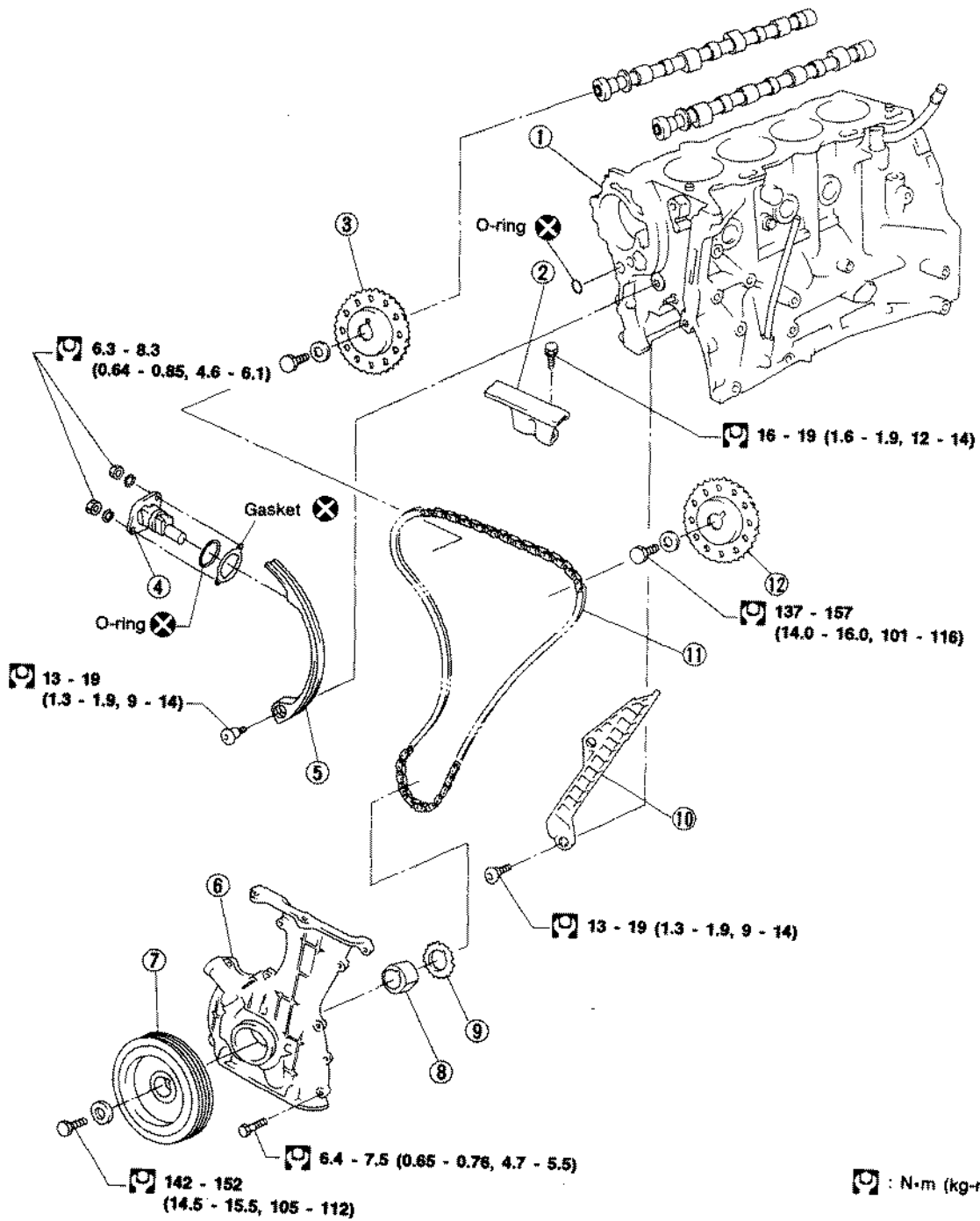


TIMING CHAIN

SR



SEM699E

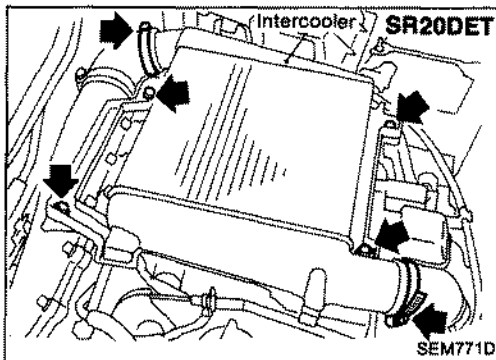
- | | | |
|--------------------------|-------------------|--------------------------|
| ① Cylinder block | ⑤ Chain guide | ⑨ Crankshaft sprocket |
| ② Chain guide | ⑥ Front cover | ⑩ Chain guide |
| ③ R.H. camshaft sprocket | ⑦ Crank pulley | ⑪ Timing chain |
| ④ Chain tensioner | ⑧ Oil pump spacer | ⑫ L.H. camshaft sprocket |

CAUTION:

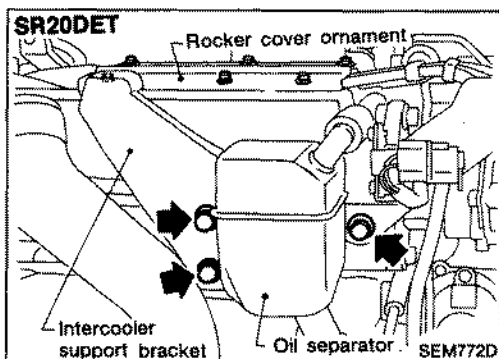
- After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.
- When installing sliding parts such as rocker arms, camshafts, chain tensioner and oil seal, be sure to apply new engine oil on their sliding surfaces.
- When tightening cylinder head bolts, camshaft sprocket bolts, crankshaft pulley bolt and camshaft bracket bolts, apply new engine oil to thread portions and seat surfaces of bolts.

Removal

1. Release fuel pressure.
Refer to "Releasing Fuel Pressure" in section EF & EC.
2. Remove engine under covers.
3. Remove front R.H. wheel and engine side cover.
4. Drain coolant by removing cylinder block drain plug and radiator drain cock.
5. Remove radiator.
6. Remove air duct to intake manifold.



7. Remove intercooler cover and intercooler. (SR20DET only)

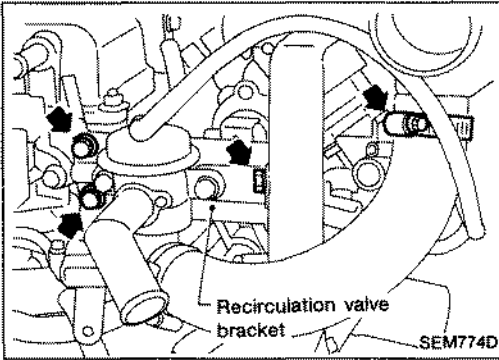


8.
 - SR20DE: Remove oil separator.
 - SR20DET: Remove oil separator, intercooler support bracket and rocker cover ornament.

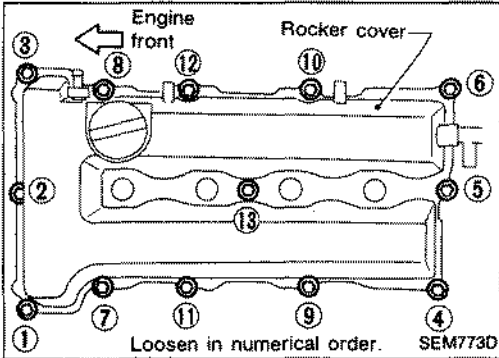
9. Remove P.C.V. hoses from rocker cover.
10. Remove drive belts and water pump pulley.
11. Remove alternator.
12. Remove power steering oil pump.
13. Remove vacuum hoses, fuel hoses, wires, harness, connectors and so on.
14. Remove all spark plugs.

Removal (Cont'd)

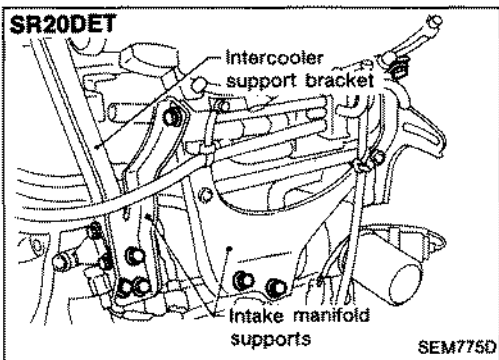
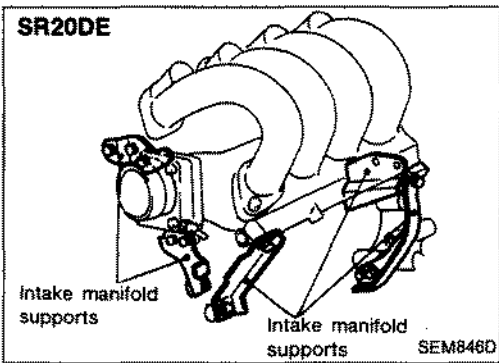
15. Remove recirculation valve bracket. (SR20DET only)



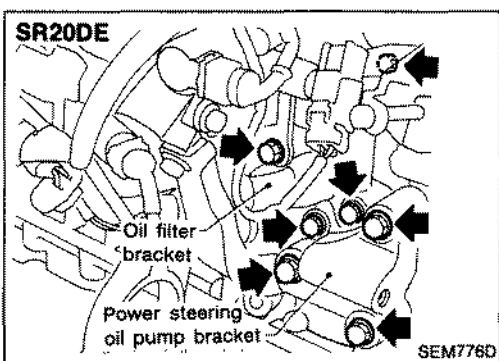
16. Remove rocker cover.



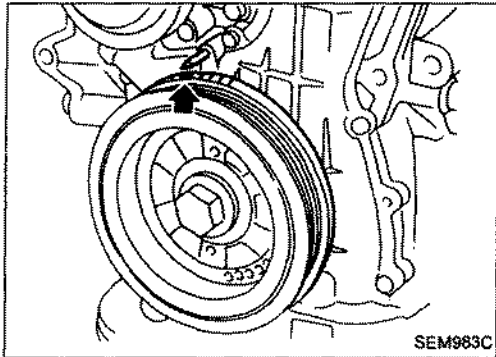
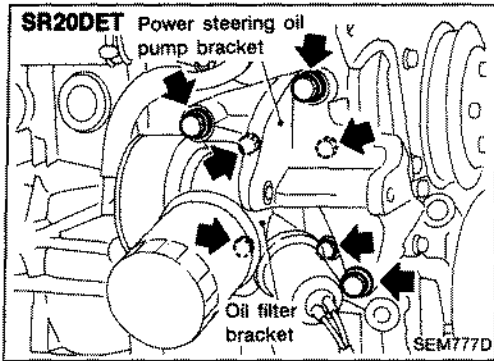
17. ● SR20DE: Remove intake manifold supports.
 ● SR20DET: Remove intake manifold supports and inter-cooler support bracket.



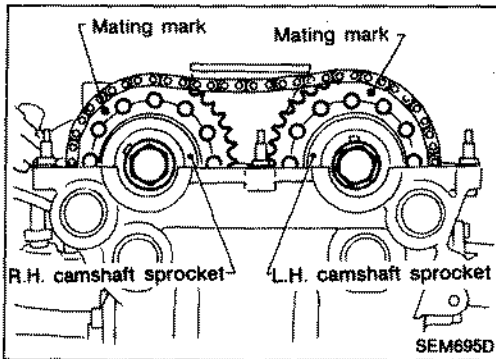
18. Remove oil filter bracket and power steering oil pump bracket.



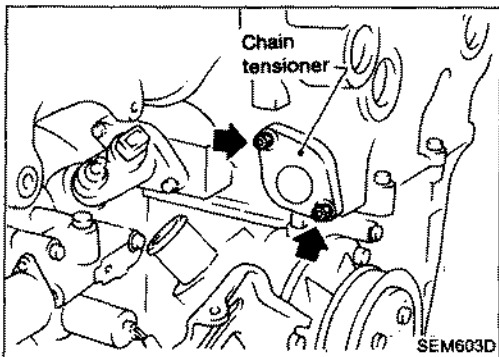
Removal (Cont'd)



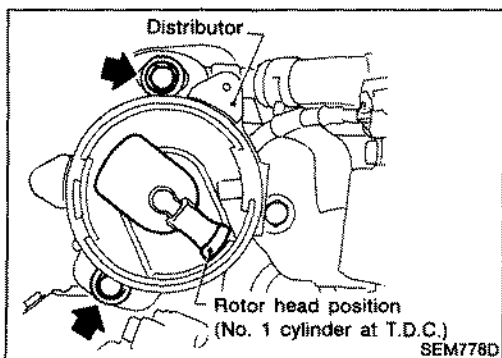
19. Set No. 1 piston at T.D.C. on the compression stroke by rotating crankshaft.



- Rotate crankshaft until mating mark on camshaft sprocket is set at position indicated in figure at left.



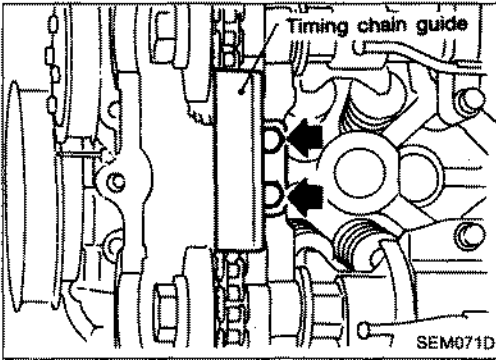
20. Remove chain tensioner.



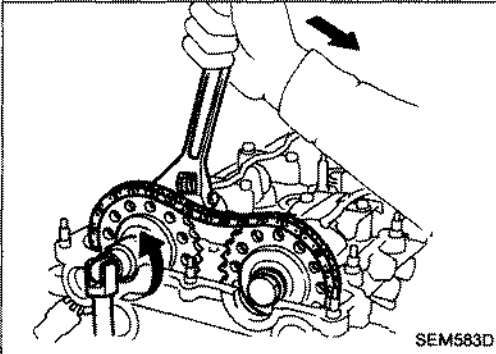
21. Remove distributor.
Do not turn rotor with distributor removed.

Removal (Cont'd)

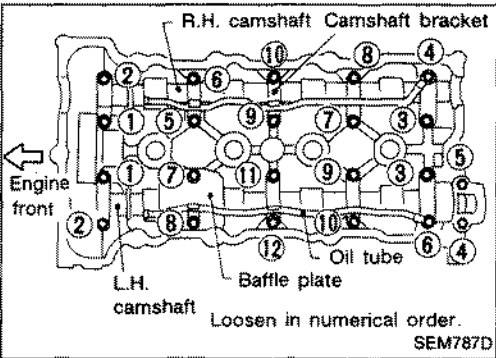
22. Remove timing chain guide.



23. Remove camshaft sprockets.

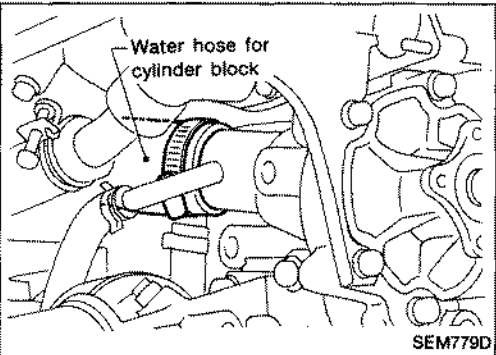


24. Remove camshafts, camshaft brackets, oil tubes and baffle plate.

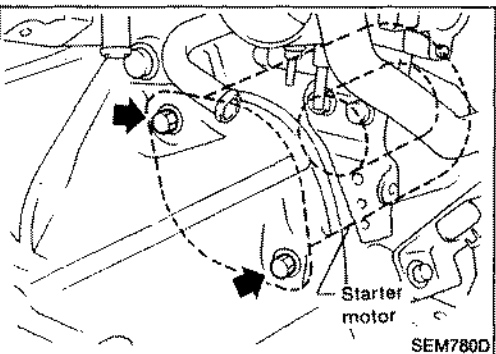


25. Remove the following water hoses.

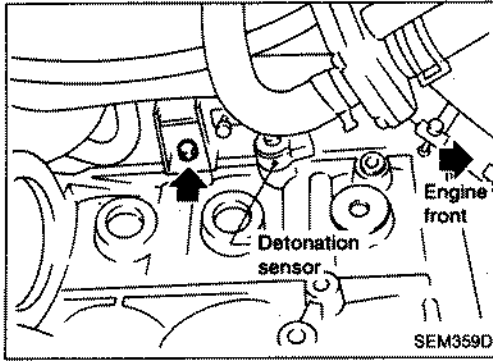
- Water hose for cylinder block.
- Water hoses from heater.



26. Remove starter motor.

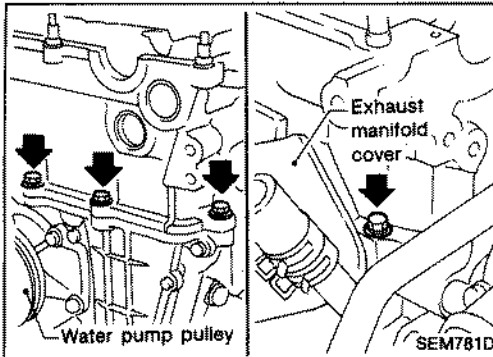


Removal (Cont'd)

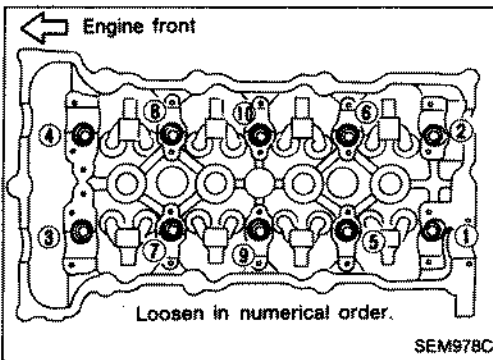


27. Remove water pipe bolt.

28. Remove exhaust manifold with turbocharger. Refer to "Removal" in "TURBOCHARGER". (SR20DET only)



29. Remove cylinder head outside bolts.



30. Remove cylinder head bolts.

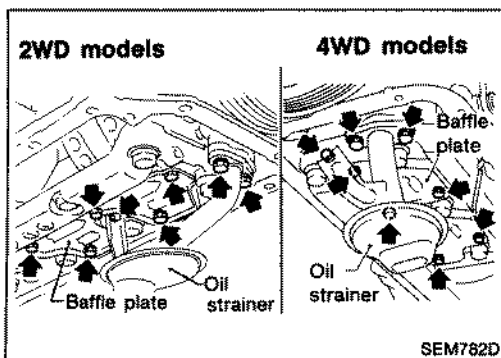
● **Bolts should be loosened in two or three steps.**

31. ● SR20DE: Remove cylinder head with intake and exhaust manifolds.

● SR20DET: Remove cylinder head with intake manifold.

32. Remove oil pans.

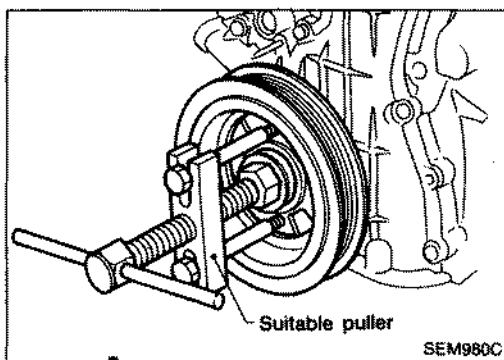
Refer to "Removal" in "OIL PAN".



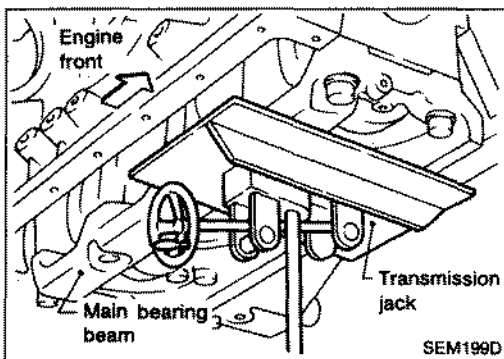
33. Remove oil strainer and baffle plate.

Removal (Cont'd)

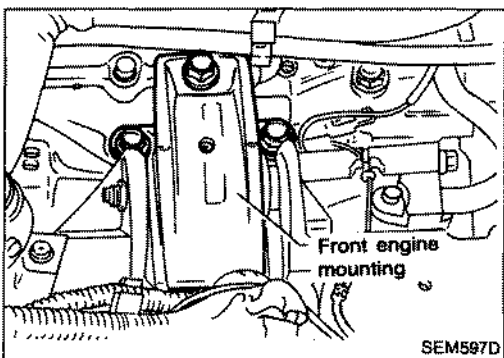
34. Remove crankshaft pulley.



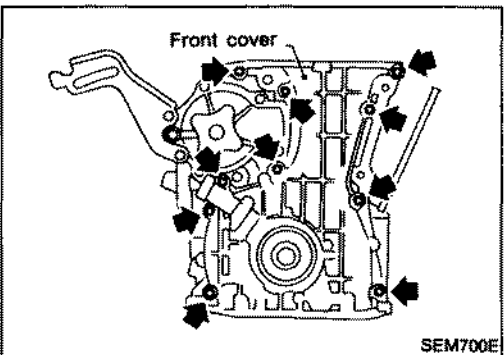
35. Set a suitable transmission jack under main bearing beam.



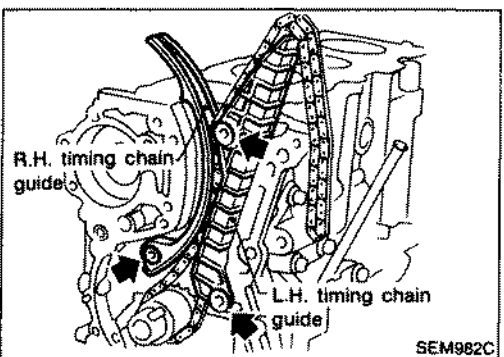
36. Remove front engine mounting.

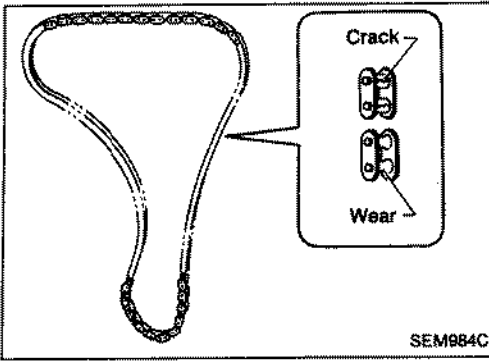


37. Remove front cover.



38. Remove timing chain guides and timing chain.

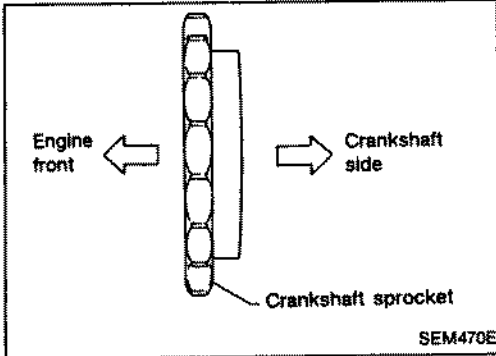




SEM984C

Inspection

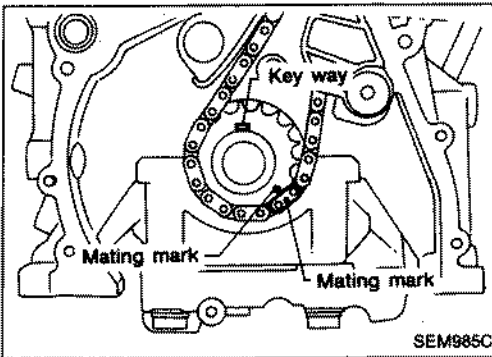
Check for cracks and excessive wear at roller links. Replace chain if necessary.



SEM470E

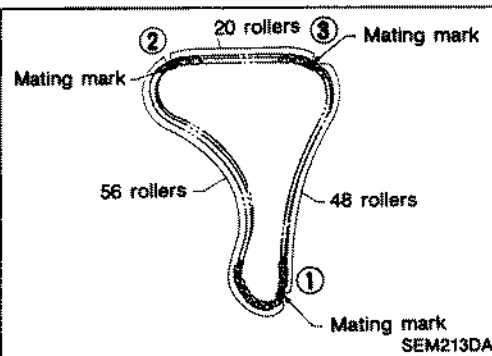
Installation

1. Install crankshaft sprocket on crankshaft.



SEM985C

2. Position crankshaft so that No. 1 piston is set at T.D.C. (Keyway at 12 o'clock-mating mark at 4 o'clock approx.) fit timing chain to crankshaft sprocket so that mating mark is in line with mating mark on crankshaft sprocket.

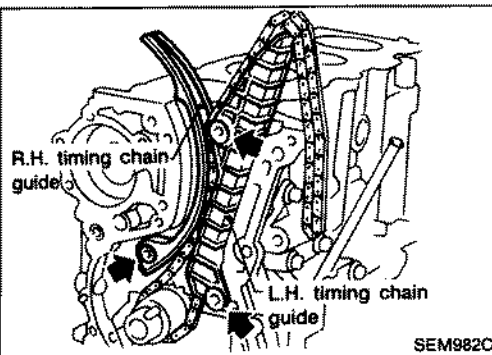


SEM213DA

• Mating mark color on timing chain.

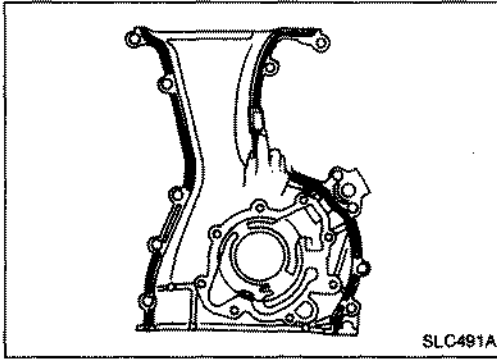
- ① : Gold
- ②, ③ : Silver

3. Install timing chain and timing chain guides.

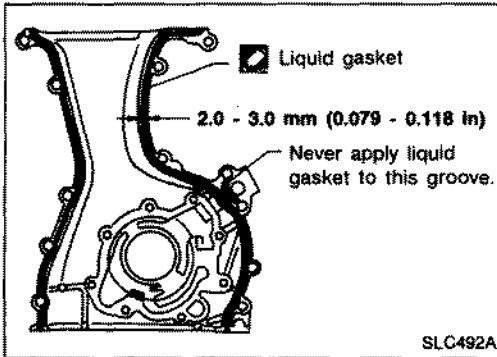


SEM982C

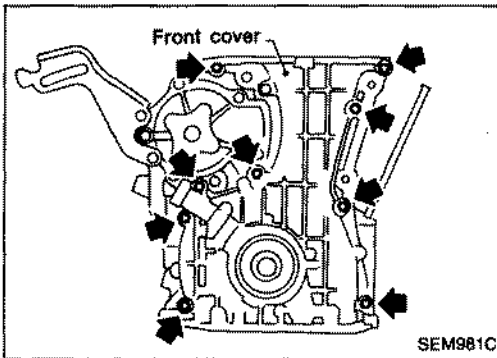
Installation (Cont'd)



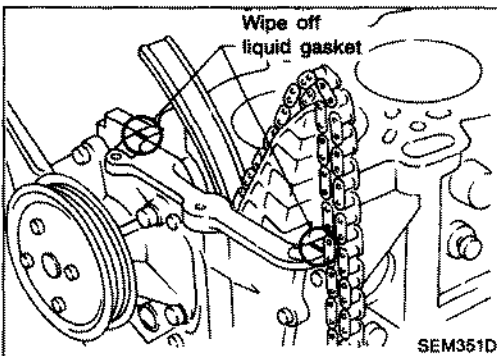
4. Before installing front cover, remove all traces of liquid gasket from mating surface using a scraper.
 - Also remove traces of liquid gasket from mating surface of cylinder block.



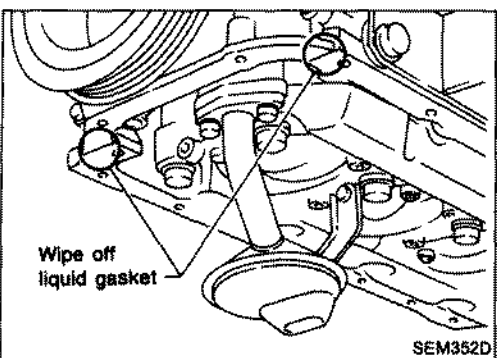
5. Apply a continuous bead of liquid gasket to mating surface of front cover.
 - Use Genuine Liquid Gasket or equivalent.



6. Install oil pump drive spacer and front cover.

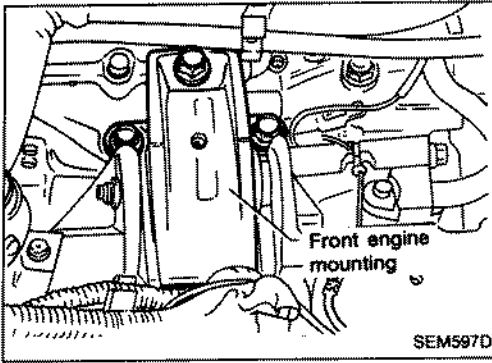


- Wipe off excessive liquid gasket.

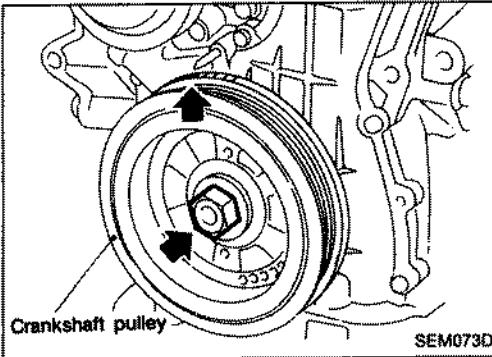


TIMING CHAIN

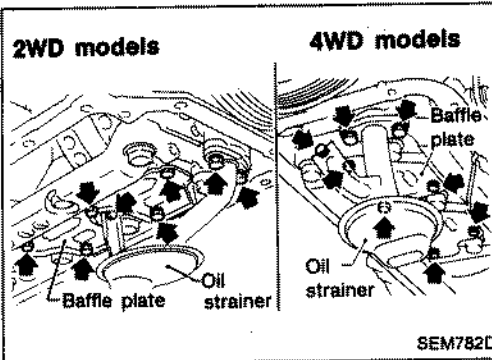
Installation (Cont'd)



7. Install front engine mounting.

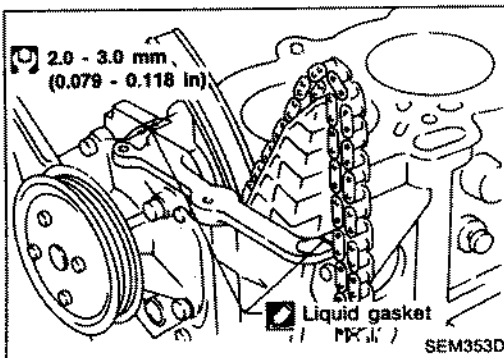


8. Install crankshaft pulley.
9. Set No. 1 piston at T.D.C. on its compression stroke.



10. Install oil strainer and baffle plate.

11. Install oil pan.
Refer to "Installation" in "OIL PAN".



12. Before installing cylinder head gasket, apply a continuous bead of liquid gasket to mating surface of cylinder block.

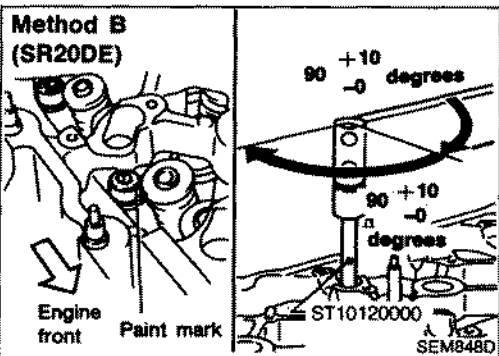
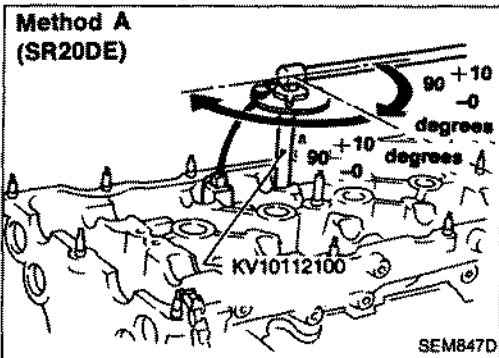
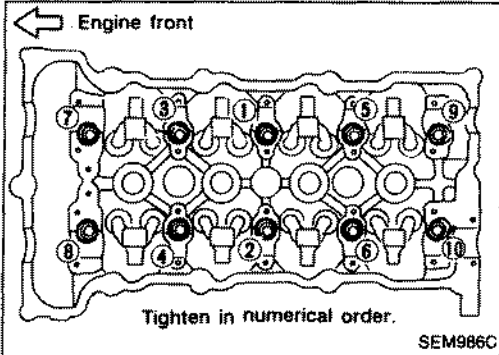
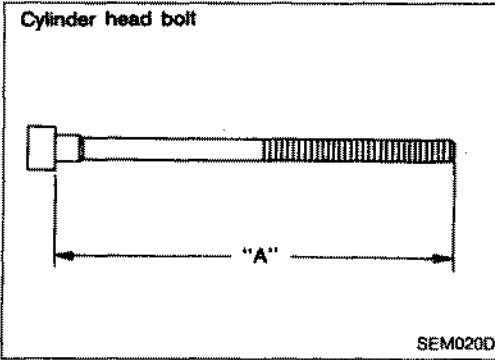
Installation (Cont'd)

- 13. ● SR20DE: Install cylinder head with intake and exhaust manifolds.
- SR20DET: Install cylinder head with intake manifold.

CAUTION:

The cylinder head bolts of SR20DE can be reused providing dimension "A" is not exceeded.

Dimension "A":
158.2 mm (6.23 in)



● Tightening procedure:

(SR20DE)

- Ⓐ Tighten all bolts to 39 N·m (4.0 kg·m, 29 ft·lb).
- Ⓑ Tighten all bolts to 78 N·m (8.0 kg·m, 58 ft·lb).
- Ⓒ Loosen all bolts completely.
- Ⓓ Tighten all bolts to 34 to 44 N·m (3.5 to 4.5 kg·m, 25 to 33 ft·lb).

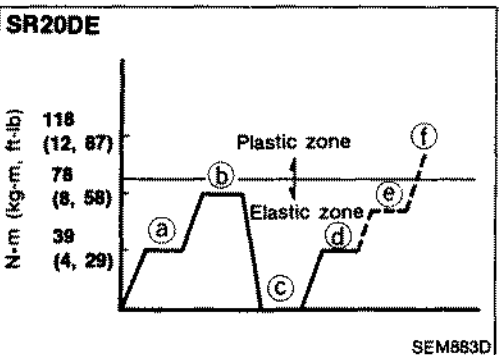
- Ⓔ Method A: Turn all bolts 90 to 100 degrees clockwise with Tool or suitable angle wrench.

Method B: If angle wrench is not available, mark the side of each cylinder head bolt with a paint mark facing the front of the engine, then turn all bolts 90 to 100 degrees clockwise.

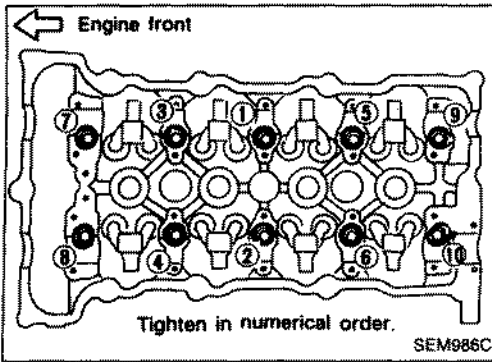
- Ⓕ Turn all bolts 90 to 100 degrees clockwise.
- Ⓖ Ensure that paint mark on each bolt faces the rear of the engine. (Method B only)

Do not turn any bolt 180 to 200 degrees clockwise all at once.

	Tightening torque N·m (kg·m, ft·lb)
Ⓐ	39 (4.0, 29)
Ⓑ	78 (8.0, 58)
Ⓒ	0 (0, 0)
Ⓓ	39 ± 5 (4.0 ± 0.5, 28.9 ± 3.6)
Ⓔ	90 +10 -0 degrees
Ⓕ	90 +10 -0 degrees

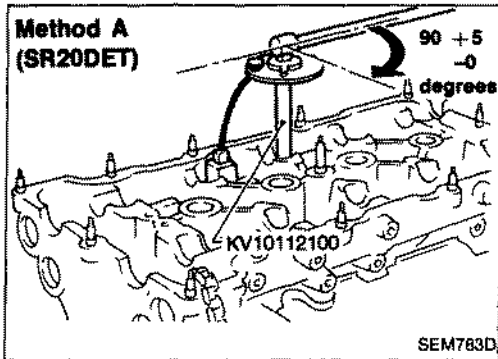


Installation (Cont'd)



(SR20DET)

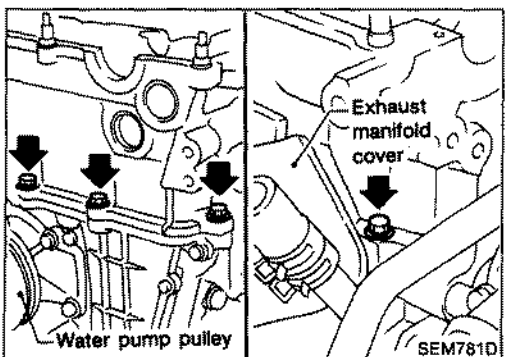
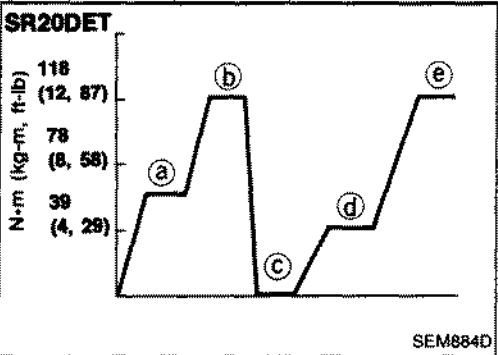
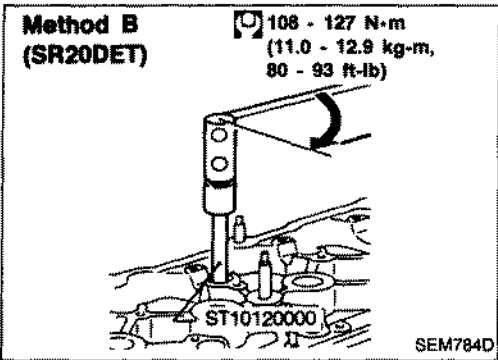
- (a) Tighten all bolts to 59 N·m (6.0 kg·m, 43 ft·lb).
- (b) Tighten all bolts to 108 to 118 N·m (11.0 to 12.0 kg·m, 80 to 87 ft·lb).
- (c) Loosen all bolts completely.
- (d) Tighten all bolts to 36 to 42 N·m (3.7 to 4.3 kg·m, 27 to 31 ft·lb).



- (e) Method A: Turn all bolts 90 to 95 degrees clockwise with Tool or suitable angle wrench.

Method B: If angle wrench is not available, tighten all bolts to 108 to 127 N·m (11.0 to 12.9 kg·m, 80 to 93 ft·lb).

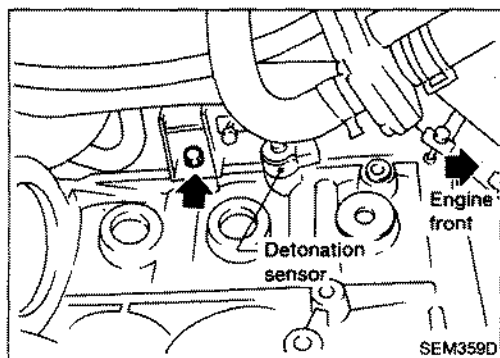
	Tightening torque N·m (kg·m, ft·lb)
(a)	59 (6.0, 43)
(b)	113 ± 5 (11.5 ± 0.5, 83.2 ± 3.6)
(c)	0 (0, 0)
(d)	39 ± 3 (4.0 ± 0.3, 28.9 ± 2.2)
(e)	90 $\begin{smallmatrix} +5 \\ -0 \end{smallmatrix}$ degrees or 117.2 ± 9.3 (11.95 ± 0.95, 86.4 ± 6.9)



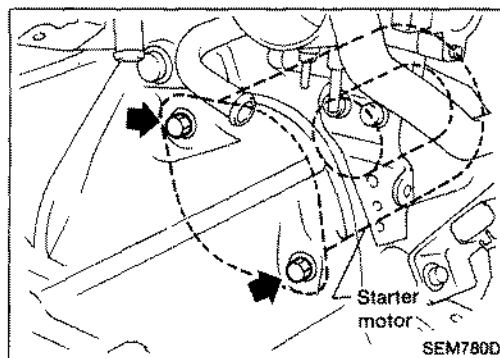
- 14. Install cylinder head outside bolts.
- 15. Install exhaust manifold with turbocharger. Refer to "Installation" in "TURBOCHARGER". (SR20DET only)

Installation (Cont'd)

16. Install water pipe bolt.

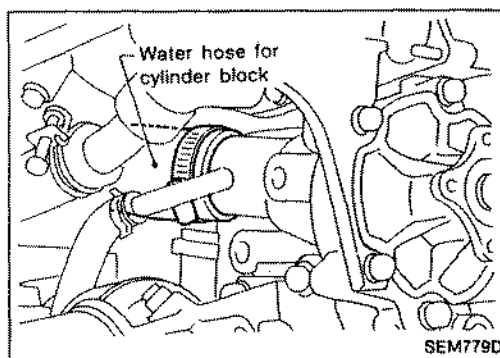


17. Install starter motor.



18. Install the following water hoses.

- Water hose for cylinder block.
- Water hoses for heater.

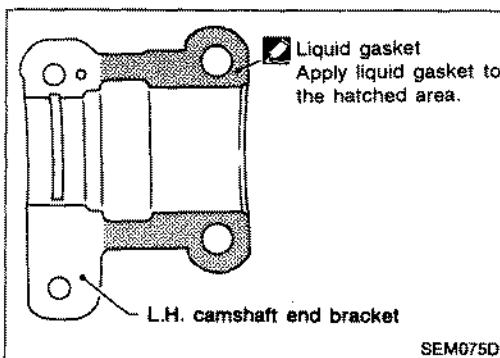


19. Before installing L.H. camshaft end bracket, remove all traces of liquid gasket from mating surface.

- Also remove traces of liquid gasket from mating surface of cylinder head.

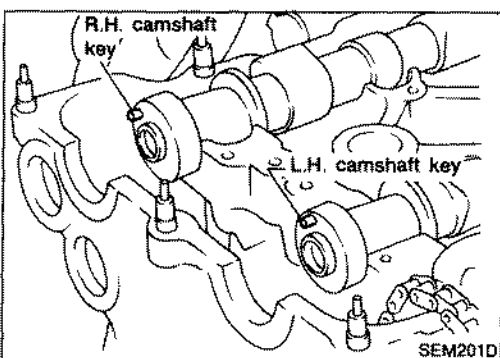
20. Apply a continuous bead of liquid gasket to mating surface of L.H. camshaft end bracket.

- Use Genuine Liquid Gasket or equivalent.

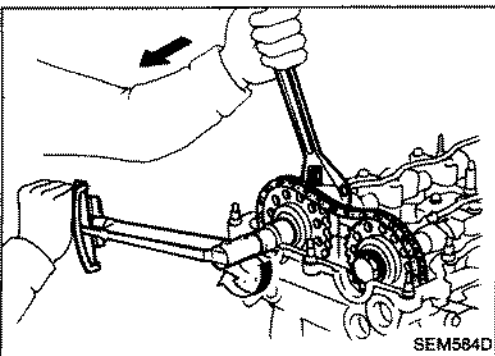
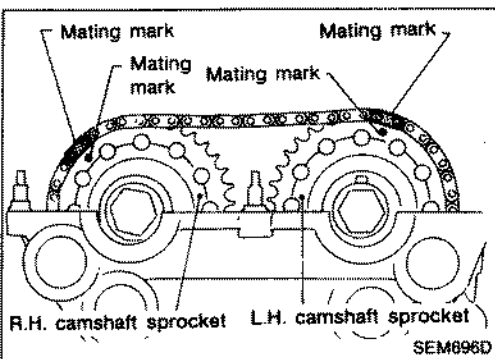
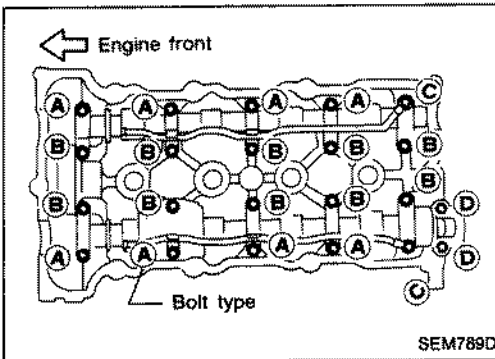
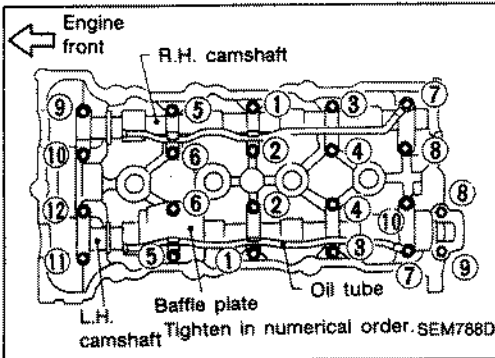
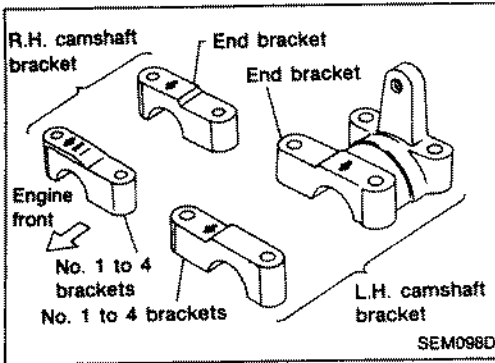


21. Install camshafts, camshaft brackets, oil tubes and baffle plate.

- Position camshaft.
 - L.H. camshaft key at about 12 o'clock
 - R.H. camshaft key at about 10 o'clock



Installation (Cont'd)



- **Tightening procedure**

STEP 1:

R.H. camshaft

Tighten bolts ⑨ - ⑩ in that order then tighten bolts ① - ⑧ in that order.

☞: 2 N·m (0.2 kg-m, 1.4 ft-lb)

L.H. camshaft

Tighten bolts ⑪ - ⑫ in that order then tighten bolts ① - ⑩ in that order.

☞: 2 N·m (0.2 kg-m, 1.4 ft-lb)

STEP 2:

Tighten bolts in the specified order.

☞: 6 N·m (0.6 kg-m, 4.3 ft-lb)

STEP 3:

Tighten bolts in the specified order.

☞: 9.0 - 11.8 N·m
(0.92 - 1.2 kg-m, 6.7 - 8.7 ft-lb)

... Bolt type A B C

☞: 18 - 25 N·m
(1.8 - 2.6 kg-m, 13 - 19 ft-lb)

... Bolt type D

22. Install camshaft sprockets.

Line up mating marks on timing chain with mating marks on camshaft sprockets.

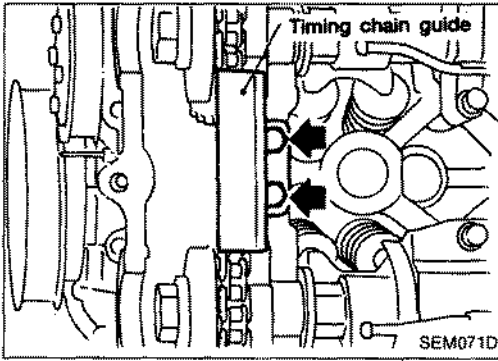
- **Lock camshafts as shown in figure and tighten to specified torque.**

☞: 137 - 157 N·m

(14.0 - 16.0 kg-m, 101 - 116 ft-lb)

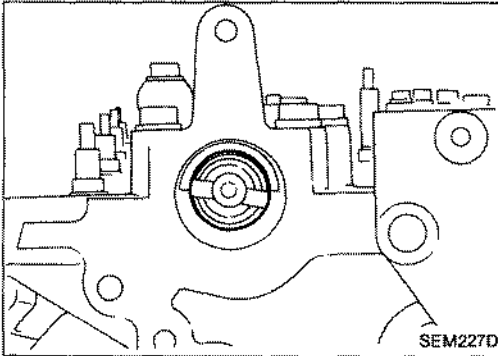
Installation (Cont'd)

23. Install timing chain guide.

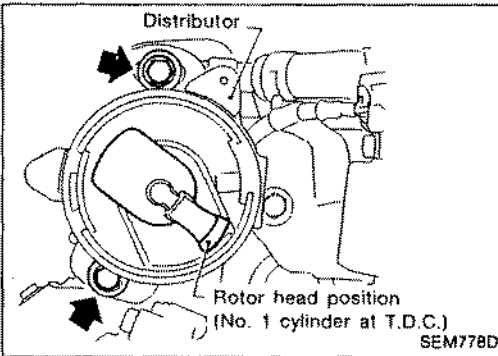


24. Install distributor.

- Make sure that position of camshaft is as shown in figure.

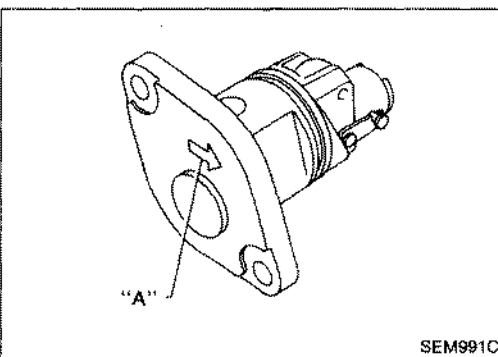
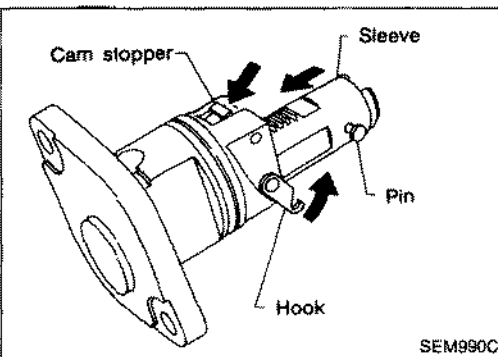


- After installing, confirm that distributor rotor head is set as shown in figure.



25. Install chain tensioner.

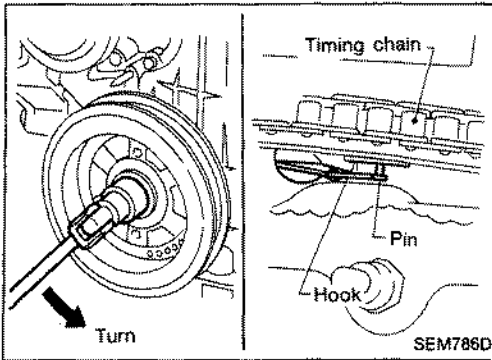
- Press cam stopper down and "press-in" sleeve until hook can be engaged on pin. When tensioner is bolted in position the hook will release automatically. Ensure arrow "A" faces the front of the engine.



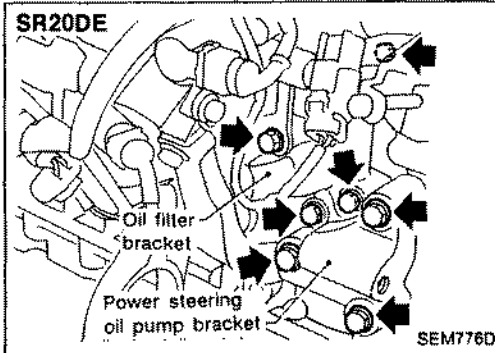
TIMING CHAIN

SR

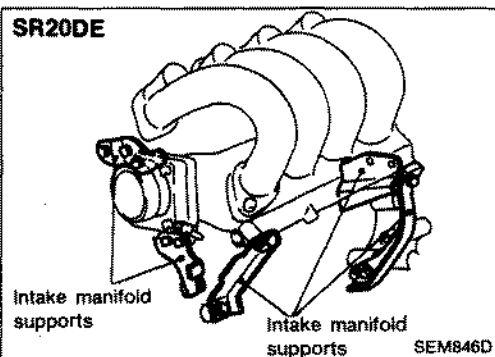
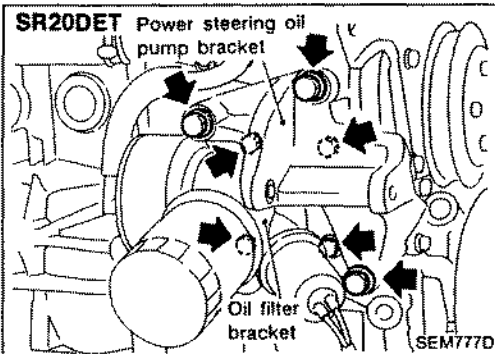
Installation (Cont'd)



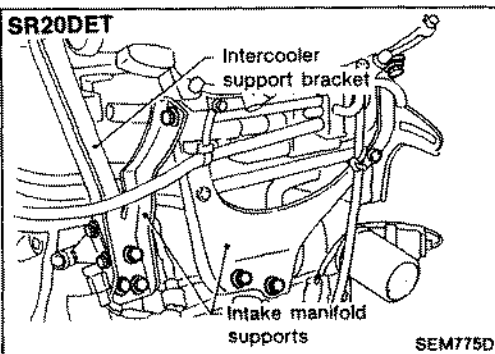
- If hook does not release automatically, turn crankshaft counterclockwise until it does release.



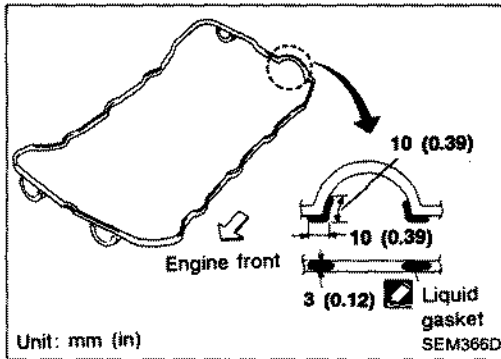
26. Install oil filter bracket and power steering oil pump bracket.



27. ● SR20DE: Install intake manifold supports.
● SR20DET: Install intake manifold supports and inter-cooler support bracket.

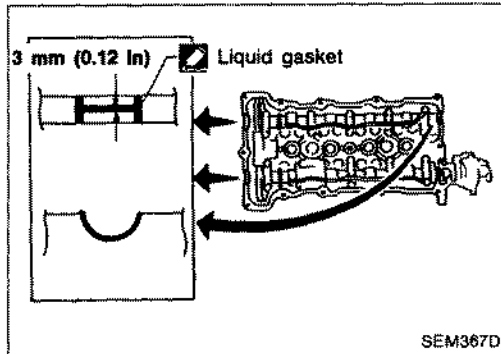


Installation (Cont'd)



28. Before installing rocker cover, remove all traces of liquid gasket from mating surface of rocker cover gasket to cylinder head.
29. Apply a continuous bead of liquid gasket to mating surface of rocker cover gasket and cylinder head.

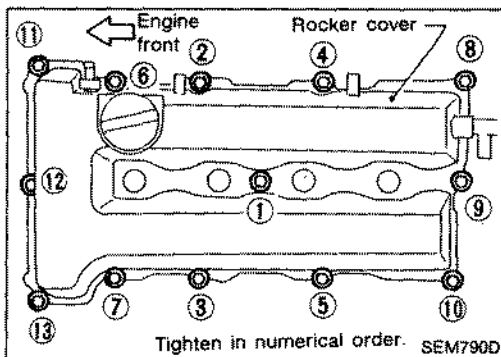
● Use Genuine Liquid Gasket or equivalent.



30. Install rocker cover.

Rocker cover tightening procedure:

- (1) Tighten nuts ① - ⑩ - ⑪ - ⑬ - ⑧ in that order to 4 N-m (0.4 kg-m, 2.9 ft-lb).
- (2) Tighten nuts ① to ⑬ as indicated in figure to 8 to 10 N-m (0.8 to 1.0 kg-m, 5.8 to 7.2 ft-lb).



31. Install recirculation valve bracket. (SR20DET only)
32. Refit spark plugs and leads.
33. Install vacuum hoses, fuel hoses, wires, harness, connectors and so on.
34. Install power steering oil pump.
35. Install alternator.
36. Install water pump pulley and drive belts.
37. Install P.C.V. hoses to rocker cover.
38. ● Install oil separator. (SR20DE)
● Install oil separator, intercooler support bracket and rocker cover ornament. (SR20DET)
39. Install intercooler cover and intercooler. (SR20DET only)
40. Refit air duct to intake manifold.
41. Install radiator.
42. Refit hoses and refill with coolant.
Refer to MA section.
43. Install engine side cover and front R.H. wheel.
44. Install engine under covers.