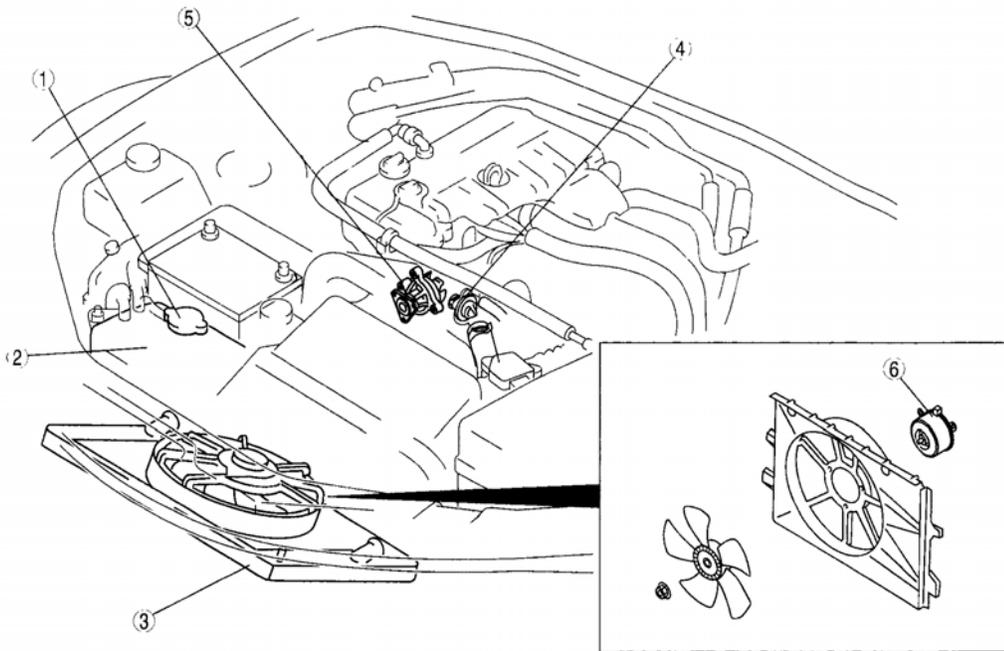


2007 ENGINE

Cooling System - MX-5 Miata

COOLING SYSTEM LOCATION INDEX [LF]



E5U112ZW5003

1	Cooling system cap
2	Coolant reserve tank
3	Radiator

4	Thermostat
5	Water pump
6	Cooling fan motor

**Fig. 1: Identifying Location Of Cooling System Components**  
 Courtesy of MAZDA MOTORS CORP.

COOLING SYSTEM SERVICE WARNINGS [LF]

**WARNING:**

- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

## **ENGINE COOLANT LEVEL INSPECTION [LF]**

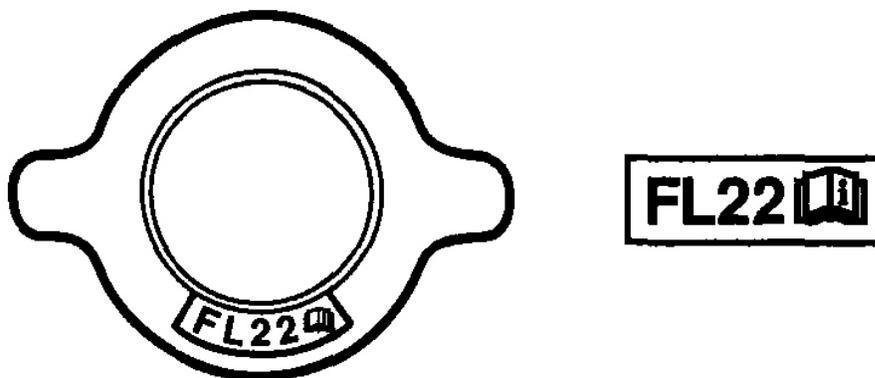
### **WARNING:**

- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

### **NOTE:**

- If the "FL22" mark is shown on or near the cooling system cap, use FL22 type engine coolant.
- FL22 type engine coolant is shipped as a diluted solution (55% coolant, 45% water). Use the solution as is when replacing coolant.

1. Verify that the engine coolant level in the coolant reserve tank is between the L and F marks.
2. If the engine coolant level is below L mark, add engine coolant.



E5U112ZW5010

**Fig. 2: Identifying Proper Cooling System Cap**  
Courtesy of MAZDA MOTORS CORP.

## ENGINE COOLANT PROTECTION INSPECTION [LF]

1. Measure the coolant temperature and specific gravity using a thermometer and a hydrometer.

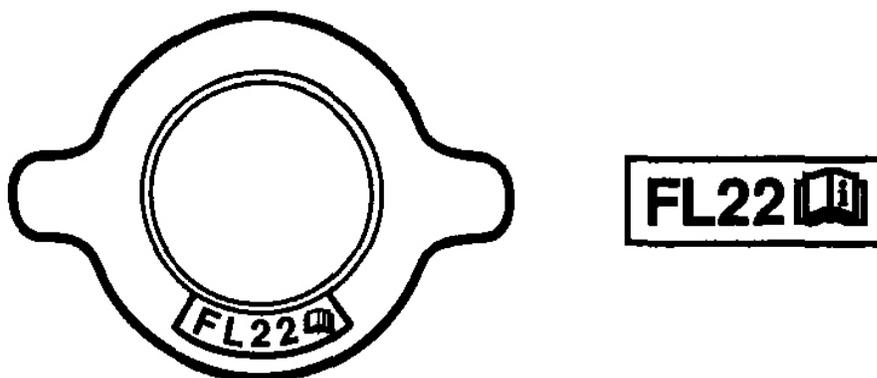
### CAUTION:

- Use engine coolant at a concentration that meets the environmental conditions in which the vehicle is driven, otherwise engine damage could occur.
- The engine has aluminum parts and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.
- Do not use coolants containing Alcohol, Methanol, Borate or Silicate. These coolants could damage the cooling system.
- Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.
- Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.

### NOTE:

- If the "FL22" mark is shown on or near the cooling system cap, use FL22 type engine coolant.
- FL22 type engine coolant is shipped as a diluted solution (55%

coolant, 45% water). Use the solution as is when replacing coolant.



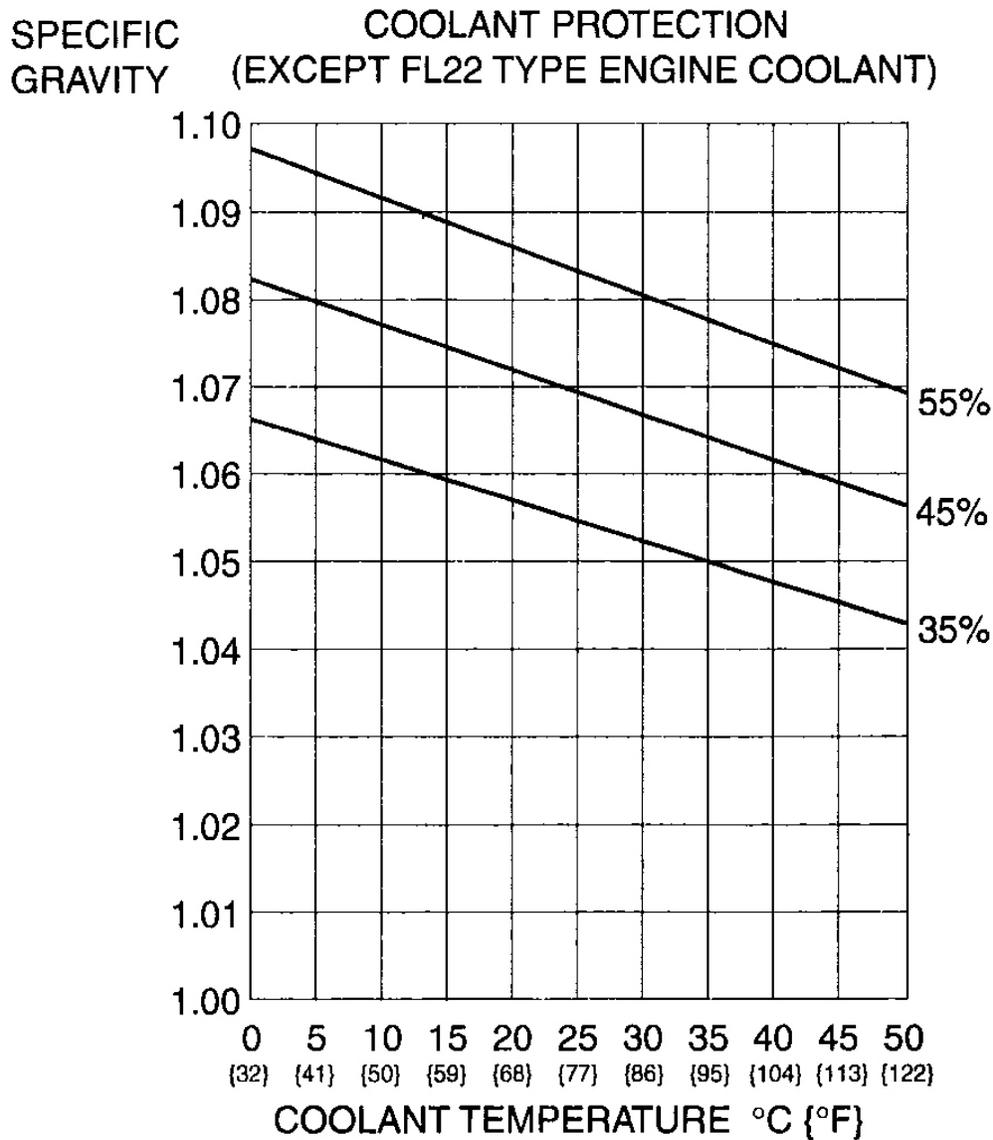
E5U112ZW5010

**Fig. 3: Identifying Proper Cooling System Cap**  
Courtesy of MAZDA MOTORS CORP.

2. Determine the coolant protection level by referring to the graph shown in **Fig. 4**.
  - If the coolant protection level is not correct, add water or coolant.

# 2007 Mazda MX-5 Miata Sport

2007 ENGINE Cooling System - MX-5 Miata



DDA112ZW4003

**Fig. 4: Coolant Protection Level Graph**  
Courtesy of MAZDA MOTORS CORP.

## ENGINE COOLANT REPLACEMENT [LF]

**WARNING:**

- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and

## 2007 Mazda MX-5 Miata Sport

### 2007 ENGINE Cooling System - MX-5 Miata

cause serious injury. It may also damage the engine and cooling system.

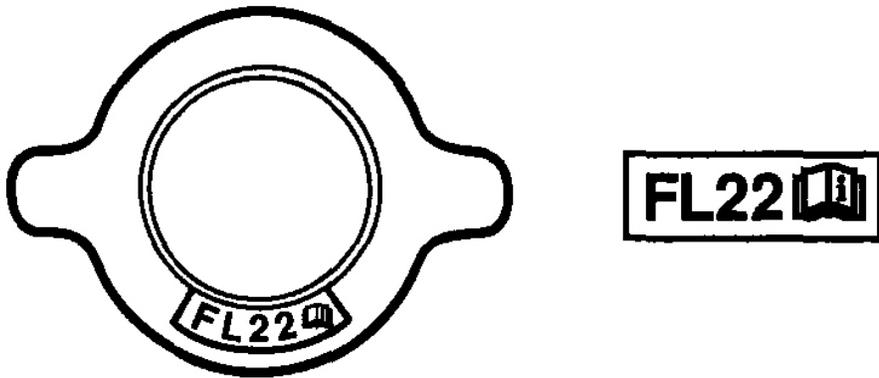
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

#### CAUTION:

- Use engine coolant at a concentration that meets the environmental conditions in which the vehicle is driven, otherwise engine damage could occur.
- The engine has aluminum parts and must be protected by an ethylene-glycol-based coolant to prevent corrosion and freezing.
- Do not use coolants containing Alcohol, Methanol, Borate or Silicate. These coolants could damage the cooling system.
- Use only soft (demineralized) water in the coolant mixture. Water that contains minerals will cut down on the coolant's effectiveness.
- Engine coolant damages paint. If engine coolant does get on a painted surface, rinse it off quickly.

#### NOTE:

- If the "FL22" mark is shown on or near the cooling system cap, use FL22 type engine coolant.
- FL22 type engine coolant is shipped as a diluted solution (55% coolant, 45% water). Use the solution as is when replacing coolant.



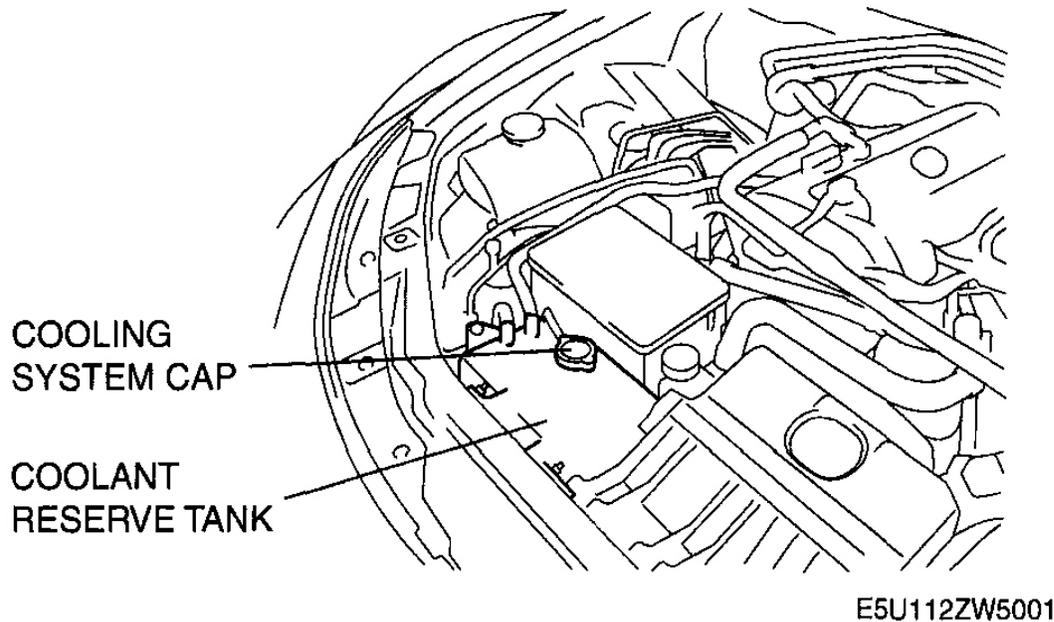
E5U112ZW5010

**Fig. 5: Identifying Proper Cooling System Cap**  
Courtesy of MAZDA MOTORS CORP.

**Engine coolant capacity (approx. quantity)**

**7.5 L {7.9 US qt, 6.6 Imp qt}**

1. Remove the cooling system cap.



**Fig. 6: Identifying Cooling System Cap & Reserve Tank**  
Courtesy of MAZDA MOTORS CORP.

2. Remove the radiator drain plug and drain the engine coolant into a container.
3. Flush the cooling system with water until all traces of color are gone.
4. Let the system drain completely.
5. Tighten the radiator drain plug.

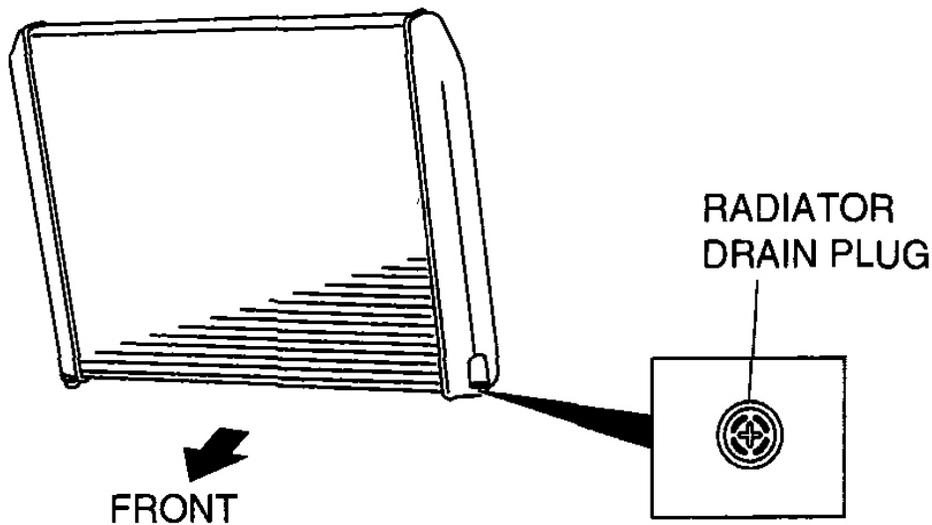
**Tightening torque**

**0.8-1.5 N.m {8-15 kgf.cm, 7-13 in.lbf}**

6. Referring to **ANTIFREEZE SOLUTION MIXTURE PERCENTAGE TABLE** , select the correct volume percentage of the water and coolant.

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2007 ENGINE Cooling System - MX-5 Miata



E5U112ZW5002

**Fig. 7: Identifying Radiator Drain Plug**  
Courtesy of MAZDA MOTORS CORP.

### ANTIFREEZE SOLUTION MIXTURE PERCENTAGE (EXCEPT FL22 TYPE ENGINE COOLANT)

Engine coolant protection	Volume percentage (%)		Gravity at 20°C {68°F}
	Water	Coolant	
Above -16°C {3°F}	65	35	1.057
Above -26°C {-15°F}	55	45	1.072
Above -40°C {-40°F}	45	55	1.086

7. Refill the coolant into the coolant reserve tank up to the F mark on the tank.
8. Install the cooling system cap.

#### **CAUTION:**

- If the water temperature gauge rises too high, stop the engine and decrease the water temperature to prevent overheating. Then, verify the malfunctioning part and repair or replace it.
- If the engine coolant level in the coolant reserve tank is below the L mark during engine coolant air bleeding operation, stop the engine, and after the engine coolant temperature decreases, add engine coolant. Then, resume the engine coolant air bleeding operation.

9. Start the engine and warm up the engine by idling.
10. After the engine warms up, perform the following steps. At this time, be careful of the coolant temperature to prevent overheating.
  1. Run the engine at **approx. 2,500 rpm** for **5 min** .
  2. Run the engine at **approx. 3,000 rpm** for **5s** , then idle.
  3. Repeat step 2 4-5 times.
11. Stop the engine, and inspect the coolant level after the coolant temperature decreases. If it is low, repeat steps 7 thru 10.
12. Inspect for engine coolant leakage. (See ENGINE COOLANT LEAKAGE INSPECTION [LF] .)

## ENGINE COOLANT LEAKAGE INSPECTION [LF]

### WARNING:

- **Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.**
- **Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.**
- **When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.**

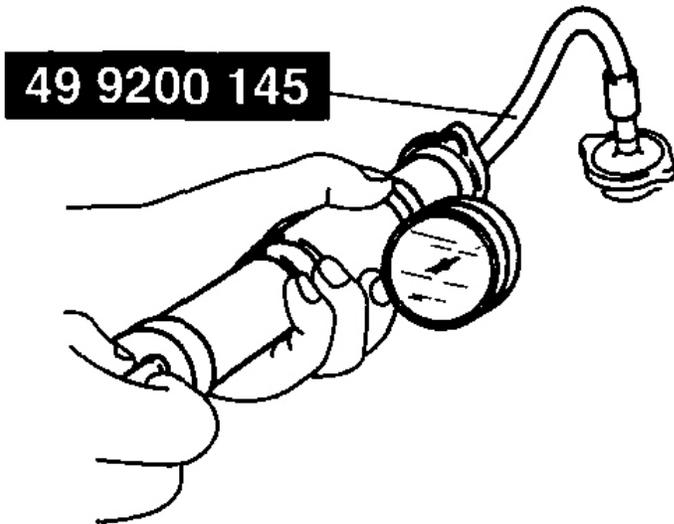
1. Inspect the engine coolant level. (See ENGINE COOLANT LEVEL INSPECTION [LF] .)
2. Remove the cooling system cap.
3. Clean the installation parts of the cooling system cap.
4. Install the **SST** and a radiator cap tester to the coolant reserve tank filler port.
5. Apply pressure using the radiator cap tester.

### CAUTION:

- **Applying more than 122.6 kPa {1.25 kgf/cm<sup>2</sup> , 17.8 psi} can damage the hoses, fittings, and other components, and cause leakage.**

### Pressure

**122.6 kPa {1.25 kgf/cm<sup>2</sup> , 17.8 psi} [1 min]**



CHU0112W013

**Fig. 8: Applying Pressure Using Radiator Cap Tester**  
Courtesy of MAZDA MOTORS CORP.

6. When pressurizing the cooling system, verify that the pressure is maintained.
  - If the gauge needle drops, it may indicate water leakage. Repair or replace the applicable part.

## COOLING SYSTEM CAP INSPECTION [LF]

### WARNING:

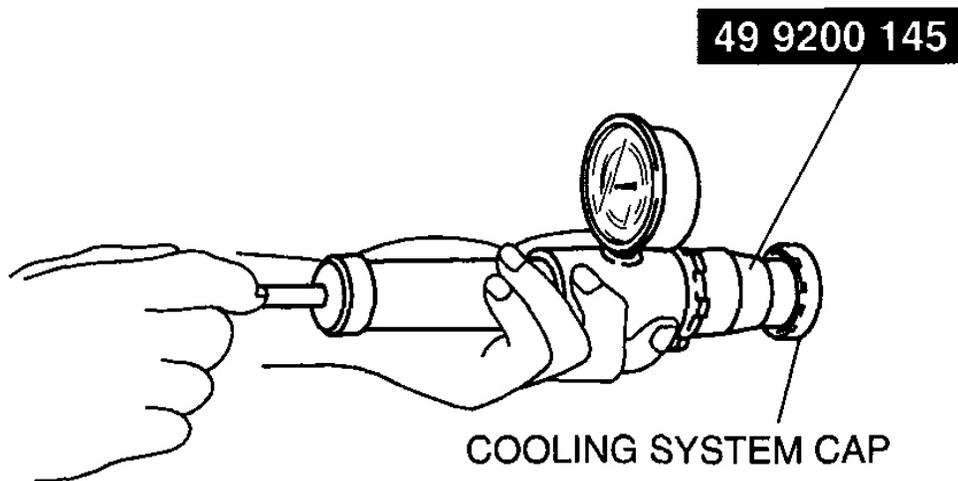
- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you're sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Clean the cooling system cap and the sealed part.

2. Inspect for cracks or roll up on the sealed part of the cooling system cap.
  - If there is any malfunction, replace the cooling system cap.
3. Attach the cooling system cap to the **SST** and a radiator cap tester.
4. Hold the cooling system cap downward and apply pressure gradually. Verify that the pressure is held stable for **10s** .
  - If the pressure is not held stable, replace the cooling system cap.

### Cooling system cap valve opening pressure

93.2-122.6 kPa {0.95-1.25 kgf/cm<sup>2</sup> , 13.5-17.8 psi}



CHU0112W011

**Fig. 9: Attaching Cooling System Cap To SST & Radiator Cap Tester**  
Courtesy of MAZDA MOTORS CORP.

## COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]

### WARNING:

- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and

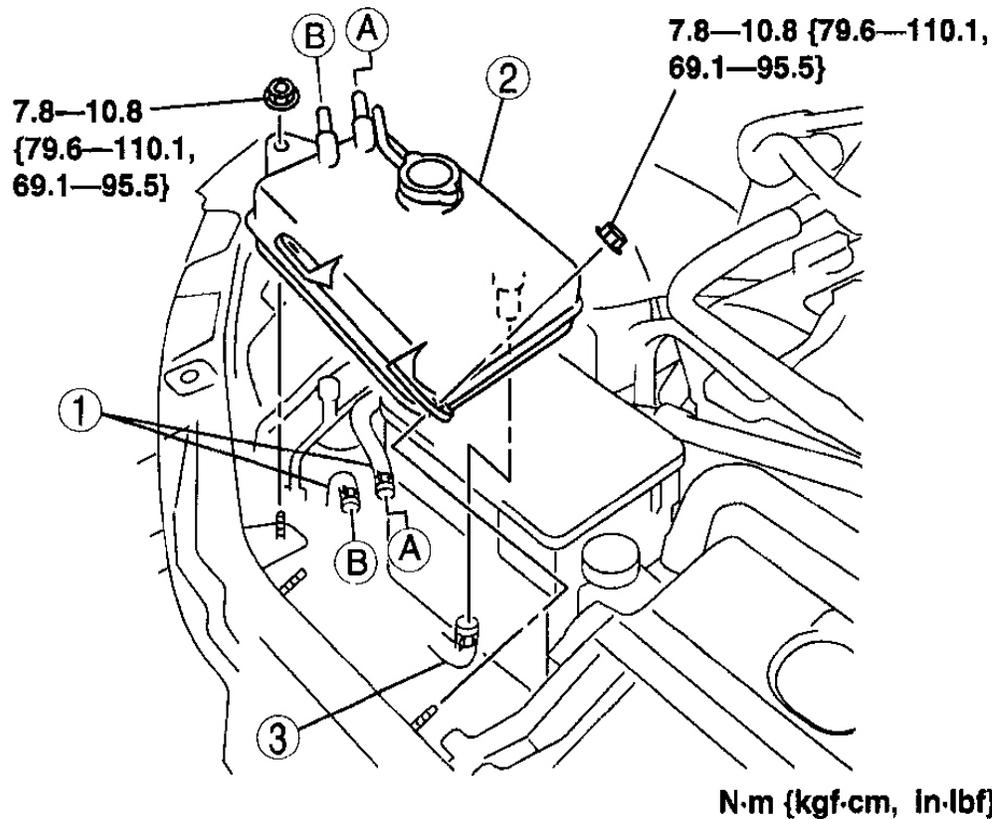
## 2007 Mazda MX-5 Miata Sport

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slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.

- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Drain the engine coolant until the coolant reserve tank becomes empty. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
2. Remove in the order indicated in **Fig. 10** .
3. Install in the reverse order of removal.
4. Add engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
5. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)



N·m {kgf·cm, in·lbf}

E5U112ZW5004

1	Hose
2	Coolant reserve tank
3	Hose

**Fig. 10: Identifying Removal Order Of Coolant Reserve Tank (With Torque Specifications)**  
Courtesy of MAZDA MOTORS CORP.

## RADIATOR REMOVAL/INSTALLATION [LF]

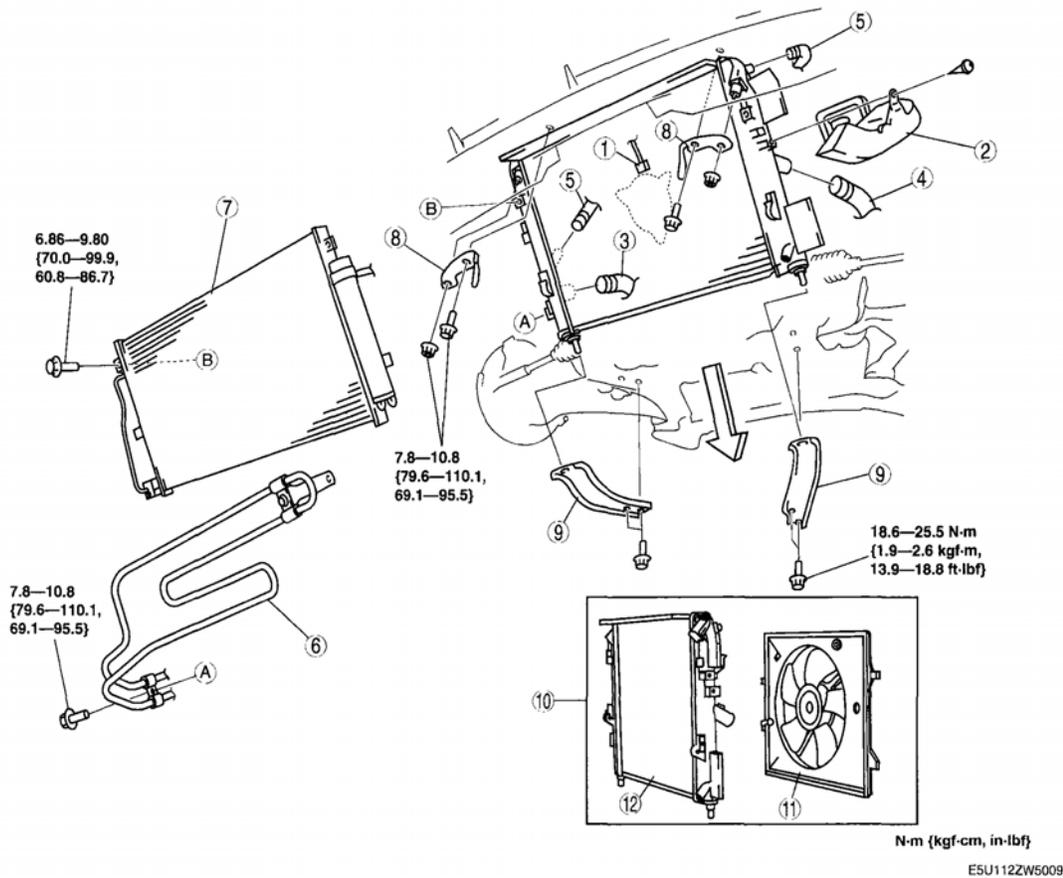
**WARNING:**

- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Remove the splash shield and under cover.
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
3. Remove the battery, battery tray, and battery duct. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the PCM and air cleaner insulator. (See **PCM REMOVAL/INSTALLATION [LF]** .)
6. Remove the coolant reserve tank. (See **COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the ATF oil cooler hose. (AT)
8. Remove in the order indicated in the table.
9. Install in the reverse order of removal.
10. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
11. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)
12. Inspect the ATF level. (AT) (See **AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION [SJ6A-EL]** .)

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1	Cooling fan motor connector
2	PCM duct
3	Radiator lower hose
4	Radiator upper hose
5	Coolant reserve tank hose
6	P/S cooling pipe

7	Condenser
8	Upper mount rubber bracket
9	Lower mount rubber bracket
10	Radiator and cooling fan component
11	Cooling fan component
12	Radiator

**Fig. 11: Identifying Removal Order Of Radiator (With Torque Specifications)**  
Courtesy of MAZDA MOTORS CORP.

### P/S COOLING PIPE REMOVAL NOTE

1. Remove the P/S cooling pipe with the hoses still connected.

### CONDENSER REMOVAL NOTE

1. Remove the condenser with the cooler pipes still connected.

### THERMOSTAT REMOVAL/INSTALLATION [LF]

#### WARNING:

- Never remove the cooling system cap or loosen the radiator drain

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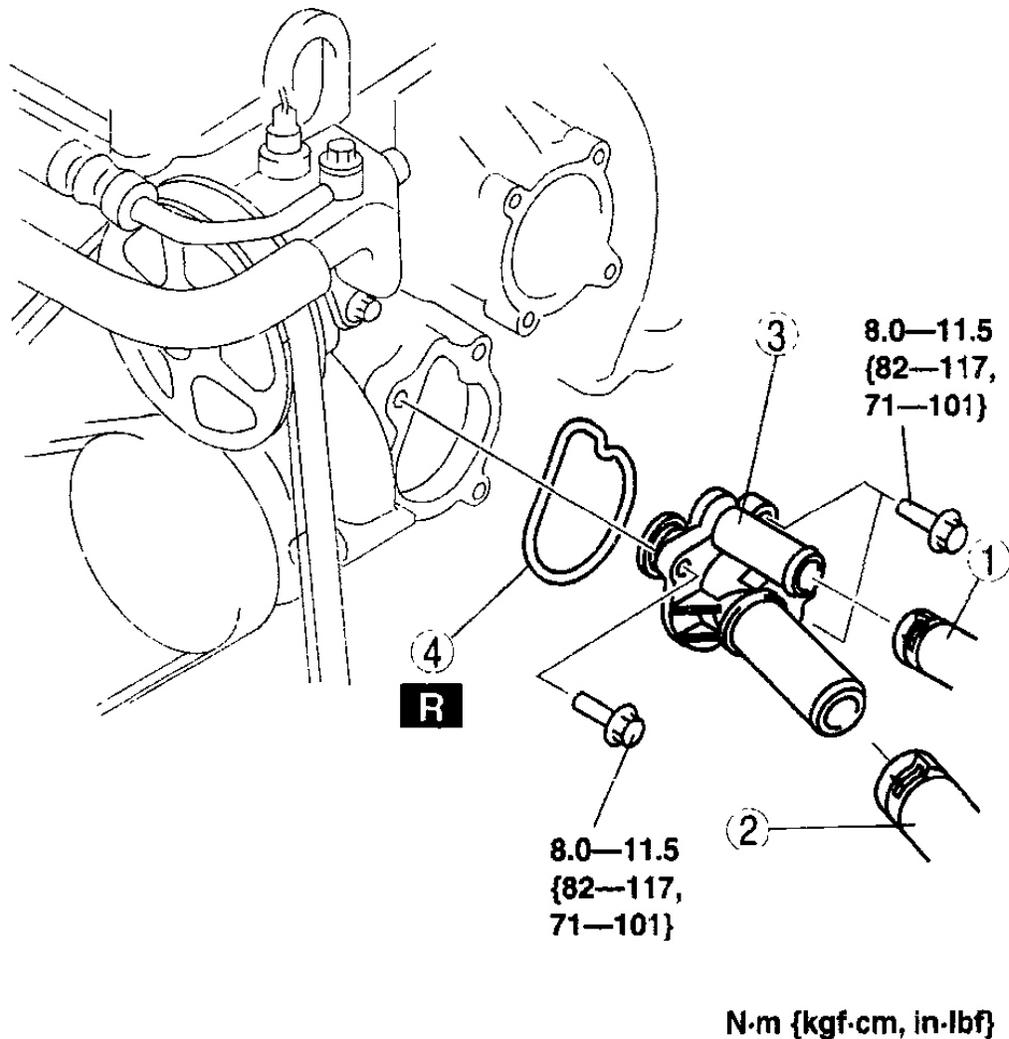
plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.

- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the throttle body. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove in the order indicated in **Fig. 12** .
6. Install in the reverse order of removal.
7. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
8. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)

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E5U112ZW5005

1	Bypass hose
2	Lower radiator hose
3	Thermostat component
4	Gasket

**Fig. 12: Identifying Removal Order Of Thermostat (With Torque Specifications)**  
 Courtesy of MAZDA MOTORS CORP.

### THERMOSTAT INSPECTION [LF]

1. Inspect the thermostat for the following.

**WARNING:**

- During inspection, the thermostat and water are extremely hot and can cause severe burns. Do not touch the thermostat and water.
- The valve should not open under normal temperature.
- Opening temperature and valve lift
  - If there is malfunction, replace the thermostat.

**Thermostat initial-opening temperature**

**80-84°C {176-183°F}**

**Thermostat full-open temperature**

**97°C {207°F}**

**Thermostat full-open lift**

**More than 8.0 mm {0.31 in}**

## **WATER PUMP REMOVAL/INSTALLATION [LF]**

**WARNING:**

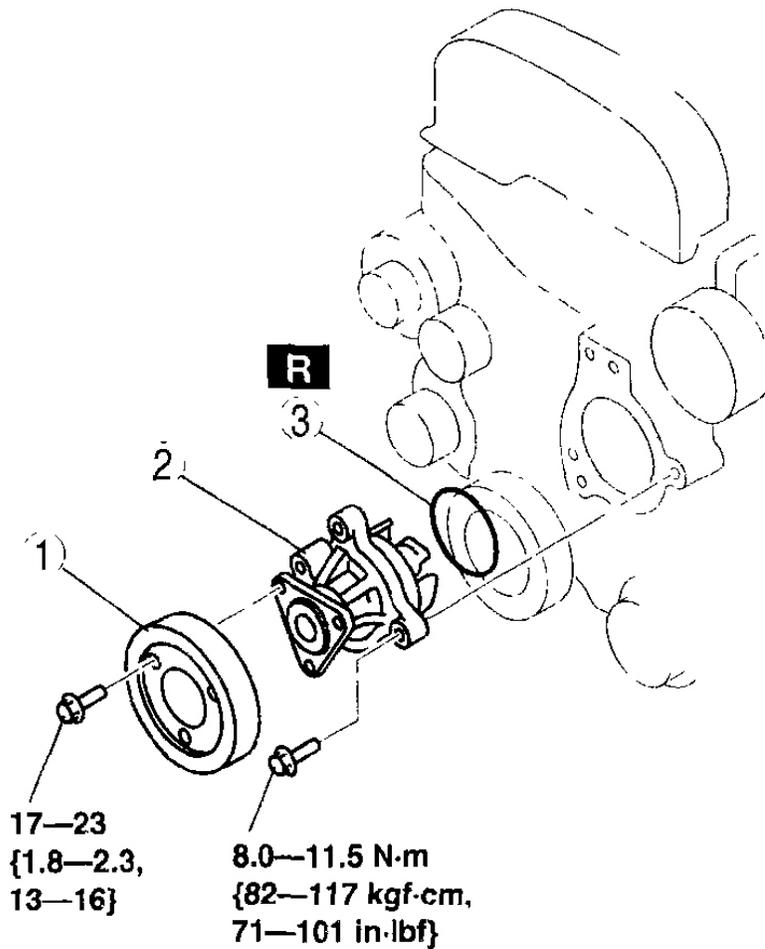
- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Remove the battery cover.
2. Disconnect the negative battery cable. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
3. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Loosen the water pump pulley bolt and remove the drive belt. (See **DRIVE BELT REPLACEMENT [LF]** .)

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6. Remove in the order indicated in **Fig. 13** .
7. Install in the reverse order of removal.
8. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
9. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)



N·m {kgf·m, ft·lbf}

E5U112ZW5006

1	Water pump pulley
2	Water pump
3	O-ring

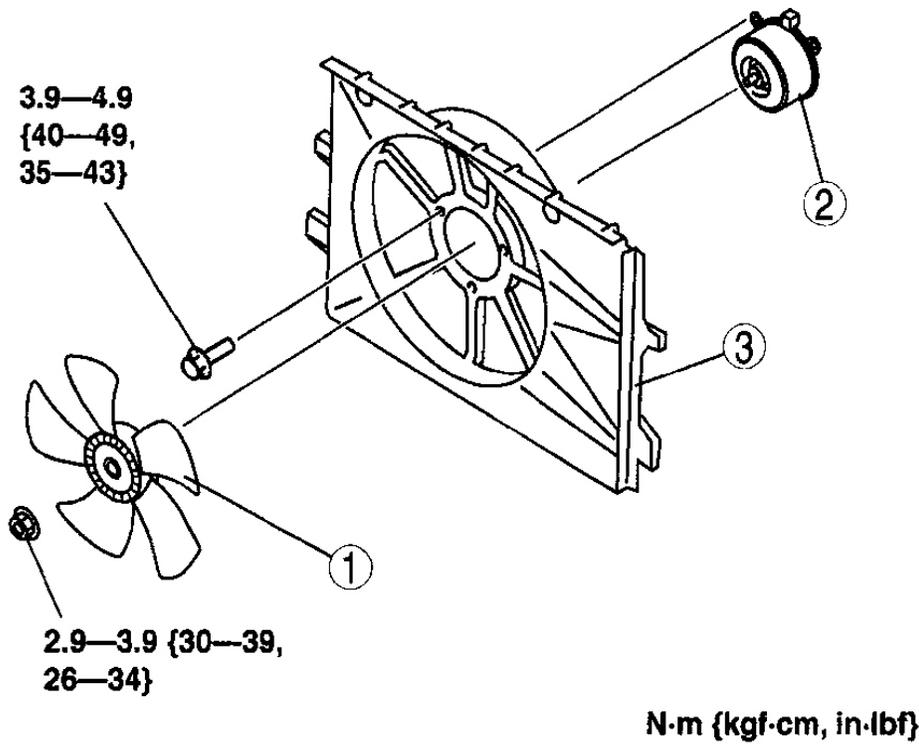
**Fig. 13: Identifying Removal Order Of Water Pump (With Torque Specifications)**  
Courtesy of MAZDA MOTORS CORP.

## FAN MOTOR REMOVAL/INSTALLATION [LF]

**WARNING:**

- Never remove the cooling system cap or loosen the radiator drain plug while the engine is running, or when the engine and radiator are hot. Scalding engine coolant and steam may shoot out and cause serious injury. It may also damage the engine and cooling system.
- Turn off the engine and wait until it is cool. Even then, be very careful when removing the cap. Wrap a thick cloth around it and slowly turn it counterclockwise to the first stop. Step back while the pressure escapes.
- When you are sure all the pressure is gone, press down on the cap using the cloth, turn it, and remove it.

1. Remove the splash shield and under cover.
2. Drain the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
3. Remove the battery, battery tray, and battery duct. (See **BATTERY REMOVAL/INSTALLATION [LF]** .)
4. Remove the air cleaner. (See **INTAKE-AIR SYSTEM REMOVAL/INSTALLATION [LF]** .)
5. Remove the PCM and air cleaner insulator. (See **PCM REMOVAL/INSTALLATION [LF]** .)
6. Remove the coolant reserve tank. (See **COOLANT RESERVE TANK REMOVAL/INSTALLATION [LF]** .)
7. Disconnect the ATF oil cooler hose. (AT)
8. Remove the radiator and cooling fan component. (See **RADIATOR REMOVAL/INSTALLATION [LF]** .)
9. Remove in the order indicated in the table.
10. Install in the reverse order of removal.
11. Refill the engine coolant. (See **ENGINE COOLANT REPLACEMENT [LF]** .)
12. Inspect for engine coolant leakage. (See **ENGINE COOLANT LEAKAGE INSPECTION [LF]** .)
13. Inspect the ATF level. (AT) (See **AUTOMATIC TRANSMISSION FLUID (ATF) INSPECTION [SJ6A-EL]** .)



E5U112ZW5008

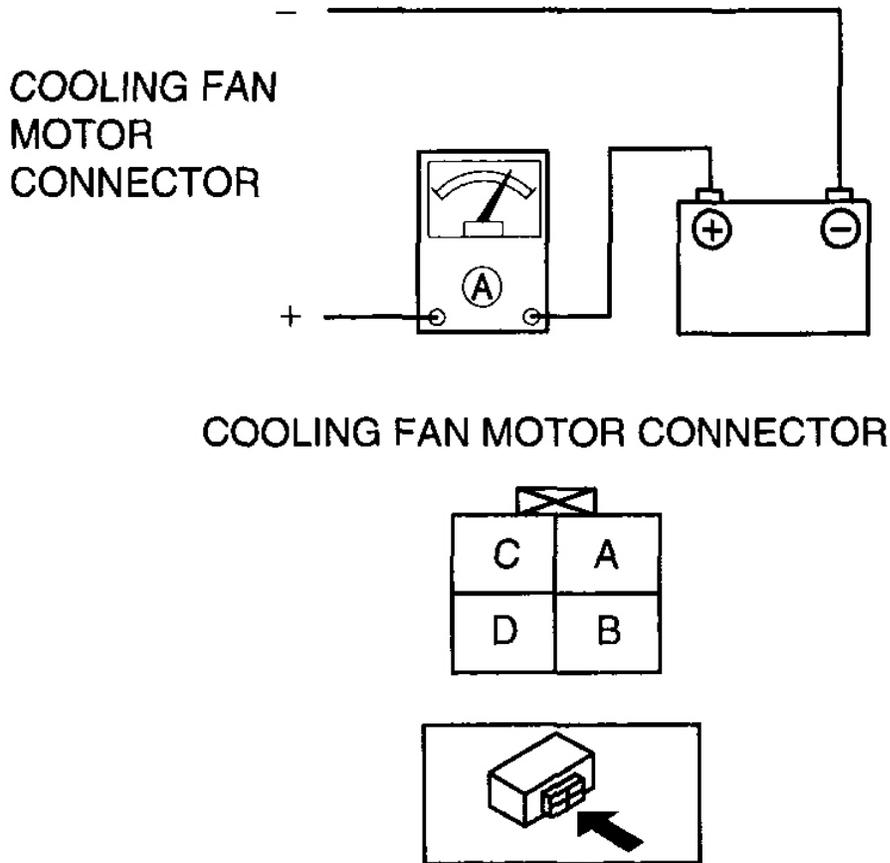
1	Cooling fan
2	Cooling fan motor
3	Radiator cowl

**Fig. 14: Identifying Removal Order Of Fan Motor (With Torque Specifications)**  
 Courtesy of MAZDA MOTORS CORP.

## FAN MOTOR INSPECTION [LF]

### PART INSPECTION

1. Verify that the battery is fully charged.
2. Install a tester and battery to the cooling fan motor connector (4 terminals) as shown in **Fig. 15**.



E5U112ZW5007

**Fig. 15: Identifying Cooling Fan Motor Connector**  
 Courtesy of MAZDA MOTORS CORP.

**FAN MOTOR OPERATION TABLE**

Fan motor rotation speed	Connection terminal	
	Positive	Negative
High	A and C	B and D
Middle	C	B and D
Low	C	B

- Verify that fan motor operates smoothly at the standard current.
  - If there is any malfunction, replace the applicable part.

**Cooling fan motor current**

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**High: 9.0-12.0 A**

**Middle: 6.4-9.4 A**

**Low: 4.8-7.8 A**