

COOLING

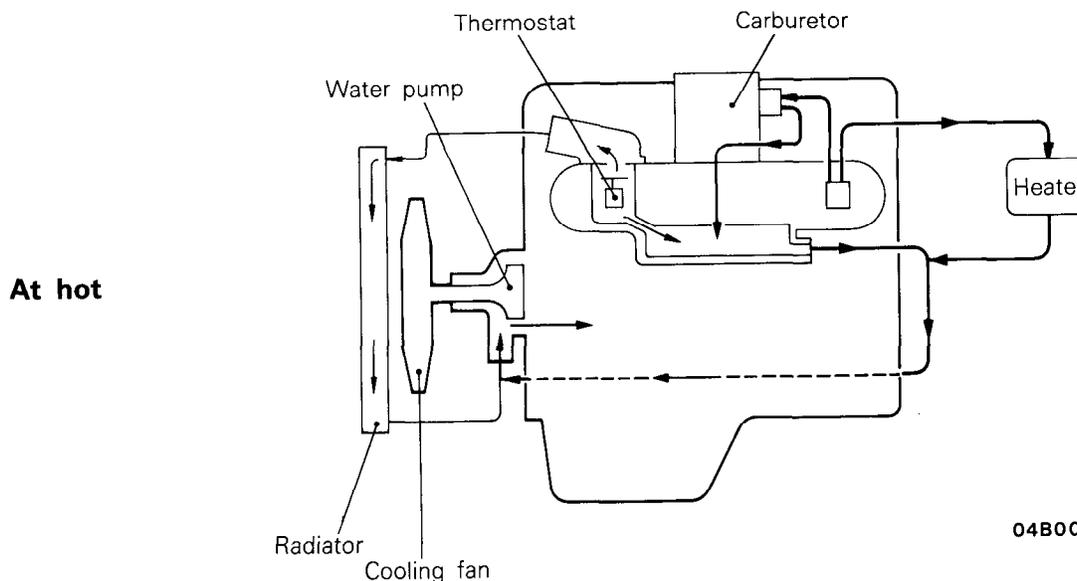
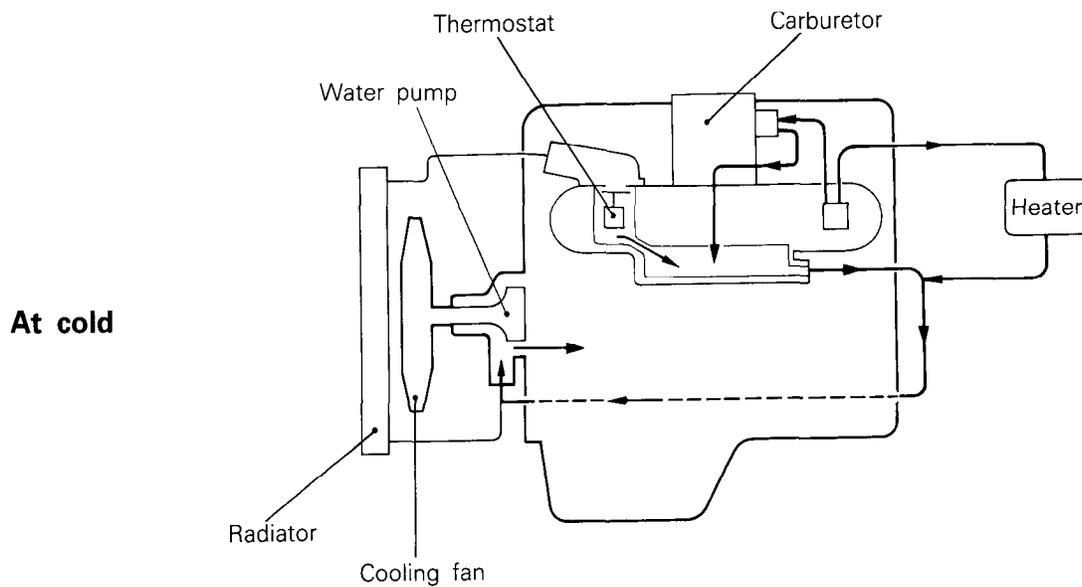
CONTENTS

N07AA--

COOLING FAN	9	SPECIFICATIONS	3
GENERAL INFORMATION	2	General Specifications	3
RADIATOR	8	Lubricants	4
SERVICE ADJUSTMENT PROCEDURES	6	Sealants	4
Coolant Concentration Test	6	Service Specifications	3
Coolant Leak Check	6	Torque Specifications	4
Coolant Replacement	6	THERMOSTAT	10
Drive Belt Deflection Adjustment	7	TROUBLESHOOTING	5
Drive Belt Deflection Checking Procedure	6	No Rise in Temperature	
Radiator Cap Pressure Test	6	Overheat	
SPECIAL TOOL	5	WATER HOSE AND PIPE	15
		WATER PUMP	12
		WATER TEMPERATURE GAUGE UNIT	17

GENERAL INFORMATION

The cooling system is a water cooling type and the coolant is forcibly circulated by the water pump. The temperature control of the coolant is conducted by the thermostat installed in the intake manifold. Immediately after engine starting, the coolant does not flow into the radiator until the coolant temperature reaches the thermostat valve opening temperature. The coolant circulates in the engine and it is promptly warmed up to the proper temperature, and at the same time, the temperature of the coolant in the cylinder block and cylinder head is made uniform. When the coolant temperature rises and the thermostat valve opens, the coolant flows into the radiator. The coolant cooled by the radiator is pumped up and pressurized by the water pump and delivered to the cylinders and cools the engine. Also, the cooling fan is installed at the water pump pulley and reduces the coolant temperature in proportion to the engine revolution. Furthermore, between the fan and pulley, the fan clutch is installed, which reduces the engine output loss and noise.



04B0047

SPECIFICATIONS

GENERAL SPECIFICATIONS

N07CA--

Items	Specifications
Cooling method	Water-cooled, pressurized, forced circulation
Radiator	
Type	Pressurized corrugated fin type
Performance kJ/h (kcal/h, B.T.U./h)	
Vehicles with a manual transmission	182,512 (43,600, 173,016)
Vehicles with an automatic transmission	187,326 (44,750, 177,579)
Fan clutch	
Type	Thermostatic control type with spiral type bimetal
Water pump	
Type	Impeller of centrifugal type
Thermostat	
Type	Wax pellet type with jiggle valve
Identification mark	88 (Stamped on flange)
Drive belt	
Type	V-belt
Water temperature gauge unit	
Type	Thermistor type
Thermoswitch for automatic transmission	
Type	Thermo-ferrite type
Water temperature sensor	
Type	Thermistor type
Thermoswitch for air conditioner	
Type	Heat-sensitive thermistor type

SERVICE SPECIFICATIONS

N07CB--

Items	Specifications
Standard value	
Opening pressure of radiator cap high pressure valve kPa (psi)	75–105 (11–15)
Range of concentration of anti-freeze in coolant %	30–60
Alternator drive belt deflection mm (in.)	9–12 (.35–.47)
Thermostat valve opening temperature °C (°F)	88 (190)
Thermostat full-opening temperature °C (°F)	100 (212) or more
Limit	
Opening pressure of radiator cap high pressure valve kPa (psi)	65 (9.2)

TORQUE SPECIFICATIONS

N07CC--

Items	Nm	ft.lbs.
Alternator brace bolt	12–15	9–11
Alternator support nut	20–22	14–16
Radiator		
Radiator shroud to radiator	3–7	2–5
Radiator to headlight support	8–11	6–8
Cooling fan to fan clutch	10–12	7–9
Fan clutch to water pump pulley	8–10	6–7
Water outlet fitting attaching bolt	10–13	7–9
Air cleaner attaching nut	16–19	12–14
Air pipe assembly to reed valve bracket	10–13	7–9
Air pipe assembly flare nut	70–100	51–72
Exhaust manifold cover	12–15	9–11
Exhaust manifold attaching nut	15–20	11–14
Exhaust manifold to exhaust pipe	20–30	14–22
Water pipe attaching bolt	10–12	7–9
Thermoswitch	6–9	4–7
Water temperature switch	10–14	7–10
Water temperature sensor	20–40	14–29
Water temperature gauge unit	8–10	6–7

LUBRICANTS

N07CD--

lit. (U.S.qts., Imp.qts.)

Items	Recommended antifreeze	*Quantity
Engine coolant	DIA QUEEN LONG-LIFE COOLANT (Part No. 0103044) or HIGH QUALITY ETHYLENE GLYCOL ANTIFREEZE COOLANT	8.0 (8.5, 7.0)

NOTE : * Includes 0.65 lit. (0.69 U.S.qts., 0.57 Imp.qts.) in reserve tank

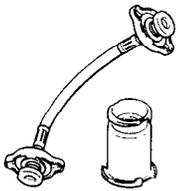
SEALANTS AND ADHESIVES

N07CE--

Items	Specified sealants and adhesive	Quantity
Water temperature gauge unit	3M ART Part No. 8660 or equivalent	As required
Water temperature sensor	3M Adhesive Nut locking 4171 or equivalent	As required
Water temperature switch	3M ART Part No. 8660 or equivalent	As required
Thermo switch	3M Adhesive Nut Locking 4171 or equivalent	As required

SPECIAL TOOL

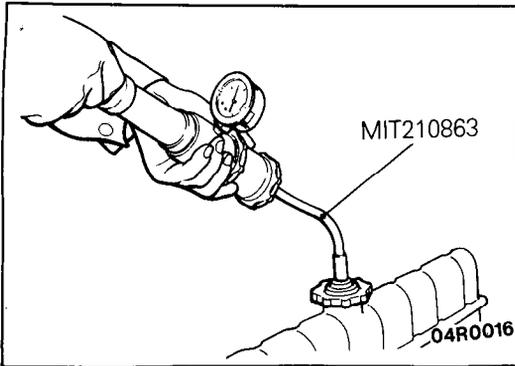
N07DA--

Tool (Number and name)	Use
MIT210863 Radiator cap test adapter	Radiator cap test
	

TROUBLESHOOTING

N07EBAA

Symptom	Probable cause	Remedy	Reference page
Overheat	Improper coolant	Replenish	7-6
	Coolant concentration too thick	Correct	7-6
	Loose or broken drive belt	Replace	7-6
	Inoperative fan clutch	Replace	7-9
	Damaged or blocked (insufficiently ventilated) radiator fins	Correct	-
	Water leaks		
	Damaged radiator core joint	Replace	7-8
	Corroded or cracked hoses (radiator hose, heater hose, etc.)	Replace	7-8, 15
	Loose bolt or faulty gasket in water outlet fitting (thermostat)	Correct or replace	7-10
	Loose water pump mounting bolt or faulty gasket	Correct or replace	7-12
	Faulty radiator cap valve or setting of spring	Replace	7-6
	Loose cylinder head bolt	Correct	9-39
	Damaged cylinder head gasket	Replace	9-17
	Cracked cylinder block	Replace	9-64
Cracked cylinder head	Replace	9-39	
Faulty thermostat operation	Replace	7-10	
Faulty water pump operation	Replace	7-12	
Water passage clogged with slime or rust deposit or foreign substance	Clean	-	
No rise in temperature	Faulty thermostat	Replace	7-10



SERVICE ADJUSTMENT PROCEDURES

COOLANT LEAK CHECK

N07FAAD

1. Loosen radiator cap.
2. Confirm that the coolant level is up to the filler neck.
3. Using a special tool, install a radiator cap tester to the radiator filler neck and apply 160 kPa (23 psi) pressure. Hold for two minutes in that condition, while checking for leakage from the radiator, hose or connections.

Caution

Be sure to completely clean away any moisture from the places checked. When the tester is removed, be careful not to spill any coolant from it. Be careful, when installing and removing the tester and when testing, not to deform the filler neck of the radiator.

4. If there is leakage, repair or replace the appropriate part.

RADIATOR CAP PRESSURE TEST

N07FBAC

1. Use a special tool to attach the cap to the tester.
2. Increase the pressure until the indicator of the gauge stops moving.

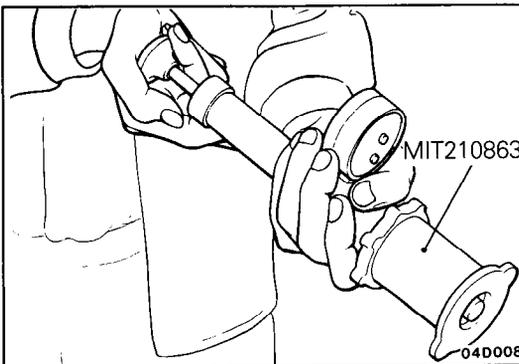
Standard value : 75–105 kPa (11–15 psi)

Limit : 65 kPa (9.2 psi)

3. Replace the radiator cap if the reading does not remain at or above the limit.

NOTE

Be sure that the cap is clean before testing, since rust or other foreign material on the cap seal will cause an improper indication.



COOLANT REPLACEMENT

N07FCAA

Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.

COOLANT CONCENTRATION TEST

N07FDAC

Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.

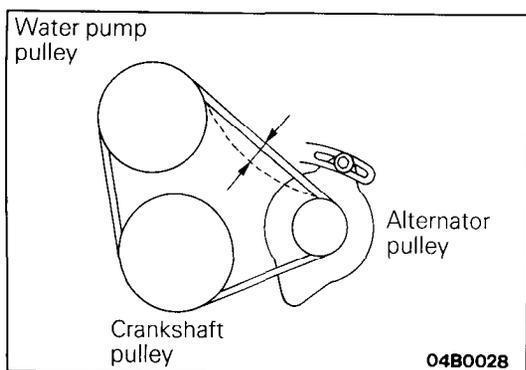
DRIVE BELT DEFLECTION CHECKING PROCEDURE

N07FEAE

1. Check to be sure that the belt is correctly installed in the groove of the pulley.

Caution

If there is belt squeal or slippage, check the amount of deflection, check for wear, damage or deterioration at the surface of contact with the pulley, and check for scars on the pulley.

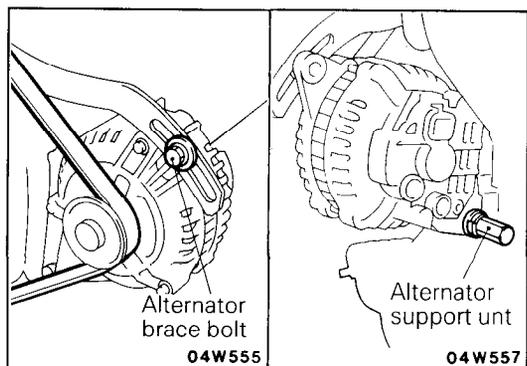


- Apply a pressure of 100 N (22 lbs.) to the rear surface of the belt at the center between the pulleys, as shown in the figure, and then measure the amount of deflection.

Standard value : 9–12 mm (.35–.47 in.)

Caution

- Measure the amount of belt deflection between the designated pulleys.
- An overtensioned belt could cause not only premature belt wear but also noise and damage to water pump bearing and alternator bearing. A loose belt also could cause failure of the alternator to generate enough power and consequently a rundown battery.

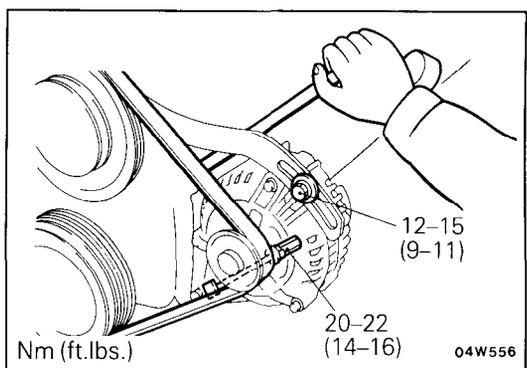


DRIVE BELT DEFLECTION ADJUSTMENT

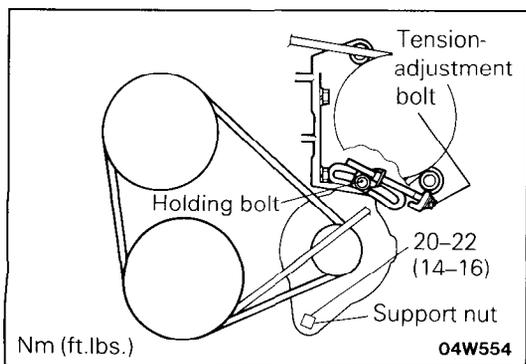
N07FFAD

Vehicles without an air conditioner

- Loosen the alternator brace bolt and the alternator support nut.



- Place a bar or similar object in contact with the stator part of the alternator, and manually provide the suitable tension to adjust the amount of belt deflection.
- Tighten the alternator brace bolt and the alternator support nut to the specified torque.



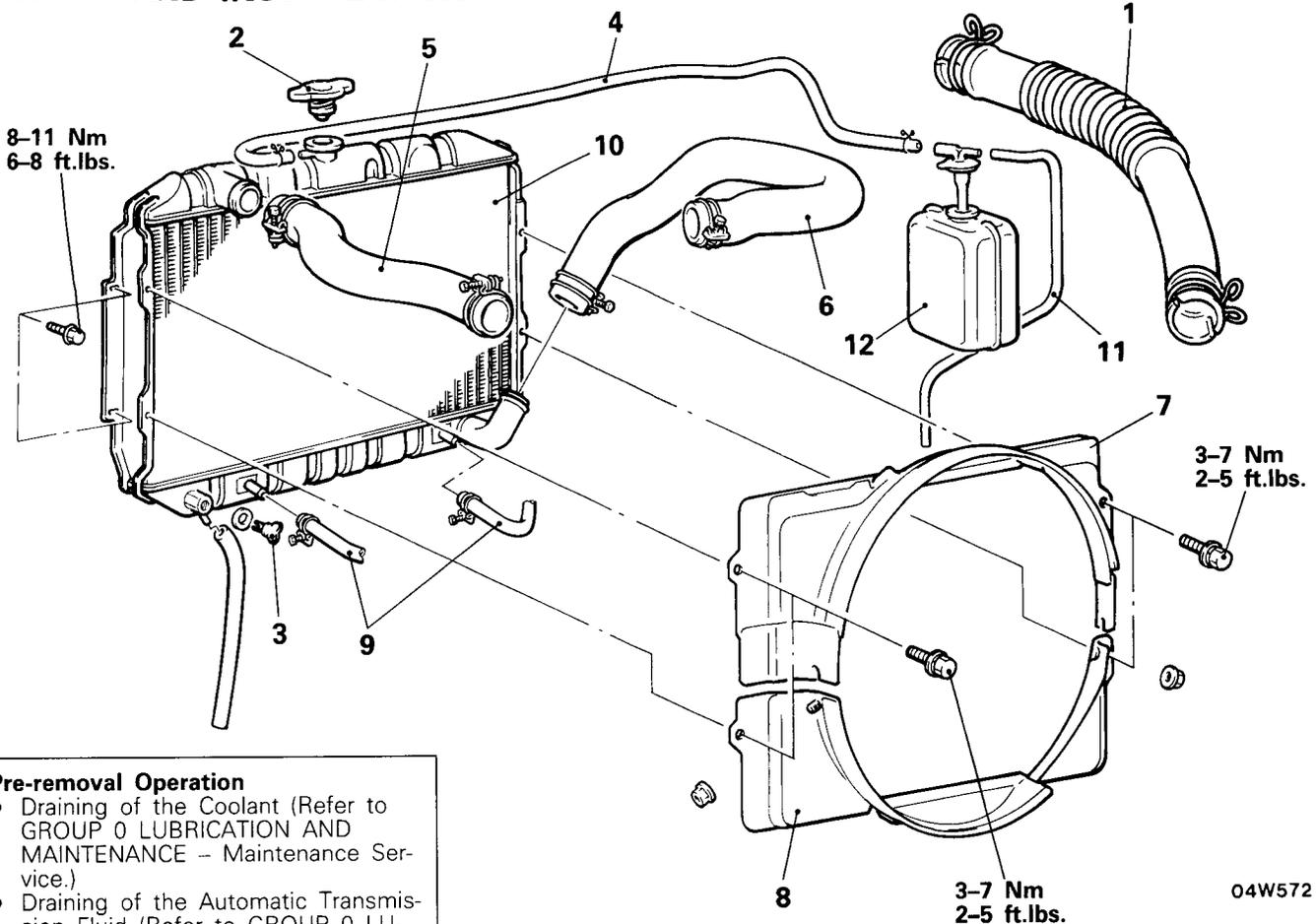
Vehicles with an air conditioner

- Loosen the alternator support nut and the bolt holding the alternator.
- Adjust the amount of deflection of the belt by using the tension-adjustment bolt.
- Tighten the alternator support nut and the bolt holding the alternator.

RADIATOR

REMOVAL AND INSTALLATION

N070A--

**Pre-removal Operation**

- Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE - Maintenance Service.)
- Draining of the Automatic Transmission Fluid (Refer to GROUP 0 LUBRICATION AND MAINTENANCE - Maintenance Service.)

Post-installation Operation

- Supplying of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE - Maintenance Service.)
- Supplying of the Automatic Transmission Fluid (Refer to GROUP 0 LUBRICATION AND MAINTENANCE - Maintenance Service.)

Radiator removal steps

1. Air duct
2. Radiator cap
3. Drain plug

4. Connection of overflow hose
5. Radiator upper hose
6. Radiator lower hose
7. Radiator upper shroud
8. Radiator lower shroud
9. Connection of automatic oil cooler hoses (Vehicles with an automatic transmission)
10. Radiator

Reserve tank removal steps

4. Connection of overflow hose
11. Overflow tube
12. Reserve tank

NOTE

Reverse the removal procedures to reinstall.

INSPECTION

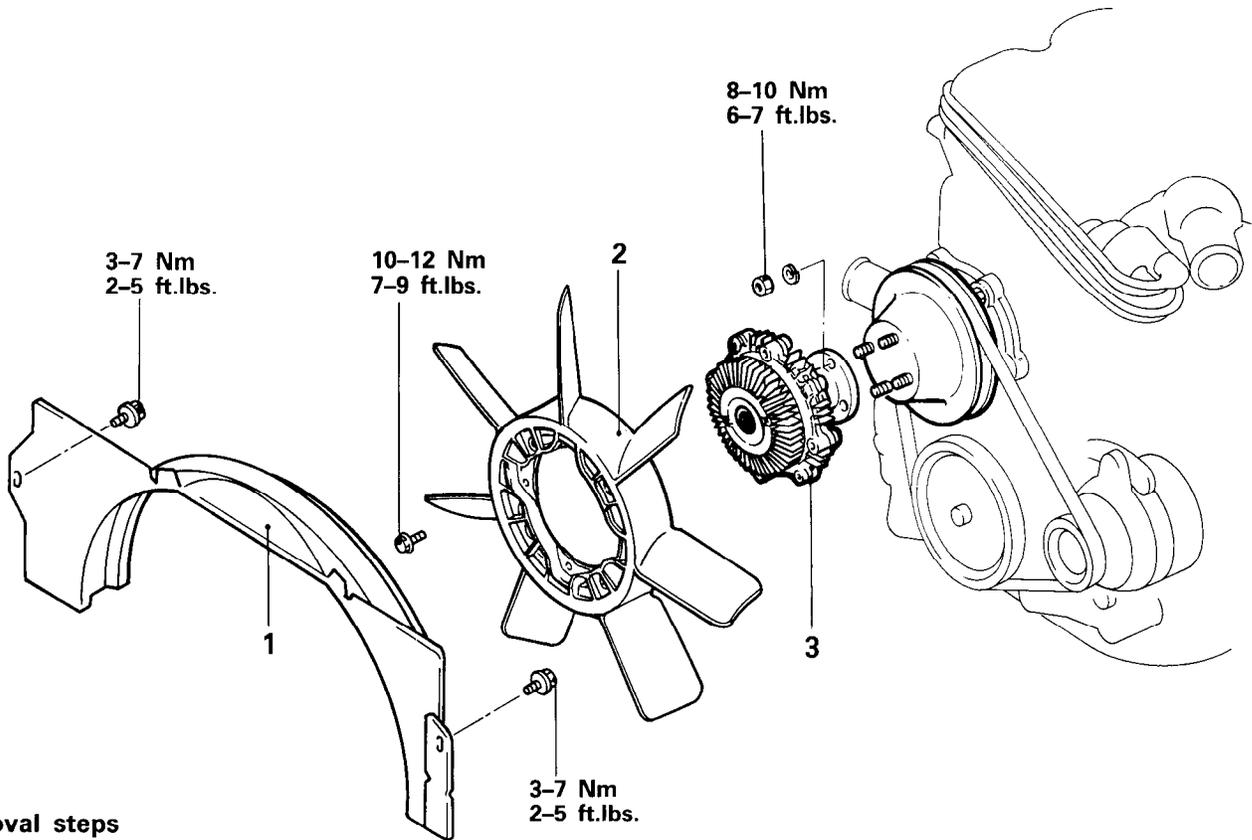
N070CAB

- Check for foreign material between radiator fins.
- Check the radiator fins for bend or damage.
- Check the radiator for corrosion, damage, rust or scale.
- Check the radiator hoses for cracks, damage or deterioration.
- Check the reserve tank for damage.
- Check the spring of radiator cap for deterioration.
- Check the packing of radiator cap for damage or cracks.

COOLING FAN

RAMOVAL AND INSTALLATION

N07HA--



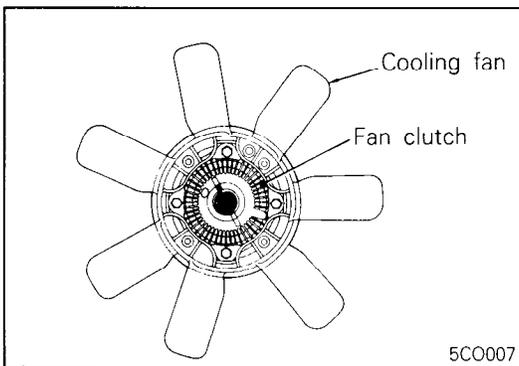
Removal steps

1. Radiator upper shroud
2. Cooling fan
3. Fan clutch

NOTE

Reverse the removal procedures to reinstall.

04B0024

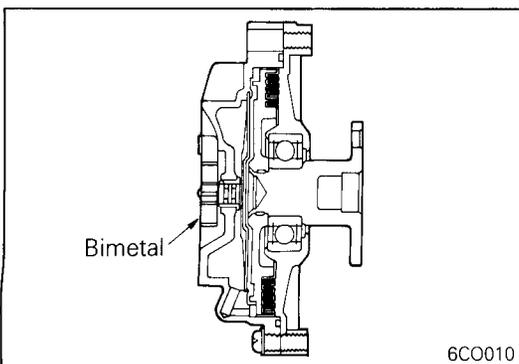


INSPECTION

N07HCAA

COOLING FAN

- Check blades for damage and cracks.
- Check bolt holes or their vicinity in fan hub for cracks and damage.



FAN CLUTCH

- Check fan clutch for fluid leaks from case joint and seals. If fluid quantity decreases due to leakage, fan speed will decrease and engine overheating might result.
- When a fan attached to an engine is turned by hand, it should give a sense of some resistance. If fan turns lightly, it is faulty.
- Check bimetal strip for damage.

THERMOSTAT

REMOVAL AND INSTALLATION

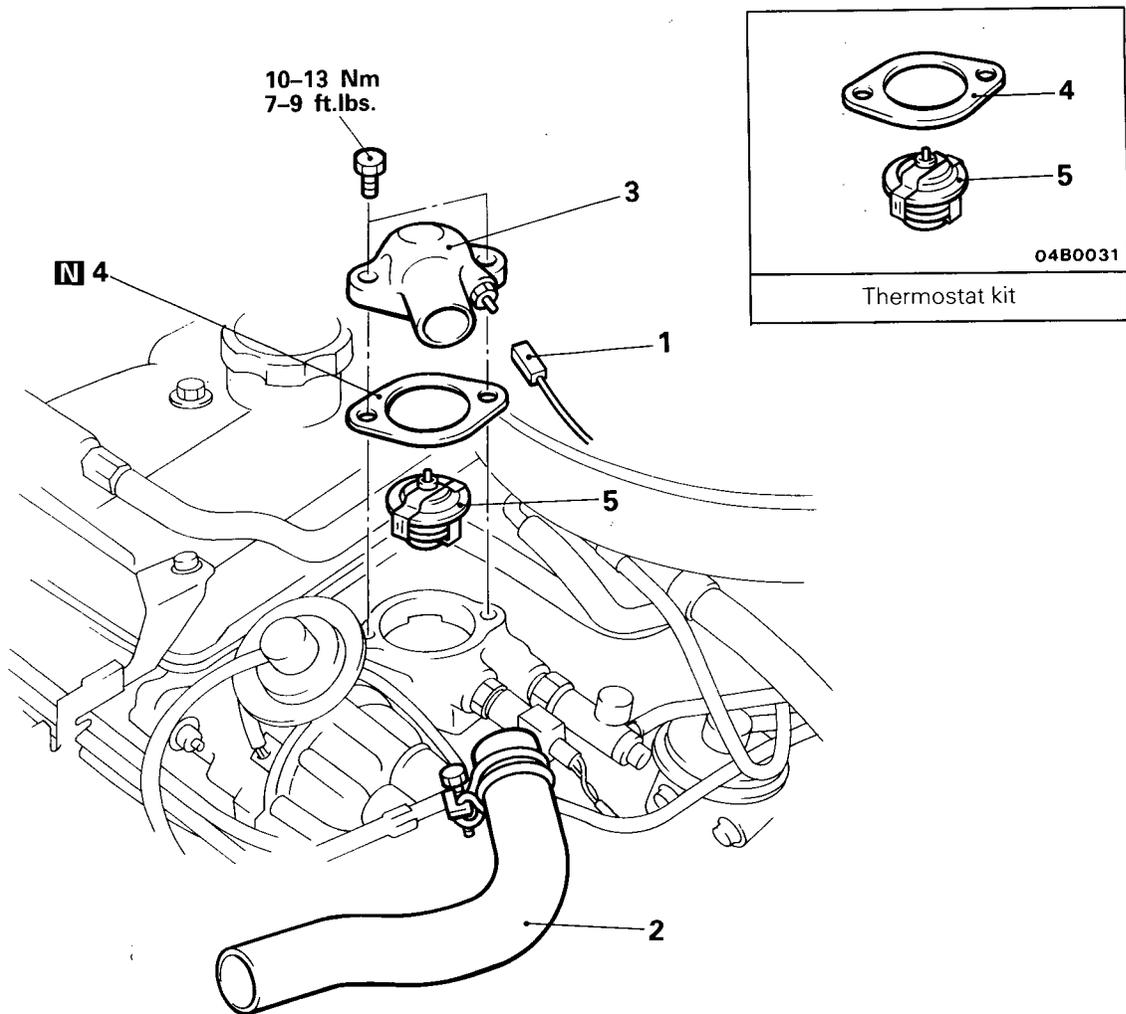
N07GB--

Pre-removal Operation

- Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE - Maintenance Service.)

Post-installation Operation

- Supplying of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE - Maintenance Service.)



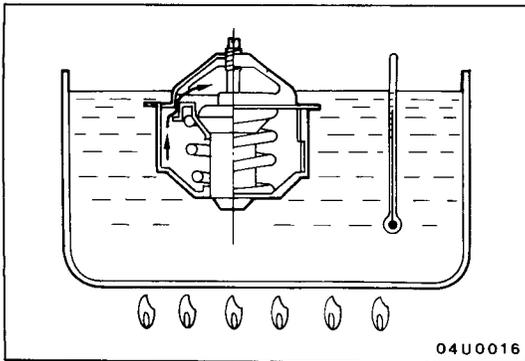
04B0030

Removal steps

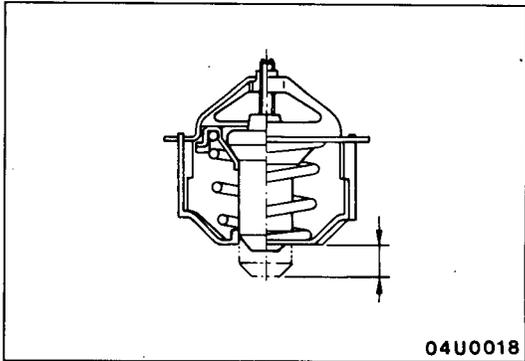
1. Connection of water temperature switch connector (Vehicles with an air conditioner)
2. Connection of radiator upper hose
3. Water outlet fitting
4. Water outlet fitting gasket
- ◆◆ 5. Thermostat

NOTE

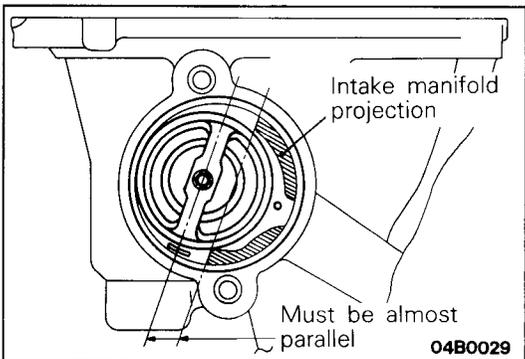
- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆ : Refer to "Service Points of Installation"
- (3) **N** : Non-reusable parts



04U0016



04U0018



04B0029

INSPECTION

N07GDAC

1. If the valve opens at all at room temperature the part should be replaced.
2. An obviously malformed part or one with cracks or damage should be replaced.
3. Clean off any rust or encrustation on the valve.
4. Immerse the thermostat in a container filled with water. Raise the temperature of the water while stirring it checking to ensure that the temperatures at which the valve begins to open, and at which it is fully open [(the fully opened valve should be raised at least 8 mm (.31 in.))] are within the specified values.

Standard values :

Opening temperature	88°C (190°F)
Fully open	100°C (212°F) or more

NOTE

The height of the valve when fully opened should be calculated by first measuring its height when fully closed and determining the difference.

SERVICE POINTS OF INSTALLATION

N07GEAA

5. INSTALLATION OF THERMOSTAT

Install the thermostat to the intake manifold as illustrated.

Caution

The thermostat flange fits over the manifold seat; ensure that the thermostat is not installed at an angle.

WATER PUMP

REMOVAL AND INSTALLATION

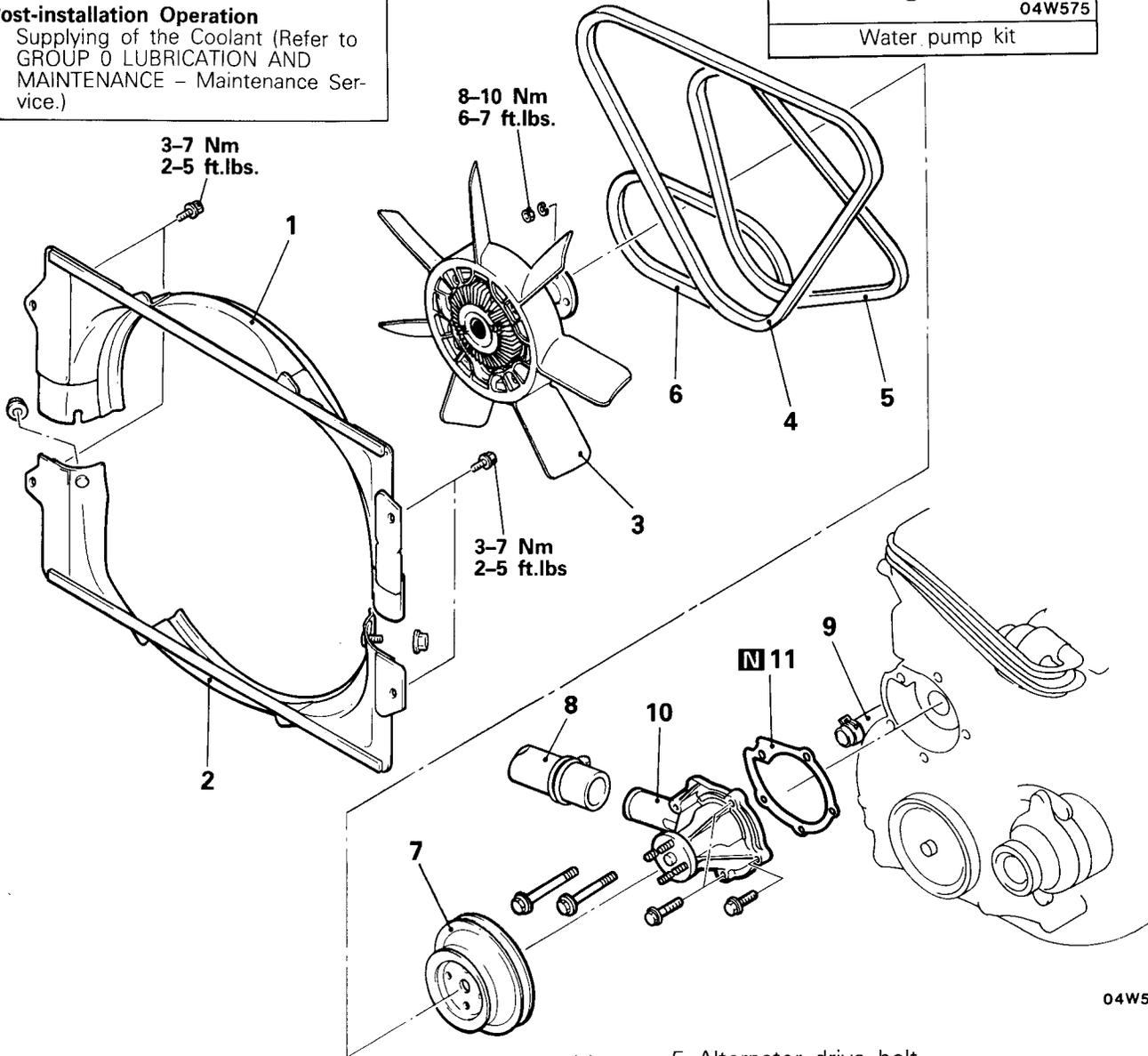
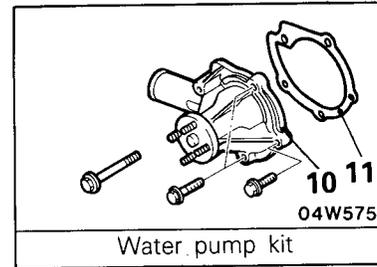
N07MB-

Pre-removal Operation

- Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)

Post-installation Operation

- Supplying of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)



04W574

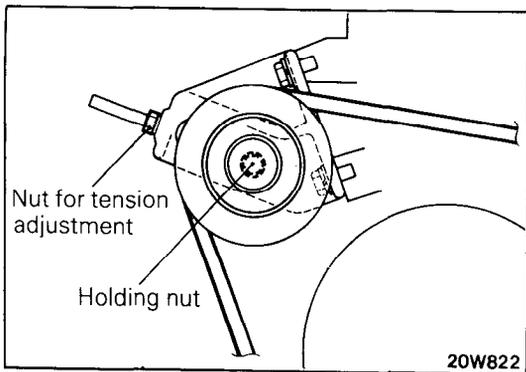
Removal steps

1. Radiator upper shroud
2. Radiator lower shroud
3. Cooling fan clutch assembly
- ◆◆ Adjustment of air conditioner compressor drive belt deflection
- ◀▶ 4. Air conditioner compressor drive belt (Vehicles with an air conditioner)
- ◆◆ Adjustment of alternator drive belt deflection

- ◀▶ 5. Alternator drive belt
- ◆◆ Adjustment of power steering oil pump drive belt deflection
- ◀▶ 6. Power steering oil pump drive belt
7. Water pump pulley
8. Connection of radiator lower hose
9. Connection of heater hose
- ◆◆ 10. Water pump
11. Water pump gasket

NOTE

- (1) Reverse the removal procedures to reinstall.
- (2) ◆◆ : Refer to "Service Points of Removal".
- (3) ▶◆ : Refer to "Service Points of Installation".
- (4) N : Non-reusable parts

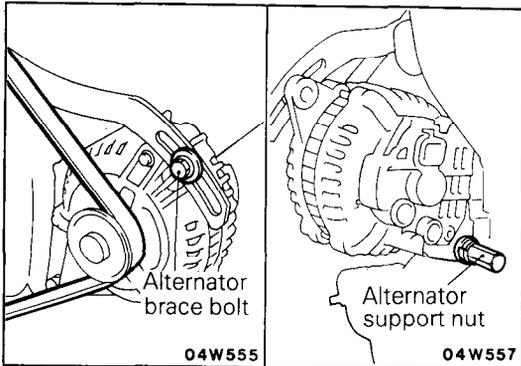


SERVICE POINTS OF REMOVAL

N07MCAC

4. REMOVAL OF AIR CONDITIONER COMPRESSOR DRIVE BELT

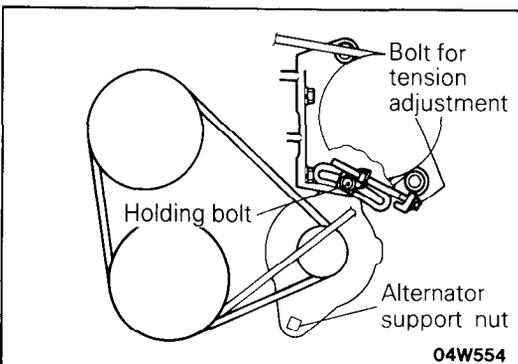
- (1) Loosen the nut holding the tension pulley.
- (2) Loosen the nut for tension adjustment, and then remove the drive belt.



5. REMOVAL OF ALTERNATOR DRIVE BELT

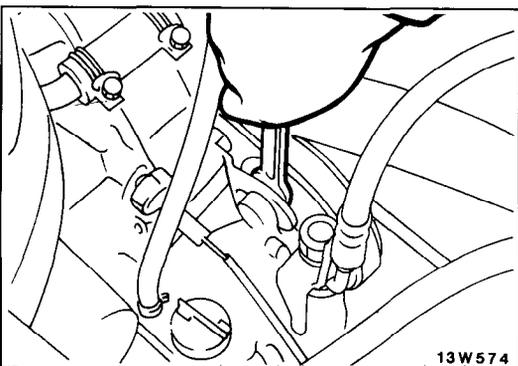
Vehicles without an air conditioner

Loosen the alternator brace bolt and the alternator support nut, and then remove the alternator drive belt.



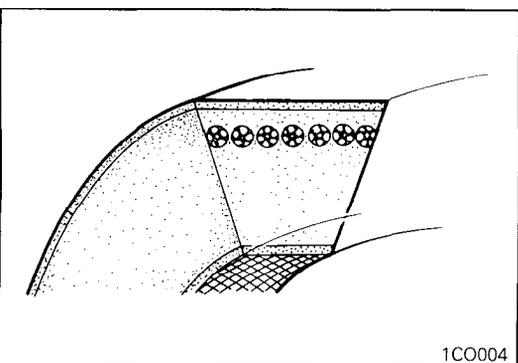
Vehicles with an air conditioner

- (1) Loosen the bolt holding the alternator and then loosen the alternator support nut.
- (2) Loosen the bolt for deflection adjustment, and then remove the alternator drive belt.



6. REMOVAL OF POWER STEERING OIL PUMP DRIVE BELT

Loosen the bolt holding the power steering oil pump, and then remove the drive belt.

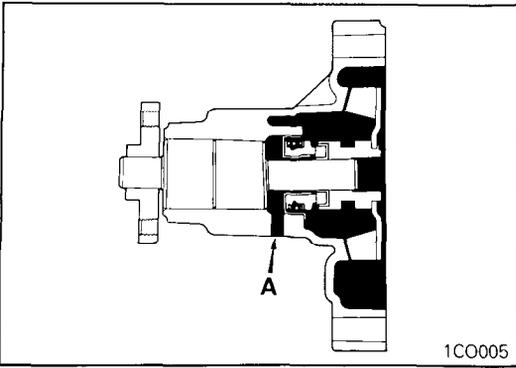


INSPECTION

N07MDAC

BELT

- Check surface for damage, peeling or cracks.
- Check surface for presence of oil or grease.
- Check rubber for wear or hardening.



WATER PUMP

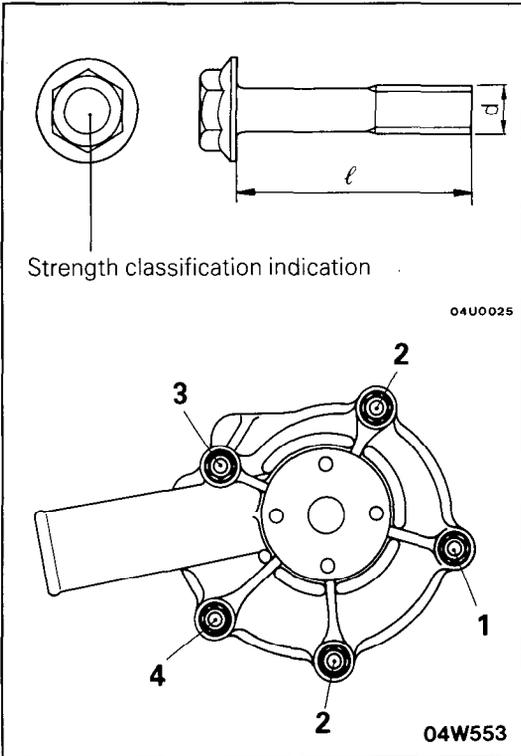
- Check each part for cracks, damage or wear, and replace the water pump assembly if necessary.
- Check the bearing for damage, abnormal noise and sluggish rotation, and replace the water pump assembly if necessary.
- Check the seal unit for leaks, and replace the water pump assembly if necessary.
- Check for water leakage. If water leaks from hole "A" seal unit is faulty. Replace as an assembly.

SERVICE POINTS OF INSTALLATION

N07MEAE

10. INSTALLATION OF WATER PUMP

The dimension of the water pump's installation bolt differs according to the installation location, so care must be taken to avoid incorrect installation.



No.	Strength classification (Head mark)	d x ℓ mm (in.)
1	4T	8 x 23 (.31 x .90)
2	4T	8 x 28 (.31 x 1.10)
3	4T	8 x 88 (.31 x 3.46)
4	4T	8 x 78 (.31 x 3.07)

● ADJUSTMENT OF POWER STEERING OIL PUMP DRIVE BELT DEFLECTION

Refer to GROUP 19 STEERING – Service Adjustment Procedures.

● ADJUSTMENT OF ALTERNATOR DRIVE BELT DEFLECTION

Refer to P.7-7.

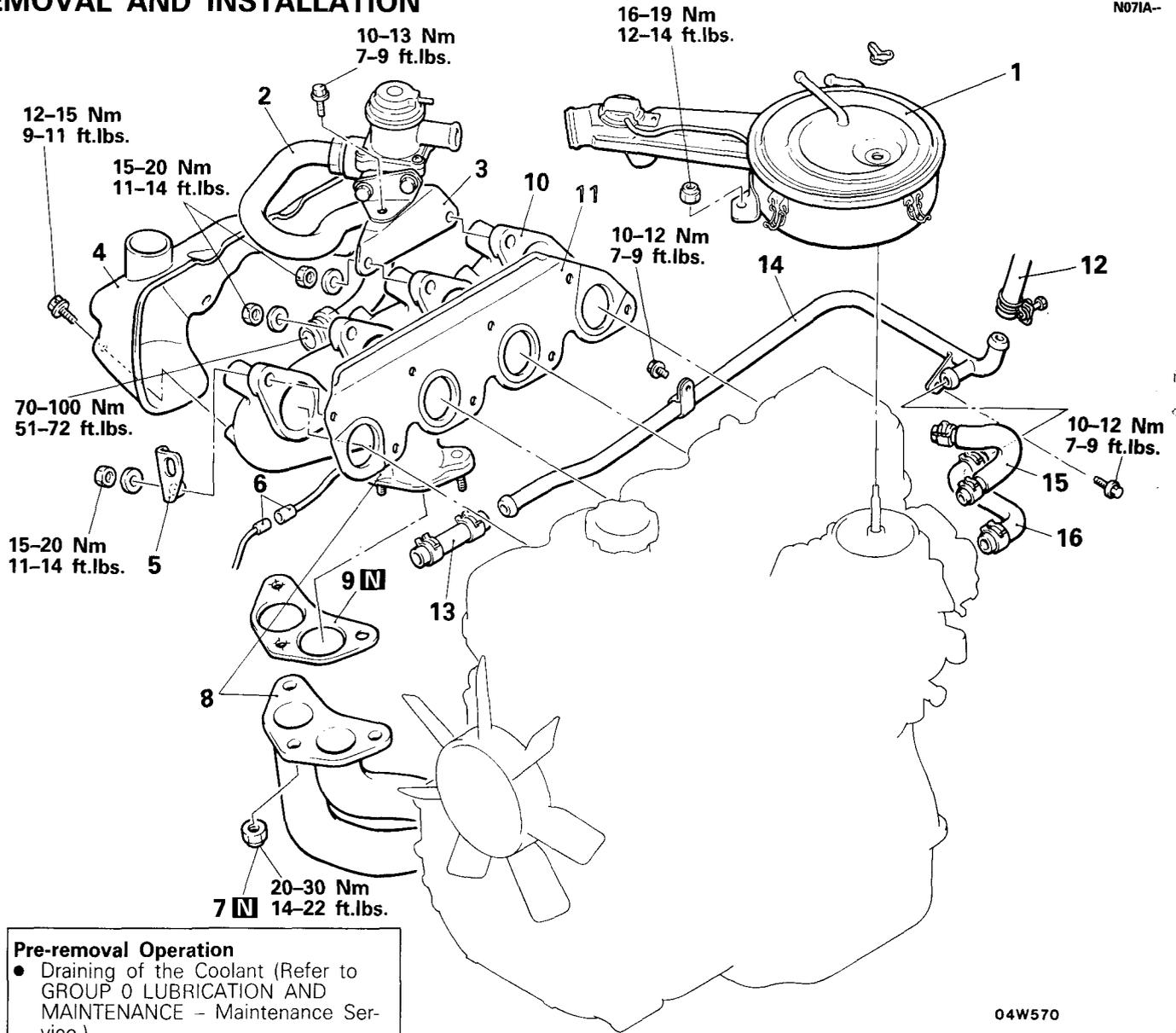
● ADJUSTMENT OF AIR CONDITIONER COMPRESSOR DRIVE BELT DEFLECTION

Refer to GROUP 24 HEATERS AND AIR-CONDITIONING – Service Adjustment Procedures.

WATER HOSE AND PIPE

REMOVAL AND INSTALLATION

N071A-



Pre-removal Operation
 ● Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)

Post-installation Operation
 ● Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)

04W570

Water pipe removal steps

- ◄◄ ◄◄ 1. Air filter
- 2. Reed valve and air pipe assembly
- 3. Reed valve bracket
- 4. Exhaust manifold cover
- 5. Engine hanger
- 6. Connection of oxygen sensor connector
- 7. Self-locking nut
- 8. Connection of exhaust manifold and exhaust pipe
- 9. Gasket
- 10. Exhaust manifold
- ◄◄ ◄◄ 11. Exhaust manifold gasket

- 12. Connection of heater hose
- 13. Heater hose
- 14. Water pipe

Water hose removal steps

- 15. Water hose
- 16. Water by-pass hose

NOTE
 (1) Reverse the removal procedures to reinstall.
 (2) ◄◄ ◄◄ : Refer to "Service Points of Removal".
 (3) ◄◄ ◄◄ : Refer to "Service Points of Installation".
 (4) [N] : Non-reusable parts

SERVICE POINTS OF REMOVAL

N071B--

1. REMOVAL OF AIR FILTER

Refer to GROUP 11 INTAKE AND EXHAUST – Air Filter.

SERVICE POINTS OF INSTALLATION

N071DAD

11. INSTALLATION OF EXHAUST MANIFOLD GASKET

Replace the gasket if there is peeling, flaking of damage.

1. INSTALLATION OF AIR FILTER

Refer to GROUP 11 INTAKE AND EXHAUST – Air Filter.

WATER TEMPERATURE GAUGE UNIT

REMOVAL AND INSTALLATION

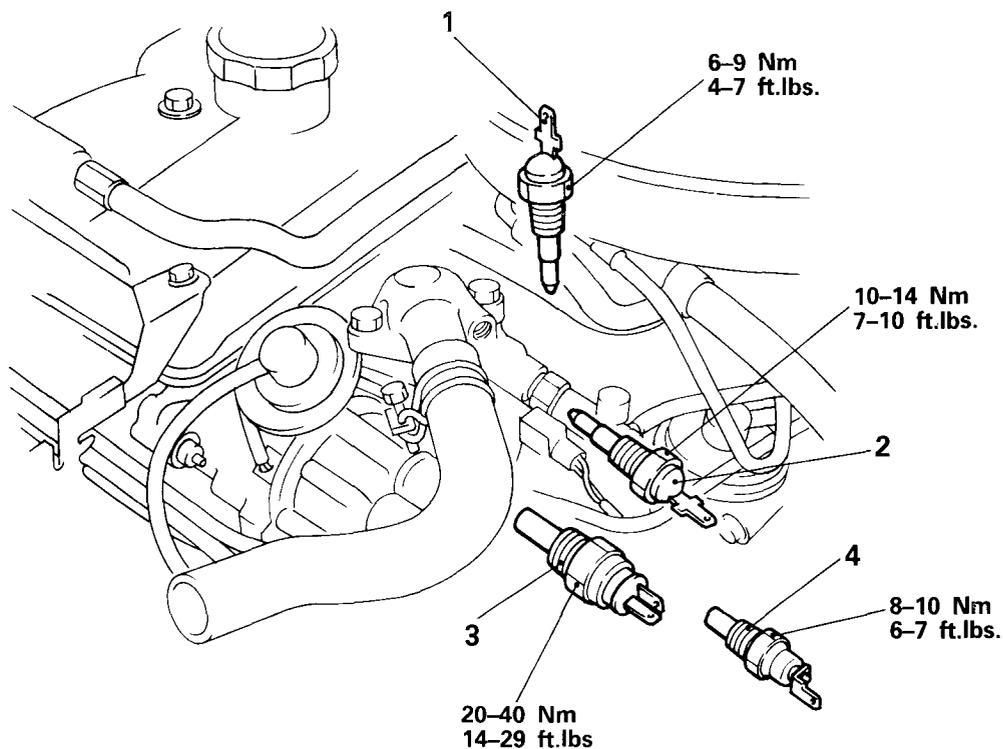
N070B--

Pre-removal Operation

- Draining of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)

Post-installation Operation

- Supplying of the Coolant (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Maintenance Service.)



04W573

- ◆◆ 1. Thermo switch
(Vehicles with an automatic transmission)
- ◆◆ 2. Water temperature switch
(Vehicles with an air conditioner)
- ◆◆ 3. Water temperature sensor
- ◆◆ 4. Water temperature gauge unit

NOTE

◆◆ : Refer to "Service Points of Installation".

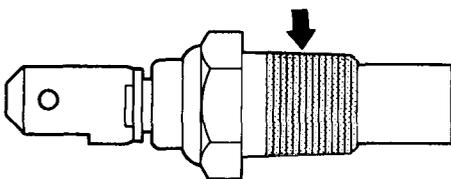
SERVICE POINTS OF INSTALLATION

N070EAF

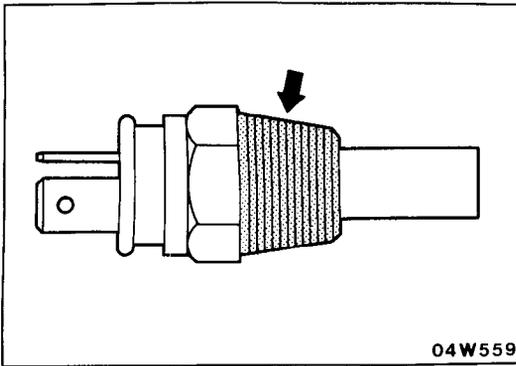
4. APPLICATION OF SEALANT TO WATER TEMPERATURE GAUGE UNIT

Apply a coating of specified sealant to the threaded part, and then tighten to the specified torque.

Specified sealant : 3M ART Part No. 8660 or equivalent



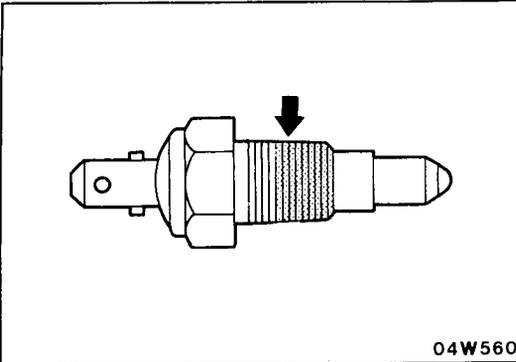
04W558



3. APPLICATION OF ADHESIVE TO WATER TEMPERATURE SENSOR

Apply a coating of specified adhesive to the threaded part, and then tighten to the specified torque.

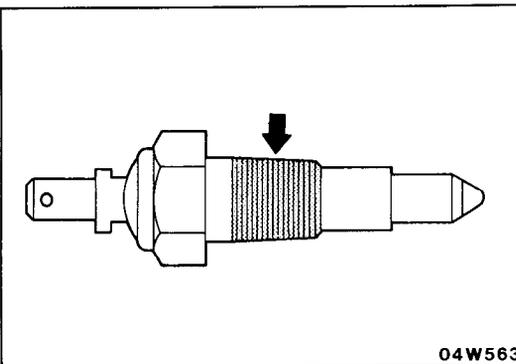
Specified adhesive : 3M Adhesive Nut Locking 4171 or equivalent



2. APPLICATION OF SEALANT TO WATER TEMPERATURE SWITCH

Apply a coating of specified sealant to the threaded part, and then tighten to the specified torque.

Specified sealant : 3M ART No. 8660 or equivalent



1. APPLICATION OF ADHESIVE TO THERMO SWITCH

Apply a coating of specified adhesive to the threaded part, and then tighten to the specified torque.

Specified adhesive : 3M Adhesive Nut Locking 4171 or equivalent