

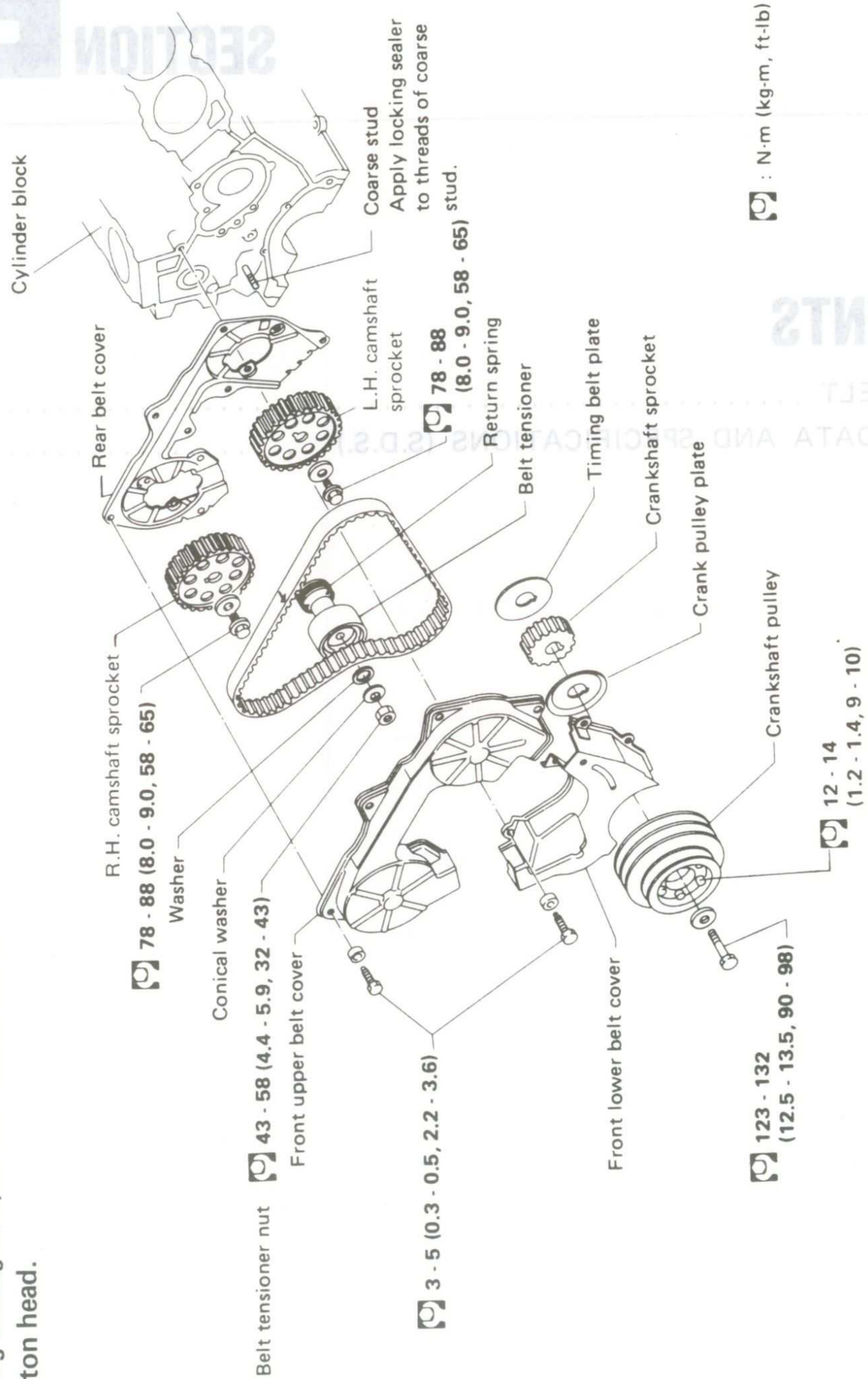
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TIMING BELT

CAUTION:

- Do not bend or twist timing belts too tightly.
- Ensure timing belt, camshaft sprockets, crankshaft sprocket and belt tensioner are clean and free from oil or water.
- Before installing timing belt, confirm that No. 1 cylinder is set at T.D.C. on compression stroke.
- Align arrow on timing belt forward.
- Align white lines on timing belt with punch mark on camshaft sprockets and crankshaft sprocket.
- Adjust belt tension with all spark plugs removed and both rocker shafts loosened completely.
- After removing timing belt, do not rotate crankshaft and camshaft separately because valves hit piston head.



□ : N·m (kg·m, ft·lb)

TIMING BELT

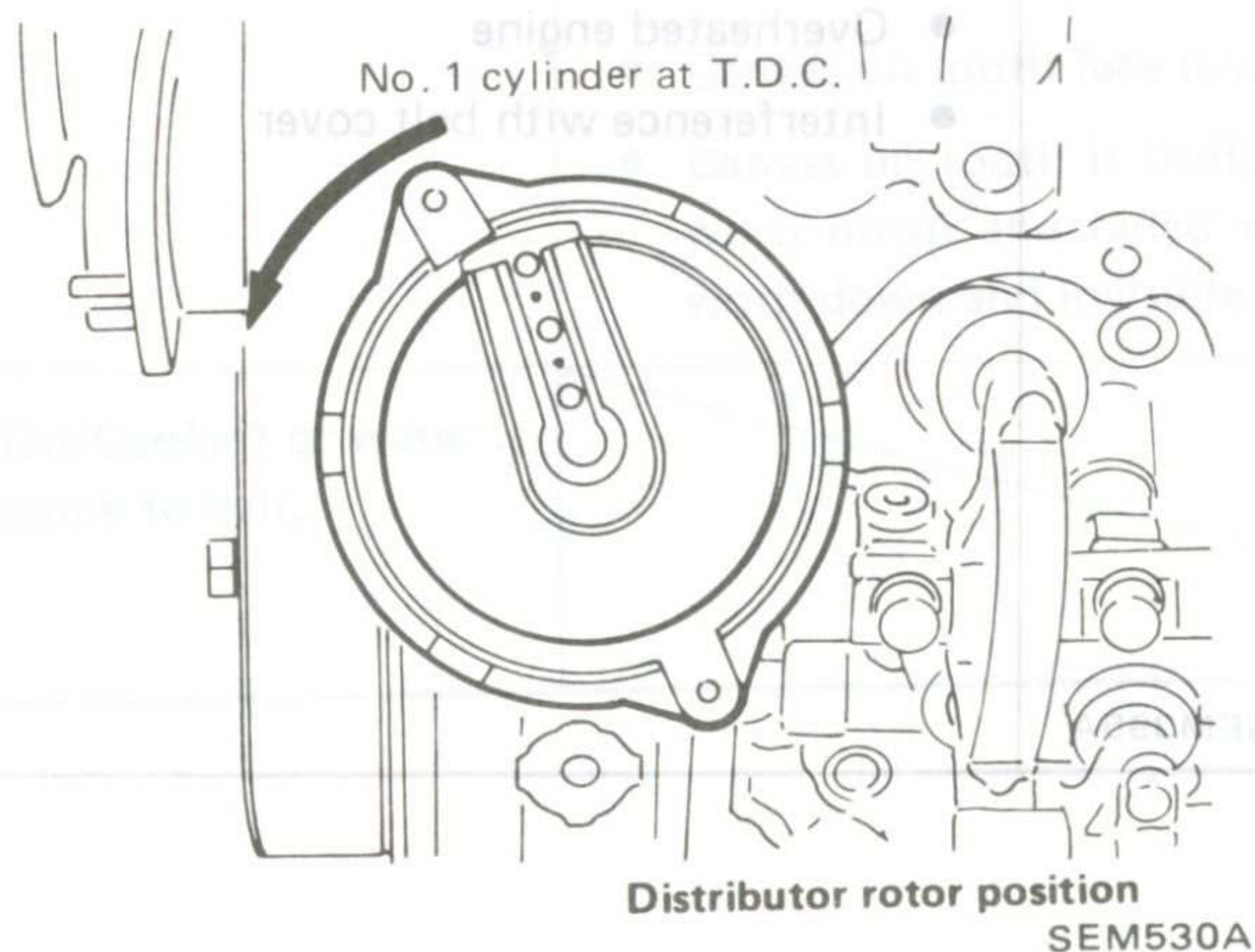
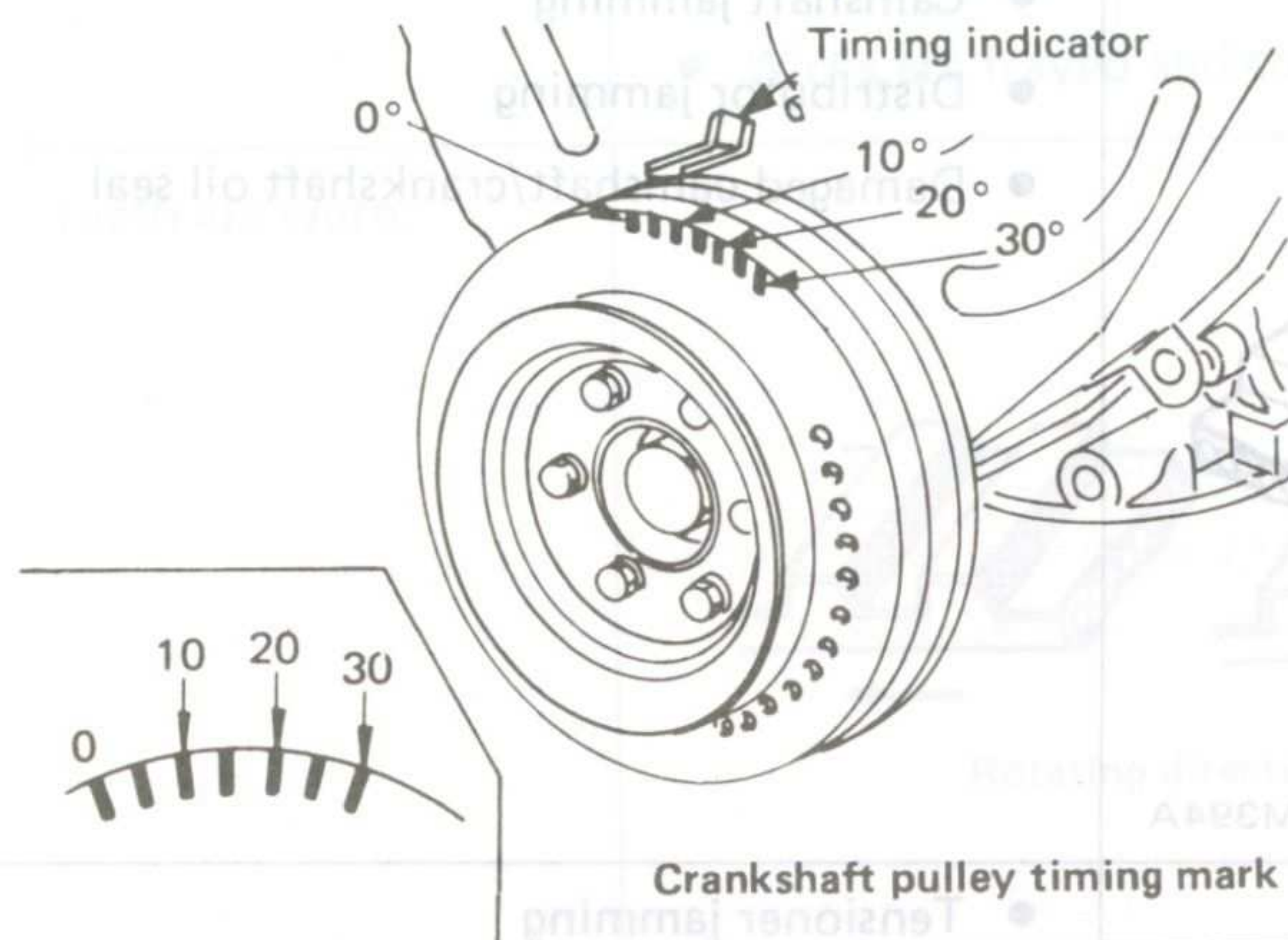
Removal

After removing timing belt, do not rotate crankshaft and camshaft separately, because valves hit piston heads.

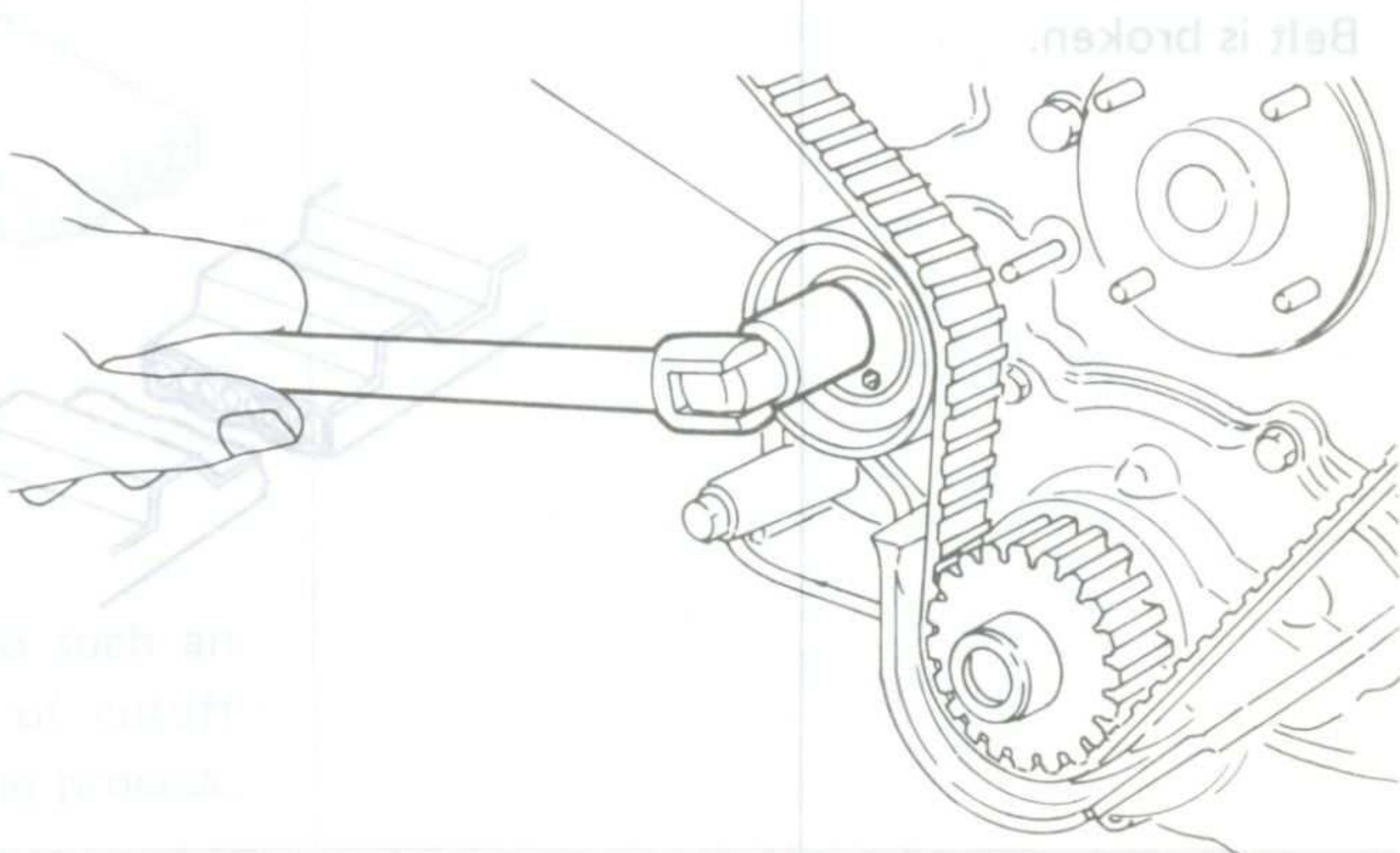
1. Remove engine undercover and drain engine coolant from radiator.

Be careful not to allow coolant to contact drive belts.

2. Remove radiator shroud and fan.
3. Remove the following belts.
 - Power steering drive belt
 - Compressor drive belt
 - Alternator drive belt
4. Remove upper and lower radiator hoses.
5. Set No. 1 cylinder at T.D.C. on its compression stroke.



6. Remove idler bracket of the compressor drive belt and crankshaft pulley.
7. Remove front upper and lower belt covers.
8. Replace timing belt by loosening timing belt tensioner and return spring.

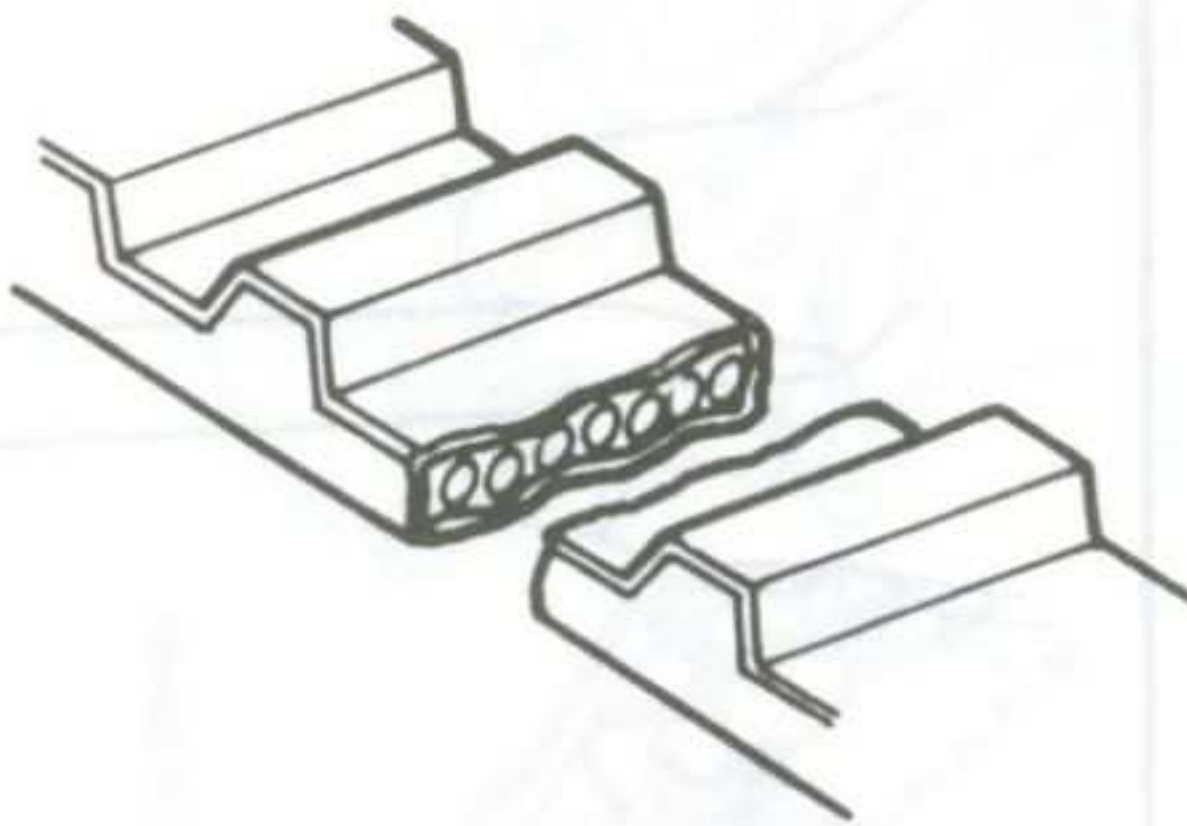
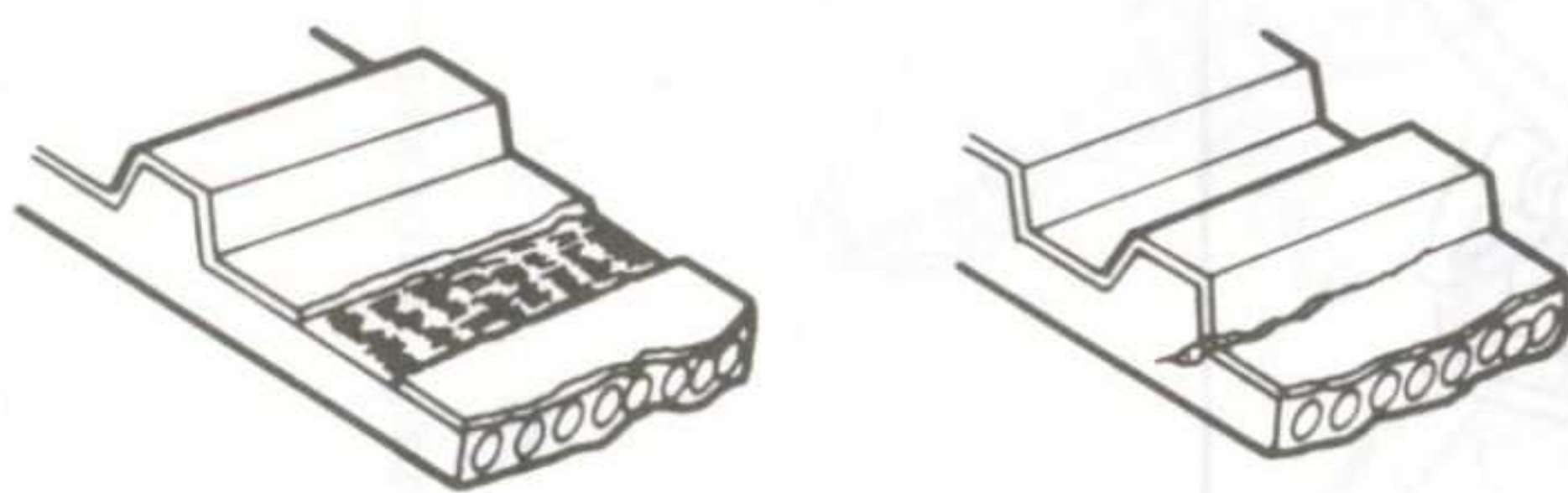
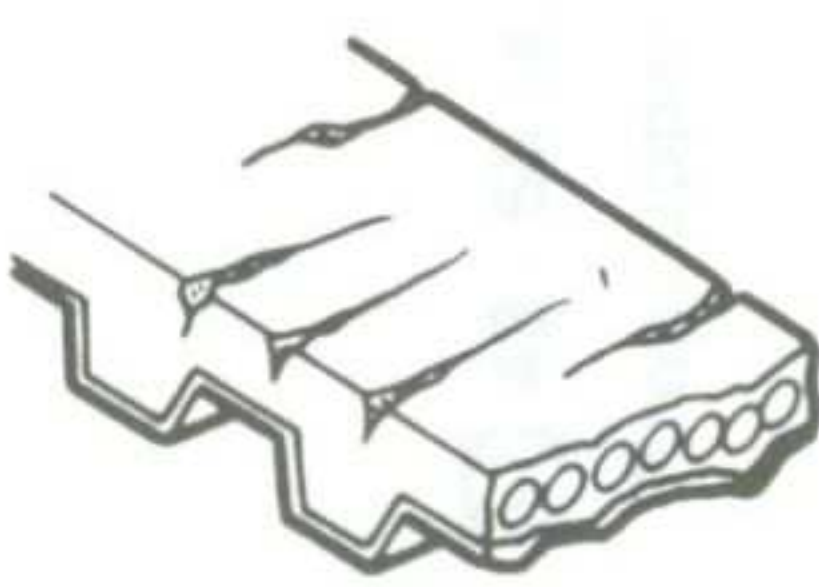


SEM240A

TIMING BELT

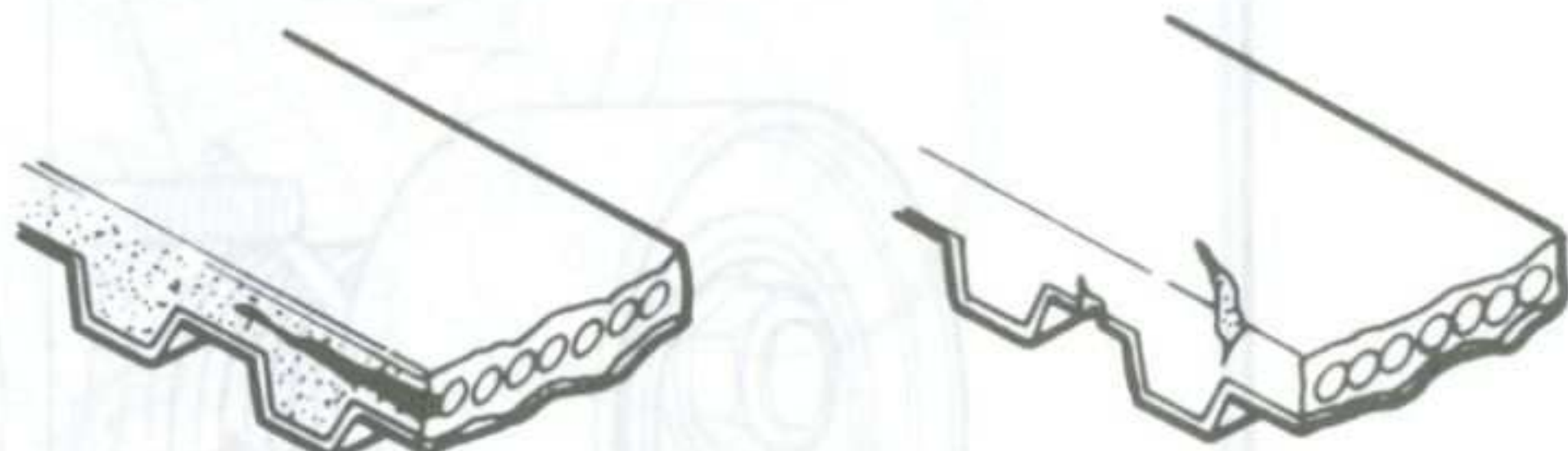
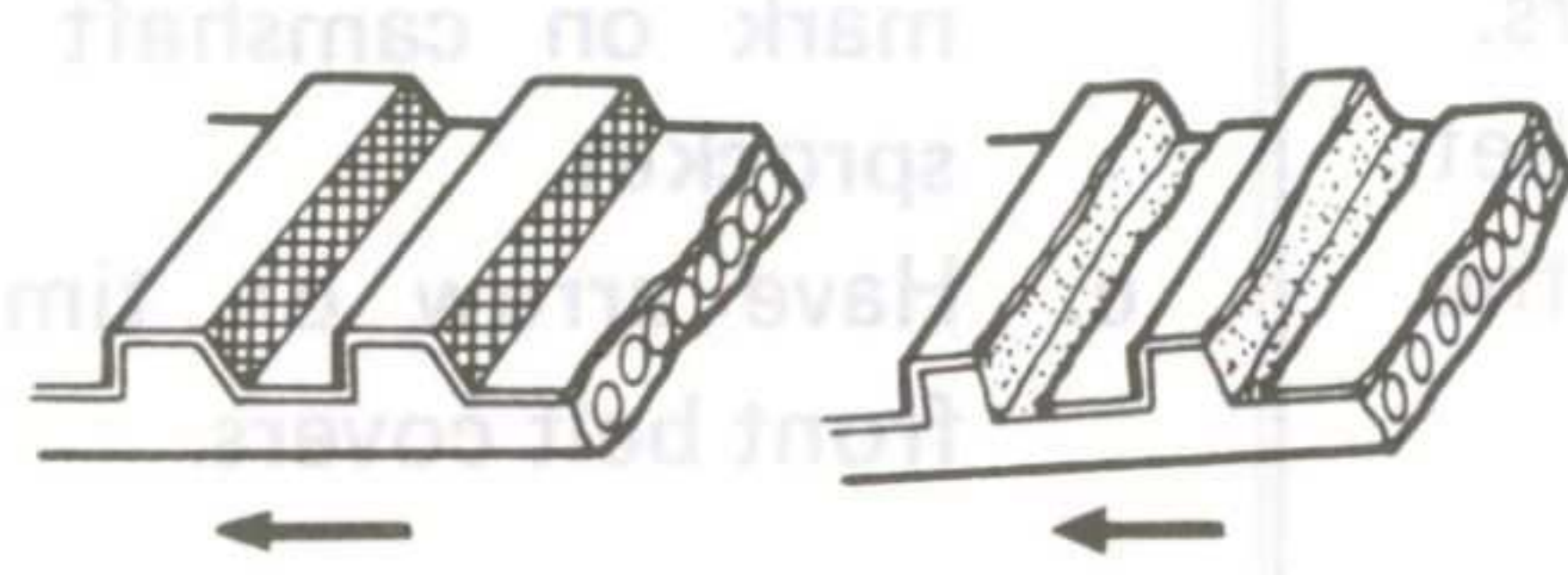
Inspection

Visually check the condition of the timing belt.
Replace if any abnormality is found.

Item to check	Problem	Cause
Belt is broken.	 SEM393A	• Improper handling • Poor belt cover sealing • Coolant leakage at water pump
Tooth is broken/ tooth root is cracked.	 SEM394A	• Camshaft jamming • Distributor jamming • Damaged camshaft/crankshaft oil seal
Back surface is cracked/worn.	 SEM395A	• Tensioner jamming • Overheated engine • Interference with belt cover

TIMING BELT

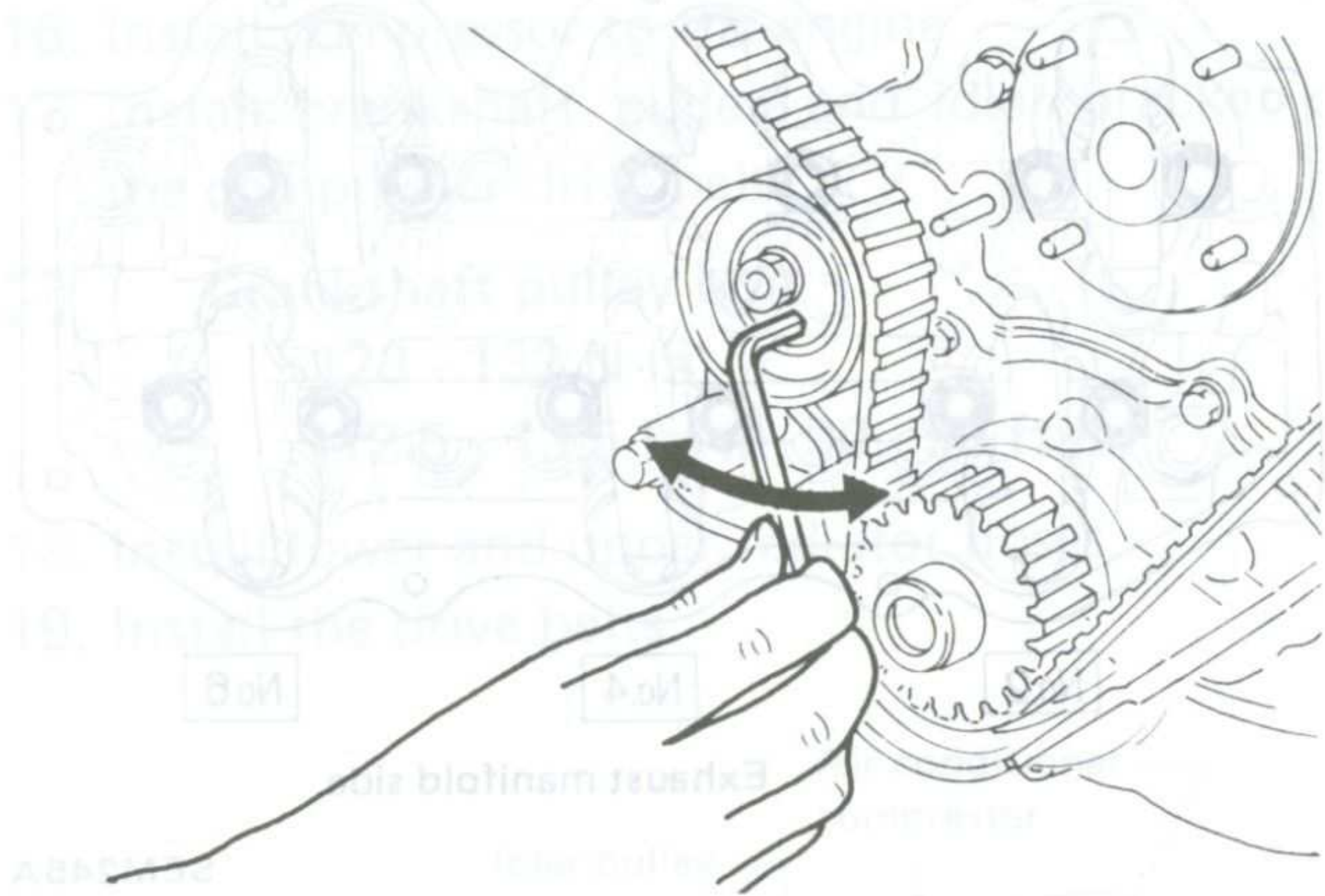
Inspection (Cont'd)

Item to check	Problem	Cause
Side surface is worn.	 - Side surface of belt is worn to such an extent that there is no trace of cutoff performed during manufacturing process. - Belt corners are worn and round. - Wicks are frayed and coming out. SEM396A	- Improper installation of belt - Malfunctioning crank pulley plate/timing belt plate
Teeth are worn.	 Rotating direction - Canvas on tooth face is worn down. - Canvas on tooth is fluffy, rubber layer is worn down and faded white, or fiber is worn down and invisible. SEM397A	- Poor belt cover sealing - Coolant leakage at water pump - Camshaft not functioning properly - Distributor not functioning properly - Excessive belt tension
Oil/Coolant or water is stuck to belt.		- Poor oil sealing of each oil seal - Coolant leakage at water pump - Poor belt cover sealing

TIMING BELT

Installation (Cont'd)

10. Slowly turn tensioner with hexagon wrench clockwise and counterclockwise two or three times.



SEM244A

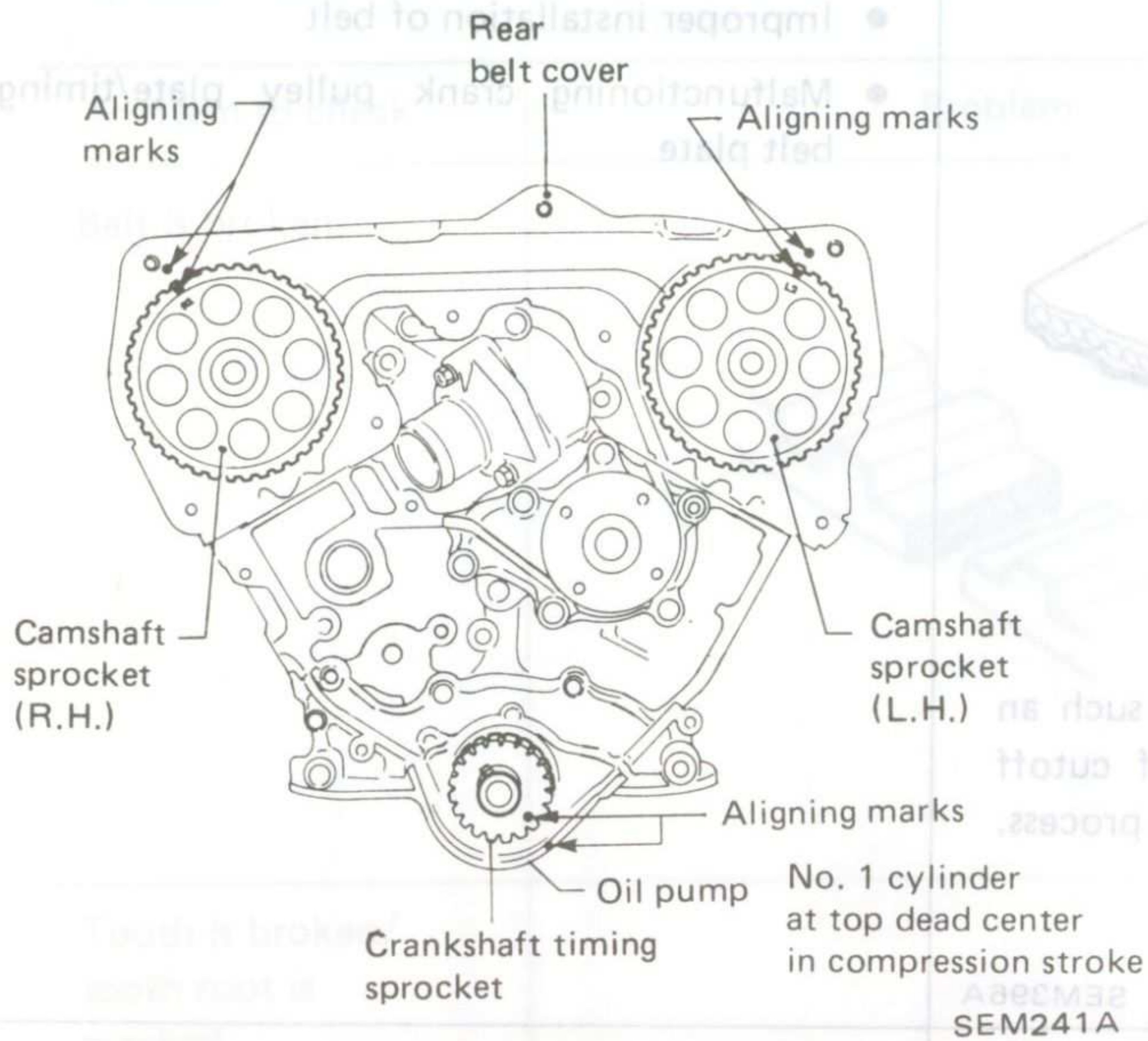
11. Tighten tensioner lock nut.

 : 43 - 58 N·m
(4.4 - 5.9 kg-m, 32 - 43 ft-lb)

TIMING BELT

Installation

1. Confirm that No. 1 cylinder is set at T.D.C. on its compression stroke.



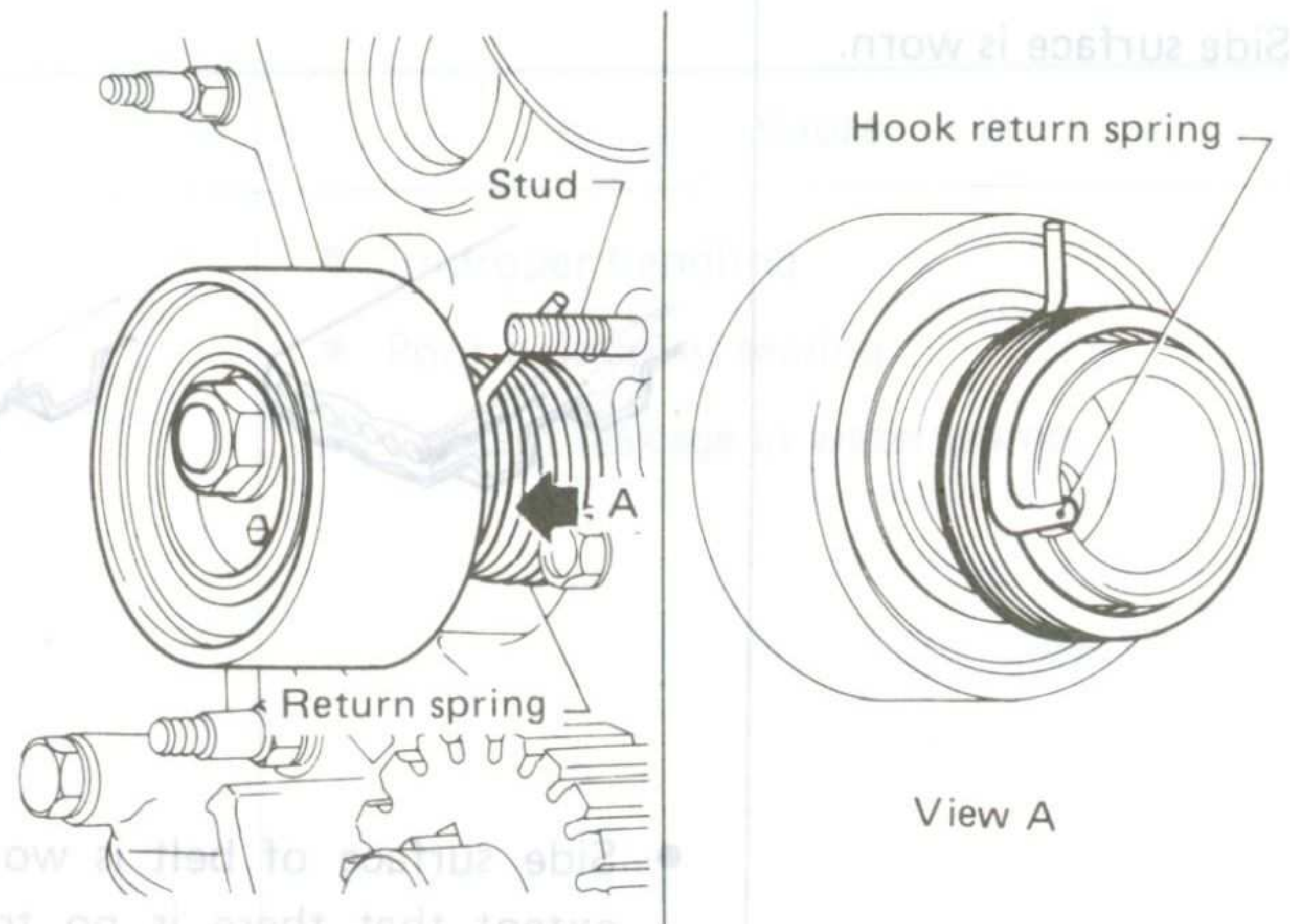
2. Disconnect all hoses, connectors and wires attached to intake collector and rocker covers.
3. Remove compressor from compressor bracket and secure with a suitable wire or rag to the body.
4. Remove collector cover and intake collector.
5. Remove both rocker covers and loosen all rocker shaft securing bolts.

Loosen all rocker shaft securing bolts thoroughly so that timing belt tension can be adjusted correctly. Otherwise, proper belt tension cannot be obtained.

6. Install tensioner and return spring.

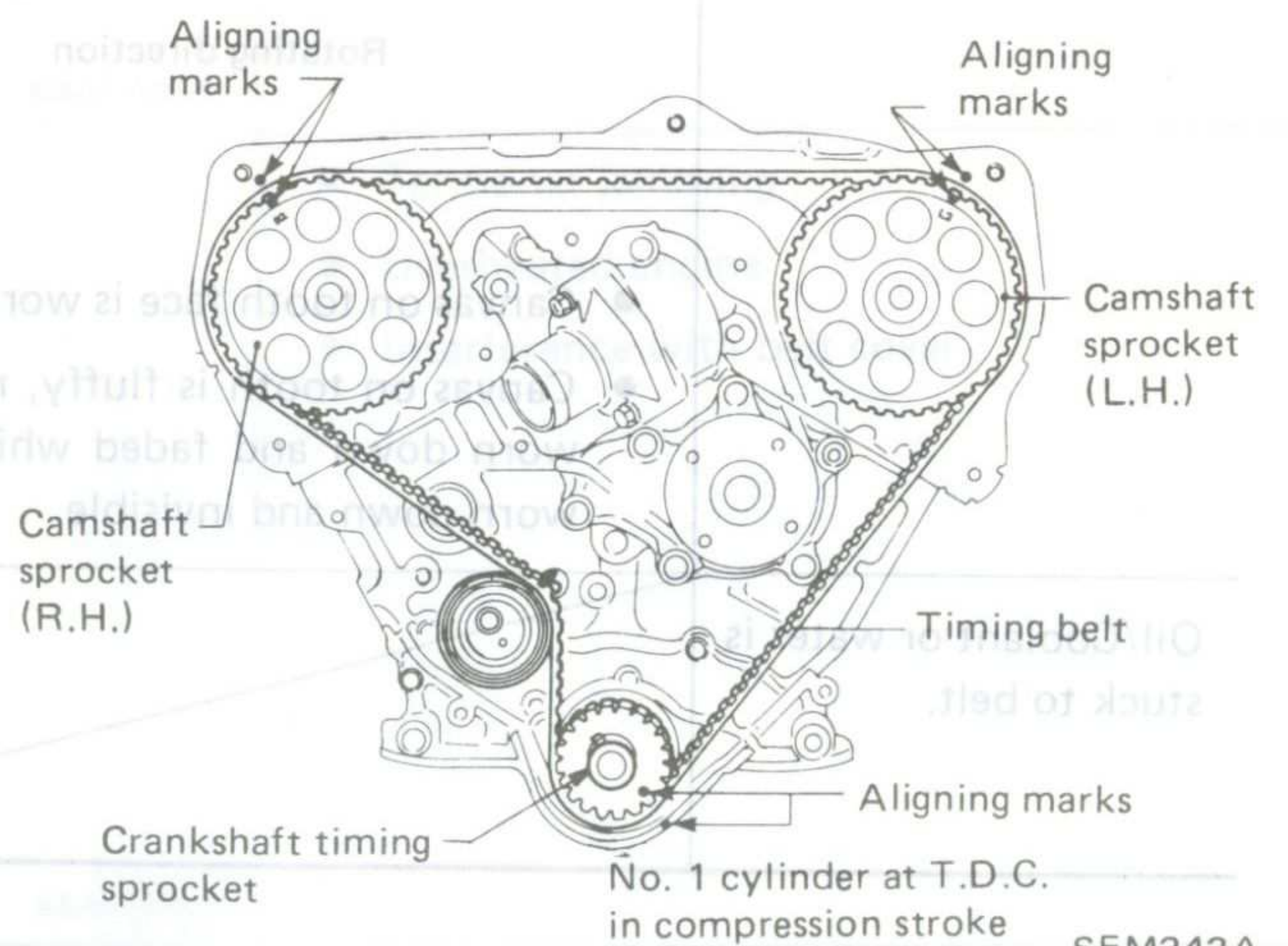
If coarse stud is once removed, apply locking sealer to threads of stud before installing.

7. Turn tensioner clockwise with hexagon wrench and temporarily tighten tension lock nut.



8. Set timing belt.

- a. Ensure timing belt is clean and free from oil or water. Do not bend it.
- b. Align white lines on timing belt with punch mark on camshaft sprockets and crankshaft sprocket.
- c. Have arrow on timing belt pointing toward front belt covers.



9. Loosen tensioner lock nut.

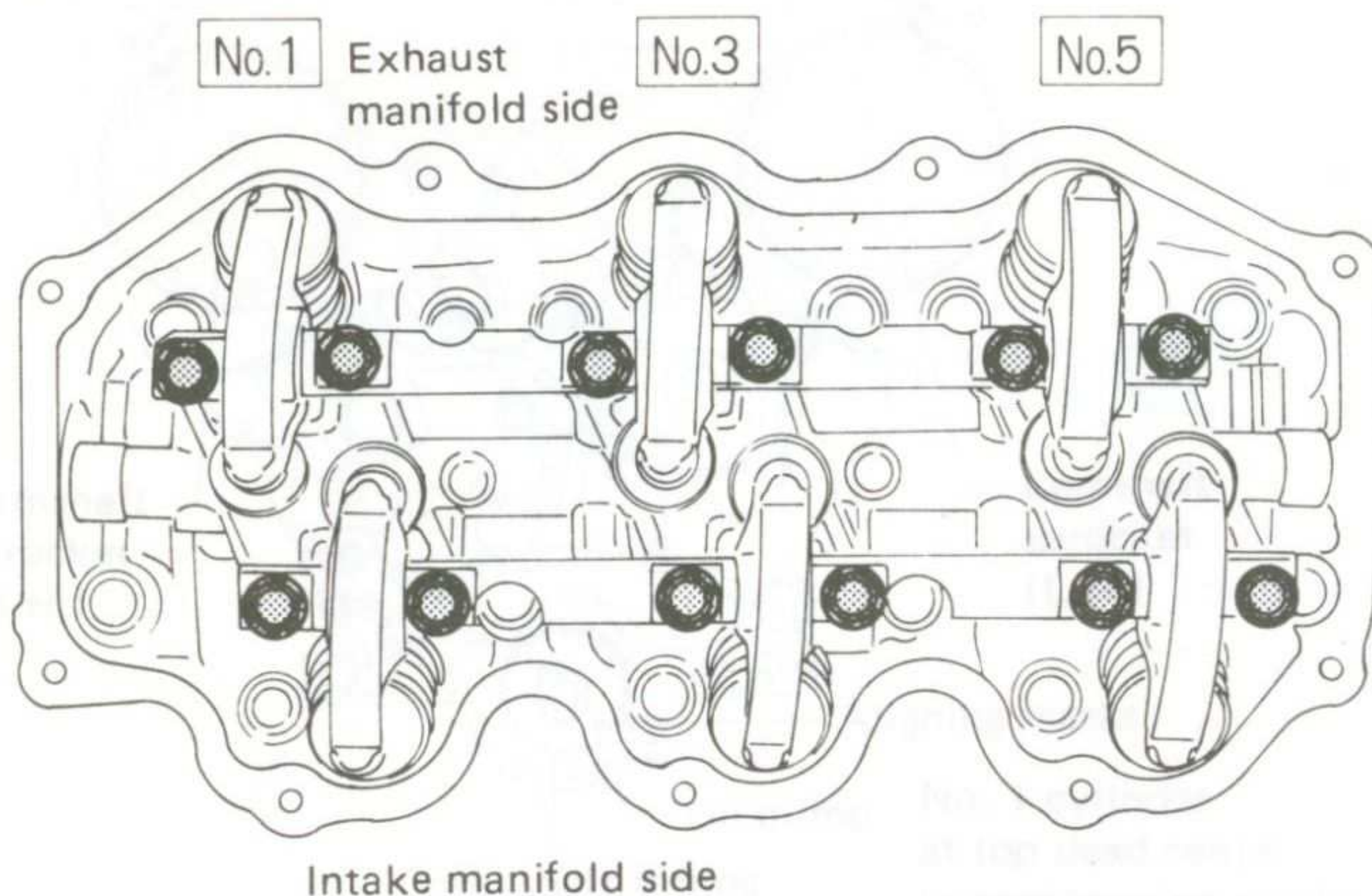
TIMING BELT

Installation (Cont'd)

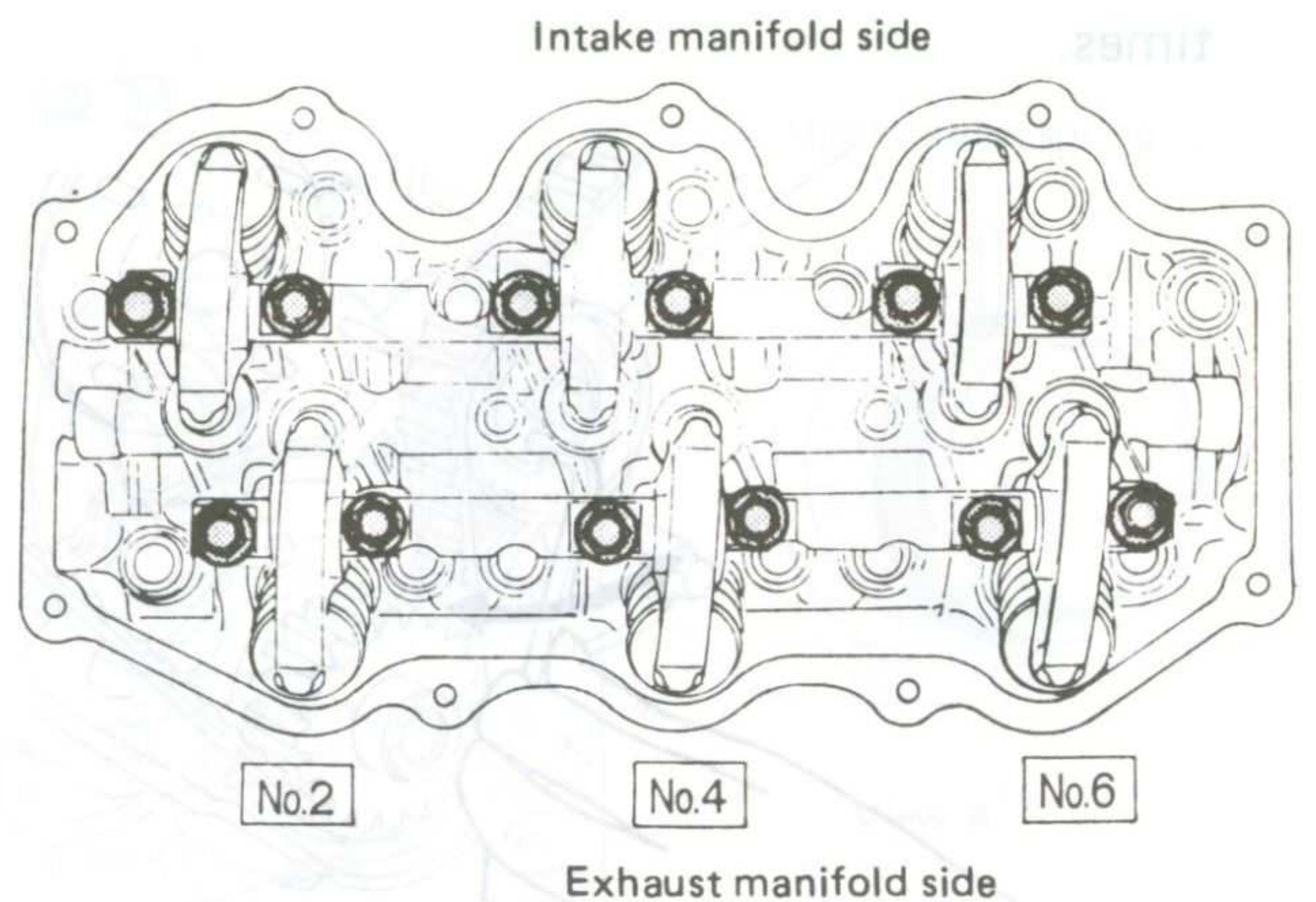
12. Tighten rocker shaft securing bolts in two or three stages.

 **18 - 22 N·m**
(1.8 - 2.2 kg-m, 13 - 16 ft-lb)

R.H. rocker shafts



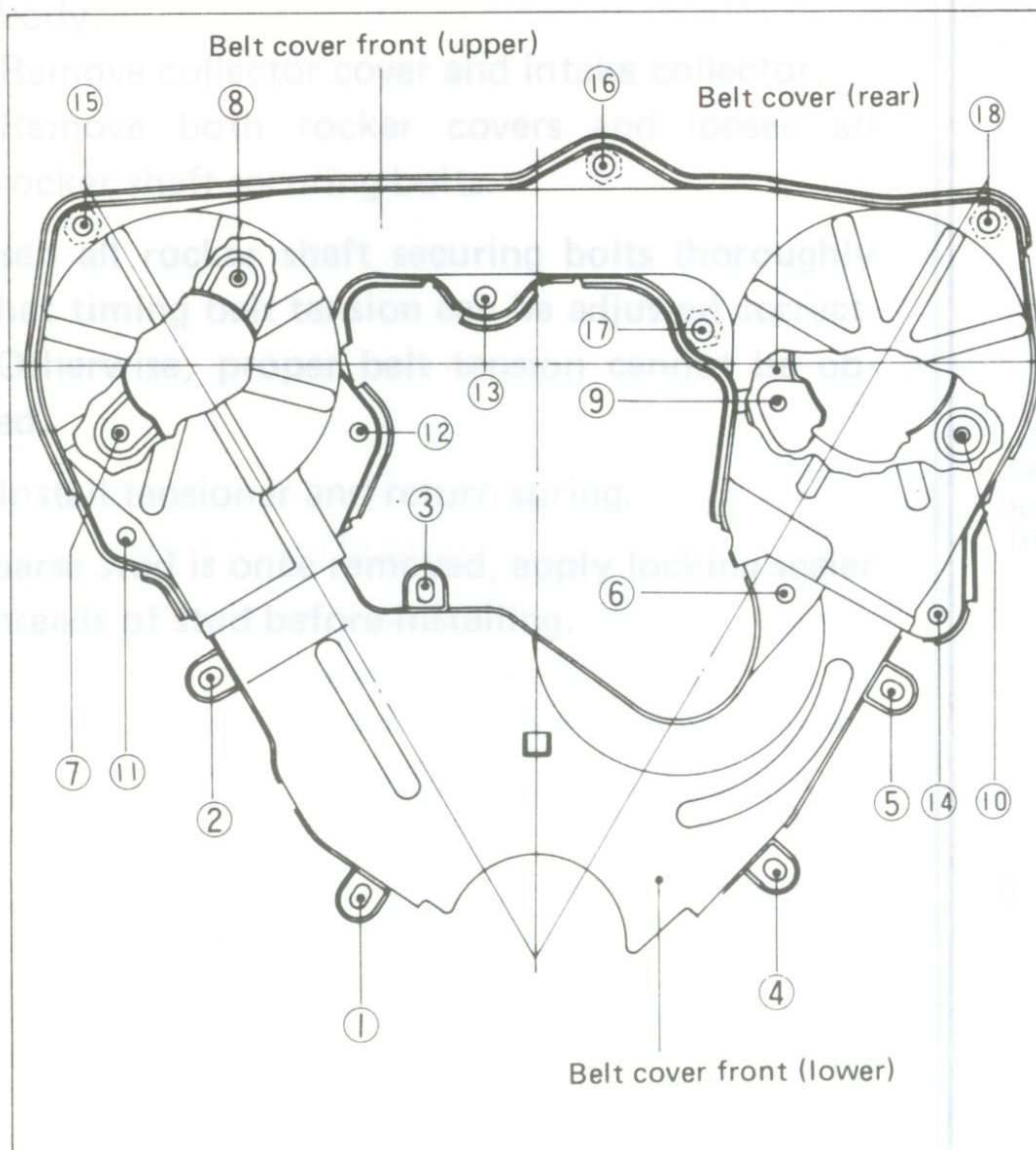
L.H. rocker shafts

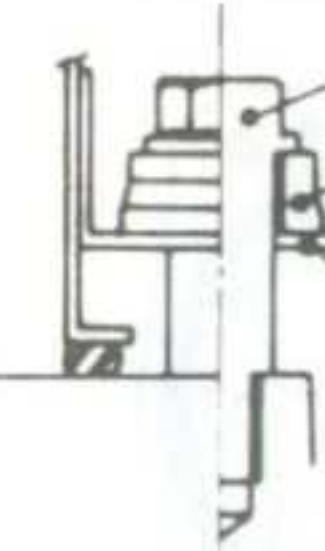
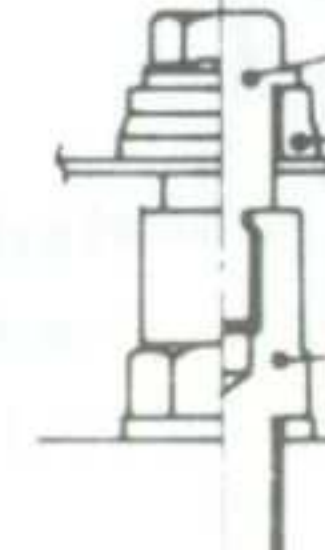
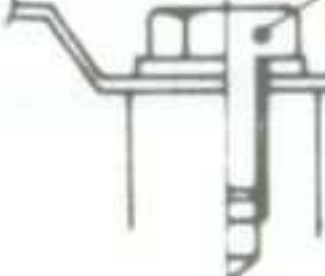
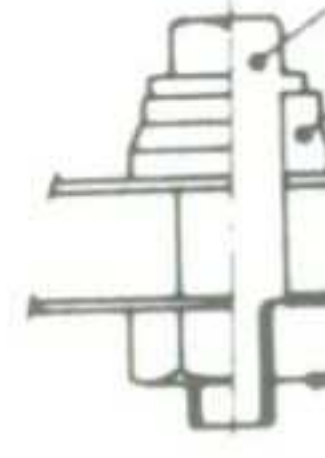


SEM245A

Before tightening, be sure to set camshaft lobe at the position where lobe is not lifted.

13. Install lower and upper belt covers.



Tightened parts	Section	Parts tightened with bolts
 Bolt A (6 pcs.) Rubber washer Belt cover front (lower)	①, ②, ③, ④ ⑤, ⑭	①, ②, ③, ④ : Cylinder block ⑤, ⑭ : Compressor bracket
 Bolt B (1 pc.) Rubber washer Belt cover front (lower) Water pump mounting bolt	⑥	Water pump mounting bolt
 Bolt C (4 pcs.) Belt cover (rear)	⑦, ⑧, ⑨, ⑩	Cylinder head
 Bolt A (7 pcs.) Rubber washer Belt cover front (upper) Belt cover (rear) Welded nut (4 pcs.)	15, 16, 17, 18 11, 12 13	15, 16, 17, 18 : Welded nuts 11, 12 : Cylinder head 13 : Water outlet

SEM248A

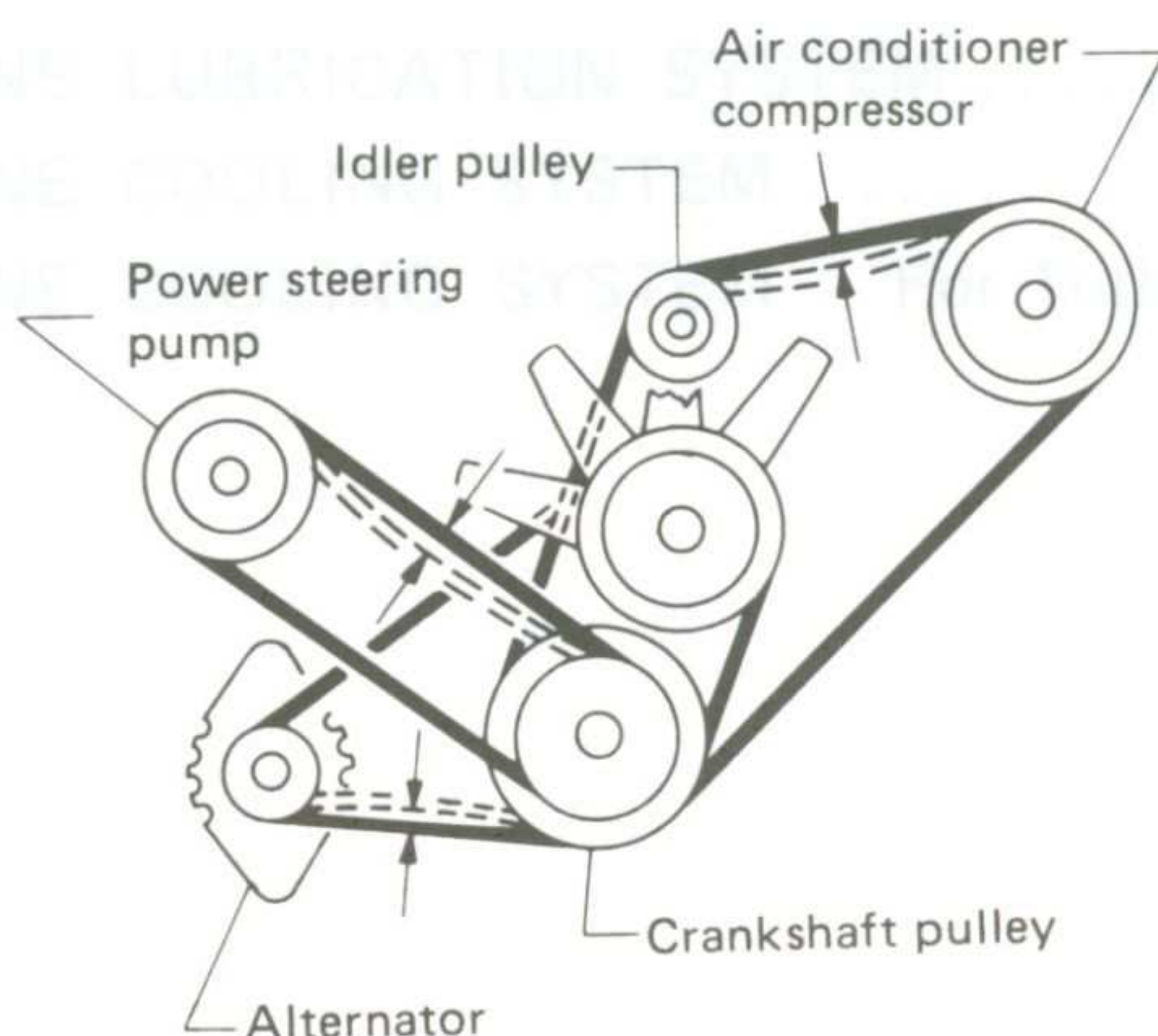
TIMING BELT

Installation (Cont'd)

14. Install rocker covers, intake collector and intake manifold.
15. Connect hoses, connectors and wires.
16. Install compressor to the engine.
17. Install crankshaft pulley and idler bracket of the compressor drive belt.

 : **Crankshaft pulley bolt**
123 - 132 N·m
(12.5 - 13.5 kg-m, 90 - 98 ft-lb)

18. Install lower and upper radiator hoses.
19. Install the drive belts.



SMA707B

Unit: mm (in)

	Adjusted deflection of used belt	Set deflection of new belt
Alternator	7.5 - 8.5 (0.295 - 0.335)	6.5 - 7.5 (0.256 - 0.295)
Air conditioner compressor	9 - 10 (0.35 - 0.39)	8 - 9 (0.31 - 0.35)
Power steering oil pump	14 - 16 (0.55 - 0.63)	12 - 14 (0.47 - 0.55)
Applied pushing force	98 N (10 kg, 22 lb)	

20. Install fan and radiator shroud.
21. Fill radiator with engine coolant up to filler opening.

Slowly pour coolant through coolant filler neck to allow air in system to escape.

22. Fill reservoir tank up to "MAX" level. Then close radiator cap.
23. Run the engine at approximately 2,000 rpm until it warms up.
24. Check area around radiator drain plug and radiator hoses for any sign of water leakage.
25. Stop the engine and after it cools down, refill the radiator and engine with coolant up to the filler opening. Fill the reservoir tank with coolant up to "MAX" level.

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

Tightening Torque

TIGHTENING TORQUE

Engine outer parts

	N·m	kg-m	ft-lb
Injector holder	2.5 - 3.2	0.25 - 0.33	1.8 - 2.4
Cylinder head temperature sensor	12 - 16	1.2 - 1.6	9 - 12
Exhaust gas sensor	18 - 24	1.8 - 2.4	13 - 17

Engine parts

	N·m	kg-m	ft-lb
Water drain plug	34 - 44	3.5 - 4.5	25 - 33

Turbocharger related parts

	N·m	kg-m	ft-lb
Water inlet tube } Water outlet tube }	31 - 41	3.2 - 4.2	23 - 30

14. Install rocker covers, intake collector and intake manifold.
15. Connect hoses, connectors and wires.
16. Install compressor to the engine.
17. Install crankshaft pulley and idler pulley of the compressor drive belt.
18. Install lower and upper radiator hoses.
19. Install the drive belts.

