ENGINE LUBRICATION & COOLING SYSTEMS

SECTION LC

CONTENTS

CONTENTS (Cont'd)

Precautions

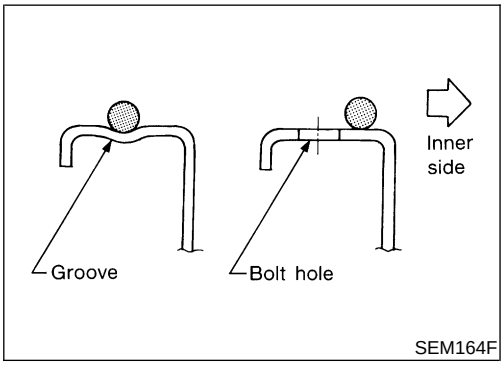
SUPPLEMENTAL RESTRAINT SYSTEM (SRS) “AIR BAG” AND “SEAT BELT PRE-TENSIONER”

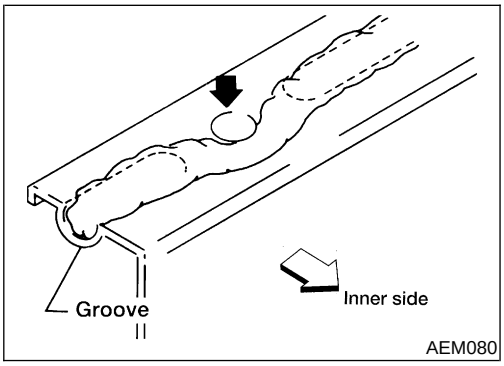
NELC0140

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.
The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.
Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connectors.**
- **The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**





LIQUID GASKET APPLICATION PROCEDURE

NELC0141

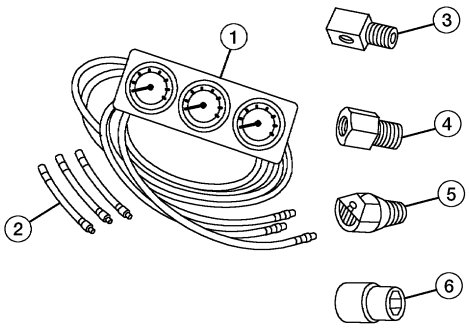
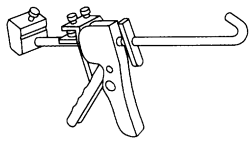
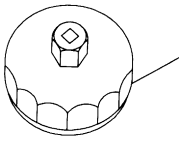
1. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Silicone RTV or equivalent. Refer to ***GI-51***, “Recommended Chemical Products and Sealants”.)
   - For oil pan, be sure liquid gasket diameter is 3.5 to 4.5 mm (0.138 to 0.177 in).
   - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

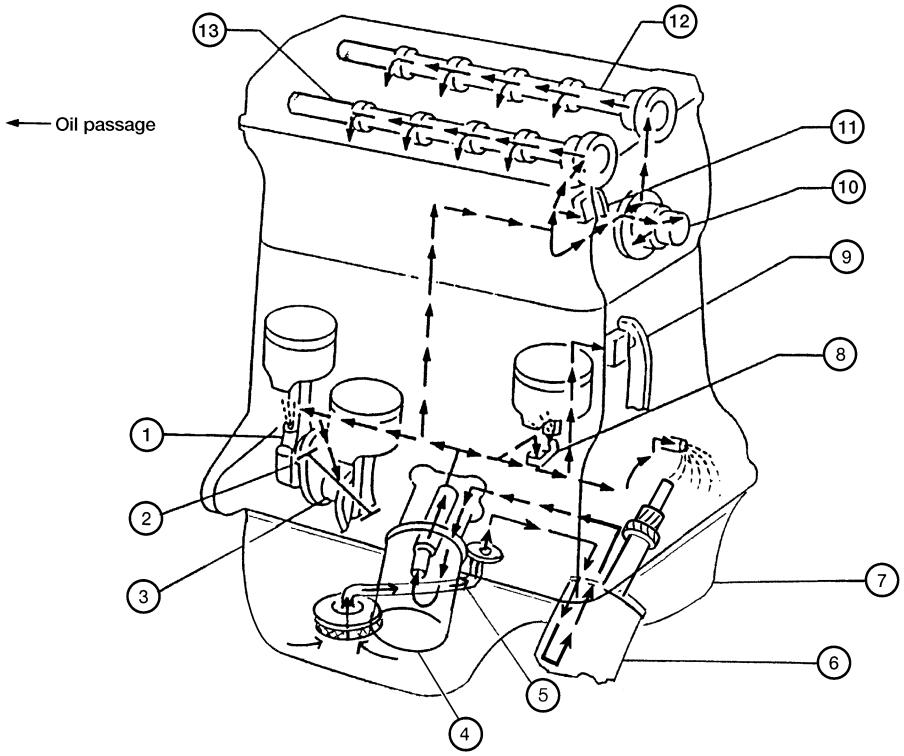
=NELC0142

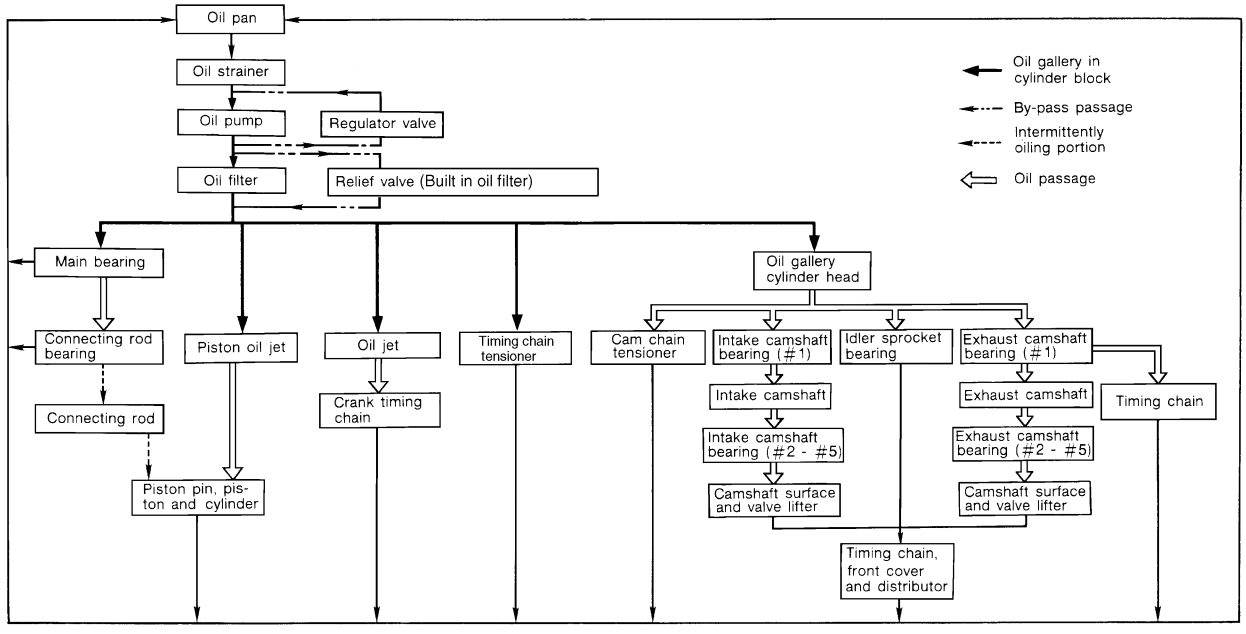
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
(J34301-C) Oil pressure gauge set 1: (J34301-1) Oil pressure gauge 2: (J34301-2) Hoses 3: (J34298) Adapter 4: (J34282-1) Adapter 5: (790-301-1230-A) 60° adapter 6: (J34301-15) Square socket	 AAT896	Measuring oil pressure **Maximum measuring range:** **1,379 kPa (14 kg/cm^2, 200 psi)**
WS39930000 (—) Tube presser	 NT052	Pressing the tube of liquid gasket
KV10115801 (J38956) Oil filter wrench	 NT362	Removing and installing oil filter

Lubrication Circuit

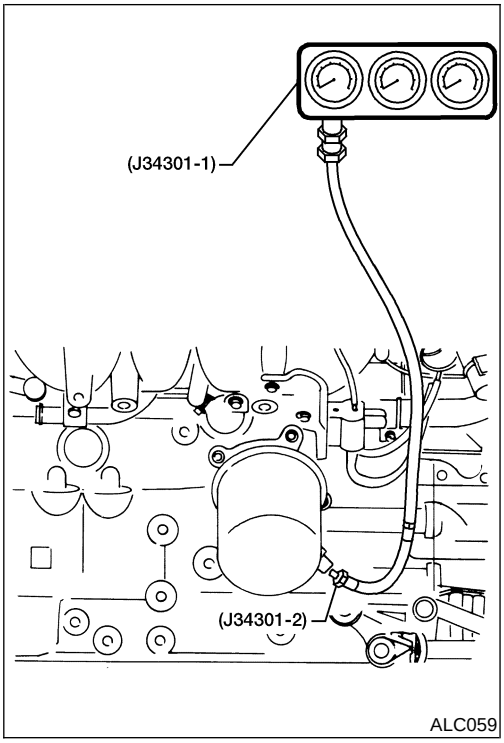
NELC0143





WLC030

1. Connecting rod
2. Connecting rod bearing
3. Main bearing
4. Oil filter
5. Oil strainer
6. Oil pump
7. Oil pan
8. Piston oil jet
9. Timing chain tensioner
10. Idler sprocket
11. Upper timing chain tensioner
12. Exhaust camshaft
13. Intake camshaft



Oil Pressure Check

NELC0144

WARNING:

- **Be careful not to burn yourself, as the engine and oil may be hot.**
- **For M/T models, put shift lever in Neutral "N" position. For A/T models, put selector lever in Park "P" position.**

1. Check oil level.
2. Remove oil pressure switch.
3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

kPa (kg/cm^2, psi)

Engine speed	Approximate discharge pressure
Idle speed	More than 78 (0.8, 11)
3,000 rpm	412 - 481 (4.2 - 4.9, 60 - 70)

- **If difference is extreme, check oil passage and oil pump for oil leaks.**

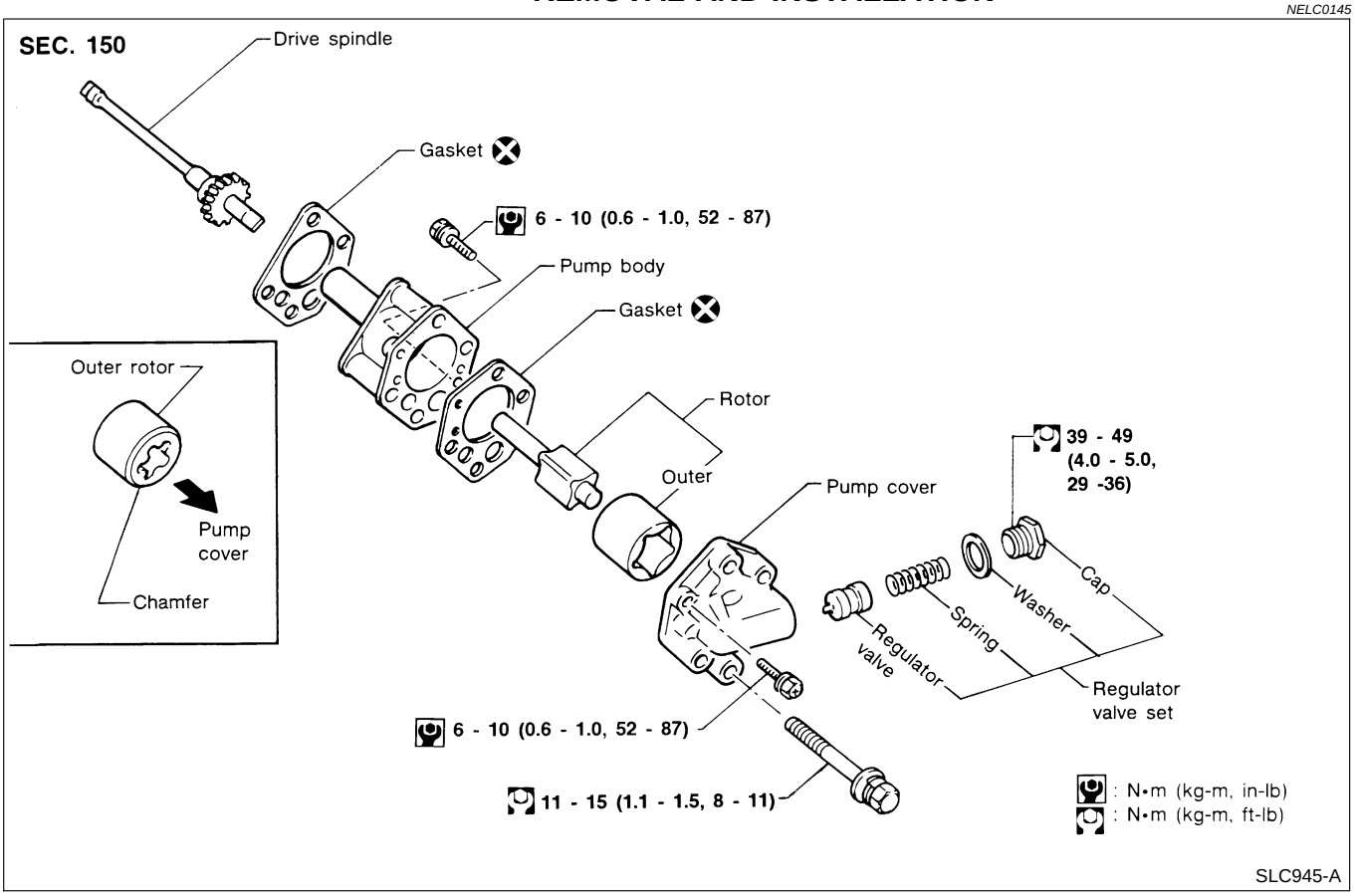
6. Install oil pressure switch with sealant.

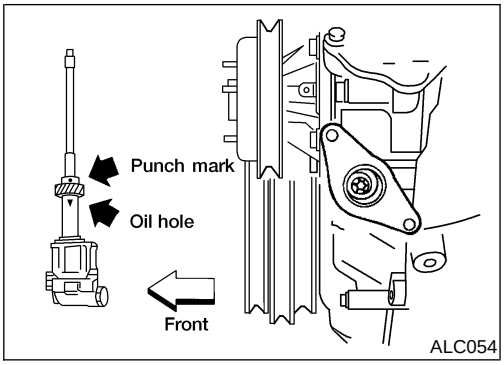
: 12.25 – 17.25 N·m (1.3 – 1.7 kg-m, 9 – 12 ft-lb)

Oil Pump

REMOVAL AND INSTALLATION

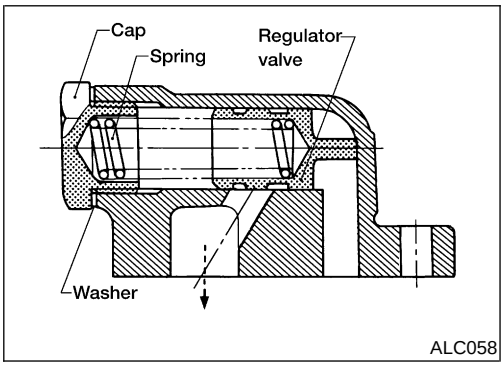
NELC0145





ALC054

- **Always replace with new oil seal and gasket.**
- **When removing oil pump, turn crankshaft so that No. 1 piston is at TDC on its compression stroke.**
- **When installing oil pump, apply engine oil to gears, then align punch mark on drive spindle and oil hole on oil pump.**



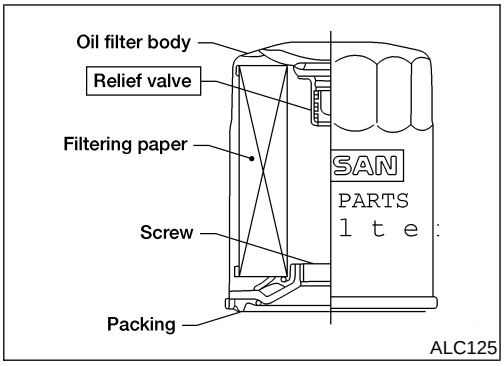
ALC058

REGULATOR VALVE INSPECTION

NELC0146

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.

- **Replace regulator valve set or oil pump assembly, if damaged.**



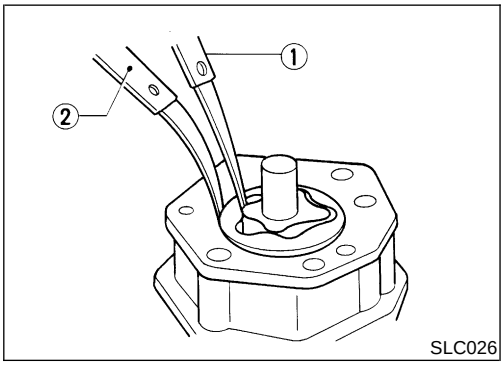
ALC125

OIL FILTER

NELC0147

The oil filter is a small, full-flow cartridge type and is provided with a relief valve.

- **Use Tool KV10115801 (J38956) for removing oil filter.**



SLC026

OIL PUMP INSPECTION

NELC0148

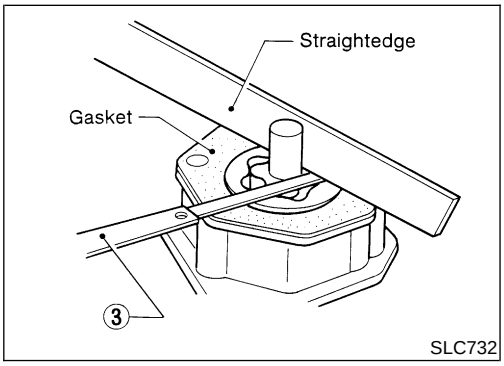
Using a feeler gauge, check the following clearances.

Standard clearance:

Unit: mm (in)

Rotor tip clearance **1**	Less than 0.12 (0.0047)
Outer rotor to body clearance **2**	0.15 - 0.21 (0.0059 - 0.0083)
Side clearance (with gasket) **3**	0.04 - 0.100 (0.0016 - 0.0039)

- **If the tip clearance (1) exceeds the limit, replace rotor set.**
- **If body to rotor clearances (2, 3) exceed the limit, replace oil pump assembly.**



SLC732

Service Data and Specifications (SDS)

OIL PRESSURE CHECK

NELC0149

kPa (kg/cm^2, psi)

Engine speed	Approximate discharge pressure
Idle speed	More than 78 (0.8, 11)
3,000	412 - 481 (4.2 - 4.9, 60 - 70)

REGULATOR VALVE

NELC0150

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

OIL PUMP

NELC0151

Unit: mm (in)

Rotor tip clearance	Less than 0.12 (0.0047)
Outer rotor to body clearance	0.15 - 0.21 (0.0059 - 0.0083)
Side clearance (with gasket)	0.04 - 0.100 (0.0016 - 0.0039)

Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) “AIR BAG” AND “SEAT BELT PRE-TENSIONER”

NELC0152

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.

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WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connectors.**
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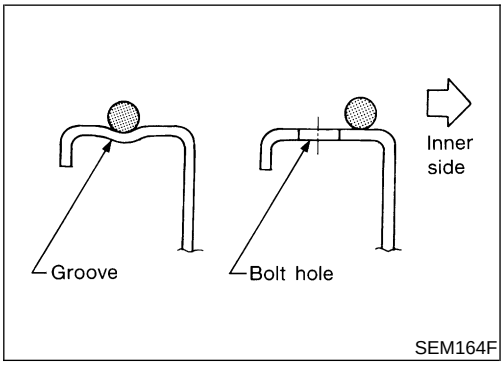
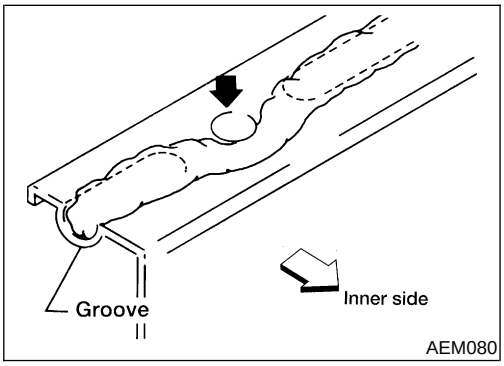




LIQUID GASKET APPLICATION PROCEDURE

NELC0153

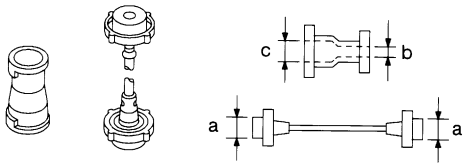
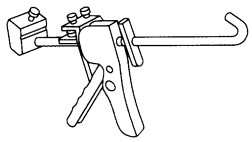
1. Use a scraper to remove all traces of old liquid gasket from mating surfaces and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Silicone RTV or equivalent. Refer to ***GI-51***, “Recommended Chemical Products and Sealants”.)
   - For oil pan, be sure liquid gasket diameter is 3.5 to 4.5 mm (0.138 to 0.177 in).
   - For areas except oil pan, be sure liquid gasket diameter is 2.0 to 3.0 mm (0.079 to 0.118 in).
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

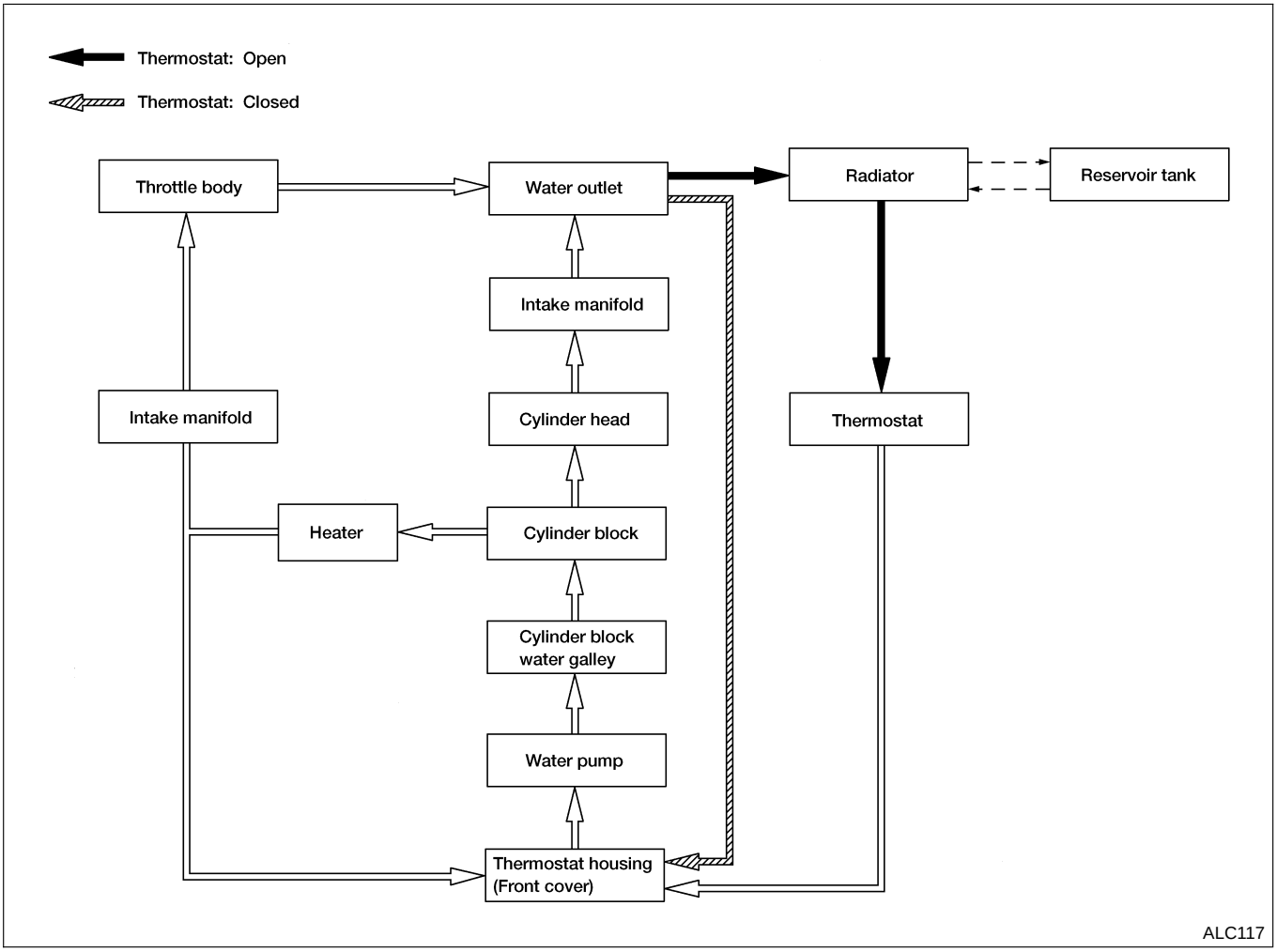
=NELC0154

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
EG17650301 (J33984-A) Radiator cap tester adapter	 NT564	Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
WS39930000 (—) Tube presser	 NT052	Pressing the tube of liquid gasket

Cooling Circuit

NELC0155



System Check

NELC0156

WARNING:

- **Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.**
- **Wrap a thick cloth around the radiator cap. Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the radiator cap by turning it all the way.**

CHECKING COOLING SYSTEM HOSES

NELC0156S01

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Chafing
- Deterioration

CHECKING RADIATOR

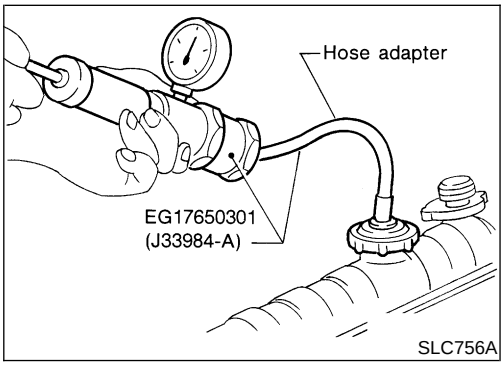
NELC0156S02

Check radiator for mud or clogging. If necessary, clean radiator as follows.

CAUTION:

- **Be careful not to bend or damage the radiator fins.**
- **When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns.**
- **Tape the harness connectors to prevent water from entering.**

1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when water flows clear coming out of the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep the air hose end more than 30 cm (11.8 in) away from the core.
5. Blow air again into all the radiator core surfaces once per minute until no water blows out and the core is dry.



CHECKING COOLING SYSTEM FOR LEAKS

NELC0156S03

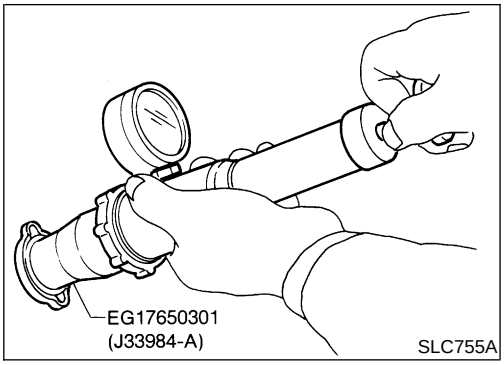
To check for leakage, apply pressure to the cooling system with a radiator cap tester.

Testing pressure:

157 kPa (1.6 kg/cm^2, 23 psi)

CAUTION:

Higher pressure than specified may cause radiator damage.

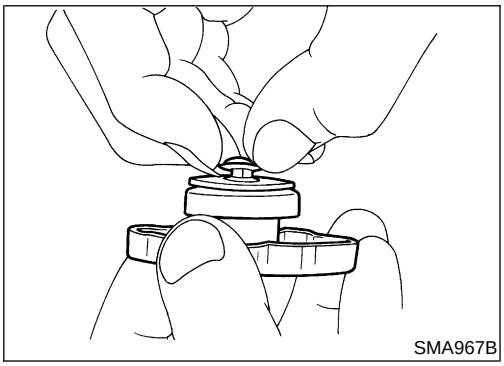


CHECKING RADIATOR CAP

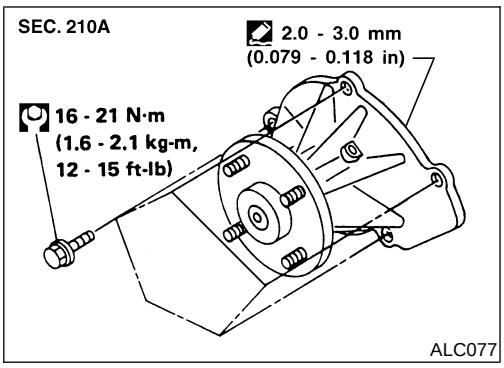
NELC0156S04

To check radiator cap, apply pressure to radiator cap with a radiator cap tester.

Radiator cap relief pressure:
Standard
78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi)
Limit
59 kPa (0.6 kg/cm^2, 9 psi)



Pull the negative pressure valve to open it.
Check that it closes completely when released.



Water Pump

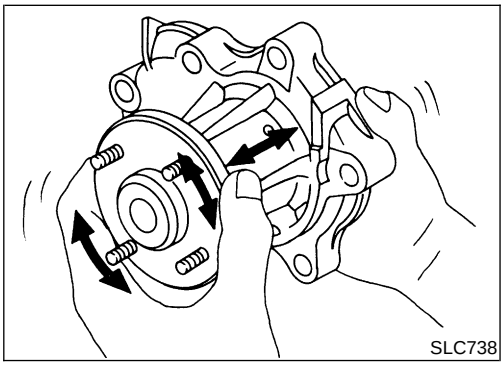
REMOVAL

NELC0157

CAUTION:

- **When removing water pump assembly, be careful not to get coolant on drive belts.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely. Check for leaks using radiator cap tester.**

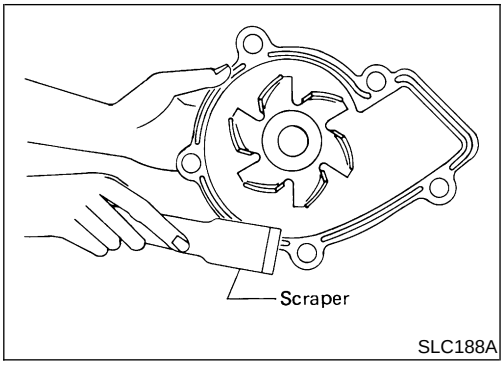
1. Drain coolant from engine.
   Refer to ***MA-17***, "Changing Engine Coolant".
2. Remove fan coupling with fan.
3. Remove power steering pump drive belt, generator drive belt and A/C compressor drive belt.
4. Remove water pump.



INSPECTION

NELC0158

- Check body assembly for rust or corrosion.
- Check for rough operation due to excessive end play.

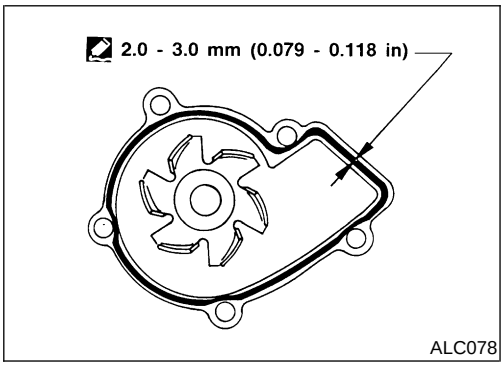


SLC188A

INSTALLATION

NELC0159

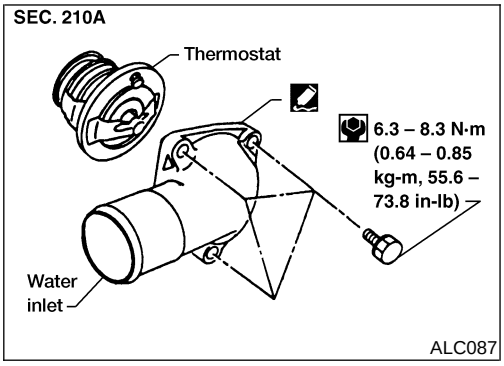
1. Use a scraper to remove liquid gasket from water pump.
- **Also remove traces of liquid gasket from mating surface of cylinder block.**



ALC078

2. Apply a continuous bead of liquid gasket to mating surface of water pump.
- **Use Genuine Silicone RTV or equivalent. Refer to *GI-51*, "Recommended Chemical Products and Sealants".**

When filling the radiator with coolant, refer to *MA-17*, "Changing Engine Coolant".
When installing the drive belts, refer to *MA-16*, "Checking Drive Belts".



ALC087

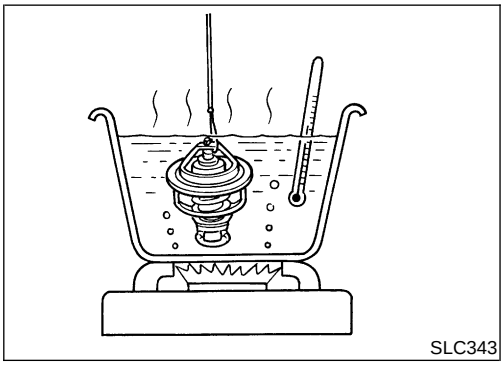
Thermostat

REMOVAL

NELC0160

- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**

1. Drain coolant from engine. Refer to ***MA-17***, "Changing Engine Coolant".
2. Remove air cleaner and air duct assembly.
3. Remove water hose from water inlet housing.
4. Remove water inlet housing, then take out thermostat.


SLC343

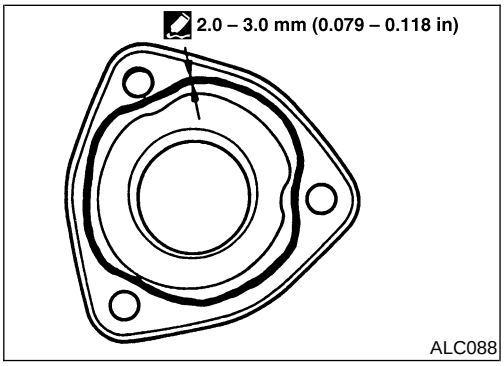
INSPECTION

NELC0161

1. Check valve seating condition at normal room temperature. It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8 mm/90°C (0.31 in/194°F)

3. Check if valve closes at 5°C (9°F) below valve opening temperature.



ALC088

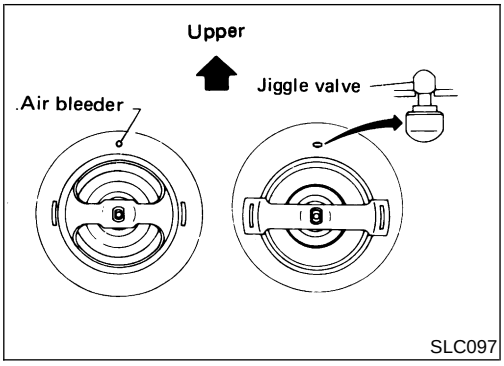
INSTALLATION

NELC0162

1. Use a scraper to remove old liquid gasket from water inlet.
- **Also remove traces of liquid gasket from mating surface of front cover.**

2. Apply a continuous bead of liquid gasket to mating surface of water inlet.
- **Use Genuine Silicone RTV or equivalent. Refer to *GI-51*, "Recommended Chemical Products and Sealants".**

Thermostat (Cont'd)



3. Install thermostat with jiggle valve or air bleeder at upper side.
4. Install water inlet housing.
5. Install water hose to water inlet housing.
6. Install air cleaner and air duct assembly.
7. Refill engine coolant. Refer to ***MA-17***, " Changing Engine Coolant".

- **After installation, run engine for a few minutes and check for leaks.**

Radiator

REMOVAL AND INSTALLATION

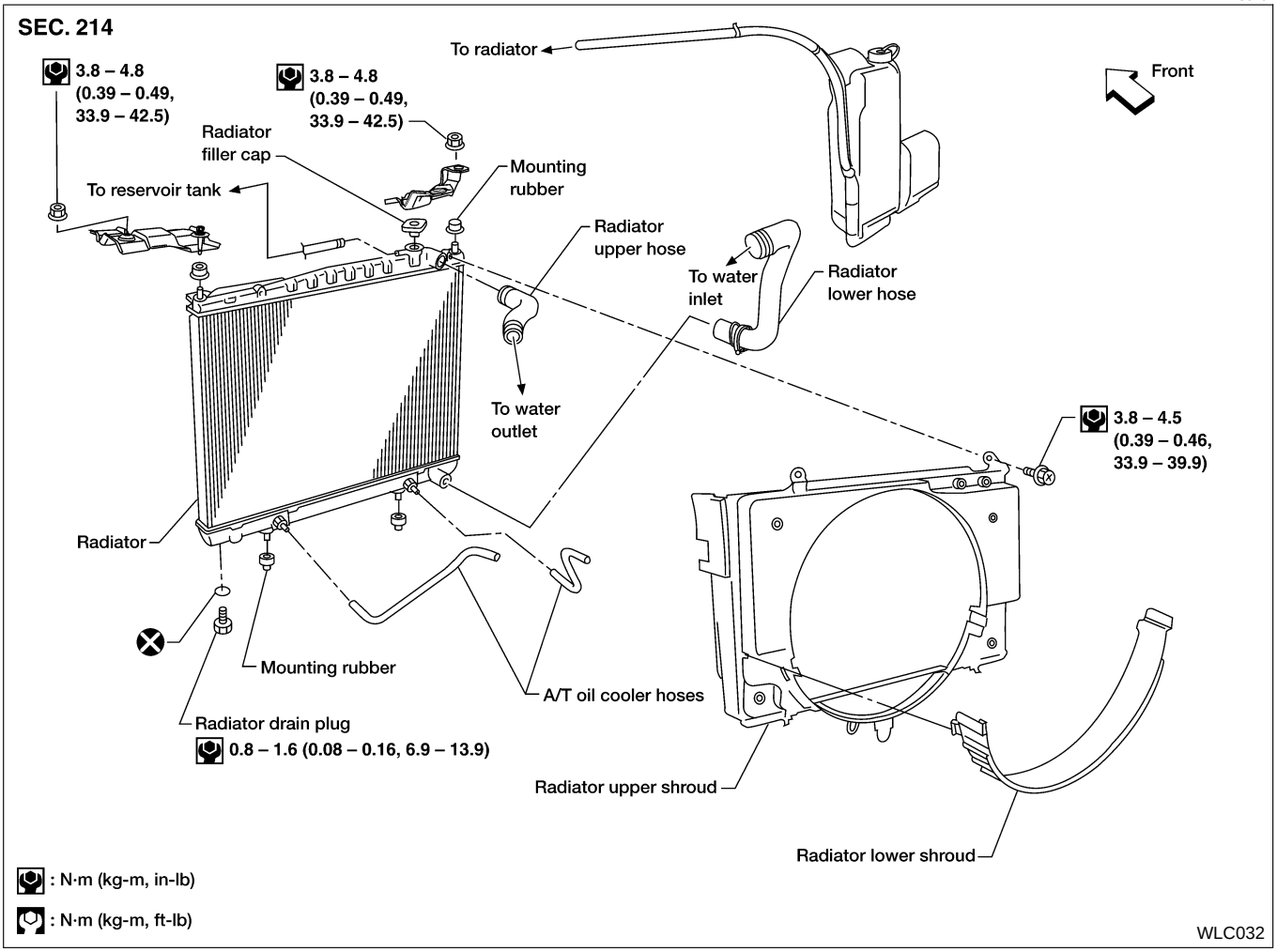
NELC0163

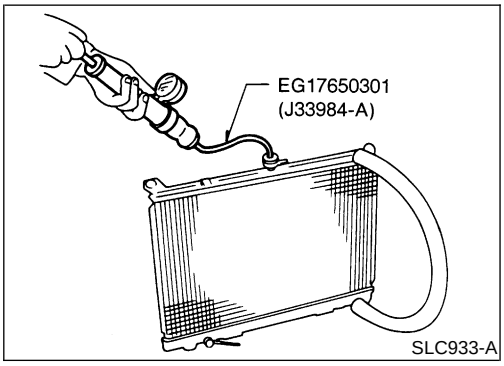
1. Remove under cover.
2. Drain coolant from radiator. Refer to ***MA-17***, "Changing Engine Coolant".
3. Disconnect upper and lower radiator hoses.
4. Remove air cleaner and air duct assembly.
5. Remove lower radiator shroud.
6. Remove radiator shroud.
7. Remove A/T oil cooler hoses (A/T models only).
8. Disconnect coolant reservoir hose.
9. Remove radiator.
10. After replacing radiator, install all parts in reverse order of removal.
11. Refill engine coolant. Refer to ***MA-17***, "Changing Engine Coolant".

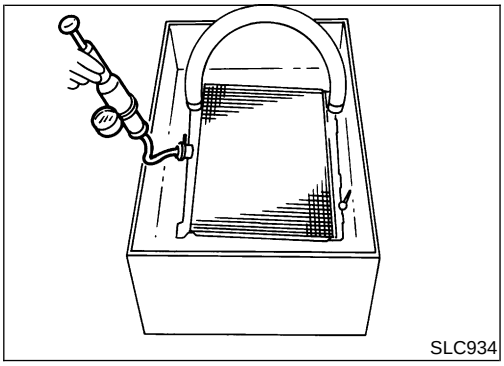
- **After installation, run engine for a few minutes, and check for leaks.**

COMPONENTS

NELC0164







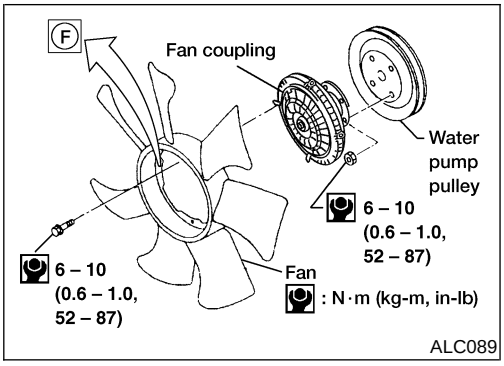
INSPECTION

NELC0165

1. Apply pressure with Tool.

   Specified pressure value:
   157 kPa (1.6 kg/cm^2, 23 psi)

2. Check for leakage.

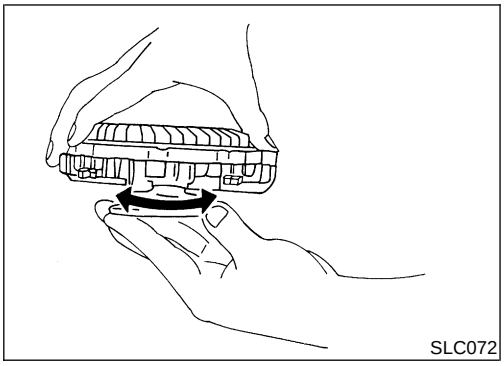


Cooling Fan (Crankshaft driven)

REMOVAL AND INSTALLATION

NELC0166

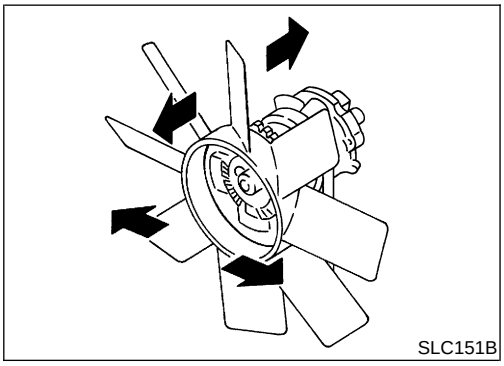
- Do not release the drive belt tension by removing the fan/water pump pulley.
- Fan coupling cannot be disassembled and should be replaced as a unit. If front mark **F** is present, install fan so that side marked **F** faces the front.
- Install the drive belt only after the fan and fan coupling to water pump flange bolts/nuts have been properly torqued.
- Proper alignment of these components is essential. Improper alignment will cause them to wobble and may eventually cause the fan to separate from the water pump, causing extensive damage.



INSPECTION

NELC0167

Check fan coupling for rough operation, wobbling, oil leakage or bent bimetal fins.



After assembly, verify the fan does not wobble or flap while the engine is running.

WARNING:

- **When the engine is running, keep hands and clothing away from moving parts such as drive belts and fan.**

Refilling Engine Coolant

NELC0168

For details on refilling the engine cooling system, refer to ***MA-17***, “REFILLING ENGINE COOLANT”.

Overheating Cause Analysis

=NELC0169

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Fan coupling does not operate	Fan and coupling	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	Fan shroud	—
	Improper coolant mixture ratio	—	Coolant quality, viscosity	—
	Poor coolant quality	—		—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

Overheating Cause Analysis (Cont'd)

	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	Excessive payload
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	Dirty radiator	
		Blocked condenser	Dirty condenser	
		Blockage in front of radiator	Installed large fog lamp	

Service Data and Specifications (SDS)

THERMOSTAT

NELC0170

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 8 mm/90 (0.31 in/194°F)

RADIATOR

NELC0171

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	Standard	78 - 98 (0.8 - 1.0, 11 - 14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)

Precautions

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) “AIR BAG” AND “SEAT BELT PRE-TENSIONER”

NELC0138

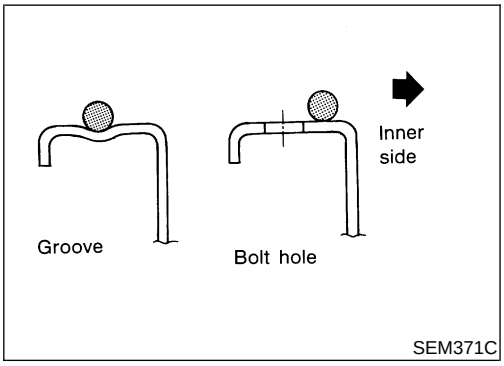
The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and in the instrument panel on the passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness, and spiral cable.

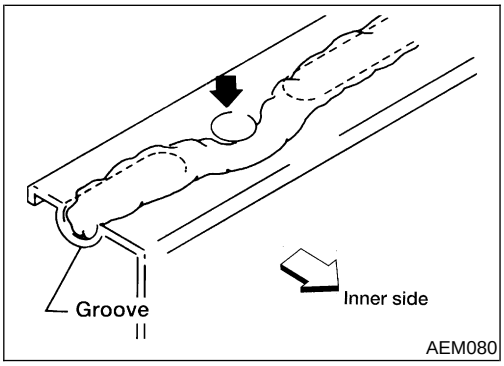
The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.

Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow harness connectors.**
- **The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**





LIQUID GASKET APPLICATION PROCEDURE

NELC0001

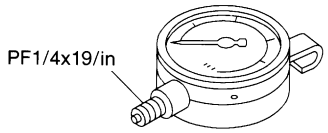
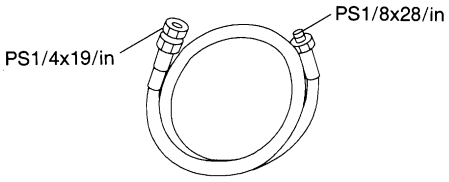
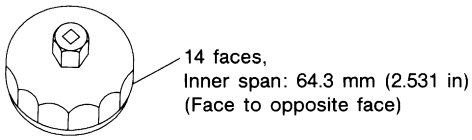
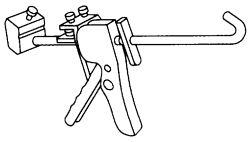
1. Use a scraper to remove all traces of old liquid gasket from mating surface and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Silicone RTV or equivalent. Refer to ***GI-51***, “Recommended Chemical Products and Sealants”.)
   - **Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) diameter (for oil pan).**
   - **Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) diameter (in areas except oil pan).**
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

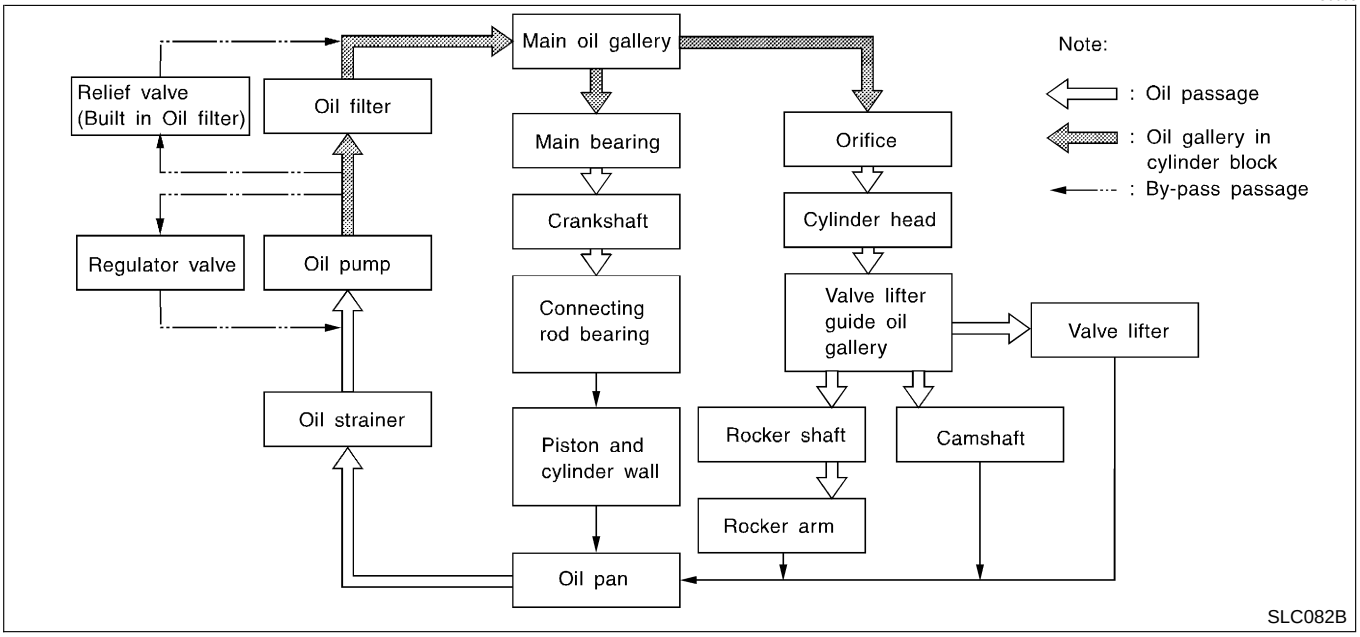
=NELC0002

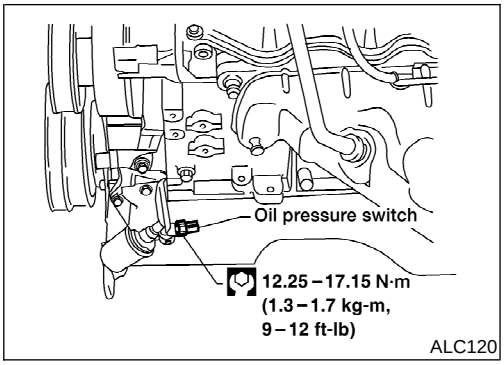
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
ST25051001 (J25695-1) Oil pressure gauge	 NT558	Measuring oil pressure **Maximum measuring range: 2,452 kPa (25 kg/cm^2, 356 psi)**
ST25052000 (J25695-2) Hose	 NT559	Adapting oil pressure gauge to cylinder block
KV10115801 (J38956) Oil filter wrench	 NT362	Removing and installing oil filter
WS39930000 (—) Tube presser	 NT052	Pressing the tube of liquid gasket

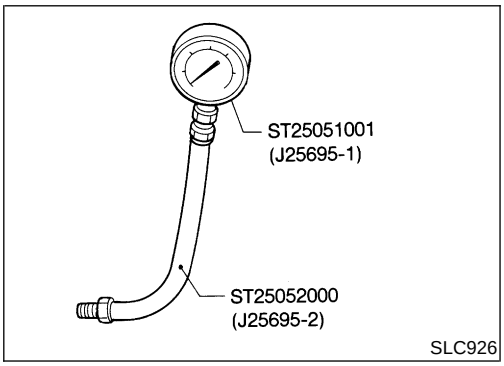
Lubrication Circuit

NELC0003





ALC120



SLC926

Oil Pressure Check

NELC0004

WARNING:

- **Be careful not to burn yourself, as the engine and oil may be hot.**
- **Oil pressure check should be done in "Neutral position" (M/T) or "Parking position" (A/T).**

1. Check oil level.
2. Remove oil pressure switch.
3. Install pressure gauge.
4. Start engine and warm it up to normal operating temperature.
5. Check oil pressure with engine running under no-load.

kPa (kg/cm^2, psi)

Engine speed	Approximate discharge pressure
Idle speed	More than 59 (0.6, 9)
2,000 rpm	412 - 451 (4.2 - 4.6, 60 - 65)

If difference is extreme, check oil passage and oil pump for oil leaks.

6. Install oil pressure switch with sealant.
   : 12.25 – 17.15 N·m (1.3 – 1.7 kg-m, 9 – 12 ft-lb)

Oil Pump

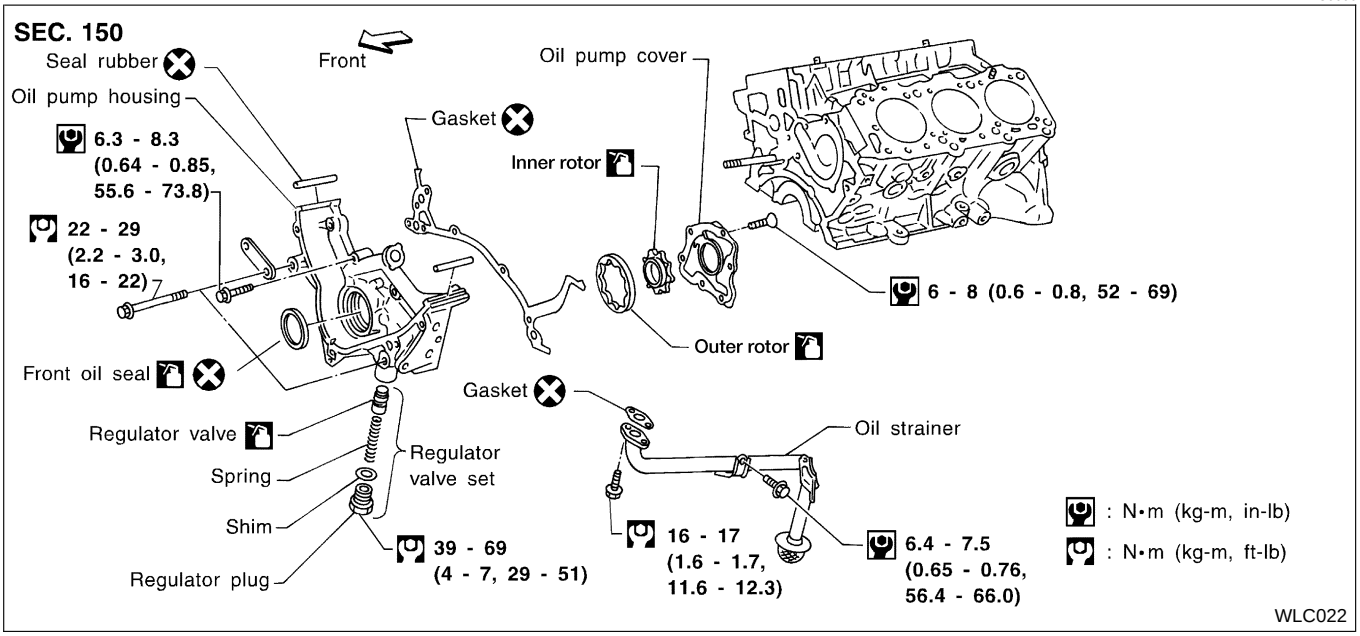
REMOVAL AND INSTALLATION

NELC0005

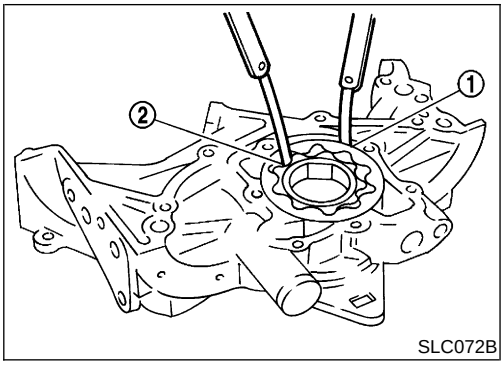
1. Drain engine oil.
2. Drain engine coolant from drain plug on radiator.
3. Remove air duct (from mass air flow sensor to throttle body).
4. Remove cooling fan.
5. Remove radiator hoses (upper and lower) and fan shroud. Refer to "Radiator", LC-32.
6. Remove drive belts. Refer to ***MA-26***, "Checking Drive Belts".
7. Remove crankshaft pulley and front upper and lower belt covers. Refer to ***EM-82***, "TIMING BELT".
8. Remove oil pan. Refer to ***EM-79***, "OIL PAN".
9. Remove oil strainer.
10. Remove oil pump assembly.

DISASSEMBLY AND ASSEMBLY

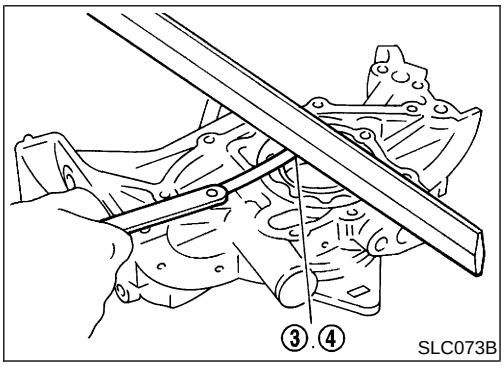
NELC0006



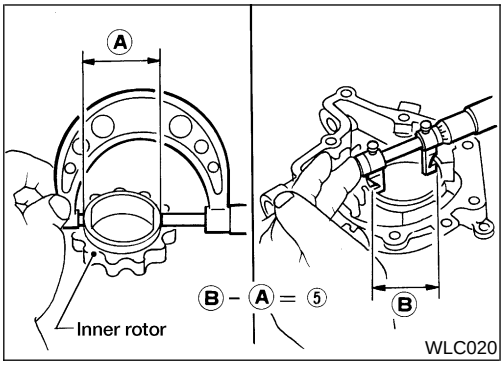
- **Always replace with new oil seal and gasket.**
- **When installing oil pump, apply engine oil to inner and outer rotors.**
- **Be sure that O-ring is properly installed.**



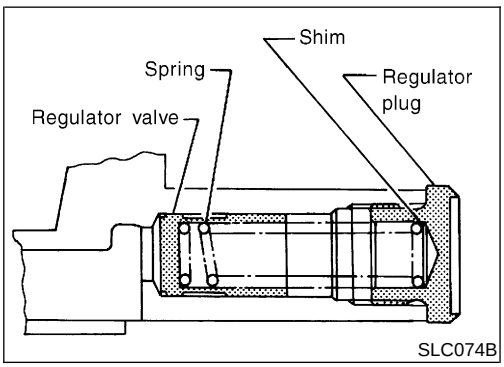
SLC072B



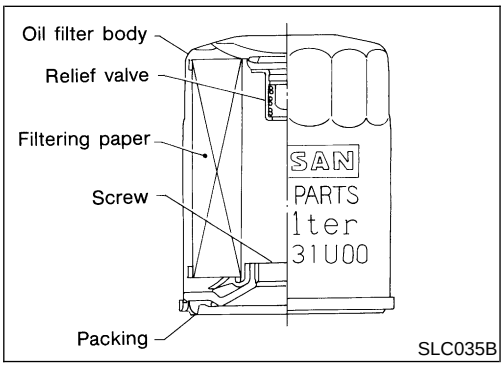
SLC073B



WLC020



SLC074B



SLC035B

INSPECTION

NELC0007

Using a feeler gauge, straightedge and micrometers, check the following clearances:

Unit: mm (in)

Body to outer rotor radial clearance **1**	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance **2**	Below 0.18 (0.0071)
Body to inner rotor axial clearance **3**	0.05 - 0.09 (0.0020 - 0.0035)
Body to outer rotor axial clearance **4**	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance **5**	0.045 - 0.091 (0.0018 - 0.0036)

- **If the tip clearance (2) exceeds the limit, replace rotor set.**
- **If body to rotor clearances (1, 3, 4, 5) exceed the limit, replace oil pump body assembly.**

REGULATOR VALVE INSPECTION

NELC0008

1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil. Check that it falls smoothly into the valve hole by its own weight.

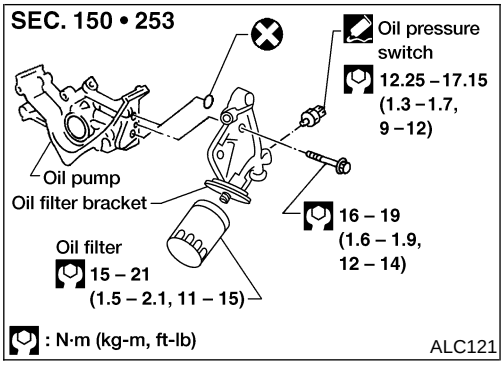
If damaged, replace regulator valve set or oil pump assembly.

OIL FILTER

NELC0009

The oil filter is a small, full-flow cartridge type and is provided with a relief valve.

- **Use Tool KV10115801 (J38956) for removing oil filter.**



OIL FILTER BRACKET

NELC0010

1. Remove oil filter.
2. Disconnect oil pressure switch and connector.
3. Remove oil filter bracket.

Service Data and Specifications (SDS)

OIL PRESSURE CHECK

=NELC0011
(kg/cm^2, psi)

Engine speed	Approximate discharge pressure
Idle speed	More than 59 (0.6, 9)
2,000 rpm	412 - 451 (4.2 - 4.6, 60 - 65)

REGULATOR VALVE

NELC0012
Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

OIL PUMP

NELC0013
Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance	Below 0.18 (0.0071)
Body to inner rotor axial clearance	0.05 - 0.09 (0.0020 - 0.0035)
Body to outer rotor axial clearance	0.050 - 0.110 (0.0020 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)

Precautions

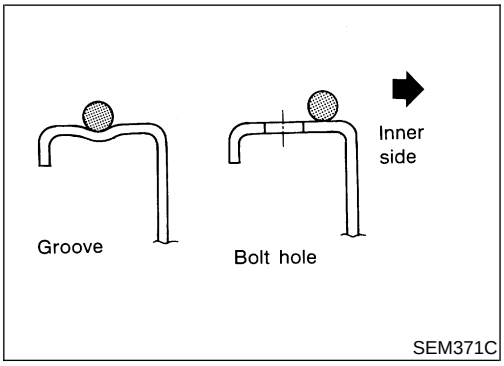
SUPPLEMENTAL RESTRAINT SYSTEM (SRS) “AIR BAG” AND “SEAT BELT PRE-TENSIONER”

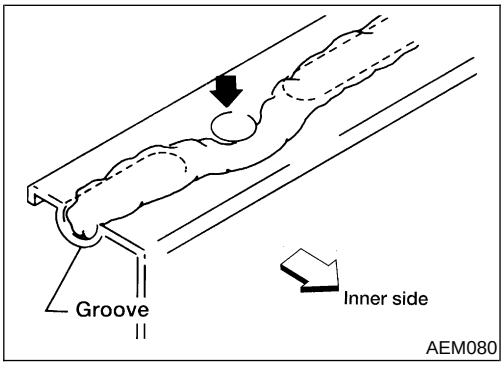
NELC0139

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER” used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of driver air bag module (located in the center of the steering wheel), front passenger air bag module (located on the instrument panel on passenger side), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable.
The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch. Because no rear seat exists where a rear-facing child restraint can be placed, the switch is designed to turn off the passenger air bag so that a rear-facing child restraint can be used in the front passenger seat. The switch is located in the center of the instrument panel, near the ashtray. When the switch is turned to the ON position, the passenger air bag is enabled and could inflate in a frontal collision. When the switch is turned to the OFF position, the passenger air bag is disabled and will not inflate in a frontal collision. A passenger air bag OFF indicator on the instrument panel lights up when the passenger air bag is switched OFF. The driver air bag always remains enabled and is not affected by the passenger air bag deactivation switch.
Information necessary to service the system safely is included in the **RS section** of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance should be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the RS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS harnesses can be identified by yellow harness connectors.**
- **The vehicle (except Crew Cab model) is equipped with a passenger air bag deactivation switch which can be operated by the customer. When the passenger air bag is switched OFF, the passenger air bag is disabled and will not inflate in a frontal collision. When the passenger air bag is switched ON, the passenger air bag is enabled and could inflate in a frontal collision. After SRS maintenance or repair, make sure the passenger air bag deactivation switch is in the same position (ON or OFF) as when the vehicle arrived for service.**





LIQUID GASKET APPLICATION PROCEDURE

NELC0014

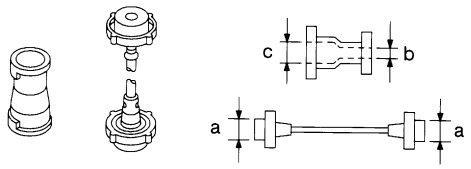
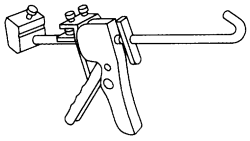
1. Use a scraper to remove all traces of old liquid gasket from mating surface and grooves. Also, completely clean any oil from these areas.
2. Apply a continuous bead of liquid gasket to mating surfaces. (Use Genuine Silicone RTV or equivalent. Refer to ***GI-51***, “Recommended Chemical Products and Sealants”.)
   - **Be sure liquid gasket is 3.5 to 4.5 mm (0.138 to 0.177 in) diameter (for oil pan).**
   - **Be sure liquid gasket is 2.0 to 3.0 mm (0.079 to 0.118 in) diameter (in areas except oil pan).**
3. Apply liquid gasket around the inner side of bolt holes (unless otherwise specified).
4. Assembly should be done within 5 minutes after coating.
5. Wait at least 30 minutes before refilling engine oil and engine coolant.

Preparation

SPECIAL SERVICE TOOLS

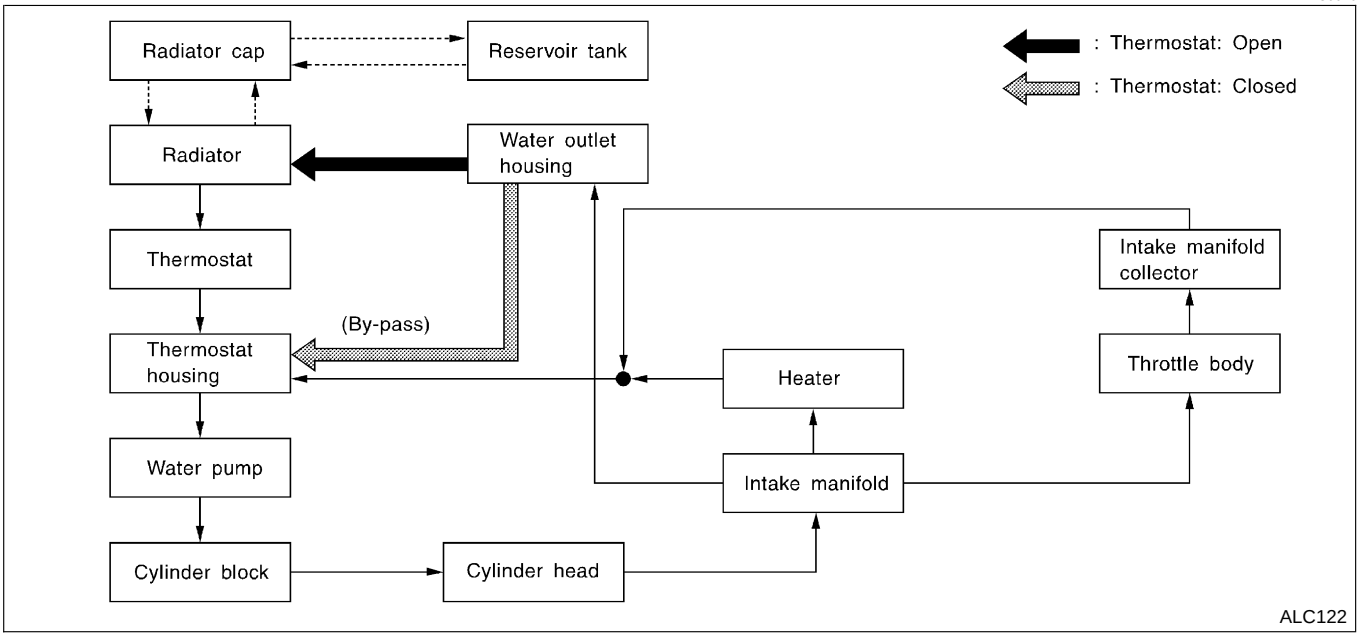
=NELC0015

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
EG17650301 (J33984-A) Radiator cap tester adapter	 NT564	Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
WS39930000 (—) Tube presser	 NT052	Pressing the tube of liquid gasket

Cooling Circuit

NELC0016



System Check

NELC0017

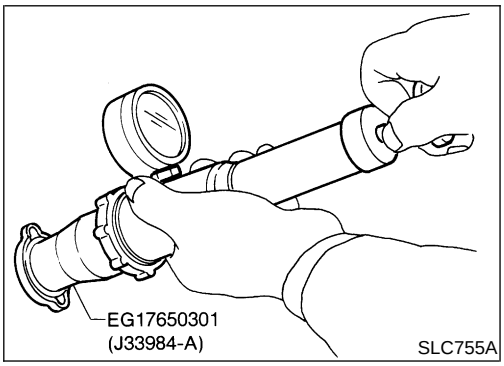
WARNING:

- **Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.**
- **Wrap a thick cloth around the cap. Slowly turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by turning it all the way.**

CHECKING COOLING SYSTEM HOSES

NELC0017S01

Check hoses for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.



CHECKING RADIATOR CAP

NELC0017S02

To check radiator cap, apply pressure to cap with a tester.

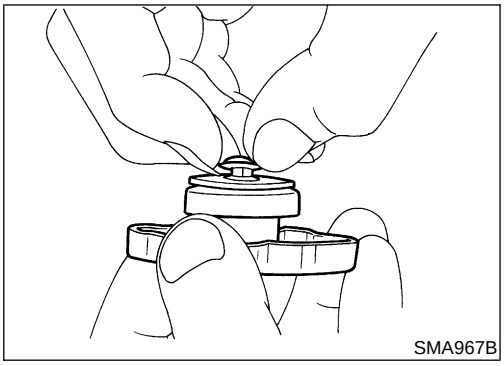
Radiator cap relief pressure:

Standard

78 - 98 kPa (0.8 - 1.0 kg/cm^2, 11 - 14 psi)

Limit

59 kPa (0.6 kg/cm^2, 9 psi)



Pull the negative pressure valve to open it.
Check that it closes completely when released.

CHECKING RADIATOR

NELC0017S04

Check radiator for mud or clogging. If necessary, clean radiator as follows.

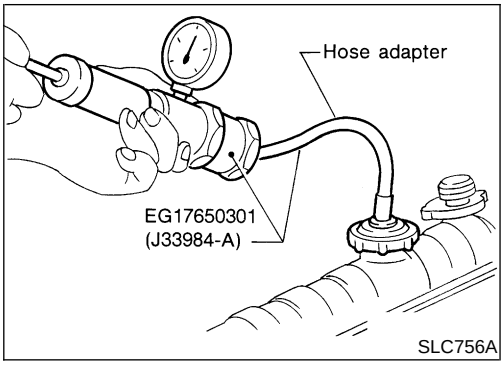
CAUTION:

- **Be careful not to bend or damage the radiator fins.**
- **When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns.**
- **Tape the harness connectors to prevent water from entering.**

1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when water flows clear coming out from the radiator.
4. Blow air into the back side of radiator core vertically downward.

- Use compressed air lower than 490 kPa (5 kg/cm^2, 71 psi) and keep the air hose end more than 30 cm (11.8 in) away from the core.

5. Blow air again into all the radiator core surfaces once per minute until no water blows out and the core is dry.



CHECKING COOLING SYSTEM FOR LEAKS

NELC0017S03

To check for leakage, apply pressure to the cooling system with a tester.

Testing pressure: 157 kPa (1.6 kg/cm^2, 23 psi)

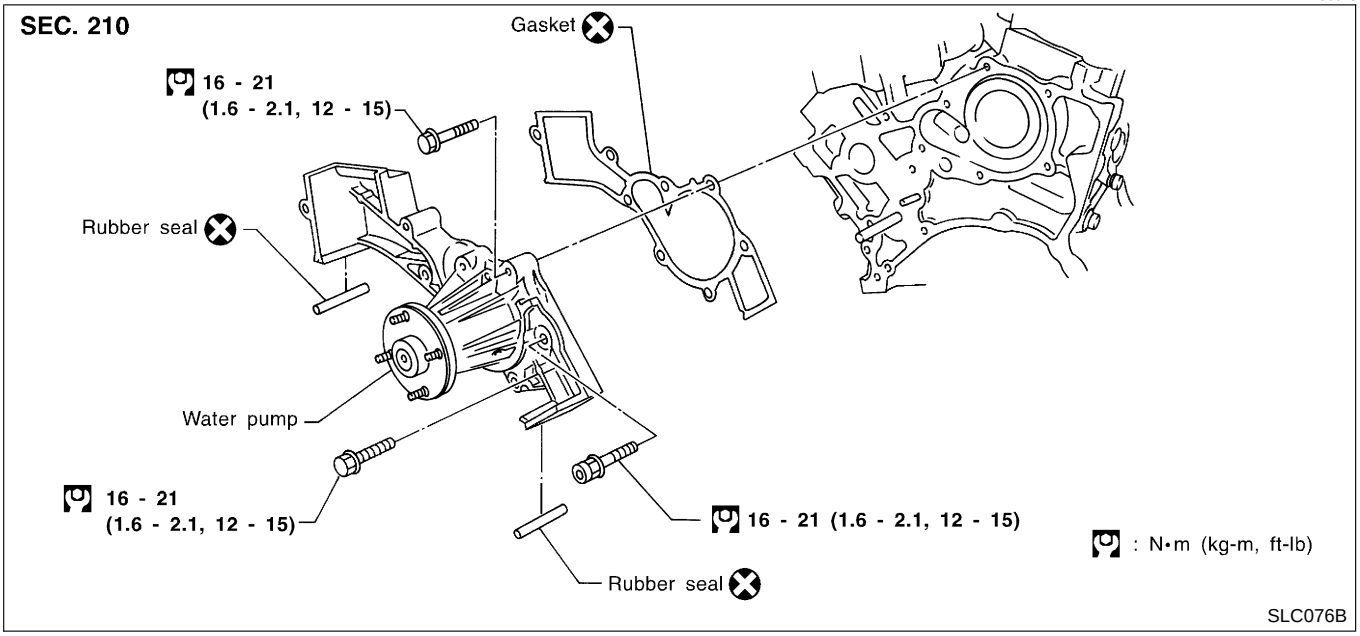
CAUTION:

Higher pressure than specified may cause radiator damage.

Water Pump

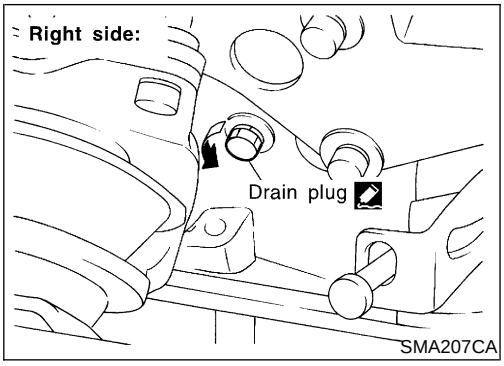
REMOVAL

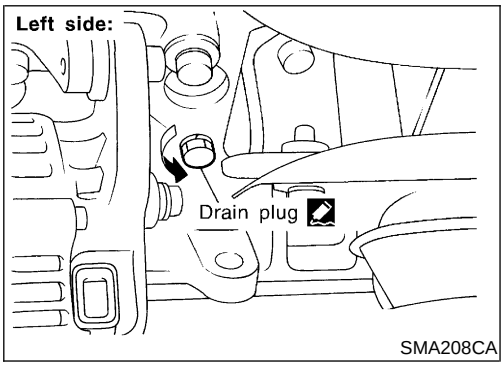
NELC0018



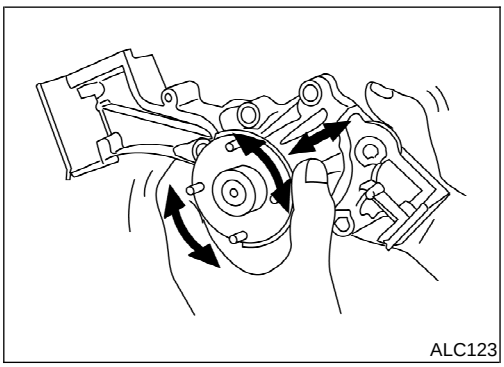
CAUTION:

- **When removing water pump assembly, be careful not to get coolant on timing belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, connect hose and clamp securely, then check for leaks using radiator cap tester.**
- **To avoid deforming timing cover, make sure there is adequate clearance between it and the hose clamp.**





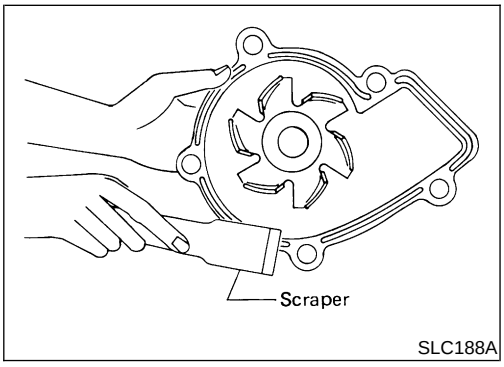
1. Drain coolant from drain plugs on both sides of cylinder block and radiator. Refer to ***MA-28***, "Changing Engine Coolant".
2. Remove radiator hoses (upper and lower) and fan shroud. Refer to "Radiator", LC-32.
3. Remove drive belts. Refer to ***MA-26***, "Checking Drive Belts".
4. Remove water pump pulley.
5. Remove crankshaft pulley and front (upper and lower) belt cover. Refer to ***EM-82***, "TIMING BELT".
6. Remove water pump.



INSPECTION

NELC0019

1. Check for badly rusted or corroded body assembly and vanes.
2. Check for rough operation due to excessive end play.

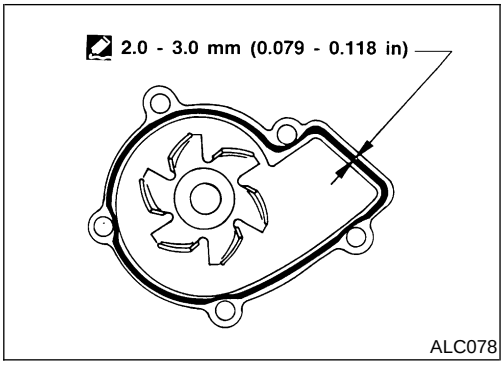


INSTALLATION

NELC0132

1. Use a scraper to remove liquid gasket from water pump.

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



ALC078

2. Apply a continuous bead of liquid gasket to mating surface of water pump.
- **Use Genuine Silicone RTV or equivalent. Refer to *GI-51*, "Recommended Chemical Products and Sealants".**

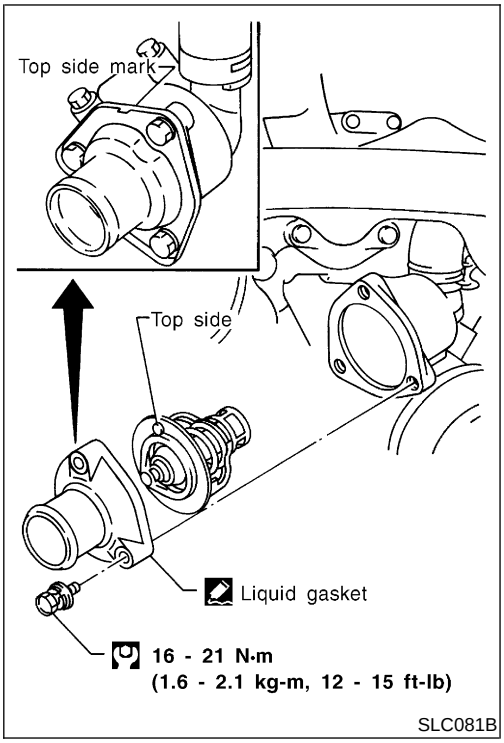
When filling the radiator with coolant, refer to *MA-28*, "Changing Engine Coolant".
When installing the drive belts, refer to *MA-26*, "Checking Drive Belts".

Thermostat

REMOVAL

NELC0020

1. Drain engine coolant from drain plugs on radiator.
2. Remove radiator hoses (upper and lower) and fan shroud.
3. Remove drive belts.
4. Remove pulley bracket.
5. Remove water inlet and thermostat assembly.

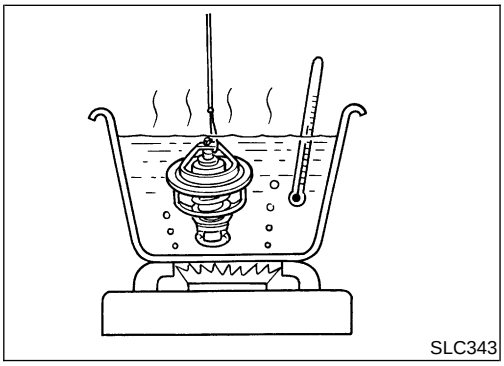


SLC081B

INSPECTION

NELC0021

1. Check valve seating condition at ordinary temperatures. It should seat tightly.

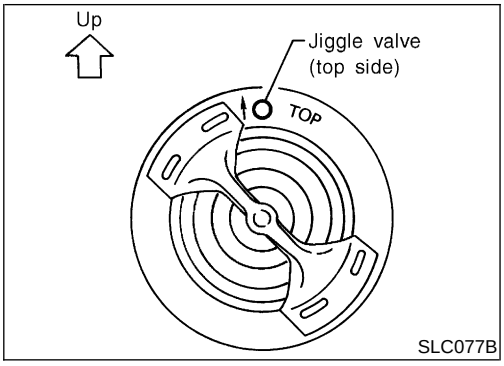

SLC343

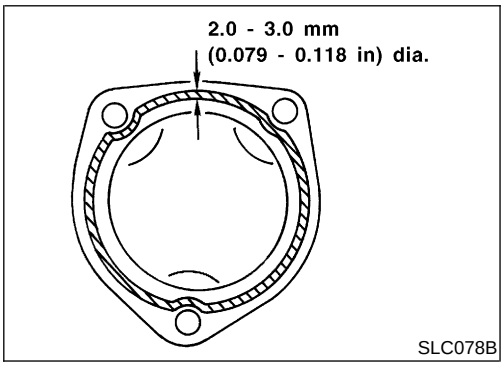
2. Check valve opening temperature and valve lift.

Description	VG33E	VG33ER
Valve opening temperature	82°C (180°F)	76.5°C (170°F)
Valve lift	More than 10 mm/95°C (0.39 in/203°F)	More than 10 mm/90°C (0.39 in/194°F)

3. Then check if valve is closed at 5°C (9°F) below valve opening temperature.

Thermostat (Cont'd)





INSTALLATION

NELC0022

1. Install thermostat with jiggle valve or air bleeder at upper side.
2. When installing water inlet apply liquid gasket as shown.

- **Use Genuine Silicone RTV or equivalent. Refer to *GI-51*, "Recommended Chemical Products and Sealants".**
- **After installation, run engine for a few minutes, and check for leaks.**
- **Be careful not to spill coolant over engine compartment. Use a rag to absorb coolant.**

Radiator

REMOVAL AND INSTALLATION

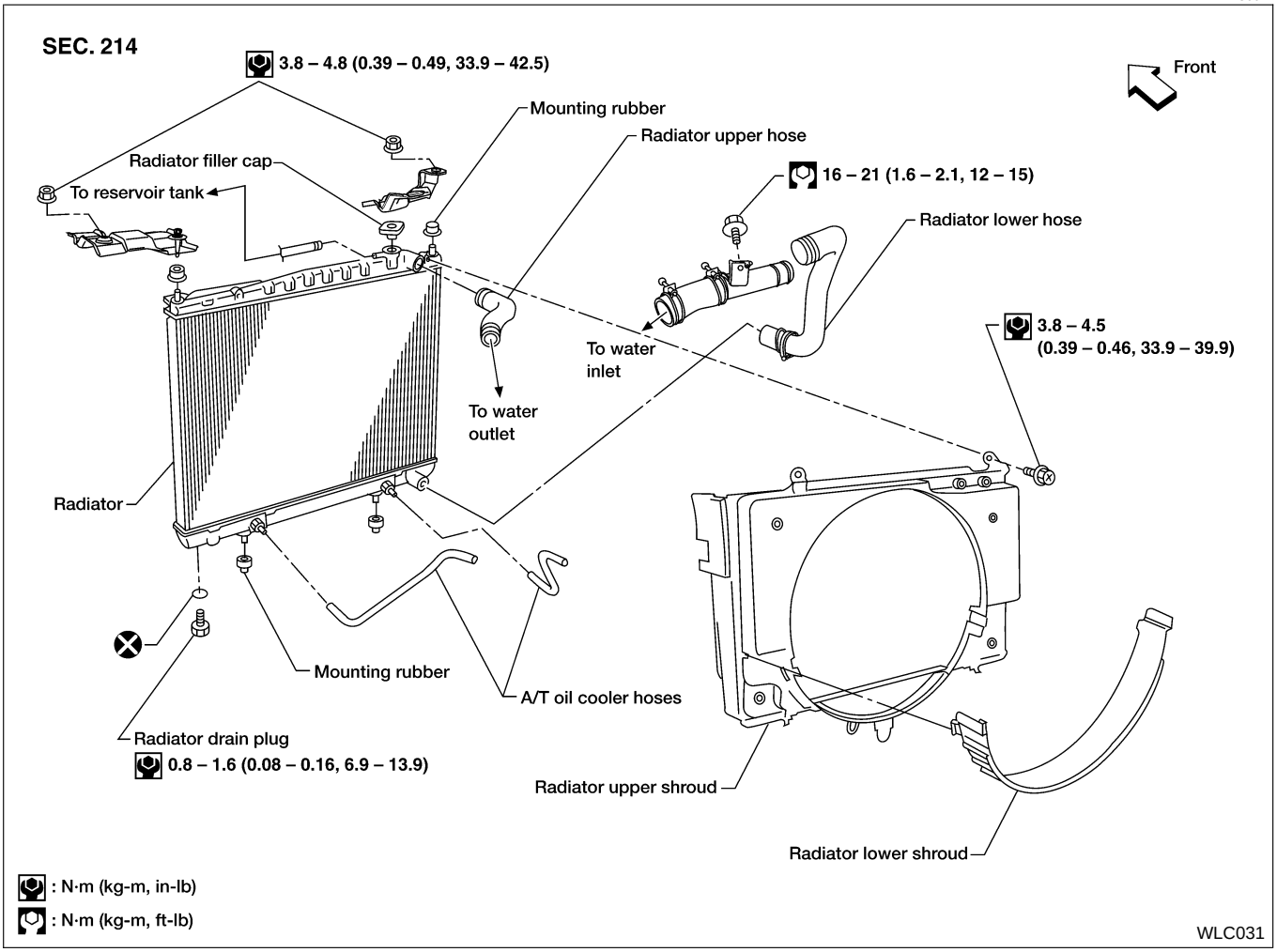
NELC0023

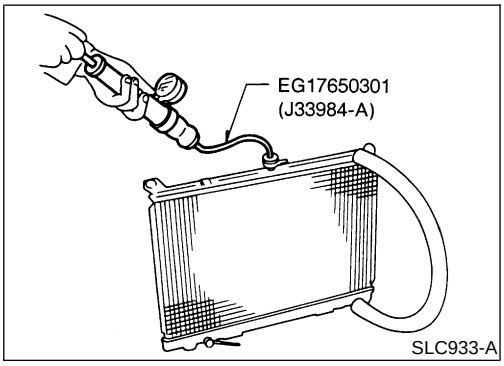
1. Remove under cover.
2. Drain coolant from radiator drain plug.
3. Remove air duct. (From mass air flow sensor to throttle body)
4. Disconnect radiator upper and lower hoses.
5. Remove A/T oil cooler hoses. (A/T model only)
6. Remove radiator lower shroud.
7. Disconnect reservoir tank hose.
8. Remove radiator.
9. After repairing or replacing radiator, install any part removed in reverse order of removal.
10. Refill the engine cooling system. Refer to ***MA-28***, "Changing Engine Coolant".

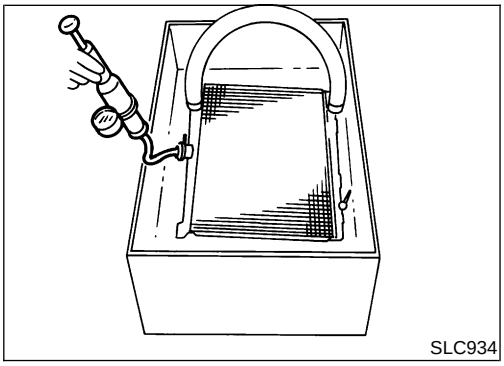
- After installation, run the engine until it reaches operating temperature and check the system for leaks.

COMPONENTS

NELC0024







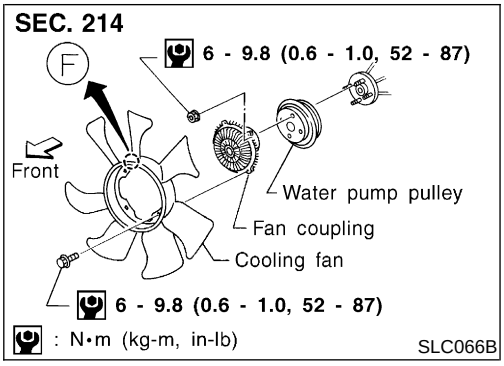
INSPECTION

NELC0028

1. Apply pressure with Tool.

Specified pressure value:
157 kPa (1.6 kg/cm^2, 23 psi)

2. Check for leakage.

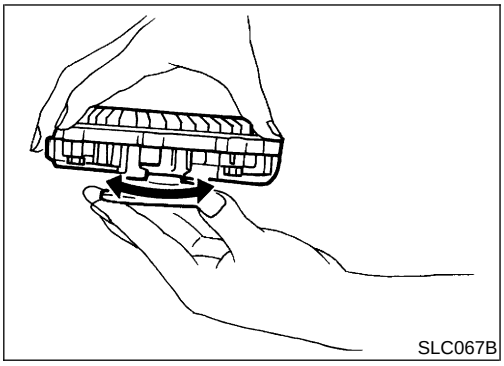


Cooling Fan (Crankshaft driven)

REMOVAL AND INSTALLATION

NELC0029

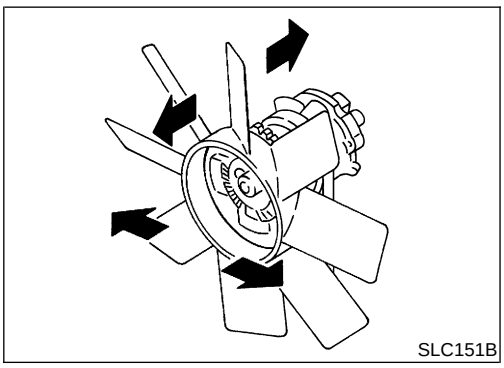
- Do not release the drive belt tension by removing the fan/water pump pulley.
- Fan coupling cannot be disassembled and should be replaced as a unit. If front mark **F** is present, install fan so that side marked **F** faces the front.
- Install the drive belt only after the fan and fan coupling to water pump flange bolts/nuts have been properly torqued.
- Proper alignment of these components is essential. Improper alignment will cause them to wobble and may eventually cause the fan to separate from the water pump causing extensive damage.



INSPECTION

NELC0030

Check fan coupling for rough operation, wobbling, oil leakage or bent bimetal fins.



After assembly, verify the fan does not wobble or flap while the engine is running.

WARNING:

- **When the engine is running, keep hands and clothing away from moving parts such as drive belts and fan.**

Refilling Engine Coolant

=NELC0031

For details on refilling the engine cooling system, refer to “REFILLING ENGINE COOLANT”, ***MA-28***.

Overheating Cause Analysis

NELC0032

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	—	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Fan coupling does not operate	Fan and coupling	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	Fan shroud	—
	Improper coolant mixture ratio	—	Coolant quality, viscosity	—
	Poor coolant quality	—		—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

Overheating Cause Analysis (Cont'd)

	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	Excessive payload
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	—
		Blocked radiator grille	Installed car brassiere	
			Mud contamination or paper clogging	
		Blocked radiator	Dirty radiator	
		Blocked condenser	Dirty condenser	
		Blockage in front of radiator	Installed large fog lamp	

Service Data and Specifications (SDS)

THERMOSTAT

NELC0033

Description	VG33E	VG33ER
Valve opening temperature	82°C (180°F)	76.5°C (170°F)
Valve lift	More than 10 mm/95°C (0.39 in/203°F)	More than 10 mm/90°C (0.39 in/194°F)

RADIATOR

NELC0034

Unit: kPa (kg/cm^2, psi)

Cap relief pressure	Standard	78 - 98 (0.8 - 1.0, 11 - 14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)