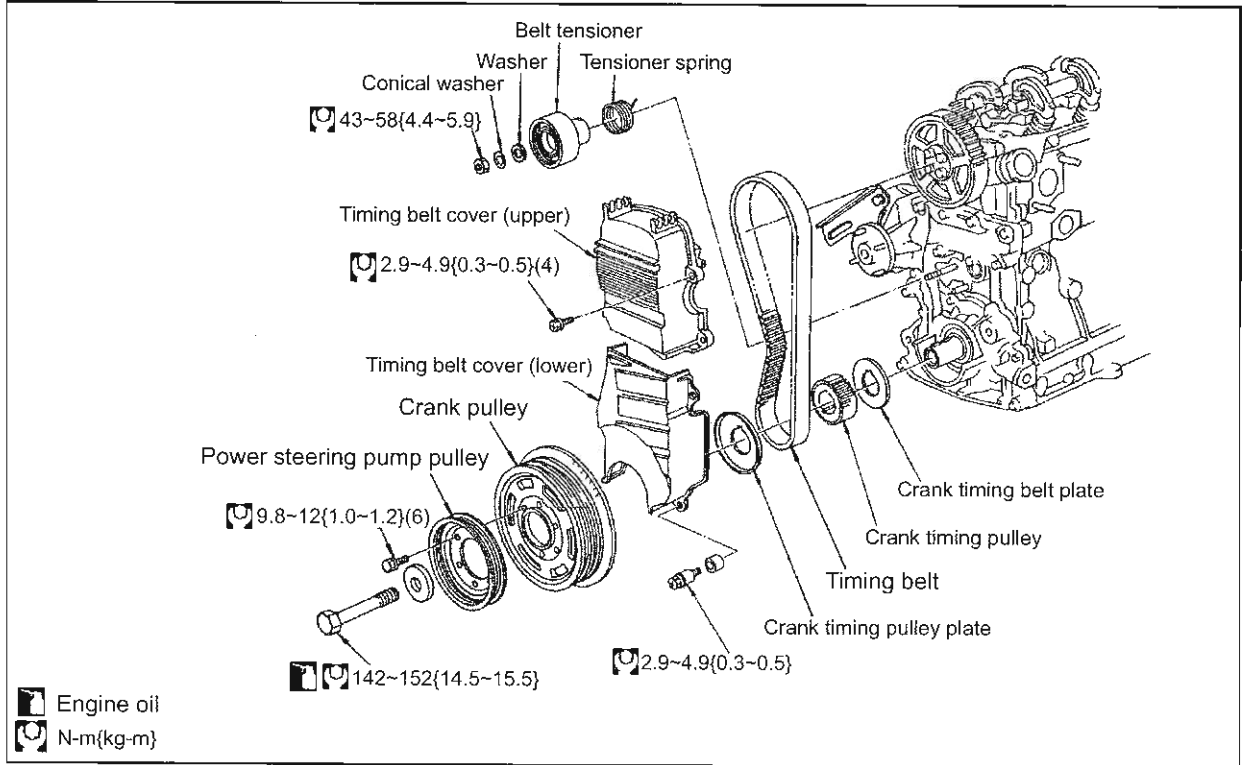


RB20E ENGINE

8. TIMING BELT (RB20E)



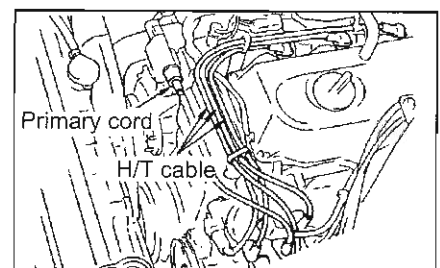
Replacement period: Every 100,000 km

Caution:

- Do not twist or bend the timing belt. Care must be taken not to allow grease or water to come in contact with the timing belt.
- Do not readjust (retension) the belt as it will shorten the life expectancy of the timing belt.
- It is recommended to replace the timing belt with a new one, once you have removed or loosened the timing belt during inspection or removal of other parts.

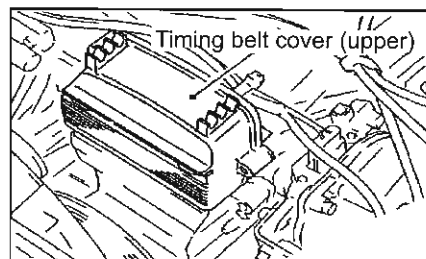
Removal

- Remove a negative battery terminal.
 - Open the boot lid.
 - Remove the boot front finisher and disconnect negative battery terminal.
- Remove the air cleaner and the air duct.
- Remove the under cover.
- Extract coolant from radiator drain plug.
- Remove the cooling fan.
- Remove the radiator.
- Remove the supplement belt.
- Remove the high-tension cord and the primary cord from the timing belt cover (upper).

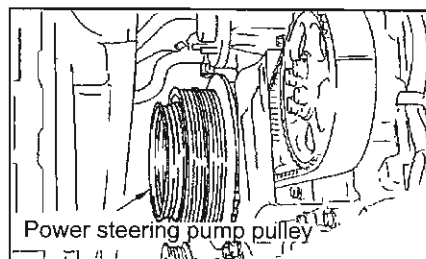


RB20E ENGINE

9. Remove the timing belt cover (upper).

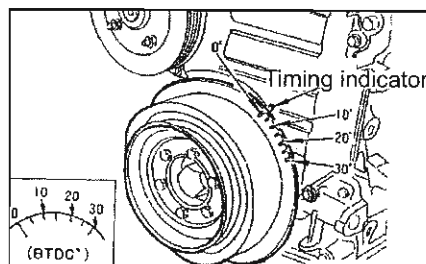


10. Remove the power steering pump pulley from the crank pulley.

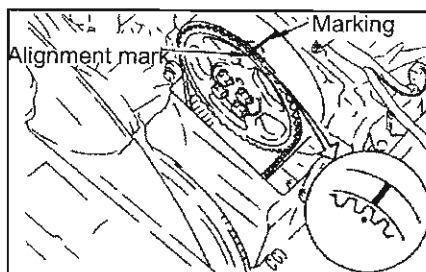


11. Position No. 1 cylinder at compression T.D.C (top dead centre).

- Turn the crank pulley clockwise and align belt cover timing indicator and the timing mark (0°).

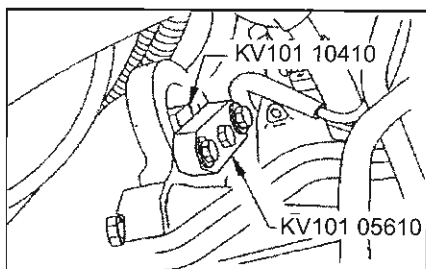


- At this time, the cam timing pulley alignment mark should be in the position shown in the diagram on right.
- If the cam timing pulley alignment is not at correct position, turn the crank pulley 360° clockwise.
- Place alignment mark on back side of the timing belt by aligning it to the cam timing pulley alignment mark.



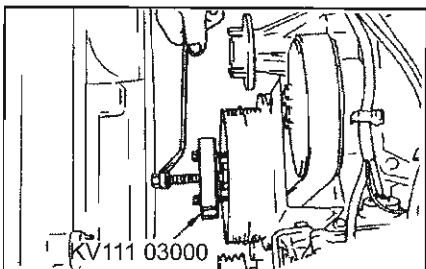
12. Remove the crank pulley.

- (1) Remove the starter motor.
- (2) Install the ring gear stopper to fix the drive plate.



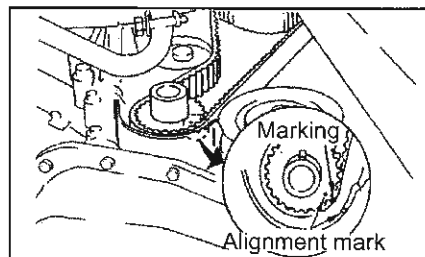
(3) Loosen the crank pulley bolt and draw out approx. 1cm.

(4) Install M6 x 1.0 with underhead approx. 40mm to crank pulley screw hole. Use the crank pulley to remove from the crankshaft.

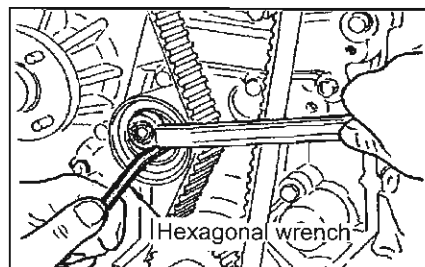


RB20E ENGINE

13. Remove the timing belt cover (lower).
14. Remove the crank timing pulley plate (front).
15. Place alignment mark on back side of the timing belt by aligning it to the crank timing pulley alignment mark.







16. Remove the timing belt.
 - (1) Loosen the tension pulley installation nuts.
 - (2) Insert the wrench into tensioner pulley hexagonal hole and turn it to remove the timing belt.



17. Remove the tensioner pulley.
18. Remove the crank timing pulley.
19. Remove the crank timing pulley plate (rear).

Inspection

- Refer to the diagram below to inspect the timing belt. Check for any wear or adhesion of foreign objects.
- Replace timing belt if inspection indicates any problem.

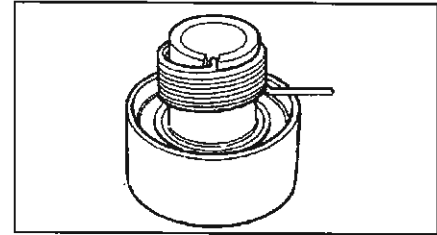
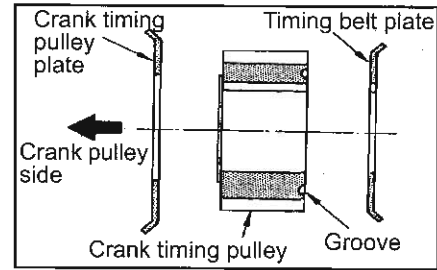
ITEM	CONDITION	CAUSE
Missing tooth Cracked tooth		Cam shaft lock
Cracks on rear side		Tensioner lock Engine overheat Interference with belt cover etc.
Wear and cracks on the side		Belt mis-alignment Belt plate malfunction
Worn teeth		Cam shaft rotation resistance
Grease or water adhesion	-	Oil seal malfunction Water pump leak

- Check each pulley tooth for any wear or cracks. Replace with new belt if any abnormality is found.

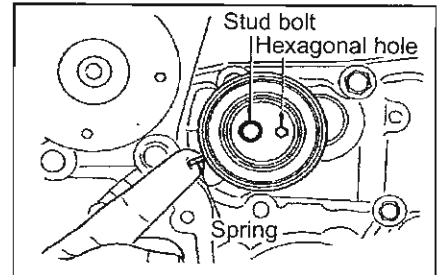
RB20E ENGINE

Installation

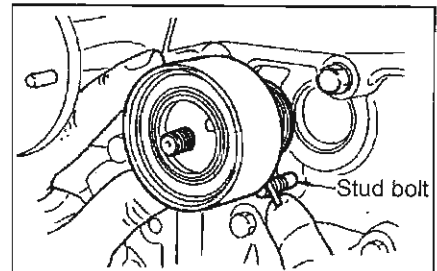
1. Install the timing belt plate (rear).
 - Compared to front side, the rear timing pulley plate has smaller external diameter.
 - When installing make sure the external diameter R is facing the direction shown in the diagram on the right.
2. Install the crank timing pulley.
 - Make sure the crankshaft key is facing the top.



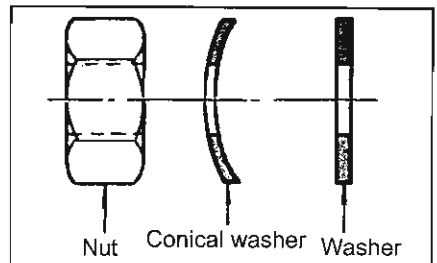
3. Install the tensioner pulley.
 - (1) Fit the spring claw to the tensioner pulley groove securely.
 - (2) Install it in a way so the tensioner pulley hexagonal hole and the spring claw is positioned as shown in the diagram on the right.



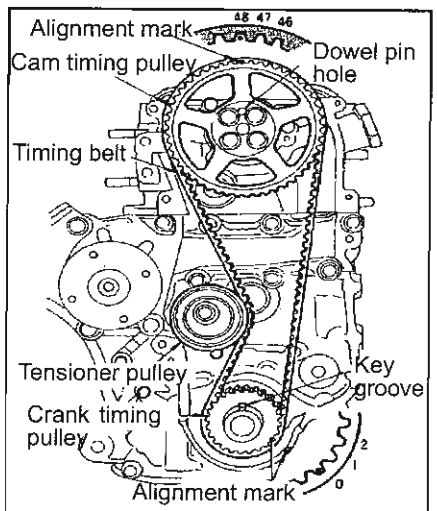
- (3) Hold the tensioner pulley with your finger. Hook the spring on top of the stud bolt by rotating the spring anti-clockwise.



- (4) Temporarily install the tensioner pulley by installing in the order of washer, conical washer and installation nut.
 - Make sure the conical washer is facing the direction shown in the diagram on the right.

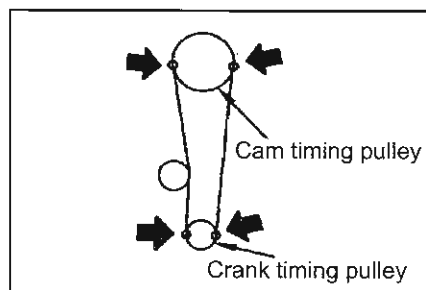


4. Install the timing belt.
 - (1) Check that the crank timing pulley key groove is facing up.
 - (2) Check that the cam timing pulley alignment mark is facing up.
 - (3) Insert wrench to the tensioner pulley hexagonal hole and turn it clockwise to temporarily tighten the installation nut to fix the tensioner pulley.
 - (4) Install the timing belt by aligning the crank timing pulley and cam timing pulley alignment mark to the timing belt reverse side alignment mark.
 - After installing make sure each pulley and the belt alignment mark is as shown in the diagram on the right.



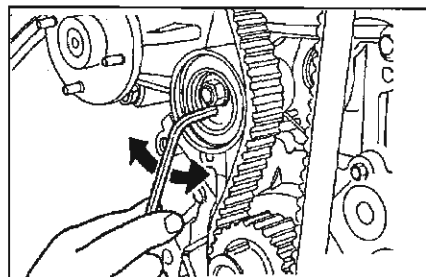
RB20E ENGINE

- (5) Loosen the tensioner pulley installation nut to tension the timing belt.
 - Make sure the timing belt and the pulley is securely engaged at four locations as shown in the diagram on the right.



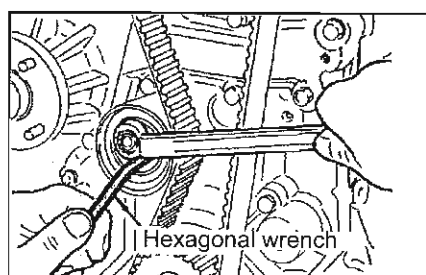
5. Adjust the timing belt tension.

- (1) Remove the spark plug.
- (2) Remove the rocker cover.
- (3) Loosen all rocker shaft installation bolts.
- (4) Insert the wrench to tensioner pulley hexagonal hole and turn it anti-clockwise two to three turns to fit in the timing belt.
 - OR turn the crankshaft clockwise twice.

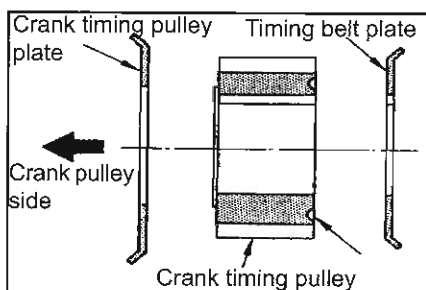


- (5) Insert wrench to tensioner pulley hexagonal hole to fix the tensioner pulley to tighten the installation nuts.

Tightening torque (N-m{kg-m})	43~58{4.4~5.9}
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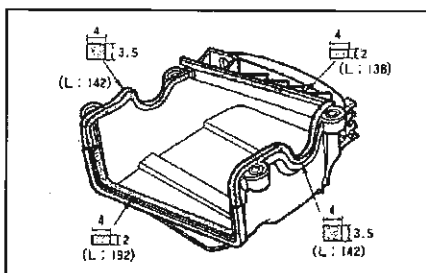
6. Install the crank timing pulley plate (front).
 - Compared to rear side, the front timing pulley plate has bigger external diameter.
 - When installing make sure the external diameter R is facing the direction shown in the diagram on the right.



7. Install the timing belt cover (lower).

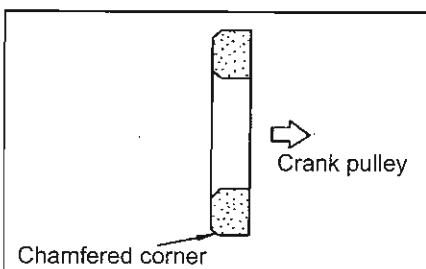
Tightening torque (N-m{kg-m})	2.9~4.9{0.3~0.5}
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8. Install the timing belt cover (upper).
 - Apply gasket to reverse side of the cover.

Tightening torque (N-m{kg-m})	2.9~4.9{0.3~0.5}
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9. Install the crank pulley.
 - Coat crank pulley bolt and the surface with engine oil.
 - Install the washer so the flat surface is facing the crank pulley.

Tightening torque (N-m{kg-m})	142~152{14.5~15.1}
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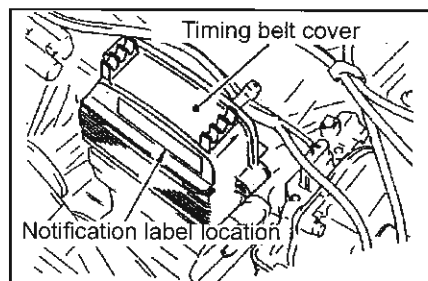


10. Install the power steering pump pulley.

Tightening torque (N-m{kg-m})	9.8~12{1.0~1.2}
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RB20E ENGINE

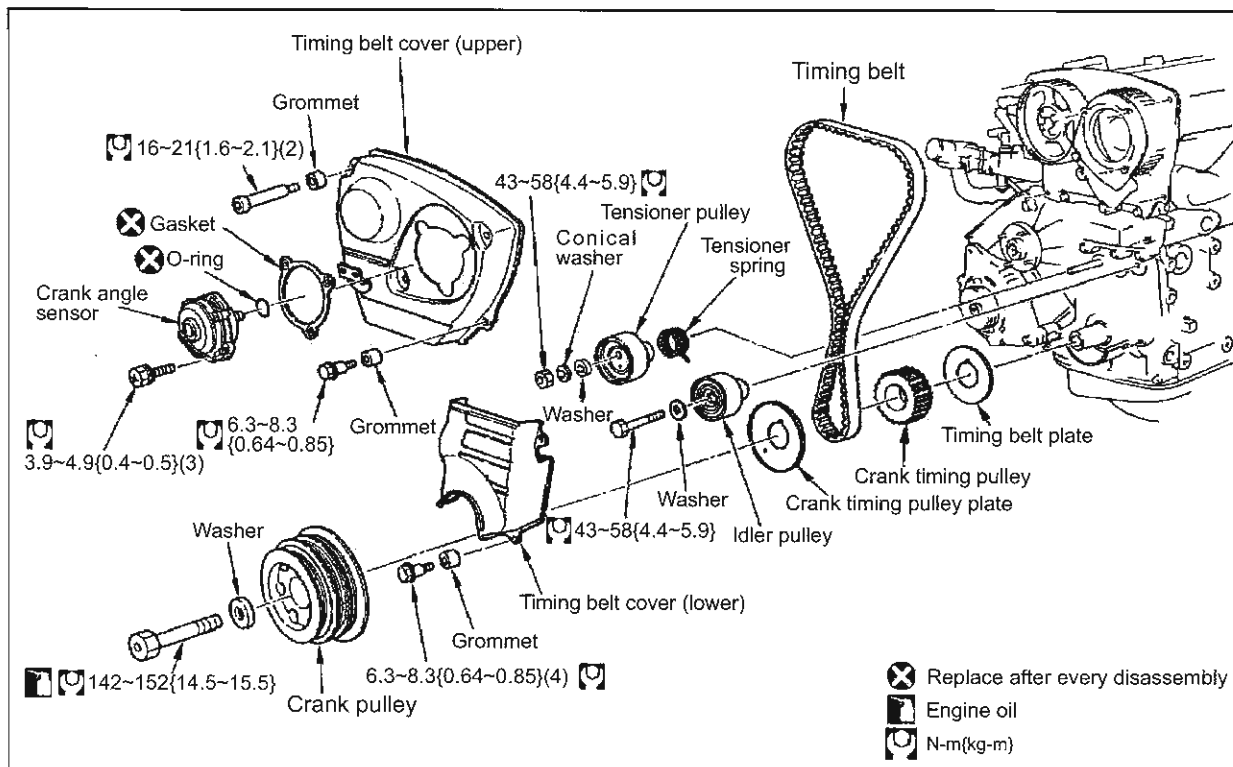
11. Timing belt replacement notification label is placed in front surface of the timing belt cover (upper). Place new label once you have replaced the timing belt.
 - Write mileage and the date on the label.



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

RB25DE / RB25DET ENGINE

8. TIMING BELT (RB25DE / RB25DET)

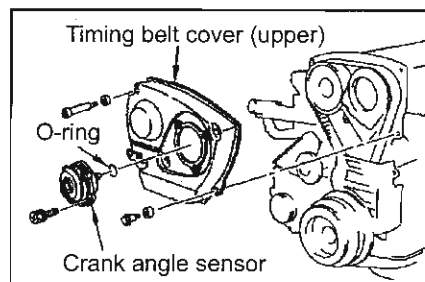


Caution:

- Do not twist or bend the timing belt. Care must be taken not to allow grease or water to come in contact with the timing belt.
- Do not readjust (retension) the belt as it will shorten the life expectancy of the timing belt.
- It is recommended to replace the timing belt with a new one, once you have removed or loosened the timing belt during inspection or removal of parts.

Removal

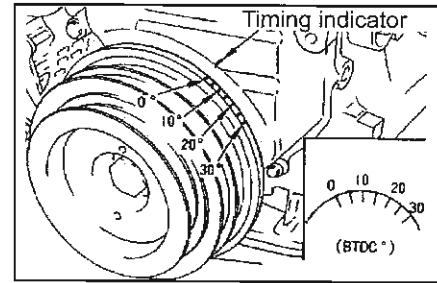
1. Remove the negative battery terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot room front finisher and disconnect negative battery terminal.
2. Remove the under cover.
3. Extract coolant from radiator drain plug.
4. Remove the radiator.
5. Remove the cooling fan.
6. Remove the supplement belt.
7. Remove the crank angle sensor.
 - The crank angle sensor must be handled gently so it will not cause any damage.
8. Remove the timing belt cover (upper).



RB25DE / RB25DET ENGINE

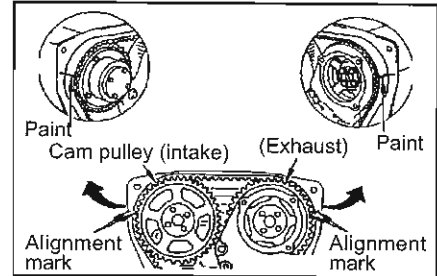
9. Position No. 1 cylinder at compression T.D.C (top dead centre) position.

(1) Turn the crank pulley clockwise and align timing belt cover indicator and the timing mark (0°).



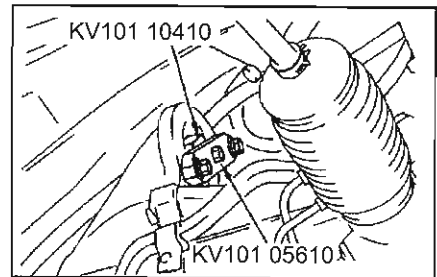
(2) Check that the cam timing pulley alignment mark is aligned with belt cover alignment mark.

- If the cam timing pulley alignment is not in correct position, turn the crank pulley 360° clockwise.
- Place alignment mark on back side of the timing belt by aligning it to the cam timing pulley alignment mark.



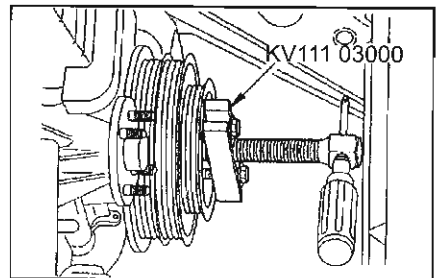
10. Remove the crank pulley.

(1) Remove the starter motor. Place the ring gear stopper to fix the crankshaft.



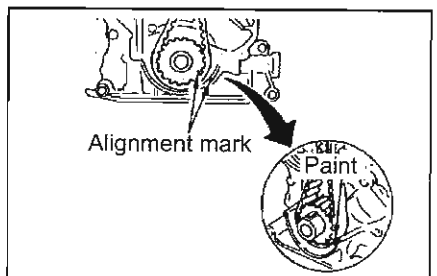
(2) Loosen the crank pulley bolt and draw out approx. 1cm.

- Install M6 x 1.0 (2) with underhead approx. 50mm to crank pulley screw holes. Use the pulley puller to remove the crank pulley from the crankshaft.



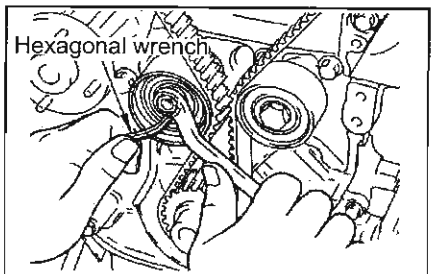
11. Remove the timing belt cover (lower).

- Remove the crank timing pulley plate.
- Place alignment mark on back side of the timing belt by aligning it to the crank timing pulley alignment mark.



12. Remove the timing belt.

- (1) Loosen the tension pulley installation nuts.
- (2) Insert the wrench into tensioner pulley hexagonal hole and turn it clockwise to tighten the installation nut temporarily.
- (3) Remove timing belt from each pulley.



13. Remove cam timing pulley.

14. Remove crank timing pulley.




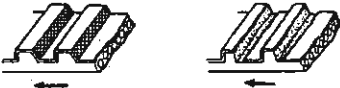
RB25DE / RB25DET ENGINE

- 15.Remove the timing belt plate.
- 16.Remove the tensioner pulley and the spring.
- 17.Remove the idler pulley.

Inspection

Timing belt

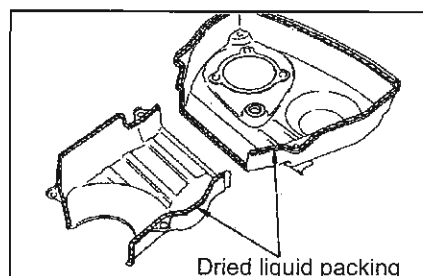
- Refer to the diagram below to inspect the timing belt.
Check for any wear or adhesion of foreign objects.
- Replace timing belt if inspection indicates any problem.

ITEM	CONDITION	CAUSE
Missing tooth Cracked tooth		Cam shaft lock
Cracks on rear side		Tensioner lock Engine overheat Interference with belt cover etc.
Wear and cracks on the side		Belt mis-alignment Belt plate malfunction
Worn teeth		Cam shaft rotation resistance
Grease or water adhesion	-	Oil seal malfunction Water pump leak

- Check each pulley tooth for any wear or cracks.
Replace with new belt if any abnormality is found.

Timing belt cover gasket

- Check if there is any wear or damage to timing belt cover (upper and lower) reverse side dried liquid packing.
- Replace the cover ASSY if there is any fault or abnormal.

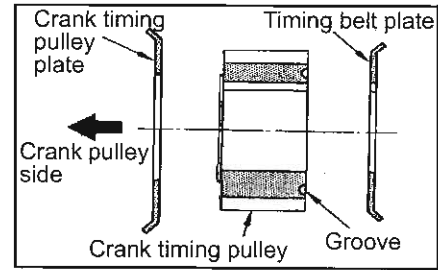


Installation

1. Install idler pulley.

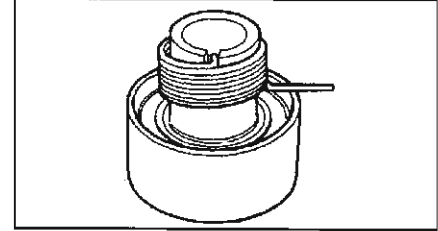
Tightening torque (N-m{kg-m}) 43~58{4.4~5.9}

- After tightening with correct torque, make sure the idler pulley will turn smoothly.

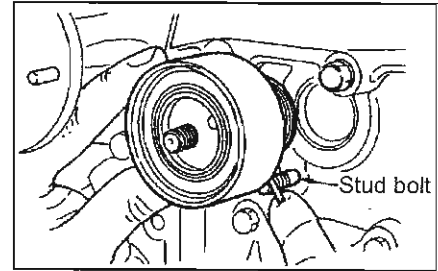


2. Install the tensioner pulley.

- (1) Fit the tensioner spring claw to the tensioner pulley groove securely.

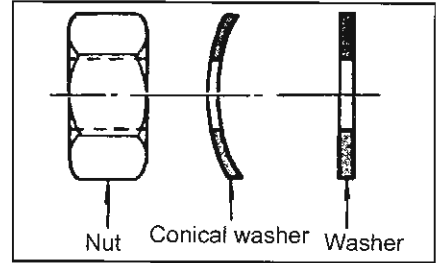


- (2) Hold the tensioner pulley with your finger. Hook the spring on top of the stud bolt by rotating the spring anti-clockwise.



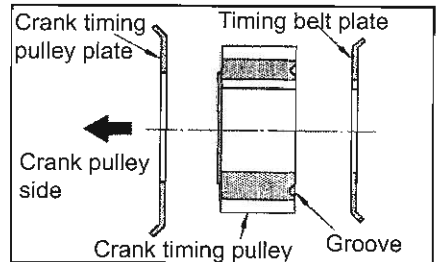
- (3) Temporarily install the tensioner pulley by installing in the order of washer, conical washer and installation nut.

- Make sure the conical washer is facing the direction shown in the diagram on the right.



3. Install the timing belt plate (rear) and the crank timing pulley.

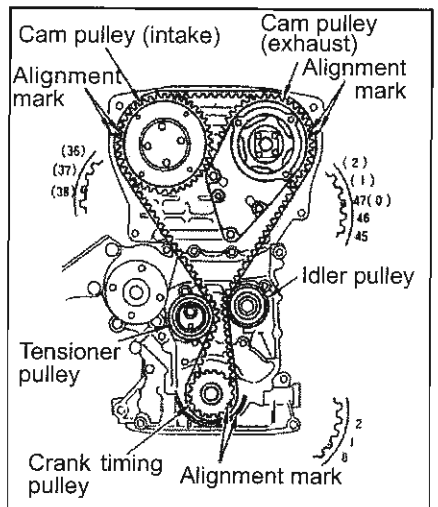
- Crankshaft key must be facing up.
- Rear timing belt plate has smaller exterior diameter compared to the front timing belt plate.
- Make sure the exterior diameter 'R' is facing correct direction.



4. Install the cam pulley.

5. Install the timing belt.

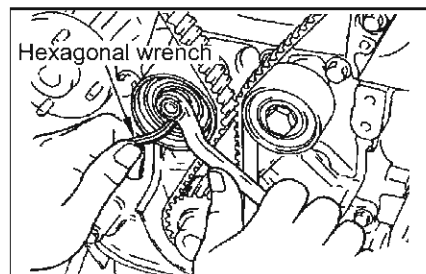
- (1) Align the crank timing pulley alignment mark to oil pump housing alignment mark (No. 1 cylinder T.D.C).
 - (2) Align cam pulley alignment mark to each belt cover alignment mark. (No. 1 cylinder T.D.C).
 - (3) Insert the wrench to tensioner pulley hexagonal hole and turn it clockwise to temporarily tighten the installation nut.
 - (4) Align timing belt and each pulley alignment mark to install the timing belt.
- Make sure each timing pulley and timing belt alignment mark is at position shown in the diagram.



RB25DE / RB25DET ENGINE

6. Adjust the timing belt tension.

- (1) Turn the crankshaft clockwise twice with tensioner pulley installation bolt in loose condition.
- (2) Insert wrench to tensioner pulley hexagonal hole to fix the tensioner pulley to tighten the installation bolts.
Tightening torque(N-m{kg-m}) 43~58{4.4~5.9}
- The timing belt tension should be at correct tension.



7. Install the crank timing pulley plate.

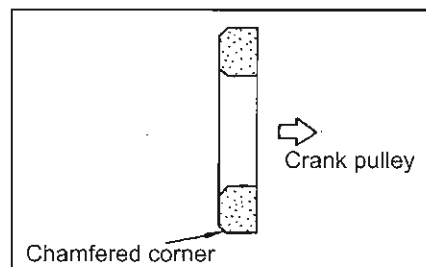
8. Install the timing belt cover (lower).

Tightening torque (N-m{kg-m}) 6.4~8.4{0.65~0.86}

9. Install the crank pulley.

- Fix the crankshaft using the ring gear stopper.
- Install the washer so the flat surface is facing the crank pulley.
- Coat installation bolt and flange surface then tighten the bolts.

Tightening torque (N-m{kg-m}) 142~152{14.5~15.5}

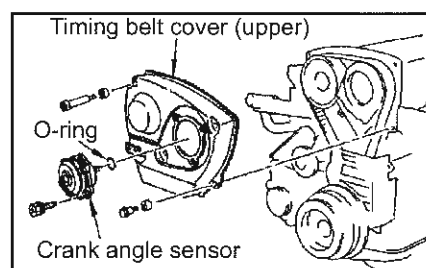


10. Install the timing belt cover (upper)

Tightening torque (N-m{kg-m})

Inner hexagonal installation bolt 16~21{1.6~2.1}

Installation bolt 6.4~8.4{0.65~0.86}



11. Install the crank angle sensor.

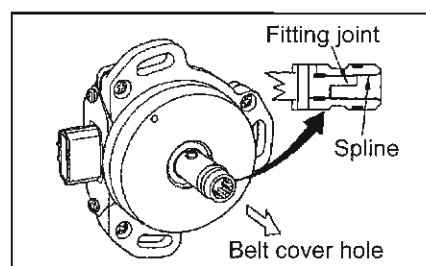
- (1) Apply grease to spline parts.

Caution:

Do not use chassis grease as it will outflow in high temperature.

- (2) There is a fitting joint inside the spline. Check the position of the spline before installing.
- (3) Check if it can be inserted in to the crank angle sensor belt cover hole easily, then tighten the bolt.
- (4) If it doesn't move easily, loosen the belt cover installation bolt while the crank angle sensor is in inserted position. Lightly move the belt cover up, down, right and left to align the centre of the belt cover hole and the cam shaft centre. Tighten the bolts.

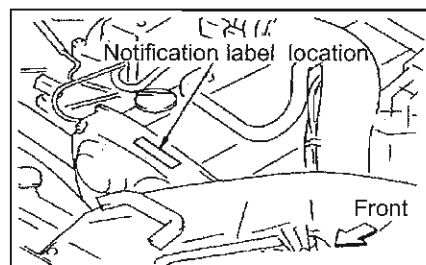
Tightening torque (N-m{kg-m}) 3.9~4.9{0.4~0.5}



12. Place new timing belt replacement notification label on the timing belt cover surface (upper) once you have replaced the timing belt.

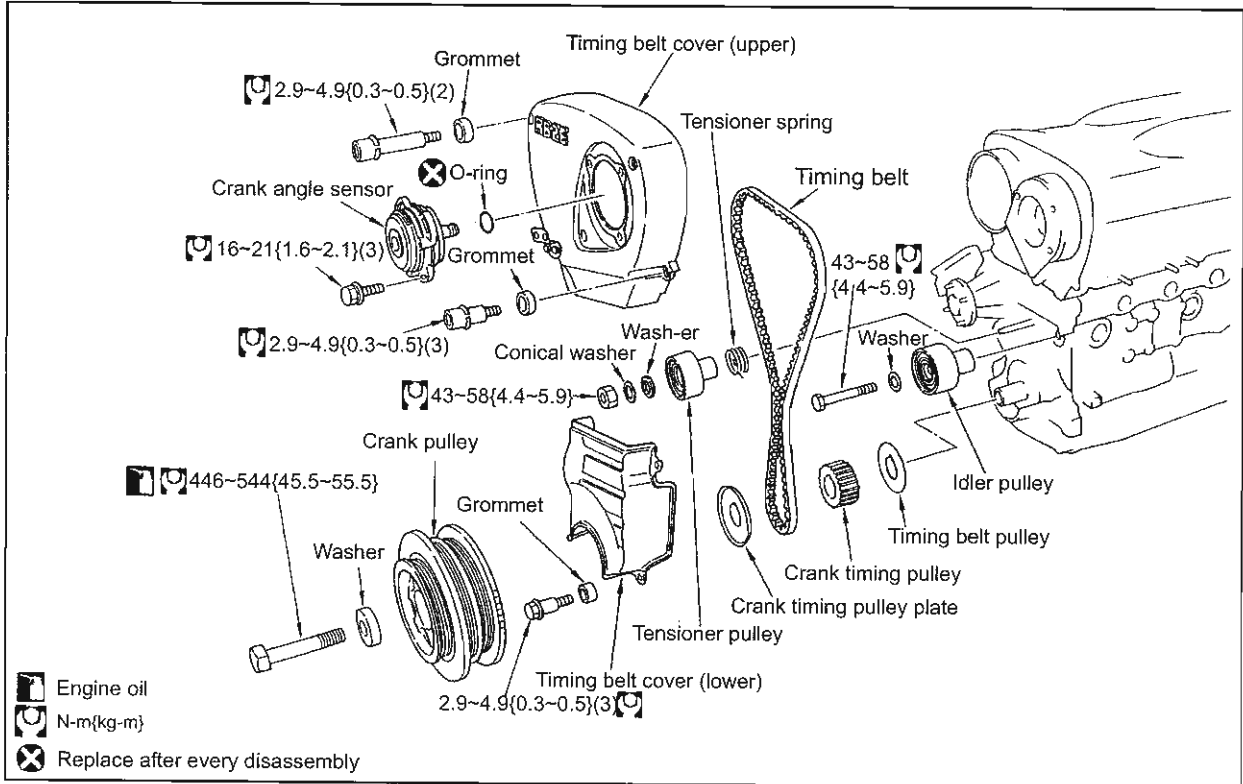
- Write mileage and the date on the label.

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



RB26DETT ENGINE

8. TIMING BELT (RB26DETT)

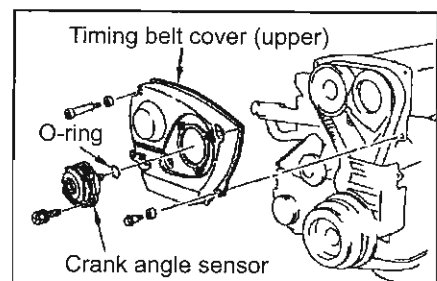


Caution:

- Do not twist or bend the timing belt. Care must be taken not to allow grease or water to come in contact with the timing belt.
- Do not readjust (retension) the belt as it will shorten the life expectancy of the timing belt.
- It is recommended to replace the timing belt with a new ones, once you have removed or loosened the timing belt during inspection or removal of parts.

Removal

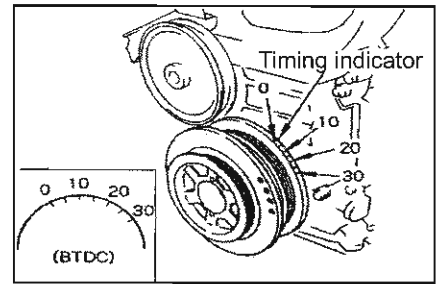
- Remove the negative battery terminal inside the boot.
- Remove the front spoiler under cover.
- Remove the under cover.
- Extract coolant from radiator drain plug.
- Remove the radiator.
- Remove the cooling fan.
- Remove the supplement belt.
- Remove the crank angle sensor.
 - The crank angle sensor must be handled gently so it will not cause any damage.
- Remove the timing belt cover (upper).



RB26DETT ENGINE

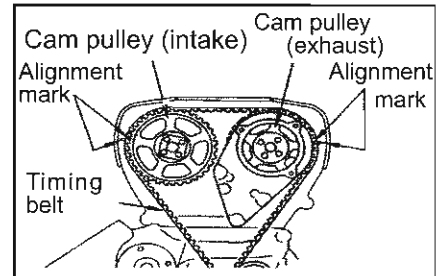
10. Position No. 1 cylinder at compression T.D.C (top dead centre) position.

- (1) Turn the crank pulley clockwise and align timing belt cover indicator and the timing mark (0°).



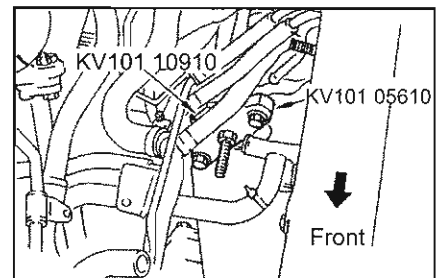
- (2) Check that the cam timing pulley alignment mark is aligned with belt cover alignment mark.

- If the cam timing pulley alignment is not at correct position, turn the crank pulley 360° clockwise.
- Place alignment mark on back side of the timing belt by aligning it to the cam timing pulley alignment mark.



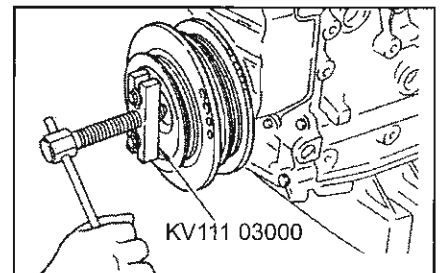
11. Remove the crank pulley.

- (1) Remove the starter motor.
- (2) Place the ring gear stopper to fix the crankshaft.



- (3) Loosen the crank pulley bolt and draw out approx. 1cm.

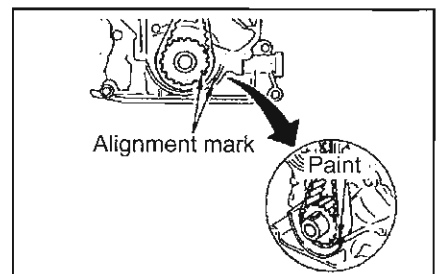
- Install M6 x 1.0 (2) with underhead approx. 50mm to crank pulley bolt holes. Use the pulley puller to remove the crank pulley from the crankshaft.



12. Remove the timing belt cover (lower).

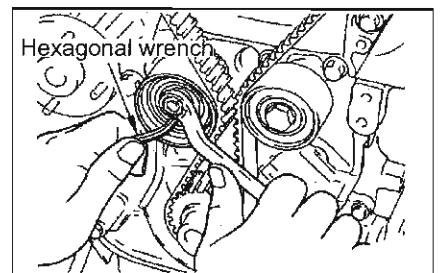
13. Remove the crank timing pulley plate.

14. Place alignment mark on back side of the timing belt by aligning it to the crank timing pulley alignment mark.



15. Remove the timing belt.

- (1) Loosen the tensioner pulley installation nuts.
- (2) Insert the wrench into tensioner pulley hexagonal hole and turn it clockwise to tighten the installation nut temporarily.
- (3) Remove the timing belt from each pulley.



16. Remove the cam timing pulley.

17. Remove the crank timing pulley.

18. Remove the timing belt plate.





19. Remove the tensioner pulley and the spring.

20. Remove the idler pulley.

Inspection

Timing belt

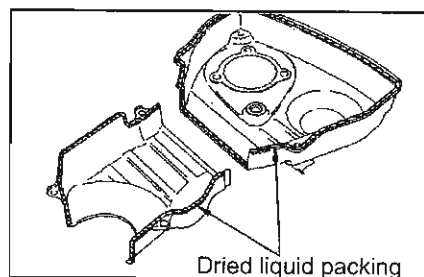
- Refer to the diagram below to inspect the timing belt. Check for any wear or adhesion of foreign objects.
- Replace timing belt if inspection indicates any problem.

ITEM	CONDITION	CAUSE
Missing tooth Cracked tooth		Cam shaft lock
Cracks on rear side		Tensioner lock Engine overheat Interference with belt cover etc.
Wear and cracks on the side		Belt mis-alignment Belt plate malfunction
Worn teeth		Cam shaft rotation resistance
Grease or water adhesion	-	Oil seal malfunction Water pump leak

- Check each pulley tooth for any wear or cracks. Replace with new belt if any abnormality is found.

Timing belt cover gasket

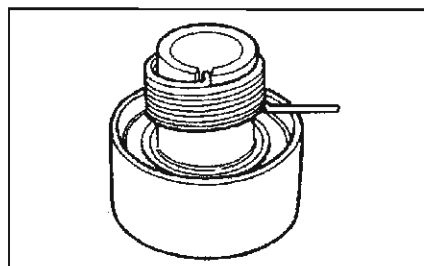
- Check if there is any wear or damage to timing belt cover (upper and lower) reverse side dried liquid packing.
- Replace the cover ASSY if there is any fault or abnormal.



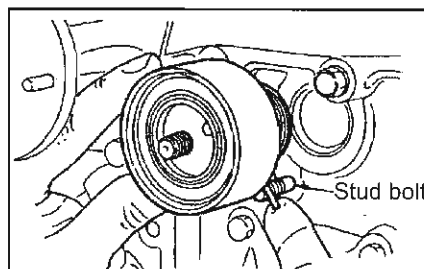
RB26DETT ENGINE

Installation

1. Install idler pulley.
Tightening torque (N·m{kg·m}) 43~58{4.4~5.9}
- After tightening with correct torque, make sure the idler pulley will turn smoothly.

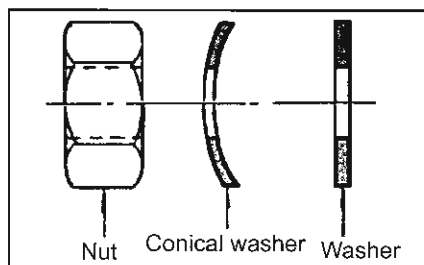


2. Install the tensioner pulley.
 - (1) Fit the tensioner spring claw to the tensioner pulley groove securely.

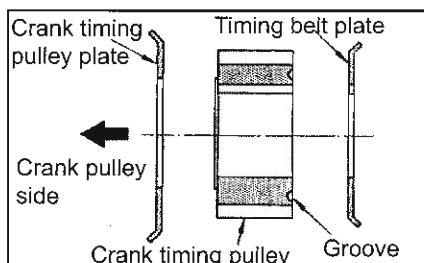


- (2) Hold the tensioner pulley with your finger. Hook the spring on top of the stud bolt by rotating the spring anti-clockwise.

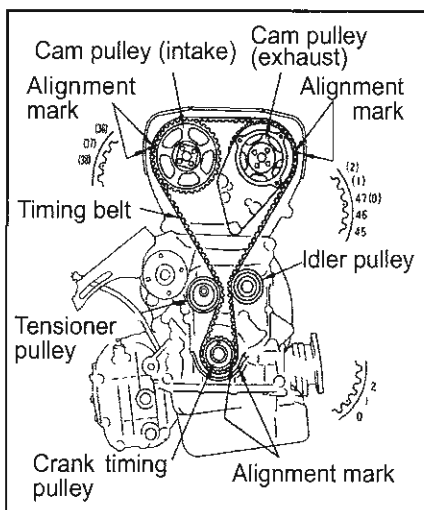
- (3) Temporarily install the tensioner pulley by installing in the order of washer, conical washer and installation nut.
 - Make sure the conical washer is facing the direction shown in the diagram on the right.



3. Install the timing belt plate (rear) and the crank timing pulley.
 - Crankshaft key must be facing up.
 - Rear timing belt plate has smaller exterior diameter compared to the front timing belt plate.
 - Make sure the exterior diameter 'R' is facing correct direction.



4. Install the cam pulley.
5. Install the timing belt.
 - (1) Align the crank timing pulley alignment mark to oil pump housing alignment mark (No. 1 cylinder T.D.C).
 - (2) Align cam pulley alignment mark to each belt cover alignment mark. (No. 1 cylinder T.D.C).
 - (3) Insert the wrench to tensioner pulley hexagonal hole and turn it clockwise to temporarily tighten the installation nut.
 - (4) Align timing belt and each pulley alignment mark to install the timing belt.
 - Make sure each timing pulley and timing belt alignment mark is at position shown in the diagram.



RB26DETT ENGINE

6. Adjust the timing belt tension.

(1) Remove all spark plugs.

(2) Turn the crankshaft clockwise twice with tensioner pulley installation bolt in loose condition.

(3) Insert wrench to tensioner pulley hexagonal hole to fix the tensioner pulley to tighten the installation bolts.

Tightening torque(N-m{kg-m}) 43~58{4.4~5.9}

• The timing belt tension should be at correct tension.

7. Install the crank timing pulley plate.

8. Install the timing belt cover (lower).

Tightening torque (N-m{kg-m}) 6.4~8.4{0.65~0.86}

9. Install the crank pulley.

• Fix the crankshaft using the ring gear stopper.

• Install the washer so the flat surface is facing the crank pulley.

• Coat installation bolt and flange surface then tighten the bolts.

Tightening torque (N-m{kg-m}) 142~152{14.5~15.5}

10. Install the timing belt cover (upper).

Tightening torque (N-m{kg-m}) 2.9~4.9{0.3~0.5}

11. Install the crank angle sensor.

(1) Apply grease to spline parts.

Caution:

Do not use chassis grease as it will outflow in high temperature.

(2) There is a fitting joint inside the spline. Check the position of the spline before installing.

(3) Check if it can be inserted in to the crank angle sensor belt cover hole easily, then tighten the bolt.

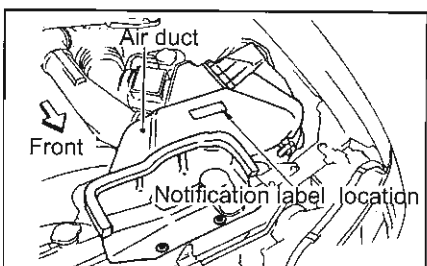
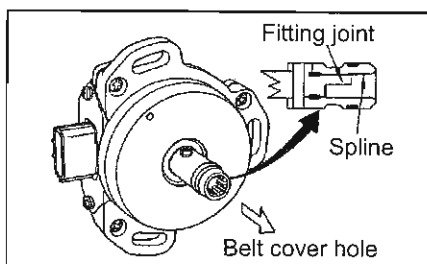
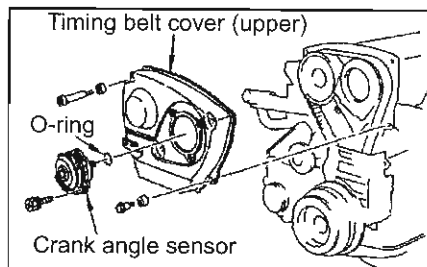
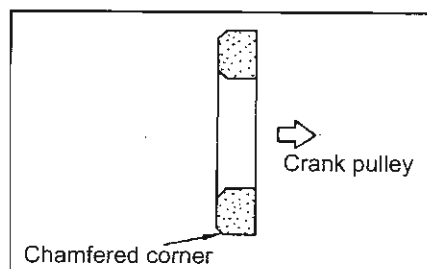
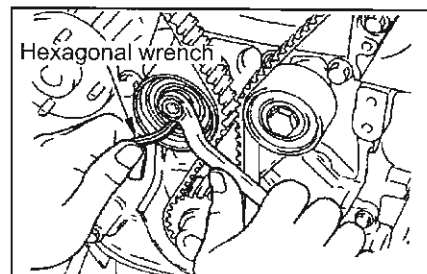
(4) If it doesn't move easily, loosen the belt cover installation bolt while the crank angle sensor is in inserted position. Lightly move the belt cover up, down, right and left to align the centre of the belt cover hole and the cam shaft centre. Tighten the bolts.

Tightening torque (N-m{kg-m}) 3.9~4.9{0.4~0.5}

12. Place new timing belt replacement notification label once you have replaced the timing belt.

• Write mileage and the date on the label.

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



RB20E / RB25DE / RB25DET / RB26DETT ENGINE

9. ENGINE OIL

Engine oil replacement period

ENGINE	OIL TYPE	REPLACEMENT PERIOD
RB20E, RB25DE	SE, SF, SG	15,000 km or every year
RB25DET	SG	10,000 km or every year
	SE, SF	5,000 km or every 6 months
RB26DETT	SE, SF, SG	5,000 km or every 6 months

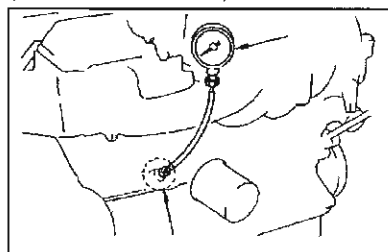
ITEM		ENGINE	RB25E / RB25DE	RB20E	RB26DETT	
					STD	N1
Oil tank capacity (L)		H level	4.0	4.1	4.5	5.8
		L level	3.0	3.3	3.5	4.8
Oil replacement amount (L)	Replacing oil only	Extracted from drain plug	Approx. 3.8	Approx. 3.9	Approx. 4.2	Approx. 4.8
		Extracted using oil changer	Approx. 4.0	Approx. 4.1	-	-
	Replacing oil and filter	Extracted from drain plug	Approx. 4.2	Approx. 4.3	Approx. 4.6	Approx. 5.2
		Extracted using oil changer	Approx. 4.4	Approx. 4.5	-	-

Oil pressure inspection

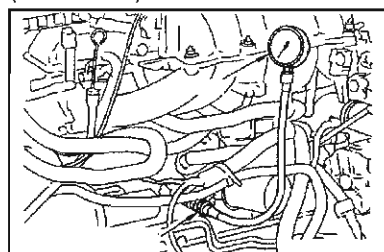
- Check engine oil level.
- Remove oil pressure switch.
- Connect oil pressure gauge
- Check if there is adequate oil pressure for engine rev after warming up the engine.

ENGINE REV		Idling	2000	6000
Discharge pressure (MPa {kg/cm ² } / rpm)	RB20E	0.1{1.0}	0.37{3.8}	0.47{4.8}
	RB25DE	0.1{1.0}	0.32{3.3}	0.52{5.3}
	RB25DET	0.11{1.1}	0.34{3.5}	0.55{5.6}
	RB26DETT	0.15{1.5}	0.30{3.0}	0.46{4.6}

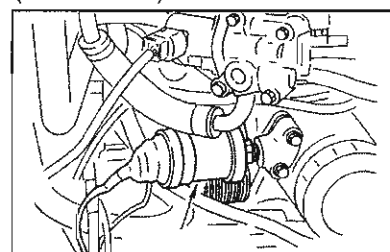
(RB20E / RB25DE)



(RB25DET)



(RB26DETT)



10. OIL FILTER

Oil filter replacement period

(When SE, SF or SG oil is used)

ENGINE	REPLACEMENT PERIOD
RB20E / RB25DE	15,000 km or every year
RB25DET	10,000 km or every year
RB26DETT	10,000 km or every year

Removal

Use oil filter wrench to remove the oil filter.

Caution:

Catch dripping waste oil when removing the oil filter.

Installation

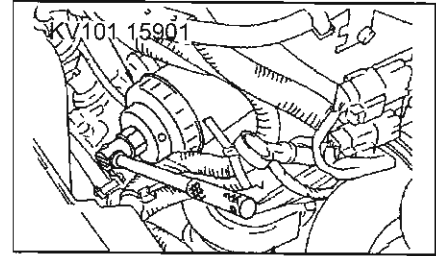
1. Wipe off any dirt or dust from surface area of the cylinder block (oil filter bracket: RB25DET / RB26DETT) and coat the new filter oil seal area with engine oil.
2. Insert the oil filter and turn it 2/3 of a turn until it touches the cylinder block (oil filter bracket: RB25DET / RB26DETT).

Tightening torque (N-m{kg-m}) 15~21{1.5~2.1}

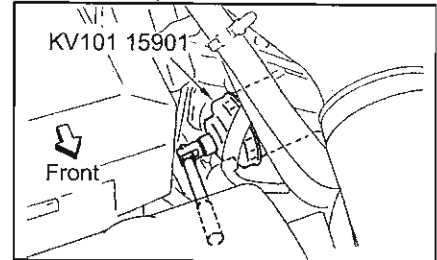
Caution:

Check to make sure there are no oil leaks after starting the engine.

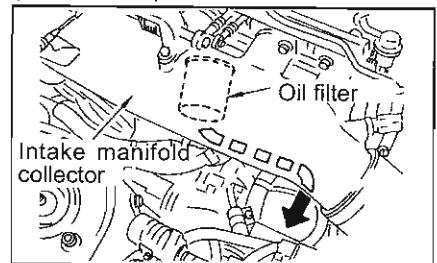
(RB25DET)



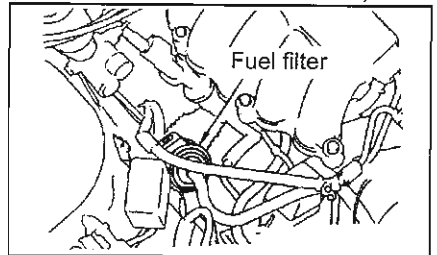
(RB26DETT)



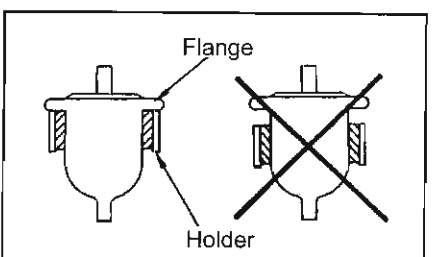
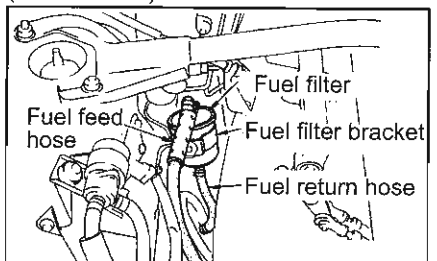
(RB26DETT)



(RB20E / RB25DE / RB25DET)



(RB26DETT)



4 - 8 FUEL FILTER

Replacement period: Every 100,000 km

Removal

1. Release the fuel pressure.
2. Loosen the hose clamp and remove the fuel hose (RB20E / RB25DE / RB25DET), fuel feed and return hose (RB26DETT) from the filter.
3. Remove the fuel filter from the bracket.

Installation

- Carry out the removal procedures in reverse order noting the following points below:
 - Make sure to tighten the hose clamp.
 - Make sure there are no fuel leaking when the ignition is turned to ON position.
 - When installing the fuel filter, make sure the flange is touching the holder upper end.

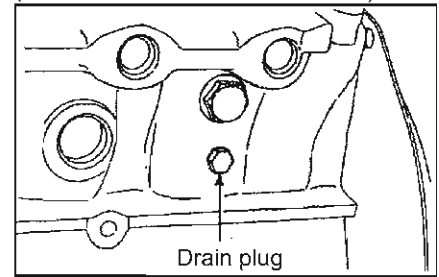
11. COOLANT

Replacement period: **Every 2 years**

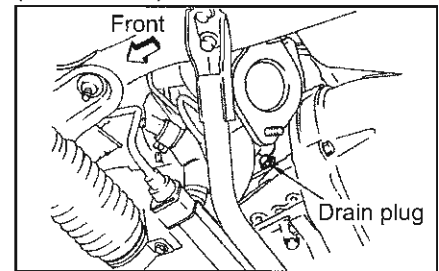
Extracting coolant

1. Place the ignition switch to ON position and set the vehicle temperature to 32°C using the heater control temperature adjustment knob.
2. Remove the under cover (RB20E / RB25DE / RB25DET).
3. Remove the radiator drain plug and remove the radiator cap to extract the coolant.
4. Remove the exhaust front tube (RB26DETT).
5. Remove the drain plug on the left side of the cylinder block to extract the coolant inside the cylinder block.
6. Remove the reservoir tank and discharge coolant.

(RB20E / RB25DE / RB25DET)



(RB26DETT)



Filling up coolant

1. Install the reservoir tank.
2. Install the radiator drain plug and the cylinder drain plug.
 - Coat thread part of the cylinder block drain plug with sealing agent (Three bond 1386B)
3. Check each clamp to make sure it is tightened securely.
4. Place the ignition switch to ON position and set the vehicle temperature to 32°C using the heater control temperature adjustment knob.
5. Remove air release plug located at front side of the intake manifold collector.

Note:

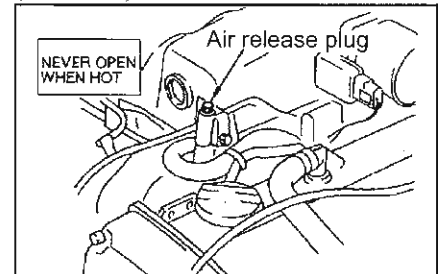
The bolt with copper washer is the air release plug. There is a caution label located near the air release plug.

6. Top up the radiator with coolant at filling speed of less than 2L / min. Close the plug if the coolant start spouting out from the air release plug while filling up the radiator. Top up coolant to the top.
 - Replace air release plug copper washer with a new one.
7. Close the radiator cap and start the engine. Keep idling until the thermostat injection valve opens.
8. Check that the engine coolant temperature gauge needle is pointing over mid way. Touch the radiator lower hose and make sure warm water is flowing.
9. After checking the thermostat injection valve, race the engine 2 to 3 times with 10 seconds interval between each at 2500rpm.

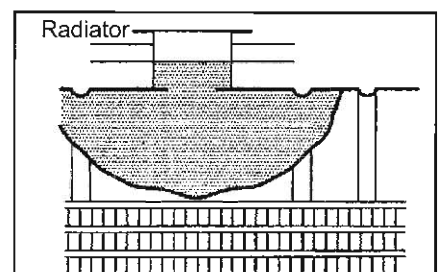
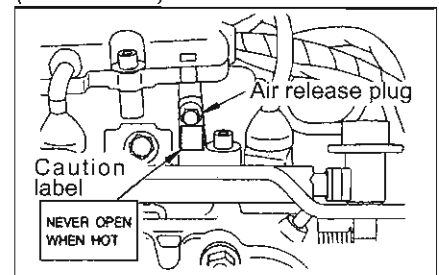
Caution:

Do not raise the engine coolant temperature too high.

(RB25DE)



(RB26DETT)

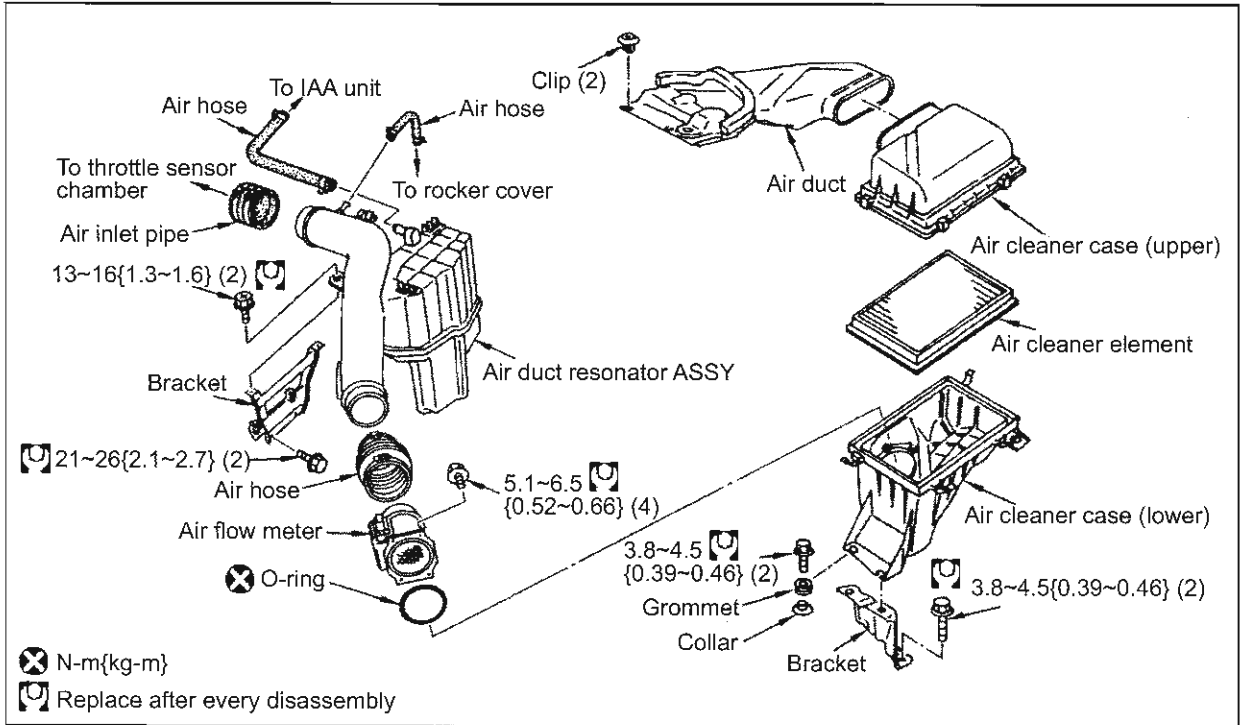


RB20E / RB25DE / RB25DET / RB26DETT ENGINE

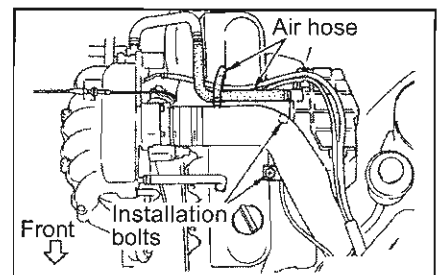
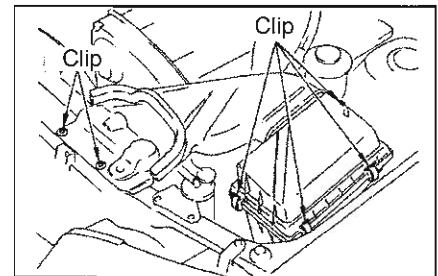
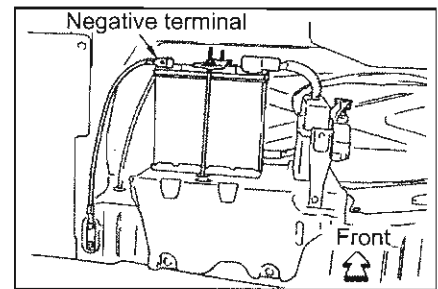
- 10. Stop the engine.
- 11. After cooling down the engine, open the radiator cap and check the level of coolant. If the coolant level has decreased repeat the steps from 7.
- 12. Once the coolant level has stabilised top up the coolant to the MAX line.
- 13. Refill the coolant to the filler tube. Place the radiator cap and stop the engine.
- 14. After cooling down the engine, refill the reservoir tank with coolant to the MAX line.
- 15. Restart the engine and increase the engine speed to 3000rpm from idling position. At this time make sure there is no heater core water flowing sound from the instrument panel area. If there is a water flowing sound, repeat steps 7 to 14 until the coolant level stabilises.

Reference: LLC density.

Standard	LLC 30%
Cold climate area	LLC 50%

EN3 ENGINE MECHANICAL (RB20E)**1. AIR CLEANER & AIR DUCT****Removal**

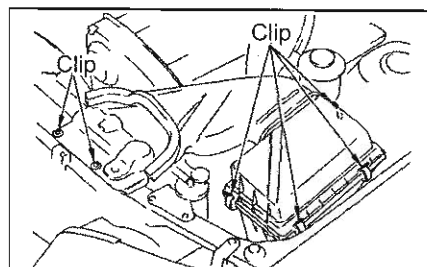
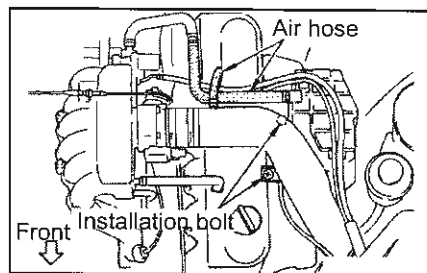
1. Remove negative battery terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Before removing, use air gun to remove any rubbish, dust etc. to avoid foreign objects entering the duct.
3. Remove the air flow meter connector.
4. Remove the air duct, air cleaner case (upper) and air cleaner element.
 - Remove 2 air duct clips and 4 air cleaner case (upper) clips.
5. Remove the air cleaner case (lower).
 - Remove the installation bolts.
6. Remove the air duct, resonator ASSY.
 - Remove 2 air hoses, and installation bolts.

**Inspection**

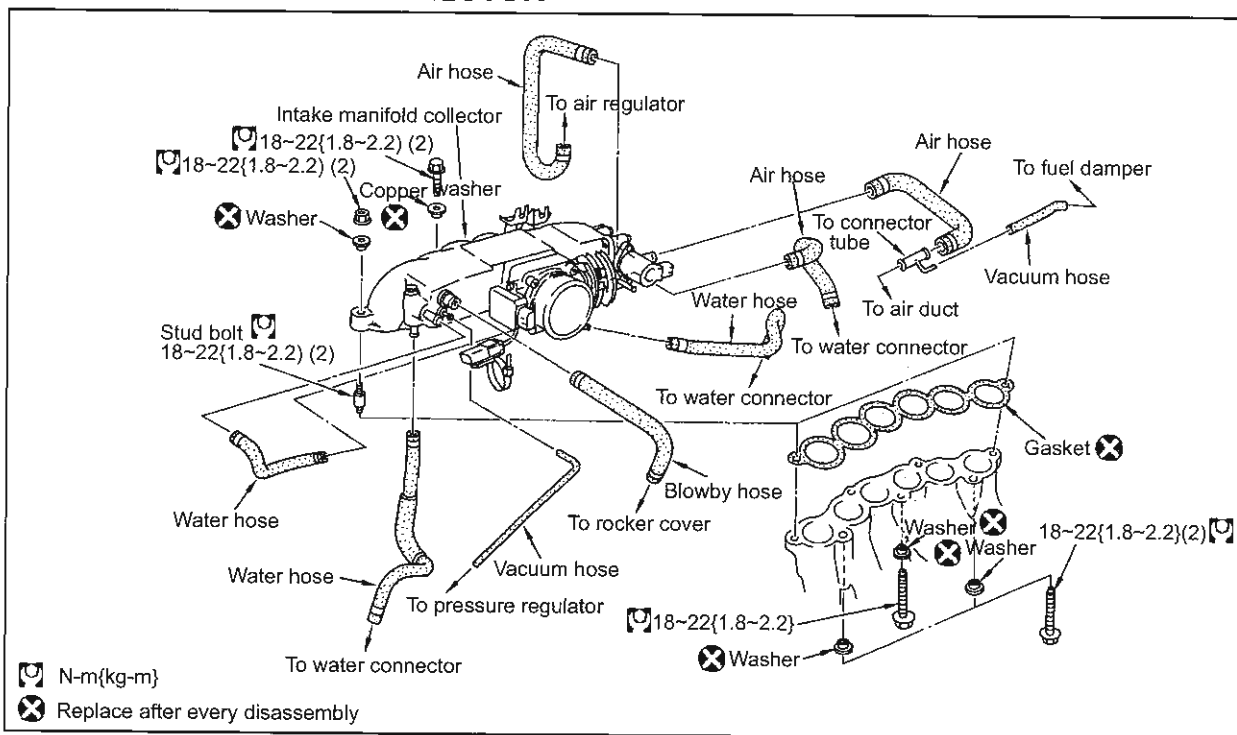
- Make sure the cleaner element is not dirty.
Inspection period: Every 60,000 km

Installation

1. Install the air duct and resonator ASSY.
 - Tighten installation bolts (2).
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
 - Install the air hose (2).
2. Install the air cleaner case (lower).
Tightening torque (N-m{kg-m}) 5.1~6.5{0.52~0.66}
3. Install the air cleaner element, air cleaner case (upper) and the air duct.
 - Install 4 clips on the air cleaner case (upper) and 2 clips on the air duct clips.
4. Install the rest in reverse order to the removal procedure.

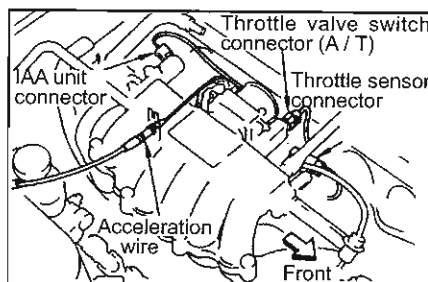


2. INTAKE MANIFOLD COLLECTOR



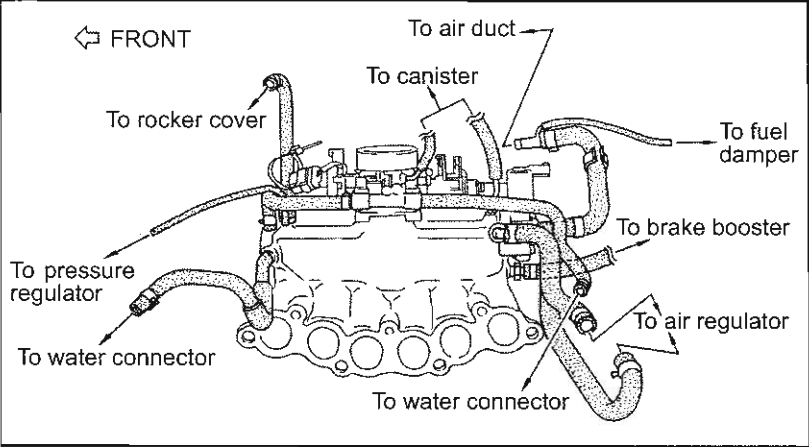
Removal

1. Remove the negative battery terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Drain coolant from the radiator drain plug.
3. Remove the air duct and the resonator ASSY.
4. Remove the acceleration wire and the ASCD wire from the throttle drum.

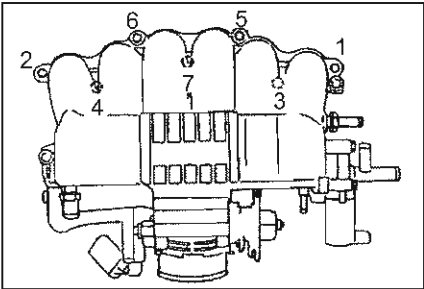


RB20E ENGINE

- 5. Remove the throttle valve switch (A / T), throttle sensor and AAC valve connectors.
- 6. Refer to the diagram below to remove each hoses.
 - The diagram refers to the reverse side of the intake manifold collector.
 - Remove the hose below the intake manifold collector after removing the installation bolts.



- 7. Remove the installation bolts in order shown in the diagram.
- 8. Remove the intake manifold collector.
- 9. Remove the intake manifold collector gasket.

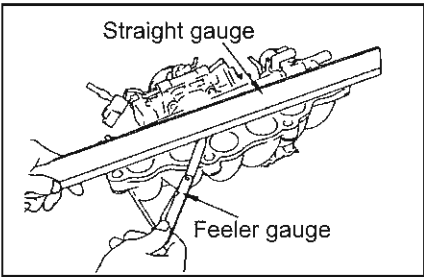


Inspection

Distortion of the intake manifold collector

(1) Completely remove the gasket on reverse side of the intake manifold collector.

- Use the straight gauge and the feeler gauge to measure the distortion in six directions.
Limit value (mm) 0.1
- If the distortion is over the limit use a surface grinder to repair distortion. Replace the intake manifold collector if the distortion is too excessive to fix.



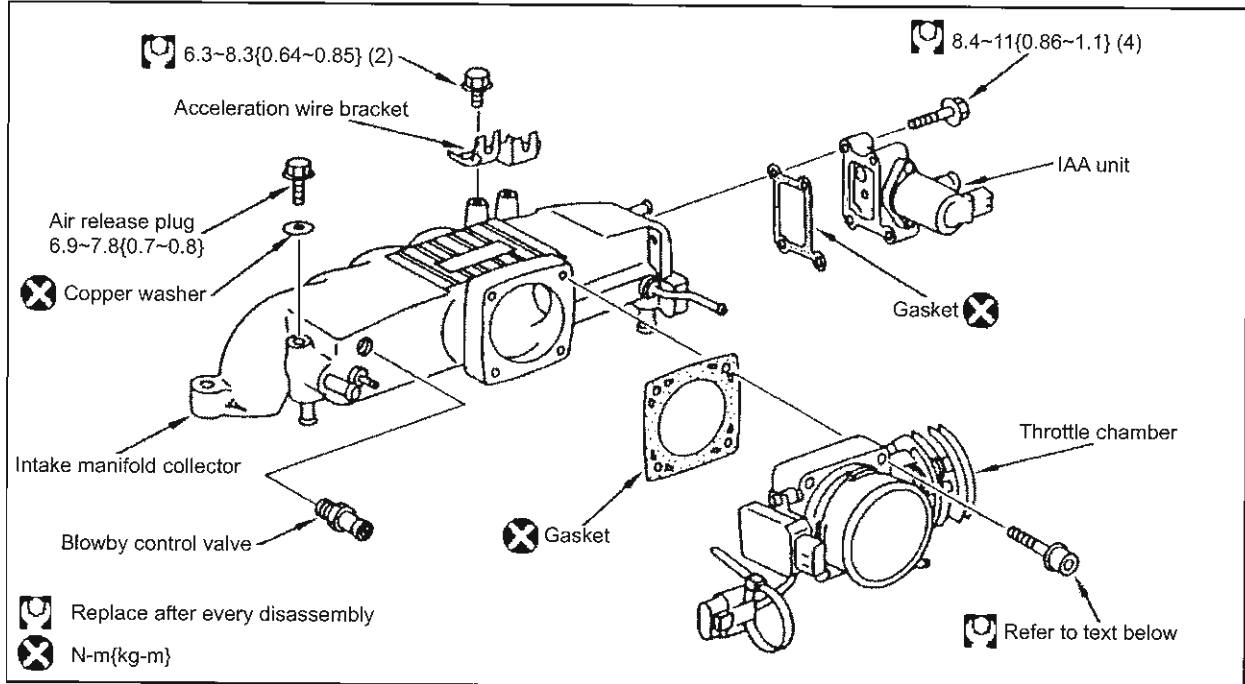
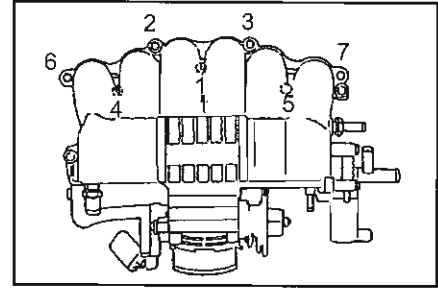
Installation

- 1. Install the intake manifold collector gasket.
 - Replace the gasket with a new one.
 - Remove any fluid, grease, rubbish etc. adhered to installation surface.
- 2. Install the intake manifold collector ASSY.
 - Care must be taken to select the correct bolt.

Installation position	Bolt underhead length (mm)
1	100
2, 3	37
4, 5	109
6, 7	Stud bolt + nut

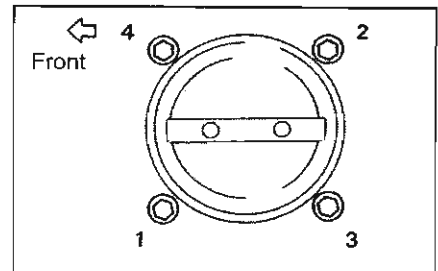
RB20E ENGINE

- Install the installation bolts in the order shown in the diagram on the right.
- Make sure the gasket is fitted correctly.
Tightening torque (N-m{kg-m}) 18~22{1.8~2.2}
- 3. Install the rest in reverse order to the removal procedure.
- Make sure to tighten the hose clamp securely.



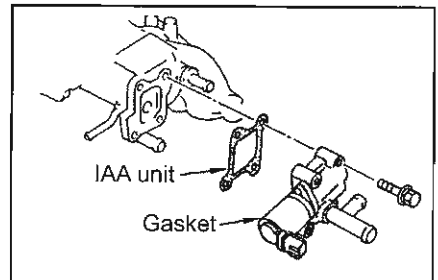
Disassembly

1. Remove the throttle chamber.
 - Remove the installation bolts in order shown.
2. Remove the IAA unit.



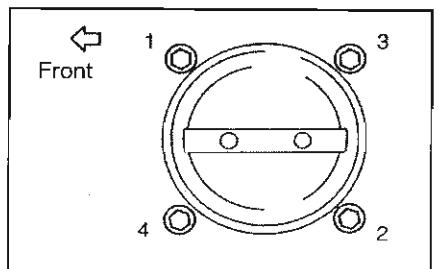
Assembly

1. Install the IAA unit.
 - Replace the gasket with a new one.
Tightening torque (N-m{kg-m}) 8.4~11{0.86~1.1}



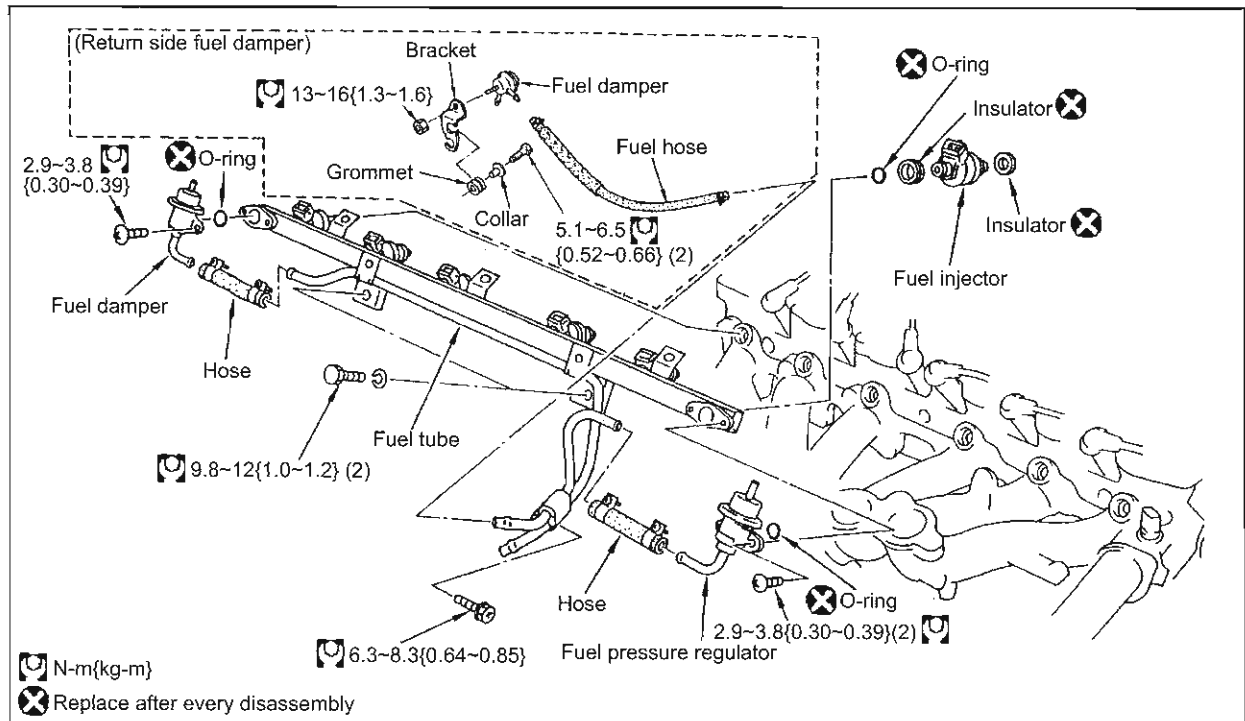
2. Install the throttle chamber.
 - Remove old gasket and other foreign objects adhered to installation surface.
 - Replace the gasket with a new one.
 - Install the bolts in two stages in the order shown.
Tightening torque (N-m{kg-m})

1st	8.8~11{0.9~1.1}
2nd	18~22{1.8~2.2}



RB20E ENGINE

3. FUEL INJECTOR

**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. Drain coolant from the radiator drain plug.
4. Remove the air duct and resonator ASSY.
5. Remove the intake manifold collector.
6. Remove the fuel feed and return hose from fuel tube side.

Caution:

Make sure to place a hole cap to avoid fuel leakage.

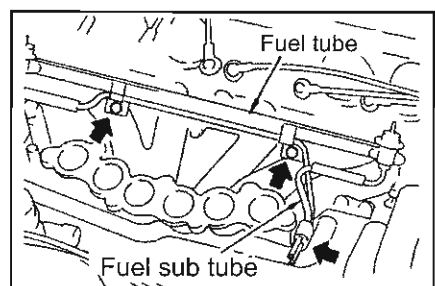
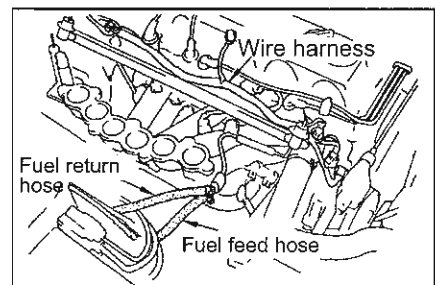
7. Remove the fuel injector harness connector.
8. Remove the intake manifold front side fuel sub tube installation bolt.
9. Remove the fuel tube installation bolt to remove fuel tube and the injector ASSY.
 - Care must be taken not to drop insulator attached to the injector inside the engine bay when removing the injector ASSY.
10. Remove fuel injector from the fuel tube.

Caution:

- Care must be taken not to damage fuel injector.
 - Do not disassemble fuel injector.
11. Remove fuel pressure regulator (front side) and fuel damper (rear side) from the fuel tube.

Caution:

The fuel inside the fuel tube may leak.



Inspection**Fuel tube & fuel hose**

- Look for any fuel leakage from the fuel tube and the fuel hoses.
- Replace with new ones if there are any abnormalities.

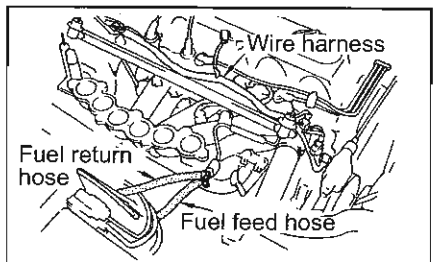
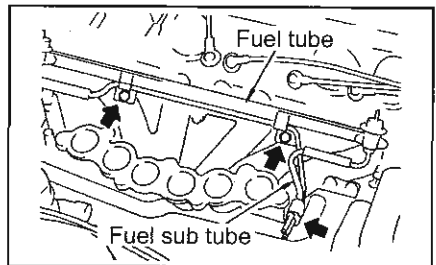
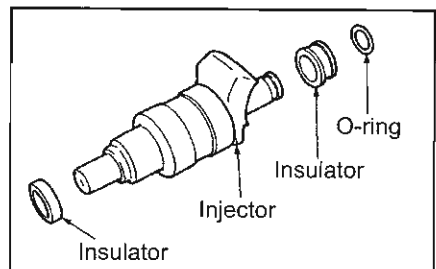
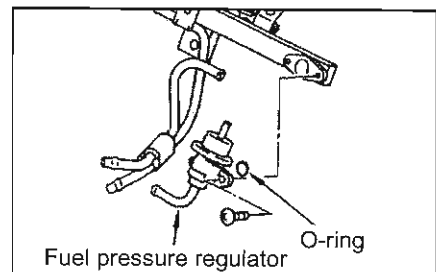
Installation

1. Install fuel pressure regulator (front side) and the fuel damper (rear side).
- Replace O-ring with new ones.
 - Read the handling note before carrying out the operation.

Tightening torque (N-m{kg-m}) 2.9~3.8{0.30~0.39}

Handling note

- Always handle the O-ring with bare hands (no gloves).
- Only apply engine oil (7.5W-30 or similar viscosity) and never clean or soak the o-ring in a solvent solution.
- Avoid using dirty o-ring and devices with dust or other foreign objects adhered to it.
- When installing the o-ring care must be taken not to scratch the o-ring with tools or nails. Also do not twist or stretch them.
- When inserting fuel injector, pressure regulator or fuel dumper into the fuel tube, do not twist or turn the parts.

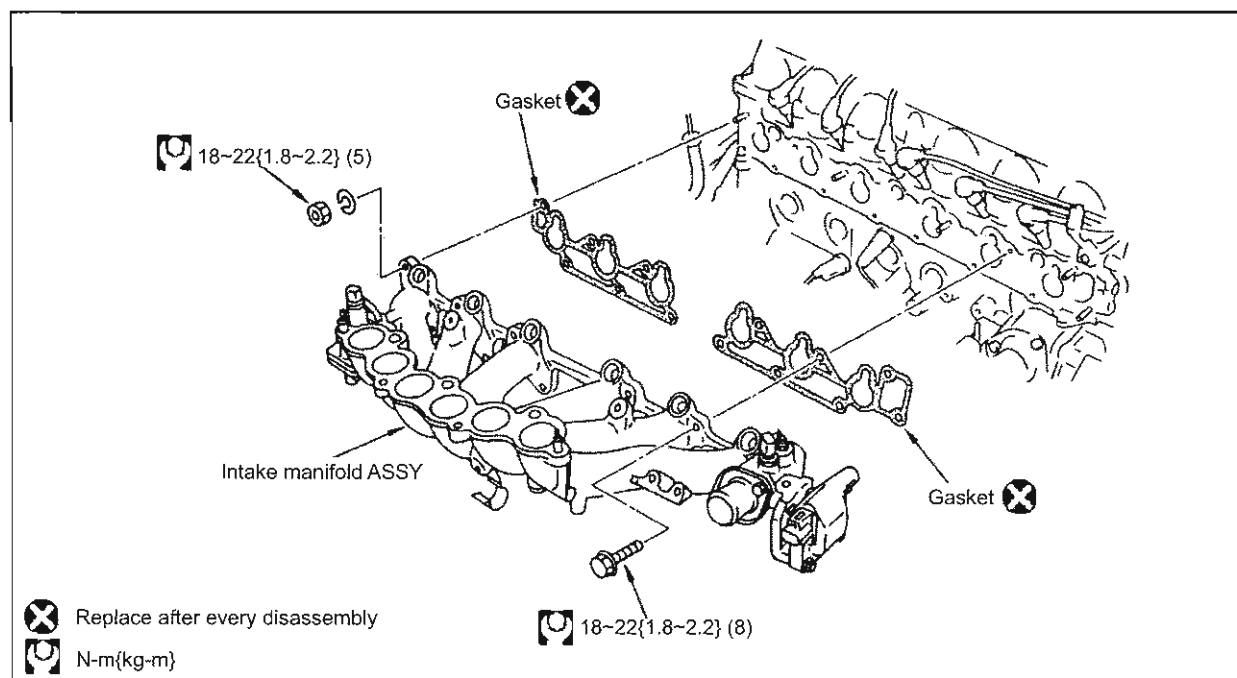


2. Install the fuel injector to fuel tube.
 - Replace the insulator (up & down) with a new one.
 - Replace the o-ring with a new one.
3. Install the fuel tube and the injector ASSY.
 - Tighten right and left evenly.

Tightening torque (N-m{kg-m}) 9.8~12{1.0~1.2}
4. Fuel sub tube installation bolts.

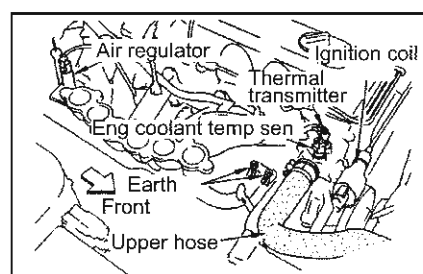
Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}
5. Install fuel injector harness connector.
6. Install fuel feed and return hose to fuel tube.
 - Install feed hose (fuel filter side hose) to fuel tube bottom side and install return hose to upper side.
7. Place the ignition switch to the ON position and apply pressure to the fuel pipings to check for any fuel leakage.
8. Install the rest in reverse order to the removal procedure.

4. INTAKE MANIFOLD

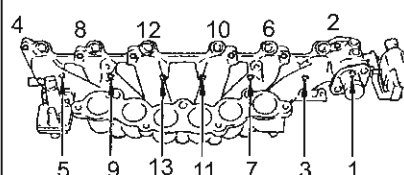


Removal

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. Drain coolant from the radiator drain plug.
4. Drain coolant from the cylinder block drain plug.
5. Remove the air duct and resonator ASSY.
6. Remove the intake manifold collector.
7. Remove the fuel injector.
8. Remove the connector and primary terminal from the ignition coil.
9. Disconnect the thermal transmitter and engine coolant temperature sensor connector.
10. Remove the radiator upper hose from water outlet side.
11. Disconnect the air regulator connector.
12. Disconnect two earth terminals.
13. Remove water hose from the bracket below the intake manifold.
14. Remove the intake manifold.
 - Remove installation bolts and nuts in the order shown in the diagram on the right.
15. Remove the intake manifold gasket.



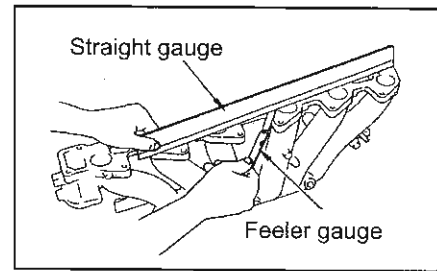
Nut: 1, 2, 4, 10, 12
Bolt: 3, 5, 6, 7, 9, 11, 13



Inspection

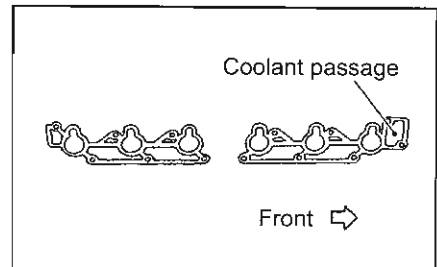
Distortion of the intake manifold

- Use a straight gauge and the feeler gauge to measure the distortion of the front and reverse surface in six directions.
Limit value (mm) 0.1
- If the distortion is over the limit use a surface grinder to repair distortion. Replace the intake manifold if the distortion is too excessive to fix.



Installation

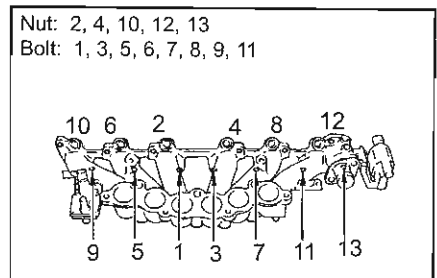
1. Install the intake manifold gasket.
 - Use scraper to remove any gasket or foreign objects etc. adhered to intake manifold and cylinder head installation surface.
 - Clean the surface using white gasoline.
 - Replace the gasket with a new one.
 - Make sure the coolant passage way is facing the front when installing the gasket.



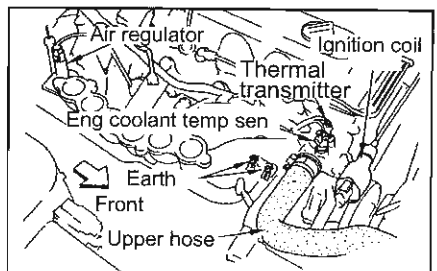
2. Install the intake manifold.
 - Tighten the installation bolts and nuts uniformly in several stages in order shown in the diagram on the right.

Tightening torque (N-m{kg-m}) 18~22{1.8~2.2}

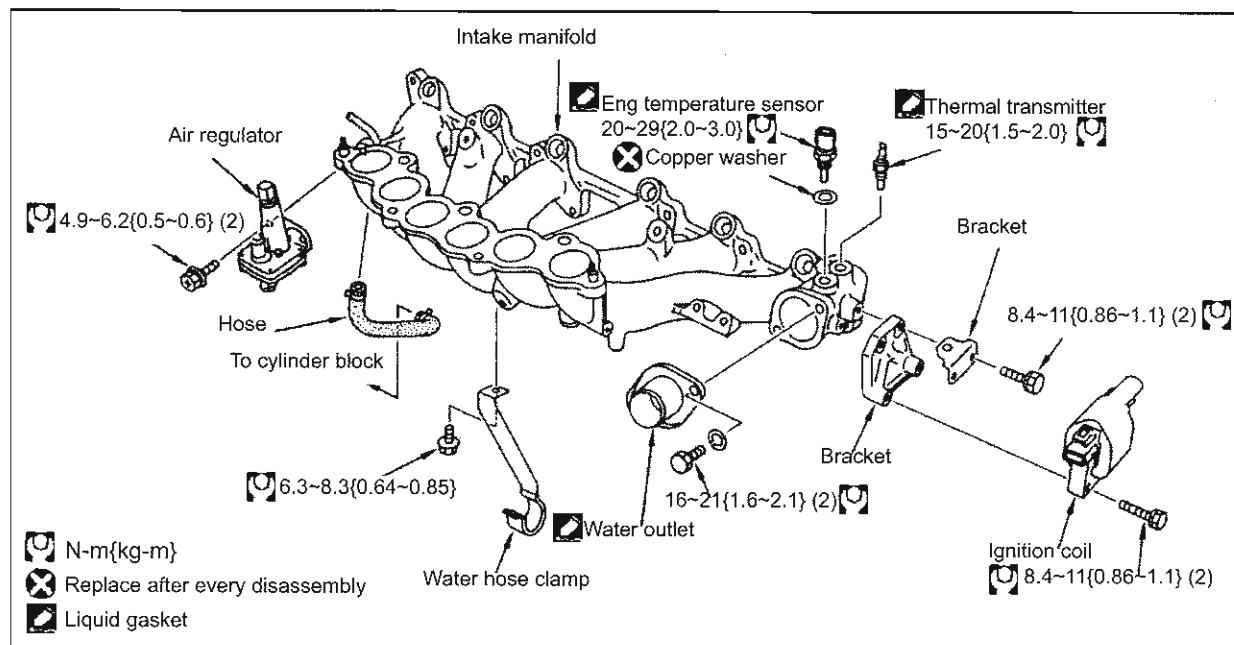
3. Install the water hose to the bracket below intake manifold.
4. Connect two earth terminals.



5. Install the air regulator connector.
6. Install the radiator upper hose to water outlet.
7. Install the engine coolant temperature sensor and thermal transmitter connector.
8. Install the connector and primary terminal to the ignition coil.
9. Install the rest in reverse order to the removal procedure.



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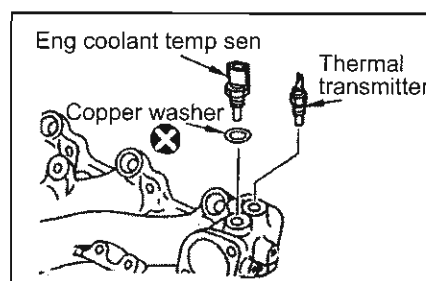
**Disassembly**

1. Remove the water outlet.
2. Remove the ignition coil.
3. Remove the ignition coil bracket.
4. Remove the thermal transmitter and water temperature sensor.
5. Remove the air regulator.

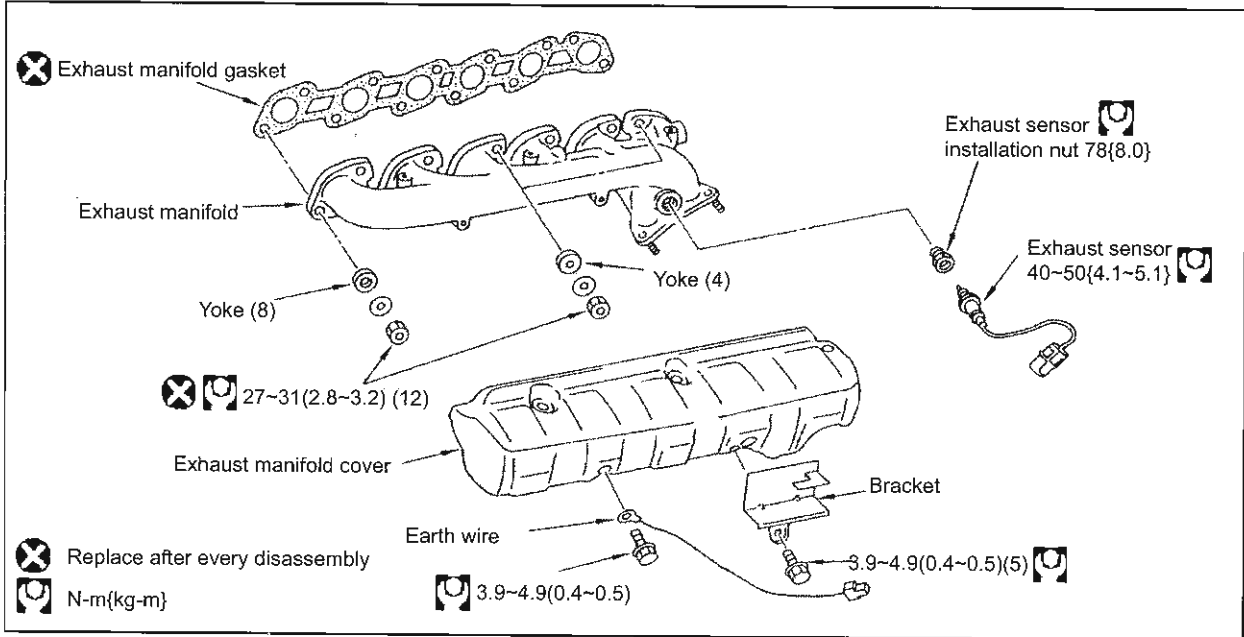
Assembly

1. Install the air regulator.
Tightening torque (N-m{kg-m}) 4.9~6.2{0.5~0.6}
2. Install the thermal transmitter and the water temperature sensor.
 - Replace the engine coolant temperature sensor copper washer with a new one.
 - Apply sealing agent to thread part and tighten to specified torque.

Thermal transmitter	
Tightening torque (N-m{kg-m})	15~20{1.5~2.0}
Engine coolant temperature sensor	
Tightening torque (N-m{kg-m})	20~29{2.0~3.0}
3. Install the ignition coil bracket.
Tightening torque (N-m{kg-m}) 8.4~11{0.86~1.1}
4. Install the ignition coil.
Tightening torque (N-m{kg-m}) 8.4~11{0.86~1.1}
5. Install the water outlet.

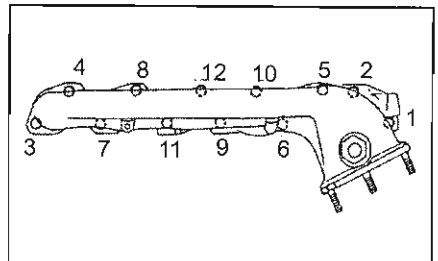
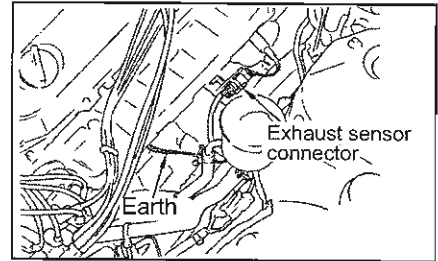


5. EXHAUST MANIFOLD



Removal

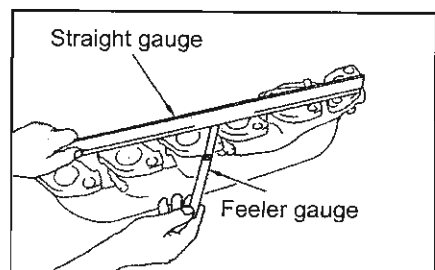
1. Remove the battery negative terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove air duct and resonator ASSY.
3. Remove the exhaust front tube from exhaust manifold.
4. Remove the exhaust sensor connector.
5. Disconnect earth wire from the exhaust manifold cover side.
6. Remove the exhaust manifold cover.
7. Remove the exhaust sensor.
 - Care must be taken not to cause any damage to the exhaust sensor.
8. Remove the exhaust manifold.
 - Remove the installation nuts in the order shown in diagram on right.
9. Remove the exhaust manifold gasket.



Inspection

Distortion of exhaust manifold

- Use a scraper to remove gasket on the installation surface.
- Use a straight gauge and feeler gauge to measure the installation surface distortion in four directions.
Limit value (mm) 0.3
- If the distortion is over the limit use the surface grinder to repair distortion. Replace the exhaust manifold if the distortion is too excessive to fix.



Installation

1. Install exhaust manifold gasket.

- Use the scraper to remove gasket and other foreign object from exhaust manifold and cylinder head installation area.
 - Clean the installation surface with white gasoline.

- When installing the stud bolt, make sure the stud bolt with shorter thread side if on the cylinder head side.
 - Replace the gasket with a new one.
 - Install the gasket in the correct direction shown.
2. Install exhaust manifold.

There are No. 3, No.4 for port (4) and non-port (12) yokes. Make sure to use correct yoke for each parts.

Diameter ΦD (mm)

No. 3, No. 4 port

22

No. 1, 2, 5, 6 port

24

- Install the washer in the direction shown.

3. Install the exhaust manifold cover.

Tightening torque (N-m{kg-m})

3.9~4.9{0.4~0.5}

4. Install exhaust front tube.

- Replace the installation nuts with a new one.
 - Tighten the installation nuts in the order shown in the diagram on the right.

Tightening torque (N-m{kg-m})

27~31{2.8~3.2}

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

6. Install exhaust sensor.

Tightening torque (N-m{kg-m})

78{8.0}

Exhaust sensor installation nuts

40~50{4.1~5.1}

Exhaust sensor

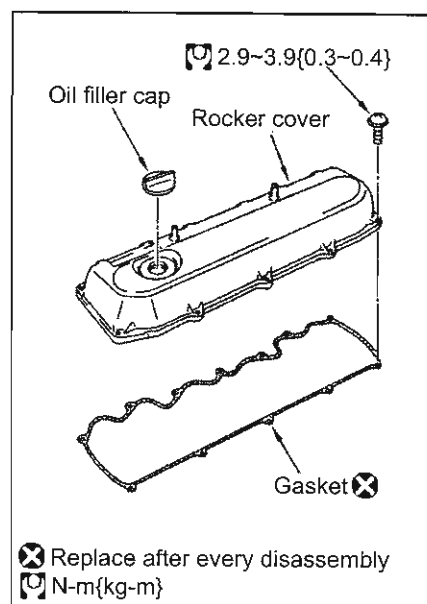
40~50{4.1~5.1}

EN-77

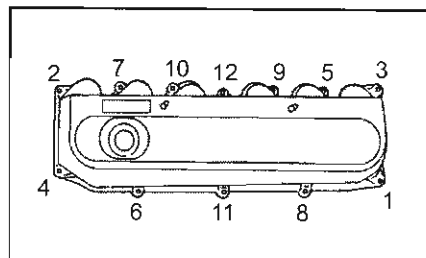
6. ROCKER COVER

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 air duct and resonator ASSY.
3. Remove the blowby hose.



4. Remove installation screws in order shown in the diagram on the right.
5. Remove gasket from the rocker cover.

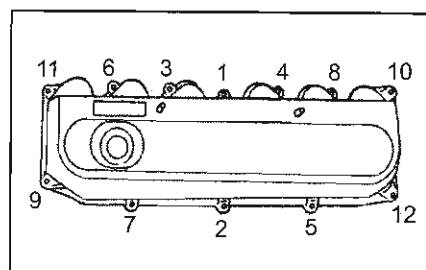


Inspection

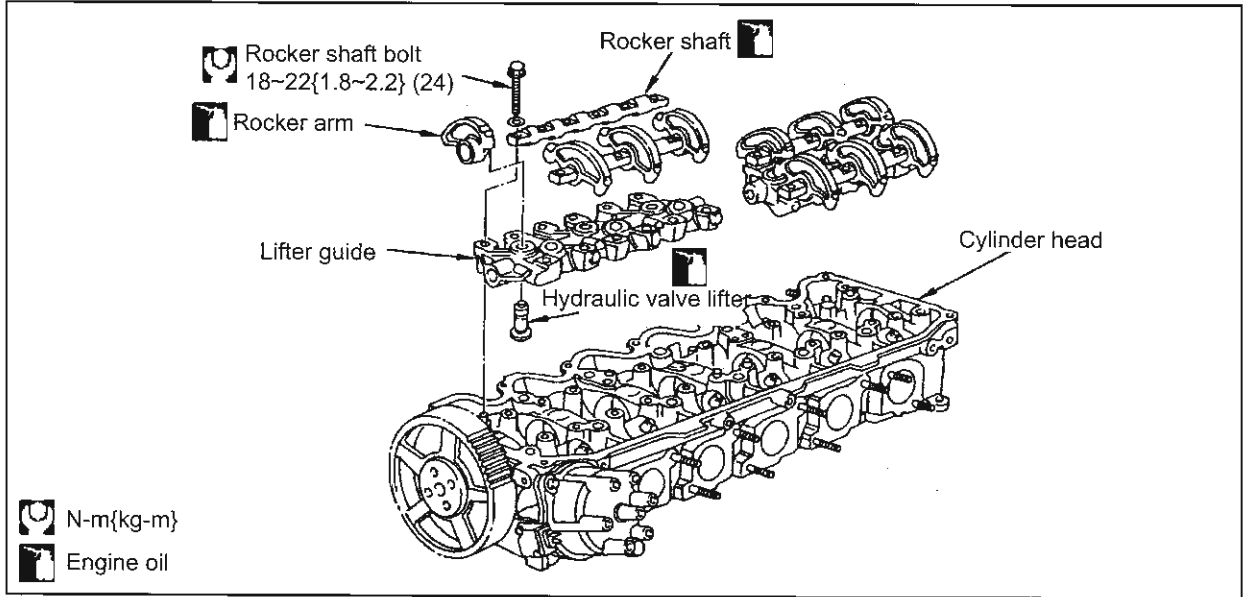
- Check for any cracks, damage or oil leaking from the rocker cover.
- Replace the rocker cover if any abnormality is found.
- Make sure engine oil is not leaking from between the rocker cover and the cylinder head.

Installation

1. Install the gasket to rocker cover.
 - Replace the gasket with a new one.
 - Install the gasket to rocker cover installation groove securely.
2. Install the rocker cover.
 - Remove any oil and rubbish etc. from cylinder head side installation surface.
 - Tighten installation screws in order shown in the diagram on the right.
3. Install the rest in reverse order to the removal procedure.

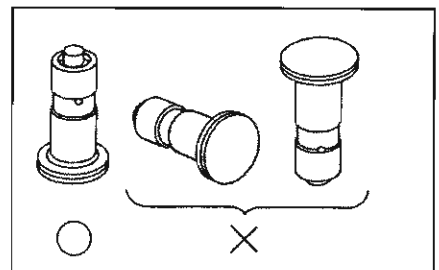
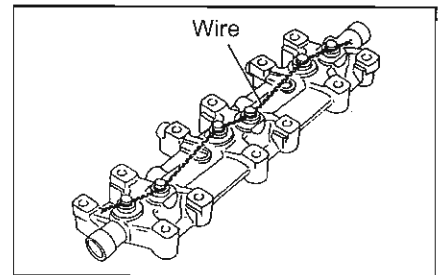


7. ROCKER SHAFT



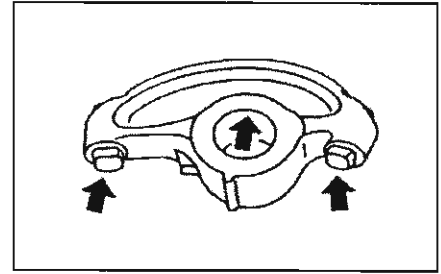
Removal

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 air duct and resonator ASSY.
3. Remove the rocker cover.
4. Remove the rocker shaft and rocker arm ASSY by removing the rocker shaft bolt.
5. Remove the rocker arm from the rocker shaft.
 - Check the installation position and store it away to avoid confusion.
6. Remove the lifter guide together with hydraulic lifter.
 - Secure each hydraulic valve lifter with wire etc. and remove carefully without dropping.
7. Remove the hydraulic valve lifter from the lifter guide.
 - Check the installation position and store it away 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 hydraulic valve lifter.



Inspection**Rocker shaft visual inspection**

- Visually inspect rocker arm rotational part for any wear or damage.
- If there are any abnormalities replace with a new one.

**Rocker arm visual inspection**

- Visually inspect rocker arm and rotational part for any wear or damage.
- If there are any abnormalities replace with a new one.

Rocker arm oil clearance

(Rocker shaft external diameter)

- Use micrometer to measure the external diameter near the rocker shaft oil groove.

Standard value (mm) $\Phi 17.979 \sim 18.000$

(Rocker arm internal diameter)

- Use inside micrometer to measure the internal diameter of the rocker arm shaft hole.

Standard value (mm) $\Phi 18.007 \sim 18.028$

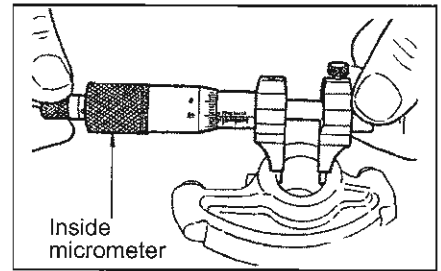
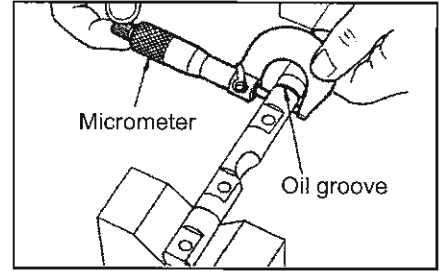
(Rocker arm oil clearance) =

(Rocker arm internal diameter) -

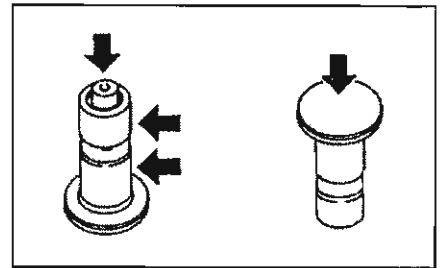
(Rocker shaft external diameter)

Standard value (mm) $\Phi 0.007 \sim 0.049$

- Replace rocker arm or rocker shaft if the standard value is incorrect.

**Hydraulic valve lifter visual inspection**

- Visually inspect cam shaft working surface, lifter surface and guide rotational parts for any wear or damage. Replace with a new one if there are any abnormalities.

**Hydraulic valve lifter clearance**

(Hydraulic valve lifter external diameter)

- Use micrometer to measure the external diameter of hydraulic valve lifter.

Standard value (mm) $\Phi 15.947 \sim 15.957$

(Hydraulic valve lifter hole diameter)

- Use inside micrometer to measure the diameter of hydraulic valve lifter hole diameter.

Standard value (mm) $\Phi 16.000 \sim 16.013$

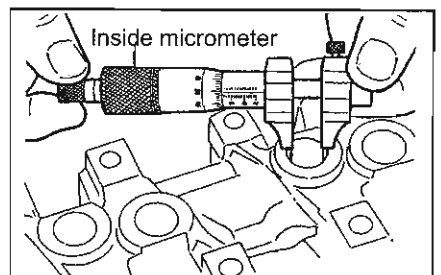
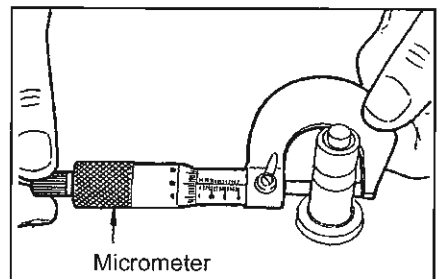
(Hydraulic valve lifter clearance) =

(valve lifter hole diameter) -

(valve lifter external diameter)

Standard value (mm) $\Phi 0.043 \sim 0.066$

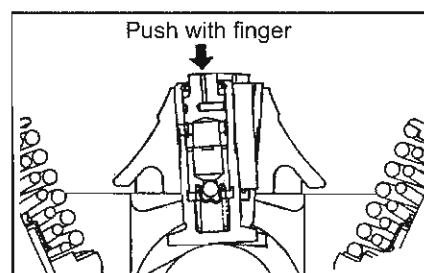
- Replace rocker arm or rocker shaft if the standard value is incorrect.



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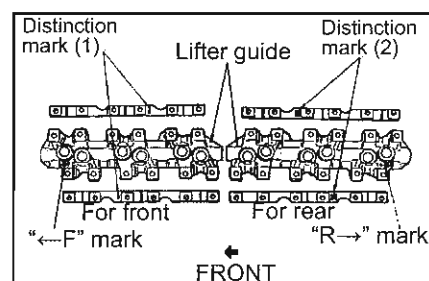
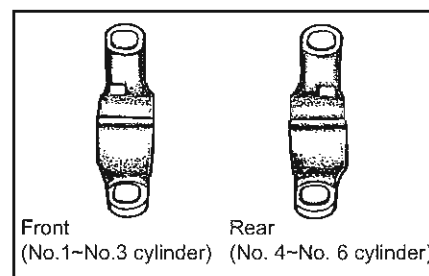
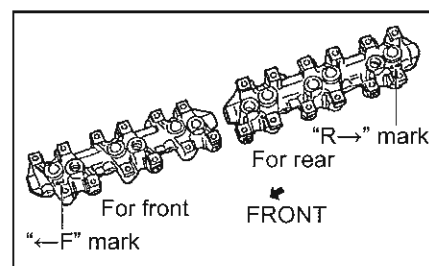
Hydraulic valve lifter air interfusion inspection

- Apply engine oil to rotational surface to install.
 - After installation push down on the plunger head. If it moves more than 1mm carry out the air release operation using 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 plunger head movement.
 - (2) If the air is not released by carrying out above method, replace the hydraulic valve lifter with a new one.



Installation

1. Install the hydraulic valve lifter to the lifter guide.
 - Apply engine oil to rotational parts.
 - Install parts back in same position as before removal and fix using wire etc. to avoid them falling into the engine bay.
2. Install the lifter guide.
 - The front (No. 1~3 cylinders) and the rear (No. 4~6 cylinders) can be distinct by molded mark F and R. Make sure the molded marks are facing correct direction as shown in the diagram on the right.
3. Install rocker arm to the rocker shaft.
 - Apply engine oil to rotational parts, the valve lifter and the valve stem contact part.
 - Install them back in same position.
 - The front (No. 1~3 cylinders) and the rear (No. 4~6 cylinders) rocker arm are shaped different. Care must be taken to place them correctly.
- The front (No. 1~3 cylinders) and the rear (No. 4~6 cylinders) rocker shaft are shaped different. They can be distinct by distinction mark.
4. Install the rocker shaft and the rocker arm ASSY.
 - Check the front and rear before installing.
 - When installing the rocker shaft make sure the cylinder head bolt installation notch is facing out.

Caution:

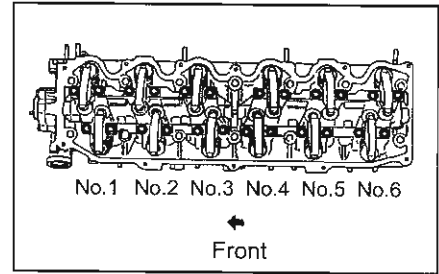
Do not completely tighten the rocker shaft bolts.

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5. Tighten rocker shaft bolts.

- Use the following method to tighten the rocker shaft bolts uniformly.

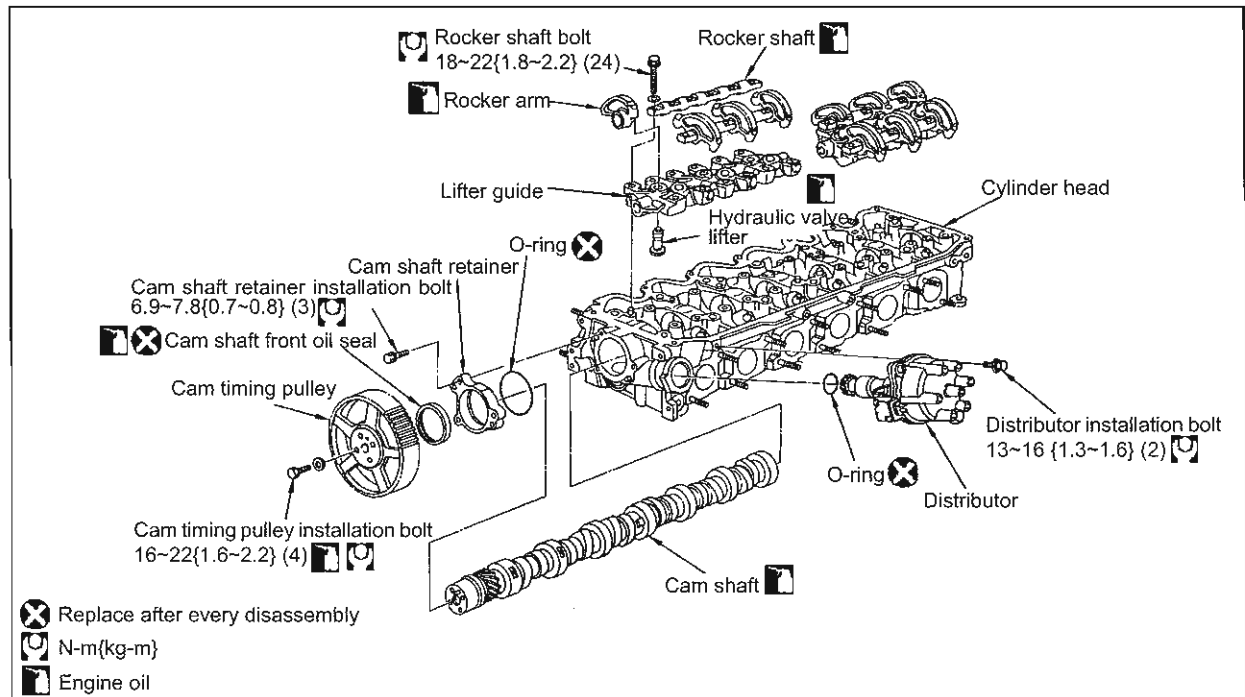
- (1) Position No.1 cylinder at T.D.C (top dead centre) position.
- (2) Tighten No.4~6 cylinder rocker shaft bolts.
Tightening torque (N-m{kg-m}) 18~22{1.8~2.2}
- (3) Position No.6 cylinder at T.D.C by turning the crankshaft once.
- (4) Tighten No.1~3 cylinder rocker shaft bolts.
Tightening torque (N-m{kg-m}) 18~22{1.8~2.2}



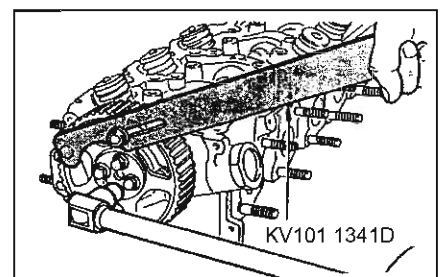
6. Make sure there is no trapped air inside the hydraulic valve lifter.
7. Install the rest in reverse order to the removal procedure.
8. Start the engine and make sure there is no abnormal sound from the hydraulic valve lifter.

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8. CAM SHAFT

**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 under cover.
4. Drain coolant from the radiator drain plug.
5. Drain coolant from the cylinder block drain plug.
6. Remove the radiator upper hose and the lower hose from engine side.
7. Remove the air duct and the resonator ASSY.
8. Remove the intake manifold collector.
9. Remove the fuel injector.
10. Remove the intake manifold.
11. Remove the exhaust front tube.
12. Remove the exhaust manifold.
13. Remove the cooling fan.
14. Remove the radiator.
15. Remove the auxiliary belt.
16. Remove the timing belt.
17. Remove the rocker cover.
18. Remove the cylinder head.
19. Remove the distributor.
20. Remove the rocker shaft and the rocker arm ASSY.
21. Remove the lifter guide.
22. Remove the cam timing pulley.
 - Use pulley holder to fix the cam timing pulley to remove the installation bolts.
23. Remove the cam shaft retainer.



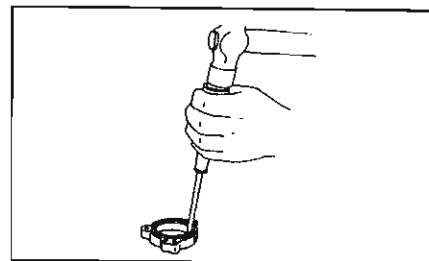
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24. Remove front oil seal from the cam shaft retainer.

- Use negative driver to remove oil seal from the cam shaft retainer.

25. Remove the cam shaft.

- Carefully remove journal and the cam from the cylinder head, making sure they will not touch the cam shaft bracket.



Inspection

Cam shaft visual inspection

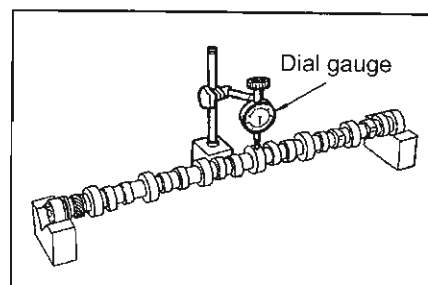
- Check to make sure there is no damage or wear to the cam shaft.
- Replace if any abnormalities are found.

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.
- Cam shaft run-out is equal to half of movement width indicated on dial gauge.

Limit value (mm) 0.01

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



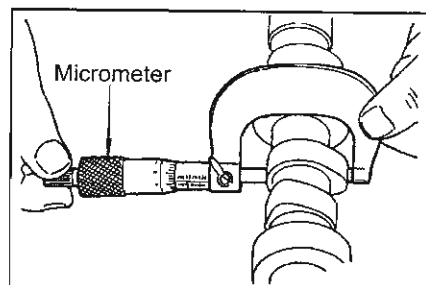
Cam nose height

- Use micrometer to measure cam nose height.

Standard value (mm)	Intake	39.242~39.432
	Exhaust	39.123~39.313

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)

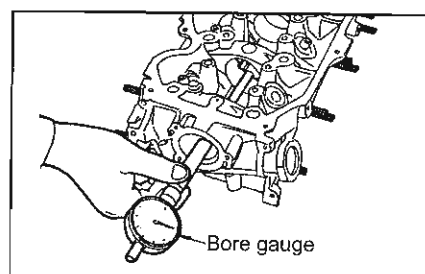
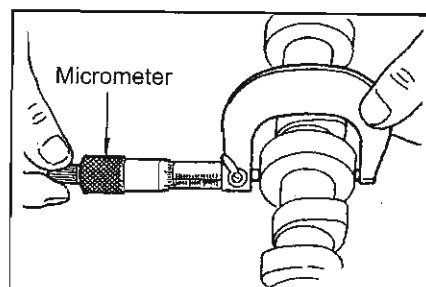
- Use micrometer to measure cam journal external diameter.

Standard value (mm)	
(No.1~No.6 journal)	$\Phi 46.935 \sim \Phi 47.025$
(No.7 journal)	$\Phi 46.415 \sim \Phi 46.435$

(Cam bracket internal diameter)

- Use bore gauge to measure.

Standard value (mm)	
(No.1~No.6 journal)	$\Phi 47.000 \sim \Phi 47.025$
(No.7 journal)	$\Phi 46.500 \sim \Phi 46.525$



RB20E ENGINE

(Cam oil clearance) =

(Cam bracket internal diameter) -
(Cam journal external diameter)

Standard value (mm)

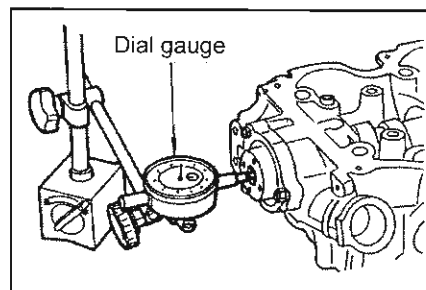
(No.1~No.6 journal) 0.045~0.090

(No.7 journal) 0.056~0.110

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

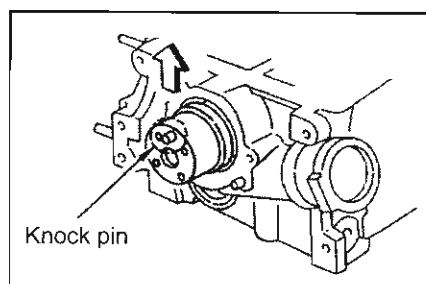
Cam shaft end play

- 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) 0.030~0.060
- 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.



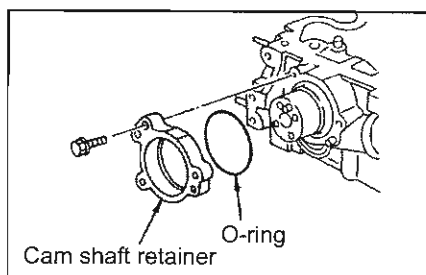
Installation

1. Install the cam shaft.
 - Apply engine oil to cam nose and the cam journal.
 - When installing make sure the knock pin on front side of the cam shaft is facing upwards.
 - Insert the journal and the cam straight so that it will not interfere with cam bracket.



2. Install the cam shaft retainer.
 - If the cam shaft front oil seal has been removed, install the retainer without attaching the oil seal at this stage.
 - Replace the O-ring with a new one.

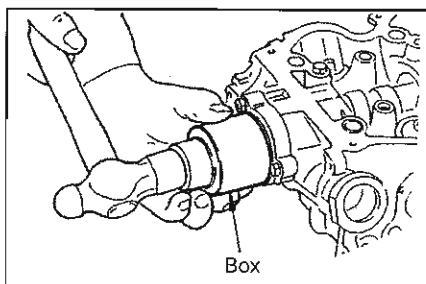
Tightening torque (N-m{kg-m}) 6.9~7.8{0.7~0.8}



3. Install the cam shaft front oil seal.
 - Apply engine oil to oil seal lip area.
 - Carefully tap in the oil seal using 41mm box etc. until level with retainer front surface.

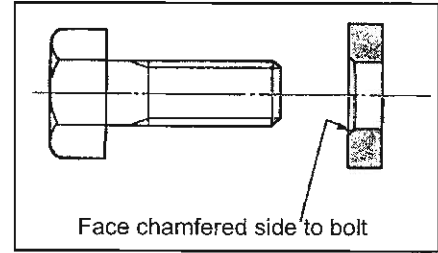
Caution:

Do not tap the oil seal too hard as it will block retainer oil return.



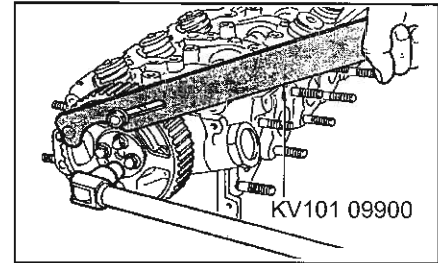
RB20E ENGINE

4. Install cam timing pulley.
 - When installing the washer face the side with chamfered internal diameter to bolt side.
 - Apply engine oil to installation bolt thread part.



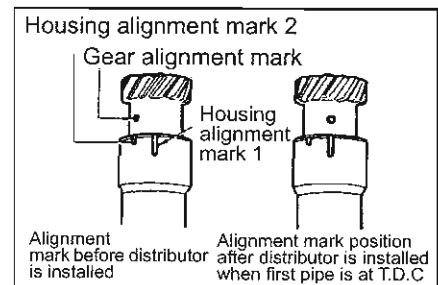
5. Use pulley holder to fix the cam timing pulley and tighten the bolts.

Tightening torque (N-m{kg-m}) 16~22{1.6~2.2}



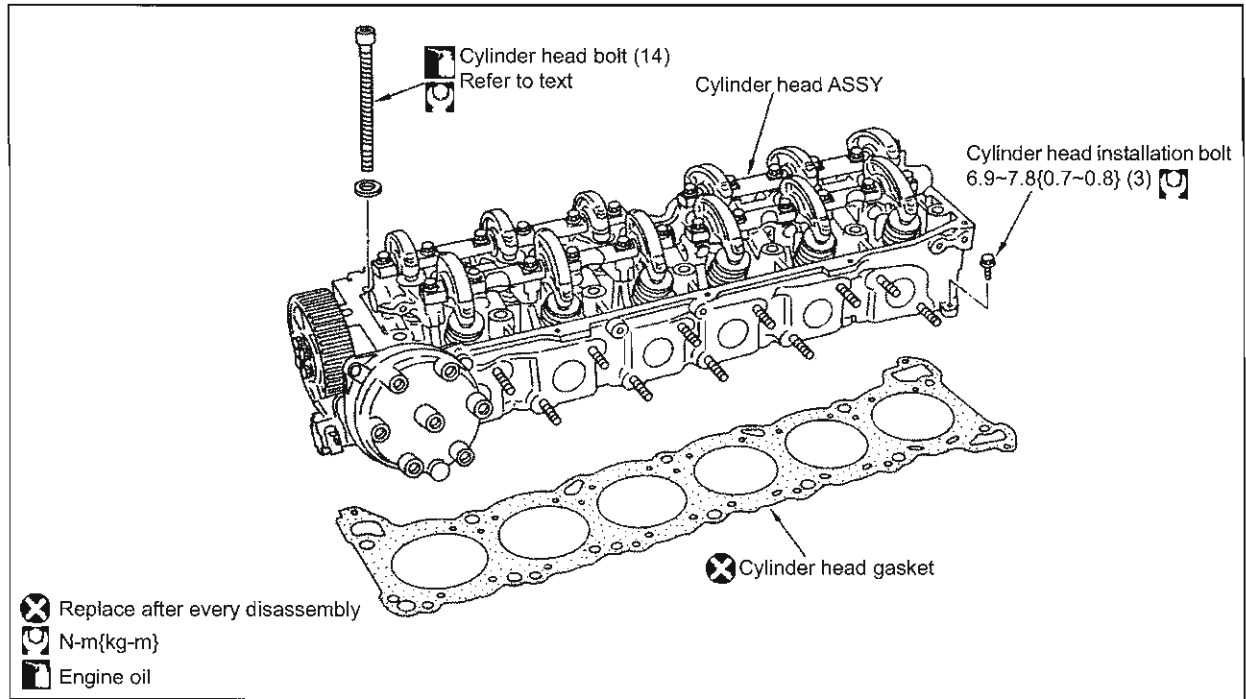
6. Install the distributor.
 - Replace the o-ring with a new one.
 - Make sure No.1 cylinder is at compression T.D.C position.
 - Install the distributor driven gear by aligning the distributor driven gear alignment mark to small housing side alignment mark.

Tightening torque (N-m{kg-m}) 13~16{1.3~1.6}



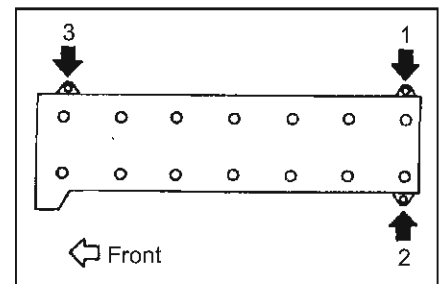
7. Install the rest in reverse order to the removal procedure.

9. CYLINDER HEAD GASKET



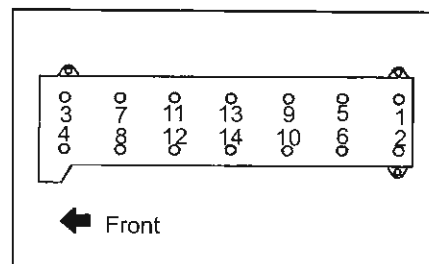
Removal

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 under cover.
4. Drain coolant from the radiator drain plug.
5. Drain coolant from the cylinder block drain plug.
6. Remove the radiator upper hose and the lower hose from engine side.
7. Remove the air duct and the resonator ASSY.
8. Remove the intake manifold collector.
9. Remove the fuel injector.
10. Remove the intake manifold.
11. Remove the exhaust front tube.
12. Remove the exhaust manifold.
13. Remove the cooling fan.
14. Remove the radiator.
15. Remove the auxiliary belt.
16. Remove the timing belt.
17. Remove the rocker cover.
18. Remove the cylinder head ASSY.
 - Remove the cylinder head auxiliary bolts in the order shown.



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- Remove the cylinder head bolts in the order shown.
19. Remove the cylinder head gasket.

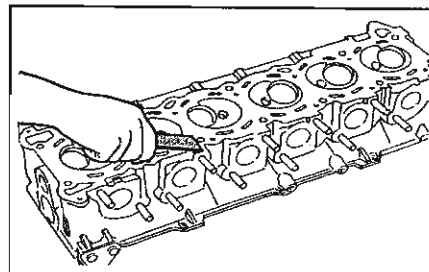
**Inspection**

Cylinder head distortion

- Use a scraper to remove gasket.

Caution:

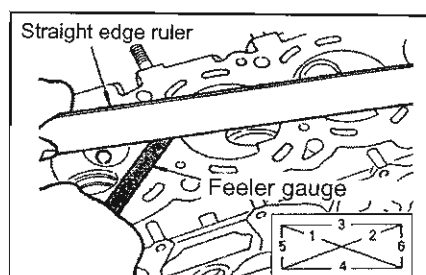
Care must be taken not to allow removed gasket to enter oil and coolant passage.



- Measure cylinder head under surface for distortion in six directions.

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.



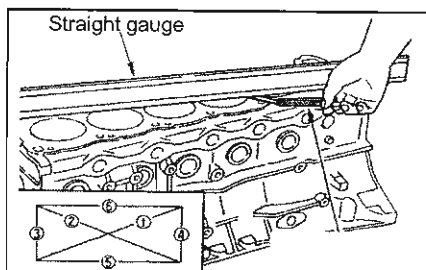
Cylinder block top surface distortion

- Use the scraper to completely remove gasket, oil, water stains and carbon etc. on the 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 straight gauge.
- Limit value (mm) 0.1
- If the value is over the limit use a surface grinder to correct the distortion.
 - Replace the cylinder block if the distortion value is too great.

**Installation**

- Install the cylinder head gasket.
- Replace the gasket with a new one.
 - Use a scraper to remove gasket and other foreign objects from cylinder block side and cylinder head side installation surface.

Caution:

Care must be taken not to allow foreign objects to enter oil and coolant passage.

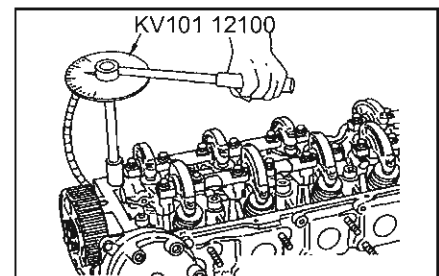
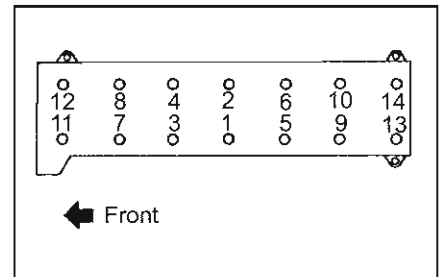
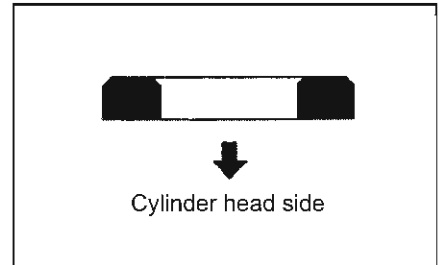
- Clean the surface using white gasoline.
- Install the gasket aligning to knock pin.

RB20E ENGINE

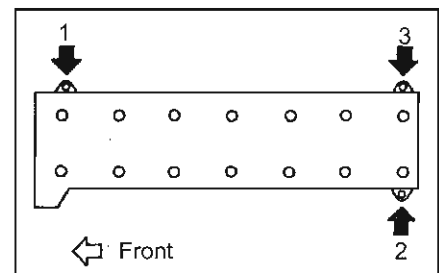
2. Install the cylinder head.
 - Make sure the No.1 cylinder head is at T.D.C position.
 - Check that No.1 cylinder intake and exhaust valve is not raised.
 - Install the cylinder head carefully trying not to damage the cylinder head gasket.
3. Tighten the cylinder head bolts.
 - Apply engine oil to thread part and bearing surface.
 - Install the washer with non-chamfered side facing the cylinder head.
4. Tighten the cylinder head bolts in order shown in the diagram to the right.
 - (1) Tighten to 29N-m{3kg-m}
 - (2) Tighten to 78N-m{8kg-m}
 - (3) Loosen to 0N-m{0kg-m}
 - (4) Tighten to 25~34N-m{2.5~3.5kg-m}
 - (5) Tighten to 100° ~ 105°. If you don't have an angle wrench tighten to 78~88N-m{8.0~9.0kg-m}

Caution:

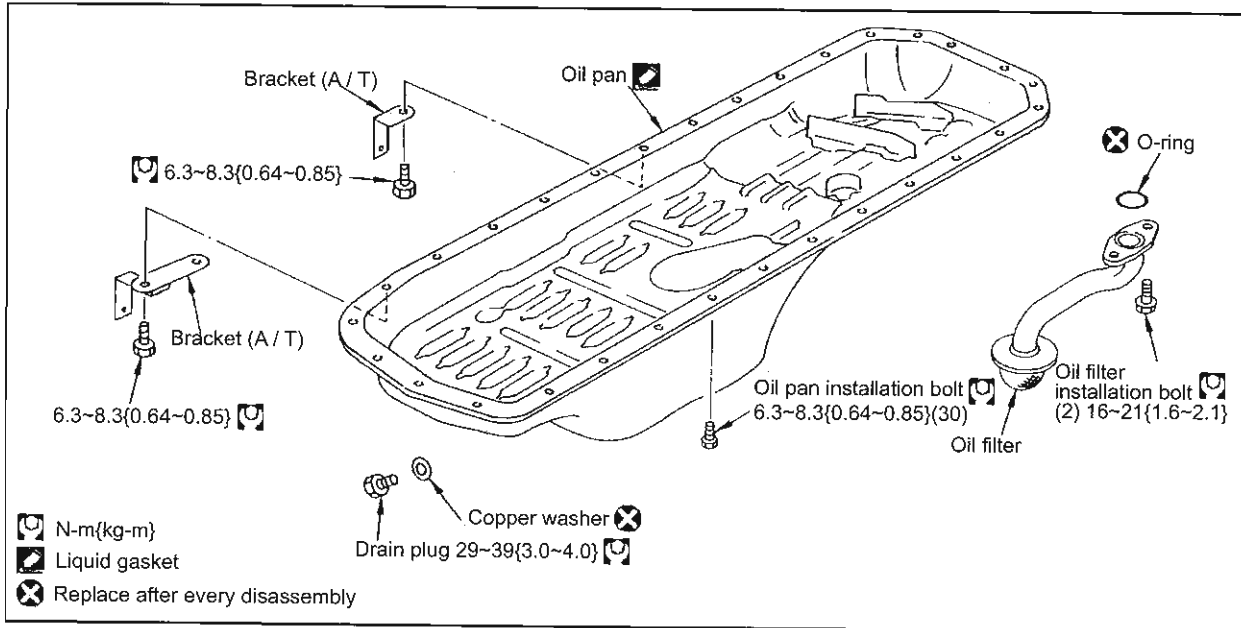
Rotation angle should be checked using angle wrench or protractor. Never estimate visually.



5. Tighten the cylinder head auxiliary bolts in the order shown in the diagram to the right.
6. Install the rest in reverse order to the removal procedure.

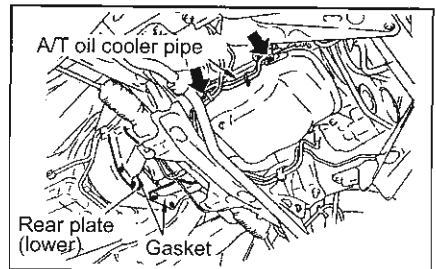
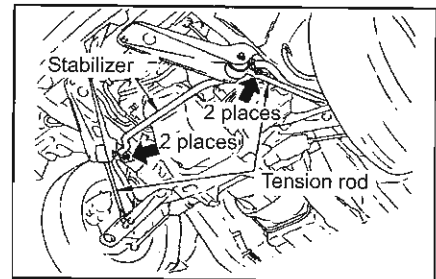


10. OIL PAN & OIL FILTER

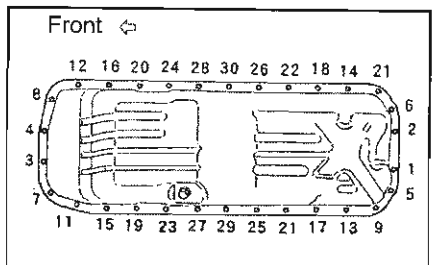


Removal

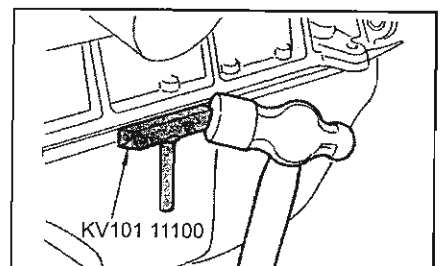
1. Remove the battery negative terminal.
- (1) Open the boot lid.
- (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove the under cover.
3. Drain engine oil from the oil pan drain plug.
4. Remove the tension rod.
5. Remove the stabilizer. OR remove stabilizer installation bolts and installation nuts located on the vehicle side and lower the stabilizer to below the oil pan.
6. Remove A / T oil cooler tube from the oil pan bracket.
7. Remove right and rear gasket.
8. Remove the lower rear plate (A / T vehicles).
9. Remove right and left front side engine mount installation nuts.
10. Attach a sling to the engine and raise using a hoist.



11. Remove installation bolts in the order shown in the diagram to the right.



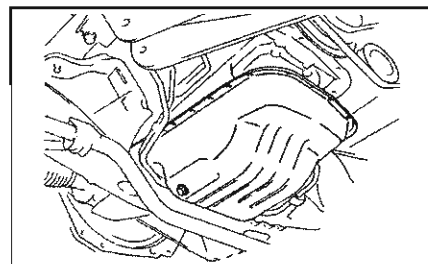
12. Remove oil pan from the cylinder block.
- (1) Insert seal cutter between the oil pan and the cylinder block.
- (2) Tap the seal cutter rear surface using a hammer to remove the oil pan.



13. Remove oil pan.

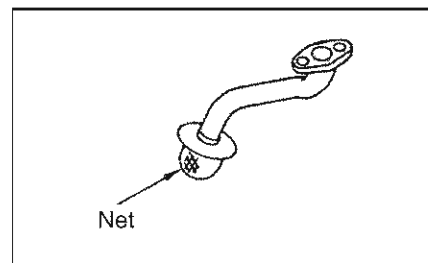
- Remove the oil pan carefully making sure it will not interfere with oil filter net area.

14. Remove the oil filter.

**Inspection**

Oil filter visual inspection

- Check that there are no foreign objects on the oil filter net.
- Clean the net if there are any foreign objects.
- Replace with new one if there are any fault.

**Installation**

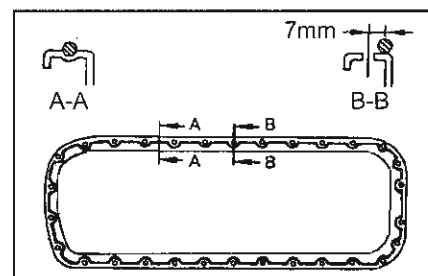
1. Install the oil filter.

- Replace the o-ring with a new one.

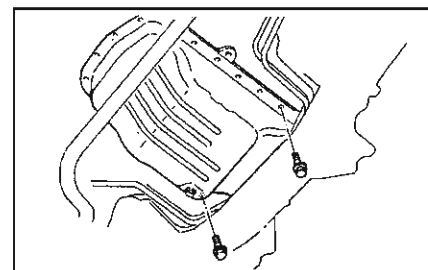
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

2. Install the oil pan.

- Use scraper to remove any oil liquid gasket on the oil pan and cylinder block installation surface.
- Clean the installation surface using white gasoline.
- Apply bond (KP510 00150) to specified position shown in the diagram on right at approx. $\Phi 3.5 \sim 4.5$.



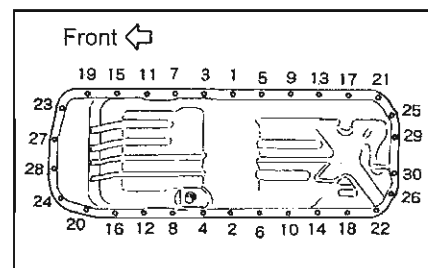
- Place the oil pan below cylinder block. Care must be taken not to allow liquid gasket to come in contact with the cylinder block and other parts.
- Place 2 bolts (M6 x 1.25) at suitable position and tighten temporarily. Install other bolts temporarily.



- Tighten the bolts to specified torque in order shown in the diagram on right.

Tightening torque(N-m{kg-m}) 6.3~8.3{0.64~0.85}

- No. 2 and No. 20 installation bolts will also tighten A / T oil cooler pipings.

**Caution:**

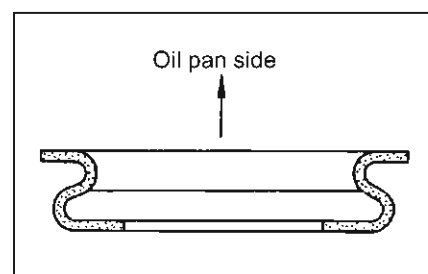
Do not over tighten the installation bolts.

3. Install oil pan drain plug.

- Replace the washer with a new one.
- Install in the direction shown.

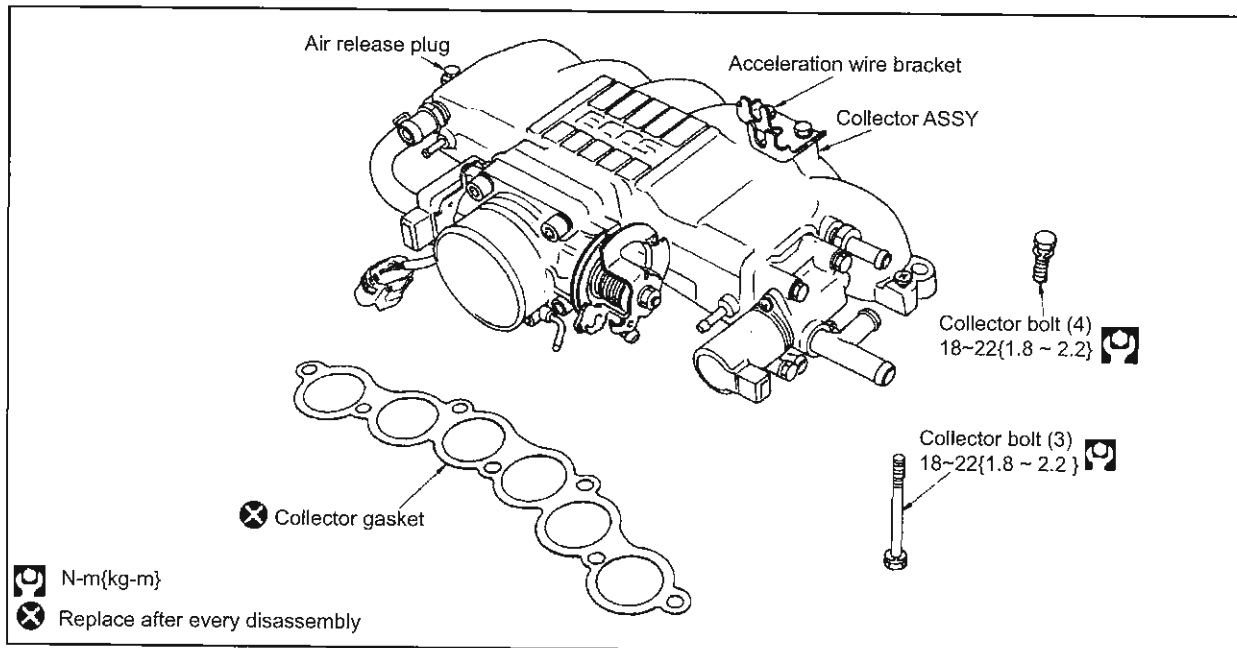
Tightening torque (N-m{kg-m}) 29~39{3.0~4.0}

- 4. Install the rest in reverse order to the removal procedure.

**Inspection**

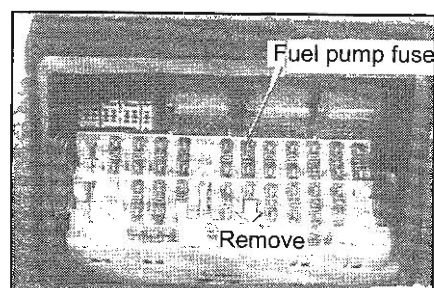
- Check the level of engine oil.

11. COLLECTOR ASSY



Removal

- Release the fuel pressure inside the fuel pipings.
 - Start the engine.
 - After starting the engine remove the fuel pump fuse and wait until the engine stops. Crank the engine two or three times to consume fuel remaining in the fuel pipes.
 - If the vehicle doesn't start, remove the fuel pump and the fuse and crank the engine four to five times to consume fuel remaining in the fuel pipes.



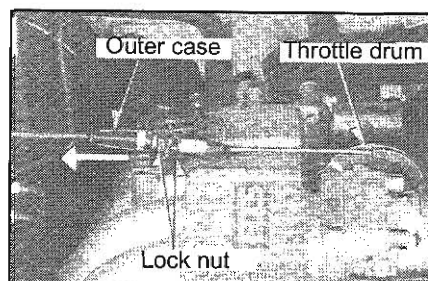
Caution:

The battery may become weak, use booster cable to connect to another battery if necessary.

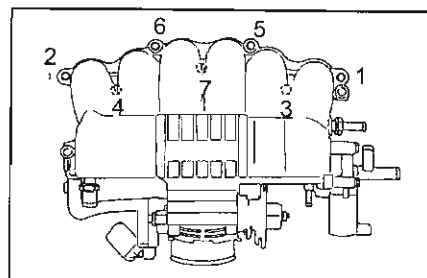
- Accelerator wire adjustment.
 - Provide adequate slack for the acceleration wire and use the lock nut to pull the outer case in the direction of the accelerator pedal.
 - Return the lock nut 1.0 ~ 1.5 turns from the position where the throttle drum starts moving (no play at this time) and tighten securely.

Tightening torque (N-m{kg-m})

8~10{0.8~1.0}



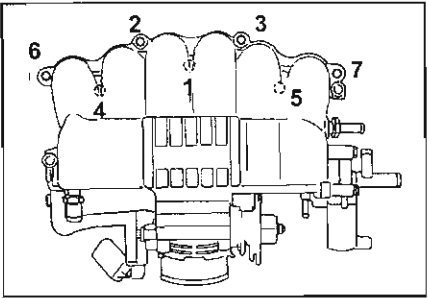
- Remove the collector bolts.
 - Remove the bolts in order shown in the figure on the right.



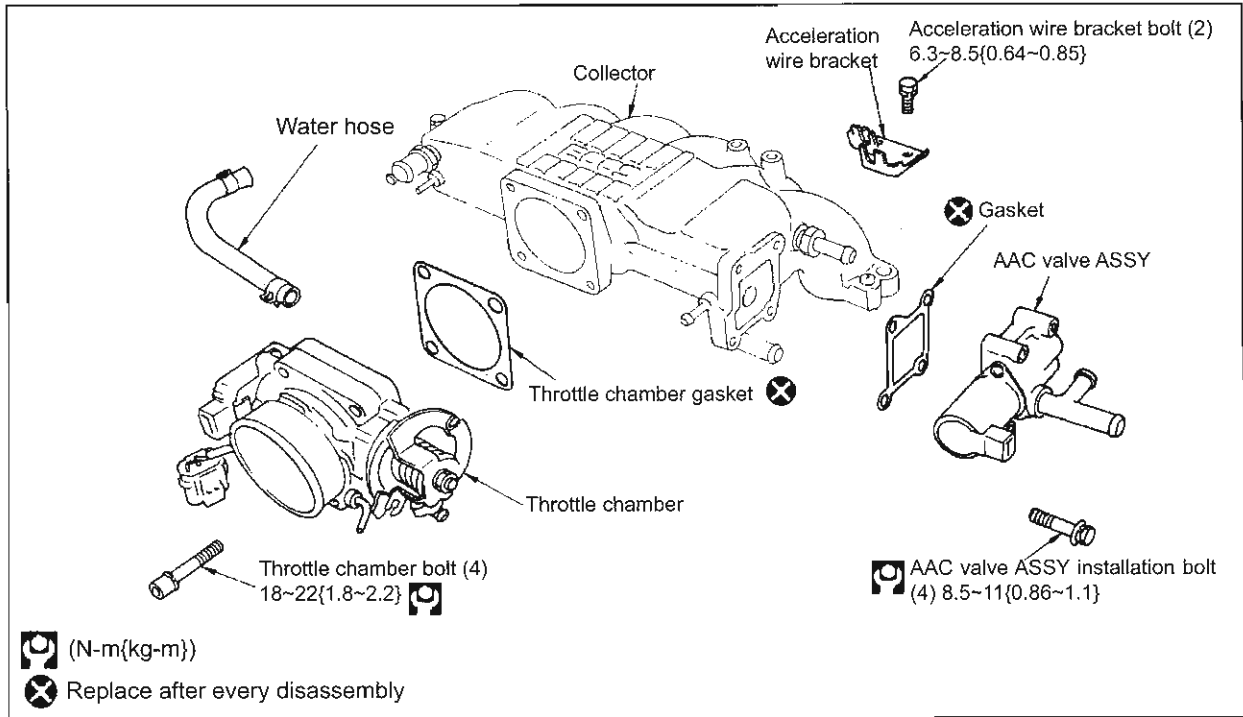
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Installation

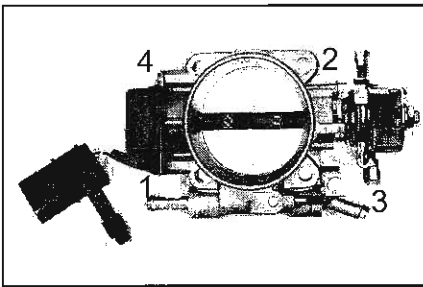
- 1. Install the collector bolts.
- Install the bolts in the order shown in the figure on the right uniformly in two to three stages.



Disassembly

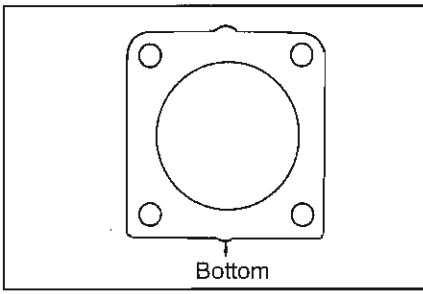


- 1. Remove throttle chamber bolts
- Remove the bolts in the order shown in the figure on the right.

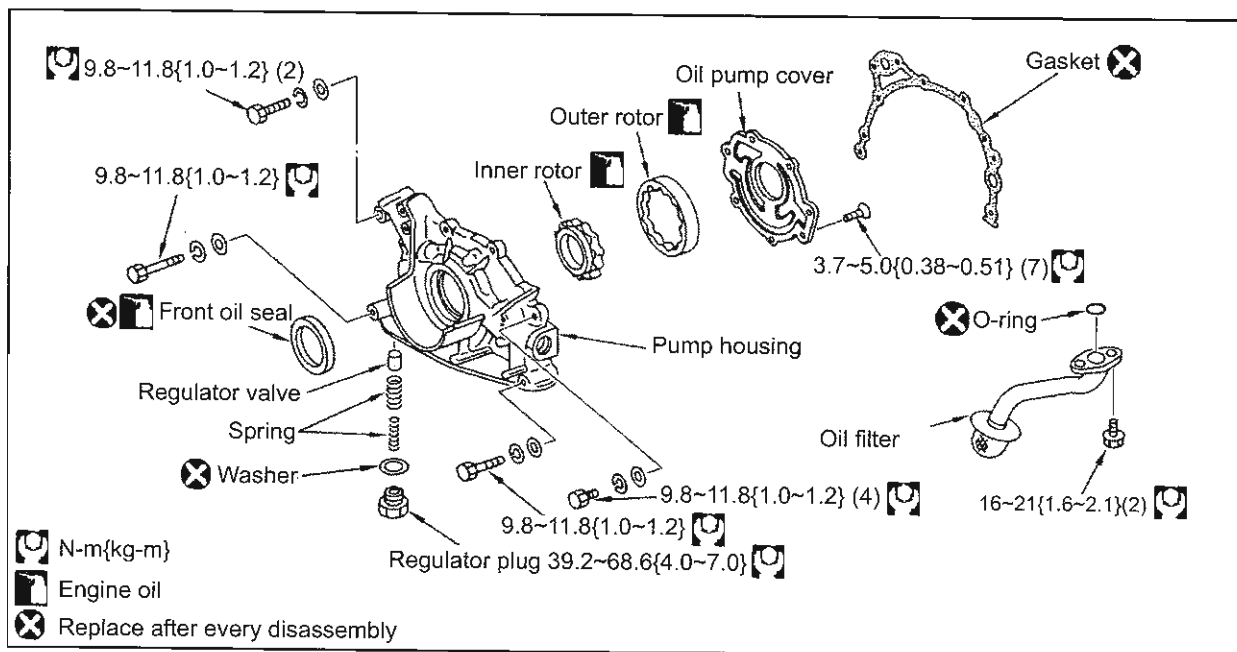


Assembly

- 1. Install the bolts in the order shown in the figure on the right uniformly in two stages.
Tightening torque (N-m{kg-m})
1st stage 9~11{0.9~1.1}
2nd stage 18~22{1.8~2.2}
- 2. Install the throttle chamber gasket.
- When installing the throttle chamber gasket, make sure to install it in the correct direction.



12. OIL PUMP



Removal

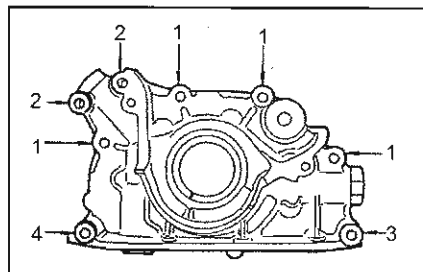
1. Remove the battery negative terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove the under cover.
3. Drain coolant from the radiator drain plug.
4. Drain the engine oil from the oil pan.
5. Remove the air duct (external air introduction side).
6. Remove the cooling fan.
7. Remove the radiator.
8. Remove auxiliary belt.
9. Remove the timing belt.
10. Remove the crank timing pulley.
11. Remove the timing belt rear cover.
12. Remove the oil pan.
13. Remove the oil pump.

Installation

1. Install the oil pump.
 - Use the scraper to remove old gasket from the oil pump and the cylinder block.
 - Use white gasoline to remove grease, water and rubbish from the installation surface.
 - Replace the gasket with a new one.
 - Align to the knock pin on the cylinder block side to install.
 - There are four types of oil pump installation bolts. Make sure to use the correct bolts.

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Installation position	Number	Installation bolt length below head (mm)
1	4	20
2	2	35
3	1	45
4	1	55



Tightening torque (N-m{kg-m}) 9.8~11.8{1.0~1.2}

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

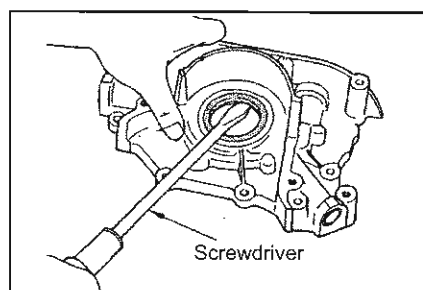
Disassembly

1. Remove the front oil seal.
 - Use a tool such as a screwdriver to remove.

Caution:

Care must be taken not to damage the oil pump housing.

2. Remove the oil pump cover.
3. Remove the inner and outer rotor.
4. Disconnect the regulator plug and remove the spring and the regulator valve.



Inspection

Oil pump visual inspection

- Check for any wear or damage on the inner and outer rotor and the oil pump housing.
- Replace the oil pump ASSY if there is any abnormality.

Oil pump parts clearance inspection

- Use the feeler gauge to check the following clearance.

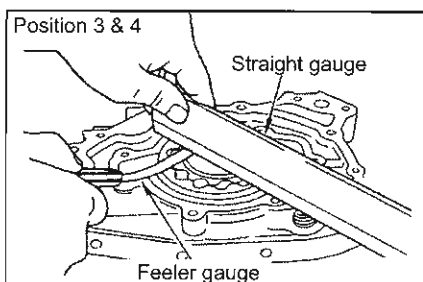
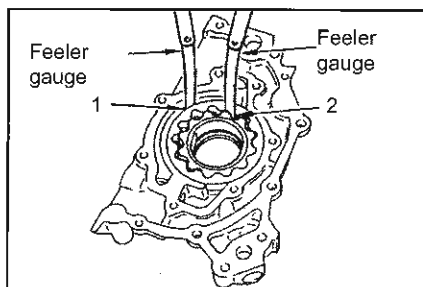
(1) Outer rotor to oil pump housing clearance
Standard value (mm) 0.11~0.2

(2) Outer rotor and inner rotor chip clearance.
Standard value (mm) Below 0.180

(3) Inner rotor to oil pump housing side clearance
Standard value (mm) 0.05~0.07

(4) Outer rotor to oil pump housing side clearance
Standard value (mm) 0.05~0.11

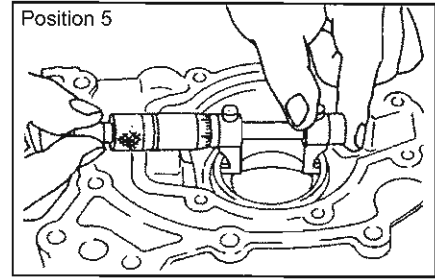
- Replace the oil pump ASSY if any of the measurements are out of standard value.



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(5) Inner rotor to oil pump housing inlow area clearance

- Use the method below to measure the clearance between the inner rotor and oil pump housing inlow area.
- Use the micrometer to measure the oil pump housing inlow inner diameter.



(6) Use the micrometer to measure the inner rotor inlow outer diameter.

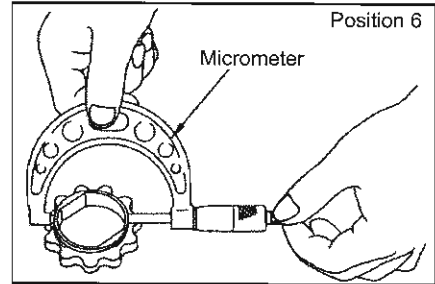
(Inner rotor to oil pump housing inlow area clearance) =

(Oil pump housing inlow inner diameter) -

(Oil pump housing inlow outer diameter)

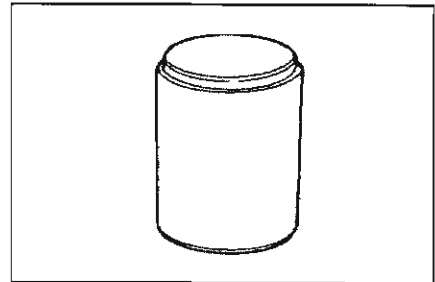
Standard value (mm) 0.045~0.091

- Replace the oil pump ASSY if the measurements are out of standard value.

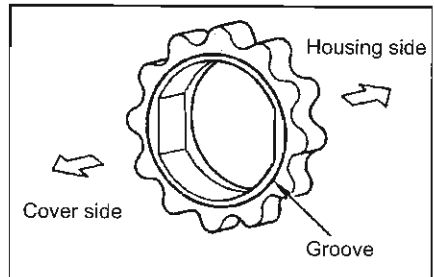


Regulator valve visual inspection

- Check for any wear or damage on the regulator valve rotational parts.
- Check the regulator spring for any abnormality.
- Replace the regulator valve or the oil pump ASSY if there are any faults.

**Assembly**

1. Install the inner and the outer rotor.
 - Apply engine oil to each rotational and moving parts.
 - Position the inner rotor groove to the cover side.



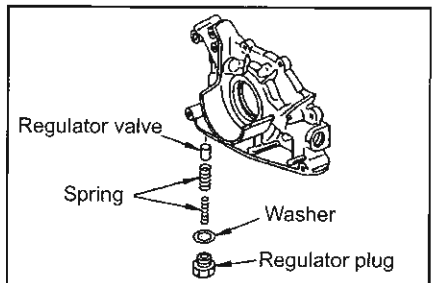
2. Tighten the oil pump cover installation screws equally.

Tightening torque (N-m{kg-m}) 3.7~5.0{0.38~0.51}

3. Install the regulator valve.

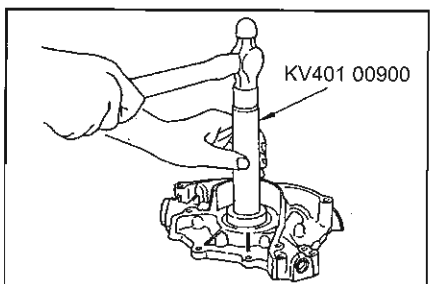
- Apply engine oil to rotational parts.
- Replace the regulator washer with a new one.
- Tighten the regulator plug.

Tightening torque (N-m{kg-m}) 39~69{4.0~7.0}



4. Install the front oil seal.

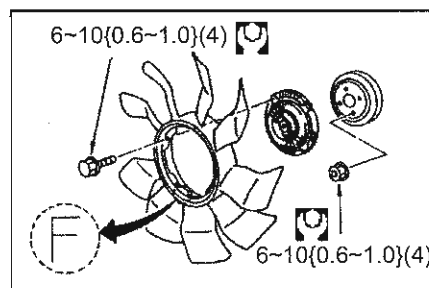
- Replace the oil seal with a new one.
- Check if there is any damage or deformation on oil seal periphery.
- Position the oil seal side with writing towards front.
- Use the oil seal drift to insert the oil seal in until level with installation surface.
- Apply engine oil or chassis grease to oil seal lip surface.



13. COOLING FAN

Removal

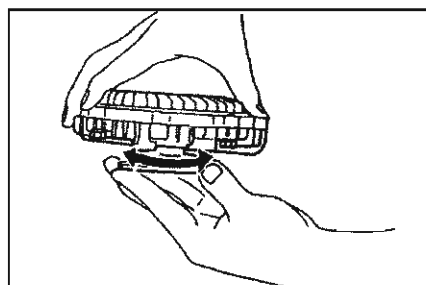
1. Remove the battery negative terminal inside the boot.
2. Remove the air duct.
3. Loosen the cooling fan installation nuts.
4. Loosen the fan belt.
5. Remove the installation nuts to remove the cooling fan.
6. Remove the installation bolts to remove the fan from the cup ring.



Inspection

Cup ring inspection

- Check for any silicon oil leak.



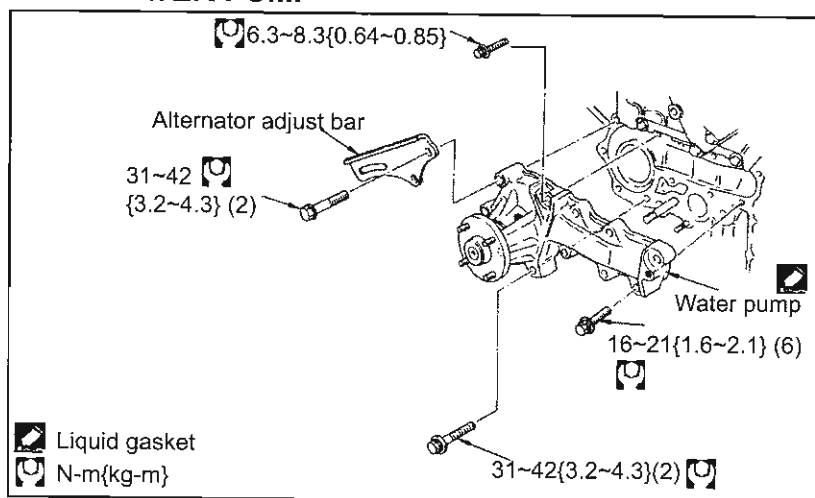
Cooling fan inspection

- Check for any damage or cut.

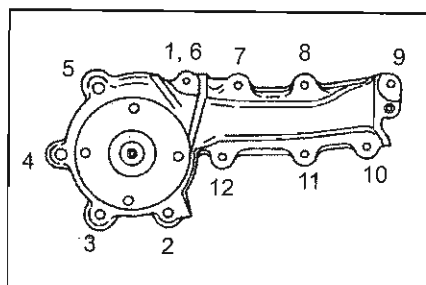
Installation

Install parts in the reverse order to the removal procedure.

- Install the fan to the cup ring making sure the front mark is facing front.
Tightening torque (N·m{kg-m}) 6~10{0.6~1.0}
- Adjust the fan belt tension.

14. WATER PUMP**Removal**

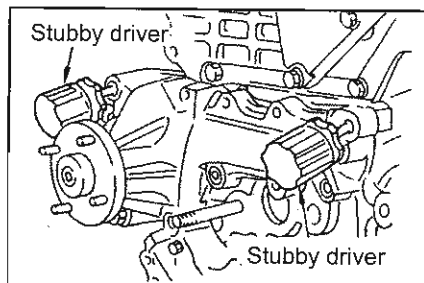
1. Remove the battery negative terminal inside the boot.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove the air duct.
3. Remove the under cover.
4. Drain coolant from the radiator drain plug.
5. Drain coolant from the cylinder block drain plug.
6. Remove the cooling fan.
7. Remove the radiator.
8. Remove the auxiliary belt.
9. Remove the water pump pulley.
10. Remove the timing belt.
11. Remove the tensioner pulley.
12. Remove the alternator adjust bar.
13. Remove the installation bolts in the order shown.
14. Remove the water pump.



- Insert a stubby driver into the installation bolt hole and move it up and down to remove.

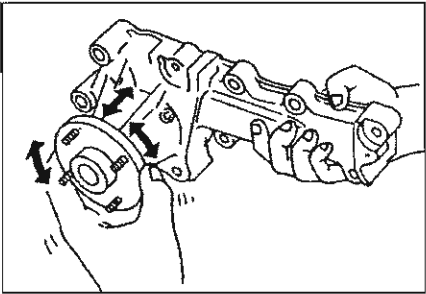
Caution:

Care must be taken not to damage the cylinder block side screws.



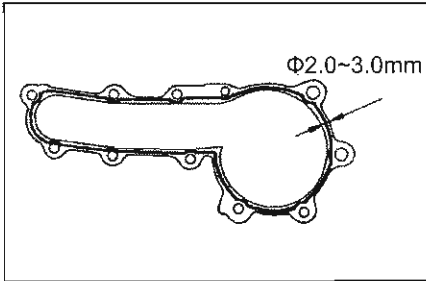
Inspection

- Check the water pump main body and the vane for rust or foreign objects.
- Make sure the water pump is not warpy.
- Replace the water pump if there is any abnormality.

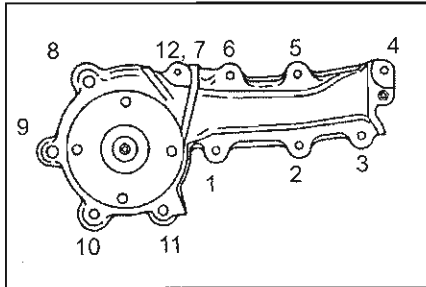


Installation

1. Install the water pump.
- Use a scraper to remove old gasket from the water pump and the cylinder block installation surface.
 - Clean the installation surface with white gasoline.
 - Apply sealing agent (KP710 00150) to the position shown in approx. $\Phi 2.0 \sim 3.0 \text{mm}$.



- Tighten the installation bolts in the order shown.
- Tighten the installation bolts 8 and 9 together with the alternator adjust bar.

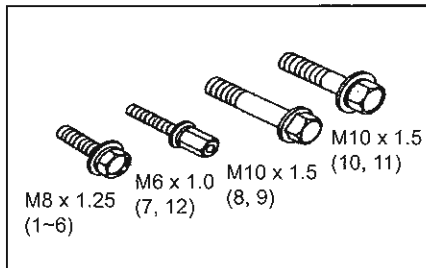


- There are four types of installation bolts.

Tightening torque (N-m{kg-m})

M6	6.3~8.3{0.64~0.85}
M8	16~21{1.6~2.1}
M10	31.4~42.1{3.2~4.3}

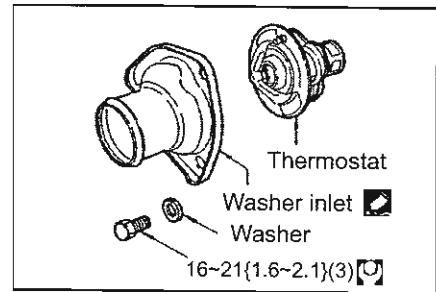
2. Install the rest in reverse order to the removal procedure.



15. THERMOSTAT & WATER INLET

Removal

1. Remove the battery negative terminal inside the boot.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Drain coolant from the radiator drain plug.
3. Drain coolant from the cylinder block drain plug.
4. Remove the alternator belt to shift the alternator down.
5. Remove the alternator adjust bracket.
6. Remove the radiator lower hose at the thermostat housing side.
7. Remove the water inlet.
 - Insert end of a tool such as a screwdriver into the thermostat housing and move it up and down to remove.
8. Remove the thermostat.



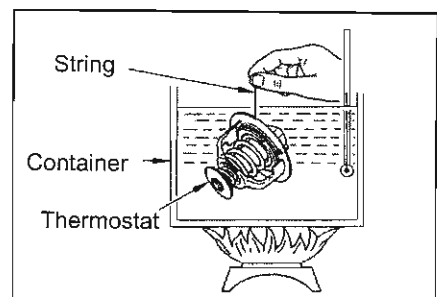
Inspection

Thermostat inspection

Check the valve opening temperature and maximum valve lift.

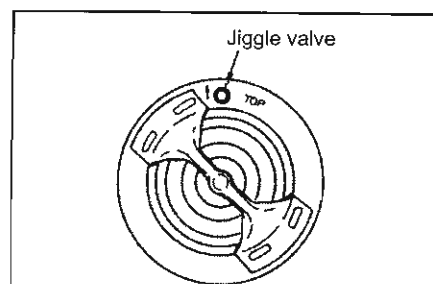
- Hang the thermostat by string to the valve and submerge in heated water in double walled container and stir water while heating it up.
- The opening temperature is the temperature when the valve opens and thermostat falls from the string.

Valve opening temperature (°C)	76.5
Max. valve lift (mm/°C)	Over 10 / 90
- Replace the thermostat if the value is not at standard value.



Installation

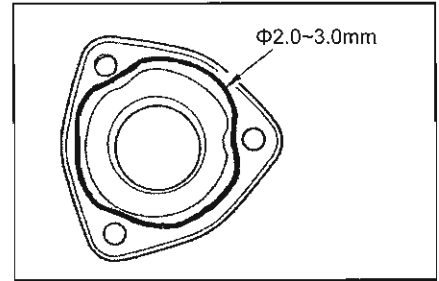
1. Use a scraper to remove old liquid gasket from the water inlet and the cylinder block installation surface.
 - Use white gasoline to clean the surface.
2. Install the thermostat.
 - Position the thermostat so the jiggle valve (TOP mark) is on the top.



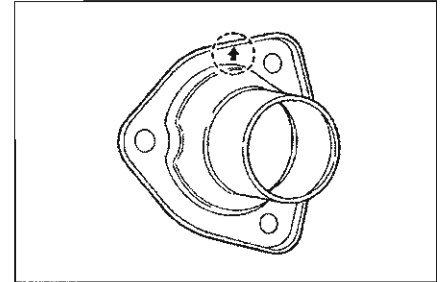
RB20E ENGINE

3. Install the water inlet.

- Apply sealing agent (KP510 00150) at approx. $\Phi 2.0\sim 3.0\text{mm}$ as shown in the figure on the right.



- Install in position as shown.
- Tighten the installation bolts.
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

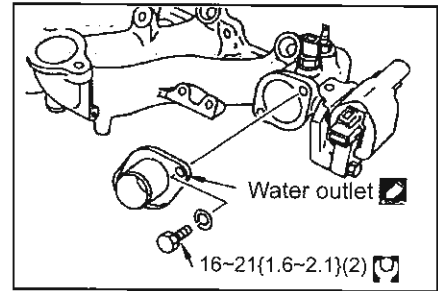


4. Install the rest in reverse order to the removal procedure.

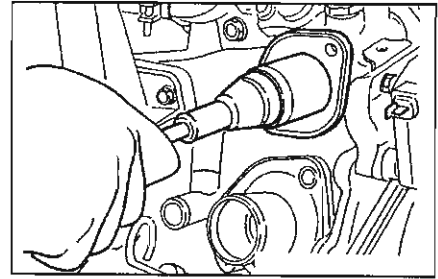
16. WATER OUTLET

Removal

1. Remove the battery negative terminal inside the boot.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Drain coolant from the radiator drain plug.
3. Remove the radiator upper hose at the water outlet side.



4. Remove the water outlet.
 - Insert end of a tool such as a screwdriver into the water outlet and move it up and down to remove.



Inspection

Visual inspection

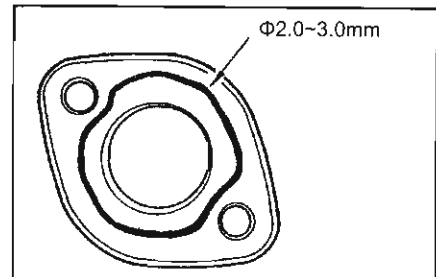
- Check the water outlet for any deformation or wear.
- Replace the water outlet if there is any abnormality.

Installation

1. Use a scraper to remove old liquid gasket on the water outlet and intake manifold installation surface.
 - Use white gasoline to clean the installation surface.
2. Install the water outlet.

- Apply sealing agent (KP510 00150) at $\Phi 2.0 \sim 3.0$ mm and install the water outlet.

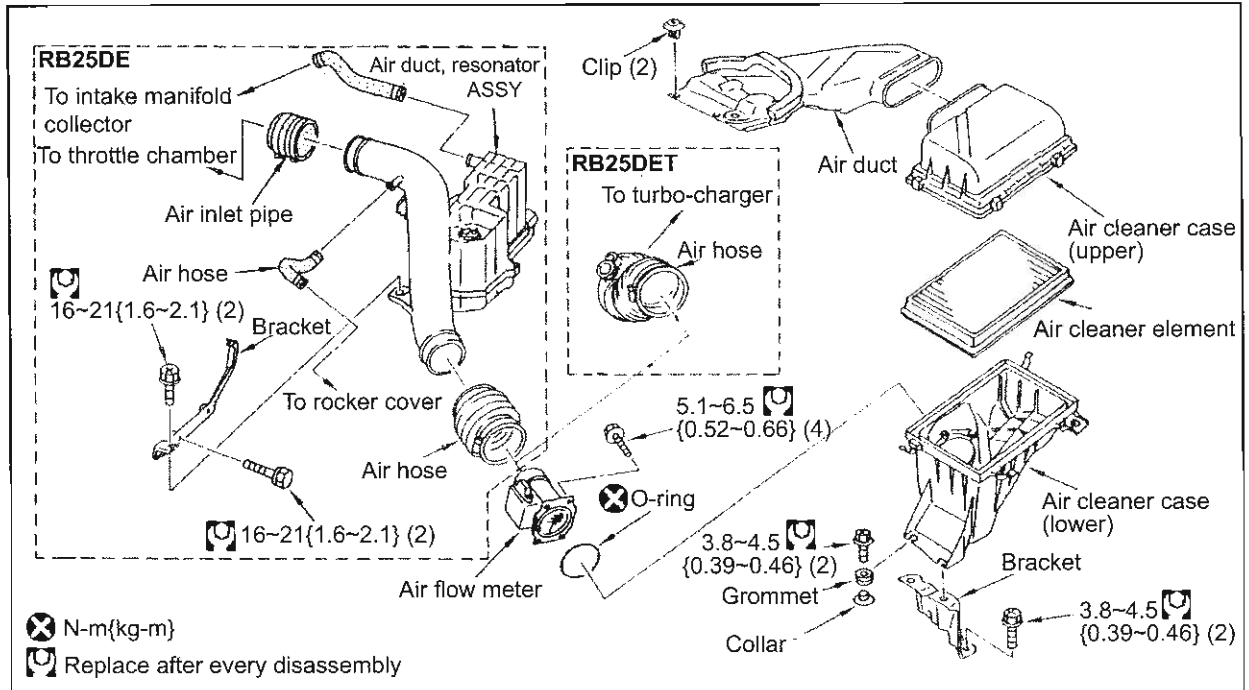
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



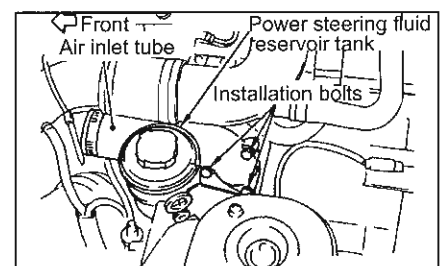
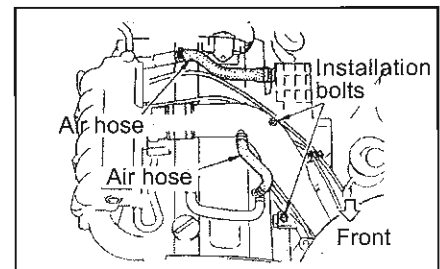
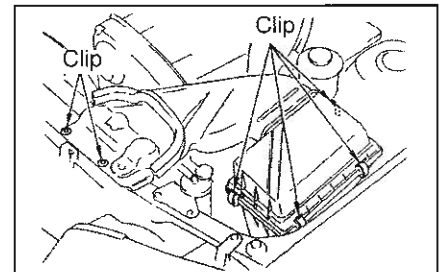
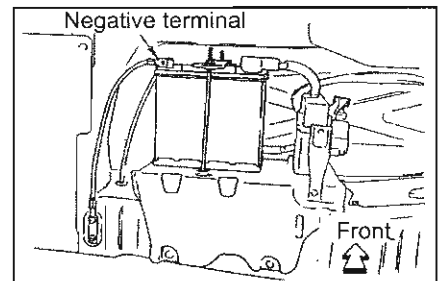
3. Install the rest in reverse order to the removal procedure.

RB25DE / RB25DET ENGINE

1. AIR CLEANER & AIR DUCT (RB25DE / RB25DET)

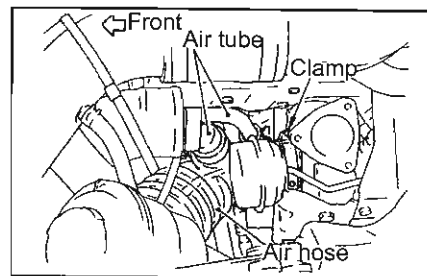
**Removal**

- Remove negative battery terminal.
 - Open the boot lid.
 - Remove the boot front finisher and remove the negative battery terminal.
- Before removing, use air gun to remove any rubbish, dust etc. to avoid foreign objects entering the duct.
- Remove the air flow meter connector.
- Remove the air duct, air cleaner case (upper) and air cleaner element.
 - Remove 2 air duct clips and 4 air cleaner case (upper) clips.
- Remove the air cleaner case (lower).
 - Remove 4 installation bolts.
- Remove the air duct, resonator ASSY (RB25DE).
 - Remove 2 air hoses, and installation bolts.
- Remove the air hose (RB25DET).
 - Remove the air inlet tube.
 - Remove 3 installation bolts.
 - Remove power steering reservoir tank installation bolts and shift it towards front.



RB25DE / RB25DET ENGINE

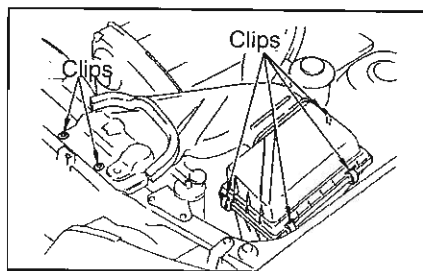
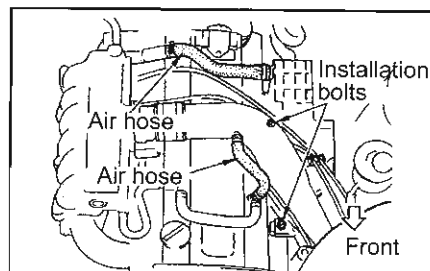
- (3) Remove air tube from the air hose.
- (4) Remove air hose clamp to take out the air hose.

**Inspection**

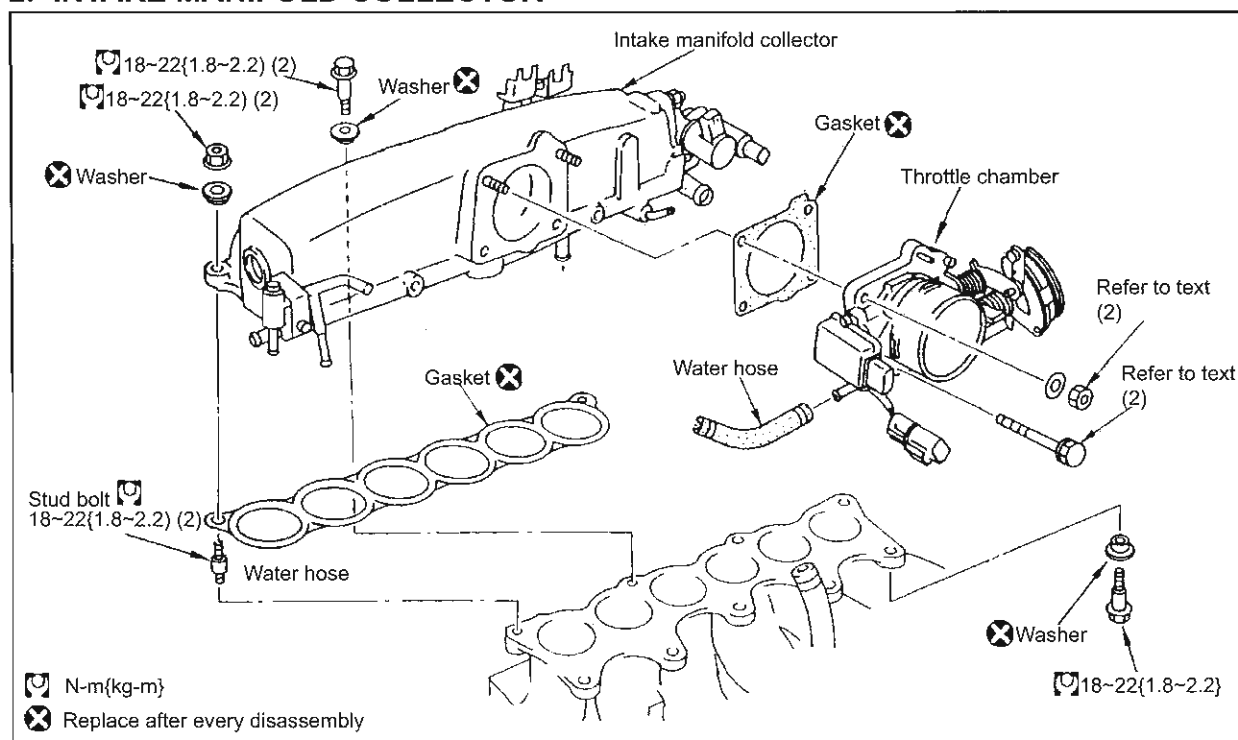
- Make sure the air cleaner element is clean.
Periodic replacement period: Every 60,000km

Installation

1. Install the air hose (RB25DET).
 - Make sure the clamp is facing correct direction when installing.
2. Install the air duct and resonator ASSY (RB25DE).
 - Tighten 2 installation bolts.
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
 - Install 2 air hoses.
3. Install the lower air cleaner case.
 - Tightening torque (N-m{kg-m}) 3.8~4.5{0.39~0.46}
4. Install the air cleaner element, air cleaner case (upper) and the air duct.
 - Place 4 air cleaner case (upper) clips and 2 air duct clips.
5. Install the rest in reverse order to the removal procedure.
 - When the air flow meter is removed, replace the o-ring at installation.

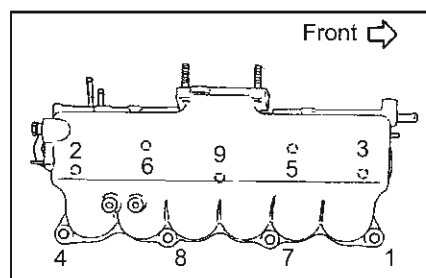
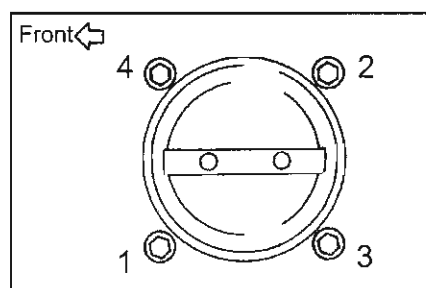


2. INTAKE MANIFOLD COLLECTOR



Removal

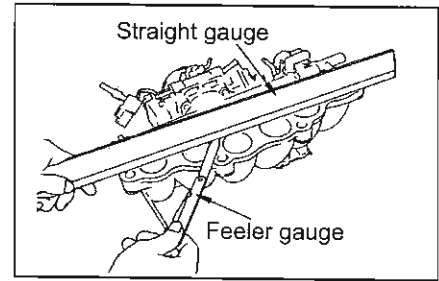
1. Remove the negative battery terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Drain coolant from the radiator drain plug.
3. Remove the air duct and the resonator ASSY.
4. Remove the air inlet pipe.
5. Disconnect the accelerator wire and the ASCD wire.
6. Remove the throttle sensor, throttle valve switch, AAC valve and FICD connector.
7. Disconnect the water vacuum, blow-by and air hoses on the intake manifold collector.
8. Remove the throttle chamber ASSY.
 - Remove the installation bolts in the order shown.
 - Remove the gasket.
9. Remove the intake manifold collector ASSY.
 - Remove the installation nuts and bolts in the order shown in the figure to the right.
 - Check if you have removed all hoses and wires.
10. Remove the gasket.



Inspection

Distortion of the intake manifold collector

- Use the straight gauge and the feeler gauge to measure the distortion in six directions.
Limit value (mm) 0.1
- If the distortion is over the limit use the surface grinder to repair distortion. Replace the intake manifold collector if the distortion is too excessive to fix.



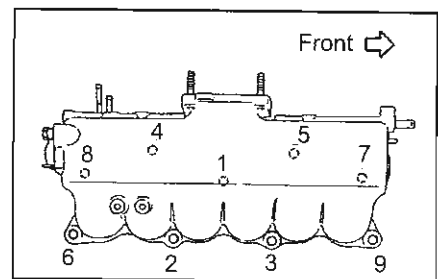
Installation

1. Install the gasket.
 - Replace the gasket with a new one.
 - Remove any fluid, grease, rubbish etc. adhered to installation surface.
2. Install the intake manifold collector ASSY.
 - Tighten installation nuts and bolts in several stages in order shown.
Tightening torque (N-m{kg-m}) 18~22{1.8~2.2}

Caution:

Install 1, 4, 5, and 7 installation bolts from below intake manifold.

No. 6 and 9 is a stud bolt and nut.

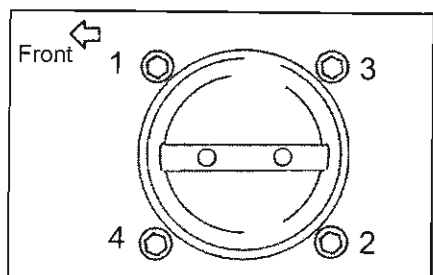
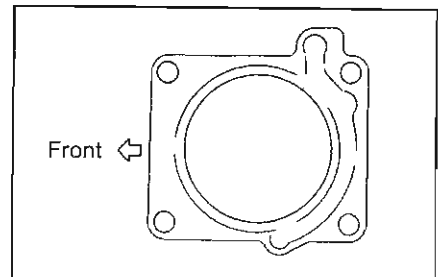


3. Install intake manifold collector hoses.

4. Install the throttle chamber.
 - (1) Make sure there are no grease or rubbish on the gasket and installation surface.
 - (2) Install the gasket.
 - Replace the gasket with a new one.
 - (3) Install the bolts in the order shown in two stages.

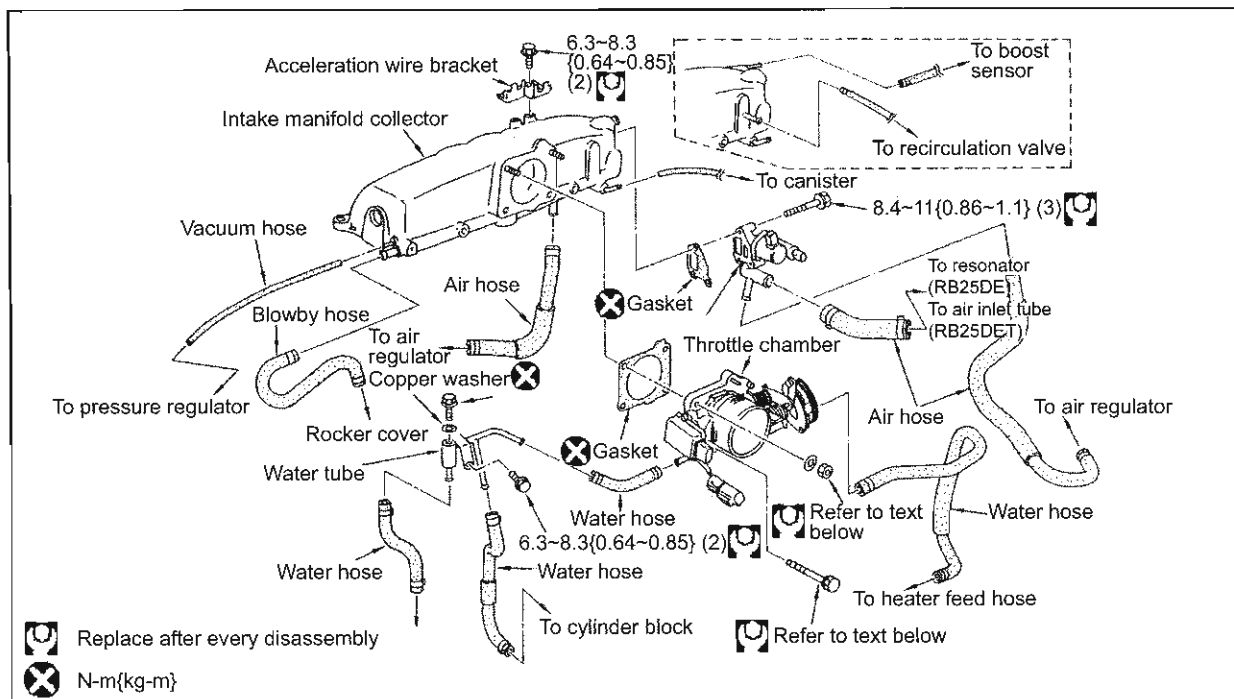
Tightening torque (N-m{kg-m})

1 st	8.8~11{0.9~1.1}
2 nd	18~21{1.8~2.1}



5. Install each pipes according to the diagram on the following page.
 - The diagram shows the reverse side of the intake manifold collector.
6. Install the rest in reverse order to the removal procedure.

RB25DE / RB25DET ENGINE



Disassembly

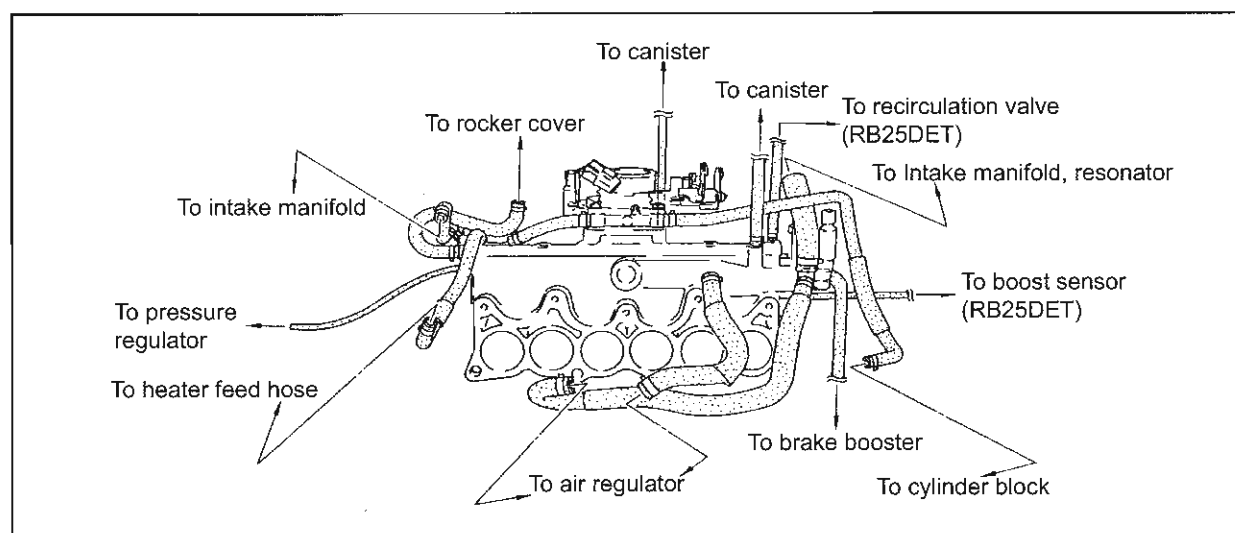
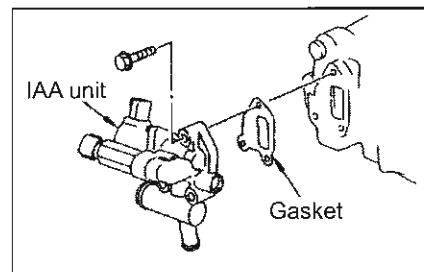
1. Remove the IAA unit.

Caution:

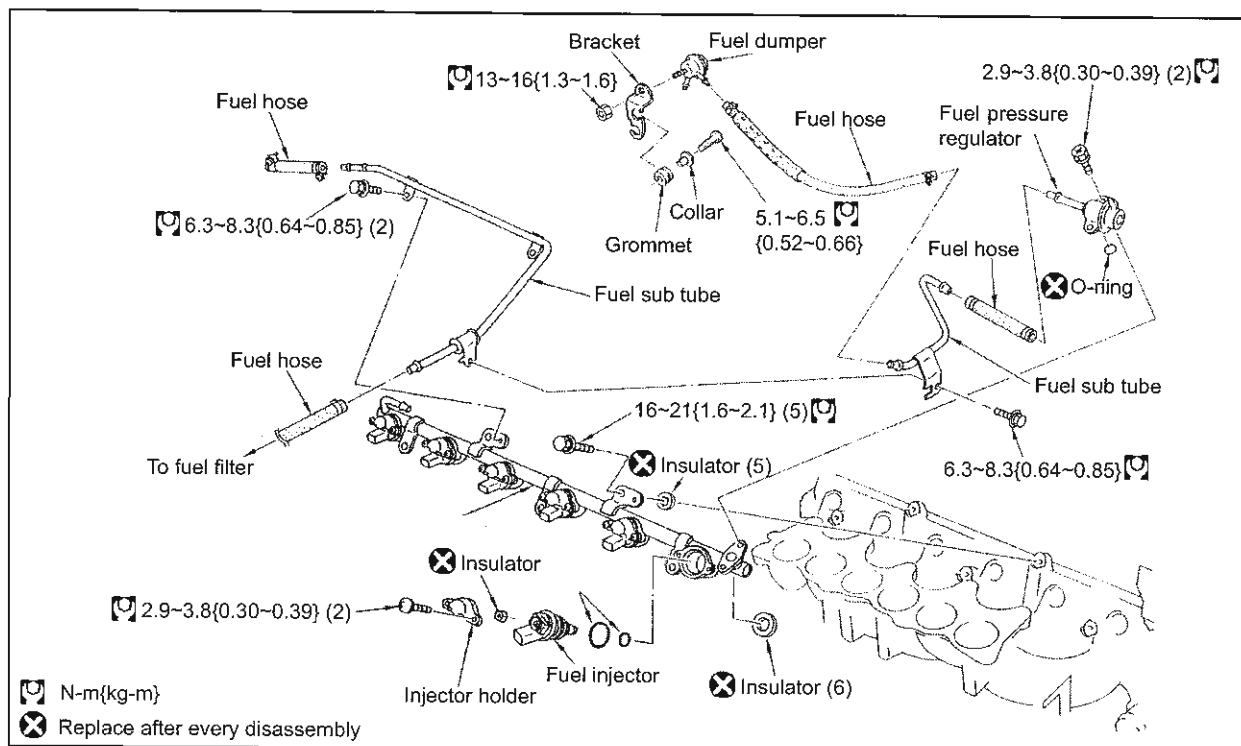
Do not disassemble IAA unit.

Assembly

1. Install the IAA unit.
- Replace the gasket with a new one.
 - Make sure there are no grease or rubbish on the gasket and installation surface.
- Tightening torque (N-m{kg-m}) 8.4~11{0.86~1.11}

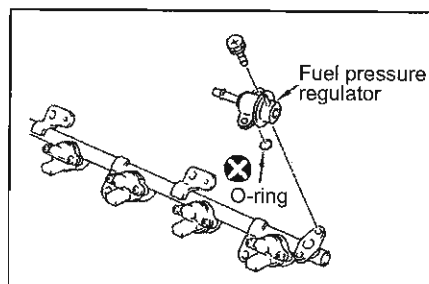
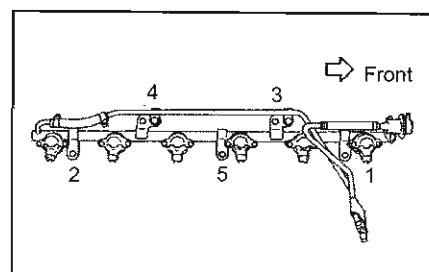


3. FUEL INJECTOR



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. Drain coolant from the radiator drain plug.
 4. Remove air duct and resonator ASSY.
 5. Remove air inlet pipe.
 6. Remove intake manifold collector ASSY.
 7. Remove fuel tube and fuel injector ASSY.
 - (1) Remove fuel feed and the return hose.
 - Place a hole cap immediately after removing the fuel hose to avoid fuel leak.
 - (2) Disconnect the fuel injector harness connector.
 - (3) Remove fuel tube installation bolts.
 - (4) Remove fuel tube installation bolts in order shown in the diagram on right.
 8. Remove the fuel pressure regulator.
- Caution:**
Fuel remaining in the fuel tube may leak.



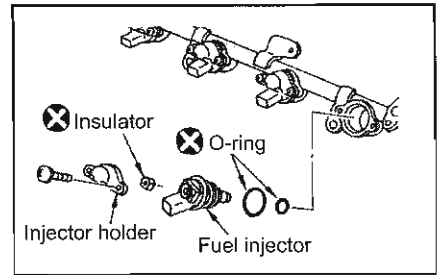
RB25DE / RB25DET ENGINE

9. Remove fuel injector from the fuel tube.

- (1) Remove the injector hose.
- (2) Remove the fuel injector by pushing from nozzle side.
 - Do not hold the connector parts.
 - Care must be taken not to drop them.

Caution:

Do not disassemble the fuel injector.

**Inspection**

Fuel tube & fuel hose

- Check to make sure the fuel is not leaking from the fuel tube and the fuel hose.
- Replace the parts if there are any abnormalities.

Installation

1. Install fuel injector to the fuel tube.

- (1) Install o-ring to fuel injector.
 - Replace o-ring with a new one.
 - Read the handling note before carrying out the operation.

Handling note

- Always handle the O-ring with bare hands (no gloves).
- Only apply engine oil (7.5W-30 or similar viscosity) and never clean or soak the o-ring in solvent solution.
- Avoid using dirty o-ring and devices with dust or other foreign objects adhered to it.
- When installing the o-ring care must be taken not to scratch the o-ring with tools or nails. Also do not twist or stretch them.
- When inserting the fuel injector, pressure regulator or fuel dumper into the fuel tube, do not twist or turn the parts.

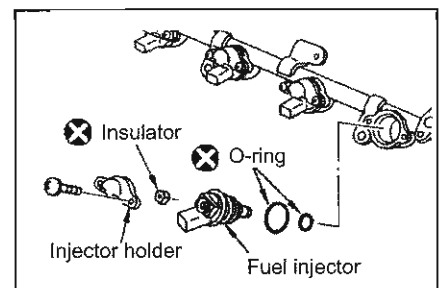
(2) Install the fuel injector to fuel tube.

- Care must be taken not to damage the nozzle tip.

Note:

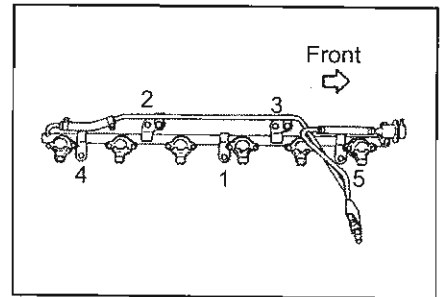
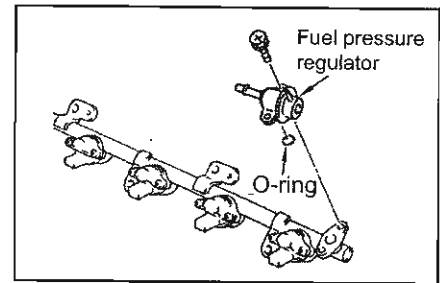
If it is difficult to install the fuel injector due to o-ring resistance, first install the injector holder and use a screw with under head approx. 30mm to tighten up alternately to insert the fuel injector.

Tightening torque (N·m{kg·m}) 2.9~3.8{0.30~0.39}

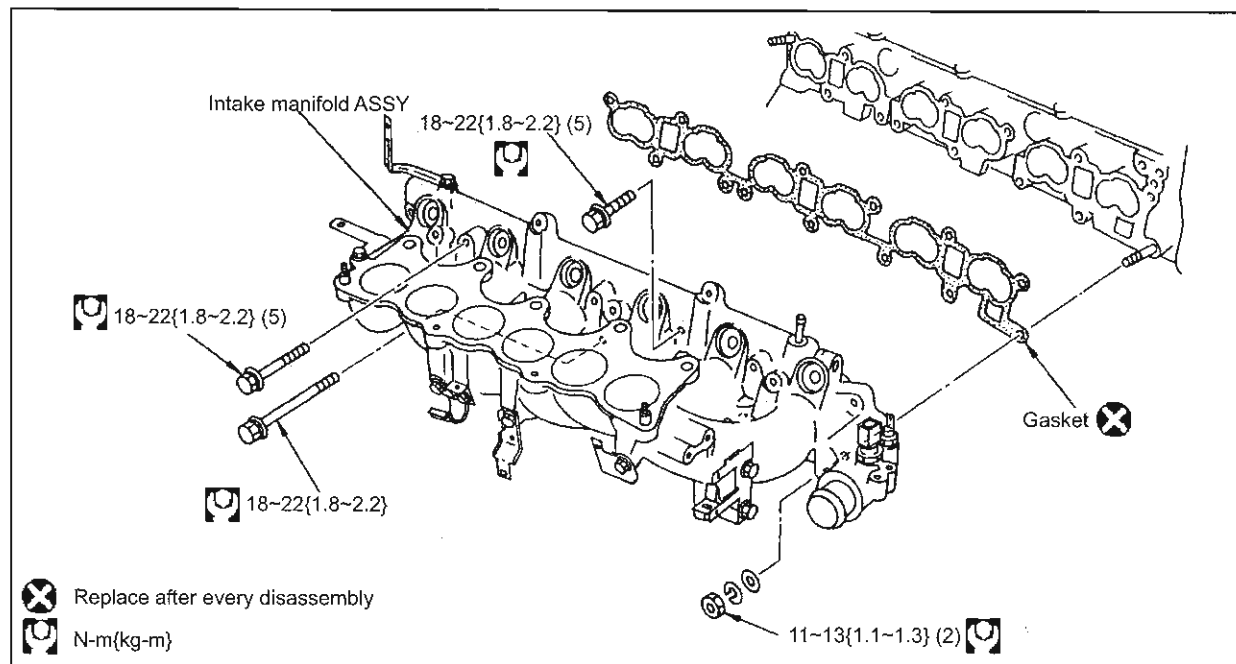


RB25DE / RB25DET ENGINE

2. Install the fuel pressure regulator.
 - Replace the o-ring with a new one.
Tightening torque (N-m{kg-m}) 2.9~3.8{0.30~0.39}
3. Install fuel tube and fuel injector ASSY.
 - (1) Install fuel sub tube to the fuel tube.
Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}
 - (2) Tighten the fuel tube installation bolts in the order shown in two stages.
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
 - Replace the insulator with a new one.
4. Install the fuel injector connectors.
5. Install the fuel feed and return hose.
 - Insert the hose tip up to the second bulged part of the fuel tube and make sure to securely tighten the clamp.
6. Install the rest in reverse order to the removal procedure.
7. Place the ignition switch to the ON position to place fuel pressure to fuel pipings to check for any fuel leak.

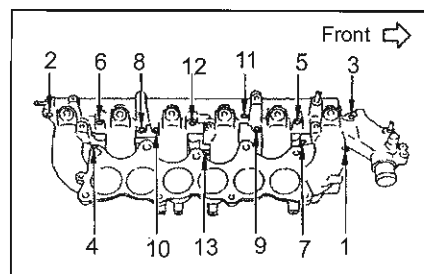
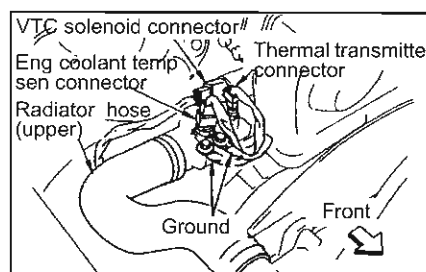


4. INTAKE MANIFOLD



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. Drain coolant from the radiator drain plug.
4. Drain coolant from the cylinder block drain plug.
5. Remove air duct and resonator ASSY.
6. Remove the air inlet pipe.
7. Remove the intake manifold collector ASSY.
8. Remove the fuel injector ASSY.
9. Remove the radiator hose (upper).
10. Disconnect thermal transmitter connector.
11. Disconnect engine coolant temperature sensor connector.
12. Disconnect VTC solenoid connector.
13. Remove ground terminals (2).
14. Disconnect air regulator connector.
15. Remove the oil level gauge guide installation bolt.
16. Remove the intake manifold ASSY.
 - (1) Remove installation bolts and nuts in order shown in the figure on the right.
 - (2) Remove each water hose below intake manifold. (RB25DET).
17. Remove the gasket.



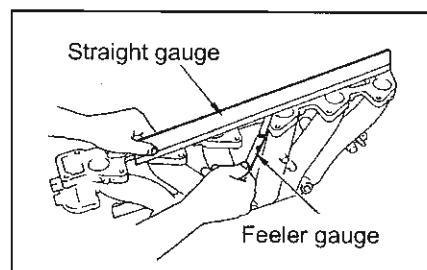
Inspection

Distortion of the intake manifold

- Use the straight gauge and the feeler gauge to measure the distortion of the front and reverse surface in six directions.

Limit value (mm) 0.1

- If the distortion is over the limit use the surface grinder to repair distortion. Replace the intake manifold if the distortion is too excessive to fix.



Installation

- Install the gasket.
 - Use a scraper to remove any gasket or foreign objects etc. adhered to intake manifold and cylinder head installation surface.
 - Replace the gasket with a new one.

2. Install intake manifold ASSY.

(1) Install each water hoses below intake manifold (RB25DET).

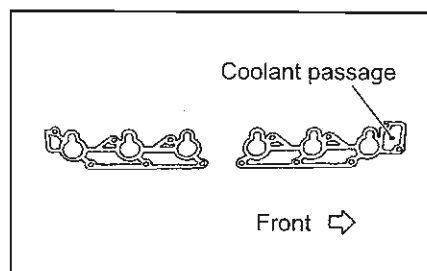
(2) Install the bolts and nuts in the order shown in figure on the right.

Tightening torque (N-m{kg-m})

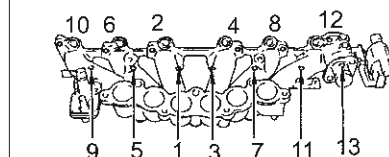
Bolt 18~22{1.8~2.2}

Nut 11~13{1.1~1.3}

	Bolt			Nut
Installation position	3, 4, 5, 6, 11	2, 7, 8, 9, 10	1	12, 13
Bolt under head length (mm)	40	65	95	-



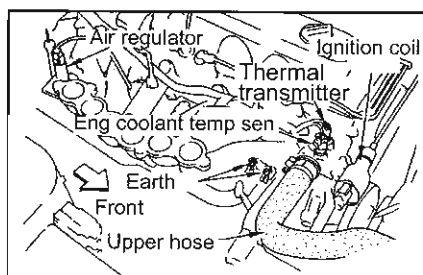
Nut: 2, 4, 10, 12, 13
Bolt: 1, 3, 5, 6, 7, 8, 9, 11



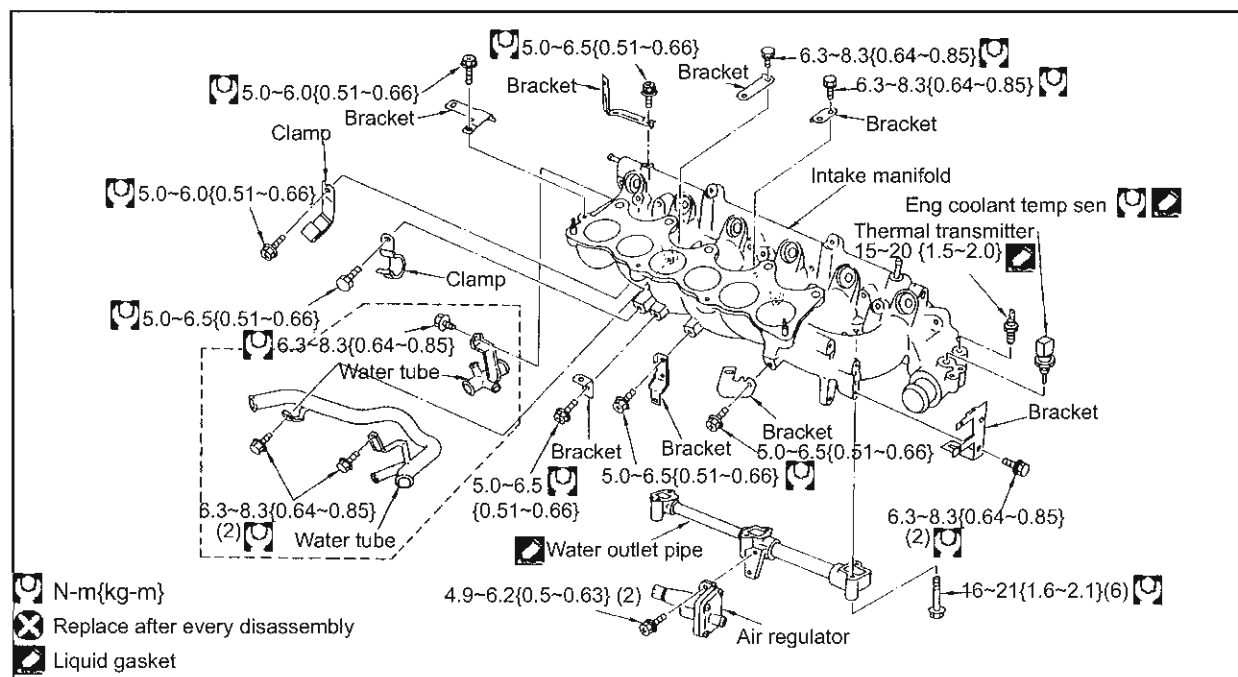
3. Install the oil level gauge guide installation bolt.

Tightening torque (N-m{kg-m}) 3.9~4.9{0.4~0.5}

- Install the air regulator connector.
- Install the radiator hose (upper).
- Connect the earth terminal.
- Install the VTC solenoid connector.
- Install the engine coolant temperature sensor connector.
- Install the thermal transmitter connector.
- Install the rest in reverse order to the removal procedure.

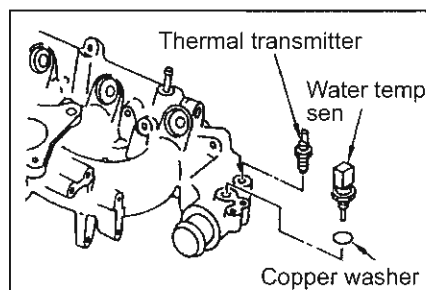


RB25DE / RB25DET ENGINE



Disassembly

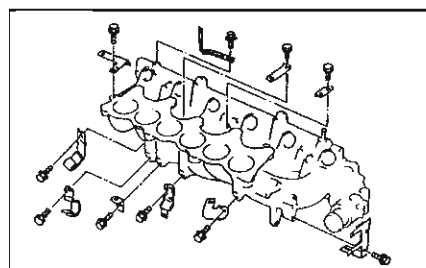
1. Remove the engine coolant temperature sensor and thermal transmitter.



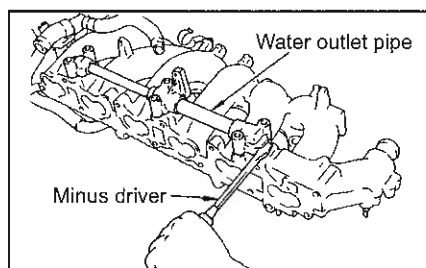
2. Remove each bracket and the clamps.
3. Remove the air regulator.

Caution:

- Do not disassemble and adjust the air regulator.
- Care must be taken not to damage parts by dropping tools.

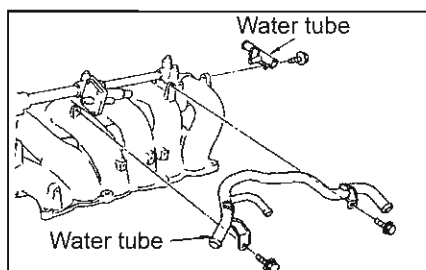


4. Remove water outlet pipe.
 - Place a screwdriver etc. between right and left water outlet pipe. Move it up and down gently to remove.
5. Remove the water tube. (RB25DET)



Assembly

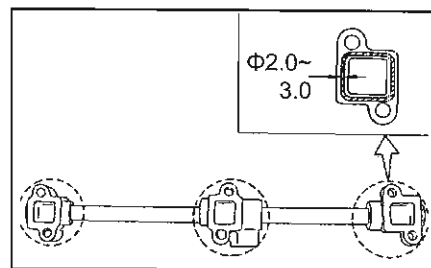
1. Install the water tube (RB25DET)
Tightening torque (N·m{kg·m}) 6.3~8.3{0.64~0.85}



RB25DE / RB25DET ENGINE

2. Install water outlet pipe.

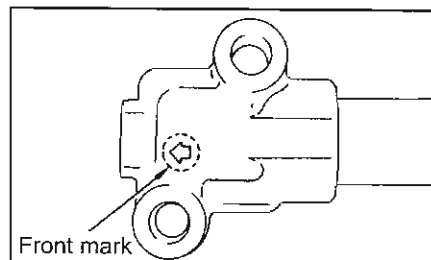
- (1) Use the scraper to remove gasket on water pipe installation surface and intake manifold side installation surface.
- (2) Apply sealing agent (KP510 00150) as shown in the figure on the right at approx. $\Phi 2.0 \sim 3.0$ mm.



(3) Install the water outlet pipe to intake manifold.

- Make sure the front mark is facing the front when installing.

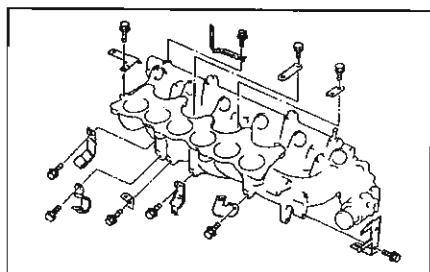
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



3. Install the air regulator.

Tightening torque (N-m{kg-m}) 4.9~6.2{0.5~0.63}

4. Install each bracket and the clamps as shown.



5. Install the engine coolant temperature sensor and thermal transmitter.

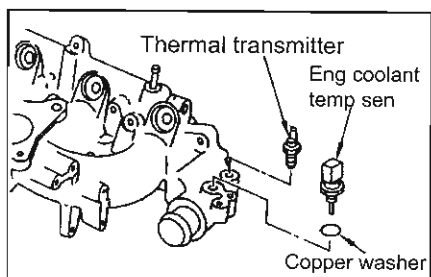
- Apply the sealing agent to thread part.

Tightening torque (N-m{kg-m})

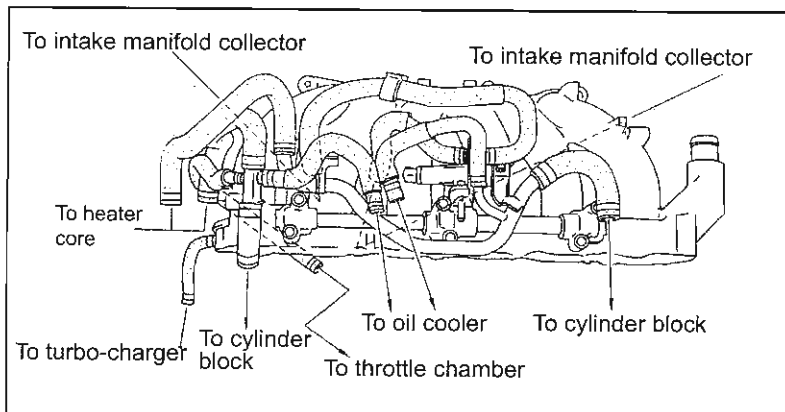
Engine coolant temperature sensor 20~29{2.0~3.0}

Thermal transmitter 15~20{1.5~2.0}

- Replace the engine coolant temperature sensor copper washer with a new one.

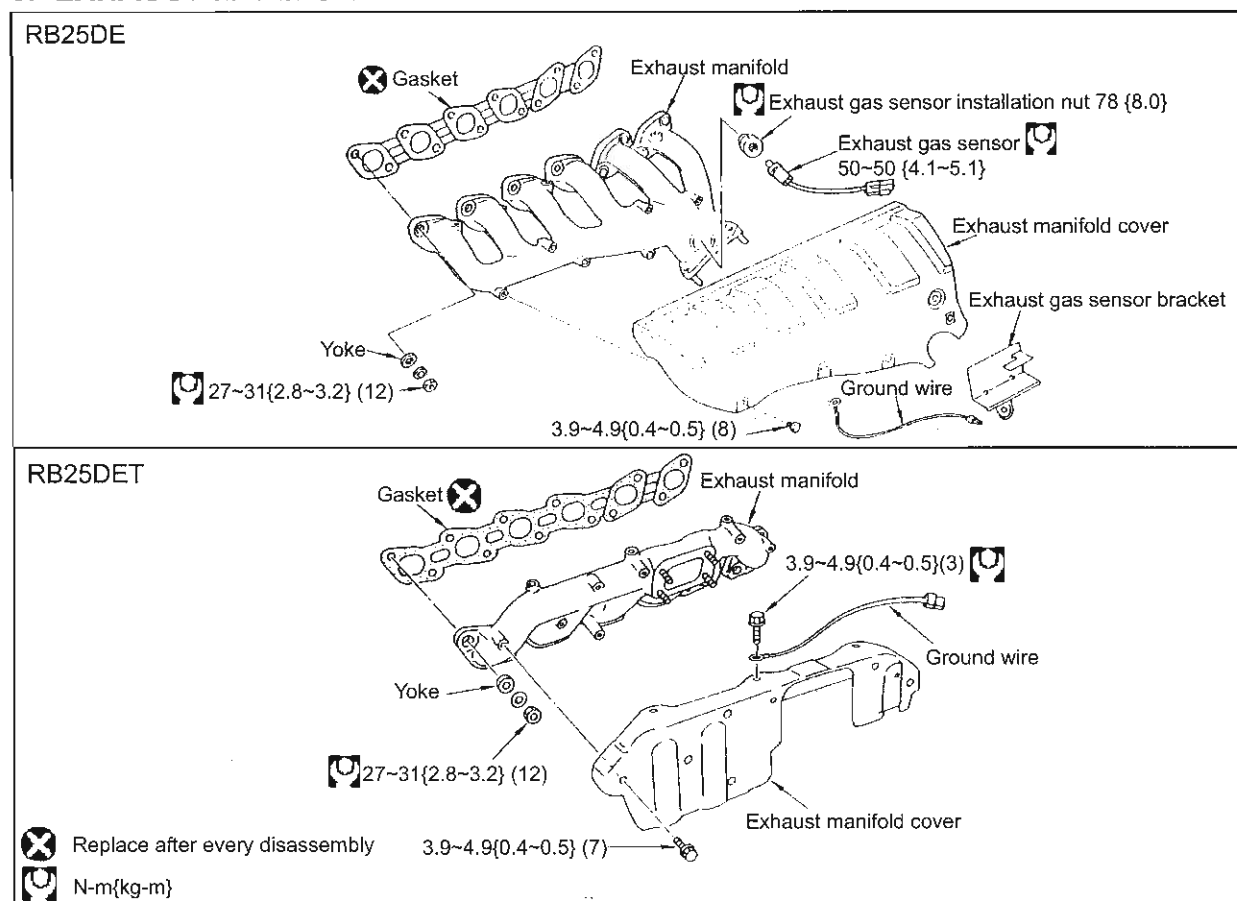


6. Install each pipings following the diagram below.

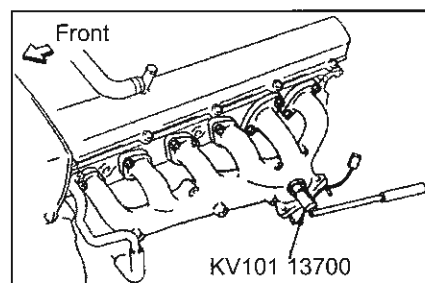


RB25DE / RB25DET ENGINE

5. EXHAUST MANIFOLD

**Removal**

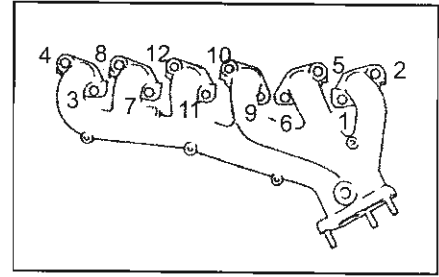
1. Remove the battery negative terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove the under cover.
3. Remove the air duct and resonator ASSY.
4. Remove the air inlet pipe and air inlet hose (RB25DET).
5. Remove the air hose (RB25DET)
6. Remove the exhaust front tube from exhaust manifold (RB25DE), turbo-charger (RB25DET).
7. Disconnect the exhaust gas sensor connector.
8. Disconnect the earth wire between exhaust manifold and the body.
9. Remove the turbo-charger (RB25DET).
10. Remove exhaust manifold cover.
11. Remove exhaust gas sensor (RB25DE).
 - Use exhaust gas sensor socket remover to remove.



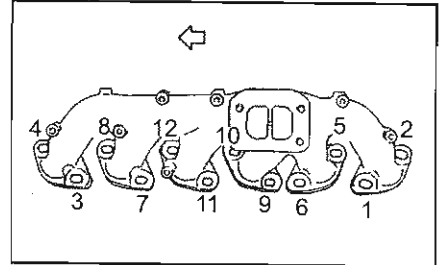
RB25DE / RB25DET ENGINE

12. Remove the exhaust manifold.

- Remove the installation nuts in the order shown in the figure on right.



13. Remove the gasket.

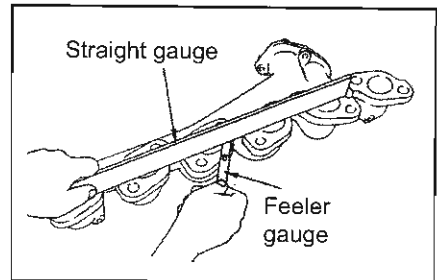
**Inspection**

Distortion of exhaust manifold

- Use the scraper to remove gasket on the installation surface.
- Use the straight gauge and the feeler gauge to measure the installation surface distortion in four directions.

Limit value (mm) 0.3

- If the distortion is over the limit use the surface grinder to repair distortion. Replace the exhaust manifold if the distortion is too excessive to fix.



Gas leak from the exhaust parts

- Look for any gas leak between the cylinder head side installation surface and exhaust front tube, (RB25DE), turbo-charger side installation surface (RB25DET).

Installation

1. Install exhaust sensor (RB25DE).

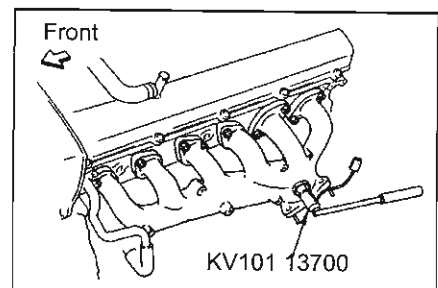
- Use exhaust sensor installation socket to install.

Caution:

Care must be taken not to cause any damage to exhaust gas sensor.

Tightening torque (N-m{kg-m})

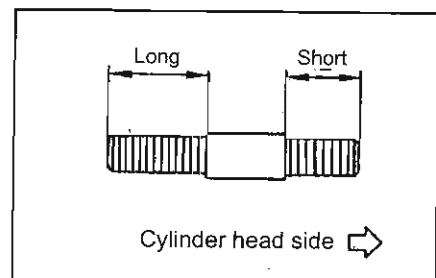
Exhaust sensor installation nut	78{8.0}
Exhaust sensor	40~50{4.1~5.1}



2. Install the stud bolt to cylinder head by placing the double nut.

Tightening torque (N-m{kg-m}) 27~31{2.8~3.2}

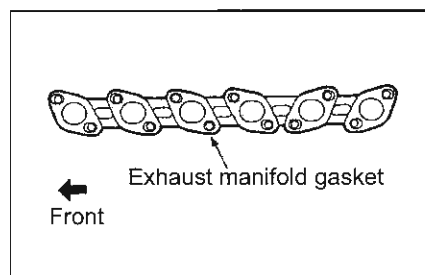
- Remove the double nut after installation.
- Replace the stud bolt with a new one.
- When installing the stud bolt, make sure the stud bolt with shorter thread side is on the cylinder head side.



RB25DE / RB25DET ENGINE

3. Install the gasket.

- Use the scraper to remove gasket on the cylinder head and exhaust manifold installation surface.
 - Replace the gasket with a new one.
 - Make sure to install the gasket facing correct way.
- Tightening torque (N-m{kg-m}) 3.9~4.9{0.4~0.5}

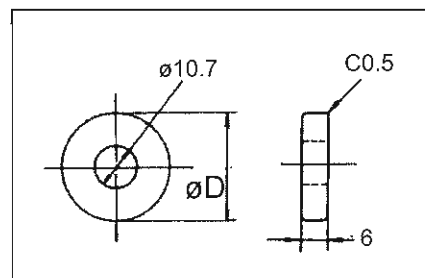


4. Install the exhaust manifold.

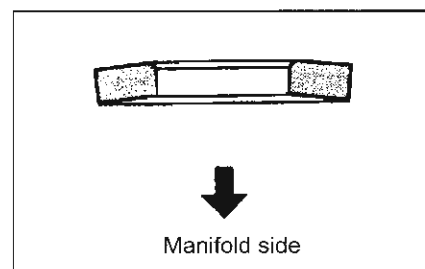
- Install the washer and the yoke.
- Make sure to place correct yoke when installing.

Exterior diameter ΦD (mm)

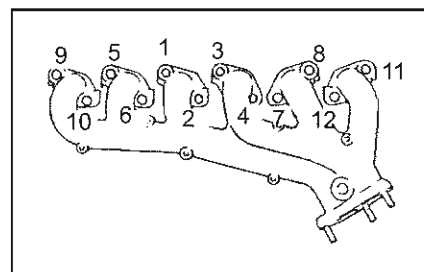
No.3 & No.4 port	22
No.1, No.2, No. 5 & No.6 port	24



- Install the washer as shown.



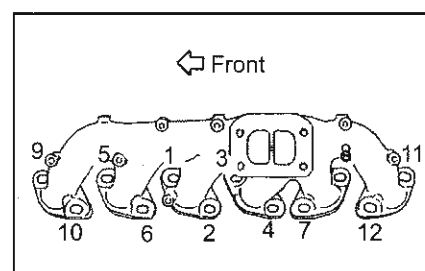
- Tighten the installation nuts in order shown in the figure on right.



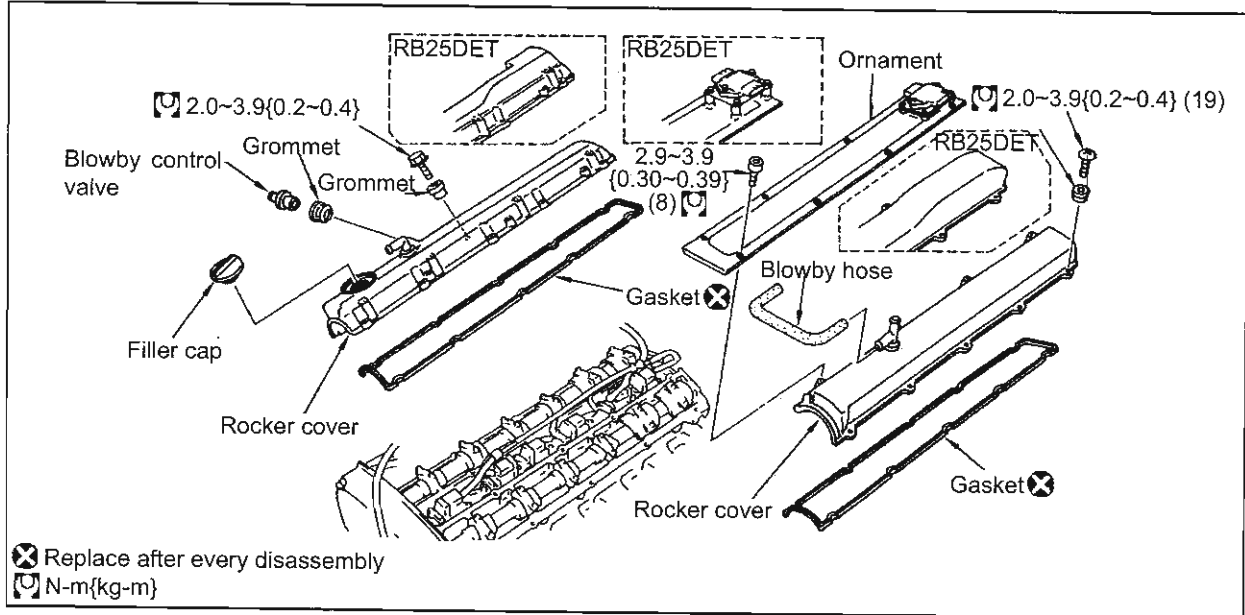
5. Install exhaust manifold cover.

Tightening torque (N-m{kg-m}) 3.9~4.9{0.4~0.5}

6. Install the turbo-charger (RB25DET).
7. Connect the earth wire between exhaust manifold and the body.
8. Install Exhaust gas sensor connector (RB25DE).
9. Install exhaust front tube.
10. Install the rest in reverse order to the removal procedure.
11. After installation is completed, start the engine and check for any exhaust gas leak.

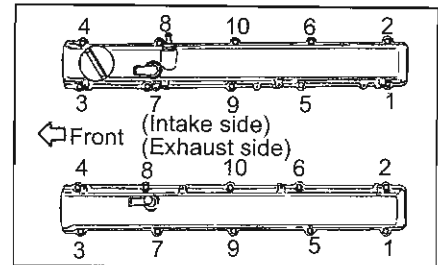


6. ROCKER COVER



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 blowby hose.
3. Remove air duct and resonator ASSY (RB25DE).
4. Remove air inlet pipe (RB25DET).
5. Remove the canister hose (RB25DET).
6. Disconnect the power transistor unit connector.
7. Remove the ornament.
8. Disconnect ignition harness connector from the clamp.
9. Remove the rocker cover.
 - Loosen the installation screw on intake and exhaust side in order shown in the figure on right.

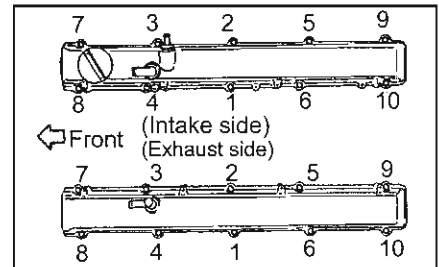


Inspection

- Check for any wear or damage on the rocker cover.
- Replace the rocker cover if any abnormality is found.
- Make sure the oil will not leak from the rocker cover and cylinder head alignment surface.

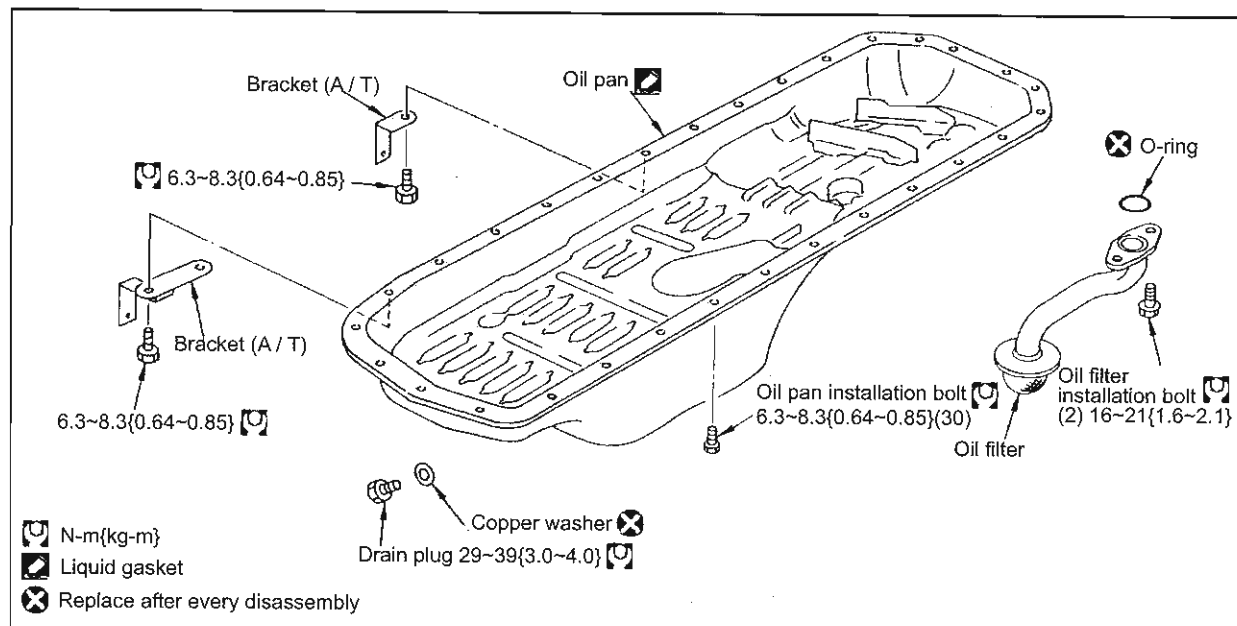
Installation

1. Install the gasket to rocker cover.
 - Replace the gasket with a new one.
 2. Install the rocker cover.
 - Remove any oil and rubbish etc. from cylinder head side installation surface.
 - Intake side No.1 bolt is a hexagonal bolt.
 - Tighten the installation bolts and screws in several stages in order shown in the figure on right.
- Tightening torque (N-m{kg-m}) 2.0~3.9{0.2~0.4}



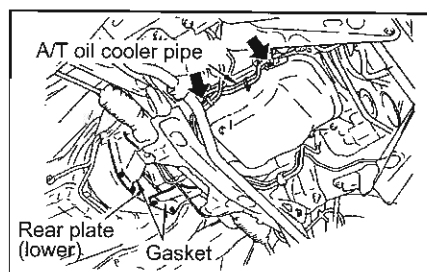
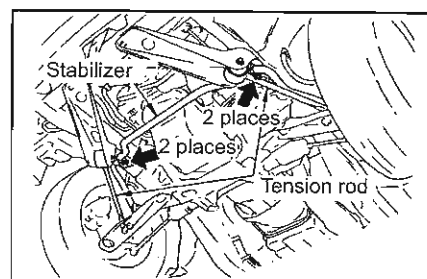
3. Fix the ignition coil harness using the clamp.
4. Install the ornament.
5. Install the rest in reverse order to the removal procedure.

7. OIL PAN & OIL FILTER

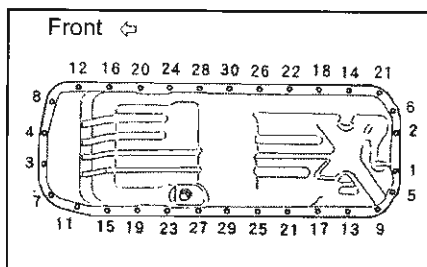


Removal

1. 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 under cover.
4. Drain engine oil from the oil pan drain plug.
5. Remove the stabilizer. OR remove stabilizer installation bolts and installation nuts located on the vehicle side and lower the stabilizer to below the oil pan.
6. Remove A / T oil cooler tube from the oil pan bracket.
7. Remove right and rear gasket.
8. Remove the lower rear plate (A / T vehicles).
9. Remove right and left front side engine mount installation nuts.
10. Attach the sling to engine and raise it up using the hoist.

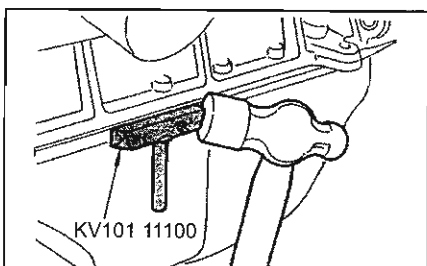


11. Remove installation bolts in the order shown in the figure on right.



12. Remove oil pan from the cylinder block.

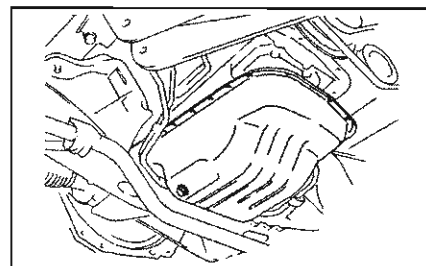
- (1) Insert seal cutter between the oil pan and the cylinder block.
- (2) Tap the seal cutter rear surface using the hammer to remove the oil pan.



13. Remove the oil pan.

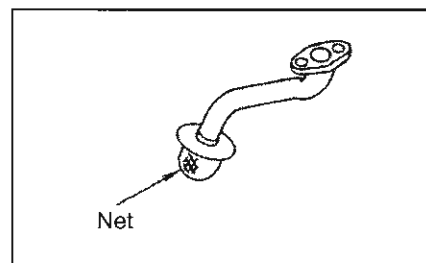
- Remove the oil pan carefully making sure it will not interfere with the oil filter net area.

14. Remove the oil filter.

**Inspection**

Oil strainer visual inspection

- Check that there are no foreign objects on the oil filter net.
- Clean the net if there are any foreign objects.
- Replace with a new one if there is any fault.

**Installation**

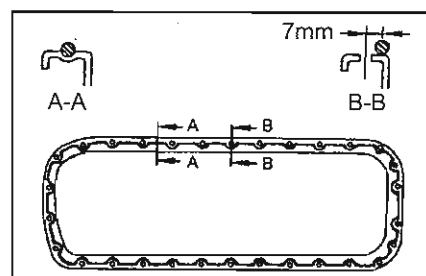
1. Install the oil filter.

- Replace the o-ring with a new one.

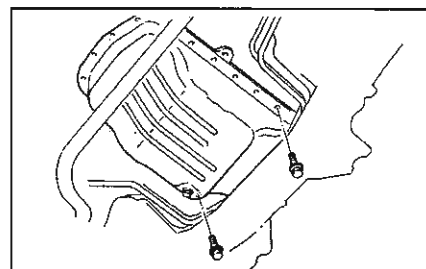
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

2. Install the oil pan.

- Use scraper to remove any oil liquid gasket on the oil pan and cylinder block installation surface.
- Clean the installation surface using white gasoline.
- Apply bond (KP510 00150) to specified position shown in the figure on right at approx. $\Phi 3.5\sim 4.5$.



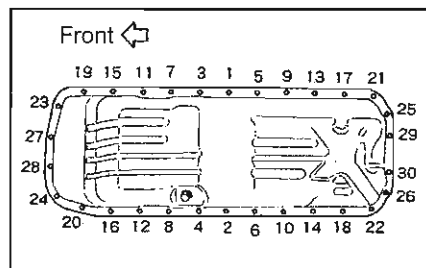
- Place the oil pan below cylinder block. Care must be taken not to allow liquid gasket to come in contact with the cylinder block and other parts.
- Place 2 bolts (M6 x 1.25) at suitable position and tighten temporarily. Install other bolts temporarily.



- Tighten the bolts to specified torque in order shown in the figure on right.

Tightening torque(N-m{kg-m}) 6.3~8.3{0.64~0.85}

- No. 2 and No. 20 installation bolts will also tighten A / T oil cooler pipings.

**Caution:**

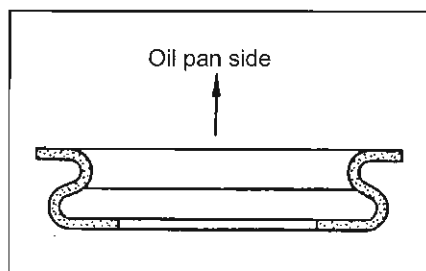
Do not over tighten the installation bolts.

3. Install the oil pan drain plug.

- Replace the washer with a new one.
- Install in the direction shown.

Tightening torque (N-m{kg-m}) 29~39{3.0~4.0}

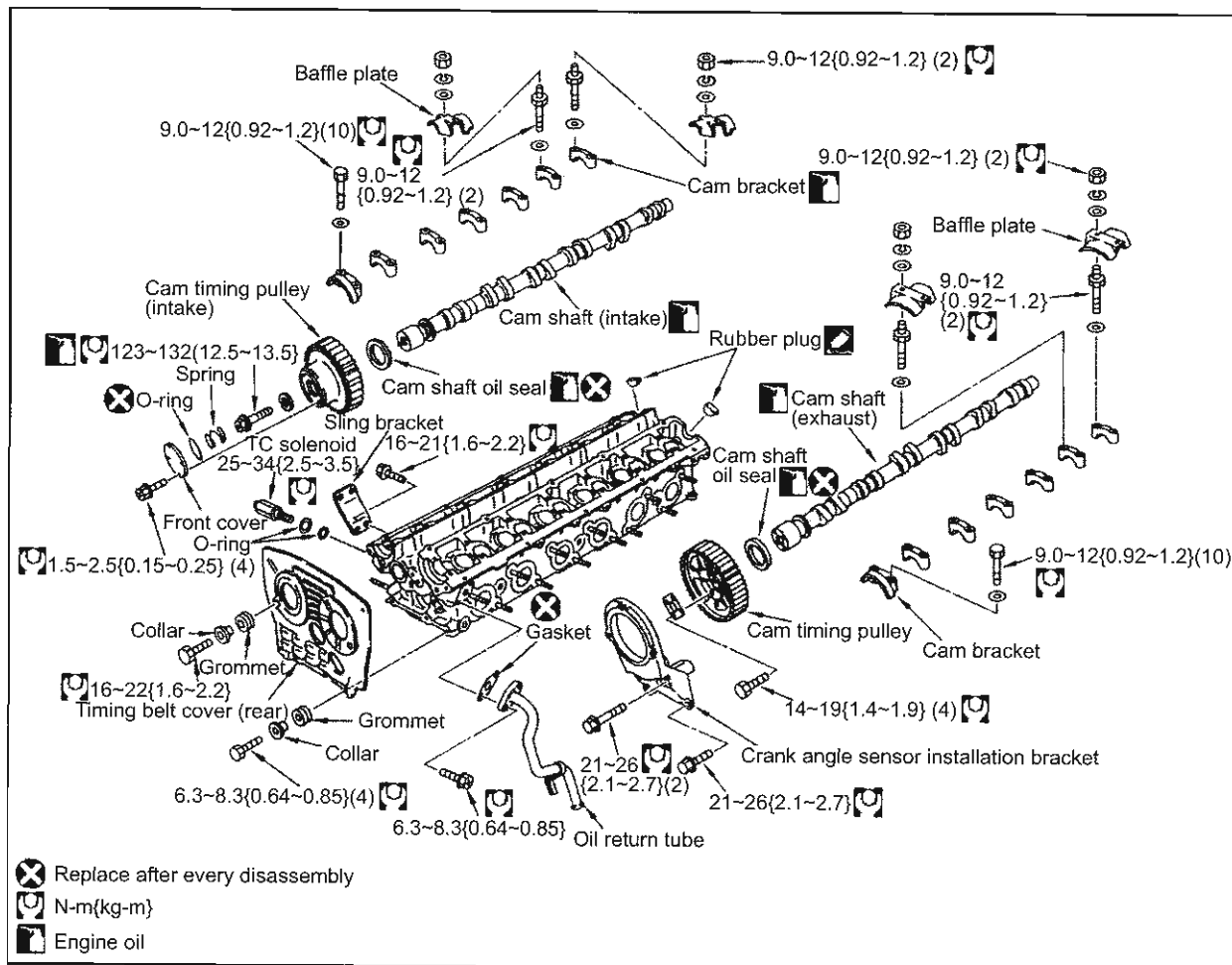
- 4. Install the rest in reverse order to the removal procedure.

**Inspection**

- Check the level of engine oil.

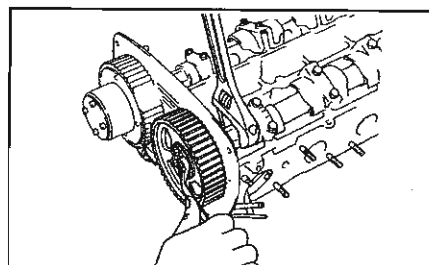
RB25DE / RB25DET ENGINE

8. CAM SHAFT



Removal

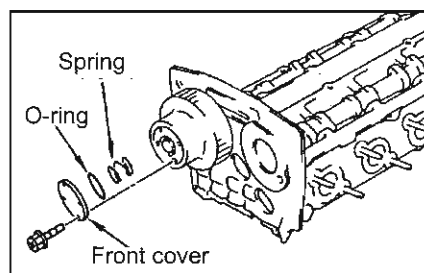
1. Remove the battery negative terminal.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Remove the under cover.
3. Remove air duct and resonator ASSY (RB25DE).
4. Remove air inlet pipe.
5. Drain coolant from the radiator drain plug.
6. Drain 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.

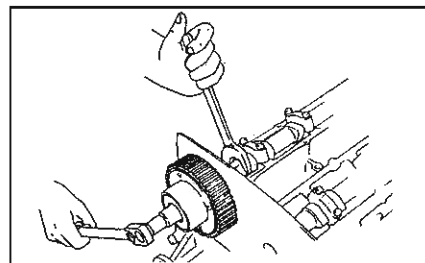


(2) Remove the cam timing pulley installation bolt by holding the cam shaft hexagonal part using the spanner.

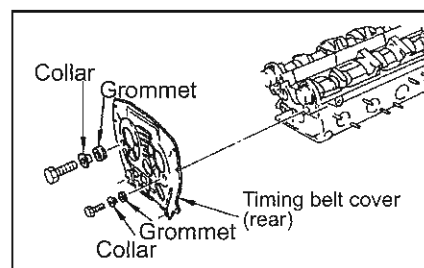
(3) Remove cam timing pulley from the cam shaft.

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.

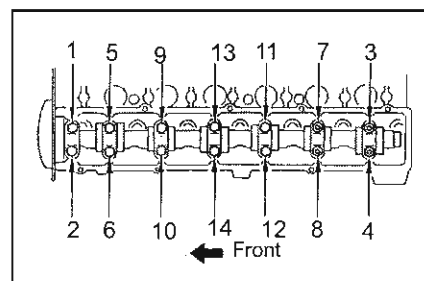
16. Remove the cam bracket.

- 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.

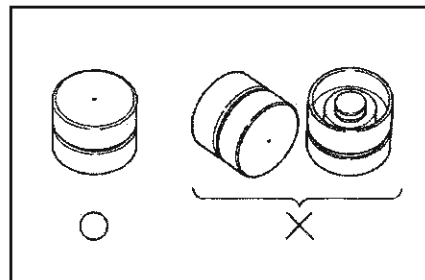


17. Remove the cam shaft.

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.

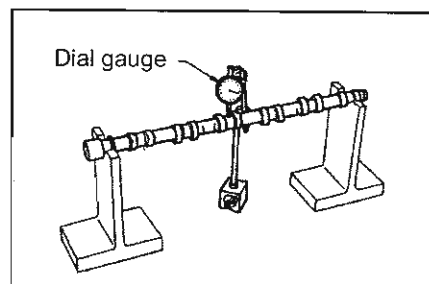
Cam shaft run-out

- 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

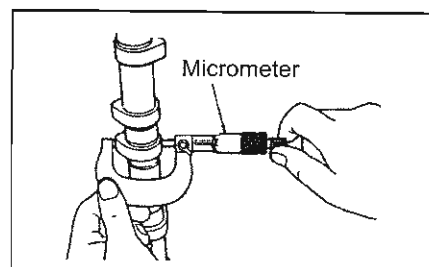
Exhaust 39.705~39.895

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**

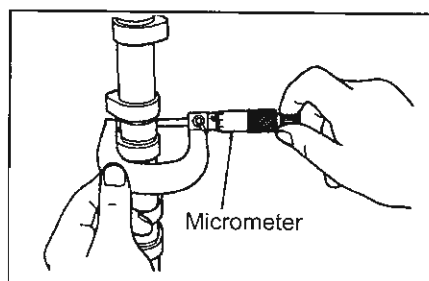
(Cam journal external diameter)

- 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) -

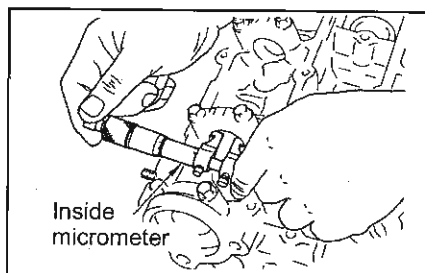
(Cam journal external diameter)

Standard value (mm)

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

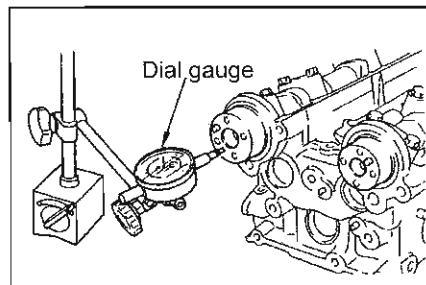
No.7 journal $\Phi 0.061 \sim \Phi 0.101$

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

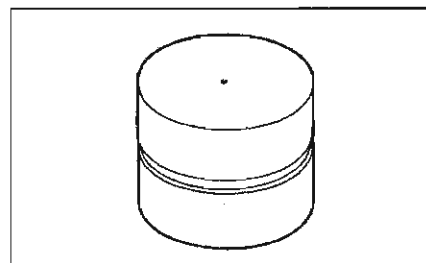


Cam shaft end play

- 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.

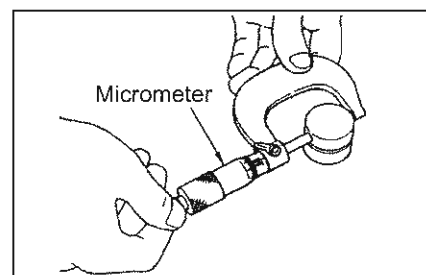
**Hydraulic valve lifter visual inspection**

- 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**

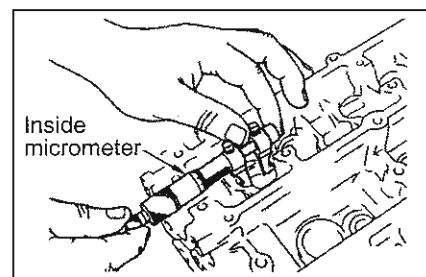
(Hydraulic valve lifter external diameter)

- 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) -

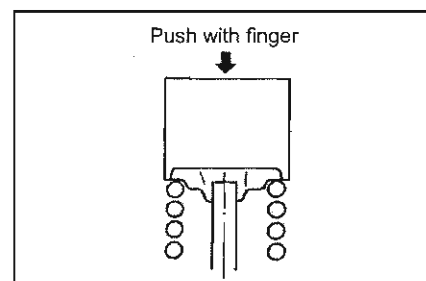
(Hydraulic valve lifter external diameter)

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

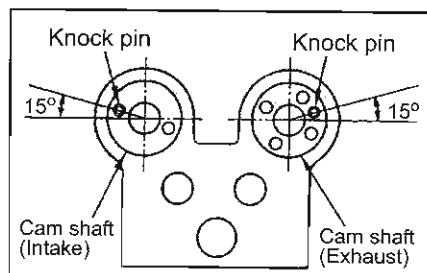
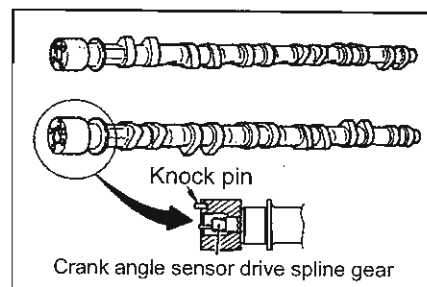
- Apply engine oil to rotational surface and install hydraulic valve lifter to the cylinder head.
- After the installation push down on the head. If the head move more than 1 mm carry out the air release operation using the method below. (Use same method to check the valve lifter when abnormal sound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



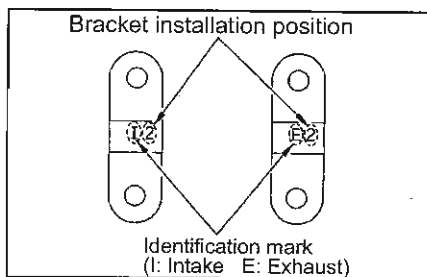
- (1) After installing the rocker cover, run the engine at approx. 1000rpm with no-load for 10 minutes. Recheck the head movement.
- (2) If the air is not released by carrying out the above method, replace the hydraulic valve lifter with a new one.

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 gear.
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.

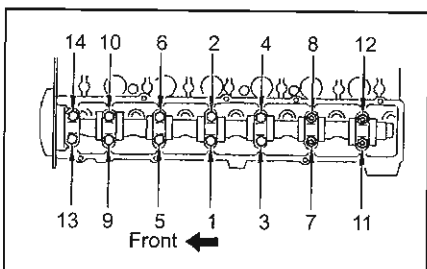


- (2) Tighten the cam bracket installation bolts in the order shown in several stages.

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}

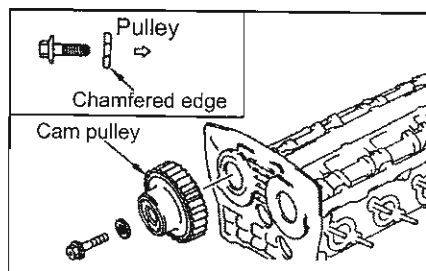
7. Install the cam shaft front oil seal.

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.

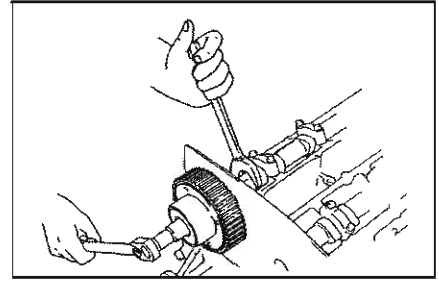


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- (3) Use the spanner to fix cam shaft hexagonal part to tighten installation bolt.

Caution:

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

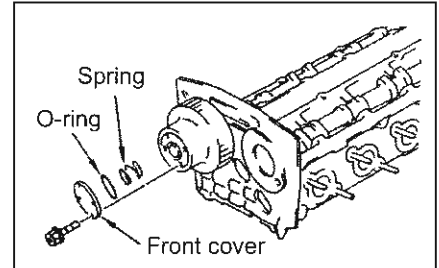


- (4) Insert a spring into pulley and fit the front cover.

- 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).

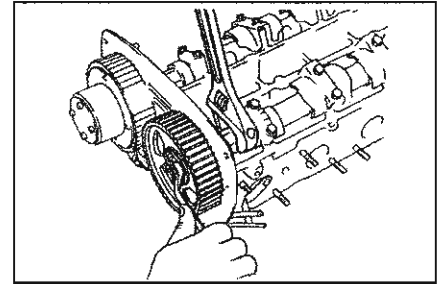
- (1) Install the cam timing pulley to the cam shaft.

- 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}

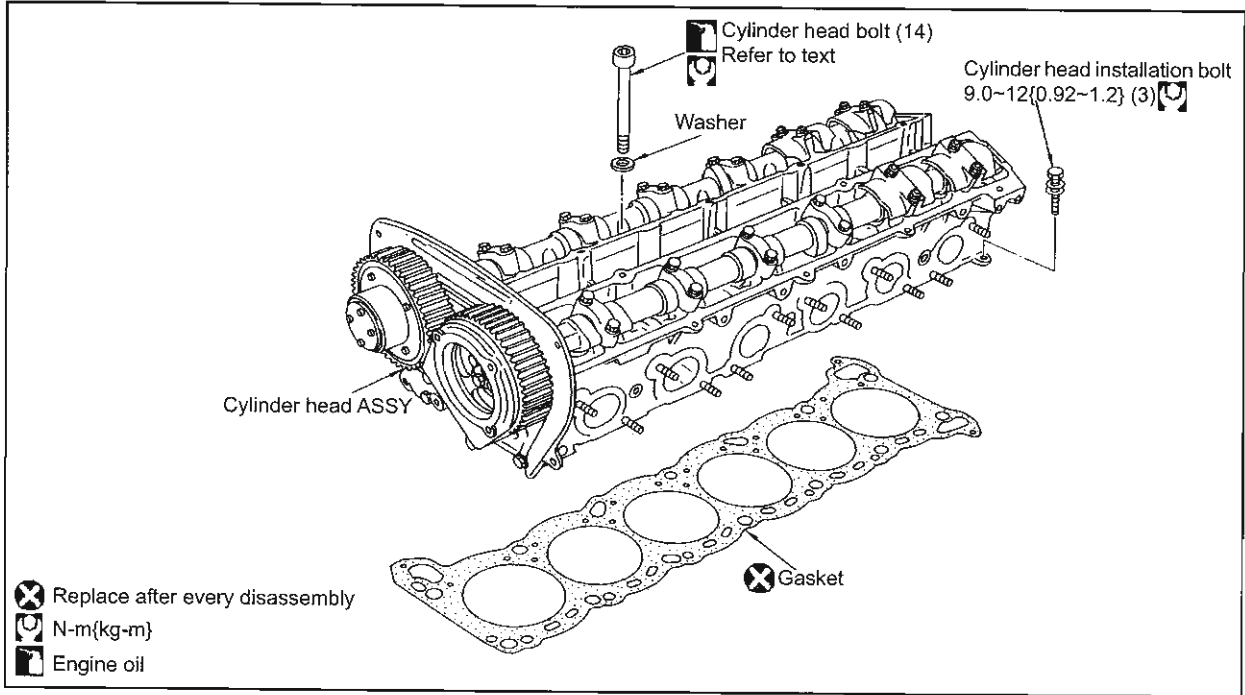
- (2) Install the crank angle sensor installation bracket.

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



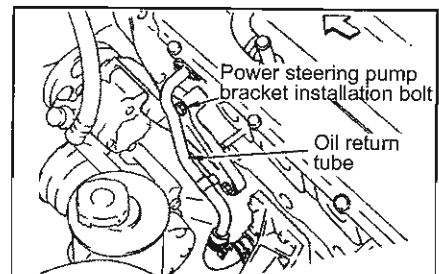
10. Install the rest in reverse order to the removal procedure.

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.

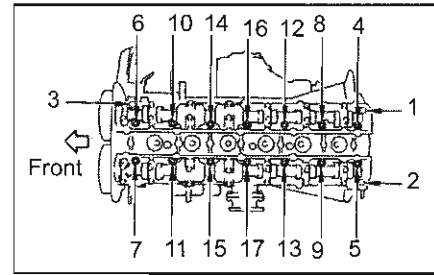


20. Remove the cylinder head ASSY.

(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.

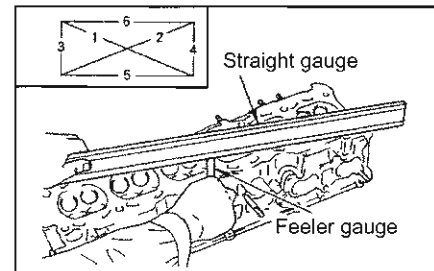
Caution:

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.

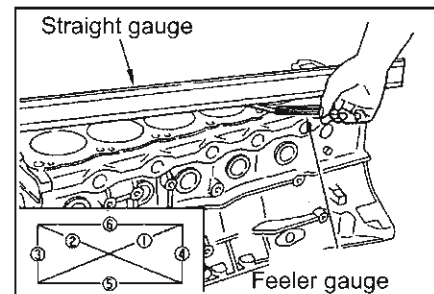
Caution:

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.

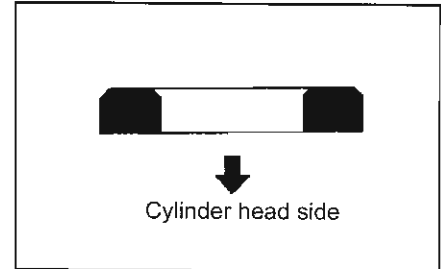
- Use scraper to remove gasket on the installation surface.
- Replace the gasket with a new one.
- Align the cylinder head gasket to dowel pin to install.

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.

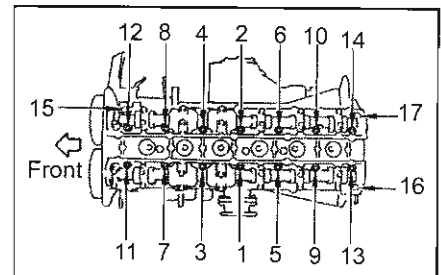
- Apply engine oil to thread part of the screw.
- Install the washer non-chamfered side facing the cylinder head.



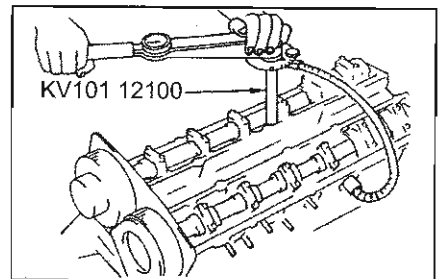
4. Tighten the installation bolts in the order shown (1 ~ 14).

- (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.



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

Caution:

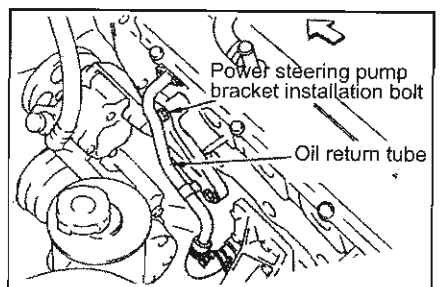
Tightening angle should be checked using the angle wrench or protractor. Never estimate visually.

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}

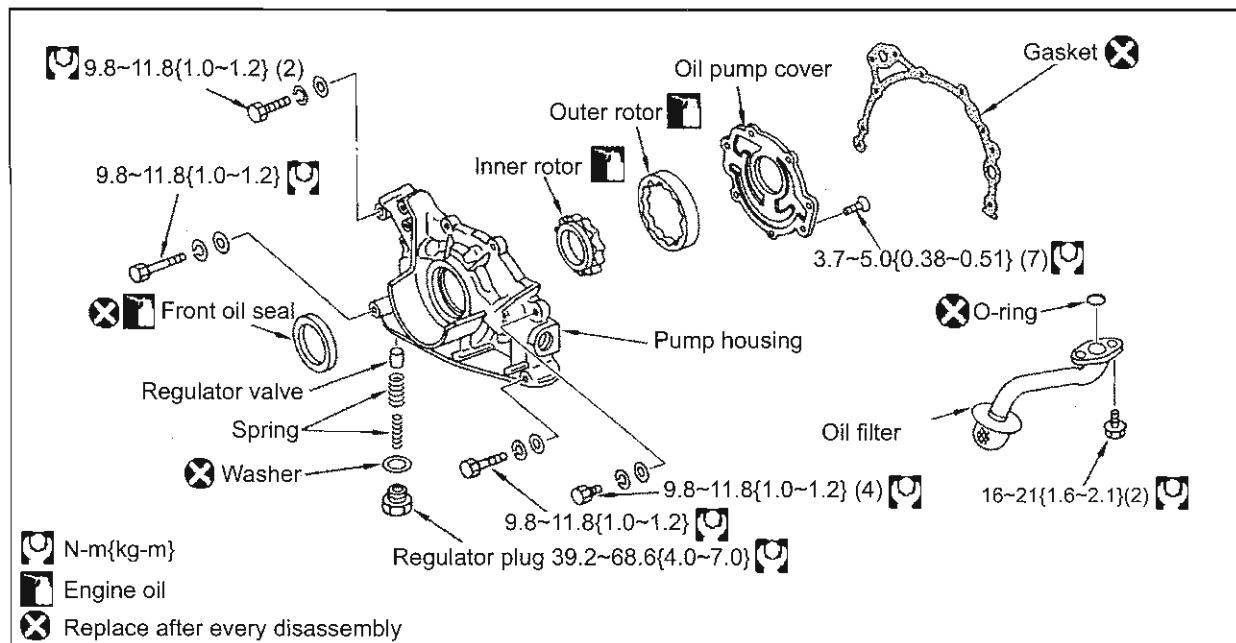
6. Install the top installation bolts for the power steering pump bracket.

Tightening torque (N-m{kg-m}) 37~50{3.8~5.1}



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

10. OIL PUMP



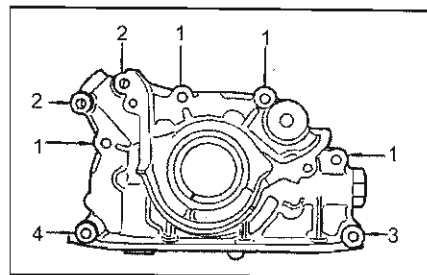
Removal

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. Drain coolant from the radiator drain plug.
4. Drain the engine oil from the oil pan.
5. Remove the air duct (external air introduction side).
6. Remove the cooling fan.
7. Remove the radiator.
8. Remove auxiliary belt.
9. Remove the timing belt.
10. Remove the crank timing pulley.
11. Remove the timing belt rear cover.
12. Remove the oil pan.
13. Remove the oil pump.

Installation

1. Install the oil pump.
 - Use a scraper to remove old gasket from the oil pump and the cylinder block.
 - Use white gasoline to remove grease, water and rubbish from the installation surface.
 - Replace the gasket with a new one.
 - Align to the knock pin on the cylinder block side to install.
 - There are four types of oil pump installation bolts. Make sure to use the correct bolts.

Installation position	Number	Installation bolt length below head (mm)
1	4	20
2	2	35
3	1	45
4	1	55



Tightening torque (N-m{kg-m}) 9.8~11.8{1.0~1.2}

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

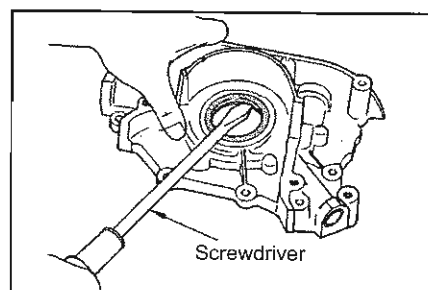
Disassembly

1. Remove the front oil seal.
 - Use a tool such as a screwdriver to remove.

Caution:

Care must be taken not to damage the oil pump housing.

2. Remove the oil pump cover.
3. Remove the inner and outer rotor.
4. Disconnect the regulator plug and remove the spring and the regulator valve.



Inspection

Oil pump visual inspection

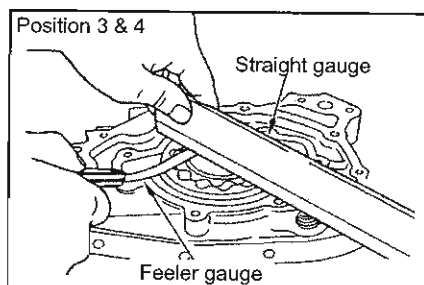
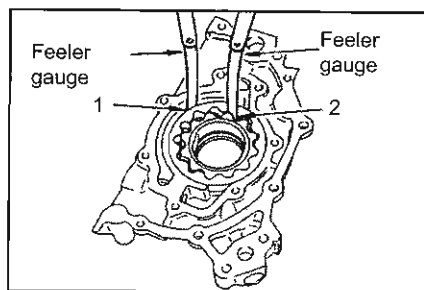
- Check for any wear or damage on the inner and outer rotor and the oil pump housing.
- Replace the oil pump ASSY if there is any abnormality.

Oil pump parts clearance inspection

- Use the feeler gauge to check the following clearance.

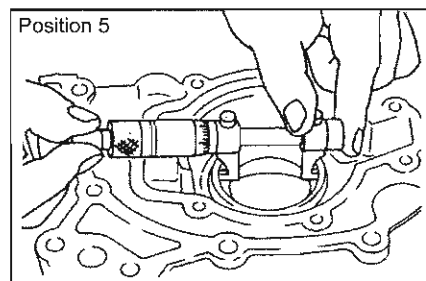
- (1) Outer rotor to oil pump housing clearance
Standard value (mm) 0.11~0.2
- (2) Outer rotor and inner rotor chip clearance.
Standard value (mm) Below 0.180
- (3) Inner rotor to oil pump housing side clearance
Standard value (mm) 0.05~0.09
- (4) Outer rotor to oil pump housing side clearance
Standard value (mm) 0.05~0.11

- Replace the oil pump ASSY if any of the measurements are out of standard value.



(5) Inner rotor to oil pump housing inlow area clearance.

- Use method below to measure the clearance between the inner rotor and oil pump housing inlow area.
- Use a micrometer to measure the oil pump housing inlow inner diameter.

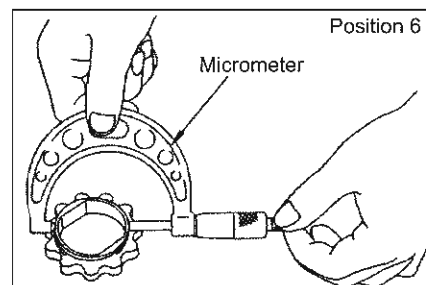


(6) Use a micrometer to measure the inner rotor inlow outer diameter.

(Inner rotor to oil pump housing inlow area clearance) =
 (Oil pump housing inlow inner diameter) -
 (Oil pump housing inlow outer diameter)

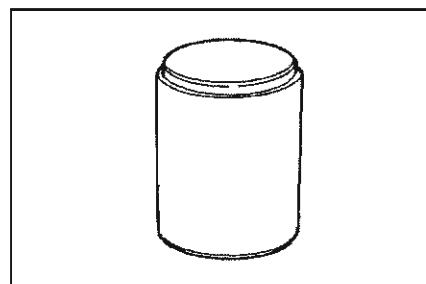
Standard value (mm) 0.045~0.091

- Replace the oil pump ASSY if the measurements are out of standard value.



Regulator valve visual inspection

- Check for any wear or damage on the regulator valve rotational parts.
- Check the regulator spring for any abnormality.
- Replace the regulator valve or the oil pump ASSY if there is any fault.



Assembly

1. Install the inner and the outer rotor.
 - Apply engine oil to each rotational and moving parts.
 - Position the inner rotor groove to cover side.

2. Tighten the oil pump cover installation screws equally.

Tightening torque (N-m{kg-m}) 3.7~5.0{0.38~0.51}

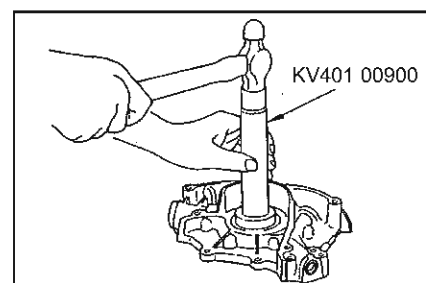
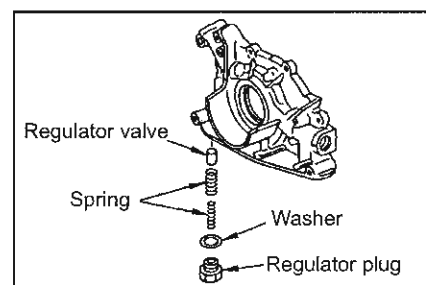
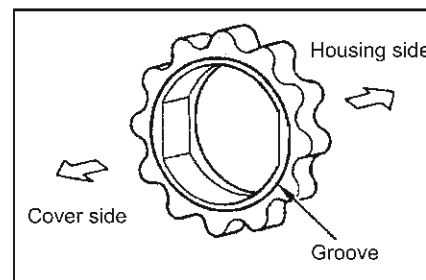
3. Install the regulator valve.

- Apply engine oil to rotational parts.
- Replace the regulator washer with a new one.
- Tighten the regulator plug.

Tightening torque (N-m{kg-m}) 39~69{4.0~7.0}

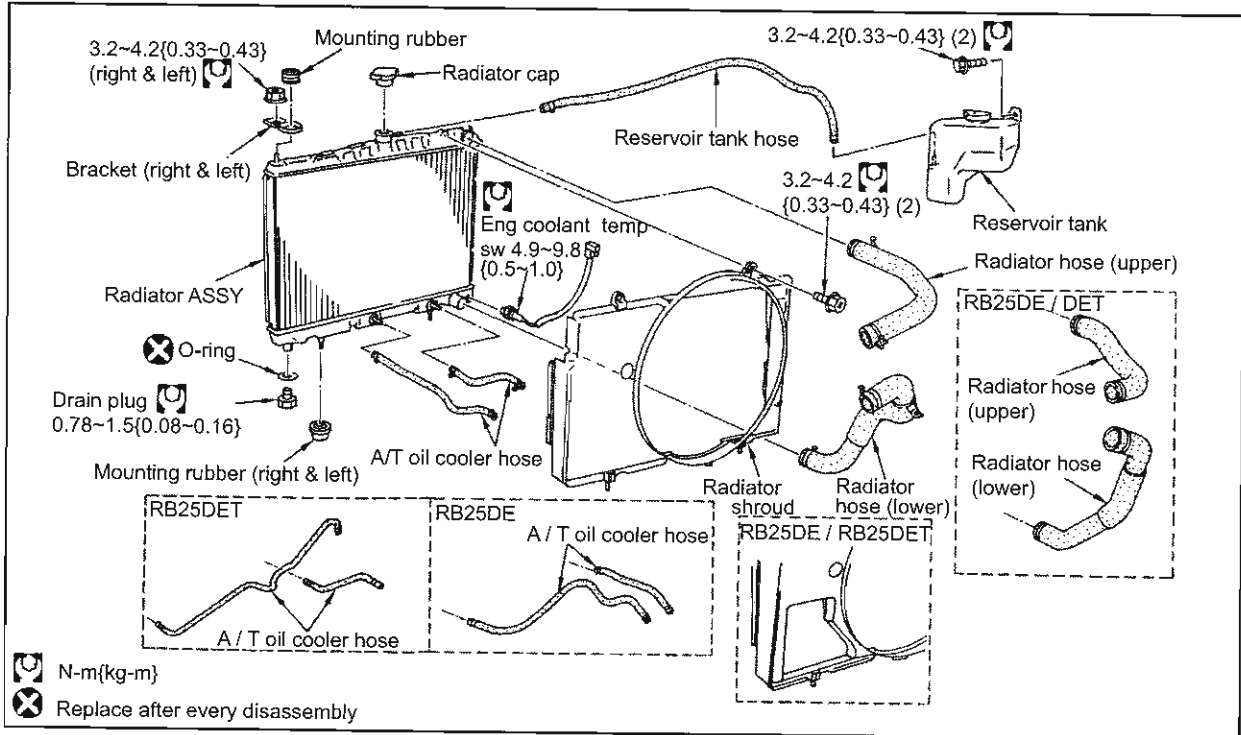
4. Install the front oil seal.

- Replace the oil seal with a new one.
- Check if there is any damage or deformation on oil seal periphery.
- Position the oil seal side with writing towards front.
- Use the oil seal drift to insert the oil seal in until level with installation surface.
- Apply engine oil or chassis grease to oil seal lip surface.



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11. RADIATOR

**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. Drain coolant from the radiator drain plug.
4. Remove the air duct.
5. Remove the reservoir tank hose on the radiator side.
6. Remove the radiator upper hose.
7. Remove the radiator lower hose.
8. Remove the A/T oil cooler hose (A/T vehicle).
 - Place a hole cap on the A/T oil cooler pipe.
9. Disconnect the engine coolant temperature switch harness connector.
10. Remove the radiator upper mount bracket (right & left).
11. Remove the radiator ASSY.
 - Care must be taken not to damage the radiator core.
12. Remove the radiator shroud from the radiator.
13. Remove the engine coolant temperature switch from the radiator.

Installation

1. Install the engine coolant temperature switch to the radiator.
Tightening torque (N-m{kg-m}) 4.9~9.8{0.5~1.0}
2. Install the radiator shroud to the radiator.
Tightening torque (N-m{kg-m}) 3.2~4.2{0.33~0.43}
 - Care must be taken not to damage the radiator core.
 - Only use genuine shroud installation bolts.
3. Install the radiator ASSY.
 - Care must be taken not to damage the radiator core.
4. Install right and left radiator upper mount bracket.
Tightening torque (N-m{kg-m}) 3.2~4.2{0.33~0.43}
5. Install the engine coolant temperature switch harness.
6. Install A/T oil cooler hose (A/T vehicle).
7. Install the rest in reverse order to the removal procedure.

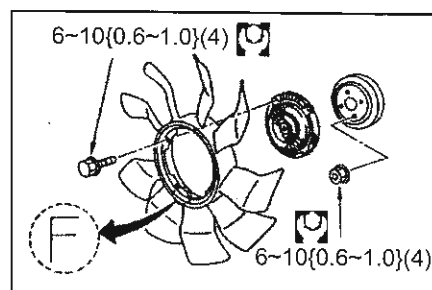
Inspection

- Check the level of coolant and A/T fluid. Top up if necessary.
- Start the engine and look for any coolant or A/T fluid leakage.

12. COOLING FAN

Removal

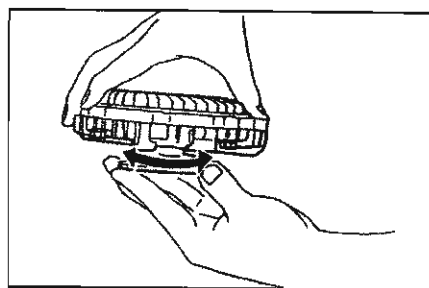
1. Remove the battery negative terminal inside the boot.
2. Remove the air duct.
3. Loosen the cooling fan installation nuts.
4. Loosen the fan belt.
5. Remove the installation nuts to remove the cooling fan.
6. Remove the installation bolts to remove the fan from the cup ring.



Inspection

Cup ring inspection

- Check for any silicon oil leak and bimetal bent.



Cooling fan inspection

- Check for any damage or cut.

Installation

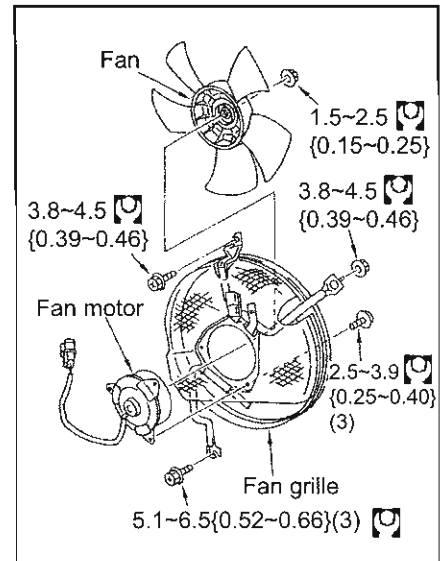
Install the parts in reverse order to the removal procedure.

- Install the fan to the cup ring making sure the front mark is facing front.
Tightening torque (N·m{kg·m}) 6~10{0.6~1.0}
- Adjust the fan belt tension.

13. AUXILIARY MOTOR FAN

Removal

1. Remove the battery negative terminal inside the boot.
- (1) Open the boot lid.
- (2) Remove the boot front finisher and remove the negative battery terminal.

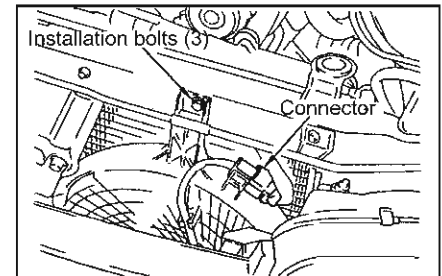


2. Remove the auxiliary fan harness connector.
3. Remove three installation bolts to remove the radiator fan from below.

Caution:

Care must be taken not to damage the air conditioner condenser.

4. Remove the fan from the fan motor.
5. Remove the fan motor from the fan grille.



Installation

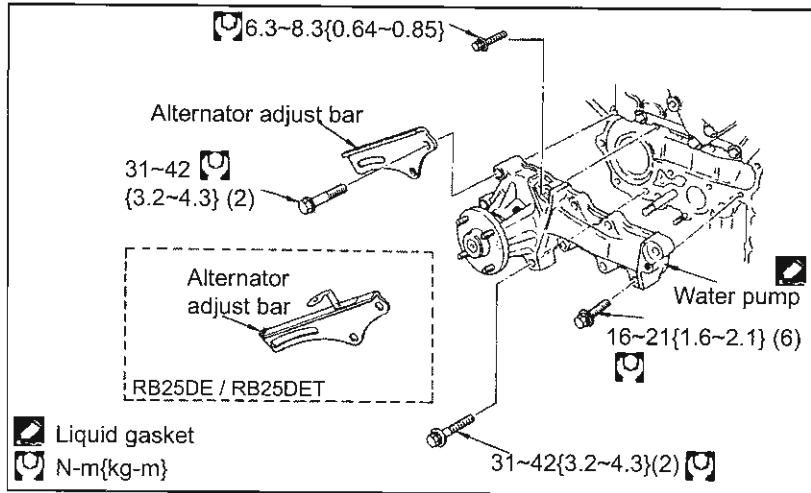
1. Install the fan motor to the fan grille.
Tightening torque (N·m{kg·m}) 2.5~3.9{0.25~0.40}
2. Install the fan to the fan motor.
Tightening torque (N·m{kg·m}) 1.5~2.5{0.15~0.25}
3. Install the auxiliary motor fan.

Caution:

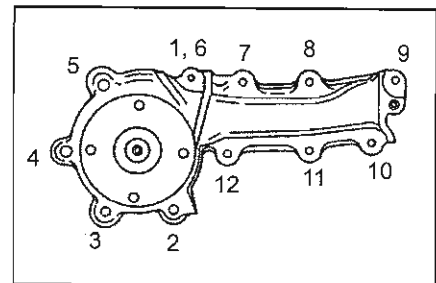
Care must be taken not to damage the air conditioner condenser.

Tightening torque (N·m{kg·m}) 5.1~6.5{0.52~0.66}

4. Install the auxiliary motor fan harness connector.
5. Install the rest in reverse order to the removal procedure.

14. WATER PUMP**Removal**

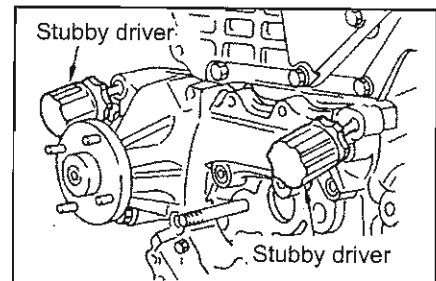
1. Remove the battery negative terminal inside the boot.
2. Remove the air duct.
3. Remove the under cover.
4. Drain coolant from the radiator drain plug.
5. Drain coolant from the cylinder block drain plug.
6. Remove the cooling fan.
7. Remove the radiator.
8. Remove the auxiliary belt.
9. Remove the water pump pulley.
10. Remove the timing belt.
11. Remove the tensioner pulley.
12. Remove the tensioner pulley and the idler pulley.
13. Remove the alternator adjust bar.
14. Remove the installation bolts in the order shown.
15. Remove the water pump.



- Insert the stubby driver into the installation bolt hole and move it up and down to remove.

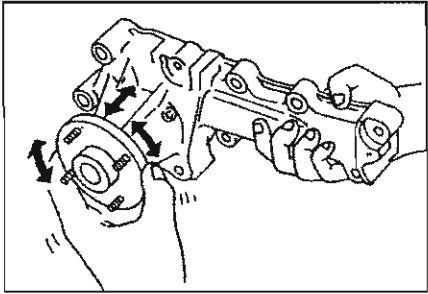
Caution:

Care must be taken not to damage the cylinder block side screws.



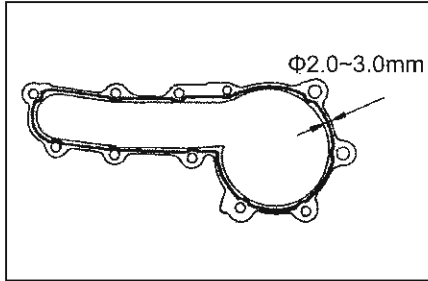
Inspection

- Check the water pump main body and the vane for rust or foreign objects.
- Make sure the water pump is not warpy.
- Replace the water pump if there are any abnormalities.

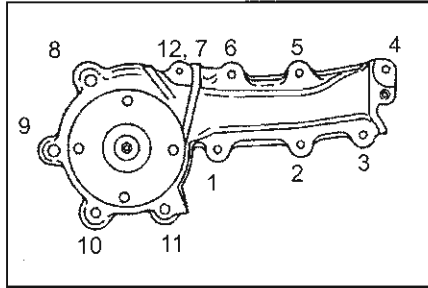


Installation

1. Install the water pump.
- Use a scraper to remove old gasket from the water pump and the cylinder block installation surface.
 - Clean the installation surface with white gasoline.
 - Apply sealing agent (KP710 00150) to the position shown in approx. $\Phi 2.0\sim 3.0\text{mm}$.



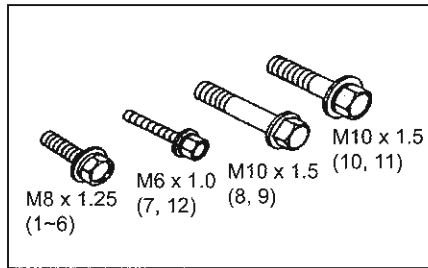
- Tighten the installation bolts in the order shown.
- Tighten the installation bolts 8 and 9 together with the alternator adjust bar.



- There are four types of installation bolts.

Tightening torque (N-m{kg-m})

M6	6.3~8.3{0.64~0.85}
M8	16~21{1.6~2.1}
M10	31.4~42.1{3.2~4.3}

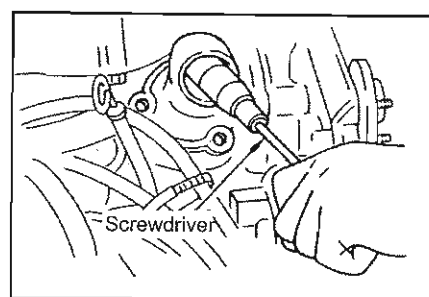
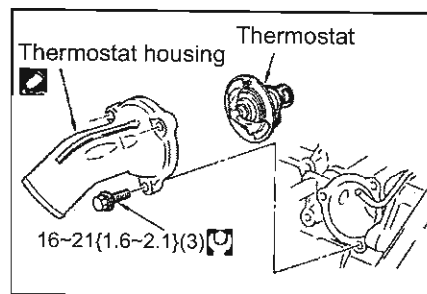


2. Install the rest in reverse order to the removal procedure.

15. THERMOSTAT & WATER INLET

Removal

1. Remove the battery negative terminal inside the boot.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.
2. Drain coolant from the radiator drain plug.
3. Drain coolant from the cylinder block drain plug.
4. Remove the alternator belt to shift the alternator down.
5. Remove the alternator adjust bracket.
6. Remove the radiator lower hose at the thermostat housing side.
7. Remove the water inlet.
 - Insert end of a tool such as a screwdriver into the thermostat housing and move it up and down to remove.
8. Remove the thermostat.



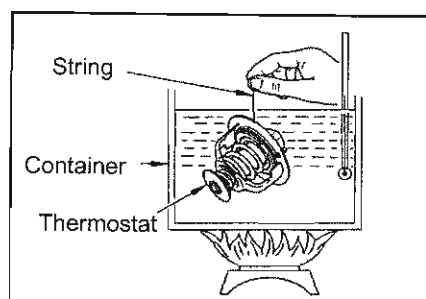
Inspection

Thermostat inspection

Check the valve opening temperature and maximum valve lift.

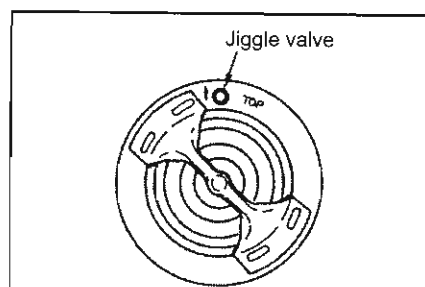
- Hang the thermostat by string on the valve and submerge in heated water in double walled container and stir water while heating it up.
- The opening temperature is the temperature when the valve opens and thermostat falls from the string.

Valve opening temperature (°C)	76.5
Max. valve lift (mm/°C)	Over 10 / 90
- Replace the thermostat if the value is not at standard value.



Installation

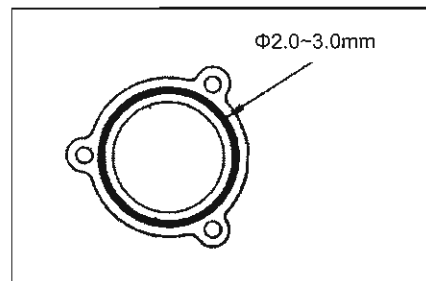
1. Use a scraper to remove old liquid gasket from the water inlet and the cylinder block installation surface.
 - Use white gasoline to clean the surface.
2. Install the thermostat.
 - Position the thermostat so the jiggle valve (TOP mark) is on the top.



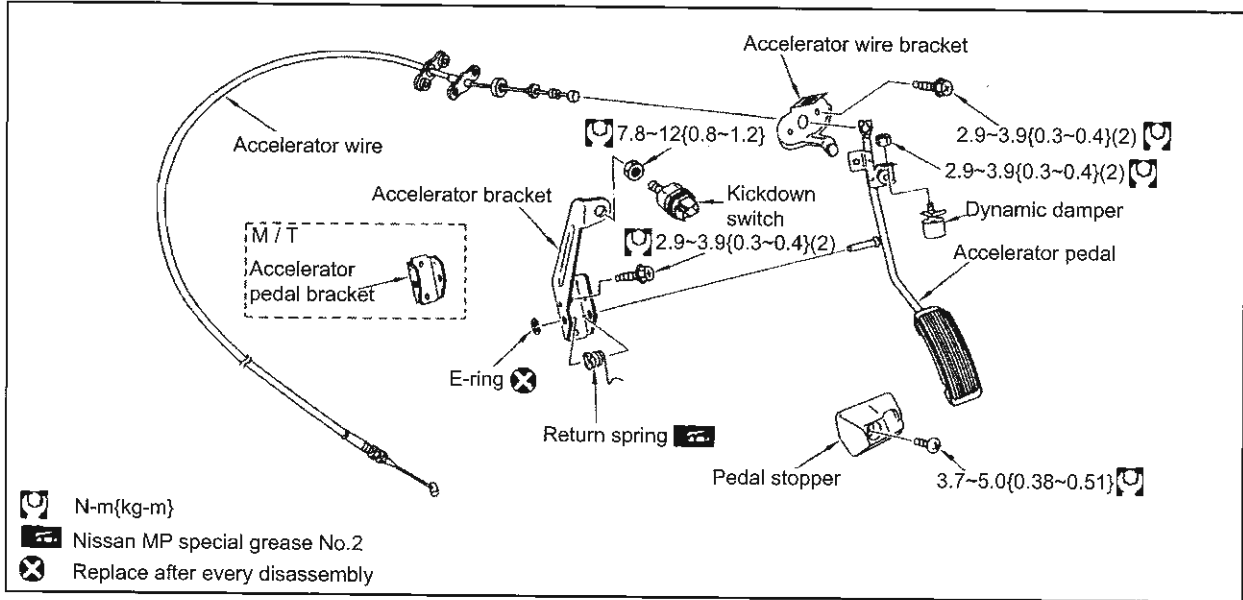
RB25DE / RB25DET ENGINE

3. Install the water inlet.

- Apply sealing agent (KP510 00150) at approx. $\Phi 2.0\sim 3.0\text{mm}$ as shown in the figure.
- Tighten the installation bolts.
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



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

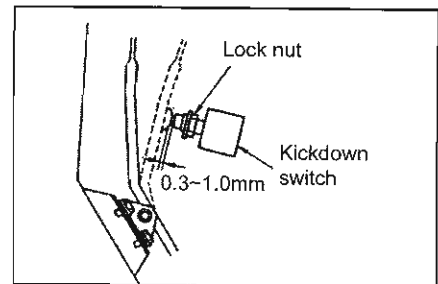
16. ACCELERATOR CONTROL SYSTEM**Removal**

1. Disconnect the accelerator wire at throttle drum side.
2. Disconnect the accelerator wire at accelerator pedal side.
3. Remove the accelerator pedal bracket installation bolt to remove the accelerator pedal / bracket ASSY.

Installation

Installation is the reverse order of the removal procedure.

- Apply Nissan MP special grease No. 2 to the return spring.
 - Replace E-ring with a new one.
 - Adjust the installation position when the kickdown switch is removed (A/T).
 - Depress the accelerator pedal so the throttle drum is in full open position. In this position adjust the opening to approx. 0.3~1.0mm, then tighten the lock nut.
- Kickdown switch lock nut installation torque (N-m{kg-m}) 7.8~12{0.8~1.2}

**Caution:**

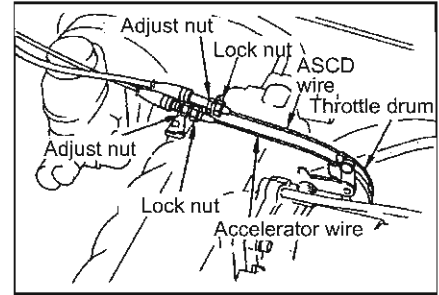
- Do not position the switch to fully open stopper.
- Do not damage or bend the wire.
- Make sure to apply grease to each parts except for the inner wire at installation.

Inspection

- Make sure the throttle drum side is fully open when the accelerator pedal is depressed fully.
- Make sure the parts will move smoothly.

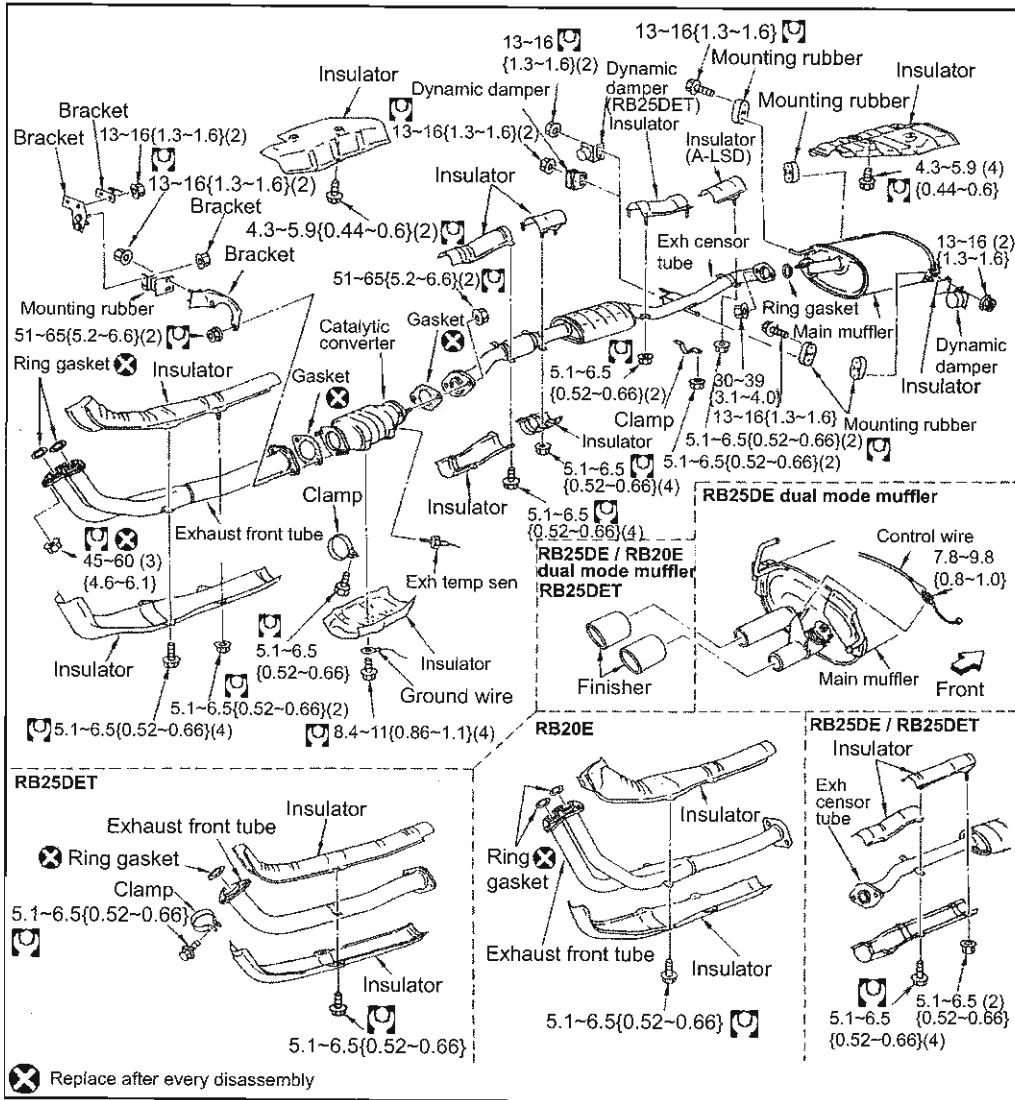
Adjustment

- Loosen the wire and adjust the adjust nut to pull the outer case towards the accelerator pedal until the throttle drum starts to move.
From this position turn back the adjust nut 1.5 ~ 2.0 turns, and secure the lock nut.



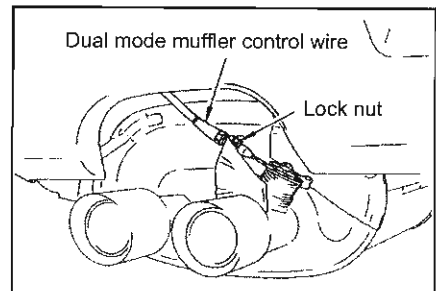
RB25DE / RB25DET ENGINE

17. EXHAUST SYSTEM



Removal

- Disconnect each parts at connection and remove.
- Remove the muffler in the following way for the vehicle with dual mode muffler:
 - (1) First remove the main muffler rear mounting rubber and lower the rear end before separating with the rear tube.
 - (2) Disconnect dual mode muffler control wire from the main muffler.
 - (3) Remove the main muffler.



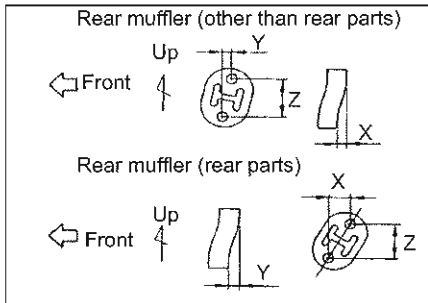
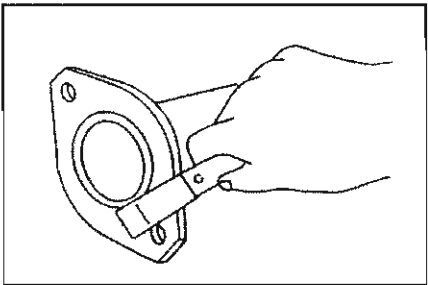
Installation

- Replace or repair the heat shield plate with deformation. Clean and remove foreign objects.
- Make sure there is no excessive gap between exhaust pipe and the heat shield plate when installed.

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- Remove old gasket etc. from each sealing surface at the connection. Connect securely to avoid any gas leaks.
- Replace each gasket with a new one.
- Replace the front tube installation nut with a new one.
- Install each clamp by aligning the insulator projection and the clamp hole.
- Install the dual mode muffler control wire.
Lock nut tightening torque (N-m{kg-m})
7.8~9.8{0.8~1.0}
- Adjust the dual mode muffler control wire on the actuator side.
- Do not twist or pull the mount rubbera when install-ing.
- Offset measurements when each mount rubber is installed correctly.

PARTS		X	Y	Z
Main muffler		-5~5	0~10	38~48
Centre muffler front		-5~5	0~10	38~48
Centre muffler rear	Right	33~43	-5~5	17~27
	Left	33~43	-5~5	17~27



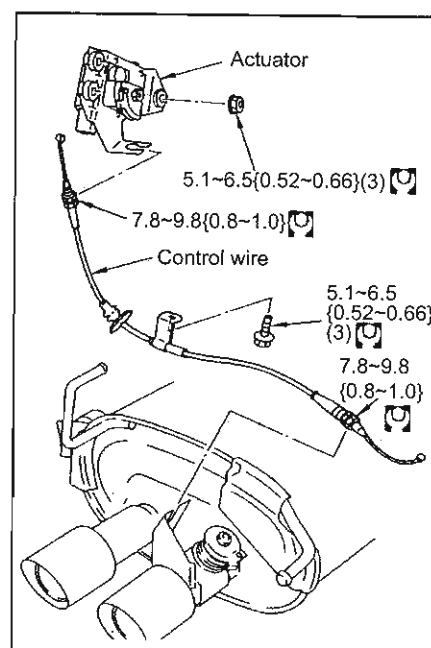
Inspection

- Start the engine and check for any gas leaks from each connection.
- Check for any exhaust gas leaks due to corrosion.
- Replace parts with new ones if there is a gas leak due to corrosion.

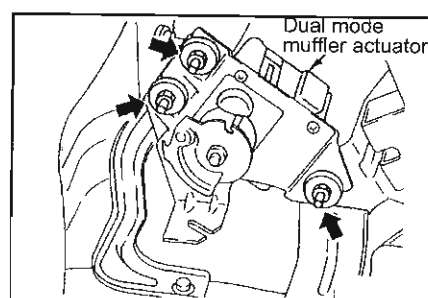
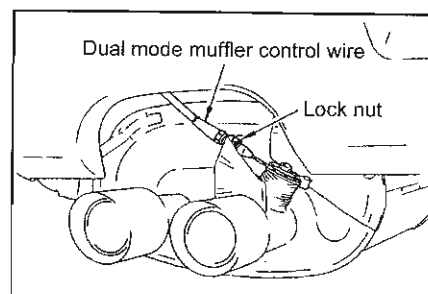
18. DUAL MODE MUFFLER

Removal

1. Remove the battery negative terminal inside the boot.
 - (1) Open the boot lid.
 - (2) Remove the boot front finisher and remove the negative battery terminal.



2. Remove the control wire.
 - First remove the actuator side then muffler side.
 - For the muffler side control wire, first remove from the mounting rubber then lower the rear end to remove the wire.
3. Remove the actuator.
 - Remove three installation nuts and remove the harness connector from behind the actuator. Then remove the actuator.



Installation

1. Install the actuator.
 - Connect the harness connector behind the actuator.
 - Tighten three installation nuts.
Tightening torque (N-m{kg-m}) 5.1~6.5{0.52~0.66}
2. Install the control wire to the main muffler side.
Tightening torque (N-m{kg-m}) 25~32{2.6~3.3}
3. Install the main muffler to the mount.
4. Temporarily connect control wire to the actuator.
 - Do not apply too much force to the wire.
5. Adjust the wire.

Adjustment

- To take up the slack from the inner wire, first loosen the wire bracket lock nut on the actuator side and then move the outer cable in the direction of the arrow.
- The outer cable will interfere with the wire drum if the outer cable is positioned excessively towards the actuator lever.
- If the inner wire is too tight, move the outer cable in the opposite direction to the arrow.

Caution:

The valve will be partially open if the wire is too tight.

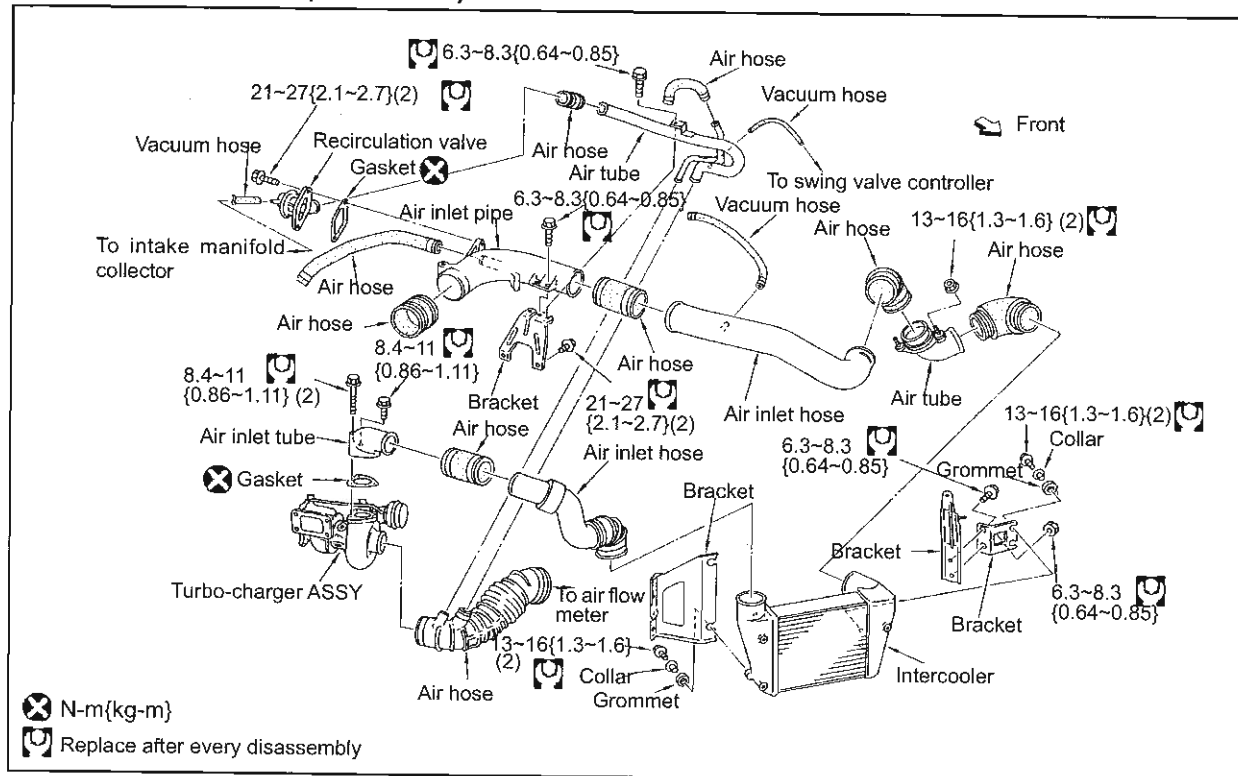
- Inner wire adjustment.
Press down on the inner wire between the valve lever wire bracket and the tail tube wire bracket with a finger, the wire slack should be approx. 2mm.
- Tighten the actuator side lock nut after the adjustment.
Tightening torque (N-m{kg-m}) 7.8~9.8{0.8~1.0}

Inspection

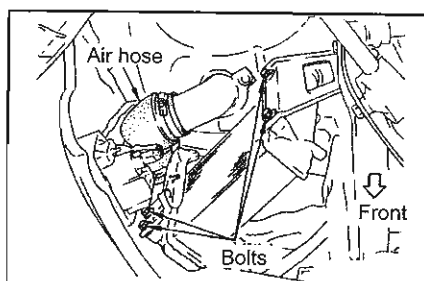
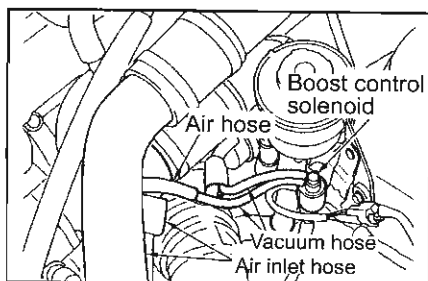
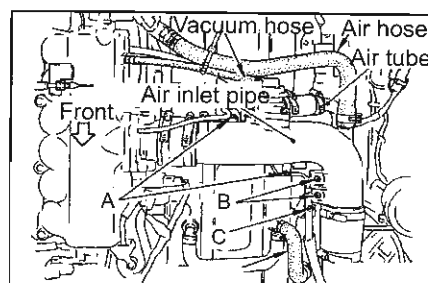
- Make sure the valve is not half open when the ignition switch is in ON position. Check for any exhaust gas leaks from right side of the tail tube when idling.
- Check if the valve will open fully at approx. 4100rpm.

RB25DET ENGINE

1. INTER-COOLER (RB25DET)

**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 air duct and the air cleaner case.
3. Remove air inlet pipe and the air tube.
 - (1) Remove vacuum hose and the air hose.
 - (2) Remove the canister tube installation bolt (A), air inlet pipe installation bolt (B) and air tube installation bolt (C).
 - (3) Loosen each clamp to remove air inlet pipe and the air tube.
4. Remove the air inlet hose.
 - (1) Remove air hose and the vacuum hose from the boost control solenoid and air inlet hose.
 - (2) Place alignment marks as required and loosen each clamp to remove air inlet hose.
5. Remove inter-cooler.
 - (1) Remove the front fender protector (left).
 - (2) Remove 4 installation bolts shown.
 - (3) Loosen clamps on the air hose to remove inter-cooler.



Inspection

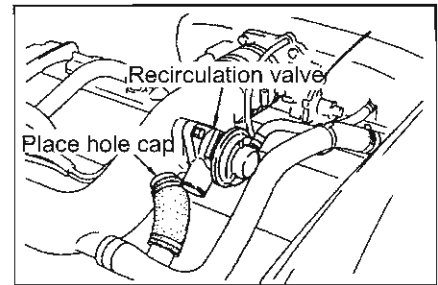
Inter-cooler visual inspection

- Check inter-cooler for any damage or wear.
- Replace inter-cooler if there is any fault.

Recirculation valve

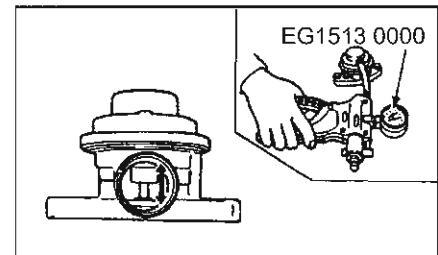
Function inspection

- Disconnect recirculation valve compressor upper end hose (place a hole cap). Check if the air will blow back when the throttle is closed.



Element inspection

- Make sure the recirculation valve diaphragm will rise and the negative pressure is retained when the vacuum handy pump is used to apply negative pressure (-230+/-50mmHg).



Installation

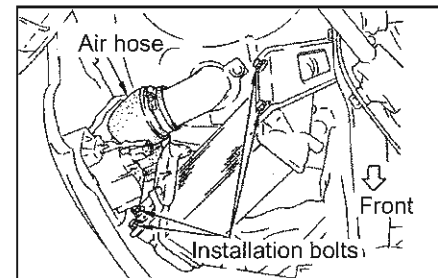
1. Install the inter-cooler.

(1) Tighten 4 installation bolts.

Tightening torque (N-m{kg-m}) 13~16{1.3~1.6}

(2) Tighten air hose clamps.

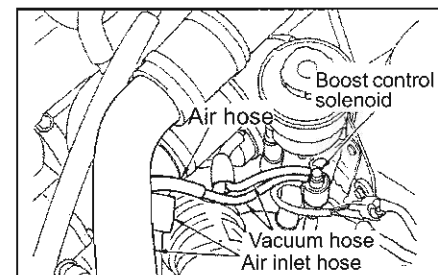
(3) Install front fender protector (left side).



2. Install air inlet hose.

(1) Align the alignment mark to install the air inlet hose.

(2) Install three vacuum hoses boost control solenoid and air inlet hose.



3. Install the air inlet pipe.

Tightening torque (N-m{Kg-m}) 6.3~8.3{0.64~0.85}

4. Install the air tube.

• Tighten installation bolt (C).

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

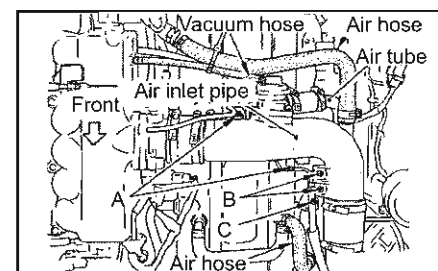
5. Install the canister tube.

• Tighten installation bolt (A).

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

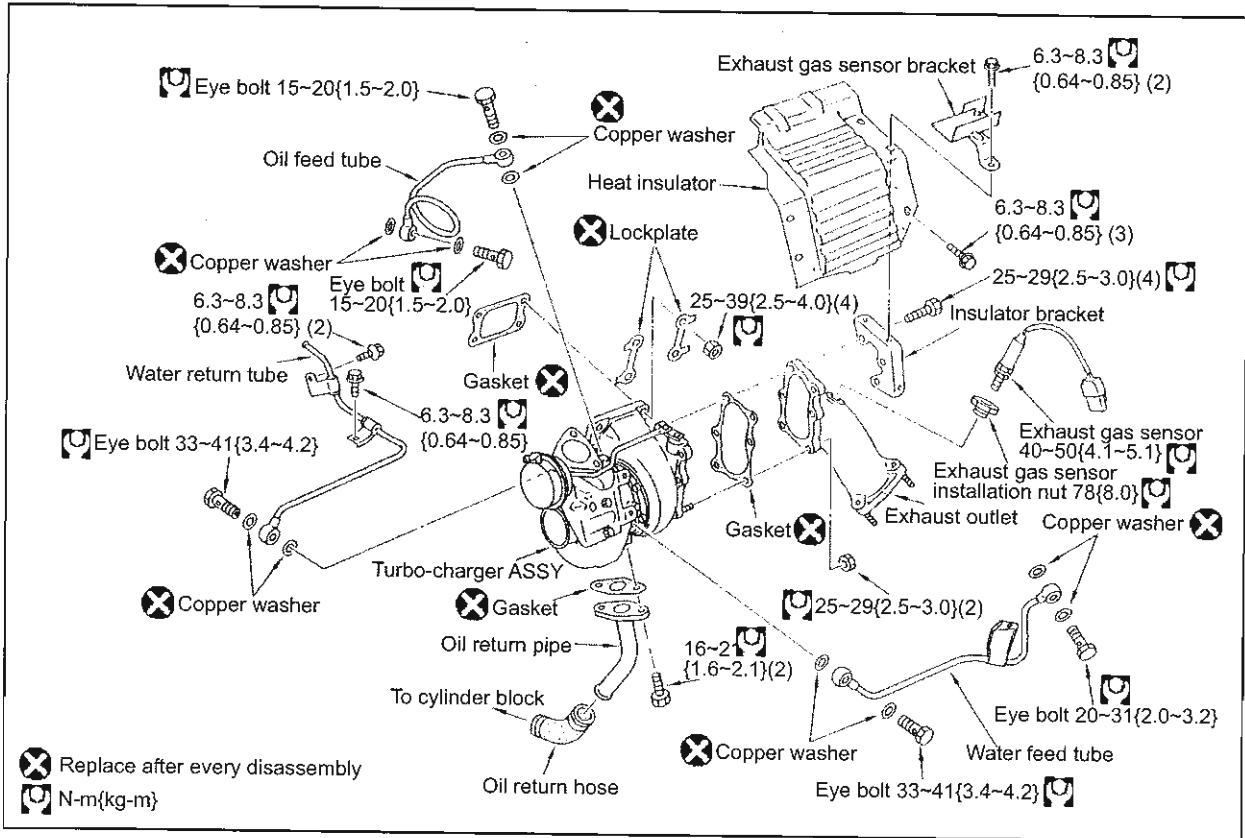
6. Install the air hose and the vacuum hose.

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



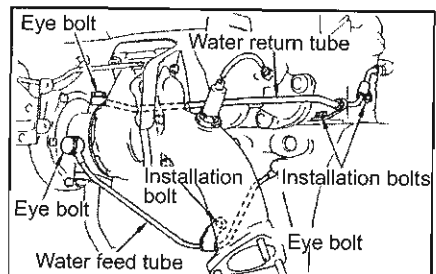
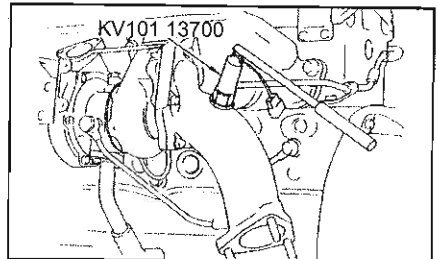
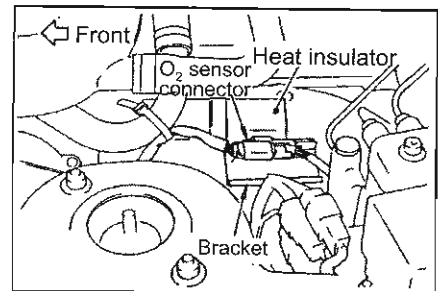
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2. TURBO-CHARGER



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. Drain coolant from the radiator drain plug.
3. Remove the exhaust front tube.
4. Remove air inlet tube.
5. Remove air hose from the turbo-charger.
6. Remove swing valve controller from the vacuum hose.
7. Remove the earth wire.
8. Disconnect exhaust gas sensor connector.
9. Remove the heat insulator and exhaust gas sensor bracket.
10. Remove exhaust sensor.
 - Use exhaust sensor remover socket to remove.
 - Do not cause damage to exhaust sensor.
11. Remove water feed tube.
 - Drain coolant from an eye bolt on the water feed tube on the cylinder block side or from the cylinder block drain plug.
 - Remove two eye bolts and installation bolt.
12. Remove water return tube.
 - Remove eye bolt and two installation bolts.



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13. Remove oil feed tube.

- Remove two eye bolts.

14. Remove oil return pipe.

- Loosen oil return hose clamp to remove two installation bolts.

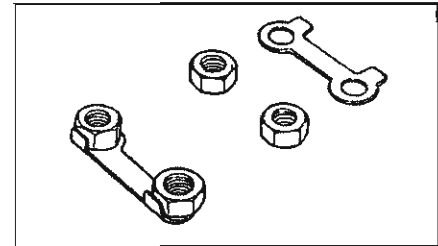
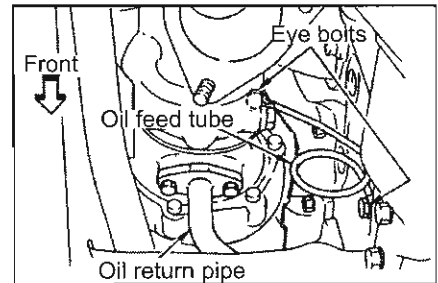
15. Remove exhaust outlet and the insulator bracket.

16. Lift up the claw to remove four turbo-charger installation nuts.

17. Remove the turbo-charger.

Warning:

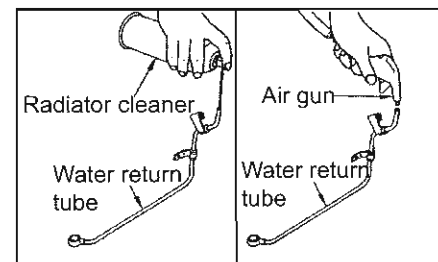
Do not disassemble turbo-charger.



Inspection

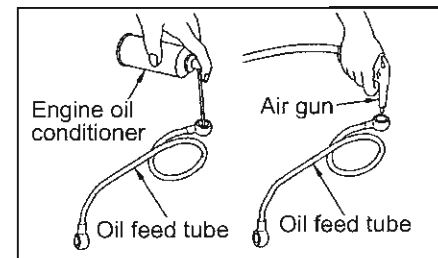
Water feed / Return tube

Check to make sure there are no blockages or rust inside the water feed and the return tube by blowing in air using the air gun after cleaning the tube with radiator cleaner.



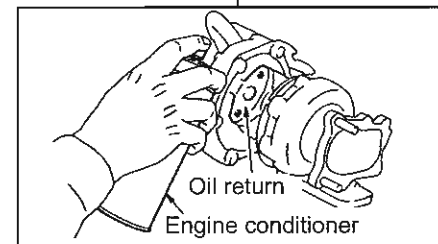
Oil feed / Return tube

Check to make sure there are no blockages or rust inside the oil feed and the return tube by blowing air in using the air gun after cleaning the tube with engine conditioner.

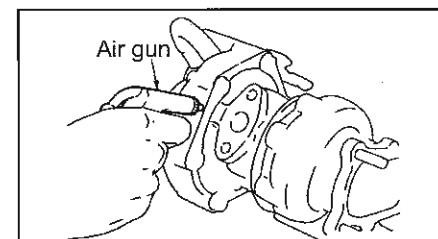


Turbo-charger

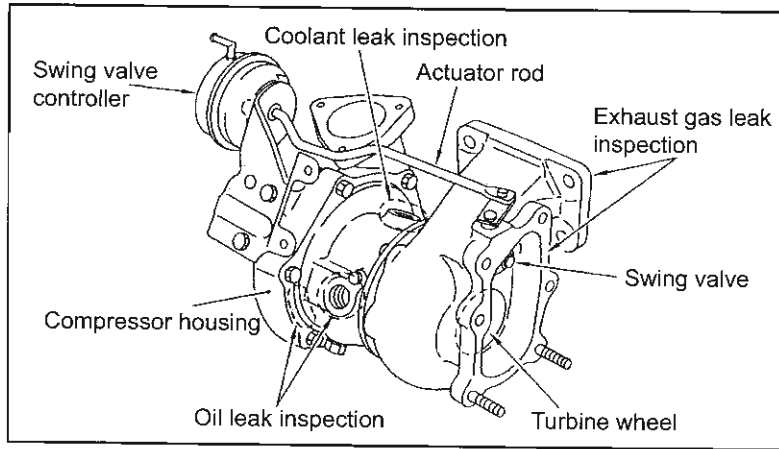
- Clean before inspection.
- Clean the oil feed and the oil return with engine conditioner.
- Clean the water inlet and outlet with radiator cleaner.



- After cleaning use the air gun to blow clean.
- Also blow air to the compressor wheel, turbine wheel, compressor housing and turbine housing.

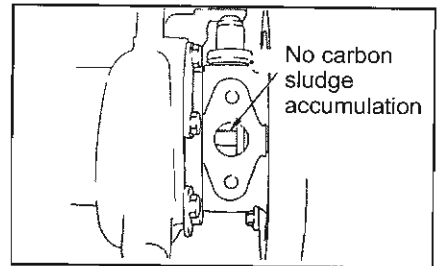
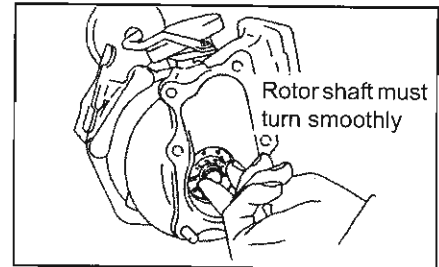


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Rotor shaft

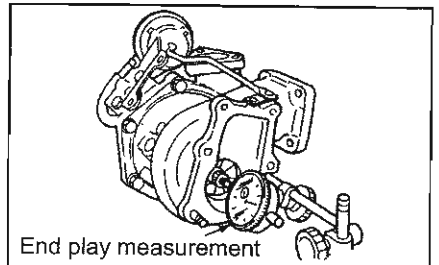
- Make sure the rotor shaft will turn smoothly when pushed with finger.
- The rotor shaft must not be loose when moved right / left.



- Make sure there is no carbon sludge accumulation.
- Make sure there is no change in colour with the rotor shaft.

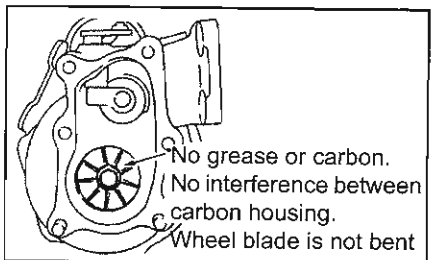
Rotor shaft end play

- Set end play by placing the dial gauge to the rotor shaft end and place it to the axle direction.
- Standard value (mm) 0.120 ~ 0.200



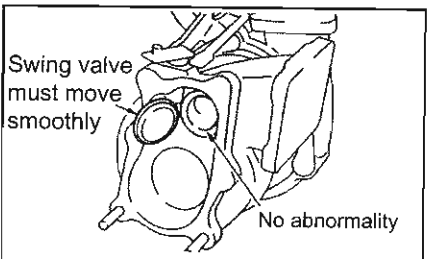
Turbine wheel

- Make sure there is no grease adhesion.
- Make sure there is no carbon accumulation.
- Make sure the turbine wheel blade is not bent or broken.
- Make sure there is no interference between the turbine housing and the wheel.



Swing valve

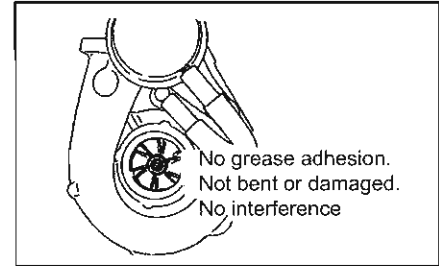
- Remove actuator rod E-ring and check if the swing valve will move smoothly with no deformation or damage.
- Check for any abnormality with the turbine housing seat surface.



RB25DET ENGINE

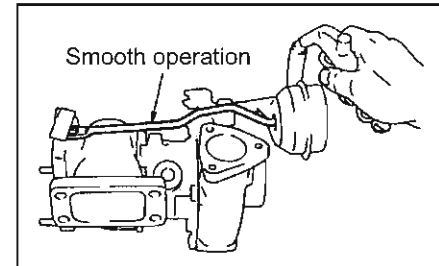
Compressor wheel

- Make sure there is no grease adhesion at admission port.
- Check for any interference between the compressor housing.
- Make sure the wheel is not bent or damaged.



Swing valve controller

- Remove swing valve controller rubber hose at compressor housing side.
- Inspection must be carried out when actuator rod is installed and removed.
- Make sure the swing valve controller rod will move when the air gun is used to blow air in (approx. 51kPa{385mmHg} [M/T vehicle], approx. 36kPa{270mmHg} [A/T vehicle]). Stop air gun operation as soon as it starts moving.

Caution:

Before blowing the air to the swing valve controller rod make sure to check the air gun pressure using the LPG pressure gauge (0.10MPa{1kg/cm²} ST1957 2000) so it will not damage the diaphragm.

Turbo-charger fault diagnosis (oil leak, smoke, lack of power, lack of acceleration, abnormal noise)

Points to be checked before diagnosis:

- (1) Level of engine oil is between MIN and MAX line (If the level is over the MAX line, the engine oil will flow into the intake duct causing a fault with the turbo-charger).
 - (2) Enquire the customer if the oil had been cooled down by idling the vehicle after driving.
- Referring to the table on the following page, replace the turbo ASSY if any of the unit tests are faulty.
 - If no fault is detected there is no fault with the turbo unit, inspect other vehicle parts.

Inspection parts	Inspection result	Phenomenon			
		Oil leak	Smoke	Noise	No power No Acceleration
Turbine wheel	Dirty with oil	▲	●	▲	▲
	Carbon accumulation	▲	●	○	○
	Interference with housing	▲	○	●	○
	Wheel is bent or broken			●	●
Compressor wheel	Inside the admission port is dirty with oil	○	○		
	Interference with housing	▲	○	●	○
	Wheel is bent or broken			●	●
Rotor shaft end play checking both turbine and compressor	Doesn't turn smoothly when pushed with a finger		▲	▲	○
	Doesn't turn when pushed with a finger				●
	Movement of the bearing is great	▲	▲	○	▲
Rotor shaft and oil return	Carbon sludge accumulation at scavenge hole	▲	●	▲	▲
Swing valve opera- tion (use air gun)	Doesn't operate smoothly when correct air pressure is applied (Approx. 51kPa{385mmHg} [M/T vehicle], Approx. 36kPa{270mmHg} [A/T vehicle])				●

[● Extremely high ○ High ▲ Small]

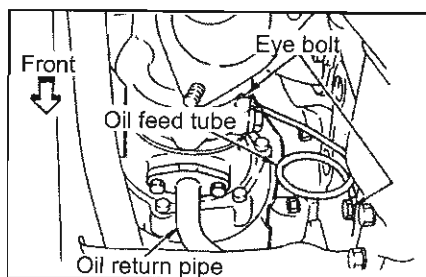
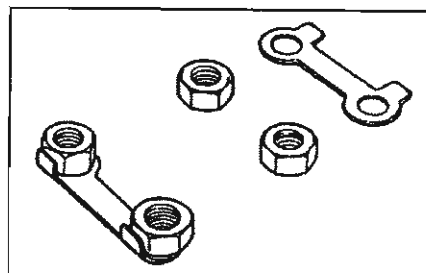
Installation

1. Install turbo-charger to the exhaust manifold.
 - Replace the gasket with a new one.
Tightening torque (N-m{kg-m}) 25~39{2.5~4.0}
 - After tightening the installation nut fold the lock plate claw towards the installation nut to fix the installation nut.
 - Replace the lockplate with a new one.
2. Install the exhaust outlet and the insulator bracket.
Tightening torque (N-m{kg-m}) 25~29{2.5~3.0}
3. Install the oil return pipe.
 - Replace the gasket with a new one.
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
 - Tighten oil return hose clamp.
4. Install the oil feed tube.
 - Replace the copper washer with a new one.

Caution:

The eye bolts for the oil feed tube are labelled "G" as they are different to other eye bolts.

Tightening torque (N-m{kg-m}) 15~20{1.5~2.0}



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5. Install the water return tube.

- Replace the copper washer with a new one.

Tightening torque (N-m{kg-m})

Installation bolt 6.3~8.3{0.64~0.85}

Eye bolt 33~41{3.4~4.2}

6. Install the water feed tube.

- Replace the copper washer with a new one.

Tightening torque (N-m{kg-m})

Turbo-charger side eye bolt 33~41{3.4~4.2}

Cylinder block side eye bolt 20~31{2.0~3.2}

7. Install the exhaust sensor to exhaust outlet.

- Use the exhaust sensor installation socket to install.

Caution:

Do not cause any damage to the exhaust sensor when installing.

Tightening torque (N-m{kg-m})

Exhaust sensor installation nut 78{8.0}

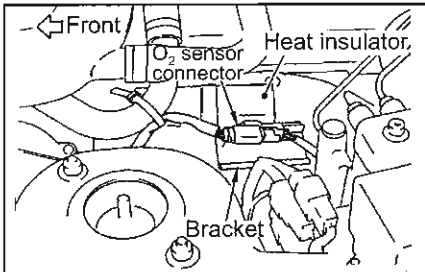
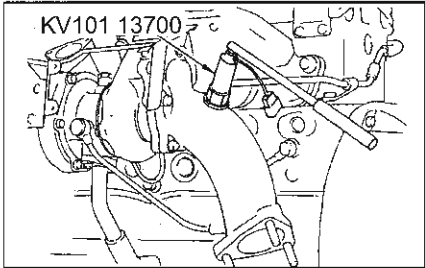
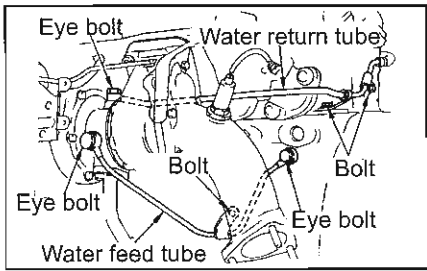
Exhaust sensor 40~50{4.1~5.1}

8. Install the heat insulator and the exhaust sensor bracket.

Tightening torque(N-m{kg-m}) 6.3~8.3{0.64~0.85}

9. Install the exhaust sensor connector and the ground wire.

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



Inspection

- Start the engine and look for any leakage from the turbo-charger pipings such as coolant and engine oil. Also check exhaust manifold and the turbo-charger connection for any exhaust gas leak.

Turbo-charger function inspection

- Stop the engine after engine has warmed up.
- Connect three-way connector to the air hose between the air inlet pipe and the swing valve control and install the compound gauge.

- Start the engine and increase the engine rev. Read the maximum value on the compound gauge.

Swing valve opening pressure (kPa{mmHg})

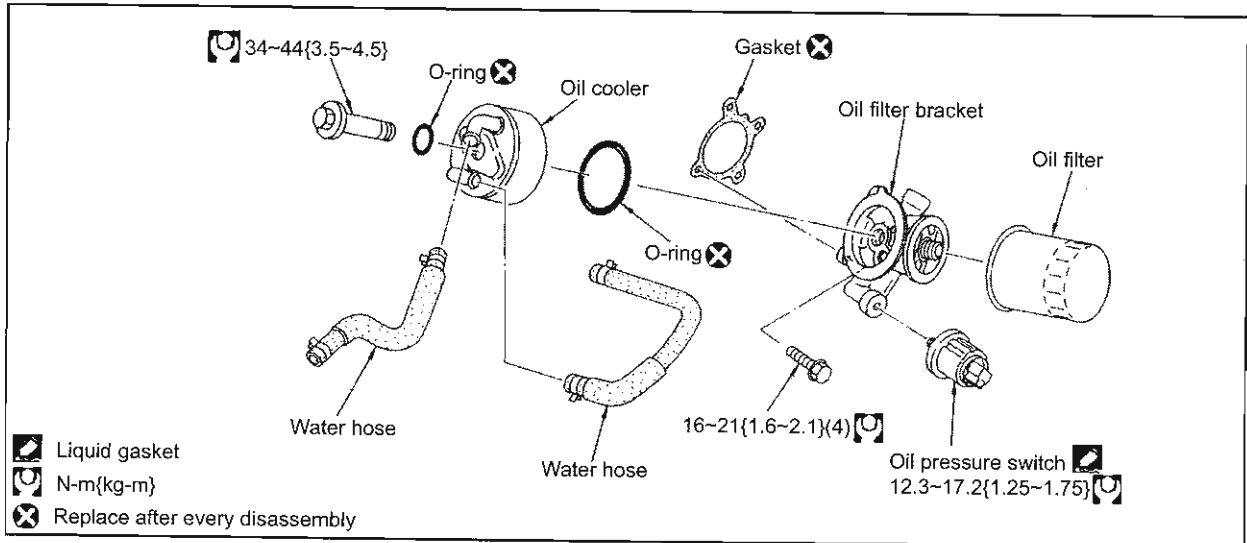
M / T 49~54{365~405}

A / T (when lifting 0.38mm) 33~39{250~290}

- If the value is not within the standard value carry out the inspection below.

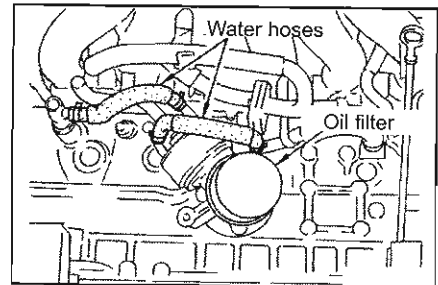
Compound gauge pointer	Inspection
Pressure is low / incorrect	<ul style="list-style-type: none"> • Air leak with breath system • Faulty turbo-charger
Doesn't increase swing valve opening pressure (standard value)	<ul style="list-style-type: none"> • Disconnected / broken swing valve controller hose • Non-operational swing valve controller

3. OIL FILTER BRACKET & OIL COOLER



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. Drain coolant from the radiator drain plug.
4. Drain coolant from the cylinder block drain plug.
5. Remove the oil filter.
6. Disconnect two water hoses on the oil cooler side.
7. Remove the oil pressure switch connector.
8. Remove the oil filter bracket and the oil cooler ASSY.
9. Remove the gasket.



Installation

1. Install the oil filter bracket and the oil cooler ASSY.
 - Replace the gasket with a new one.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
2. Install two water hoses.
3. Install the oil filter.
4. Install the rest in reverse order to the removal procedure.

Disassembly

1. Remove the oil pressure switch.
2. Remove the oil cooler from the oil filter bracket.

Inspection

Oil filter bracket visual inspection

- Check for any damage or wear.
- Replace the oil filter bracket if there is any abnormality.

Oil cooler inspection

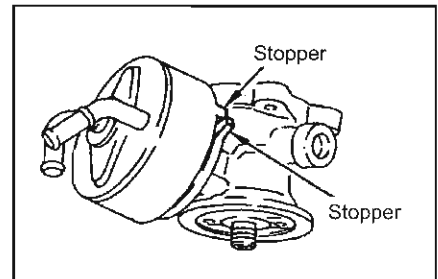
- Check for any clogs in the oil cooler.
- Replace the oil cooler with a new one if there is any abnormality.

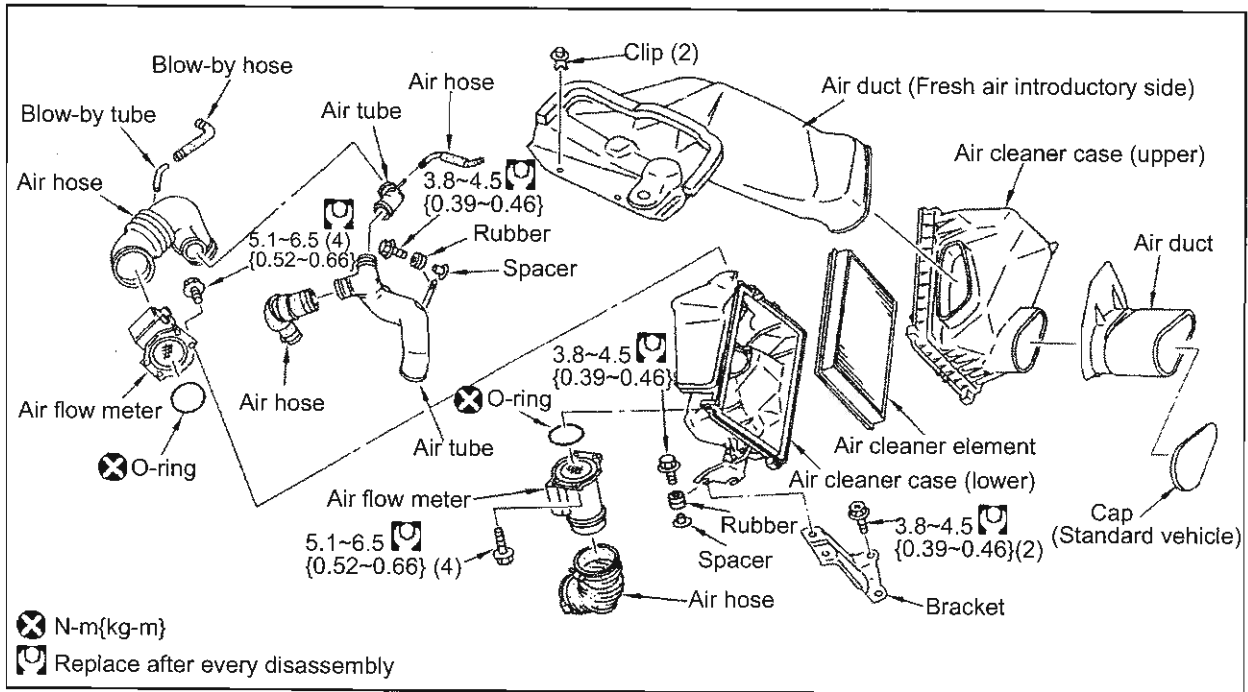
Assembly

1. Install the oil cooler to the oil filter bracket.
 - Replace the o-ring with a new one.
 - Align the oil cooler stopper to the oil filter bracket stopper and tighten the installation bolts.

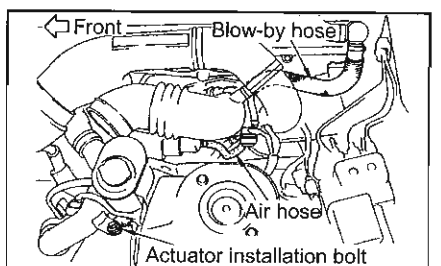
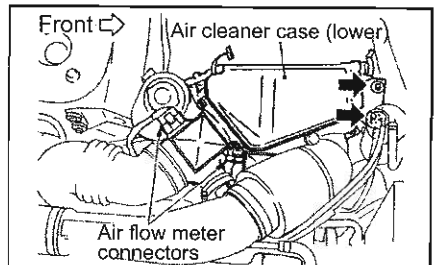
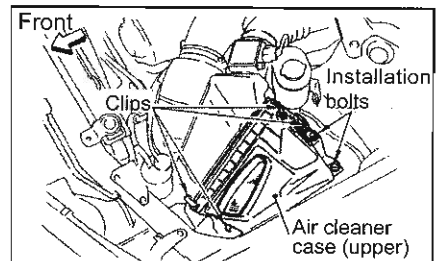
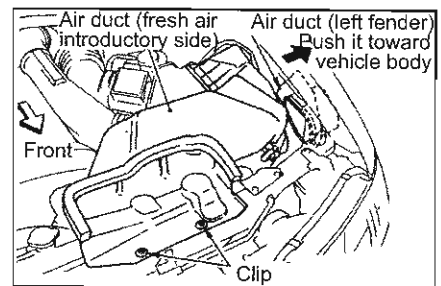
Tightening torque (N-m{kg-m}) 34~44{3.5~4.5}
2. Install the oil pressure switch.
 - Apply sealing agent (KP510 00150) to the thread part then install.

Tightening torque (N-m{kg-m}) 12.3~17.2{1.25~1.75}



1. AIR CLEANER & AIR DUCT (RB26DETT)**Removal**

1. Remove negative battery terminal.
 2. Use air gun to remove any rubbish, dust etc. from the air cleaner area to avoid foreign objects entering the duct.
 3. Remove the air duct (fresh air introductory side) clips.
 4. Remove the air duct (left fender side) from the air cleaner case (upper) and push it towards the vehicle side.
 5. Remove the air cleaner case (upper).
 - Remove 4 clips and loosen the installation bolts.
 6. Remove the air cleaner element.
 7. Remove the air cleaner case (lower).
 8. Remove each air hose and the air tube.
 - Disconnect each air hose and the air tube.
 - Place alignment marks as necessary at each connection part and loosen the clamps to remove.
- Loosen air tube installation bolt.
 - Remove the air hose and the blow-by hose.
 - Place alignment marks as necessary at each connection part and loosen the clamps to remove.



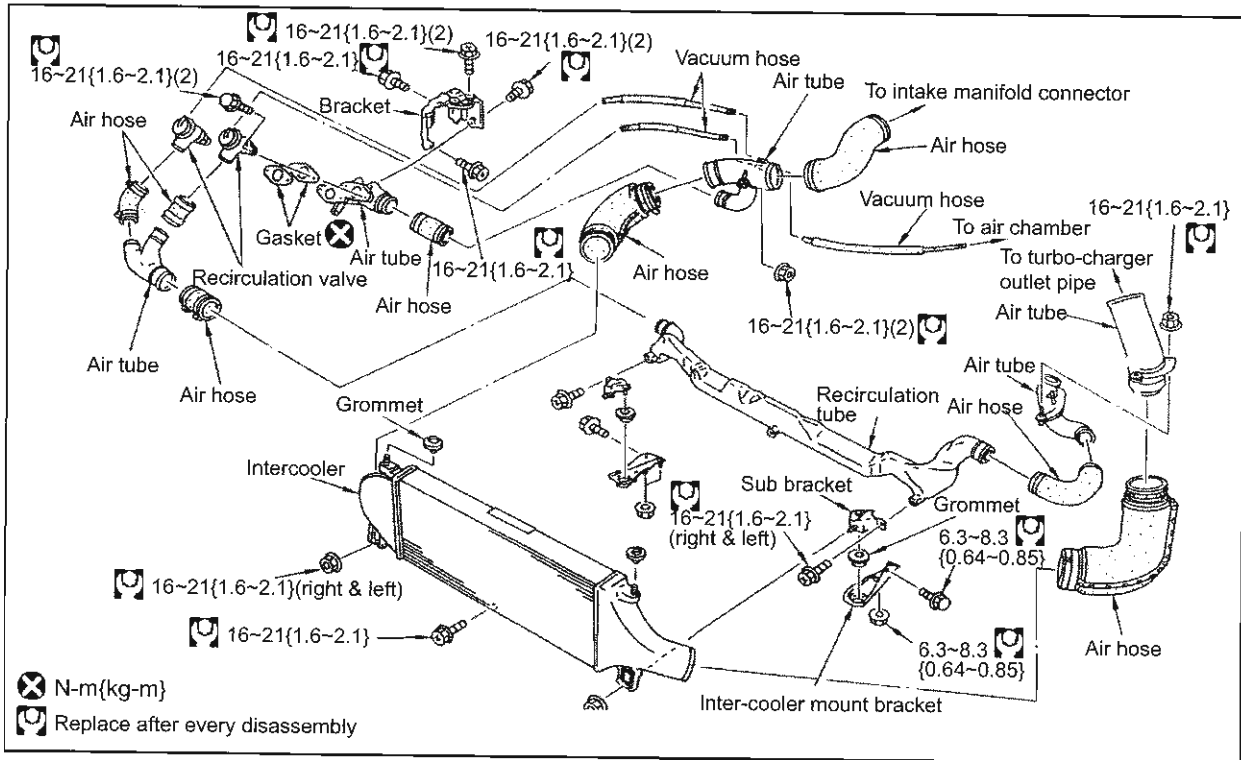
Inspection

- Check to make sure the air cleaner case, the air duct, air hose, air tube and blow-by hose is not damaged or worn in any way.
- Replace the parts with new ones if any abnormality is found.

Installation

1. Install the rest in reverse order to the removal procedure.
- Align the parts to alignment marks and install each air hoses and the air tubes.
 - Tighten each clamp securely.

2. INTER-COOLER



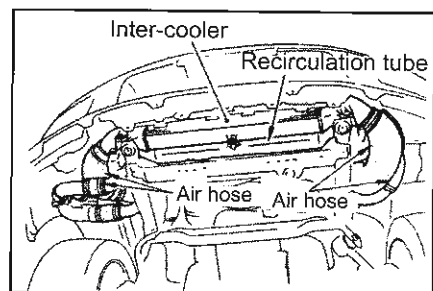
Removal

1. Remove the battery negative terminal.
2. Remove the front spoiler under cover.
3. Remove the brake cooling duct (right and left).
4. Remove the fender protector front (right and left).
5. Place alignment marks on each connection part using paint.

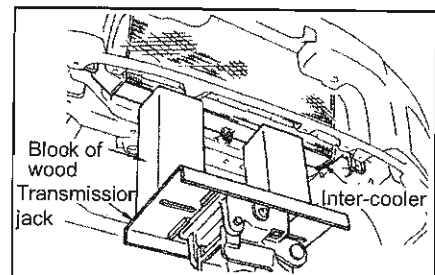
Caution:

Make sure to place alignment marks on the hose clamp so to place in correct position at installation.

6. Remove the inter-cooler.
 - (1) Remove the air hoses (both sides of inter-cooler).
 - (2) Remove the air hose (both sides of recirculation tube).

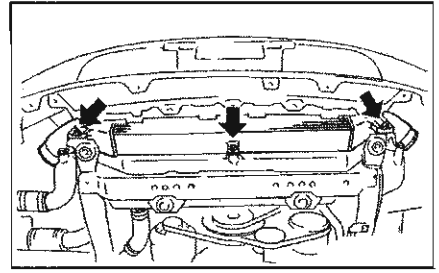


- (3) Support the inter-cooler lower surface using a jack etc. to avoid inter-cooler from falling.



RB26DETT ENGINE

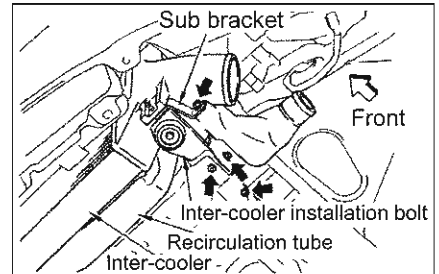
- (4) Remove installation bolts and two installation nuts on lower front side of the inter-cooler.



- (5) Remove right and left installation bolt and installation nuts on the inter-cooler installation bracket.
 (6) Remove right and left inter-cooler installation bracket and right and left sub bracket.
 (7) Remove inter-cooler and the recirculation tube.

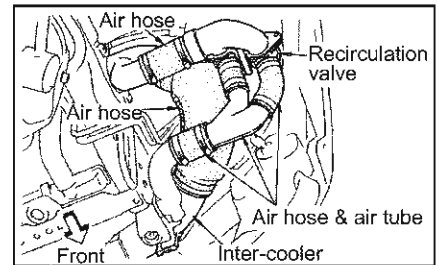
Caution:

Care must be taken not to damage inter-cooler core.

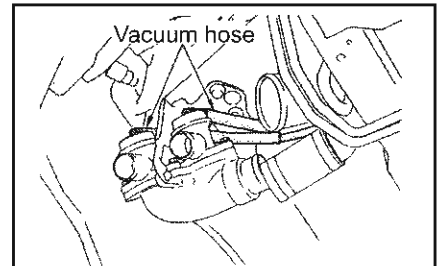


7. Remove the recirculation valve.

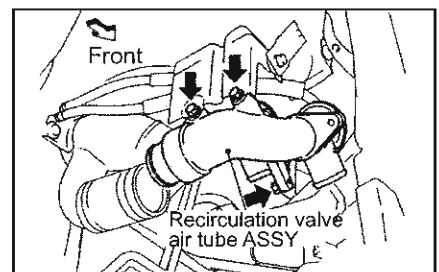
- (1) Remove the air hoses and the air tubes between recirculation tube and the recirculation valve outlet.
 (2) Remove the air hose at recirculation valve inlet.
 (3) Remove the inter-cooler right side air hose.



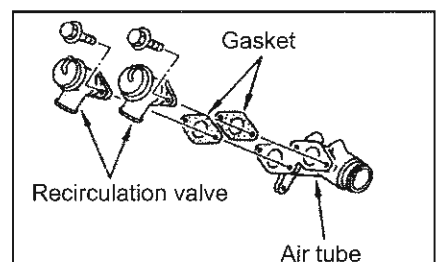
- (4) Remove two vacuum hoses at recirculation valve side.



- (5) Remove three installation bolts to remove recirculation valve and air tube ASSY.



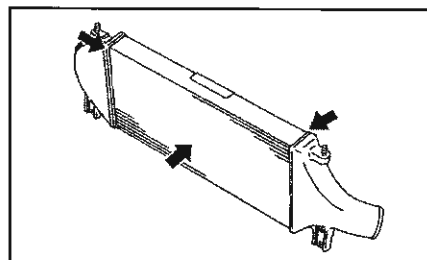
- (6) Remove the recirculation valve from the air tube.



Inspection

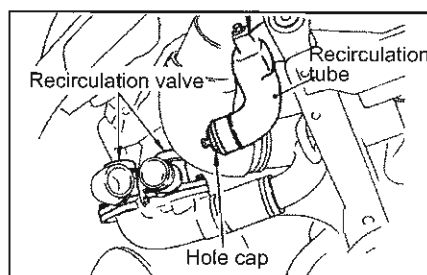
Inter-cooler visual inspection

- Check to make sure inter-cooler core is not clogged with foreign objects.
- Check if there is any damage or faults at joints on the inter-cooler core and pipings.
- Clean if there are any blockages.
- Replace the inter-cooler if there is any damage or faults.



Recirculation valve function inspection

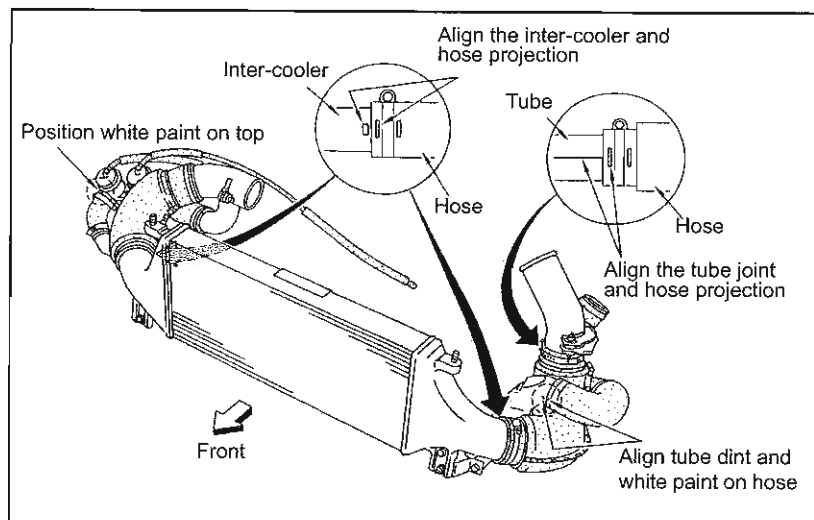
1. Remove the air hose and the air tube on recirculation valve output side.
 2. Place a hole cap on the recirculation side opening.
 3. Start the engine.
 4. Check the air blowout from the recirculation valve when the throttle is closed. It is normal if there is blowout.
- Check the vacuum hose for any disconnection or cut.
 - If there is no fault with the vacuum hose, carry out the recirculation valve operation check.



Recirculation valve operation inspection

- Use a vacuum hand pump to create negative pressure. Check if the valve will lift up to retain negative pressure.
- Standard value (kPa{mmHg}) -16~-24{-120~-180}
- Replace the recirculation valve if there is any abnormality.

Installation

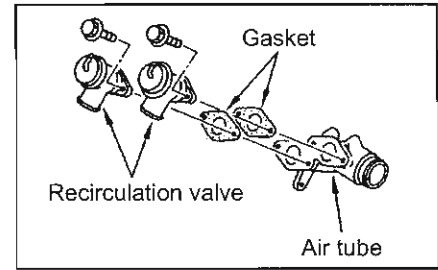


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1. Install the recirculation valve.

(1) Install the recirculation valve to the air tube.

Tightening torque(N-m{kg-m}) 16~21{1.6~2.1}

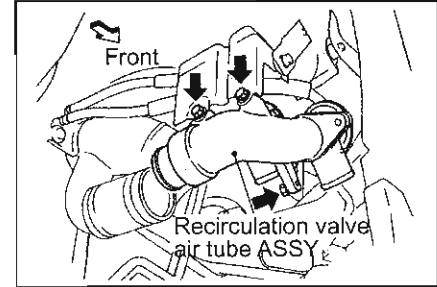


(2) Install the recirculation valve and air tube ASSY.

Tightening torque(N-m{kg-m}) 16~21{1.6~2.1}

(3) Connect the air hose and the vacuum hose.

- Reinstall the parts by using the alignment marks.
- Install the clamp securely.

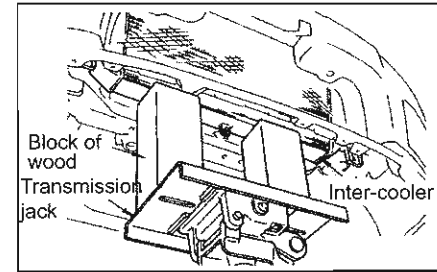


2. Install the inter-cooler.

(1) Install the mount rubber on upper right and left side of the inter-cooler to the bracket.

(2) Set the inter-cooler and the recirculation tube to installation position.

- Temporarily tighten the installation bolt at lower front side of the inter-cooler so it can be handled as a single unit.
- Securely insert the inter-cooler upper right and left projection to the mount rubber.

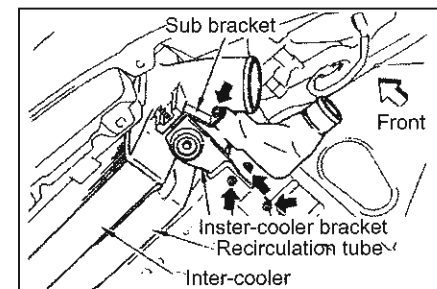
Caution:

- Care must be taken not to damage the inter-cooler core.
- The mount rubber may fall off if the inter-cooler is moved around excessively.

(3) Install the inter-cooler installation bracket (right and left) and the sub bracket (right and left).

- Temporarily tighten all installation nuts and bolts. When the installation position is correct fully tighten the nuts and bolts securely from the bracket side.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

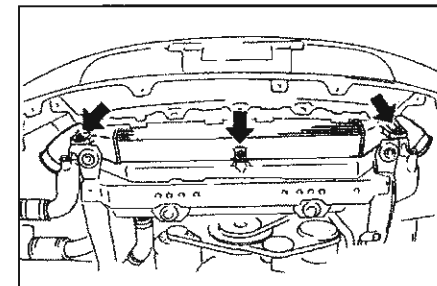


(4) Tighten installation bolt and two nuts on front lower side of the inter-cooler.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

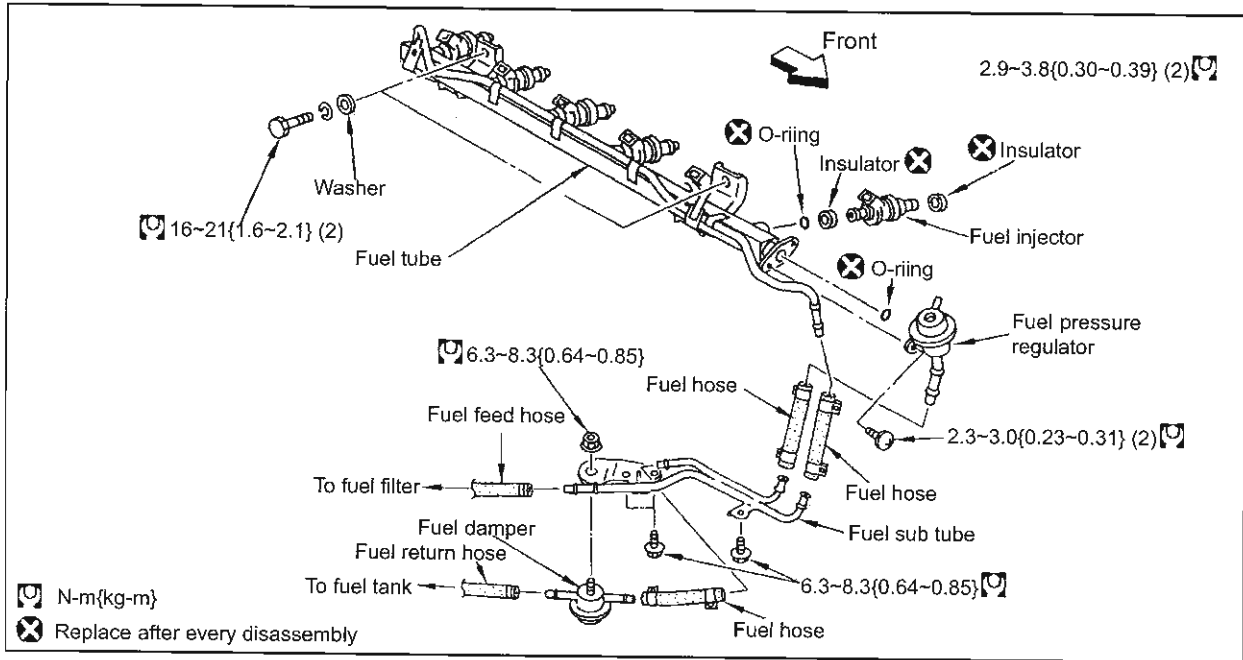
(5) Connect the air hose.

- Reinstall the parts by using the alignment marks.
- Install the clamp securely.



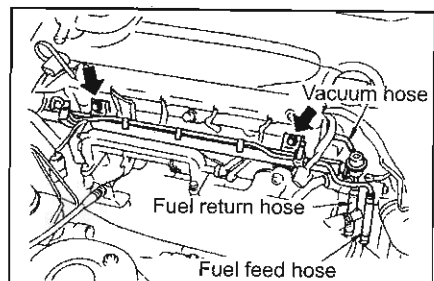
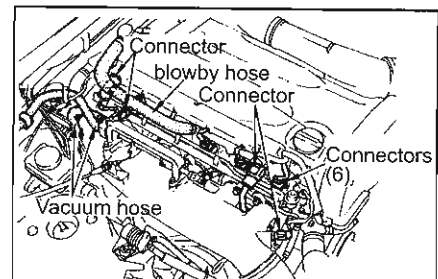
3. Install the rest in reverse order to the removal procedure.

3. FUEL INJECTOR



Removal

1. Release the fuel pressure.
2. Remove the battery negative terminal.
3. Remove the blowby hose between the rocker cover and the intake manifold.
4. Remove the vacuum hose for brake booster and the clutch booster.
5. Disconnect the following:
 - Throttle sensor
 - Throttle valve switch
 - Intake air temperature sensor
 - Knock sensor
 - Fuel injector
6. Remove the vacuum hose at the pressure regulator side.
7. Remove the fuel hose for feed and return at fuel tube side.



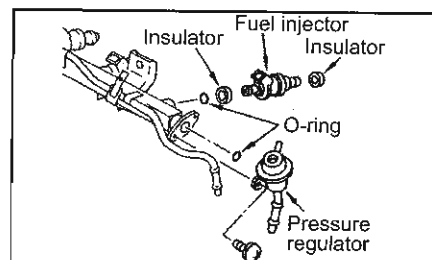
Caution:

Place the hole cap as soon as possible so the fuel will not leak.

8. Remove two installation bolts to remove fuel tube and fuel injector ASSY.
9. Remove fuel injector and the pressure regulator.
 - Pull them from the fuel tube straight.

Caution:

- Place a tray to catch leaking fuel from the fuel tube.
- Do not disassemble the fuel injector.
- Fuel injector must be handled carefully.



10. Remove fuel sub tube and fuel damper ASSY from behind the intake manifold collector.

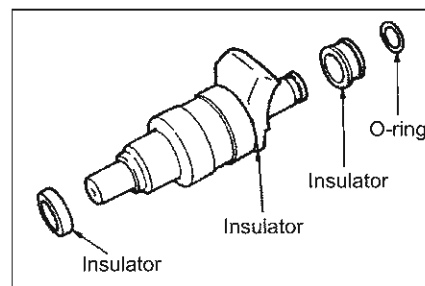
Inspection

Fuel tube and fuel hose

- Check for any fuel leaks from the fuel tube and the fuel hose.
- Replace with new ones if there is any abnormality.

Installation

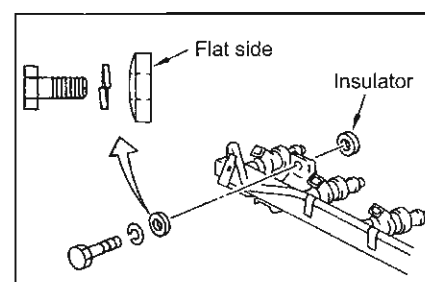
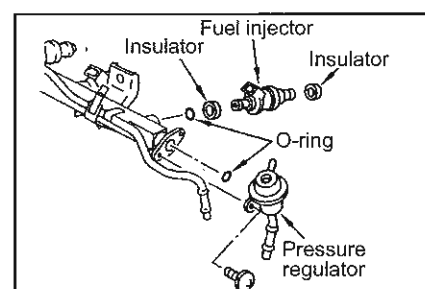
1. Install the fuel sub tube and fuel damper ASSY.
Tightening torque(N-m{kg-m}) 6.3~8.3{0.64~0.85}
 2. Install the fuel injector to the fuel tube.
- (1) Install o-ring and the insulator to the fuel injector.
- Replace the o-ring and the insulator with new ones.
 - Read the handling note before carrying out this operation.



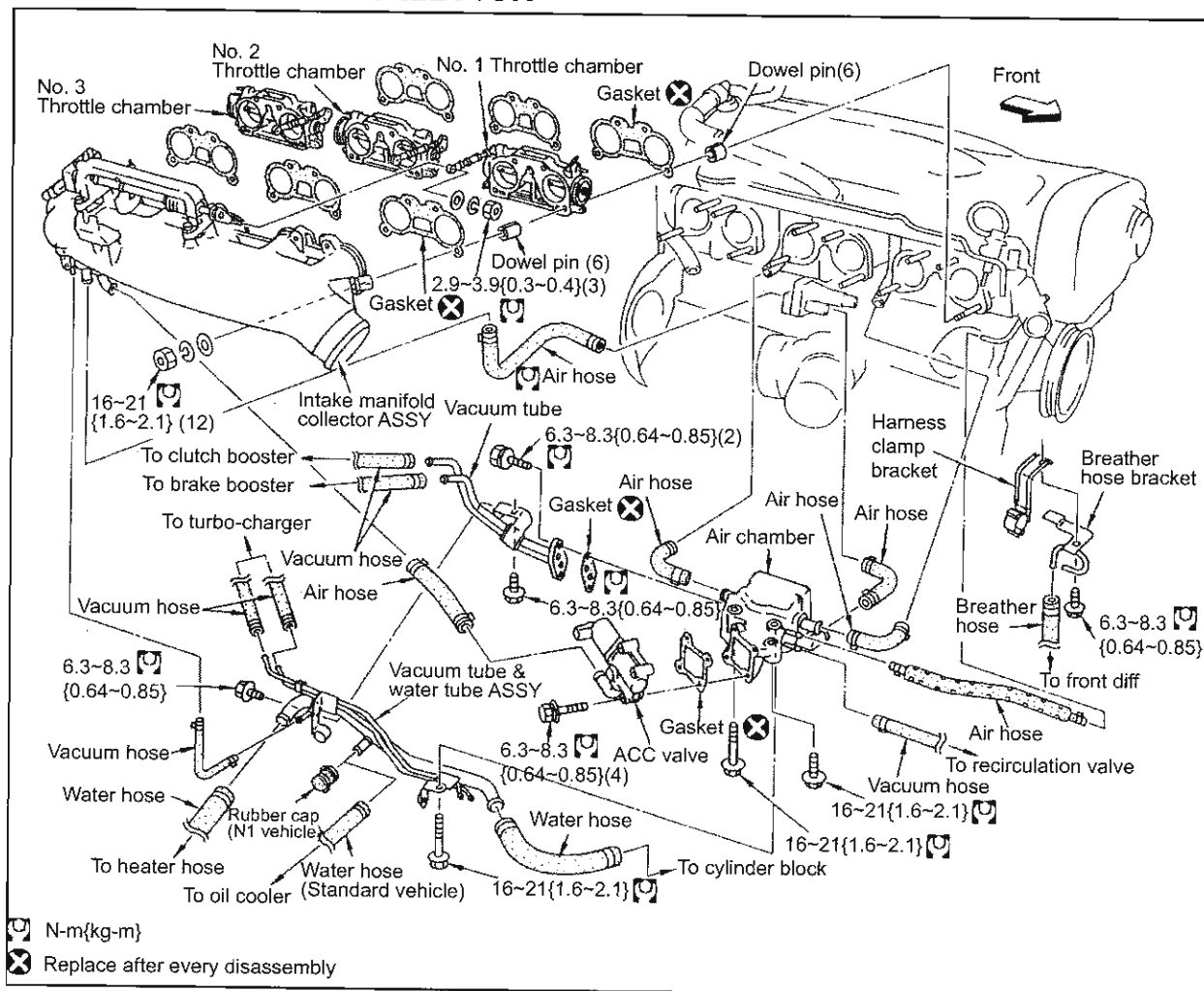
Handling note:

- Always handle the O-ring with bare hand (no gloves).
- Only apply engine oil (7.5W-30 or similar viscosity) and never clean or soak the o-ring in solvent solution.
- Avoid using dirty o-ring and devices with dust or other foreign objects adhered to it.
- When installing the o-ring care must be taken not to scratch the o-ring with tools or nails. Also do not twist or stretch them.
- When inserting fuel injector, pressure regulator or fuel damper into the fuel tube, do not twist or turn the parts.

- (2) Install the fuel injector to fuel tube.
- Care must be taken not to damage the nozzle tip.
3. Install the fuel pressure regulator.
- Replace the o-ring with a new one.
- Tightening torque (N-m{kg-m}) 2.3~3.0{0.23~0.31}
4. Install the fuel tube and fuel injector ASSY.
- Tighten right and left fuel tube installation bolts alternately.
 - Replace the insulator with a new one.
 - When installing the washer face the flat side towards the fuel tube.
5. Install the fuel feed and the return hose.
- Insert the hose tip up to the second bulged part of the fuel tube and make sure to securely tighten the clamp.
6. Connect the vacuum hose to the pressure regulator.
 7. Install the rest in reverse order to the removal procedure.

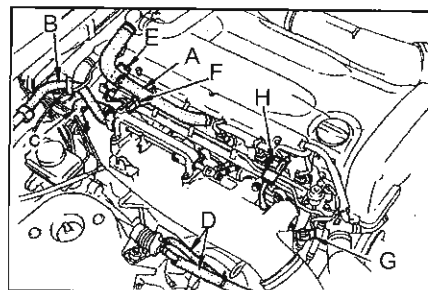


4. INTAKE MANIFOLD COLLECTOR



Removal

1. Release the fuel pressure.
2. Remove the negative battery terminal.
3. Drain coolant from the radiator drain plug.
4. Remove the front strut tower bar.
5. Remove the acceleration cable.
6. Remove the oil level gauge.
7. Remove the air hose at intake manifold collector inlet side.
8. Remove the blowby hose between the rocker cover and the intake manifold. (Labelled A)
9. Remove the vacuum hoses for the brake booster and the clutch booster. (Labelled B & C)
10. Disconnect two vacuum hose at boost control solenoid side. (Labelled D)
11. Remove connectors stated below:
 - Throttle sensor (Labelled E)
 - Throttle valve switch (Labelled F)
 - Intake air temperature sensor (Labelled G)
 - Knock sensor (Labelled H)



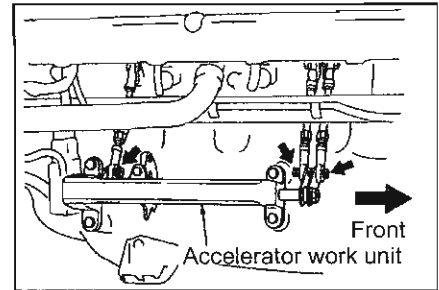
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12. Disconnect the throttle link at the accelerator work unit side.
13. Remove the vacuum hose at No. 1 throttle chamber side.
14. Remove both fuel hoses (feed & return) at the fuel sub tube.

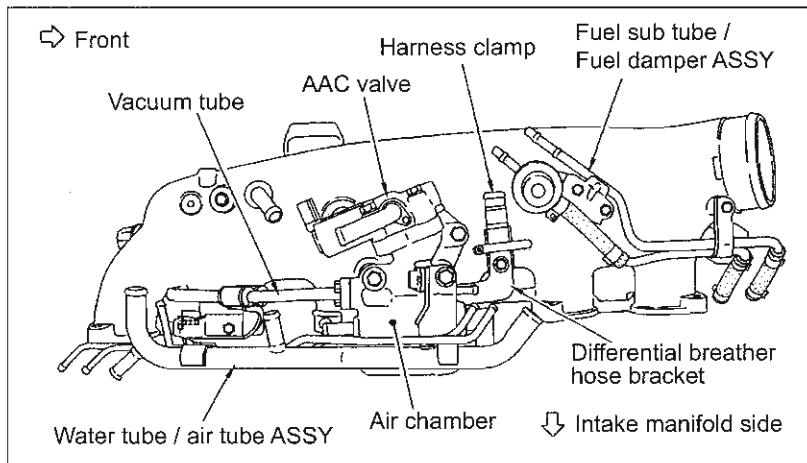
Caution:

Place a hole cap so the fuel will not leak.

15. Position the fuel filter and bracket ASSY to a position that will not get in the way.

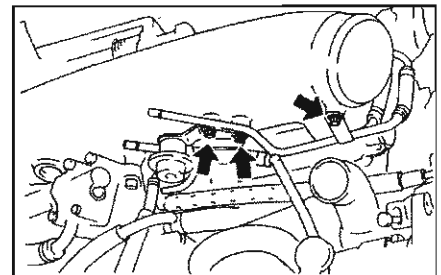

Reference:

Parts and installation bolts position on reverse side of the intake manifold collector are shown in the figure below.

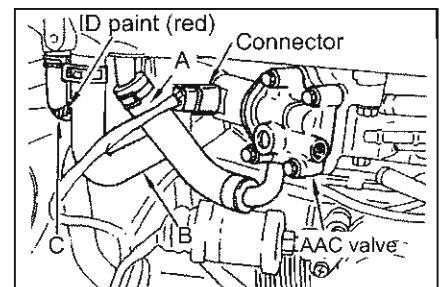


16. Remove the engine harness between the relay case and the starter motor from the clamp after opening the clamp .

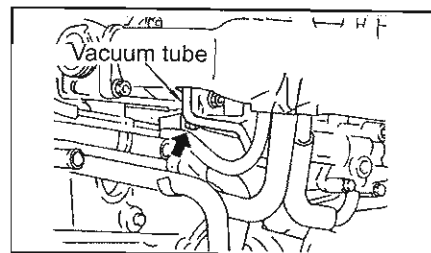
17. Remove the fuel sub tube and fuel damper ASSY.



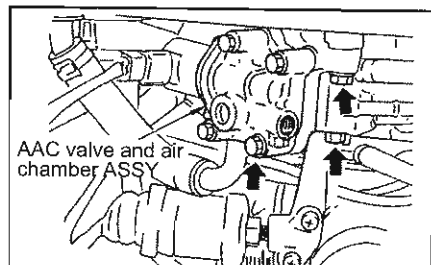
18. Remove the differential breather hose bracket and the harness clamp bracket.
19. Disconnect the AAC valve connector.
20. Disconnect the air hoses A, B and C at intake manifold collector side.



21.Remove the vacuum tube.



22.Remove the air chamber installation bolt.



23.Remove the intake manifold.

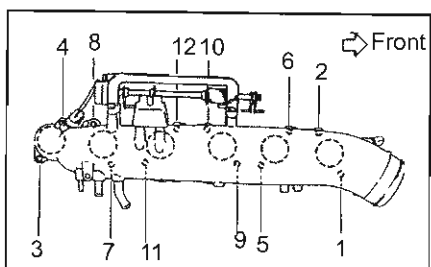
- Loosen the installation nuts in the order shown in the figure on right.

Caution:

Care must be taken not to bend the throttle link.

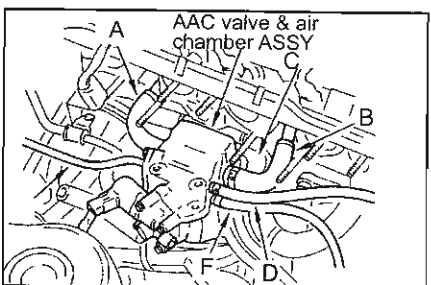
24.Remove the throttle chamber.

- First check No.2 (center) and No.3 (rear side) before removing.



25.Remove each hoses (A ~ F) to remove the AAC valve and air chamber ASSY.

- Place alignment mark as necessary.



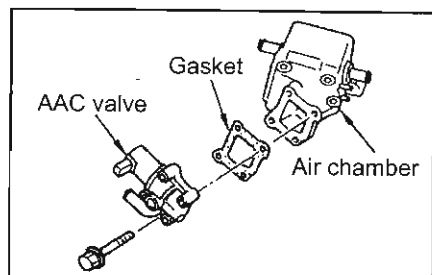
26.Remove the AAC valve from the air chamber.

Caution:

(1) Do not disassemble AAC valve.

(2) Care must be taken not to damage the AAC valve.

27.Disconnect each hose to remove the water tube and air tube ASSY.



Inspection

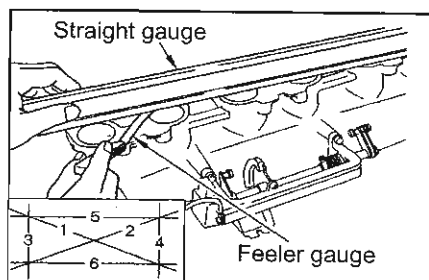
Distortion of the intake manifold collector

- Use a straight gauge and feeler gauge to measure the distortion in six directions.

Limit value (mm)

0.15

- If the distortion is over the limit replace with a new one.



Installation

1. Connect hose to water tube and air tube ASSY.
 - Check the colour of identification paint when connecting the vacuum control hose to intake manifold collector rear end.
 - Make sure the clamp is installed securely.

Reference:

- (1) The vacuum control hose between the standard vehicle and N1 vehicle is different.
- (2) The vacuum control hose must be installed in the correct direction as it has an opening.

2. Install AAC valve to the air chamber.
 - Replace the gasket with a new one.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

3. Connect hose to the AAC valve and air chamber ASSY.
 - Remove old gasket from the vacuum installation surface and clean the surface using white gasoline before connecting the hose.
 - Make sure to install the clamp securely.

4. Install the throttle chamber.
 - (1) Remove old gasket from the intake manifold and the throttle chamber and clean the surface using white gasoline.

- Clean the intake manifold collector side for the throttle chamber.

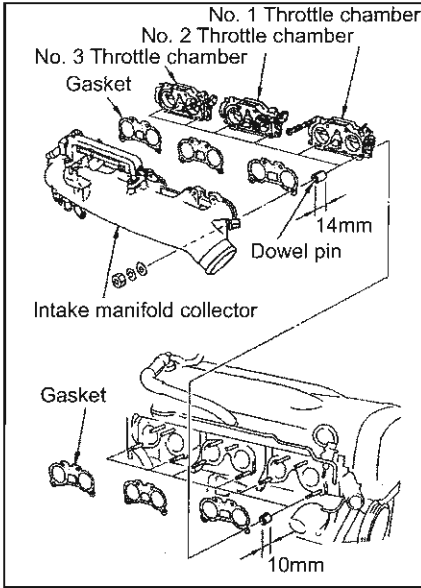
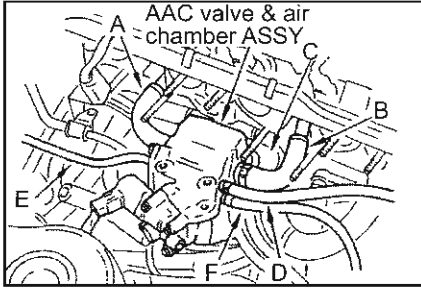
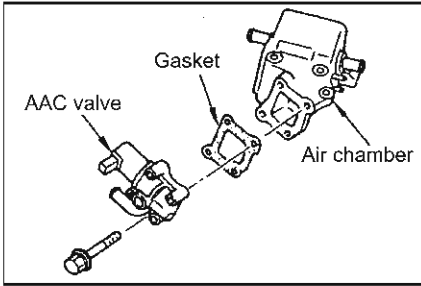
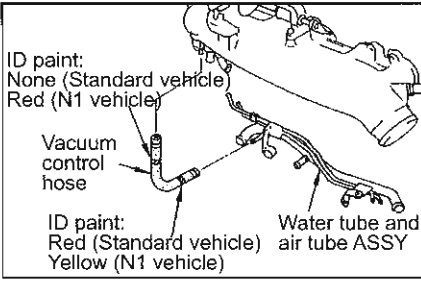
- (2) Install dowel pin to the intake manifold lower stud bolts (6).

- The length of the dowel pins are different for the throttle chamber and the intake manifold collector.

Length of the dowel pin (mm)

For throttle chamber installation	10
For collector installation	14

- (3) Install the gasket.
 - Replace the gasket with a new one.
- (4) Install the throttle chamber.
 - Make sure all three will contact the intake manifold when pushed.



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5. Install the intake manifold collector.

- (1) Remove old gasket from the intake manifold and collector and clean the surface using white gasoline.
- (2) Install the dowel pin to six stud bolts on the throttle chamber lower side.
- The length of the dowel pins are different for throttle chamber and the intake manifold collector.

Length of the dowel pin (mm)

For throttle chamber installation 10

For collector installation 14

(3) Install the gasket.

- Replace the gasket with new ones.

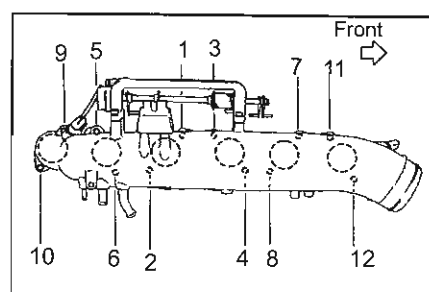
(4) Install the intake manifold collector.

- Tighten the installation nuts in the order shown in several stages.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

Caution:

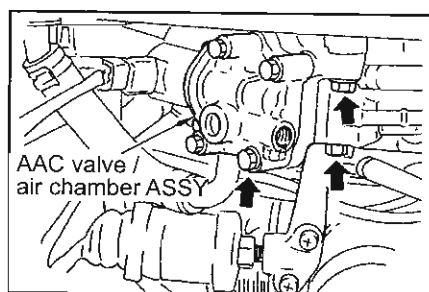
Care must be taken not to bend the throttle link.



6. Install the air chamber installation bolts.

- For installation bolts position, refer to a diagram on intake manifold collector reverse side diagram on 4. Intake manifold section.

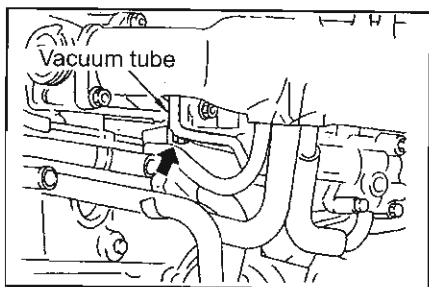
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



7. Install the vacuum tube.

- Replace the gasket with a new one.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}



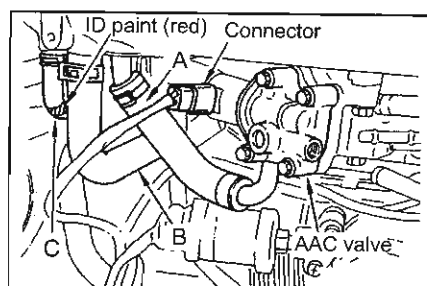
8. Install hose A, B and C to the intake manifold collector.

- When installing the vacuum control hose C, identification paint (red) should be on the intake manifold collector side (N1 vehicle).
- Make sure the clamp is installed securely.

9. Install the AAC valve connector.

10. Install the differential breather hose bracket and the harness clamp bracket.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}



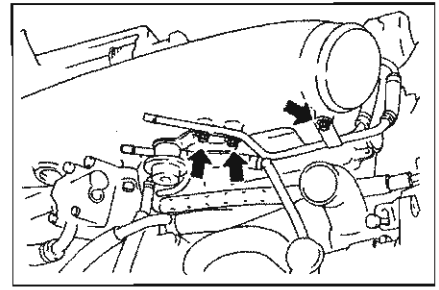
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11. Install the fuel tube and fuel damper ASSY.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

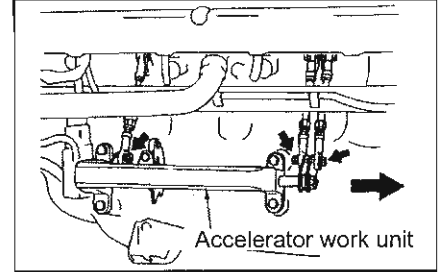
12. Install the fuel hose.

- Insert the hose tip up to the second bulged part then tighten the clamp securely.

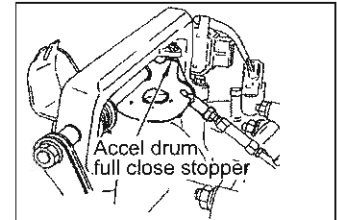
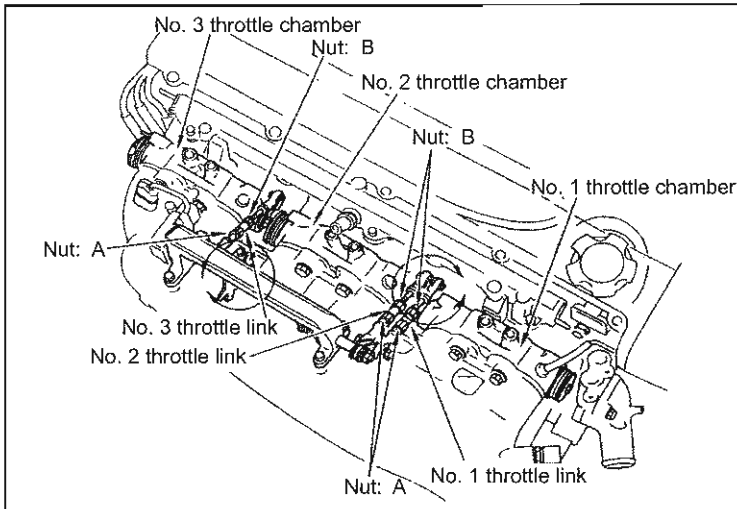


13. Install the throttle link to the accelerator work unit.

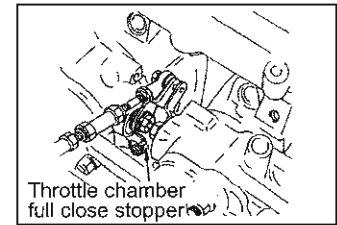
Tightening torque (N-m{kg-m}) 2.9~3.9{0.3~0.4}



14. Carry out the method below to adjust the throttle chamber link when you have replaced any parts which will have affect on the way the throttle valve opening and closing motion or when there are any abnormality with the throttle valve opening and closing motion.

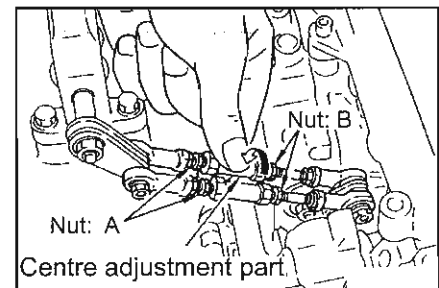


Y in detail

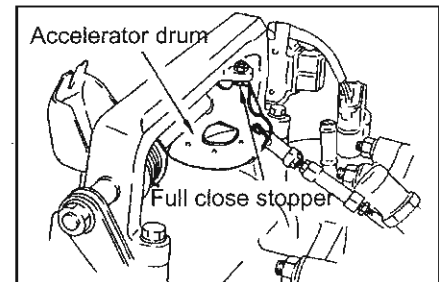


Z in detail

- (1) Loosen each throttle link nut A and B and turn each throttle link centre adjustment part anti-clockwise to shorten the links.



- Shorten each throttle link until the accelerator drum hit the full close stopper on the accelerator work unit side.

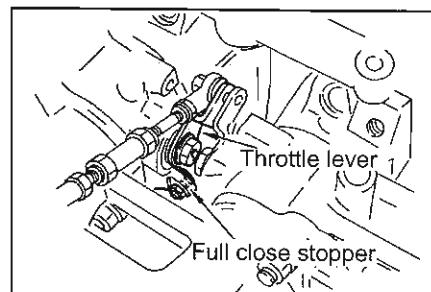


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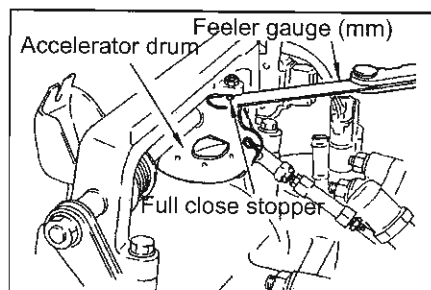
- (2) shorten each throttle link so the throttle lever will open from full close stopper on the throttle chamber side.

Caution:

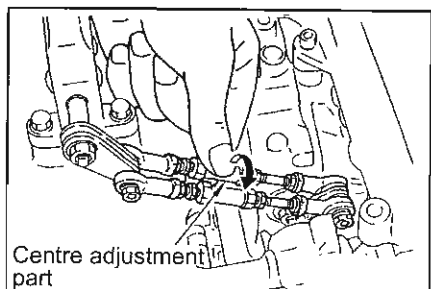
Nut A and B do not lock.



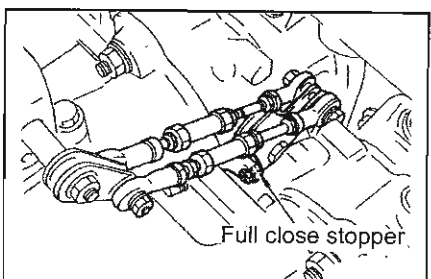
- (3) Insert 1mm feeler gauge between accelerator drum and accelerator work unit side full stopper. Fix the accelerator drum so it will not move.



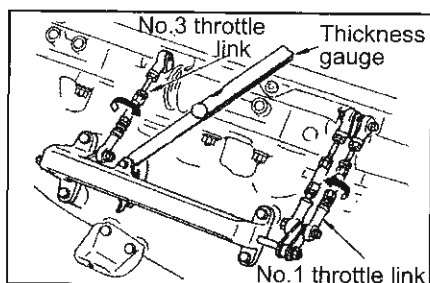
- (4) With the feeler gauge placed, turn No. 2 throttle link centre adjustment part clockwise to extend the throttle link until the full close stopper on the throttle lever and throttle chamber side contacts.



- (5) Resistance will be felt when the full close stopper hit. Extend the throttle link until just before this resistance is felt.



- (6) Adjust No. 3 and No. 1 throttle links as same as No. 2 throttle link adjustment.

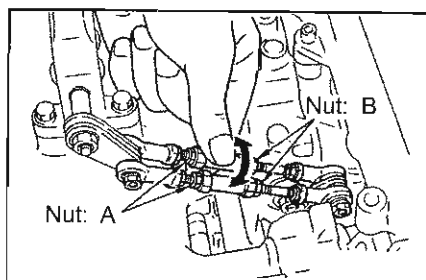


- (7) Tighten lock nut A and B after centre adjustment for 3 throttle links are completed.

Caution:

Make sure the centre adjustment parts will not turn when tightening the lock nuts.

Tightening torque(N-m{kg-m}) 2.9~3.9{0.3~0.4}

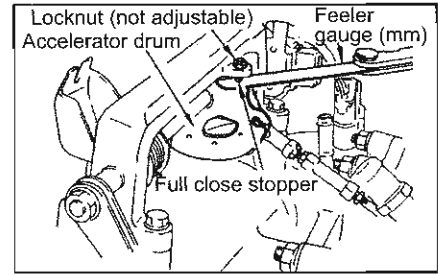


RB26DETT ENGINE

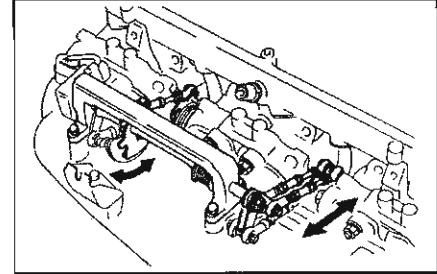
- (8) Remove the feeler gauge placed by accelerator work unit side full close stopper.

Caution:

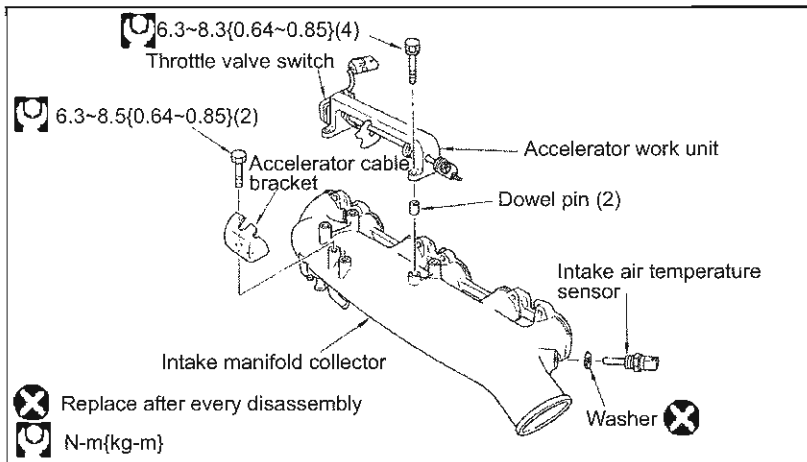
Do not adjust the lock nut on full close stopper side.



- (9) Check that each throttle chamber will move smoothly when the throttle chamber is fully closed and opened repeatedly.



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



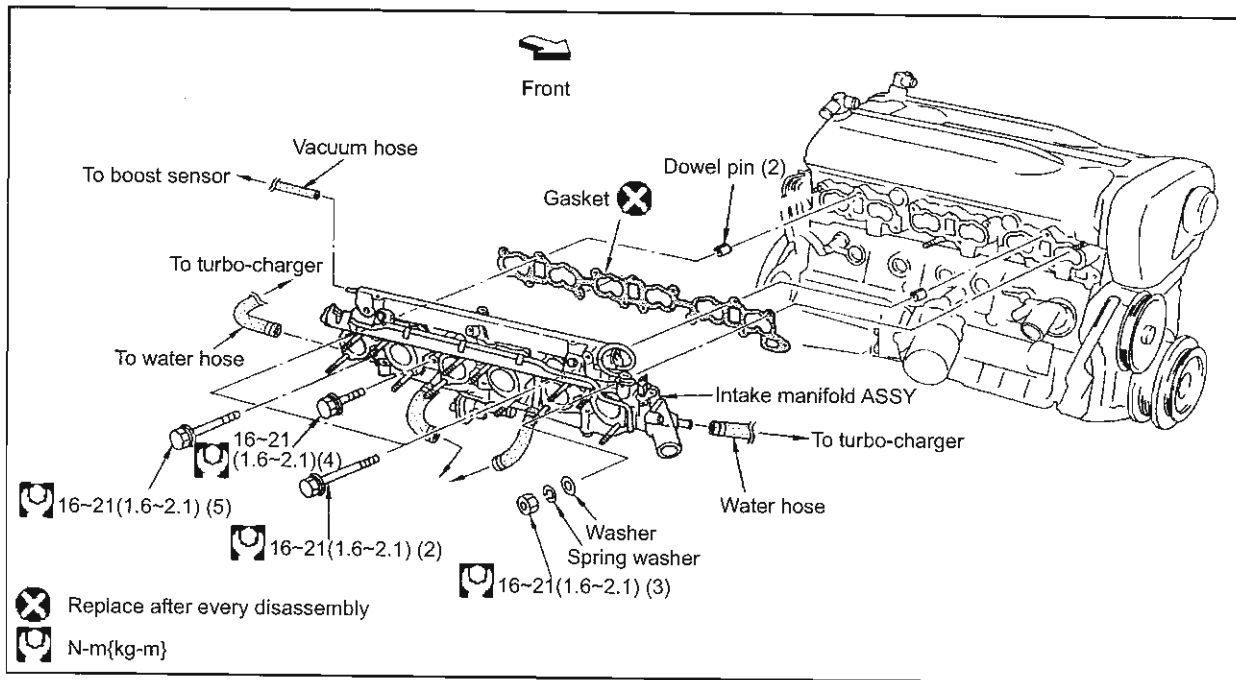
Disassembly

1. Remove the accelerator work unit.
2. Remove the intake air temperature sensor.
3. Remove the accelerator cable bracket.

Assembly

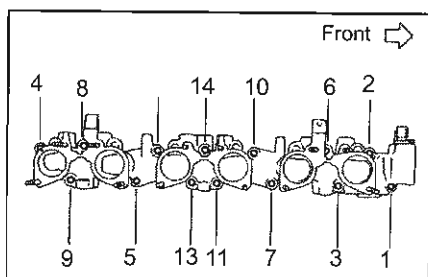
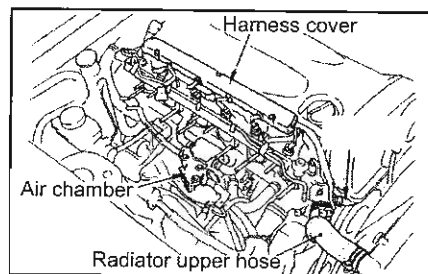
1. Install the accelerator cable bracket.
Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}
2. Install the intake air temperature sensor.
 - Replace the copper washer with a new one.
 - Tightening torque (N-m{kg-m}) 20~29{2.0~3.0}
3. Install the accelerator work unit.
 - Install two dowel pins.
 - Tighten the installation bolts alternately.
 - Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

5. INTAKE MANIFOLD



Removal

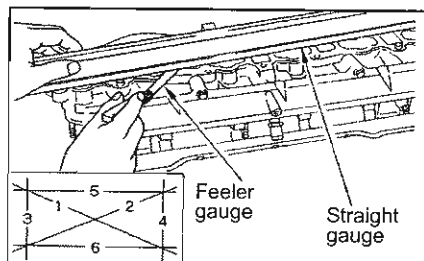
1. Release the fuel pressure.
 2. Remove the battery negative terminal.
 3. Drain coolant from the radiator drain plug.
 4. Remove the front strut tower bar.
 5. Remove accelerator cable.
 6. Remove the intake manifold.
 7. Remove the throttle chamber.
 8. Remove the air chamber.
 9. Disconnect the radiator upper hose at water outlet side.
 10. Disconnect the water hose at water outlet side.
 11. Remove all connectors and terminals extending from the harness cover to shift the harness cover.
 12. Remove the intake manifold.
- Loosen installation bolts and nuts in the order shown to remove intake manifold.



Inspection

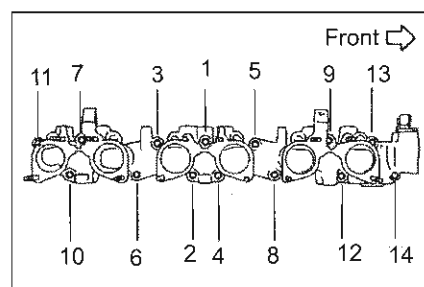
Distortion of the intake manifold

- Use a scraper to remove old gasket.
 - Use a straight gauge and feeler gauge to measure the distortion of the front and reverse surface in six directions.
- Limit value (mm) 0.15
- Replace the intake manifold if the distortion is over the limit.

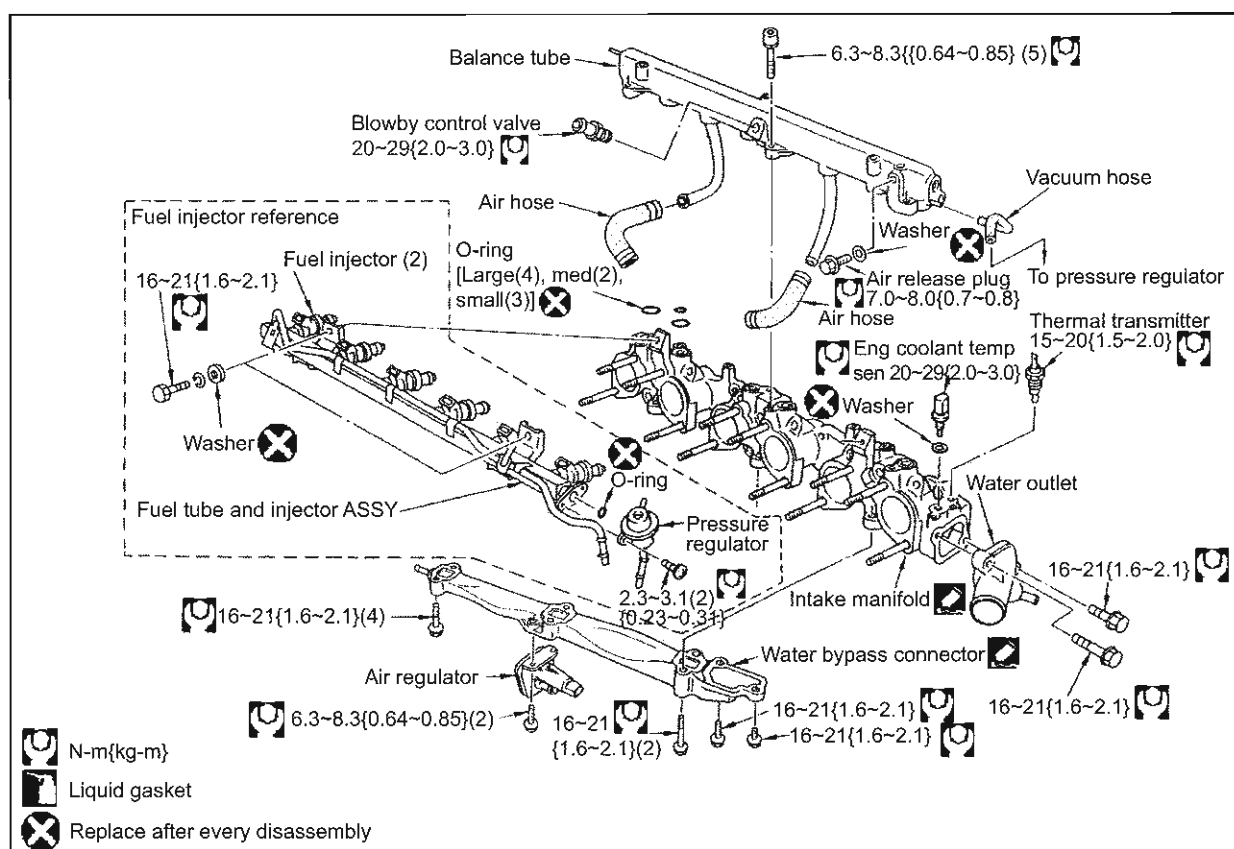


Installation

1. Install the intake manifold.
 - (1) Remove old gasket from the intake manifold and the cylinder head and clean the surface using the white gasoline.
 - Also clean the intake manifold on the throttle chamber side.
 - (2) Install the gasket.
 - Replace the gasket with a new one.
 - (3) Install the intake manifold.
 - Depending on the installation position, the bolt under head length will differ.
- Installation bolt (underhead: 30mm) 3, 5, 6, 8
 (underhead: 60mm) 1, 4, 10, 12, 14
 (underhead: 65mm) 7, 9
- Installation nut 2, 11, 13
- Tighten installation bolts and nuts in order shown in the figure on right in several stages.
- Tightening torque (N-m{kg-m}) 16~21{1.2~2.1}



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



Disassembly

1. Remove the fuel tube and injector ASSY.
2. Remove the air regulator.

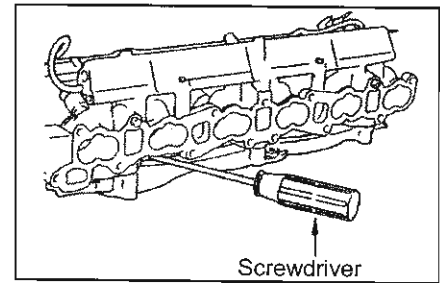
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3. Remove the water bypass connector.

- Insert a tool such as a screwdriver between the intake manifold and the water bypass connector and move it lightly to remove the connector.

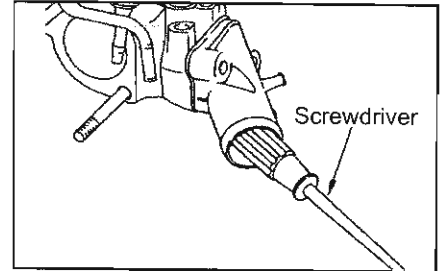
Caution:

Care must be taken not to damage the installation surface.



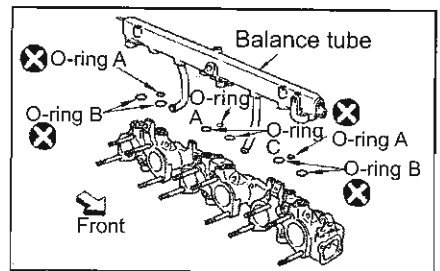
4. Remove the water outlet.

- Insert a screwdriver handle into the water outlet as shown and move it lightly to remove.



5. Remove the balance tube.

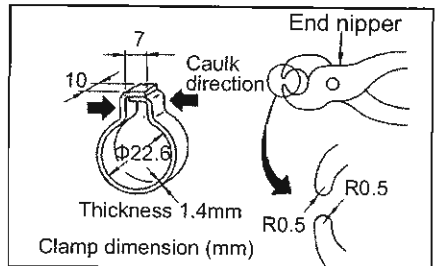
- Check the o-ring size while removing.



Assembly

1. Use the method below to caulk the clamp if the air hose was removed from the balance tube.

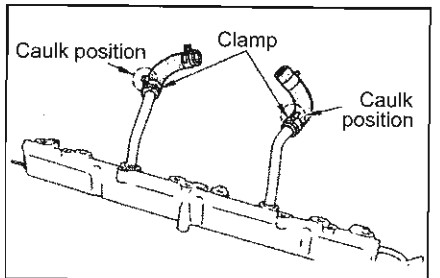
- (1) Make end of the end nipper as shown in the diagram. The end nipper can be purchased commercially.
- Caulk the clamp using the end nipper.



- (2) Install the clamp in a way so the caulk position is as shown in the diagram.

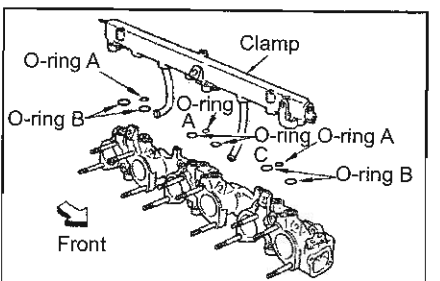
Caution:

If the non-genuine clamp is used or caulk position is installed incorrectly, the throttle valve may not close correctly due to throttle lever interference.



2. Install the balance tube.

- Replace the o-ring with a new one.
 - There are three types of o-ring. Make sure to install correct o-rings.
 - A (small): 3 positions near cylinder head
 - B (med): 2 centre positions near throttle chamber
 - C (large): 4 outer positions near throttle chamber
 - Install the o-ring to installation groove.
- Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}



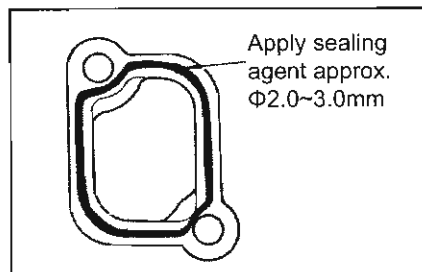
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3. Install the water outlet.

- (1) Remove old gasket from the intake manifold and the water outlet and clean the surface using the white gasoline.

- (2) Apply sealing agent (KP710 00150) to position shown with no gaps at approx. $\Phi 2.0 \sim 3.0 \text{mm}$.

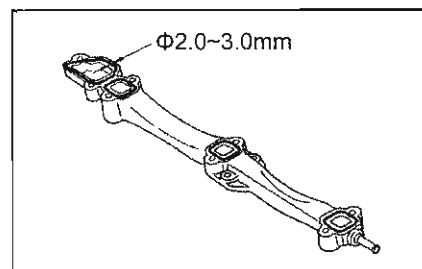
Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



4. Install the water bypass connector.

- (1) Remove old gasket from the intake manifold and the water bypass connector and clean the surface using the white gasoline.

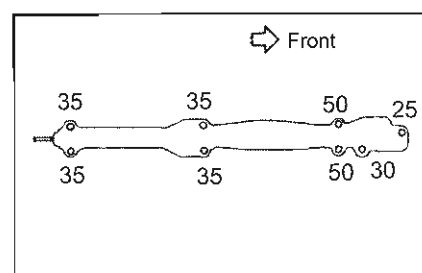
- (2) Apply sealing agent (KP710 00150) to position shown with no gaps at approx. $\Phi 2.0 \sim 3.0 \text{mm}$.



- (3) Tighten installation bolts from the centre to outside.

- Depending on the installation position the bolt head length will differ.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



5. Install the air regulator.

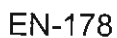
Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

6. Install the engine coolant temperature sensor.

- Replace the copper washer with a new one.
- Apply sealing agent to the thread part.

Tightening torque (N-m{kg-m}) 20~29{2.0~3.0}

7. Install the fuel line and injector ASSY.



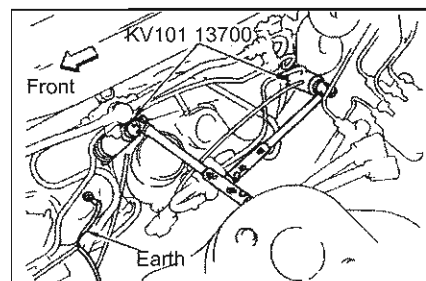
Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the front spoiler under cover (N1 vehicle).
3. Remove the under cover.
4. Remove the exhaust front tube.
5. Drain coolant from the radiator drain plug.
6. Drain coolant from the cylinder drain plug.
7. Remove the front strut tower bar.
8. Remove the air duct, air cleaner case and the air hose.

Caution:

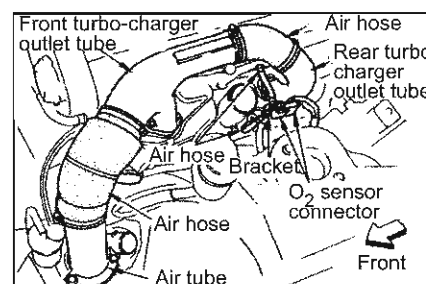
Close the turbo-charger opening to avoid foreign objects from entering.

9. Remove the exhaust gas sensor.
 - Use exhaust gas sensor removal socket to remove.
 - Do not drop or cause damage to the sensor.



10. Disconnect all tubes and hoses shown in the figure on right.

- (1) Disconnect the exhaust gas sensor connector and remove the harness connector from the bracket.
- (2) Remove the air hose from the bracket.
- (3) Place alignment mark as necessary and remove the rear turb-charger outlet tube, 2 air hoses, front turbo-charger outlet tube and the air tube.

**Caution:**

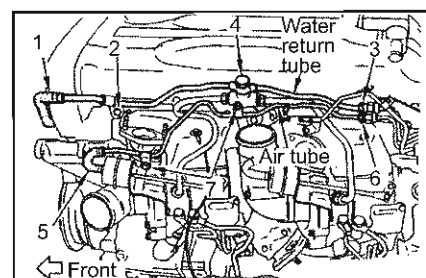
Close the turbo-charger opening to avoid foreign objects from entering.

11. Remove the water return tube (A).

- Remove in the order of 1 to 4.

12. Remove the air tube.

- Remove in the order of 5 to 7.



13. Remove the water return tube (B) and (C).

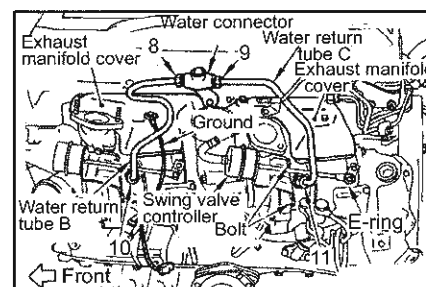
- (1) Loosen the nut (8) and (9).

- (2) Loosen nut (10) and remove the water return tube (B).

- (3) Loosen nut (11) and remove water return tube (C).

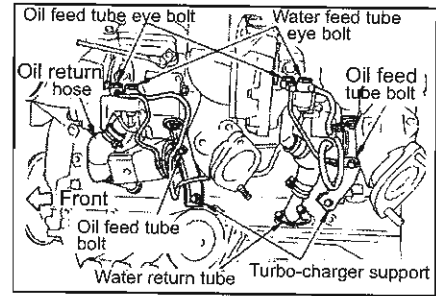
14. Remove the water connector.

15. Remove the exhaust manifold cover.



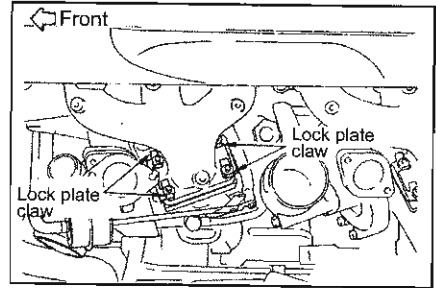
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16. Remove water feed tube eye bolt and oil feed tube eye bolt.
17. Remove the oil feed tube installation bolt.
18. Remove the oil return hose and the oil return tube.
19. Remove the turbo-charger support.



20. Remove the turbo-charger ASSY from the exhaust manifold.

- (1) Open the lock plate claw and loosen the turbo-charger ASSY installation nuts.

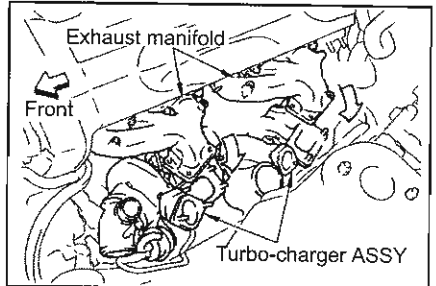


- (2) Remove the turbo-charger ASSY from the exhaust manifold and place it below the exhaust manifold.

Caution:

Do not bend the oil tube and water tube.

21. Remove the turbo-charger gasket.



22. Remove exhaust manifold.

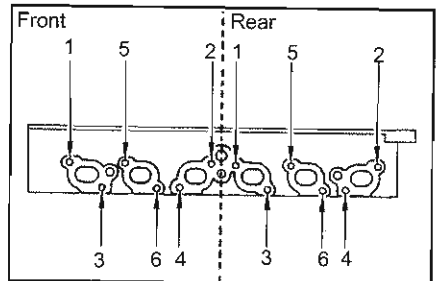
- Remove installation bolts in the order shown.

23. Remove the exhaust manifold gasket.

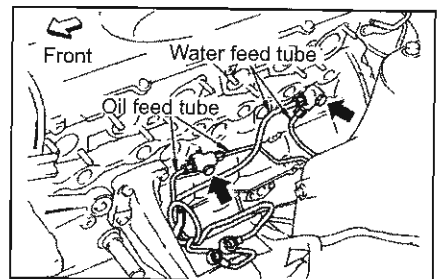
24. Remove the turbo-charger ASSY.

Caution:

Care must be taken not to bend the oil tube and the water tube.

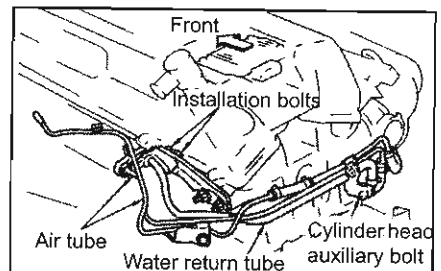


25. Remove the water feed tube and the oil feed tube from the cylinder block.



26. Remove the air tube and the water return tube ASSY from the cylinder head rear side.

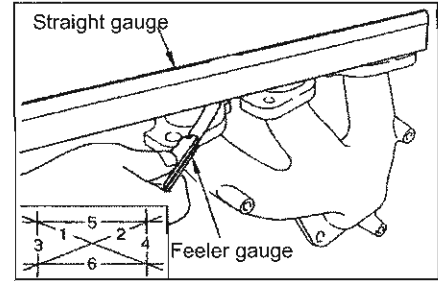
- Remove the installation bolts and the cylinder head auxiliary bolts.



Inspection

Distortion of exhaust manifold

- Use a scraper to remove gasket on the installation surface.
- Use a straight gauge and feeler gauge to measure the installation surface distortion in four directions.
Limit value (mm) 0.3
- Replace the exhaust manifold if the distortion is over the limit.

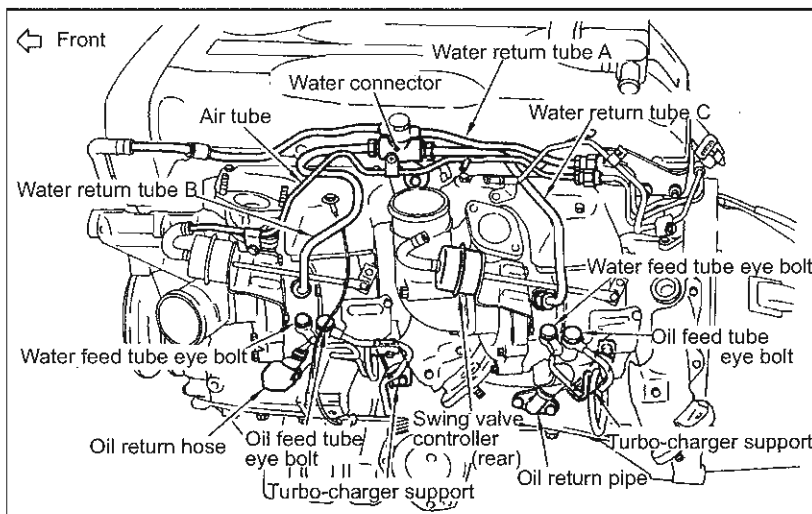


Gas leak from the exhaust parts

- Look for any gas leak from the cylinder head installation surface, catalytic converter installation surface and the exhaust front tube installation surface.

Installation

- Each pipe installation location is shown in the figure below.



1. Install the air tube / water return tube ASSY to the cylinder head rear side.

Tightening torque (N-m{kg-m})

Cylinder head auxiliary bolt 9.0~12{0.92~1.2}

Installation bolt 6.3~8.3{0.64~0.85}

2. Install the water feed tube and the oil feed tube to the cylinder block.

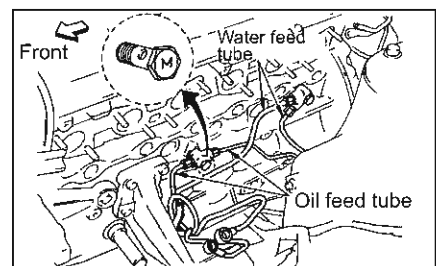
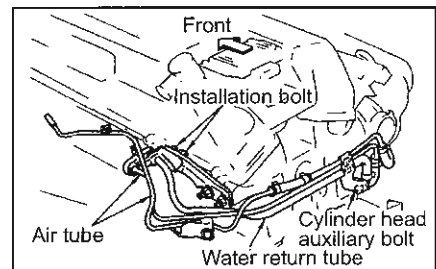
- Replace the copper washer with a new one.
- Install the eye bolt with ID mark 'M' to the oil feed tube.

Tightening torque (N-m{kg-m})

Water feed tube eye bolt 20~31{2.0~3.2}

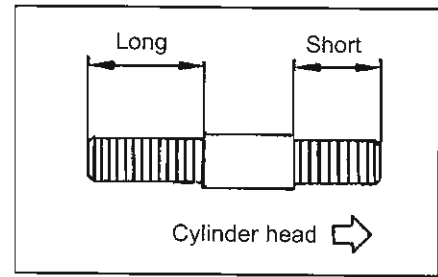
Oil feed tube eye bolt 15~20{1.5~2.0}

3. Lower the turbo-charger ASSY to the left side of the engine making sure each tube is not bent.



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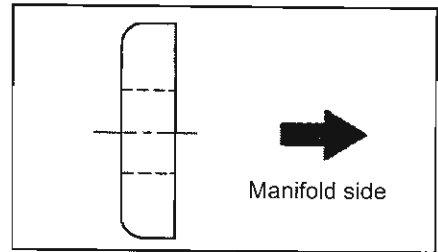
4. Install the stud bolt to the cylinder head by inserting the double nut.
 - When installing the stud bolt, make sure the stud bolt with the shorter thread side is installed to the cylinder head side.



5. Install the exhaust manifold gasket.
 - Replace the gasket with a new one.
 - Remove old gasket from the cylinder head and the exhaust manifold and clean the surface using the white gasoline.

6. Install the exhaust manifold.

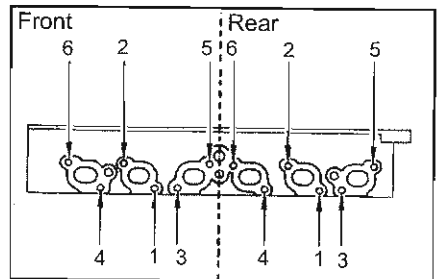
- (1) Install the washer with the flat surface facing the cylinder head.



- (2) Tighten the installation nuts in the order shown in the figure.

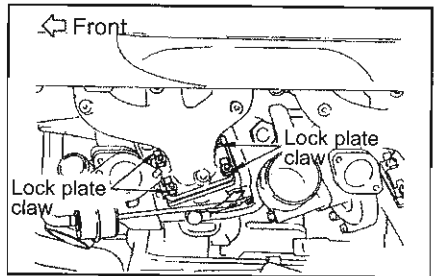
Tightening torque (N-m{kg-m}) 18~24{1.8~2.4}

- Replace the installation nuts with new ones.



7. Install the turbo-charger ASSY to the exhaust manifold.

- Replace the gasket with a new one.
- After tightening the installation nuts fold the lock plate claw inwards.
- Replace the lock plate with a new one.



8. Install the turbo-charger support.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

9. Install the oil feed tube installation bolt to the turbo-charger support.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

10. Install the oil return hose and the oil return tube.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

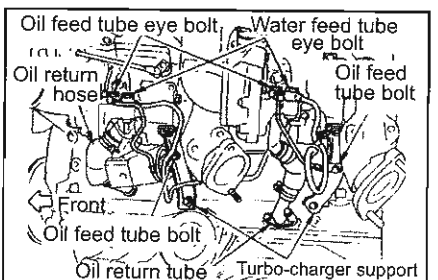
11. Install the water feed tube eye bolt and the oil feed tube eye bolt.

- Replace the copper washer with a new one.

Tightening torque (N-m{kg-m})

Water tube eye bolt 29~39{3.0~4.0}

Oil tube eye bolt 18~20{1.8~2.0}



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12. Install the exhaust manifold cover.

- Attach earth wire to the front side exhaust manifold cover.

Tightening torque (N-m{kg-m}) 3.7~5.0{0.38~0.51}

13. Install the water connector.

Tightening torque (N-m{kg-m}) 31~44{3.1~4.4}

14. Install the water return tube (B) and (C).

- First temporarily tighten the nuts 8 to 11, then fully tighten.

Tightening torque (N-m{kg-m}) 20~31{2.0~3.2}

15. Install the air tube.

- Install the nuts in the order of 7 to 5.

Tightening torque (N-m{kg-m})

Nut 7 6.3~8.3{0.64~0.85}

Installation bolt 6 15~20{1.5~2.0}

16. Install the water tube (A).

- Install in the order of 4 to 1.

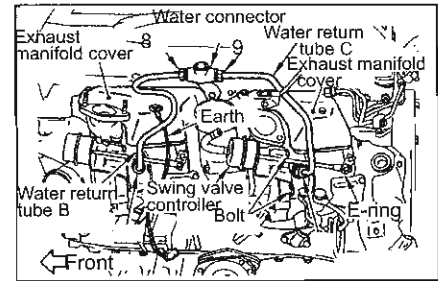
- Install an eye bolt with identification mark 'N' for No. 4 eye bolt.

Tightening torque (N-m{kg-m})

Eye bolt No. 4 33~41{3.4~4.2}

Eye bolt No. 3 21~31{2.0~3.2}

Installation bolt No. 2 6.3~8.3{0.64~0.85}



17. Install every tube and hose shown in the figure.

- (1) Install the rear turbo-charger outlet tube, two air hoses, the front turbo-charger outlet tube and the air tube by aligning to the alignment mark.

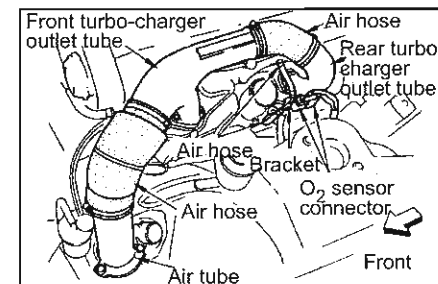
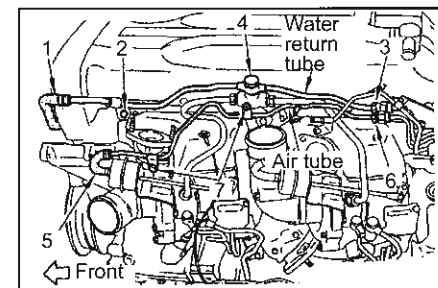
- (2) Install the bracket to the rear turbo-charger outlet tube.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

- (3) Install the air hose to the bracket.

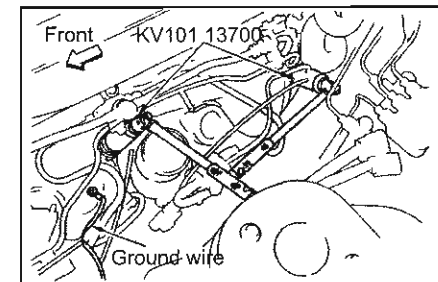
- (4) Connect the O₂ sensor connector and fix to the bracket.

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

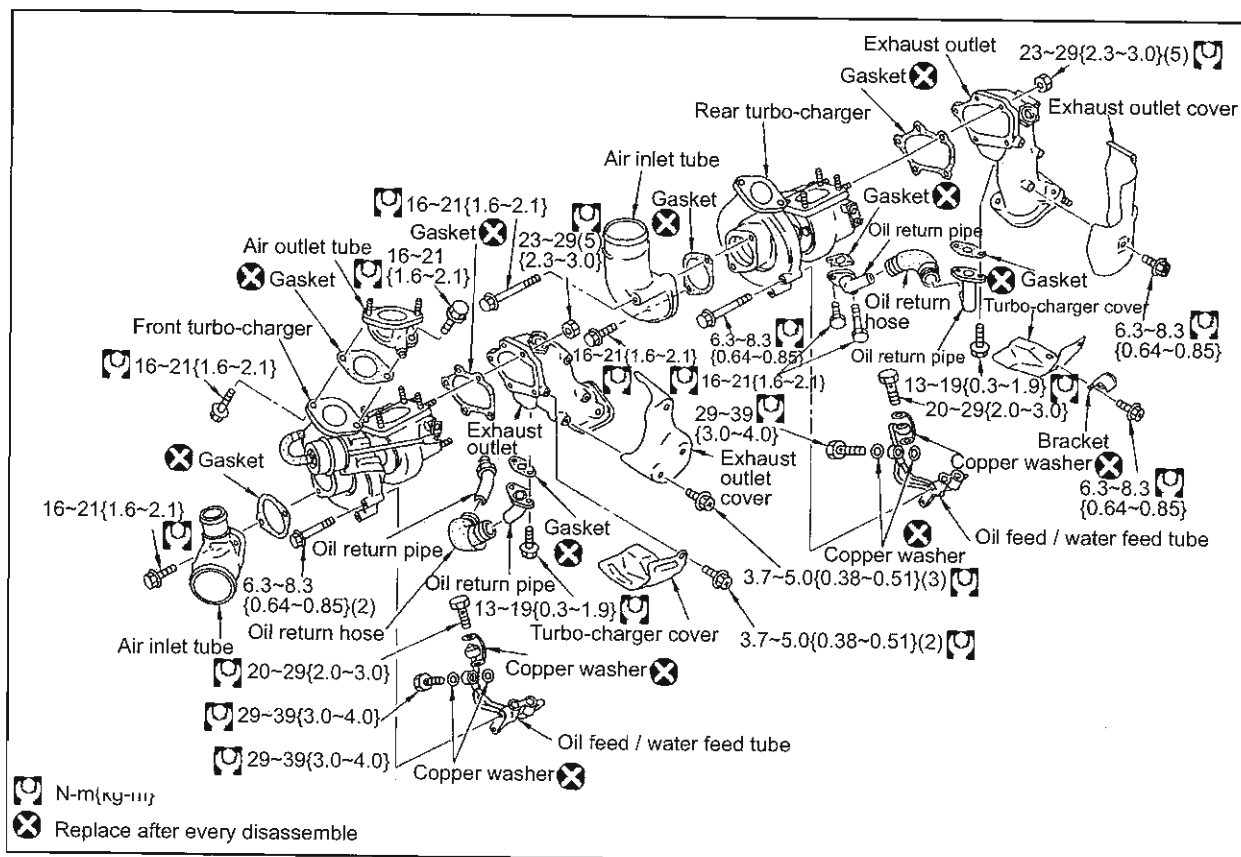
19. Install the O₂ sensor.

- Use the exhaust gas sensor installation socket to install.
- Care must be taken not to cause any damage.
- Do not drop or hit the sensor.

Tightening torque (N-m{kg-m}) 40~50{4.1~5.1}

**Inspection**

Start the engine and make sure there are no coolant or engine oil leaks from the turbo-charger connections. Also check the exhaust manifold and the turbo-charger connection for any exhaust gas leak.



Disassembly

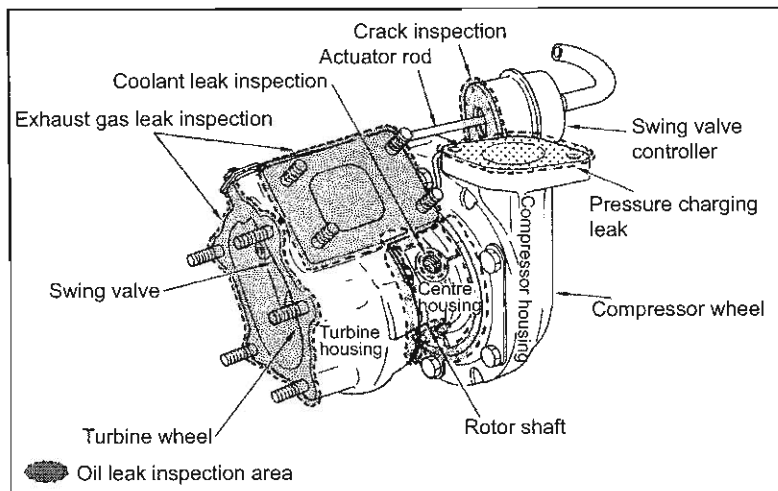
Turbo-charger

Caution:

Do not disassemble turbo-charger main body.

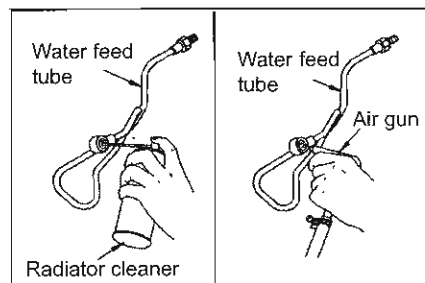
1. Remove the exhaust outlet cover and the turbo-charger cover.
2. Remove the exhaust outlet.
3. Remove the air inlet tube.
4. Remove the air outlet tube (front turbo-charger only).
5. Remove the oil feed and water feed tube.
6. Remove the oil return pipe and the oil return hose.

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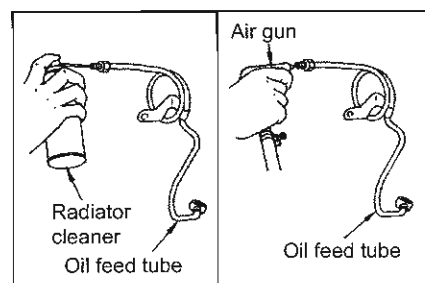
Water feed / Return tube

- Check to make sure there are no blockages or rust inside the water feed and the return tube by blowing compressed air using a air gun after cleaning the tube with radiator cleaner.



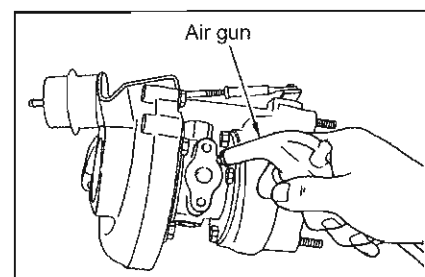
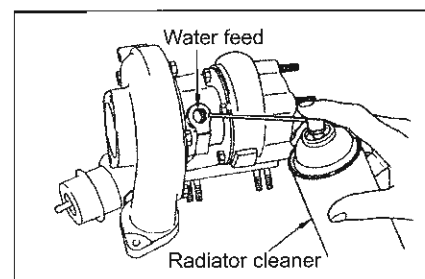
Oil feed / Return tube

- Check to make sure there are no blockage or rust inside the oil feed and the return tube by blowing compressed air using a air gun after cleaning the tube with engine conditioner.



Turbo-charger

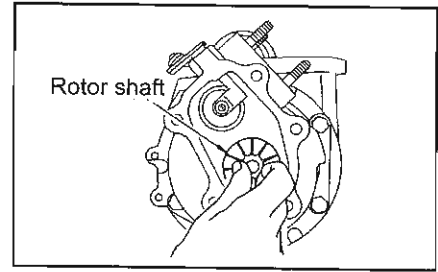
- Clean before inspection.
- Clean the oil feed and the oil return with engine conditioner.
- Clean the water feed and return with radiator cleaner.
- Blow compressed air using a air gun to the compressor wheel, turbine wheel, compressor housing and turbine housing.



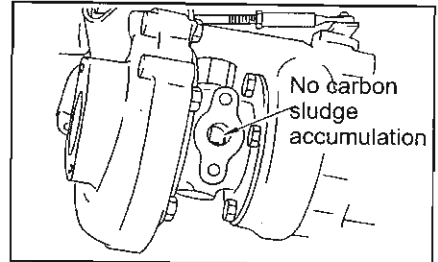
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Rotor shaft

- Make sure the rotor shaft will turn smoothly when pushed with finger.
- The rotor shaft must not be loose when moved right / left.



- Make sure there are no carbon sludge accumulation.
- Make sure there are no change in colour with the rotor shaft.



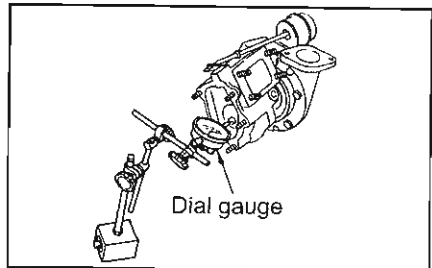
Rotor shaft end play

- Set end play by placing the dial gauge to the rotor shaft end and place it to the axle direction.
Standard value (mm) 0.013 ~ 0.097

Reference:

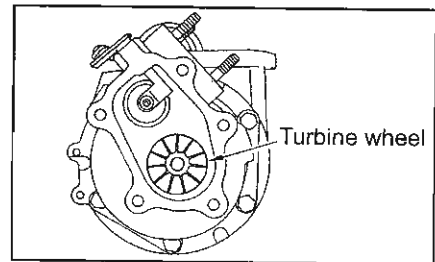
Rotor shaft diameter direction

Clearance standard value (mm): 0.056 ~ 0.127



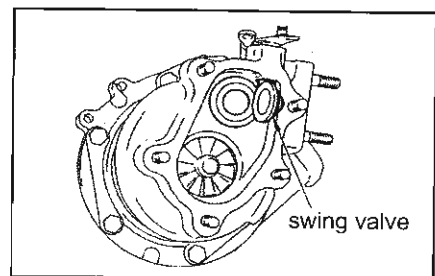
Turbine wheel

- Make sure there are no grease adhesion.
- Make sure there are no carbon accumulation.
- Make sure the turbine wheel blade is not bent or broken.
- Make sure there are no interference between the turbine housing and the wheel.



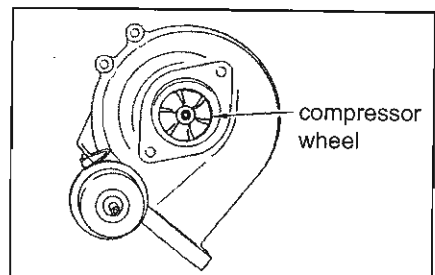
Swing valve

- Remove actuator rod E-ring and check if the swing valve will move smoothly with no deformation or damage.
- Check for any abnormality with the turbine housing seat surface.



Compressor wheel

- Make sure there are no grease adhesion at admission port.
- Check for any interference between the compressor housing.
- Make sure the wheel is not bent or damaged.



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Swing valve controller

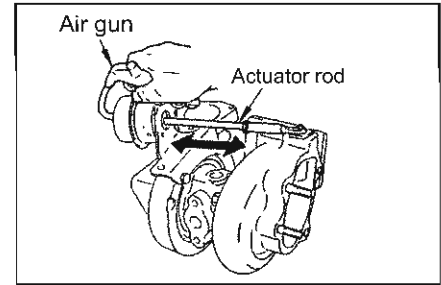
- Remove swing valve controller rubber hose on the compressor housing side.
- Inspection must be carried out when actuator rod is installed and removed.
- Make sure the swing valve controller rod will operate when the air gun is used to blow compressed air. Stop the air gun operation as soon as it starts moving.

Actuator rod operation pressure (kPa{mmHg})

0.38mm lift	59~64{440~480}
4.00mm lift	78~84{587~627}

Caution:

Before blowing the air into the swing valve controller rod make sure to check the air gun pressure using the LPG pressure gauge (0.10MPa{1kg/cm²} ST1957 2000) so it will not damage the diaphragm.

**Assembly**

1. Install the oil return pipe and the oil return hose.
Tightening torque (N-m{kg-m}) 13~19{1.3~1.9}
2. Install the oil feed and water feed tube.
 - Replace the copper washer with a new one.
 - Tighten using the method below:

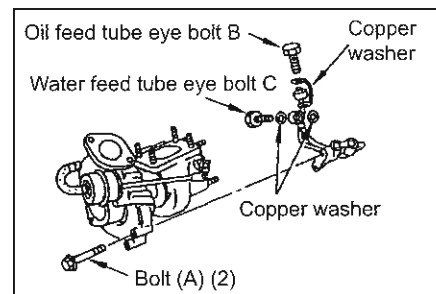
- (1) Temporarily tighten two bolts (A).
- (2) Tighten oil feed tube eye bolt B and the water feed tube eye bolt C.

Tightening torque (N-m{kg-m})

Eye bolt (B)	20~29{2.0~3.0}
Eye bolt (C)	29~39{3.0~4.0}

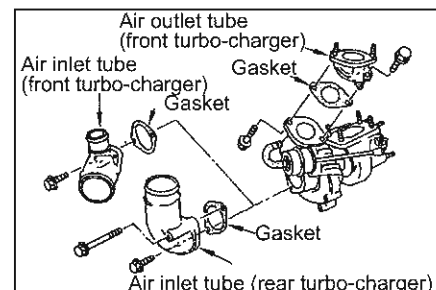
- (3) Tighten bolts (A).

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

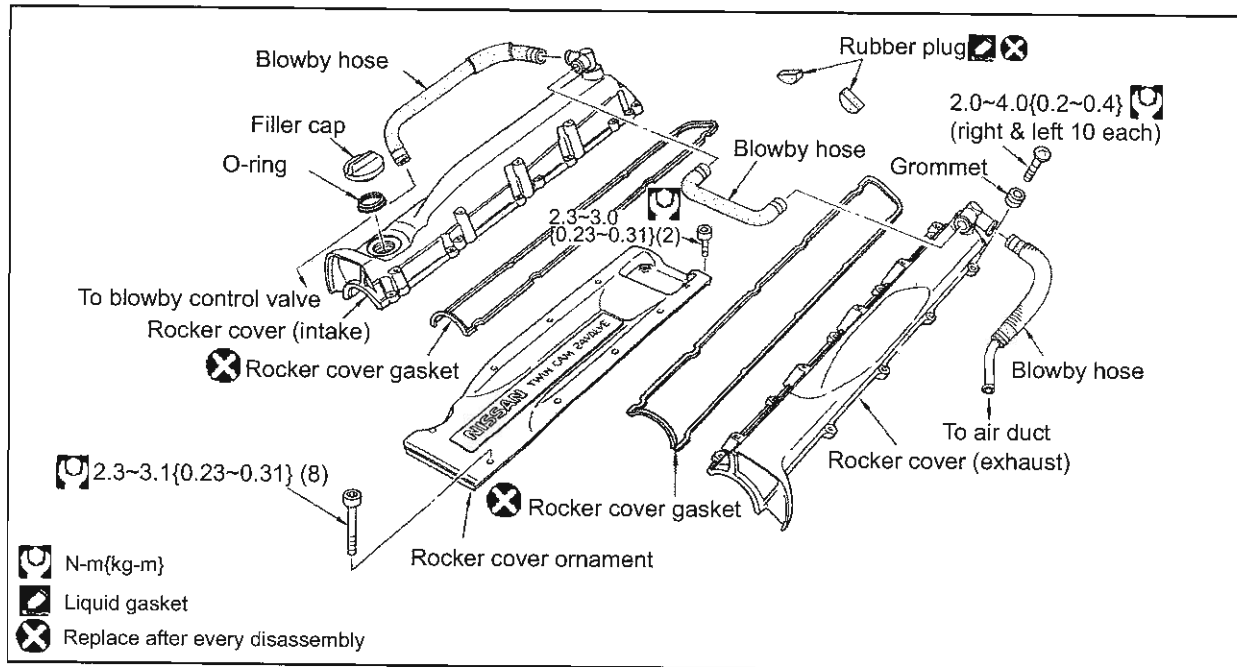


3. Install the air outlet tube (front turbo-charger only).
 - Replace the gasket with a new one.
4. Install the air inlet tube.
 - Replace the gasket with a new one.
5. Install the exhaust outlet.
 - Replace the gasket with a new one.
6. Install the turbo-charger cover and exhaust outlet cover.

Tightening torque (N-m{kg-m}) 3.7~5.0{0.38~0.51}

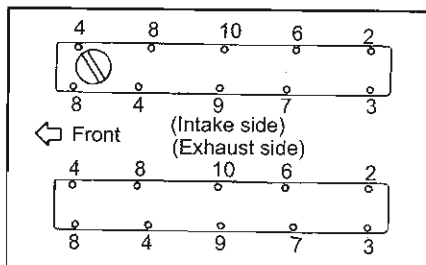
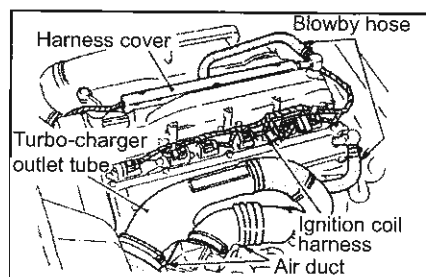


7. ROCKER COVER



Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the air duct.
3. Remove the rocker cover ornament.
4. Remove the turbo-charger outlet tube.
5. Shift the ignition coil harness.
6. Disconnect each harness and terminal and shift the harness cover.
7. Disconnect right and left blowby hose on the rocker cover side.
8. Remove the rocker cover.
 - Loosen the installation screws in order shown.
 - Remove both right and left rocker cover.



Inspection

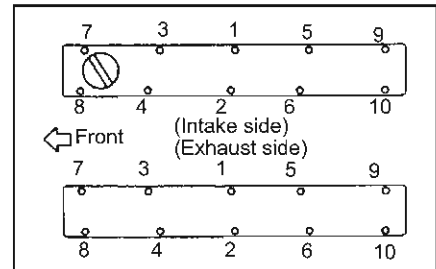
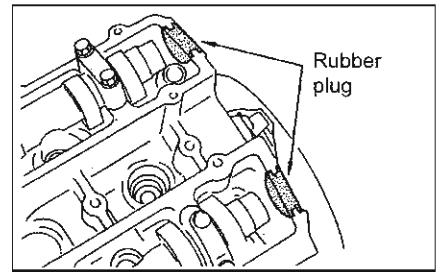
- Check if there are any damage or cracks on the rocker cover.
- Replace the rocker cover if there is any fault.
- Check to make sure there is no oil leaking from between the rocker cover and the cylinder head.

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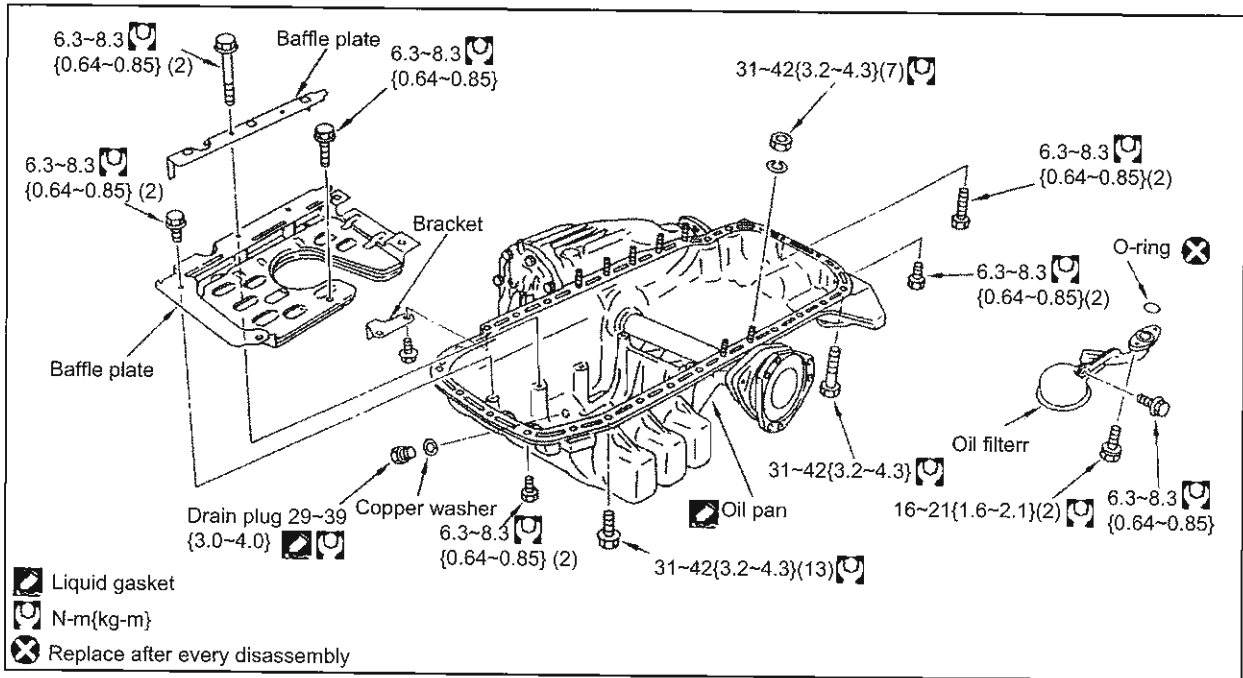
Installation

1. Install the rubber plug to the end of the cylinder head.
- (1) Remove old gasket from the cylinder head and the exhaust manifold and clean the surface using white gasoline.
- (2) Apply sealing agent to the installation surface.
2. Install the gasket to the rocker cover.
 - Replace the gasket with a new one.
3. Install the rocker cover.
 - Remove grease, dust etc. from the cylinder head side installation surface.
 - Tighten the installation screws in order shown in several stages.

Tightening torque (N-m{kg-m}) 2.0~3.9{0.2~0.4}
4. Fix the ignition coil harness with the clamp.
5. Install the rocker cover ornament.
6. Install the rest in reverse order to the removal procedure.

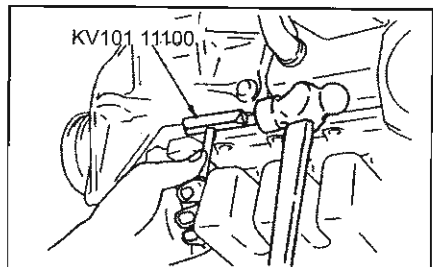
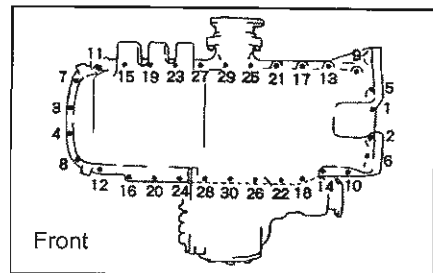


8. OIL PAN & OIL FILTER



Removal

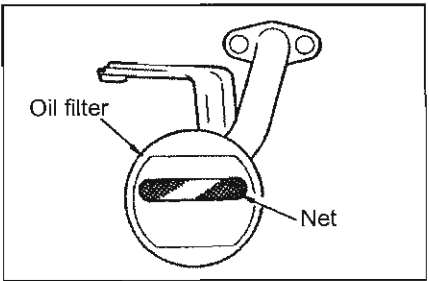
1. Remove the engine / transmission / transfer ASSY from the vehicle.
2. Remove the transmission / transfer ASSY from the engine.
3. Set the engine ASSY to the engine stand.
4. Drain the engine oil from the oil pan drain plug.
5. Remove the fly-wheel.
6. Remove the rear plate.
7. Remove the oil pan from the cylinder block.
- (1) Remove the oil pan installation bolts and nuts in the order shown.
 - No. 12 and 16 installation bolts will tighten the bracket.
- (2) Insert the seal cutter between the oil pan and the cylinder block.
- (3) Tap the seal cutter rear surface using a hammer to remove the oil pan.
- (4) Remove the oil pan carefully making sure the baffle plate will not interfere with the oil filter.
8. Remove the baffle plate.
9. Remove the oil filter.



Inspection

Oil filter visual inspection

- Check that there are no foreign objects on the oil filter net.
- Clean the filter net if there are any foreign objects.
- Replace with new one if there is any fault.

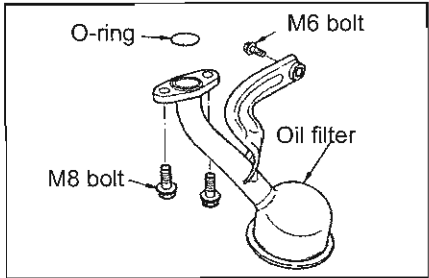


Installation

1. Install the oil filter.
- Replace the o-ring with a new one.

Tightening torque (N-m{kg-m})

M6 bolt	6.3~8.3{0.64~0.35}
M8 bolt	16~21{1.6~2.1}

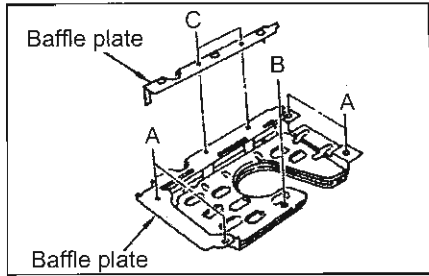


2. Install the baffle plate.

- Make sure to install the correct installation bolts.

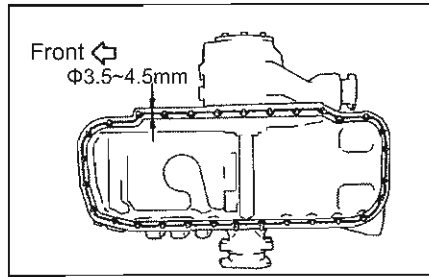
Bolt underhead(mm)	Bolt (A)	12
	Bolt (B)	30
	Bolt (C)	55

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

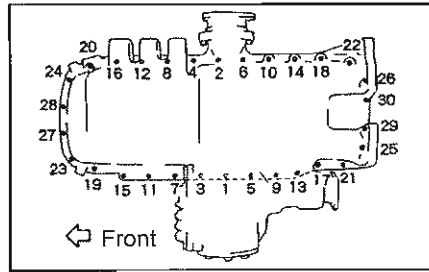


3. Install the oil pan.

- Use the scraper to remove old liquid gasket from the oil pan and the cylinder block.
- Use white gasoline to clean the installation surface.
- Apply sealing agent (KP710 00150) at $\Phi 3.5 \sim 4.5$ mm to position shown in the figure.

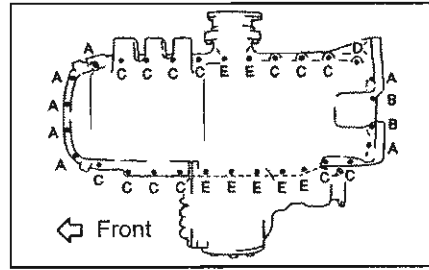


- Tighten the installation bolts in the order shown.



- Install the tightening bolts and the nuts.

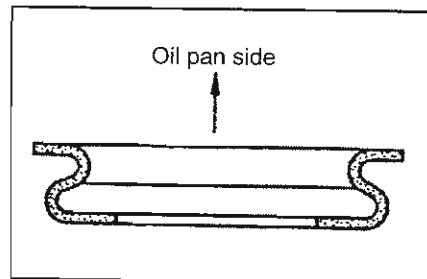
(A)	M6 bolt (bolt underhead 16mm)
(B)	M6 bolt (bolt underhead 30mm)
(C)	M10 bolt (bolt underhead 30mm)
(D)	M10 bolt (bolt underhead 50mm)
(E)	M10 nut
Tightening torque (N-m{kg-m})	
M6 bolt	6.3~8.3{0.64~0.85}
M10 bolt & nut	31~42{3.2~4.3}



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4. Install the oil pan drain plug.
 - Replace the washer with a new one.
 - Make sure the oil pan drain plug is facing in the correct direction as shown.

Tightening torque (N-m{kg-m}) 29~39{3.0~4.0}



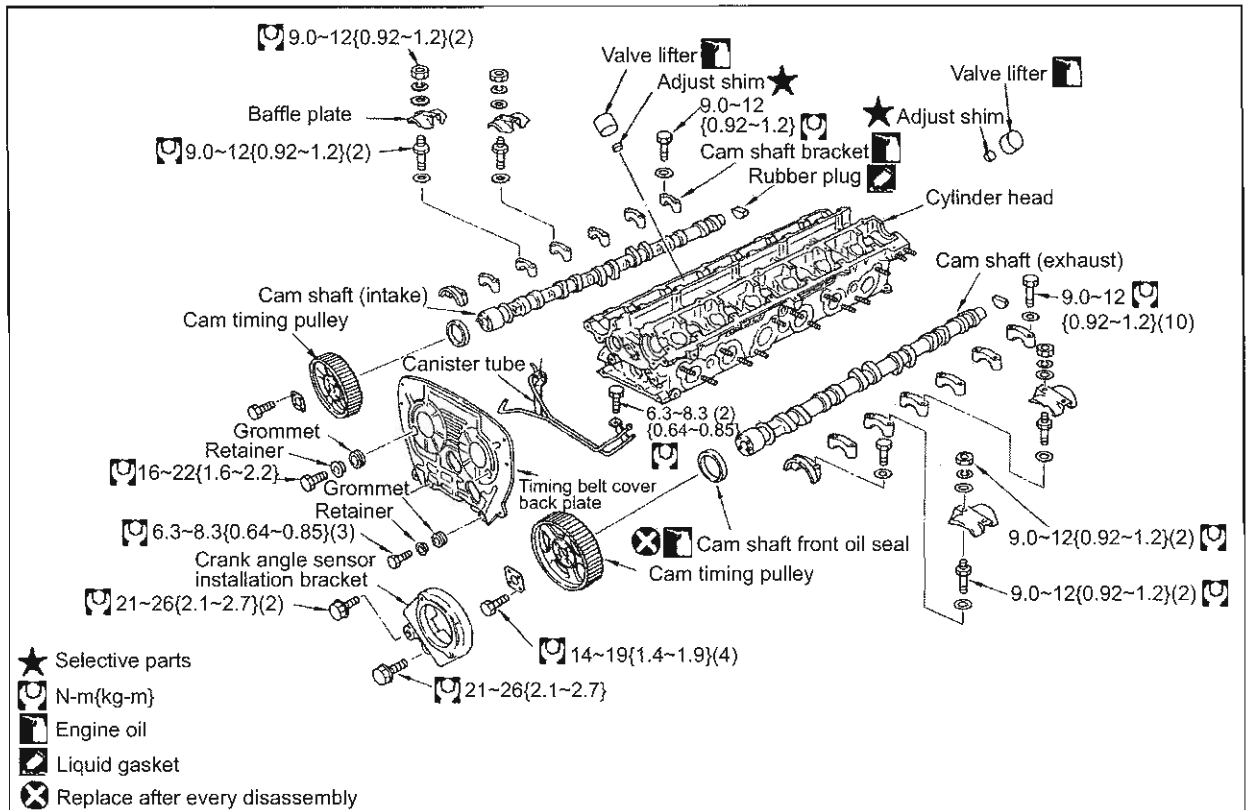
5. Install the rest in reverse order to the removal procedure.

Inspection

- Check the engine oil level.
- Warm up the engine and look for any oil leak and check the oil pressure.

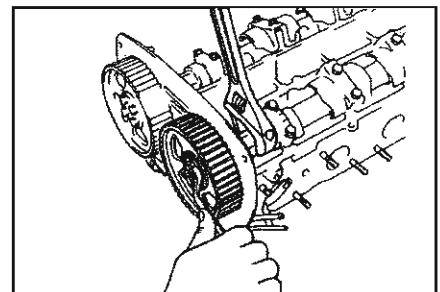
RB26DETT ENGINE

9. CAM SHAFT



Removal

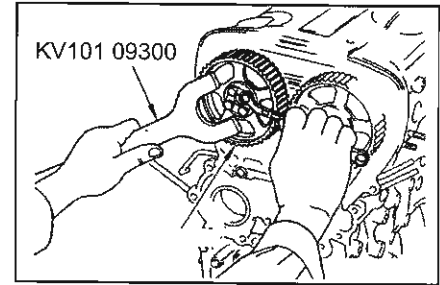
1. Remove the battery negative terminal inside the boot.
 2. Remove the front spoiler under cover (N1 vehicle).
 3. Remove the under cover.
 4. Drain coolant from the radiator drain plug.
 5. Drain coolant from the cylinder drain plug.
 6. Remove the front strut tower bar.
 7. Remove the front turbo-charger outlet tube, the air hose, the rear turbo-charger outlet tube (exhaust side cam shaft).
 8. Remove the cooling fan.
 9. Remove the radiator.
 10. Remove auxiliary belt.
 11. Remove the timing belt.
 12. Remove the rocker cover.
 13. Remove the cam timing pulley (exhaust side).
- (1) Remove the crank angle sensor installation bracket.
 - (2) Use a spanner or the pulley holder to fix the hexagonal area of the cam timing pulley to loosen the installation bolts.
 - (3) Remove the cam timing pulley from the cam shaft.



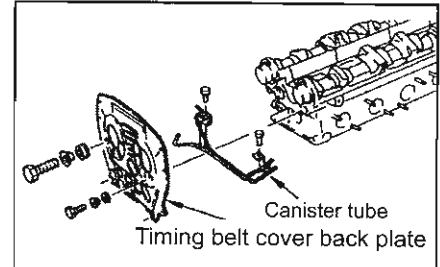
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14. Remove the cam timing pulley (intake side).

- Use the spanner or the pulley holder to fix the hexagonal area of the cam timing pulley to loosen the installation bolts.



15. Remove the timing belt cover (rear) and the canister tube.



16. Remove the baffle plate from No.3 and No.4 cam shaft bracket.

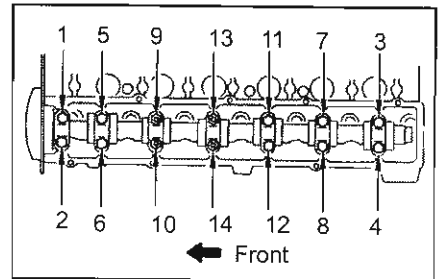
17. Remove the cam bracket.

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

Caution:

Make sure to mark the bracket installation position before removing the cam bracket.

- Carry out the cam shaft end play inspection before loosening the cam bracket installation bolts.



18. Remove the cam shaft.

19. Remove the cam shaft oil seal from the cam shaft.

20. Remove the valve lifter and the adjustment shim.

- Check the installation position and store it to avoid confusion.

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.

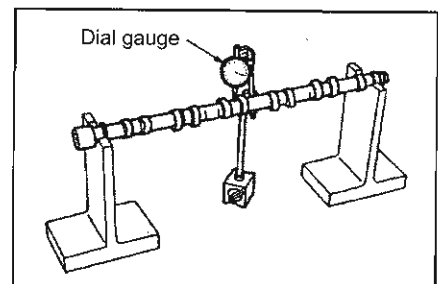
Cam shaft run-out

- Use V-block on a 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.



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Cam nose height

- Use micrometer to measure cam nose height.

Standard value (mm)

Intake 40.58

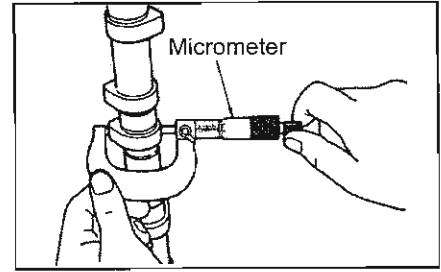
Exhaust 40.28

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) $\Phi 27.935 \sim \Phi 27.955$

(Cam bracket internal diameter)

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

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

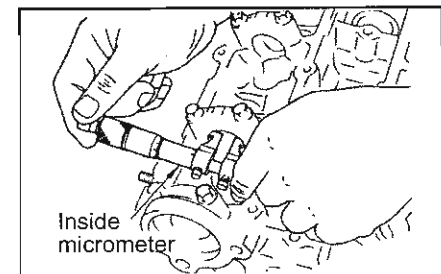
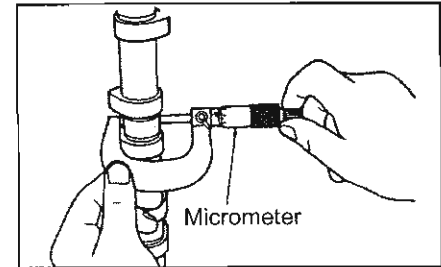
(Cam shaft oil clearance) =

(Cam bracket internal diameter) -

(Cam journal external diameter)

Standard value (mm) $\Phi 0.045 \sim \Phi 0.086$

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

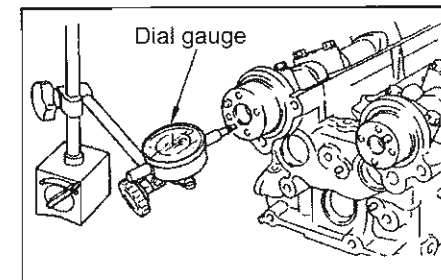


Cam shaft end play

- Set a dial gauge to the 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.



Valve lifter clearance

(Valve lifter external diameter)

- Use micrometer to measure hydraulic valve lifter external diameter.

Standard value (mm) $\Phi 30.955 \sim 30.965$

(Valve lifter internal diameter)

- Use inside micrometer to measure hydraulic valve lifter internal diameter.

Standard value (mm) $\Phi 31.000 \sim 31.020$

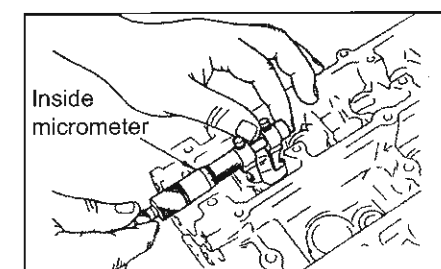
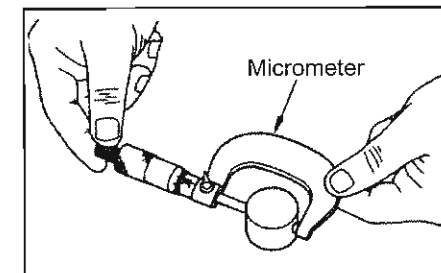
(Valve lifter clearance) =

(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.



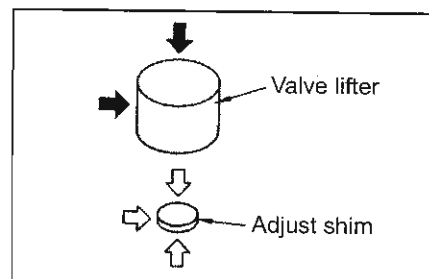
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Valve lifter visual inspection

- Check the cam nose rotational area and the lifter surface for any damage or wear. Replace if there are any abnormality.

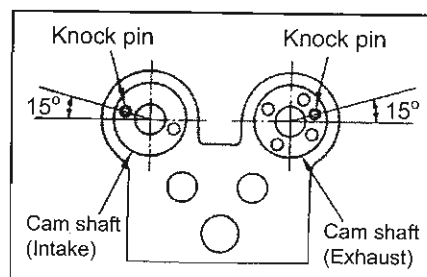
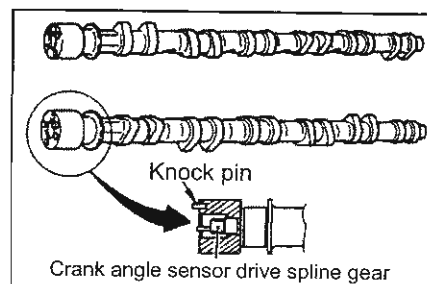
Adjustment shim visual inspection

- Look for any damage or wear on the valve stem contact surface. Replace if there are any abnormalities.



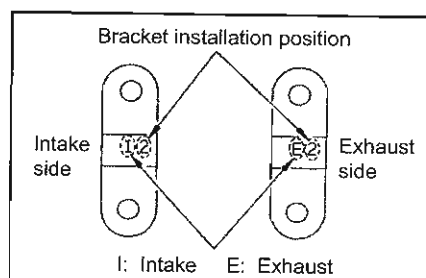
Installation

1. Install the valve lifter and the adjustment shim.
 - Apply engine oil to the rotational area.
 - Install it in the correct position.
2. Install the cam shaft to the cylinder head.
 - Apply engine oil to the cam nose, journal and thrust parts.
 - 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.

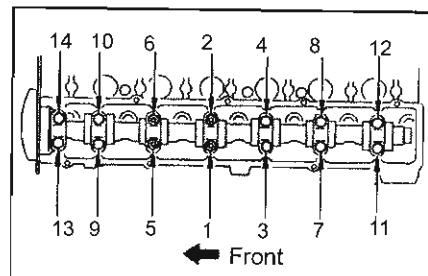


- 2) Tighten the cam bracket installation bolts in the order shown in several stages.

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

5. Install the baffle plate to No.3 and No.4 cam shaft bracket.

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



6. Install the timing belt cover (rear).

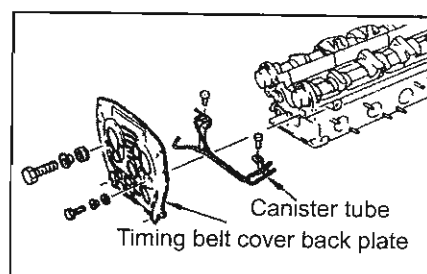
Tightening torque (N-m{kg-m})

M6 bolt

6.3~8.3{0.64~0.85}

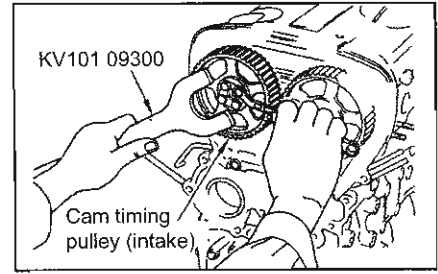
M8 bolt

16~22{1.6~2.2}

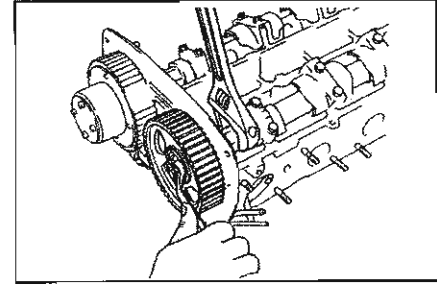


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7. Install the cam front oil seal.
 8. Install the cam timing pulley (intake).
 - (1) Install the cam timing pulley to the cam shaft.
 - Face the washer with the chamfered side towards the pulley.
 - (2) Apply engine oil to thread parts and the bearing surface of the installation bolts.
 - (3) Use the spanner to fix cam shaft hexagonal part to tighten installation bolt.
- Tightening torque (N-m{kg-m}) 14~19{1.4~1.9}



9. Install cam timing pulley (exhaust).
 - (1) Install cam timing pulley to the cam shaft.
 - Fix cam shaft hexagonal part using the spanner or pulley holder to fix the timing pulley to tighten installation bolts in opposite angle.
- Tightening torque (N-m{kg-m}) 14~19{1.4~1.9}
- (2) Install 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.

10. VALVE CLEARANCE

Inspection

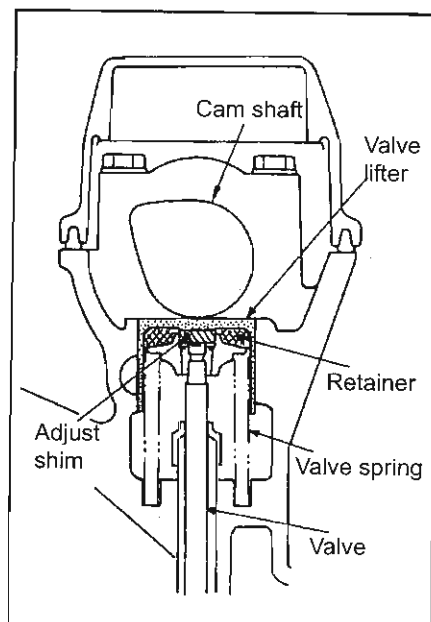
- Measure the valve clearance when the cam shaft and the valve associated parts are removed or replaced. If the value is out of standard value replace the adjustment shim.

Valve clearance standard value (mm)

(When cold)	Intake	0.42~0.48
	Exhaust	0.35~0.41
(When hot: reference only)	Intake	
0.48~0.54	Exhaust	0.41~0.47

Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the under plate.
3. Remove the under cover.
4. Drain coolant from the radiator drain plug.
5. Drain coolant from the cylinder drain plug.
6. Remove the front turbo-charger outlet tube, the air hose, the rear turbo-charger outlet tube (exhaust side cam shaft).
7. Remove the cooling fan.
8. Remove the radiator.
9. Remove auxiliary belt.
10. Remove the timing belt.
11. Remove the rocker cover.
12. Remove the cam shaft.
13. Remove the valve lifter.
14. Remove the adjustment shim from rear side of the valve lifter.



Adjustment

- Use the method below to select the adjustment shim:
Adjustment shim thickness formula (mm).

$$t = t_1 + (C_1 - C_2)$$

t = Adjustment shim thickness

t_1 = Removed shim thickness

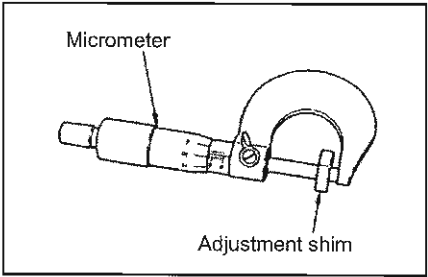
C_1 = Measured valve clearance

C_2 = Standard valve clearance (when cold)

C_2 : 0.45 (intake)
0.38 (exhaust)

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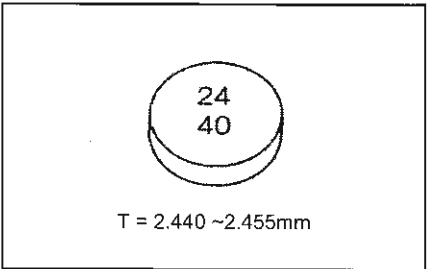
- Use the micrometer to measure the valve stem end surface (centre area) of the removed adjustment shim thickness (t_1).



- Refer to the engraved marks on the adjustment shim to determine the shim thickness.

Example:

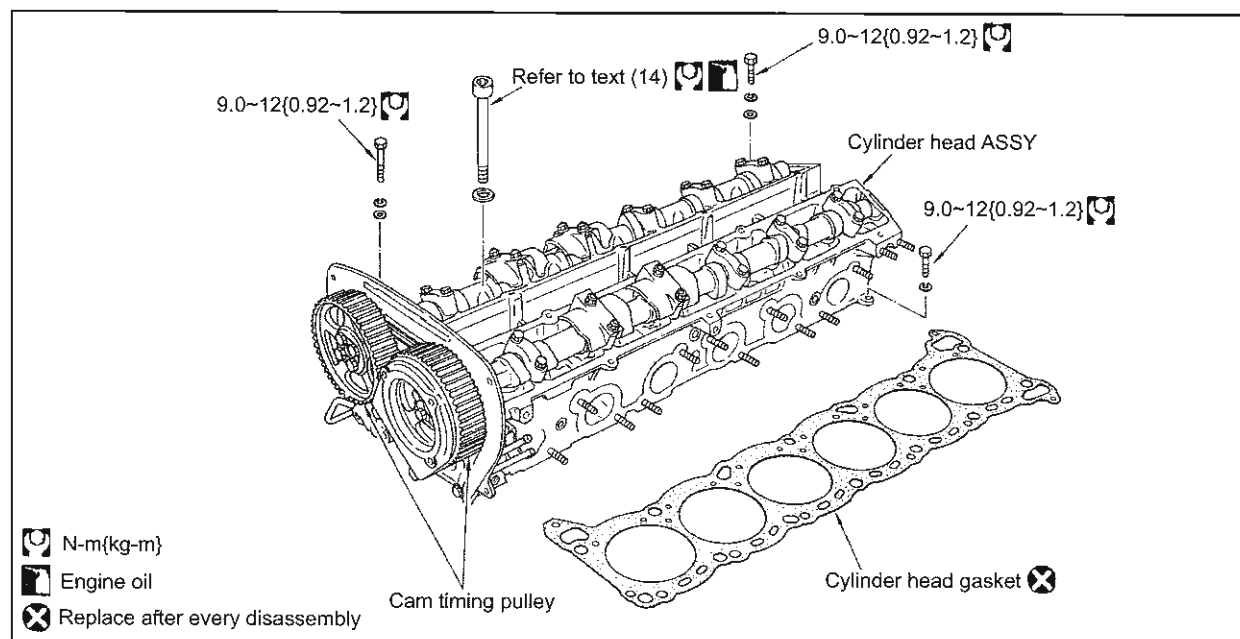
Mark	Shim thickness
'22 75'	2.275 mm
'22 90'	2.290 mm
.	.
.	.
.	.
'33 10'	3.310 mm



- There are total of 70 adjustment shim thickness.
- The range for adjustment shim thickness is between 2.275 ~ 3.310 mm.

Installation

1. Install the selected adjustment shim to the reverse side of the valve lifter.
- Face the adjustment shim with engraved side towards the valve lifter.
2. Install the cam shaft and the cam timing pulley.
3. Install the timing belt.
4. Install the crank pulley.
5. Turn the crank pulley twice.
6. Make sure the valve clearance is within the standard value.
7. Install the rest in reverse order to the removal procedure.

11. CYLINDER HEAD GASKET**Removal**

1. Release the fuel pressure.
2. Remove the battery negative terminal inside the boot.
3. Remove the front spoiler under cover (N1 vehicle).
4. Remove the under cover.
5. Drain coolant from the radiator drain plug.
6. Drain coolant from the cylinder drain plug.
7. Remove the exhaust front tube.
8. Remove the front strut tower bar.
9. Remove the cooling fan.
10. Remove the radiator.

[Engine right]

11. Remove the accelerator cable from the throttle drum.
12. Remove each hoses and the connectors from the fuel injector, intake manifold collector, intake manifold, and between the vehicle body and the cylinder block.

[Engine left]

13. Remove the air duct, air cleaner case and the air hose.
14. Remove the turbo-charger ASSY from the exhaust manifold side and lower it below the exhaust manifold.

[Engine front]

15. Remove auxiliary belt.
16. Remove the rocker cover.
17. Remove the timing belt.

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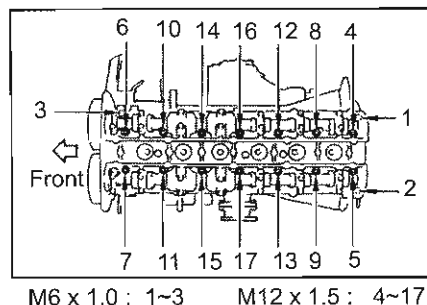
18. Remove the cylinder head ASSY.

(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 to remove the cylinder head ASSY.

19. Remove the cylinder head gasket.



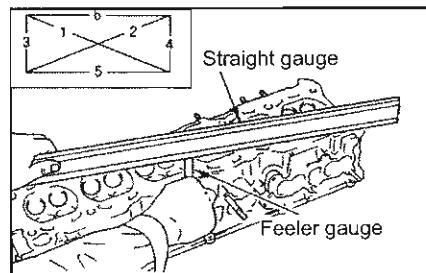
Inspection

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 passages.



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

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.

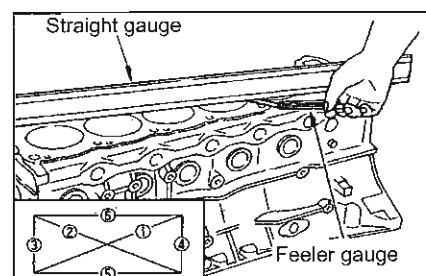
Caution:

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

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

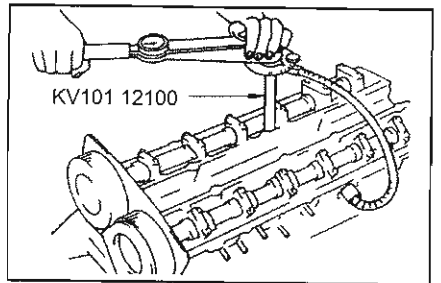
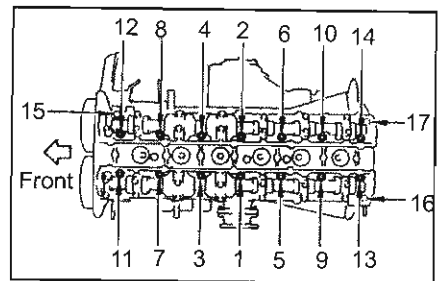
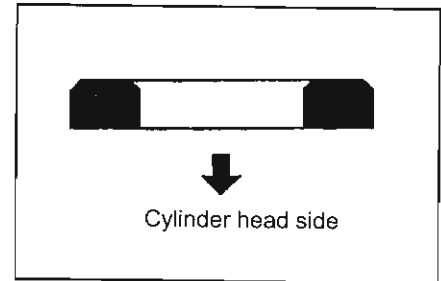
Limit value (mm) 0.1

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



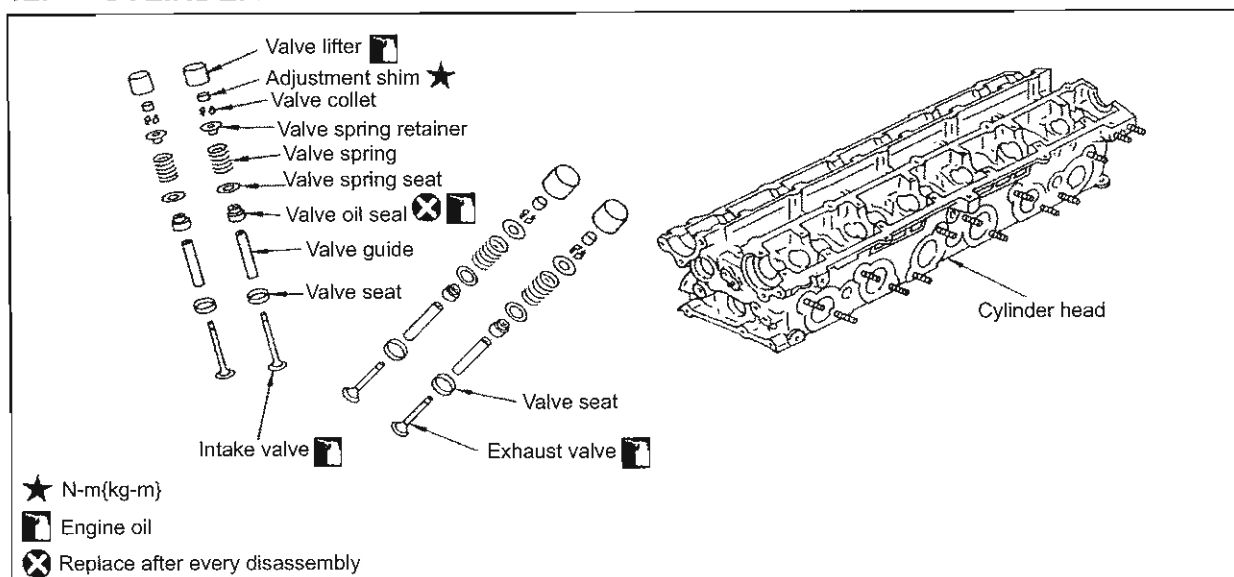
Installation

1. Install the cylinder head gasket.
 - Use the scraper to remove old gasket on the installation surface.
 - Remove any water, grease and rubbish on the installation surface.
 - Align the dowel pin to install.
 - Replace the gasket with a new one.
2. Install the cylinder head ASSY.
 - Make sure the No. 1 cylinder is at T.D.C position.
 - Check 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 cylinder head bolts.
 - Coat thread parts and the bearing surface with engine oil.
 - 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 108N-m {11kg-m}
 - (3) Loosen to 0N-m {0kg-m} torque
 - (4) Tighten to 25~34N-m {2.5~3.5kg-m}
 - (5) Tighten to 85° ~ 90°
(OR 103~113N-m {10.5~11.5kg-m})
 - Install the cylinder head auxiliary bolts (15~17).
Tightening torque (N-m {kg-m}) 9.0~12 {0.92~1.2}

**Caution:**

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

12. CYLINDER HEAD

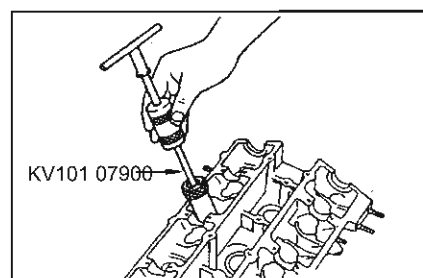
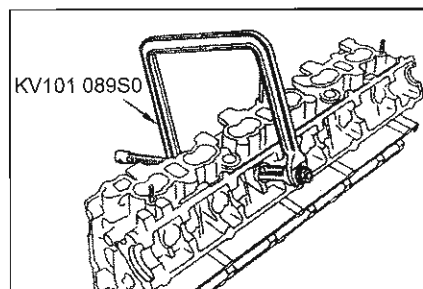


Removal & Installation

Refer to the cylinder head gasket for removal and installation operation of the cylinder head.

Disassembly

1. Remove the cam timing pulley and the rear timing belt cover.
2. Remove the cam shaft.
3. Remove the valve lifter and the adjustment shim.
4. Remove the valve collet.
 - Use the valve spring compressor to compress the valve spring. Use magnet screwdriver to remove the valve collet.
5. Remove the valve spring retainer.
6. Remove the valve spring.
7. Remove the valve by pushing the valve stem towards the combustion chamber.
 - Carry out the valve guide clearance inspection before removing the valve.
 - Check the installation position before removing the valve.
8. Remove the valve oil seal.
 - Use the oil seal puller to remove the valve oil seal.
9. Remove the valve spring seat.
10. Remove the valve guide.
11. Remove the valve seat.



Inspection**Cylinder head distortion**

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

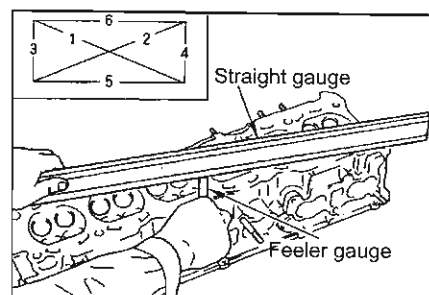
Caution:

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

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

Limit value (mm) 0.2

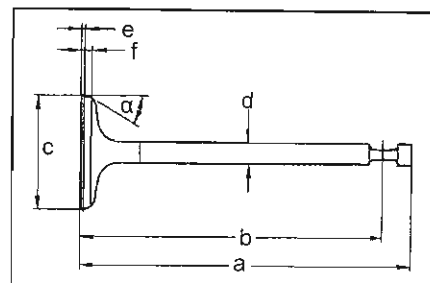
- If the value exceeds the limit apply compound to press platen and readjust the surface. If the value exceeds the limit greatly, replace the cylinder head with a new one.

**Valve measurement****Standard value (Intake)**

a(mm)	100.88~101.08
b(mm)	97.3~97.6
Φc (mm)	34.58~34.7
Φd (mm)	5.965~5.980
e(mm)	1.3
f(mm)	2.6~2.9
α (o)	45°30'

Standard value (Exhaust)

a(mm)	99.88~100.08
b(mm)	95.33~95.63
Φc (mm)	30.0~30.2
Φd (mm)	6.905~6.920
e(mm)	1.2
f(mm)	2.9~3.2
α (o)	45°15'~45°45'



- Replace the valve with a new one if the exhaust valve is out of standard value.

Valve guide clearance

- Carry out this inspection before removing the valve guide.
- Check if the valve stem diameter is at standard value.
- Extend the valve towards the combustion chamber for approx. 15mm. Move the valve to read the movement width on the dial gauge.

Standard value (mm)	intake	0.020~0.053
	exhaust	0.040~0.073

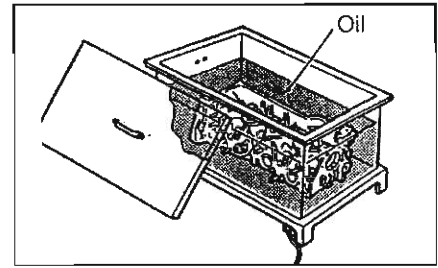
Limit value (mm)	intake	0.1
	exhaust	0.1

- Replace the valve guide with a new one if over the limit value.

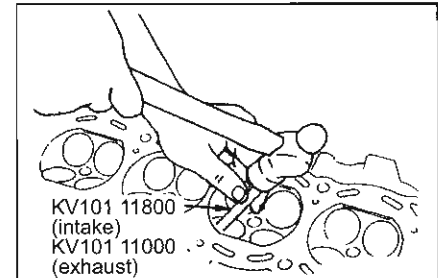
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Valve guide replacement

- Replace with oversize (0.5mm) valve guide when the valve guide is removed.
- (1) Use oil tank to heat up the cylinder head to approx. 150~160°.



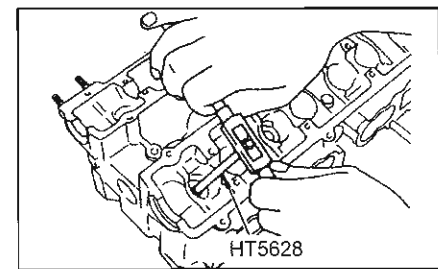
- (2) Use the valve guide drift to tap from the combustion chamber side to remove the valve guide.



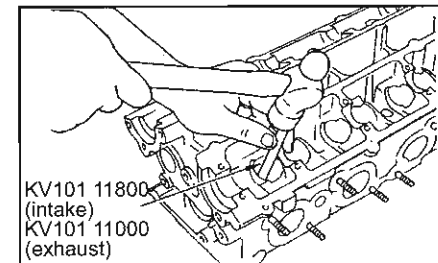
- (3) Use the valve guide reamer to ream the cylinder head guide hole.

Internal diameter standard value (mm)

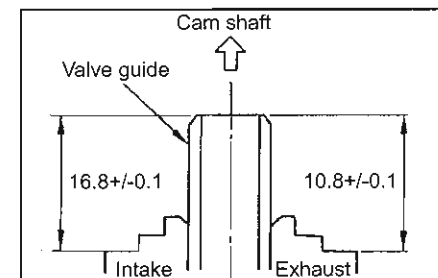
Intake	$\Phi 10.460 \sim 10.478$
Exhaust	$\Phi 11.460 \sim 11.478$



- (4) Heat the cylinder head to approx. 150~160°.
- (5) Use the valve guide drift to tap from the cam shaft side to insert the valve guide.



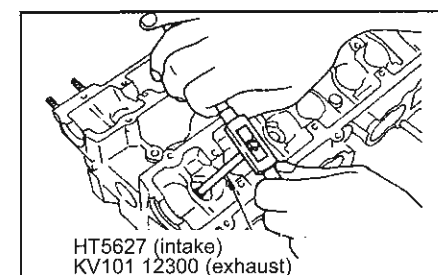
- The valve guide press-fit dimensions are shown in the figure.



- (6) Readjust the valve guide using the valve guide reamer.

Finished standard value (mm)

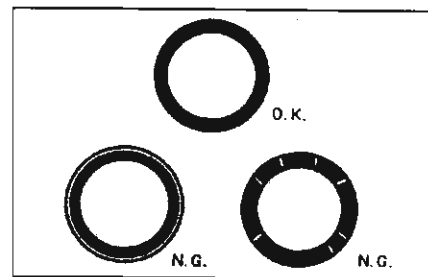
Intake	$\Phi 6.000 \sim 6.018$
Exhaust	$\Phi 7.000 \sim 7.018$



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Valve seat inspection

- Carry out this inspection after checking the valve guide and the valve measurement.
- Check the valve seat and the valve face contact surface.
- Replace the valve seat if there is any abnormality or faults.



Valve seat replacement

- Replace with oversize (0.5mm) valve guide when the valve guide is removed.

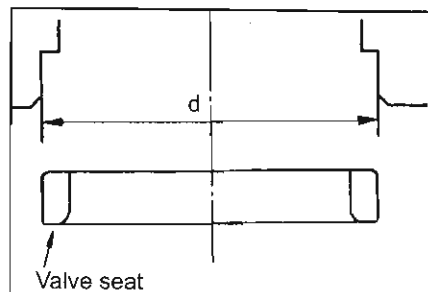
(1) Cut and grind the valve seat to remove the valve seat.

(2) Readjust the mounting hole for oversize valve seat.

Valve seat diameter standard value (mm)

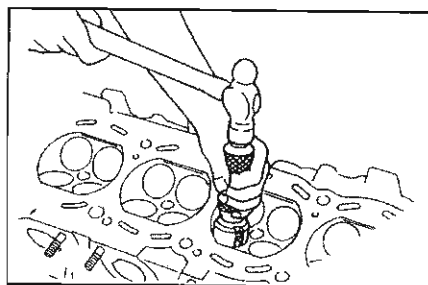
Intake $\Phi 36.500 \sim 36.516$

Exhaust $\Phi 32.500 \sim 32.516$



(3) Heat up the cylinder head in an oil bath to approx. $110 \sim 130^\circ$.

(4) Use dry ice to cool the valve seat. Use the valve seat drift to tap the valve seat.

Caution:

Do not touch cooled valve seat with bare hands.

(5) Readjust the valve seat using the valve seat cutter set and the valve seat grinder.

Standard measurement (mm)

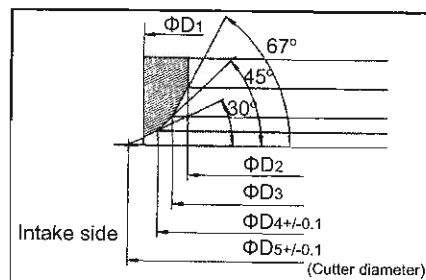
Intake $\Phi D1: 36.597 \sim 36.613$

$\Phi D2: 29.85 \sim 30.15$

$\Phi D3: 32.0$

$\Phi D4: 34.3$

$\Phi D5: 37.5$



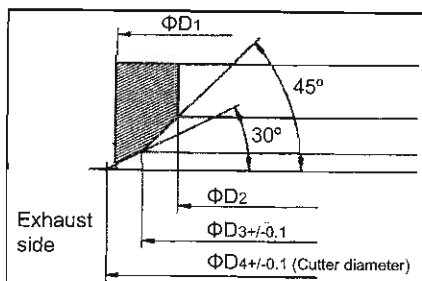
Exhaust

$\Phi D1: 32.580 \sim 32.596$

$\Phi D2: 24.85 \sim 25.15$

$\Phi D3: 29.6$

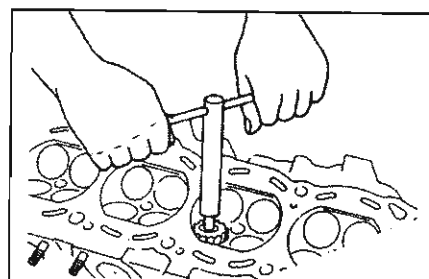
$\Phi D4: 32.5$

Caution:

When using the valve seat cutter make sure to hold the cutter with two hands and press firmly.

(6) Use compound to adjust the valve measurement.

(7) Recheck to make sure the contact surface is correct.



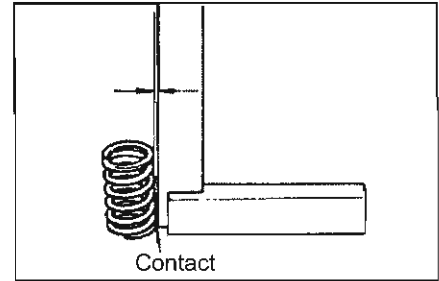
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Valve spring squareness inspection

- Place a right-angle straight edge (L-square) so it is touching the spring. Turn the spring and measure the maximum clearance between the upper spring surface and the right angle surface to determine out-of-square distance.

Limit value (mm) 1.8

- Replace the valve spring if over the limit value.

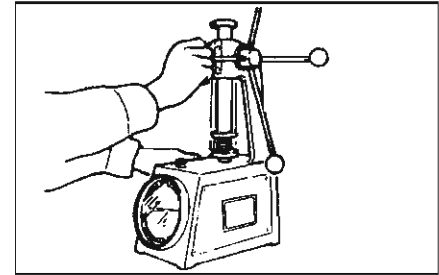


Free length and compression load inspection

- Use the valve spring tester.

Standard value:

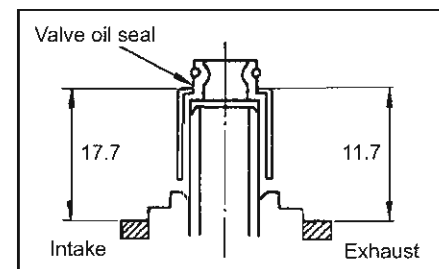
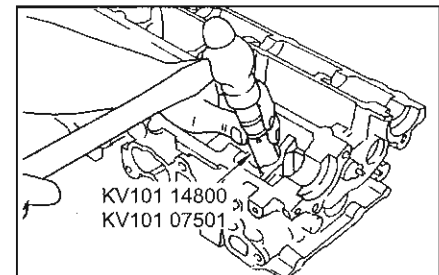
Free length (mm)	46.54
Compression load (N{kg})	24.0
Compression length (mm)	35.0
Identification colour	White



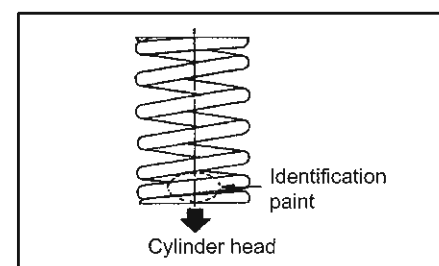
- Replace the valve spring with a new one if not at standard value.

Assembly

- Install the valve guide.
 - Install the valve seat.
 - Install the valve spring seat.
 - Install the valve oil seal.
- Use the valve oil seal drift to install new valve oil seal.
 - Apply engine oil to valve guide and valve oil seal lip surface.
 - Install as shown in the figure.

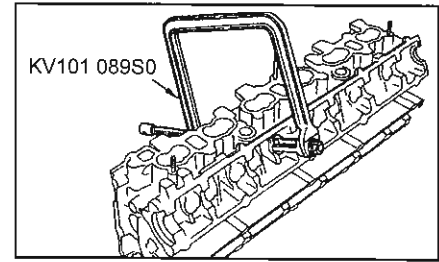


- Install the valve.
- Apply engine oil to valve stem.
- Install the valve spring.
- Install the valve spring with the narrow end pitch towards the cylinder head (identification colour side down).



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7. Install the valve spring retainer.
8. Install the valve collet.
 - Use the valve spring compressor to compress the valve spring. Use a magnet screwdriver to install the valve collet.
 - Use plastic hammer to tap the stem surface to check if it is installed correctly.



9. Install the adjustment shim and the valve lifter.
10. Install the cam shaft.
11. Install the rest in reverse order to the removal procedure.

13. CYLINDER BLOCK

Caution:

At disassembly

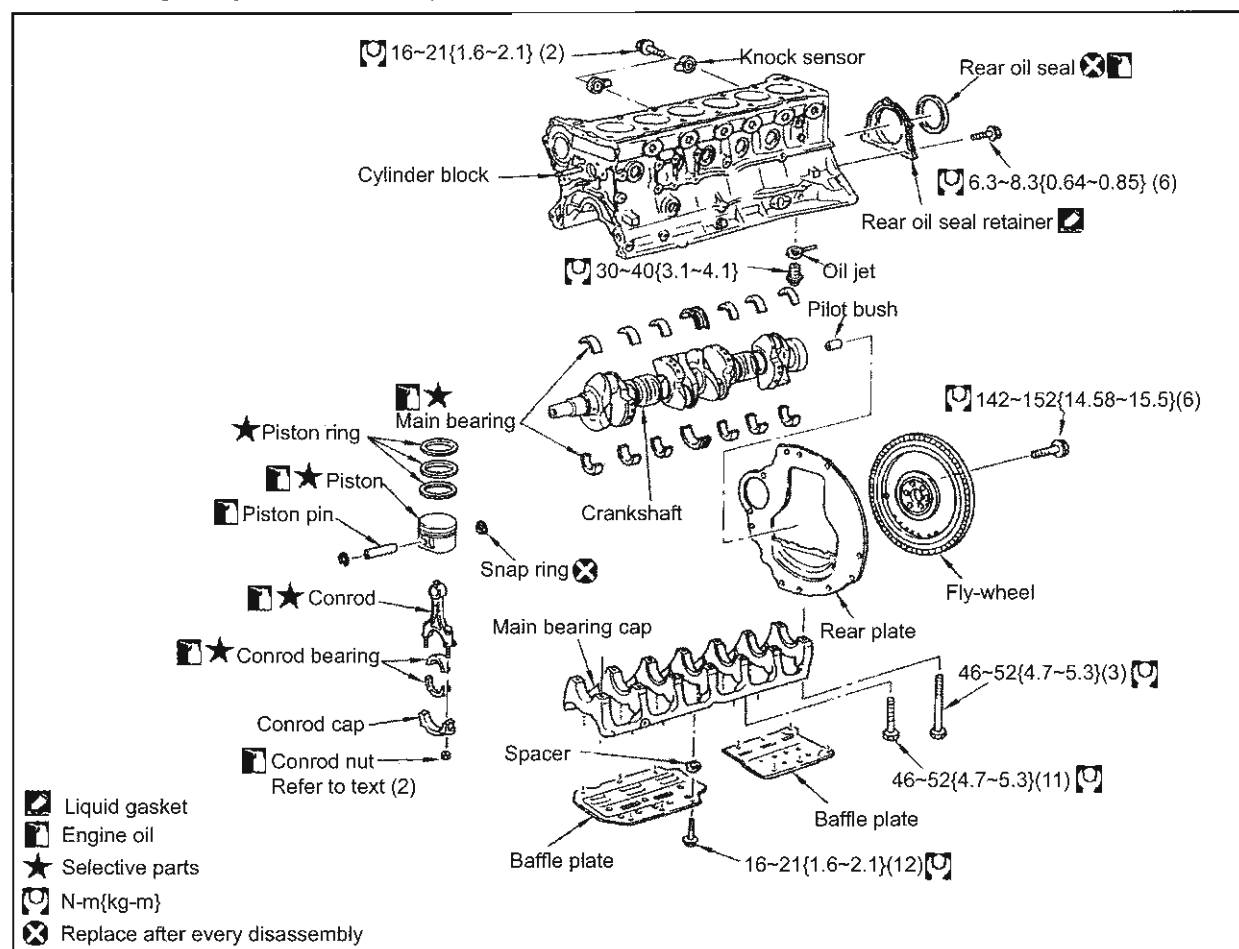
- Always make sure to use correct tools where mentioned and only carry out possible operations.
- Place marks on the disassembled parts so it can be assembled correctly. Make sure they are stored correctly.
- Tighten the bolts and nuts in the correct order shown.

At inspection, repairing and replacing

- Follow the inspection points and only replace or repair where necessary. Only replace the old parts with same types of new parts.

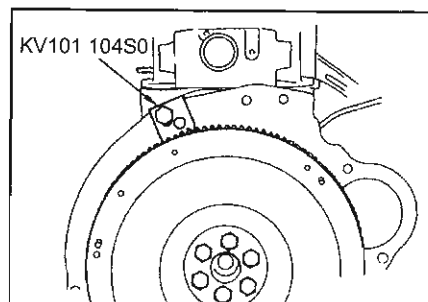
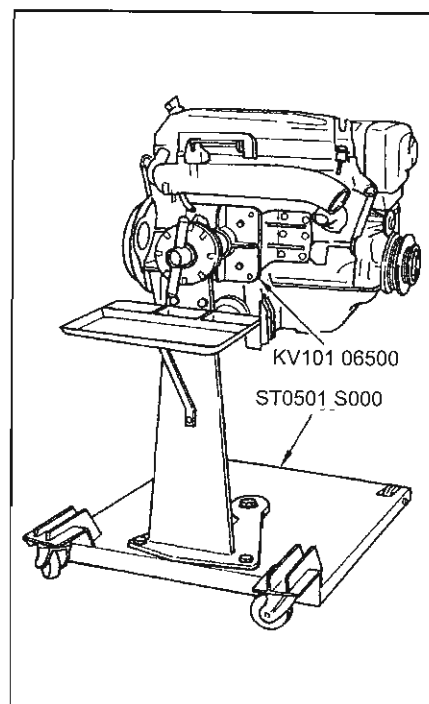
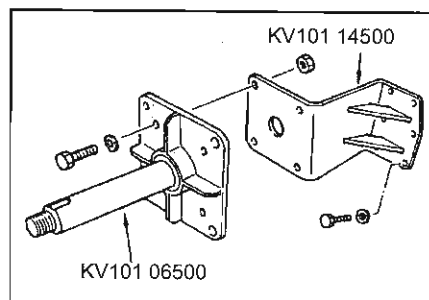
At assembly

- Always use torque wrench when tightening the nuts and bolts.
- Use the angle wrench or the protractor to check the tightening angle of the conrod nut.
- Tighten installation bolts and nuts in the order shown in several stages.
- Clean and air blow with air gun each parts especially the oil and coolant passage.
- Always replace the gasket, packing, oil seal and the o-ring with new ones after each disassembly.
- Care must be taken not to damage alignment surface and the rotational area. Remove all foreign objects and apply engine oil.



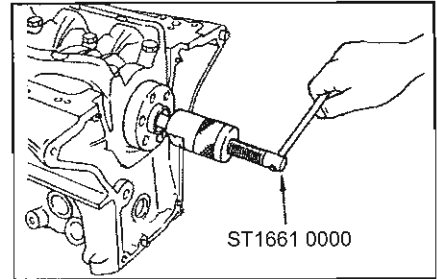
Disassembly

1. Remove the engine / transmission / transfer ASSY from the vehicle.
2. Remove the transmission / transfer ASSY from the engine.
3. Remove the engine mount from the cylinder block.
4. Drain coolant from the cylinder block drain plug.
5. Remove the oil filter.
6. Remove the oil filter bracket and the cooling type oil cooler.
7. Install the engine ASSY to the engine stand.
 - (1) Attach the engine sub attachment to the right side of the cylinder block.
Tightening torque (N-m{kg-m}) 39~49{4.0~5.0}
 - (2) Attach the engine attachment to the engine sub attachment.
Tightening torque (N-m{kg-m}) 39~49{4.0~5.0}
- (3) Hoist the engine ASSY and attach it to the engine stand.
8. Drain engine oil from the oil pan drain plug.
9. Remove the engine slinger.
10. Remove the alternator.
11. Remove the turbo-charger ASSY.
12. Remove the air conditioner compressor bracket.
13. Remove the power steering pump bracket.
14. Remove the rocker cover.
15. Remove the timing belt.
16. Remove the cylinder head.
17. Remove the oil pan and the oil filter.
18. Remove the water pump.
19. Remove the oil pump.
20. Remove the water inlet and the thermostat.
21. Remove two knock sensors from right side of the cylinder block.
22. Remove the fly-wheel.
 - Use the ring gear stopper to fix and remove the installation bolts.
 - Carry out the wheel run-out inspection before removing the fly-wheel.
23. Remove the baffle plate from the main bearing cap.

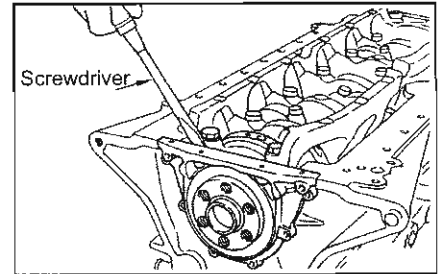


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24. Use the pilot bush puller to remove the pilot bush.



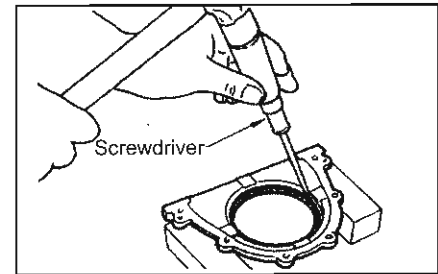
25. Remove the rear plate.
 26. Remove the rear oil seal retainer.
 • Use a screwdriver to remove the retainer.



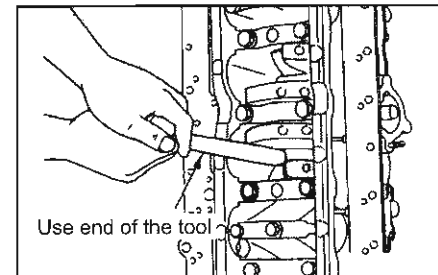
27. Remove the rear oil seal.
 • Use a screwdriver to remove the oil seal.

Caution:

Care must be taken not to damage the rear oil seal retainer.



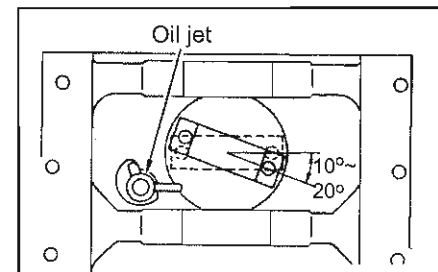
28. Remove the baffle plate.
 29. Remove the piston and the conrod ASSY.
 (1) Position the crankshaft pin to B.D.C (bottom dead centre) position.
 (2) Remove the conrod cap and use handle end of the hammer to push it out to the cylinder head side.
 • Carry out the conrod side clearance inspection before removing the piston / conrod ASSY.



- Push the conrod towards the left direction so it will not interfere with the oil jet.
 (3) Remove the conrod bearing.

Caution:

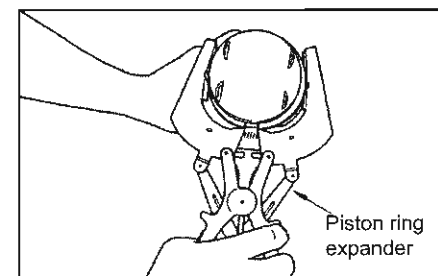
Check the installation position before removing the conrod bearing.



30. Remove the piston ring from the piston.
 • Use the piston ring expander.

Caution:

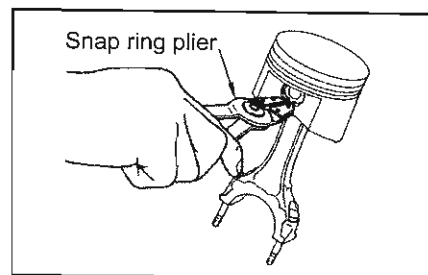
Care must be taken not to damage the piston.
 Do not over expand the piston ring.



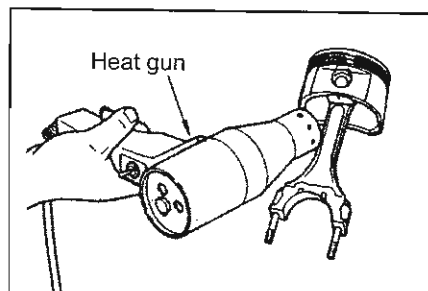
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31. Remove the piston from the conrod.

(1) Use the snap ring plier to remove the snap ring.



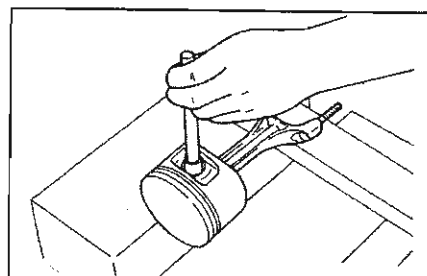
(2) Heat up the piston using a heat gun to approx. 60~70°.



(3) Push the piston out using a round bar with diameter $\Phi 20\text{mm}$.

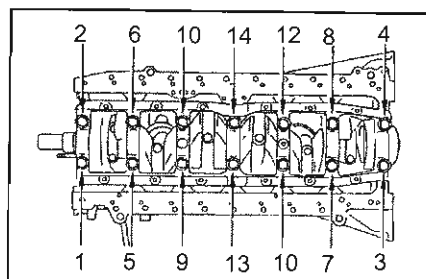
Caution:

Do not remove the conrod bolt from the conrod.



32. Remove the main bearing cap.

- Loosen and remove the installation bolts in order shown in several stages.
- Carry out the crankshaft side clearance inspection before loosening the main bearing cap bolts.



- Use the screwdriver to remove the main bearing cap.

Caution:

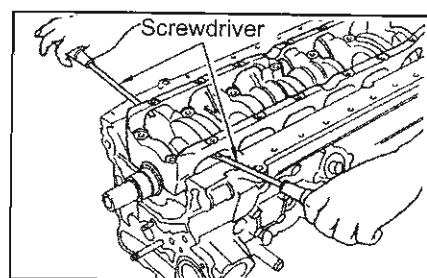
Care must be taken not to damage the oil pan seal surface.

33. Remove the crankshaft.

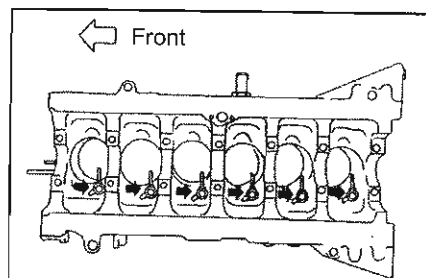
34. Remove the main bearing from the main bearing cap and cylinder block.

Caution:

Check installation position before removing the parts.



35. Remove the oil jet.

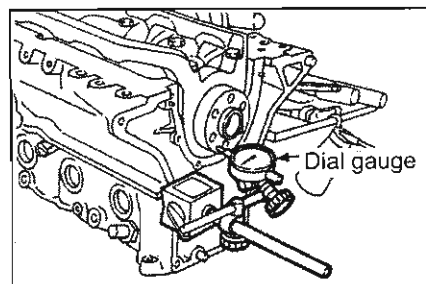


Inspection**Crankshaft side clearance**

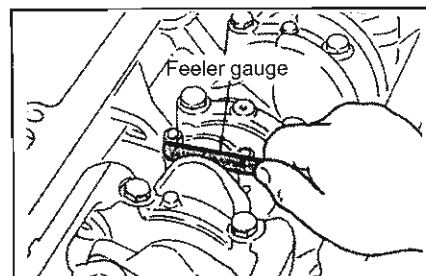
- Use the dial gauge or the feeler gauge to measure clearance between the thrust bearing and the crank arm when the crankshaft is moved forwards or backwards.

Standard value (mm) 0.05 ~ 0.18

Limit value (mm) 0.3



- If the measurement is over the limit value replace No.4 bearing (thrust bearing) to new one and remeasure the crankshaft side clearance. Replace the crankshaft if the value is still over limit.

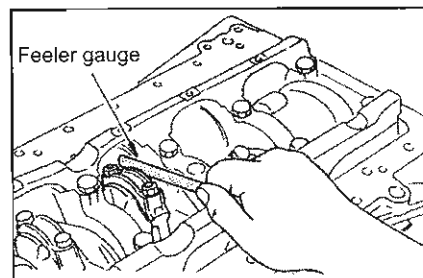
**Conrod side clearance**

- Use the feeler gauge to measure the side clearance between the conrod and the crank arm.

Standard value (mm) 0.2 ~ 0.3

Limit value (mm) 0.4

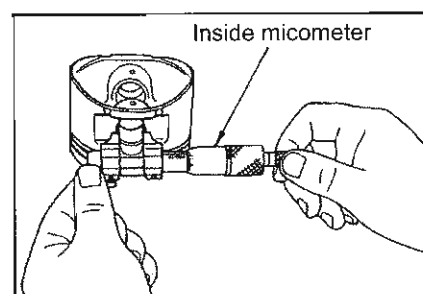
- If the measurement is over the limit value replace the conrod to new one and remeasure the conrod side clearance. Replace the crankshaft if the value is still over limit.

**Piston and piston pin clearance****(Piston pin inside diameter)**

- Use the inside micrometer to measure the piston pin inside diameter.

Standard value (mm) Grade O $\Phi 20.987 \sim 20.993$

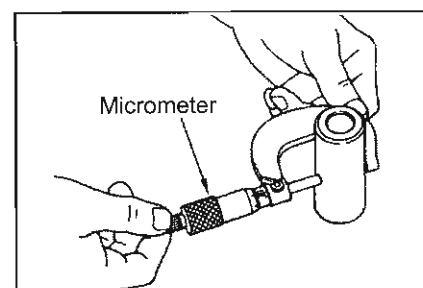
Grade I $\Phi 20.993 \sim 20.999$

**(Piston pin outer diameter)**

- Use the micrometer to measure the piston pin outer diameter.

Standard value (mm) Grade O $\Phi 20.989 \sim 20.995$

Grade I $\Phi 20.995 \sim 21.001$

**(Piston pin clearance) =**

(Piston pin inside diameter) - (Piston pin outer diameter)

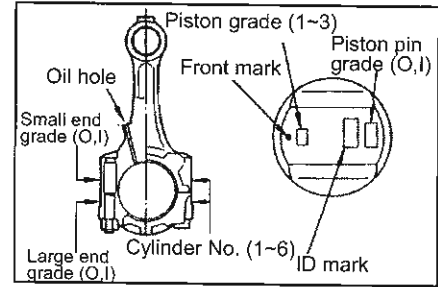
Standard value at room temperature (20°C) (mm)

-0.004 ~ 0

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- If the value is not at standard value, make sure the conrod small end inside diameter is within the standard value. Select the piston pin grade according to the measurement range and replace the piston pin / piston pin ASSY with new one with the same piston pin grade.

Standard value (mm)	Grade O	$\Phi 21.000 \sim 21.006$
	Grade I	$\Phi 21.006 \sim 21.012$



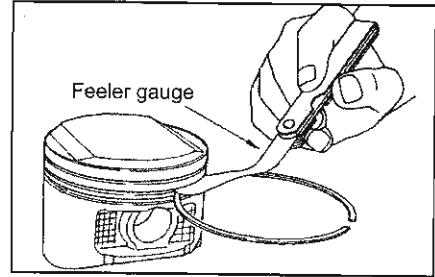
Piston ring side clearance

- Use the feeler gauge to measure between the piston ring and the piston ring groove.

Standard value (mm)	Top ring	0.040~0.075
	Second ring	0.030~0.065
	Oil ring	0.065~0.135

Limit value (mm)	Top & second ring	0.1
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- If the value is over the limit replace the piston or the piston ring ASSY.

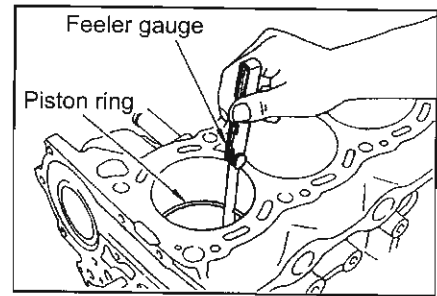


Piston ring closed gap

- Make sure the cylinder bore inner diameter is within the standard value.
- Use the piston to insert the piston ring to the cylinder intermediate position to measure the closed gap.

Standard value (mm)	Top ring	0.24~0.34
	Second ring	0.42~0.57
	Oil ring	0.20~0.60

- Replace the piston ring if not within the standard value.



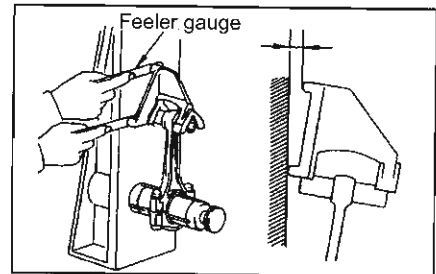
Conrod bend and torsion

- Use the conrod aligner to inspect.

Bend limit value (mm)	0.15 (every 100mm)
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Torsion limit value (mm)	0.3 (every 100mm)
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- Replace the conrod ASSY if over the limit value.



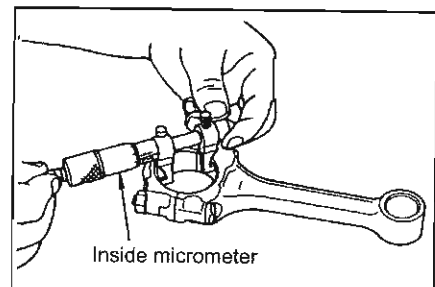
Conrod large end diameter

- Use the inside micrometer to measure the conrod large end inner diameter by first placing the conrod cap without conrod bearing and tightening the conrod nut to standard tightening torque.

Standard value (mm)	Grade O	$\Phi 51.000 \sim 51.007$
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	Grade I	$\Phi 51.007 \sim 51.013$
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- Replace the conrod if not within standard value.



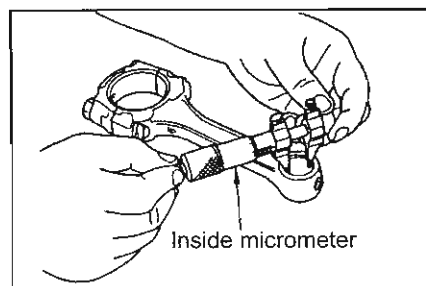
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Conrod bush clearance (small end)

(Conrod small end inner diameter)

- Use the inside micrometer to measure small end inner diameter.

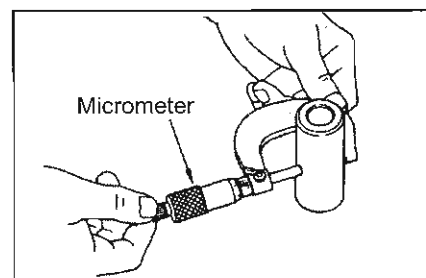
Standard value (mm)	Grade O	$\Phi 21.000 \sim 21.006$
	Grade I	$\Phi 21.006 \sim 21.012$



(Piston pin outer diameter)

- Use the micrometer to measure the piston pin outer diameter.

Standard value (mm)	Grade O	$\Phi 20.989 \sim 20.995$
	Grade I	$\Phi 20.995 \sim 21.001$



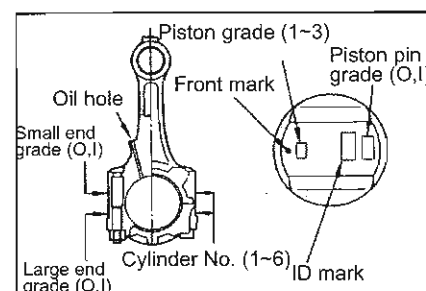
(Conrod bush oil clearance) =

(Conrod small end inner diameter) -

(Piston pin outer diameter)

Standard value (mm)	0.005~0.017
---------------------	-------------

- If not within the standard value recheck each measurement. If still not within the standard value replace either conrod ASSY, piston / piston pin ASSY or replace both.
- If replacing both parts, make sure to match the piston / piston pin ASSY pin grade and the conrod small end grade.
- If replacing either conrod ASSY or the piston / piston pin ASSY, measure and use the parts with the same grade.



Cylinder block top surface distortion

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

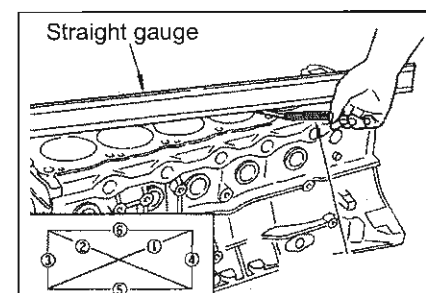
Caution:

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

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

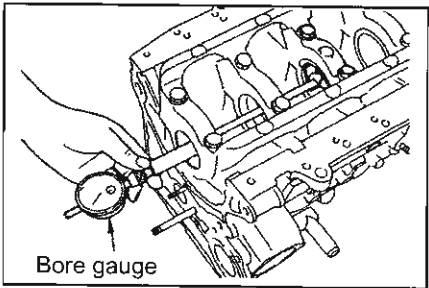
Limit value (mm)	0.1
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- If the value is over the limit use a surface grinder to correct the distortion. Replace the cylinder block if the distortion is too great.



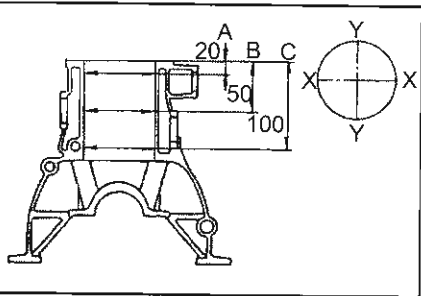
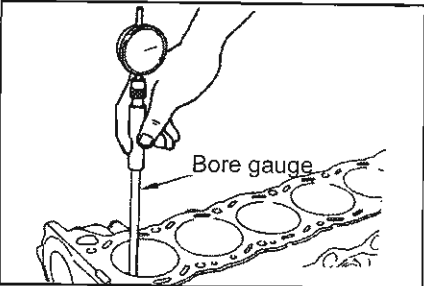
Main bearing housing inner diameter

- Place a main bearing cap without installing the main bearing. Tighten the tightening bolts to specified tightening torque.
- Use the bore gauge to measure main bearing housing inner diameter.
Standard value (mm) $\Phi 58.645 \sim 58.670$
- Replace the cylinder block, the main bearing cap ASSY if the value is not within the standard value.



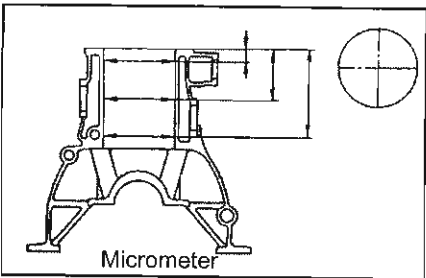
Piston to cylinder bore clearance
(Cylinder bore inner diameter)

- Use the bore gauge to measure the cylinder inner diameter in a total of six positions. Top, centre and bottom (A, B, C) and in two directions (X, Y).
Cylinder inner diameter standard value (mm) $\Phi 86.000 \sim 86.030$
Wear out limit value (mm) 0.2
Elliptic limit value (X, Y difference)(mm) 0.015
Taper limit value (A, C difference) (mm) 0.010
- If the measurement value is over the limit value or the cylinder inner wall is damaged or burnt conduct honing or boring.
- The piston oversize is set at 0.5 OS (0.5mm oversize) or 1.0 OS (1.0mm oversize) at the time of service. When using the oversize piston conduct honing on the cylinder, so the piston cylinder clearance is between 0.035~0.055mm. Also use oversize piston rings for oversize piston.



Piston outer diameter

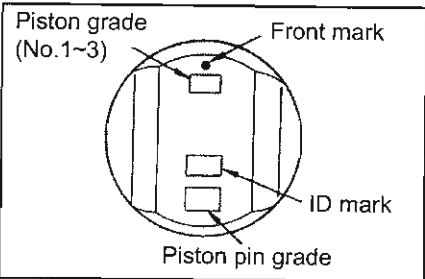
- Use the micrometer to measure the outer diameter of the piston skirt.
Measurement position: 13mm from the piston foot
Standard value (mm) $\Phi 85.955 \sim 85.985$



(Clearance) =
(Cylinder inner diameter) - (Piston skirt area diameter)
Standard value at room temperature (20°C)
0.035~0.055

- If the clearance is not at standard value, replace the piston by selecting the correct grade using the table below.

Grade No. (Engraved)		1		2		3	
Cylinder bore inner diameter		$\frac{86.010}{86.000}$		$\frac{86.020}{86.010}$		$\frac{86.030}{86.020}$	
Piston	Outer diameter	$\frac{85.965}{85.955}$		$\frac{85.975}{85.965}$		$\frac{85.985}{85.975}$	
	Pin grade	O	I	O	I	O	I

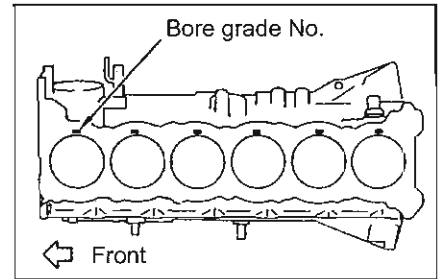


Caution:

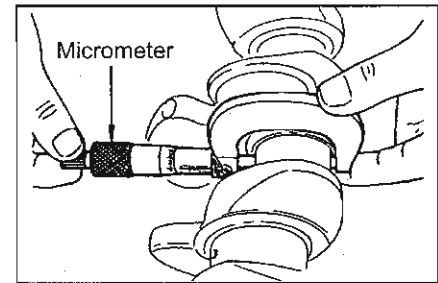
The piston is selected together with the piston pin ASSY. When replacing the piston refer to the conrod bush oil clearance section to select the piston pin grade.

Reference:

Select the piston with the same grade as the cylinder block left upper surface bore grade engravings when using the new cylinder block.

**Crankshaft journal diameter**

- Use the micrometer to measure journal diameter.
Standard value (mm) $\Phi 54.951 \sim 54.975$

**Crankshaft pin diameter**

- Use the micrometer to measure the outer diameter of the pin.
Standard value (mm) $\Phi 41.961 \sim 41.974$

Crankshaft ellipticity and taper

- Use the micrometer to measure each journal and the pins for each direction as shown in the figure.
- Ellipticity can be determined by the difference between measurement A and B.

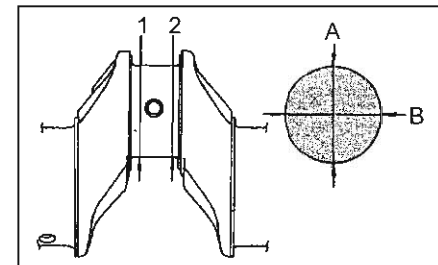
$$\text{Ellipticity} = A - B$$

- Taper can be determined by the difference between measurement 1 and 2.

$$\text{Taper} = 1 - 2$$

Limit value for ellipticity and taper (mm) 0.05

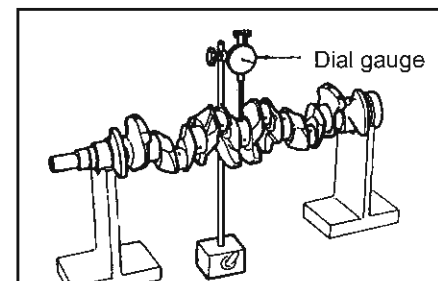
- If the value is over the limit replace with a new one.

**Crankshaft run-out**

- Use V-block on fixed surface and support the crankshaft journal.
- Set the dial gauge vertically to No. 4 journal.
- Crankshaft run-out is equal to half the movement width indicated in the dial gauge.

Limit value (mm) 0.05

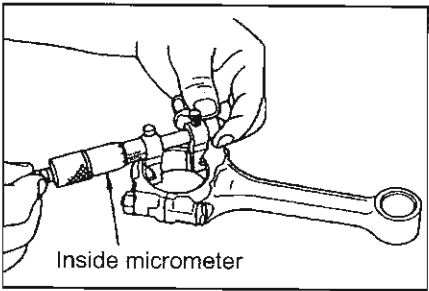
- If the run-out is over the limit value replace the crankshaft.



Conrod bearing oil clearance

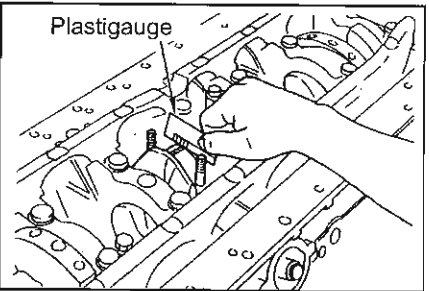
Method A

- Use the inside micrometer to measure the conrod bearing inner diameter. First instal the conrod bearing to the conrod and tighten the conrod nut to specified tightening torque.
- (Oil clearance) =
 (Conrod bearing inner diameter) -
 (Crankshaft pin diameter)
- Standard value (mm) 0.020~0.040
 Limit value (mm) 0.090
- If the measurement is over the limit value replace the conrod bearing.



Method B (using the plastigauge)

- Remove all dust and foreign objects from the crankshaft pin and the bearing surface.
- Cut off a piece of plastigauge slightly shorter than the bearing width. Place the plastigauge on the crankshaft axle direction avoiding the oil hole.
- Assemble the conrod bearing to the conrod cap and tighten the conrod nut to specified tightening torque.



Caution:

Do not turn the crankshaft.

- Remove the conrod cap and the bearing and measure the plastigauge width using the plastigauge scale.

Conrod bearing selection

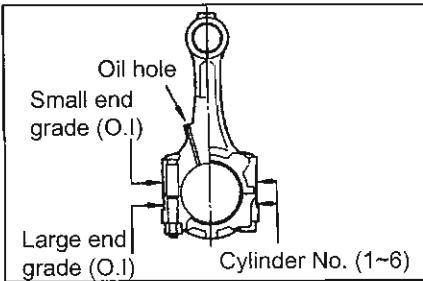
- Select the conrod bearing from the selection chart below.

(mm)

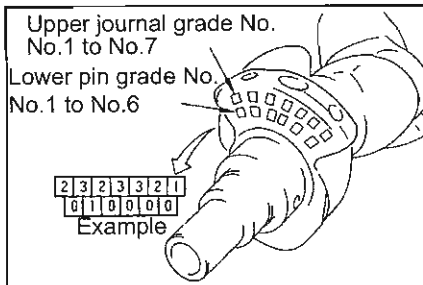
Conrod large end inner diameter			$\Phi 51.007$ $\Phi 51.000$	$\Phi 51.013$ $\Phi 51.007$
Crank pin diameter	Grade No. (Engraved)		O	I
$\Phi 47.974$ $\Phi 47.968$	0	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 0 1.500~1.503 0.020 / 0.039 None	STD 1 1.503~1.506 0.021 / 0.039 Brown
$\Phi 47.968$ $\Phi 47.961$	1	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 1 1.503~1.506 0.020 / 0.040 Brown	STD 2 1.506~1.509 0.021 / 0.040 Green

Reference:

If the conrod is new check with the large end grade engravings with the selection chart.



If the crank shaft is new check with the crankshaft surface pin grade engravings with the selection chart.



Using under size bearing

- Under size bearing can be used if oil clearance can not be adjusted to standard value when the standard size conrod bearing is used to measure the oil clearance.
- When using the under size bearing, measure the bearing inner diameter and grind the pin in order to adjust the oil clearance to standard value.

Bearing under size chart (mm)

Size	Thickness	Grade No.
US0.08	1.541 / 1.549	8
US0.12	1.561 / 1.569	12
US0.25	1.626 / 1.634	25

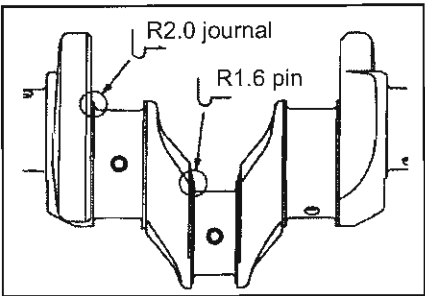
Caution:

Care must be taken not to damage the fillet R when grinding the crank pin to use an under size bearing.

Main bearing oil clearance

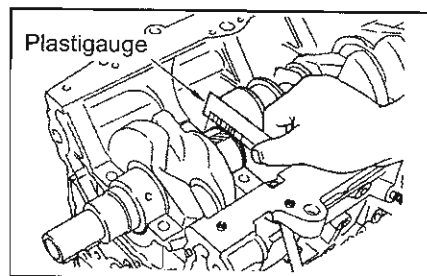
Method A

- Install the main bearing to the cylinder block and the conrod cap and tighten the main bearing bolt to specified tightening torque. Measure the main bearing inner diameter.
(Oil clearance) =
(Main bearing inner diameter) -
(Crankshaft journal diameter)
Standard value (mm) 0.028~0.046
Limit value (mm) 0.090
- If the measurement is over the limit value replace the main bearing.



Method B (using the plastigauge)

- Remove all dust and foreign objects from the crankshaft journal and the bearing surface.
- Cut off a piece of plastigauge slightly shorter than the bearing width. Place the plastigauge on the crankshaft axle direction avoiding the oil hole.
- Tighten the main bearing to the specified tightening torque.

Caution:

Do not turn the crankshaft.

- Remove the bearing cap and the bearing to measure the plastigauge width using the plastigauge scale.

Main bearing selection

- Select the main bearing from the selection chart below.

(mm)

Cylinder block bearing housing inner diameter			58.651 58.645	58.657 58.651	58.663 58.657	58.670 58.663
Crank journal diameter	Grade No. (Engraved)		0	1	2	3
54.975 54.969	0	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 0 1.818~1.821 0.028 / 0.046 Black	STD 1 1.821~1.824 0.028 / 0.046 Brown	STD 2 1.824~1.827 0.028 / 0.046 None	STD 3 1.827~1.830 0.028 / 0.047 Yellow
54.969 54.963	1	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 1 1.821~1.824 0.028 / 0.046 Brown	STD 2 1.824~1.827 0.028 / 0.046 None	STD 3 1.827~1.830 0.028 / 0.046 Yellow	STD 4 1.830~1.833 0.028 / 0.047 Blue
54.963 54.957	2	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 2 1.824~1.827 0.028 / 0.046 None	STD 3 1.827~1.830 0.028 / 0.046 Yellow	STD 4 1.830~1.833 0.028 / 0.046 Blue	STD 5 1.833~1.836 0.028 / 0.047 Green
54.957 54.951	3	Bearing grade No. Bearing thickness (mm) Oil clearance (mm) Identification colour	STD 3 1.827~1.830 0.028 / 0.046 Yellow	STD 4 1.830~1.833 0.028 / 0.046 Blue	STD 5 1.833~1.836 0.028 / 0.046 Green	STD 6 1.836~1.839 0.028 / 0.047 Pink

Reference:

Depending on the installation position the measurement and the feature size will be different.

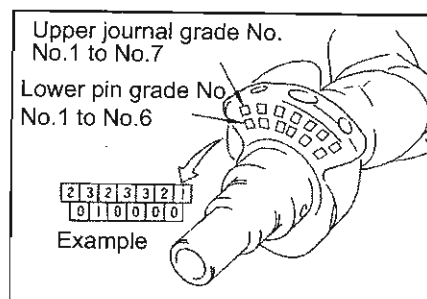
No.1 ~ No.3, No.5 ~ No.7 upper side (with groove)

No.1 ~ No.3, No.5 ~ No.7 lower side (without groove)

No.4 upper side (Thrust bearing, with groove)

No.4 lower side (Thrust bearing, without groove)

- If the crank shaft is new, check the crank shaft front surface journal grade No. engravings with the selection chart.

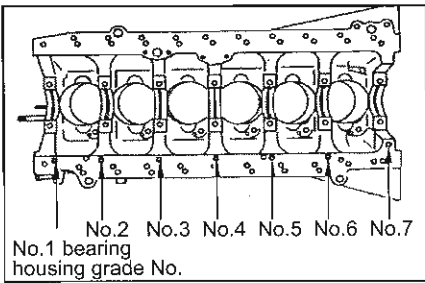


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- If the cylinder block is new check the cylinder block bottom surface housing inner diameter grade No. engravings with the selection chart.

Using under size bearing

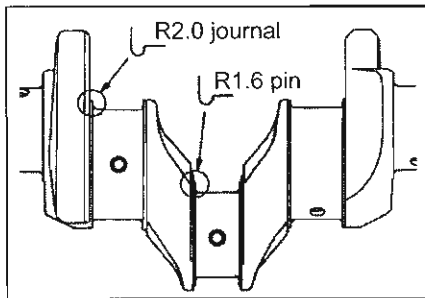
- Under size bearing can be used if oil clearance can not be adjusted to standard value when the standard size main bearing is used to measure the oil clearance.
- When using the under size bearing, measure the bearing inner diameter and grind the pin in order to adjust the oil clearance to standard value.



Bearing under size chart (mm)

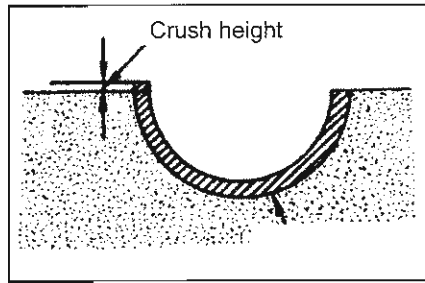
Size	Thickness
US0.25	1.950 / 1.958

Caution:
Care must be taken not to damage the fillet R when grinding the crank pin to use an under size bearing.



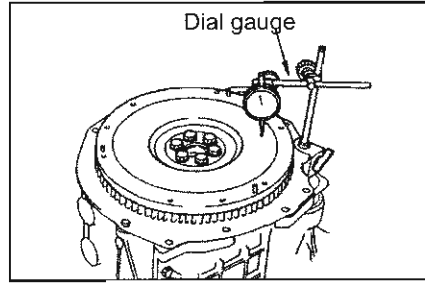
Main bearing crush height

- When the main bearing is installed tighten the bearing cap to specified tightening torque and when the cap is removed the bearing tip is projecting.
- Replace the part when there is no main bearing crush height.



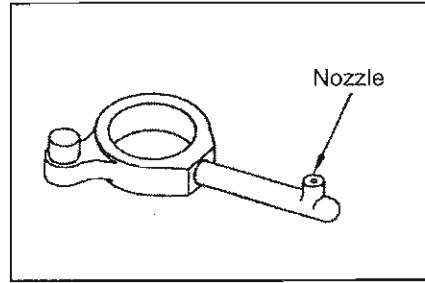
Fly-wheel run-out

- Use a dial gauge to measure the run-out of the fly-wheel clutch plate working face.
- Limit value (mm) 0.10
- Replace the fly-wheel when the value is over the limit.



Oil jet

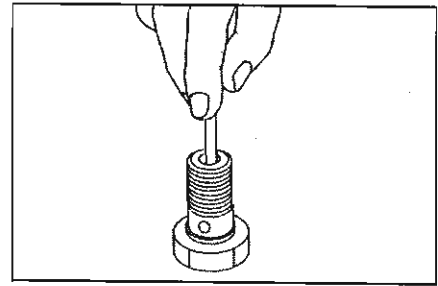
- Check the nozzle for any deformation or damage.
- Blow compressed air from the nozzle side and check if there is any blockage.
- Clean or replace the oil jet if there is any abnormality.



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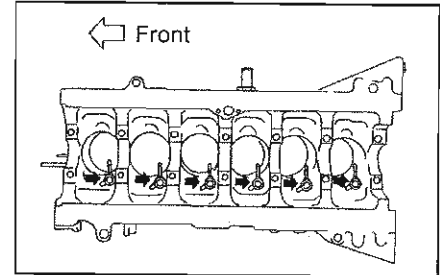
Oil jet eye bolt

- Use a clean stick to push the check valve inside the eye bolt. Check if it move smoothly with moderate resistant force.
- Replace with a new one if there is any abnormality.



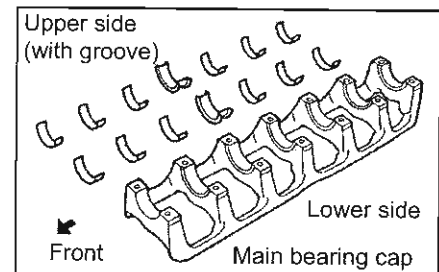
Assembly

1. Use the air gun to blow compressed air through the cylinder block coolant passage, oil passage, inside the crank case and inside the cylinder bore to remove any foreign objects.
2. Install the oil jet.
Tightening torque (N-m{kg-m}) 30~40{3.1~4.1}



3. Install the main bearing.

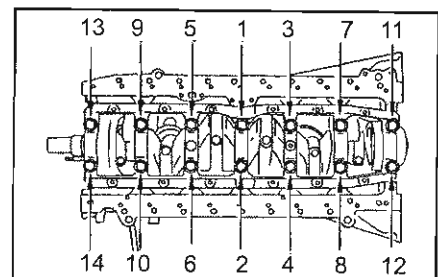
- (1) Remove any rubbish, dust, grease etc. from the cylinder block and the main bearing cap bearing installation surface.
- (2) Care must be taken with the main bearing installation direction.
 - Install side with the oil hole and the groove to the cylinder block side, and the side without the oil hole and the groove to main cap side.
 - Coat engine oil to the bearing surface (inner) when installing the bearing. Do not apply engine oil to the reverse side but clean sufficiently.
 - Make sure the cylinder block oil hole and the bearing oil hole position is correct.



4. Install the crankshaft to the cylinder block.
5. Install the main bearing cap.
 - Apply engine oil to the installation bolts thread area.
 - Longer bolts are used for positions 1, 11 and 12.
 - Tighten the installation bolts in the order shown in the figure.

Tightening torque (N-m{kg-m}) 46~52{4.7~5.3}

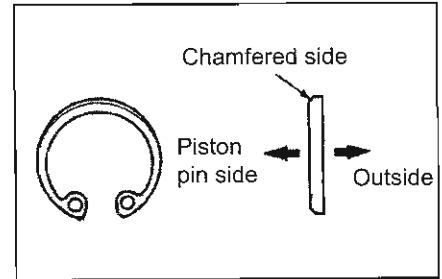
- After securing the bolts make sure the crankshaft turns smoothly by hand.



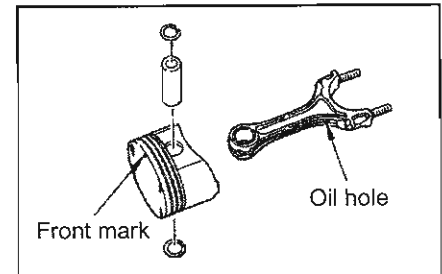
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6. Install the piston to the conrod.

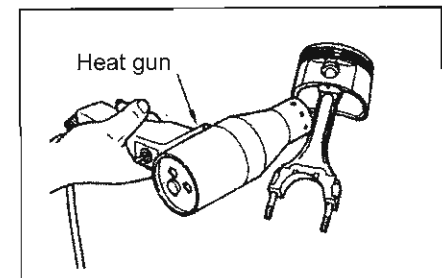
- (1) Use the snap ring plier to install the snap ring to the piston rear side installation groove.
 - Use new snap ring.
 - Install so the chamfered side is facing the piston pin.
 - Make sure to fit into the piston installation groove securely.



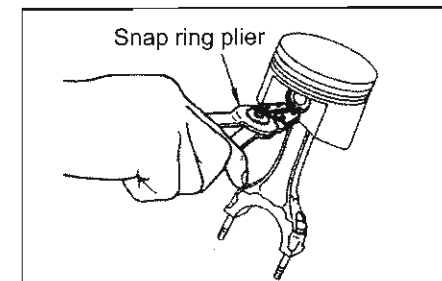
- (2) When the piston front mark is faced towards the engine front, the conrod oil hole must be on the left side when seen from the engine front.



- (3) Heat up the piston using a industrial heat gun (to approx. 60~70°C) then insert the piston pin into the piston and the conrod from the piston front.
 - At the time of insertion make sure to apply plenty of oil to the pin, pin hole and the conrod small end parts.



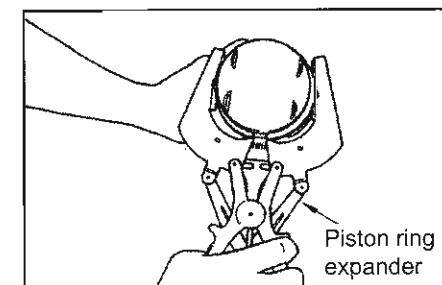
- (4) Install the snap ring to the piston front side.
 - Refer to (1) for snap ring installation direction.
 - After installation make sure the conrod move smoothly.



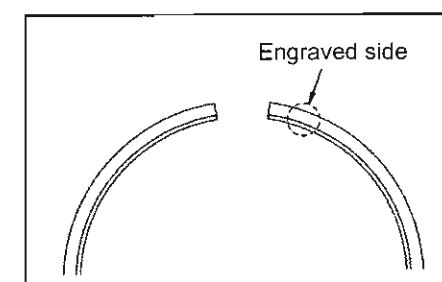
7. Use the piston ring expander to install the piston ring.

Caution:

Care must be taken not to damage the piston.

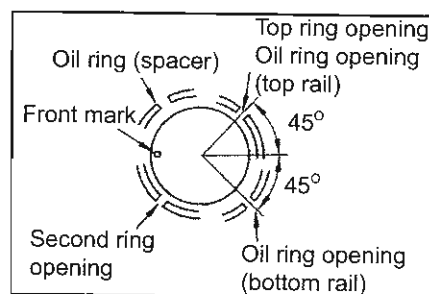


- Install in a way so the engraved mark on the top and the second ring alignment area will face the top.

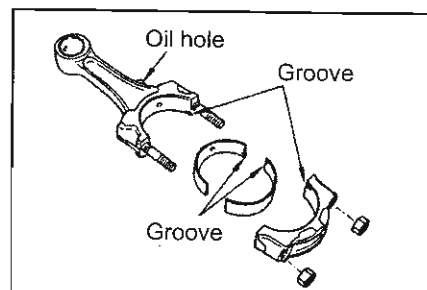


RB26DETT ENGINE

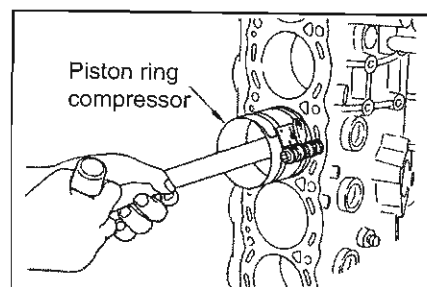
- Position the alignment mark as shown in the figure.



- Install the conrod and the conrod bearing to the conrod cap.
 - Coat the bearing surface (inner) with engine oil when installing the conrod bearing. Clean the reverse side sufficiently.
 - Align the conrod bearing projection and the conrod rotation stopper groove to install.
 - Make sure the conrod main body oil hole and the bearing oil hole position is correct.



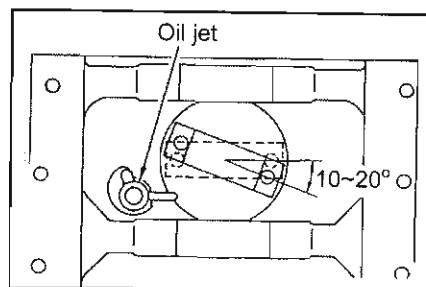
- Install the piston and conrod ASSY to the crankshaft.
 - Position the crank pin to B.D.C (bottom dead centre).
 - Apply plenty of engine oil to the cylinder bore, the piston and the crank pin.
 - Check the cylinder position and the conrod cylinder number.
 - Face the piston front mark towards the engine front and use the piston ring compressor to install.



- Position the conrod in an angle of approx. 10~20° as shown in the figure, so it will not hit the oil jet when inserted.

10. Install the conrod cap.

- Make sure the conrod and the cap cylinder No. is on the same side when installing.

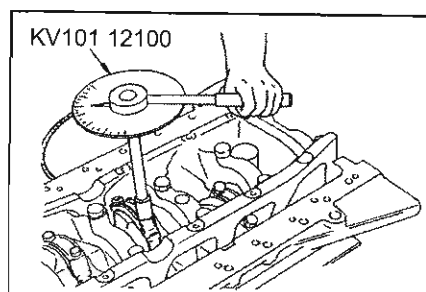


- Tighten the conrod nuts in the following order.

- Apply engine oil to the conrod bolts and nuts bearing surface.
- Tighten to 14~16N0m{1.4~1.6kg-m}.
- Place alignment marks to the nuts and the conrod cap (eg white paint etc) in one direction (if using the protractor).
- Additionally tighten 60 ~ 65°.

Caution:

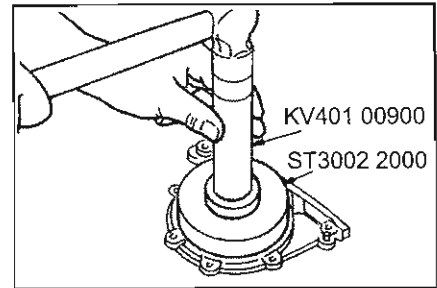
Make sure to use the angle wrench or the protractor to tighten. Never estimate visually.



RB26DETT ENGINE

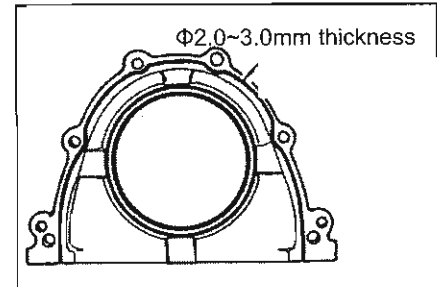
11. Install the rear oil seal.

- (1) Apply engine oil or chassis grease to oil seal lip circumference.
- (2) Use the oil seal drift to tap in the oil seal to level with the oil seal retainer front surface. Care must be taken not to cause any damage to the oil seal circumference.



12. Install the rear oil seal retainer.

- (1) Use the scraper to remove liquid gasket.
- (2) Apply sealing agent (KP710 00150) to the rear oil seal retainer at approx. $\Phi 2.0 \sim 3.0$ mm.

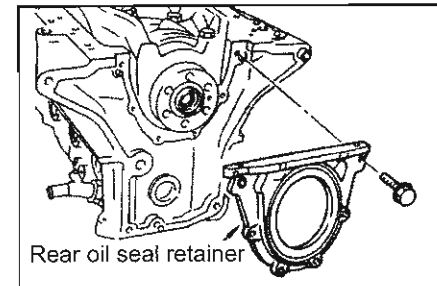


13. Align the rear oil seal retainer to the dowel pin to install.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

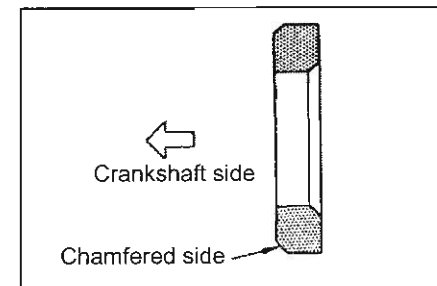
14. Install the baffle plate to the main bearing cap.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}



15. Install the pilot bush.

- Face the chamfered side towards the crankshaft and tap the pilot bush in until it hits the end.



16. Install the fly-wheel.

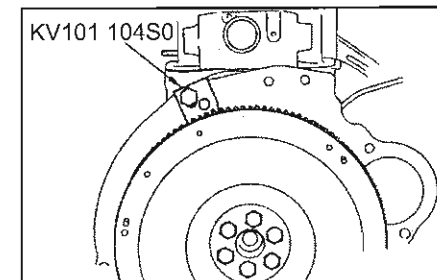
- Use a ring gear stopper to fix the fly-wheel to tighten the installation bolts.
- Apply engine oil to the installation bolts thread and the bearing surface.
- Tighten the bolts in several stages in opposing angle.

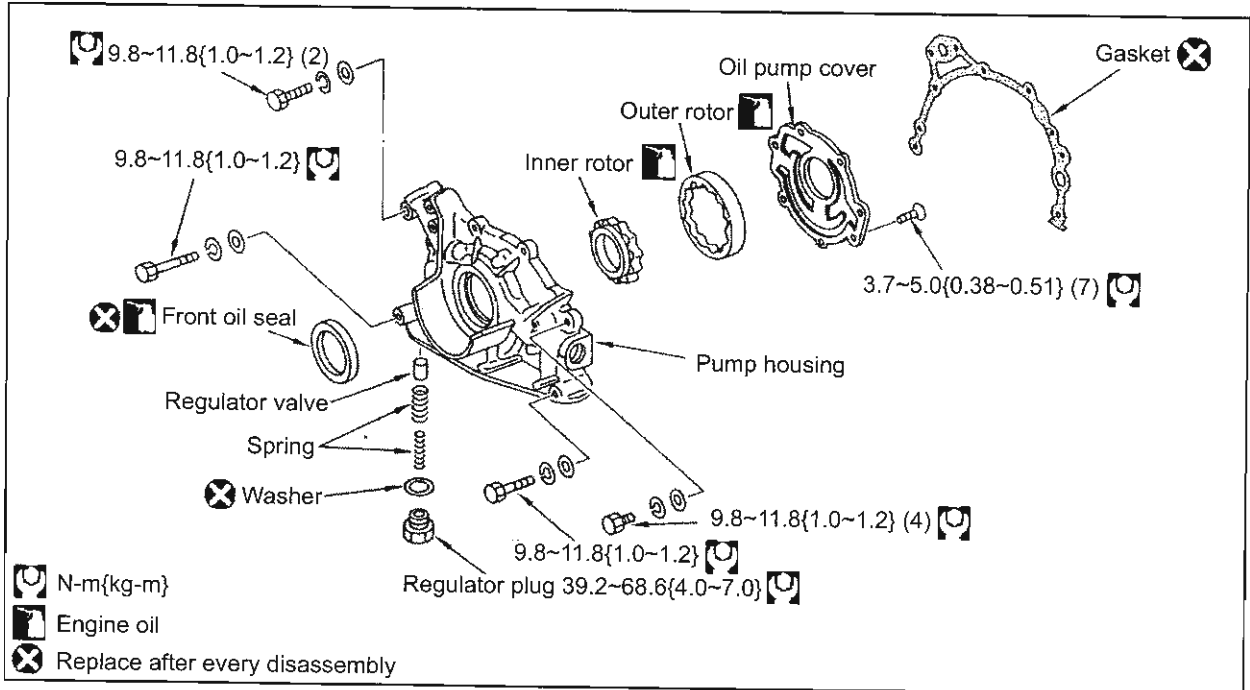
Tightening torque (N-m{kg-m}) 142~152{14.5~15.5}

17. Install two knock sensors.

- Make sure there are no foreign objects on the cylinder block installation surface and the knock sensor rear surface.

Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}

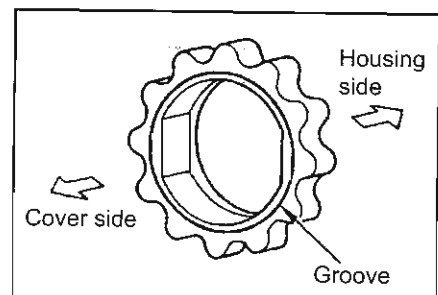


14. OIL PUMP**Removal**

1. Remove the engine transmission ASSY.
2. Remove the transmission from the engine and attach it to the engine stand.
3. Drain the engine oil from the oil pan.
4. Remove the cooling fan.
5. Remove auxiliary belt.
6. Remove the timing belt.
7. Remove the crank timing pulley.
8. Remove the timing belt rear cover.
9. Remove the oil pan.
10. Remove the oil filter.
11. Remove the oil pump ASSY.

Installation

1. Install the inner rotor and the outer rotor.
 - Apply engine oil to each rotational parts.
 - Face the inner rotor groove side towards the cover to install.



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2. Equally tighten oil pump cover installation screw.
Tightening torque (N-m{kg-m}) 3.7~5.0{0.37~0.51}

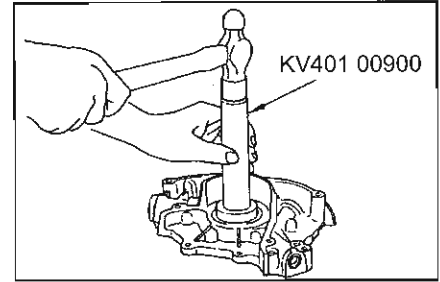
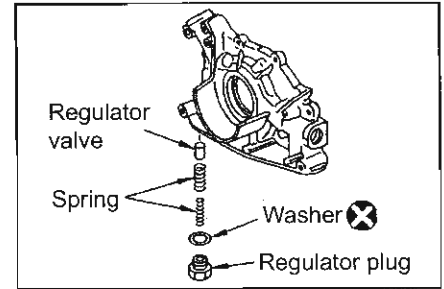
3. Install the regulator valve.

- Apply engine oil to rotational parts.
- Replace the regulator washer with a new one.
- Tighten the regulator plug.

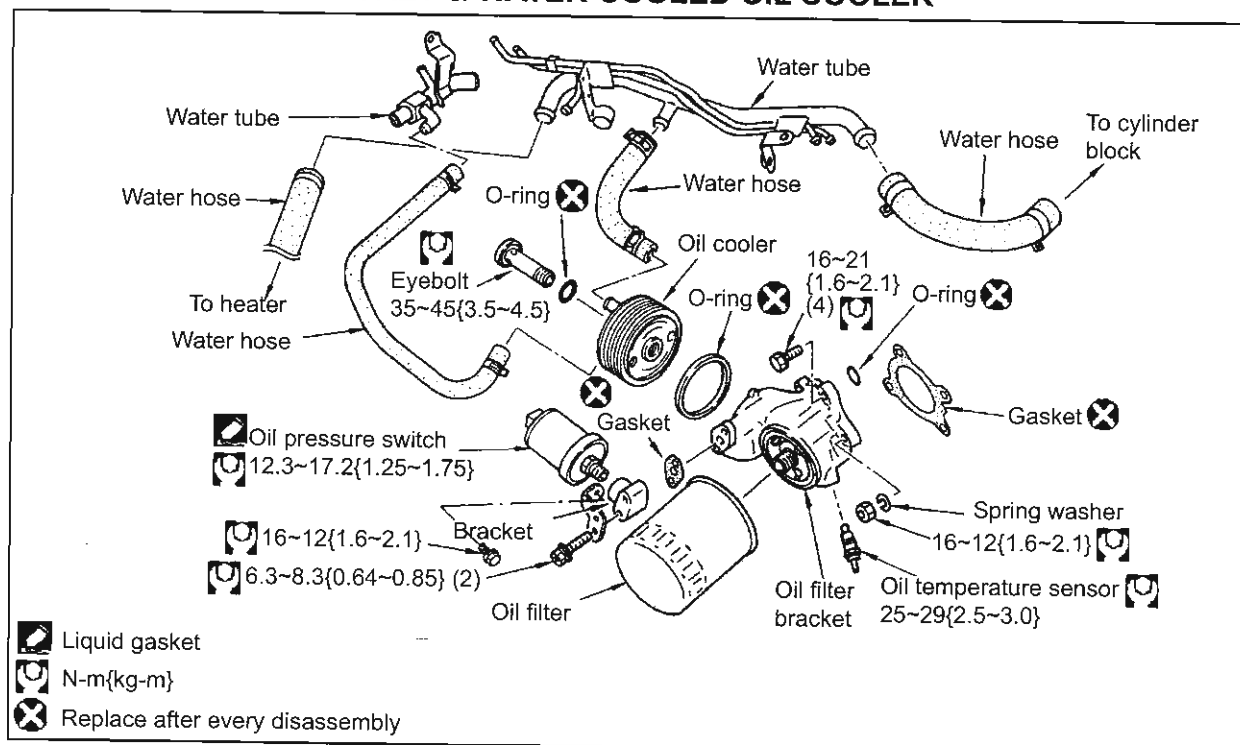
Tightening torque (N-m{kg-m}) 39~69{4.0~7.0}

4. Install the front oil seal.

- Replace the oil seal with a new one.
- Make sure there is no damage to the oil seal circumference.
- Position the oil seal next to the front side.
- Use the oil seal drift to insert the oil seal to level with the oil pump oil seal installation surface.
- Apply engine oil or the chassis grease to oil seal lip circumference.

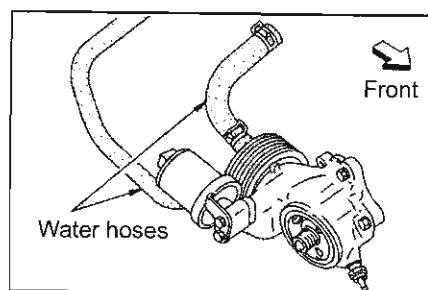


15. OIL FILTER BRACKET & WATER-COOLED OIL COOLER



Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the under cover.
3. Drain coolant from the radiator drain plug.
4. Drain coolant from the cylinder drain plug.
5. To create working space remove the following:
 - Strut tower bar
 - Accelerator cable
 - Accelerator cable bracket.
6. To create working space move the following:
 - Fuel filter and fuel filter bracket.
 - Main harness (between the starter motor and the relay case)
7. Remove the oil filter.
8. Remove the oil pressure switch connector and oil temperature sensor connector.
9. Remove two water hoses on oil cooler side.
10. Remove the oil filter bracket and oil cooler ASSY.
11. Remove the gasket.

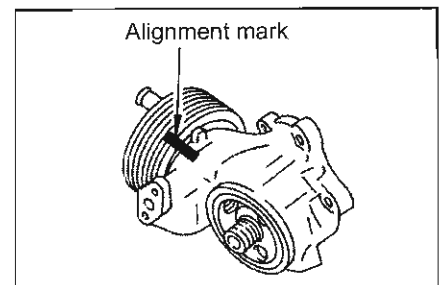


Installation

1. Install the oil filter bracket and oil cooler ASSY.
 - Replace the gasket with a new one.
 - Replace the o-ring with a new one.Tightening torque (N-m{kg-m}) 16~21{1.6~2.1}
2. Install two water hoses.
 - Tighten the clamps securely.
3. Install the oil filter.
4. Install the rest in reverse order to the removal procedure.
5. Check the engine oil and coolant level.
6. Start the engine and check for any engine oil or coolant leaks.
7. Cool the engine and recheck the engine oil and coolant level. Top up if the level has decreased.

Disassembly

1. Remove the oil pressure switch.
2. Remove the oil temperature sensor.
3. Remove the oil cooler from the oil filter bracket.
 - Place alignment marks on the oil filter bracket and the oil cooler before removal.



Inspection

Oil filter bracket visual inspection

- Check for oil leak due to any damage.
- Replace the oil filter bracket with a new one if there is any abnormality or faults.

Oil cooler inspection

- Check for any blockages in the oil cooler.
- Replace the oil cooler with new one if there is any abnormality or faults.

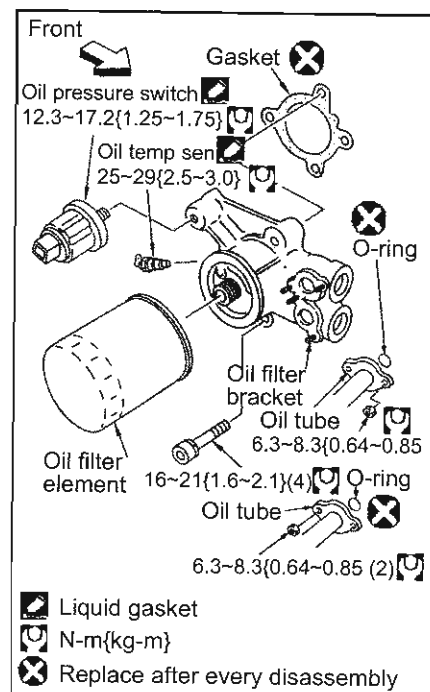
Assembly

1. Install the oil cooler to the oil filter bracket.
 - Replace the o-ring with a new one.
 - Align the oil cooler and the oil filter bracket alignment mark and tighten the eyebolts.Tightening torque (N-m{kg-m}) 34~44{3.5~4.5}
2. Install the oil pressure switch and the oil temperature sensor.
 - Apply sealing agent (KP710 00150) to the thread part.Tightening torque (N-m{kg-m})
 - Oil pressure switch 12.3~17.2{1.25~1.75}
 - Oil temperature sensor 25~29{2.5~3.0}

OIL FILTER BRACKET (N1 vehicle)

Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the under cover.
3. To create working space remove the following:
 - Strut tower bar.
 - Accelerator cable.
 - Accelerator cable bracket.
4. To create working space move the following:
 - Fuel filter and fuel filter bracket.
 - Main harness (between the starter motor and the relay case).
5. Remove the oil filter.
6. Remove the oil pressure switch connector and oil temperature sensor connector.
7. Remove two oil tubes from the oil filter bracket.
8. Remove the oil filter bracket.
9. Remove the gasket.
10. Remove the oil pressure switch and the oil temperature sensor from the oil filter bracket.



Inspection

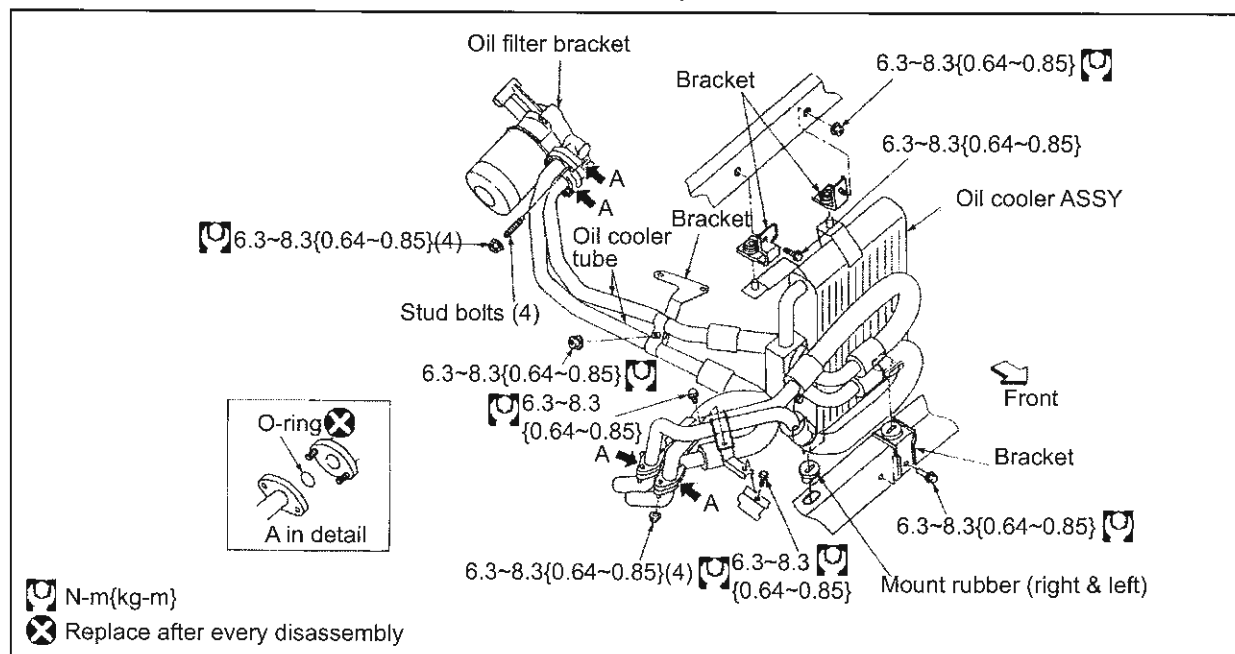
Oil filter bracket visual inspection

- Check for oil leaks due to any damage.
- Replace the oil filter bracket with a new one if there is any abnormality or faults.

Installation

1. Install the oil pressure switch and the oil temperature sensor.
 - Apply sealing agent (KP710 00150) to thread part.
- Tightening torque (N-m{kg-m})
- | | |
|------------------------|----------------------|
| Oil pressure switch | 12.3~17.2{1.25~1.75} |
| Oil temperature sensor | 25~29{2.5~3.0} |
2. Install the oil filter bracket.
 - Replace the gasket and the o-ring with a new one.
- Tightening torque (N-m{kg-m})
- | | |
|--|----------------|
| | 16~21{1.6~2.1} |
|--|----------------|
3. Install two oil tubes.
- Tightening torque (N-m{kg-m})
- | | |
|--|--------------------|
| | 6.3~8.3{0.63~0.85} |
|--|--------------------|
4. Connect the oil pressure switch connector and the oil temperature sensor connector.
 5. Install the oil filter.
 6. Install the rest in reverse order to the removal procedure.
 7. Check the level of engine oil and look for any oil leaks.

16. AIR-COOLED OIL COOLER (N1 vehicle)

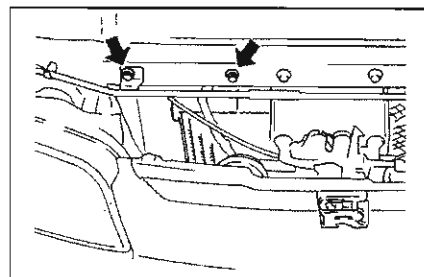


Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the front spoiler under cover.
3. Remove the under cover.
4. Drain coolant from the radiator drain plug.
5. Remove the radiator.
6. Remove the oil tube at oil cooler side.
 - Place a hole cap on the oil tube side and the oil cooler side.
7. Remove right and left oil cooler mount bracket (upper) installation bolts and nuts.
8. Remove the oil cooler from the engine bay side.

Caution:

Care must be taken not to damage the oil cooler core.



Inspection

Oil cooler visual inspection

- Make sure there is no damage or abnormality with the oil cooler core.
- Replace the oil cooler if there is any fault.

Oil hose visual inspection

- Check the oil hose for any cut or damage.
- Replace the oil hose if there is any fault.

Installation

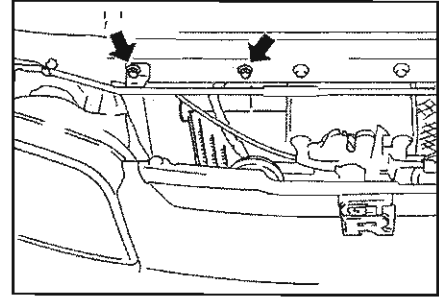
1. Install the oil cooler.
 - (1) Install the mount bracket (upper) to the oil cooler.
 - (2) Install the oil cooler from engine bay side.
 - Make sure to insert the grommet into the installation hole securely.
 - (3) Tighten the mount bracket (upper) installation bolts and nuts.

Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}

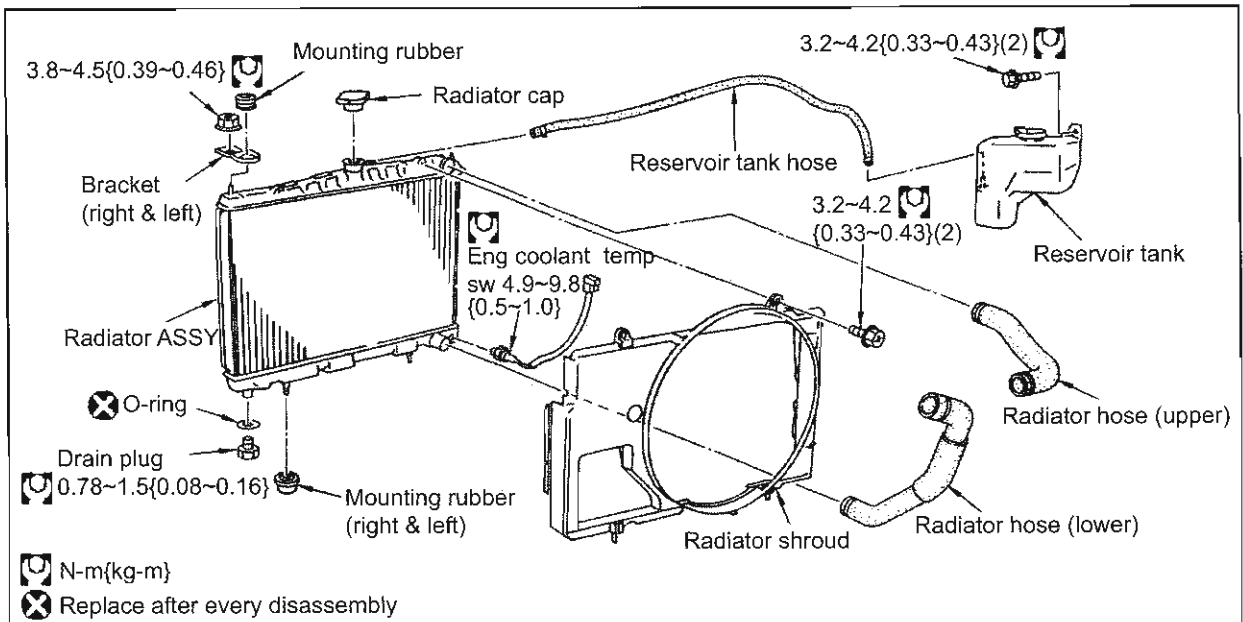
Caution:

Care must be taken not to damage the oil cooler core parts.

2. Connect the oil tube.
 - Replace the o-ring with a new one.
- Tightening torque (N-m{kg-m}) 6.3~8.3{0.64~0.85}
3. Install the rest in reverse order to the removal procedure.
 4. Check the level of engine oil.
 5. Start the engine and check for any engine oil leak.
 6. After cooling down the engine, recheck the level of engine oil and top up if necessary.



17. RADIATOR



Removal

1. Remove the battery negative terminal inside the boot.
2. Drain coolant from the radiator drain plug.
3. Remove the air duct.
4. Remove the reservoir tank hose at radiator side.
5. Remove the radiator upper hose and lower hose.

Caution:

Care must be taken not to get coolant on the alternator electrical components.

6. Remove the engine coolant temperature switch harness connector.
7. Remove right and left radiator upper mount bracket.
8. Remove the fan shroud installation bolts and move the fan shroud towards the cooling fan.
9. Remove the radiator ASSY.
 - Care must be taken not to damage the radiator core.
10. Remove the fan shroud.
11. Remove the engine coolant temperature switch from the radiator.

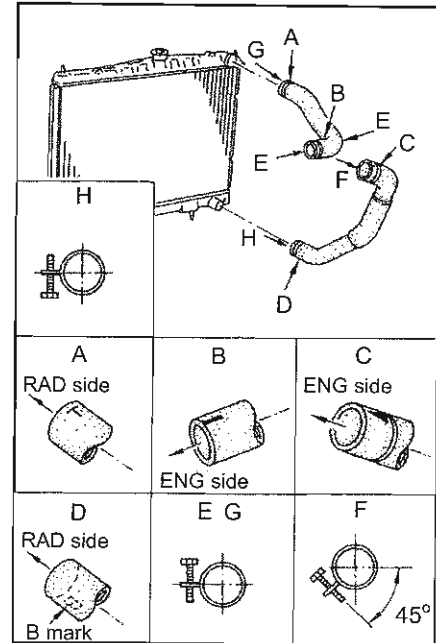
Installation

1. Install the engine coolant temperature switch to the radiator.

Tightening torque (N-m{kg-m}) 4.9~9.8{0.5~1.0}
2. Place the shroud on the cooling fan temporarily.
3. Install the radiator ASSY.
 - Care must be taken not to damage the radiator core.

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4. Install the right and left radiator upper mount bracket.
Tightening torque (N-m{kg-m}) 3.8~4.5{0.39~0.46}
5. Install the engine coolant temperature switch harness connector.
6. Install the radiator shroud.
Tightening torque (N-m{kg-m}) 3.2~4.2{0.33~0.43}
 - Care must be taken not to damage the radiator core.
 - Only use genuine shroud installation bolts.
7. Install the radiator hose.
 - Position the radiator hose so the hose end alignment mark is as shown.
 - Tighten the clamp to specified torque.
Tightening torque (N-m{kg-m}) 2.0~2.2{0.20~0.22}
8. Install the rest in reverse order to the removal procedure.

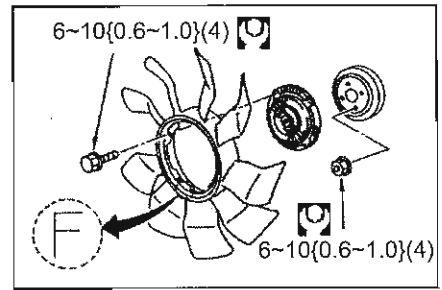
**Inspection**

- Check the coolant level and top up if necessary.
- Start the engine and check for any coolant leaks.

18. COOLING FAN

Removal

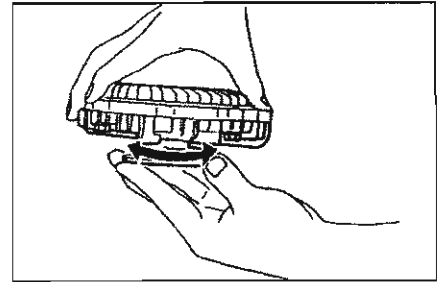
1. Remove the battery negative terminal inside the boot.
2. Remove the air duct.
3. Loosen the cooling fan installation nuts.
4. Loosen the fan belt.
5. Remove the installation nuts to remove the cooling fan.
6. Remove the installation bolts to remove the fan from the cup ring.



Inspection

Cup ring inspection

- Check for any silicon oil leak.



Cooling fan inspection

- Check for any damage or cut.

Installation

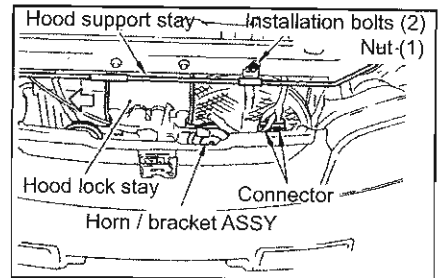
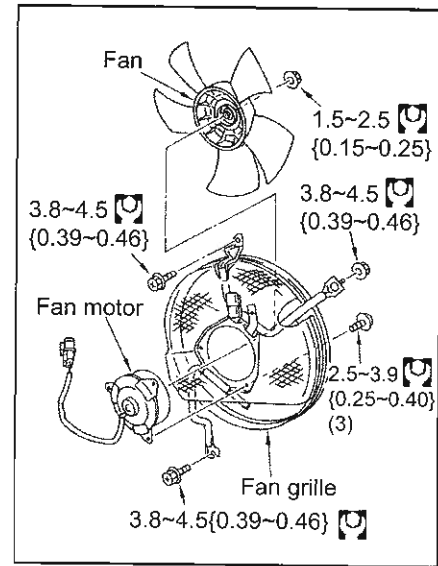
Install the parts in reverse order to the removal procedure.

- Install the fan to the cup ring making sure the front mark is facing front.
Tightening torque (N-m{kg-m}) 6~10{0.6~1.0}
- Adjust the fan belt tension.

19. AUXILIARY MOTOR FAN

Removal

1. Remove the battery negative terminal inside the boot.
2. Remove the front spoiler under cover (N1 vehicle).
3. Remove the under cover.
4. Remove the hood support stay.
5. Remove the left side horn bracket ASSY.



6. Remove the hood lock stay installation bolts and move the hood lock stay to the right side of the vehicle.
7. Disconnect the auxiliary motor fan harness connector.
8. Remove the installation bolts (top and bottom) and the installation nuts to remove auxiliary motor fan.

Caution:

Care must be taken not to damage the air conditioner condenser.

9. Remove the fan from the fan motor.
10. Remove the fan motor from the fan grille.

Installation

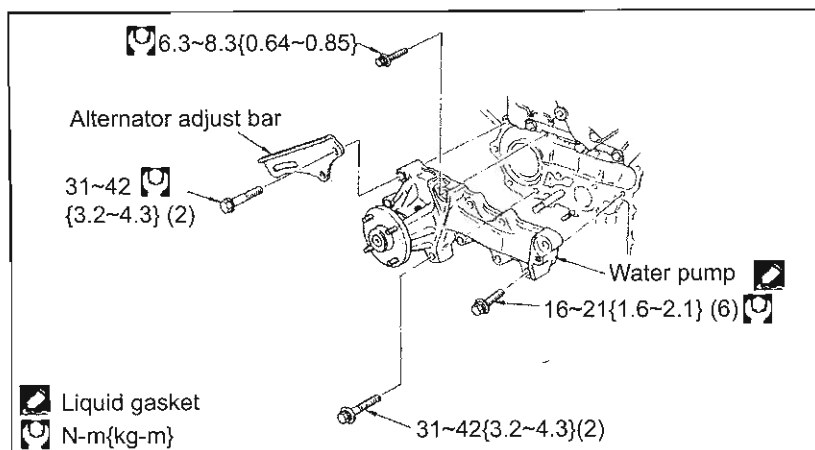
1. Install the fan motor to the fan grille.
Tightening torque (N·m{kg·m}) 2.5~3.9{0.25~0.40}
2. Install the fan to the fan motor.
Tightening torque (N·m{kg·m}) 1.5~2.5{0.15~0.25}
3. Install the auxiliary motor fan.

Caution:

Care must be taken not to damage the air conditioner condenser.

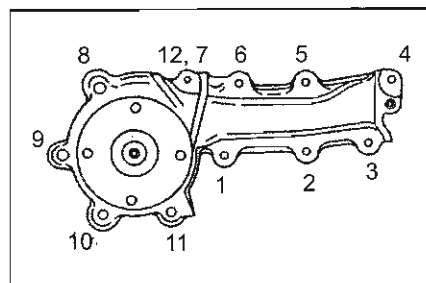
4. Install the auxiliary motor fan harness connector.
5. Install the rest in reverse order to the removal procedure.

20. WATER PUMP



Removal

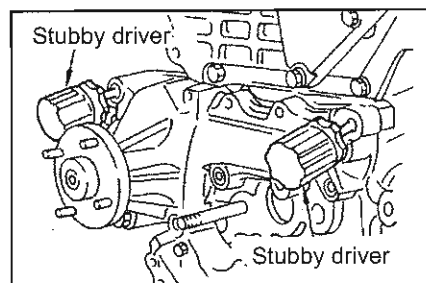
1. Remove the battery negative terminal inside the boot.
2. Remove the air duct.
3. Remove the front spoiler under cover (N1 vehicle).
4. Remove the under cover.
5. Drain coolant from the radiator drain plug.
6. Drain coolant from the cylinder block drain plug.
7. Remove the cooling fan.
8. Remove the radiator.
9. Remove the auxiliary belt.
10. Remove the water pump pulley.
11. Remove the timing belt.
12. Remove the tensioner pulley.
13. Remove the tensioner pulley and the idler pulley.
14. Remove the alternator adjust bar.
15. Remove the installation bolts in the order shown.
16. Remove the water pump.



- Insert a stubby driver into the installation bolt hole and move it up and down to remove.

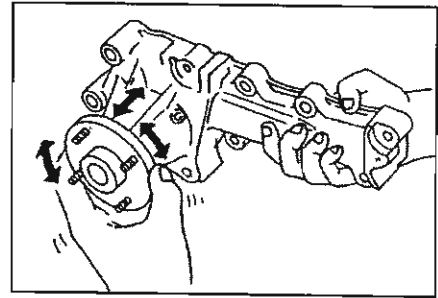
Caution:

Care must be taken not to damage the cylinder block side screws.

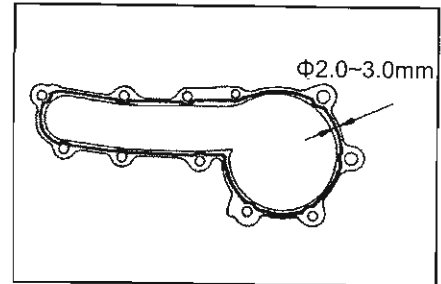


Inspection

- Check the water pump main body and the vane for rust or foreign objects.
- Make sure the water pump is not wobbly.
- Replace the water pump if there is any abnormality.

**Installation**

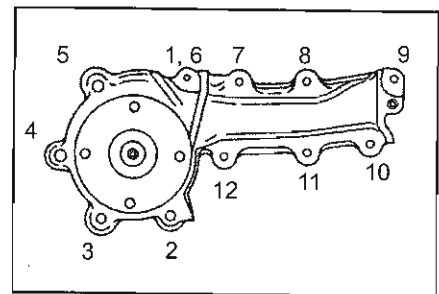
1. Install the water pump.
- Use a scraper to remove old gasket from the water pump and the cylinder block installation surface.
 - Clean the installation surface with white gasoline.
 - Apply sealing agent (KP710 00150) to the position shown in approx. $\Phi 2.0\sim 3.0\text{mm}$.
 - Tighten the installation bolts in the order shown.
 - Tighten the installation bolts 4 and 5 together with the alternator adjust bar.

**Reference:**

No. 1 and 6 refers to retightening the same bolt twice.

- The bolt measurements are different depending on the installation position.

M6 bolt:	No. 1
M8 bolt:	No. 7, 8, 9, 10, 11, 12
M10 bolt (short)	No. 2, 3
M10 bolt (long)	No. 4, 5



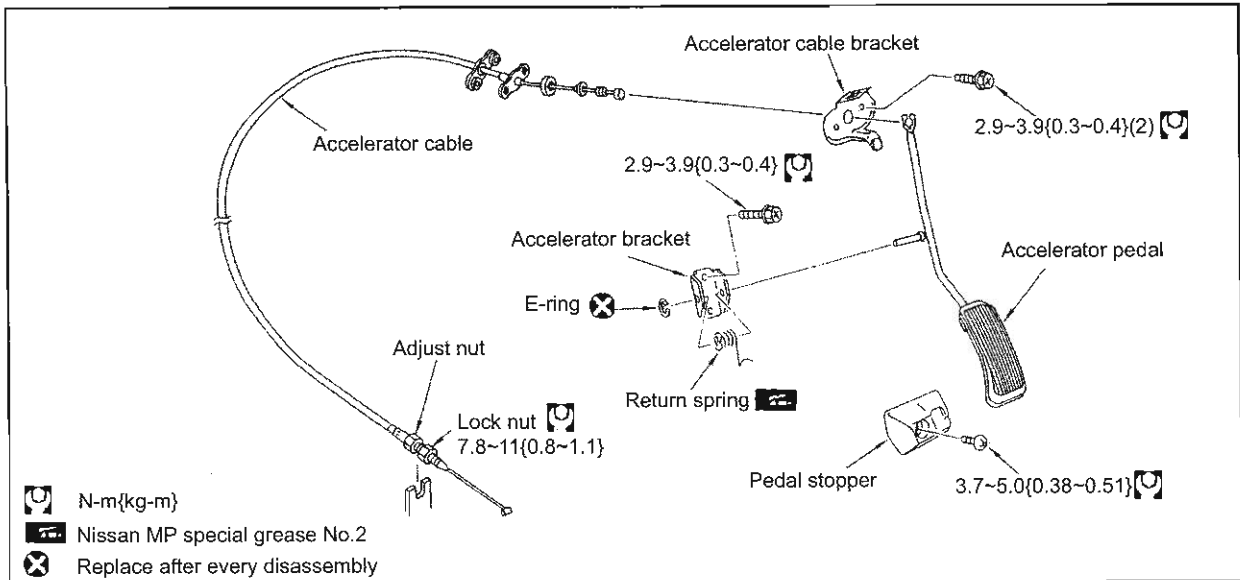
- There are three types of installation bolts.

Tightening torque (N-m{kg-m})

M6	6.3~8.3{0.64~0.85}
M8	16~21{1.6~2.1}
M10	31.4~42.1{3.2~4.3}

2. Install the rest in reverse order to the removal procedure.
3. Check the coolant level.
4. Start the engine and check for any coolant leaks.
5. After cooling down the engine recheck the coolant level and top up if necessary.

21. ACCELERATOR CONTROL SYSTEM



Removal

1. Remove the accelerator cable outer case from the accelerator cable bracket.
2. Disconnect the accelerator cable at throttle drum side.
3. Disconnect the accelerator cable at accelerator pedal side.
4. Remove the accelerator pedal bracket installation bolts to remove the accelerator pedal / bracket ASSY.

Installation

Installation is the reverse order of the removal procedure.

- Apply Nissan MP special grease No. 2 to the return spring.
- Replace E-ring with a new one.

Caution:

- Do not position the switch to fully open stopper.
- Do not damage or bend the wire.

Inspection

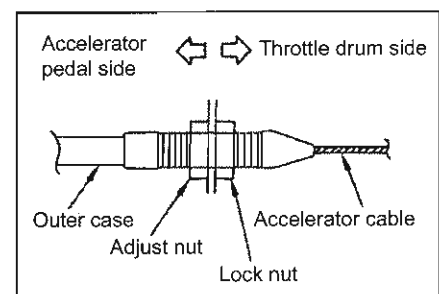
- Make sure the throttle drum side is fully open when the accelerator pedal is depressed fully.
- Make sure it move smoothly.

Adjustment

- Loosen the wire and adjust the adjust nut to pull the outer case towards the accelerator pedal until the throttle drum starts to move.

From this position turn back the adjust nut 1.5 ~ 2.0 turns, and secure the lock nut.

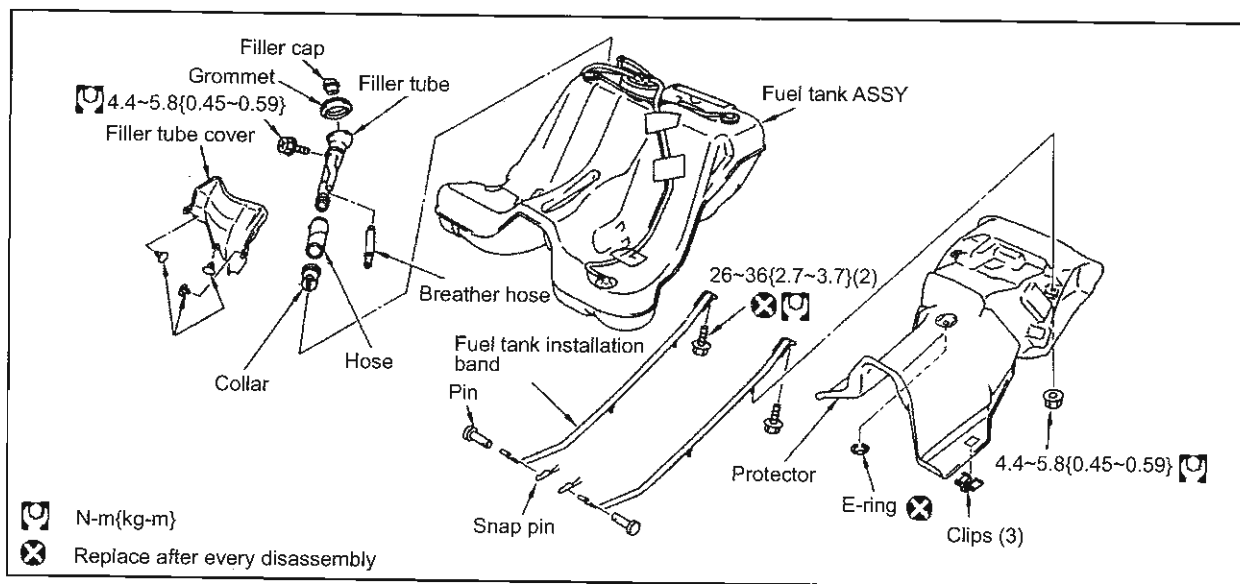
Tightening torque (N·m{kg·m}) $7.8 \sim 11 \{0.8 \sim 1.1\}$



22. FUEL TANK

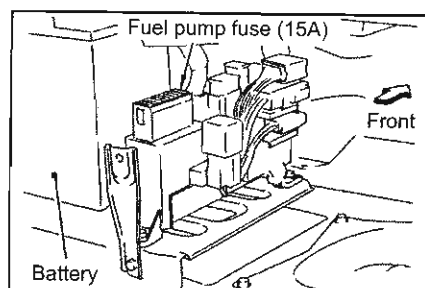
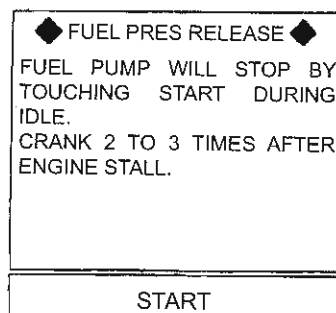
Caution:

- Check the fuel tube is secured properly to the vehicle body with a clip. Make sure there are no fuel leaks, damaged or rusty tubes. Replace parts if there is any abnormality.
- Check to make sure the evaporator system tubes are connected properly after installation.
- Check the clips for cracks and make sure they are not coming off. Replace the parts if there is any abnormality or faults.



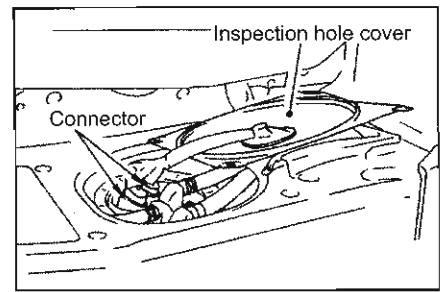
Removal

1. Open the boot lid.
 2. Remove the boot front finisher.
 3. Remove the strut tower bar.
 4. Remove the rear floor board.
 5. Release fuel pressure from the fuel line.
- Releasing fuel pressure
- Start the engine.
 - Select the "Fuel pressure release" in "Work support" mode with CONSULT.
 - Select "Start" and after engine stalls crank it 2 to 3 times.
 - For the vehicles that are unable to start, crank 3 to 4 times.
 - After restarting the engine, remove the fuel pump fuse and run the engine until it stalls. Crank 2 to 3 times to consume fuel left in the fuel pipes.
6. Remove the negative battery terminal.
 7. Open the fuel filler lid.
 8. Remove the rear speaker amp and rear speaker amp bracket.



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9. Open the inspection hole cover and remove the connector from the fuel sender unit.

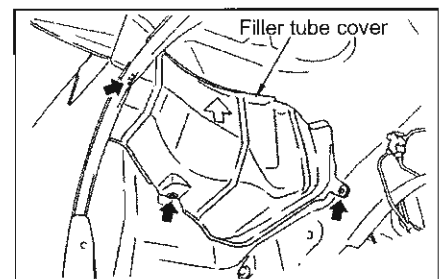


10. Extract the fuel inside the fuel tank by removing the filler opening or the fuel sender unit.

Caution:

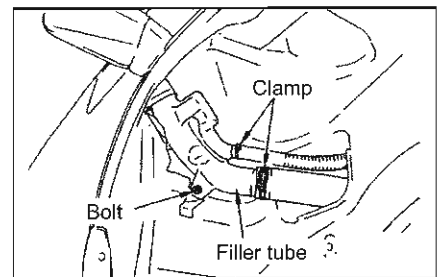
Keep open flames and sparks away from work area.

11. Remove exhaust centre tube and main muffler.
12. Remove the drive shaft.
13. Remove the rear suspension member ASSY.
14. Remove the park brake wire, differential breather hose and ABS sensor harness.
15. Remove the filler tube cover.



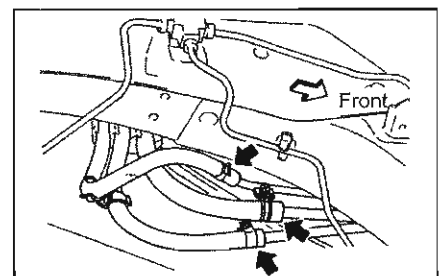
16. Remove the filler tube.

- Loosen two clamps to remove the hose and then remove installation bolts to pull out the filler tube from the grommet on the filler opening side.



17. Remove the fuel hose on the right side of the fuel tank.

- Place an alignment mark on the fuel hose to avoid confusion.

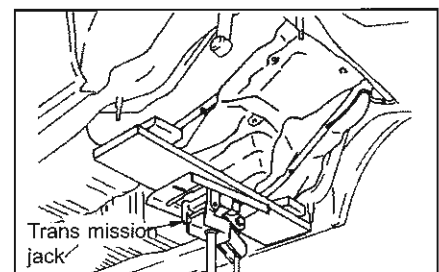


18. Use transmission jack to support bottom of the fuel tank.

- Place a caul etc. under the fuel tank to support securely.

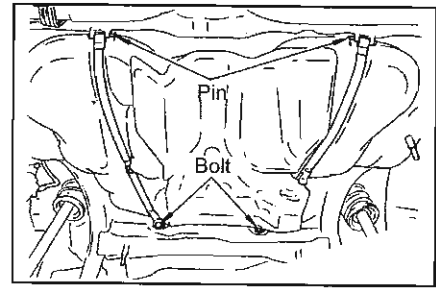
Reference:

When it is necessary to remove the fuel tank protector, remove it before using the transmission jack to support the fuel tank.

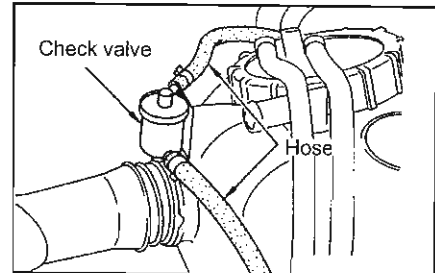


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19. Remove two fuel tank installation band pins at the front and two band pins at the rear.
20. Remove the fuel tank by lowering the transmission jack supporting the fuel tank.



21. Remove the fuel check valve.
 - Remove two hoses and the clip on the bracket.

**Inspection**

Fuel tank visual inspection

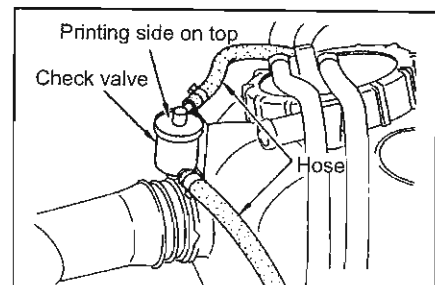
- Look for any cuts or wear.
- Replace the fuel tank if there is any abnormality.

Fuel hose visual inspection

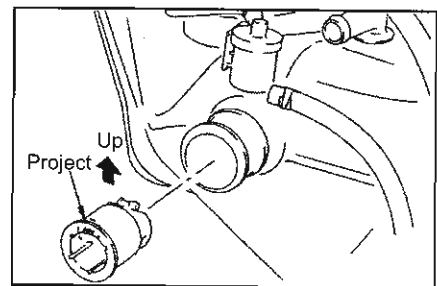
- Look for any cuts or wear.
- Replace the fuel tank if there is any abnormality.

Installation

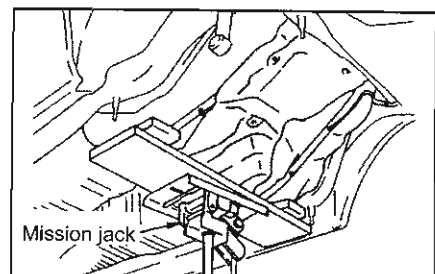
1. Install the fuel check valve.
 - Position the side with printing on the top.
 - Insert the hose until it touches the end then securely fix the clamp.



2. When installing the fuel tank filler opening collar position as shown in the figure.
3. Install each fuel hose.
 - Connect each hose securely.
 - Place the clamps making sure it will not touch the bulged area.



4. Use the transmission jack to support the bottom and install the fuel tank ASSY at installation position.
 - Hold the filler hose and the vent hose with hands until it is inserted into the hole on the vehicle body so it will not interfere with the vehicle body.



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5. Install the fuel tank installation band.

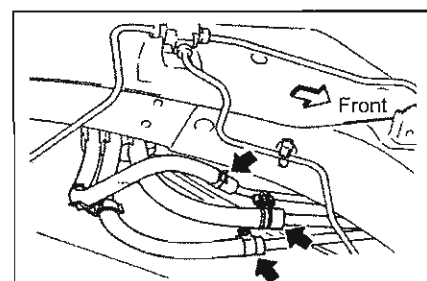
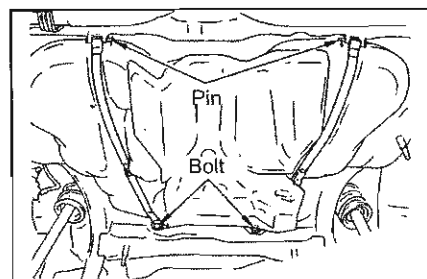
- Identification paint (R) is located on the reverse side of the band (on the tank side).
- Insert front pin from outside to inside and make sure to attach the fixing pin.
- Replace the rear side installation bolts with new ones.

Tightening torque (N-m{kg-m}) 26~36{2.7~3.7}

6. Install the fuel tank protector.

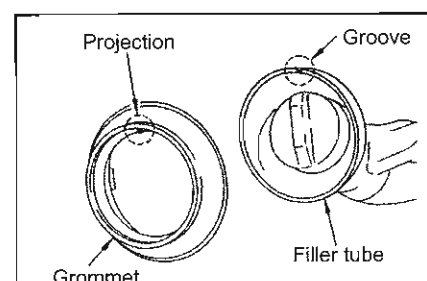
7. Connect the fuel hose to the right side of the fuel tank.

- Align to the alignment mark that you have placed at the removal.
- Fix the clamp securely avoiding the bulged area.

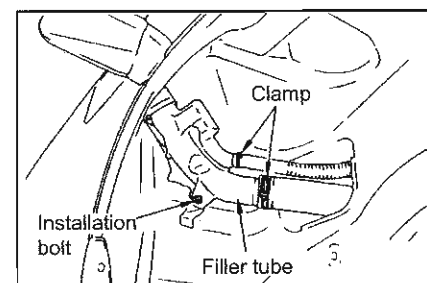


8. Install the filler tube.

- Align the projection on the grommet on the filler opening side to the groove on the filler tube to install.

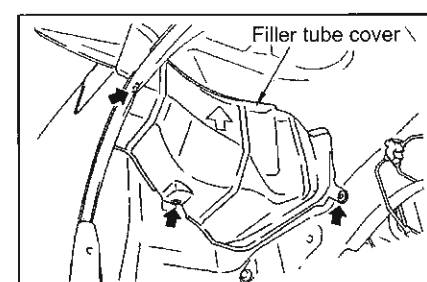


- Connect hoses securely.
- Fix the clamp securely avoiding the bulged area.

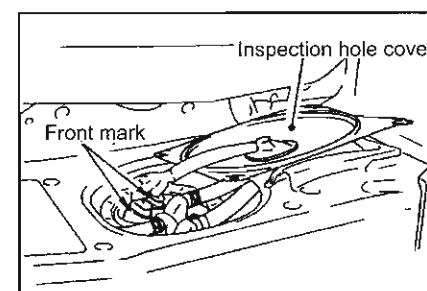


9. Attach the filler tube cover.

- Position the arrow on the top.



10. Connect the fuel sender unit connector.



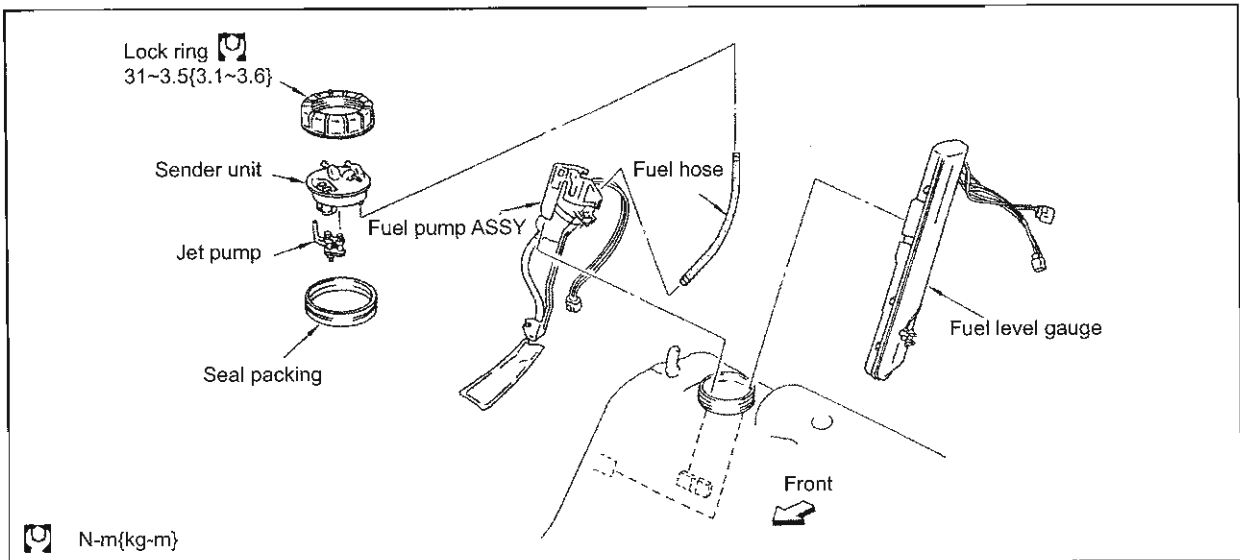
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11. Install the inspection hole cover.
 - Position so the arrow will face the front.
12. Install the rest in reverse order to the removal procedure.

Inspection

- Make sure each clamp is closed securely.
- Place the ignition switch to ON position. Check for any fuel leaks when the fuel pressure is applied to the fuel lines.

23. FUEL PUMP & FUEL GAUGE



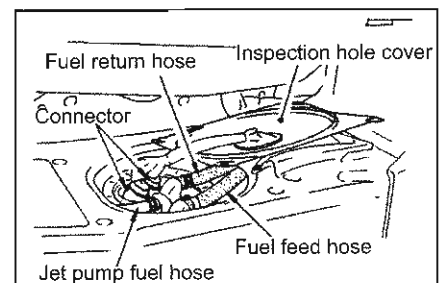
Removal

1. Open the boot lid.
2. Remove the boot front finisher.
3. Remove the strut tower bar.
4. Remove the rear floor board.
5. Release fuel pressure from the fuel line.

Releasing fuel pressure

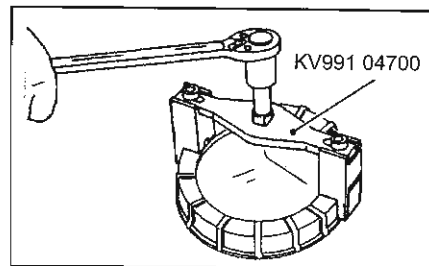
- Start the engine.
- Select the "Fuel pressure release" in "Work support" mode with CONSULT.
- Select "Start" and after engine stalls crank it 2 to 3 times.
- For the vehicles that are unable to start, crank 3 to 4 times.
- After restarting the engine, remove the fuel pump fuse and run the engine until it stalls. Crank 2 to 3 times to consume fuel left in the fuel pipes.

6. Remove the negative battery terminal.
 7. Open the fuel filler lid.
 8. Fully open the filler cap and release the fuel tank inner pressure.
 9. Remove the rear speaker amp and rear speaker amp bracket.
 10. Open inspection hole cover and remove the fuel hose and the fuel sender unit connector.
- Place alignment mark to avoid confusion at installation.



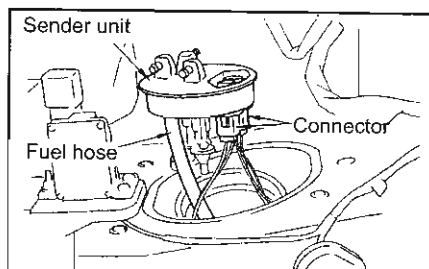
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11. Use the lock ring wrench to remove the lock wrench.



12. Lift up the fuel sender unit to remove the connector and the fuel hose.

13. Extract fuel remaining in the tank.

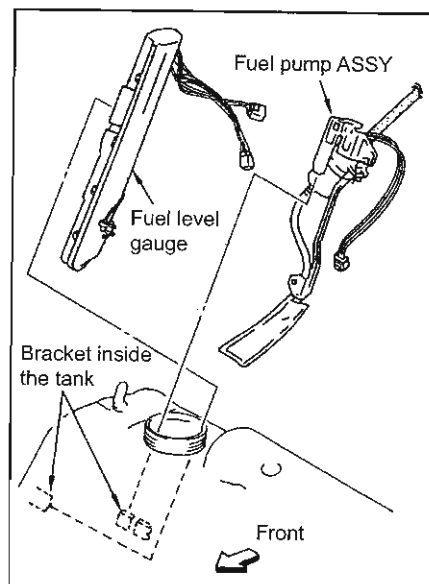


14. Remove the fuel pump.

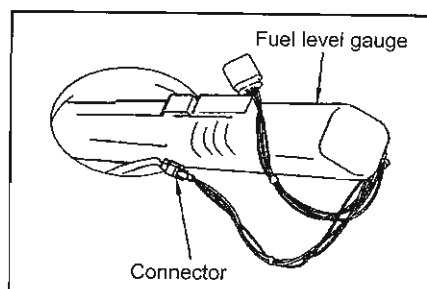
- Slide the fuel pump upwards to remove.

15. Remove the fuel level gauge.

(1) Slide the fuel level gauge towards the left side of the vehicle and bring it to the fuel tank opening to remove.



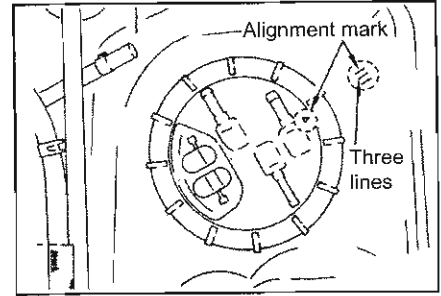
(2) Disconnect the connector and remove the fuel level gauge.



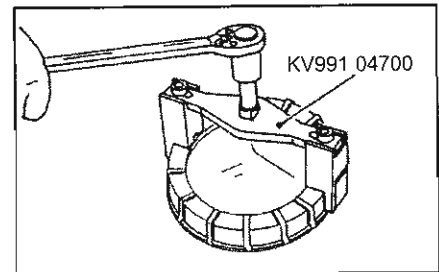
Installation

Install the parts in reverse order to the removal procedure taking note of the following points:

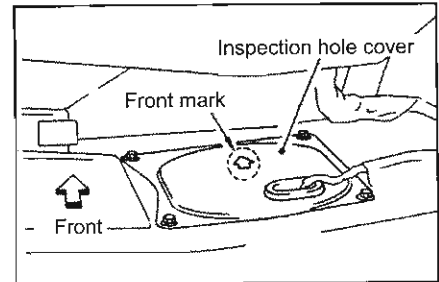
- Connect the fuel hose and the connectors securely.
- Make sure to connect the fuel pump wiring in the correct direction.
- Replace the seal packing with a new one.
- Position the fuel sender unit so the alignment mark will face three centre lines on the fuel tank.



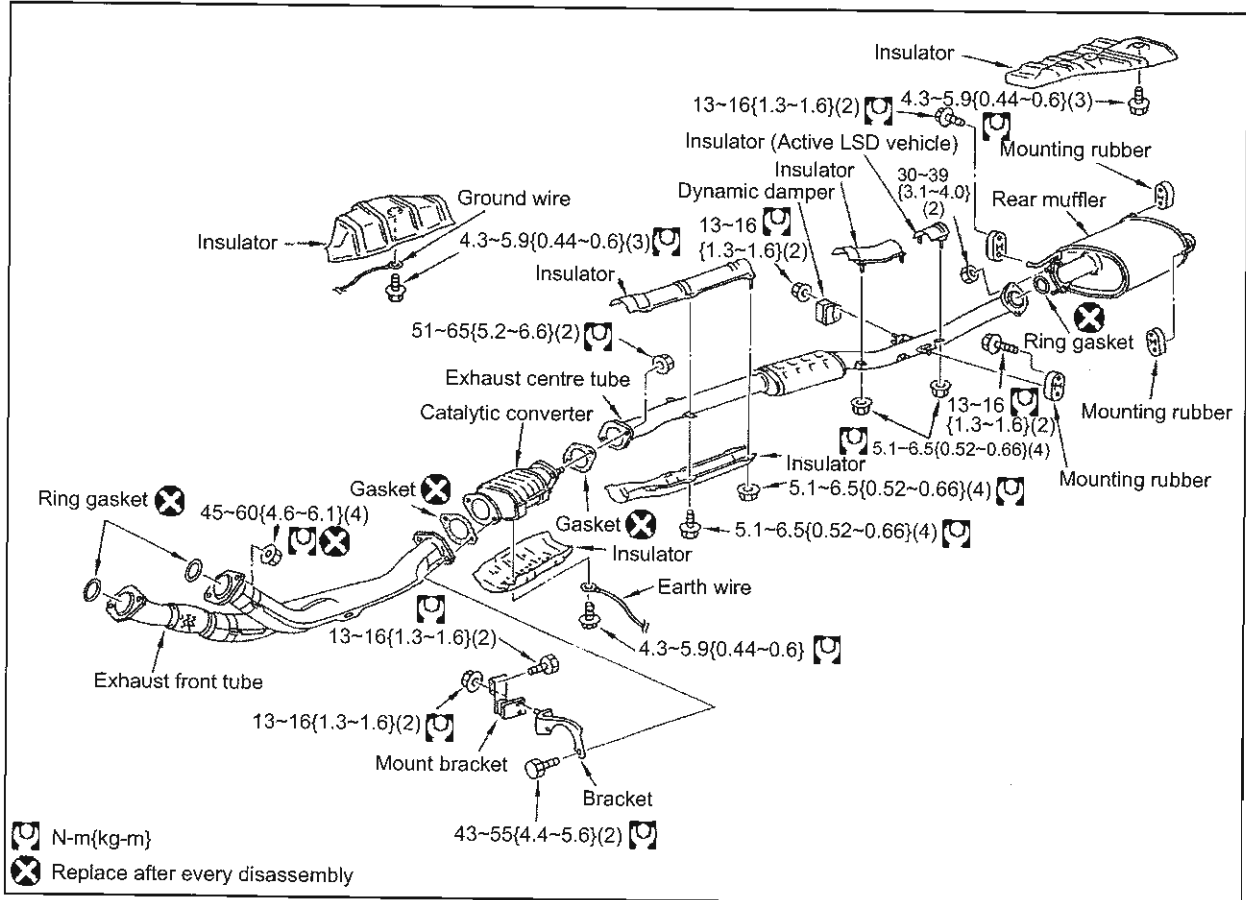
- Use the lock ring wrench to tighten the lock ring.
Tightening torque (N-m{kg-m}) 30~35{3.1~3.6}



- Position the inspection cover so the arrow will face the front.



24. EXHAUST SYSTEM

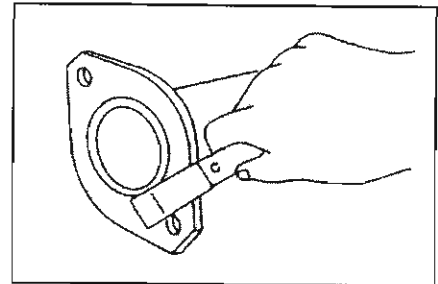


Removal

- Disconnect each parts at connection and remove.

Installation

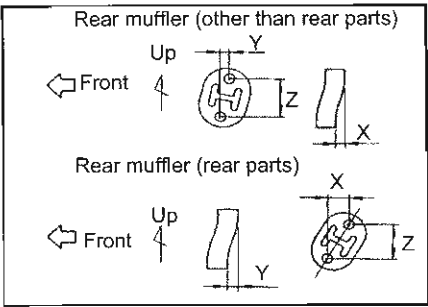
- Replace or repair the heat shield plate with deformation. Clean and remove foreign objects.
- Make sure there is no excessive gap between exhaust pipe and the heat shield plate when installed.
- Remove old gasket etc. from each sealing surface at the connection. Connect securely to avoid any gas leak.
- Replace each gasket with a new one.
- Replace the front tube installation nut with a new one.
- Install each clamps by aligning the insulator projection and the clamp hole.
- Do not twist or pull any mount rubber at installation.



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- Offset measurements when each mount rubber is installed correctly.

PARTS		X	Y	Z
Exhaust centre tube		0	5	43
Rear muffler front		0	5	43
Rear muffler rear	Right	38	0	29
	Left	38	0	29



Inspection

- Start the engine and check for any gas leaks from each connection.
- Check for any exhaust gas leaks due to corrosion.
- Replace the parts with new one if there is gas leak due to corrosion.