

COOLING SYSTEM

1528-01/1528-07/1528-09/1528-20/1528-22/1528-24/
2112-01/2112-02/2130-13/9210-05/

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COOLING SYSTEM

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دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



COOLING SYSTEM**1528-01****GENERAL INFORMATION****1. SPECIFICATIONS**

Category			Specifications	Remarks
Cooler	Type		Forced circulation / water-cooled	-
Radiator	Coolant flow type		Cross flow	
	Core size (mm)		A/T: 480W*460H*16T M/T: 480W*460H*11T	
Electric fan	Type		Electric	
	Capacity	A/T	200 W	
		M/T	150 W	
	Control type		Resistor type (low/high)	
Coolant reservoir tank	Capacity		1.6 L	
	Cap type / pressure		Screw type / 1.4bar	
Thermostat	Type		Wax pellet type	
	Opening temperature		90 ± 2°C	
	Fully open temperature		100°C	
Coolant	Anti-freeze		SYC1025 (LCC)	
	Mixing ratio (water:antifreeze)		50:50	
	Coolant capacity		Approx. 6.5 L	

Modification basis	
Application basis	
Approved by	

COOLING SYSTEM

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2. PRECAUTIONS

CAUTION

- If 100% of anti-freeze is added, the water pump vane can be damaged and thermal conductivity can be decreased resulting in poor circulation in the cooling system which leads to overheated engine.
- Use of non-recommended coolant could form scales in the cooling system because of chemical reaction. This restricts the flow in the cooling system and causes overheating and seizure of the engine.
- Hot coolant or steam can spray out with great force when the coolant reservoir tank cap is opened while the engine is running or hot, causing serious burns.
- To open the coolant reservoir cap, wrap the cap with a wet towel or thick cloth after the engine has been cooled down sufficiently.
- If cold water is added while the engine is overheated, the engine or radiator can be deformed.
- Anti-freeze can damage the painted surface. Avoid contact with the painted surface.
- Anti-freeze and water should be mixed in proper mixture ratio. Never add only water when the coolant runs low.
- If the anti-freeze concentration is too low, there is a danger of freeze-up. If the anti-freeze concentration is too high, it will reduce the cooling capacity of the system, resulting in overheating of the engine.

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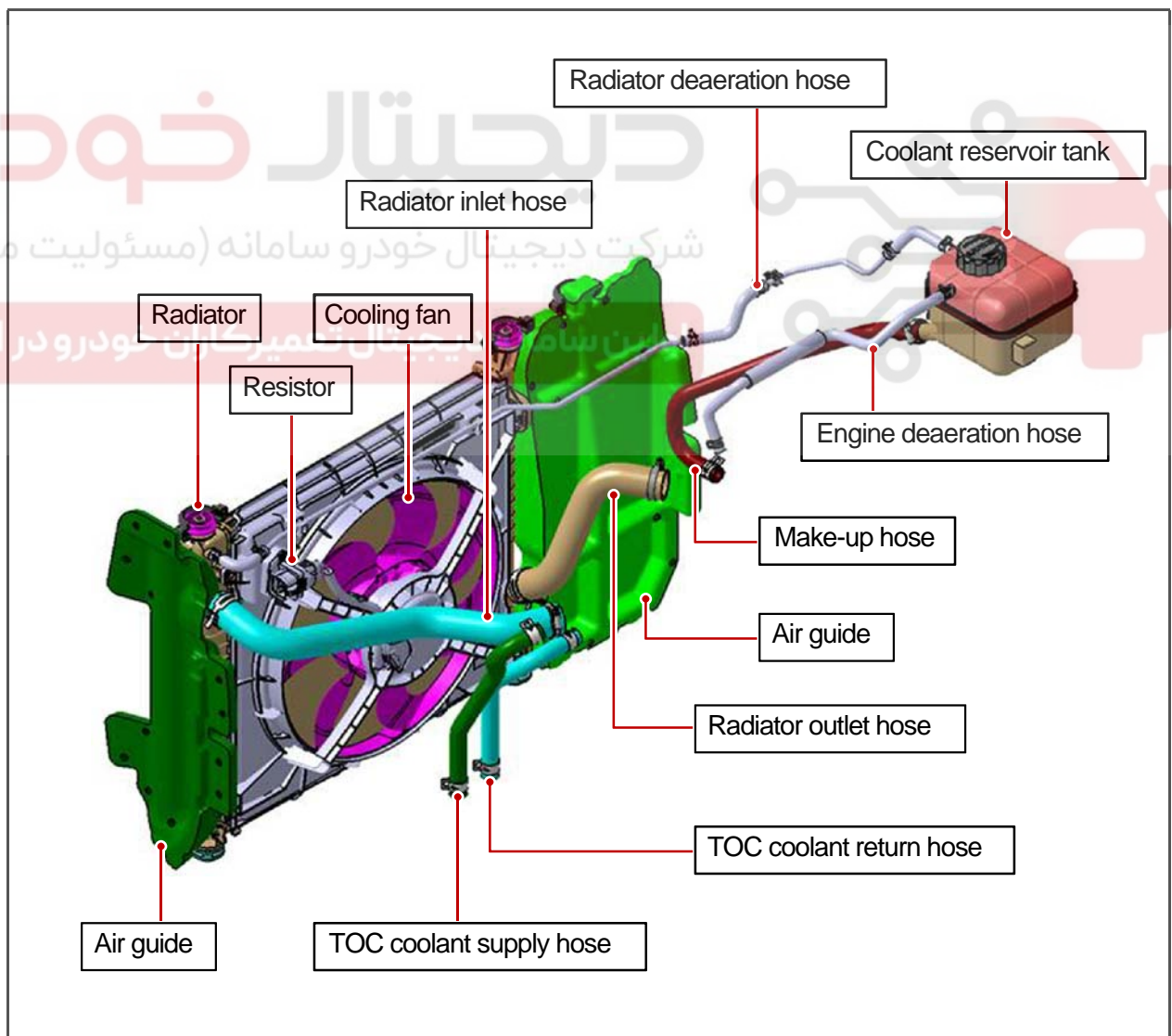
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OVERVIEW AND OPERATING PROCESS




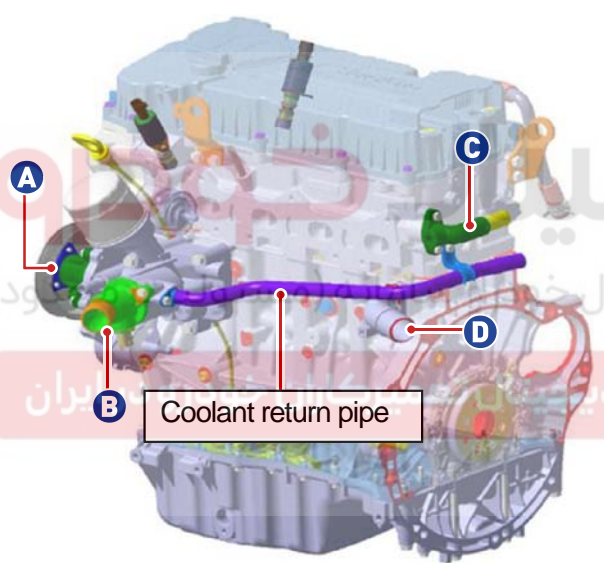
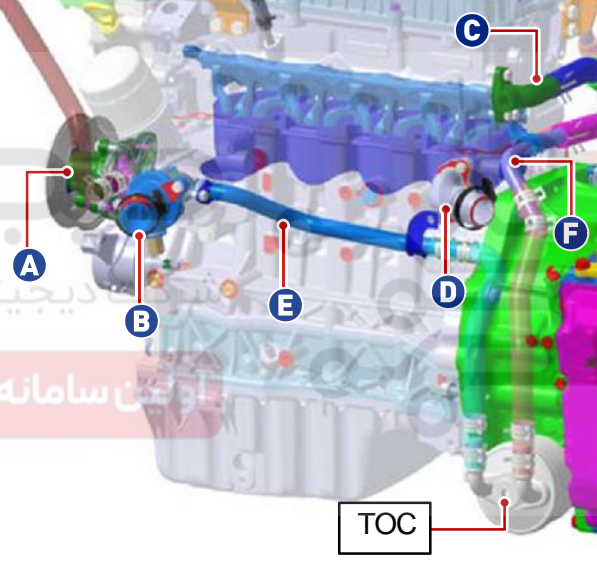



1. OVERVIEW

The cooling system of the engine dissipates the heat generated by the running engine. The coolant is forced to circulate by the water pump and cooled down in the radiator by heat exchange between the coolant and the fresh air taken in through the fan. Properly cooled down coolant in the radiator flows into the engine to maintain the optimized engine operating temperature. For a vehicle with A/T, the coolant also flows into the transmission oil cooler (TOC) of the A/T through the heater core and absorbs the heat enough to maintain the best operating temperature. The electric fan is equipped with a resistor. The engine ECU controls the 2 electric fan relays which determine the speed of the fan (high speed and low speed). It also controls the A/C compressor and electric fan according to the operation of A/C.

2. COMPONENTS



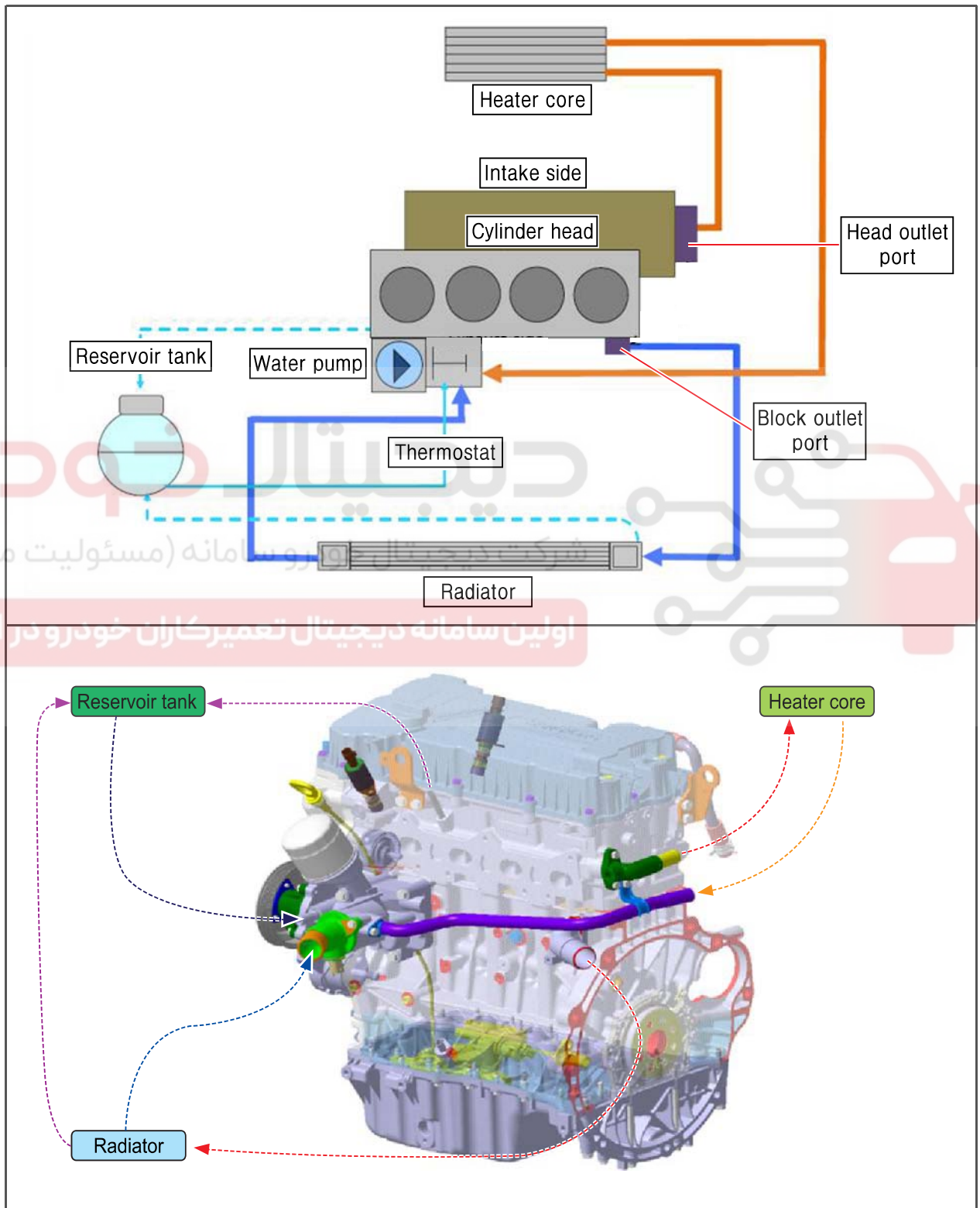
Modification basis	
Application basis	
Approval	

<div>A</div> <div>Water pump</div> <div></div>	<div>B</div> <div>Thermostat</div> <div></div>	<div>C</div> <div>Cylinder head outlet port</div> <div><div>Coolant temperature sensor</div><div></div></div>			
<div>For a vehicle with M/T</div> <div><div>A</div><div>B</div><div>C</div><div>D</div><div>Coolant return pipe</div><div></div></div>			<div>For a vehicle with A/T</div> <div><div>A</div><div>B</div><div>C</div><div>D</div><div>E</div><div>F</div><div>TOC</div><div></div></div>		
<div>D</div> <div>Cylinder block outlet port</div> <div></div>	<div>E</div> <div>TOC coolant return pipe</div> <div></div>	<div>F</div> <div>TOC coolant supply pipe</div> <div></div>			

3. OPERATING PROCESS

1) System Diagram

► For a vehicle with M/T

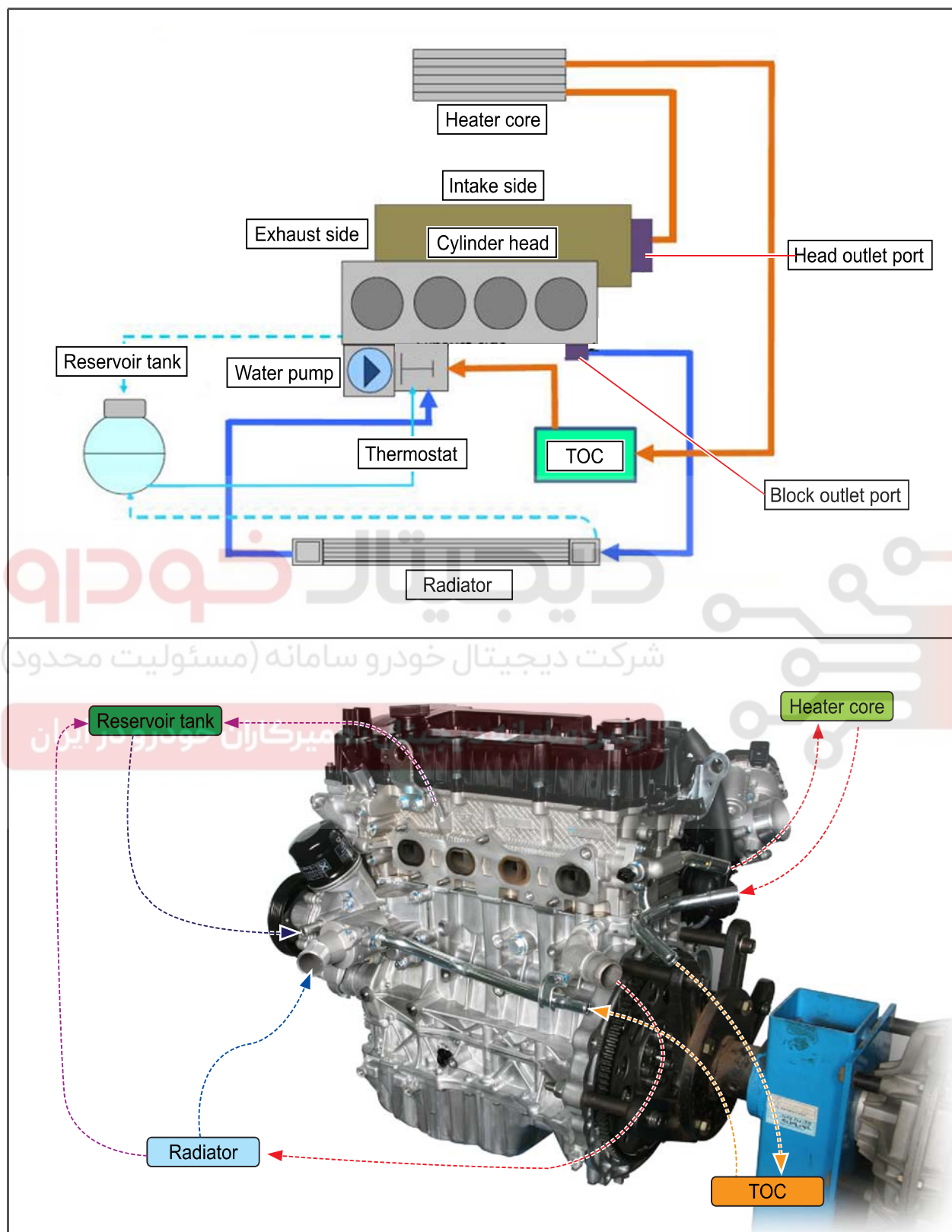


Modification basis	
Application basis	
Approval	

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► For a vehicle with A/T

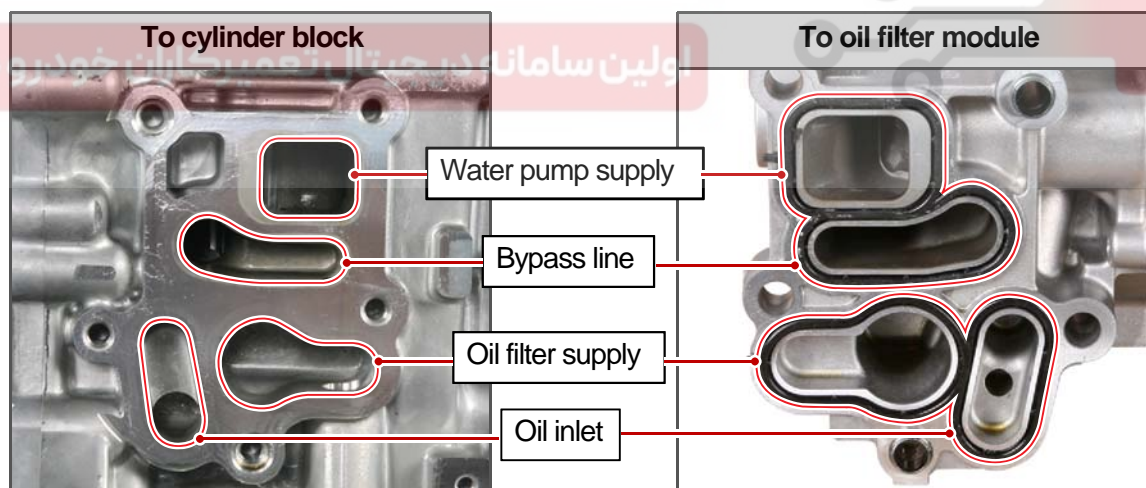
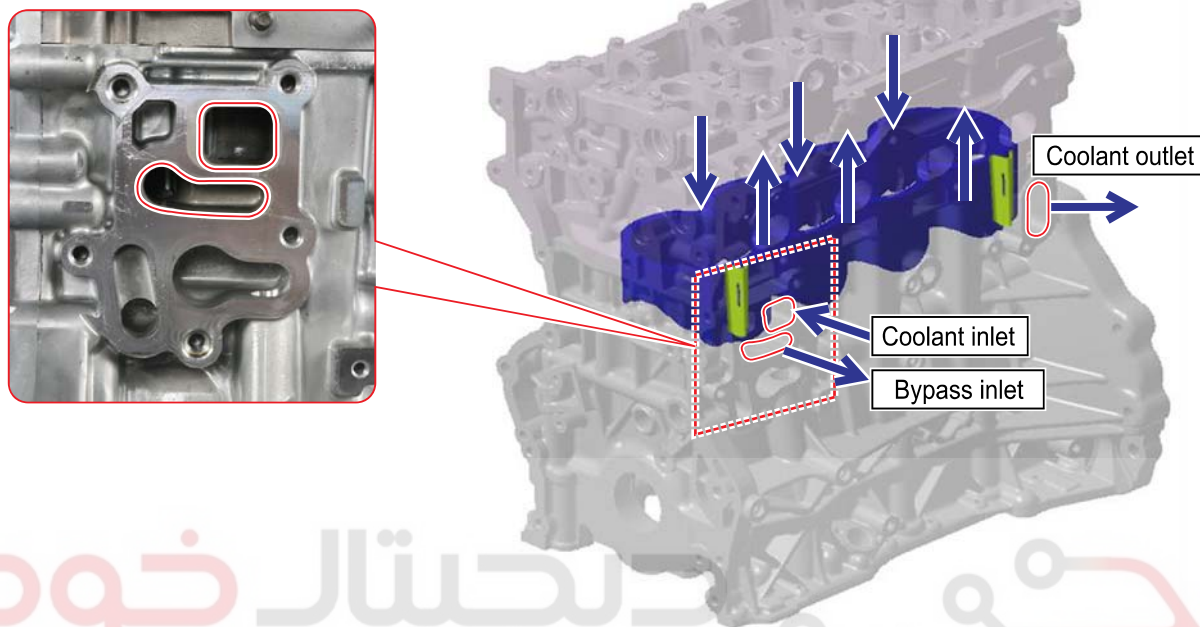


COOLING SYSTEM

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Modification basis	
Application basis	
Affected VIN	021 62 99 92 92

► Flow in cooling system

**NOTE**

- Oil filter supply: Cylinder block to oil filter, Before filtering
- Oil inlet: Oil filter to cylinder block, After filtering

Modification basis	
Application basis	
Approval	

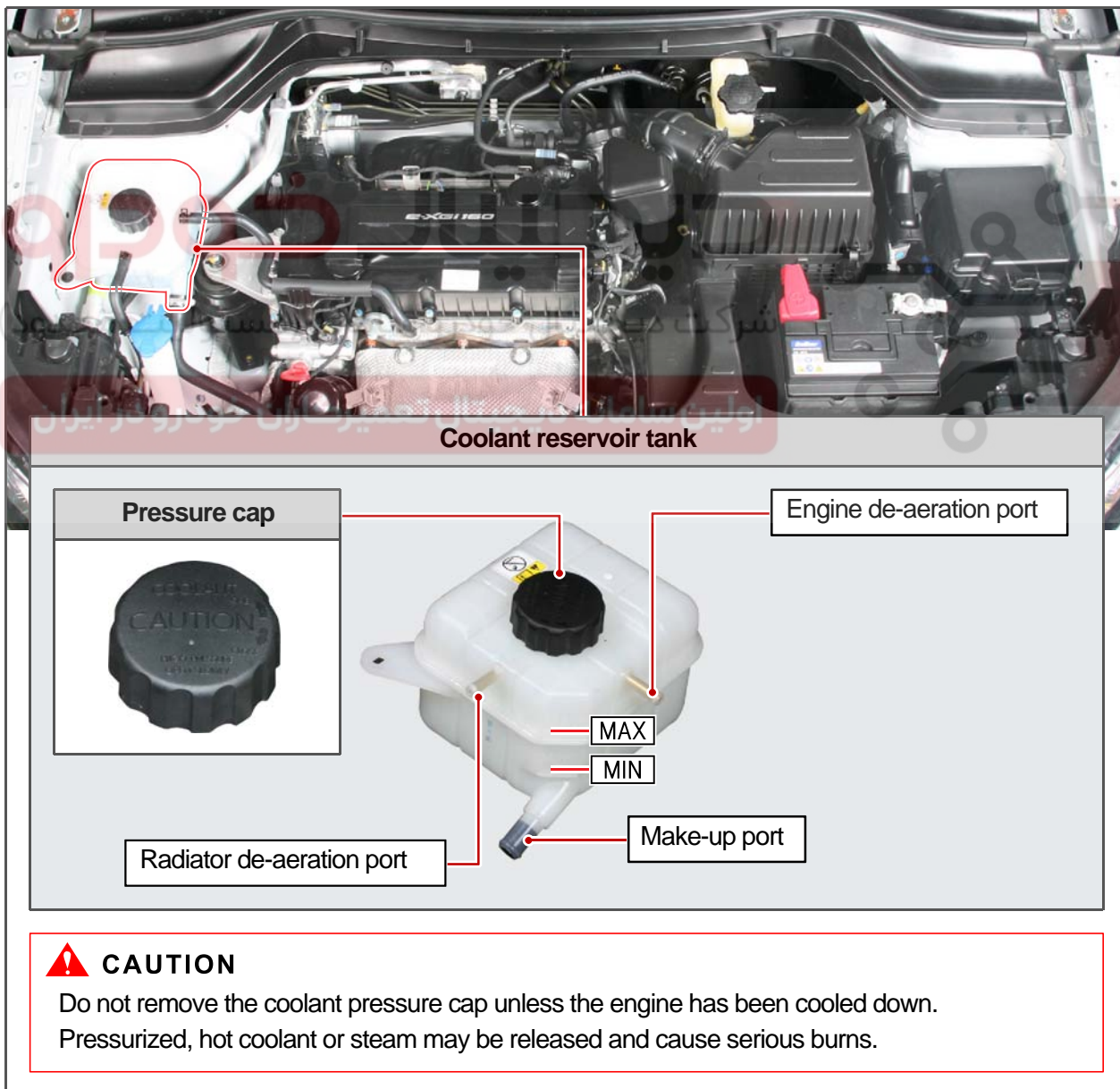
CONFIGURATION AND FUNCTIONS

2130-13 COOLANT RESERVOIR TANK

1) Overview

The coolant reservoir tank is made of semi-transparent plastic so that the coolant level can be identified visually. This tank collects the vapor generated in the process of coolant circulation separately to improve the cooling performance. The pressure cap of the tank keeps the coolant boiling point high to minimize the loss of coolant. The coolant level should be between the MAX and MIN marks on the coolant reservoir tank after the cooling system has been cooled down.

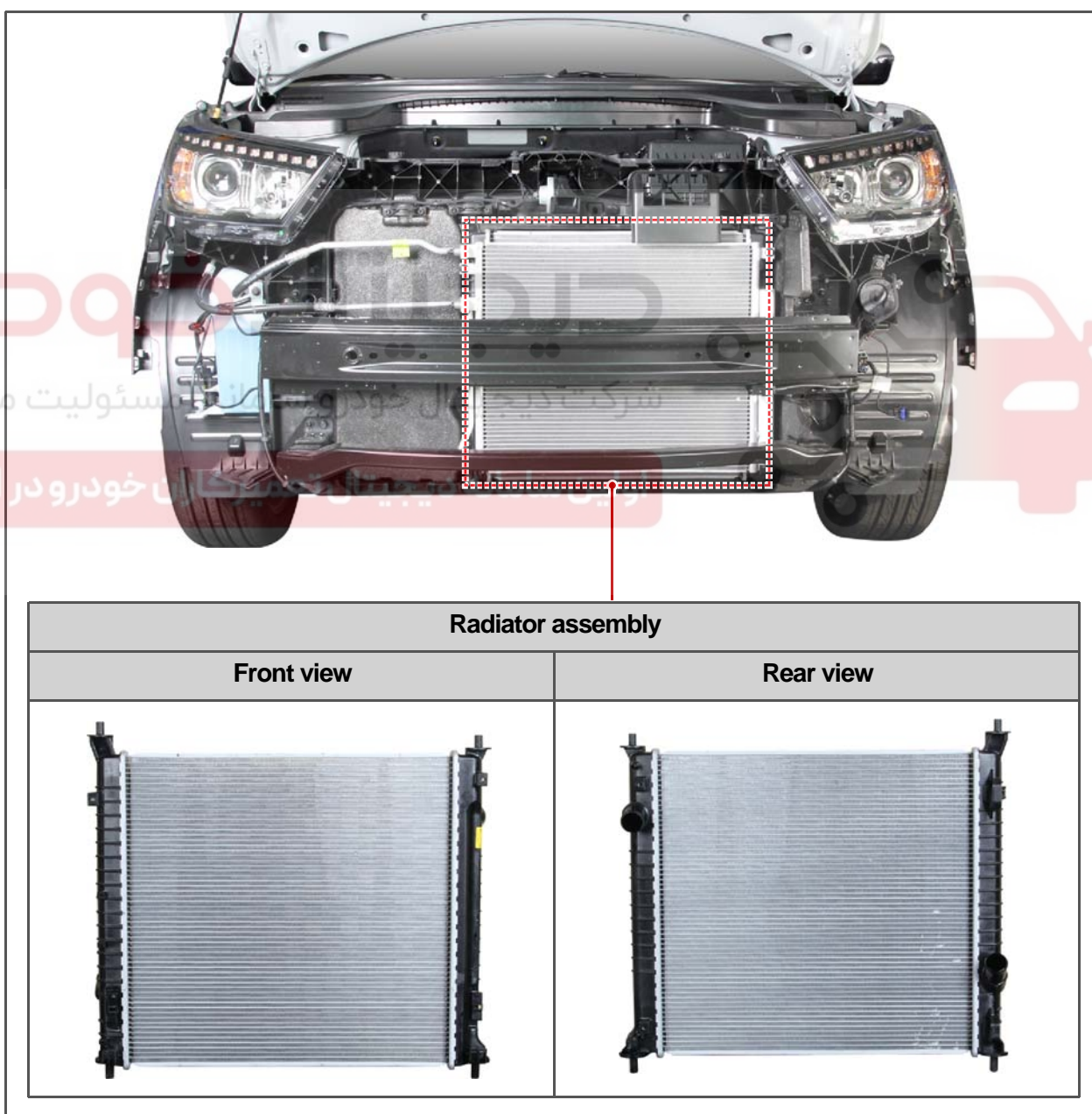
2) Mounting Location and Components



S.G.N.

2112-01 RADIATOR ASSEMBLY**1) Overview**

When the coolant flows through the coolant passages of the cylinder block and cylinder head, the coolant is heated by the heat from the engine. The radiator assembly cools down the heated coolant while the coolant flows in the radiator. This vehicle is equipped with a light fin tube type aluminum radiator. The fins are located on the outer surface to transfer heat to ambient air. The coolant heat is transferred by the fins as the coolant passes through the tube of the radiator core.

2) Mounting Location and Components

Modification basis	
Application basis	
Approval	

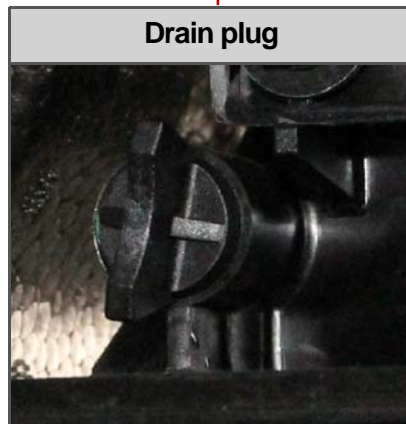
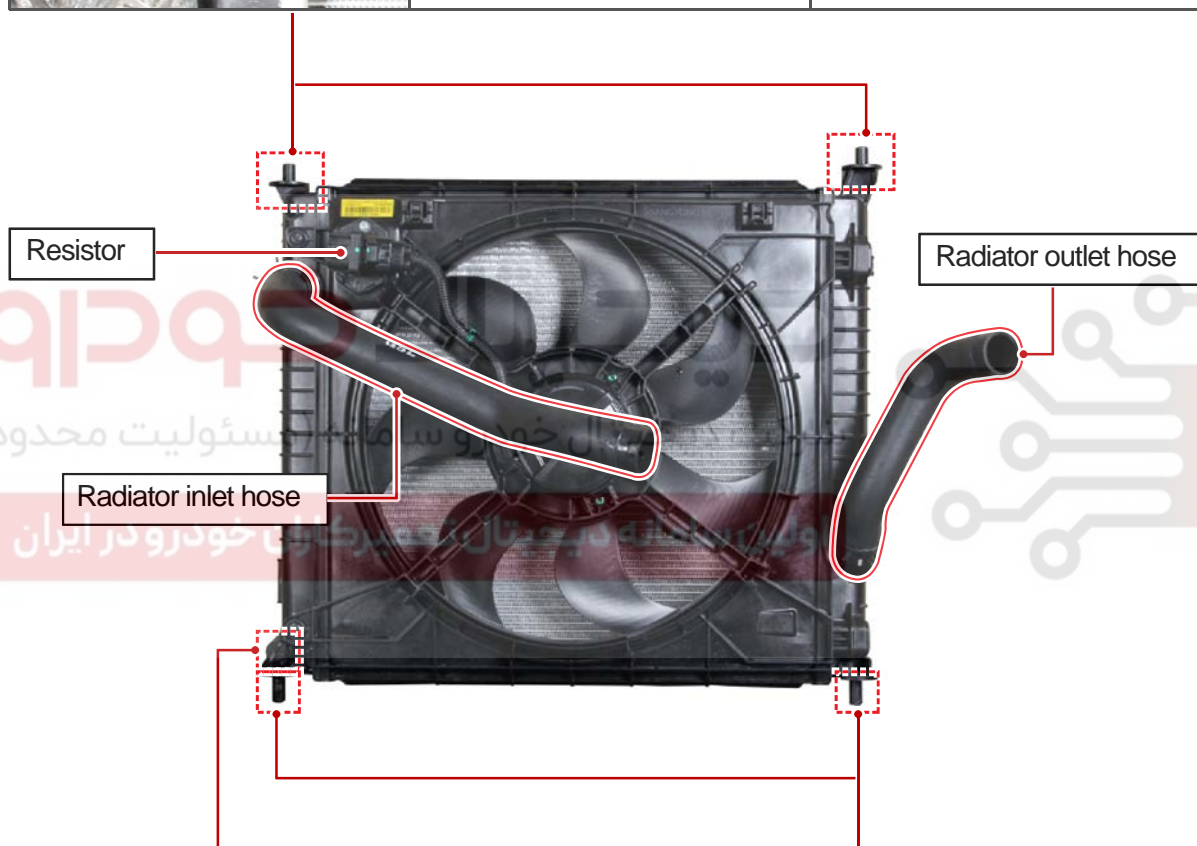
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Electric fan installed on radiator



Upper mounting bracket with insulator

Fitted	Bracket	Insulator
		



Drain plug

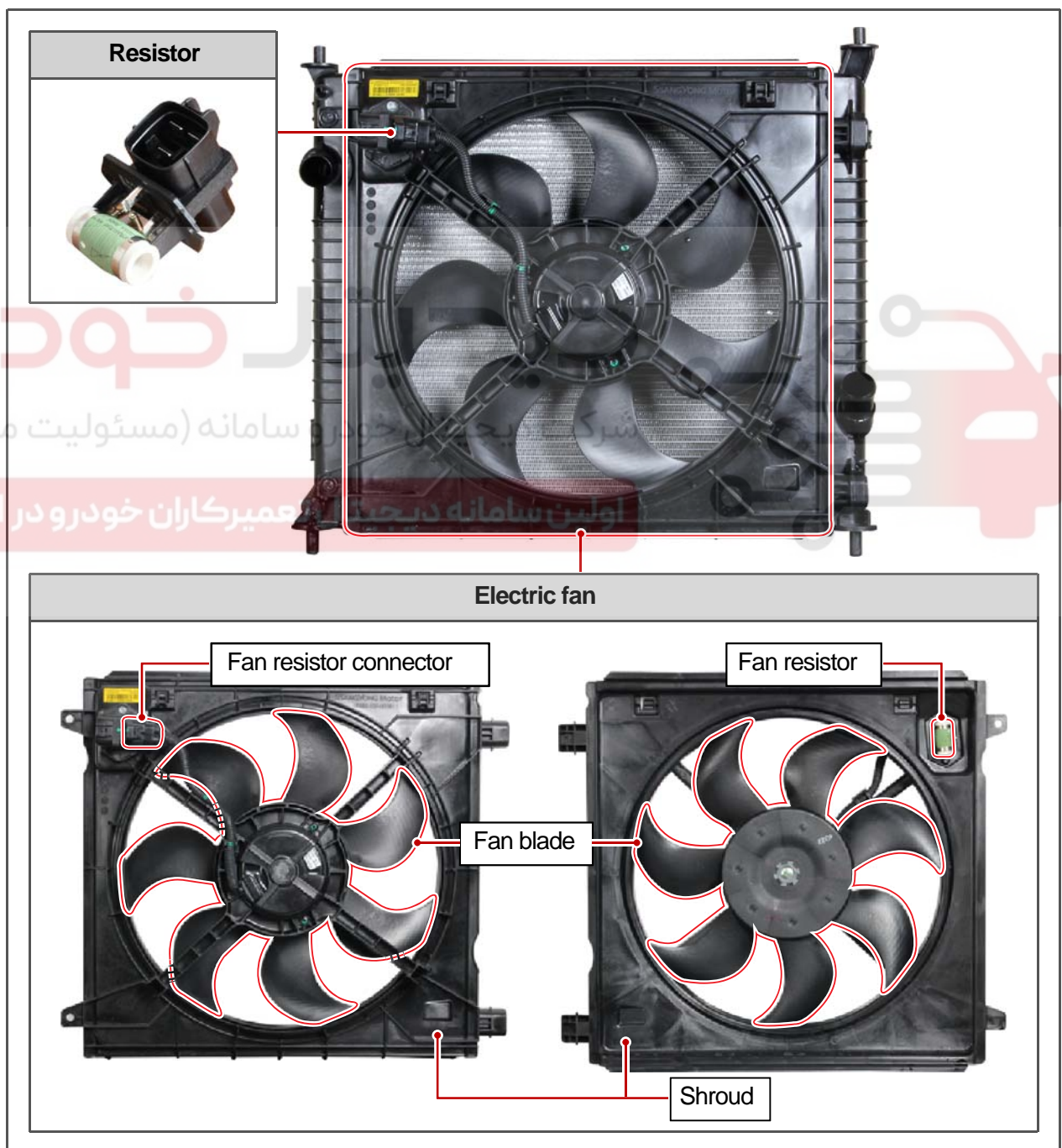
Lower mounting insulator

Fitted	Component
	

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2112-02 ELECTRIC FAN**1) Overview**

The electric fan is installed on the rear side of the radiator. It brings in fresh air using the motor and dissipates the heat generated by the running engine to improve the cooling performance. The electric fan is operated by the engine ECU which controls the 2 electric fan relays (high speed and low speed).

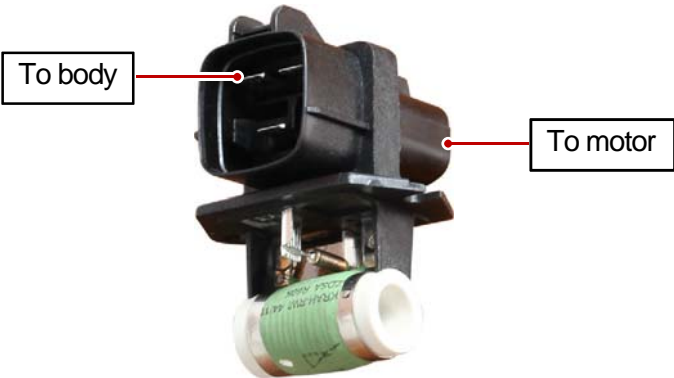
2) Mounting Location and Components

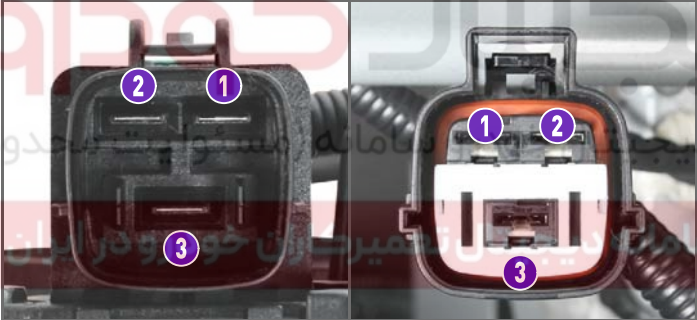
Modification basis	
Application basis	
Approval basis	

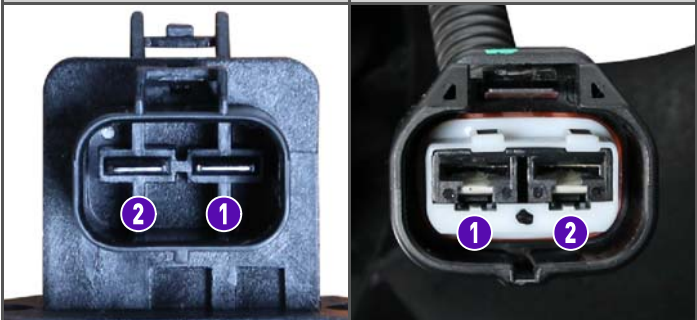
COOLING SYSTEM

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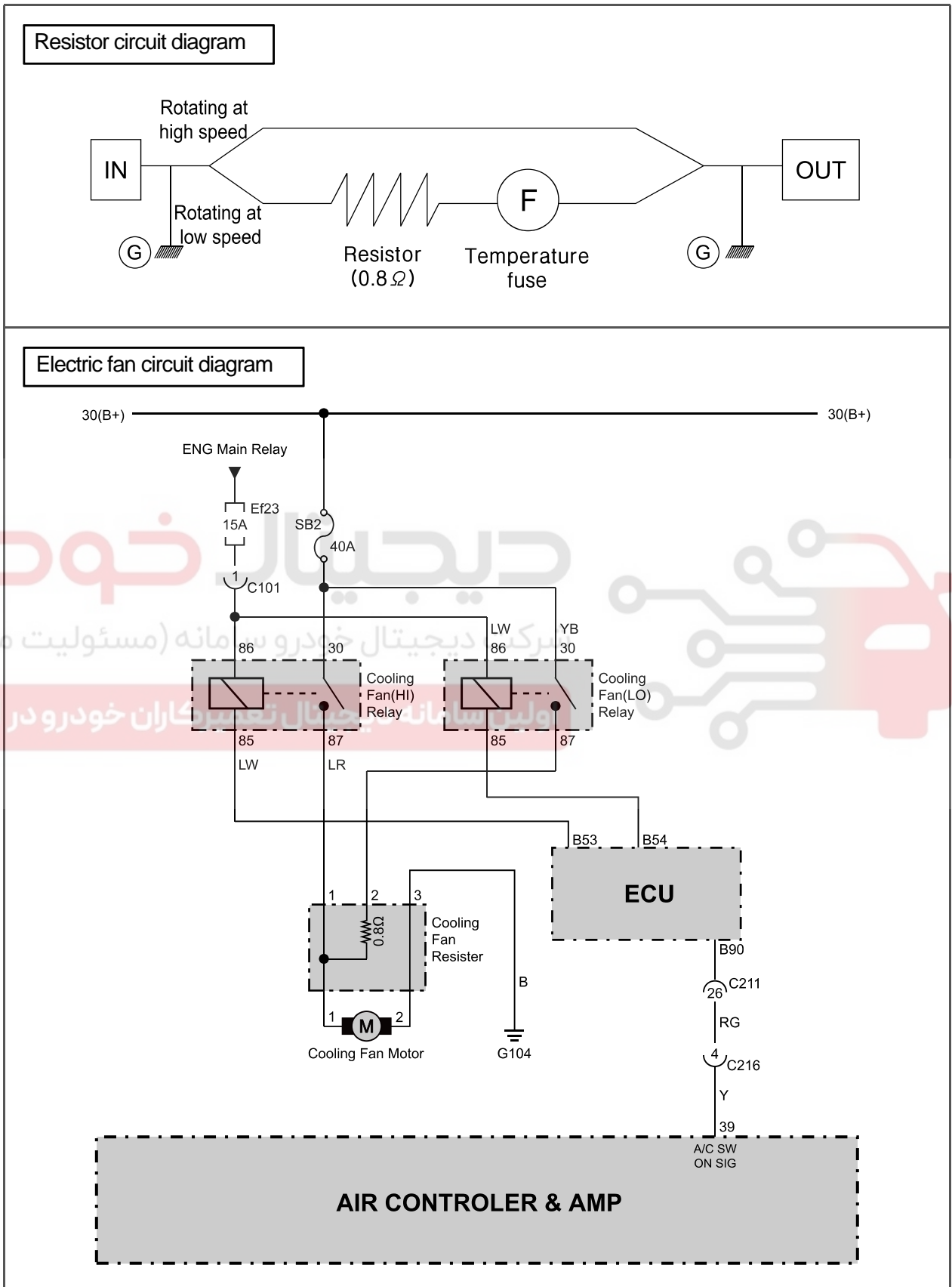
3) Connector

Resistor	
	

Connector to body		Pin No.	Function
To fan resistor	To wiring	1	High
		2	Low
		3	Ground

Connector to motor		Pin No.	Function
To fan resistor	To wiring	1	Power supply
		2	Ground

4) Circuit Diagram



Modification basis	
Application basis	
Life cycle	

► Resistor check

Measure the resistance between the positive (+) terminal of the motor side connector and the LOW terminal of the body side connector with a multi tester to check the temperature fuse for a short circuit.

- Normal: resistance within 0.8Ω ($\pm 10\%$) is detectable
- Abnormal: resistance of 0.8Ω is not detectable

⚠ CAUTION

The HIGH terminal of the body side connector cannot be used to check the temperature fuse for short circuit by directly connecting to the positive (+) terminal of the motor side connector.

💡 NOTE**Temperature fuse**

Cuts off the power forcibly when the temperature of the resistor has increased because of the electric fan stuck (cut off temperature: 165°C)

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شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

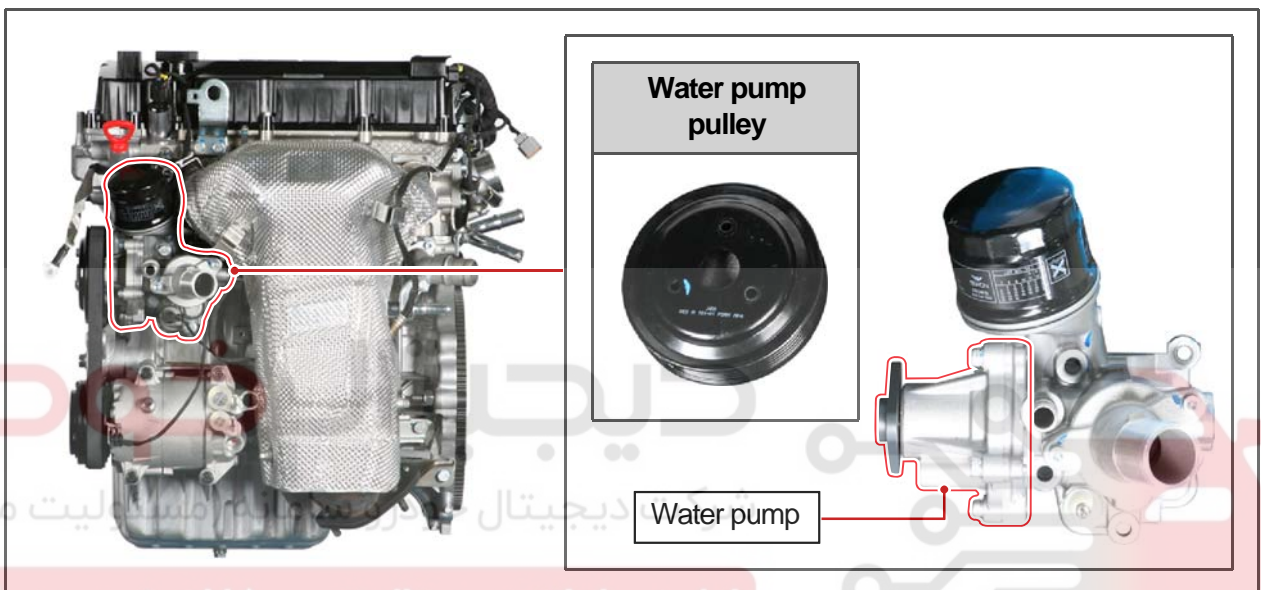
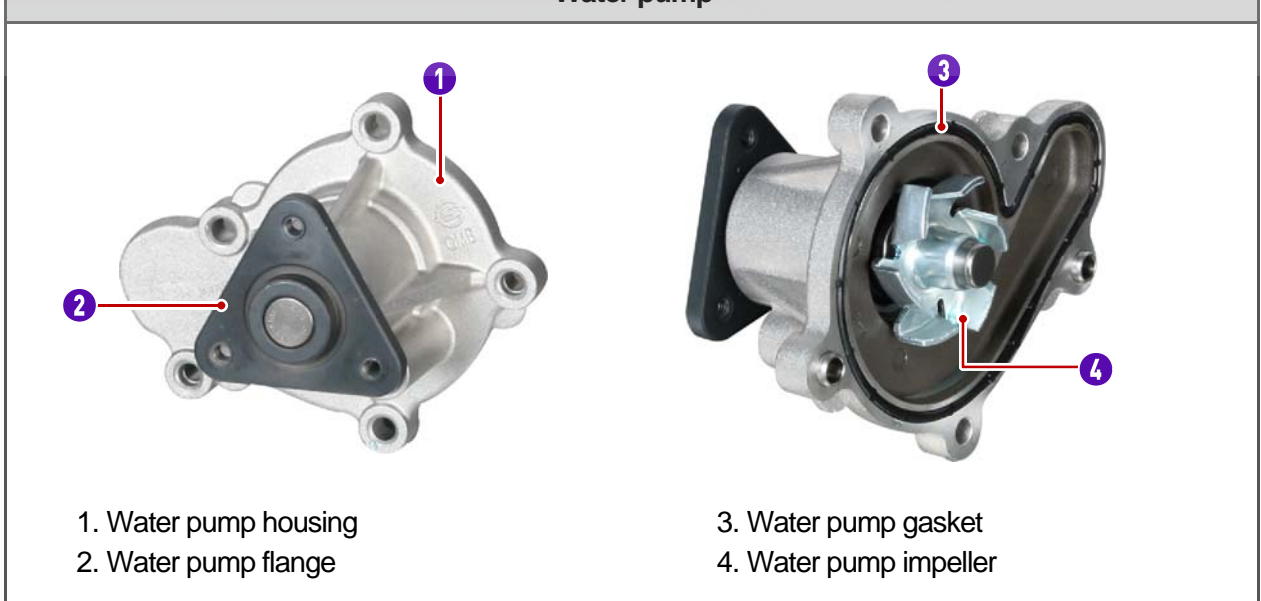
اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



S.G.N.

1528-01 WATER PUMP**1) Overview**

The water pump assembly is combined with the oil filter module and driven by the engine fan belt. The pump is a centrifugal pump which consists of an impeller, a drive shaft, and a drive belt gear. The impeller is supported by a completely sealed bearing.

2) Mounting Location and Components**Water pump**

Modification basis	
Application basis	
Approval	

COOLING SYSTEM

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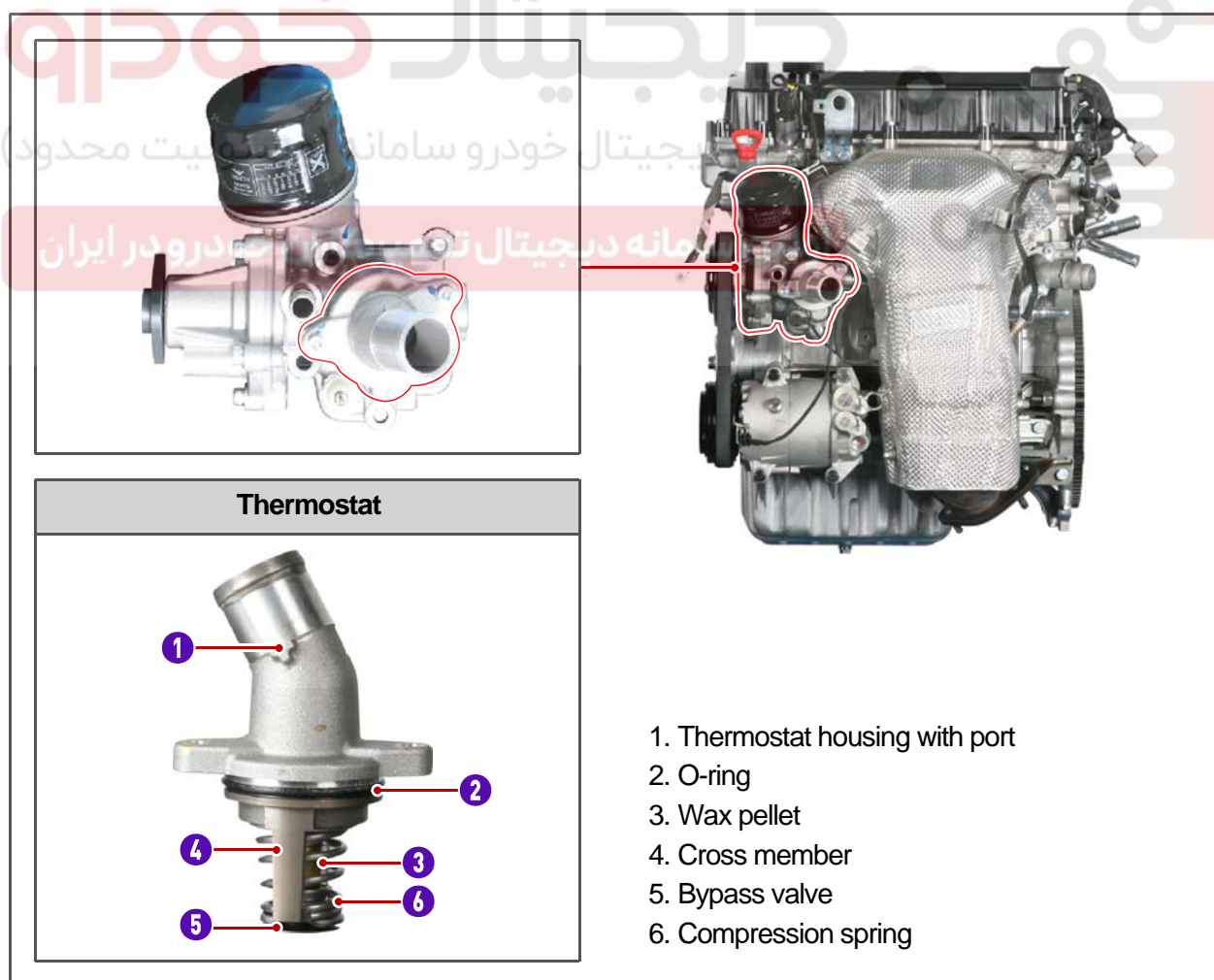
S.G.N.

1528-07 THERMOSTAT**1) Overview**

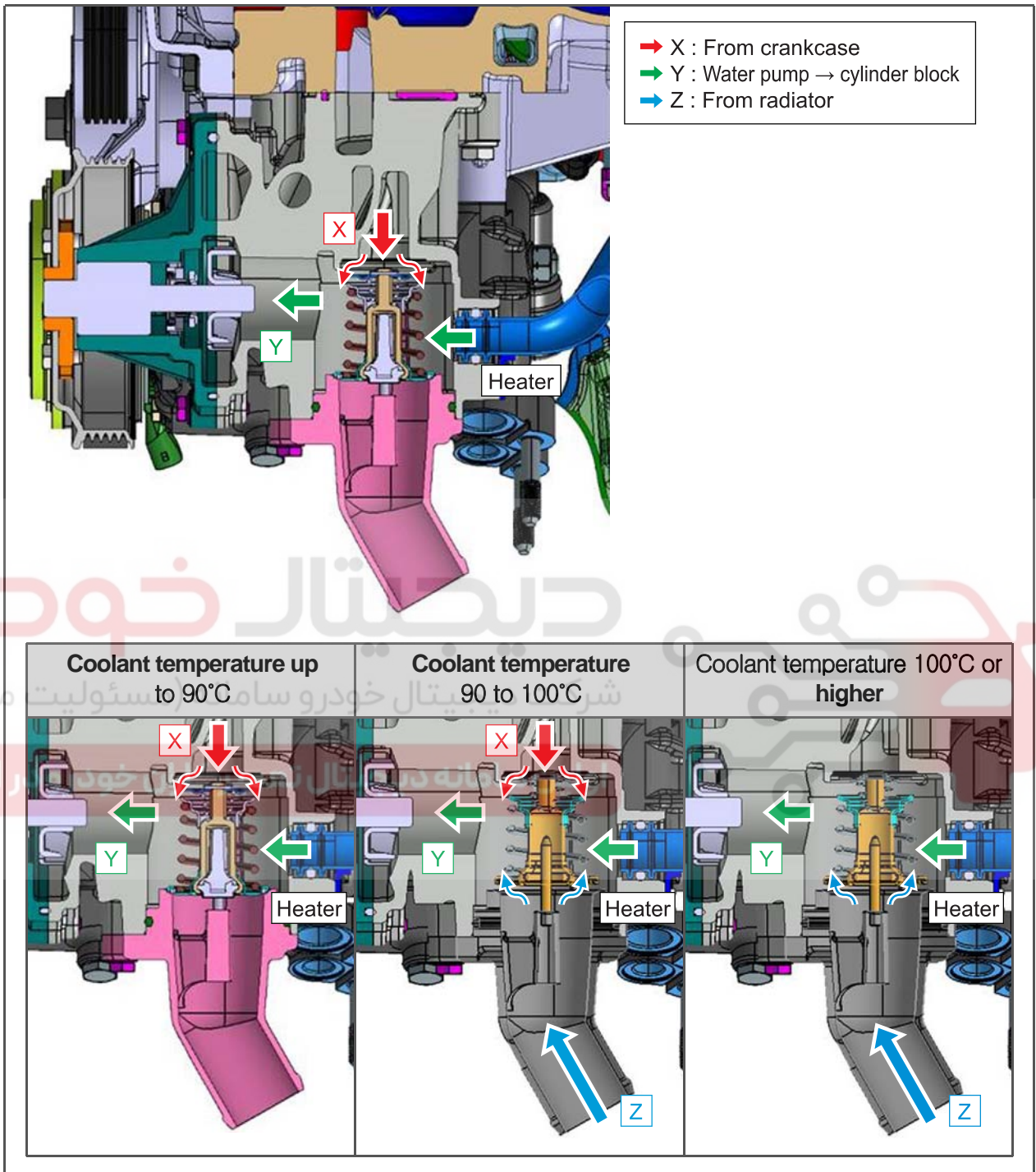
When the temperature of the coolant reaches a certain level, the thermostat begins to open and lets the coolant flows from the engine to the radiator. The hot coolant from the engine is cooled down as it flows through the radiator. The heat exchange between the coolant and fresh air, while the coolant flows through the radiator, keeps the engine operating temperature normal.

The wax pellet in the thermostat is sealed in a metal case. The wax pellet element expands when it is heated and contracts when it is cooled down. As the wax pellet expands by the heat from the running engine, the thermostat valve is opened and the engine coolant flows from the radiator to the engine. Alternatively, if the wax pellet contracts by the low temperature of the coolant, the thermostat valve will be closed and shut off the coolant flows from the radiator to the engine.

The thermostat begins to open when the coolant temperature reaches about 90°C and is fully open at 100°C. It is fully closed when the coolant temperature drops below 85°C.

2) Mounting Location and Components

3) Operating Process



Modification basis	
Application basis	
Effective date	

REMOVAL AND INSTALLATION

S.G.N.
0000-00

CHECK AND INSPECTION

Cause		Action
Coolant level low	<ul style="list-style-type: none"> - Leaks in radiator - Leaks in coolant reservoir tank - Leaks in heater core 	<ul style="list-style-type: none"> - Change the radiator - Change the coolant reservoir tank - Change the heater
	<ul style="list-style-type: none"> - Leaks in joint junction of coolant hose - Damaged coolant hose 	<ul style="list-style-type: none"> - Reconnect the hose or replace the clamp - Change the hose
	<ul style="list-style-type: none"> - Leaks from water pump gasket - Leaks from inner seal of water pump 	<ul style="list-style-type: none"> - Change the gasket - Change the water pump
	<ul style="list-style-type: none"> - Leaks from water inlet cap - Leaks in thermostat housing 	<ul style="list-style-type: none"> - Change the water inlet cap gasket - Change the thermostat sealing
	<ul style="list-style-type: none"> - Incorrect tightening torque of the cylinder head bolts - Damaged cylinder head gasket 	<ul style="list-style-type: none"> - Tighten the bolts to the specified torque - Change the cylinder head gasket
Coolant temperature abnormally high	<ul style="list-style-type: none"> - Coolant leaks (Coolant level is low) - Improper coolant anti-freeze mixture ratio (lean) - Stepped coolant hose condition 	<ul style="list-style-type: none"> - Add coolant - Check the coolant anti-freeze concentration - Repair or replace the hose
	<ul style="list-style-type: none"> - Defective thermostat - Defective water pump - Defective radiator - Defective coolant reservoir tank or cap 	<ul style="list-style-type: none"> - Change the thermostat - Change the water pump - Change the radiator - Change the coolant reservoir tank or tank cap
	<ul style="list-style-type: none"> - Cracks on the cylinder block or cylinder head - Clogged coolant passages in the cylinder block or cylinder head 	<ul style="list-style-type: none"> - Change the cylinder block or cylinder head - Clean the coolant passage
	<ul style="list-style-type: none"> - Clogged radiator core 	<ul style="list-style-type: none"> - Clean the radiator core
	<ul style="list-style-type: none"> - Improper operation of cooling fan 	<ul style="list-style-type: none"> - Replace the cooling fan or repair related circuits
	<ul style="list-style-type: none"> - Defective temperature sensor or faulty wiring 	<ul style="list-style-type: none"> - Replace the sensor or repair the related wiring
Coolant temperature abnormally low	<ul style="list-style-type: none"> - Thermostat stuck open 	<ul style="list-style-type: none"> - Change the thermostat
	<ul style="list-style-type: none"> - Improper operation of cooling fan 	<ul style="list-style-type: none"> - Replace the cooling fan or repair related circuits
	<ul style="list-style-type: none"> - Defective temperature sensor or faulty wiring 	<ul style="list-style-type: none"> - Replace the sensor or repair the related wiring

(1) Coolant Check

1. Park the vehicle on level ground and check if the coolant level is between the MAX and MIN marks on the coolant reservoir tank.
2. Add coolant, if necessary. The coolant should be changed when required.



⚠ CAUTION

- Do not open the pressure cap when the engine is hot. Wrap the cap with thick cloth after the engine has been cooled down sufficiently.
- Make sure the coolant does not contact with other surfaces when checking the pressure cap or adding coolant. Immediately wipe off any coolant spillage.

Modification basis	
Application basis	
Approved by	

2) Leaks Check



1. Release the pressure in the system by loosening the pressure cap of the coolant reservoir slightly. Then, remove the pressure cap completely.

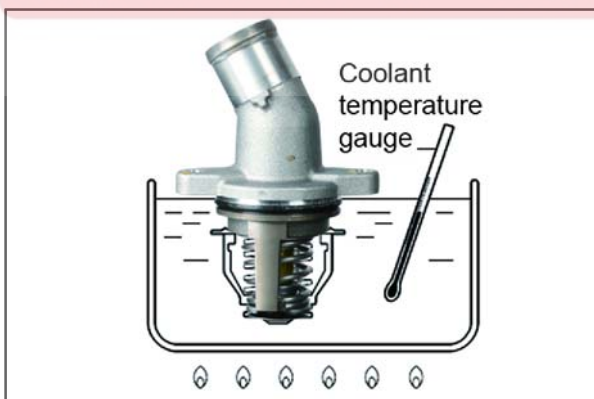
CAUTION

Never open the cap until the coolant temperature drops under 90°C to prevent any burn.



2. Add the coolant so that the coolant level is between the MAX and MIN marks on the coolant reservoir tank.
3. Connect the tester to the coolant reservoir tank filler and apply pressure (1.4 bar).
4. If the pressure displayed on the tester drops, check all the coolant hoses, pipes and connections for leaks and replace or tighten, if necessary.

3) Thermostat



Immerse the thermostat into the water. Heat the water and check the valve opening temperature.

Valve opening temperature

$90 \pm 2^{\circ}\text{C}$

S.G.N.

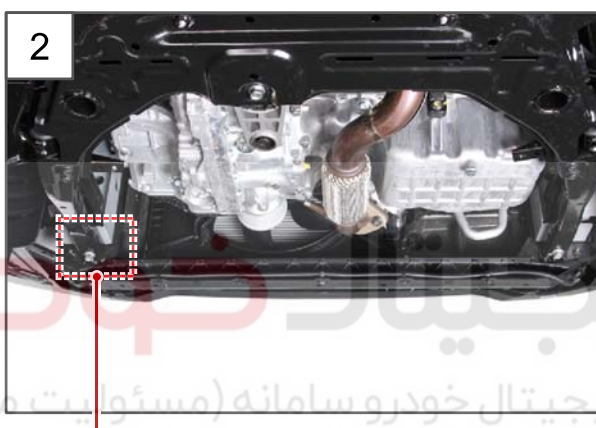
9210-05 COOLANT DRAIN AND FILL UP



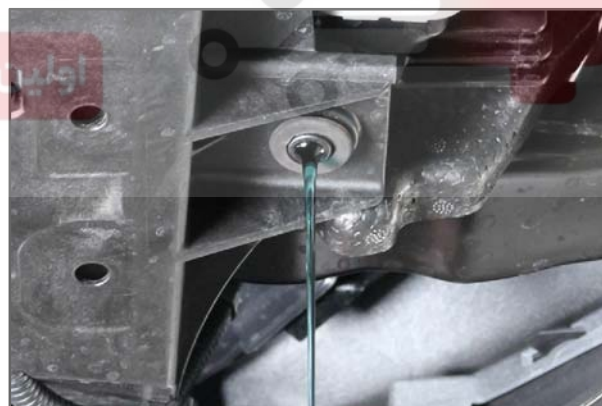
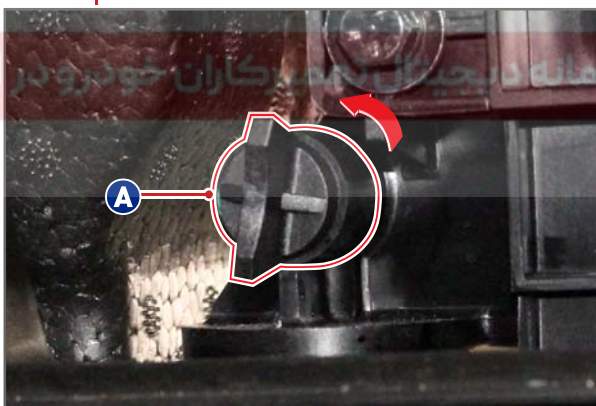
1. Release pressure in the system by loosening the pressure cap of the coolant reservoir tank slightly. Then, remove the pressure cap completely.

CAUTION

Never open the cap until the coolant temperature drops under 90°C to prevent any burn.



2. Remove the under cover from the underside of the vehicle and unscrew the radiator drain plug (A) to drain the coolant.

ENGINE
GENERALENGINE
ASSEMBLYFUEL
SYSTEMIGNITION
SYSTEMINTAKE
SYSTEMEXHAUST
SYSTEMLUBRICA
TIONCOOLING
SYSTEMCHARGIN
GSTARTIN
GCRUISE
CONTROLENGINE
CONTROL

E E M

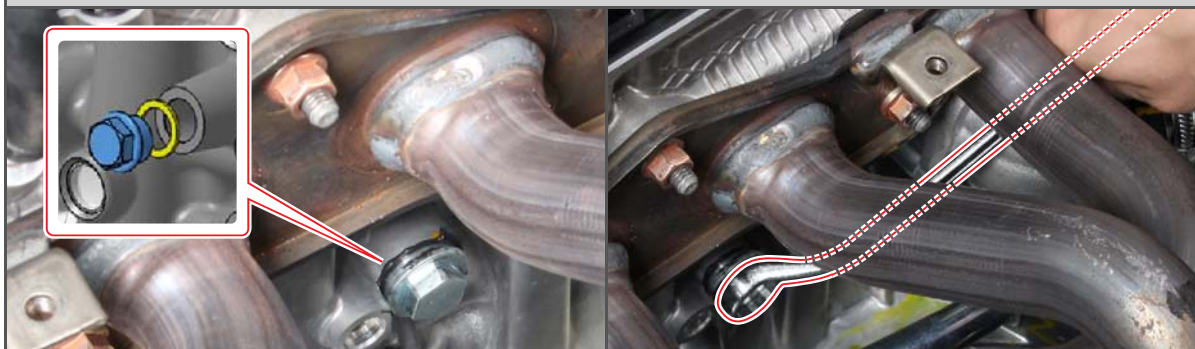
Modification basis	
Application basis	
Approval basis	

COOLING SYSTEM

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3. Drain the coolant by following the procedure below according to the corresponding vehicle specification.

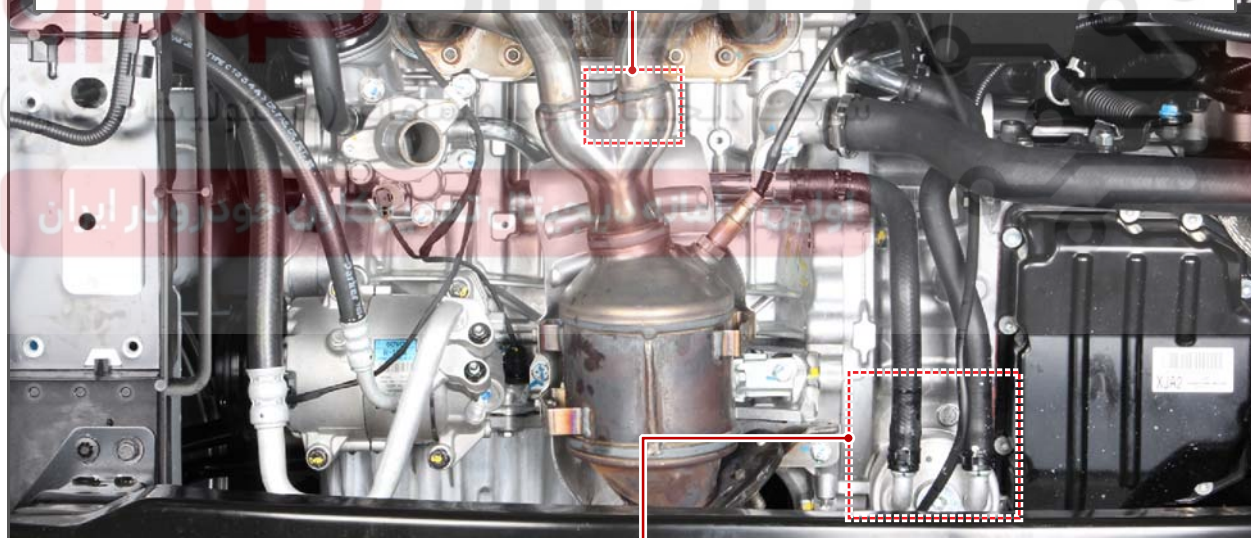
For a vehicle with M/T



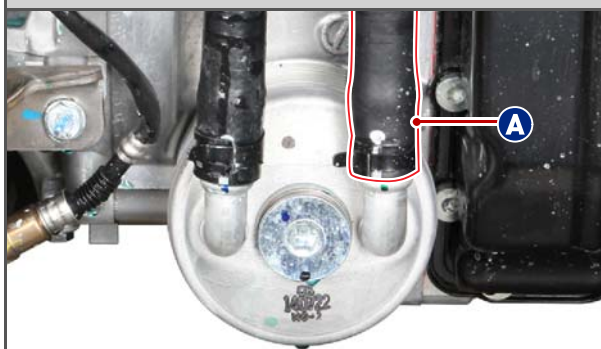
Remove the exhaust manifold heat protector and unscrew the screw plug (19 mm) of the cylinder block to drain the coolant.

(When installing the screw plug, replace the washer with a new one)

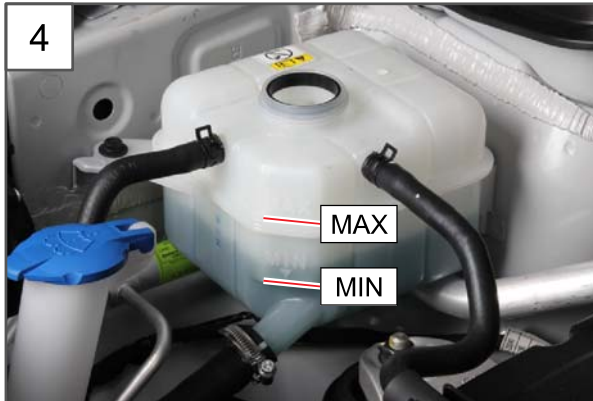
Tightening torque 30 Nm



For a vehicle with A/T



Disconnect the TOC coolant supply hose (A) to drain the coolant.



4. Install the radiator drain plug, engine screw plug, and TOC coolant hose and fill up with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
5. Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

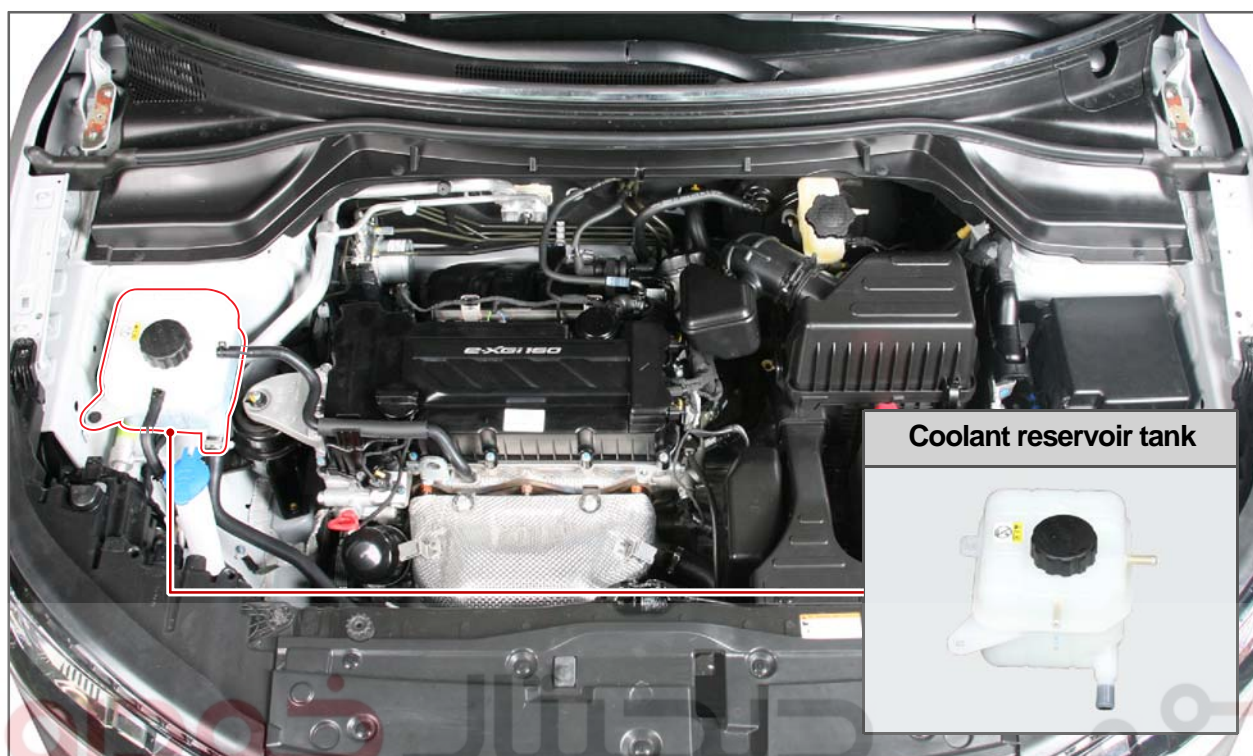


Modification basis	
Application basis	
Approval basis	

S.G.N.

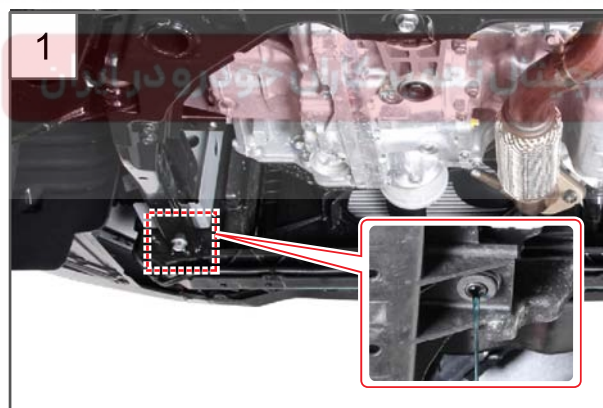
2130-13

COOLANT RESERVOIR TANK



Coolant reservoir tank

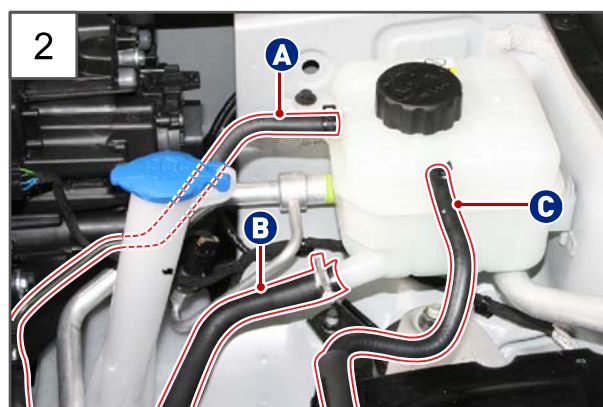
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)



1. Remove the under cover from the underside of the vehicle and unscrew the radiator drain plug to drain the coolant.

**NOTE**

Refer to "COOLANT DRAIN AND FILL UP" under this subsection.



2. Disconnect the hoses (A), (B), and (C) connected to the coolant reservoir tank.

A. Radiator deaeration hose
B. Make-up hose
C. Engine deaeration hose

Modification basis	
Application basis	
Affected VIN	021 62 99 92 92



3. Unscrew the 2 mounting bolts (10 mm) for the coolant reservoir tank.

Tightening torque $10 \pm 1.0 \text{ Nm}$



4. Remove the coolant reservoir tank by sliding the mounting upward in the direction of the arrow shown in the picture.



5. Install in the reverse order of removal.

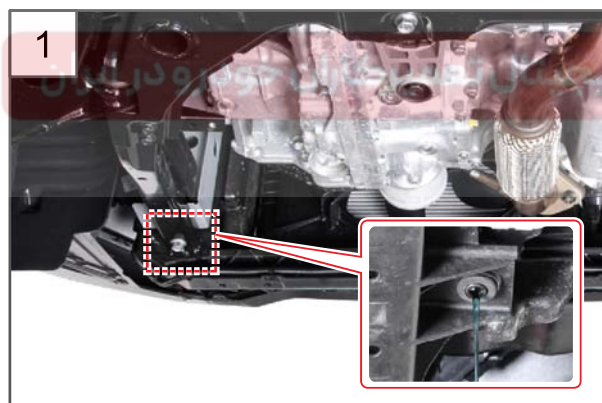
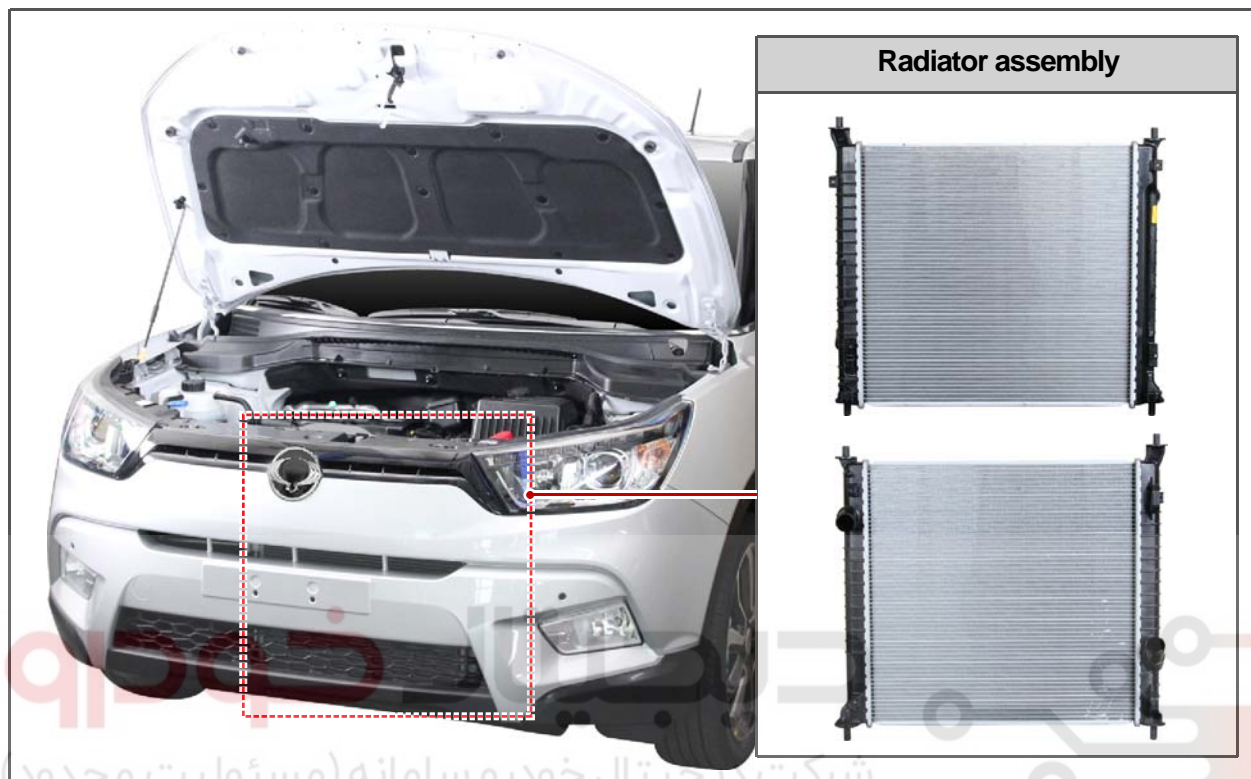


NOTE

- Install the coolant reservoir tank and fill up with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

Modification basis	
Application basis	
After service	

S.G.N.

2112-01 RADIATOR ASSEMBLY**Preceding work** - Disconnect the negative battery cable.

1. Remove the under cover from the underside of the vehicle and unscrew the radiator drain plug to drain the coolant.

**NOTE**

Refer to "COOLANT DRAIN AND FILL UP" under this subsection.



2. Remove the 2 screw rivets securing the snorkel assembly.

Modification basis	
Application basis	
Affected VIN	021 62 99 92 92



3. Remove the snorkel assembly.

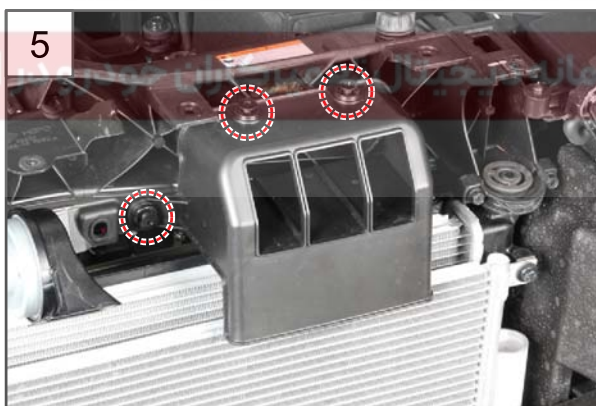


4. Remove the front bumper from the vehicle.



NOTE

Refer to "FRONT BUMPER ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "BODY EXTERIOR" section in "BODY" chapter.

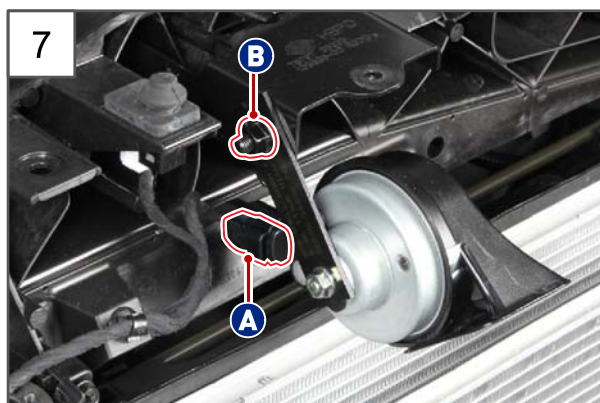


5. Remove the 3 screw rivets securing the water protector.



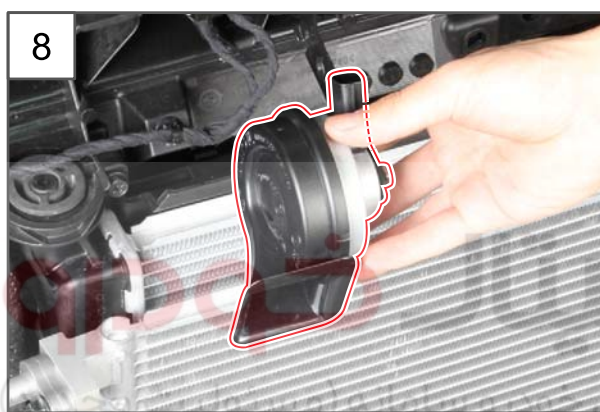
6. Remove the water protector.

Modification basis	
Application basis	
Approval basis	



7. Disconnect the horn connector (A) and unscrew the mounting bolt (B, 12 mm).

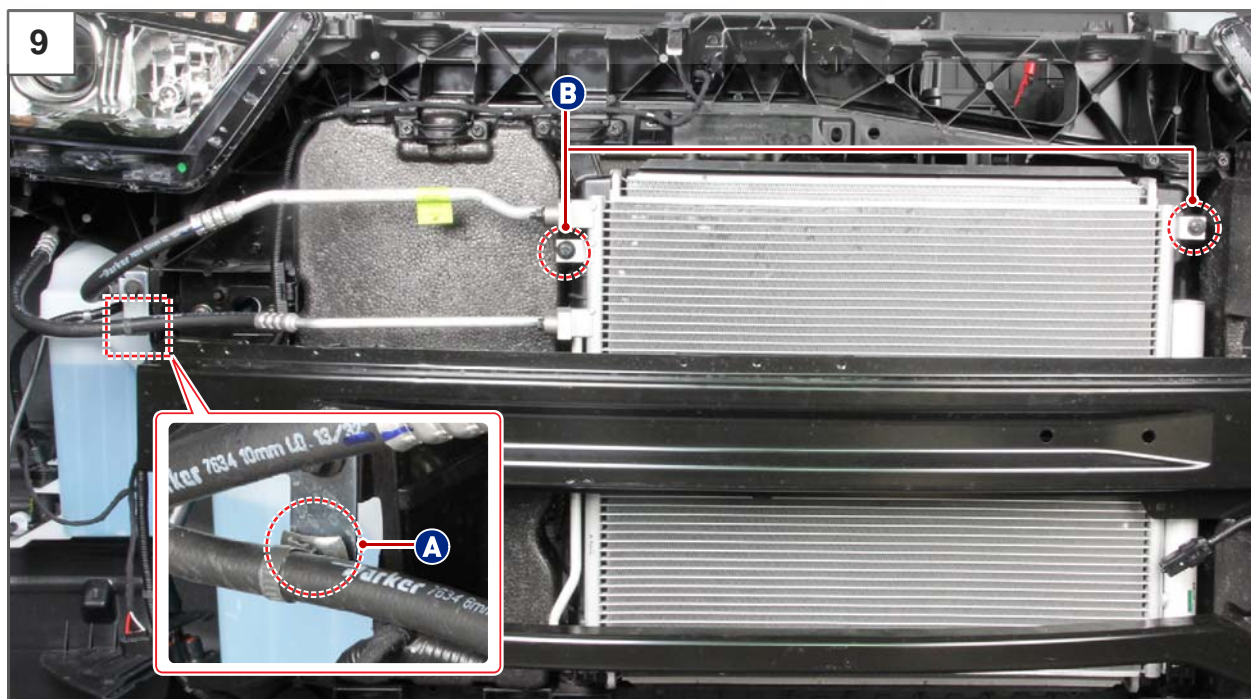
Tightening torque $25 \pm 2,5 \text{ Nm}$

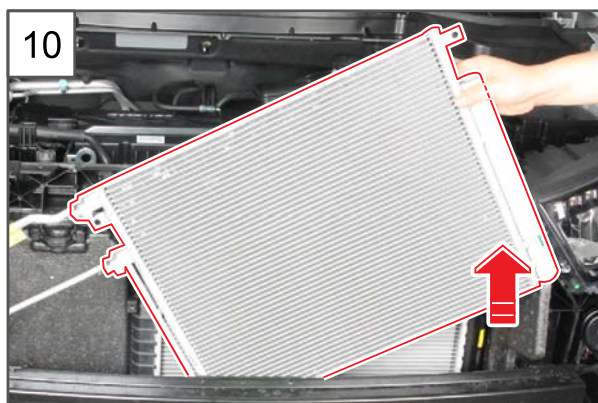


8. Remove the horn.

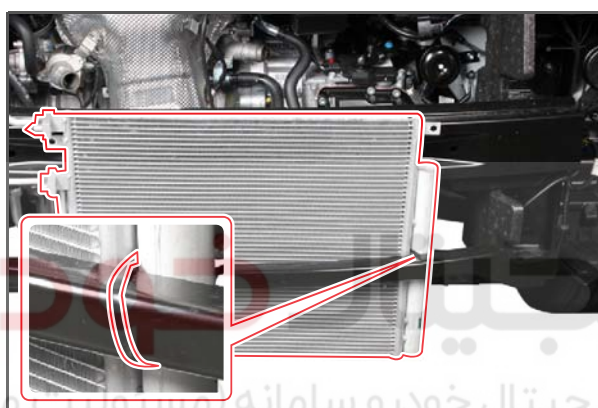
9. Remove the clamps (A) securing the A/C pipe and unscrew the 2 mounting bolts (B, 10 mm) for the A/C condenser.

Tightening torque $10 \pm 1,0 \text{ Nm}$





10.Remove the A/C condenser.



CAUTION

Secure the removed condenser to the vehicle with cable ties to prevent the parts such as A/C condenser and A/C pipe from being damaged.



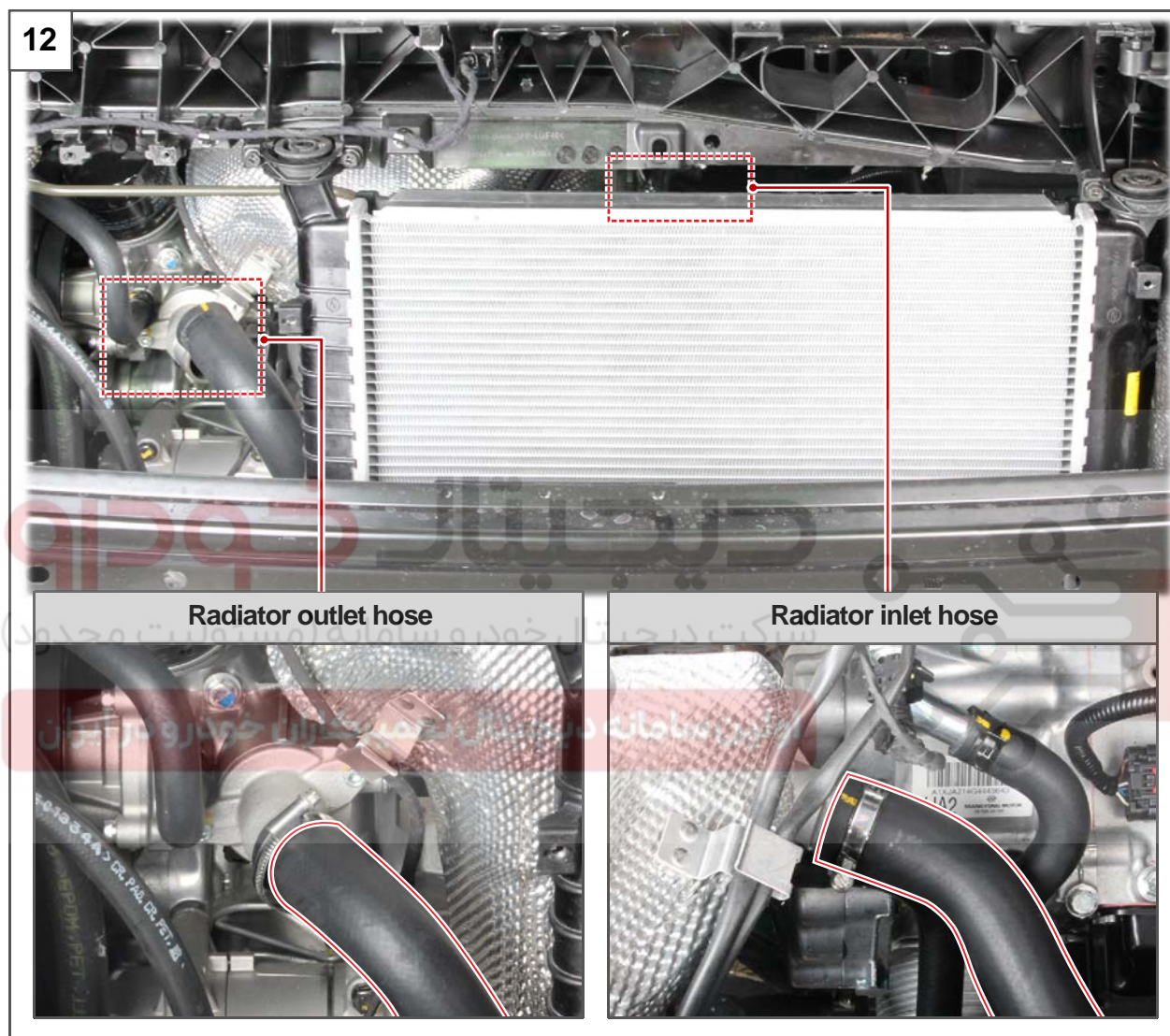
11.Remove the air guide from the vehicle.

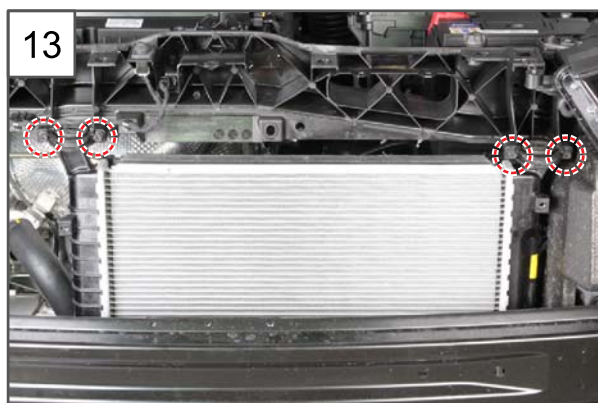


Modification basis	
Application basis	
Accessories	

12. Remove the 2 spring clamps (7 mm) and disconnect the radiator inlet/outlet hoses from the engine.

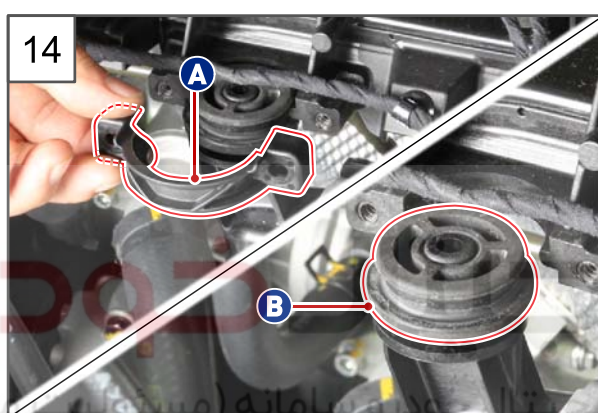
Tightening torque 6 to 7 Nm



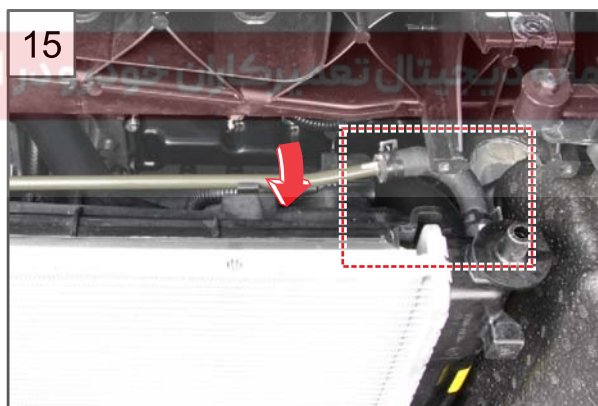


13. Unscrew the 4 mounting bolts (10 mm) for the radiator upper mounting bracket.

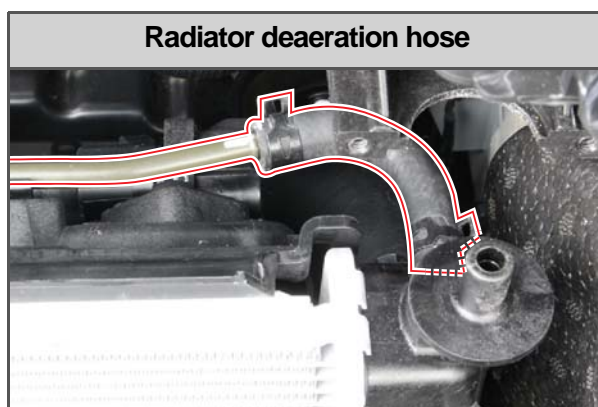
Tightening torque $10 \pm 1.0 \text{ Nm}$



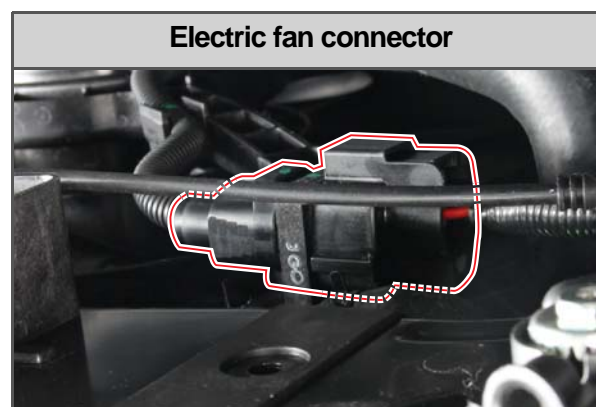
14. Remove the 2 radiator upper mounting brackets (A) and 2 upper mounting insulators (B).



15. Pry apart the radiator slightly and remove the deaeration hose and electric fan connector.

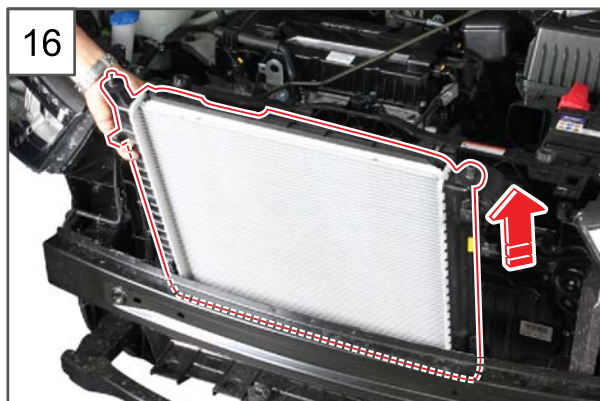


Radiator deaeration hose

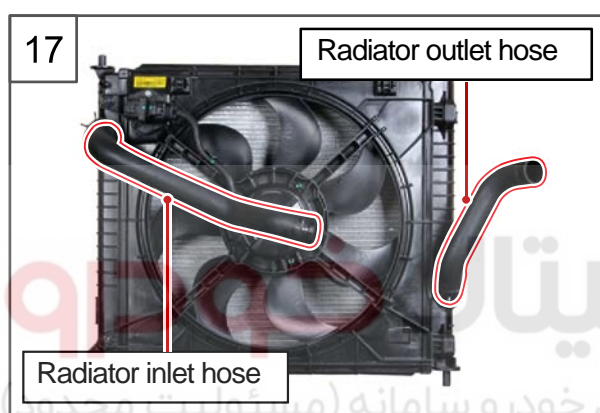


Electric fan connector

Modification basis	
Application basis	



16. Remove the radiator and electric fan assembly.

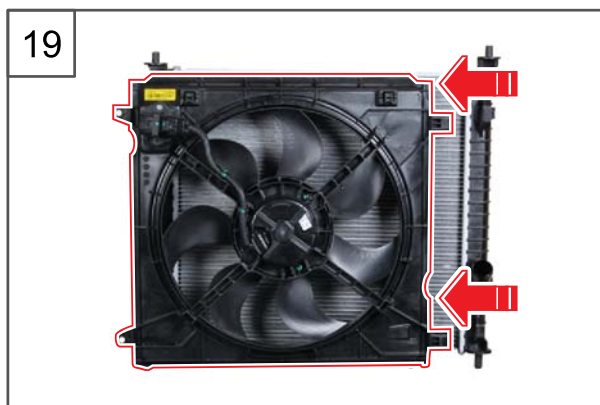


17. Disconnect the radiator inlet and outlet hoses from the removed radiator assembly.



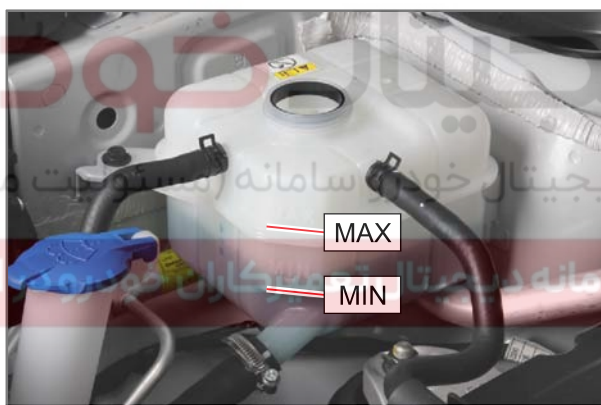
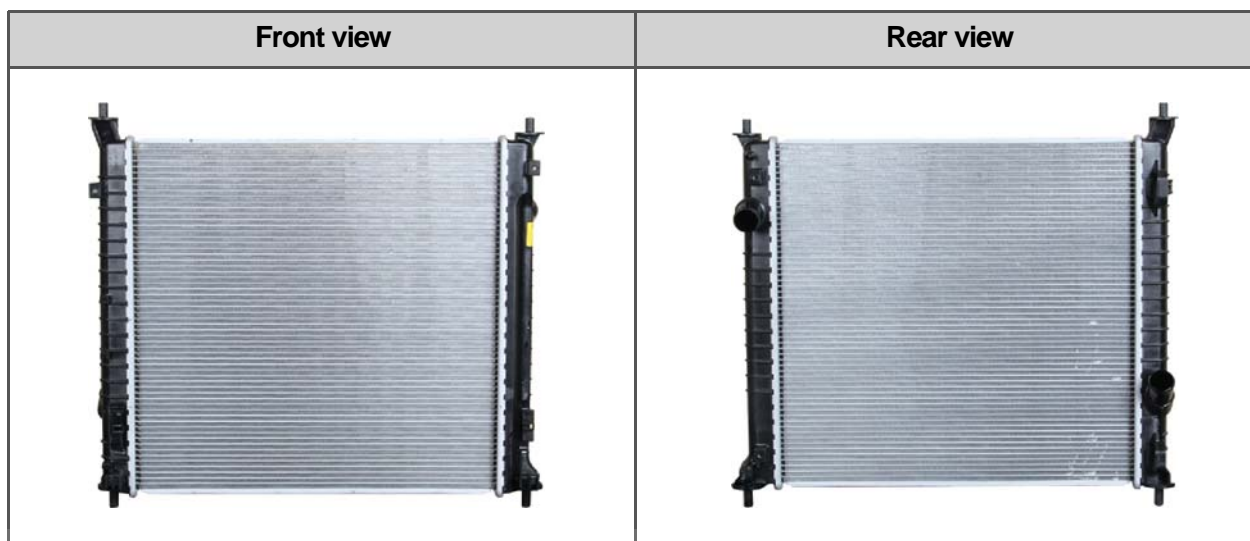
18. Unscrew the 2 mounting bolts (10 mm) for the electric fan.

Tightening torque $10 \pm 1,0 \text{ Nm}$



19. Separate the electric fan from the radiator.

20. Install in the reverse order of removal.



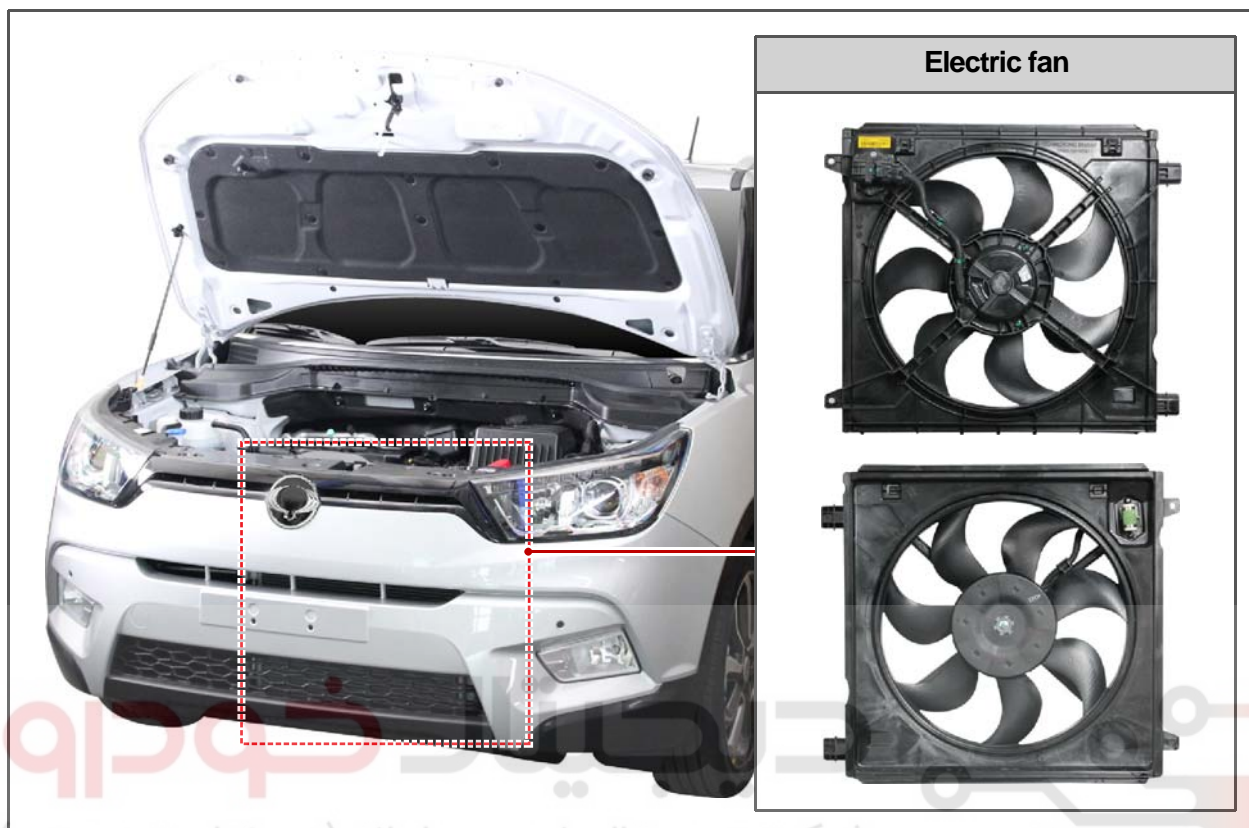
NOTE

- Install the radiator assembly and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

Modification basis	
Application basis	
Approval	

S.G.N.

2112-02 ELECTRONIC FAN

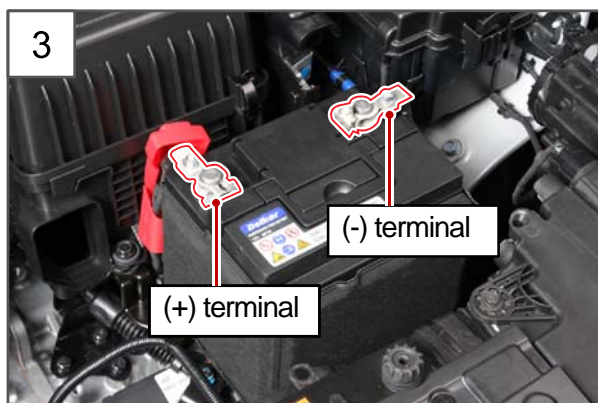


1. Remove the 2 screw rivets securing the snorkel assembly.



2. Remove the snorkel assembly.

Modification basis	
Application basis	
Affected VIN	021 62 99 92 92



3. Turn off all electrical functions and loosen and disconnect the negative (-) terminal (10 mm) and positive (+) terminal (10 mm) from the battery.

Tightening torque 6.0 ± 1.0 Nm



4. Unscrew the 2 mounting bolts (12 mm) for the battery clamp.

Tightening torque 3.7 to 7.8 Nm

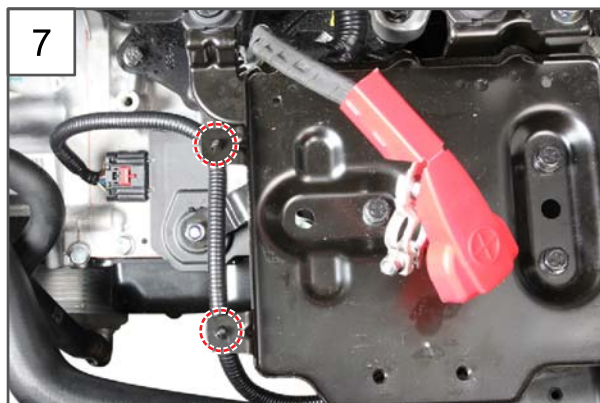


5. Remove the battery clamp.

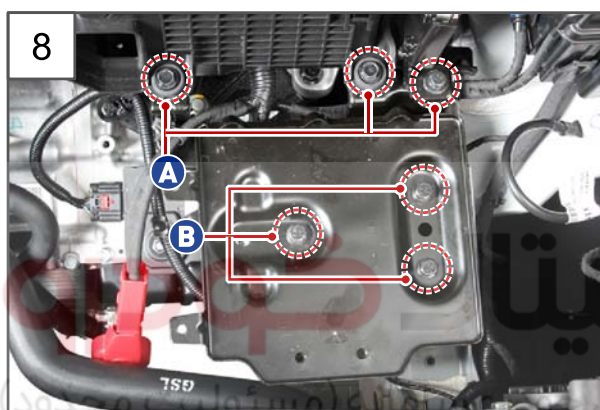


6. Remove the battery from the vehicle.

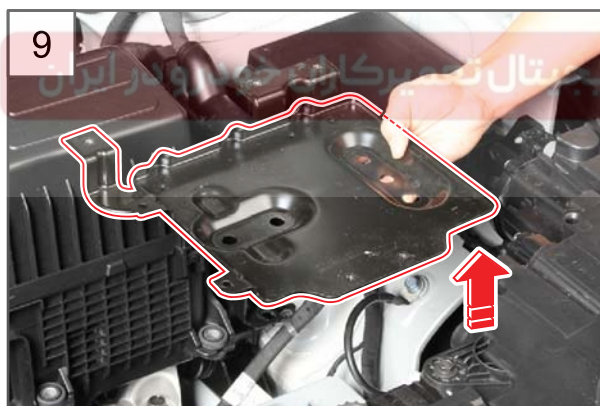
Modification basis	
Application basis	
Effectivity	



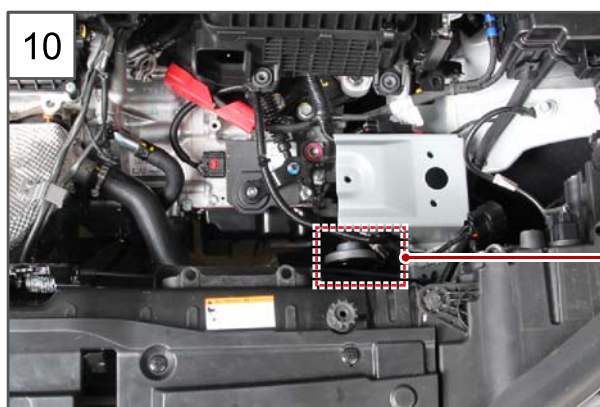
7. Remove the 2 battery positive cable wiring clamps from the battery tray.



8. Unscrew the 3 mounting bolts (A, 12 mm) and 3 mounting bolts (B, 14 mm) for the battery tray.

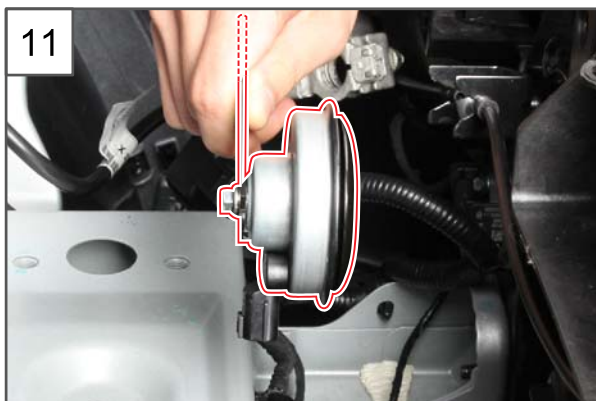


9. Remove the battery tray.

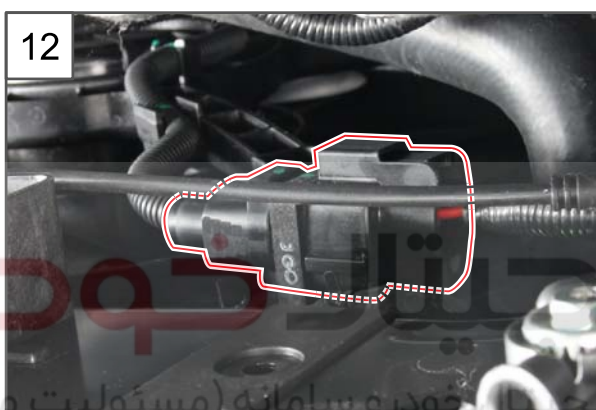


10. Disconnect the connector (A) from the annunciator installed under the battery tray and unscrew the mounting bolt (B, 12 mm).





11.Remove the annunciator.

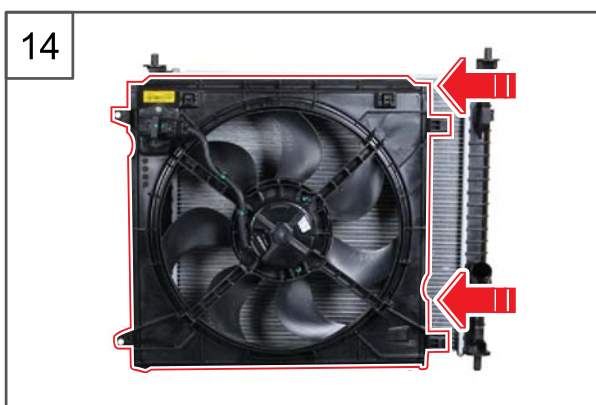


12.Disconnect the electric fan connector.



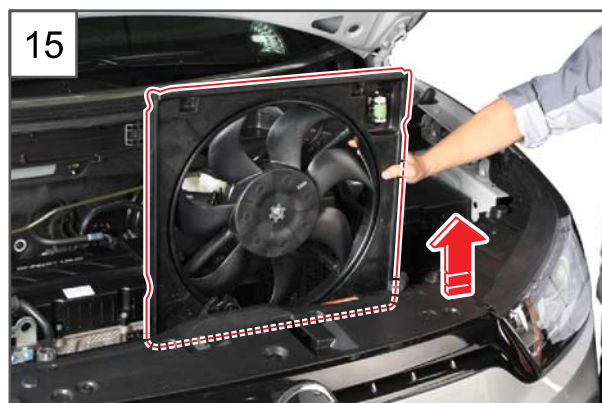
13.Unscrew the 2 mounting bolts (10 mm) for the electric fan.

Tightening torque $10 \pm 1.0 \text{ Nm}$



14.Separate the electric fan from the radiator.

Modification basis	
Application basis	
Life cycle	



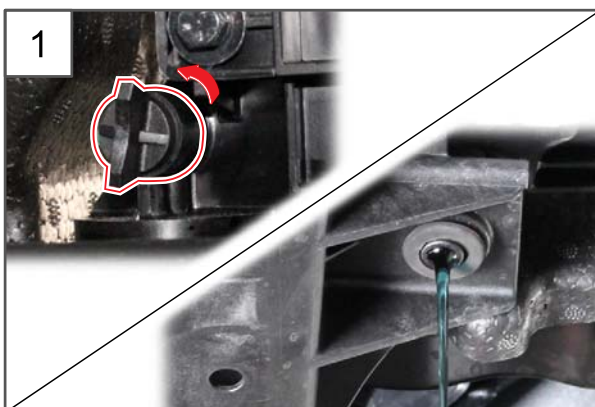
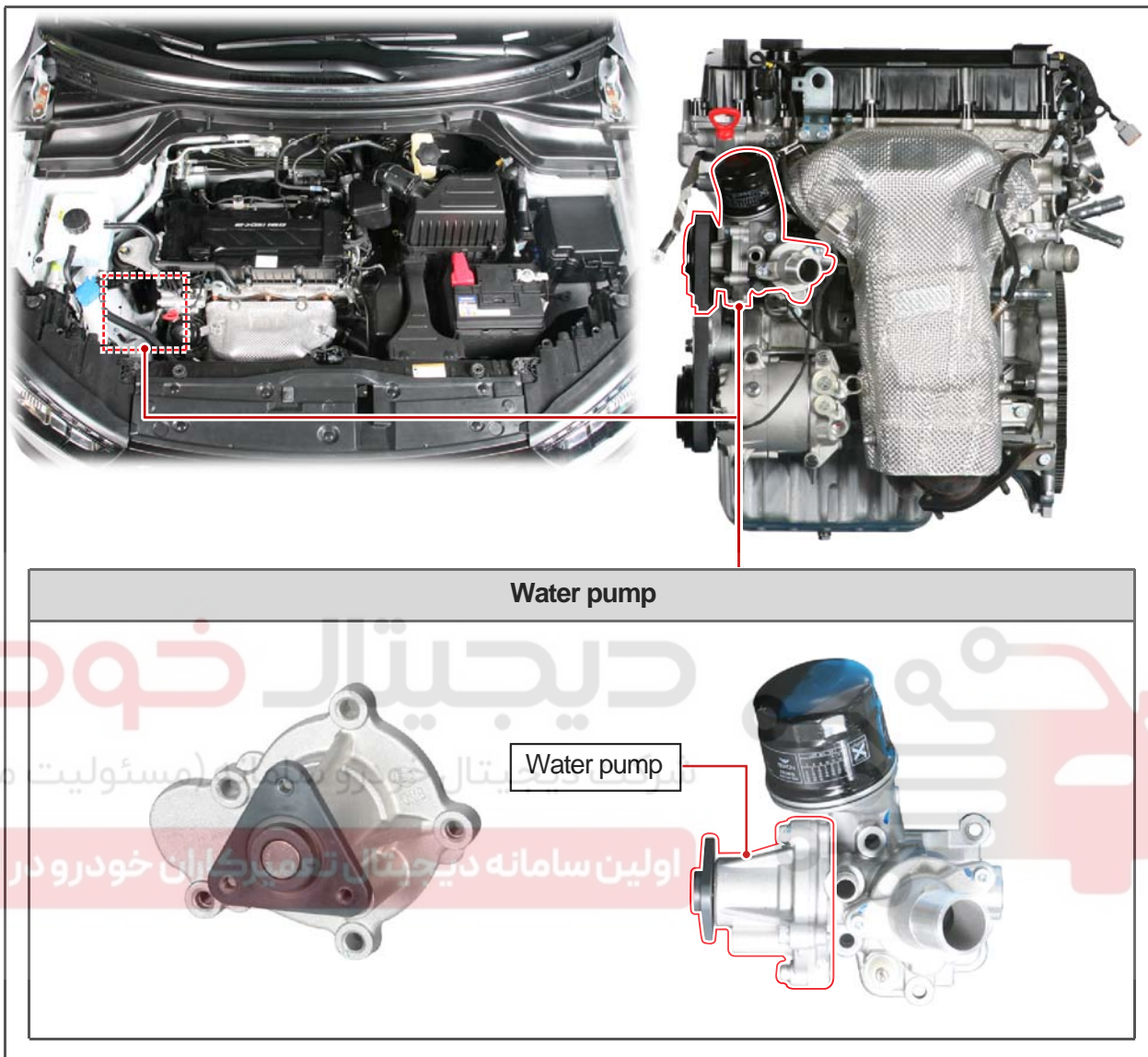
15.Remove the electric fan from the vehicle.

16.Install in the reverse order of removal.



S.G.N.

1528-01 WATER PUMP

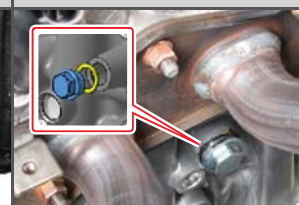


1. Drain the coolant. Refer to "COOLANT DRAIN AND FILL UP" under this subsection.

For a vehicle with A/T



For vehicle with M/T



Modification basis	
Application basis	
Reference	

COOLING SYSTEM

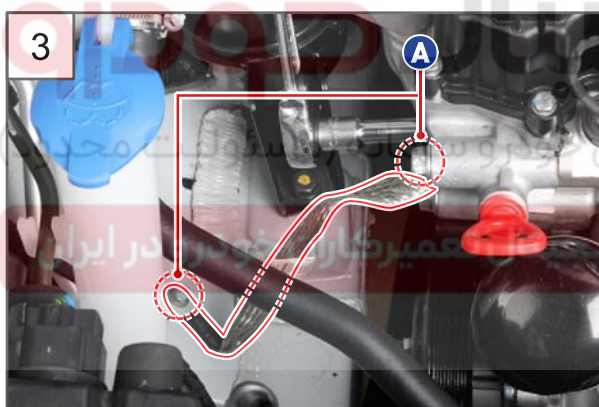
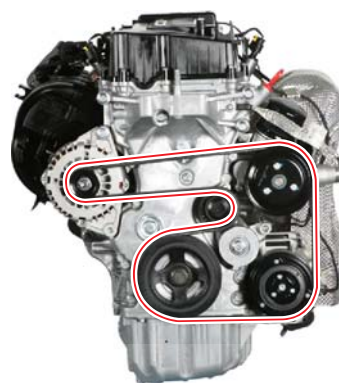
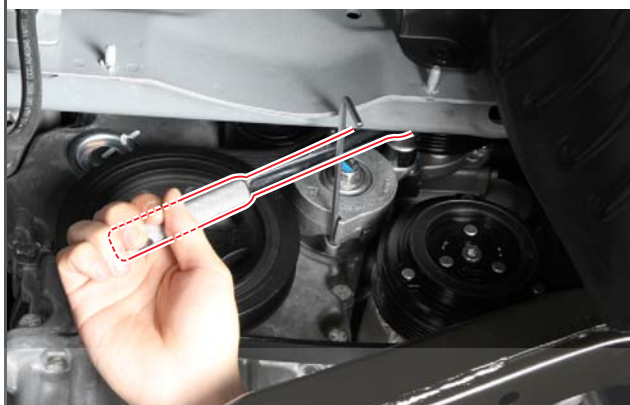
TIVOLI 2015.03

2. Remove the fan belt from the vehicle.



NOTE

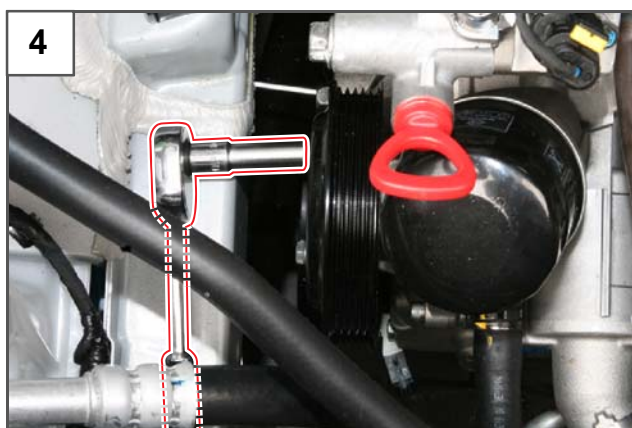
Refer to "BELT SYSTEM" under "REMOVAL AND INSTALLATION" subsection of "ENGINE ASSEMBLY" section in "G16DF ENGINE" chapter.



3. Unscrew the 2 mounting bolts (A, 10 mm) to remove the engine ground cable.

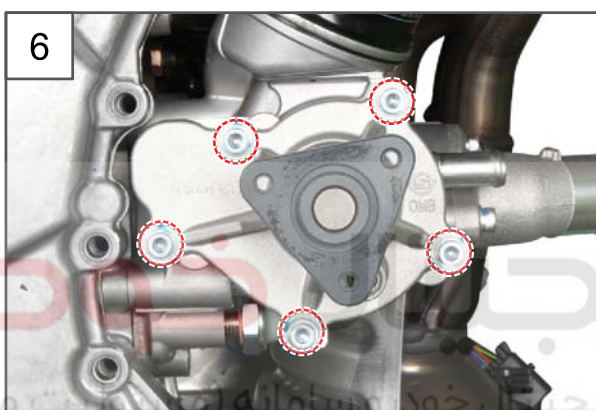
4. Unscrew the 3 mounting bolts (10 mm) for the water pump pulley.

Tightening torque $10 \pm 1.0 \text{ Nm}$





5. Remove the water pump pulley from the water pump.

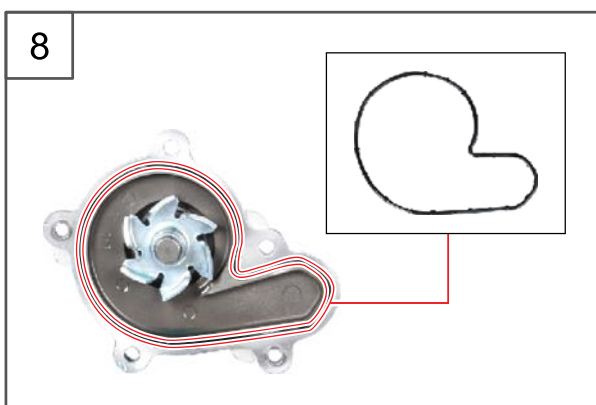


6. Unscrew the 5 hexagon mounting bolts (5 mm) for the water pump.

Tightening torque $10 \pm 1.0 \text{ Nm}$



7. Remove the water pump from the vehicle.

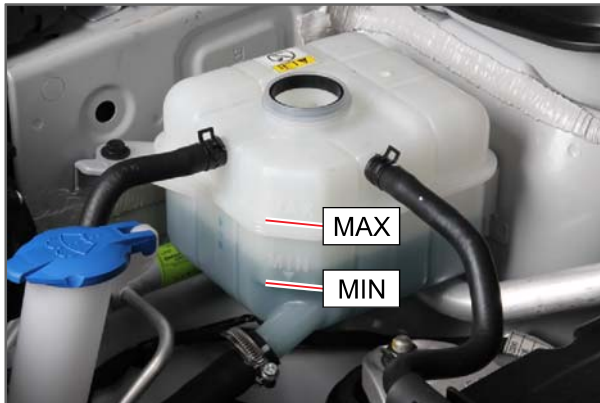


8. Install in the reverse order of removal.

CAUTION

Replace the water pump gasket with a new one when installing.

Modification basis	
Application basis	
Effective date	

**NOTE**

- Install the water pump and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

دیجیتال خودرو

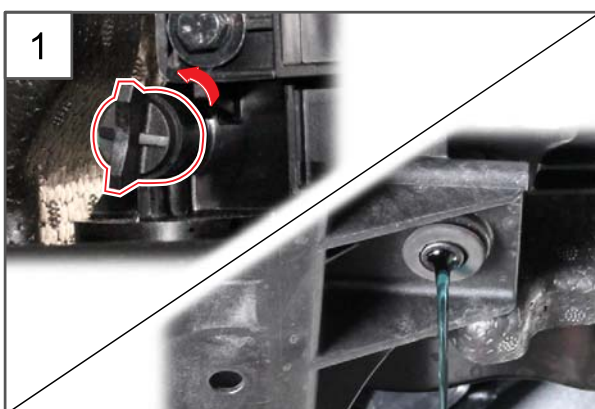
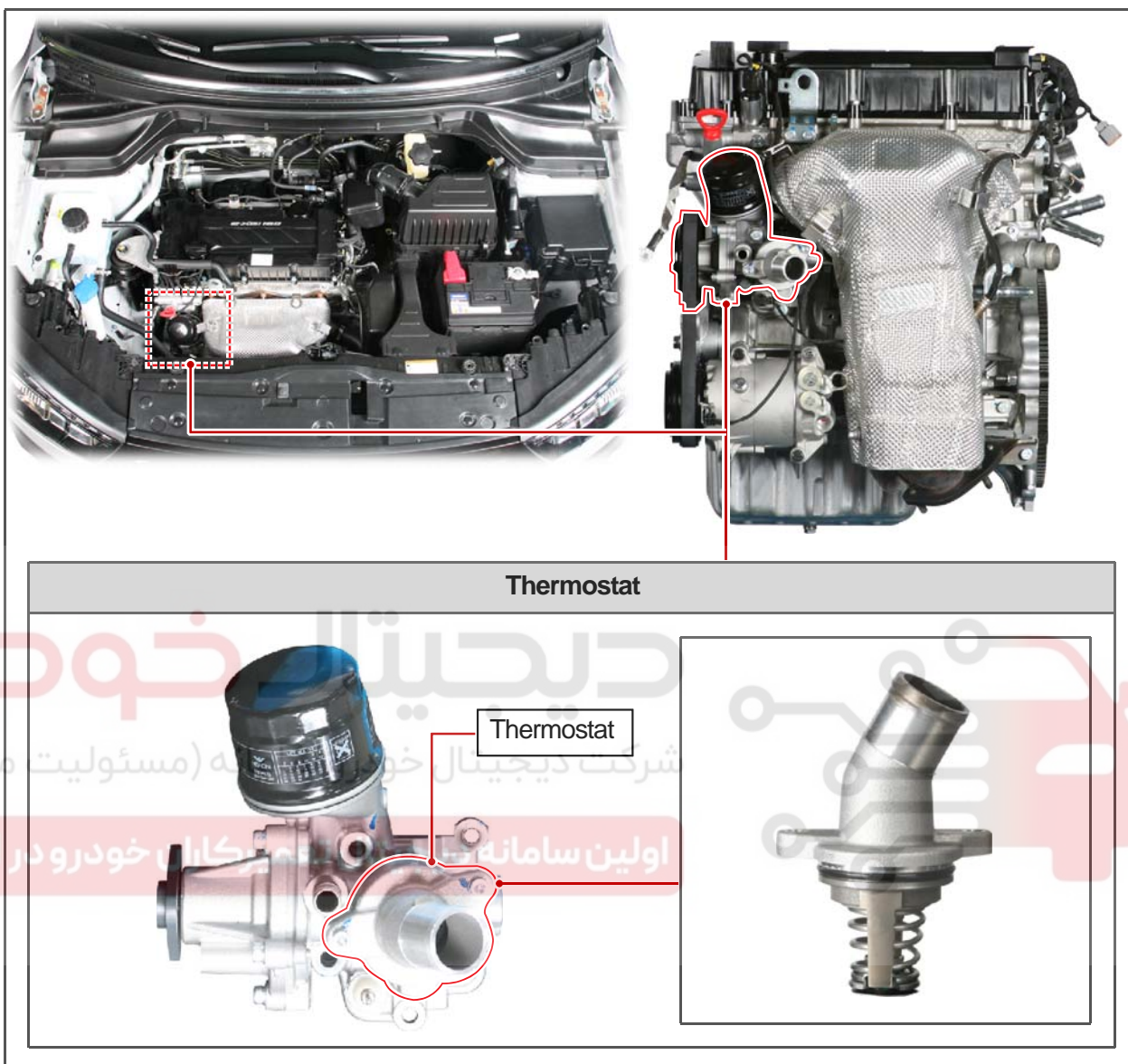
شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

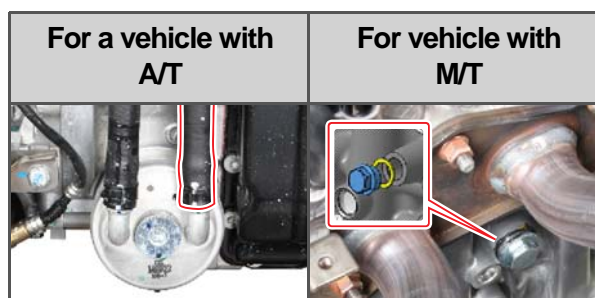


S.G.N.

1528-07 THERMOSTAT



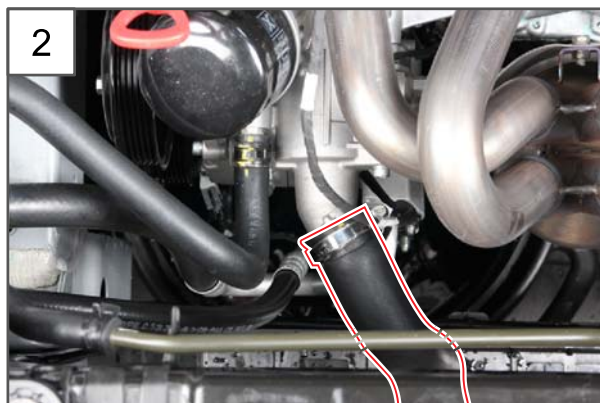
1. Drain the coolant. Refer to "COOLANT DRAIN AND FILL UP" under this subsection.



Modification basis	
Application basis	
Reference	

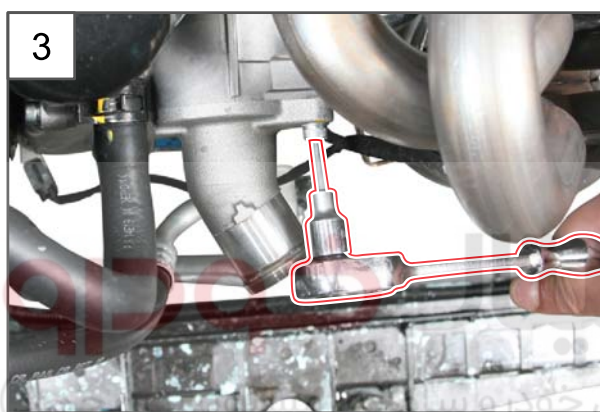
COOLING SYSTEM

TIVOLI 2015.03



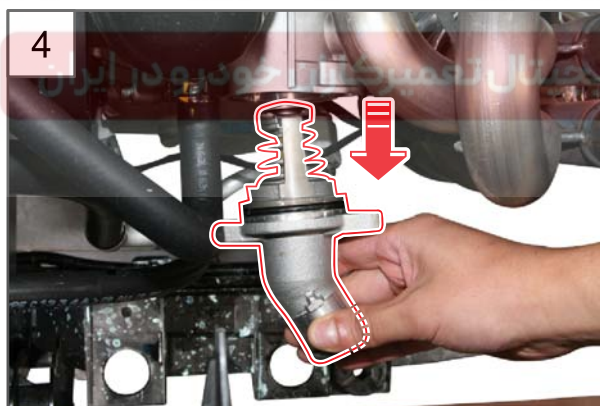
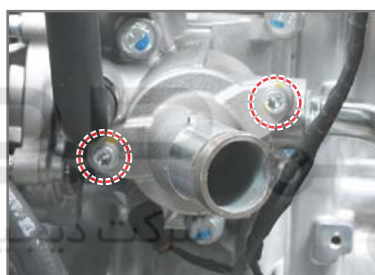
2. Remove the spring clamp (7 mm) and disconnect the radiator outlet hose from the thermostat.

Tightening torque 6 to 7 Nm

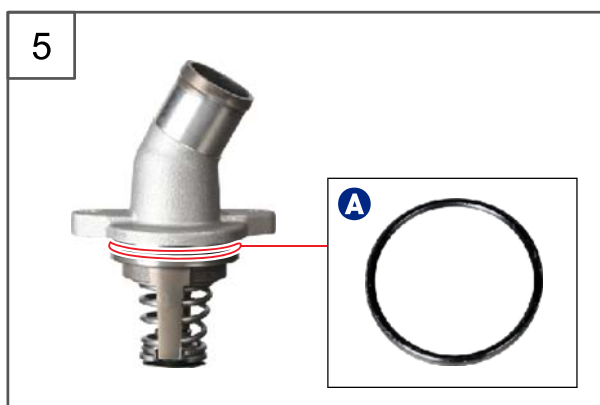


3. Unscrew the 2 hexagon mounting bolts (5 mm) for the thermostat.

Tightening torque $10 \pm 1,0$ Nm



4. Remove the thermostat from the vehicle.



5. Install in the reverse order of removal.

CAUTION

Replace the thermostat O-ring (A) with a new one when installing.

**NOTE**

- Install the thermostat and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران

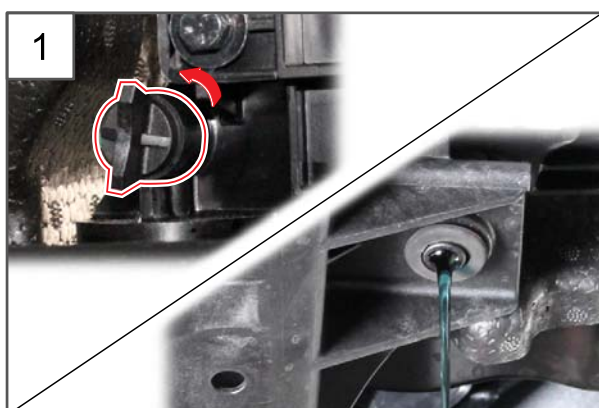
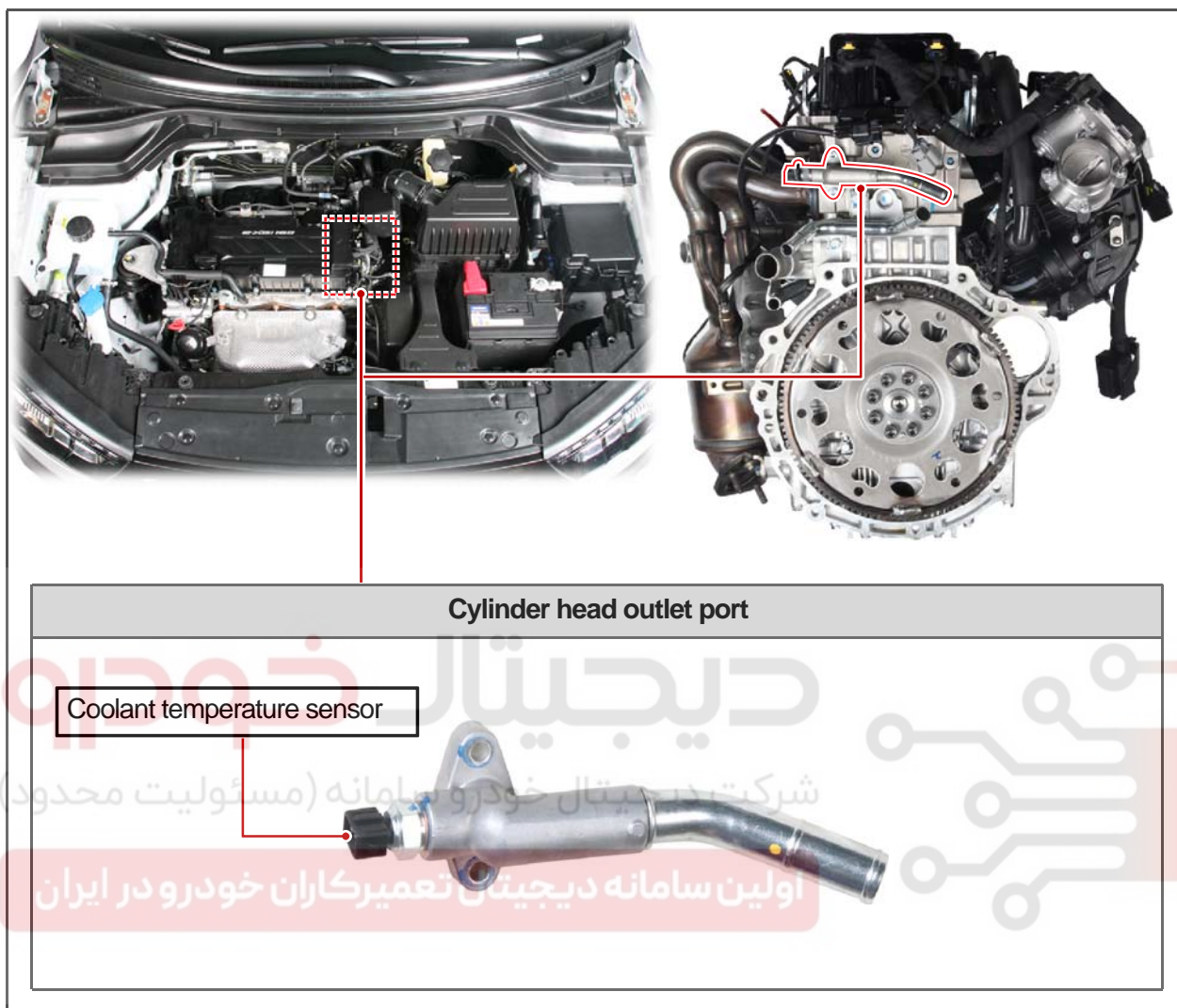


Modification basis	
Application basis	
Approval basis	

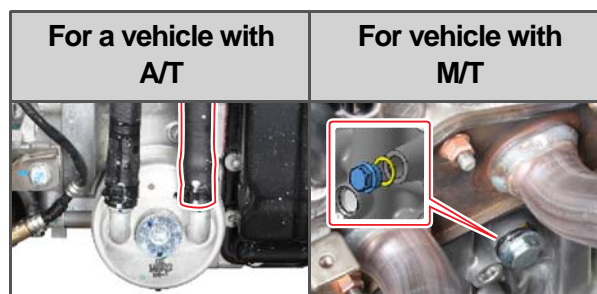
S.G.N.

1528-20

CYLINDER HEAD OUTLET PORT



1. Drain the coolant. Refer to "COOLANT DRAIN AND FILL UP" under this subsection.



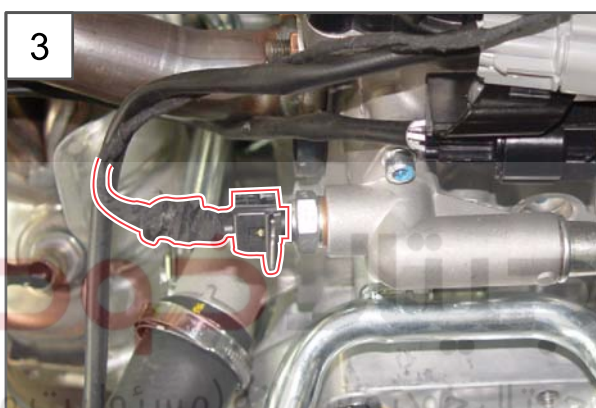


2. Remove the air cleaner assembly.



NOTE

Refer to "AIR CLEANER ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "INTAKE SYSTEM" section in "G16DF ENGINE" chapter.



3. Disconnect the coolant temperature sensor connector.



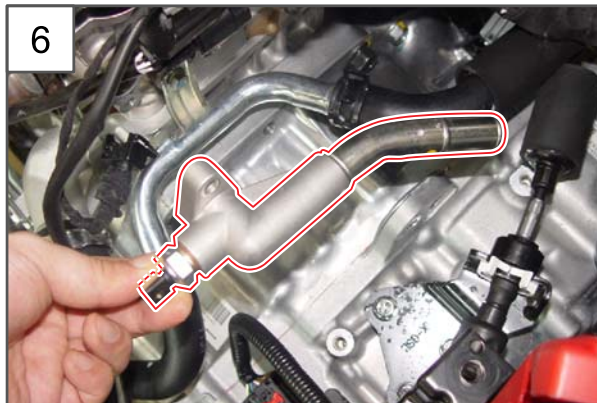
4. Disconnect the heater upper hose from the cylinder head outlet port.



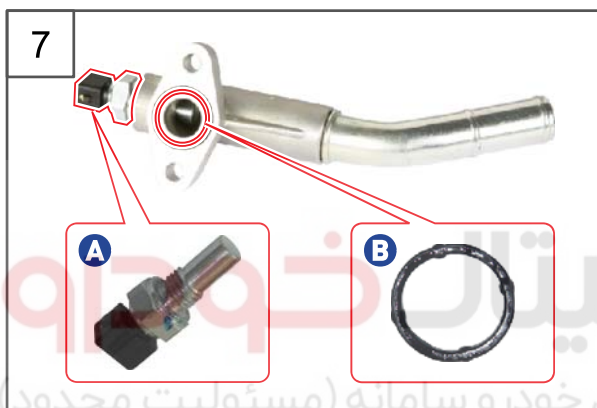
5. Unscrew the 2 hexagon mounting bolts (5 mm) for the cylinder head outlet port.

Tightening torque $10 \pm 1.0 \text{ Nm}$

Modification basis	
Application basis	
Approval basis	



6. Remove the cylinder head outlet port.



7. Remove the coolant temperature sensor (A) from the removed cylinder head outlet port.

8. Install in the reverse order of removal.

CAUTION

Replace the cylinder head outlet port gasket (B) with a new one when installing.



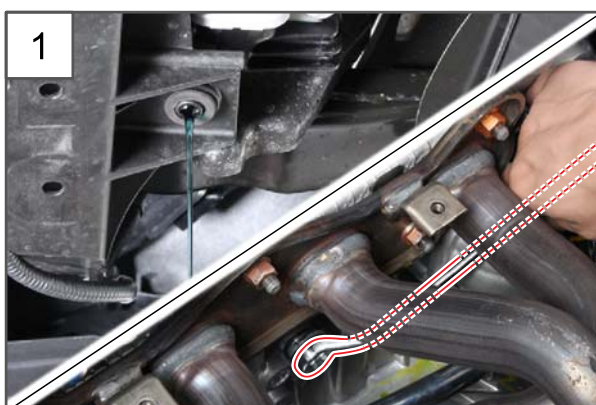
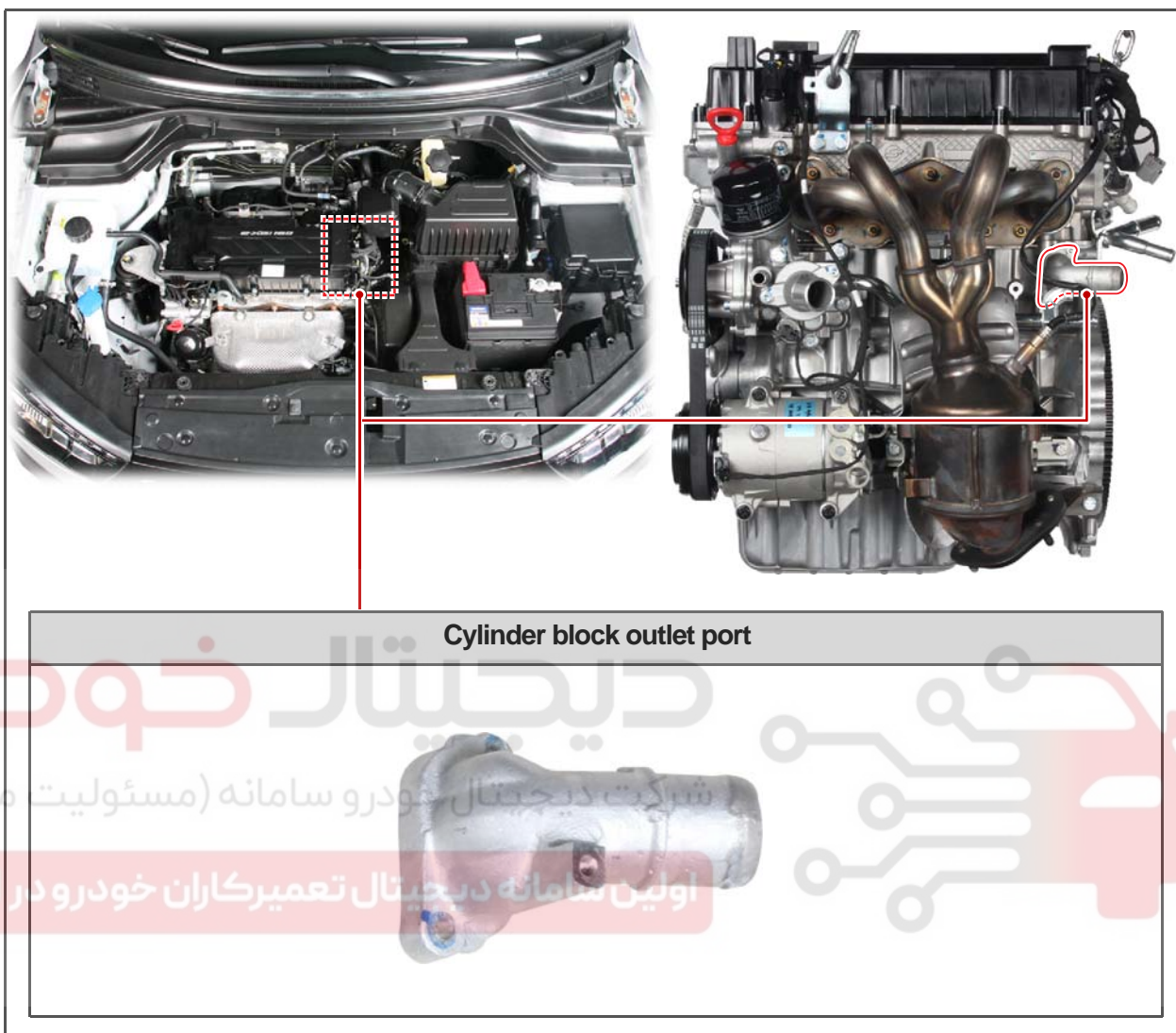
NOTE

- Install the cylinder head outlet port and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

S.G.N.

1528-09

CYLINDER BLOCK OUTLET PORT



1. Remove the radiator drain plug and screw plug of the cylinder block to drain the coolant.

**NOTE**

Refer to "COOLANT DRAIN AND FILL UP" under this subsection.

Modification basis	
Application basis	
Approval basis	

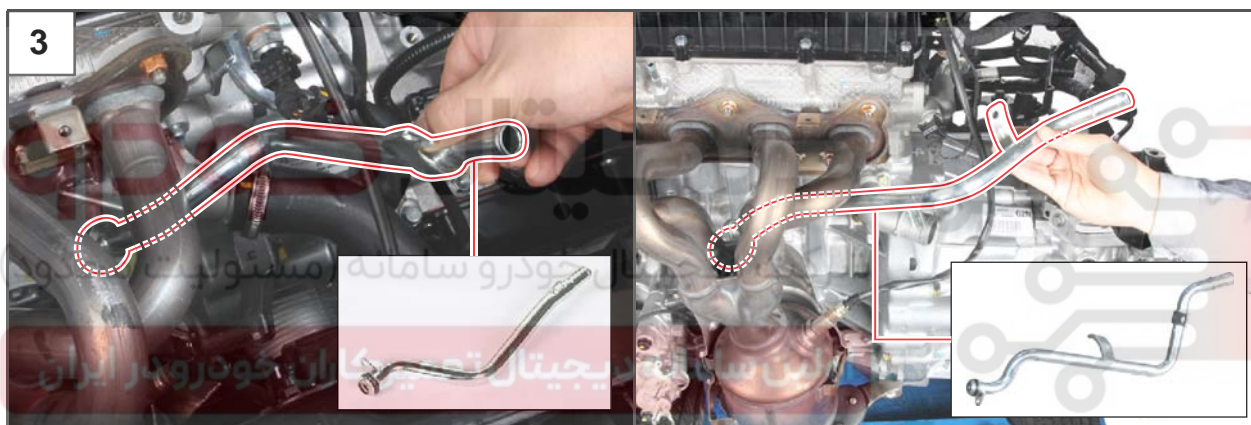
COOLING SYSTEM

TIVOLI 2015.03



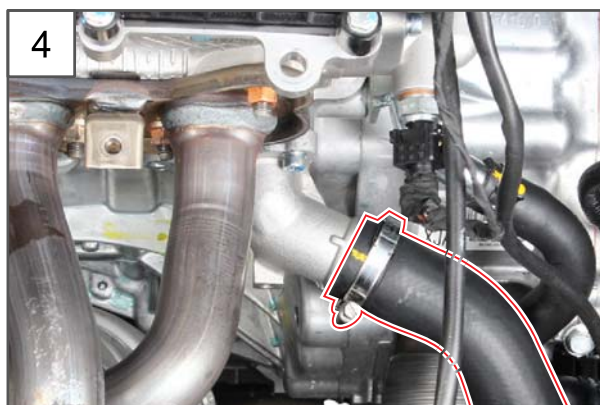
2. Remove the snorkel assembly.

3. Remove the TOC coolant return pipe (for a vehicle with A/T) or coolant return pipe (for a vehicle with M/T).



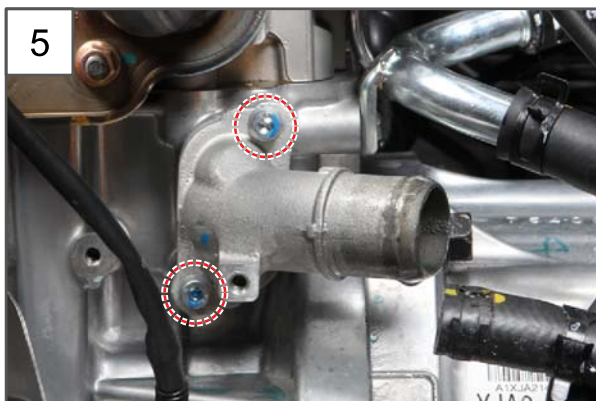
NOTE

- For a vehicle with A/T, refer to "TOC COOLANT RETURN PIPE" under this subsection.
- For a vehicle with M/T, refer to "COOLANT RETURN PIPE" under this subsection.



4. Remove the spring clamp (7 mm) and disconnect the radiator inlet hose from the cylinder block outlet port.

Tightening torque 6 to 7 Nm



5. Unscrew the 2 hexagon mounting bolts (5 mm) for the cylinder block outlet port.

Tightening torque $10 \pm 1.0 \text{ Nm}$



6. Remove the cylinder block outlet port.



7. Install in the reverse order of removal.

CAUTION

Replace the cylinder block outlet port gasket (A) with a new one when installing.

NOTE

- Install the cylinder block outlet port and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

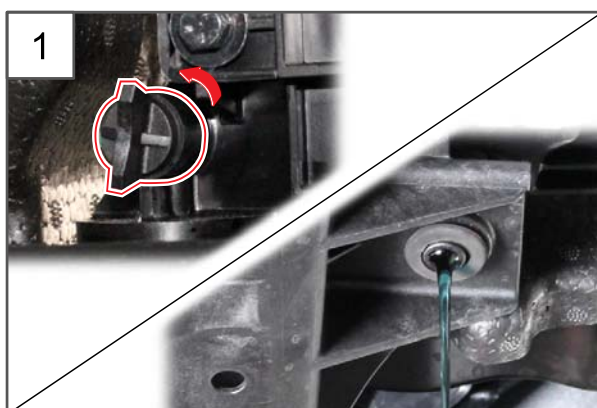
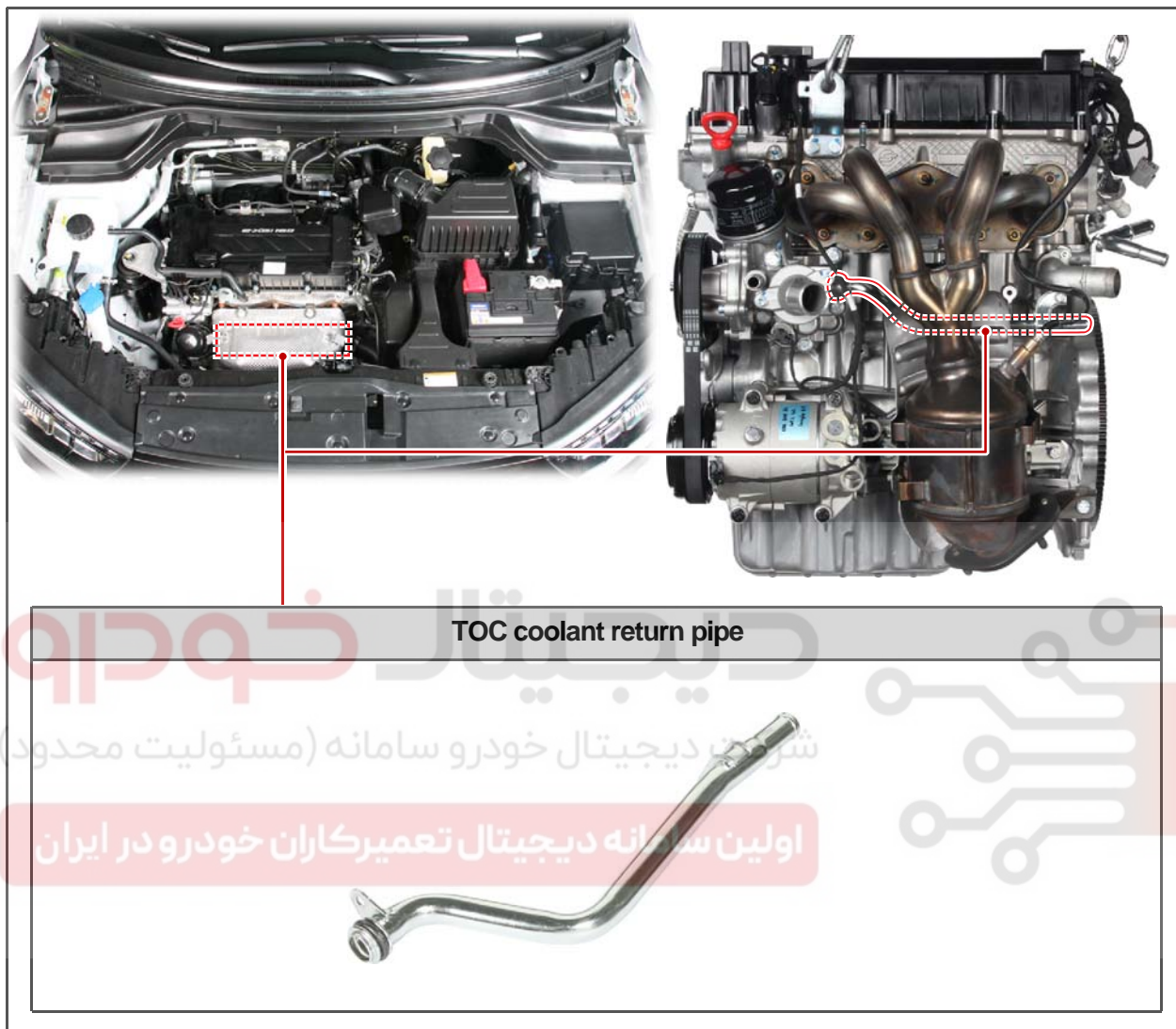


Modification basis	
Application basis	
Approval	

S.G.N.

1528-24

TOC COOLANT RETURN PIPE (FOR A VEHICLE WITH A/T)

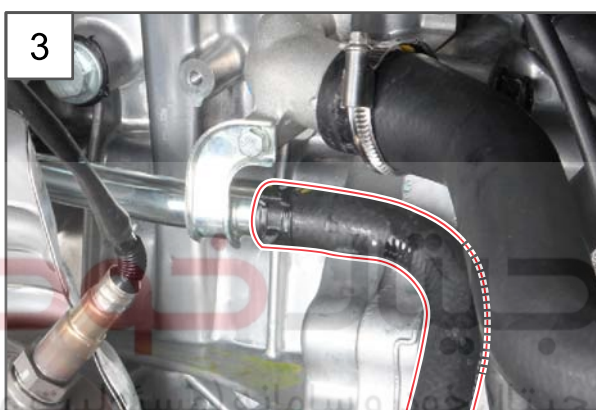


1. Drain the coolant. Refer to "COOLANT DRAIN AND FILL UP" under this subsection.

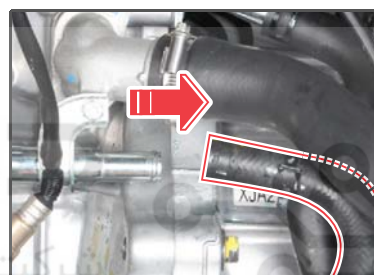




2. Remove the snorkel assembly.

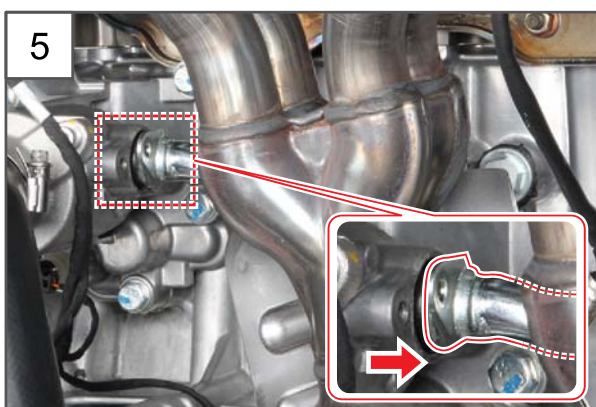


3. Remove the exhaust heat protector and disconnect the TOC coolant return hose from the TOC coolant return pipe.



4. Unscrew the 2 mounting bolts (10 mm) for the TOC coolant return pipe.

Tightening torque $10 \pm 1.0 \text{ Nm}$



5. Remove the TOC coolant return pipe by pulling on the mounting part to the oil filter module.



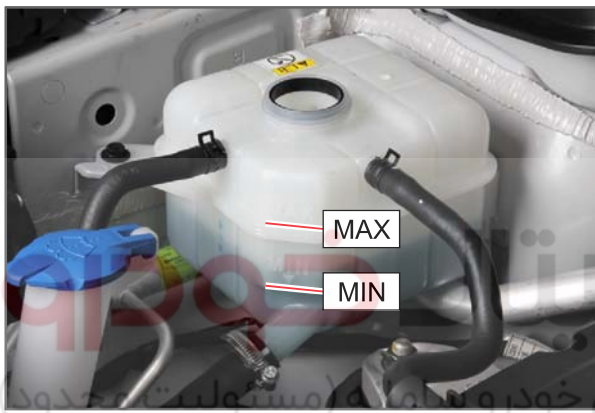
Modification basis	
Application basis	
Approval basis	



6. Install in the reverse order of removal.

CAUTION

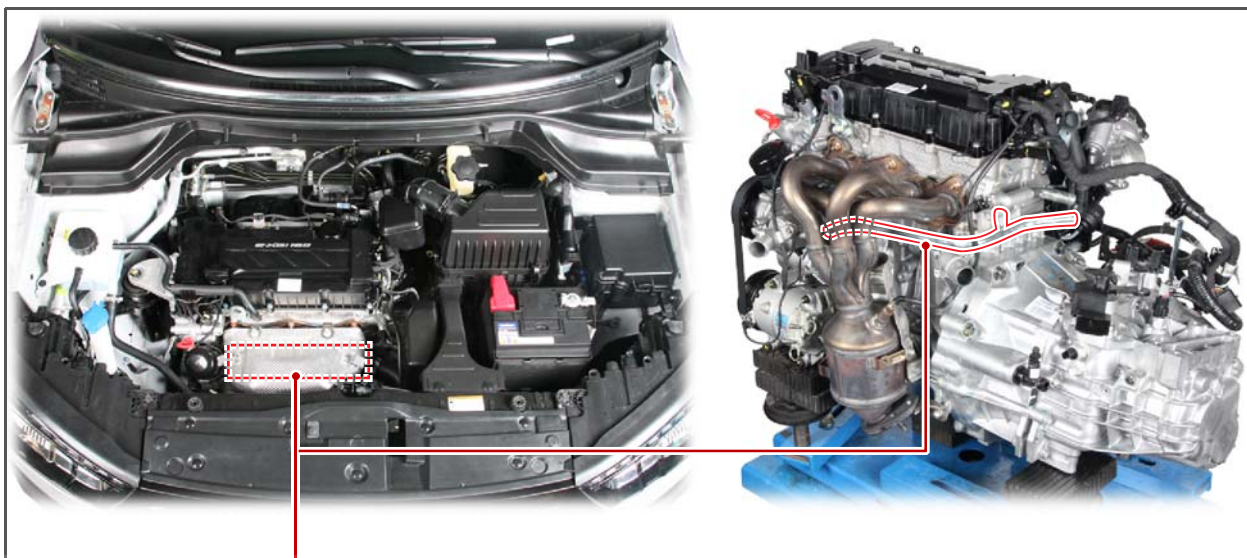
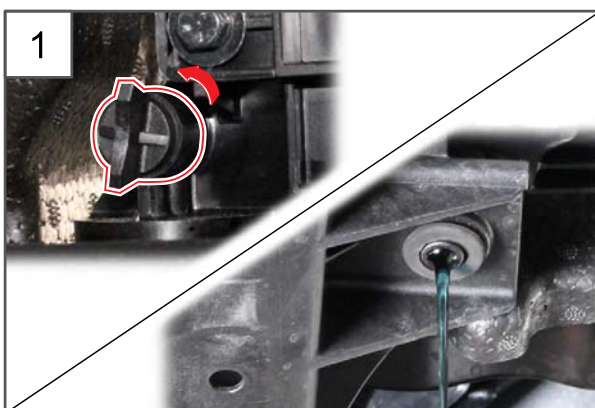
Replace the TOC coolant return pipe O-ring (A) with a new one when installing.



NOTE

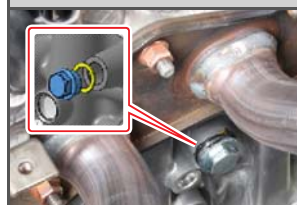
- Install the TOC coolant return pipe and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

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S.G.N.
1528-24**COOLANT RETURN PIPE (FOR A VEHICLE WITH M/T)****Coolant return pipe**

1. Drain the coolant. Refer to "COOLANT DRAIN AND FILL UP" under this subsection.

For vehicle with M/T



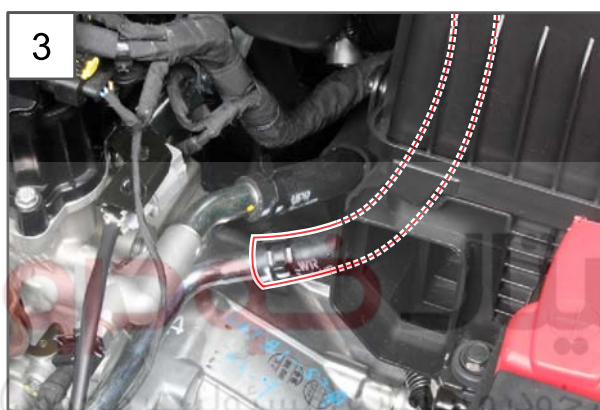
Modification basis	
Application basis	
Approval basis	

COOLING SYSTEM

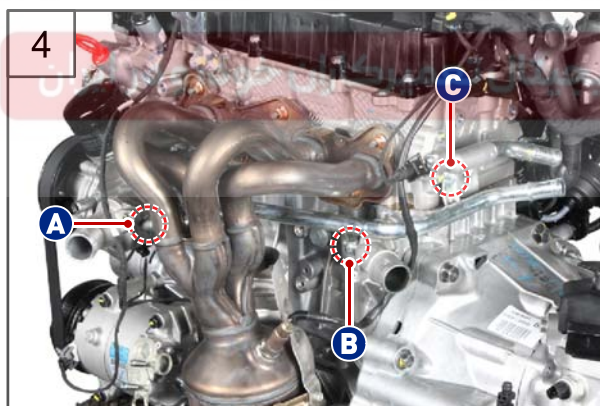
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2. Remove the snorkel assembly.

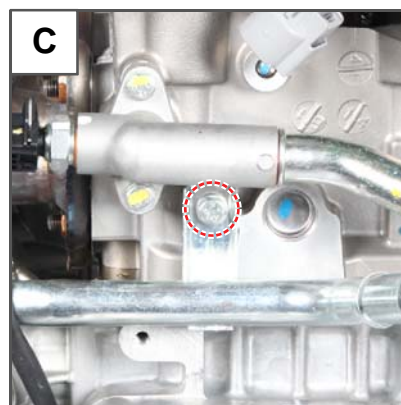
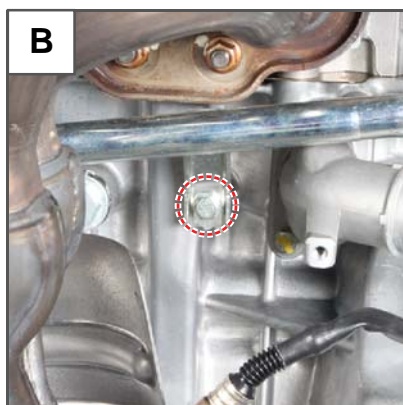
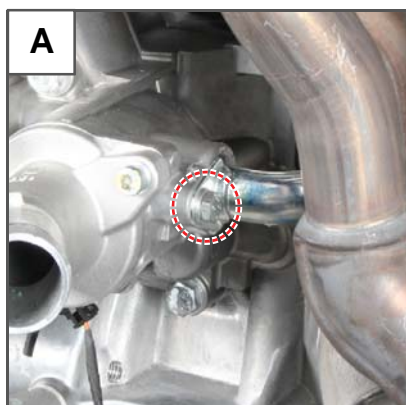


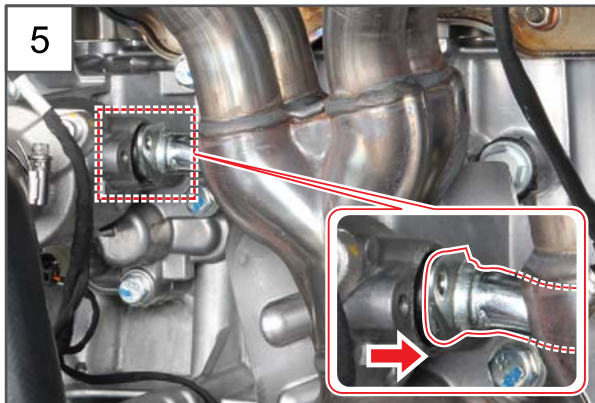
3. Remove the heater lower hose from the coolant return pipe.



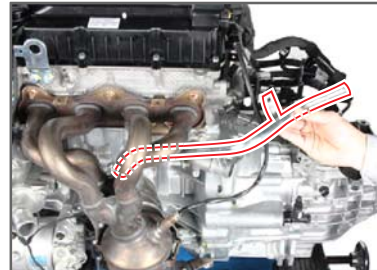
4. Unscrew the 3 mounting bolts (A), (B), and (C) (10 mm) for the coolant return pipe.

Tightening torque $10 \pm 1,0 \text{ Nm}$





5. Remove the coolant return pipe by pulling on the mounting part to the oil filter module.



6. Install in the reverse order of removal.

CAUTION

Replace the coolant return pipe O-ring (A) with a new one when installing.



NOTE

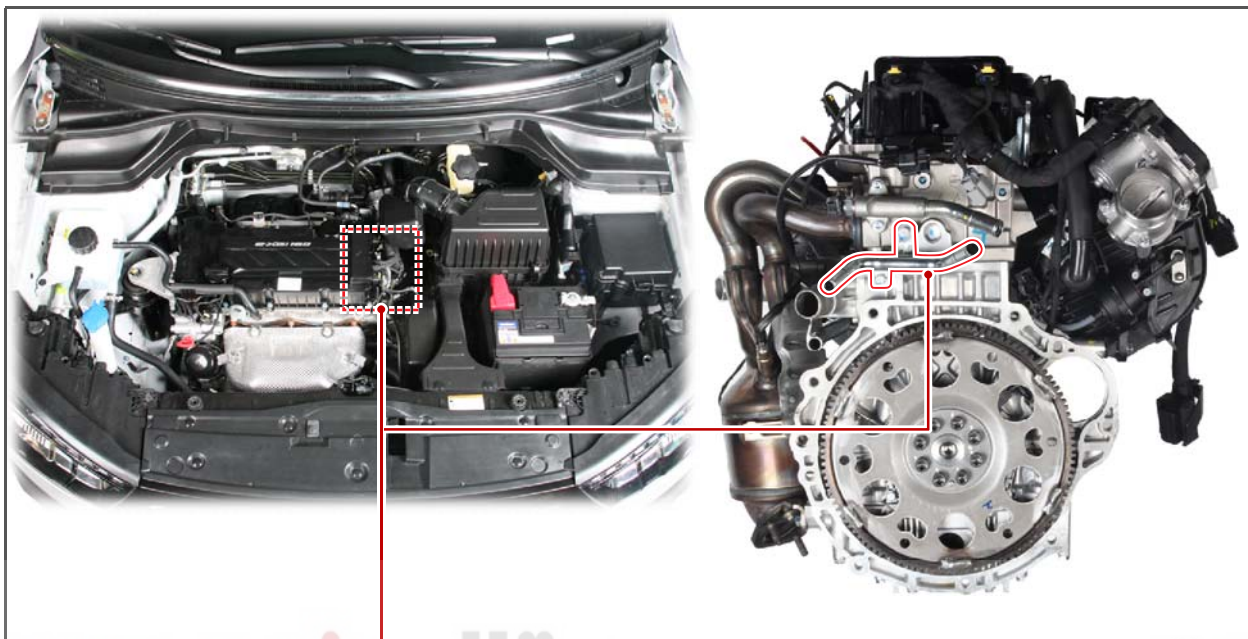
- Install the coolant return pipe and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)

Modification basis	
Application basis	
Accessories	

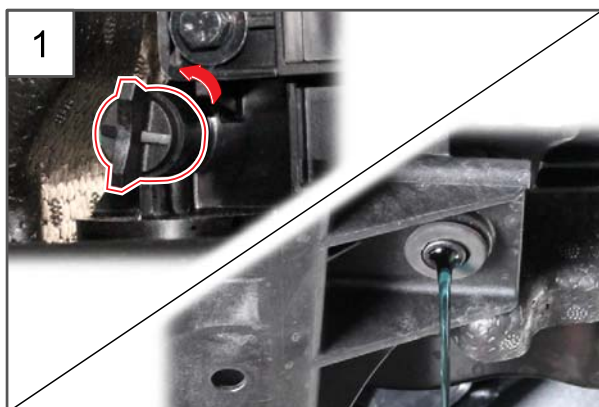
S.G.N.

1528-22

TOC COOLANT SUPPLY PIPE (FOR A VEHICLE WITH A/T)



TOC coolant supply pipe



1. Drain the coolant. Refer to "COOLANT DRAIN AND FILL UP" under this subsection.

For a vehicle with
A/T



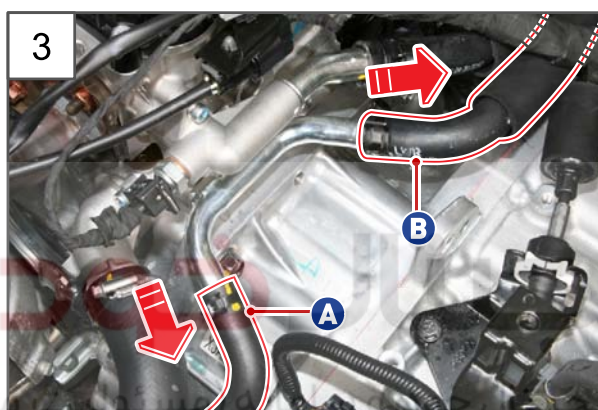


2. Remove the air cleaner assembly.



NOTE

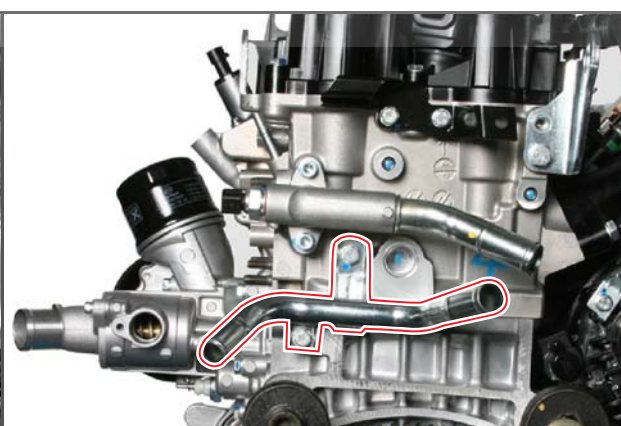
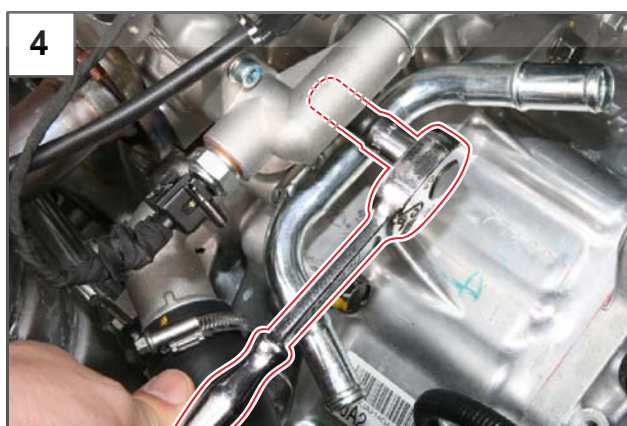
Refer to "AIR CLEANER ASSEMBLY" under "REMOVAL AND INSTALLATION" subsection of "INTAKE SYSTEM" section in "G16DF ENGINE" chapter.



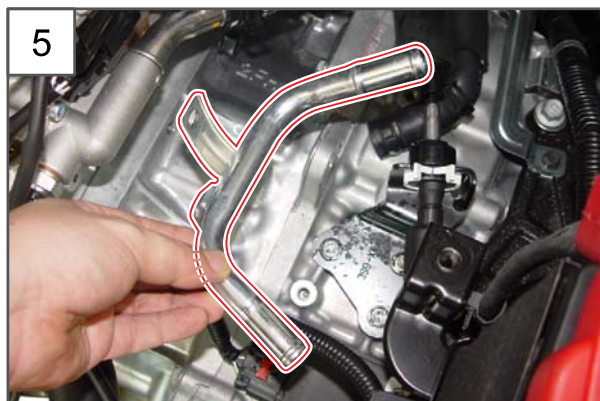
3. Disconnect the TOC coolant supply hose (A) and heater lower hose (B) from the TOC coolant supply pipe.

4. Unscrew the 2 mounting bolts (10 mm) for the TOC coolant supply pipe.

Tightening torque $10 \pm 1.0 \text{ Nm}$



Modification basis	
Application basis	
Effective date	



5. Remove the TOC coolant supply pipe.



6. Install in the reverse order of removal.



NOTE

- Install the TOC coolant supply pipe and fill the coolant reservoir tank with the coolant. Start the engine so that the engine speed reaches 1,500 to 2,000 rpm. After that, bleed the air from the cooling system and add coolant again.
- Fit the coolant reservoir tank pressure cap. After warming up the engine (thermostat open), check if the coolant level reaches to the MAX mark. If not, refill the coolant. (within 10 mm in relation to MAX mark)