HEATERS AND AIR CONDITIONING

CONTENTS

AIR CONDITIONING **20**
AIR CONDITIONER CONTROL SWITCH **88**
BLOWER ASSEMBLY **93**
COMPRESSOR **101**
EVAPORATOR **95**
GENERAL INFORMATION **20**
HEATER UNIT **89**
RECEIVER, CONDENSER, COMPRESSOR CLUTCH ASSEMBLY **98**
SAFETY PRECAUTIONS **73**
SERVICE ADJUSTMENT PROCEDURES **74**
- Charging the System 84
- Compressor Drive Belt Adjustment 87
- Compressor Noise 87
- Correcting Low Refrigerant Level 81
- Discharging the System 82
- Evacuating the System 83
- Handling Tubing and Fittings 85
- Manifold Gauge Set Installation 74
- Performance Test 80
- Refrigerant Leak Repair Procedure 80
- Testing the System for Leaks 79
- Test Procedures 75

SPECIFICATIONS **37**
- General Specifications 37
- Service Specifications 37
- Torque Specifications 37

TROUBLESHOOTING **38**
- Automatic Air Conditioning System Control Parts Layout 70
- Control Unit Terminal Voltage Table 64
- Operational Check and Causes of Troubles 38
- Self-diagnosis 60
- System Diagnostic Procedure 42
- Troubleshooting Table 56

VENTILATORS **104**

HEATERS **2**
BLOWER ASSEMBLY **15**
GENERAL INFORMATION **2**
HEATER CONTROL **8**
HEATER UNIT **12**
SERVICE ADJUSTMENT PROCEDURES **6**
- Temperature Control System Adjustment 6

TROUBLESHOOTING **3**
- Blower Motor Inoperative
- Insufficient Heat
- No Ventilation even when Mode Selection Lever is Operated

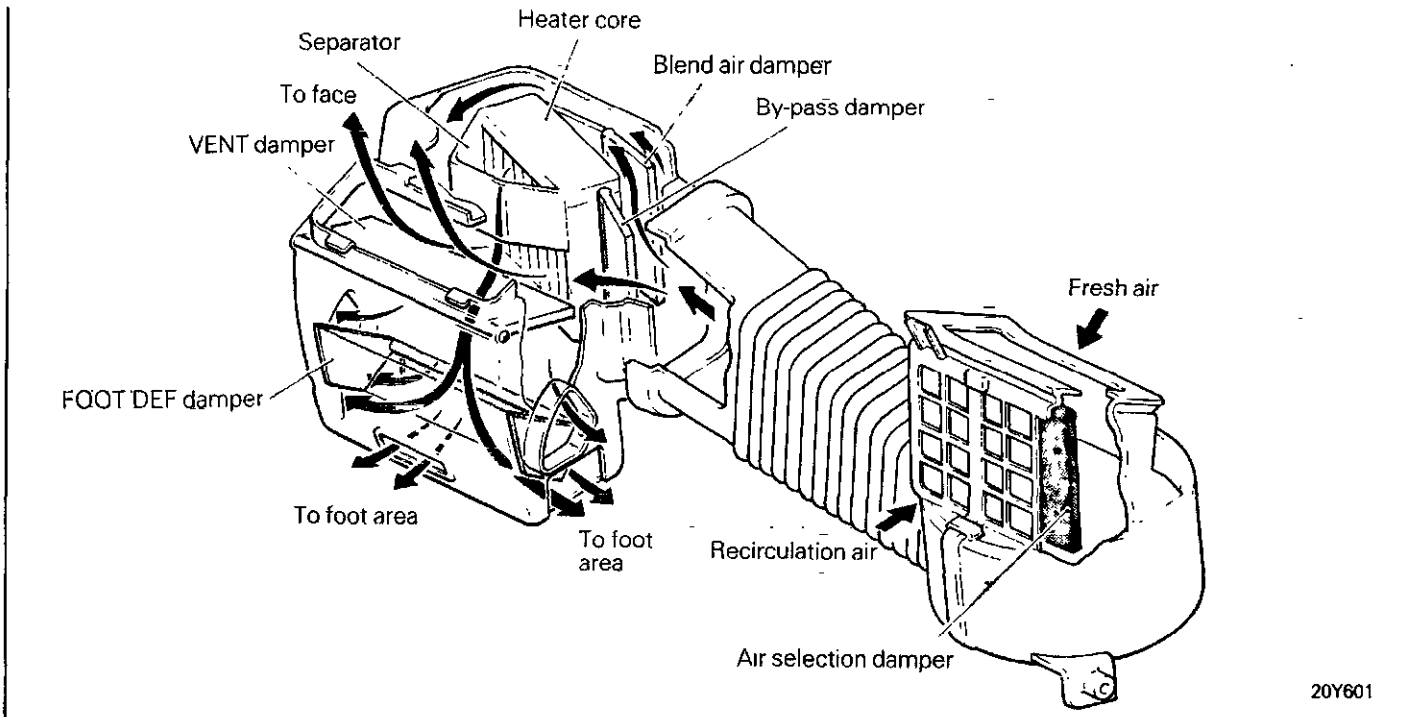
VENTILATORS **17**

HEATERS

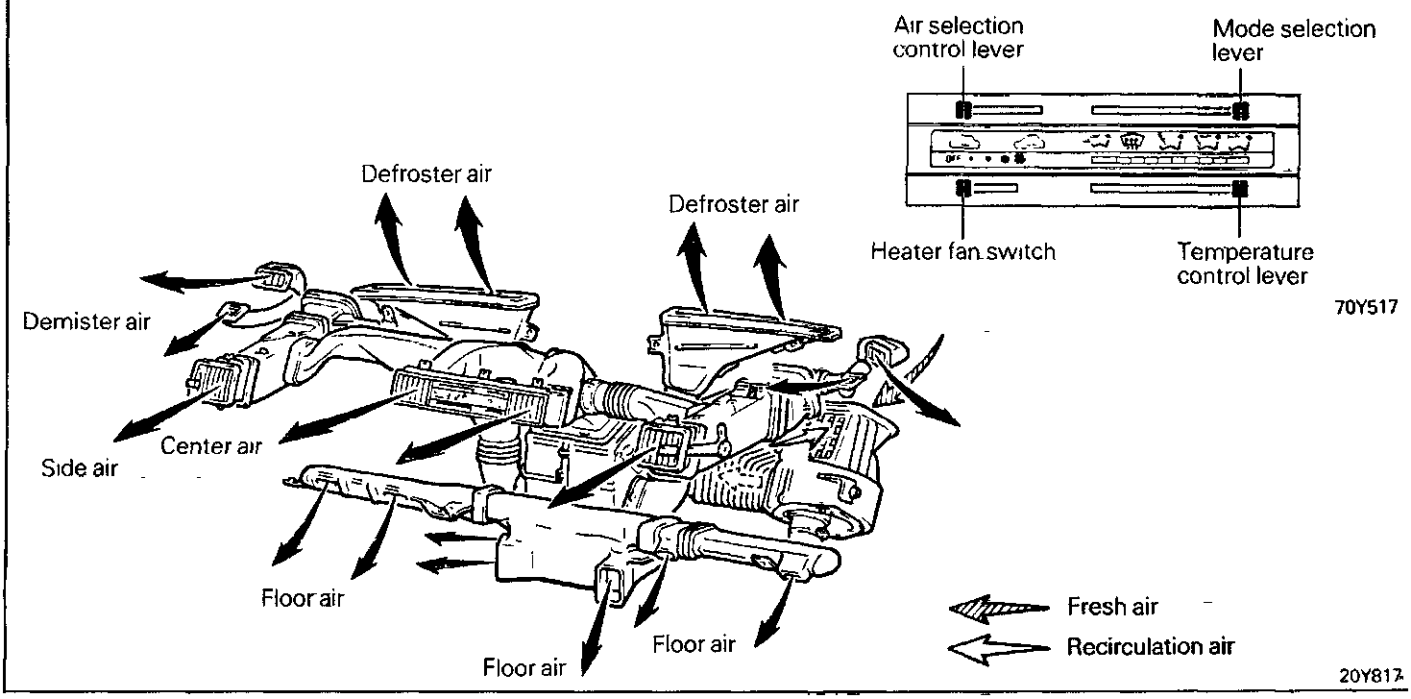
GENERAL INFORMATION

N24BAAE

The heater system is a composite type where the heater unit is centrally located in the vehicle with the blower and connected by ducting, and an excellent blend air system is incorporated to respond to temperature control.
In the blend air heat control system, the blower brings in outside or inside air which will be guided by dampers (blend air damper and by-pass damper) located along the heater core and controls the amount of air which passes through the heater core and which will be by-passed. All of the air is brought together in the mixture chamber behind the heater core from which the mixed air is conducted to the various outlets.
A dual high bi-level heater is provided which directs hot air to the windshield or occupants' legs and cool air to their faces. Also a lap heater duct is provided to direct warm air to front seat occupants' laps.



20Y601



70Y517

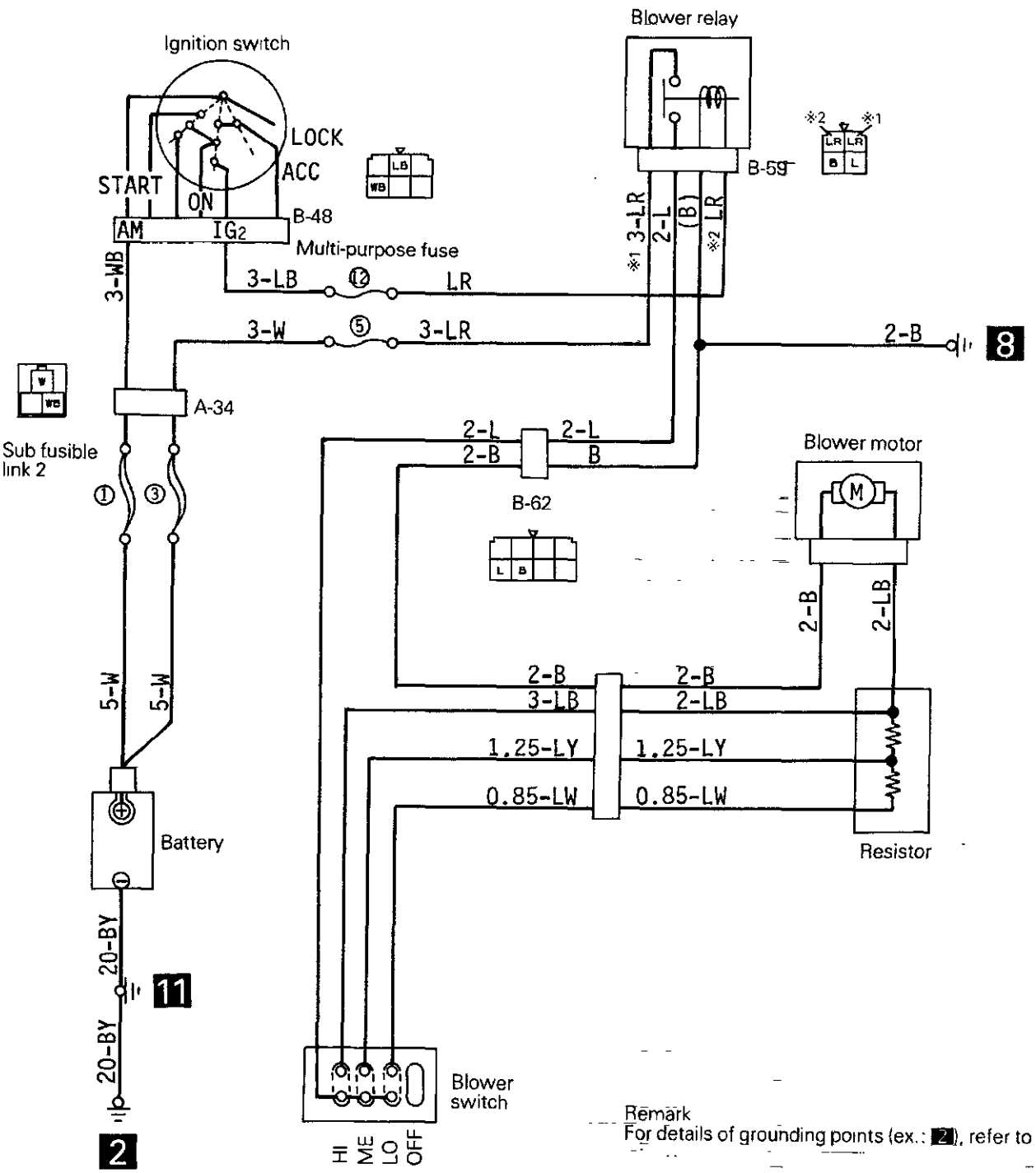
20Y817

TROUBLESHOOTING

N24EAAD

Symptom	Probable cause	Remedy
Insufficient heat	Obstructed floor outlets	Correct
	Changeover dampers improperly adjusted or binding	Correct
	Clogged heater hoses	Replace
	Improperly adjusted control cables	Adjust
	Plugged or partially plugged heater core	Clean or replace
No ventilation even when mode selection lever is operated	Incorrect adjustment of changeover dampers	Adjust
	Incorrect installation of mode selection control wire	Adjust
	Improper duct connection, collapse or clogging	Repair or replace
Blower motor inoperative	Burnt-out fuse	Replace
	Poor grounding	Correct
	Blower switch malfunction	Replace
	Blower motor malfunction	Replace

CIRCUIT DIAGRAM



Remark
For details of grounding points (ex.: 2), refer to page 8-10.

37Y589

Wire color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

OPERATION N24EAAH

- When the ignition switch is at "ON", current flows through fuse No. 12, blower relay (coil), and ground, causing the blower relay contacts to close.
- Then, when the blower switch is set at any of "LO", "ME" or "HI", current flows through fuse No. 5, blower relay (contacts), blower switch, resistor, blower motor and ground, causing the blower motor to rotate.

TROUBLESHOOTING HINTS

Blower motor turns only at high speed.

- Check resistor.

SERVICE ADJUSTMENT PROCEDURES

N24FAAE

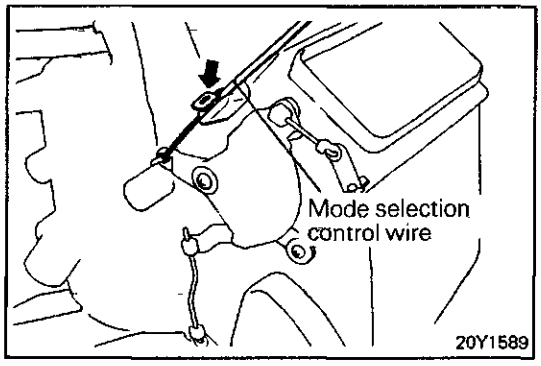
TEMPERATURE CONTROL SYSTEM ADJUSTMENT

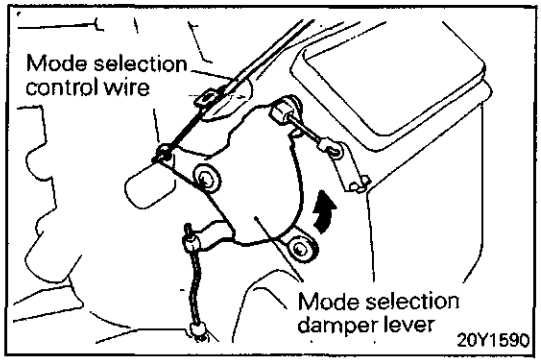
MODE SELECTION LEVER

1. Set the mode selection lever to every position to operate the blower. Check to see that the air blows out correctly according to the lever positions.
2. If air does not blow out from the outlets matched with the mode selection lever position, adjust the mode selection control wire. If the result of the adjustment is unsatisfactory, then adjust the damper.

Adjustment of the Mode Selection Control Wire

1. Disconnect the defroster duct at the driver's seat side from the heater unit and the defroster nozzle.
2. Disconnect the mode selection control wire from the heater unit's clip.

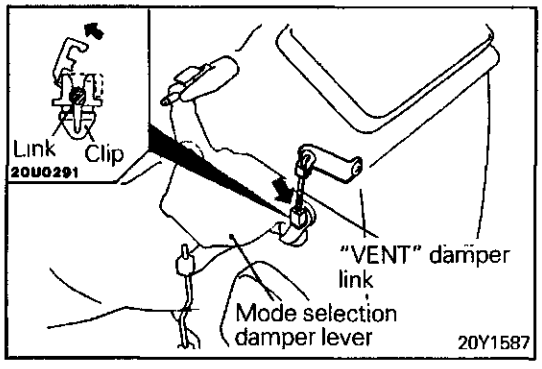




3. Set the mode selection lever of heater control to the "" position.
4. Turn the mode selection damper lever completely to the left.
5. Connect the mode selection control wire to the air outlet changeover damper lever, and to the clip part of the heater unit.

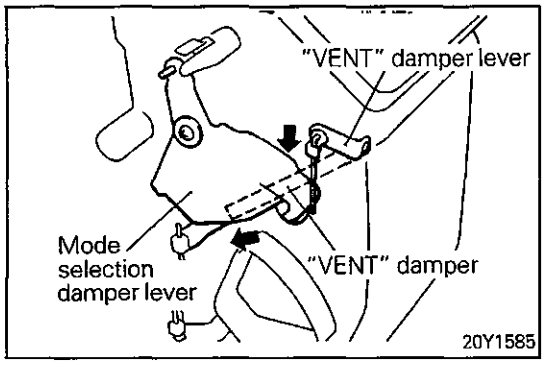
Caution
Be careful that the lever does not move when clipping.

6. Check that the heater control mode selection lever moves smoothly with some resistance at each position and air blows out from the outlets matched with the lever position.
7. If air blows out from the outlets not matched with the mode selection lever position even after control wire adjustment, adjust the "VENT" damper and "FOOT/DEF" damper.
8. Connect the driver's side defroster duct to the heater unit and defroster nozzle.

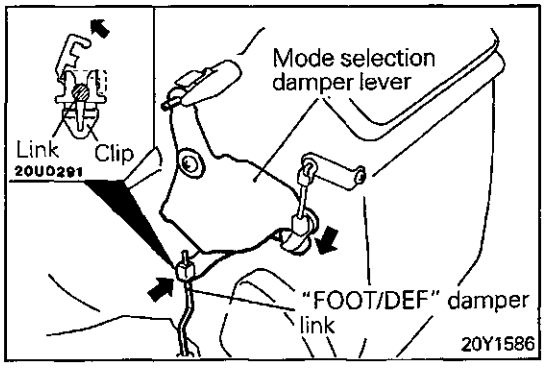


Adjustment of the Damper

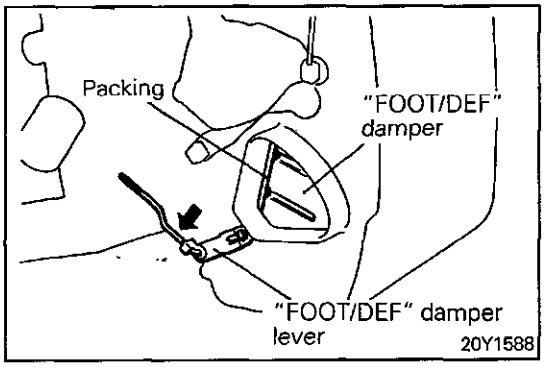
1. Disconnect the mode selection control wire from the mode selection damper lever and the heater unit's clip.
2. Adjust the "VENT" damper as follows:
   (1) Unlock the mode selection damper lever clip and disconnect the link for the "VENT" damper from the mode selection damper lever.



(2) Turn the mode selection damper lever completely to the right.
(3) Pull the "VENT" damper lever completely downward, and move the damper to the position (not visible) shown in the illustration.
(4) Attach the end of the link for the "VENT" damper to the mode selection damper lever.

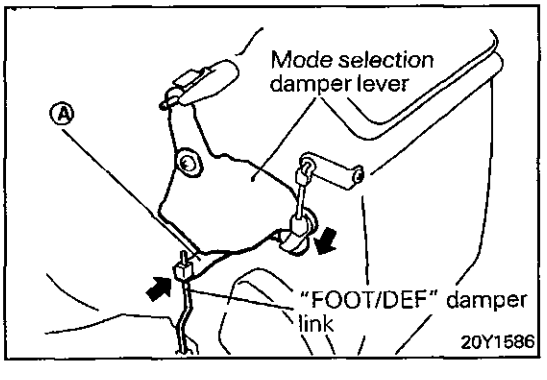


3. Adjust the "FOOT/DEF" damper as follows:
(1) Unlock the mode selection damper lever clip and disconnect the link for the "FOOT/DEF" damper from the mode selection damper lever.
(2) Turn the mode selection damper lever completely to the right.



(3) Pull the "FOOT/DEF" damper lever completely downward and move the damper to the position shown in the illustration (Make sure that the packing is in contact with the case).

NOTE
Confirmation can be made that the "FOOT/DEF" damper is raised upward through the defroster blower outlet of the heater unit (with defroster duct disconnected).



(4) Attach the end of the link for the "FOOT/DEF" damper to the mode selection damper lever.

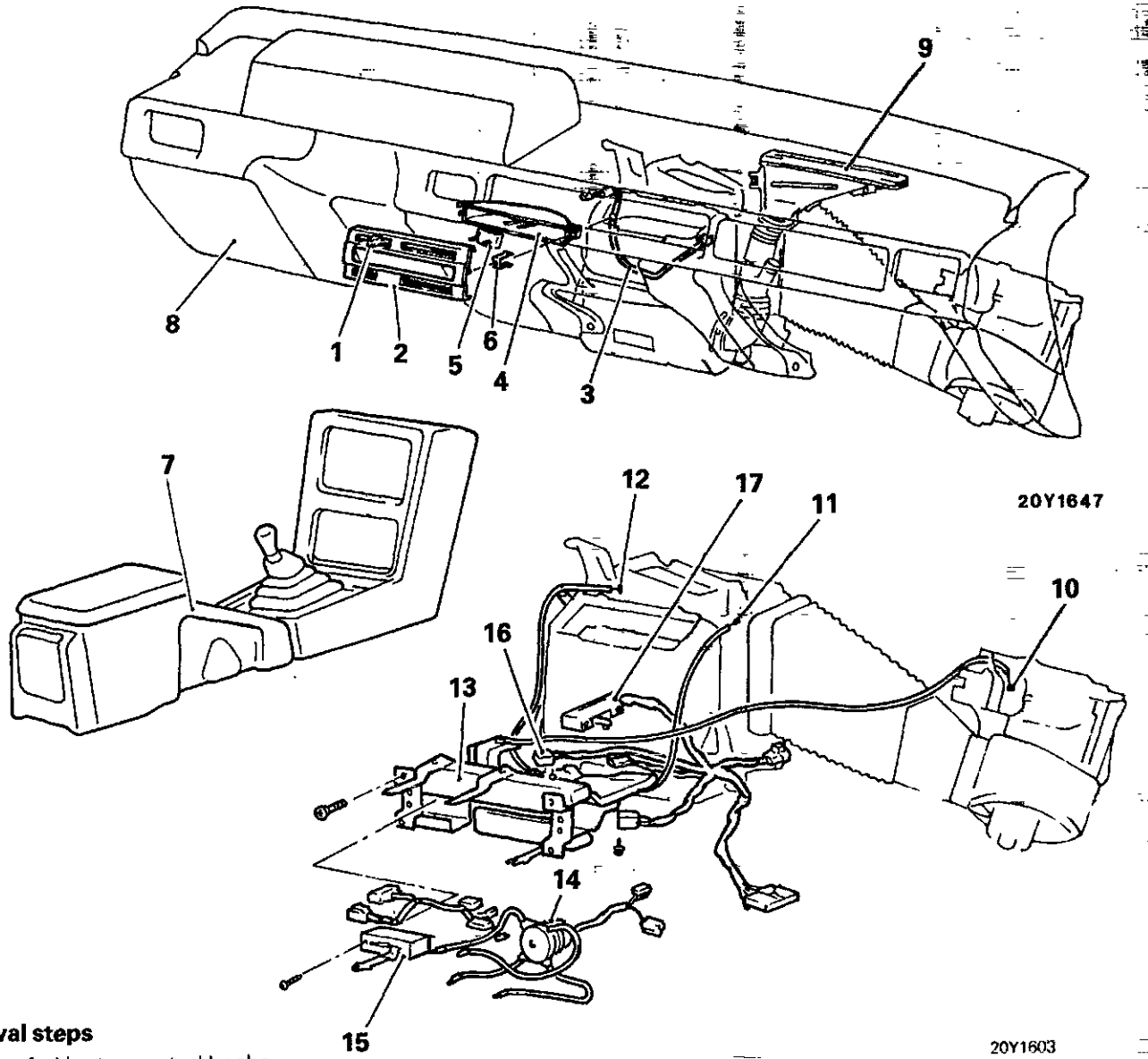
NOTE
When attaching it, pull the lever end (A in the illustration) in the direction of the arrow.

4. Referring to the paragraph on adjustment of the mode selection control wire, connect the mode selection control wire to the mode selection damper lever.

HEATER CONTROL

N24GA--

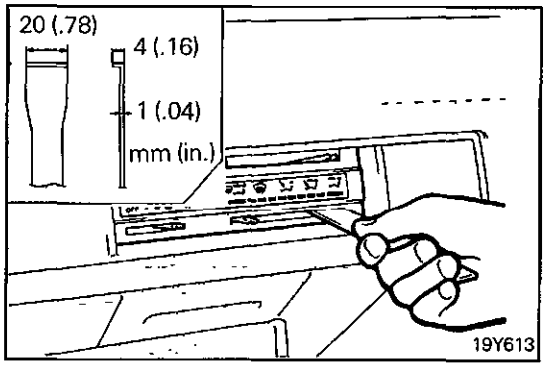
REMOVAL AND INSTALLATION



Removal steps

1. Heater control knobs
◆◆ 2. Heater control panel
3. Heater control panel illumination lamp
4. Lamp case
5. Lamp cover
6. Springs
◆◆ ◆◆ 7. Floor console
◆◆ ◆◆ 8. Instrument panel
9. Defroster nozzle, passenger's side
◆◆ 10. Air selection control wire connection
◆◆ Adjustment of air selection control wire
◆◆ 11. Temperature control wire connection
◆◆ Adjustment of temperature control wire
◆◆ 12. Mode selection control wire connection
◆◆ Adjustment of mode selection control wire
◆◆ 13. Heater control assembly
14. Optical fiber lamp assembly
15. Heater fan switch
16. Micro switch
17. Slide switch

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ◆◆: Refer to "Service Points of Installation".



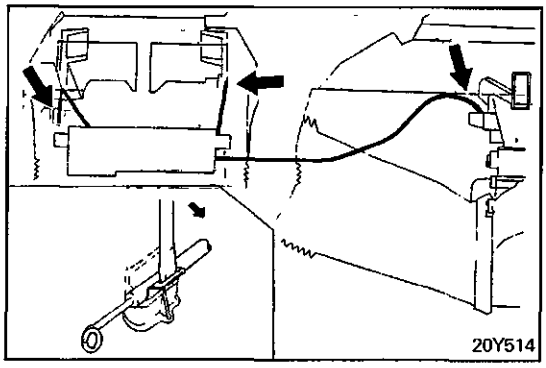
SERVICE POINTS OF REMOVAL N24GBAF

2. REMOVAL OF HEATER CONTROL PANEL

Insert the tool shown in the illustration into the lever hole of the heater control panel, and pull to remove.

7. REMOVAL OF INSTRUMENT PANEL / 8. FLOOR CONSOLE

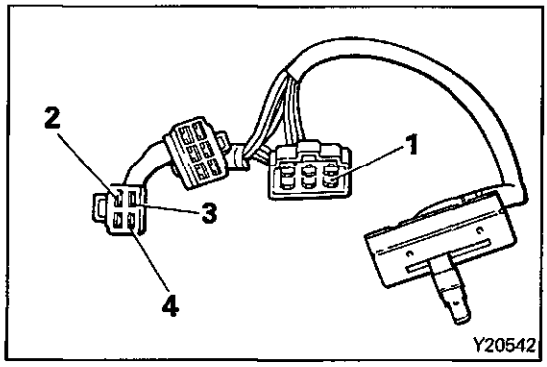
Refer to GROUP 23 BODY – Instrument Panel / Floor Console.



10. DISCONNECTION OF AIR SELECTION CONTROL WIRE / 11. TEMPERATURE CONTROL WIRE / 12. MODE SELECTION CONTROL WIRE

Disconnect the control wires from the heater unit and blower assembly.

NOTE
Detach the control wires with a screwdriver as shown in the illustration.



INSPECTION N24GCAD

Operate the switch, and check the continuity between the terminals.

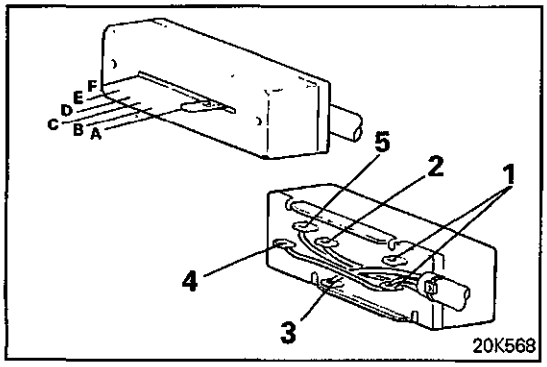
NOTE
○–○ indicates that there is continuity between the terminals.

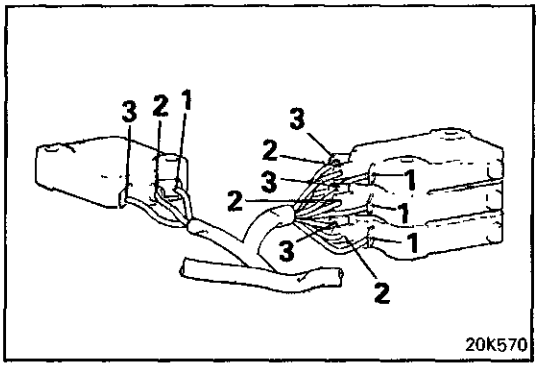
BLOWER SWITCH

Switch position \ Terminal No.	1	2	3	4
OFF				
• (Low)	○	○		
● (Medium)	○		○	
● (High)	○			○

SLIDE SWITCH

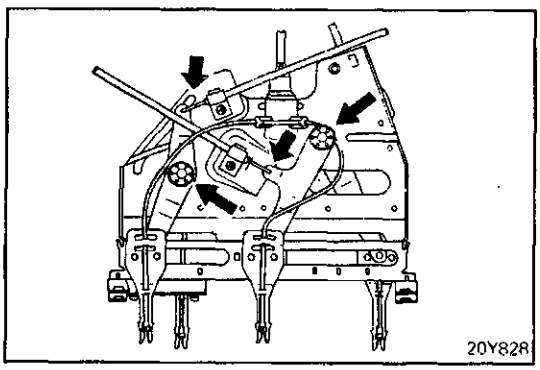
Switch position \ Terminal No.	1	2	3	4	5
A	○				○
B	○	○			○
C		○			○
D		○	○		○
E			○		○
F			○	○	○





MICRO SWITCH

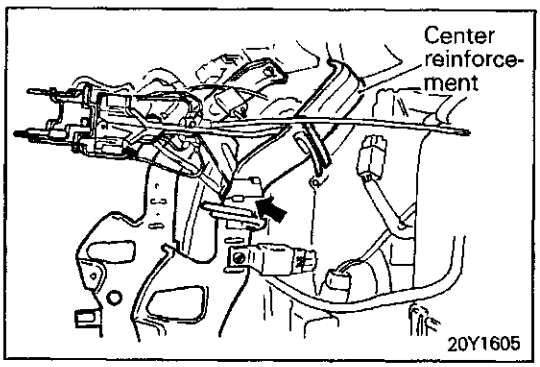
Switch position \ Terminal No.	1	2	3
PRESSED	○	○	
NOT PRESSED		○	○



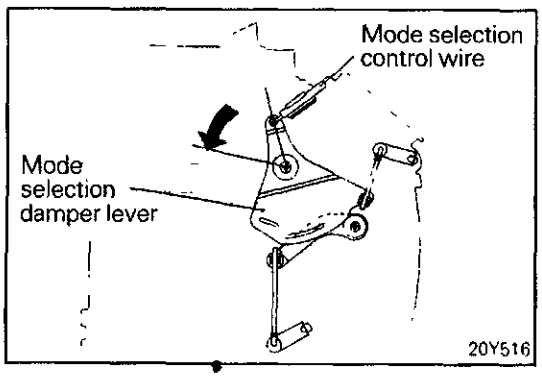
SERVICE POINTS OF INSTALLATION N24GDAF

13. INSTALLATION OF HEATER CONTROL ASSEMBLY

(1) Apply chassis grease to all moving parts of the heater control assembly.

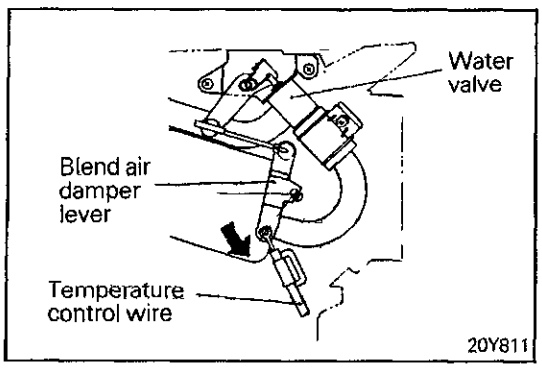


(2) Insert the heater control assembly bracket in the center reinforcement.



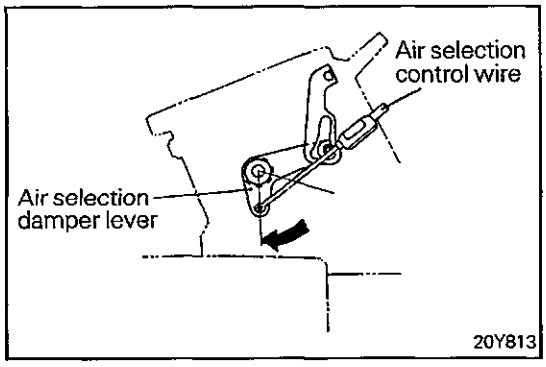
- **ADJUSTMENT OF MODE SELECTION CONTROL WIRE**

(1) Set the mode selection lever to position.
(2) With the mode selection damper lever pushed in the direction of arrow, connect the inner cable of the mode selection control wire to the end of the mode selection damper lever and clip down the cable casing.



- **ADJUSTMENT OF TEMPERATURE CONTROL WIRE**

(1) Set the temperature control lever to the extreme left.
(2) With the blend air damper lever pushed in the direction of arrow, connect the inner cable of the temperature control wire to the end of the blend air damper lever and clip down the cable casing.



- **ADJUSTMENT OF AIR SELECTION CONTROL WIRE**
  (1) Set the air selection control lever to position.
  (2) With the air selection damper lever pushed in the direction of arrow, connect the inner cable of air selection control wire to the end of the air selection damper lever and clip down the cable casing.

8. INSTALLATION OF INSTRUMENT PANEL / 7. FLOOR CONSOLE

Refer to GROUP 23 BODY – Instrument Panel / Floor Console.

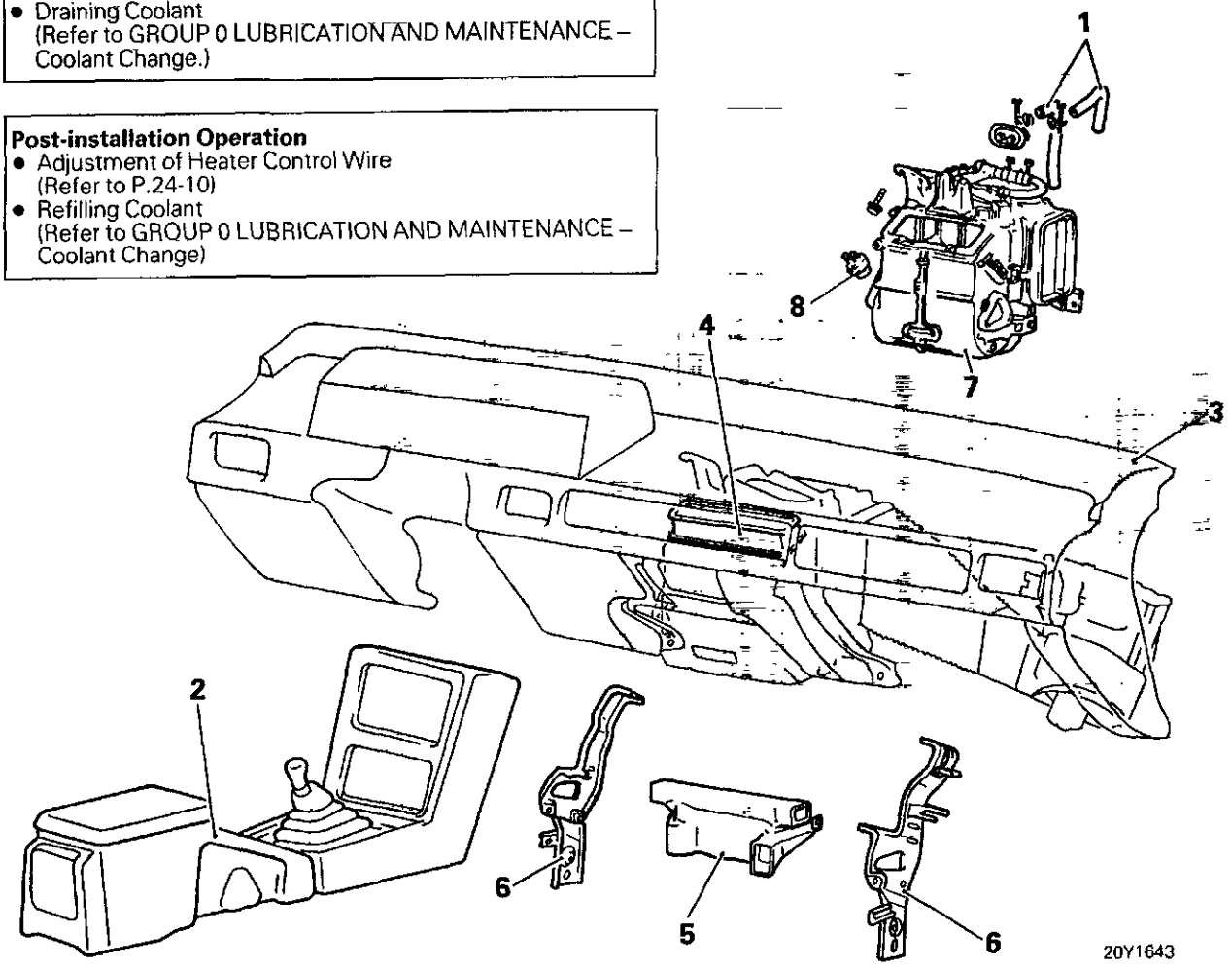
HEATER UNIT

N24IA-A

REMOVAL AND INSTALLATION

Pre-removal Operation
- Draining Coolant
  (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Coolant Change.)

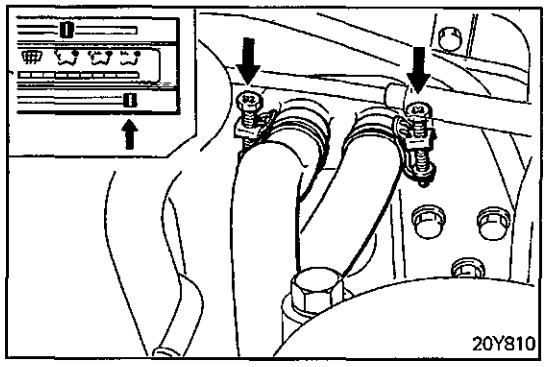
Post-installation Operation
- Adjustment of Heater Control Wire
  (Refer to P.24-10)
- Refilling Coolant
  (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Coolant Change)



Removal steps

◆◆ 1. Water hoses
◆◆ ▶◀ 2. Floor console
◆◆ ▶◀ 3. Instrument panel
4. Center ventilator duct
5. Lap heater duct
6. Center reinforcement
7. Heater unit
8. Blower relay

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ▶◀: Refer to "Service Points of Installation".



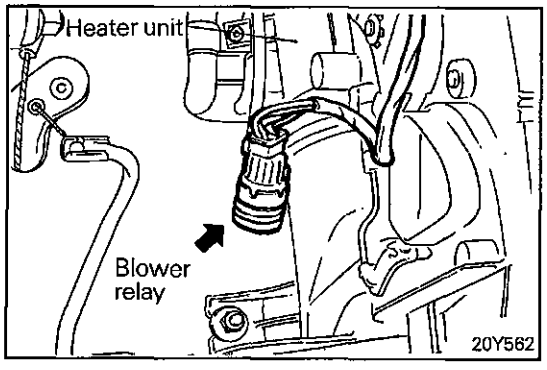
SERVICE POINTS OF REMOVAL N24IBAF

1. REMOVAL OF WATER HOSE

(1) Move the temperature control lever to the "warm" position.
(2) Disconnect the water hoses from the heater unit.

2. REMOVAL OF INSTRUMENT PANEL / 3. FLOOR CONSOLE

Refer to GROUP 23 BODY – Instrument Panel / Floor Console.

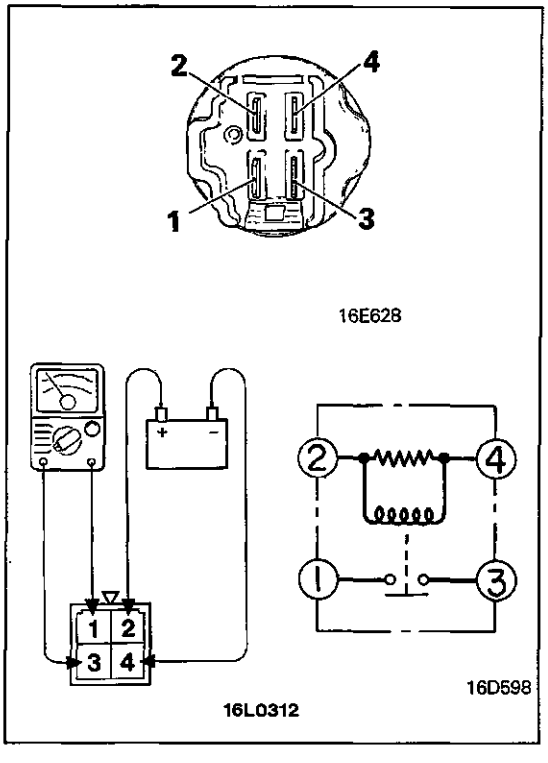


INSPECTION N24ICAB

- Check the dampers and link mechanism for proper operation.
- Check the heater core for clogging or water leakage.
- Check the water valve for operation and clogging.

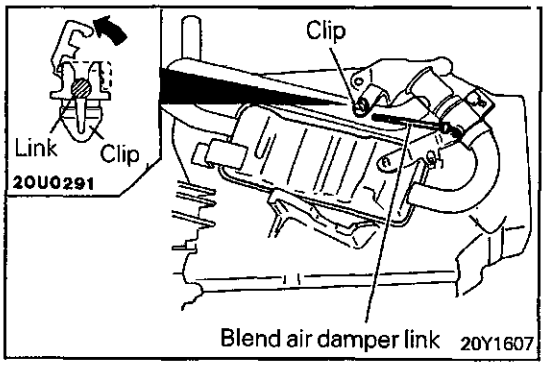
BLOWER RELAY

(1) Remove the blower relay.



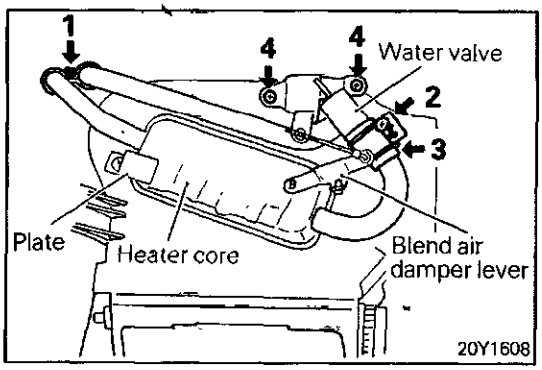
(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 4 is grounded.

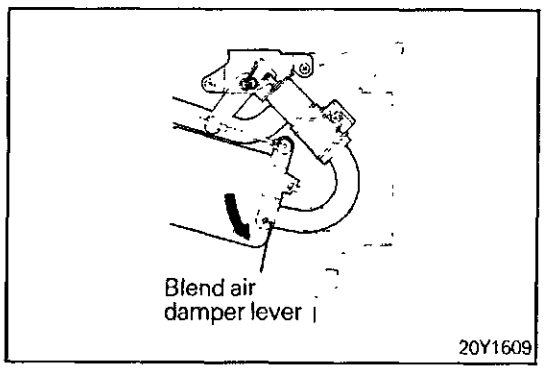
Voltage applied	Terminals 1 – 3	Conductive
Voltage not applied	Terminals 1 – 3	Non-conductive
	Terminals 2 – 4	Conductive



HEATER CORE AND WATER VALVE REPLACEMENT N24IGAB1

1. Unlock the water valve lever clip and disconnect the link for the blend air damper from the water valve lever.





2. Remove the following parts and then remove the water valve.
   (1) Clamp
   (2) Joint hose clamp
   (3) Joint hose
   (4) Screw
3. Remove the plate and remove the heater core. If it is hard to remove due to its contact with the damper lever, remove the damper lever first.
4. Install the heater core and water valve.
5. Push the water valve lever all the way inward so that the water valve is at the closed position.
6. Pull the blend air damper lever fully in the direction of arrow so that the blend air damper is completely closed.

SERVICE POINTS OF INSTALLATION N24IEAE

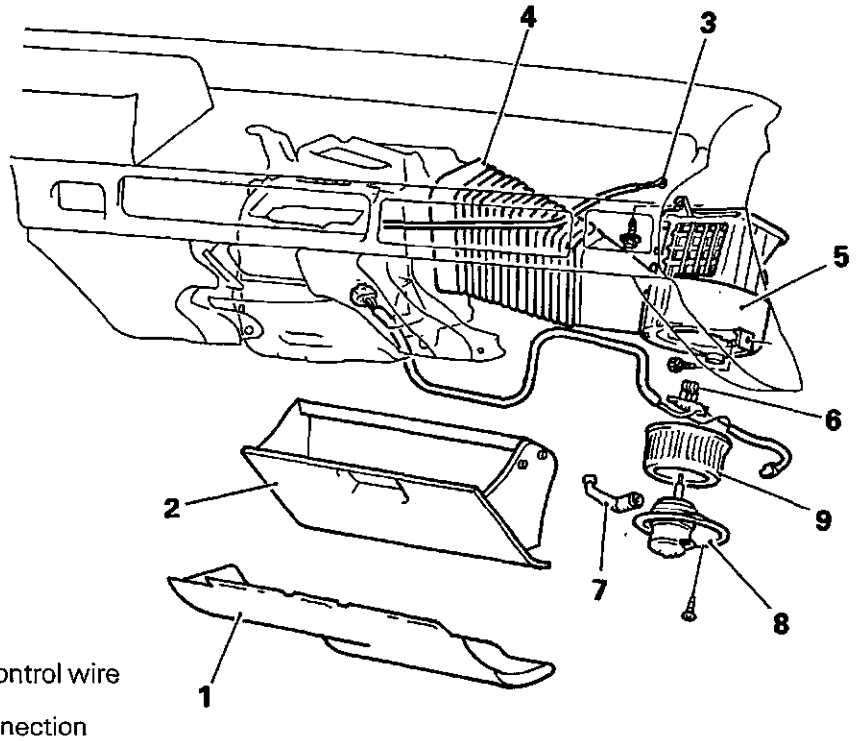
3. INSTALLATION OF INSTRUMENT PANEL / 2. FLOOR CONSOLE

Refer to GROUP 23 BODY – Instrument Panel / Floor Console.

BLOWER ASSEMBLY

N24KA-A

REMOVAL AND INSTALLATION

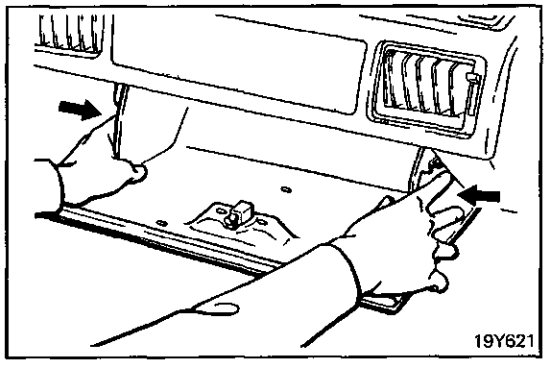


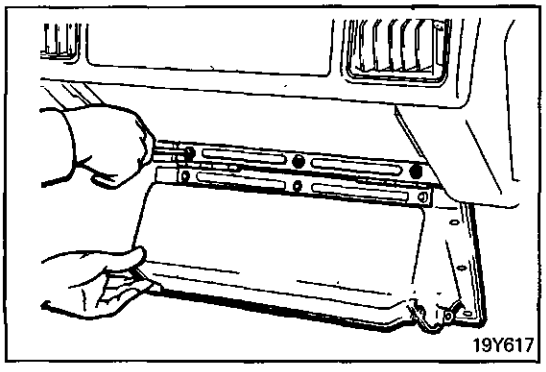
Removal steps

1. Under cover
◆◆ Adjustment of air selection control wire
◆◆ 2. Glove box
3. Air selection control wire connection
4. Duct (vehicles without air conditioner) or duct joint (vehicles with air conditioner)
◆◆ 5. Blower assembly
6. Resistor
7. Hose
8. Blower motor
9. Blower

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ◆◆: Refer to "Service Points of Installation".

20Y1611





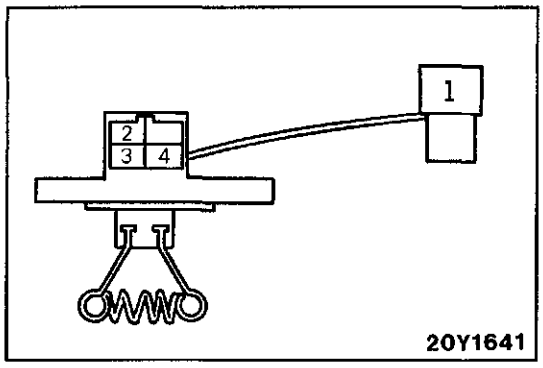
SERVICE POINT OF REMOVAL

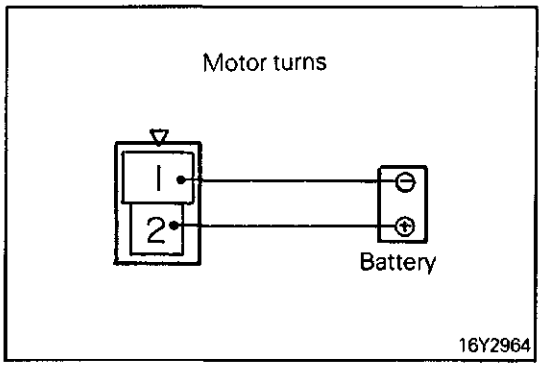
N24KBAF1

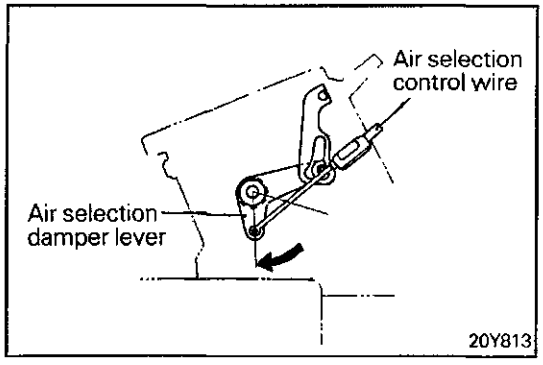
2. REMOVAL OF GLOVE BOX

(1) Grasp and release the glove box lid lock to open the lid. Pull the glove box forward while pressing both sides inward.

(2) Remove the glove box.







INSPECTION N24KCAE

RESISTOR

Connect an ohmmeter to each terminal of the resistor and measure the resistance.

Terminal connections	Resistance
1 – 2 (Low)	Approx. 1.4 Ω
1 – 3 (Medium)	Approx. 0.4 Ω
1 – 4 (High)	Approx. 0 Ω

BLOWER MOTOR

(1) Connect the blower motor to the battery (battery positive terminal to terminal "2" and battery negative terminal to terminal "1") and check that the motor runs smoothly.
(2) Check that abnormal noise is not produced during rotation.

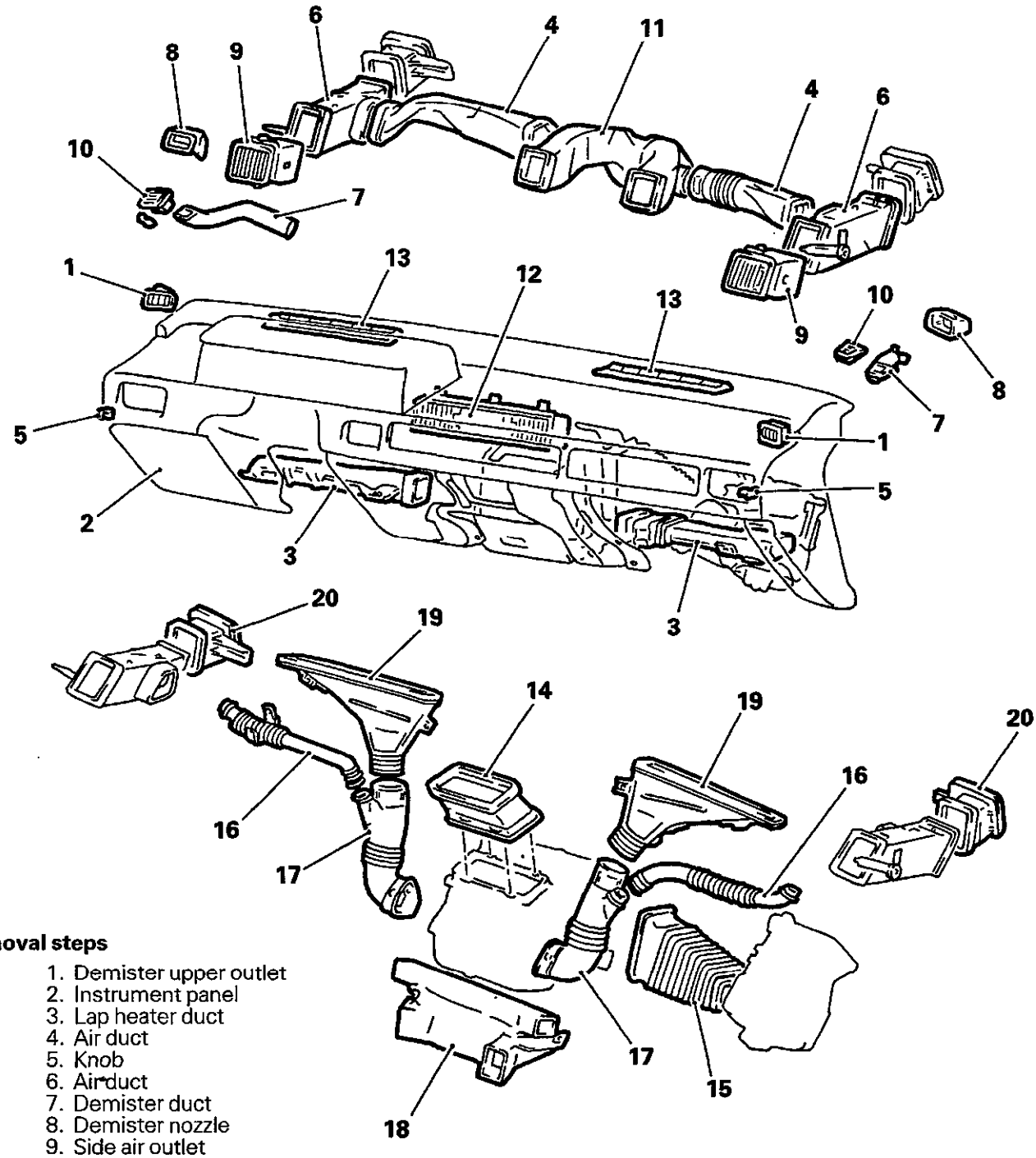
SERVICE POINT OF INSTALLATION N24KDAD

- **ADJUSTMENT OF AIR SELECTION CONTROL WIRE**
  (1) Set the air selection control lever to position.
  (2) With the air selection damper lever pushed in the direction of arrow, connect the inner cable of air selection control wire to the end of the air selection damper lever and clip down the cable casing.

VENTILATORS

N24MA-A

REMOVAL AND INSTALLATION



Removal steps

1. Demister upper outlet
2. ◆◆ Instrument panel
3. Lap heater duct
4. Air duct
5. Knob
6. ◆◆ Air duct
7. ◆◆ Demister duct
8. ◆◆ Demister nozzle
9. Side air outlet
10. ◆◆ Demister lower outlet
11. ◆◆ Center air duct
12. ◆◆ Center air outlet
13. ◆◆ Defroster garnish
14. Center ventilator duct
15. Duct
16. Demister hose
17. Air duct
18. Lap heater center duct
19. ◆◆ Defroster duct
20. ◆◆ Side ventilator duct

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".

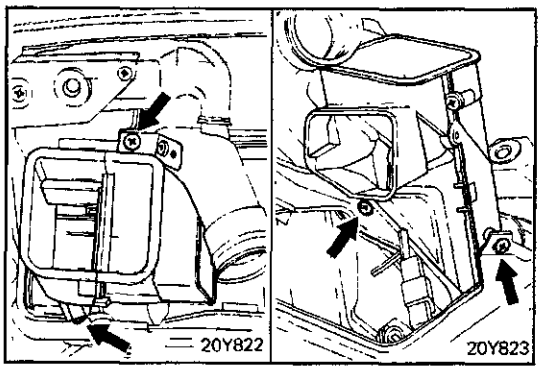
20Y1612

SERVICE POINTS OF REMOVAL

N24MBAJ1

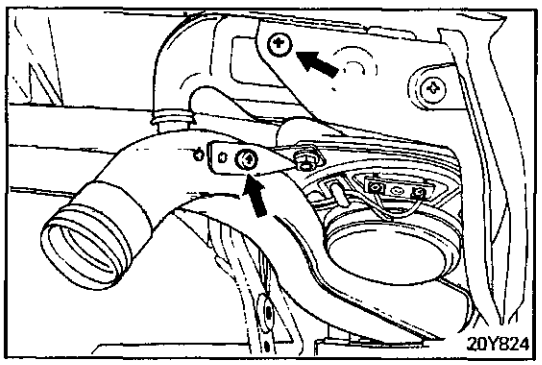
2. REMOVAL OF INSTRUMENT PANEL

Refer to GROUP 23 BODY – Instrument Panel.



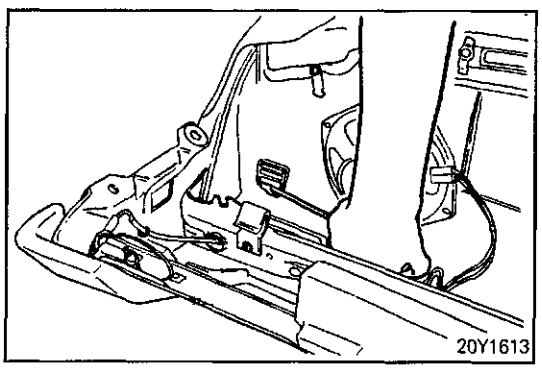
6. REMOVAL OF AIR DUCT

Remove the air duct and knob, and then remove the air duct.



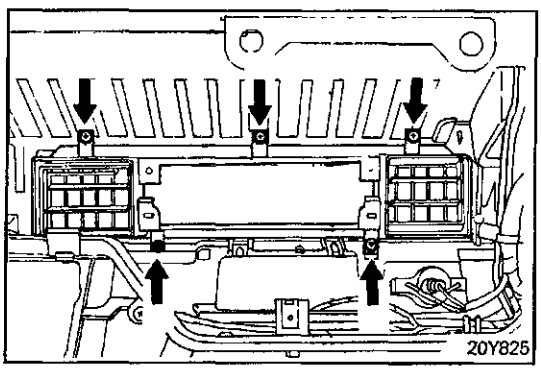
7. REMOVAL OF DEMISTER DUCT / 8. DEMISTER NOZZLE

Remove the demister duct and the demister nozzle.



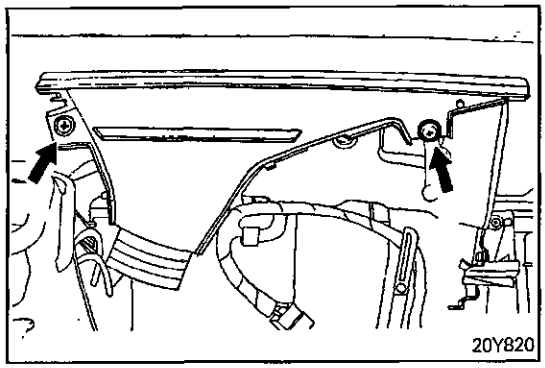
10. REMOVAL OF DEMISTER LOWER OUTLET

Remove the clip, and then remove the demister lower outlet.



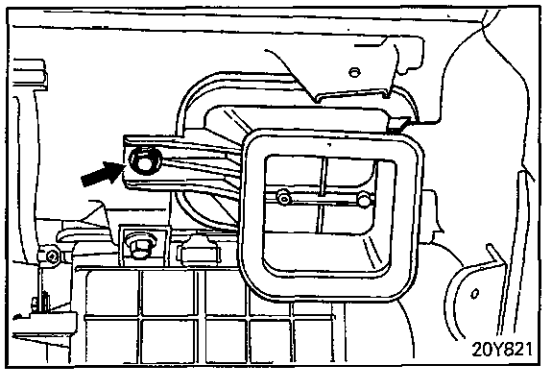
11. REMOVAL OF CENTER AIR DUCT / 12. CENTER AIR OUTLET

Remove the center air duct, and then remove the center air outlet.



6. REMOVAL OF AIR DUCT / 19. DEFROSTER DUCT

Remove the air duct, and then remove the defroster duct. Remove the instrument pad. (Refer to GROUP 23 BODY – Instrument Panel.)



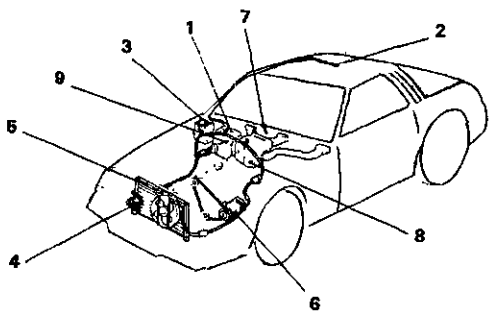
20. REMOVAL OF SIDE VENTILATOR DUCT

Remove the side ventilator duct from the body.

INSPECTION

N24MCAA1

Check all ducts for cracks.



1. Cooling unit
2. Interior temperature sensor
3. Blower motor
4. Receiver assembly
5. Condenser
6. Compressor
7. Photo-sensor
8. Heater unit
9. Foot area temperature sensor

20Y1529

AIR CONDITIONING

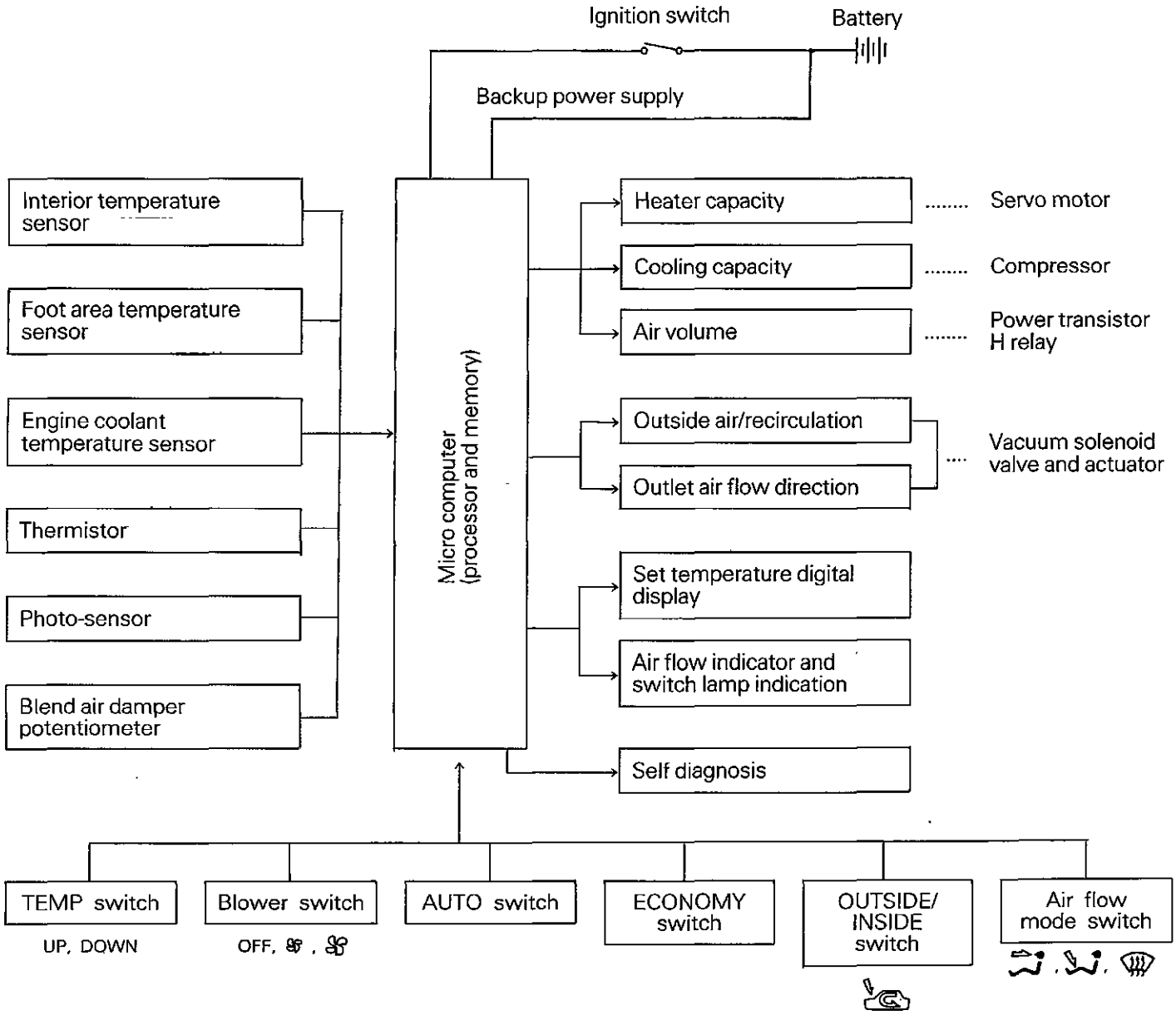
GENERAL INFORMATION

N24BBAD

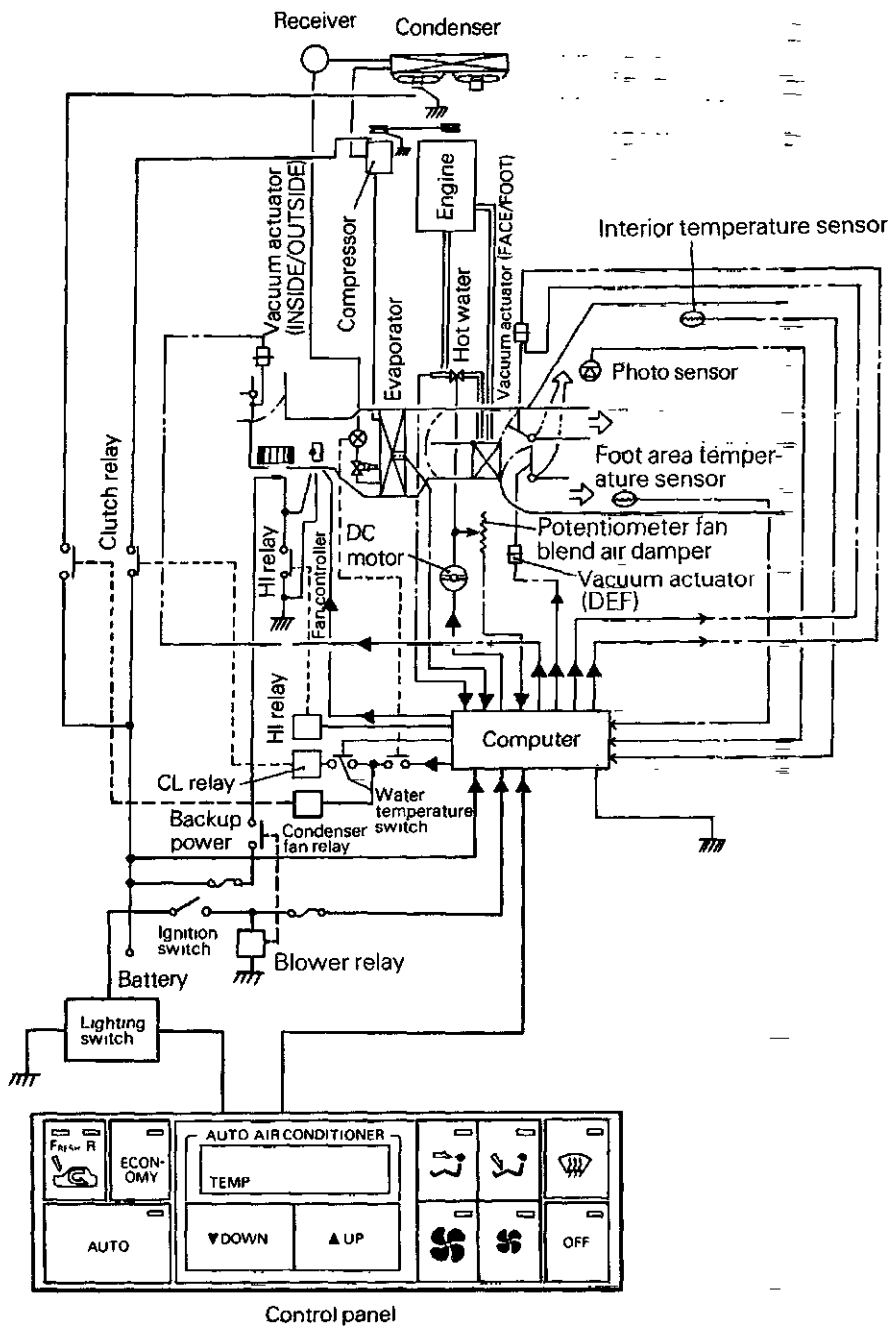
For car interior temperature control, a "feedback control system" is employed, in which the difference between set temperature and inside temperature is compared by a microcomputer and the system mechanisms are so operated as to eliminate the difference. In the microcomputer, the input data from various sensors (interior temperature sensor, foot area temperature sensor, photo-sensor, thermistor, hot water thermosensor), potentiometers and control switches are processed and its outputs control the selection of inside air recirculation or introduction of outside air, direction of air flow, outlet air temperature and air volume.

Further, as a backup circuit is provided to store set temperature and temperature conditions outside air/recirculation, in memory even when the ignition switch is turned OFF (with battery terminals in connect condition), if the ignition switch is turned ON again, the system resumes automatic control operation in the same condition as before turning off of ignition switch provided the switch is in AUTO position.

By changeover of the switch, manual operation is also possible. In this case, the functions other than those selected for manual control are accomplished in automatic control mode.

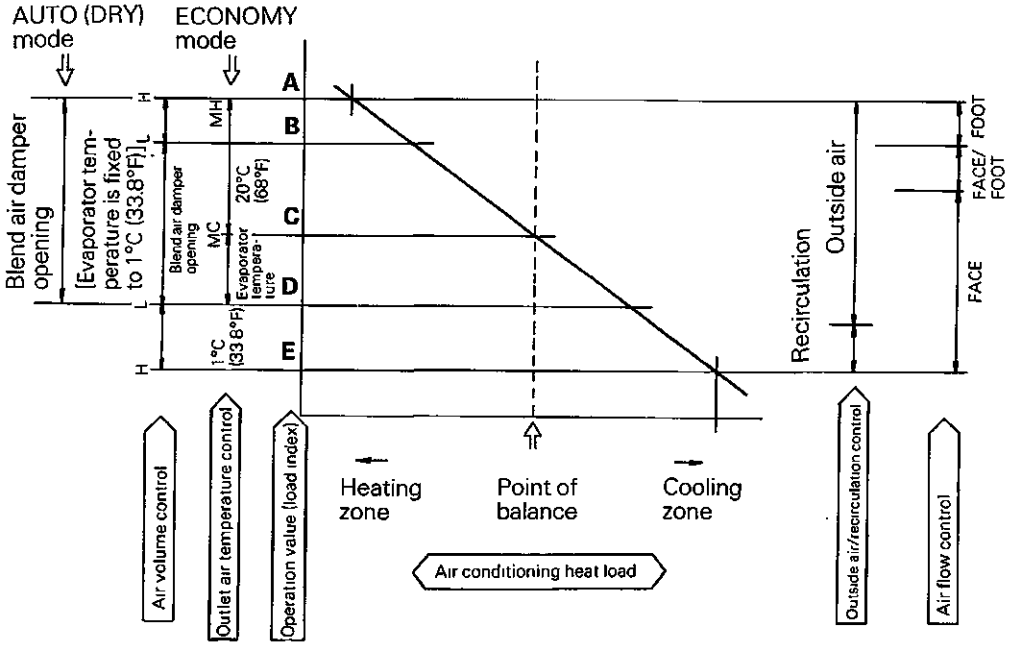

Ignition switch
Battery
Backup power supply
Interior temperature sensor
Foot area temperature sensor
Engine coolant temperature sensor
Thermistor
Photo-sensor
Blend air damper potentiometer
Micro computer (processor and memory)
Heater capacity
Cooling capacity
Air volume
Servo motor
Compressor
Power transistor H relay
Outside air/recirculation
Outlet air flow direction
Vacuum solenoid valve and actuator
Set temperature digital display
Air flow indicator and switch lamp indication
Self diagnosis
TEMP switch
UP, DOWN
Blower switch
OFF,
AUTO switch
ECONOMY switch
OUTSIDE/ INSIDE switch
Air flow mode switch

SUMMARY


Receiver
Condenser
Engine
Vacuum actuator (INSIDE/OUTSIDE)
Compressor
Evaporator
Hot water
Vacuum actuator (FACE/FOOT)
Interior temperature sensor
Photo sensor
Foot area temperature sensor
Potentiometer fan blend air damper
Vacuum actuator (DEF)
Clutch relay
HI relay
Fan controller
DC motor
HI relay
Computer
CL relay
Water temperature switch
Backup power
Condenser fan relay
Ignition switch
Blower relay
Battery
Lighting switch
AUTO AIR CONDITIONER
TEMP
ECON-OMY
AUTO
▼DOWN
▲UP
OFF
Control panel

TEMPERATURE CONTROL DIAGRAM

[Blend air damper opening in AUTO (DRY) mode is different from that in ECONOMY mode.]



20Y1576

OUTLET AIR TEMPERATURE CONTROL

1. Blend Air Damper Operating Range

   On activating the AUTO switch, inside temperature and set temperature are compared and, on the basis of preset control conditions before starting (hereinafter called "temperature control value", the temperature control value is changed according to detected temperature difference to the HOT side if inside temperature is lower and to the COOL side if it is higher. The servo motor is driven and blend air damper opening is controlled according to the change in temperature control operation value so that in the case of change to the HOT side, blend air damper will open to raise outlet air temperature and in the case of change to the COOL side, blend air damper will close to lower outlet air temperature.

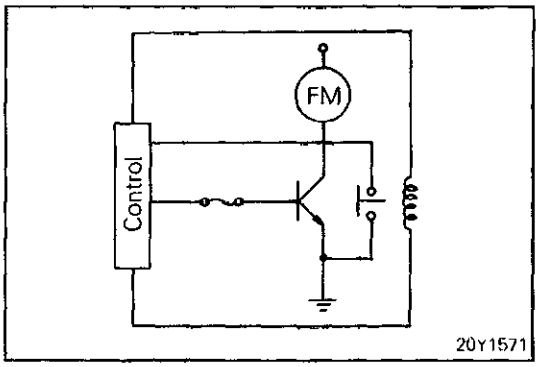
   In the AUTO mode, the blend air damper operating range is from the point "a" to the point "d" in the control diagram, and the temperature control operation value changes from value "A" to "D" according to damper position. In the ECONOMY mode, the damper operating range and the corresponding temperature control value range are from the point "a" to "c" and from the value "A" to "C", respectively.

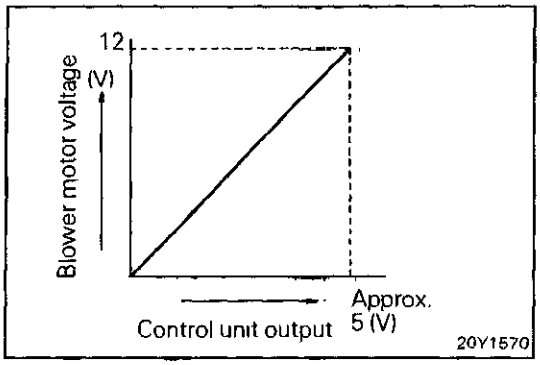
2. Evaporator Temperature Variable Range (Evaporator temperature variable range is set if the ECONOMY mode is selected.)

   If inside temperature becomes higher when the blend air damper is closed and the system is in the cooling range, a command is given to lower evaporator temperature with blend air damper closed, which causes the compressor operating rate to increase. If inside temperature becomes lower, a command is given to raise evaporator temperature with blend air damper in closed position, and a lower compressor operating rate results. Through the course of above operation, the outlet air temperature is controlled to an optimum level. The evaporator temperature control range to change compressor operating rate is between the points, "c" and "d" in the control diagram. In the AUTO mode, however, this control range (between points "c" and "d") is cleared. If compressor operating rate reaches 100% and further cooling is required, air volume is increased in the range between "d" and "e" in the control diagram. On the contrary, if blend air damper opening reaches MAX HOT and further heating is required, air volume is increased in the range between points B and A in the diagram.

3. Selection of ECONOMY Mode

   If the ECONOMY switch is pressed, the control range mentioned in the above paragraph 2 is established and if the switch is pressed again, the compressor stops and only air is supplied through outlets.





AIR VOLUME CONTROL

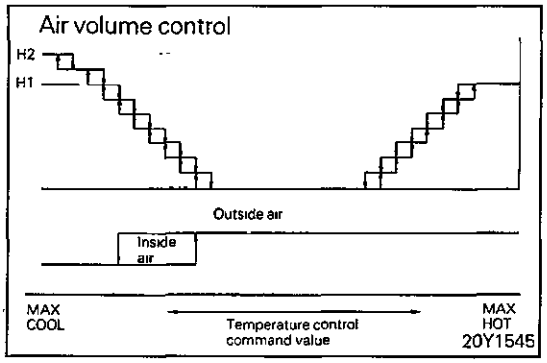
Outlet air volume is controlled automatically in either cooling range or heating range if the system is in AUTO mode. In the MANUAL mode, the system operates according to the button settings.

Blower speed is controlled according to the temperature control value obtained by comparing inside temperature and set temperature.

Outlet voltage from the computer controls power transistor to change blower motor voltage. For the maximum speed operation, the relay is energized to directly apply the maximum supply voltage to the blower motor.

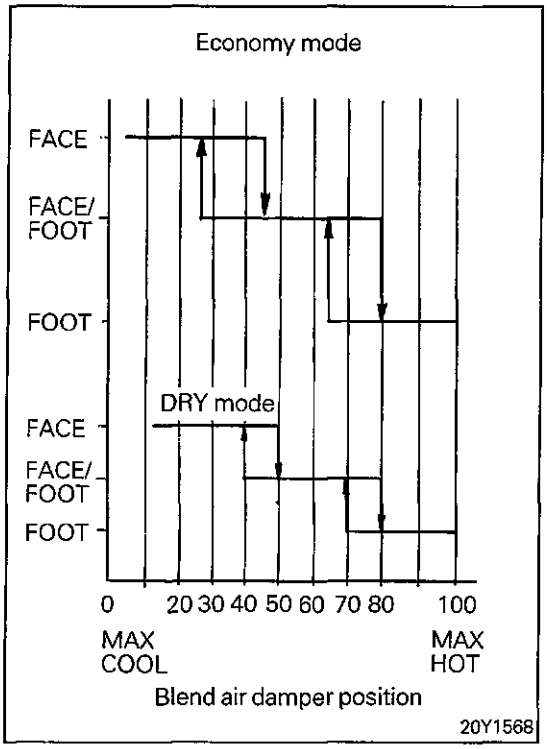
Cooling range	Heating range	Manual control
10 steps	8 steps	2 steps

In the temperature control diagram, the outlet air volume control range is between points "d" and "e" for cooling and between points "a" and "b" for heating.



INSIDE/OUTSIDE AIR CONTROL

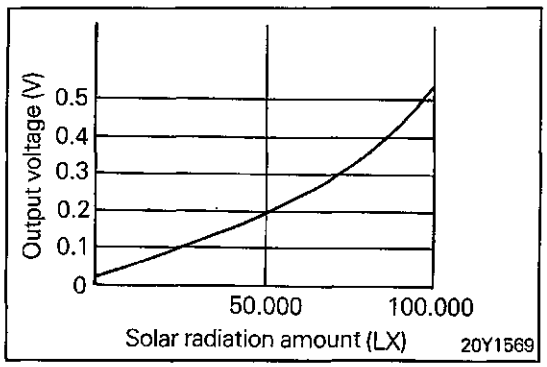
In the AUTO mode, the inside/outside air damper operation for selecting blower air suction port is controlled automatically according to the temperature control value obtained through comparison of inside temperature and set temperature. In the cooling range, the inside air circulation is selected if inside temperature is high and the outside air introduction is selected if inside temperature is low.
Even in AUTO mode, the selection is possible as desired by pressing the MANUAL button. However, this method of control has the following limitations:
(1) After start, outside air is introduced for two minutes.
(2) Outside air is introduced in DEF mode.
(3) Inside air recirculates when set temperature is 18°C (65°F).
(4) Outside air is introduced when set temperature is 32°C (90°F).



AIR FLOW CONTROL

Air blown by the blower is cooled or heated with the evaporator or heater to an optimum temperature and then supplied to the car interior through various outlets. For the air flow directions, any of the three modes FACE, FACE/FOOT and FOOT is determined depending on temperature setting conditions and selected automatically through operation of blend air damper. Between DRY and ECONOMY modes, the air flow mode change points are different as illustrated.
However, the air flow selecting operation has the following limitations:
(1) Set temperature 18°C (65°F) Fixed to FACE mode
Set temperature 32°C (90°F) Fixed to FOOT mode
(2) Coolant temperature compensation in heating
When inside temperature is lower than set temperature by more than 3°C (37.4°F), the air outlet and blower speed are fixed as follows depending on engine coolant temperature to improve heating at system start time.

Coolant temperature	Air flow mode	Blower speed	Compressor
Below 50°C (122°F)	Defroster	Ambient temperature below 0.6°C (32°F): M over 0.6°C (32°F): L	ON
50°C (122°F) or higher	AUTO mode		



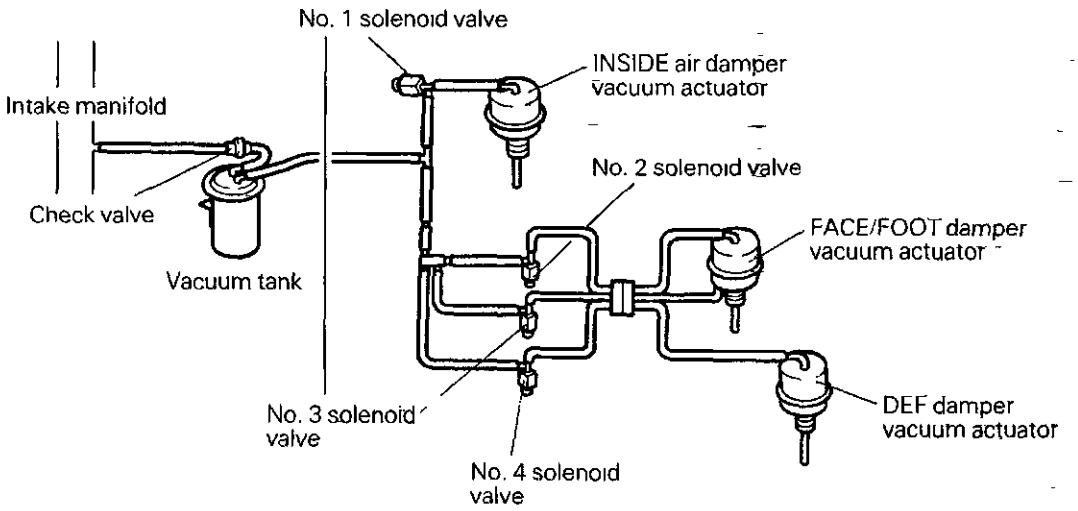
COMPENSATION OF SOLAR RADIATION

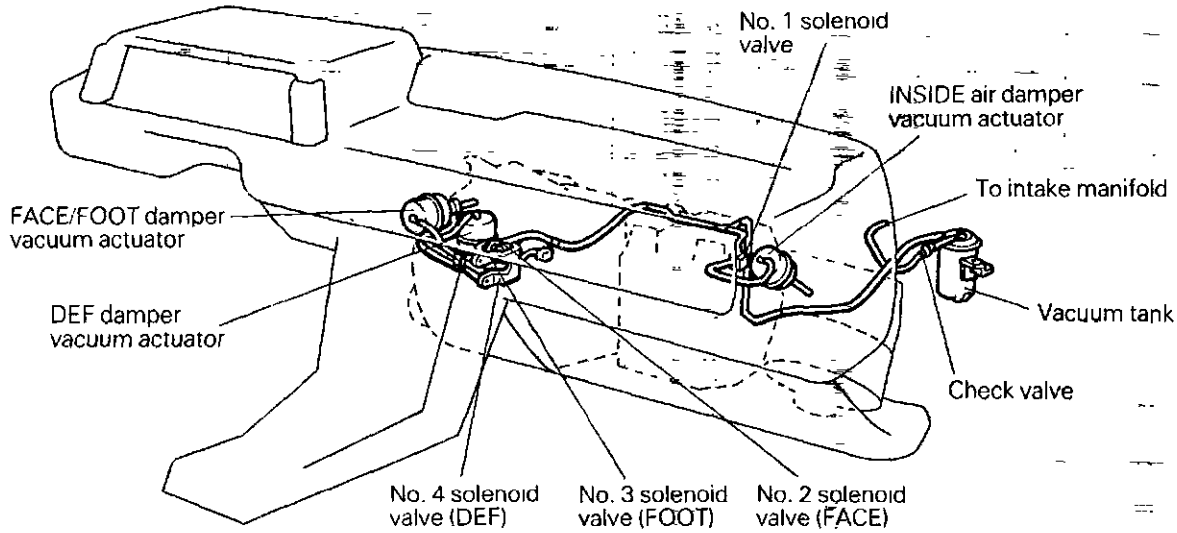
The photo-sensor (photodiode) senses the solar radiation amount. The data from this sensor is used for correcting the temperature control value. According to the corrected value, the blend air damper position or blower speed is controlled for an optimum interior temperature.

VACUUM SYSTEM

The vacuum system consisting of vacuum tank, check valve, vacuum hoses, vacuum solenoid valves and vacuum actuators, energizes or de-energizes the solenoid valves in response to signals from computer and operates the vacuum actuators to open or close the dampers for switching air flow. The relationship between modes and solenoids are as shown below.

Mode \ Solenoid	No. 1	No. 2	No. 3	No. 4
Inside air recirculation	ON	–	–	–
Outside air introduction	OFF	–	–	–
FACE	–	ON	OFF	OFF
FACE/FOOT	–	OFF	OFF	OFF
FOOT	–	OFF	ON	OFF
DEF	–	OFF	ON	ON
DEF/FACE	–	OFF	OFF	ON





20Y1621

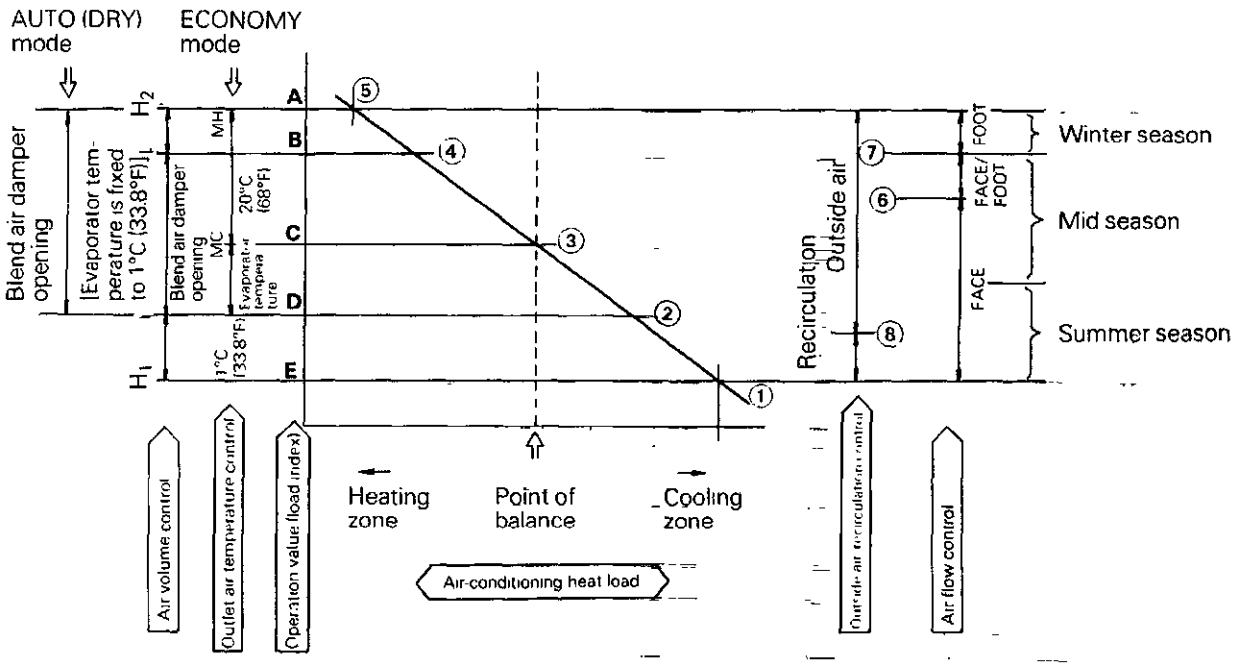
FAN CONTROL SYSTEM

This system detects the air conditioner operating state and coolant temperature through the information from the air conditioner switch, pressure switch and thermosensor, and controls the operation of radiator fan and pusher fan.

FAN CONTROL MODES

Status of switches and sensors / Fan operation					Radiator fan motor No. 1		Radiator fan motor No. 2		Pusher fan motor	
Air conditioner switch	Pressure switch	Engine coolant temperature switch	Thermosensor No. 1	Thermosensor No. 2	ON	OFF	ON	OFF	ON	OFF
OFF	–	–	OFF	OFF		○		○		○
			ON	OFF	○			○		○
			ON	ON	○		○		○	
ON	OFF	ON	OFF	OFF	○		○			○
		ON	ON	OFF	○		○			○
		ON	ON	ON	○		○		○	
		OFF	ON	ON	○		○		○	
	OFF	ON	OFF	OFF	○		○		○	
		ON	ON	OFF	○		○		○	
		ON	ON	ON	○		○		○	
		OFF	ON	ON	○		○		○	

Remarks:
Contact operating pressure and temperature
Pressure switch: 1,912 kPa (277 psi) → ON
Engine coolant temperature switch: 113°C (235°F) → OFF
Thermosensor No. 1: 85°C (185°F) → ON
Thermosensor No. 2: 100°C (212°F) → ON



The following explanation is one sample of operations for automatic air conditioner.

A: COOL START (summer season, high solar radiation)

[CONDITIONS]

- Car interior temperature: 32°C (90°F)
- Set temperature: 75°F
- Ambient temperature: 30°C (86°F)

1. Push AUTO switch (air conditioner ON).
   It starts at position (1) on above temperature conditions, each modes should be as follows:
   - Air flow control: FACE mode
   - Inside/outside air: Inside circulation

     NOTE
     After start, outside air is introduced for 2 minutes.
   - Blower speed: MAX HIGH speed (10th step)
   - Blend air damper opening ratio: MAX COOL (close)
   - Compressor: ON
2. Blower is controlled low speed according to the lower interior temperature and then blower speed which balances with cooling load maintains to be same temperature between interior and set. [Air mix damper opening ratio is MAX COOL (position (1) to (2)).]

3. In case of low cooling load caused by lower solar radiation and ambient temperature 30 to 25°C (86 to 77°F), blower stays LO speed and blend air damper opening ratio is controlled between MAX COOL (0 %) to 30 % and then interior temperature is stabilized to be same with set temperature.
   (Blend air damper opening ratio is position ② to ③.)

B: ECONOMY SWITCH ON

If push the economy switch during ② and ③ in the diagram, blend air damper stays at MAX COOL position and it controls running ratio of compressor.
As a result, interior temperature is stabilized to be same with set temperature.
(If cooling load goes to ③ from ②, off time of compressor becomes longer.)

C: INSIDE/OUTSIDE MODE CHANGE OVER

In case of cooling, after start, outside air is introduced for 2 minutes and then changes to inside air.
When blower speed goes down to 3rd lower step, inside mode changes to outside mode (position ⑧).
However in case of high solar radiation, when blower speed goes to 5th step, it changes to outside mode.
(Position ① to ②, ② to ⑤ is always outside mode.)

D: HEATING (winter season to mid season)

[CONDITIONS]

- Car interior temperature: –10°C (14°F)
- Set temperature: 75°F
- Ambient temperature: –10°C (14°F)

1. Push AUTO switch.
   It starts at position ⑤ on above temperature conditions. Each modes should be as follows:
   - Air flow control: FOOT mode
   - Inside/outside air: Outside air
   - Fan speed: H2 (8th step, MAX speed)
   - Compressor: OFF

   However, radiator temperature is cold at engine starting, therefore air flow control keeps DEF mode and blower stays 5th speed step.
2. Fan speed and blend air damper opening ratio is controlled low according to the higher interior temperature, and then fan speed blend air damper which balances with heating load maintains to be same temperature between interior and set.
   [Fan speed is 3rd to 4th step, blend air damper opening ratio is 70 % to 80 % (position ④ to ⑤).]

   NOTE
   Fan speed and blend air damper move symmetrically during position ④ to ⑤.

3. In case of ambient temperature 0.6 to 5°C (32 to 41°F), fan speed and blend air damper opening ratio goes to low by lower heat load.
   The air flow mode changes to BI LEVEL mode at position (7).

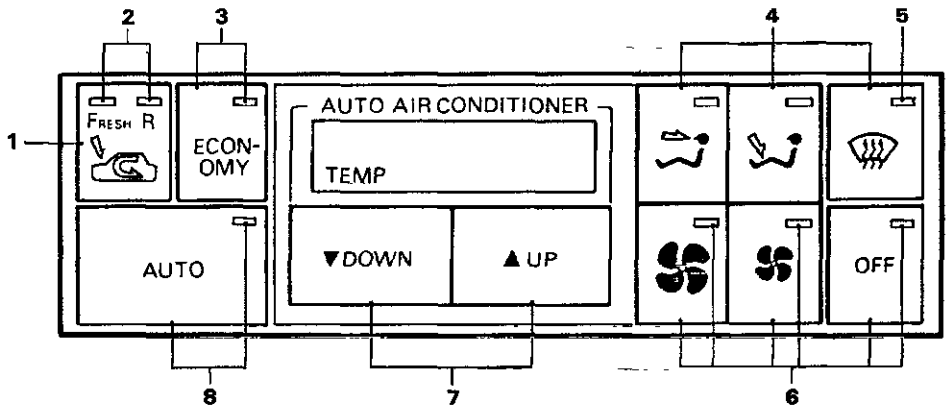
   NOTE
   Compressor begins to run at above ambient temperature 0.6°C (32°F).
4. In case of ambient temperature 10 to 15°C (50 to 59°F) fan speed and blend air damper opening ratio goes to lower by much lower heat load and the air flow mode changes to FACE at position (6).

E: MID SEASON

Low heat load like ambient temperature 5 to 15°C (41 to 59°F) and set temperature 75°F.

1. If interior temperature is over the set temperature during (2) to (3), air conditioner starts by COOL.
2. If interior temperature is below the set temperature, air conditioner starts by heat during (5) to (3).

OPERATION



70Y506

CONTROL PANEL

1. Air Selection Switch

   Ignition switch at ON and control in AUTO mode:
   Inside air recirculation or outside air introduction mode as selected in AUTO mode is established, with the lamp lit dim.

   Manual setting:
   By every depression of the switch, the selected mode is reversed and the status is held, with corresponding lamp lit.

2. Outside Air Introduction Mode Display LED (Green) and Inside Air Circulation Mode Display LED (Orange)

   Ignition switch at ON and control in AUTO mode:
   The LED lights to indicate inside air recirculation or outside air introduction mode as selected in AUTO mode.

   Manual setting:
   The LED indicates inside air recirculation or outside air introduction mode.

3. ECON Operation Display LED (Orange) and ECON Switch

   The LED operation and ECON switch operation are synchronized.

   Ignition switch ON and control in AUTO mode:
   Switch lamp is lit dim and LED is off.

   Manual setting:
   If ECONO key is pressed, ECONO mode is set and ECONO switch and LED are lit.
   If the key is pressed again, compressor OFF mode is set and ECONO switch is lit dim, with LED being off (fan in operation).
   The ECONO and OFF modes are established alternatively at every depression of ECONO key.

4. Air Flow Mode Selection Switch

   Ignition switch at ON and control in AUTO mode:
   (1) Air flow mode is determined in AUTO mode.
   (2) All lamps are lit dim.

   Manual setting:
   (1) Air flow mode is established as selected.
   (2) Lamps for set keys only are lit.

5. Air Flow Mode Operation Display LED (Orange)

   Ignition switch at ON and control in AUTO mode:
   LED for mode selected in AUTO mode is lit. [LED for FACE, FACE/FOOT, FOOT or DEF mode is lit (when coolant temperature is compensated).]

   Manual setting:
   LED for set air flow mode (FACE, FACE/FOOT, FOOT, DEF or FACE/DEF) is lit. Simultaneous selection of DEF and FOOT is impossible. (DEF is selected if they are selected simultaneously.)
   * The LED's for two modes selected within a second are lit. In case of concurrent selection of DEF and FOOT, however, the mode selected later becomes effective.

6. For Operation Display LED (Orange) and Blower Switch

The LED operation is synchronized with switch operation.

Ignition at ON and control in AUTO mode:
(1) Blower speed level is determined by deviation of interior temperature from set temperature.
(2) Switch lamps are all lit dim.

Manual setting:
(1) Blower speed level is set as selected (OFF*, Lo or Hi).
(2) Switch lamps and LED's are lit for set keys only.
* If OFF key is pressed, ECONO operation display LED, ECONO switch lamp and AUTO switch lamp are lit dim (with compressor OFF).

7. Temperature Control Switch

(1) After ignition switch is set to ON, lamp is always lit dim.
(2) Beep sound is produced once at every set temperature change. (Setting changes at 1°F increments from 65 to 90°F.)
(3) If pressed simultaneously, no change occurs in set temperature. No beep sound.
(4) No effect on other switches.
(5) If the switch is kept pressed, set temperature continues to change down to 65°F or up to 90°F. (Below 65°F or above 90°F, neither set temperature change nor beep sound is caused even if the switch is pressed).

8. AUTO Operation Display LED (Orange) and AUTO Switch

The LED operation and AUTO switch operation are synchronized.

(1) Ignition switch ON:
AUTO switch lamp and LED only are lit. (Other switch lamps are lit dim.) Operation display LED's are as described in the respective displays.

Manual setting:
When the blower speed level and air flow mode are selected and compressor is in OFF mode, AUTO switch lamp is lit dim and AUTO LED indicator is off. In case of air selection mode and ECONOMY mode selection, however, AUTO switch lamp and LED will be lit.

(2) If AUTO key is pressed again, AUTO mode is set and AUTO switch lamp and LED will be lit except when temperature is same as set temperature.

SENSOR MOUNTING POSITION

Interior temperature sensor

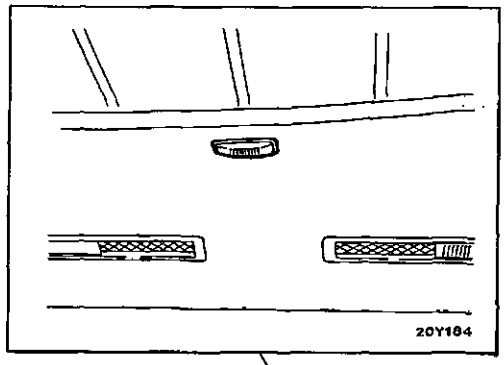
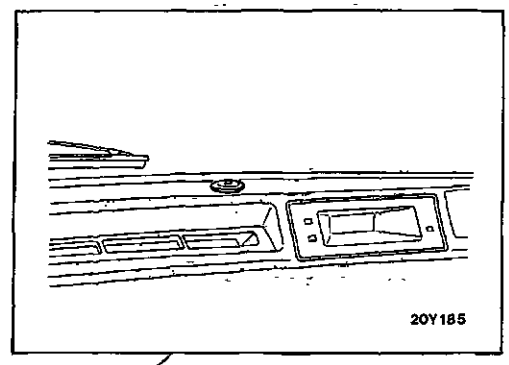
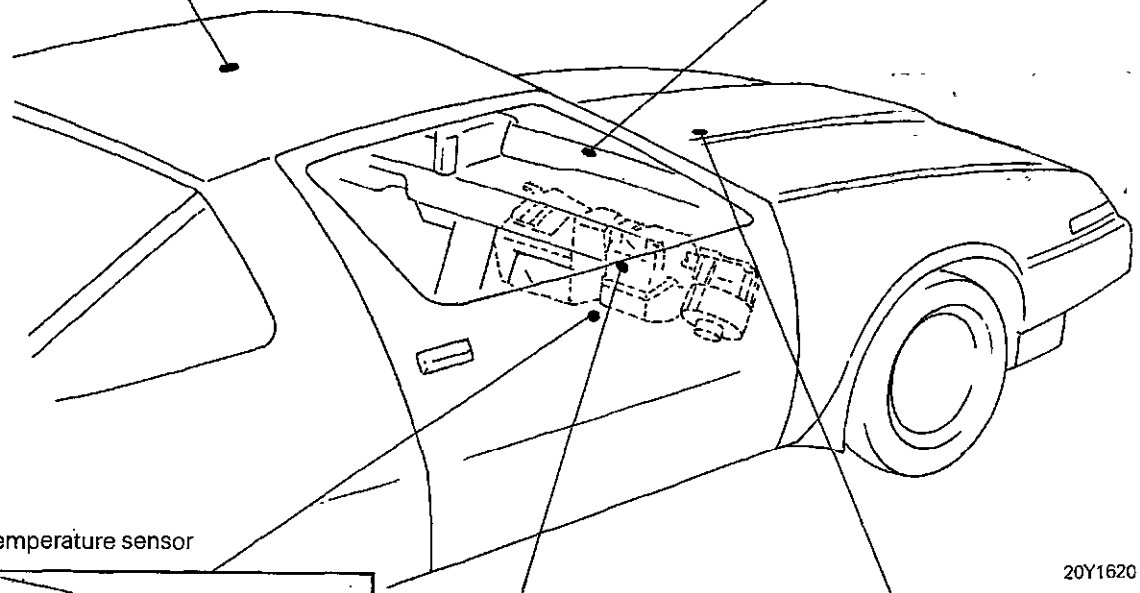
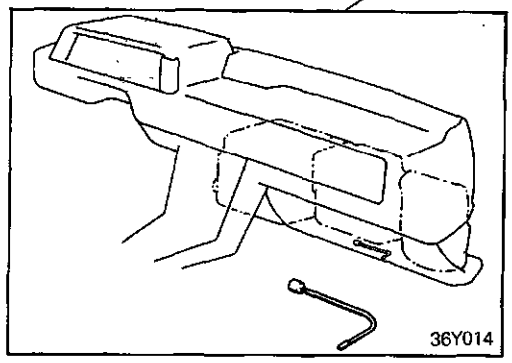


Photo-sensor

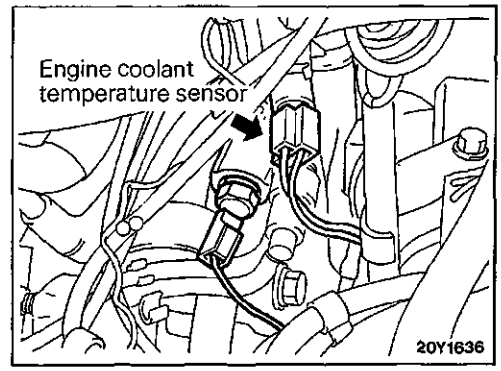




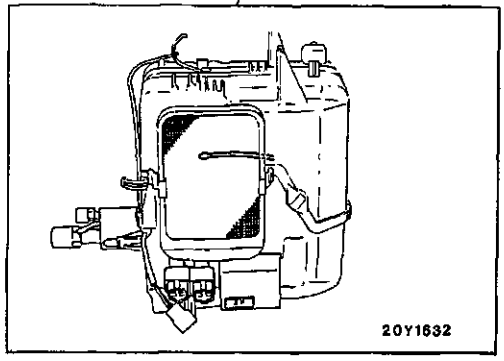
Foot area temperature sensor

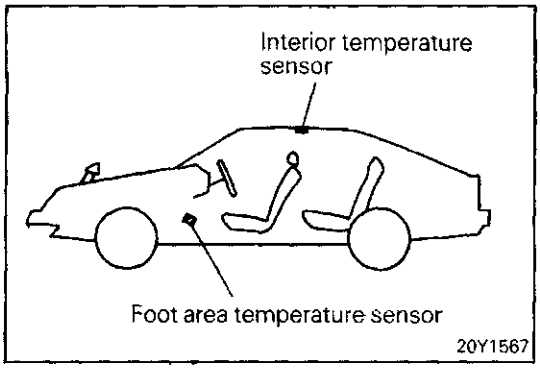


Engine coolant temperature sensor



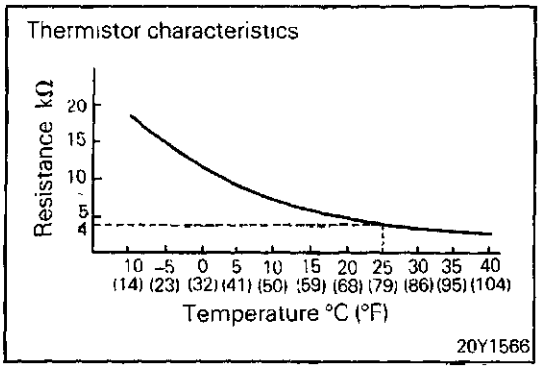
Thermistor



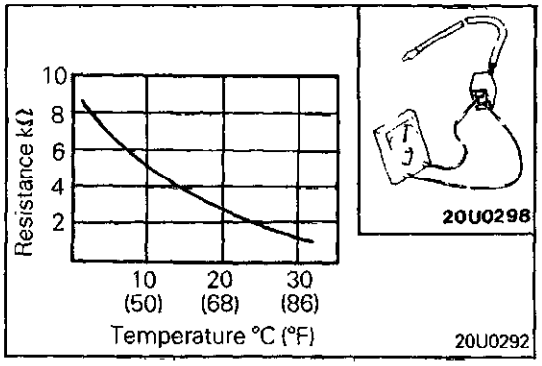


INTERIOR TEMPERATURE SENSOR AND FOOT AREA TEMPERATURE SENSOR

Changes in interior temperatures, cause thermistor resistance in those sensors to change and apply such resistance change data as input to the microcomputer.



The temperatures detected by interior temperature sensor and foot area temperature sensor are averaged and obtained value is used as an interior temperature data.



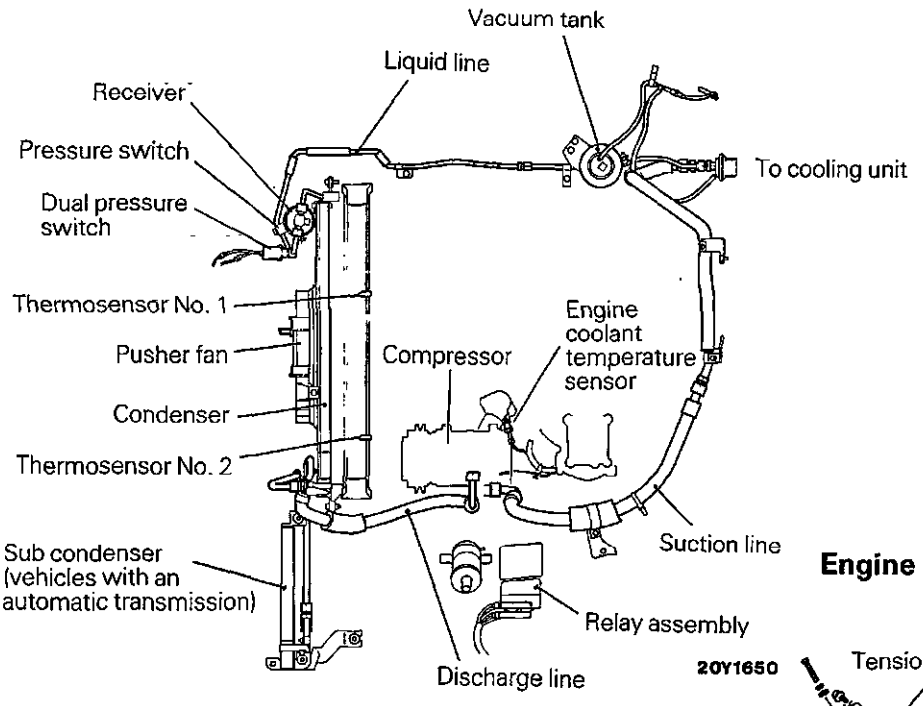
THERMISTOR

This sensor senses evaporator air flow temperature and inputs the signal to the microcomputer for compressor ON–OFF control.
Further, it detects the frost point to prevent frosting of evaporator.

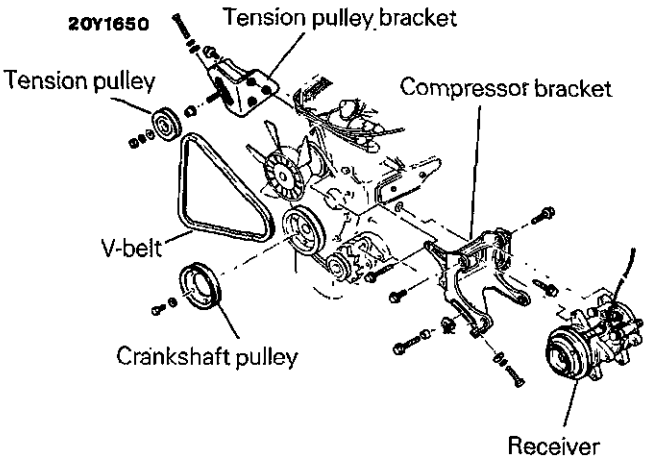
AIR CONDITIONER SYSTEM COMPONENTS

N24BBBC

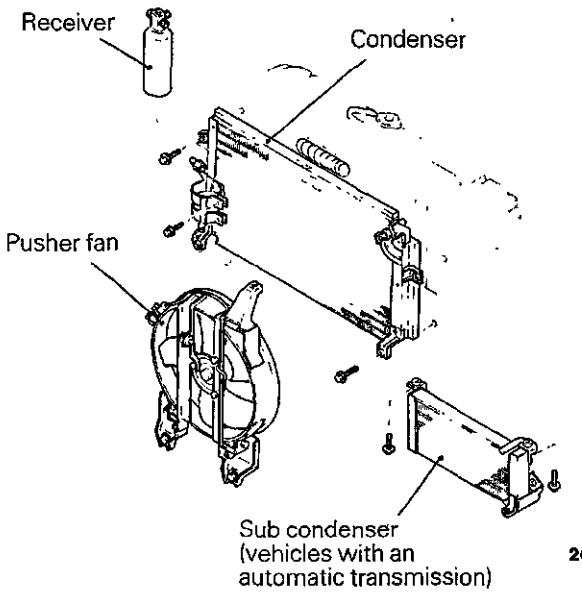
Piping



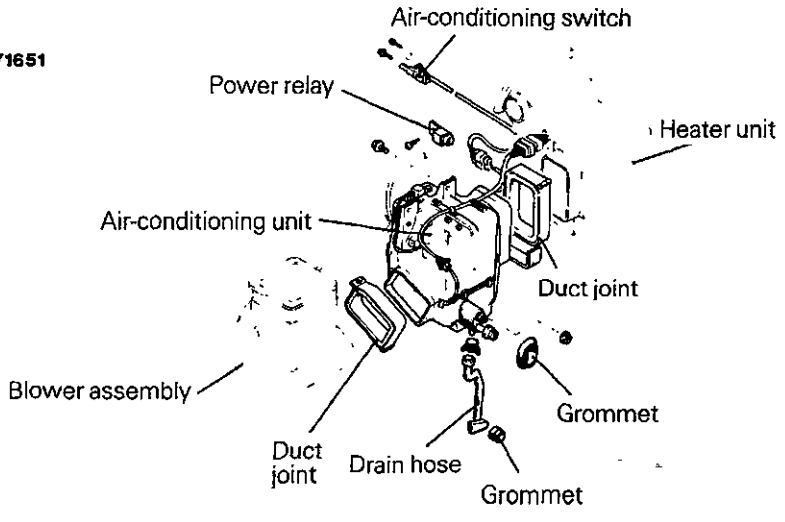
Engine compartment



20Y999



Passenger compartment



20Y1504

Compressor – The prime purpose of the compressor is to compress the low pressure refrigerant vapor from the evaporator into a high pressure, high temperature vapor. The 6 cylinder DR6148 compressor is used on all vehicles in this Service Manual.

Magnetic Clutch – are mounted on the compressor providing a convenient way to drive and disengage it in accordance to the cooling needs.

Condenser – is located in front of the radiator. Its function is to cool the hot, high pressure refrigerant gas causing it to condense into high pressure liquid refrigerant.

Receiver Drier – is used to remove any traces of moisture from the refrigerant system. This component incorporates the sight glass.

Sight Glass – at the top of the receiver drier is provided as a diagnostic tool to observe refrigerant flow and indicate refrigerant level.

Dual Pressure Switch – prevents damage to the compressor in case of system loss and over of refrigerant charge.

Fusible Plug – is located on the receiver drier. Its function is to prevent damage to the air-conditioning system in the event that excessive pressure develops due to condenser air flow being restricted by for example, leaves, newspaper, and overcharge of refrigerant, or air in the system.

Expansion Valve – The expansion valve is used for all applications. Its function is to meter refrigerant into the evaporator in accordance with cooling requirements.

Evaporator Coil – is located in the evaporator and its function is to cool, and dehumidify the air before it enters the vehicles.

Freeze Control – A thermistor is installed at the heater side evaporator.
The main function of a freeze control is to keep condensate water on the face of the evaporator coil from freezing and restricting air flow.

Service Valves – at the compressor and the discharge. The valves are used to test and service the refrigerant system.

SPECIFICATIONS

GENERAL SPECIFICATIONS

N24CA--

Items	Specifications
Air conditioner type	AC174LN
Compressor	
Type	DR6148
Compressor oil cc (fl.oz.)	DENSO OIL 170 (5.7)
Protective devices	
Pressure switch kPa (psi)	ON at 1,912 (277), OFF at 1,618 (235)
Dual pressure switch kPa (psi)	Low pressure switch ON at 230 (33.4), OFF at 206 (29.9) High pressure switch OFF at 2,648 (384), ON at 2,059 (299)
Thermosensor No. 1 °C (°F)	ON at 85 (185), OFF at 81 (177.8)
Thermosensor No. 2 °C (°F)	ON at 100 (212), OFF at 96 (204.8)
Engine coolant temperature switch °C (°F)	ON above 106 (222.8), OFF at 113 (235)
Refrigerant and quantity to be charged g (oz.)	R12 910 (32)

SERVICE SPECIFICATIONS

N24CB--

Items	Specifications
Standard value	
Drive belt deflection mm (in.)	17 – 20 (.7 – .8)
Thermo switch °C (°F)	
OFF → ON	46 – 54 (115 – 129)
ON → OFF	43 (109) or more
Potentiometer Ω	
MAX HOT position	180
MAX COOL position	4,640

TORQUE SPECIFICATIONS

N24CC--

Items	Nm	ft.lbs.
Liquid line	12 – 15	9 – 11
Suction line	30 – 34	22 – 26
Discharge line	20 – 25	15 – 18
Center piece securing nut	15 – 17	11 – 13
Front housing through bolt	25 – 26	18 – 20

TROUBLESHOOTING

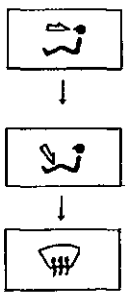
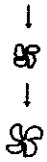
N24EBAD

OPERATIONAL CHECK AND CAUSES OF TROUBLES

Operate the switches in the sequence in the following table and check the operation of each controller to verify correct operation of respective system components.

No.	Action	Normal operation	Abnormal operation/ Probable cause
1	Start the engine. (Proceed to check after coolant is sufficiently warmed.)	• The AUTO switch lamp on control panel lights.	• AUTO switch lamp does not light and no beep sound is heard even if the switch is pressed. - Problem in switch
		• The display changes to preset temperature indication.	• No indication. - Problem in digital display
		• Air volume changes according to blower switch position.	• Blower motor does not operate even if the fan switch is set to ON. - Problem in fan controller
		• Compressor comes into operation.	• Compressor does not operate. - Problem in air conditioner
2	Change temperature setting to 90°F. (Set blower switch to AUTO position unless otherwise specified.)	• On depression of UP switch, beep sound is produced and the sound stops once 90°F is reached.	• No beep sound. Temperature setting remains unchanged. - Problem in switch - Problem in wiring harness
		• Beep sound is heard while temperature setting is being changed.	
		• When 90°F temperature is reached, the indication changes from "FACE" to "FACE/FOOT" and then to "FOOT", and also the air outlet accordingly.	• Air flow does not change to FOOT mode or air outlet does not correspond to mode indication. - Problem in air flow change vacuum solenoid or vacuum actuator
		• Outlet air reaches the warmest temperature.	• The warmest temperature cannot be attained or, conversely, temperature drops to the lowest. - Problem in blend air damper servo motor
		• Outside air is introduced.	• Interior air recirculates. - Problem in outside/inside air damper vacuum solenoid or actuator
		• Compressor stops.	• Compressor comes into operation. - Problem in wiring harness - Problem in control box
		• Blower speed becomes MH.	• Blower speed remains unchanged. - Problem in fan controller - Problem in wiring harness - Problem in control box

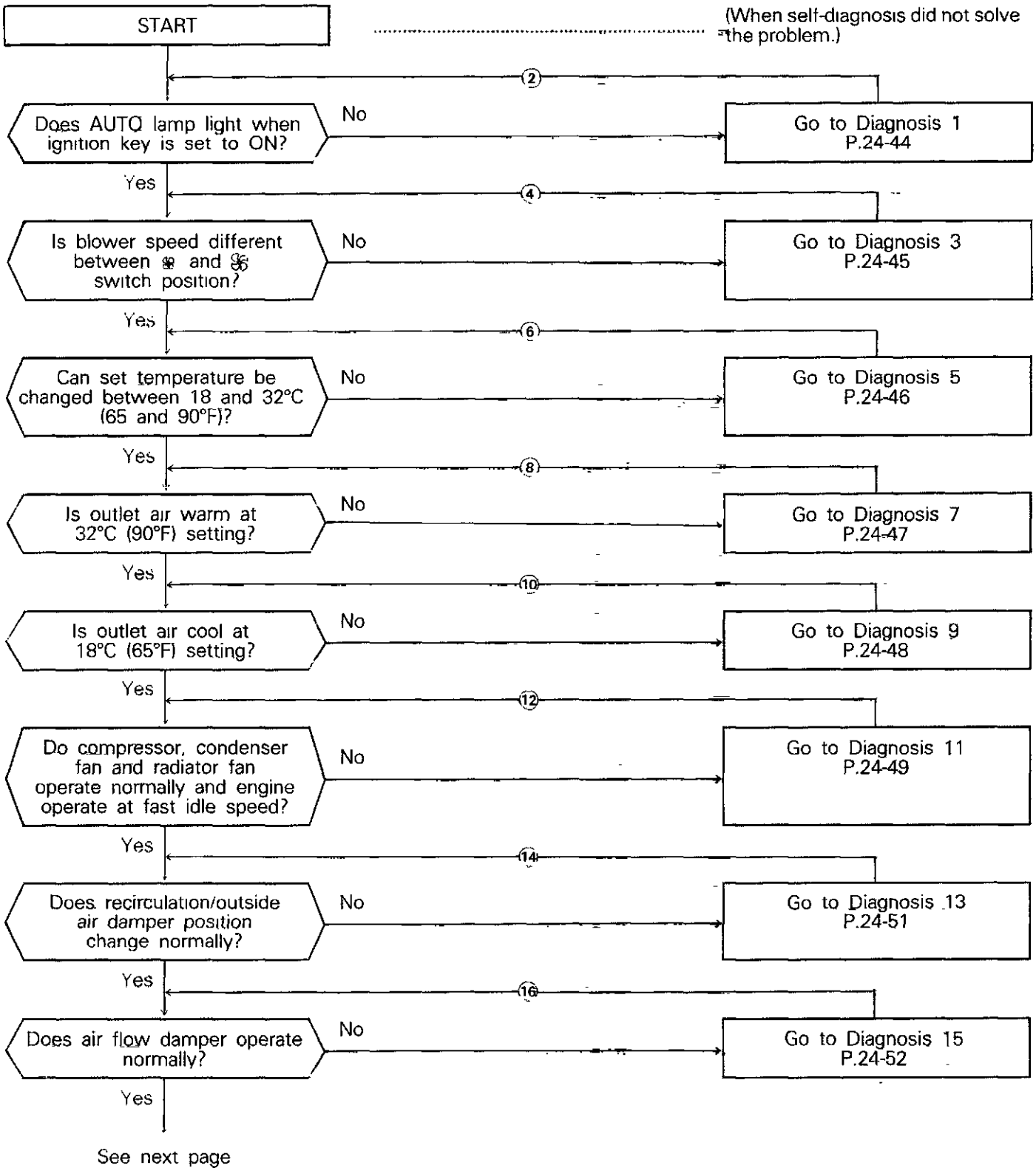
No.	Action	Normal operation	Abnormal operation/ Probable cause
3	Change temperature setting from 90 to 65°F.	• Upon depression of DOWN switch, beep sound is produced and the sound stops once 65°F temperature is reached.	• No beep sound. Temperature setting remains unchanged. - Problem in switch - Problem in wiring harness
		• Beep sound is heard while temperature setting is being changed.	• Temperature indication remains unchanged. - Problem in indicator - Problem in wiring harness
		• When 65°F temperature is reached, the indication changes from "FOOT" to "FACE/FOOT" and then to "FACE", and also the air outlet accordingly. (Observe LED also.)	• Air flow does not change to FACE mode or air outlet does not correspond to the indicated mode. - Problem in air flow changeover vacuum solenoid or actuator
		• Outlet air temperature becomes the lowest (blend air damper is closed).	• Outlet air does not become cooler, much less the lowest temperature (blend air damper does not operate). - Problem in blend air damper servo motor
		• Compressor comes into operation.	• Compressor does not operate. - Problem in air conditioner
		• Air flow changes from introduction of outside air to recirculation of inside air.	• Outside air is introduced. - Problem in air selection damper actuator
		• Blower speed becomes "H" (H relay closes).	• Blower speed remains unchanged and H relay is inoperative. - Problem in power transistor - Problem in relay
4	Press air selection switch twice and then press AUTO switch. (Temperature setting is 77°F.)	• Every depression of air selection causes beep sound and switch lamp is kept lit in that while. Once AUTO switch is pressed, the air selection lamp goes off.	• Beep sound is produced but lamp does not light. - Blown lamp bulb
			• Neither beep sound is produced nor lamp lights. - Problem in switch
		• On depression of air selection switch, the damper position changes from recirculation position to outside air position and vice-versa.	• Damper position does not change (but air flow indication changes). - Problem in recirculation/outside air damper actuator
		• If AUTO switch is pressed, damper returns automatically to its original position and indication also returns to "AUTO".	

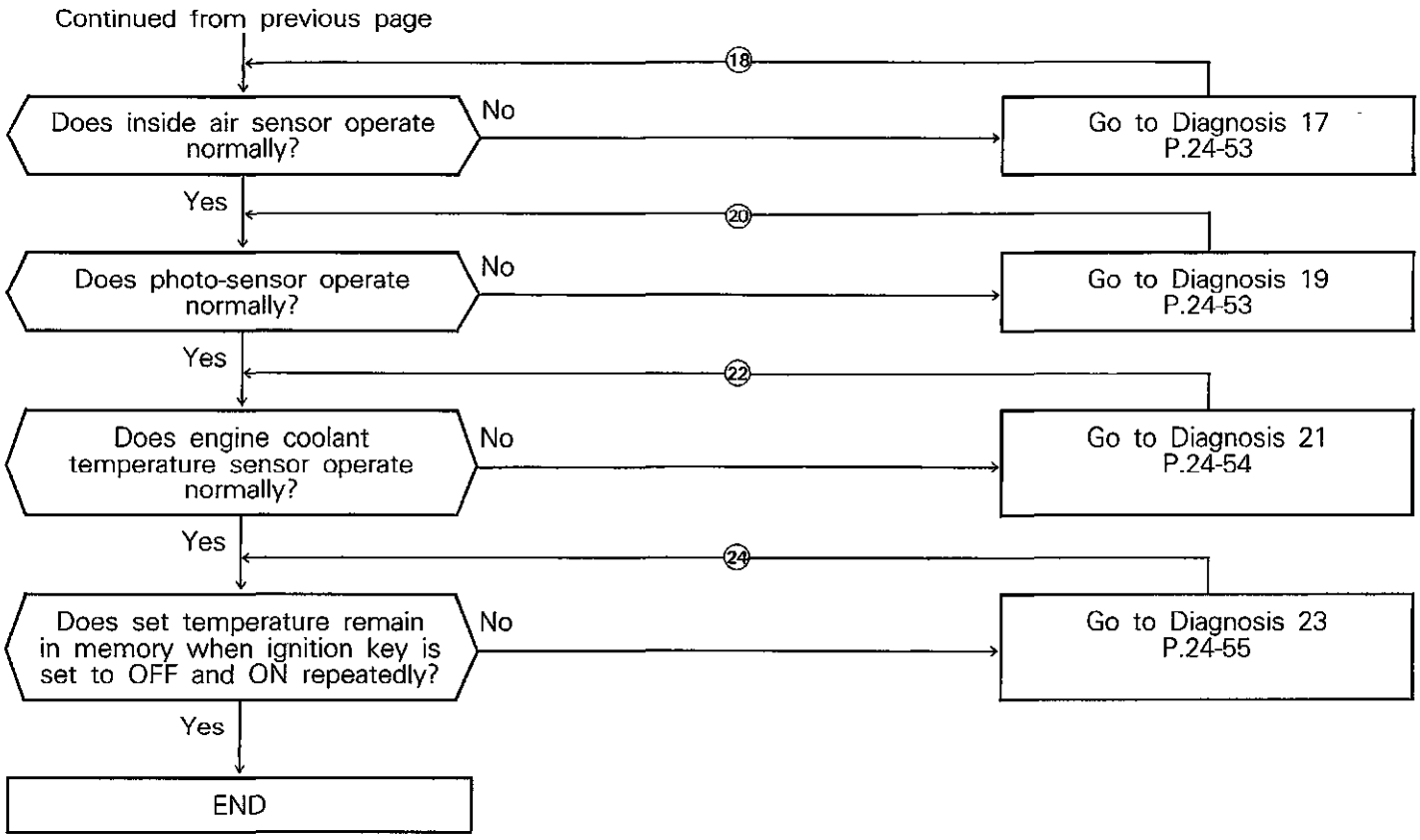
No.	Action	Normal operation	Abnormal operation/ Probable cause
5	Press ECONOMY switch three times and then press AUTO switch. (Temperature setting is 77°F.)	• Every depression of switch causes beep sound and switch lamp lights every other depression. • Second depression of switch causes compressor to stop and switch lamp and AUTO lamp to go off. • When AUTO switch is pressed, ECONOMY switch lamp goes off and air conditioner comes into operation continuously.	• No beep sound is produced (no response to switch action). - Problem in switch - Problem in wiring harness • Beep sound is produced but lamp does not light. - Blown lamp bulb (Switch does not operate.) • Compressor operates but condenser fan does not. - Problem in condenser motor - Problem in condenser motor relay
6	Push air flow mode switches one after another. 	• Beep sound is produced when respective switch is pushed; corresponding switch lamp and LED light. • AUTO lamp goes off when any of the switches is pushed. • Air comes out from the outlets corresponding to pushed switch. • Indication on air flow indicator changes according to depression of switch. *[ ] and [ ] modes cannot be selected simultaneously. If both are selected concurrently, [ ] will have priority over the other.	• No beep sound is produced (no response to switch action). - Problem in switch - Problem in wiring harness • Beep sound is produced but lamp does not light. - Blown switch lamp bulb • Air flow direction does not change. - Problem in damper actuator
7	Change blower switch position. OFF ↓ 	• Outlet air volume changes according to switch position. • If AUTO mode switch is activated, air volume changes automatically according to interior temperature. (For example, if the interior sensor is touched by hand when interior temperature is lower than bodily temperature, the air volume will increase.) • When engine is cold, if AUTO mode switch is activated, fan speed is fixed to low speed for some while after start of engine.	• No air volume change is caused by setting the switch to different positions (and). - Problem in switch - Problem in wiring harness • Fan motor does not operate in both and positions. - Problem in fan controller - Blown fuse - Broken harness • When AUTO mode switch is activated, fan turns at high speed even in cold season or stays turning at low speed even after the engine is warmed. - Problem in water temperature switch - Problem in water temperature switch wiring harness

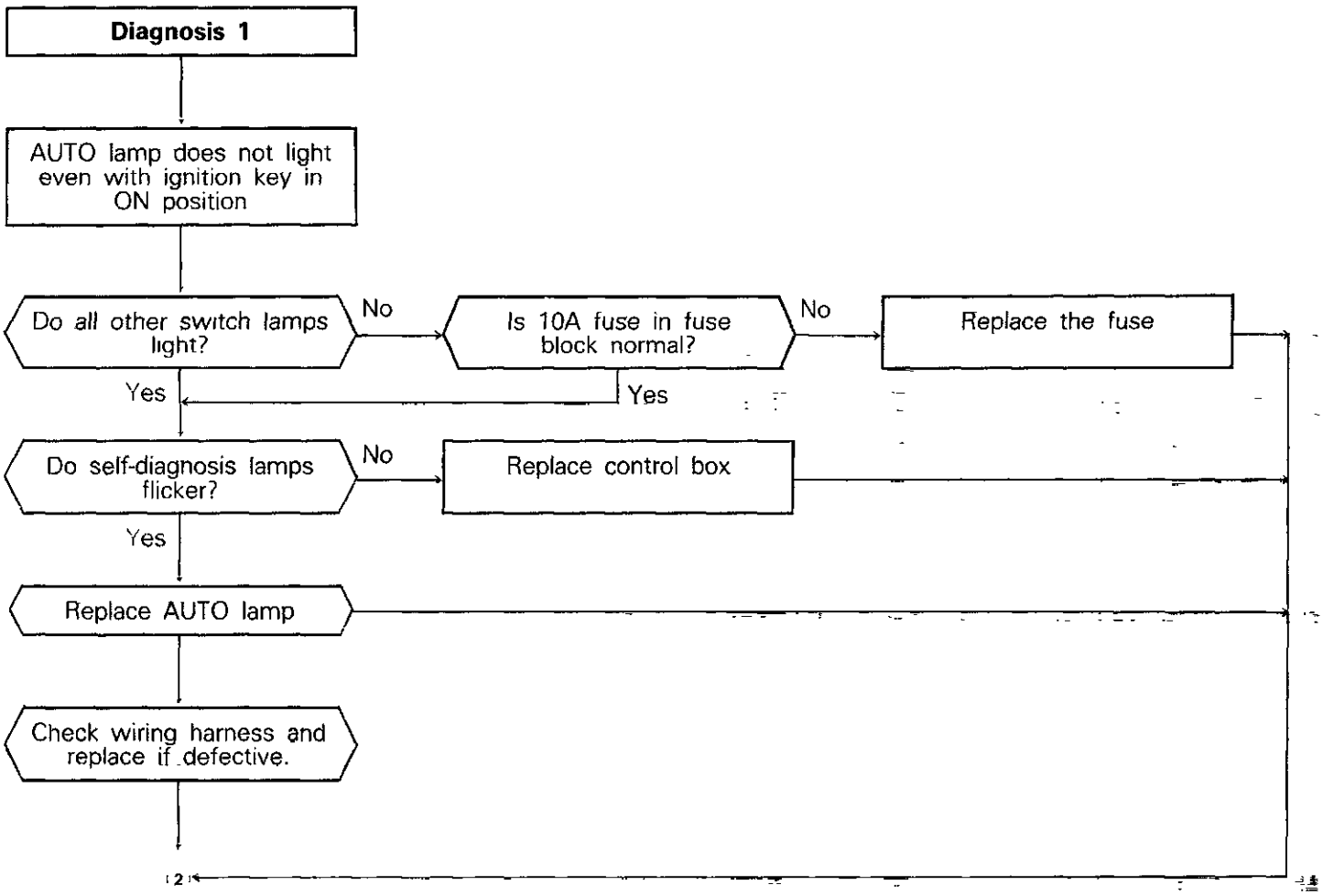
No.	Action	Normal operation	Abnormal operation/ Probable cause
8	Check for AUTO mode function (interior temperature sensor operation). (Set AUTO mode switch to ON; temperature setting is 77°F.) * Touch interior temperature sensor heat sensing plate with hand to warm it to 30°C (86°F) or over. Then cool the plate down to 10°C (50°F) or below.	• When the interior temperature sensor is touched with hand, the air flow mode becomes to FACE, the blend air damper moves to the coolest position and blower speed changes to H level. The interior air recirculates under this condition. (If the system is in ECONOMY mode, the compressor comes into operation.) • When the interior temperature sensor is cooled down, the outside air is introduced, the blend air damper moves to the warmest position and the air flow mode becomes to FOOT. Also, the fan speed becomes MH level. (If the system is in ECONOMY mode, the compressor stops.)	• Neither touching the sensor with hand nor cooling it causes the results. - Problem in interior temperature sensor - Problem in wiring harness - Problem in controller
9	Check photo-sensor for function. (With the system in AUTO mode, set the blower switch to AUTO position temperature setting is 77°F.) Expose the photo-sensor to sunbeam for checking.	• When the sensor is exposed to sunbeam, the outlet air temperature lowers. (Blower speed increases in summer.) • When the sensor is covered by hand, the outlet air temperature rises. (Blower speed decreases in summer.)	• No change results from action on sensor. - Problem in photo-sensor - Broken wiring harness - Problem in controller (Clean the photo-sensor.)
10	Check engine coolant temperature switch for operation. (With the system in AUTO mode, set the blower switch to AUTO position; temperature setting.) * Cool the interior temperature sensor heat sensing plate down to 20°C (68°F) or lower.	• When engine coolant temperature is lower than 50°C (122°F), the blower speed is in L level and the air flow mode becomes DEF. • When engine coolant temperature rises to 50°C (122°F) or higher, the blower speed increases and air flow mode becomes FOOT, FACE/FOOT or FACE.	• Blower motor speed is not fixed to L level even when engine coolant temperature is lower than 50°C (122°F). - Problem in controller - Problem in wiring harness • Air flow remains in mode. - Problem in engine coolant temperature switch - Broken wiring harness - Problem in controller

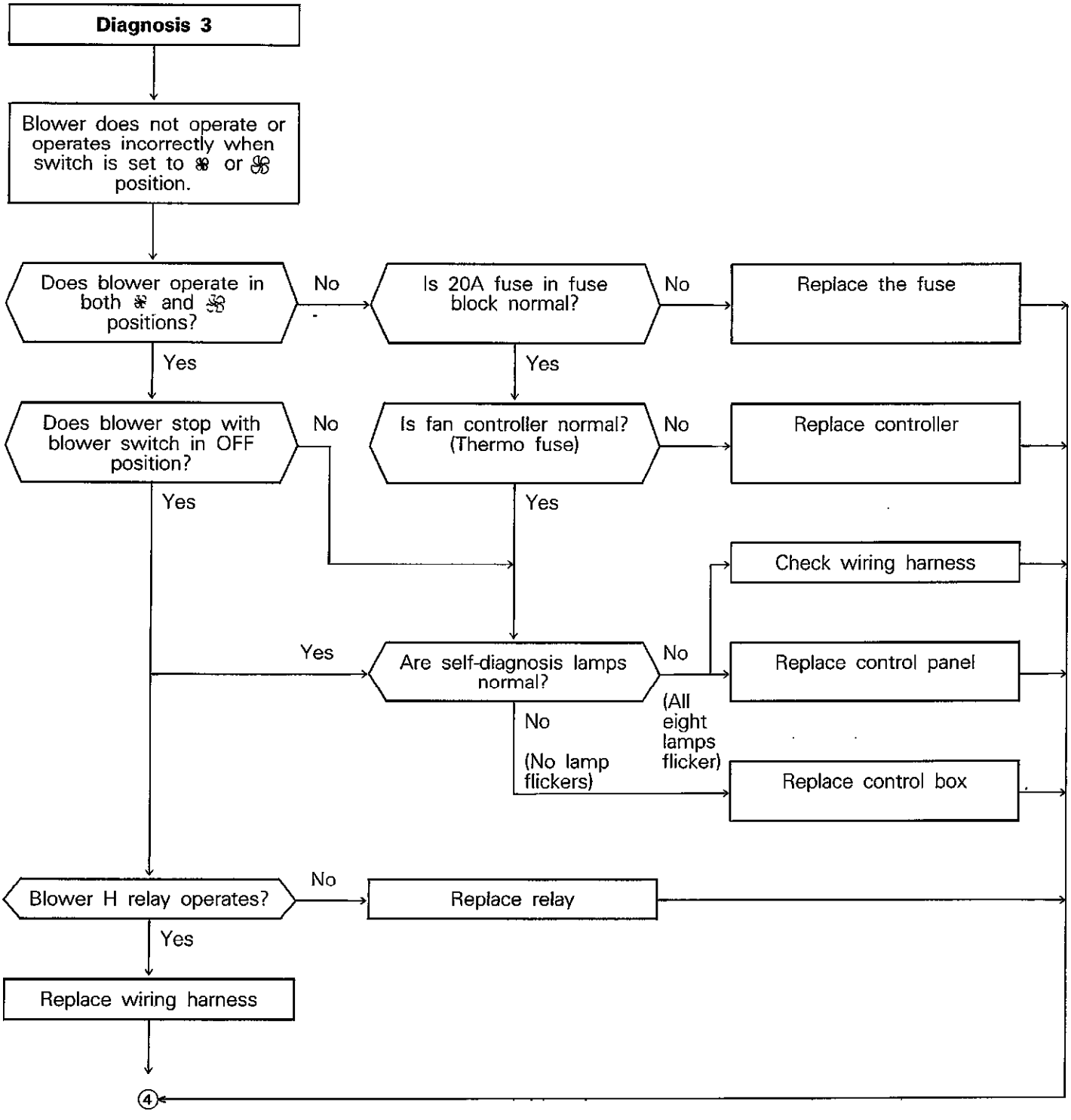
SYSTEM DIAGNOSTIC PROCEDURE

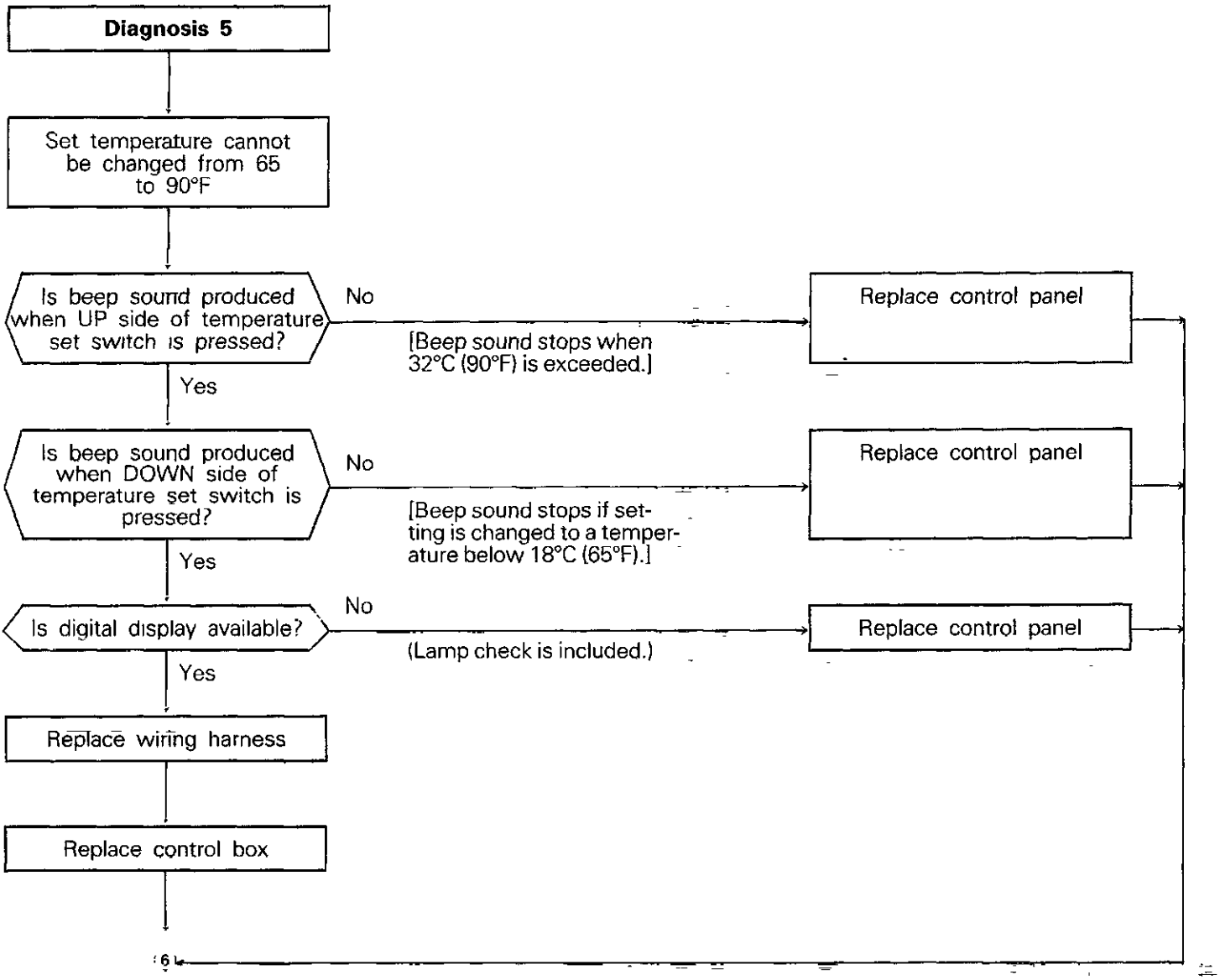
[Main diagnostic flow]

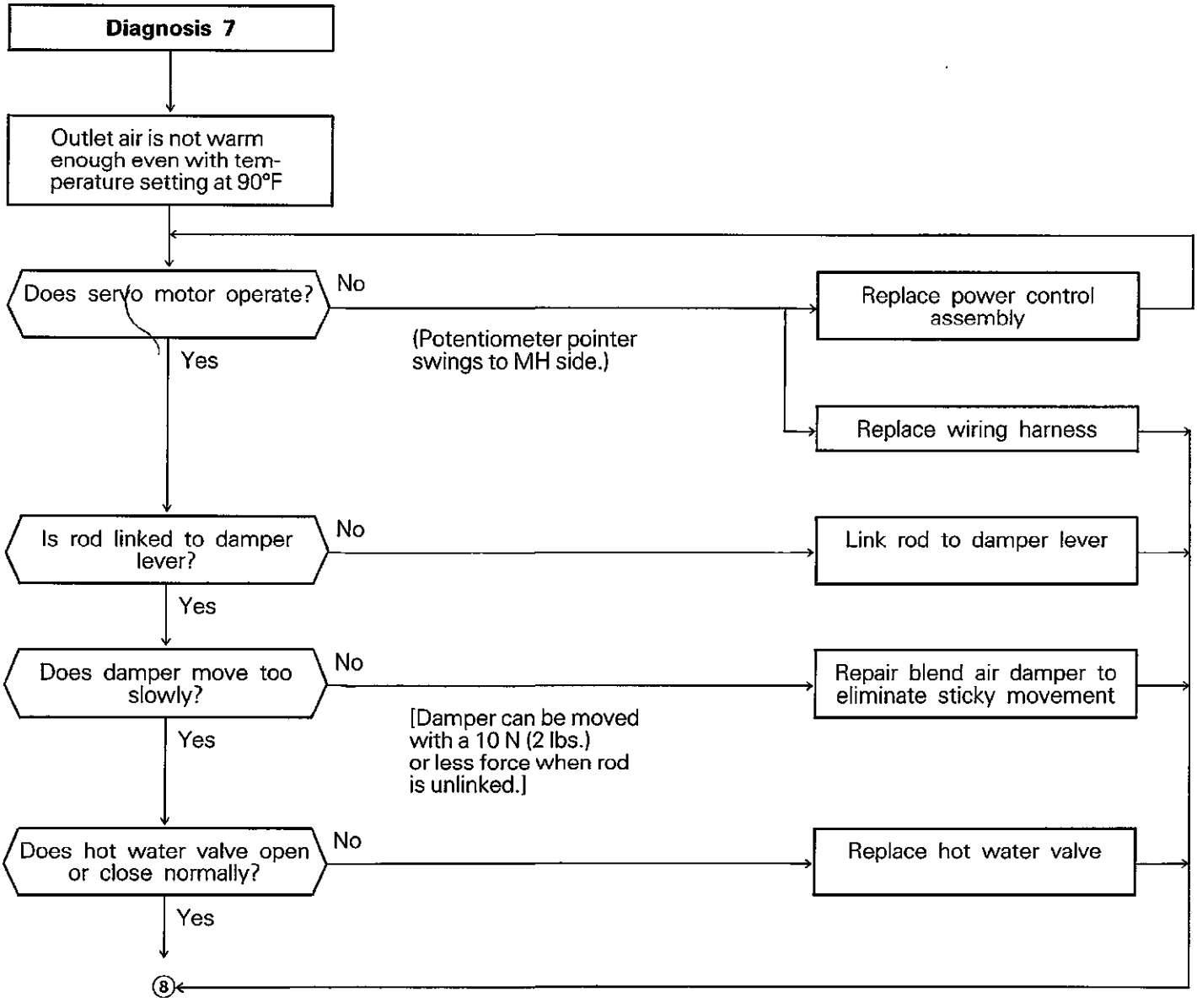


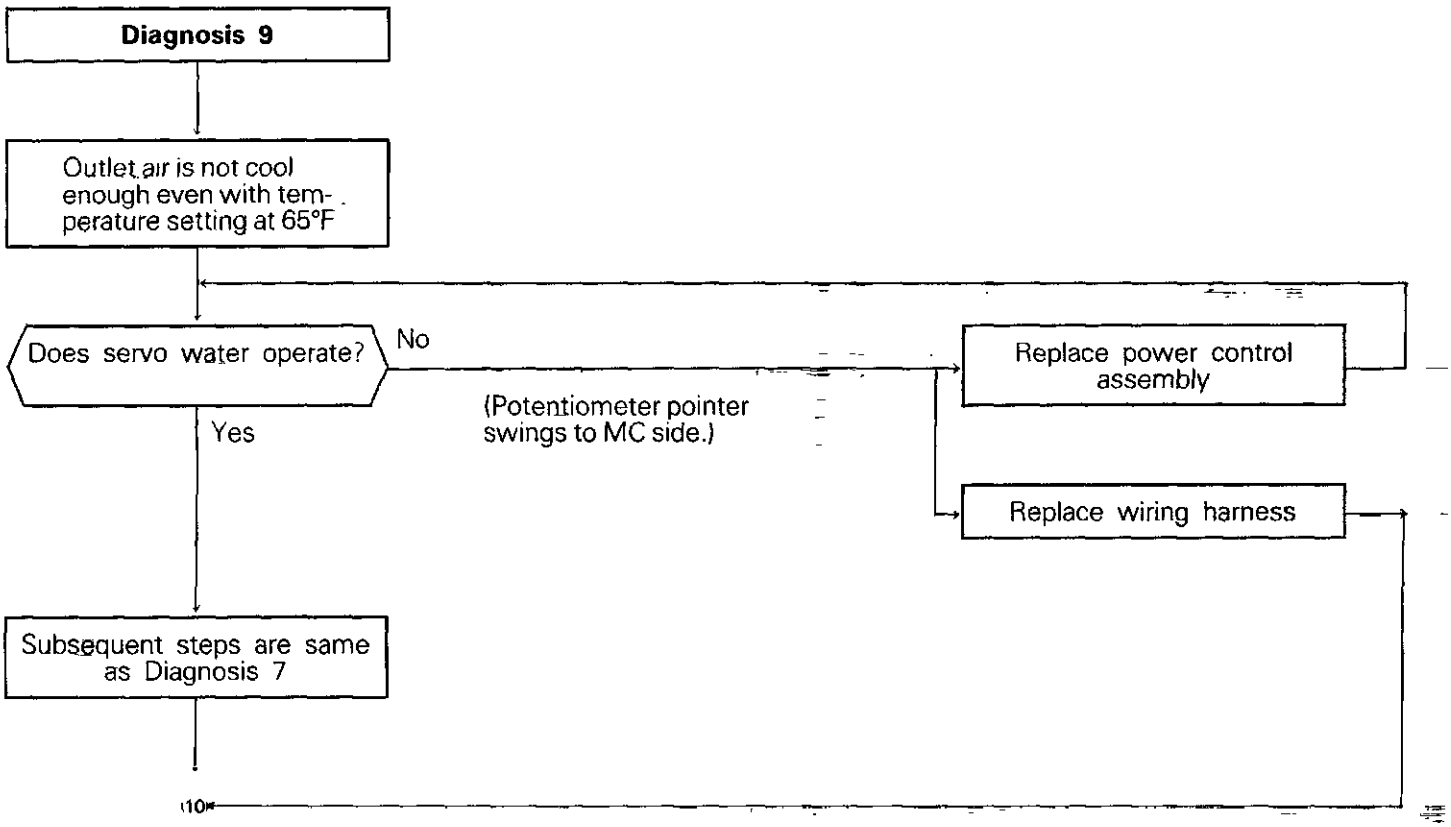

Continued from previous page
18
Does inside air sensor operate normally?
No
Go to Diagnosis 17 P.24-53
Yes
20
Does photo-sensor operate normally?
No
Go to Diagnosis 19 P.24-53
Yes
22
Does engine coolant temperature sensor operate normally?
No
Go to Diagnosis 21 P.24-54
Yes
24
Does set temperature remain in memory when ignition key is set to OFF and ON repeatedly?
No
Go to Diagnosis 23 P.24-55
Yes
END

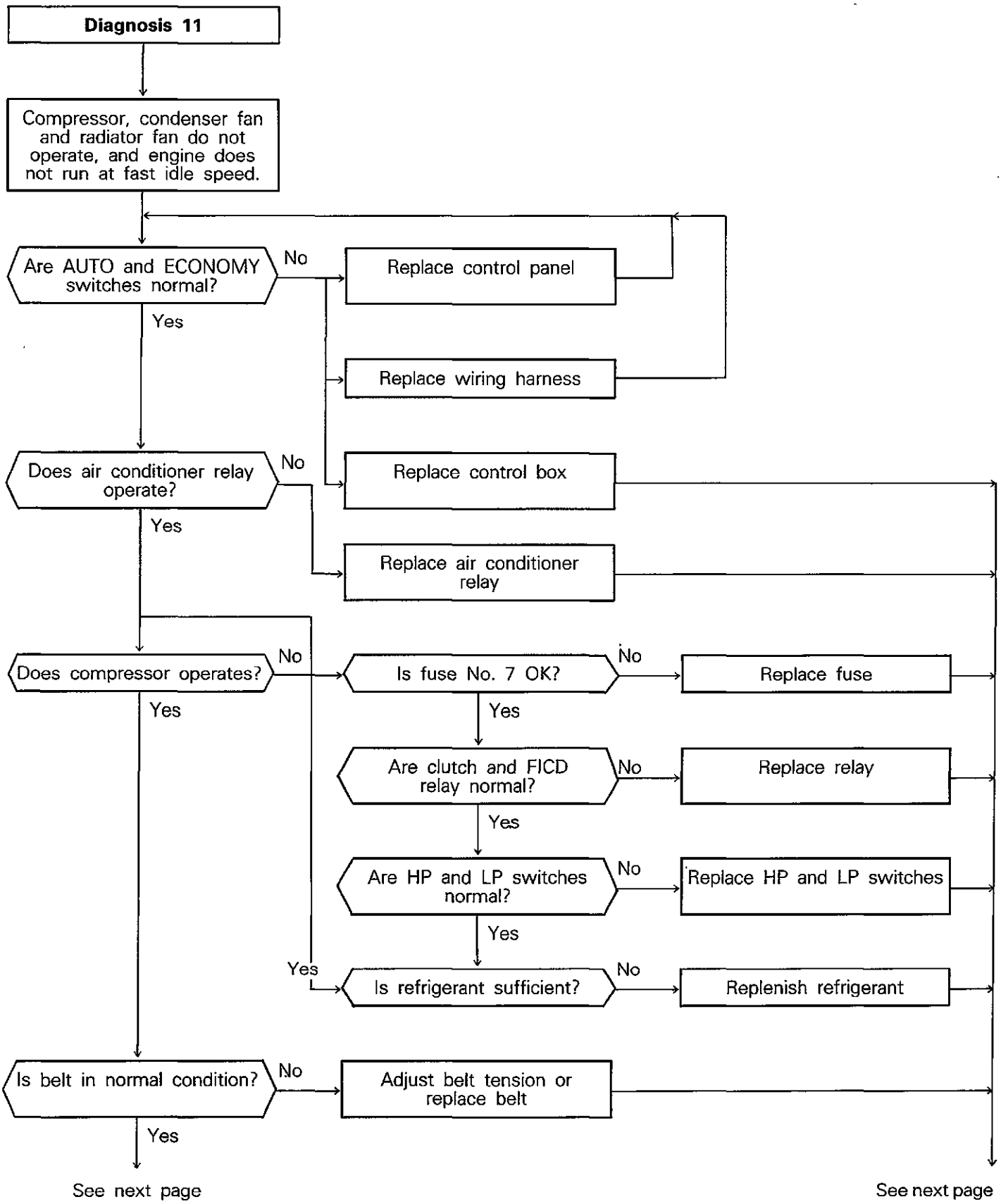

Diagnosis 1
AUTO lamp does not light even with ignition key in ON position
Do all other switch lamps light?
No
Is 10A fuse in fuse block normal?
No
Replace the fuse
Yes
Yes
Do self-diagnosis lamps flicker?
No
Replace control box
Yes
Replace AUTO lamp
Check wiring harness and replace if defective.
2

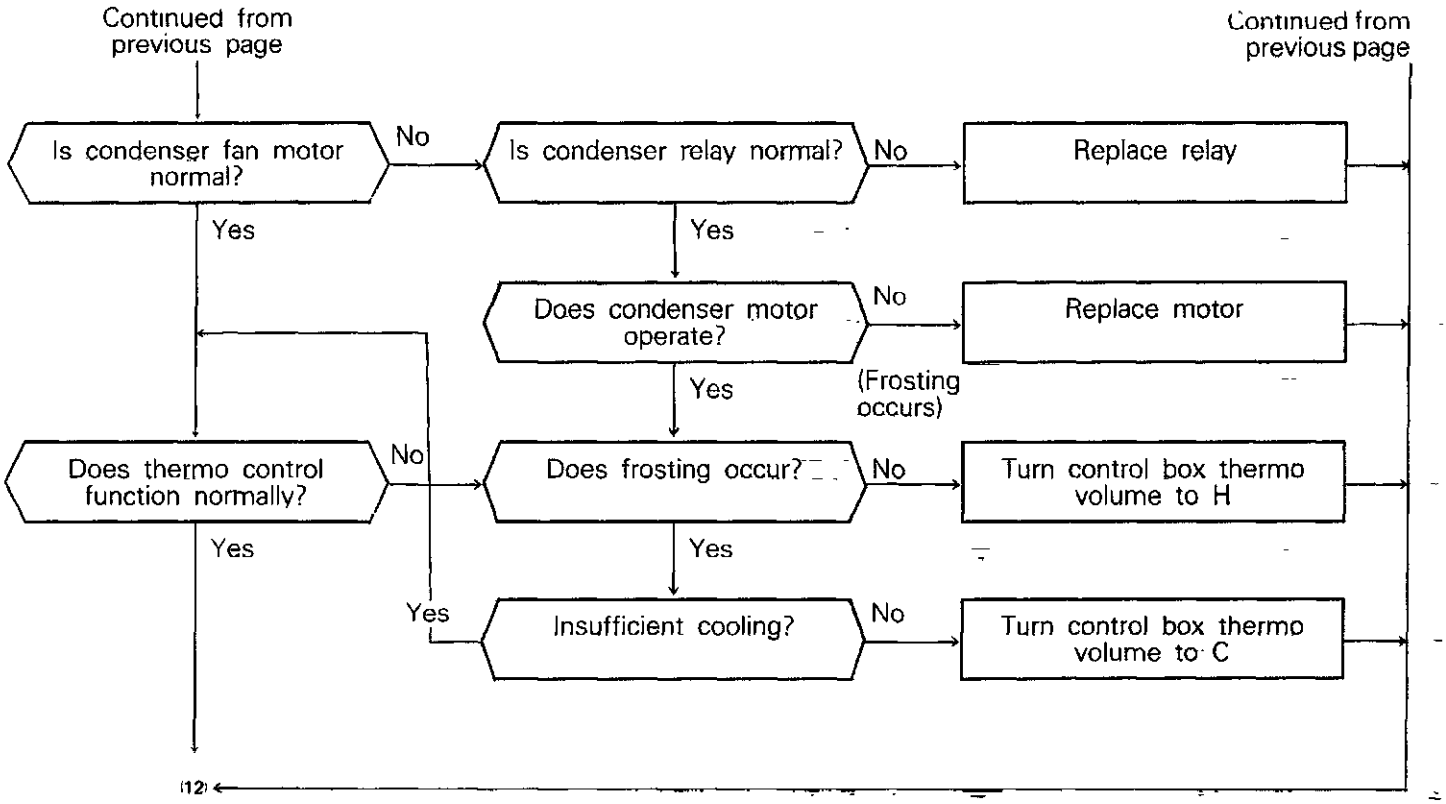

Diagnosis 3
Blower does not operate or operates incorrectly when switch is set to or position.
Does blower operate in both and positions?
No
Is 20A fuse in fuse block normal?
No
Replace the fuse
Yes
Yes
Does blower stop with blower switch in OFF position?
No
Is fan controller normal? (Thermo fuse)
No
Replace controller
Yes
Yes
Check wiring harness
Yes
Are self-diagnosis lamps normal?
No
Replace control panel
(All eight lamps flicker)
No
(No lamp flickers)
Replace control box
Blower H relay operates?
No
Replace relay
Yes
Replace wiring harness
④

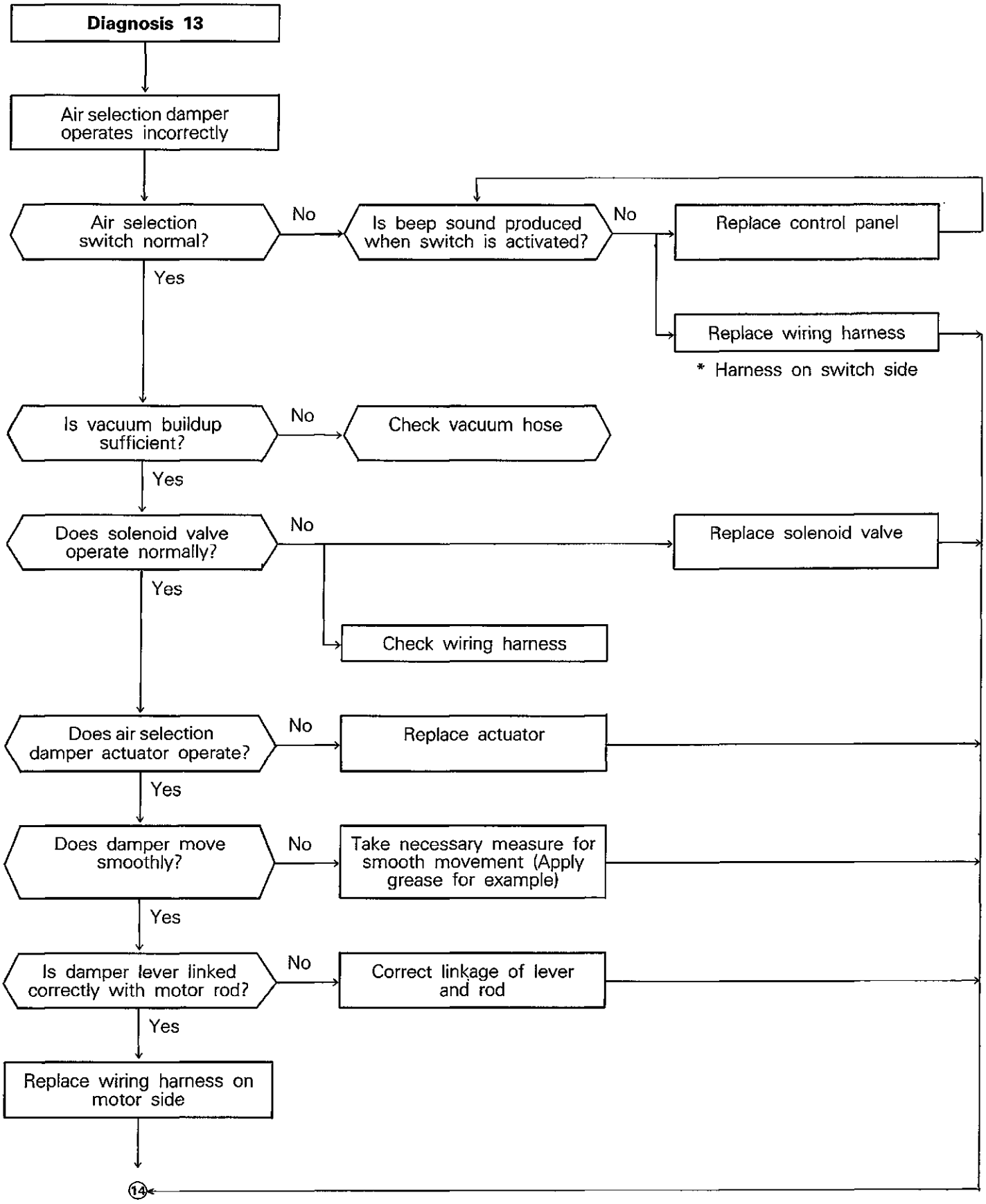

Diagnosis 5
Set temperature cannot be changed from 65 to 90°F
Is beep sound produced when UP side of temperature set switch is pressed?
No
[Beep sound stops when 32°C (90°F) is exceeded.]
Replace control panel
Yes
Is beep sound produced when DOWN side of temperature set switch is pressed?
No
[Beep sound stops if setting is changed to a temperature below 18°C (65°F).]
Replace control panel
Yes
Is digital display available?
No
(Lamp check is included.)
Replace control panel
Yes
Replace wiring harness
Replace control box
6

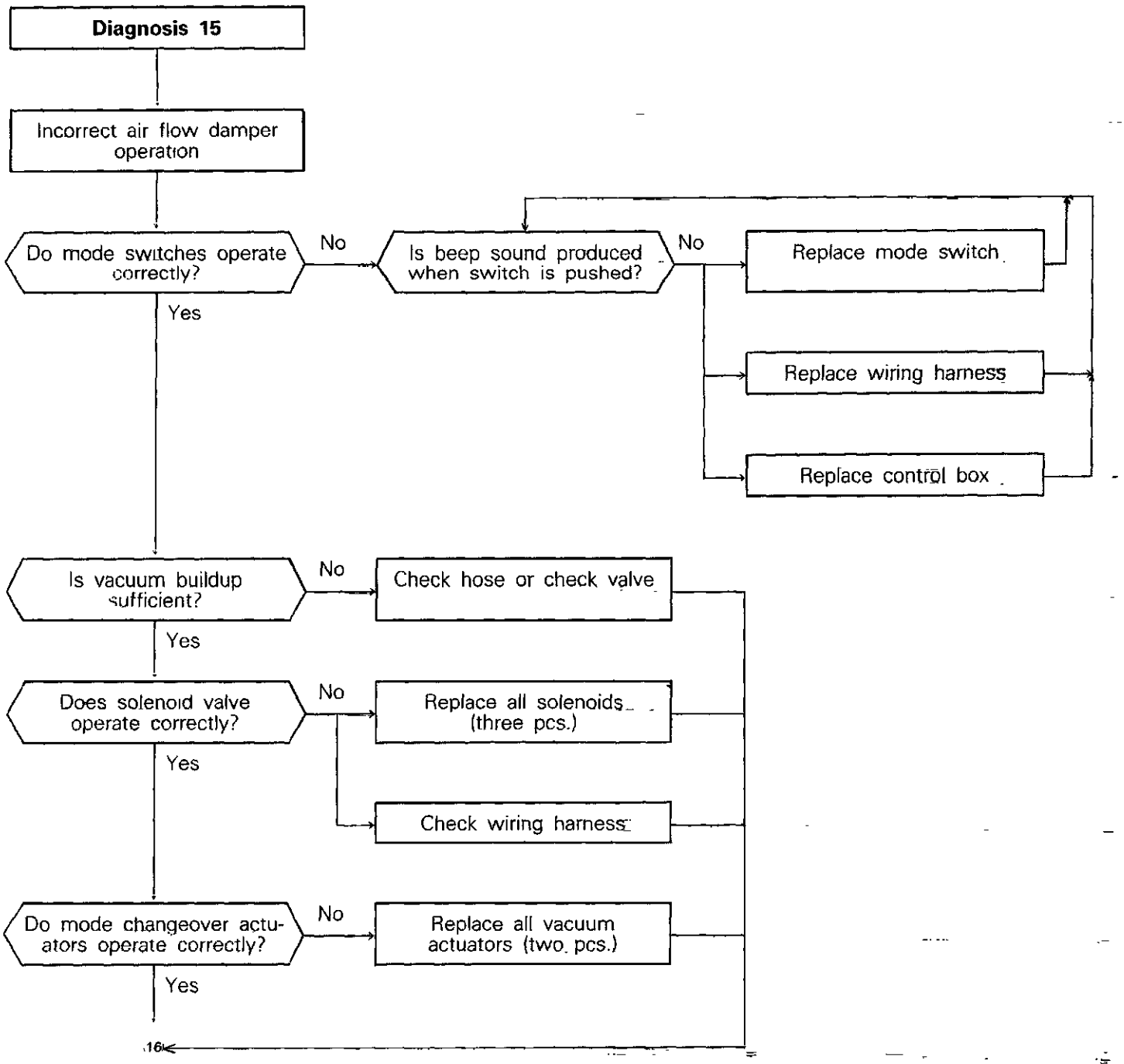

Diagnosis 7
Outlet air is not warm enough even with temperature setting at 90°F
Does servo motor operate?
No
(Potentiometer pointer swings to MH side.)
Replace power control assembly
Yes
Replace wiring harness
Is rod linked to damper lever?
No
Link rod to damper lever
Yes
Does damper move too slowly?
No
Repair blend air damper to eliminate sticky movement
[Damper can be moved with a 10 N (2 lbs.) or less force when rod is unlinked.]
Yes
Does hot water valve open or close normally?
No
Replace hot water valve
Yes
⑧

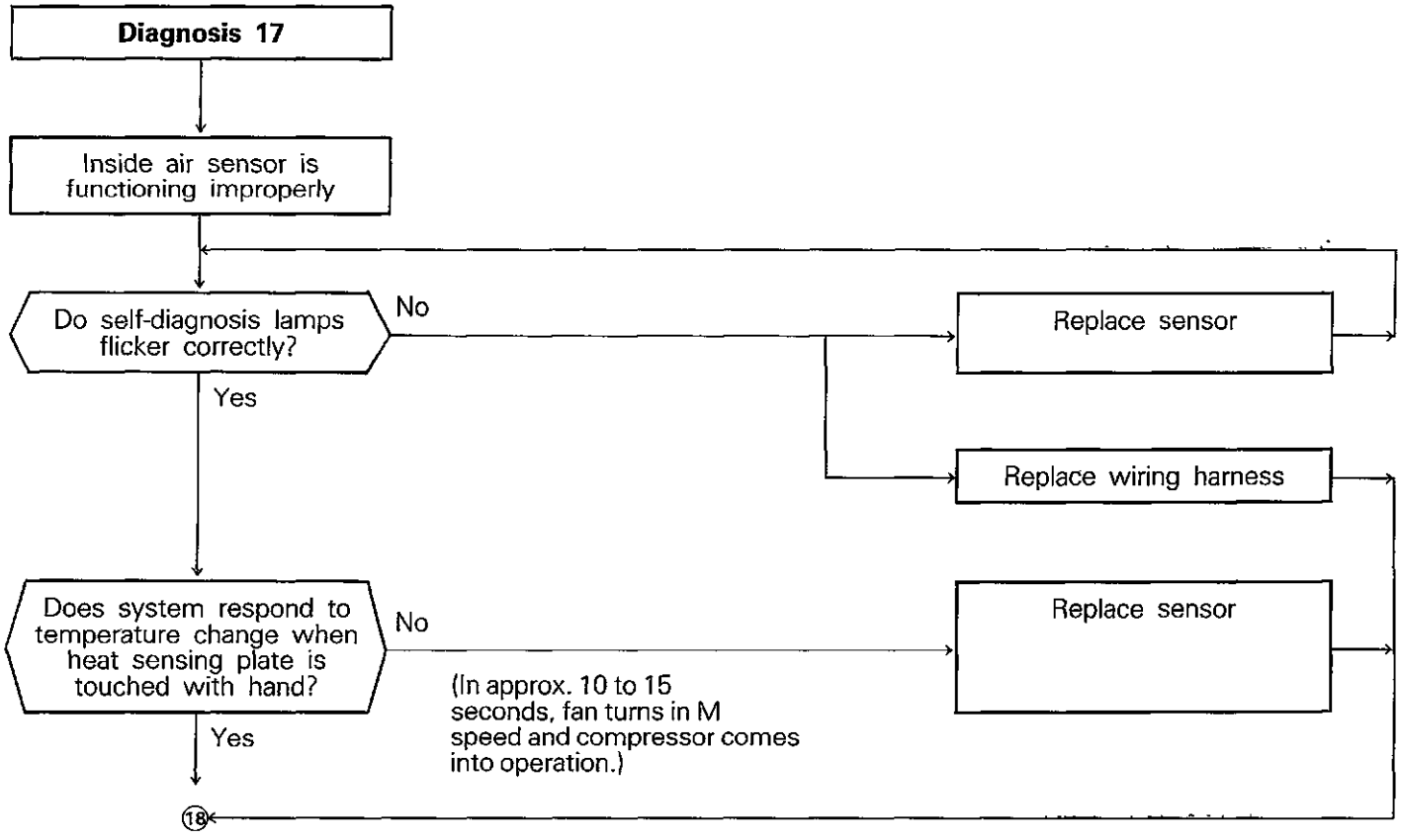

Diagnosis 9
Outlet air is not cool enough even with temperature setting at 65°F
Does servo water operate?
No
(Potentiometer pointer swings to MC side.)
Yes
Replace power control assembly
Replace wiring harness
Subsequent steps are same as Diagnosis 7
10

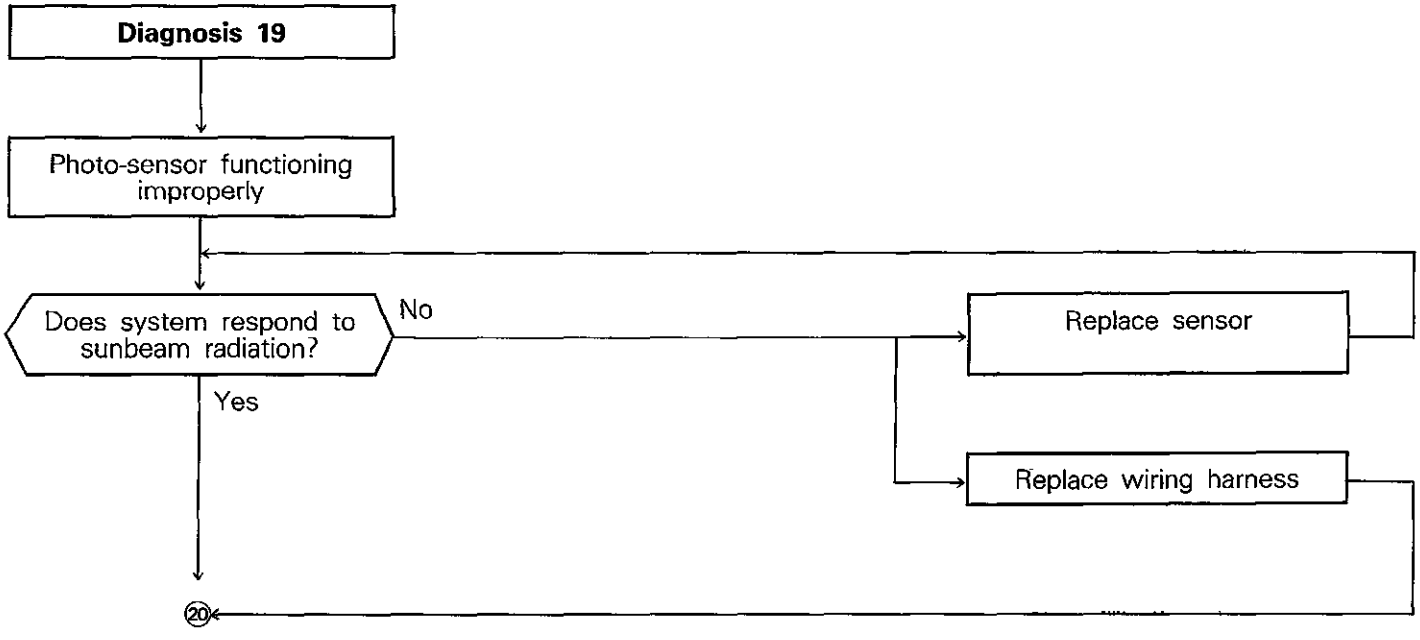

Diagnosis 11
Compressor, condenser fan and radiator fan do not operate, and engine does not run at fast idle speed.
Are AUTO and ECONOMY switches normal?
No
Replace control panel
Replace wiring harness
Yes
Does air conditioner relay operate?
No
Replace control box
Replace air conditioner relay
Yes
Does compressor operates?
No
Is fuse No. 7 OK?
No
Replace fuse
Yes
Yes
Are clutch and FICD relay normal?
No
Replace relay
Yes
Are HP and LP switches normal?
No
Replace HP and LP switches
Yes
Yes
Is refrigerant sufficient?
No
Replenish refrigerant
Is belt in normal condition?
No
Adjust belt tension or replace belt
Yes
See next page
See next page

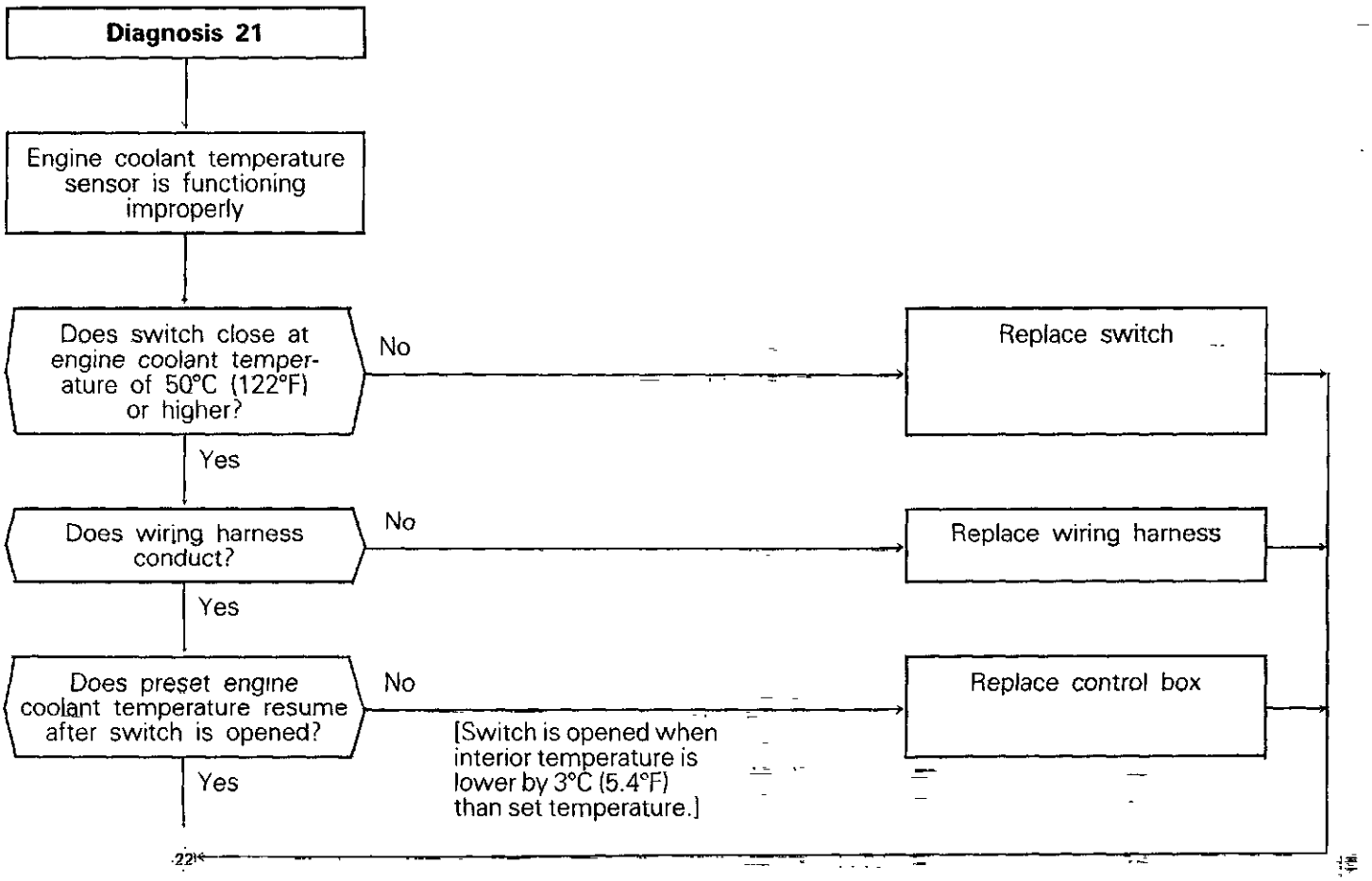

Continued from previous page
Is condenser fan motor normal?
No
Is condenser relay normal?
No
Replace relay
Yes
Yes
Does condenser motor operate?
No
Replace motor
Yes
(Frosting occurs)
Does thermo control function normally?
No
Does frosting occur?
No
Turn control box thermo volume to H
Yes
Yes
Yes
Insufficient cooling?
No
Turn control box thermo volume to C
Continued from previous page
(12)

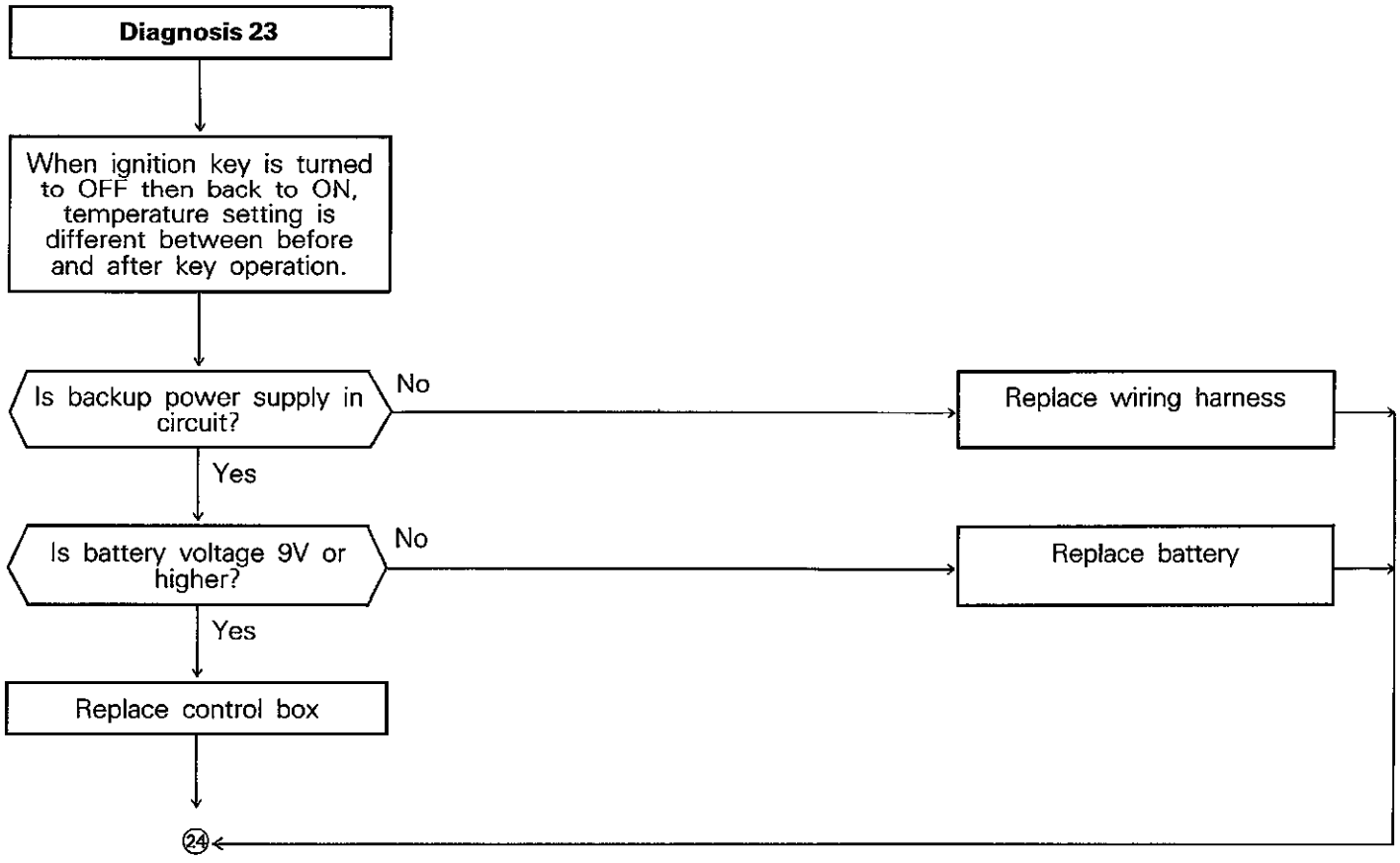

Diagnosis 13
Air selection damper operates incorrectly
Air selection switch normal?
No
Is beep sound produced when switch is activated?
No
Replace control panel
Replace wiring harness
* Harness on switch side
Yes
Is vacuum buildup sufficient?
No
Check vacuum hose
Yes
Does solenoid valve operate normally?
No
Replace solenoid valve
Check wiring harness
Yes
Does air selection damper actuator operate?
No
Replace actuator
Yes
Does damper move smoothly?
No
Take necessary measure for smooth movement (Apply grease for example)
Yes
Is damper lever linked correctly with motor rod?
No
Correct linkage of lever and rod
Yes
Replace wiring harness on motor side
14


Diagnosis 15
Incorrect air flow damper operation
Do mode switches operate correctly?
No
Is beep sound produced when switch is pushed?
No
Replace mode switch
Replace wiring harness
Replace control box
Yes
Is vacuum buildup sufficient?
No
Check hose or check valve
Yes
Does solenoid valve operate correctly?
No
Replace all solenoids (three pcs.)
Check wiring harness
Yes
Do mode changeover actuators operate correctly?
No
Replace all vacuum actuators (two pcs.)
Yes
16


Diagnosis 17
Inside air sensor is functioning improperly
Do self-diagnosis lamps flicker correctly?
No
Replace sensor
Yes
Replace wiring harness
Does system respond to temperature change when heat sensing plate is touched with hand?
No
Replace sensor
(In approx. 10 to 15 seconds, fan turns in M speed and compressor comes into operation.)
Yes
18


Diagnosis 19
Photo-sensor functioning improperly
Does system respond to sunbeam radiation?
No
Replace sensor
Yes
Replace wiring harness
20


Diagnosis 21
Engine coolant temperature sensor is functioning improperly
Does switch close at engine coolant temperature of 50°C (122°F) or higher?
No
Replace switch
Yes
Does wiring harness conduct?
No
Replace wiring harness
Yes
Does preset engine coolant temperature resume after switch is opened?
No
Replace control box
[Switch is opened when interior temperature is lower by 3°C (5.4°F) than set temperature.]
Yes
22


Diagnosis 23
When ignition key is turned to OFF then back to ON, temperature setting is different between before and after key operation.
Is backup power supply in circuit?
No
Replace wiring harness
Yes
Is battery voltage 9V or higher?
No
Replace battery
Yes
Replace control box
24

TROUBLESHOOTING TABLE

Check item (Symptom)		Fuse	Harness	Lamp bulb	Damper control motor & link	Water valve	Magnetic clutch	Power relays	Sensor switches	Blower motor	Pusher fan motor	Control unit (diagnosis output)	Vacuum system (VSV, hose, check valve)
1	"AUTO" lamp does not illuminate when ignition switch is turned to "ON" position	(1)	(4)	(3)								(2)	
2	Inside temperature does not rise (no hot air)		(5)		(3)	(4)			(2)			(1)	
3	Inside temperature does not drop (no cool air)		(5)		(3)	(4)	(7)	(6)	(2)			(1)	
4	Blower does not run	(1)	(6)					(5)	(4)	(3)		(2)	
5	Blower does not stop		(4)					(3)	(2)			(1)	
6	Air inlet switching damper does not operate		(4)						(3)			(1)	(2)
7	Air outlet switching damper does not operate		(4)						(3)			(1)	(2)
8	Pusher fan does not operate when air conditioner is operating		(4)					(1)	(2)		(3)		
9	Temperature setting changes when ignition switch is turned to "OFF" position and then back to "ON" position		(2)									(1)	

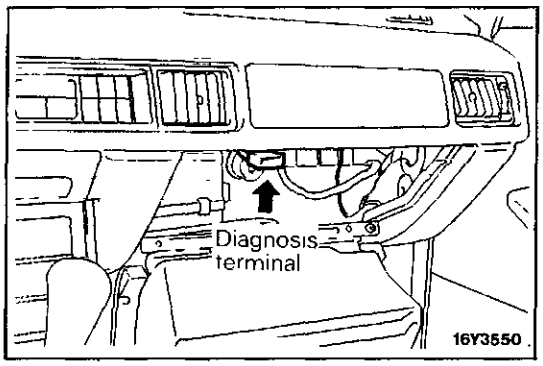
NOTE
1. ○ indicates items requiring check (number in circle indicates check order).
2. Use self-diagnosis and measure terminal voltage for control unit check.

Symptom	Probable cause	Remedy
1. "AUTO" lamp does not illuminate when ignition switch is turned to "ON" position	Open No. 12 fuse	Replace fuse
	Faulty control unit	Check diagnosis output
	Faulty full auto air conditioner panel assembly	Replace full auto air conditioner panel assembly
	Burnt-out "AUTO" indicator bulb	Replace "AUTO" lamp bulb
	Open harness between full auto air conditioner panel assembly and control unit	Correct harness
2. Inside temperature does not rise (no hot air)	Faulty control unit	Check diagnosis output
	Faulty interior temperature sensor input circuit	
	Faulty foot area temperature sensor input circuit	
	Faulty thermistor input circuit	
	Faulty blend air damper potentiometer input circuit	
	Faulty blend air damper control motor	Replace blend air damper control motor
	Inadequate connection between blend air damper control motor lever and blend air damper	Correct connection
	Seized blend air damper	Correct blend air damper
	Water valve failure	Replace water valve
	Open harness between blend air damper control motor and control unit	Correct harness
3. Inside temperature does not drop (no cool air)	Faulty control unit	Check diagnosis output
	Faulty upper interior temperature sensor input circuit	
	Faulty lower interior temperature sensor input circuit	
	Faulty thermistor input circuit	
	Faulty blend air damper potentiometer input circuit	
	Faulty blend air damper control motor	Replace blend air damper control motor
	Inadequate connection between blend air damper control motor lever and blend air damper	Correct connection
	Seized blend air damper	Correct blend air damper

NOTE
When engine coolant temperature is below 50°C (122°F), blower speed is held at LOW.

Symptom	Probable cause	Remedy
3. Inside temperature does not drop (no cool air)	Water valve failure	Replace water valve
	Open harness between blend air damper control motor and control unit	Correct harness
	Faulty power relay (for compressor)	Replace power relay
	Faulty magnet clutch	Check or replace magnet clutch
	Refrigerant leaks	Replenish refrigerant
4. Blower does not run	Open fuse No. 5	Replace fuse
	Faulty control unit	Check diagnosis output
	Faulty blower motor	Replace blower motor
	Blown temperature fuse in power transistor or poor grounding	Replace temperature fuse or correct grounding
	Faulty power relay (for starter cut)	Replace power relay (for starter cut)
	Open harness between fuse and power relay (for starter cut)	Correct harness
	Open harness between power relay (for starter cut) and blower motor	
	Open harness between power transistor and control unit	
5. Blower does not stop	Faulty control unit	Check diagnosis output
	Faulty blower switch (OFF SW)	Replace full auto air conditioner panel assembly
	Faulty power relay (for high speed)	Replace power relay
	Shorted harness between blower switch and control unit	Correct harness
	Shorted harness between power relay (for high speed) and power transistor and control unit	
6. Air inlet switching damper does not operate	Faulty control unit	Check diagnosis output
	Defective vacuum solenoid valve	Replace vacuum solenoid valve
	Defective or disconnected vacuum hose	Check or replace vacuum hose
	Defective vacuum system including vacuum tank	Check or replace vacuum system
	Faulty full auto air conditioner switch (inside/outside air switching)	Replace full auto air conditioner panel assembly
	Faulty air inlet switching control vacuum actuator	Replace air inlet switching control vacuum actuator
	Air inlet switching damper failure	Correct air inlet switching damper

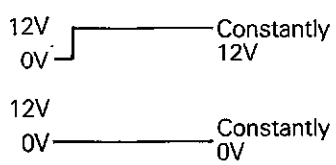
Symptom	Probable cause	Remedy
6. Air inlet switching damper does not operate	Open harness between full auto air conditioner panel assembly and control unit	Correct harness
	Open harness between air inlet switching vacuum solenoid valve and control unit	Correct harness
7. Air outlet switching damper does not operate	Faulty control unit	Check diagnosis output
	Defective vacuum solenoid valve	Replace vacuum solenoid valve
	Defective or disconnected vacuum hose	Check or replace vacuum hose
	Defective vacuum system including vacuum tank	Check or replace vacuum system
	Faulty full auto air conditioner switch (mode selection)	Replace full auto air conditioner panel assembly
	Faulty air outlet switching control vacuum actuator	Replace air outlet switching control vacuum actuator
	Inadequate engagement between cam and damper link or incorrect adjustment	Correct engagement or adjust
	FACE/DEF or FACE/FOOT damper failure	Correct FACE/DEF or FACE/FOOT damper
	Open harness between full auto air conditioner panel assembly and control unit	Correct harness
	Open harness between air outlet switching vacuum solenoid valve and control unit	
8. Pusher fan does not operate when air conditioner is operating	Faulty power relay (for pusher fan)	Replace power relay
	Faulty thermo sensor No. 2 (vehicles with an intercooler)	Check or replace thermo sensor
	Faulty pusher fan motor	Check or replace fan motor
	Faulty pressure switch (vehicles with an intercooler)	Check or replace pressure switch
9. Temperature setting changes when ignition switch is turned to "OFF" position and back to "ON" position	Faulty control unit	Check diagnosis output
	Insufficient battery charge or faulty battery	Recharge, adjust specific gravity or replace battery
	Open harness between ignition switch and control unit	Correct harness



SELF-DIAGNOSIS

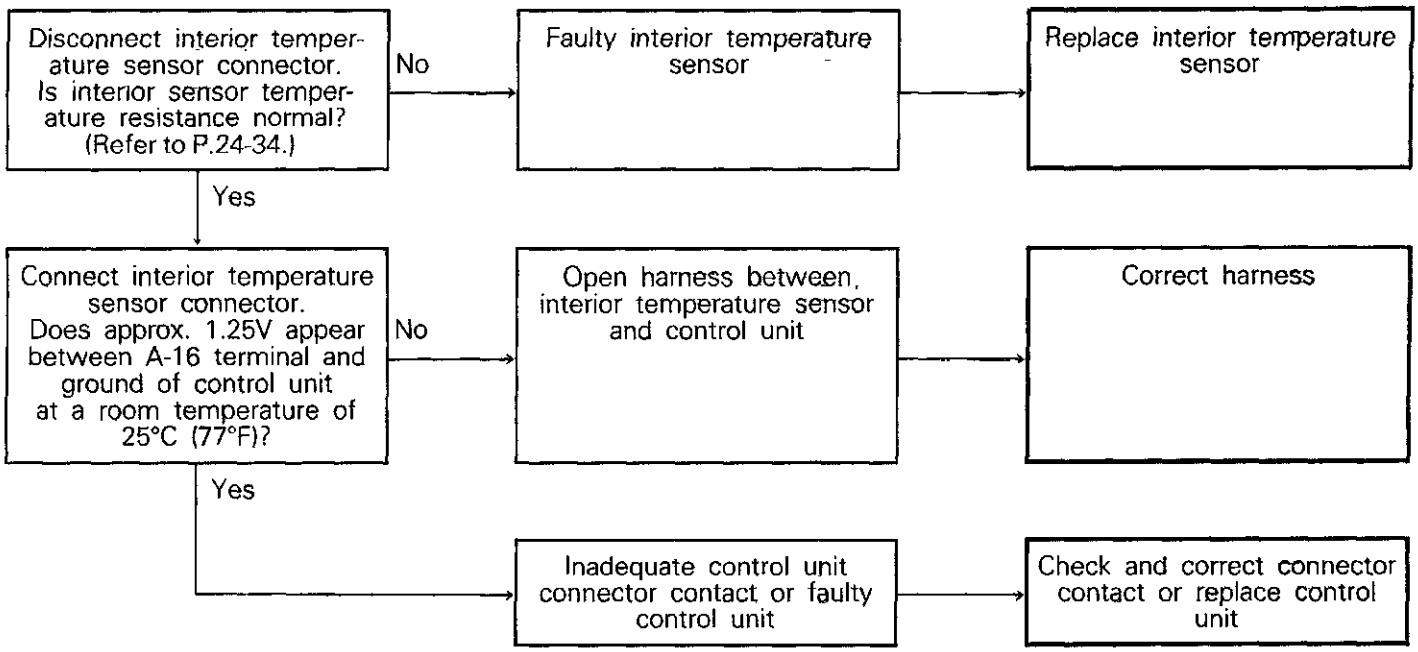
The self-diagnostic function provides indication of abnormal conditions with microcomputer, sensors and potentiometer wiring (broken wire, short circuit, etc.) and also an automatic control function by which a failure is compensated for by substitution of value to minimize the trouble resulting from the failure.

SELF-DIAGNOSIS INDICATIONS

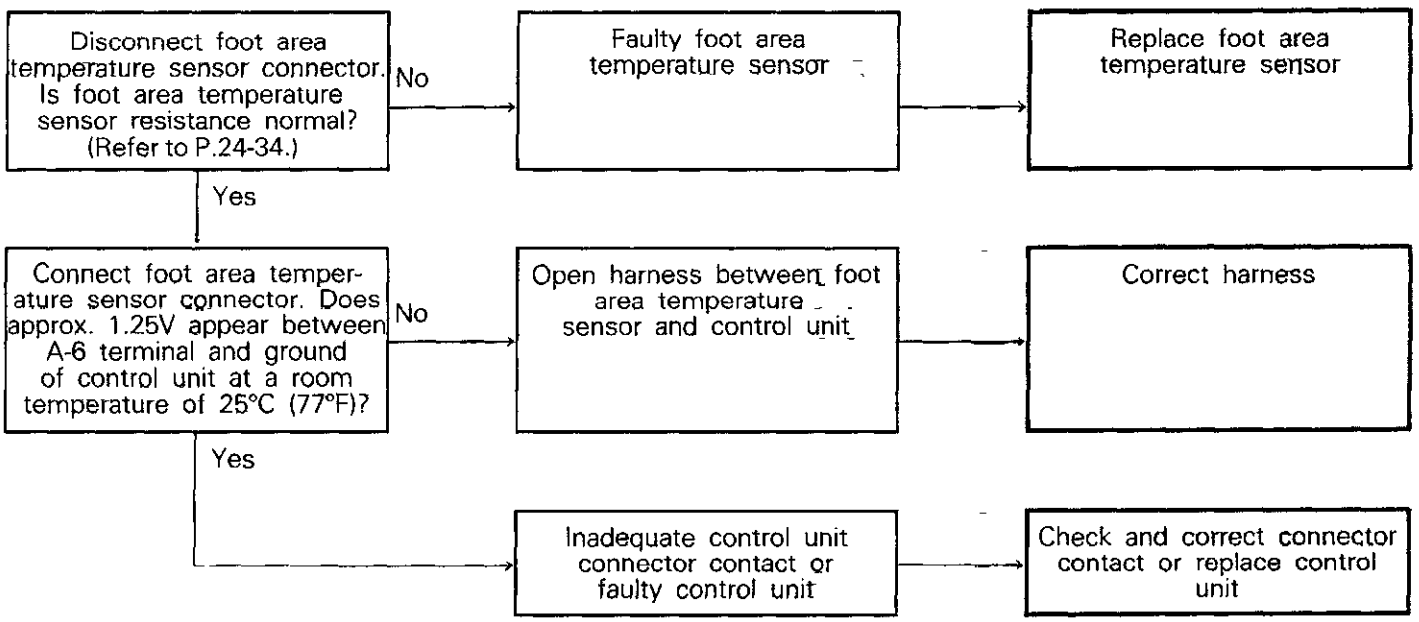
Code No.	Diagnosis display pattern	Malfunction (A/C condition)	Probable cause	Failsafe
0		Normal	–	–
2		Open or shorted interior temperature sensor circuit or faulty upper in-car sensor	• Disconnected interior temperature sensor connector • Open or shorted internal wiring of interior temperature sensor • Open or shorted harness in interior temperature sensor circuit or disconnected connector	Set interior temperature sensor input signal at 25°C (77°F)
3		Open or shorted foot area temperature sensor circuit or faulty foot area temperature sensor	• Disconnected foot area temperature sensor connector • Open or shorted internal wiring of foot area temperature sensor • Open or shorted harness in foot area temperature sensor circuit or disconnected connector	Set foot area temperature sensor input signal at 25°C (77°F)
4		Open or shorted wiring of thermistor circuit or faulty thermistor	• Disconnected thermistor connector • Open or shorted internal wiring of thermistor • Open or shorted harness in thermistor circuit or disconnected connector	Set thermistor input signal at 1°C (33.8°F) and turn off compressor
6		Open or shorted blend air damper potentiometer circuit or faulty blend air damper potentiometer	• Disconnected blend air damper potentiometer connector • Open or shorted internal wiring of blend air damper potentiometer • Open or shorted harness in blend air damper potentiometer circuit or disconnected connector	Set blend air damper at MAX HOT position
–		Internal failure of control unit	• Replace control unit	–

NOTE
1. Code Nos. 1, 5, 7 and 8 are intentionally omitted.
2. If two or more troubles are caused at the same time, one with the largest code No. is displayed.
3. The contents of troubles are stored until the ignition switch is turned off.

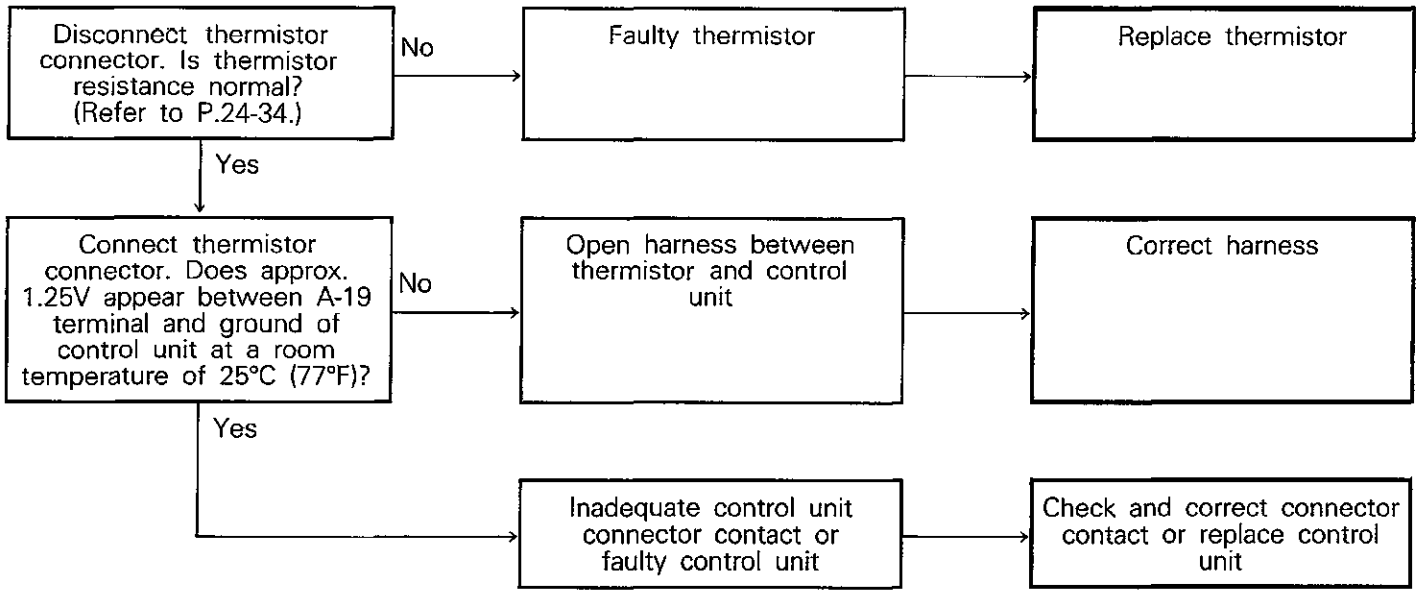
DIAGNOSIS DISPLAY PATTERN 2



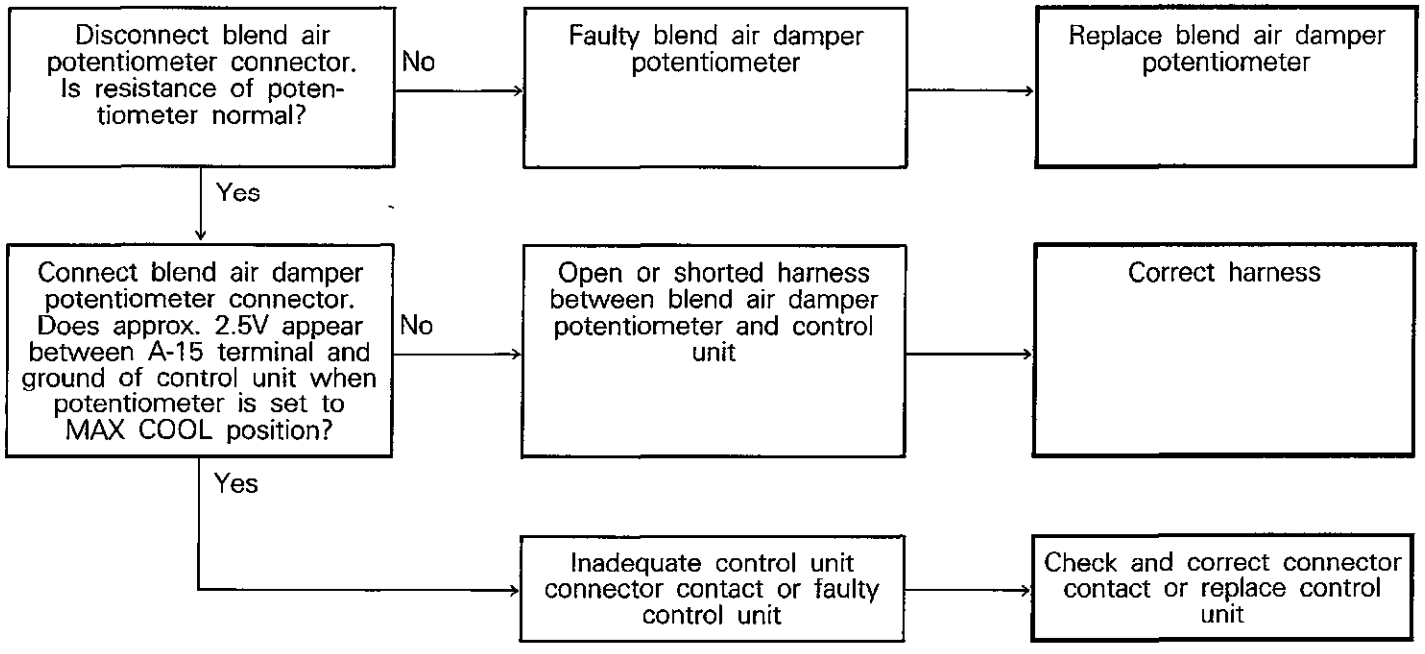
DIAGNOSIS DISPLAY PATTERN 3



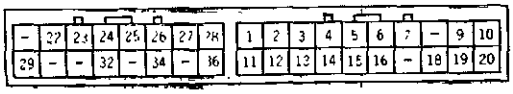
DIAGNOSIS DISPLAY PATTERN 4



DIAGNOSIS DISPLAY PATTERN 5



Arrangement of control unit terminals



20Y1597

CONTROL UNIT TERMINAL VOLTAGE TABLE

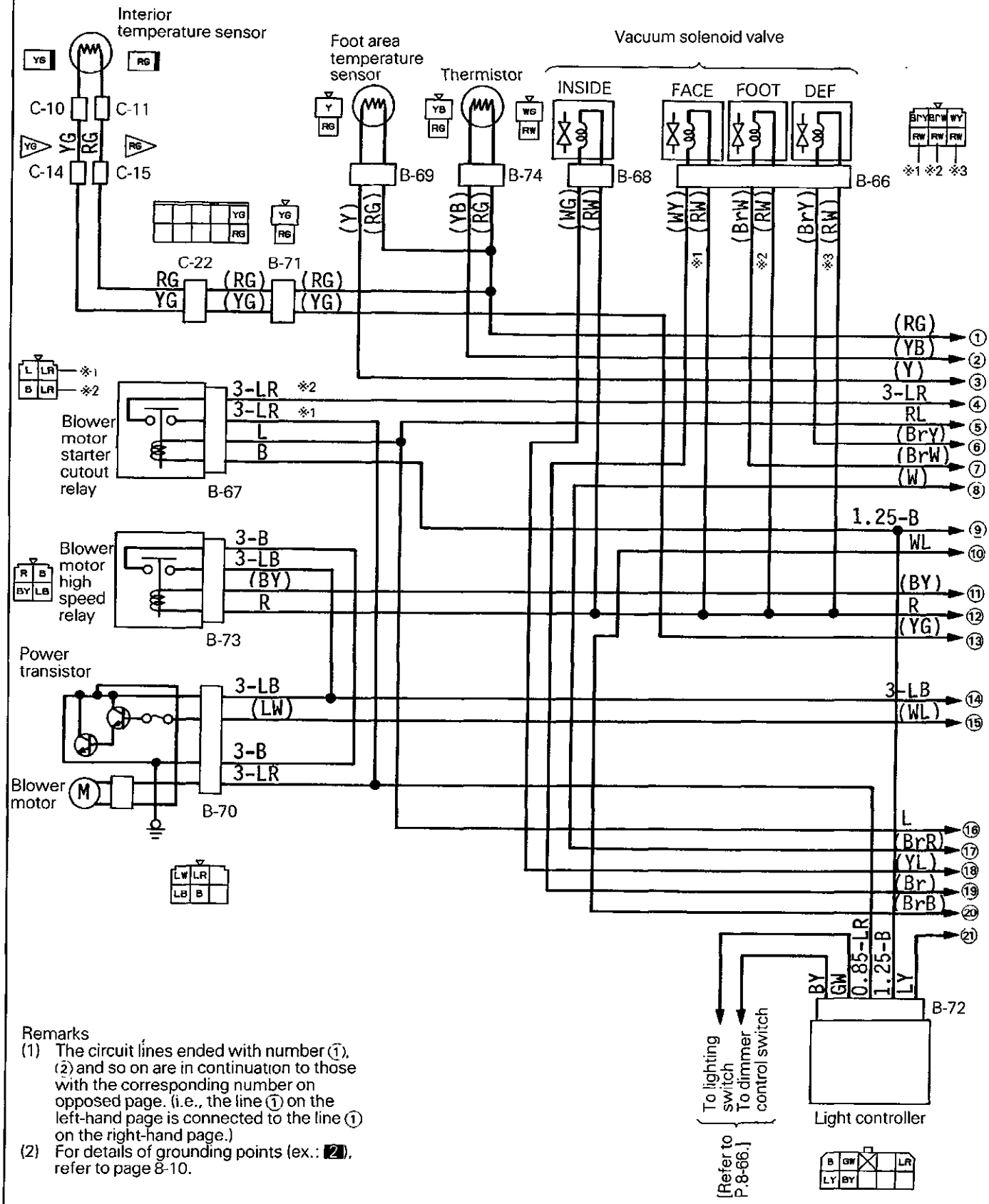
PRECAUTIONS ON TERMINAL VOLTAGE CHECKING

1. Before disconnecting or reconnecting the control unit connector, be sure to disconnect the battery terminals.
2. Measure the terminal voltage between each terminal and ground (body) or B terminal with the control unit connector connected.
   When measuring the terminal voltage, be sure to observe the following.
   (1) Make sure that the tester is set in the voltage (V) range.
   (2) Do not accidentally short the terminal to be measured with other terminals.
   Use of a tester in resistance (ohm) range or shorting between terminals could cause damage to electronic parts in the control unit.
3. Make sure that the connectors are connected securely. Pay particular attention to the controller assembly (including the panel) connector connections.

Pin No.	Signal name	Condition	Nominal value
1	IG power supply	When ignition key is at ON position	Approx. 12V
		When ignition key is at other position than ON	0V
2	Ground	–	0V
3	Battery power	When battery is connected	Approx. 12V
		When battery is not connected	0V
4	Photo-sensor (input)	When illumination is 5,000 lux	(Approx. –0.1V)
		When illumination is 10,000 lux	(Approx. –0.25V)
		When harness is open	(0V)
5	Photo-sensor (ground)	–	0V
6	Foot area temperature sensor	When room temperature is 25°C (77°F)	Approx. 1.25V
		When harness is open	0V
7	Blend air damper control potentiometer	At MAX COOL	Approx. 0.2V
		At MAX HOT	Approx. 2.3V
9	Blend air damper control potentiometer	–	0V
10	Control panel display power (from light controller)	When lighting switch is OFF	Approx. 12V
		When lighting switch is ON	Voltage changes with dimmer control setting
11	IG power supply	When ignition key is at ON position	Approx. 12V
		When ignition key is at other position than ON	0V
12	Ground	–	0V
13	Actuator power (power relay for high speed vacuum solenoid valve)	–	Approx. 12V
14	Control panel display power (from light controller)	When lighting switch is OFF	Approx. 12V
		When lighting switch is ON	Voltage changes with dimmer control setting
15	Sensor power	–	Approx. 2.5V
16	Interior temperature sensor	When room temperature is 25°C (77°F)	Approx. 1.25V
		When harness is open	0V

Pin No.	Signal name	Condition	Nominal value
18	Diagnosis output	–	–
19	Thermistor	When room temperature is 25°C (77°F)	Approx. 1.25V
		When harness is open	0V
20	Power transistor (base)	When blower is rotating	0 to 5V
22	Blower motor	When switch HI is ON	Approx. 0 to 1V
		When switch LO is ON	Approx. 6V
		When switch is OFF	Approx. 12V
23	Engine coolant temperature sensor	When engine coolant temperature sensor is ON	Approx. 0.2 to 0.8V
		When engine coolant temperature sensor is OFF	Approx. 12V
24	Blend air damper control motor	When motor (reverse) is ON	Approx. 12V
		When motor is OFF	0V
25	Inside/outside air switching vacuum solenoid valve	When ON (inside air)	Approx. 0.2 to 0.8V
		When OFF (outside air)	Approx. 12V
26	Air outlet mode selection vacuum solenoid valve	When ON (in FACE mode)	Approx. 0.2 to 0.8V
		When OFF (other than above)	Approx. 12V
27	Air outlet mode selection vacuum solenoid valve	When ON (in FOOT or DEF mode)	Approx. 0.2 to 0.8V
		When OFF (other than above)	Approx. 12V
28	Air outlet mode selection vacuum solenoid valve	When ON (in DEF or DEF/FACE mode)	Approx. 0.2 to 0.8V
		When OFF (other than above)	Approx. 12V
29	Ground	–	0V
32	Blend air damper control motor	When motor (forward) is ON	Approx. 12V
		When motor is OFF	0V
34	Power relay (for high speed)	When blower speed is HI	Approx. 0.2 to 0.8V
		When blower speed is other than HI	Approx. 12V
36	A/C output	When A/C is ON	Approx. 12V

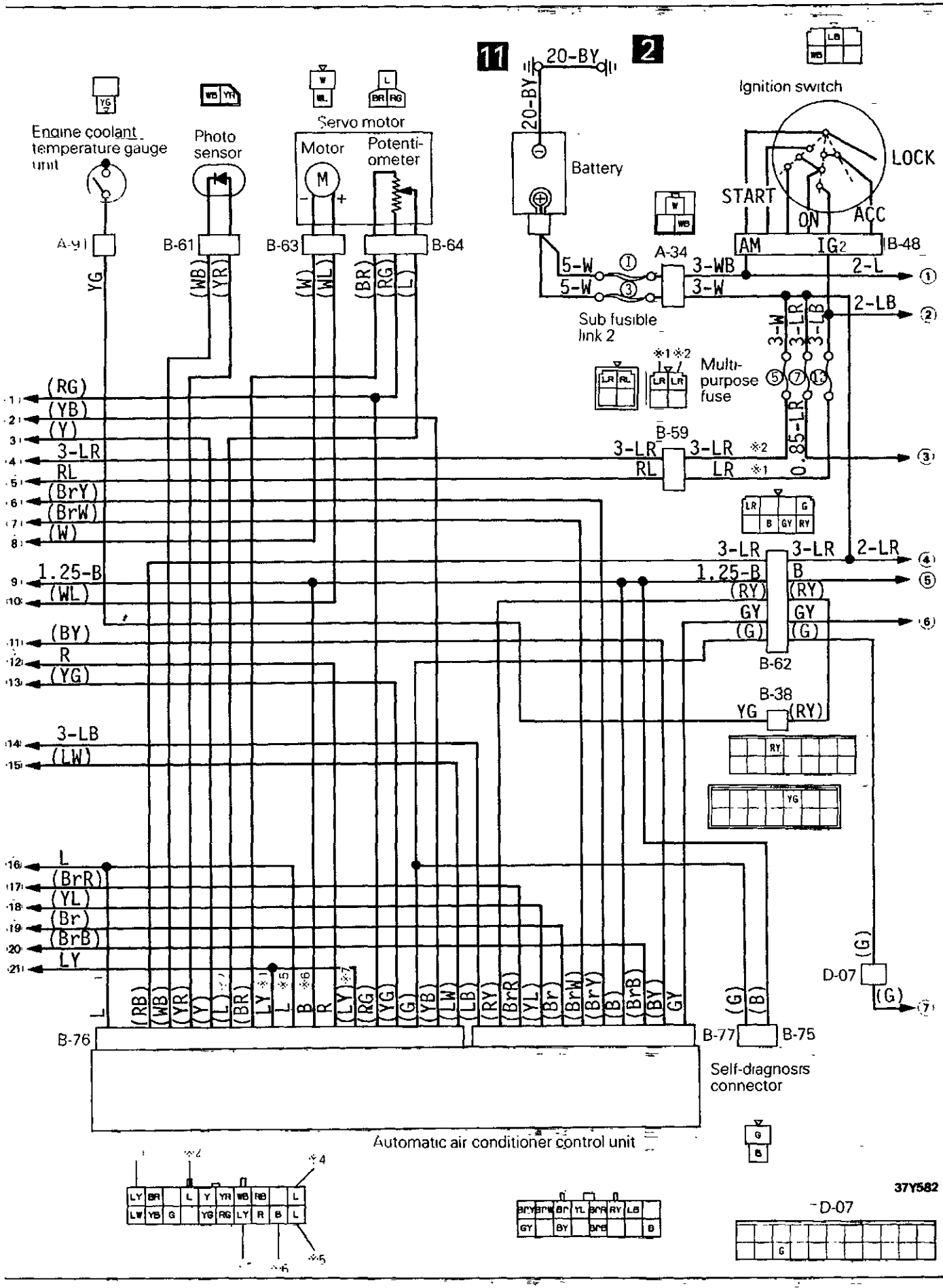
CIRCUIT DIAGRAMS

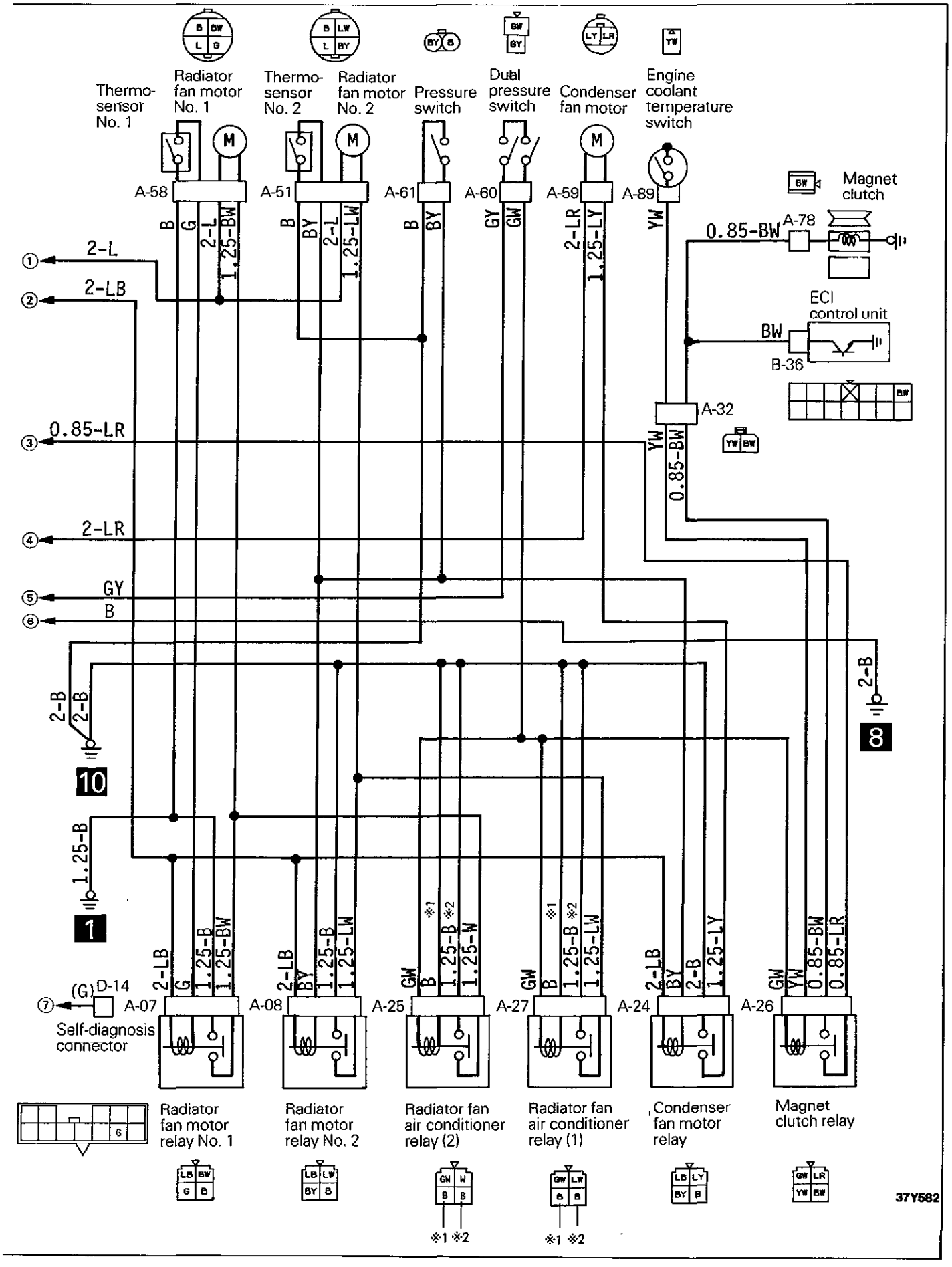


Remarks
(1) The circuit lines ended with number ①, ② and so on are in continuation to those with the corresponding number on opposed page. (i.e., the line ① on the left-hand page is connected to the line ① on the right-hand page.)
(2) For details of grounding points (ex.: 2), refer to page 8-10.

Wire color code

B: Black	Br: Brown	G: Green	Gr: Gray	L: Blue	Lg: Light green
Ll: Light blue	O: Orange	P: Pink	R: Red	Y: Yellow	W: White

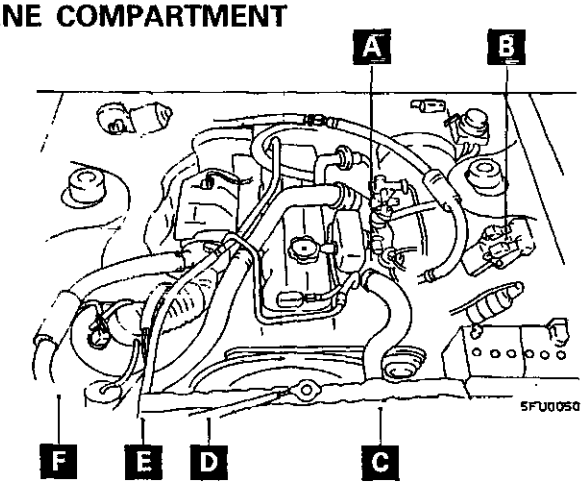

11
2
20-BY
Battery
Ignition switch
LOCK
START
ON
ACC
AM
IG2
B-48
A-34
5-W
3-WB
3-W
2-L
2-LB
Sub fusible link 2
Multi-purpose fuse
3-LR
3-LB
0.85-LR
B-59
RL
LR
B-62
B-38
YG
(RY)
Engine coolant temperature gauge unit
Photo sensor
Servo motor
Motor
Potenti-ometer
A-9
B-61
B-63
B-64
YG
(WB)
(YR)
(W)
(WL)
(BR)
(RG)
(L)
(RG)
(YB)
(Y)
3-LR
RL
(BrY)
(BrW)
(W)
1.25-B
(WL)
(BY)
R
(YG)
3-LB
(LW)
L
(BrR)
(YL)
(Br)
(BrB)
LY
B-76
B-77
B-75
D-07
(G)
(B)
Self-diagnosrs connector
Automatic air conditioner control unit
37Y582

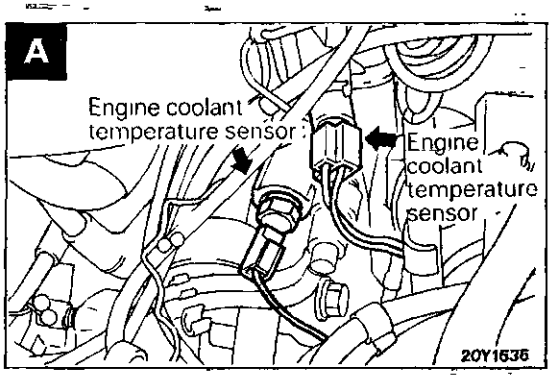

Thermo-sensor No. 1
Radiator fan motor No. 1
Thermo-sensor No. 2
Radiator fan motor No. 2
Pressure switch
Dual pressure switch
Condenser fan motor
Engine coolant temperature switch
A-58
A-51
A-61
A-60
A-59
A-89
Magnet clutch
A-78
0.85-BW
ECI control unit
BW
B-36
A-32
2-L
2-LB
0.85-LR
2-LR
GY
B
2-B
10
8
1.25-B
1
(G) D-14
A-07
A-08
A-25
A-27
A-24
A-26
Self-diagnosis connector
Radiator fan motor relay No. 1
Radiator fan motor relay No. 2
Radiator fan air conditioner relay (2)
Radiator fan air conditioner relay (1)
Condenser fan motor relay
Magnet clutch relay
※1 ※2
37Y582

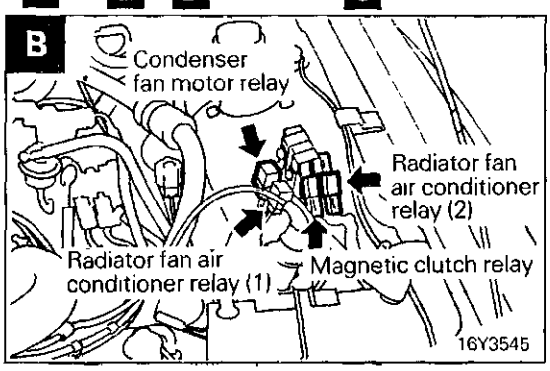
AUTOMATIC AIR CONDITIONING SYSTEM CONTROL PARTS LAYOUT

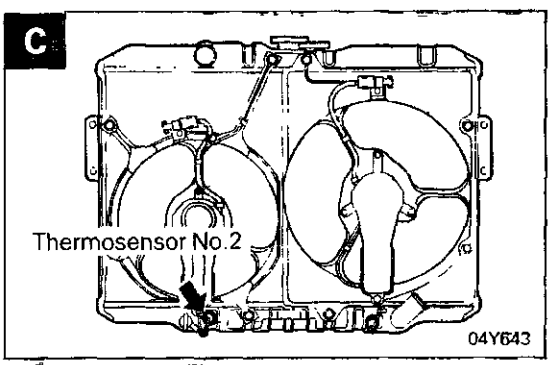
Name	Symbol	Name	Symbol
Automatic air conditioner control unit	H	Magnetic clutch relay	B
Automatic air conditioner self-diagnosis connector	J	Photo-sensor	G
Blower motor high speed relay	M	Power transistor	K
Blower motor starter cutout relay	M	Pressure switch	E
Condenser fan motor relay	B	Radiator fan, air conditioner relay (1), (2)	B
Dual pressure switch	E	Radiator fan motor relay 1, 2	F
Engine coolant temperature sensor	A	Solenoid valve No. 1	K
Engine coolant temperature switch	A	Solenoid valve No. 2, No. 3, No. 4	I
Foot area temperature sensor	L	Thermistor	M
Interior temperature sensor	N	Thermosensor No. 1	D
Light controller	M	Thermosensor No. 2	C

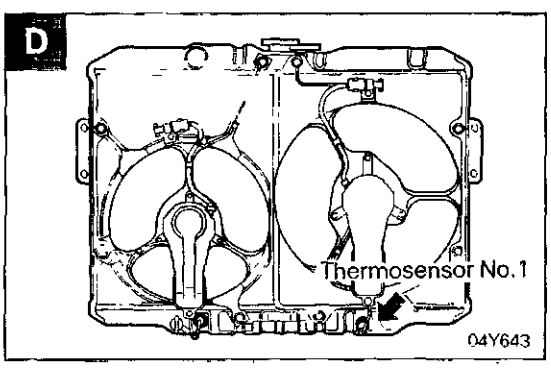
ENGINE COMPARTMENT

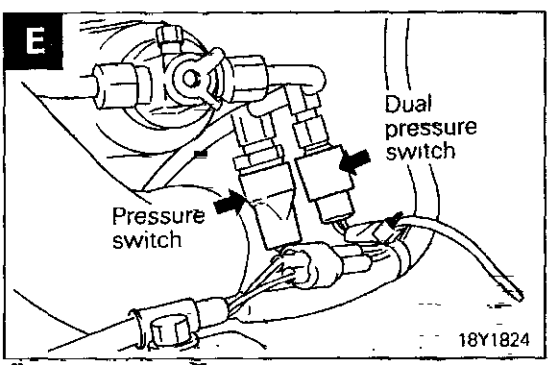




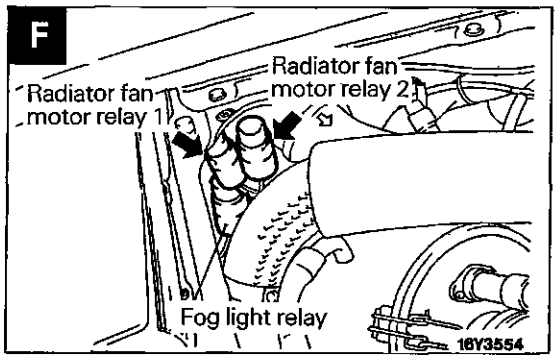




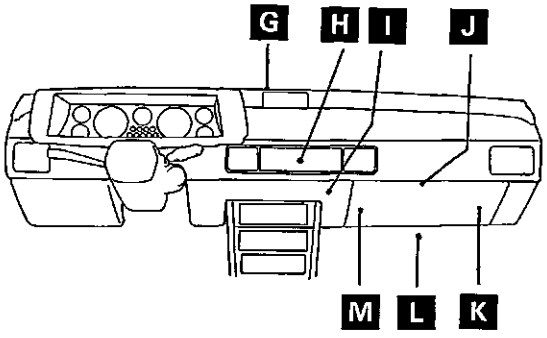




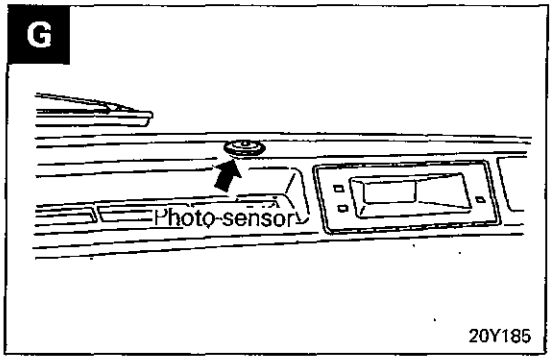
F



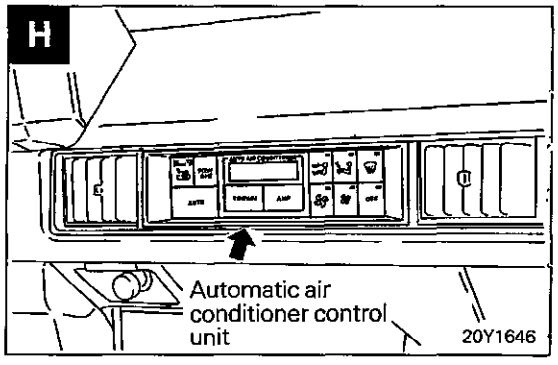
INSTRUMENT PANEL



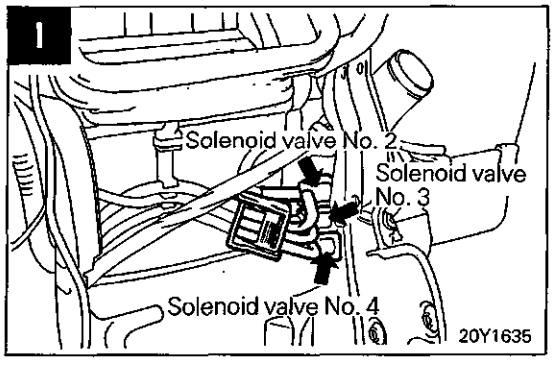
G



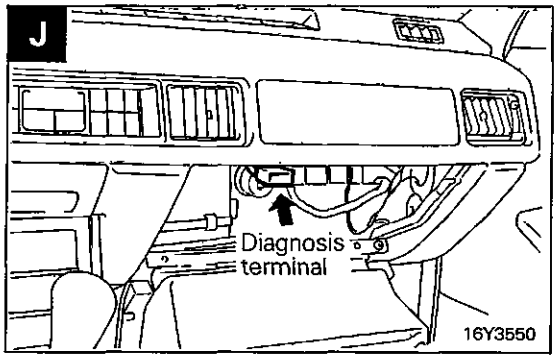
H



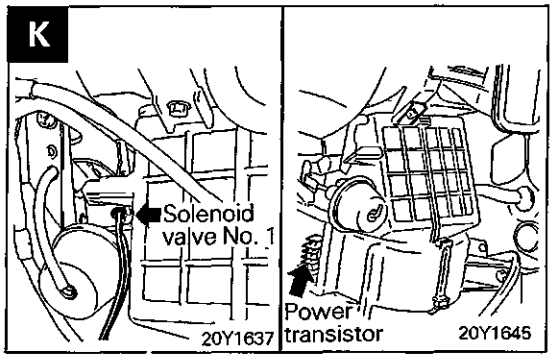
I



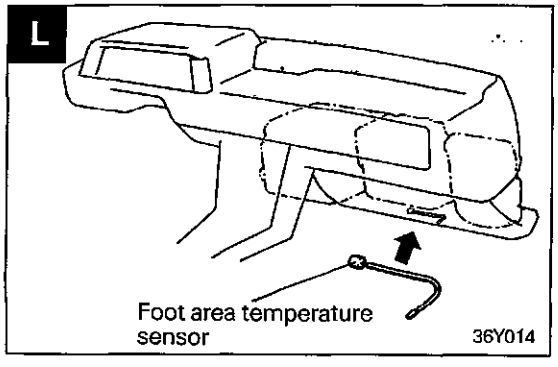
J



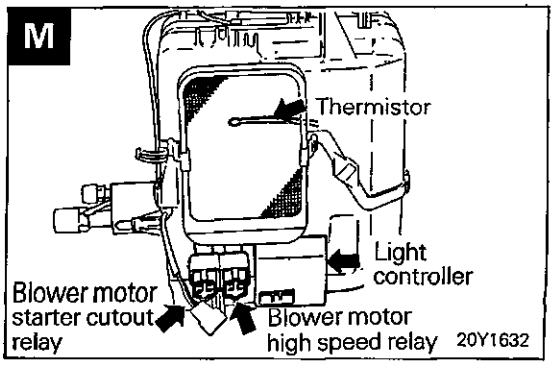
K



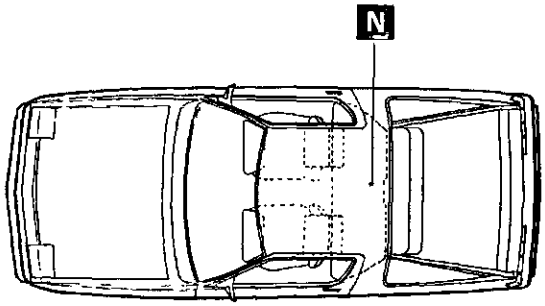
L



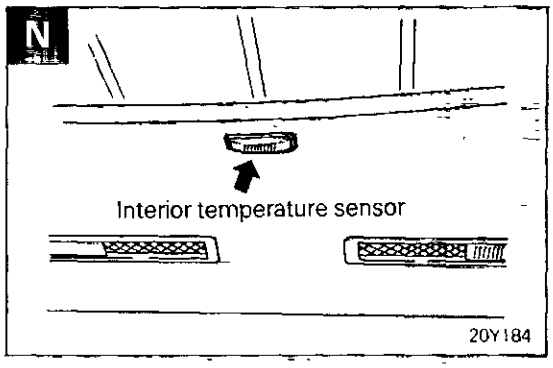
M



ROOF



16Y2782



SAFETY PRECAUTIONS

N24PAAA

The refrigerant used in all air-conditioning installations is R-12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of –29.8°C (–21.7°F), at atmospheric pressure, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable, and nonexplosive. It is nonpoisonous except when it is in direct contact with open flame. It is noncorrosive except when combined with water. The following precautions must be observed when handling R-12.

Caution
Wear safety goggles when servicing the refrigeration system.

R-12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes.
Always wear safety goggles when servicing the refrigeration part of the air-conditioning system. Keep a bottle of sterile mineral oil handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. R-12 is rapidly absorbed by the oil. Next, splash the eyes with plenty of cold water. Call your doctor immediately even though irritation has ceased after treatment.

Caution
Do not heat R-12 above 52°C (125°F).

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 52°C (125°F) is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

Caution
Keep R-12 containers upright when charging the system.

When metering R-12 into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

Caution
Always work in a well-ventilated room.

Good ventilation is vital in the working area. Always discharge the refrigerant into the service bay exhaust system or outside the building. Large quantities of refrigerant vapor in a small, poorly ventilated room can displace the air and cause suffocation.
Although R-12 vapor is normally nonpoisonous, contact with an open flame can cause the vapor to become very poisonous. Do not discharge large quantities of refrigerant in an area having an open flame. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling the fumes from the leak detector.

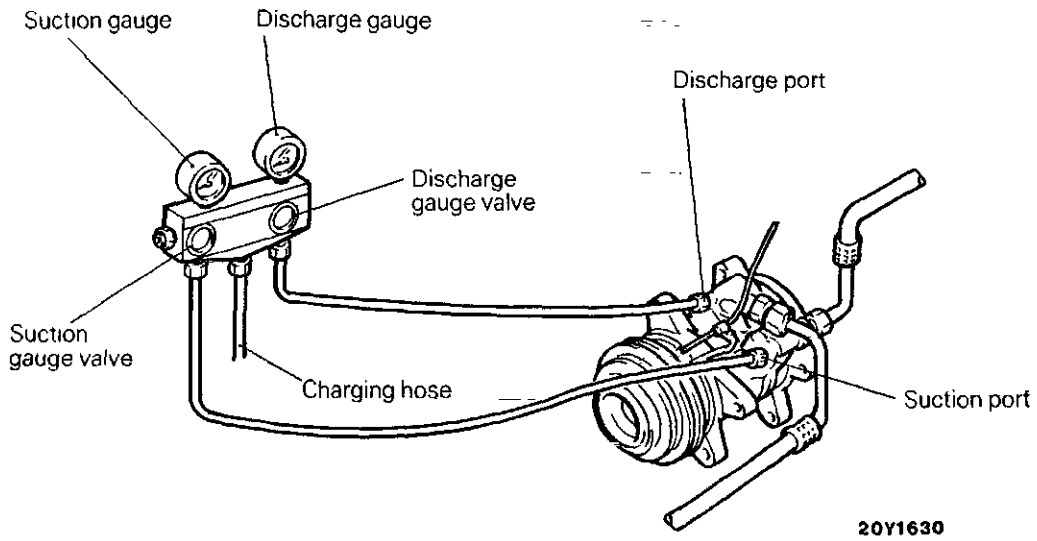
Caution
Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces, and in combination with moisture can severely corrode all metal surfaces.

SERVICE ADJUSTMENT PROCEDURES

N24FDAA

MANIFOLD GAUGE SET INSTALLATION

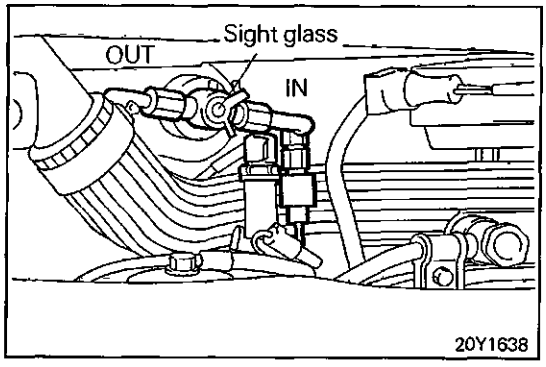


Manifold Gauge Valves – should be closed when connecting the manifold gauge set to the service port of the compressor and the discharge line. The suction gauge valve at the left is opened to provide a passage between the suction gauge and the center manifold outlet. The discharge gauge valve at the right is opened to provide a passage between the discharge pressure gauge and the center manifold outlet.
Detailed instructions for proper use of the gauge set manifold are contained in the text covering each test and service operation employing these gauges.

Suction Gauge – the left side of the manifold set is calibrated to register 0 to –100 kPa (0 to 30 in. of vacuum) and 0 to 1,000 kPa (0 to 150 psi). This gauge is connected to the suction port of the compressor.

Discharged Gauge – the right of the manifold set is calibrated to register 0 to 2,100 kPa (0 to 300 psi). For all tests this gauge is connected to the discharge port of the system.

Center Manifold Outlet – provides the necessary connection for a long service hose used when discharging the system, using a vacuum pump to "pull a vacuum" before charging the system, and for connecting the supply of refrigerant when charging the system.



TEST PROCEDURES N24FEAD

RECEIVER DRIER

The receiver drier assembly consists of; Drier reservoir, Refrigerant level sight glass and Fusible plug.

To Test the Receiver Drier

(1) Operate the unit and check the piping temperature by touching the receiver drier outlet and inlet.
(2) If there is a difference in the temperatures, the received drier is restricted.
Replace the receiver drier.

SIGHT GLASS REFRIGERANT LEVEL TEST

The sight glass is a refrigerant level indicator. To check the refrigerant level, clean the sight glass and start the vehicle engine. Push the air conditioner button to operate the compressor, place the blower switch to high and move the temperature lever to extreme left. After operating for a few minutes in this manner, check the sight glass.

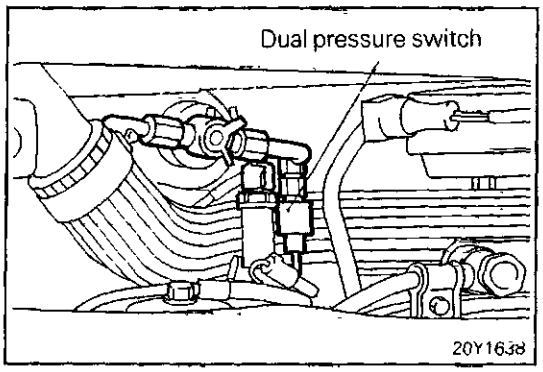
(1) If the sight glass is clear, the magnetic clutch is engaged, the compressor discharge line is warm and the compressor inlet line is cool; the system has a full charge.
(2) If the sight glass is clear, the magnetic clutch is engaged and there is no significant temperature difference between compressor inlet and discharge lines; the system has lost some refrigerant.
(3) If the sight glass is clear and the magnetic clutch is disengaged; the clutch is faulty or, the system is out of refrigerant. Perform low pressure switch test to determine condition. Check low pressure switch, and clutch coil for electrical continuity.
(4) If the sight glass shows foam or bubbles, the system could be low on charge. Occasional foam or bubbles are normal when the ambient temperature is above 43°C (110°F) or below 21°C (70°F).
Adjust the engine speed to 1,500 rpm. Block the air flow thru the condenser to increase the compressor discharge pressure to 1,422 to 1,520 kPa (206 to 220 psi). If sight glass still shows bubbles or foam, system charge level is low.
The refrigerant system will not be low on charge unless there is a leak. Find and repair the leak. If the leak can be repaired without discharging the system an oil level check is not necessary. Use the procedure for correcting low refrigerant level found in the Refrigerant System Service Procedure Section.

FUSIBLE PLUG

In 105°C (221°F) ambient, the fusible link melts and the refrigerant in the system is discharged.
Once the fusible link has melted, it cannot be reused. Therefore, install a new fusible link and charge the system with refrigerant.

DUAL PRESSURE SWITCH

Dual pressure switch is installed to the liquid line of the receiver outlet.
This combines the high pressure switch with low pressure switch.



LOW PRESSURE SWITCH

The low pressure switch, is wired in series with the magnetic clutch. It cuts off the electrical power supply to the clutch when refrigerant pressure drops below the control point of the switch.
Whenever the system is inactivated by the low pressure switch due to refrigerant loss, the refrigerant oil may have been lost. Therefore, to prevent damage to the compressor due to operation without sufficient lubrication, the leak must be repaired and the compressor oil [15 cc (0.5 fl.oz.)] added before final charge of the system.
The switch is a sealed, factory calibrated unit. No attempt shall be made to adjust or otherwise repair it. If it is found to be faulty it must be replaced.

To Test the Low Pressure Switch (Engine Off)

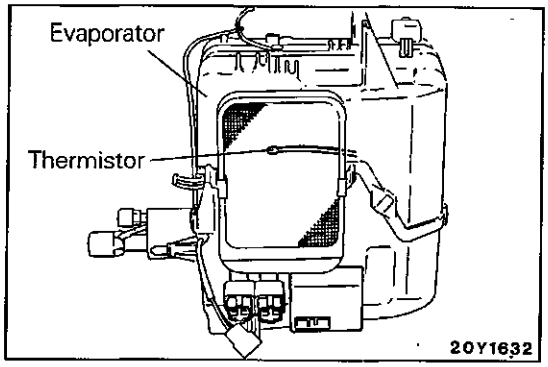
(1) Jump wire leads.
(2) Press the A/C switch and blower switch on.
(3) Momentarily turn the ignition switch on (do not crank the engine), listen for the clutch engaging.
(4) If the clutch does not engage, the thermistor, coolant temperature switch, high pressure switch or fuse may be faulty.
(5) If clutch engages, connect the manifold gauge set and read pressure. At pressure of 206 kPa (30 psi) or above, switch must actuate the clutch.
If the pressure is below 206 kPa (30 psi), refrigerant system is low in charge. For corrective action refer to refrigerant leak repair procedure.
(6) Reconnect wire on switch and perform step number 3. If the clutch does not engage, discharge the system, replace the switch, and recharge the system.

HIGH PRESSURE SWITCH

The high pressure switch cuts off the electrical power supply to the magnetic clutch when refrigerant pressure rises above the setting.
This switch may operate when the flow of air across the condenser is obstructed by the dead leaves, newspaper, etc. blocking the condenser surface, or the refrigerant system is overcharged.

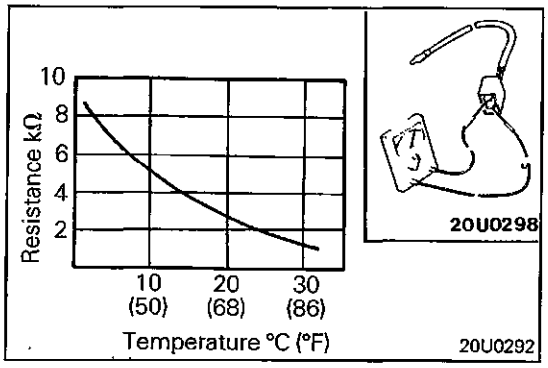
To Test the High Pressure Switch (Engine Off)

(1) Jump the wire leads.
(2) Press the A/C switch and blower switch ON.
(3) Momentarily turn the ignition switch on (do not crank the engine), and listen for the clutch engaging.
(4) If the clutch does not engage, the thermistor, low pressure switch, coolant temperature switch, or fuse may be faulty. Correct fault.
(5) If clutch engages, connect the manifold gauge set and read pressure. At any pressure of 2,010 kPa (291.5 psi), the switch must be off.
(6) If the clutch does not engage, replace the switch.



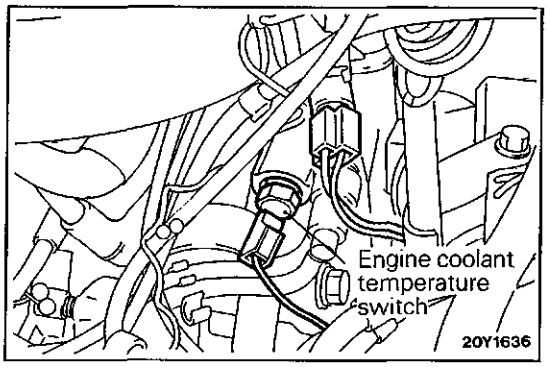
THERMISTOR

The thermistor turns on/off the compressor clutch depending on the temperature of the air flowing through the evaporator outlet.
When the air temperature at the evaporator outlet rises due to reduced air flow rate, clogged evaporator fin or insufficient refrigerant, the thermistor detects it and sends the signal to the automatic air conditioner to turn on the compressor clutch. If the evaporator fin surface is covered with frost, the faulty thermistor is suspected.



To Test the Thermistor

(1) Disconnect the thermistor connector at the evaporator case and measure the resistance with an ohmmeter. If the resistance value is within the range shown in the illustration, the thermistor is in order. If not, replace the thermistor.
(2) If the thermistor is in order, the automatic air conditioner may be faulty. Replace it.



ENGINE COOLANT TEMPERATURE SWITCH

The engine coolant temperature switch is located on the thermostat housing, and is connected to the clutch in series. When the coolant temperature in the radiator reaches above 113°C (235°F), it turns the compressor OFF. This is to prevent engine overheating.

To Test the Engine Coolant Temperature Switch

(1) Remove wire from engine coolant temperature switch and jump leads together.
(2) Press the A/C switch and blower switch ON.
(3) Momentarily turn the ignition switch ON (do not crank the engine), and listen for the clutch engaging.
(4) If the clutch does not engage the thermistor, low pressure switch, high pressure switch wiring or fuse may be faulty.
(5) If clutch engage, replace the switch.

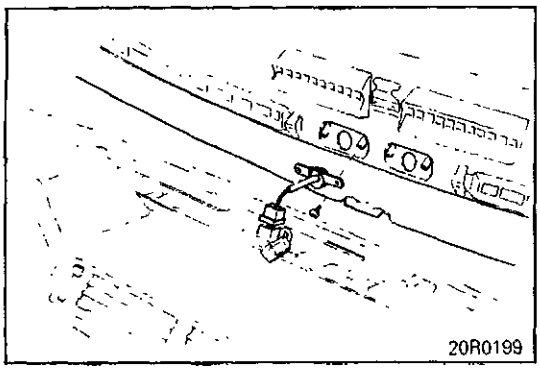
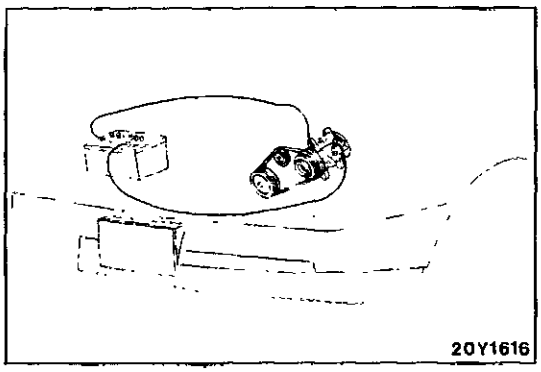


PHOTO-SENSOR

The photo-sensor senses the intensity of sunshine and when it is high, has the fan speed increased, preventing the room temperature from becoming high.

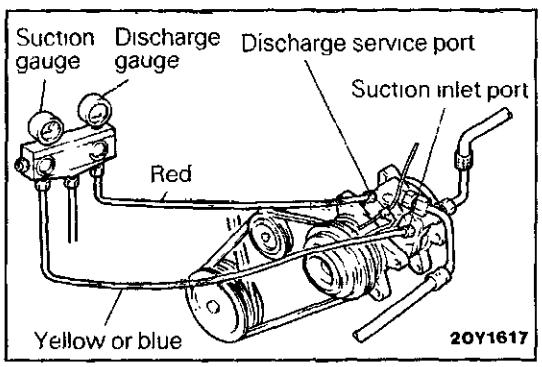
To Test the Photo-sensor

In the sunshine, cover the photo-sensor with a hand. If the fan speed is reduced, the photo-sensor is in order. If not, replace.



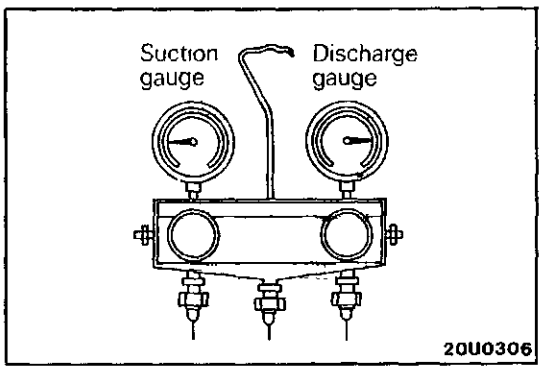
MAGNETIC CLUTCH

(1) Disconnect the wiring to the magnetic clutch.
(2) Connect battery (+) voltage directly to the wiring for the magnetic clutch.
(3) If the magnetic clutch is normal, there will be a "click". If the pulley and armature do not make contact ("click") there is a malfunction.



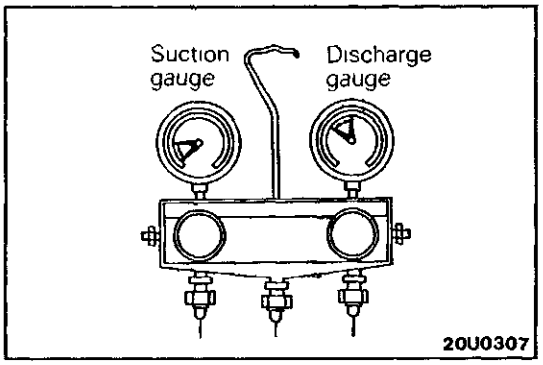
COMPRESSOR

(1) Install the manifold gauge set, and run the air conditioner.
(2) If a pressure of approx. 490 kPa (71 psi) is indicated on the suction gauge side and a pressure of approx. 883 kPa (128 psi) is indicated on the discharge gauge side, the compressor has abnormal compression.
Replace the compressor.

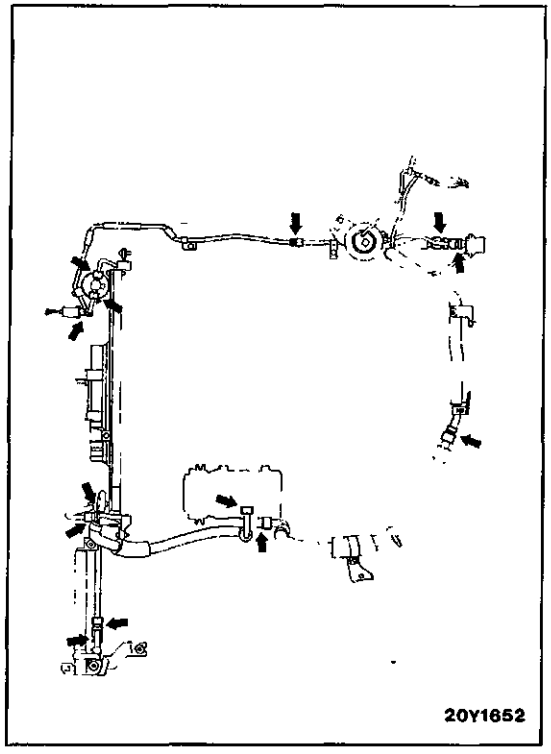


(3) If a pressure of 294 to 392 kPa (43 to 59 psi) is indicated on the suction gauge side and a pressure of approx. 1,961 kPa (284 psi) is indicated on the discharge gauge side, it is suspected that air is present in the air conditioning system.
Discharge the system, evacuate and recharge with specified amount of refrigerant.

Recharging condition
- Air temperature sucked in cooler (evaporator): 30 – 35°C (86 – 95°F)
- Engine speed: 2,000 rpm
- Blower speed: High



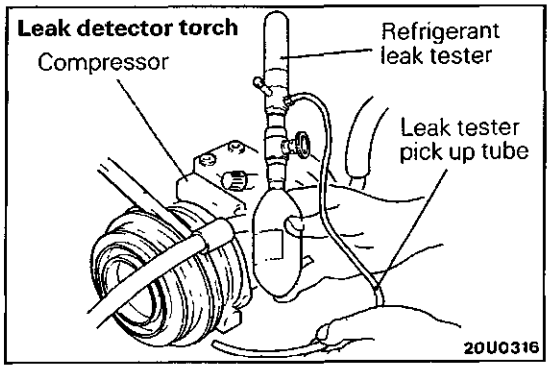
(4) During operation of the air conditioner, cold air may stop flowing after the elapse of time and this state is maintained before cold air flows out again. If cold air stops flowing out with negative pressure indicated on the suction gauge side and a pressure of 588 to 980 kPa (85 to 142 psi) indicated on the discharge gauge side, it is suspected that water is present in the air conditioning system.
Discharge the system. Replace receiver drier.
Evacuate and check for leaks, and recharge with specified amount of refrigerant.

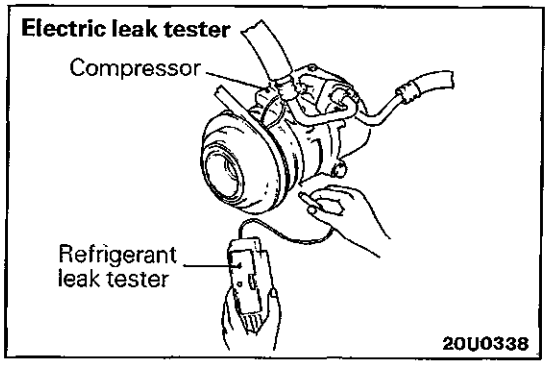


TESTING THE SYSTEM FOR LEAKS N24FFAA

A leak is likely to occur where two components are connected together. See the illustration for possible locations.
The Leak Detector Torch is a butane gas-burning torch used to locate a leak in any part of the refrigeration system. Refrigerant gas drawn into the sampling or "sniffer" hose will cause the flame to change color in proportion to the size of the leak. A very small leak will produce a flame varying from yellowish-green to bright green. A large leak will produce a brilliant blue flame.

Caution
Do not use the lighted detector in any place where explosive gases, dust or vapors are present. Do not breathe the fumes that are produced by the burning of refrigerant gas. Large concentrations of refrigerant in the presence of a live flame become dangerously toxic.





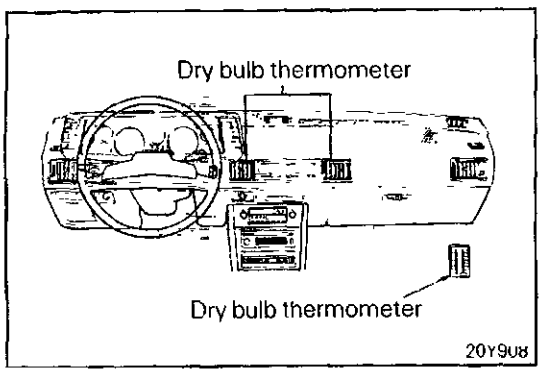
If the flame remains bright yellow when the tester is removed from a possible leak point, insufficient air is being drawn in through the sampling tube, or the copper reaction wire is dirty.

(1) Assemble leak detector as shown. Be sure detector is seated tightly over torch gasket.
(2) Holding torch upright, screw-in butane charger (clockwise) until punctured. (Do not use force.)
(3) Screw-out butane charger (counterclockwise) about 1/4 turn.
(4) Point torch away from body – then light escaping gas with match. Always keep torch in upright position.
(5) Adjust flame by turning cartridge in or out as required.
(6) Allow 30 seconds to heat copper reaction wire.

Caution
Never remove butane charger while torch is lighted or in the presence of any open flame.

(7) Examine all tube connectors and other possible leak points by moving the end of the sampling hose from point to point. Always keep torch in upright position. Since R-12 is heavier than air, it is good practice to place the open end of sampling hose directly below point being tested. Be careful not to pinch sampling tube since this will shut off air supply to flame and cause a color change.
(8) Watch for a change in the color of the flame. Small leaks will produce a green color and large leaks a bright blue color. If leaks are observed at tube fittings, tighten the connection, using the proper flare wrenches, and retest.

NOTE
An electric leak tester which sounds to alarm also be used.



PERFORMANCE TEST N24FWAA

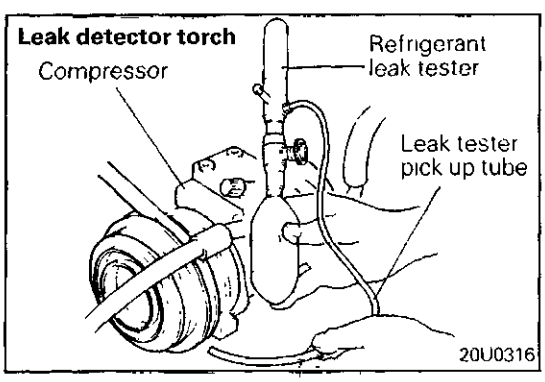
Air temperature in test room must be 21°C (70°F) minimum for this test.

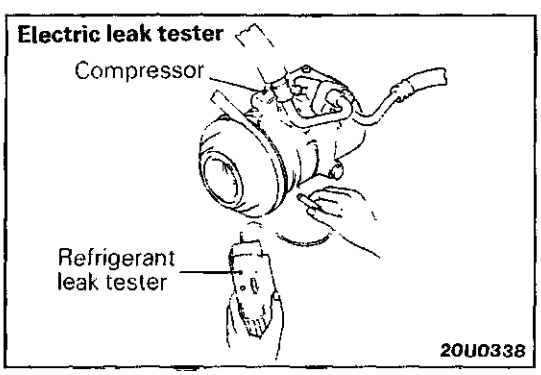
(1) Connect a tachometer and manifold gauge set.
(2) Set A/C controls to A/C, panel temperature lever on RECIRC, and blower on high.
(3) Start engine and adjust R.P.M. to 1,000 with A/C clutch engaged.
(4) Engine should be warmed up with doors, windows, and hood open.
(5) Insert a thermometer in the left center A/C outlet and operate the engine for 5 minutes.
(6) Note the discharge air temperature.

NOTE
If the clutch cycles, take the reading before the clutch disengages.

Performance Temperature Chart

Garage ambient temperature °C (°F)	21 (70)	26.5 (80)	32 (90)	37.5 (100)	40.6 (105)
Discharge air temperature °C (°F)	1.7 – 4.4 (35 – 40)	1.7 – 5.0 (35 – 41)	1.7 – 5.6 (35 – 42)	1.7 – 6.1 (35 – 43)	1.7 – 6.7 (35 – 44)
Compressor discharge pressure kPa (psi)	928 – 1,322 (132 – 188)	1,069 – 1,547 (152 – 220)	1,209 – 1,772 (172 – 252)	1,336 – 1,969 (190 – 280)	1,406 – 2,109 (200 – 300)
Evaporator suction pressure kPa (psi)	127 – 148 (18 – 21)	131 – 162 (18.6 – 23)	134 – 176 (19 – 25)	135 – 188 (19.2 – 26.8)	136 – 194 (19.4 – 27.6)





REFRIGERANT LEAK REPAIR PROCEDURE N24FHAD

LOST CHARGE

If the system has lost all charge due to a leak:

(1) Evacuate the system. (See procedure.)
(2) Charge the system with approximately one pound of refrigerant.
(3) Check for leaks.
(4) Discharge the system.
(5) Repair leaks.
(6) Replace receiver drier.

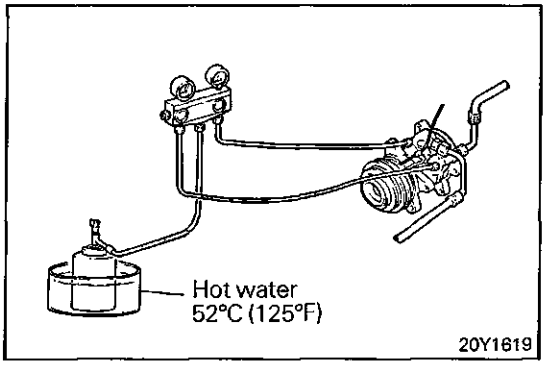
Caution
Replacement filter-drier units must be sealed while in storage. The drier used in these units will saturate water quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keeping the system open any longer than necessary.

(7) Evacuate and charge the system.

LOW CHARGE

If the system has not lost all of its refrigerant charge; locate and repair all leaks. If it is necessary to increase the system pressure to find the leak (because of an especially low charge) add refrigerant. If it is possible to repair the leak without discharging the refrigerant system, use the procedure for correcting low refrigerant level.

CORRECTING LOW REFRIGERANT LEVEL



Since the refrigeration system is completely sealed, refrigerant level will not be low unless there is a leak in the system. Before adding refrigerant when the cause of low level is not known, the system should be tested for leaks. Assuming that leaks have been corrected without discharging the system, proceed with partial charge.
Install and connect manifold gauge set.

(1) Close both gauge set manifold valves.
(2) Connect the suction gauge test hose to the suction port of the compressor. Connect the discharge gauge test hose to the discharge port.
(3) Connect one end of long test hose to center manifold outlet, other end to refrigerant dispensing manifold.
(4) Close two dispensing manifold valves and open remaining dispensing manifold valve. Remove protective cap from opened valve.
(5) Screw a can of R-12 to the opened manifold valve. Be sure gasket is in place and in good condition. Tighten refrigerant can and manifold locking nut to insure a good seal. Do not overtighten. 8 to 11 Nm (6 to 8 ft.lbs.) is sufficient if gasket is in good condition.
(6) Turn manifold valve (above the refrigerant can) completely clockwise to puncture the can. This closes the valve and seals the refrigerant in the can.

Caution
Never heat small cans of refrigerant over 52°C (125°F) as they may explode.

(7) Place the refrigerant in a large pan of water heated to 52°C (125°F). Place pan of water containing the refrigerant can on an accurate scale so the amount of refrigerant added can be weighed. Open the refrigerant manifold valve.
(8) Purge all air from test hoses. Air in the system will be trapped in the condenser causing abnormally high discharge pressures and interfering with condensing of the refrigerant.
(9) Slightly loosen both test hoses at the gauge set manifold. Tighten the hoses as soon as the air is purged.
(10) Slightly loosen charging hose connection at gauge set manifold. This will purge air from the charging hose. Tighten connection as soon as air is purged.
(11) With vehicle windows open and hood up, operate engine at 1,500 rpm and jump the low pressure switch terminals located on the receiver drier so the clutch will remain engaged.
(12) Place air conditioner control on A/C and place the blower switch on high.

(13)If necessary, block the condenser to maintain a discharge pressure of 1,422 to 1,520 kPa (206 to 220 psi). System must be charged through the evaporator suction service ports as follows:

(a) Slowly open the suction service gauge valve. Meter flow of refrigerant by adjusting the suction service gauge valve so that pressure registered at the suction service gauge does not exceed 345 kPa (50 psi). Keep refrigerant container upright.

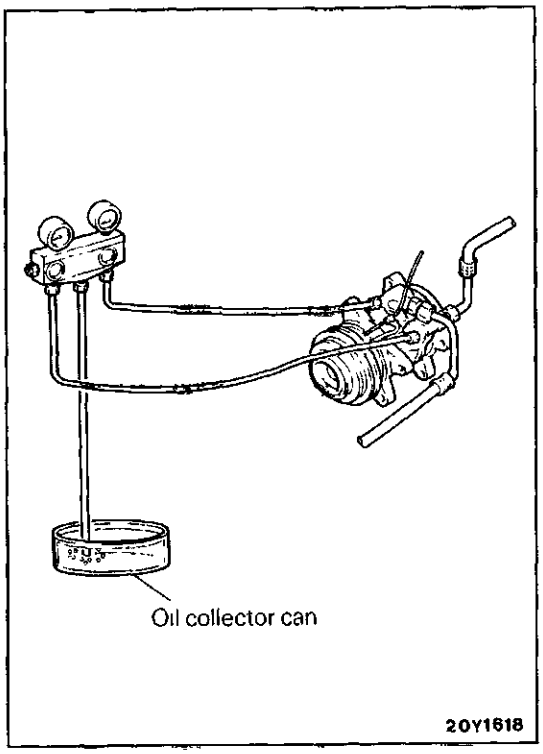
(b) Supply refrigerant gas until there is no foam visible at the sight glass. Then, add 6 oz. of refrigerant.

(c) Close the suction gauge valve.

Caution
Too much refrigerant in the system can cause abnormally high discharge pressures. Care must be used so that the exact recommended amount of refrigerant is added after foam clears in the sight glass.

(d) Close dispensing manifold valve. Remove test hoses and adapters from the service ports of compressor, install protective caps at service ports and reconnect wiring.

(e) Check system performance. (P.24-80)



DISCHARGING THE SYSTEM

Since the air conditioning refrigerant system is pressurized, it will be necessary to completely discharge the system (in a well ventilated area) before replacing any refrigerant component. The procedure is as follows:

(1) Install manifold gauge set. Make sure the gauge set valves are closed before attaching the hoses to the refrigerant system.

(2) Install a long hose to the manifold gauge set connector. Run this hose to the oil collector can near a shop exhaust system.
A good oil collector can may be made from a large empty coffee can with a plastic top. Slit the plastic top in the form of a Y to make an entrance for the refrigerant hose and an exit for the gas.

(3) Open the compressor discharge and suction line pressure valves and blow the refrigerant into the oil collector can. Watch to make sure the hose does not blow out of the collector can.

(4) When the system has been completely discharged, measure the amount of oil collected in the can. The amount of oil measured should be added to the refrigerant system before it is re-charged. Add new oil – discard the used oil.

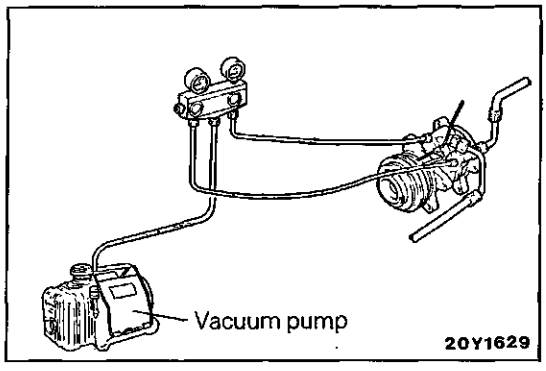
Caution
It is important to have the correct amount of oil in the refrigerant system.

Too little oil will provide inadequate compressor lubrication and cause a compressor failure. Too much oil will increase discharge air temperature.

When a DR6148 compressor is installed at the factory, it contains 170 ml of refrigerant oil. While the air conditioning system is in operation, the oil is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in various parts of the system.
When the following system components are changed, it is necessary to add oil to the system to replace the oil being removed with the component.

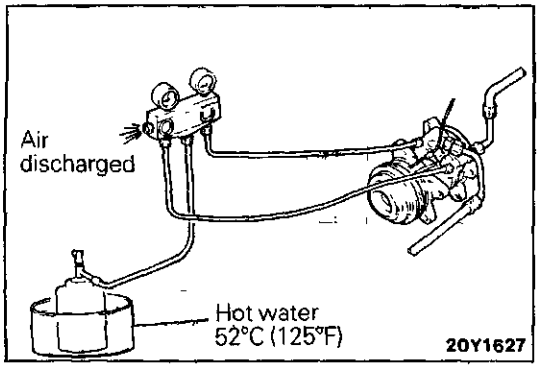
Compressor: 115 cc (3.9 fl.oz.)
Condenser: 25 cc (0.8 fl.oz.)
Evaporator: 35 cc (1.2 fl.oz.)
Line: 15 cc (0.5 fl.oz.)
Receiver drier: 0 cc (0 fl.oz.)

EVACUATING THE SYSTEM



Whenever the system has been opened to the atmosphere, it is absolutely essential that the system be evacuated or "vacuumed" to remove all the air and moisture. Air in the refrigerant system causes high compressor discharge pressures, a loss in system performance, and oxidation of the compressor oil into gum and varnish. Moisture in the refrigerant system can cause the expansion valve to malfunction. Under certain conditions, water can react with the refrigerant to form destructive acids. It is necessary to adhere to the following procedure to keep air and moisture out of the system.

(1) Install manifold gauge set. Make sure the gauge set valves are closed before attaching the hoses to the refrigerant system.
(2) Discharge the system slowly if the manifold gauge set indicates pressure in the system.
(3) Connect a long test hose from gauge set manifold center connection to vacuum pump.
(4) Open both manifold gauge set valves.
(5) Start the vacuum pump and operate until the evaporator suction gauge registers at least –101 kPa (29.9 in. of vacuum).
If at least –101 kPa (29.9 in. of vacuum) cannot be obtained, either the system has a leak or the vacuum pump is defective. Check the vacuum pump. If the pump proves to be functioning properly, the system has a leak. Charge the system with one can (14 oz.) of refrigerant. Locate and repair all leaks. Discharge the refrigerant and evacuate the system.
(6) Continue to operate the pump for at least five minutes.
(7) Close manifold valves. Turn off the vacuum pump and observe evaporator suction gauge for two minutes. The vacuum level should remain constant.
If the vacuum level falls off, the system has a leak. Charge the system with one pound of refrigerant. Locate and repair all leaks. Discharge the system and repeat evacuation procedure.



CHARGING THE SYSTEM

The refrigerant system must have been evacuated using the previous procedure before charging.
Charge using only R-12 refrigerant. R-12 is available in bulk tanks or small cans. Follow the safety precautions for handling R-12 as listed in the beginning of this group.

CHARGING WITH SMALL CANS

When using disposable cans of this type, follow carefully the can manufacturers instructions.

Caution
Never use these cans to charge into the high pressure side of the system (compressor discharge port) or into a system that is at high temperature, because the high system pressures could be transferred into the charging can causing it to explode.

Keep the refrigerant manifold valves capped when not in use. Keep a supply of extra refrigerant-can-to-refrigerant-manifold gaskets on hand so that gaskets can be replaced periodically. This will insure a good seal without excessive tightening of the can or the manifold nuts.

(1) Attach center hose from manifold gauge set to refrigerant dispensing manifold. Turn refrigerant manifold valves completely counterclockwise so they are fully open. Remove protective caps from refrigerant manifold.
(2) Screw refrigerant cans into manifold. Be sure manifold-to-can gasket is in place and in good condition. Tighten can and manifold nuts to 8 to 11 Nm (6 to 8 ft.lbs.).
(3) Turn refrigerant manifold valves completely clockwise to puncture the cans and close the manifold valves.
(4) Purge the air from the charging line by loosening the charging hose at the gauge set manifold and turning one of the refrigerant valves counterclockwise to release refrigerant. When the refrigerant gas starts escaping from the loose connection, re-tighten the hose.

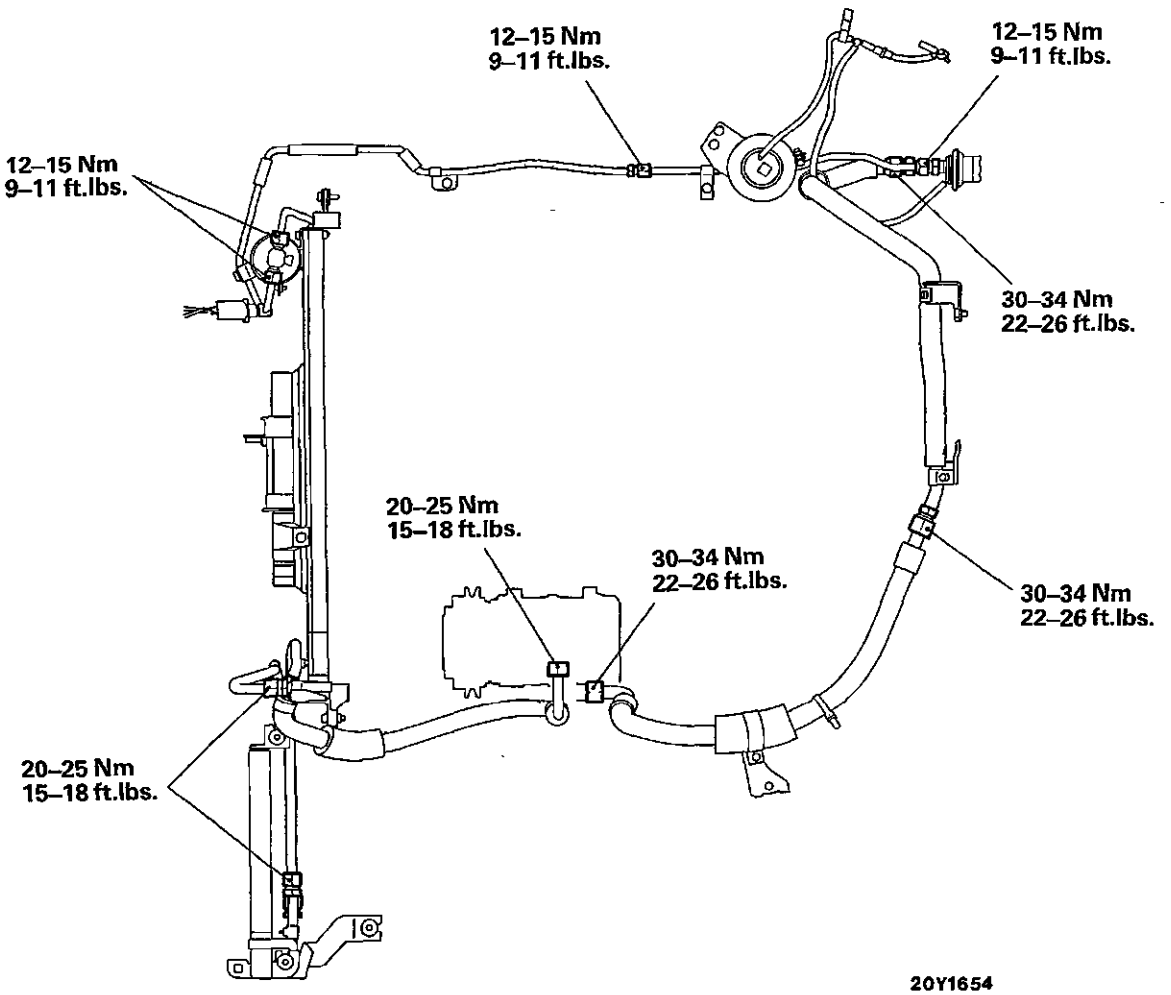
Caution
Never heat small refrigerant cans over 52°C (125°F) as they may explode.

(5) Fully open all refrigerant manifold valves being used and place the cans of refrigerant into a pan containing 52°C (125°F) water. The water will warm the charging can and aid in the transfer of the charge into the system. Place the water pan and refrigerant cans on a scale and note the weight.
(6) Jump the low pressure switch terminals located on the receiver drier so the clutch will remain engaged.
(7) Start the engine and move the controls to A/C switch ON and low blower position.
The low pressure switch will prevent the clutch from engaging until refrigerant is added to the system. If the clutch does engage, replace the switch before proceeding any further.

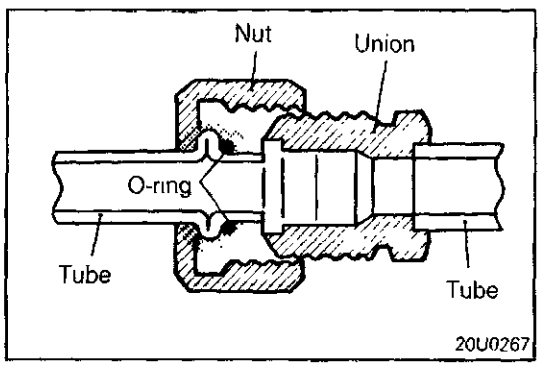
(8) Charge through the suction side of the system by slowly opening the suction manifold valve. Adjust the valve as necessary so charging pressure does not exceed 345 kPa (50 psi). Maintain the temperature of the water in the pan by adding warm water as necessary.
Note the weight of water added, to ensure accuracy when determining amount of refrigerant added to system.
(9) Adjust the engine speed to a fast idle of approximately 1,500 rpm.
(10) When specified refrigerant charge 910 g (32 oz.) has entered the system, close the gauge set manifold valves, refrigerant manifold valves, and reconnect wiring.
Each can contains 14 oz. of R-12. Use 2½ cans.

HANDLING TUBING AND FITTINGS

N24FIAC



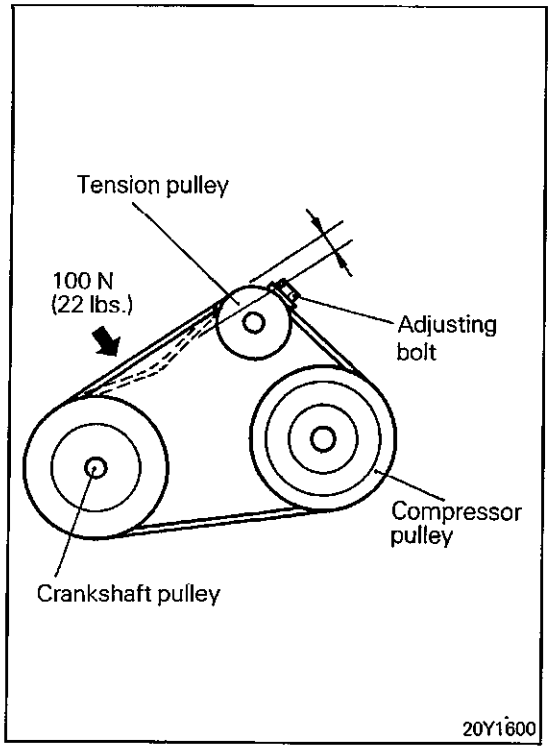
Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed.
The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly. Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.
A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose. Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 80 mm (3 in.) from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.
All plumbing connections use O-rings which are not reusable.



O-RING INSTALLATION

(1) Clean sealing surface.
(2) Make sure O-ring does not have any scratches.
(3) Connect fitting, install fastener, and torque to amount shown in the illustration.

The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure-moisture-free R-12 and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause operational troubles or even serious damage if present in more than minute quantities.
When it is necessary to open the refrigeration system, have everything you will need to service the system ready, so the system will not be left open any longer than necessary. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are ready to be used.
All tools, including the refrigerant dispensing manifold, the gauge set manifold and test hoses should be kept clean and dry.



COMPRESSOR DRIVE BELT ADJUSTMENT N24FJAA

Satisfactory performance of the air-conditioning system is dependent upon drive belt condition and tension. If the proper tensions are not maintained, belt slippage will greatly reduce air-conditioning performance and drive belt life. To avoid such adverse effects, the following service procedure should be followed:

(1) Any belt that has operated for a minimum of one half-hour is considered to be a "used" belt. Adjust air-conditioning drive belt at the time of new-car preparation.
(2) Check drive belt tension at regular service intervals and adjust as needed.

Standard value: 17 – 20 mm (.7 – .8 in.)

COMPRESSOR NOISE N24FLAA

When investigating an air-conditioning related noise, you must first know the conditions when the noise occurs. These conditions are: weather, vehicle speed, in gear or neutral, engine temperature or any other special conditions.
Noises that develop during air-conditioning operation can often be misleading. For example: what sounds like a failed front bearing or connecting rod, may be caused by loose bolts, nuts, mounting brackets, or a loose clutch assembly. Verify accessory drive belt tension (power steering, alternator or air pump). Improper accessory drive belt tension can cause a misleading noise when the compressor is engaged and little or no noise when the compressor is disengaged.
Drive belts are speed sensitive. That is, at different engine speeds, and depending upon belt tension, belts can develop unusual noises that are often mistaken for mechanical problems within the compressor.

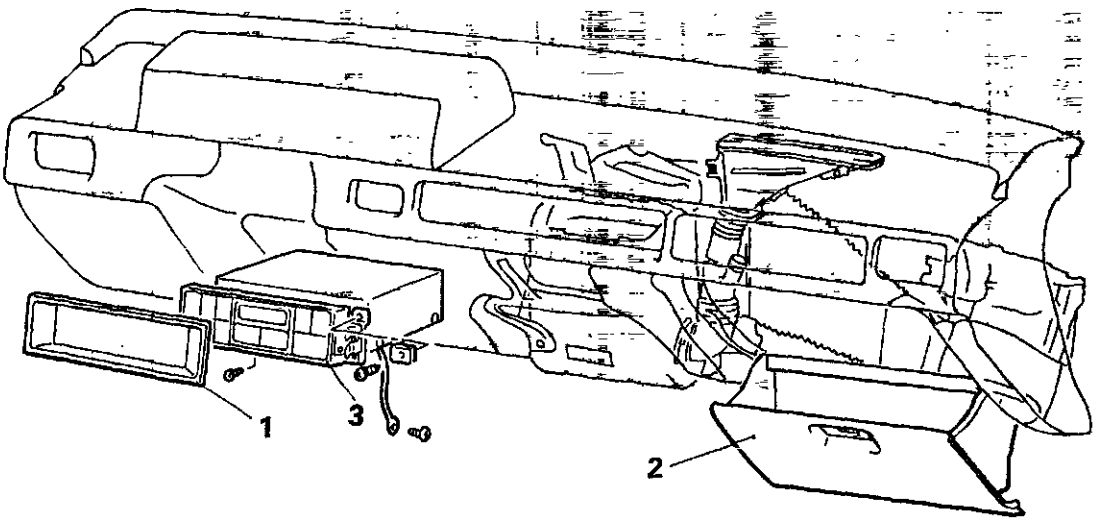
ADJUSTMENT PROCEDURES

(1) Select a quiet area for testing. Duplicate conditions as much as possible. Switch compressor on and off several times to clearly identify compressor noise.
To duplicate high ambient conditions (high head pressure), restrict air flow through condenser. Install manifold gauge set to make sure discharge pressure doesn't exceed 2,070 kPa (300 psi).
(2) Tighten all compressor mounting bolts, clutch mounting bolt, and compressor drive belt. Check to assure clutch coil is tight (no rotation or wobble).
(3) Check refrigerant hoses for rubbing or interference that can cause unusual noises.
(4) Check refrigerant charge (see "Charging the System").
(5) Recheck compressor noise as in Step 1.
(6) If noise still exists, loosen compressor mounting bolts and retorque. Repeat Step 1.
(7) If noise continues, replace compressor and repeat Step 1.

AIR CONDITIONER CONTROL SWITCH

N24QA--

REMOVAL AND INSTALLATION

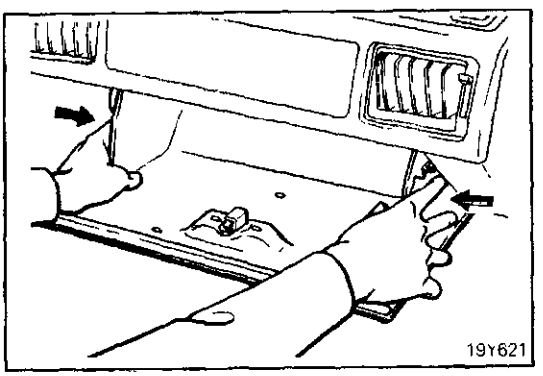


Removal steps

1. Heater control bezel
◆◆ 2. Glove box
3. Air conditioner control switch

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".

20Y1648



SERVICE POINT OF REMOVAL

N24QBAC

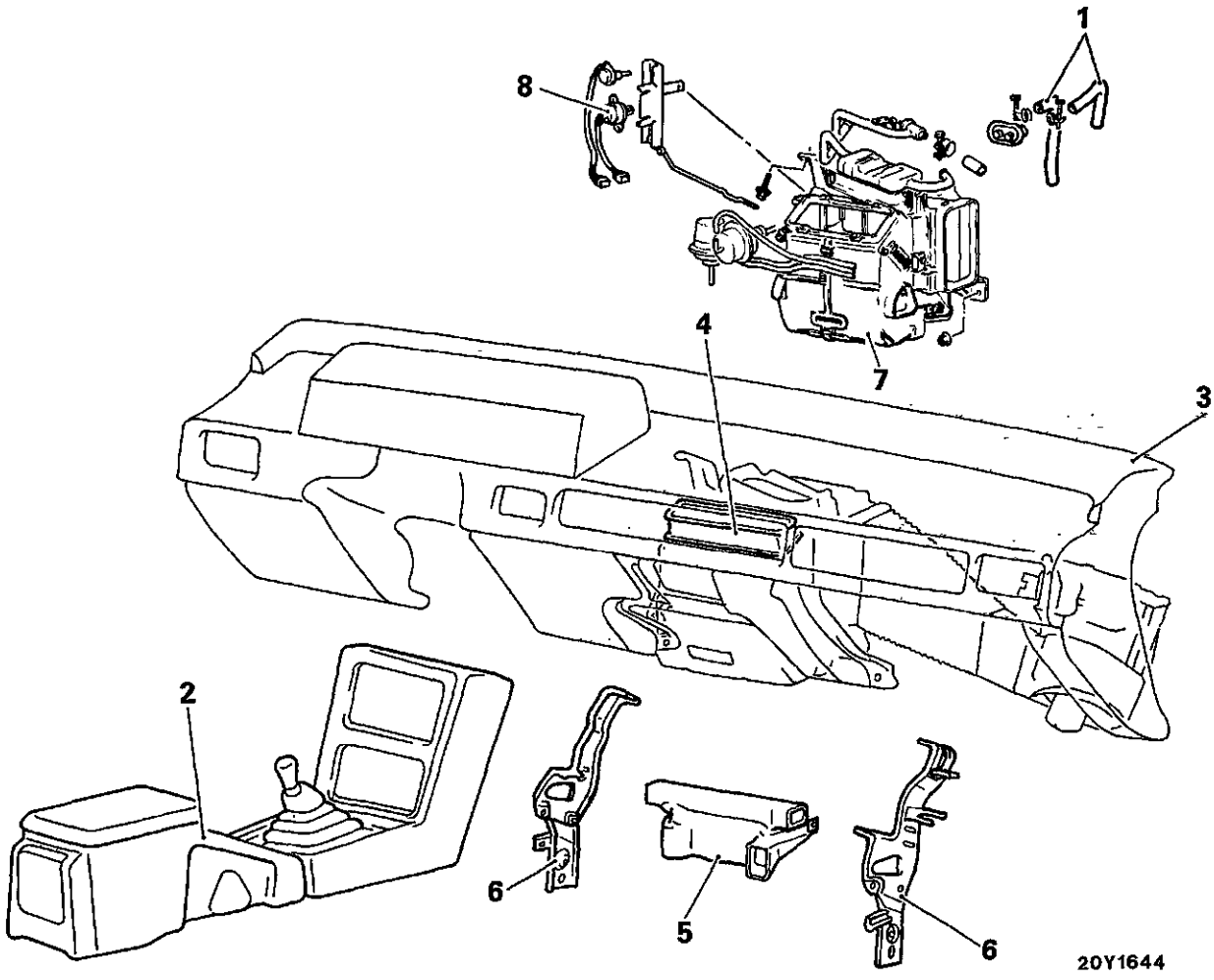
2. REMOVAL OF GLOVE BOX

Grasp and release the glove box lid lock to open the lid. Pull the glove box forward while pressing both sides inward.

HEATER UNIT

N24IA-B

REMOVAL AND INSTALLATION



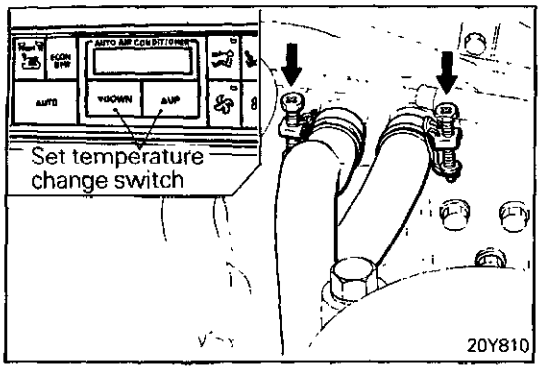
Pre-removal Operation
- Draining Coolant
  (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Coolant Change)

Post-installation Operation
- Adjustment of Heater Control Wire
  (Refer to P.24-6)
- Refilling Coolant
  (Refer to GROUP 0 LUBRICATION AND MAINTENANCE – Coolant Change)

Removal steps

◆◆ ▶◀ 1. Water hoses
◆◆ ▶◀ 2. Floor console
◆◆ ▶◀ 3. Instrument panel
4. Center ventilator duct
5. Lap heater duct
6. Center reinforcement
7. Heater unit
◆◆ 8. Servo motor

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".
(3) ▶◀: Refer to "Service Points of Installation".



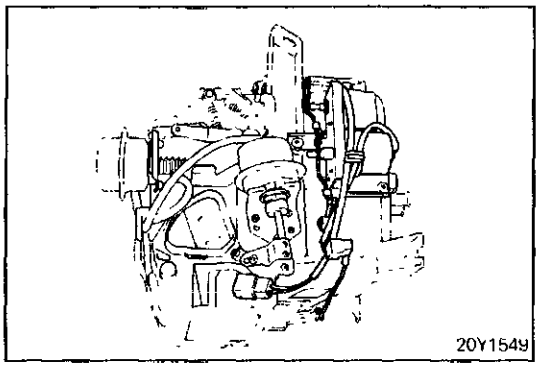
SERVICE POINTS OF REMOVAL N24IBAG

1. REMOVAL OF WATER HOSES

(1) Start the engine and operate the set temperature change switch to adjust the temperature setting to MAX HOT, then stop the engine.
(2) Disconnect the water hoses from the heater unit.

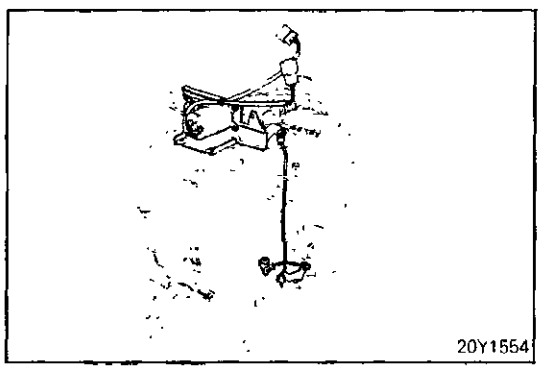
2. REMOVAL OF INSTRUMENT PANEL / 3. FLOOR CONSOLE

Refer to GROUP 23 BODY – Instrument Panel / Floor Console.



8. REMOVAL OF SERVO MOTOR

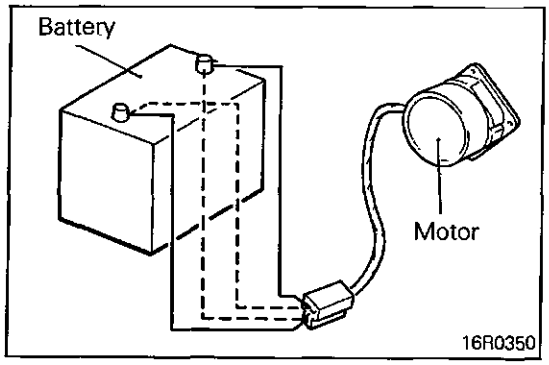
Using a screwdriver, uncouple the blend air damper and the servo motor rod.



Remove screws securing the servo motor and remove the servo motor from the heater unit.

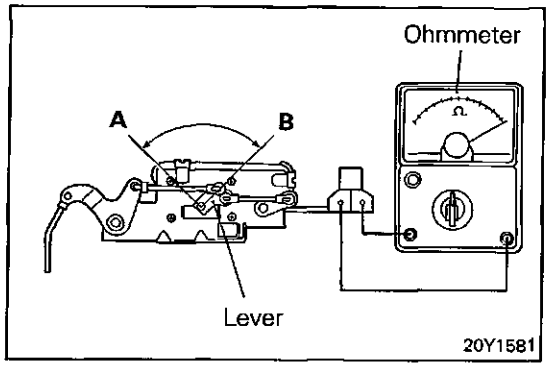
INSPECTION N24ICAC

- Check the dampers and link mechanism for proper operation.
- Check the heater core for clogging or water leakage.
- Check the water valve for operation and clogging.



MOTOR

Check that the motor runs when battery voltage is applied to the motor connector. Also check that the motor runs in the opposite direction when the polarity is reversed.

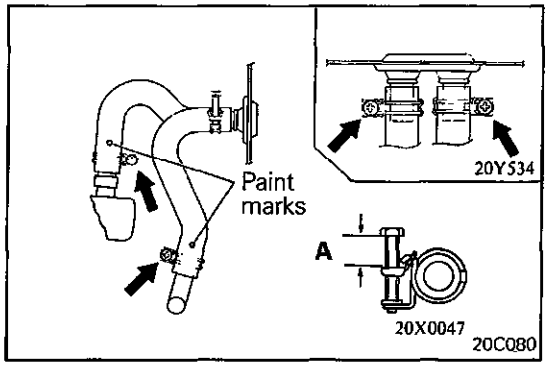


POTENTIOMETER

Connect an ohmmeter to the potentiometer connector terminals (BR and RG) and check resistance reading when the lever is moved to positions A and B.

Standard value:

MAX HOT A	**180 Ω**
MAX COOL B	**4,640 Ω**

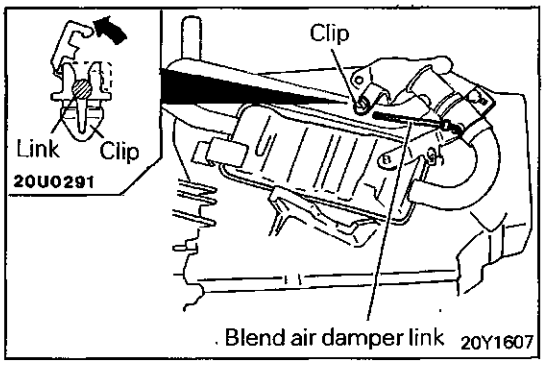


SERVICE POINT OF INSTALLATION

1. INSTALLATION OF WATER HOSES

(1) Install the water hoses, and tighten the clamps in the positions shown in the illustration.
(2) The hose with the painted mark should be connected to the engine side.

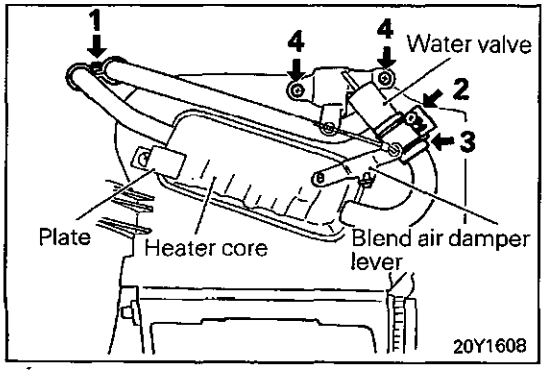
NOTE
Tighten each clamp screw until dimension A shown in the illustration is 4 – 9 mm (.16 – .35 in.).



HEATER CORE AND WATER VALVE REPLACEMENT

N24IGAB2

1. Unlock the water valve lever clip and disconnect the link for the blend air damper from the water valve lever.



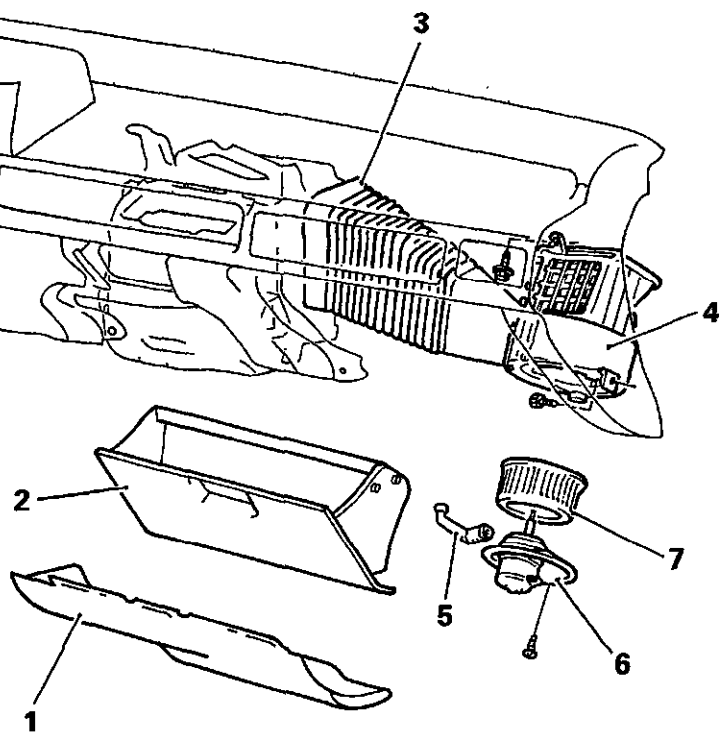
2. Remove the following parts and then remove the water valve.
   (1) Clamp
   (2) Joint hose clamp
   (3) Joint hose
   (4) Screw
3. Remove the plate and remove the heater core. If it is hard to remove due to its contact with the damper lever, remove the damper lever first.

4. Install the heater core and water valve.
5. Push the water valve lever all the way inward so that the water valve is at the closed position.
6. Pull the blend air damper lever fully in the direction of arrow so that the blend air damper is completely closed.

BLOWER ASSEMBLY

N24KA-B

REMOVAL AND INSTALLATION

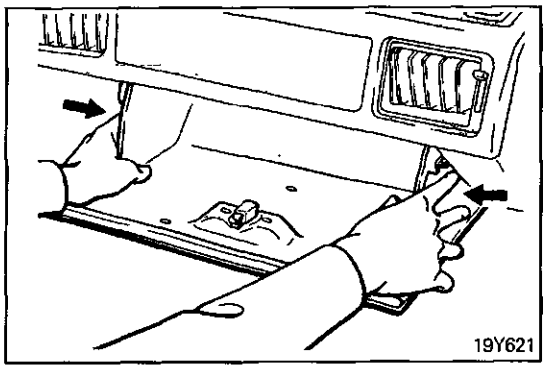


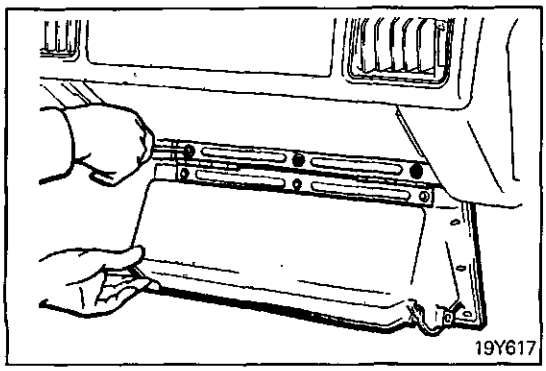
Removal steps

1. Under cover
◆◆ 2. Glove box
3. Duct joint
4. Blower assembly
5. Hose
6. Blower motor
7. Fan

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".

20Y1642





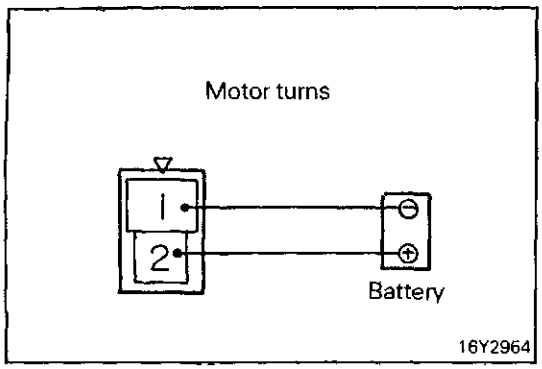
SERVICE POINT OF REMOVAL

N24KBAF2

2. REMOVAL OF GLOVE BOX

(1) Grasp and release the glove box lid lock to open the lid. Pull the glove box forward while pressing both sides inward.

(2) Remove the glove box.



INSPECTION

N24KCAF

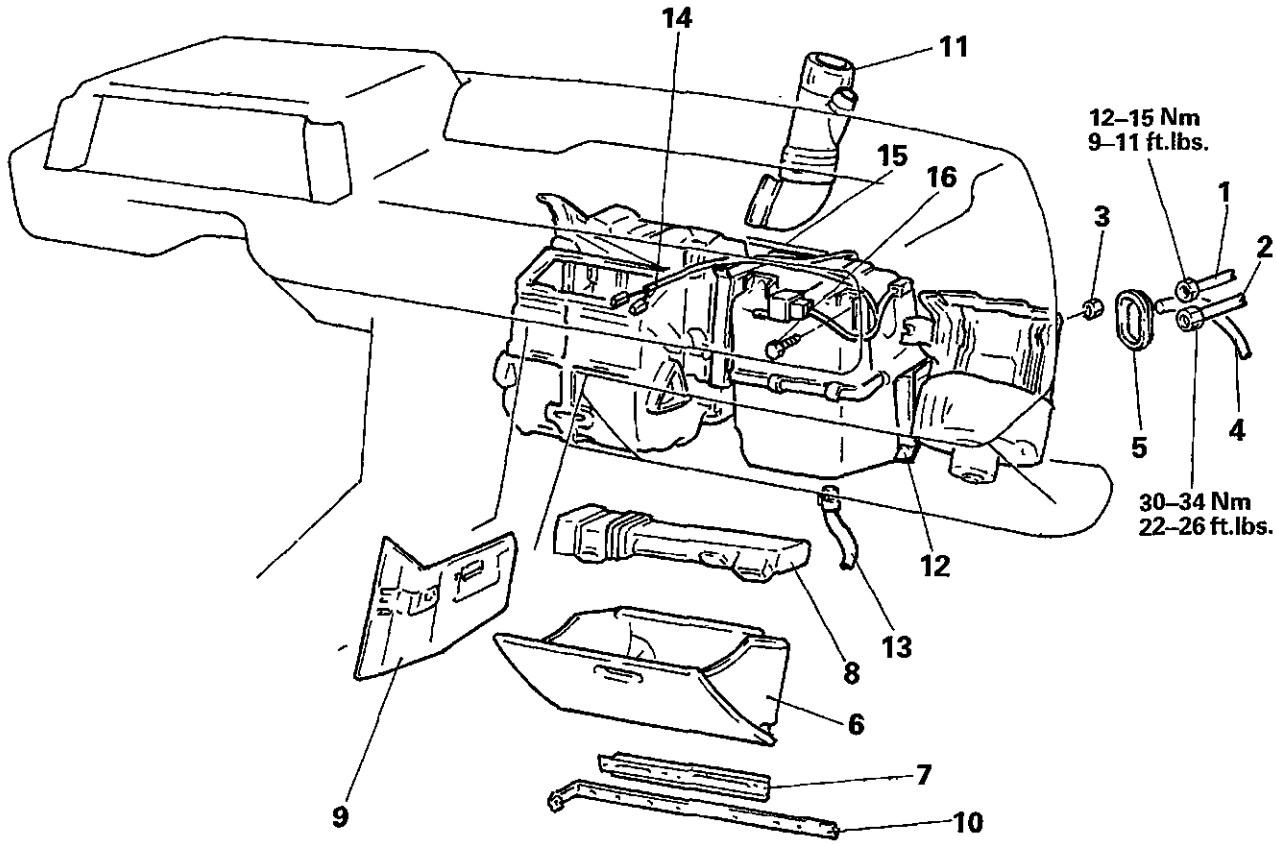
BLOWER MOTOR

(1) Connect the blower motor to the battery (battery positive terminal to terminal "2" and battery negative terminal to terminal "1") and check that the motor runs smoothly.
(2) Check that abnormal noise is not produced during rotation.

EVAPORATOR

N24RA--

REMOVAL AND INSTALLATION



20Y1626

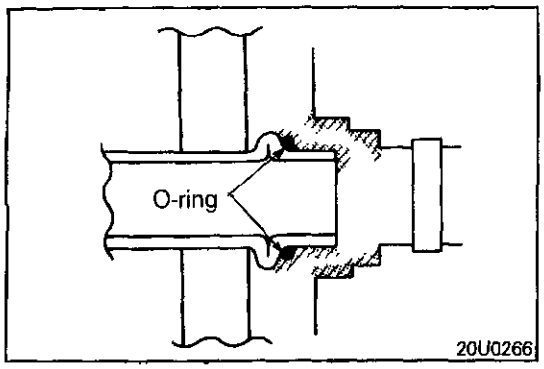
Removal steps

- ➧◆ 1. Liquid line connection
- ➧◆ 2. Suction line connection
- 3. Nut
- 4. Vacuum hose
- 5. Grommet
- 6. Glove box
- 7. Under cover
- 8. Lap heater duct
- 9. Side console duct
- 10. Glove box lower flame
- 11. Defroster duct
- 12. Duct joint
- 13. Drain hose connection
- 14. Harness connector connection
- 15. Vacuum hose
- 16. Bolt

Pre-removal Operation
- Discharge of Refrigerant (Refer to P.24-82)

Post-installation Operation
- Charging Refrigerant (Refer to P.24-84)

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ➧◆: Refer to "Service Point of Installation".

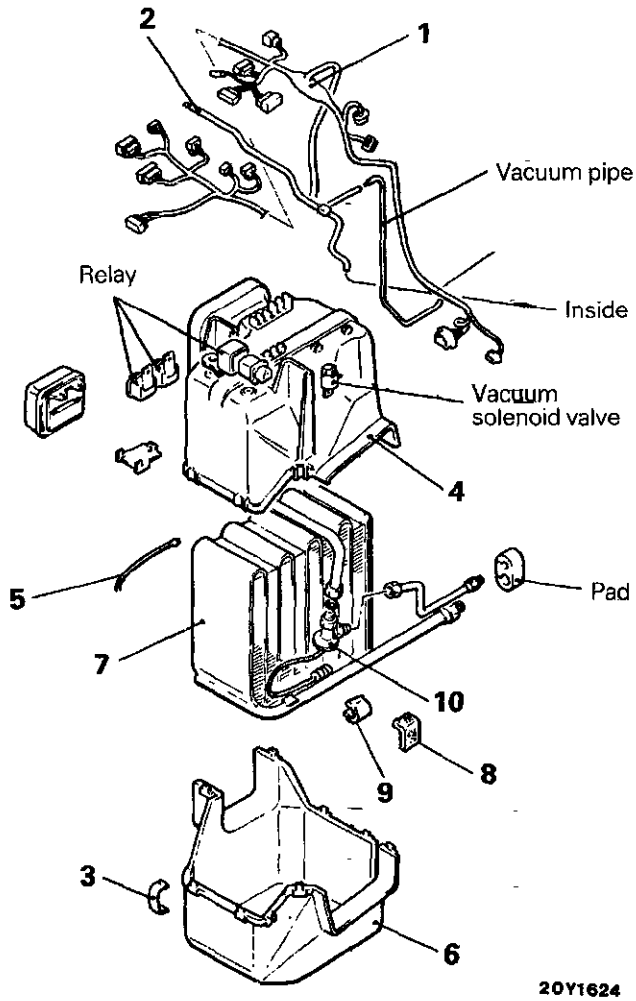


SERVICE POINTS OF INSTALLATION N24RDAC

2. APPLICATION OF COMPRESSOR OIL TO SUCTION LINE / 1. LIQUID LINE

Apply compressor oil to portions indicated before installing the liquid line and suction line.

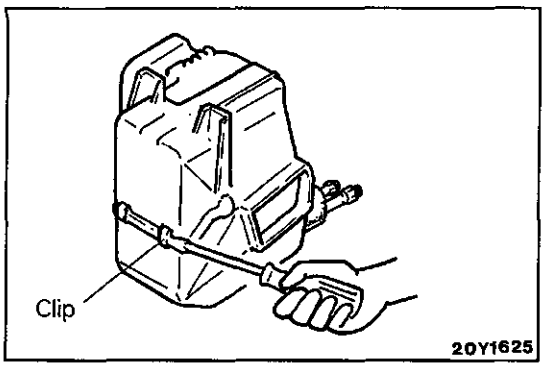
DISASSEMBLY AND REASSEMBLY N24RE--



Disassembly steps

1. Harness
2. Vacuum hose
◆◆ 3. Clip
4. Evaporator case upper
5. Air flow sensor
6. Evaporator case lower
7. Evaporator assembly
8. Sheet
9. Clip
◆◆ ◆◆ 10. Expansion valve

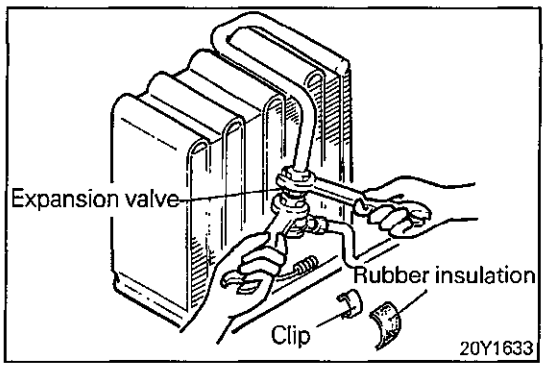
NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆: Refer to "Service Points of Disassembly".
(3) ◆◆: Refer to "Service Points of Reassembly".



SERVICE POINTS OF DISASSEMBLY N24RFAB

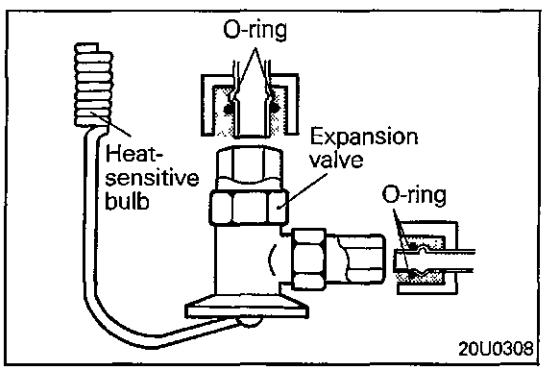
3. REMOVAL OF CLIP

Remove the clips with a flat-blade screwdriver covered with a shop towel to prevent damage to case surfaces.



10. REMOVAL OF EXPANSION VALVE

Use two wrenches to loosen the flare nut on the pipe connection (for both the inlet and outlet).



SERVICE POINT OF REASSEMBLY N24RHAD

10. APPLICATION OF COMPRESSOR OIL TO EXPANSION VALVE

Apply compressor oil to the O-rings and install the expansion valve to the evaporator assembly.

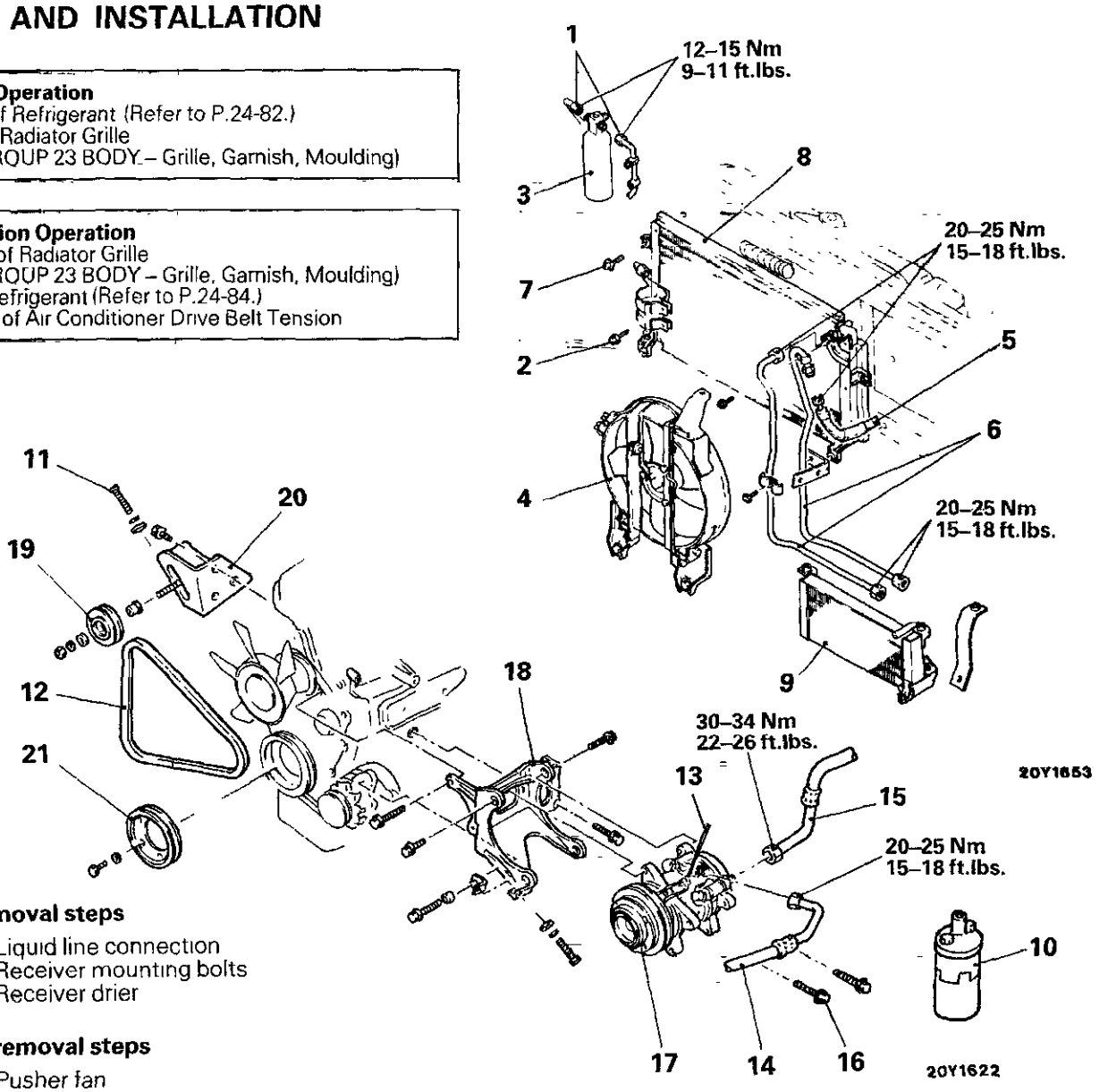
RECEIVER, CONDENSER, COMPRESSOR CLUTCH ASSEMBLY

N24TA--

REMOVAL AND INSTALLATION

Pre-removal Operation
- Discharge of Refrigerant (Refer to P.24-82.)
- Removal of Radiator Grille
  (Refer to GROUP 23 BODY – Grille, Garnish, Moulding)

Post-installation Operation
- Installation of Radiator Grille
  (Refer to GROUP 23 BODY – Grille, Garnish, Moulding)
- Charge of Refrigerant (Refer to P.24-84.)
- Adjustment of Air Conditioner Drive Belt Tension



Receiver removal steps

◆◆ 1. Liquid line connection
2. Receiver mounting bolts
3. Receiver drier

Condenser removal steps

4. Pusher fan
5. Discharge line connection
6. Discharge line (Vehicles with an automatic transmission)
7. Condenser mounting bolts
8. Condenser
9. Sub condenser (Vehicles with an automatic transmission)

Compressor removal steps

10. Ignition coil
11. Tension adjustment bolt
12. V-belt
13. Magnetic clutch harness connector connection

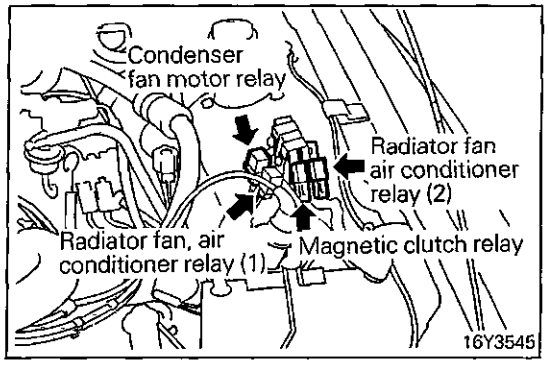
◆◆ 14. Dischange line connection
◆◆ 15. Suction line connection
16. Mounting bolt
17. Compressor
18. Compressor bracket
19. Tension pulley
20. Tension bracket
21. Crankshaft compressor pulley

NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆. Refer to "Service Points of Removal".

20Y1622

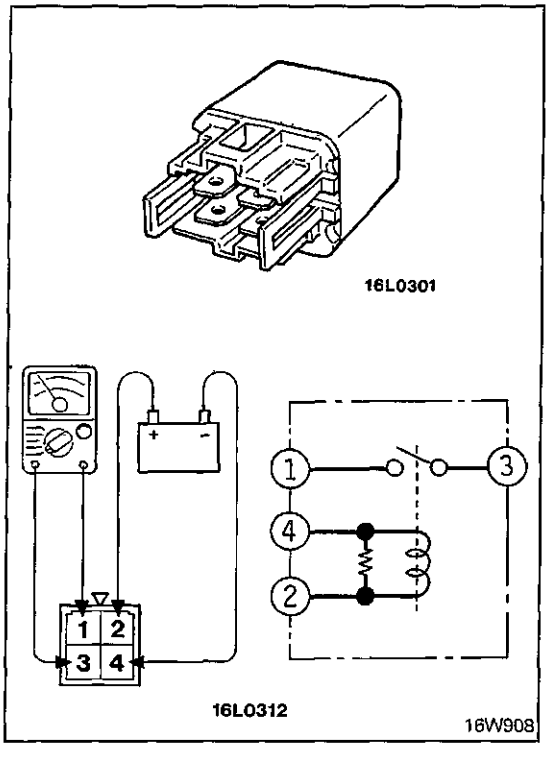
SERVICE POINT OF REMOVAL N24TBAB

Caution
If the hose or pipes are disconnected, cap the hoses or pipes with a blank plug to prevent entry of dust, dirt, and water.



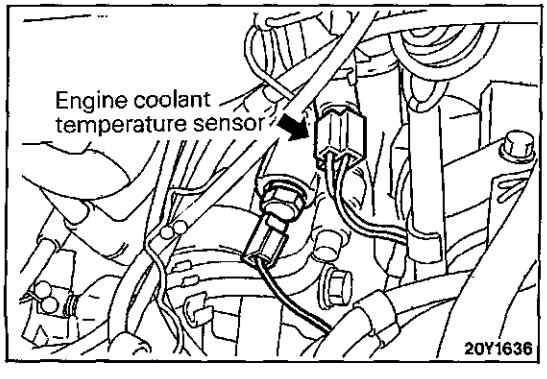
INSPECTION OF RADIATOR FAN AIR CONDITIONER RELAY, MAGNETIC CLUTCH RELAY, CONDENSER FAN MOTOR RELAY N24TCAD

(1) Remove the relay.



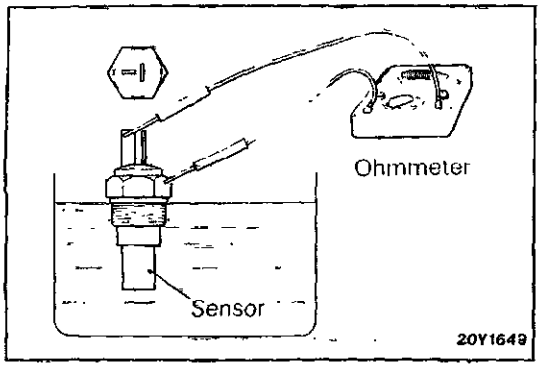
(2) Check continuity between terminals when the battery voltage is applied to the terminal 2 and the terminal 4 is grounded.

Voltage applied	Terminals 1 – 3	Conductive
Voltage not applied	Terminals 1 – 3	Non-conductive
	Terminals 2 – 4	Conductive



INSPECTION OF ENGINE COOLANT TEMPERATURE SENSOR

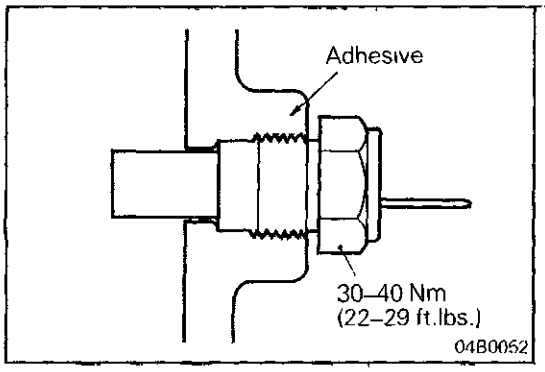
(1) Remove the engine coolant temperature sensor.



(2) Immerse the sensor section of the sensor in water and make sure that continuity is as follows at the water temperatures shown.

Standard value:

At 44 – 56°C (111 – 133°F) or higher	**Conductive**
At 43°C (109°F) or lower	**Non-conductive**

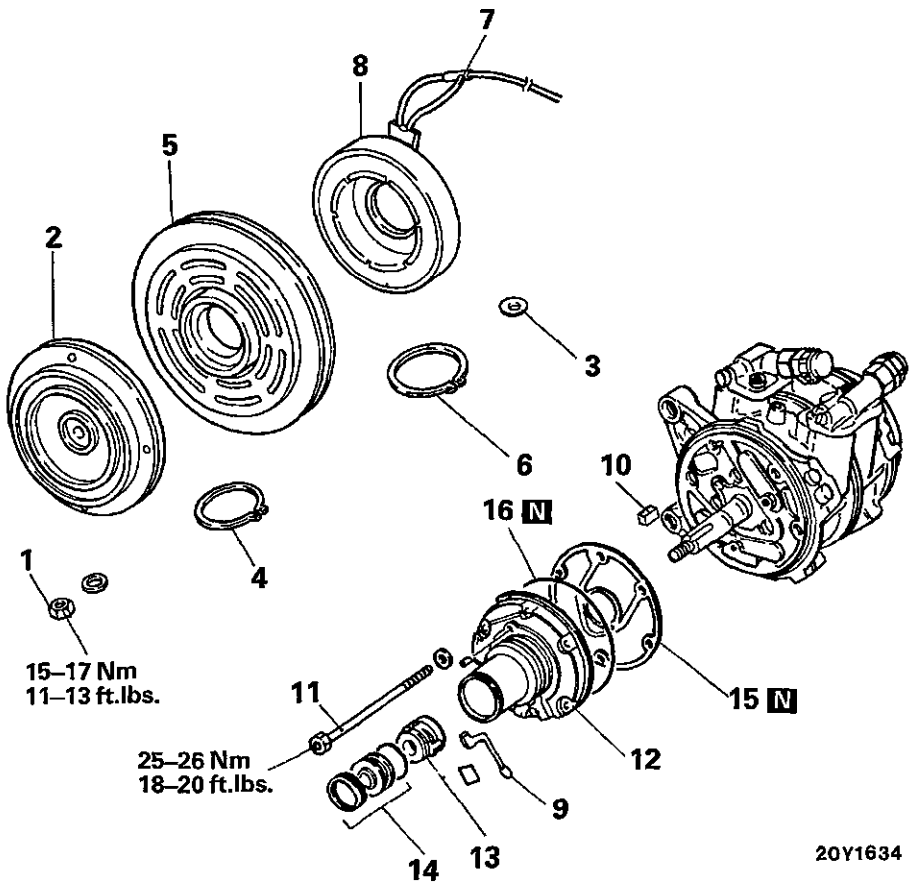


(3) After inspection, apply adhesive to the threaded portion of the engine coolant temperature sensor and install the sensor on the manifold.

COMPRESSOR

N24TE--

DISASSEMBLY AND REASSEMBLY



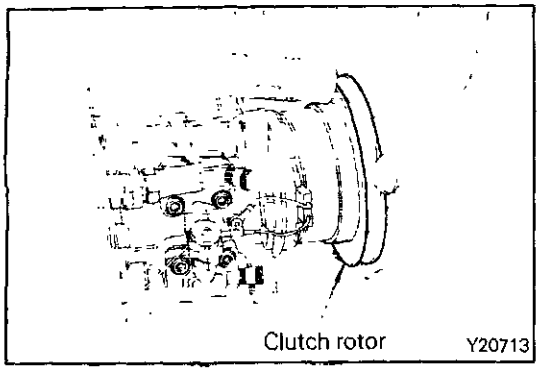
Magnetic clutch disassembly steps

1. Nut
2. Clutch hub
3. Shims
4. Snap ring
◆◆ ◆◆ 5. Rotor assembly
6. Snap ring
7. Ground terminal
◆◆ 8. Clutch coil

Compressor front housing

9. Oil drain guide
10. Woodruff key
11. Through bolts
◆◆ Refilling compressor oil
12. Front housing
◆◆ 13. Shaft seals
◆◆ 14. Seal plate
15. Gasket
16. O-ring

NOTE
(1) Reverse the disassembly procedures to reassemble.
(2) ◆◆: Refer to "Service Points of Disassembly".
(3) ◆◆: Refer to "Service Points of Reassembly".
(4) N: Non-reusable parts



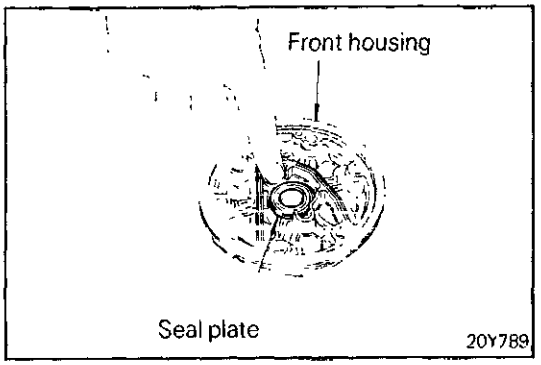
SERVICE POINT OF DISASSEMBLY N24TFAE

5. REMOVAL OF ROTOR ASSEMBLY

It may be necessary to lightly tap the rotor with a plastic hammer.

INSPECTION N24TGAE

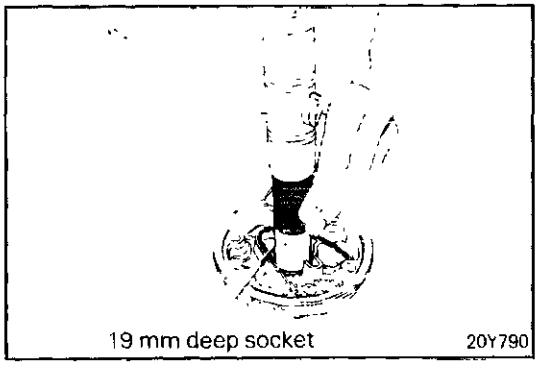
- Check the surface of the clutch hub for scoring or bluing.
- Check the surface of the rotor for scoring or bluing.
- Check the sealing surfaces for cracks, scratches and deformation.
- Check the front housing for cracks or scoring on the sealing surfaces.
- Check the compressor shaft for scoring.



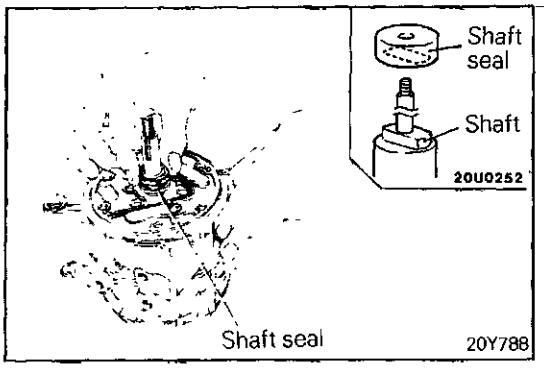
SERVICE POINTS OF REASSEMBLY N24THAE

14. INSTALLATION OF SEAL PLATE

Lubricate the seal plate and a new O-ring with compressor oil. Push the seal plate and O-ring into the front housing.



Install the seal plate into the front housing with a 19 mm deep well socket.

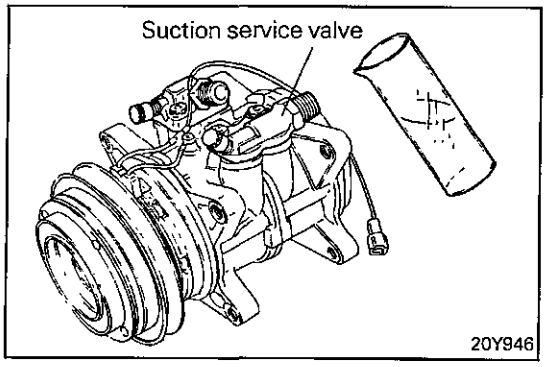


13. INSTALLATION OF SHAFT SEAL

Lubricate the shaft seal with compressor oil. Install the shaft seal on the shaft.

NOTE

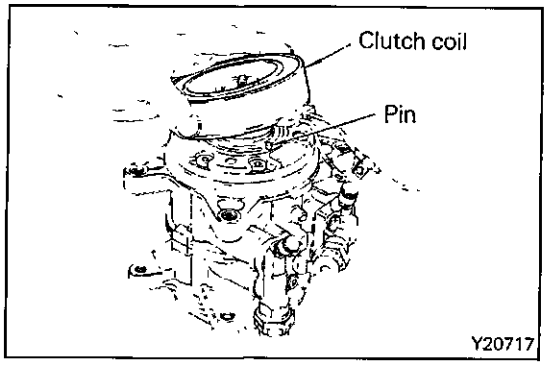
Rotate the shaft seal lightly by hand to check that it is fitted into the notch on the compressor shaft.



- **REFILLING COMPRESSOR OIL**

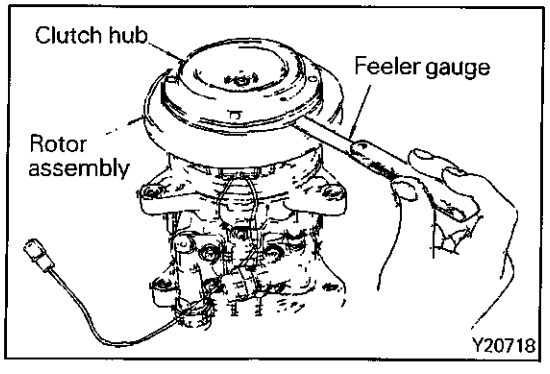
Pour the 115 cc (3.9 fl.oz.) or 170 cc (5.7 fl.oz.) of new compressor oil into the service valves.

When only compressor has been removed:
115 cc (3.9 fl.oz.)
When entire refrigerant system has been replaced:
170 cc (5.7 fl.oz.)



8. INSTALLATION OF CLUTCH COIL

The clutch coil must be aligned with the pin in the compressor housing.



5. INSTALLATION OF ROTOR ASSEMBLY

Clutch hub to rotor assembly clearance must be checked after installation.

MAGNETIC CLUTCH CLEARANCE

1. Tighten the clutch nut.
2. Check the clutch clearance as illustrated.

Pressure plate to rotor clearance:
0.4 – 0.7 mm (.02 – .03 in.)

NOTE
Remove clearance adjusting shims to decrease clutch clearance. Add shims selected from the following table to increase clutch clearance.

Clearance Adjustment Shims

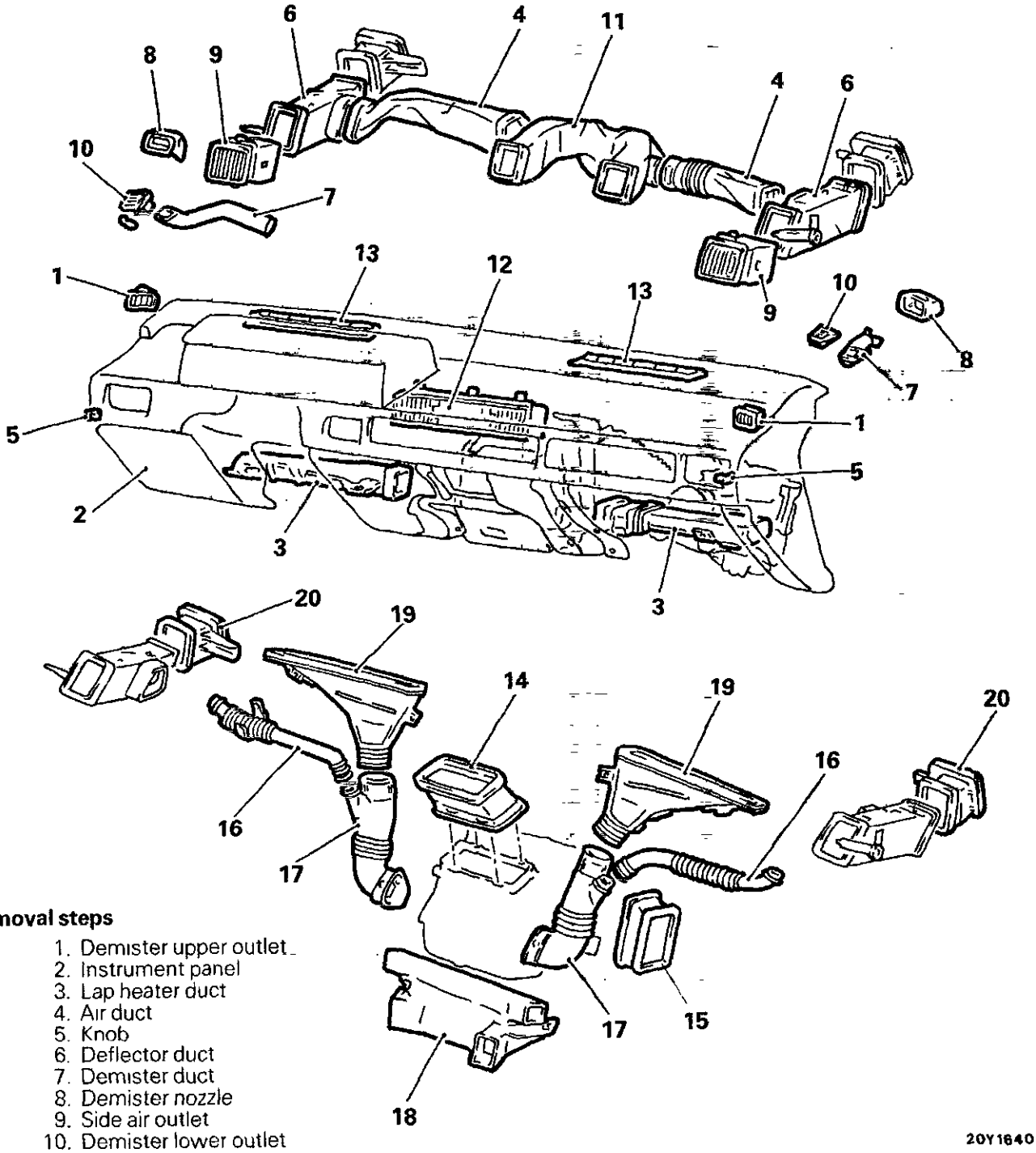
Part No.	Thickness mm (in.)
CSA935F100	0.1 (.004)
CSA935F100A	0.2 (.008)
CSA935F100B	0.5 (.020)

3. Turn the rotor by hand to confirm that it rotates freely.

VENTILATORS

N24MA-B

REMOVAL AND INSTALLATION



20Y1640

Removal steps

1. Demister upper outlet
2. ◆◆ Instrument panel
3. Lap heater duct
4. Air duct
5. Knob
6. ◆◆ Deflector duct
7. ◆◆ Demister duct
8. ◆◆ Demister nozzle
9. Side air outlet
10. ◆◆ Demister lower outlet
11. ◆◆ Center air duct
12. ◆◆ Center air outlet
13. ◆◆ Defroster garnish
14. Center ventilator duct
15. Duct joint
16. Demister hose
17. Air duct
18. Lap heater duct
19. ◆◆ Defroster duct
20. ◆◆ Side ventilator duct

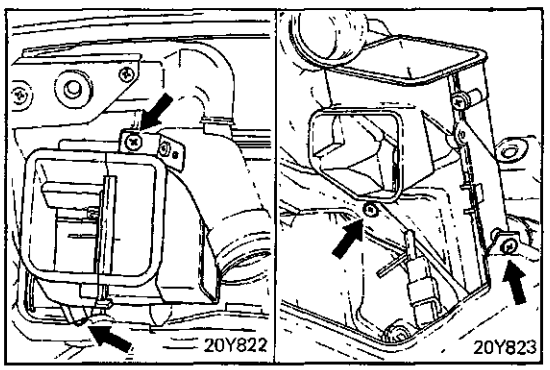
NOTE
(1) Reverse the removal procedures to reinstall.
(2) ◆◆: Refer to "Service Points of Removal".

SERVICE POINTS OF REMOVAL

N24MBAJ2

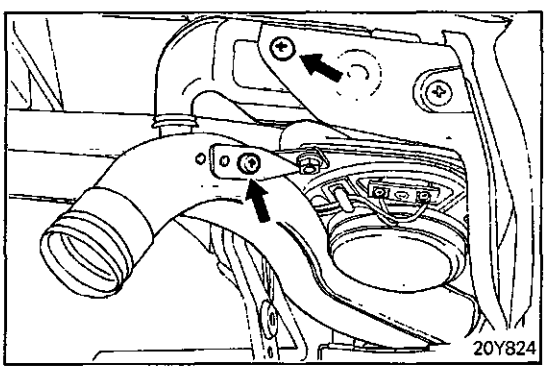
2. REMOVAL OF INSTRUMENT PANEL

Refer to GROUP 23 BODY – Instrument Panel.



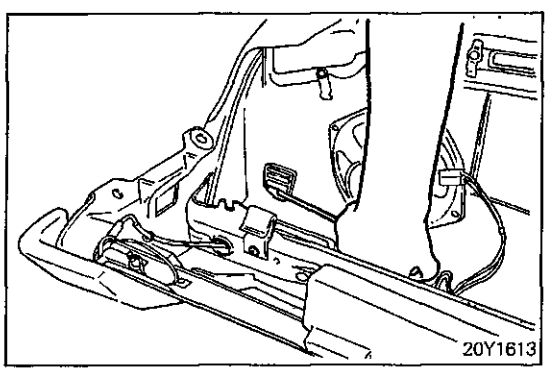
6. REMOVAL OF AIR DUCT

Remove the air duct and knob, and then remove the air duct.



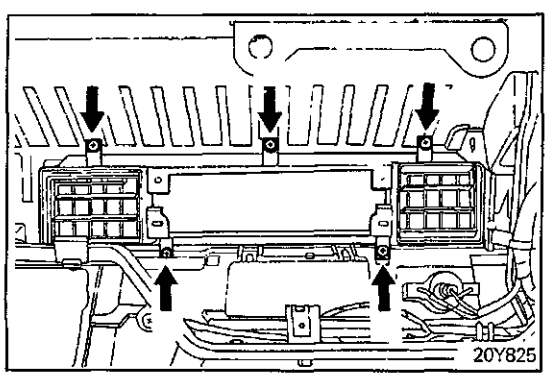
7. REMOVAL OF DEMISTER DUCT / 8. DEMISTER NOZZLE

Remove the demister duct and the demister nozzle.



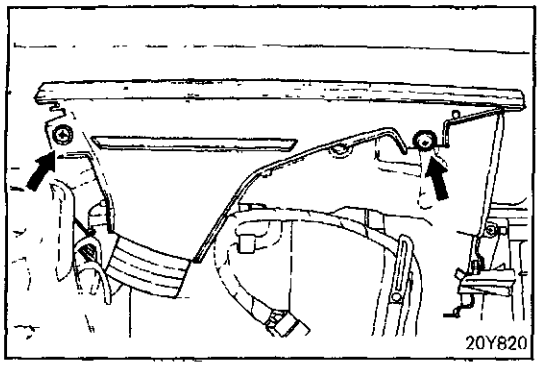
10. REMOVAL OF DEMISTER LOWER OUTLET

Remove the clip, and then remove the demister lower outlet.



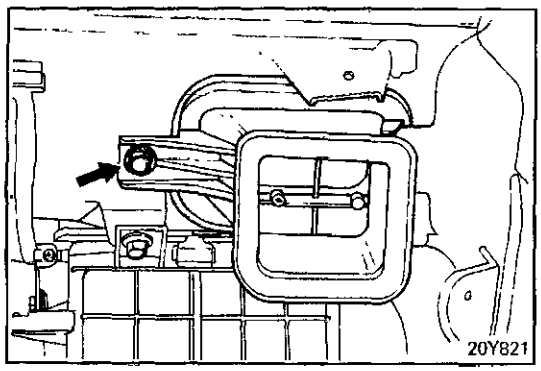
11. REMOVAL OF CENTER AIR DUCT / 12. CENTER AIR OUTLET

Remove the center air duct, and then remove the center air outlet.



6. REMOVAL OF AIR DUCT / 19. DEFROSTER DUCT

Remove the air duct, and then remove the defroster duct. Remove the instrument pad. (Refer to GROUP 23 BODY – Instrument Panel.)



20. REMOVAL OF SIDE VENTILATOR DUCT

Remove the side ventilator duct from the body.

INSPECTION

N24MCAAZ

Check all ducts for cracks.