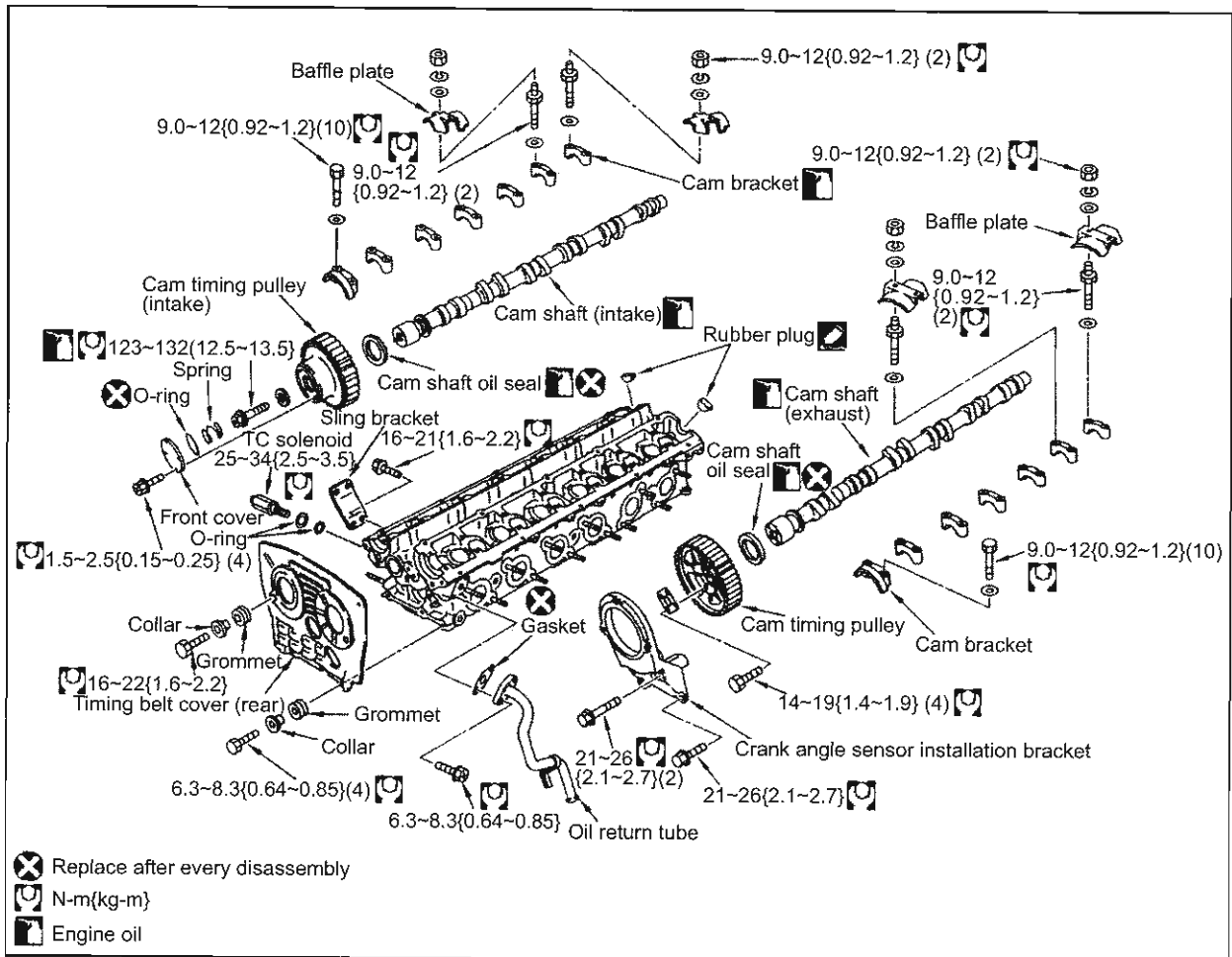


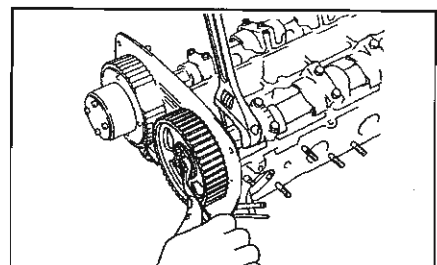
RB25DE / RB25DET ENGINE

8. CAM SHAFT



Removal

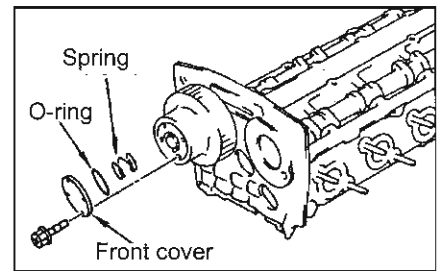
1. Remove the battery negative terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove the under cover.
3. Remove air duct and resonator ASSY (RB25DE).
4. Remove air inlet pipe.
5. Drain coolant from the radiator drain plug.
6. Drain coolant from the cylinder block drain plug.
7. Remove cooling fan.
8. Remove the radiator.
9. Remove the auxiliary belt.
10. Remove the timing belt.
11. Remove the rocker cover.
12. Remove the cam timing pulley (intake side).
 - (1) Remove the crank angle sensor installation bracket.
 - (2) Fix cam shaft hexagonal part using the spanner to remove cam timing pulley installation bolts (4).
 - (3) Remove the cam timing pulley from the cam shaft.



RB25DE / RB25DET ENGINE

13. Remove cam timing pulley (intake side).

(1) Remove the front cover, o-ring and the spring.

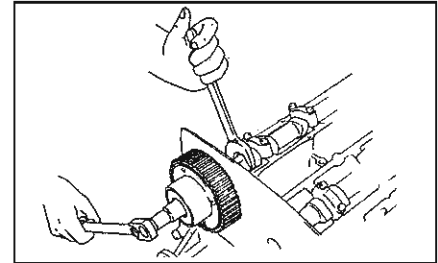


(2) Remove the cam timing pulley installation bolt by holding the cam shaft hexagonal part using the spanner.

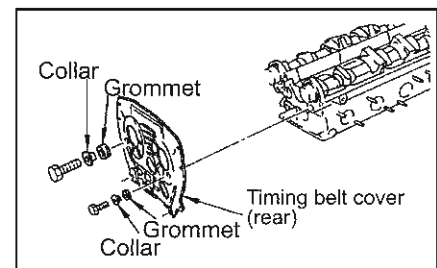
(3) Remove cam timing pulley from the cam shaft.

Caution:

Do not use pulley holder etc. to fix when removing the intake side cam timing pulley as it could damage innards.



14. Remove the timing belt cover (rear).



15. Remove the baffle plate from No.6 and No.7 cam shaft bracket.

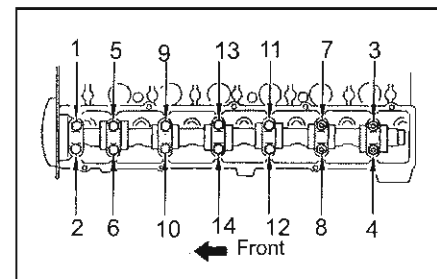
16. Remove the cam bracket.

- Loosen the cam bracket installation bolts in the order shown in several stages in the figure on right.

Caution:

Before removal make sure to mark the installation position of the cam bracket.

- Inspect the cam shaft end play before loosening the cam bracket installation bolts.

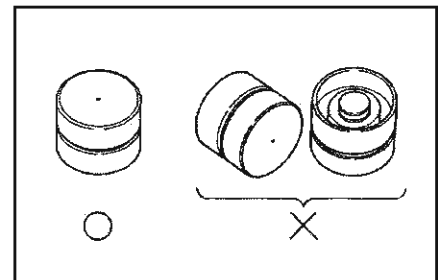


17. Remove the cam shaft.

18. Pull out the cam shaft oil seal from the cam shaft.

19. Remove the hydraulic valve lifter.

- Check the installation position and store it to avoid confusion.
- Store the hydraulic valve lifter in stand up position. If stored for a longer period of time, store it in clean engine oil.
- Do not disassemble the hydraulic valve lifter.



Inspection**Cam shaft visual inspection**

- Check to make sure there is no damage or wear to the cam shaft.
- Replace if any abnormalities are found.

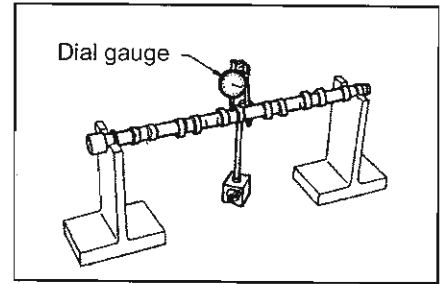
Cam shaft run-out

- Use V-block on the fixed surface and support cam shaft No. 1 and No. 7 journal.
- Set dial gauge vertically to No. 4 journal.
- Rotate the cam shaft in one direction and read the movement width on the dial gauge.

Standard value (mm) 0.02

Limit value (mm) 0.05

- If the run-out is over the limit value replace the cam shaft.

**Cam nose height**

- Use micrometer to measure cam nose height.

Standard value (mm)

Intake 39.705~39.895

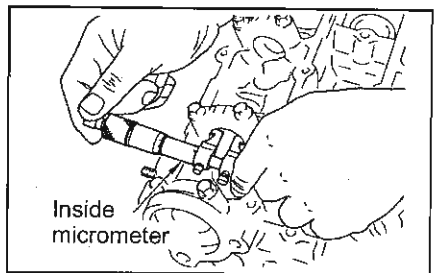
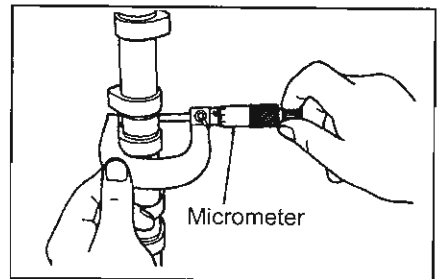
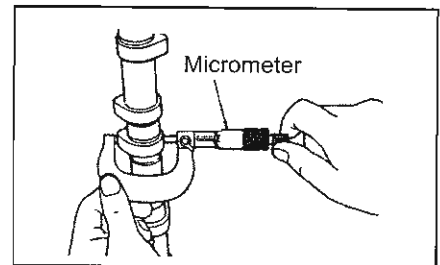
Exhaust 39.705~39.895

Wear out limit value (mm)

Intake 0.05

Exhaust 0.05

- If the value is over the limit replace the cam shaft.

**Cam shaft oil clearance****(Cam journal external diameter)**

- Use micrometer to measure cam journal external diameter.

Standard value (mm)

No.1 ~ No.6 journal $\Phi 27.935 \sim \Phi 27.955$

No. 7 journal $\Phi 27.920 \sim \Phi 27.940$

(Cam bracket internal diameter)

- Tighten cam bracket bolt to specified torque.
- Use inside micrometer to measure.

Standard value (mm) $\Phi 28.000 \sim \Phi 28.021$

(Cam shaft oil clearance) =

(Cam bracket internal diameter) -

(Cam journal external diameter)

Standard value (mm)

No.1 ~ No.6 journal $\Phi 0.045 \sim \Phi 0.086$

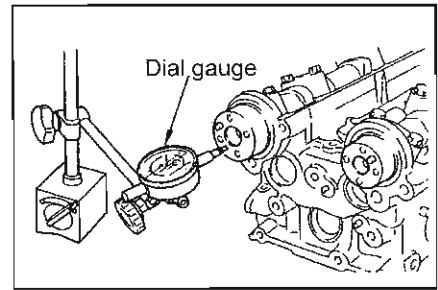
No.7 journal $\Phi 0.061 \sim \Phi 0.101$

- If the value is not within standard value, replace cylinder head ASSY or cam shaft.

RB25DE / RB25DET ENGINE

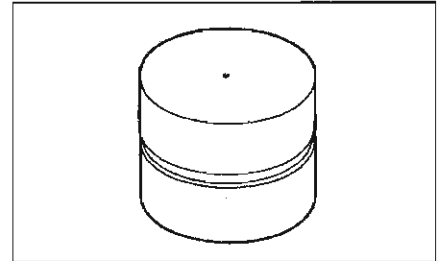
Cam shaft end play

- Set a dial gauge at front end of the cam shaft in thrust direction. Move the cam shaft forwards and backwards and read the dial gauge run-out measurement. Standard value (mm) 0.060~0.110
- If the value is not within standard value, replace the cam shaft. Re-measure and if the value is still not at standard value, also replace the cylinder head.



Hydraulic valve lifter visual inspection

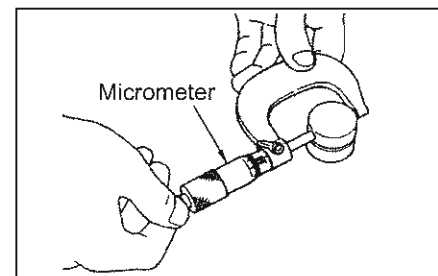
- Look for any wear or damage on the cam shaft working face, lifter side surface and rotational parts. Replace the parts if any abnormalities are found.



Hydraulic valve lifter clearance

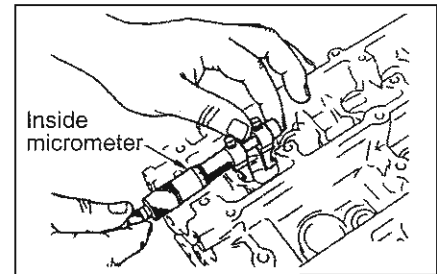
(Hydraulic valve lifter external diameter)

- Use the micrometer to measure hydraulic valve lifter external diameter. Standard value (mm) $\Phi 30.955\sim 30.965$



(Hydraulic valve lifter internal diameter)

- Use inside micrometer to measure hydraulic valve lifter internal diameter. Standard value (mm) $\Phi 31.000\sim 31.020$



(Hydraulic valve lifter clearance) =

(Hydraulic valve lifter internal diameter) -

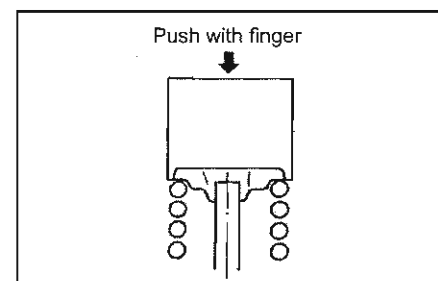
(Hydraulic valve lifter external diameter)

Standard value (mm) $\Phi 0.035\sim 0.065$

- If the value is not within standard value, replace hydraulic valve lifter or cylinder head.

Hydraulic valve lifter air interfusion inspection

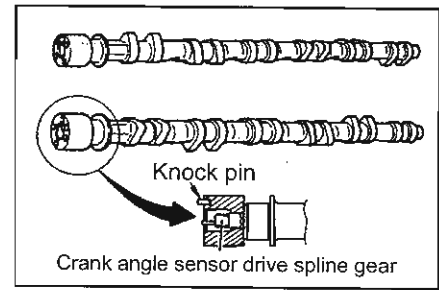
- Apply engine oil to rotational surface and install hydraulic valve lifter to the cylinder head.
- After the installation push down on the head. If the head move more than 1 mm carry out the air release operation using the method below. (Use same method to check the valve lifter when abnormal sound is heard when the engine is started).



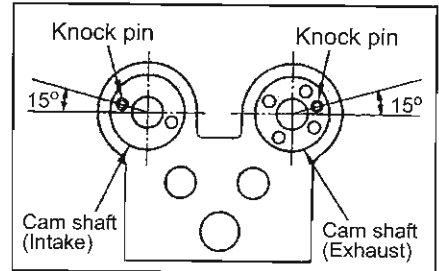
- (1) After installing the rocker cover, run the engine at approx. 1000rpm with no-load for 10 minutes. Recheck the head movement.
- (2) If the air is not released by carrying out the above method, replace the hydraulic valve lifter with a new one.

Installation

1. Install hydraulic valve lifter.
 - Apply engine oil to rotational surface.
 - Install the hydraulic valve lifter in the position before it was removed.
 - Carry out the air interfusion inspection.
2. Install cam shaft to the cylinder head.
 - Coat the cam nose, journal and thrust parts with engine oil.
 - The distinction between the intake and the exhaust side cam shaft can be determined by the crank angle sensor drive spline.

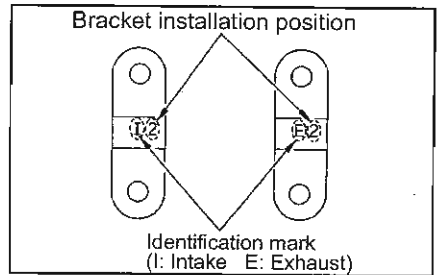


3. Install the cam shaft to the cylinder head so the knock pin is as shown in the figure.



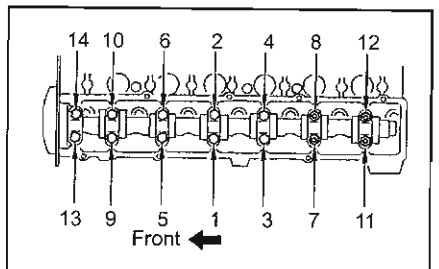
4. Install the cam bracket.

- (1) Check the engraved mark on the cam bracket surface and the markings you have made at the removal to install the cam bracket in correct position.



- (2) Tighten the cam bracket installation bolts in the order shown in several stages.

Tightening torque (N-m{kg-m}) 9.0~12{0.92~1.2}

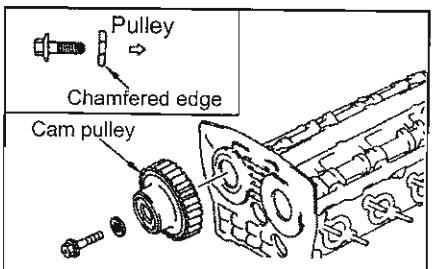


5. Install the baffle plate to No. 6 and No. 7 cam shaft bracket.

Tightening torque(N-m{kg-m}) 9.0~12{0.92~1.2}

6. Install the timing belt cover (rear).

Tightening torque (N-m{kg-m})
M6 bolt 6.3~8.3{0.64~0.85}
M8 bolt 16~22{1.6~2.2}



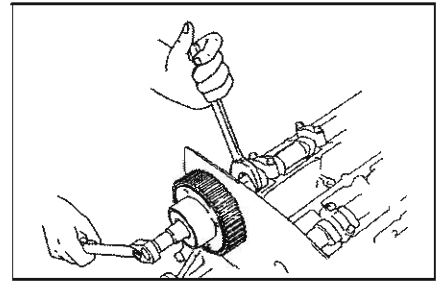
7. Install the cam shaft front oil seal.
8. Install the cam timing pulley (intake side).
 - (1) Install the cam timing pulley to the cam shaft.
 - Face the washer with chamfered side towards the pulley.
 - (2) Apply engine oil to thread parts and the bearing surface of the installation bolts.

RB25DE / RB25DET ENGINE

- (3) Use the spanner to fix cam shaft hexagonal part to tighten installation bolt.

Caution:

Do not use tools such as pulley holder to fix intake side cam timing pulley as it will damage inner parts.

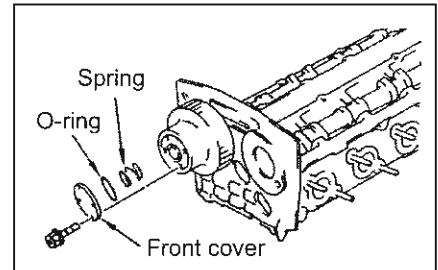


- (4) Insert a spring into pulley and fit the front cover.

- Replace the o-ring with a new one.
- Care must be taken not to drop the o-ring.

- (5) Tighten installation bolts in opposite angles.

Tightening torque (N-m{kg-m}) 1.5~2.5{0.15~0.25}



9. Install the cam timing pulley (exhaust side).

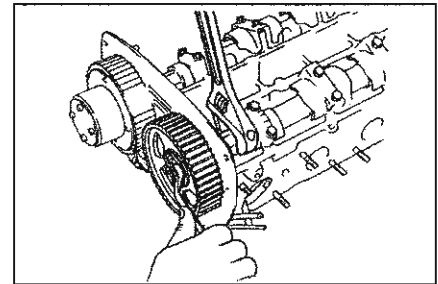
- (1) Install the cam timing pulley to the cam shaft.

- Fix the cam shaft hexagonal part using a spanner or use pulley holder to fix the timing pulley to tighten 4 installation bolts in opposite angle.

Tightening torque (N-m{kg-m}) 14~19{1.4~1.9}

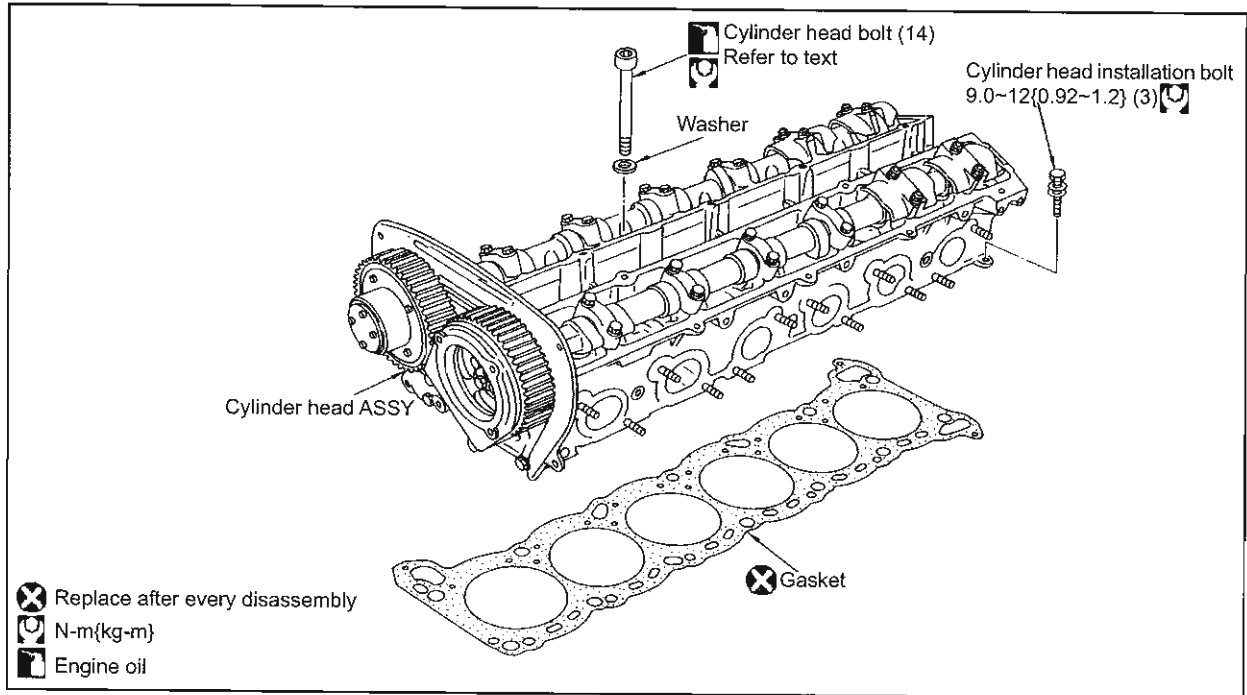
- (2) Install the crank angle sensor installation bracket.

Tightening torque (N-m{kg-m}) 21~26{2.1~2.6}



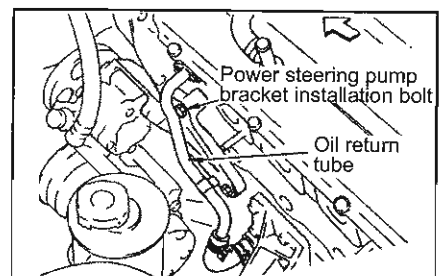
10. Install the rest in reverse order to the removal procedure.

9. CYLINDER HEAD GASKET



Removal

1. Release the fuel pressure.
2. Remove the battery negative terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
3. Remove the air duct and the resonator ASSY.
4. Remove the air inlet pipe.
5. Remove the under cover.
6. Drain coolant from the radiator drain plug.
7. Drain coolant from the cylinder block drain plug.
8. Remove the cooling fan.
9. Remove the radiator.
10. Remove the auxiliary belt.
11. Remove exhaust front tube.
12. Remove the turbo charger ASSY.
13. Remove exhaust manifold.
14. Remove intake manifold collector.
15. Remove the fuel injector.
16. Remove the intake manifold.
17. Remove the rocker cover.
18. Remove the timing belt, cam timing pulley, timing belt cover (rear).
19. Remove oil return tube and the top installation bolt on the power steering pump bracket.



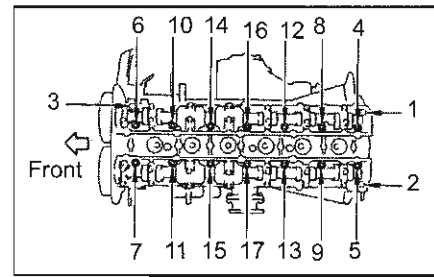
RB25DE / RB25DET ENGINE

20. Remove the cylinder head ASSY.

(1) Remove the cylinder head auxiliary bolts (1~3).

(2) Remove the cylinder head bolts (4~17).

- Loosen the cylinder head bolts in the order shown in the figure on right to remove the cylinder head ASSY.



1~3: M6 x 1.0 4~7: M12 x 1.5

21. Remove the cylinder head gasket.

Inspection

Cylinder head distortion

- (1) Use a scraper to remove grease, water stain, carbon and gasket etc.

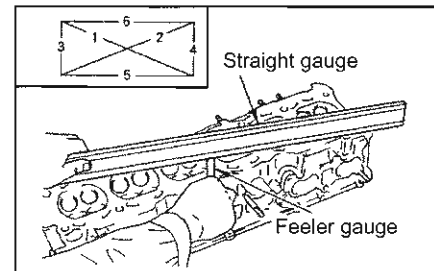
Caution:

Care must be taken not to allow removed gasket to enter oil and coolant passage.

- (2) Measure cylinder head under surface for distortion in six direction.

Limit value (mm) 0.2

- If the value exceeds the limit apply compound to press platen and readjust the surface. If the value exceeds the limit greatly, replace the cylinder head with a new one.



Cylinder block top surface distortion

- Use a scraper to completely remove gasket, oil, water stain and carbon etc. on cylinder block front surface.

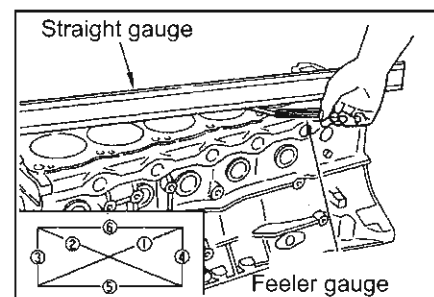
Caution:

Care must be taken not to allow removed gasket to enter oil and coolant passage.

- Measure distortion of the block top surface in six directions using a straight gauge.

Limit value (mm) 0.1

- If the value is over the limit use surface grinder to correct the distortion.
- Replace the cylinder block if the distortion value is too great.



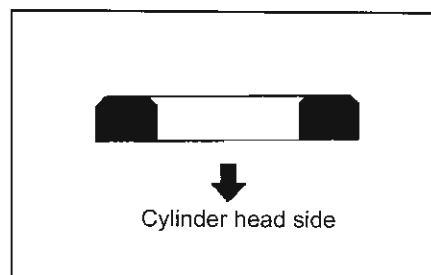
Installation

1. Install the cylinder head gasket.

- Use scraper to remove gasket on the installation surface.
- Replace the gasket with a new one.
- Align the cylinder head gasket to dowel pin to install.

RB25DE / RB25DET ENGINE

2. Install the cylinder head ASSY.
 - Check that No. 1 cylinder is at T. D. C (top dead centre)
 - Make sure each No. 1 cylinder intake and exhaust valve is not lifted.
 - Care must be taken not to damage the cylinder head gasket when installing the cylinder head.
3. Tighten the cylinder head bolts.
 - Apply engine oil to thread part of the screw.
 - Install the washer non-chamfered side facing the cylinder head.



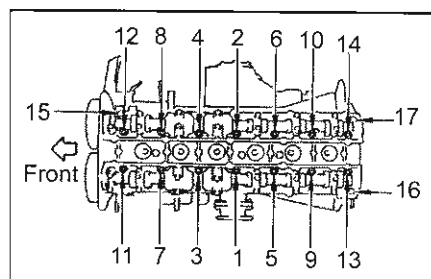
4. Tighten the installation bolts in the order shown (1 ~ 14).

- (1) Tighten to 29N-m {3kg-m}
- (2) Tighten to 98N-m {10kg-m}
- (3) Loosen to 0N-m {0kg-m}
- (4) Tighten to 25~34N-m {2.5~3.5kg-m}
- (5) Tighten to 95° ~ 100°
(OR 93~103N-m{9.5~10.5kg-m})

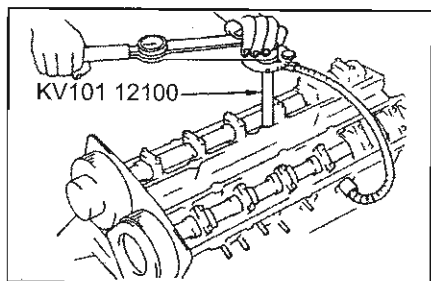
- Install the cylinder head auxiliary bolts.

Caution:

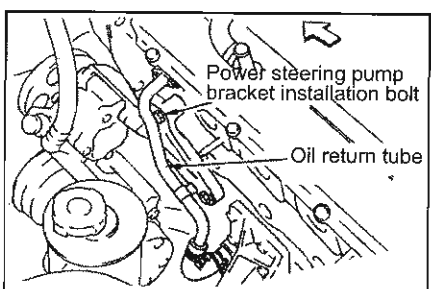
Tightening angle should be checked using the angle wrench or protractor. Never estimate visually.



1 ~ 4: M12 x 1.5 15 ~ 17: M6 x 1.0



5. Install the oil return tube.
 - Replace the gasket with a new one.
 Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}
6. Install the top installation bolts for the power steering pump bracket.
 - Tightening torque (N-m{kg-m}) 37~50{3.8~5.1}



7. Install the rest in reverse order to the removal procedure.