

Contents

Heater and air conditioning system

service warnings	1	a/c relay inspection.....	13
usage of refrigerant.....	1	blower relay removal/ installation.....	13
storage of refrigerant	1	blower relay inspection	13
service precautions	1	troubleshooting	14
application of compressor oil	1	troubleshooting procedure.....	14
maintenance procedure of refrigeration system	1	troubleshooting procedure.....	15
installation of manifold measuring instrument	1	troubleshooting procedure.....	16
recovery of refrigerant.....	1	troubleshooting procedure.....	18
charging refrigerant.....	1	troubleshooting procedure.....	21
refilling refrigerant	3	troubleshooting procedure.....	22
pressure inspection of cooling system	4	troubleshooting procedure.....	23
performance test of cooling system.....	5	troubleshooting procedure.....	25
basic system	6	troubleshooting procedure.....	28
structural view	6	troubleshooting procedure.....	32
removal and installation of blower evaporator	6	troubleshooting procedure.....	37
assembly.....	6	troubleshooting procedure.....	43
disassembling and assembling of blower	7		
evaporator assembly.....	7		
a/c compressor removal/installation.....	7		
a/c compressor installation instruction.....	8		
condenser removal/installation.....	8		
condenser installation instruction	8		
condenser inspection	8		
cooling system pipelines removal/ installation	8		
refrigerant pipelines removal instruction	9		
refrigerant pipelines installation instruction....	9		
control system	10		
structural view of control system	10		
blower motor removal/installation.....	11		
blower motor inspection.....	11		
electromagnetic clutch disassembly/assembly	11		
.....	11		
bolt removal instruction	12		
electromagnetic clutch adjustment	12		
electromagnetic clutch inspection	12		
cooling system pressure switch inspection....	12		
a/c relay removal/installation	12		

Service warnings

Usage of refrigerant

Avoid breathing in air conditioning refrigerant or lubricant vapor, which may irritate eyes, nose and throat. Besides, as to environmental concerns, we suggest that recovery/ recycling/ recharging equipments should be used for draining r-134a from the air conditioning system. If accidental system leakage occurs, ventilate working area before resuming a/c.

Don't perform pressure or leakage test on r-134a service equipment and vehicle air conditioning system with compressed air. Mixtures of air and r-134a have been proved to be combustible under pressurized condition. These mixtures, if ignited, may cause injury or property loss. Additional health and safety information on operation may be obtained from refrigerant manufacturers.

Do not let refrigerant leak near flaming fire or any kind of heat. A poisonous gas may be generated if the refrigerant gas contacts fire or heat sources such as lighted cigarettes or heaters. When carrying out any operation that may cause refrigerant leakage, extinguish or remove the above-mentioned heat sources and maintain adequate ventilation.

Using liquid refrigerant is dangerous. A small quantity on the skin can result in local frostbite. When handling the refrigerant, wear gloves and safety goggles. If refrigerant splashes into eyes, immediately wash it and consult a doctor.

Storage of refrigerant

The refrigerant container is highly pressurized. High temperature may cause explosion, resulting in scattering metal fragments and liquid refrigerant that shall cause serious injury. Refrigerant should be stored below 40°C (104 f).

Service precautions

Application of compressor oil

Only pag56 compressor oil is allowed for this model. Using of other compressor oils may damage the a/c compressor.

Do not spill pag56 compressor oil on the vehicle. Drops of compressor oil on the vehicle surface may corrode the finishing paint. If oil drops on the vehicle, wipe it dry immediately.

Pag56 or equivalent compressor oil has higher rate of moisture absorption than the previously used mineral oil. If moisture is mixed with the compressor oil, the cooling system could be damaged. Therefore, install caps immediately after using the compressor oil or removing cooling

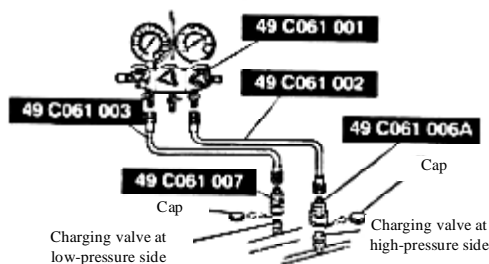
system components to prevent moisture absorption.

Service procedures

Maintenance procedure of refrigeration system

Installation of manifold measuring instrument

1. fully close the valve of the sst 49 c061 001.
2. connect the ssts 49 c061 002, 49 c061 003 to the high-pressure and low-pressure side joints of the sst 49 c061 001.
3. connect the ssts 49 c061 006a, 49 c061 007 to the ends of the ssts 49 c061 002, 49 c061 003.
4. connect the ssts 49 c061 006a, 49 c061 007 to charging valve.



Recovery of refrigerant

1. connect an r-134a recovery/recycling/ recharging device to the vehicle and operate as per the device manufacturer's instruction.

Charging refrigerant

Attention

Do not exceed the specified scope when charging the system with refrigerant. Or it may cause low efficiency of a/c system or damage the cooling recirculation system components.

Charging recycled r-134a refrigerant

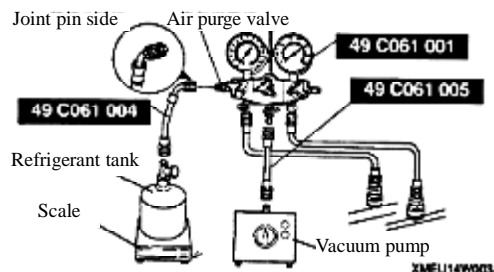
1. connect r-134a recovery/recycling/ recharging device to the vehicle and follow the device manufacturer's instructions.

Charging new r-134a refrigerant

1. install the ssts (charging device).
2. connect one end of the joint pin of the sst 49 c061004 to the air purge valve of the sst 49 c061 001.
3. connect the sst 49 c601 005 to center joint of the sst 49 c061001.
4. connect the sst 49 c601 005 to vacuum pump.

Service warnings

- connect the sst 49 c061 004 to the refrigerant reservoir.
- place the refrigerant reservoir on the scale.

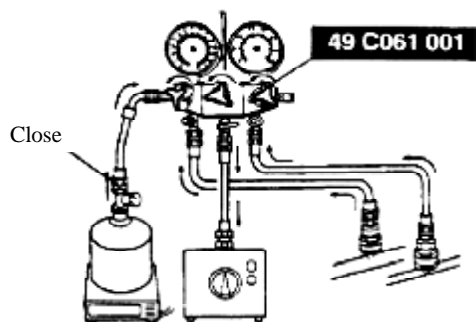


- open all valves of the sst 49 c061 001.

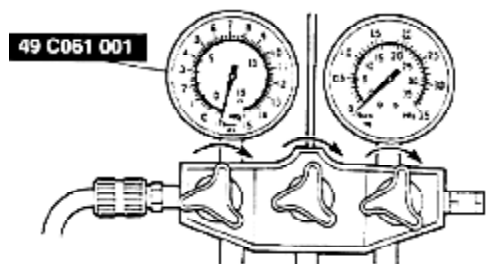
Attention

Shutting off valve of manifold pressure gauge set immediately after switching off vacuum pump, otherwise, the vacuum pump oil will flow back into the cooling recirculation system and cause low efficiency of a/c system.

- start vacuum pump and keep it operating for 15 minutes.



- verify that high-pressure and low-pressure side readings of the sst 49 c061 001 are -101 kpa (-760 mmhg, -29.9 inhg). Close valves of the sst 49c061 001.



- stop vacuum pump and wait for 5 minutes.
- examine high-pressure and low-pressure side

readings of the sst 49 c061 001. if the reading has changed, inspect for leakage and then repeat from step 7. if the reading has not changed, go to the next step.

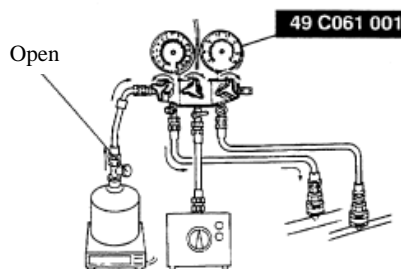
- open valve of refrigerant reservoir.
- weigh the refrigerant reservoir to verify proper charging quantity.

Standard quantity of charged refrigerant: 560 g {19.7 oz}

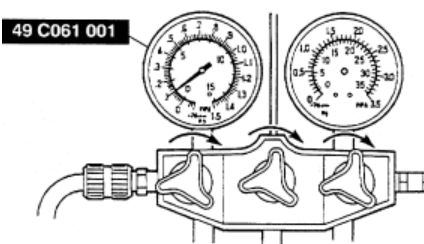
Warning

If the system is charged with overmuch refrigerant for inspection of leakage, when any leakage occurs, the refrigerant will be emitted into the atmosphere. In order to prevent accidental leakage of refrigerant, which can destroy the stratosphere ozone in the stratosphere, follow the proper procedures and charge with only a small quantity of refrigerant when inspecting for leakage.

- open the low-pressure side valve of sst 49 c061 001.



- when the high-pressure side reading reaches 98 kpa (1.0 kgf/cm², 14 pis), close low-pressure side valve of sst 49 c061 001.



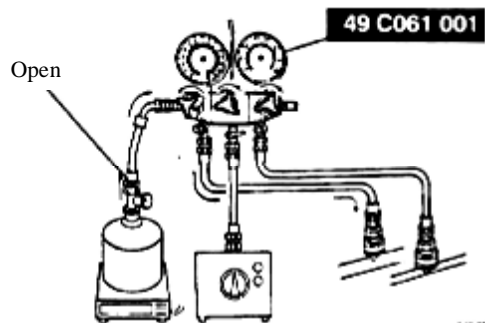
- inspect the condenser pipe joint for leakage by using the sst (leakage tester). If there is no leakage, go to step 18. if the connection is loose, tighten it and go to the next step.
- inspect for leakage again. If there is no leakage after tightening the joint, go to next step. If leakage still occurs at the same joint, discharge refrigerant and then repair the joint. Repeat the charging procedure from step 7.

Service warnings

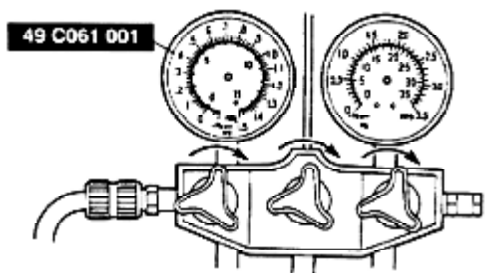
Warning

When charging cooling system with refrigerant by using service cans or refrigerant reservoir, running the engine with high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant reservoir will increase and result in explosion, the scattering metal fragments and liquid refrigerant may cause serious injury. Therefore, do not open the high-pressure side valve with the engine running.

- open low-pressure side valve of the sst 49 c061 001 and charge with refrigerant until the weight of refrigerant reservoir has decreased by 400g (14.1 oz) from the mass in step 13.



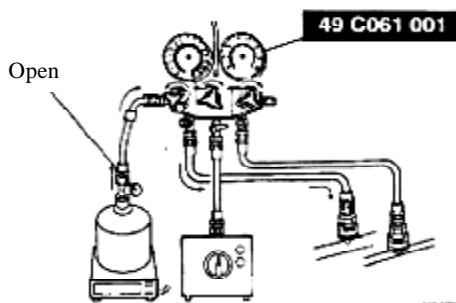
- close low-pressure side valve of sst 49 c061 001.



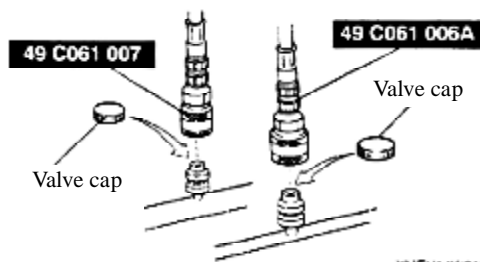
Warning

When charging cooling system with refrigerant by using service cans or refrigerant reservoir, running the engine with high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant reservoir will increase and result in explosion, the scattering metal fragments and liquid refrigerant may cause serious injury. Therefore, do not open the high-pressure side valve with the engine running.

- start engine and operate the a/c compressor.
- open the low-pressure side valve of sst 49 c061 001 and charge with refrigerant until the weight of refrigerant reservoir has decreased by 650g (22.9 oz) from the mass in step 13.



- close low-pressure side valve of the sst 49 c061 001 and the valve of the refrigerant reservoir.
- stop engine, turn off a/c compressor.
- inspect for leakage with the sst (air leakage tester). If there is no leakage, go to step 26. if leakage is found at a loose joint, tighten and then go to the next step.
- inspect for leakage again. If there is no leakage after tightening, go to the next step. If there is still leakage at the same joint, discharge the refrigerant and then repair the joint. Repeat charging procedures from step 7.
- remove the ssts 49 c061 006a, 49 c061 007 from charging valves.
- install caps back to the charging valves.



Refilling refrigerant

Attention

Do not exceed the specified scope when charging system with refrigerant. Otherwise, it will cause low efficiency of a/c system and damage the cooling system recirculation components.

Charging with recycled r-134a refrigerant

- connect r-134a recovery/recycling/ recharging device to the vehicle and follow the device manufacturer's instructions.

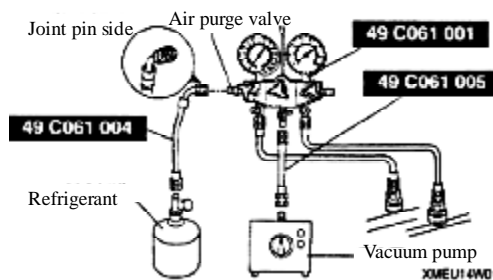
Charging with new r-134a refrigerant

- install ssts (charging device).
- connect one end of joint pin of sst 49 c061 004

Service warnings

to air purge valve of sst 49 c061 001.

3. connect sst 49 c601005 to center joint of sst 49 c061001.
4. connect sst 49 c601 005 to vacuum pump.
5. connect sst 49 c061 004 to refrigerant reservoir.

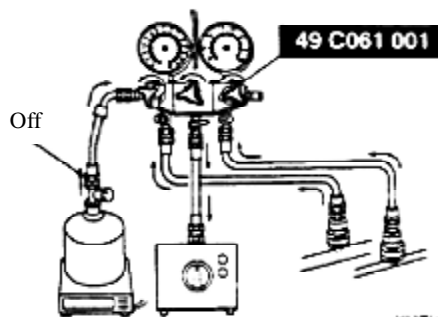


6. open all valves of sst 49 c061 001.

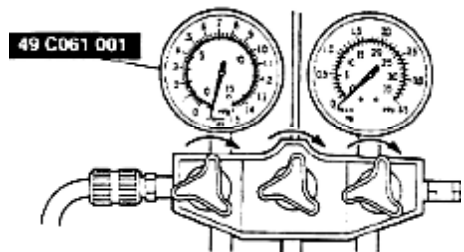
Attention

Close valve of manifold pressure gauge immediately after vacuum pump stopped. Otherwise the vacuum pump oil will flow back into the cooling recirculation system and cause low efficiency of a/c.

7. start vacuum pump and keep it operating for 1 minute.



8. close center valve of the sst 49 c061 001.



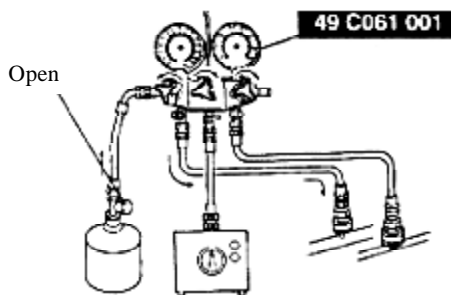
9. open valve of the refrigerant reservoir.

Warning

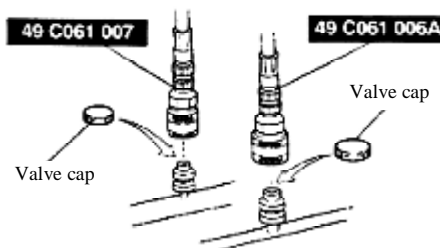
When charging the system with refrigerant by using

service cans or refrigerant reservoir, running the engine with the high-pressure side valve open is dangerous. Pressure within the service cans or refrigerant reservoir will increase and result in explosion, the scattering metal fragments and liquid refrigerant may cause serious injury. Therefore, do not open high-pressure side valve with the engine running.

10. start engine and operate the a/c compressor.
11. open low-pressure valve of sst 49 c061 001



12. refill refrigerant referring to refrigerant charging inspection.
13. close low-pressure side valve of the sst 49 c061 001 and valve of the refrigerant reservoir.
14. shut off engine and a/c compressor.
15. remove sst 49 c061 006a, 49 c061007 from the charging valves.
16. install caps on charging valves.

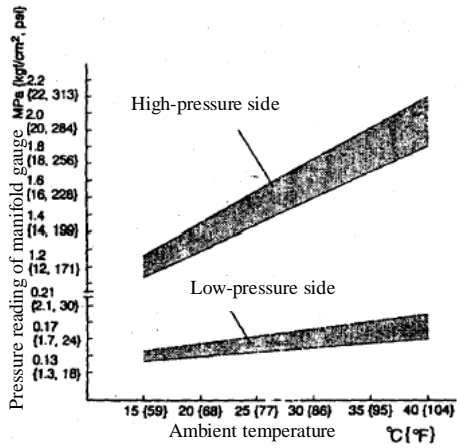


Pressure inspection of cooling system

1. install the ssts (charging device).
2. warm up the engine to normal operation temperature and run it at a constant revolution of 1,500 rpm.
3. set front fan switch at 4th position.
4. turn on a/c switch.
5. set to recirculate indoor mode.
6. set the temperature control to max cold.
7. set to vent mode.

Service warnings

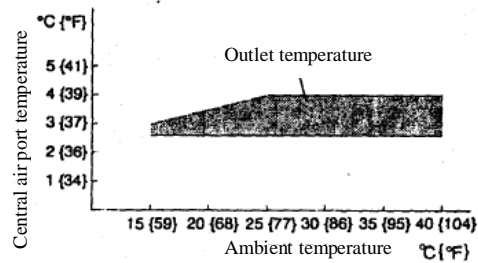
8. close all doors and windows.
9. measure ambient temperature and record pressure readings at high-pressure and low-pressure side of sst 49 c061 001.
10. verify that the intersection of pressure reading of the sst 49 c061 001 and ambient temperature is in the shaded zone. If not, diagnose and eliminate the faults of cooling system. (refer to section u, troubleshooting index)



Performance test of cooling system

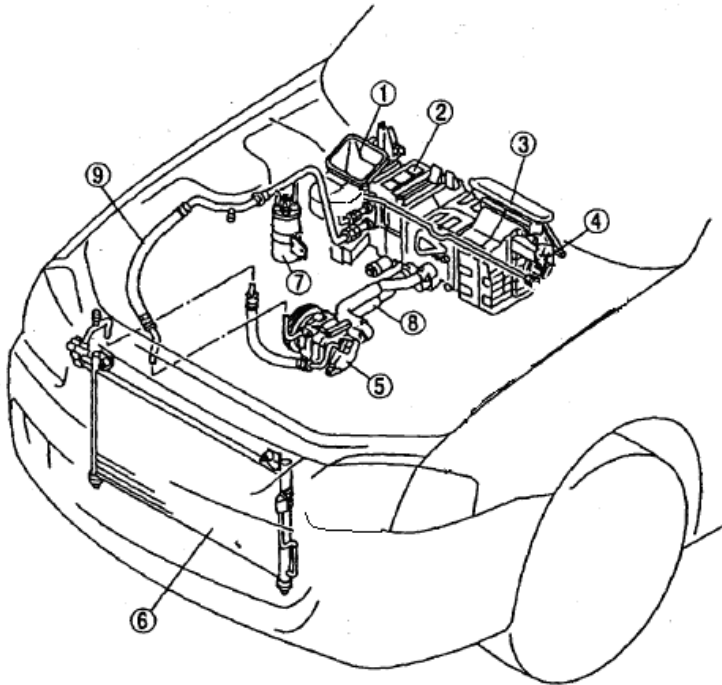
Performance test of cooling system

1. follow refrigerant charge inspection and cooling system pressure inspection procedure. (refer to section u, refrigerant charge inspection) (refer to section u refrigerant pressure inspection.) If it does not meet the technical requirements, diagnose and eliminate the faults of cooling system.(refer to section u, troubleshooting index.) If they are correct, go to the next step.
2. place a dry-bulb thermometer in central air port at driver side.
3. open the engine hood.
4. warm up the engine to normal operation temperature and keep it running at a constant revolution of 1,500 rpm.
5. set front fan switch at 4th position.
6. turn on a/c switch.
7. set the recirculate indoor mode.
8. set the temperature control to max cold.
9. set vent mode.
10. close all doors and windows.
11. wait until the central air port temperature is stable, and then the outlet air temperature is also stable. The a/c compressor is repeatedly turned on and off under control of the temperature sensor.
12. measure central air port temperature.
13. measure the ambient temperature.
14. verify that intersection of the central air port temperature and ambient temperature is in the shaded zone. If not, diagnose and remove any troubles in the cooling system. (refer to section u, troubleshooting index)



Basic system

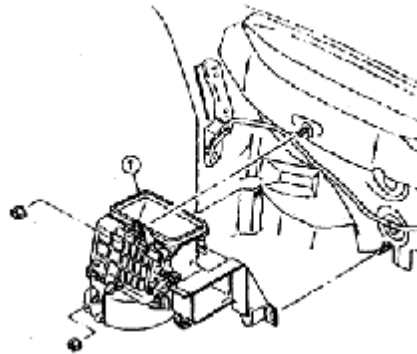
Structural view



1	Air intake
2	Blower evaporator assembly
3	Warm air blower assembly
4	Rear air ducting
5	A/c compressor
6	Condenser
7	Fluid reservoir
8	Warm air blower water pipe
9	Refrigerant

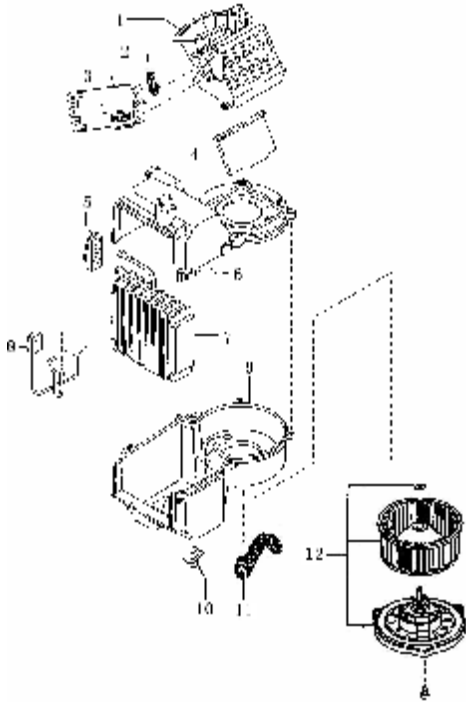
Removal and installation of blower evaporator assembly

1. disconnect the negative battery cable.
2. remove the dashboard. (refer to section s, dashboard removal /installation)
3. remove in order as shown in the table.
4. install in reverse order as of removal.



Disassembling and assembling of blower evaporator assembly

1. disassemble in order as shown in the table.
2. assemble in reverse order as of disassembly.



1	Air intake housing
2	Internal & external air damper connecting rod
3	Internal & external air damper actuator
4	Internal & external air damper assembly
5	H expansion valve
6	Blower evaporator upper housing
7	Evaporator element
8	Thermistor
9	Blower evaporator upper housing
10	Speed regulation module assembly
11	Motor throttle duct
12	Blower motor assembly

A/c compressor removal/installation

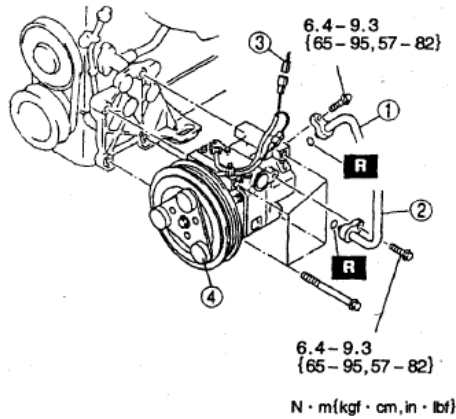
1. disconnect the negative battery cable.
2. drain refrigerant from the system.
3. remove the mudguard.
4. loosen the drive belt and remove it.

Attention

If moisture or impurity enters the cooling recirculation system, cooling ability will be reduced and abnormal noise will occur. Always plug all open fittings immediately after removing any cooling recirculation system component to keep moisture or impurity out of the system.

Do not allow a/c compressor oil to flow out. If the a/c compressor operates in lack of oil, abnormal noise and scuffing of a/c compressor will occur.

5. remove in order as shown in the table.
6. install in reverse order as of removal.
7. adjust the drive belt.
8. perform the cooling system performance test.



1	High-pressure pipe assembly (high pressure)
2	Pipe subassembly (low pressure)
3	Connector
4	A/c compressor

Basic system

A/c compressor installation instruction

1. when replacing the a/c compressor, discharge part of compressor oil from the new a/c compressor.

discharging quantity: 160ml (160cc, 5.40fl oz)
(compressor oil discharged from the used compressor)

Condenser removal/installation

1. disconnect the negative battery cable.
2. drain refrigerant from the cooling system.
3. remove the front bumper.

Attention

If moisture or impurity enters the cooling recirculation system, cooling capability will be reduced and abnormal noise will occur. Always plug all open joints immediately after removing any cooling recirculation system component to keep moisture or impurity out of the system.

Do not allow compressor oil to flow out. If the a/c compressor operates in lack of oil, abnormal noise and scuffing of a/c compressor will occur.

4. remove in order as shown in the table.
5. install in reverse order as of removal.
6. perform the cooling system performance test.

1	High-pressure hose assembly (high pressure)
2	Pipe subassembly (low pressure)
3	Condenser assembly

Condenser installation instruction

1. when installing a new condenser, add a supplement quantity of atmoscu 10 compressor oil into the condenser inlet.

supplemental quantity: 30ml (30cc, 1.0 fl oz)

Condenser inspection

1. check for cracks, damage and oil leakage. If any, replace the condenser.
2. inspect vanes for clogged by dust. If clogged, clean any dust.
3. check for bent vanes. If any vane is bent, straighten it with a flat head screwdriver.

Cooling system pipelines removal/ installation

1. disconnect the negative battery cable.
2. draw refrigerant from the system.
3. remove the front bumper.

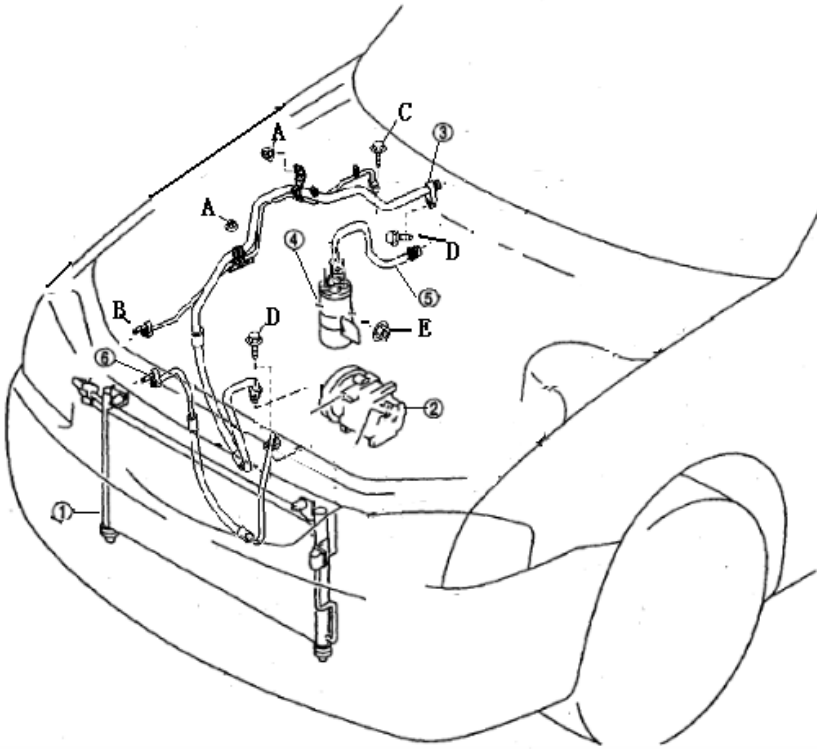
Attention

If moisture or impurity enters the cooling recirculation system, cooling ability will be reduced and abnormal noise will occur. Always plug all open joints immediately after removing any cooling recirculation system component to keep moisture or impurity out of the system.

Do not allow compressor oil to flow out. If the a/c compressor operates in lack of oil, abnormal noise and scuffing of a/c compressor will occur.

4. remove in order as shown in the table.
5. install in reverse order as of removal.
6. perform the cooling system performance test.

Basic system



- A: 8.8~12.8n·m
- B: 18.7~27.5n·m
- C: 7.8~11.8n·m
- D: 7.8~11.8n·m
- E: 8.8~12.8n·m

1	Condenser assembly
2	Compressor assembly
3	Pipe subassembly
4	Fluid reservoir assembly
5	Fluid pipe assembly
6	3 high-pressure pipe assembly

Refrigerant pipelines removal instruction

1. loosen the nuts with 2 pieces of spanners, and then remove the condenser duct or hose.

Refrigerant pipelines installation instruction

1. if new condenser duct and/or hose are installed,

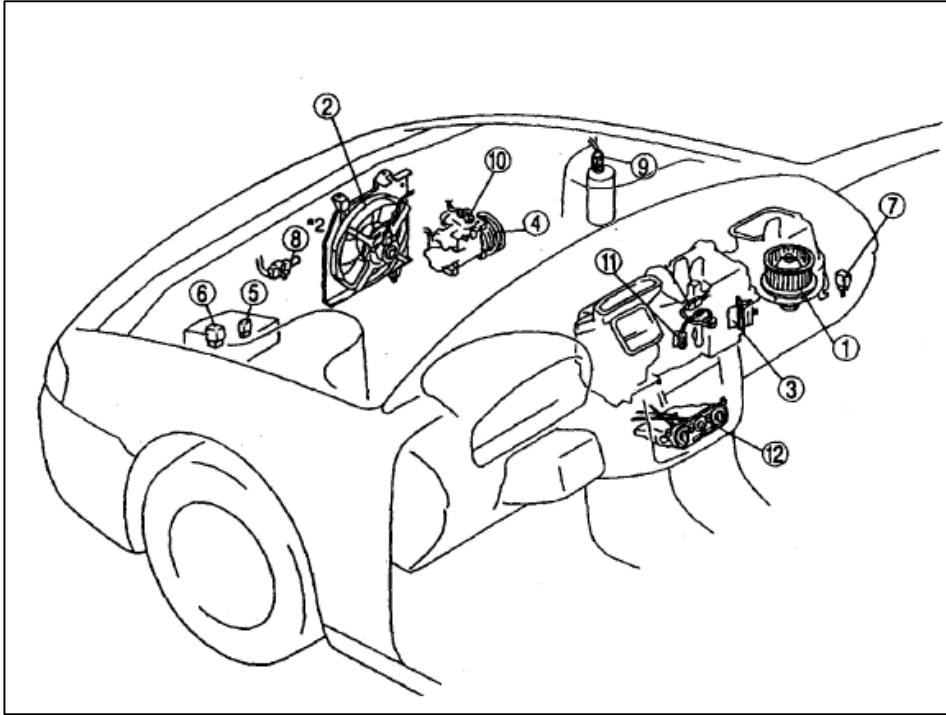
add a supplemental quantity of pag105 compressor oil.

supplemental quantity: 10ml {10cc, 0.3fl oz}

2. apply some compressor oil to the o-ring and connect the joints.
3. tighten the joints.
 - (1) tighten the nuts or bolts by hands.
 - (2) tighten the joint to specified torque. If it is a nut joint, tighten the nut with a spanner and torque wrench.

Control system

Structural view of control system

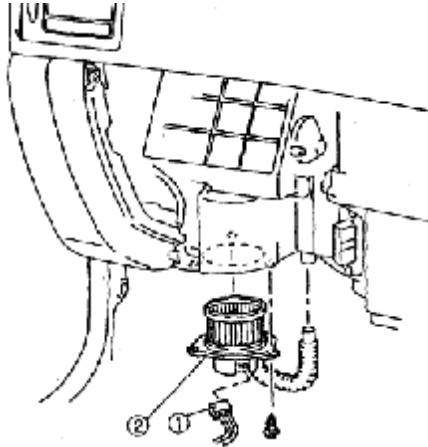


1	Blower motor
2	Condenser fan
3	Speed regulation resistance
4	Electromagnetic clutch
5	A/c relay
6	Condenser fan relay
7	Blower relay
9	Refrigerant pressure switch
10	Thermal protector
11	Thermistor
12	A/c amplifier

Control system

Blower motor removal/installation

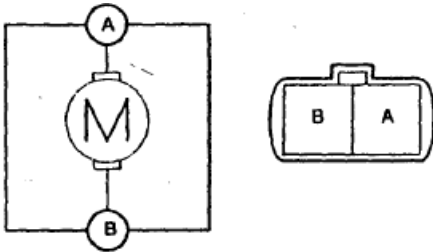
1. disconnect the negative battery cable.
2. remove in order as shown in the table.
3. install in reverse order as of removal.



1	Connector
2	Front blower motor

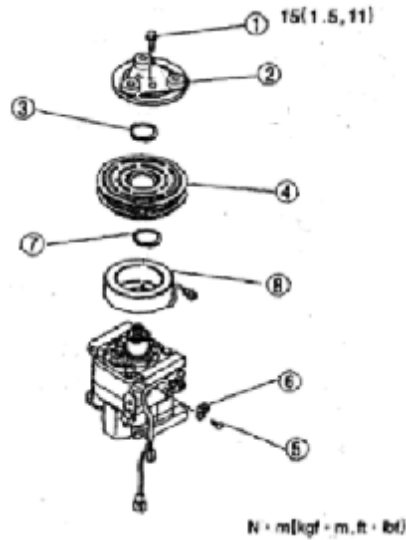
Blower motor inspection

1. disconnect blower motor connector.
2. connect terminal b of front blower motor to ground; connect motor terminal to battery positive voltage. Inspect operation of motor. If specified requirement is not met, replace the front blower motor.



Electromagnetic clutch disassembly/assembly

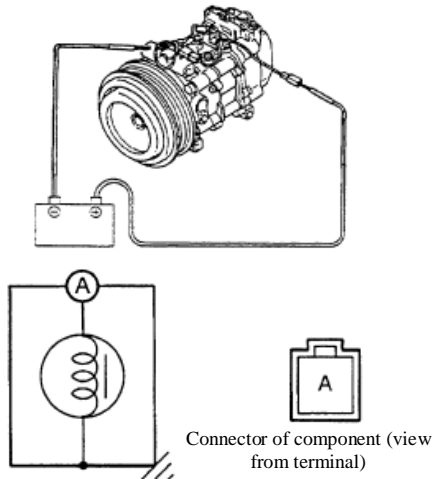
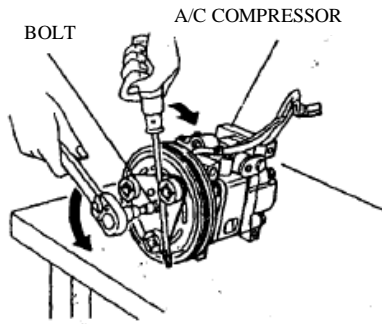
1. disassemble in order as shown in the table.
2. assemble in reverse order as of disassembly.
3. adjust the electromagnetic clutch clearance.



1	Bolt
2	Pressure plate
3	Flexible snap ring
4	A/c compressor pulley
5	Screw
6	Clip
7	Screw
8	Coil

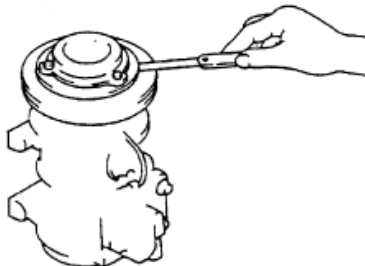
Bolt removal instruction

1. as shown in the figure, the pressure plate should be fixed in place when removing or installing the bolt.



Electromagnetic clutch adjustment

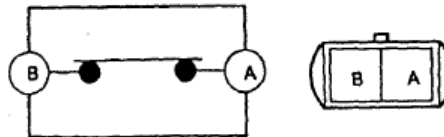
1. if shim is to be used for adjustment, those with following thickness should be selected:
 0.1 mm {0.004 in}
 0.3 mm {0.012 in}
 0.5 mm {0.020 in}
 Standard clearance
 0.3-0.7 mm {0.012-0.028 in}



3. examine operation of the electromagnetic clutch. If it is not as specified, replace the rotor winding.

Cooling system pressure switch inspection

1. install refrigerant charging device.
2. disconnect the refrigerant pressure switch connector.
3. inspect the reading of high-pressure side on manifold pressure gage and the conduction between all terminals. If the result is nonconforming with technological requirements, replace the fluid reservoir assembly.



Electromagnetic clutch inspection

1. disconnect the electromagnetic clutch connector.
2. connect terminal a of electromagnetic clutch to battery positive voltage, and a/c compressor case with ground.

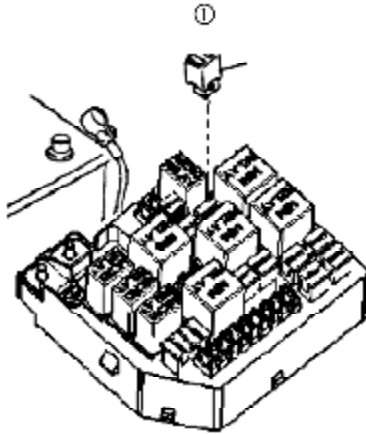
Operating characteristic of pressure switch (mpa):

Hp:off 3.14±0.2 on 2.55±0.2
 diff 0.59±0.2
 Lp:off 0.196±0.2 on 0.225±0.2
 diff ≥0.02

A/c relay removal/installation

1. disconnect negative battery cable.
2. remove main fuse block cover.
3. remove in order as shown in the table.

- install in reverse order as of removal.



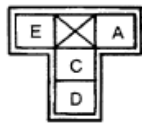
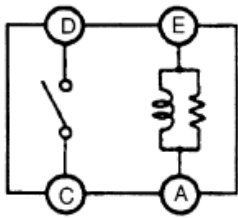
1	A/c relay
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A/c relay inspection

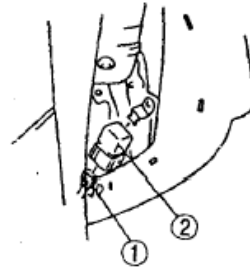
- remove a/c relay.
- inspect continuity between the a/c relay terminals with an ohmmeter. If it is not as specified, replace a/c relay.

○—○ : Continuity

Step	Terminal			
	E	A	C	D
1	○—○			
2	B+	GND	○—○	



Connector of component (view from terminal)



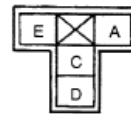
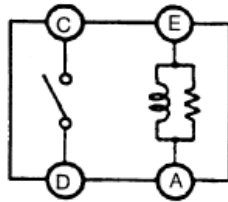
1	Connector
2	Front blower relay

Blower relay inspection

- remove the bracket.
- inspect continuity between the blower relay terminals with an ohmmeter. If it is not as specified, replace the blower relay.

○—○ : Continuity

Step	Terminal			
	E	A	C	D
1	○—○			
2	B+	GND	○—○	



Connector of component (view from terminal)

Blower relay removal/ installation

- disconnect the negative battery cable.
- remove passenger side panel.
- install in reverse order as of removal.

Troubleshooting

Troubleshooting

The areas and steps for inspection are determined according to various malfunctions. Use the chart below to verify the malfunction symptoms in order to diagnose the related area.

I. Insufficient airflow and/or no airflow from air ports

1	Insufficient airflow and/or no airflow from air ports.
Malfunction description	1. malfunction in air port or passage
Possible causes	1. malfunction in vent mode system: steps 1-4 2. malfunction in heat mode system: step 5 3. malfunction in defroster mode system: steps 6-8

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect airflow mode control system of front climate control unit. I When airflow mode control knob is operated, check whether appropriate resistance can be felt and the knob can be moved to its full range freely.	Yes	Go to next step.
		No	Go to step 1 of troubleshooting index no. 3.
2	Verify whether malfunction is in vent mode or other modes. I Does air blow out in vent mode?	Yes	Go to step 5.
		No	Go to next step.
3	Inspect air port. I Is air port clogged?	Yes	Remove obstruction, and then go to step 9.
		No	Go to next step.
4	Verify that duct in dashboard is installed. I Is duct in dashboard properly installed?	Yes	Inspect air passage for clogging, deformity and air leakage, then go to step 9.
		No	Install duct securely in the proper position, then go to step 9.
5	Verify whether malfunction is in heat mode or defroster mode. I Does air blow out in heat mode?	Yes	Go to next step.
		No	Check air port for clogging, then go to step 9.
6	Inspect defroster mode. I Does air blow out in defroster mode?	Yes	Operation is normal. Recheck malfunction symptoms.
		No	Go to next step.

Troubleshooting

Step	Inspection	Action	
7	Inspect air port. I Is air port clogged?	Yes	Remove obstruction, then go to step 9.
		No	Go to next step.
8	Verify that defroster duct is installed. I Is defroster duct properly installed?	Yes	Check air passage for clogging, deformity, and air leakage, then go to next step.
		No	Assemble properly air passage in right position, and go to next step.
9	Verify if malfunction symptom occurs after repair. I Does air blow out?	Yes	Troubleshooting completed. Explain conditions to customer.
		No	Recheck malfunction symptoms, and repeat from step 1 if malfunction reoccurs.

ii. Airflow of air port can not be changed.

2	Airflow of front air port can not be changed.
Malfunction description	Malfunction in front blower system
Possible causes	Malfunction in front blower, relay, front blower motor, front resistor, front fan switch or related harness: step 1 Malfunction in blower assembly: step 2-4

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect blower system Inspect the systems and electrical parts listed below: Front blower motor relay Front blower motor Front resistor Front fan switch Relevant harness Are all these parts normal?	Yes	Go to next step.
		No	Repair or replace the failed parts and go to step 5.
2	Verify whether malfunction occurs in blower assembly or elsewhere. I Turn ignition switch to on position. I Turn fan switch on. I Is there noise with blower in operation?	Yes	Go to next step.
		No	Go to step 4.

Troubleshooting

Step	Inspection	Action	
3	Inspect blower assembly. I Inspect blower fan for the following items: — Is fan free of interference with blower case? — Is fan free of foreign material or other obstructions? — Is fan normal?	Yes	Go to next step.
		No	Remove obstruction, repair or replace fan and blower case, and then go to step 5.
4	Inspect air intake port of blower assembly. I Is air intake port of blower assembly clogged?	Yes	Remove obstruction, and then go to next step.
		No	Inspect whether there are any obstructions in passage between blower assembly and a/c unit, and then go to next step.
5	Verify whether malfunction symptom occurs after repair. I Does air blow out?	Yes	Troubleshooting completed. Explain conditions to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.

iii. Airflow mode of air port can not be changed.

3	Airflow mode of air port can not be changed.
Malfunction symptom	I Malfunction in airflow control system of front a/c unit.
Possible causes	I Malfunction in airflow mode link, rocker, cable or cable clamp of front a/c unit. (step 1 and 2) I Malfunction in bevel gear set (2), airflow mode cable or cable clamp of front climate control unit (step 3) I Malfunction in one or more a/c unit door(s). (step 4 and 5)

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect airflow mode system of front a/c unit. I Inspect airflow mode links, airflow mode rocker, airflow mode cables, and clamps of front a/c unit. — Is there grease on links and rocker? — Are links and rockers installed correctly and in place? — Is cable clamp free of deformation? I Are all above items normal?	Yes	Go to next step.
		No	Apply grease or install links, rocker securely in place, repair or replace cable clamp, then go to step 6.

Troubleshooting

Step	Inspection	Action	
2	Verify that airflow mode cable of a/c unit is positioned securely and correctly. Is airflow mode cable positioned securely and correctly in relation to airflow links of front a/c unit?	Yes	Go to next step.
		No	Adjust airflow mode cable or install correctly, and then go to step 6.
3	Inspect front climate control unit Inspect the front climate control unit as per items shown below: — Is engagement of rack-and-pinion proper? — Is airflow mode cable properly installed in correct direction relative to rack? — Is cable clamp distorted? Are all above items normal?	Yes	Go to next step.
		No	Restore proper engagement of rack-and-pinion or install airflow mode cable in correct direction, then go to step 6.
4	Inspect airflow mode doors of front a/c unit. Is there any foreign material or obstructions in any of a/c unit doors?	Yes	Remove obstruction, then go to step 6
		No	Go to next step.
5	Verify that all airflow mode doors of front a/c unit are positioned firmly and properly. Are all doors of front a/c unit firmly and properly positioned?	Yes	Inspect each door for crack or damage, then go to next step.
		No	Install malfunction doors securely in proper position, then go to next step
6	Verify whether malfunction symptom occurs after repair. Does airflow mode change?	Yes	Troubleshooting completed. Explain conditions to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.

Iv. Fogged windshield

4	Fogged front windshield
Malfunction symptom	The indicator light doesn't work when airflow is in defroster mode Fresh of front climate control unit in defroster mode or in heat/defroster mode.
Possible causes	Malfunction in front climate control unit (ig2 signal) system, steps 2 and 4 Malfunction in air intake actuator, steps 3,6-9 Malfunction in front climate control unit (recirculate and fresh signal) system, steps 7,10—12 Malfunction in air intake door of blower assembly, steps 13, 14

When performing an asterisk (*) troubleshooting, shake the wiring harness and connectors to verify whether the intermittent malfunctions are caused by poor contact. If there is any problem, make sure that connectors, terminals and wiring harness are connected correctly and undamaged.

Troubleshooting

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect whether malfunction is in a/c system or defrost system I Does cold air blow out when switch on both a/c and fan of front climate control unit.	Yes	Go to next step.
		No	Go to step 1 of troubleshooting index no. 11.
2	Inspect a/c fuse I Is a/c fuse normally connected?	Yes	Go to next step.
		No	I Inspect blown fuse circuit for short to ground. — Repair or replace as necessary. — Install fuse with appropriate rating.
3	Inspect air intake actuator I Inspect following items of air intake actuator. — Is there any grease on the links? — Is link firmly and properly installed in position? — Is link free of obstructions? I Are all above items normal?	Yes	Go to next step.
		No	Apply grease or install link properly and firmly, remove obstruction, and then go to step 15.
*4	Inspect wiring harness between fuse block and front climate control unit for continuity. I Turn ignition switch to on position. I Disconnect climate control unit connector (12-pin) I Measure the voltage at climate control unit connector (air intake module control 12-pin) — Terminal b (ig2 signal) I Is voltage close to b+ (positive battery voltage)?	Yes	Go to next step.
		No	Repair wiring harness between fuse block and climate control unit, and then go to step 15.
5	Verify whether malfunction is in air intake port of blower assembly or elsewhere. I Does air intake actuator link alternates repeatedly between fresh and ecir mode?	Yes	Go to next step.
		No	Go to step 8.
6	Inspect air intake actuator I Inspect air intake actuator (see u-29, air intake actuator inspection) I Is it normal?	Yes	Go to next step.
		No	Replace air intake actuator, and then go to step 15.
7	Inspect wiring harness between front climate control unit and air intake actuator for short circuit to ground.	Yes	Repair wiring harness between front climate control unit and air intake actuator, and then go to step 15.

Troubleshooting

Step	Inspection	Action
	<ul style="list-style-type: none"> l Turn ignition switch to lock position. l Does one of climate control unit connector (6-pin for air intake mode) terminals below short to ground? <ul style="list-style-type: none"> — Terminal c (fresh signal) — Terminal e (recirculate signal) 	No Replace climate control unit, and then go to step 15.
8	<p>Verify whether malfunction is in air intake actuator or air intake control valve of blower assembly.</p> <ul style="list-style-type: none"> l Remove air intake actuator. l Turn ignition switch to on position. l Set fan switch at 4th position. l Can air intake mode (recirculate fresh) be changed easily when air intake link is operated manually? 	Yes Go to next step.
		No Go to step 13.
9	<p>Inspect air intake actuator</p> <ul style="list-style-type: none"> l Inspect air intake actuator (see u-32, air intake actuator inspection) l Is it normal? 	Yes Go to next step.
		No Replace air intake actuator, then go to step 15.
*10	<p>Inspect continuity of wiring harness between front climate control unit and air intake actuator.</p> <ul style="list-style-type: none"> l Turn ignition switch to lock position. l Is there continuity between following front climate control unit connector (12-pin for air intake mode) terminals and air intake actuator connector terminals? <ul style="list-style-type: none"> — Terminal c- terminal c (fresh signal) — Terminal e- terminal a (recirculate signal) 	Yes Go to next step.
		No Repair wiring harness between front climate control unit and air intake actuator, then go to step 15.
*11	<p>Inspect wiring harness between front climate control unit and air intake actuator for short circuit to ground.</p> <ul style="list-style-type: none"> l Is there continuity between following front climate control unit connector (12-pin for air intake mode) terminals and ground? <ul style="list-style-type: none"> — Terminal c (fresh signal) — Terminal e (recirculate signal) 	Yes Repair wiring harness between front climate control unit and air intake actuator, then go to step 15.
		No Go to next step.
*12	<p>Verify whether malfunction is in wiring harness (the harness b+ (positive battery voltage) between front climate control unit</p>	Yes Repair wiring harness between front climate control unit and air intake actuator, turn to step 15.

Troubleshooting

Step	Inspection	Action
	<p>and air intake actuator is short) or in front climate control unit.</p> <ul style="list-style-type: none"> l Turn ignition switch to on position. l Measure voltage between following front climate control unit connector (12-pin for air intake mode) terminals <ul style="list-style-type: none"> — Terminal c (fresh signal) — Terminal e (recirculate signal) l Is voltage close to b+ (positive battery voltage)? 	No Replace front climate control unit, then go to next step.
13	<p>Inspect air intake control valve of blower assembly.</p> <ul style="list-style-type: none"> l Is there any foreign material or obstruction in the air intake control valve of blower assembly? 	Yes Remove obstruction, then go to step 15. No Go to next step.
14	<p>Verify that air intake control valve of blower assembly is positioned firmly and properly.</p> <ul style="list-style-type: none"> l Is air intake control valve of blower assembly firmly and properly positioned? 	Yes Inspect air intake control valve for crack or damage, then go to next step. No Install air intake control valve firmly in proper position, go to next step.
15	<p>Verify if malfunction symptom occurs after repair.</p> <ul style="list-style-type: none"> l Does malfunction disappear? 	Yes Troubleshooting completed. Explain conditions to customer. No Recheck malfunction symptoms, and repeat from step 1 if it reoccurs.

V. Temperature control of front climate control unit disabled.

5	Temperature control of front climate control unit disabled.
Malfunction symptom	<ul style="list-style-type: none"> l Malfunction in air mix system or heater pipes of front a/c unit.
Possible causes	<ul style="list-style-type: none"> l Malfunction in rocker shaft cables of link or cable clamps in air mix system of front a/c unit. Step 2 l Malfunction in front climate control unit air mix cable or cable clamp of bevel gear set 2. step 4 l Malfunction in air mix control valve of front a/c unit. Steps 5 and 6 l Malfunction in heater pipeline. Step 7

Troubleshooting

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect coolant temperature. I Is coolant warmed up sufficiently?	Yes	Go to next step.
		No	Preheat engine to normal operation temperature, go to step 8.
2	Inspect air mix system of front a/c unit. I Inspect following items of front a/c unit air mix links, air mix rocker, shaft and cable clamp. — Is there grease on links and rockers? — Are links, rockers, and rods firmly installed in proper positions? — Is cable clamp free of deformation? I Are all above items normal?	Yes	Go to next step.
		No	Apply grease or install links, rocker, and shaft firmly in their proper positions, repair or replace cable clamp, go to step 8.
3	Verify that air mix cable from a/c unit is installed in proper positions firmly and correctly. I Is air mix cable firmly installed in the correct position in relation to a/c unit?	Yes	Go to next step.
		No	Adjust air mix cable or install it in correct position, go to step 8.
*4	Inspect front climate control unit I Inspect following items of front climate control unit. — Does bevel gear set properly engage? — Is air mix cable position correct in relation to bevel gear? — Is cable clamp free of deformation? I Are all above items normal?	Yes	Go to next step.
		No	Properly engage bevel gear or install air mix cable in correct position, repair or replace cable clamp, go to step 8.
5	Inspect front a/c unit I Is there any foreign material or obstruction in air mix control valve of a/c unit?	Yes	Remove obstruction, go to step 8
		No	Go to next step.
6	Inspect air mix control valves of a/c unit. I Inspect following items of air mix control valves of a/c unit. — Are air mix control valves free of cracks or damage? — Are all air mix control valves firmly and properly installed? I Are all above items normal?	Yes	Go to next step.
		No	Replace the failed control valve or install new control valve firmly in proper position, go to step 8.

Troubleshooting

Step	Inspection	Action	
7	Inspect heater pipeline I Inspect heater pipeline for the following items. — Is heater pipeline free of damage and cracks? — Are heater pipeline connections free of engine coolant leakage? — Are heater pipeline connections loose? — Are heater pipeline installation points on front a/c unit free of engine coolant leakage? I Are all above items normal?	Yes	Operation is normal. Recheck malfunction symptoms.
		No	If any heater pipeline connection is loose, tighten to specified torque. Repair or replace heater pipeline, go to next step.
8	Verify if malfunction symptom occurs after repaired. I Does unit operate normally in every temperature setting?	Yes	Troubleshooting completed. Explain conditions to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.

Vi. Insufficient airflow or no airflow from rear air port

6	Insufficient airflow or no airflow from rear air port
Malfunction symptom	Malfunction in air ports and/or ducts
Possible causes	Malfunction in vent mode system. Steps 1-3 Malfunction in heat mode system. Steps 4-6

Troubleshooting procedure

Step	Inspection	Action	
1	Verify whether malfunction is in vent mode or heat mode. I Does air blow out under vent mode?	Yes	Go to step 4.
		No	Go to next step.
2	Inspect air ports I Are any air ports clogged?	Yes	Remove obstruction, go to step 7.
		No	Go to next step.
3	Verify that roof duct is installed. I Is rear cooling ducts 1 and 2 properly installed?	Yes	Inspect the rear cooling ducts 1 and 2 for clogging, deformation or air leakage, go to step 7.
		No	Install the rear cooling ducts 1 and 2 in the proper position, and then go to step 7.

Troubleshooting

Step	Inspection	Action	
4	Inspect heat mode I Does air blow out in heat mode?	Yes	Operation is normal. Recheck malfunction symptoms.
		No	Go to next step.
5	Inspect air ports I Are any air ports clogged?	Yes	Remove obstruction, go to step 7.
		No	Go to next step.
6	Verify that heater duct is installed. I Are rear heater ducts 4 and 5 properly installed?	Yes	Inspect the rear heating ducts 4 and 5 for clogging, deformation or air leakage, go to next step.
		No	Install the rear cooling ducts 4 and 5 in the proper position, go to next step.
7	Verify whether malfunction symptom occurs after repair. I Does air blow out?	Yes	Troubleshooting completed. Explain conditions to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.

Vii. Airflow of rear air port does not change.

7	Airflow of rear air port does not change.
Malfunction symptom	Malfunction in rear blower system.
Possible causes	Malfunction in rear climate control unit fan switch, rear main fan switch or related wiring harness. Step 3 I Malfunction in rear main fan switch or related wiring harness. Step 5 I Malfunction in rear blower resistor, rear blower relay or related wiring harness. Step 6 I Malfunction in rear a/c unit. Step 7

Troubleshooting procedure

Step	Inspection	Action	
1	Verify whether malfunction is in rear fan switch or rear main fan switch system. I Does air blow out from the rear air port with rear fan switch of rear climate control unit turned on?	Yes	Go to step 4
		No	Go to next step.
2	Verify that the rear main fan switch is on rear position. I Is rear main fan switch on rear position?	Yes	Go to next step.
		No	Set the main fan switch to rear position, then repeat from step 1.

Troubleshooting

Step	Inspection	Action	
3	Inspect rear fan switch, rear main fan switch and related wiring harness. I Inspect following items of system and electrical parts. — Rear fan switch of rear climate control unit. — Rear main fan switch. — Related wiring harness I Are all above items normal?	Yes	Go to next step.
		No	Repair or replace malfunction parts, go to step 8.
4	Verify whether malfunction is in rear a/c unit fan or elsewhere. I Does air blow out from the rear air port with rear main fan switch turned on?	Yes	Go to step 7.
		No	Go to next step.
5	Inspect rear main fan switch and related wiring harness. I Inspect system and electrical parts. — Main fan switch — Related wiring harness I Are all above items normal?	Yes	Go to next step.
		No	Repair or replace malfunction parts, go to step 8.
6	Inspect rear blower resistor, rear blower relay and related wiring harness I Inspect system and electrical parts. — Rear blower resistor — Rear blower relay — Related wiring harness I Are all above items normal?	Yes	Go to next step.
		No	Repair or replace malfunction parts, go to step 8.
7	Inspect the rear a/c unit fan. I Inspect following items of rear a/c unit fan. — Is fan free of interference from rear a/c unit case? — Is fan free of obstructions? I Are all above items normal?	Yes	Inspect whether rear a/c unit duct is clogged, go to step 8.
		No	Remove obstruction, repair or replace fan and rear a/c unit case, then go to next step.
8	Verify whether malfunction symptom occurs after repair. I Does air blow out?	Yes	Troubleshooting completed. Explain conditions to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.

Troubleshooting

Viii. Airflow mode of rear air port does not change.

8	Airflow mode of rear air port does not change.
Malfunction symptom	Malfunction in airflow control system of rear a/c unit.
Possible causes	Malfunction in air control link or air control rocker of rear a/c unit. Step 1 Malfunction in ig1 signal circuit of airflow mode control actuator. Step 3 Malfunction in signal circuit of rear climate control unit of airflow mode control actuator. Steps 4, 5 and 6 Malfunction in airflow mode door of rear a/c unit. Steps 7 and 8

When performing an (*) marked troubleshooting, shake the wiring harness and connectors to verify whether the intermittent malfunctions are caused by poor contact. If there is any problem, make sure connectors, terminals and wiring harness are connected correctly and undamaged.

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect the airflow mode actuator of rear a/c unit. Remove airflow mode actuator of rear a/c unit. Inspect following items of airflow mode links and rockers. — Is there grease on the links and rockers? — Are links and rockers installed in proper positions? Are all above items normal?	Yes	Go to next step.
		No	Apply grease or install links and rockers firmly in proper positions, go to step 9.
2	Verify whether malfunction is in airflow mode actuator or rear a/c unit airflow control valve. Turn the ignition switch to on position. Set rear main fan switch at 3rd position. Can airflow mode (vent, bi-level and heat) be changed smoothly with airflow link operated manually?	Yes	Go to next step.
		No	Go to step 7.
*3	Inspect continuity of wiring harness between fuse block and air mix actuator. Measure voltage of terminal f (motor driving) of airflow mode actuator. Is voltage close to b+ (positive battery voltage)?	Yes	Go to next step.
		No	Repair wiring harness between fuse block and airflow module actuator, and then go to step 9.

Troubleshooting

Step	Inspection	Action	
4	Inspect airflow mode actuator I Inspect airflow mode actuator. (see u-30, airflow module actuator inspection) I Is it normal?	Yes	Go to next step.
		No	Replace airflow mode actuator, go to step 9.
*5	Inspect continuity of wiring harness between rear climate control unit and airflow mode actuator. I Turn ignition switch to on position. I Disconnect rear climate control unit connector from air mix actuator. I Inspect following connections for continuity: — Terminal d (rear climate control unit) — Terminal g (airflow mode actuator) — Terminal i (rear climate control unit) — Terminal a (airflow mode actuator) — Terminal k (rear climate control unit) — Terminal b (airflow mode actuator) — Terminal m (rear climate control unit) — Terminal c (airflow mode actuator) — Terminal o (rear climate control unit) — Terminal f (airflow mode actuator) I Are these circuits normal?	Yes	Go to next step.
		No	Repair wiring harness between rear climate control unit and airflow mode actuator, go to step 9.
*6	Inspect wiring harness between rear climate control unit and air mix actuator for short to ground I Inspect whether following terminals is short to ground. — Terminal d (rear climate control unit) — Terminal g (airflow mode actuator) — Terminal i (rear climate control unit) — Terminal a (airflow mode actuator) — Terminal k (rear climate control unit) — Terminal b (airflow mode actuator) — Terminal m (rear climate control unit) — Terminal c (airflow mode actuator) — Terminal o (rear climate control unit) — Terminal f (airflow mode actuator) I Are these circuits short?	Yes	Go to next step.
		No	Repair wiring harness between rear climate control unit and airflow mode actuator, go to step 9.

Troubleshooting

Step	Inspection	Action	
7	Inspect rear a/c unit	Yes	Remove obstruction, go to step 9
	I Is there any foreign material or obstruction in a/c unit airflow mode control valve?	No	Go to next step.
8	Inspect rear a/c unit airflow mode control valve.	Yes	Replace the rear climate control unit, go to next step.
	I Inspect rear a/c unit airflow mode control valve. — Is there any damage or crack at airflow mode valve? — Is airflow mode control valve firmly installed in proper position? I Are all above items normal?	No	Replace airflow mode control valve or install it in proper position, go to next step.
9	Verify whether malfunction symptom occurs after repair.	Yes	Troubleshooting completed. Explain causes to customer.
	I Does airflow mode change?	No	Recheck malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

Ix. Temperature control is failed for rear climate control unit.

9	Temperature control is failed to rear climate control unit
Malfunction symptom	Malfunction in air mix system or heater pipeline of rear a/c unit.
Possible causes	<ul style="list-style-type: none"> I Malfunction in air mix actuators' +5v signal circuit. Steps 2-5 I Malfunction in air mix actuators' voltage divider input signal circuit. Steps 6-8 I Malfunction in air mix actuators' gnd signal circuit. Steps 9-11 I Malfunction in air mix actuators' motor driving signal circuit. Steps 12-14 I Malfunction in rear a/c unit air mix control links or rockers. Step 15 I Malfunction in air mix actuator. Step 17 I Malfunction in rear a/c unit air mix control valve. Steps 18, 19 I Malfunction in heater pipeline. Step 20

When performing an asterisked (*) troubleshooting, shake the wiring harness and connectors to verify whether the intermittent malfunctions are caused by poor contact. If there is a problem, check to make sure connectors, terminals and wiring harness are connected correctly and undamaged.

Troubleshooting

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect coolant temperature Is coolant warmed up sufficiently?	Yes	Go to next step.
		No	Warm up engine to normal operation temperature, then go to step 21.
*2	Verify whether malfunction is in air mix actuator (+5v signal) system or elsewhere. Turn ignition switch to on position. Measure the voltage at terminal c (+5v signal) of air mix actuator. Is voltage approximately equivalent to +5v?	Yes	Go to step 6.
		No	Go to next step.
*3	Inspect air mix actuator for continuity. Disconnect air mix actuator connector Measure the voltage at terminal c (+5v signal) of air mix actuator Is voltage approximately equivalent to 5v?	Yes	Inspect air mix actuator, then go to step 21.
		No	Go to next step.
*4	Inspect continuity of wiring harness between rear climate control unit and air mix actuator. Turn ignition switch to lock position. Disconnect rear climate control connector. Is there continuity between terminal c (+5v signal) of air mix actuator conduct and terminal h of rear climate control unit?	Yes	Go to next step.
		No	Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
*5	Verify whether malfunction is in wiring harness (short circuit to ground between rear climate control unit and air mix actuator) or in rear climate control unit. Is there continuity between terminal c (+5v signal) of air mix actuator and ground?	Yes	Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
		No	Replace rear climate control unit, go to step 21.
*6	Inspect continuity of wiring harness between rear climate control unit and air mix actuator. Turn ignition switch to lock position. Disconnect connectors of rear climate control unit from air mix actuator. Is there continuity between terminal f of rear climate control unit and terminal e of air mix actuator?	Yes	Go to next step.
		No	Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
*7	Inspect wiring harness between rear climate	Yes	Repair wiring harness between rear

Troubleshooting

Step	Inspection	Action
	control unit and air mix actuator to determine whether it is short to ground. I Is there continuity between terminal e (voltage divider signal) of air mix actuator and ground?	climate control unit and air mix actuator, and then go to step 21. No Go to next step.
*8	Inspect wiring harness between rear climate control unit and air mix actuator for short with b+ (positive battery voltage) I Turn ignition switch to on position. I Measure wiring harness-side voltage of terminal e (voltage divider input signal) of air mix actuator. I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes Repair wiring harness between rear climate control unit and air mix actuator, go to step 21. No Go to next step.
*9	Inspect continuity of wiring harness between rear climate control unit and air mix actuator. I Is circuit between terminal e of rear climate control unit and terminal a of air mix actuator close?	Yes Go to next step. No Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
*10	Inspect wiring harness between rear climate control unit and air mix actuator to determine whether it is short to ground. I Is there continuity between terminal e of rear climate control unit connector and ground?	Yes Repair wiring harness between rear climate control unit and air mix actuator, go to step 21. No Go to next step.
*11	Inspect wiring harness between rear climate control unit and air mix actuator to determine whether it is short to b+ (positive battery voltage) I Turn ignition switch to on position. I Measure voltage at terminal e of rear climate control unit connector. I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes Repair wiring harness between rear climate control unit and air mix actuator, go to step 21. No Go to next step.

Troubleshooting

Step	Inspection	Action	
*12	Inspect continuity of wiring harness between rear climate control unit and air mix actuator. I Is there continuity between the following terminals of rear climate control connector and terminals (motor driving signal) of air mix actuator? — Terminal a — Terminal g — Terminal b — Terminal f	Yes	Go to next step.
		No	Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
*13	Inspect wiring harness between rear climate control unit and air mix actuator to determine whether it is short to ground. I Is there continuity between following terminals of rear climate control unit and ground? — Terminal a — Terminal b	Yes	Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
		No	Go to next step.
*14	Inspect wiring harness between rear climate control unit and air mix actuator to determine whether it is short to b+ (positive battery voltage) I Turn ignition switch to on position. I Measure wiring harness side voltage of following air mix connectors. — Terminal a — Terminal g — Terminal b — Terminal f I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Repair wiring harness between rear climate control unit and air mix actuator, go to step 21.
		No	Go to next step.
15	Inspect air mix actuator of rear a/c unit. I Remove the actuator. I Inspect air mix links and rockers of rear a/c unit. — Is there grease on links and rockers? — Are links and rockers firmly installed at proper position? I Are all above items normal?	Yes	Go to next step.
		No	Apply grease or install links and rockers firmly at proper positions, go to step 21.

Troubleshooting

Step	Inspection	Action	
16	Verify whether malfunction is in air mix actuator or elsewhere. I Turn ignition switch to on position. I Set rear main fan switch at 3rd position. I Does temperature of air blown out change easily with air mix rocker operated manually?	Yes	Go to next step.
		No	Go to step 18.
17	Inspect air mix actuator. I Inspect air mix actuator. (see u-30, air mix actuator inspection) I Is it normal?	Yes	Go to next step.
		No	Replace air mix actuator, go to step 21.
18	Inspect rear a/c unit I Is rear a/c unit air mix control valve clogged with foreign material?	Yes	Remove obstruction, go to step 21.
		No	Go to next step.
19	Inspect rear a/c unit's air mix control valve. I Inspect rear a/c unit's air mix control valve for the following items. — Is there any damage or crack with the air mix control valve? — Is air mix control valve firmly installed at proper position? I Are all above items normal?	Yes	Go to next step.
		No	Replace air mixing control valve or install it in proper position firmly, go to step 21.
20	Inspect heater pipeline I Inspect heater pipeline for the following items. — Is there any damage or crack with the heater pipeline? — Is there any coolant leakage with the heater pipeline joints? — Is there loose with the heater pipeline joints? — Is there any leakage with connection between the heater pipeline and the rear a/c unit? I Are all above items normal?	Yes	Replace rear climate control unit and turn to next step. If the heater pipeline is loose, tighten to specified torque.
		No	Repair or replace heater pipeline, go to next step.
21	Verify whether malfunction symptom occurs after repair. I Does rear climate control unit operate well at different temperature?	Yes	Troubleshooting completed. Explain causes to customer.
		No	Recheck malfunction symptoms, repeat from step 1 if malfunction reoccurs.

Troubleshooting

X. Air is not cold as specified.

10	Air is not cold as specified.
Malfunction symptom	Magnetic clutch operates, but malfunction is in a/c unit.
Possible causes	<p>Drive belt malfunction. Step 1</p> <ul style="list-style-type: none"> Malfunction in blower assembly, rear a/c unit and/or condenser. Steps 4, 5 Malfunction in reservoir/drier, expansion valve (valve closes too much). Step 8 Malfunction in refrigerant pipelines. Steps 9, 10 Malfunction in refrigerant pipeline joints. Steps 1, 2, 12 A/c compressor malfunction, insufficient compressor oil. Steps 14, 15 Too much compressor oil, malfunction in expansion valve, or a/c unit air mix link fault. Steps 16-18

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect drive belt <ul style="list-style-type: none"> Inspect drive belt — Gy: (see b-1 adjustment of drive belt) Is it normal? 	Yes	Go to next step.
		No	Replace driver belt, go to step 19.
2	Inspect cooling system performance <ul style="list-style-type: none"> Test refrigerant system performance. (refer to u-7 performance test of refrigeration system) Is operation normal? 	Yes	Operation is normal. (recheck malfunction symptoms)
		No	Go to next step.
3	Verify whether malfunction in air intake of a/c unit and condenser or elsewhere. <ul style="list-style-type: none"> Are pressures of refrigerant pipeline at high and low pressure side excessive high? 	Yes	Go to next step.
		No	Go to step 6.
4	Inspect a/c unit air intake port. <ul style="list-style-type: none"> Is a/c unit air intake port clogged? 	Yes	Remove obstruction, and then go to step 19. (if air does not reach evaporator within cooling unit, heat exchange does not occur and refrigerant pressure becomes high. Therefore, removal of obstruction is required.)
		No	Go to next step.

Troubleshooting

Step	Inspection	Action	
5	Inspect condenser I Inspect condenser (see u-16, condenser inspection) I Is it normal?	Yes	Adjust refrigerant to specified quantity, then go to step 19. (excessive quantity of refrigerant)
		No	Replace condenser, or repair and clear condenser vanes, then go to step 19.
6	Verify whether malfunction is in expansion valve, reservoir/drier and cooling pipeline or elsewhere. I Are pressures of refrigerant pipeline at high and low side both low?	Yes	Go to next step.
		No	Go to step 13.
7	Verify whether malfunction is in expansion valve, reservoir/drier or elsewhere. I Does refrigerant high-pressure value momentarily rise to correct value, and then fall and stay below it after a/c compressor started? (is there negative pressure on low-pressure side?)	Yes	Go to next step.
		No	Go to step 19.
8	Verify whether malfunction is in expansion valve and reservoir/drier. I Turn a/c switch off allowing air conditioner to stop for 10 minutes. I Start engine. I Turn both a/c and front fan switch on. I Does malfunction occur after a/c compressor switch is turned on?	Yes	Replace expansion valve, then go to step 19. (since the expansion valve is closed too tight, it should be replaced)
		No	Start vacuum pump and operate for 30 minutes, then go to step 19. (since water has intermixed in reservoir/drier and saturated, it must be replaced.)

Troubleshooting

Step	Inspection	Action	
9	Inspect refrigerant pipeline I Inspect refrigerant pipeline for the following items. — Is refrigerant pipeline free of damage and crack? — Are refrigerant pipeline joints free of oil stain? (visual inspection)? — Is refrigerant pipeline joints free of air leakage? — Are refrigerant pipeline installation points on condenser free of air leakage? — Are refrigerant pipeline installation points on a/c compressor free of air leakage? — Are refrigerant pipeline installation points on a/c unit free of air leakage? — Perform leakage inspection using air leakage tester. I Are all above items normal?	Yes	Go to next step.
		No	If any damage or crack found, replace the damaged parts, then go to step 19. If no damage or crack found, go to step 12.
10	Inspect evaporator pipe joints in a/c unit for air leakage. I Are refrigerant pipeline joints of evaporator in front and (or) rear a/c unit free of air leakage?	Yes	If the compressor generates noise, add 10ml (10cc.0.338 fl oz) of compressor oil to the a/c compressor. Verify that the noise is no longer heard. Adjust refrigerant to specified quantity, then go to step 19.
		No	If refrigerant pipeline is damaged or cracked, replace it, then go to step 19. If there is no damage, go to next step.
11	Inspect evaporator pipe joints in a/c unit for looseness. I Are evaporator joints in a/c unit loose?	Yes	Tighten joints to specified torque. If the compressor generates noise, add 10ml (10cc.0.338fl oz) of compressor oil to the a/c compressor. Verify that the noise is no longer heard. Adjust refrigerant to specified quantity, then go to step 19.
		No	If the compressor generates noise, add 10ml (10 cc.0.338fl oz) of compressor oil to the a/c compressor. Verify that the noise is no longer heard. Replace o-ring on refrigerant pipeline, adjust refrigerant to specified quantity, then go to step 19.

Troubleshooting

Step	Inspection	Action	
12	Inspect pipe joints for looseness. I Are refrigerant pipeline joints loose?	Yes	Tighten joints to specified torque. If the compressor generates noise, add 10ml (10cc.0.338 fl oz) of compressor oil to the a/c compressor. Verify that the noise is no longer heard. Adjust refrigerant to specified quantity, then go to step 19.
		No	If the compressor generates noise, add 10ml (10cc.0.338fl oz) of compressor oil to the a/c compressor. Verify that the noise is no longer heard. Replace o-ring on the refrigerant pipeline, adjust refrigerant to specified quantity, and then go to step 19.
13	Verify whether malfunction is in expansion valve, air mix actuator and compressor oil or elsewhere. I Does refrigerant high-pressure value rapidly increase?	Yes	Go to next step. (pressure rapidly increases.)
		No	Go to step 16.
14	Verify whether malfunction is in compressor oil quantity and a/c compressor or elsewhere I With engine accelerating, does high-pressure value increase?	Yes	Return to step 3.
		No	Go to next step.
15	Verify whether malfunction is in compressor oil quantity and a/c compressor. I After compressor oil is replenished by 10ml (10 cc. 0.338 fl oz), does high-pressure value increase?	Yes	Troubleshooting completed. (explain to customer that the malfunction is caused by insufficient compressor oil)
		No	Replace a/c compressor, then go to step 19. (cause is defective a/c compressor.)
16	Verify whether malfunction is in expansion valve or elsewhere. I Is only refrigerant low-pressure value high?	Yes	Replace expansion valve, then go to step 19. (replace it since expansion valve opens too widely).
		No	Go to next step.
17	Verify that air mix actuator is installed firmly and properly. I Are front and/or rear a/c unit air mix links, air mix rockers and shaft firmly and properly installed?	Yes	Go to next step.
		No	Repair or install links, rockers and shaft firmly in proper position, then go to step 19.

Troubleshooting

Step	Inspection	Action	
18	Adjust compressor oil I Set front fan switch at 4th position. I Turn the a/c switch on. I Set to fresh mode. I Set the temperature control to max cold. I Set to vent mode. I Run engine with constant speed of 1.500rpm for 10 minutes. I Run engine with idling speed for 1 minute. I An engine speed cycle is defined as going from idling speed to 4,000rpm and back to idling speed over a period of 12 seconds. Perform 5 cycles. I Run engine with idling speed for 30 seconds. I Drain all oil from a/c compressor and verify whether the quantity is 100ml (100cc, 3.38fl oz). I If the quantity is more than 100ml (100 cc,3.38 fl oz), only charge 100ml (100 cc, 3.38 fl Oz) of compressor oil back. I Repeat above steps 1-10, and verify whether the compressor oil quantity is 100ml (100cc, 3.38fl oz). I Is there 100ml (100 cc, 3.38 fl Oz) oil in a/c compressor?	Yes	Go to next step.
		No	Conduct as step 1-10, till oil volume of compressor is 100ml (100 cc, 3.38 fl oz).
19	Verify whether malfunction symptom occurs after repair. I Does cold air blow out (if the result of cooling system performance test is normal)?	Yes	Troubleshooting completed. Explain causes to customer.
		No	Recheck malfunction symptoms, then repeat from step 1 if malfunction reoccurs.

Troubleshooting

Xi. No cold air

11	No cold air
Malfunction symptom	Electromagnetic clutch doesn't work.
Possible causes	<ul style="list-style-type: none"> A/c compressor system malfunctions. Step 2 Incorrect refrigerant quantity. Step 3 A/c switch indicator malfunctions. Steps 4-7 Pcm a/c cut-off control system. Step 8 Pcm (igi signal) system malfunctions. Steps 9-22 Temperature sensor and a/c switch malfunctions. Steps 10-15 Pcm (a/c signal) system malfunctions. Steps 16,17 Refrigerant pressure switch malfunctions. Step 18 Pcm cooling fan control system malfunctions. Step 23 Electromagnetic clutch of a/c relay malfunctions. Steps 9, 24-27

When performing an asterisked (*) troubleshooting, shake the wiring harness and connectors to verify whether the intermittent malfunctions are caused by poor contact. If there is a problem, make sure connectors, terminals and wiring harness are connected correctly and undamaged.

Troubleshooting procedure

Step	Inspection	Action	
1	Inspect whether air blows out. <ul style="list-style-type: none"> Does air blow out? 	Yes	Go to next step.
		No	Go to step 1 of troubleshooting indexes no. 1, 2, 6 and 7.
2	Inspect a/c compressor operation. <ul style="list-style-type: none"> Start engine. Turn both a/c switch and front fan switch on. Does a/c compressor work? 	Yes	Go to step 1 of troubleshooting indexes no.10.
		No	Go to next step.
3	Inspect refrigerant quantity. <ul style="list-style-type: none"> Inspect refrigerant quantity. Is it normal? (see u-7, refrigerant system performance test) Is it normal? 	Yes	Go to next step.
		No	Add or discharge refrigerant until specified level reached, and then go to step 28.
4	Inspect a/c switch indicator. <ul style="list-style-type: none"> Does a/c switch indicator illuminate? 	Yes	Go to step 8.
		No	Go to next step.

Troubleshooting

Step	Inspection	Action	
*5	Inspect continuity of wiring harness between fuse block and front climate control unit. I Turn ignition switch to on position. I Turn both a/c switch and fan switch on. I Remove airflow mode cable and air mix cable, remove the front climate unit. I Measure voltage at front climate control unit connector terminal b (ig2 signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Go to next step.
		No	Repair wiring harness between fuse block and front climate control unit, go to step 28.
*6	Inspect continuity of wiring harness between front climate control unit and resistor. I Turn ignition switch to on position. I Turn off front fan switch. I Measure voltage at front climate control unit terminal f (blower fan signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Go to next step.
		No	Inspect wiring harness between front climate control unit and resistor, then go to step 28.
*7	Verify whether malfunction is in wiring harness (front climate control unit is grounded) or front climate control unit. I Turn ignition switch to lock position. I Is front climate control unit terminal d (gnd signal) grounded?	Yes	Replace front climate control unit, then go to step 28.
		No	Repair wiring harness between fuse block and a/c relay, then go to step 28.
8	Inspect for dtcs of pcm. I Check the dtcs in on-board diagnostic system (engine control). I Is there any dtc displayed?	Yes	Go to appropriate inspection procedure. (the cause may be a/c input signal cut-off of pcm)
		No	Go to next step.
*9	Verify whether malfunction is in electromagnetic clutch system or elsewhere. I Remove a/c relay. I Turn ignition switch to on position. I When a/c relay connector terminals c short circuit with d (on wire harness side), does electromagnetic clutch operate?	Yes	Go to next step.
		No	Go to step 24.

Troubleshooting

Step	Inspection	Action	
*10	Verify whether malfunction is in temperature sensor system or elsewhere. I Turn ignition switch to lock position. I Disconnect the refrigerant pressure switch. I Turn ignition switch to on position. I Set front fan switch at 1st position. I Measure voltage at wiring harness side of the following refrigerant pressure switch connector terminals (a/c signal) — (gy engine) terminal c I Is voltage approximately equivalent to b+ (positive battery voltage) with a/c switch off and 0v when it is on?	Yes	Go to step 16.
		No	Reconnect refrigerant pressure switch, go to next step.
*11	Verify whether malfunction is in temperature sensor and wiring harness (continuity between fuse block and humidity sensor) or elsewhere. I Disconnect temperature sensor. I Start engine. I Turn both a/c switch and front fan switch on. I When a/c amplifier connector terminals b short circuit with c (at wiring harness side) are short, does cold air blow out?	Yes	Remove shorted wire, go to next step.
		No	Remove shorted wire, go to step 13.
*12	Verify whether malfunction is in temperature sensor and wiring harness (continuity between fuse block and humidity sensor) or elsewhere. I Turn ignition switch to on position. I Measure voltage at wiring harness side of temperature sensor connector terminal a (ig2 signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Inspect temperature sensor, go to step 28.
		No	Repair wiring harness between fuse block and temperature sensor, then go to step 28
*13	Inspect wiring harness between temperature sensor and refrigerant pressure switch for short with b+ (positive battery voltage) I Turn ignition switch to on position. I Measure voltage at wiring harness side of temperature sensor connector terminal c (a/c signal). I Is voltage approximately equivalent to b+ (positive battery voltage)	Yes	Repair wiring harness between refrigerant pressure switch and temperature sensor, then go to step 28.
		No	Go to next step.

Troubleshooting

Step	Inspection	Action	
*14	Inspect continuity of wiring harness between temperature sensor and refrigerant pressure switch. I Turn ignition switch to lock position. I Inspect continuity between following temperature sensor terminals (a/c signal) and refrigerant pressure switch terminal. — (gy engine) terminal c — Terminal c I Is there continuity?	Yes	Go to next step.
		No	Repair wiring harness between refrigerant pressure switch and temperature sensor, then go to step 28.
*15	Inspect continuity of wiring harness between front climate control unit and temperature sensor I Is there continuity between front climate control unit terminal i and temperature sensor terminal b?	Yes	Replace front climate control unit
		No	Repair wiring harness between front climate control unit and temperature sensor.
*16	Verify whether malfunction is in pcm and wiring harness (continuity between pcm and refrigerant pressure switch) or elsewhere. I Turn ignition switch to on position. I Measure voltages of following refrigerant pressure switch connector terminals (at wiring harness side) — (gy engine) terminal a. I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Go to steps 18.
		No	Go to next step.
*17	Verify whether malfunction is in pcm or wiring harness (pcm and refrigerant pressure switch) I Measure voltage at pcm terminal 41 (a/c signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Repair wiring harness between pcm and refrigerant pressure switch, then go to step 28.
		No	Inspect pcm, then go to step 28.
*18	Verify whether malfunction is in refrigerant pressure switch or elsewhere. I When following refrigerant pressure switch connector terminals (at wiring harness side) are short, does cold air blow out? — (gy engine) terminal a. — Terminal c.	Yes	Inspect refrigerant pressure switch, then go to step 28.
		No	Disconnect shorted circuit and reconnect refrigerant pressure switch terminal, go to next step.

Troubleshooting

Step	Inspection	Action	
*19	Verify whether malfunction is in a/c relay system (at coil side) or elsewhere. Turn ignition switch to on position. I Turn off a/c switch. I Measure voltage at pcm connector terminal 69 (ig1 signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Go to step 23.
		No	Go to next step.
*20	Inspect a/c relay (at coil side) power line fuse. I Is a/c relay power line fuse normal?	Yes	Go to next step.
		No	Inspect for a short to ground on blown fuse circuit. Repair or replace as required. Install fuse with appropriate rating.
*21	Inspect wiring harness between fuse block and a/c relay (at coil side). I Turn ignition switch to on position. I Measure voltage at a/c relay connector terminal a (ig2 signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Go to next step.
		No	Repair wiring harness between fuse block and a/c relay, go to step 28.
*22	Inspect a/c relay(at coil side) I Inspect a/c relay. — Is it normal?	Yes	Repair wiring harness between a/c relay and pcm (terminal 69), go to step 28.
		No	Replace a/c relay, go to step 28.
*23	Inspect operation performance of cooling system. I Inspect operation performance of cooling system — Gy: (see f-188, cooling fan control system inspection (with a/c))	Yes	Go to next step.
		No	Go to appropriate inspection procedure.
*24	Inspect a/c relay (at switch side) power line fuse. I Is a/c relay power line fuse normal?	Yes	Go to next step.
		No	Inspect for a short to ground on blown fuse circuit. Repair or replace as required. Install fuse with appropriate rating.

Troubleshooting

Step	Inspection	Action	
*25	Inspect continuity of wiring harness between fuse block and a/c relay (at switch side). I Turn ignition switch to on position. I Measure voltage at a/c relay connector terminal d (a/c control signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Go to next step.
		No	Repair wiring harness between fuse block and a/c relay, go to step 28.
*26	Inspect a/c relay (at switch side) I Inspect a/c relay. I Is it normal?	Yes	Install a/c relay, go to next step
		No	Replace a/c relay, go to step 28.
*27	Verify whether malfunction is in electromagnetic clutch or wiring harness (continuity between a/c relay and electromagnetic clutch). I Measure voltage at electromagnetic clutch connector terminal a (a/c control signal). I Is voltage approximately equivalent to b+ (positive battery voltage)?	Yes	Inspect electromagnetic clutch, and then go to next step.
		No	Repair wiring harness between a/c relay and electromagnetic clutch, go to next step.
*28	Verify whether malfunction symptom occurs after repair. I Does cold air blow out (if the result of performance test of refrigeration system is normal.)?	Yes	Troubleshooting completed. Explain causes to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.

Xii. Noise with operation of a/c system

12	Noise with operation of a/c system
Malfunction symptom	Noise from a/c compressor hose of electromagnetic clutch or refrigerant pipeline
Possible causes	Electromagnetic clutch operation noise. Step 3 I A/c compressor operation noise. Steps 4-8 I A/c compressor sliding noise. Steps 9-11 I Hose or refrigerant pipeline interference noise. Steps 12

Troubleshooting

Troubleshooting procedure

Step	Inspection	Action
1	Inspect a/c compressor skidding noise	Yes Go to step 9.
	<ul style="list-style-type: none"> Is there a strident sound (a/c compressor skidding noise)? 	No Go to next step.
2	Inspect a/c compressor interference noise	Yes Go to step 12.
	<ul style="list-style-type: none"> Is there a squeaking or whirling sound (interference noise)? 	No Go to next step.
3	Inspect electromagnetic clutch operation noise	Yes Adjust clearance between pressure plate of electromagnetic clutch and a/c compressor pulley, go to step 13 (see u-27, electromagnetic clutch adjustment).
	<ul style="list-style-type: none"> Is there "click" sound (electromagnetic clutch operation noise)? 	No Go to next step.
4	Inspect duration of a/c compressor noise	Yes Go to next step.
	<ul style="list-style-type: none"> Is noise heard continuously for more than 3 seconds after a/c compressor started? 	No Condition is normal.(noise always occurs for 2-3 seconds immediately after a/c compressor started)
5	Inspect idling speed	Yes Adjust idling speed, go to step 13.
	<ul style="list-style-type: none"> Inspect idling speed. See f-3, idling speed inspection. Is it normal? 	No Go to next step.
6	Verify whether malfunction is in compressor oil or a/c compressor.	Yes Change compressor oil, go to step 13.
	<ul style="list-style-type: none"> Drain all compressor oil. Is compressor oil contaminated by metal powder? 	No Go to next step.
7	Verify whether malfunction is in the whole a/c system or a/c compressor or condenser.	Yes Replace the whole a/c system (except heater), go to step 13.
	<ul style="list-style-type: none"> Does compressor oil become white and is it mixed with water? 	No Go to next step.
8	Inspect compressor oil	Yes Replace a/c compressor and condenser, go to step 13. (because a/c compressor might wear out and fluid reservoir/drier might be clogged, thus condenser should be replaced.)
	<ul style="list-style-type: none"> Is compressor oil darker than normal state? Is there any aluminum fragment? 	No Condition is normal. Recheck the malfunction symptom.

Troubleshooting

Step	Inspection	Action	
9	Inspect drive belt I Check drive belt — Gy: (see b-1, drive belt inspection.) I Is it normal?	Yes	Go to next step.
		No	Replace drive belt, go to step 13.
10	Inspect condition of drive belt. I Is drive belt worn out? I Is there any foreign materials inserted in it or whether it is tainted with oil fouling?	Yes	Remove foreign materials and oil fouling or replace drive belt, go to step 13.
		No	Go to next step.
11	Inspect electromagnetic clutch I Inspect electromagnetic clutch (see u-27. electromagnetic clutch inspection.) I Is it normal?	Yes	Replace a/c compressor (excluding the pressure plate of electromagnetic clutch, a/c compressor belt pulley and clutch stator coil), and then go to step 13.
		No	Replace electromagnetic clutch, go to step 13.
12	Inspect a/c compressor noise I Is noise from a/c compressor?	Yes	Inspect a/c compressor visually, and replace parts as required, go to next step.
		No	If noise is from refrigerant pipeline, repair loose or lost clamp and tighten the loose bolt, go to next step.
13	Verify whether malfunction symptom occurs after repair. I Does a/c system noise disappear?	Yes	Troubleshooting completed. Explain causes to customer.
		No	Recheck malfunction symptoms, and then repeat from step 1 if malfunction reoccurs.