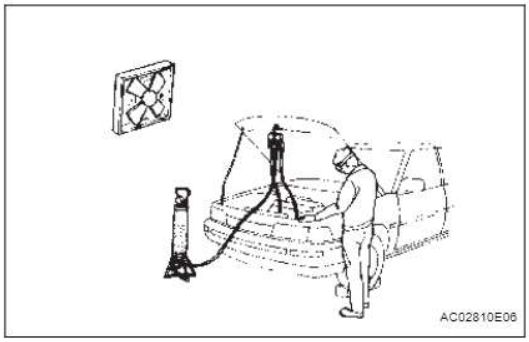
AIR CONDITIONING SYSTEM

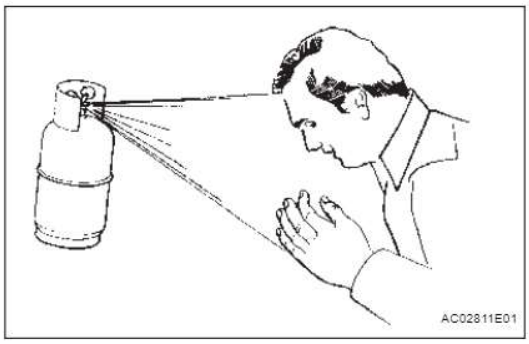
PRECAUTION

1. **NOTICE FOR INITIALIZATION**
   When disconnecting the cable from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.

System name	See procedure
Power Window Control System	See page WS-1

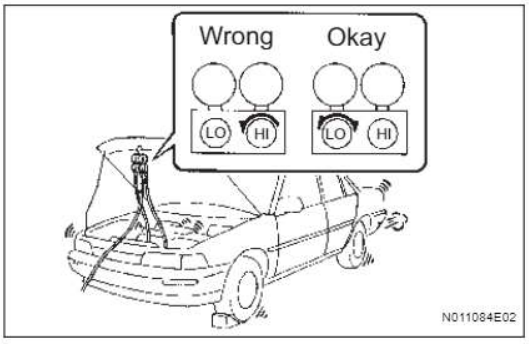
2. **NOTICES FOR HYBRID SYSTEM ACTIVATION**
   - When the warning light is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.
   - With the power switch's power mode changed to ON (IG), disconnect the battery. If the key is not in the key slot during reconnection, DTC B2799 may be output.
3. **BECAUSE COMPRESSOR HAS HIGH-VOLTAGE CIRCUIT, WEAR INSULATED GLOVES AND PULL OUT SERVICE PLUG TO CUT HIGH-VOLTAGE CIRCUIT BEFORE INSPECTION**
4. **DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME**
5. **ALWAYS WEAR EYE PROTECTION**





6. **BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN**
   If liquid refrigerant gets in your eyes or on your skin:
   (a) Wash the area with lots of cold water.
   CAUTION:
   Do not rub your eyes or skin.
   (b) Apply clean petroleum jelly to the skin.
   (c) Go immediately to a hospital or see a physician for professional treatment.
7. **NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME**
8. **BE CAREFUL NOT TO DROP CONTAINER OR APPLY PHYSICAL SHOCKS TO IT**

AC

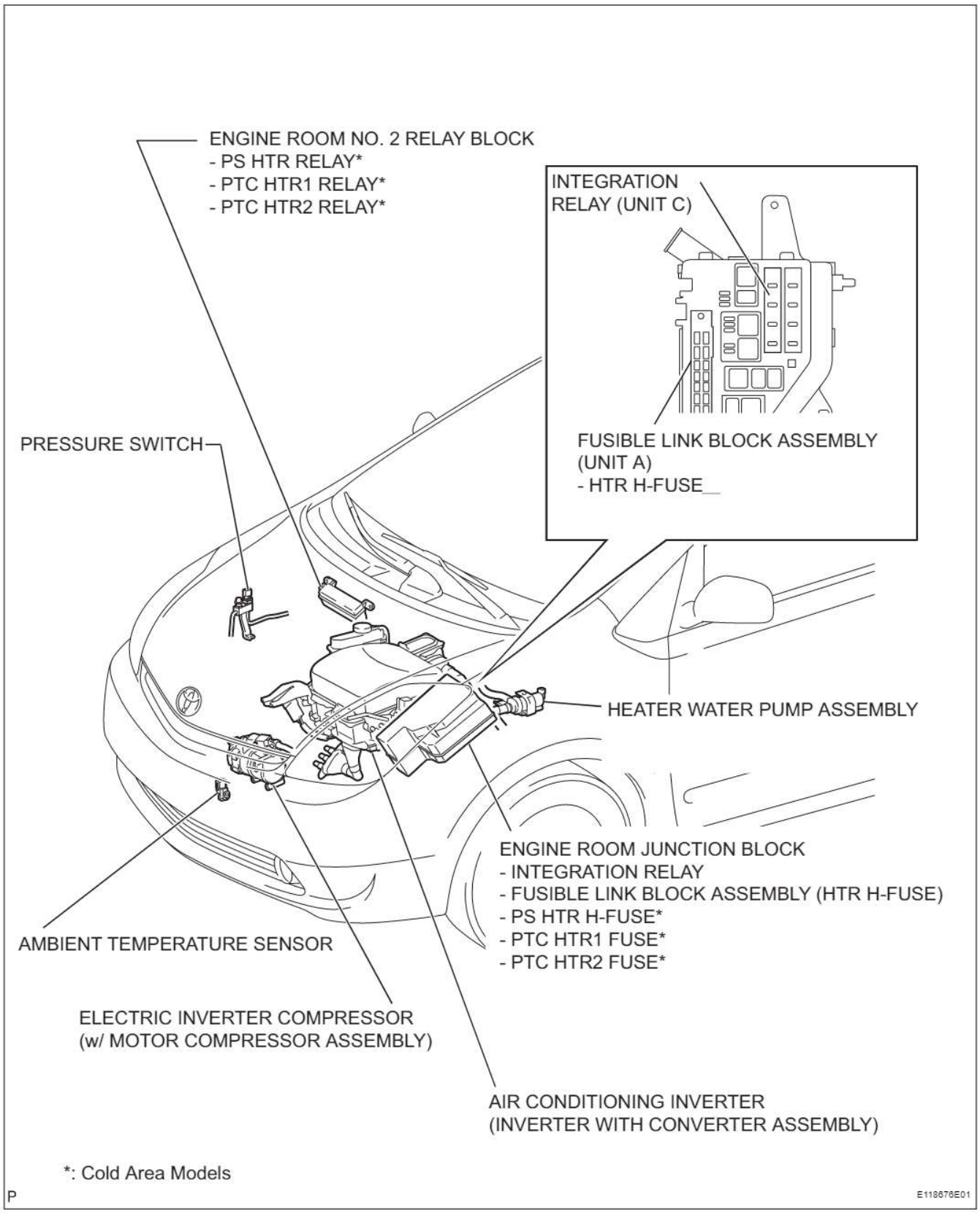


9. **DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN REFRIGERANT SYSTEM**
   If there is not enough refrigerant in the refrigerant system, oil lubrication will be insufficient and compressor burnout may occur. Necessary care should be taken to avoid this.
10. **DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING**
    Open and close only the low pressure valve. If the high pressure valves are opened, refrigerant flows in the reverse direction causing the charging cylinder to rupture.
11. **BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT**
    If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating, etc.
12. **PRECAUTIONS TO BE OBSERVED WHILE SERVICING**
    NOTICE:
    - **For the electric inverter compressor, use the ND-OIL 11.**
    - **Electrical insulation performance may decrease significantly if even a small amount of oil other than ND-OIL 11 is used or enters the refrigeration cycle, causing a DTC to be output.**
    - **Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND-OIL 11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing a DTC to be output.**

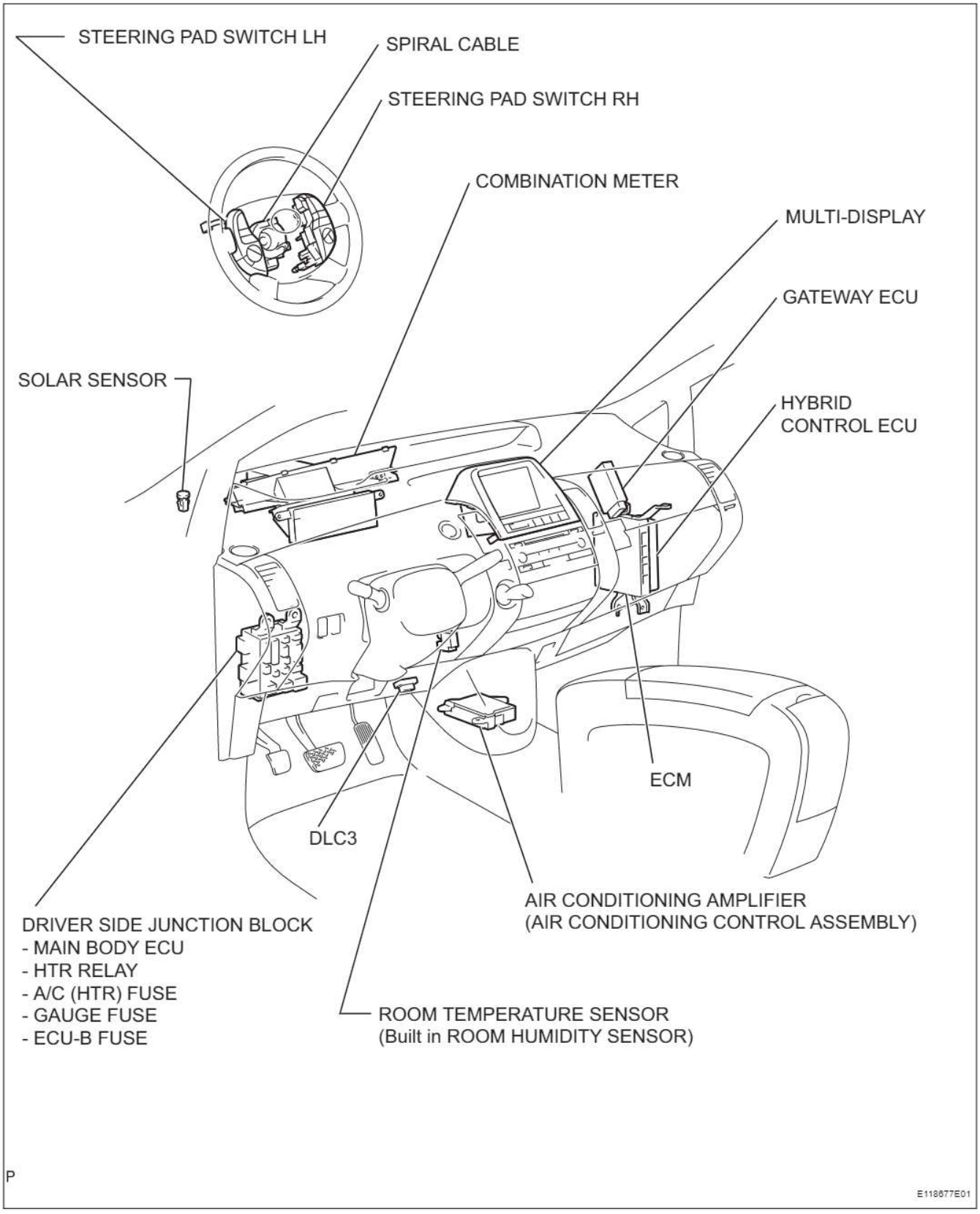
    CAUTION:
    Wear insulated gloves and pull out the service plug clip before inspection, as some of the procedures require disconnecting the high-voltage connectors.

AC

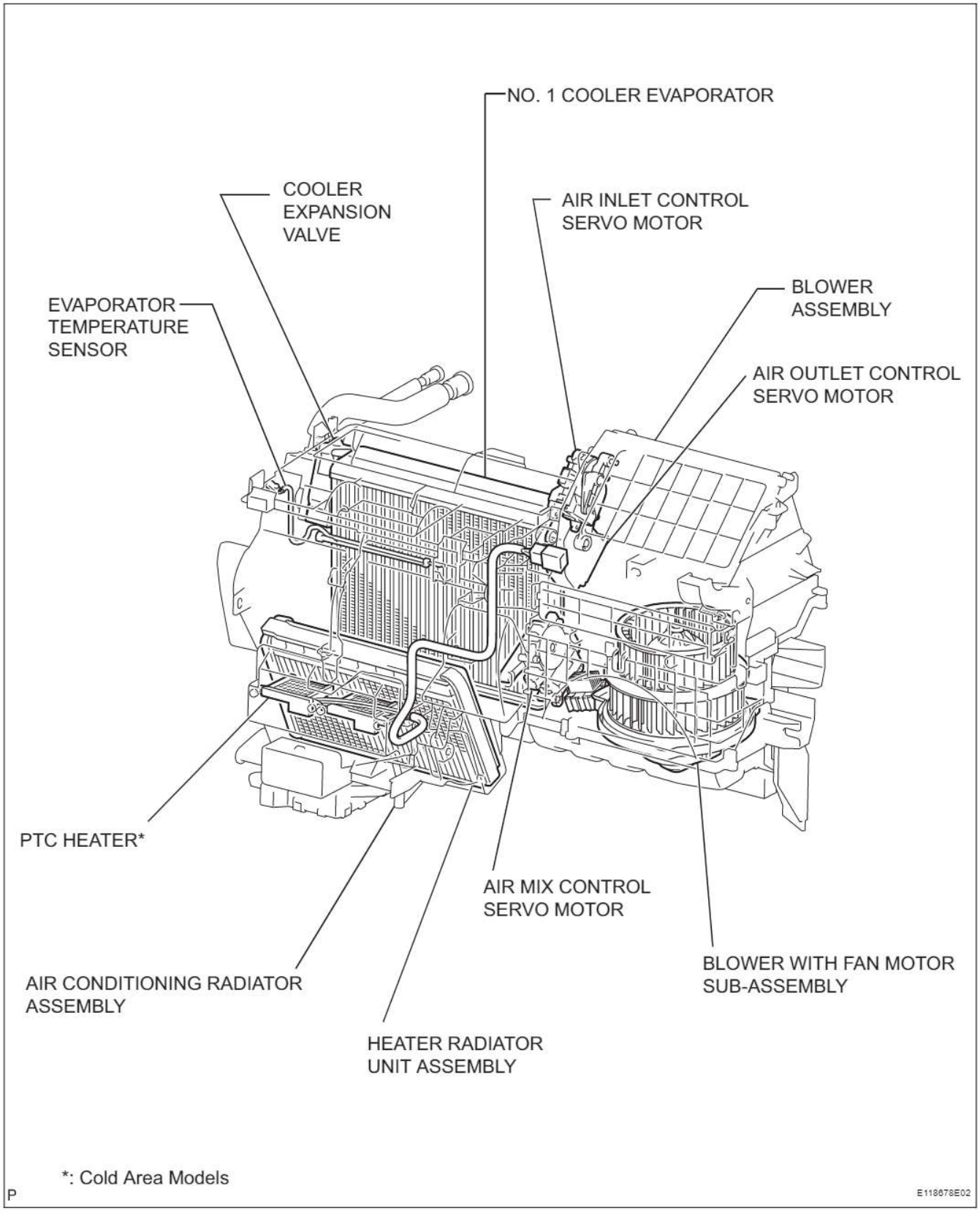
PARTS LOCATION



AC

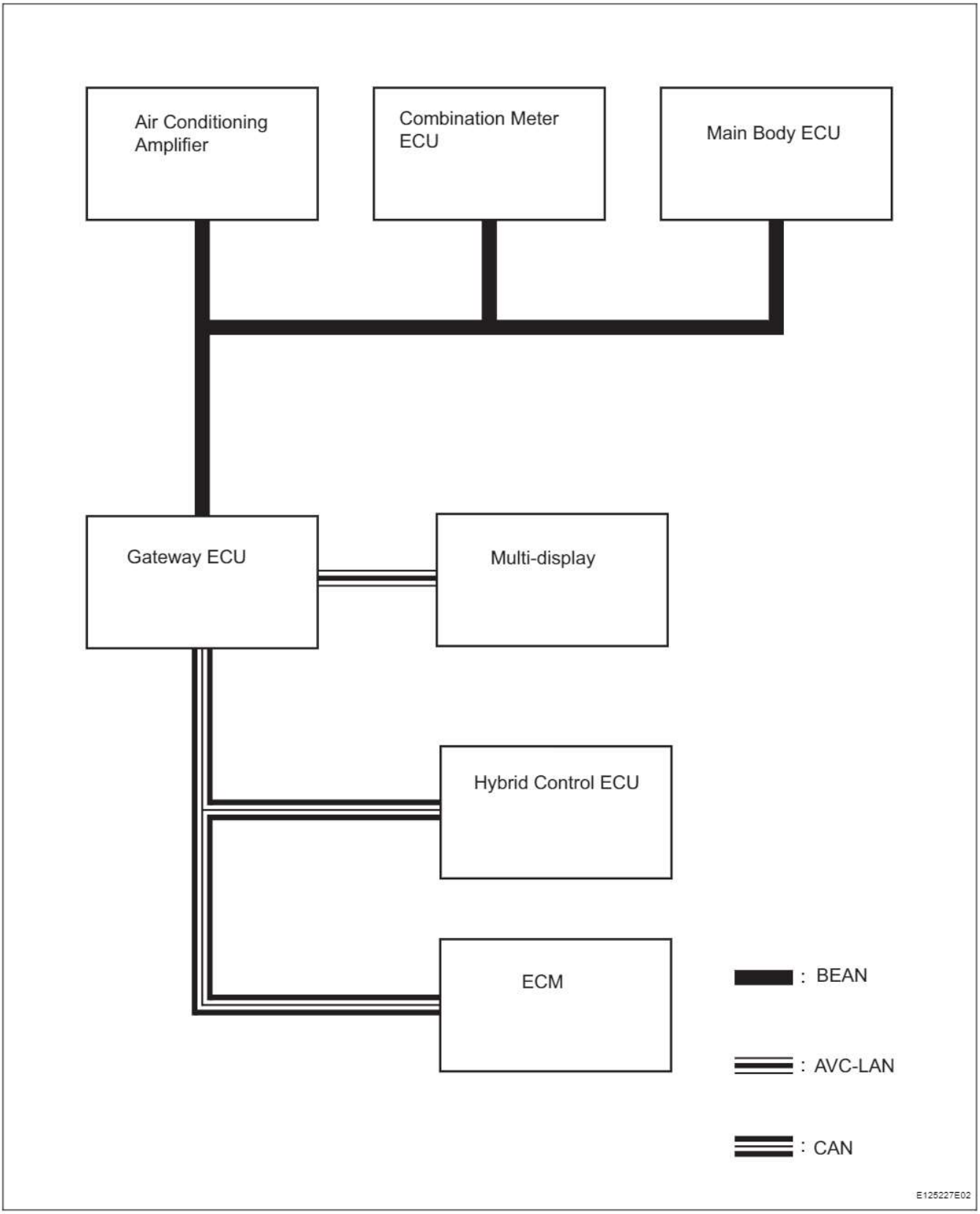

STEERING PAD SWITCH LH
SPIRAL CABLE
STEERING PAD SWITCH RH
COMBINATION METER
MULTI-DISPLAY
GATEWAY ECU
SOLAR SENSOR
HYBRID CONTROL ECU
ECM
DLC3
AIR CONDITIONING AMPLIFIER (AIR CONDITIONING CONTROL ASSEMBLY)
DRIVER SIDE JUNCTION BLOCK
- MAIN BODY ECU
- HTR RELAY
- A/C (HTR) FUSE
- GAUGE FUSE
- ECU-B FUSE
ROOM TEMPERATURE SENSOR (Built in ROOM HUMIDITY SENSOR)
P
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AC


NO. 1 COOLER EVAPORATOR
COOLER EXPANSION VALVE
AIR INLET CONTROL SERVO MOTOR
EVAPORATOR TEMPERATURE SENSOR
BLOWER ASSEMBLY
AIR OUTLET CONTROL SERVO MOTOR
PTC HEATER*
AIR MIX CONTROL SERVO MOTOR
BLOWER WITH FAN MOTOR SUB-ASSEMBLY
AIR CONDITIONING RADIATOR ASSEMBLY
HEATER RADIATOR UNIT ASSEMBLY
*: Cold Area Models
P
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AC

SYSTEM DIAGRAM



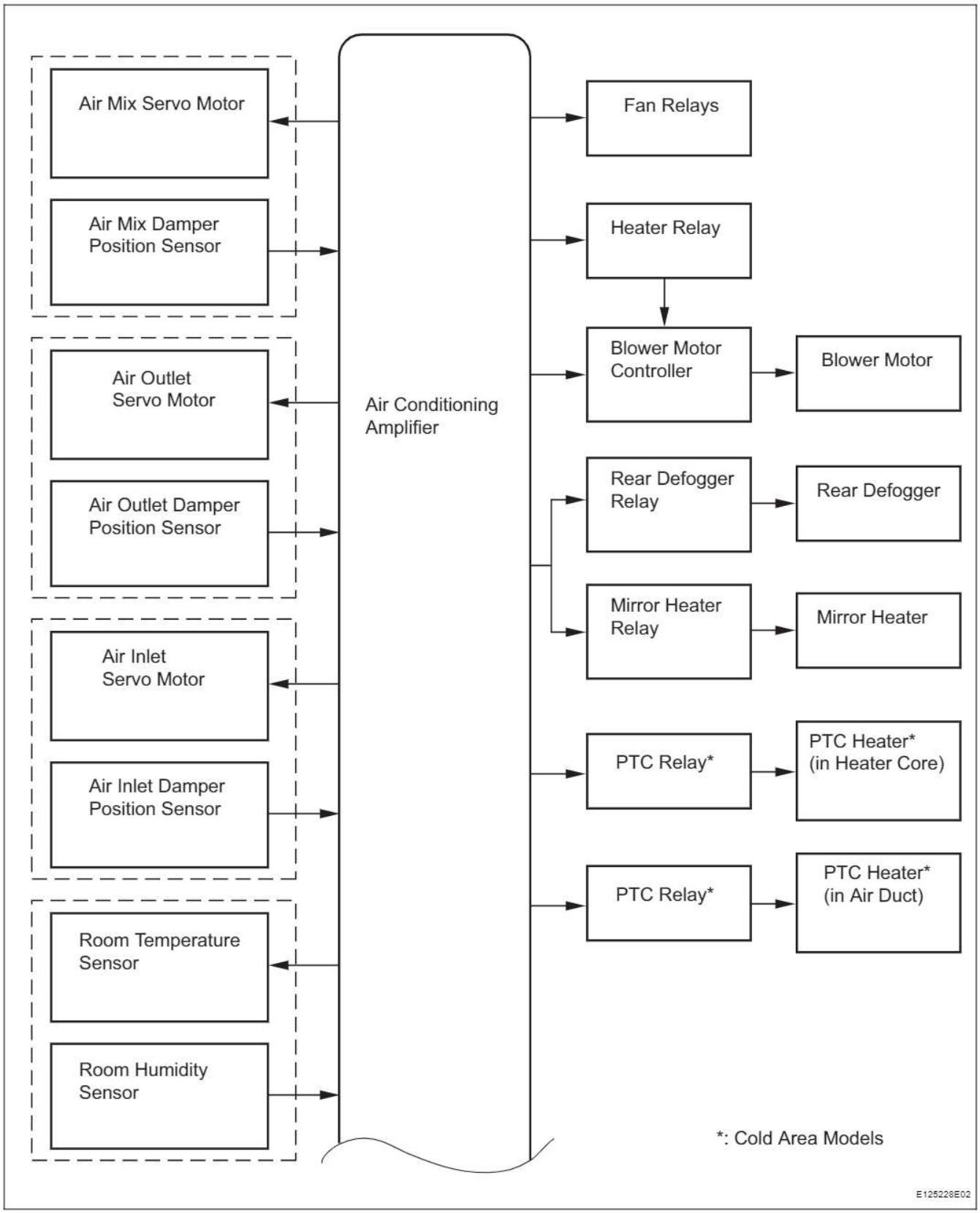
AC

Transmitter	Receiver	Line	Signal
Air Conditioning Amplifier	Combination Meter ECU	BEAN	Ambient temperature
			A/C AUTO indicator display signal
			Room temperature indicator display signal
			Fr. DEF indicator display signal
			Rr. DEF indicator display signal
	Multi-display	AVC-LAN	Ambient temperature
			AUTO, FRS, REC, Fr.DEF, Rr.DEF, A/C, FACE, B/L, FOOT, F/D display signal
			Buzzer sounding signal
			A/C indicator screen display signal
			A/C diagnosis status signal
			Blower airflow volume display signal
			A/C function information signal (rear A/C, A/C type (single, right/ left independent), Rec/Frs control, temperature display, air purifier presence, blower step, destination)
			Inside multi-display D/P seats temperature display signal
	Hybrid Control ECU	CAN	Compressor operation signal
			A/C status signal
			Water pump ON / OFF demand signal
			E/G ON demand signal
	ECM	CAN	Water temperature signal
			E/G speed signal
			Ambient temperature signal
			Thermal storage 3-port valve heater side closed signal

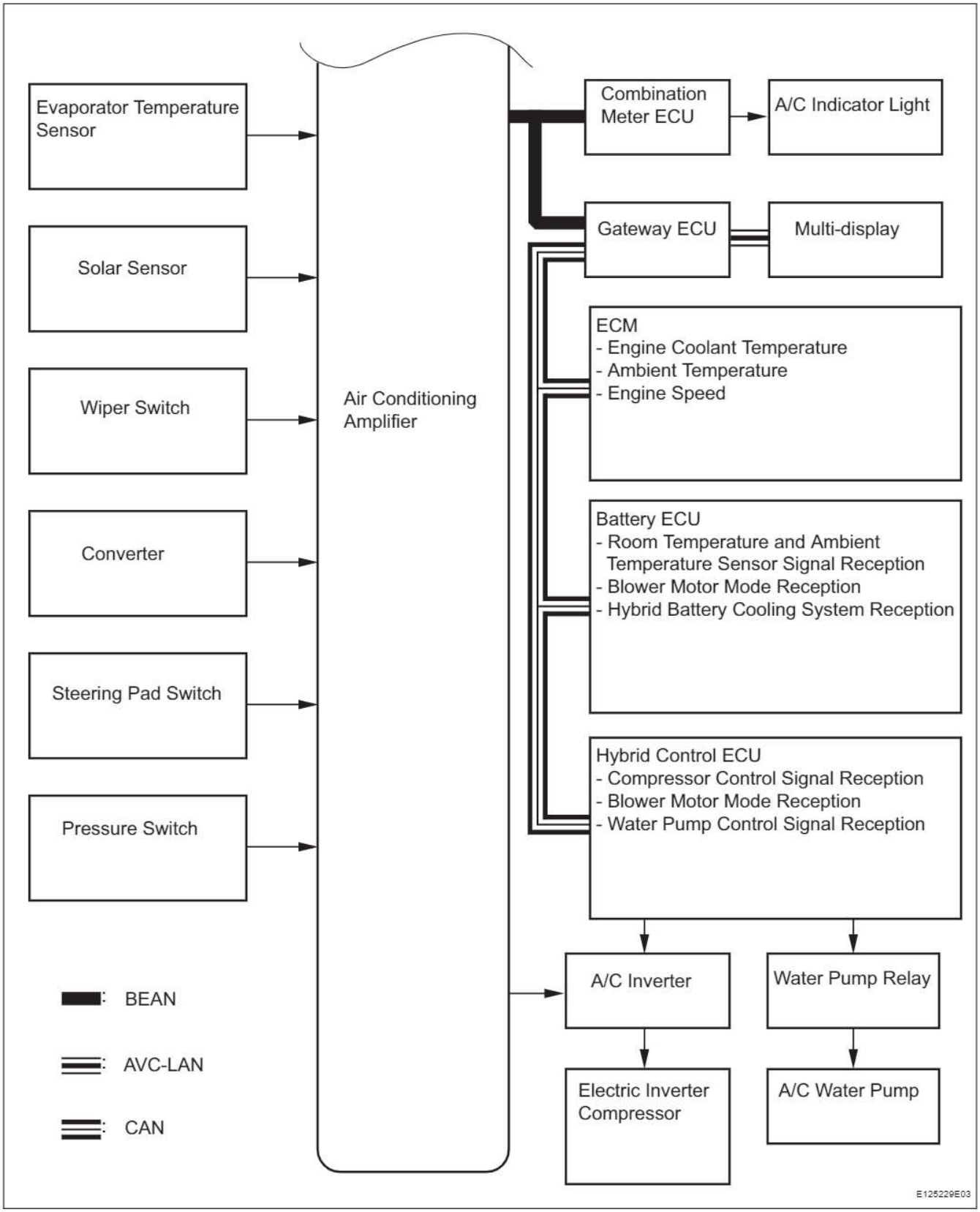
AC

Transmitter	Receiver	Line	Signal
Combination Meter ECU	Air Conditioning Amplifier	BEAN	Vehicle speed signal
Body ECU		BEAN	DTC clear signal
			Diagnosis tool demand signal
			Vehicle specs signal
Multi-display		AVC-LAN	A/C operation signal
			A/C control signal
Hybrid Control ECU		CAN	Use permissible power signal
			A/C water pump operation signal
			Standby condition signal
			Shift position signal
			Drive ready indication signal
			SOC level data signal
			EV mode state signal
			A/C motor speed signal
			A/C input power signal
			A/C motor current flow order signal
			A/C inverter temperature signal
			A/C inverter voltage signal
			A/C ECU diagnosis signal

AC


Air Mix Servo Motor
Air Mix Damper Position Sensor
Air Outlet Servo Motor
Air Outlet Damper Position Sensor
Air Inlet Servo Motor
Air Inlet Damper Position Sensor
Room Temperature Sensor
Room Humidity Sensor
Air Conditioning Amplifier
Fan Relays
Heater Relay
Blower Motor Controller
Blower Motor
Rear Defogger Relay
Rear Defogger
Mirror Heater Relay
Mirror Heater
PTC Relay*
PTC Heater* (in Heater Core)
PTC Relay*
PTC Heater* (in Air Duct)
*: Cold Area Models
E125228E02

AC


Evaporator Temperature Sensor
Solar Sensor
Wiper Switch
Converter
Steering Pad Switch
Pressure Switch
Air Conditioning Amplifier
Combination Meter ECU
A/C Indicator Light
Gateway ECU
Multi-display
ECM
- Engine Coolant Temperature
- Ambient Temperature
- Engine Speed
Battery ECU
- Room Temperature and Ambient Temperature Sensor Signal Reception
- Blower Motor Mode Reception
- Hybrid Battery Cooling System Reception
Hybrid Control ECU
- Compressor Control Signal Reception
- Blower Motor Mode Reception
- Water Pump Control Signal Reception
A/C Inverter
Water Pump Relay
Electric Inverter Compressor
A/C Water Pump
: BEAN
: AVC-LAN
: CAN
E125229E03

AC

SYSTEM DESCRIPTION

1. GENERAL

The air conditioning system has the following features:

- An ES18 type Electric Inverter Compressor is used. This compressor is driven by an alternating current provided by the A/C inverter, which is built into the inverter of the hybrid system.
  As a result, the air conditioning system is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioning system and low fuel consumption.
- A blower motor controller, which regulates the speed of the blower motor by controlling the output voltage in accordance with the duty cycle signal provided by the air conditioning amplifier, is used.
  As a result, the power loss associated with the heat generation of the conventional blower linear controller is reduced, thus realizing low fuel consumption.
- A humidity sensor function is added to the room temperature sensor in order to optimize the amount of dehumidification effort during the operation of the air conditioning system.
- A compact, lightweight and highly efficient RS (Revolutionary Slim) evaporator is used.
- A compact, lightweight and highly efficient MF-IV (Multi Flow-IV) condenser is used.
- A compact, lightweight, and highly efficient electrical water pump is used in order to ensure the proper heater performance while the engine is stopped.
- Fuzzy control is used for calculating the required outlet air temperature (TAO: Temperature Air Outlet) and the blower volume in the automatic air conditioning control system. Accordingly, the air conditioning ECU is able to calculate the outlet air temperature, blower volume, air outlet, and compressor speed that is suited to the operating environment. As a result, the comfort level of the occupants is improved.

2. AIR CONDITIONING OPERATION

- The air conditioning is controlled by using the switches that appear on the air conditioning screen display of the multi-display and the switches provided on the steering pad.
- In addition to the air conditioning screen display, the operating conditions of the AUTO, RECIRCULATION, front DEF, and rear DEF switches are indicated by the indicator lights in the combination meter.

3. HEATER CORE AND PTC HEATER

- A compact, lightweight, and highly efficient straight flow (full-path flow) aluminum heater core is used. A PTC (Positive Temperature Coefficient) heater is built into the heater core tube.

AC

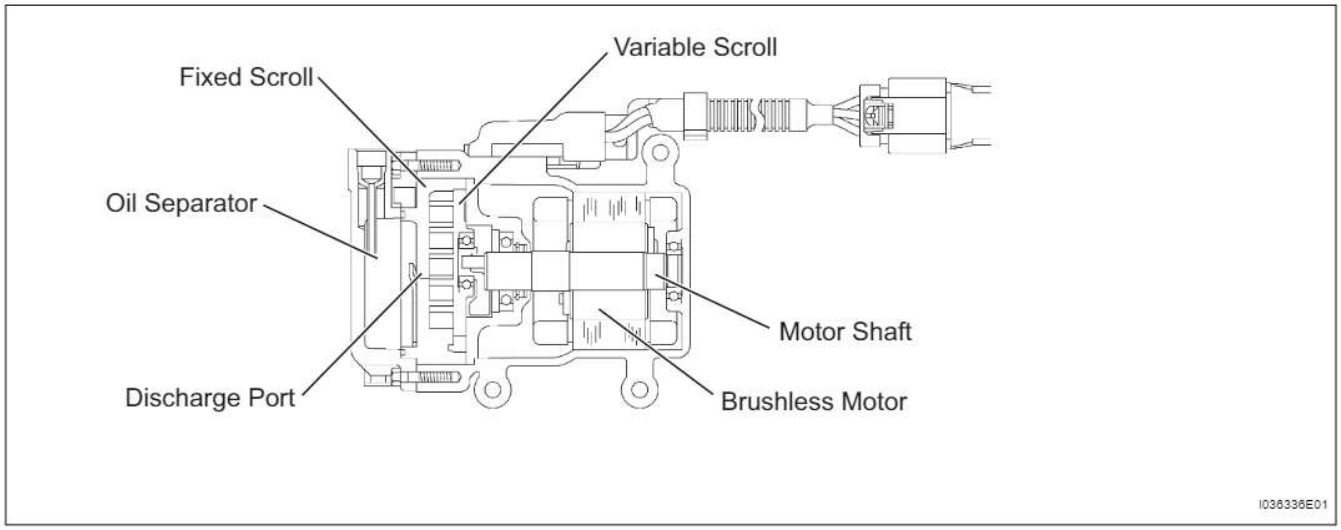
- The PTC heater contains electrodes that are interposed with a PTC element, to which current is applied in order to warm the air that passes through the fins.
- The PTC heater is provided in the air duct at the footwell outlet in front of the air conditioning unit. This PTC heater, which is a honeycomb-shaped PTC thermistor, directly warms the air that flows in the duct.

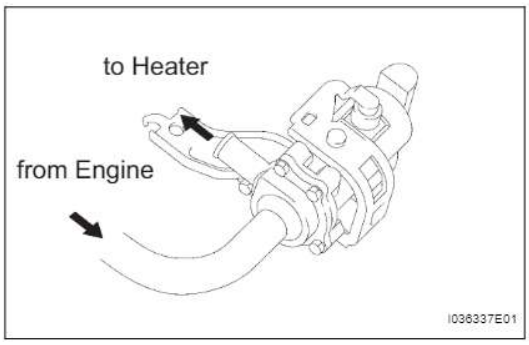
4. COMPRESSOR

- ES18 Electric Inverter Compressor is actuated by a built-in electric motor.
- The electric motor is actuated by the alternating current power (201.6 V) supplied by the A/C inverter, which is integrated in the hybrid system inverter. As a result, the air conditioning control system is actuated without depending on the operation of the engine, thus realizing a comfortable air conditioning system and low fuel consumption.
- The electric inverter compressor controls the compressor speed at the required speed calculated by the air conditioning amplifier. Thus, cooling, dehumidification performance and power consumption are optimized.
- The suction and discharge hoses at the compressor are low-moisture permeation hoses. This minimizes the entry of moisture into the refrigeration cycle.
- The compressor uses high-voltage alternating current. If a short or open circuit occurs in the compressor wiring harness, the hybrid control ECU will cut off the A/C inverter circuit in order to stop the power supply to the compressor.
- The Electric Inverter Compressor consists of a spirally wound fixed scroll and variable scroll that form a pair, a brushless motor, an oil separator, and a motor shaft.
- The fixed scroll is integrated with the housing. Because the rotation of the shaft causes the variable scroll to revolve while maintaining the same posture, the volume of the space that is partitioned by both scrolls varies to perform the suction, compression, and the discharge of the refrigerant gas.
- Locating the suction port directly above the scrolls enables direct suction, thus realizing improved suction efficiency.
- Containing a built-in oil separator, this compressor is able to separate the compressor oil that is intermixed with the refrigerant and circulates in the refrigeration cycle, thus realizing a reduction in the oil circulation rate.

AC

HINT:
In order ensure the proper insulation of the internal high-voltage portion of the compressor and the compressor housing, a compressor oil (ND-OIL 11) with a high level of insulation performance is used. Therefore, never use a compressor oil other than the ND-OIL 11 type compressor oil or its equivalent.





5. WATER PUMP

- An electrical water pump is used. This provides a stable heater performance even if the engine is stopped because of a function of the THS-II.
- A new type of electrical water pump is used in which the water flow resistance has been reduced.

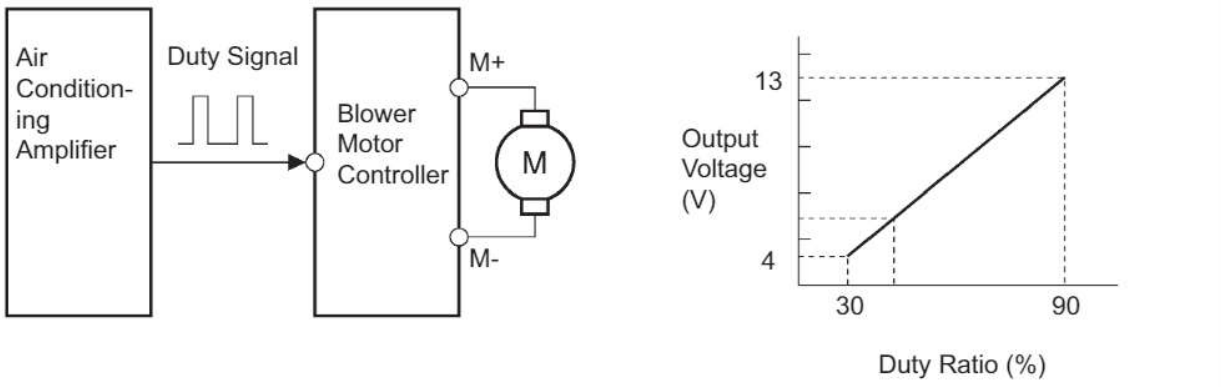
6. ROOM TEMPERATURE SENSOR AND HUMIDITY SENSOR

- A humidity sensor function is used by the room temperature sensor. By enabling the detection of humidity in the vehicle interior, this function optimizes the amount of dehumidification effort during the operation of the air conditioning system. As a result, the power consumption of the compressor has been reduced and a comfortable level of humidity has been realized in the vehicle interior.
- The humidity-sensing resistance film that is built into the humidity sensor absorbs and releases the humidity in the vehicle interior. During the absorption and releasing processes, the humidity-sensing resistance film expands (during the absorption of humidity) and contracts (during drying). The clearance between the carbon particles in the humidity-sensing resistance film expands and contracts during absorption and drying, thus changing the resistance between the electrodes. The air conditioning amplifier determines the humidity in the vehicle interior through the changes in the output voltage of the humidity sensor that are caused by the resistance between the electrodes.

AC

7. BLOWER MOTOR CONTROLLER

The blower motor controller controls the voltage that is output to the blower motor in accordance with the duty cycle signals that are input by the air conditioning amplifier. It is characterized by a smaller amount of heat generation than the blower controller used on the previous model. As a result, the power loss associated with the heat generation of the conventional blower linear controller has been reduced, thus realizing low fuel consumption.



8. AIR CONDITIONING AMPLIFIER

The air conditioning ECU has the following controls.

Control		Outline
Fuzzy Control		The fuzzy control determines the conformity levels of the temperature deviation, ambient temperature, and solar radiation by defining their respective mathematical functions. In addition, a fuzzy calculation method is used to calculate the required outlet air temperature (TAO) and the blower volume. Based on these calculations, the air conditioning amplifier effects the respective controls for the outlet air temperature, blower volume, compressor, and air outlet.
Outlet Air Temp. Control	Air Mix Damper Control	In response to the temperature control switch setting, the required outlet air temperature, evaporator temperature sensor, and engine coolant temperature sensor compensations are used by the air mix control damper control to calculate a tentative damper opening angle, through an arithmetic circuit in the air mix damper, to arrive at a target damper opening angle.

AC

Control		Outline
Blower Control	Blower Motor Start Up Control	When the blower motor is started up, the air conditioning amplifier transmits a blower motor actuation signal with a low duty cycle ratio to the blower pulse controller, which applies a low voltage to the blower motor, in order to operate the blower motor for 3 seconds at a low speed. This is designed to protect the blower pulse controller from a sudden start-up voltage surge.
	Manual Control	Sets the blower speed according to operation of the blower switch.
	Automatic Control	Step Less Air Volume Control: • When the AUTO switch located on the steering pad switch is pushed, or the air conditioning screen display of the multi-display is touched, the air conditioning amplifier automatically regulates the duty ratio to the blower pulse controller in accordance with a calculation result by the fuzzy control in order to deliver step less air volume. Warm-up Control: • When the air outlet is in the FOOT, BI-LEVEL, or FOOT/DEF mode, the blower will not operate until the engine coolant temperature increases above a prescribed value. When the temperature increases above a prescribed value, the blower motor operates at the LO speed. Time-Lagged Air Flow Control: • 2 types of time-lagged air flow control (in accordance with the detected by the evaporator temperature sensor) help prevent hot air from being emitted from FACE or BI-LEVEL vent. Sunlight Air Flow Control: • Controls the blower speed in accordance with the intensity of the sunlight when the air outlet mode is at FACE or BI-LEVEL. The blower speed can be adjusted in response to the signal received from the solar sensor.
Air Outlet Control	Manual Control	Changes the air outlet in accordance with the selected position of the mode select switch.
	Automatic Control	Mode Damper Switching Servo motor Control: • When the AUTO switch is pushed, automatic control causes the mode servo motor to rotate to a desired position in accordance with the target damper opening, which is based on the calculation of the TAO. Low-Temperature FOOT/DEF Control: • In accordance with the engine coolant temperature, ambient temperature, amount of sunlight, required outlet temperature (TAO), and vehicle speed conditions, this control automatically switches the blower outlet between the FOOT / DEF modes to prevent the window from becoming fogged when the outside air temperature is low.

AC

Control		Outline
Air Inlet Control	Manual Control	Drives the air inlet servo motor according to the operation of the air inlet control switch and fixes the dampers in the FRESH or RECIRC position.
	Automatic Control	Automatic RECIRC / FRESH Control: • When the AUTO switch is pressed, the system controls the servo motor so that the air inlet is as calculated in accordance with the TAO. DEF Mode Control: • When switching the mode switching switch to DEF mode, air conditioning amplifier turns MAX mode ON forcibly and switched to FRESH mode. • When switching the mode switching switch to FOOT / DEF mode, air conditioning amplifier switches to FRESH mode.
2-Way Flow Mode Control		At the time of selecting FRESH mode, the air conditioning amplifier will judge it as 2-way flow mode when the blower outlet is set to FOOT or FOOT / DEF, the tentative air mix damper opening angle is above the specified value (MAX HOT), and either the blower volume is more than the specified volume or the vehicle speed is less than the specified speed.
Half Inlet Air Mode Control		At the time of selecting FRESH mode, the air conditioning amplifier will judge it as half inlet air mode when the blower outlet mode is set to FACE or BI-LEVEL and TAO is more than the specified temperature, and operates both outlet air introduction and inlet air circulation at the same time.
Electric Inverter Compressor Control	Compressor Speed Control	• The air conditioning amplifier calculates target speed of the compressor based on the target evaporator temperature (which is calculated by the room temperature sensor, humidity sensor, ambient temperature sensor, and the solar sensor) and the actual evaporator temperature that is detected by the evaporator temperature sensor in order to control the compressor speed. • The air conditioning amplifier calculates the target evaporator temperature, which includes corrections based on the vehicle interior humidity (which is obtained from the humidity sensor) and the windshield glass inner surface humidity (which is calculated from the humidity sensor, solar sensor, room temperature sensor, mode damper position, and wiper operation condition). Accordingly, the air conditioning amplifier controls the compressor speed to an extent that would not inhibit the proper cooling performance or defogging performance.
Electrical Water Pump Control		The electrical water pump is used in order to ensure the proper heater performance while the blower motor is ON and the engine is stopped.

AC

Control	Outline
Engine Start Request Control	To ensure the proper heater performance when the hybrid system is started at low temperatures, the air conditioning amplifier transmits an engine start request to the hybrid control ECU in accordance with the TAO, engine coolant temperature sensor signal, and ambient temperature sensor signal.
PTC Heater Control	When the hybrid system is operating (READY) and the blower motor is turned ON, the air conditioning amplifier turns on the PTC heater if the conditions listed below are met. Heater core integrated PTC heater • Air outlet is in the FOOT, FOOT / DEF or DEF mode. • Engine coolant temperature is below specified temperature. • Ambient temperature is below specified temperature (DEF mode). • Tentative air mix damper opening angle is above the specified value (MAX HOT). Footwell air duct integrated PTC heater • Air outlet is in the FOOT or FOOT / DEF mode. • Engine coolant temperature is below specified temperature. • Tentative air mix damper opening angle is above the specified value (MAX HOT).
Electric Cooling Fan Control	The air conditioning amplifier control the cooling fan in accordance with the vehicle speed signal and compressor speed signal.
Rear Window Defogger Control	Switches the rear defogger and outside rear view mirror heaters on for 15 minutes when the rear defogger switch is switched on. Switches them off if the switch is pressed while they are operating.
Outer Temperature Indication Control	Based on the signals from the ambient temperature sensor, this control calculates the outside temperature, which is then corrected in the air conditioning ECU, and shown in the multi-display.
Self-Diagnosis	Checks the sensor and A/C inverter in accordance with operation of the air conditioning switches, then the heater control panel displays a DTC (Diagnosis Trouble Code) to indicate if there is a malfunction or not (sensor check function).
	Drives the actuators through a predetermined sequence in accordance with the operation of the air conditioning switches (actuator check function).

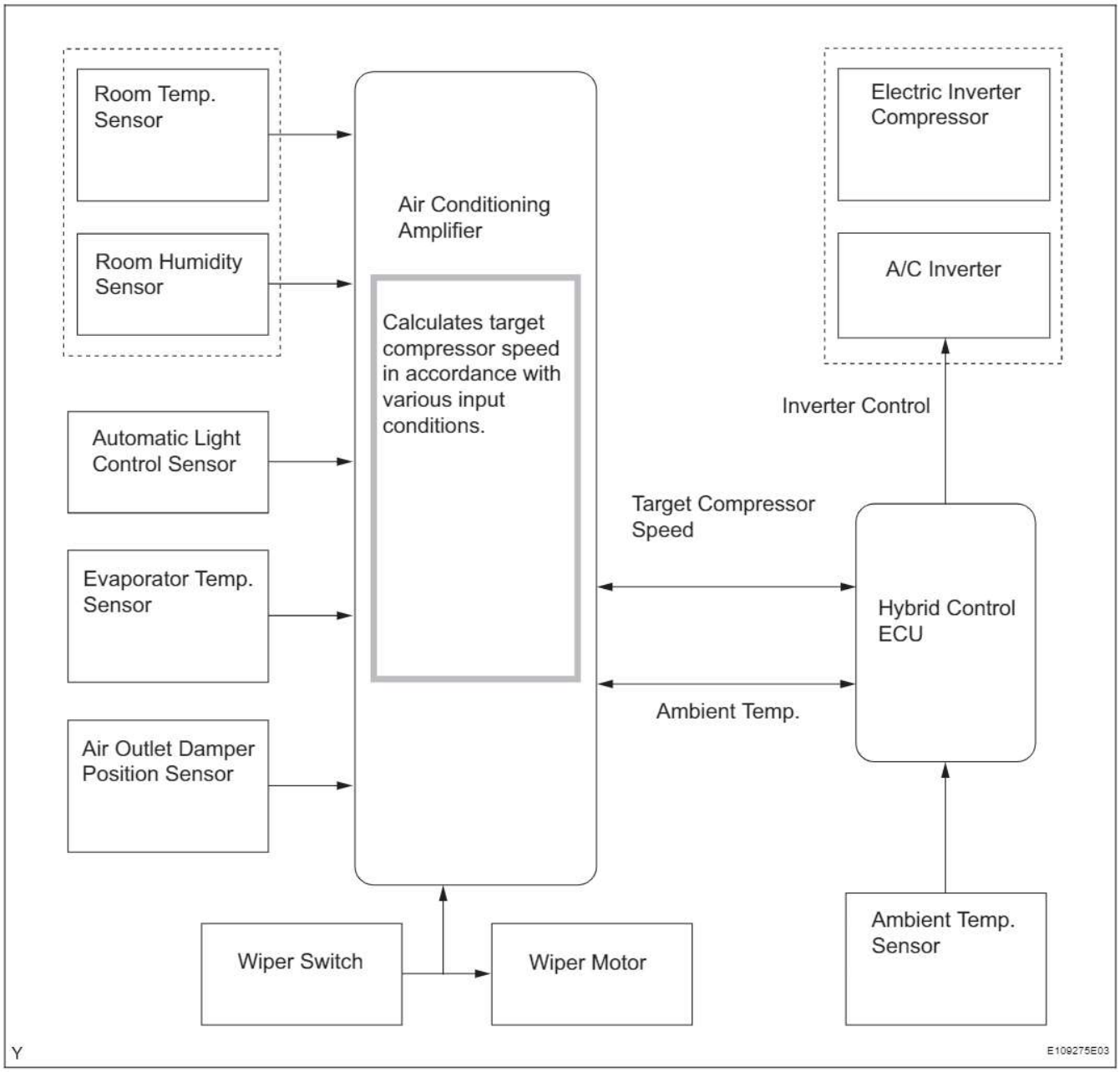
AC

9. ELECTRIC INVERTER COMPRESSOR CONTROL

- The air conditioning amplifier calculates the target compressor speed based on the target evaporator temperature (calculated from the room temperature sensor, humidity sensor, ambient temperature sensor, and solar sensor) and the actual evaporator temperature detected by the evaporator temperature sensor. Then, the air conditioning amplifier transmits the target speed to the hybrid control ECU. The hybrid control ECU controls the A/C inverter based on the target speed data in order to control the compressor to a speed that suits the operating condition of the air conditioning system.

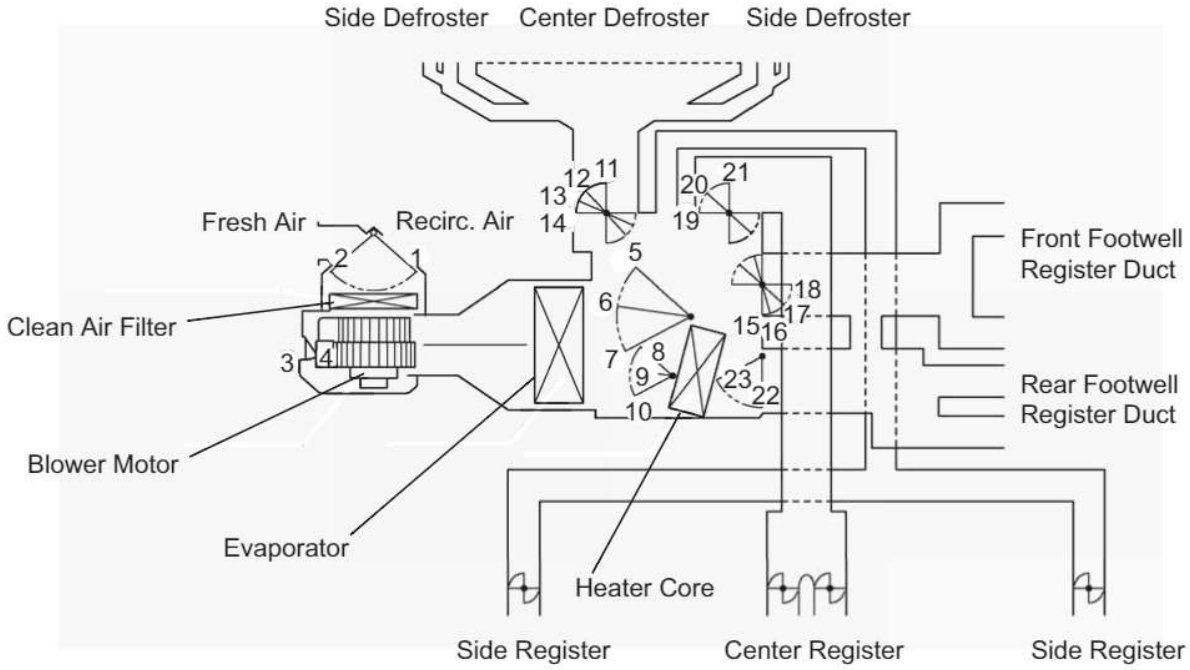
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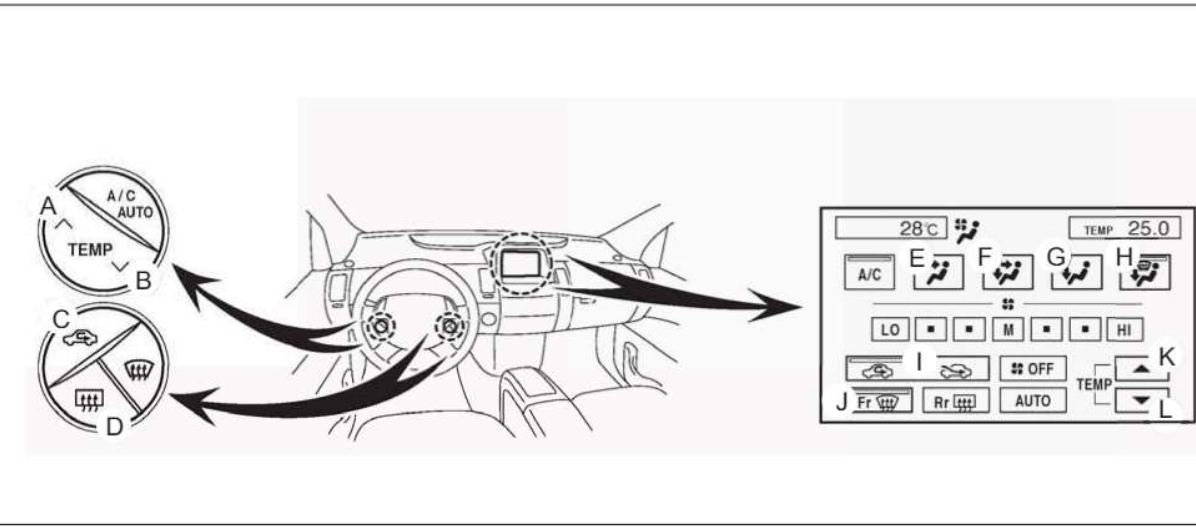
- The air conditioning amplifier calculates the target evaporator temperature, which includes corrections based on the vehicle interior humidity (which is obtained from the humidity sensor) and the windshield glass inner surface humidity (which is calculated from the humidity sensor, solar sensor, room temperature sensor, mode damper position, and wiper operation condition). Accordingly, the air conditioning amplifier controls the compressor speed to an extent that does not inhibit the proper cooling performance or defogging performance. As a result, comfort and low fuel consumption can be realized.



AC

10. MODEL POSITION AND DAMPER OPERATION





Function of main damper

Control Damper		Control Position	Damper Position	Operation
Air Inlet Control Damper	C or I	Indicator OFF	1, 3	Brings in fresh air.
			2, 4	Brings in fresh air while circulating internal air.
	C or I	Indicator ON	2, 4	Recirculates internal air.

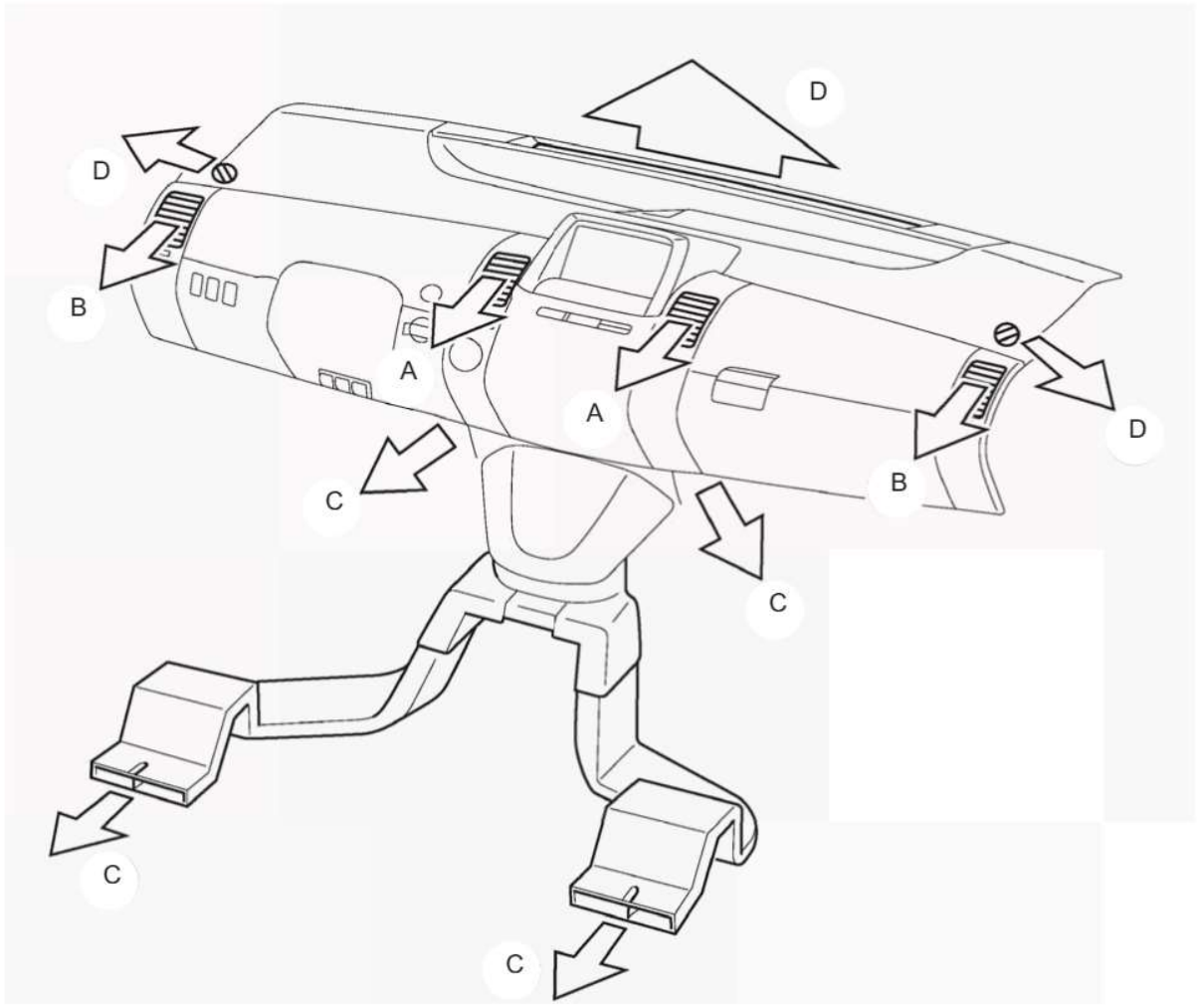
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Control Damper		Control Position	Damper Position	Operation
Air Mix Control Damper	A, B or K, L	-	5, 8 to 6, 9 to 7, 10	Varies mixture ratio of fresh air and recirculation air in order to regulate temperature continuously from HOT to COOL.
Mode Control Damper	E	FACE 	14, 15, 21, 22 (14, 16, 21, 22)*2	Air blows out of center registers and side registers.
	F	BI-LEVEL 	14, 17, 20, 22	Air mainly blows out of center registers, side registers, and footwell register ducts.
	G	FOOT 	13, 18, 19, 22 (12, 17, 19, 23)*1	Air mainly blows out of front and rear footwell register ducts. In addition, air blows out slightly from front and side defrosters, and side registers.
	H	FOOT/DEF 	12, 17, 19, 22 (11, 15, 19, 23)*1	Air mainly blows out of front and side defrosters to defrost windshield. Air also blows out from front and rear footwell register ducts, and side registers.
	D or J	DEF 	12, 17, 19, 22	Air blows out of front and side defrosters and side registers to defrost windshield.

HINT:
*1: During 2-way flow control
*2: Early stage of COOL during AUTO

AC

11. AIR OUTLETS AND AIR VOLUME RATIOS



E125224E01

Air Outlet Mode		Air Outlet Position Symbol			
		A	B	C	D
		Center Face	Side Face	Foot	Defroster
	FACE	○	○	— o*	—
	BI-LEVEL	o	o	o	—
	FOOT	—	o	○	o
	FOOT/DEF	—	o	o	o

AC

Air Outlet Mode		Air Outlet Position Symbol			
		A	B	C	D
		Center Face	Side Face	Foot	Defroster
	DEF	—	o	—	◯

HINT:
1. The circle size (O) indicates the proportion of the airflow volume.
2. The (-) indicates that the air is not blown out.
3. The (*) indicates the early stage of COOL during AUTO.

AC

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the air conditioning system.
- *: Use the intelligent tester.

1	VEHICLE BROUGHT TO WORKSHOP

NEXT

2	CUSTOMER PROBLEM ANALYSIS

(a) Confirm the problem symptoms.

NEXT

3	CHECK AND CLEAR DTCS*

NEXT

4	PROBLEM SYMPTOM CONFIRMATION

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B → GO TO STEP 6

A

5	SYMPTOM SIMULATION

NEXT

6	CHECK MULTIPLEX COMMUNICATION SYSTEM*

(a) Check for the DTC outputs.

Result

Result	Proceed to
No multiplex DTC	A
Multiplex DTC output	B

AC

B → GO TO MULTIPLEX COMMUNICATION SYSTEM

7	CHECK CAN COMMUNICATION SYSTEM*

Result

Result	Proceed to
No CAN DTC	A
CAN DTC output	B

B → GO TO CAN COMMUNICATION SYSTEM

A

8	DTC CHECK (OTHER THAN MULTIPLEX DTC)*

Result

Result	Proceed to
Malfunction code	A
Normal code	B

B → GO TO STEP 10

A

9	DTC CHART

NEXT

10	PROBLEM SYMPTOMS TABLE

NEXT

11	TERMINALS OF ECU

NEXT

12	CIRCUIT INSPECTION

NEXT

13	IDENTIFICATION OF PROBLEM

NEXT

AC

14	REPAIR OR REPLACE

NEXT

15	CONFIRMATION TEST

NEXT

END

CUSTOMIZE PARAMETERS

HINT:
The following items can be customized.

NOTICE:

- **When the customer requests a change in a function, first make sure that the function can be customized.**
- **Be sure to make a note of the current settings before customizing.**
- **When troubleshooting a function, first make sure that the function is set to the default setting.**

Air conditioning amplifier

Display (Item)	Default	Contents	Setting
SET TEMP SHIFT (Set Temperature Shift)	NORMAL	To control with the shifted temperature against the display temperature.	+2C / +1C / NORMAL / -1C / -2C
AIR INLET MODE (Air Inlet Mode)	AUTO	In case of turning the A/C ON when you desire to make the compartment cool down quickly, this is the function to change the mode automatically to RECIRCULATED mode.	MANUAL / AUTO
COMPRESSOR MODE (Compressor Mode)	AUTO	Function to turn the A/C ON automatically by pressing the AUTO button when the blower is ON and the A/C is OFF.	MANUAL / AUTO
COMPRS/DEF OPER (Compressor/Air inlet DEF operation)	LINK	Function to turn the A/C ON automatically linking with the FRONT DEF button when the A/C is OFF.	NORMAL / LINK
FOOT/DEF MODE (Foot/DEF auto mode)	ON	Function to turn the air flow from FOOT/DEF to ON automatically when AUTO MODE is ON.	OFF / ON
AUTO BLOW UP (Foot/DEF automatic blow up function)	ON	Function to switch the blower level automatically when the defroster is ON.	OFF / ON
FOOT AIR LEAK (Foot air leak)	ON	Function to cut off the airstream felt underfoot while the vehicle is moving.	OFF / ON
AMBINT TMP SFT (Ambient Temperature Shift)	NORMAL	To control with the shifted ambient temperature against the display ambient temperature.	+3C / +2C / +1C / NORMAL / -1C / -2C / -3C

AC

PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

Air conditioning system

Symptom	Suspected area	See page
Entire A/C system does not operate	1. IG power source circuit	AC-132
	2. Air conditioning amplifier	AC-28
Air Flow Control: No blower operation	1. Blower motor circuit	AC-110
	2. Air conditioning amplifier	AC-28
Air Flow Control: No blower control	1. Blower motor circuit	AC-110
	2. Air conditioning amplifier	AC-28
Air Flow Control: Insufficient air output	1. Blower motor circuit	AC-110
	2. Air conditioning amplifier	AC-28
Temperature Control: No cool air comes out	1. Volume of refrigerant	AC-136
	2. Refrigerant pressure	AC-136
	3. Pressure switch circuit	AC-59
	4. Air mix damper control servo motor circuit	AC-77
	5. Air mix damper position sensor circuit	AC-63
	6. Room temperature sensor circuit	AC-42
	7. Room humidity sensor circuit	AC-89
	8. Ambient temperature sensor circuit	AC-46
	9. A/C inverter circuit	AC-93
	10. Air conditioning amplifier	AC-28
	11. Multiplex communication circuit	MP-1
Temperature Control: No warm air comes out	1. Air mix damper control servo motor circuit	AC-77
	2. Air mix damper position sensor circuit	AC-63
	3. Ambient temperature sensor circuit	AC-42
	4. Room temperature sensor circuit	AC-42
	5. Room humidity sensor circuit	AC-89
	6. Evaporator temperature sensor circuit	AC-51
	7. Air conditioning amplifier	AC-28
	8. Multiplex communication circuit	MP-1
	9. Heater radiator	-
Temperature Control: Output air is warmer or cooler than set temperature or response is slow	1. Steering pad switch circuit	AC-125
	2. Room temperature sensor circuit	AC-42
	3. Room humidity sensor circuit	AC-89
	4. Ambient temperature sensor circuit	AC-46
	5. Solar sensor circuit	AC-55
	6. Air mix damper control servo motor circuit	AC-77
	7. Air mix damper position sensor circuit	AC-63
	8. Air conditioning amplifier	AC-28
	9. Multiplex communication circuit	MP-1

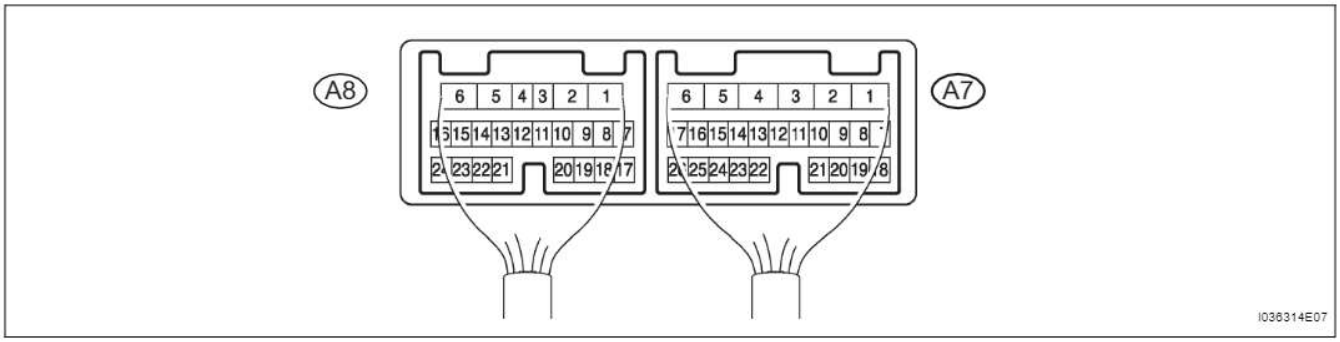
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Symptom	Suspected area	See page
Temperature Control: No temperature control (only Max. cool or Max. warm)	1. Steering wheel pad switch circuit	AC-125
	2. Air mix damper control servo motor circuit	AC-77
	3. Air mix damper position sensor circuit	AC-63
	4. Air conditioning amplifier	AC-28
No air inlet control	1. Air inlet damper control servo motor circuit	AC-81
	2. Air inlet damper position sensor circuit	AC-67
	3. Air conditioning amplifier	AC-28
No air outlet control	1. Air outlet damper control servo motor circuit	AC-85
	2. Air outlet damper position sensor circuit	AC-72
	3. Air conditioning amplifier	AC-28
Engine idle up does not occur, or is continuous	1. A/C inverter circuit	AC-93
	2. Air conditioning amplifier	AC-28
	3. Multiplex communication circuit	MP-1
Displayed set temperature value does not match with operation of temperature control switch	1. Air conditioning amplifier	AC-28
Brightness does not change when rheostat volume or light control switch is adjusted	1. Illumination light system	LI-1
	2. Air conditioning amplifier	AC-28
Unable to access the diagnosis mode	1. Air conditioning amplifier	AC-28
DTC not recorded. Set mode is cleared when power switch is turned OFF.	1. Back-up power source circuit	AC-134
	2. Air conditioning amplifier	AC-28
Unable to control A/C with the steering pad switch	1. Steering pad switch circuit	AC-125
	2. Air conditioning amplifier	AC-28
Unable to control A/C with the multi-display	1. Multiplex communication circuit	MP-1
	2. Multi-display	-
	3. Air conditioning amplifier	AC-28
The heater performance is low (PTC heater does not function)*	1. PTC heater circuit	AC-121
	2. Heater water pump circuit	AC-118
	3. Air conditioning amplifier	AC-28
	4. Multiplex communication circuit	MP-1

HINT:
*: The PTC heater operation may be stopped when an electrical load is large on the entire vehicle.

AC

TERMINALS OF ECU



1. CHECK AIR CONDITIONING AMPLIFIER

(a) Measure the voltage and resistance of the connectors.
HINT:
Check from the rear of the connector while it is connected to the air conditioning amplifier.

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AIR (A8-22) - GND (A8-1)	G - W-B	Recirculation / Fresh switch signal	Power switch ON (IG) Recirculation / Fresh switch: FRESH	Below 1 V
AIR (A8-22) - GND (A8-1)	G - W-B	Recirculation / Fresh switch signal	Power switch ON (IG) Recirculation / Fresh switch: RECIRC	10 to 14 V
AIF (A8-23) - GND (A8-1)	P - W-B	Recirculation / Fresh switch signal	Power switch ON (IG) Recirculation / Fresh switch: RECIRC	Below 1 V
AIF (A8-23) - GND (A8-1)	P - W-B	Recirculation / Fresh switch signal	Power switch ON (IG) Recirculation / Fresh switch: FRESH	10 to 14 V
AOF (A8-16) - GND (A8-1)	B - W-B	Mode switch signal	Power switch ON (IG) Mode switch: DEF	Below 1 V
AOF (A8-16) - GND (A8-1)	B - W-B	Mode switch signal	Power switch ON (IG) Mode switch: FACE	10 to 14 V
AOD (A8-24) - GND (A8-1)	Y - W-B	Mode switch signal	Power switch ON (IG) Mode switch: FACE	Below 1 V
AOD (A8-24) - GND (A8-1)	Y - W-B	Mode switch signal	Power switch ON (IG) Mode switch: DEF	10 to 14 V
TPI (A7-19) - SGTPI (A7-4)	V - L	Recirculation / Fresh switch signal	Power switch ON (IG) Recirculation / Fresh switch: RECIRC	4 V
TPI (A7-19) - SGTPI (A7-4)	V - L	Recirculation / Fresh switch signal	Power switch ON (IG) Recirculation / Fresh switch: FRESH	1 V
TPM (A7-18) - SGTPM (A7-23)	LG - P	Mode switch signal	Power switch ON (IG) Mode switch: FACE	4 V
TPM (A7-18) - SGTPM (A7-23)	LG - P	Mode switch signal	Power switch ON (IG) Mode switch: DEF	1 V
TP (A7-20) - SGTP (A7-14)	L - LG	Temperature switch signal	Power switch ON (IG) Temperature switch: Max. COOL	4 V
TP (A7-20) - SGTP (A7-14)	L - LG	Temperature switch signal	Power switch ON (IG) Temperature switch: Max. HOT	1 V
SGTE (A7-5) - Body ground	Y - Body ground	Ground for evaporator temperature sensor	Always	Below 1 Ω

AC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
TE (A7-7) - SGTE (A7-5)	B - Y	Evaporator temperature sensor signal	Power switch ON (IG) Evaporator temperature: 15°C (59°F)	2 to 2.4 V
TE (A7-7) - SGTE (A7-5)	B - Y	Evaporator temperature sensor signal	Power switch ON (IG) Evaporator temperature: 15°C (59°F)	1.4 to 1.8 V
S5TPI (A7-3) - SGTPI (A7-4)	B - L	Power supply for air inlet damper position sensor	Power switch ON (IG)	4.5 to 5.5 V
AMC (A8-19) - GND (A8-1)	B - W-B	Temperature switch	Power switch ON (IG) Temperature switch: Max. HOT	Below 1 V
AMC (A8-19) - GND (A8-1)	B - W-B	Temperature switch	Power switch ON (IG) Temperature switch: Max. COOL	10 to 14 V
AMH (A8-17) - GND (A8-1)	R - W-B	Temperature switch	Power switch ON (IG) Temperature switch: Max. COOL	Below 1 V
AMH (A8-17) - GND (A8-1)	R - W-B	Temperature switch	Power switch ON (IG) Temperature switch: Max. HOT	10 to 14 V
SGTPI (A7-4) - Body ground	L - Body ground	Ground for air inlet damper position sensor	Always	Below 1 Ω
SGTPM (A7-23) - Body ground	P - Body ground	Ground for air outlet damper position sensor	Always	Below 1 Ω
SGTP (A7-14) - Body ground	LG - Body ground	Ground for air mix damper position sensor	Always	Below 1 Ω
S5TPM (A7-11) - SGTPM (A7-23)	O - P	Power supply for air outlet damper position sensor signal	Power switch ON (IG)	4.5 to 5.5 V
S5TP (A7-13) - SGTP (A7-14)	P - LG	Power supply for air mix damper position sensor signal	Power switch ON (IG)	4.5 to 5.5 V
IG (A8-5) - GND (A8-1)	B - W-B	Power switch signal	Power switch control OFF	0 V
IG (A8-5) - GND (A8-1)	B - W-B	Power switch signal	Power switch control ON (ACC)	10 to 14 V
+B (A8-6) - GND (A8-1)	Y - W-B	Back-up power source	Always	10 to 14 V
MPX+ (A8-3) - GND (A8-1)	B - W-B	Terminal for BEAN	Engine idling after engine warmed up	Pulse generation
MPX2+ (A8-11) - GND (A8-1)	GR - W-B	Terminal for BEAN	Engine idling after engine warmed up	Pulse generation
GND (A8-1) - Body ground	W-B - Body ground	Ground for main power supply	Always	Below 1 Ω
BLW (A8-2) - GND (A8-1)	W - W-B	Blower switch signal	Power switch ON (IG) Blower switch ON (IG)	Pulse generation (see waveform 1)
S5TS (A7-12) - TS (A7-21)	GR - W-B	Solar sensor signal	Power switch ON (IG)	0.8 to 4.3 V
HR (A8-7) - GND (A8-1)	B - W-B	Blower switch signal	Power switch ON (IG) Blower switch: OFF	10 to 14 V
HR (A8-7) - GND (A8-1)	B - W-B	Blower switch signal	Power switch ON (IG) Blower switch: ON	Below 1 V
TR (A7-8) - SGTR (A7-22)	B - W	Room temperature sensor signal	Power switch ON (IG) Cabin temperature: 25°C (77°F)	1.8 to 2.2 V
TR (A7-8) - SGTR (A7-22)	B - W	Room temperature sensor signal	Power switch ON (IG) Cabin temperature: 40°C (104°F)	1.2 to 1.6 V
SGTR (A7-22) - Body ground	W - Body ground	Ground for room temperature sensor	Always	Below 1 Ω

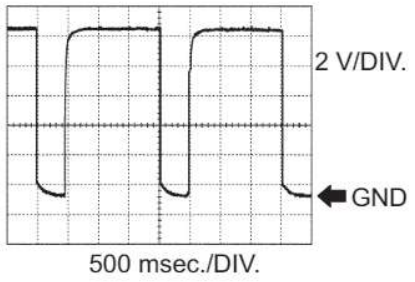
AC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ST1 (A7-2) - SGST (A7-15)	BR - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: Fr. DEF	Below 0.3 V
ST1 (A7-2) - SGST (A7-15)	BR - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: Rr. DEF	0.8 to 1.5 V
ST1 (A7-2) - SGST (A7-15)	BR - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: Recirculation/Fresh	2 to 2.9 V
ST1 (A7-2) - SGST (A7-15)	BR - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: OFF	Above 4.6 V
ST2 (A7-1) - SGST (A7-15)	LG - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: AUTO	Below 0.3 V
ST2 (A7-1) - SGST (A7-15)	LG - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: TEMP+	0.8 to 1.5 V
ST2 (A7-1) - SGST (A7-15)	LG - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: TEMP-	2 to 2.9 V
ST2 (A7-1) - SGST (A7-15)	LG - G	Steering pad switch signal	Power switch ON (IG) Steering pad switch: OFF	Above 4.6 V
SGST (A7-15) - Body ground	G - Body ground	Ground for steering pad switch	Always	Below 1 V
PSW (A7-6) - GND (A8-1)	R - W-B	Pressure switch signal	Power switch ON (IG) Refrigerant pressure: Normal	Below 1 V
PSW (A7-6) - GND (A8-1)	R - W-B	Pressure switch signal	Power switch ON (IG) Refrigerant pressure: More than 1,520 kPa (15.5 kgf/cm 2,220 psi)	10 to 14 V
RH (A7-9) - GND (A8-1)	R - W-B	Humidity sensor signal	Power switch ON (IG) Room humidity: 40%	2 V
RH (A7-9) - GND (A8-1)	R - W-B	Humidity sensor signal	Power switch ON (IG) Room humidity: 60%	2.5 V
S5RM (A7-10) - GND (A8-1)	G - W-B	Power supply for humidity sensor	Power switch ON (IG)	4.5 to 5.5 V
PTC (A7-17) - GND (A8-1)	P - W-B	PTC heater signal	Power switch ON (IG) Temperature switch: Max. HOT Coolant temperature: Below 55°C (131°F) Blower switch: OFF	Below 1 V
PTC (A7-17) - GND (A8-1)	P - W-B	PTC heater signal	Power switch ON (IG) Temperature switch: Max. HOT Coolant temperature: Below 55°C (131°F) Blower switch: LO	10 to 14 V
HT-1 (A7-26) - GND (A8-1)	BR - W-B	PTC heater signal	Power switch ON (IG) Temperature switch: Max. HOT Coolant temperature: Below 55°C (131°F) Blower switch: OFF	Below 1 V
HT-1 (A7-26) - GND (A8-1)	BR - W-B	PTC heater signal	Power switch ON (IG) Temperature switch: Max. HOT Coolant temperature: Below 55°C (131°F) Blower switch: LO	10 to 14 V

AC

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
HT-2 (A7-25) - GND (A8-1)	L - W-B	PTC heater signal	Power switch ON (IG) Temperature switch: Max. HOT Coolant temperature: Below 55°C (131°F) Blower switch: OFF	Below 1 V
HT-2 (A7-25) - GND (A8-1)	L - W-B	PTC heater signal	Power switch ON (IG) Temperature switch: Max. HOT Coolant temperature: Below 55°C (131°F) Blower switch: LO	10 to 14 V
IDH (A8-18) - GND (A8-1)	V - W-B	DC/DC converter signal	Power switch ON (IG) (Voltage normal)	10 to 14 V
IDH (A8-18) - GND (A8-1)	V - W-B	DC/DC converter signal	Power switch ON (IG) (Over voltage)	Below 1 V

Waveform 1



(b) Using an oscilloscope, measure the waveform 1.

Item	Content
Symbols (Terminal No.)	BLW (A8-2) - GND (A8-1)
Tool Setting	2 V/DIV., 500 msec./DIV.
Condition	Power switch ON (IG), Blower switch LO

HINT:
When the blower level is increased, the duty ratio changes accordingly.

AC

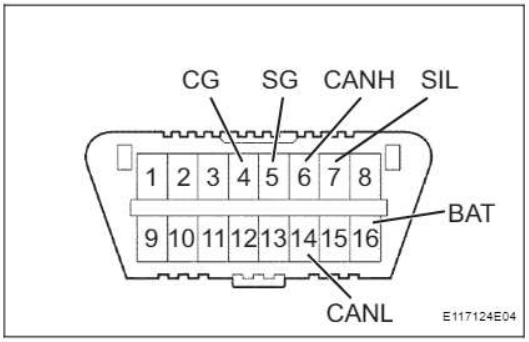
DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Air conditioning system data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the intelligent tester to check for malfunctions and perform troubleshooting.

2. CHECK DLC3

The vehicle's ECM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.



Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1Ω
SG (5) - Body ground	Signal ground	Always	Below 1Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	HIGH-level CAN bus line	Power switch OFF*	54 to 67 Ω
CANH (6) - Battery positive	HIGH-level CAN bus line	Power switch OFF*	1 MΩ or higher
CANH (6) - CG (4)	HIGH-level CAN bus line	Power switch OFF*	3 MΩ or higher
CANL (14) - Battery positive	LOW-level CAN bus line	Power switch OFF*	1 MΩ or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Power switch OFF*	3 MΩ or higher

NOTICE:

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

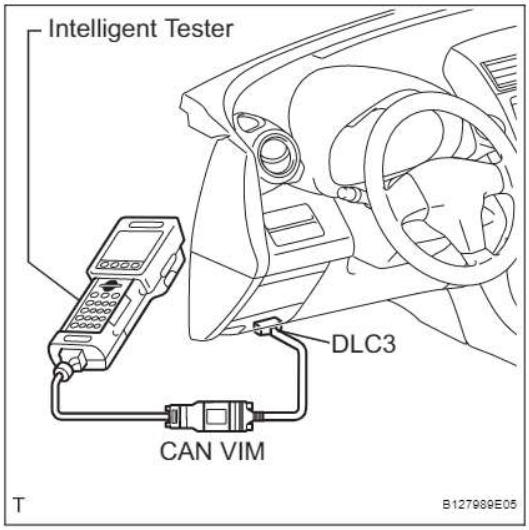
If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

HINT:

Connect the cable of the intelligent tester (with CAN VIM) to the DLC3, turn the power switch ON (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.

- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
- If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

AC



DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the power switch ON (IG) and turn the intelligent tester ON.

(c) Read the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

2. CLEAR DTC

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the power switch ON (IG) and turn the intelligent tester ON.

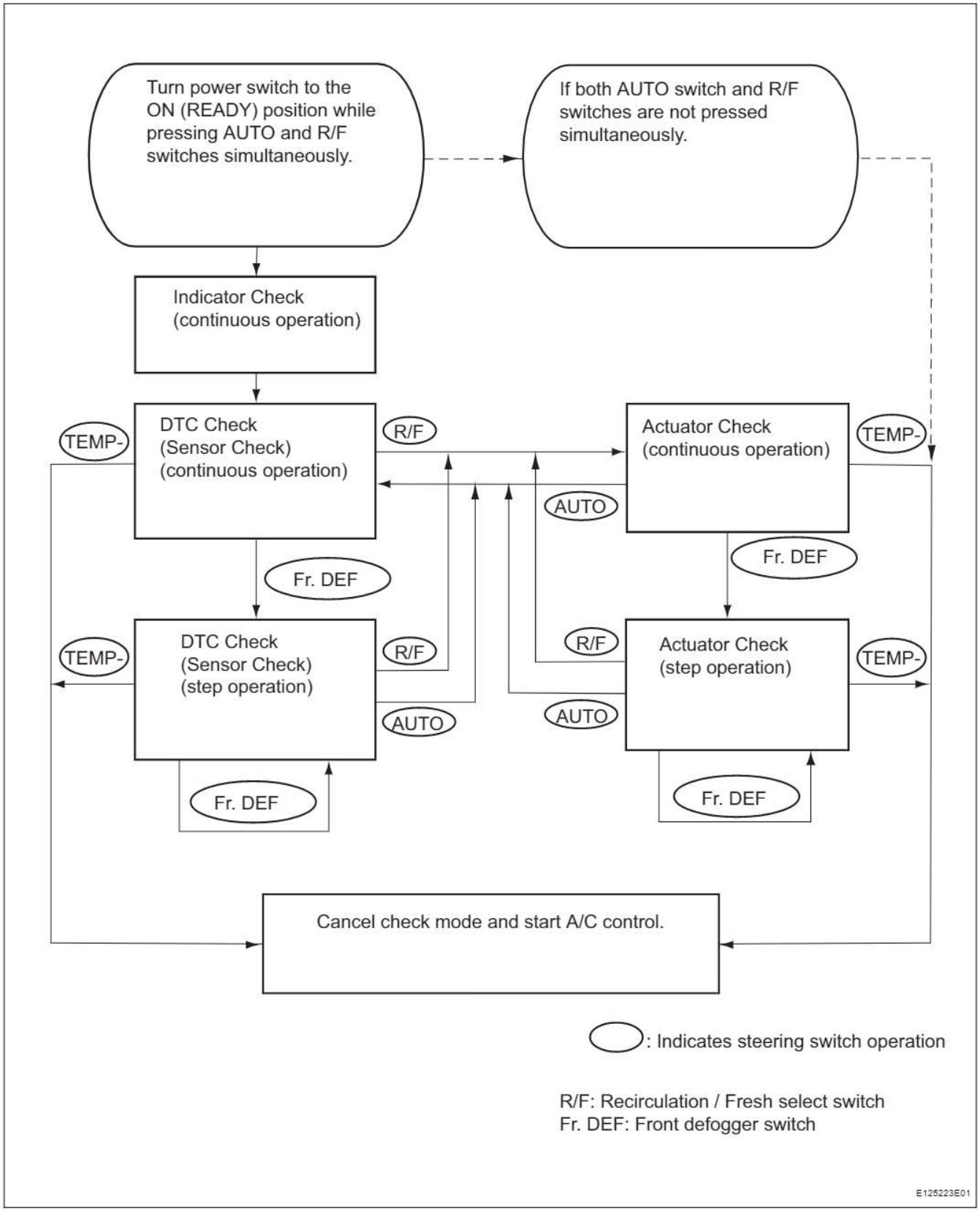
(c) Clear the DTC by following the prompts on the tester screen.
HINT:
Refer to the intelligent tester operator's manual for further details.

AC

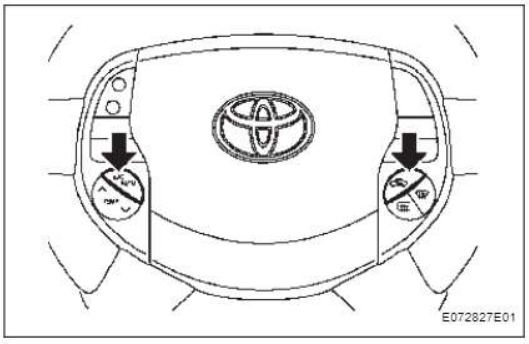
CHECK MODE PROCEDURE

1. LIST OF OPERATION METHODS

By operating each of the A/C control switches as shown in the diagram below, it is possible to enter the diagnostic check mode.


Turn power switch to the ON (READY) position while pressing AUTO and R/F switches simultaneously.
If both AUTO switch and R/F switches are not pressed simultaneously.
Indicator Check (continuous operation)
DTC Check (Sensor Check) (continuous operation)
TEMP-
R/F
Actuator Check (continuous operation)
TEMP-
AUTO
Fr. DEF
Fr. DEF
DTC Check (Sensor Check) (step operation)
TEMP-
R/F
AUTO
Actuator Check (step operation)
R/F
TEMP-
AUTO
Fr. DEF
Fr. DEF
Cancel check mode and start A/C control.
: Indicates steering switch operation
R/F: Recirculation / Fresh select switch
Fr. DEF: Front defogger switch
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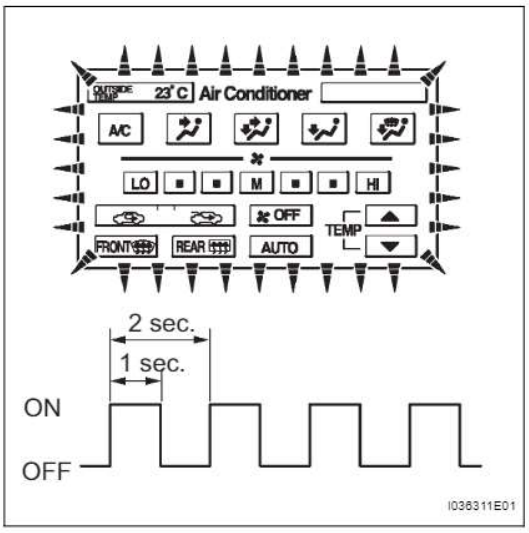
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2. INDICATOR CHECK

(a) Turn the power switch OFF.

(b) While pressing both the AUTO and R/F (Recirculation/ Fresh) switches on the steering switch, turn the power switch from OFF to ON (READY).



(c) The indicator check is automatically performed when activating panel diagnosis. Check that all indicators and setting displays come on and go off 4 times at 1 second intervals.
Check that the buzzer sounds when the indicators come on.
HINT:
The sensor check is automatically started when the indicator check is completed.

(d) Push the "TEMP DOWN (-)" switch to finish panel diagnosis.

AC

DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the intelligent tester's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the power switch ON (IG) and turn the intelligent tester ON.

(c) Read the DATA LIST by following the prompts on the tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP	Room temperature sensor / min.: -6.5°C (20.3°F) max.: 57.25°C (135.05°F)	Actual room temperature is displayed	Open in the circuit: -6.5°C (20.3°F) Short in the circuit: 57.25°C (135.05°F)
AMBI TEMP SENS	Ambient temperature sensor / min.: -23.3°C (-9.94°F) max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open in the circuit: -23.3°C (-9.94°F) Short: in the circuit: 65.95°C (150.71°F)
EVAP TEMP	Evaporator temperature sensor / min.: -29.7°C (-21.46°F) max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	Open in the circuit: -29.7°C (-21.46°F) Short in the circuit: 59.55°C (139.19°F)
SOLAR SENS-P	Solar sensor (Passenger side) / min.: 0 max.: 255	Increases as brightness increases	Open in the circuit: 0 Short in the circuit: 255
COOLANT TEMP	Engine coolant temperature / min.: 1.3°C (34.34°F) max.: 90.55°C (194.99°F)	Actual engine coolant temperature is displayed while the engine is warmed up	-
SET TEMP-D	Set temperature (Driver side) / min.: 0 max.: 255	The same contents as a setting temperature display part are displayed	-
ESTIMATE TEMP-D	Estimated temperature (Driver side) / min.: -358.4°C (-613.12°F) max.: 358.4°C (677.12°F)	Damper is at "MAX. COOL": -358.4°C (-613.12°F) Damper is at "MAX. HOT": 358.4°C (677.12°F)	-
A/M DAMP POS-P	Air mix damper position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. COOL": -10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	-
A/O DAMP POS	Air outlet damper position / min.: -14% max.: 113.5%	Damper is at "FACE": -10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
A/I DAMP POS	Air inlet damper position / min.: -14% max.: 113.5%	Damper is at "RECIRCULATION": -1.0% Damper is at "FRESH": 110.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

AC

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/M DAMP TARG-P	Air mix damper target position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. COOL": -10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	-
A/O DAMP TARG	Air outlet damper target position / min.: -14% max.: 113.5%	Damper is at "FACE": -10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
A/I DAMP TARG	Air inlet damper target position / min.: -14% max.: 113.5%	Damper is at "RECIRCULATION": -1.0% Damper is at "FRESH": 110.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
HAND FREE TEL	Handsfree telephone / OFF, ON	-	-
BLOWER LEVEL	Blower motor speed level / min.: Level 0 max.: 31	Increases in the range between 0 and 31 as the speed increases	-
AMBI TEMP	Adjusted ambient temperature / min.: -30.8°C (-23.44°F) max.: 50.8°C (123.44°F)	-	-
SET TEMP SHIFT	Shift set temperature / +2C, +1C, NORMAL, -1C, -2C	Customized value will be displayed	-
AIR INLET MODE	Air inlet mode / AUTO, MANUAL	Customized value will be displayed	-
COMPRESSOR MODE	Compressor mode / AUTO, MANUAL	Customized value will be displayed	-
COMPRS/DEF OPER	Compressor/DEF operation mode / LINK, NORMAL	Customized value will be displayed	-
FOOT AIR LEAK	Foot air leak / ON, OFF	Customized value will be displayed	-
AUTO BLOW UP	Foot/DEF automatic blower up function / ON, OFF	Customized value will be displayed	-
FOOT/DEF MODE	Foot/DEF auto mode / ON, OFF	Customized value will be displayed	-
AMBIENT TMP SFT	Ambient temperature shift / +3C, +2C, +1C, NORMAL, -1C, 2C, 3C	Customized value will be displayed	-
DESTINATION	Destination/ DOMEST, USA, EUROPE, AUSTRAL, MIDEAST, NO INFO	Changes with destinations	-
DESTINATION	Destination/ DOMEST, USA, EUROPE, AUSTRAL, MIDEAST, NO INFO	Changes with destinations	-
HUMIDITY SENS	Humidity sensor / min.: 0% max.: 100%	Actual room humidity is displayed	-
COMPRS SPD	Compressor speed / min.: 0 rpm max.: 65,535 rpm	Displays actual rotation speed in the range between 0 rpm and 7,500 rpm	-
COMPRS TARG SPD	Compressor target speed / min.: 0 rpm max.: 65,535 rpm	Displays target rotation speed in the range between 0 rpm and 7,500 rpm	-
#CODES	Number of trouble codes / min.: 0 max.: 255	Number of DTCs will be displayed	-

AC

2. PERFORM ACTIVE TEST

HINT:

Performing the intelligent tester's ACTIVE TEST allows relays, the VSV, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST early in troubleshooting is one way to save time. The DATA LIST can be displayed in the ACTIVE TEST.

It is possible to display the DATA LIST on the intelligent tester during the ACTIVE TEST.

(a) Connect the intelligent tester (with CAN VIM) to the DLC3.

(b) Turn the power switch ON (IG) and turn the intelligent tester ON.

(c) Perform the ACTIVE TEST by following the prompts on the tester.

Air conditioning amplifier

Item	Test Details / Display (Range)	Diagnostic Note
BLOWER MOTOR	Blower motor / min.: 0 max.: 31	-
AIR MIX DAMP-P	Air mix damper (Passenger side) / min.: -14% max.: 113.5%	-
A/O MODE DAMP-D	Air outlet damper position (Driver side) / min.: -14% max.: 113.5%	-
A/I DAMP-LINEAR	Air inlet damper position (linear) / min.: -14% max.: 113.5%	-
COMPRS TARG SPD	Compressor target speed / min.: 0 max.: 255	-
DEFOGGER RLY-R	Defogger relay (Rear) / OFF, ON	-
WATER PUMP RLY	Water pump / OFF, ON	-
ELECTRICAL FAN	Electrical fan / OFF, ON	-
DEFOGGER RLY-R	Defogger relay (Rear) / OFF, ON	-
A/C MAG CLUTCH	Magnetic Clutch Relay / OFF, ON	-
WATER PUMP RLY	Water pump / OFF, ON	-
ELECTRICAL FAN	Electrical fan / OFF, ON	-

AC

DIAGNOSTIC TROUBLE CODE CHART

HINT:
When the air conditioning system function properly, DTC B1400/00 is output.

Air conditioning system

DTC No.	Detection Item	Trouble Area	Memory*4	See page
B1411*1	Room Temperature Sensor Circuit	- Room temperature sensor - Wire harness between cooler room temperature sensor and air conditioning amplifier - Air conditioning amplifier	(8.5 min. or more)	AC-42
B1412*2	Ambient Temperature Sensor Circuit	- Room temperature sensor - Wire harness between ambient temperature sensor and ECM - ECM - Multiplex communication circuit - Air conditioning amplifier	(8.5 min. or more)	AC-46
B1413	Evaporator Temperature Sensor Circuit	- Evaporator temperature sensor - Wire harness between evaporator temperature sensor and air conditioning amplifier - Air conditioning amplifier	(8.5 min. or more)	AC-51
B1421*3	Solar Sensor Circuit (Passenger Side)	- Solar sensor - Wire harness between solar sensor and air conditioning amplifier or body ECU - Air conditioning amplifier	(8.5 min. or more)	AC-55
B1423	Pressure Switch Circuit	- Pressure switch - Wire harness between pressure switch and body ground - Multiplex communication circuit - Refrigerant pipe line - Air conditioning amplifier	-	AC-59
B1431	Air Mix Damper Position Sensor Circuit (Passenger Side)	- Air mix control servo motor (air mix damper position sensor) - Wire harness between air mix control servo motor and air conditioning amplifier - Air conditioning amplifier	(1 min. or more)	AC-63
B1432	Air Inlet Damper Position Sensor Circuit	- Air inlet control servo motor (air inlet damper position sensor) - Wire harness between air inlet control servo motor and air conditioning amplifier - Air conditioning amplifier	(1 min. or more)	AC-67

AC

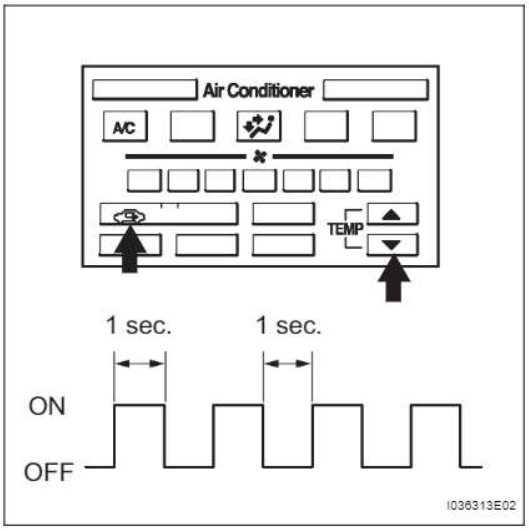
DTC No.	Detection Item	Trouble Area	Memory*4	See page
B1433	Air Outlet Damper Position Sensor Circuit	- Air outlet control servo motor (air outlet damper position sensor) - Wire harness between air outlet control servo motor and air conditioning amplifier - Air conditioning amplifier	(1 min. or more)	AC-72
B1441	Air Mix Damper Control Servo Motor Circuit (Passenger Side)	- Air mix control servo motor - Wire harness between air mix control servo motor and air conditioning amplifier - Air conditioning amplifier	(15 sec.)	AC-77
B1442	Air Inlet Damper Control Servo Motor Circuit	- Air inlet control servo motor - Wire harness between air inlet control servo motor and air conditioning amplifier - Air conditioning amplifier	(15 sec.)	AC-81
B1443	Air Outlet Damper Control Servo Motor Circuit	- Air outlet control servo motor - Wire harness between air outlet control servo motor and air conditioning amplifier - Air conditioning amplifier	(15 sec.)	AC-85
B1462	Room Humidity Sensor Circuit	- Room humidity sensor (room temperature sensor) - Wire harness between room humidity sensor (room temperature sensor) and air conditioning amplifier - Air conditioning amplifier	-	AC-89
B1471	A/C Inverter High Voltage Power Resource System Malfunction	- Hybrid control ECU - A/C inverter (inverter with converter)	-	AC-93
B1472	A/C Inverter High Voltage Output System Malfunction	- Hybrid control ECU - Electric inverter compressor (w/ motor compressor) - A/C inverter (inverter with converter)	-	AC-96
B1473	A/C Inverter Start-up Signal System Malfunction	- Wire harness between hybrid control ECU and A/C inverter (inverter with converter) - A/C inverter (inverter with converter) - Hybrid control ECU	-	AC-99
B1475	A/C Inverter Cooling / Heating System Malfunction	- A/C inverter (inverter with converter)	-	AC-101
B1476	A/C Inverter Load System Malfunction	- Volume of refrigerant - Electric inverter compressor (w/ motor compressor) - Cooling fan circuit	-	AC-102
B1477	A/C Inverter Low Voltage Power Resource System Malfunction	- A/C inverter (inverter with converter)	-	AC-104

AC

DTC No.	Detection Item	Trouble Area	Memory*4	See page
B1498	Communication Malfunction (A/C Inverter Local)	- Wire harness between hybrid control ECU and A/C inverter (inverter with converter) - Hybrid control ECU - A/C inverter (inverter with converter)	-	AC-105
P0AA6-611	Hybrid Battery Voltage System Isolation Fault	- Electric inverter compressor (w/ motor compressor) - A/C inverter (inverter with converter) - Compressor oil	-	AC-107

HINT:

- *1: If the room temperature is approx. -18.6°C (-3.7 °F) or lower, DTC B1411/11 may be output even though the system is normal.
- *2: If the ambient temperature is approx. -52.9°C (-61.4°F) or lower, a malfunction code may be output even though the system is normal.
- *3: If the check is performed in a dark place, DTC B1421/21 or B1424/24 (solar sensor circuit abnormal) could be displayed.
- *4: The air conditioning amplifier memorizes the DTC of the respective malfunction that has occurred for a period of the time indicated in the brackets.



ACTUATOR CHECK

1. ACTUATOR CHECK

(a) Start the engine to warm it up.

(b) Perform the indicator check.

(c) Push the R/F (Recirculation/Fresh) switch to perform the actuator check when the sensor check is started after the indicator check.

HINT:

Be sure to perform the actuator check with the power switch ON (READY).

(d) As the actuator check (continuous) is repeated from steps 0 to 9 at 1 second intervals, check the temperature and airflow visually and by hand.

(e) If the steps are difficult to read because they change automatically, push the "Fr. DEF" switch to display the steps step by step so that they can be read easily. The items are displayed step by step each time the "Fr. DEF" switch is pushed.

HINT:

- The display blinks at 1 second intervals in the step operation.
- The illustration indicates that code 4 is output. Push the "TEMP-" switch to finish panel diagnosis.
- Push the "AUTO" switch to enter the sensor check mode.

AC

Step No.	Display code	Conditions				
		Blower level	Air flow vent	Air inlet damper	Air mix damper	A/C compressor revolution speed (rpm)
1	0	0	FACE (-10.0%)	FRESH (110.0%)	"COOL" position (-10.0%)	0
2	1	1	FACE (-10.0%)	FRESH (110.0%)	"COOL" position (-10.0%)	0
3	2	17	FACE (-10.0%)	FRESH (110.0%)	"COOL" position (-10.0%)	7,500
4	3	17	FACE (-10.0%)	RECIRCULATION (-1.0%)	"COOL" position (-10.0%)	7,500
5	4	17	B/L (12%)	RECIRCULATION (-1.0%)	"COOL" / "HOT" (50.0% opened)	4,500
6	5	17	FOOT (49%)	RECIRCULATION (-1.0%)	"COOL" / "HOT" (65.0% opened)	4,500
7	6	17	FOOT (49%)	RECIRCULATION (-1.0%)	"HOT " position (100.0%)	4,500
8	7	17	F/D (69%)	RECIRCULATION (-1.0%)	"COOL" / "HOT" (65.0% opened)	4,500
9	8	17	F/D (95%)	RECIRCULATION (-1.0%)	"COOL" / "HOT" (90.0% opened)	4,500
10	9	31	DEF (110.0%)	RECIRCULATION (-1.0%)	"COOL" / "HOT" (50.0% opened)	4,500

AC

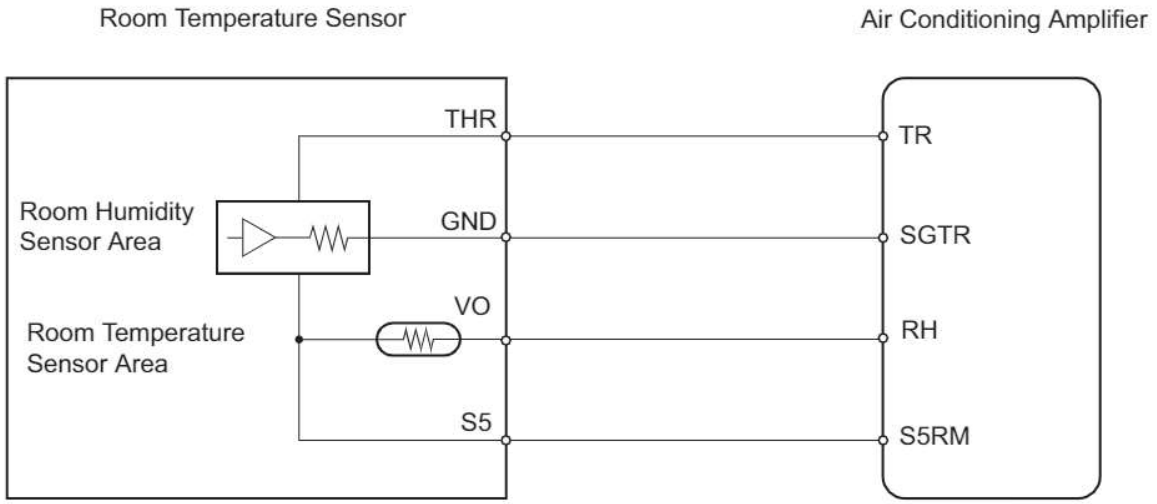
DTC	B1411	Room Temperature Sensor Circuit

DESCRIPTION

The room temperature sensor is installed in the instrument panel to detect the room temperature and control the heater and air conditioner "AUTO" function. The resistance of the room temperature sensor changes in accordance with the room temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.
The air conditioning amplifier applies voltage (5 V) to the room temperature sensor and reads voltage changes as the resistance of the room temperature sensor changes. This sensor also sends appropriate signals to the air conditioning amplifier. The room temperature sensor is integrated with the room humidity sensor.

DTC No.	Detection Condition	Trouble Area
B1411	Open or short in room temperature sensor circuit	• Room temperature sensor • Wire harness between cooler room temperature sensor and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (ROOM TEMP)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.

AC

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
ROOM TEMP	Room temperature sensor / Open in the circuit: min.: -6.5°C (20.3°F) max.: 57.25°C (135.05°F)	Actual room temperature is displayed	Open in the circuit: -6.5°C (20.3°F) Short in the circuit: 57.25°C (135.05°F)

OK:
The display is as specified in the normal condition.

Result

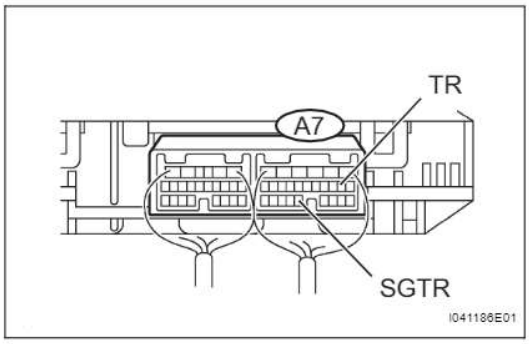
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 CHECK AIR CONDITIONING AMPLIFIER (TR VOLTAGE)



(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-8 (TR) - A7-22 (SGTR)	Power switch ON (IG) at 25°C (77°F)	1.8 to 2.2 V
A7-8 (TR) - A7-22 (SGTR)	Power switch ON (IG) at 40°C (104°F)	1.2 to 1.6 V

HINT:
As the temperature increases, the voltage decreases.
Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

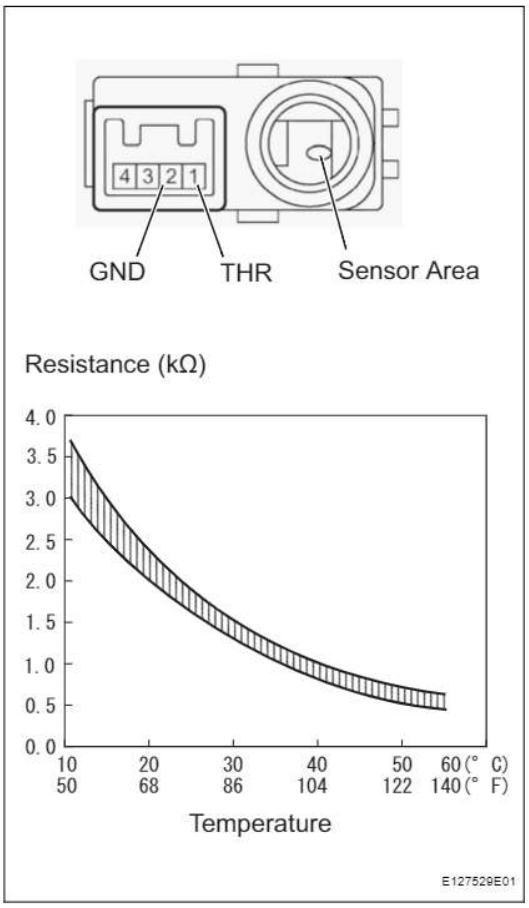
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

AC

3 INSPECT ROOM TEMPERATURE SENSOR



(a) Remove the room temperature sensor.
(b) Measure the resistance of the sensor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 (THR) - 2 (GND)	10°C (50°F)	3.00 to 3.73 kΩ
1 (THR) - 2 (GND)	15°C (59°F)	2.45 to 2.88 kΩ
1 (THR) - 2 (GND)	20°C (68°F)	1.95 to 2.30 kΩ
1 (THR) - 2 (GND)	25°C (77°F)	1.60 to 1.80 kΩ
1 (THR) - 2 (GND)	30°C (86°F)	1.28 to 1.47 kΩ
1 (THR) - 2 (GND)	35°C (95°F)	1.00 to 1.22 kΩ
1 (THR) - 2 (GND)	40°C (104°F)	0.80 to 1.00 kΩ
1 (THR) - 2 (GND)	45°C (113°F)	0.65 to 0.85 kΩ
1 (THR) - 2 (GND)	50°C (122°F)	0.50 to 0.70 kΩ
1 (THR) - 2 (GND)	55°C (131°F)	0.44 to 0.60 kΩ
1 (THR) - 2 (GND)	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

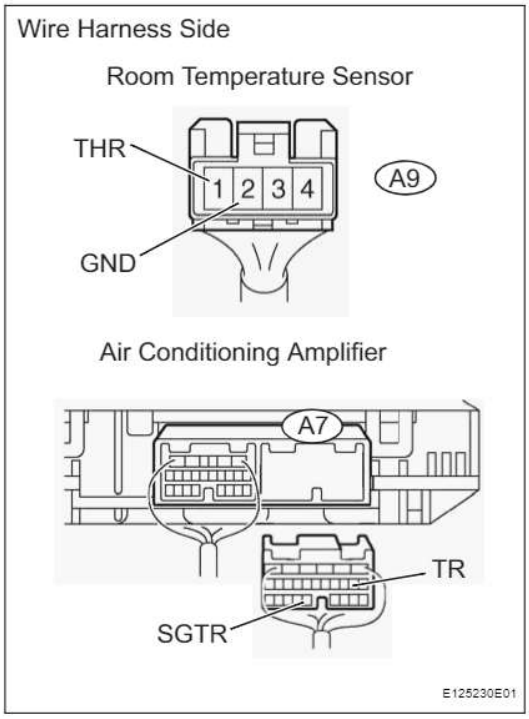
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE ROOM TEMPERATURE SENSOR**

OK →

AC

4	CHECK WIRE HARNESS (ROOM TEMPERATURE SENSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A9 sensor connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-8 (TR) - A9-1 (THR)	Below 1 Ω
A7-22 (SGTR) - A9-2 (GND)	Below 1 Ω
A7-8 (TR) - Body ground	10 kΩ or higher
A7-22 (SGTR) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

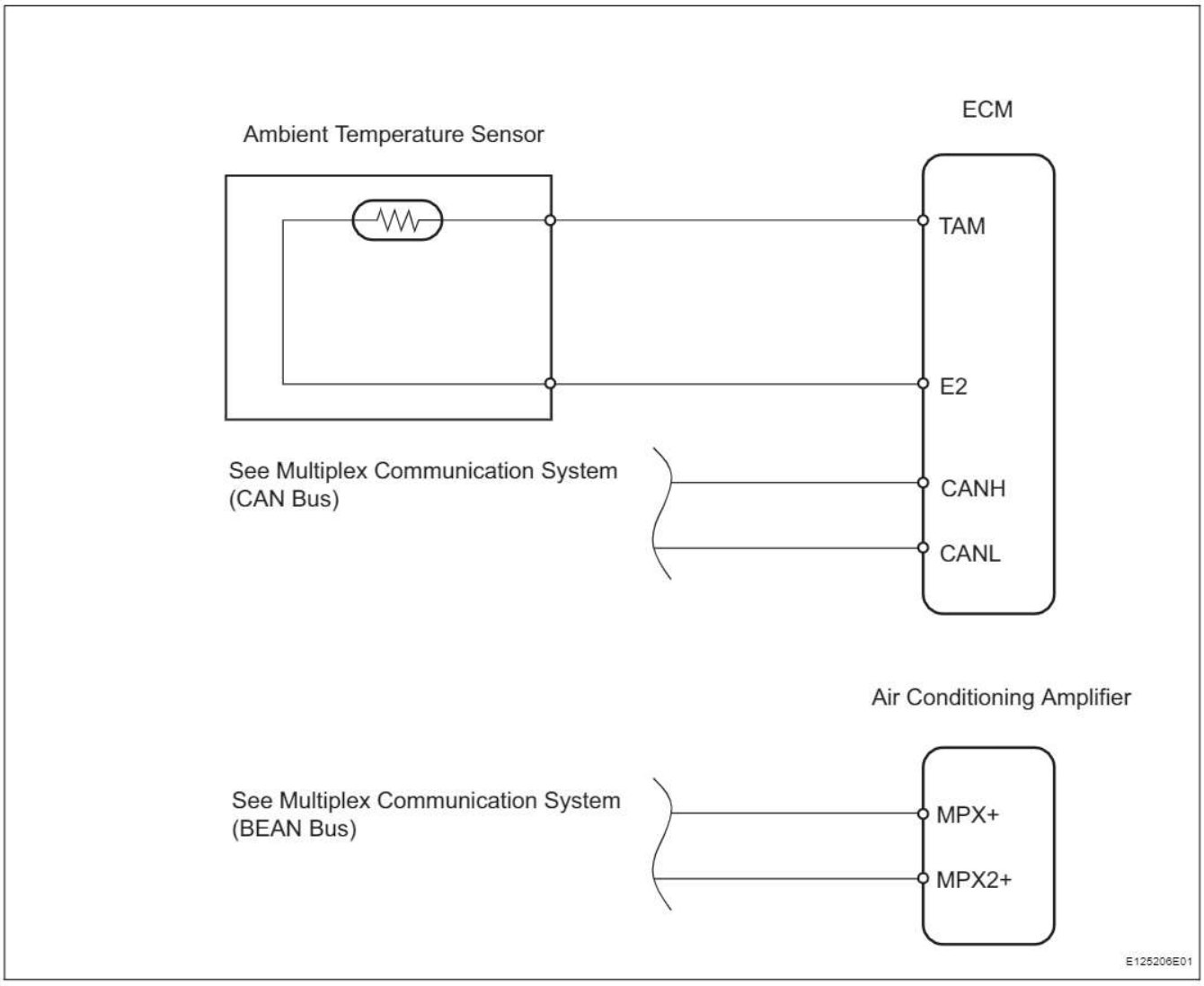
DTC	B1412	Ambient Temperature Sensor Circuit

DESCRIPTION

The ambient temperature sensor is installed in the front part of the condenser to detect the ambient temperature and control the heater and air conditioner "AUTO" function. The sensor connected to the ECM detects fluctuation in the ambient temperature that is used for controlling the room temperature. The sensor sends a signal to the air conditioning amplifier via the ECM. The resistance of the ambient temperature sensor changes in accordance with the ambient temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.
The ECM applies voltage (5 V) to the ambient temperature sensor and reads voltage changes as the resistance of the ambient temperature sensor changes. The ECM sends the read signal to the air conditioning amplifier via CAN and body multiplex communications.

DTC No.	Detection Condition	Trouble Area
B1412	Open or short in ambient temperature sensor circuit	• Ambient temperature sensor • Wire harness between ambient temperature sensor and ECM • ECM • Multiplex communication circuit • Air conditioning amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (AMBI TEMP SENS)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
AMBI TEMP SENS	Ambient temperature sensor / min.: -23.3°C (-9.94°F) max.: 65.95°C (150.71°F)	Actual ambient temperature is displayed	Open in the circuit: -23.3°C (-9.94°F) Short: in the circuit: 65.95°C (150.71°F)

OK:
The display is as specified in the normal condition.

Result

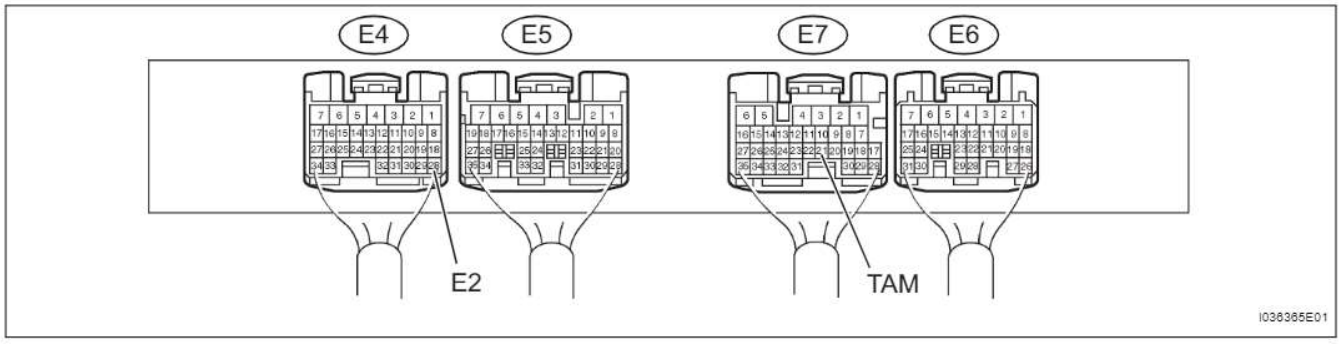
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2	CHECK ECM (TAM VOLTAGE)



(a) Remove the ECM with connectors still connected.
(b) Measure the voltage of the wire harness side connectors.

Standard voltage

Tester Connection	Condition	Specified Condition
E7-21 (TAM) - E4-28 (E2)	Power switch ON (IG) at 25°C (77°F)	1.8 to 2.2 V

AC

Tester Connection	Condition	Specified Condition
E7-21 (TAM) - E4-28 (E2)	Power switch ON (IG) at 40°C (104°F)	1.2 to 1.6 V

HINT:
As the temperature increases, the voltage decreases.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

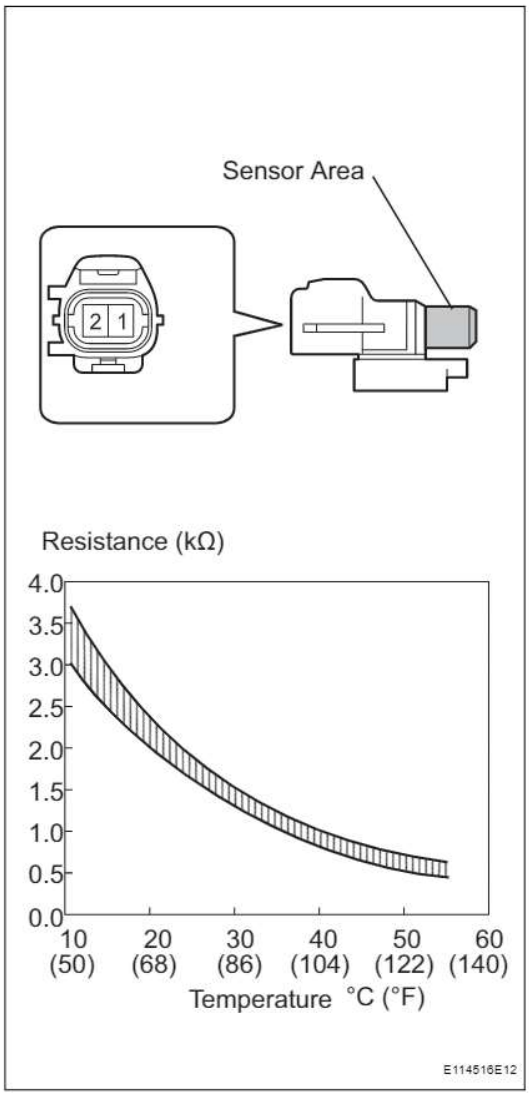
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

AC

3 INSPECT AMBIENT TEMPERATURE SENSOR



(a) Remove the ambient temperature sensor.
(b) Measure the resistance of the sensor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	10°C (50°F)	3.00 to 3.73 kΩ
1 - 2	15°C (59°F)	2.45 to 2.88 kΩ
1 - 2	20°C (68°F)	1.95 to 2.30 kΩ
1 - 2	25°C (77°F)	1.60 to 1.80 kΩ
1 - 2	30°C (86°F)	1.28 to 1.47 kΩ
1 - 2	35°C (95°F)	1.00 to 1.22 kΩ
1 - 2	40°C (104°F)	0.80 to 1.00 kΩ
1 - 2	45°C (113°F)	0.65 to 0.85 kΩ
1 - 2	50°C (122°F)	0.50 to 0.70 kΩ
1 - 2	55°C (131°F)	0.44 to 0.60 kΩ
1 - 2	60°C (140°F)	0.36 to 0.50 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

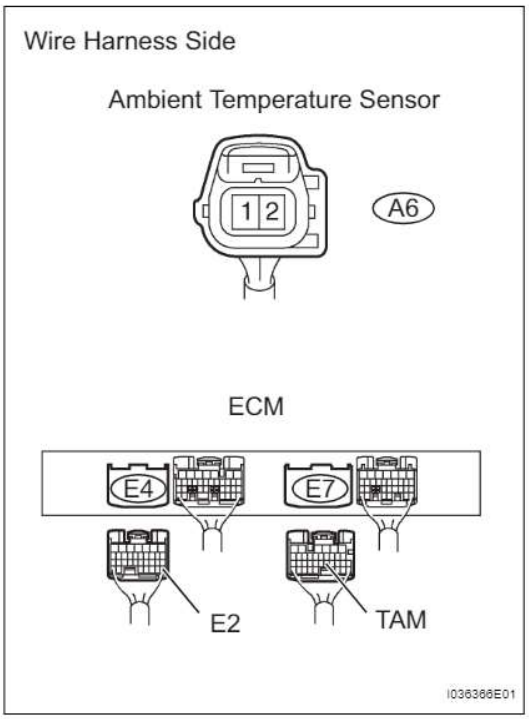
HINT:
As the temperature increases, the resistance decreases (see the graph).

NG → **REPLACE AMBIENT TEMPERATURE SENSOR**

OK

AC

4	CHECK WIRE HARNESS (AMBIENT TEMPERATURE SENSOR - ECM)



(a) Disconnect the A6 sensor connector.
(b) Disconnect the E4 and E7 ECM connectors.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
E7-21 (TAM) - A6-2	Below 1 Ω
E4-28 (E2) - A6-1	Below 1 Ω
E7-21 (TAM) - Body ground	10 kΩ or higher
E4-28 (E2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1413	Evaporator Temperature Sensor Circuit

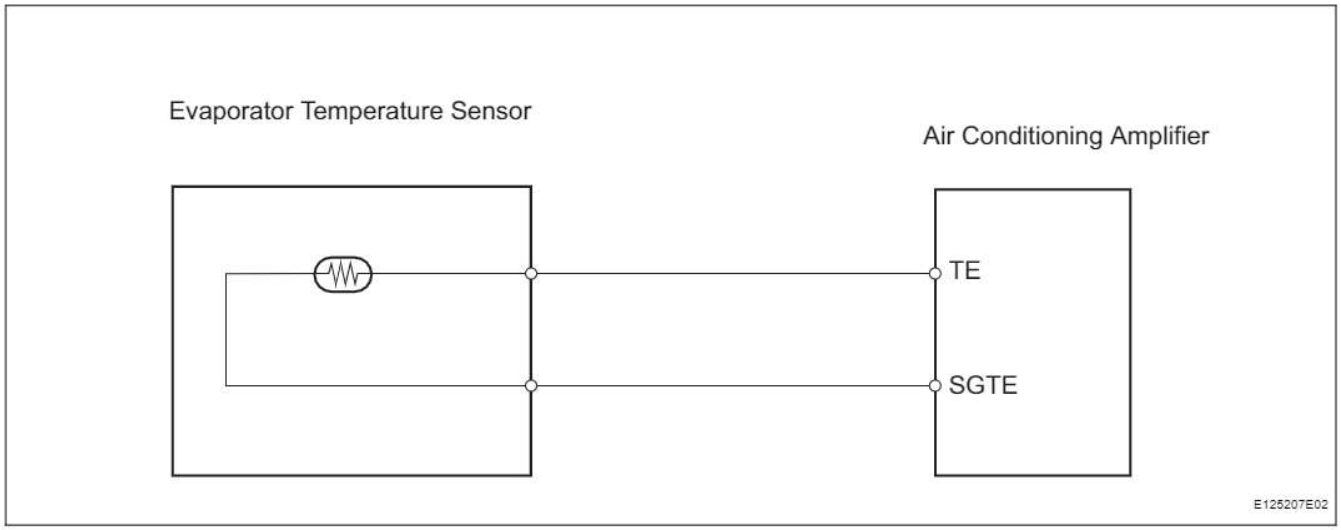
DESCRIPTION

The evaporator temperature sensor is installed on the evaporator in the air conditioner unit to detect the cooled air temperature that has passed through the evaporator and control the air conditioning. It sends appropriate signals to the air conditioning amplifier. The resistance of the evaporator temperature sensor changes in accordance with the cooled air temperature that has passed through the evaporator. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The air conditioning amplifier applies voltage (5 V) to the evaporator temperature sensor and reads voltage changes as the resistance of the evaporator temperature sensor changes. This sensor is used for frost prevention.

DTC No.	Detection Condition	Trouble Area
B1413	Open or short in evaporator temperature sensor circuit.	• Evaporator temperature sensor • Wire harness between evaporator temperature sensor and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (EVAP TEMP)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
EVAP TEMP	Evaporator temperature sensor / min.: -29.7°C (-21.46°F) max.: 59.55°C (139.19°F)	Actual evaporator temperature is displayed	Open in the circuit: -29.7°C (-21.46°F) Short in the circuit: 59.55°C (139.19°F)

AC

OK:
The display is as specified in the normal condition.

Result

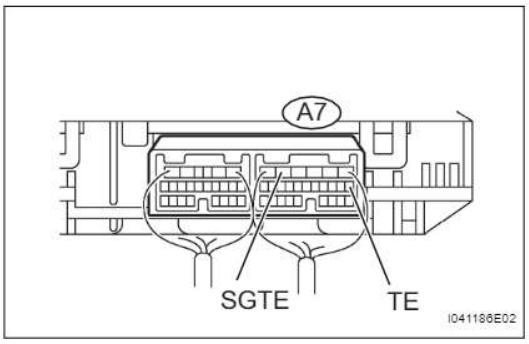
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 CHECK AIR CONDITIONING AMPLIFIER (TE VOLTAGE)



(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-7 (TE) - A7-5 (SGTE)	Power switch ON (IG) at 0 °C (32°F)	2.0 to 2.4 V
A7-7 (TE) - A7-5 (SGTE)	Power switch ON (IG) at 15°C (59°F)	1.4 to 1.8 V

HINT:
As the temperature increases, the voltage decreases.
Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

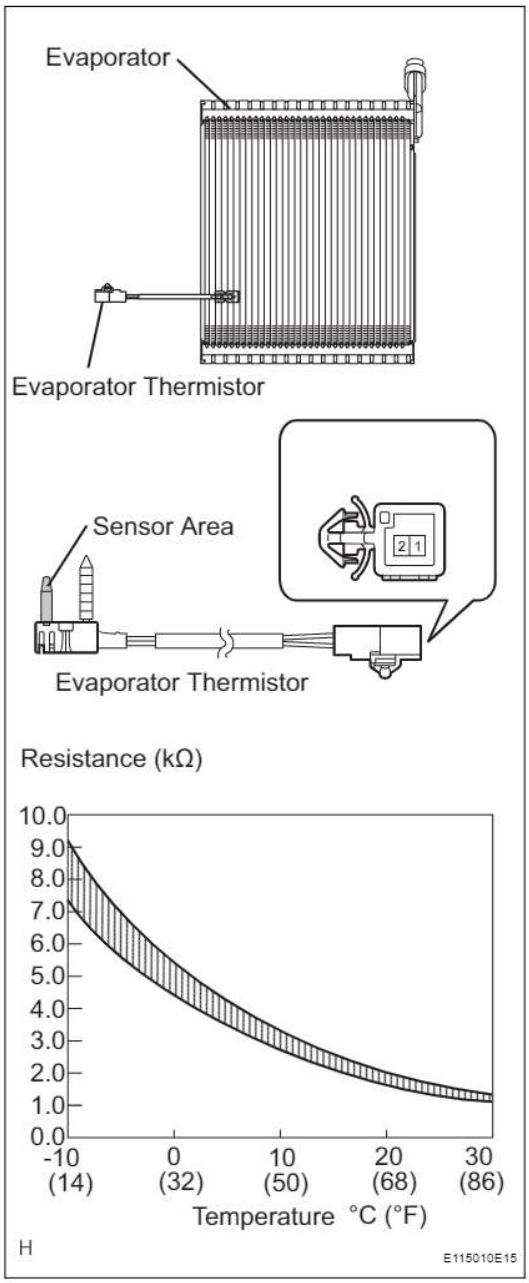
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

AC

3 INSPECT EVAPORATOR TEMPERATURE SENSOR



(a) Remove the evaporator temperature sensor.
(b) Measure the resistance of the sensor.

Standard resistance

Tester Connection	Condition	Specified Condition
1 - 2	-10°C (14°F)	7.30 to 9.10 kΩ
1 - 2	-5°C (23°F)	5.65 to 6.95 kΩ
1 - 2	0°C (32°F)	4.40 to 5.35 kΩ
1 - 2	5°C (41°F)	3.40 to 4.15 kΩ
1 - 2	10°C (50°F)	2.70 to 3.25 kΩ
1 - 2	15°C (59°F)	2.14 to 2.58 kΩ
1 - 2	20°C (68°F)	1.71 to 2.05 kΩ
1 - 2	25°C (77°F)	1.38 to 1.64 kΩ
1 - 2	30°C (86°F)	1.11 to 1.32 kΩ

NOTICE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

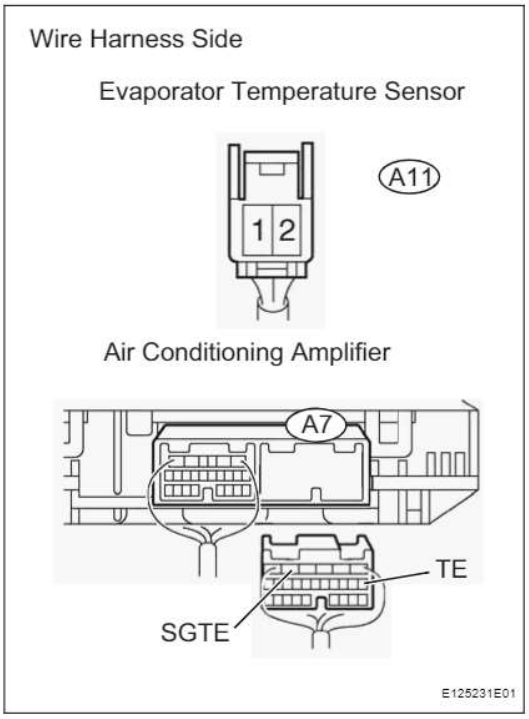
HINT:
As the temperature increases, the resistance decrease (see the graph).

NG → **REPLACE EVAPORATOR TEMPERATURE SENSOR**

OK

AC

4	CHECK WIRE HARNESS (EVAPORATOR TEMPERATURE SENSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A11 sensor connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-7 (TE) - A11-2	Below 1 Ω
A7-5 (SGTE) - A11-1	Below 1 Ω
A7-7 (TE) - Body ground	10 kΩ or higher
A7-5 (SGTE) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

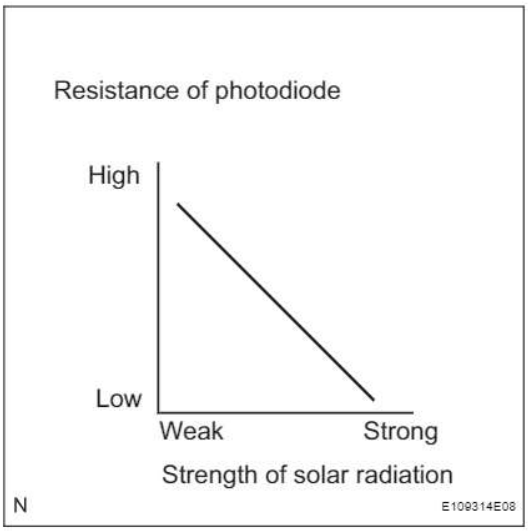
OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1421	Solar Sensor Circuit (Passenger Side)

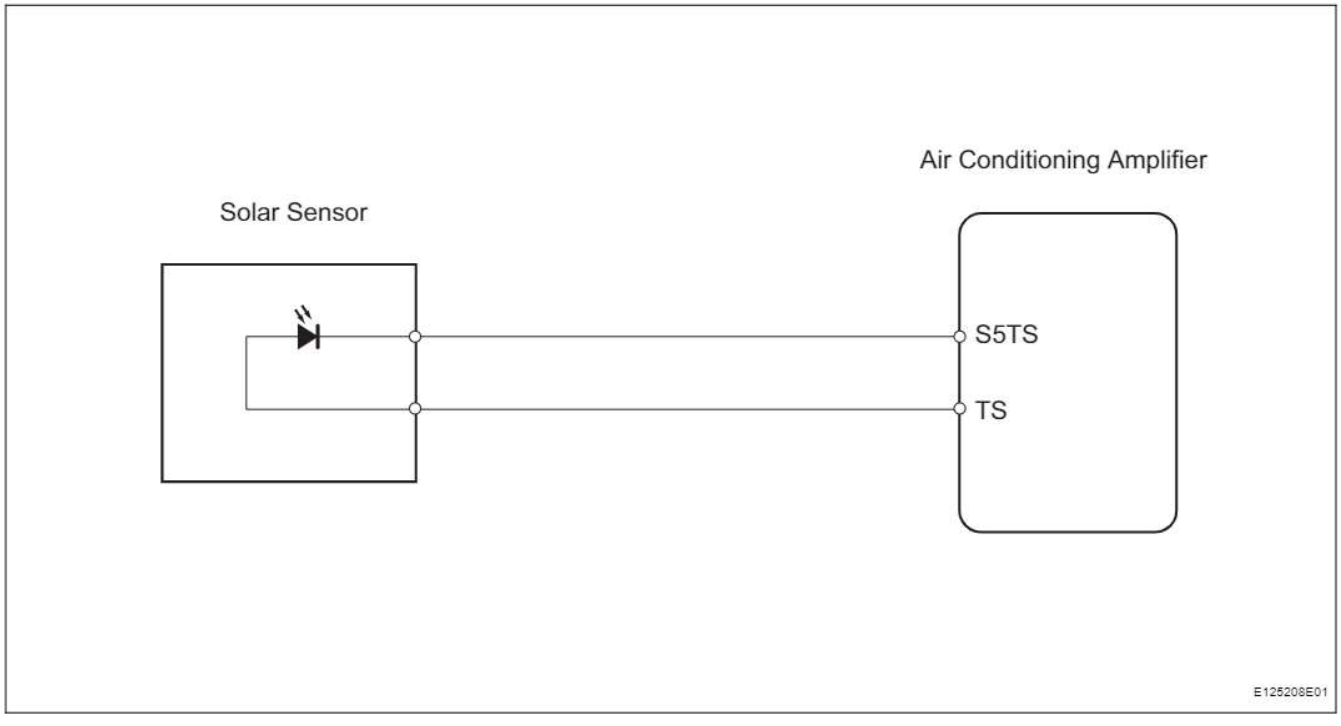
DESCRIPTION



The solar sensor is installed in the upper part of the instrument panel to detect the amount of solar radiation with a photodiode to control the heater and air conditioner "AUTO" function. It sends appropriate signals to the air conditioning amplifier. The output voltage of the solar sensor changes in accordance with the amount of solar radiation. As the amount increases, the voltage increases. As the amount decreases, the voltage decreases. The air conditioning amplifier reads voltage output from the solar sensor.

DTC No.	Detection Condition	Trouble Area
B1421	Open or short in solar sensor circuit circuit. (If the check is performed in a dark place, DTC B1421 may be displayed.)	• Solar sensor • Wire harness between solar sensor and air conditioning amplifier or body ECU • Air conditioning amplifier

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1 READ VALUE OF INTELLIGENT TESTER (SOLAR SENS-P)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
SOLAR SENS-P	Solar sensor (Passenger side) / min.: 0 max.: 255	Increases as brightness increases	Open in the circuit: 0 Short in the circuit: 255

OK:
The display is as specified in the normal condition.

Result

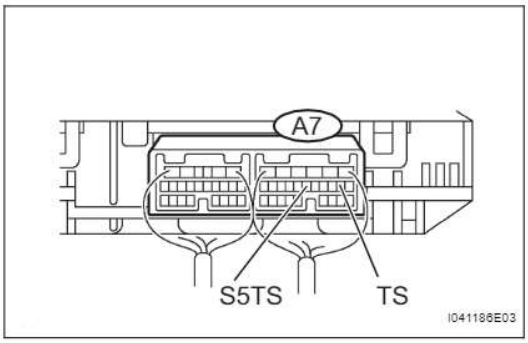
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK AIR CONDITIONING AMPLIFIER (TS VOLTAGE)



(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-12 (S5TS) - A7-21 (TS)	Power switch ON (IG)	0.8 to 4.3 V

HINT:
- As the inspection light is moved away from the sensor, the voltage increases.
- As the inspection light is moved closer to the sensor, the voltage decreases.
- Use an incandescent light for inspection. Bring it within 30 cm (11.8 in.) of the solar sensor.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

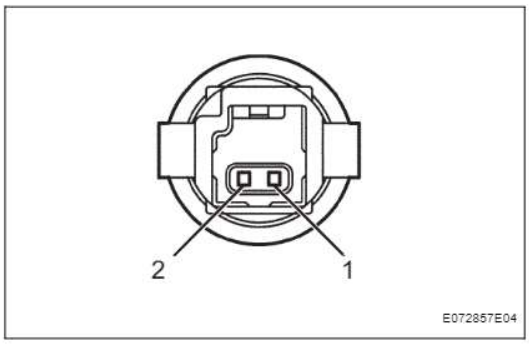
AC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

3 INSPECT SOLAR SENSOR



(a) Remove the solar sensor.
(b) Measure the resistance of the sensor.
- Connect the ohmmeter's positive (+) lead to terminal 2 and negative (-) lead to terminal 1 of the solar sensor.

Standard resistance

Tester Connection	Condition	Specified condition
1 - 2	Sensor is subject to electric light	Except ∞ Ω
1 - 2	Sensor is covered with a cloth	∞ Ω (No continuity)

NOTICE:
The connection procedure for using a digital tester such as an TOYOTA electrical tester is shown above. When using an analog tester, connect the positive (+) lead to terminal 1 and negative (-) lead to terminal 2 of the solar sensor.

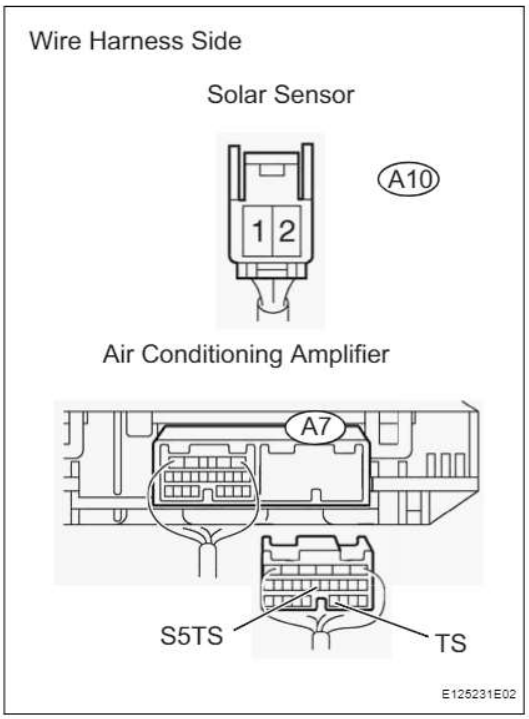
HINT:
- As the inspection light is moved away from the sensor, the resistance increases.
- Use an incandescent light for inspection. Bring it within 30 cm (11.8 in.) of the solar sensor.

NG → REPLACE SOLAR SENSOR

OK

AC

4	CHECK WIRE HARNESS (SOLAR SENSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A10 solar sensor connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-12 (S5TS) - A10-1	Below 1 Ω
A7-21 (TS) - A10-2	Below 1 Ω
A7-12 (S5TS) - Body ground	10 kΩ or higher
A7-21 (TS) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

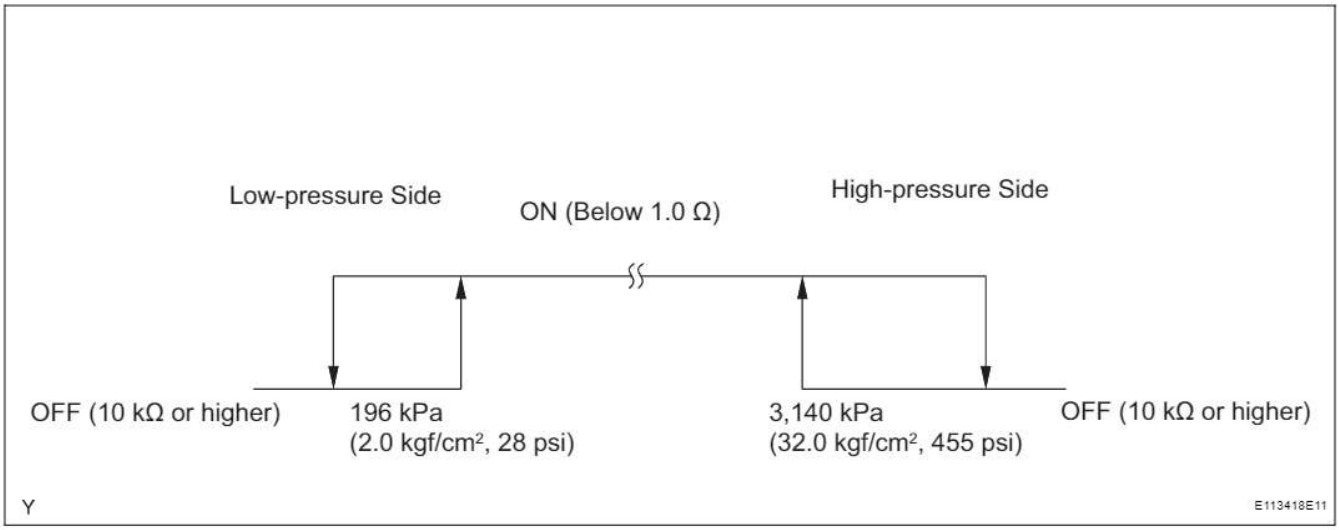
OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1423	Pressure Switch Circuit

DESCRIPTION

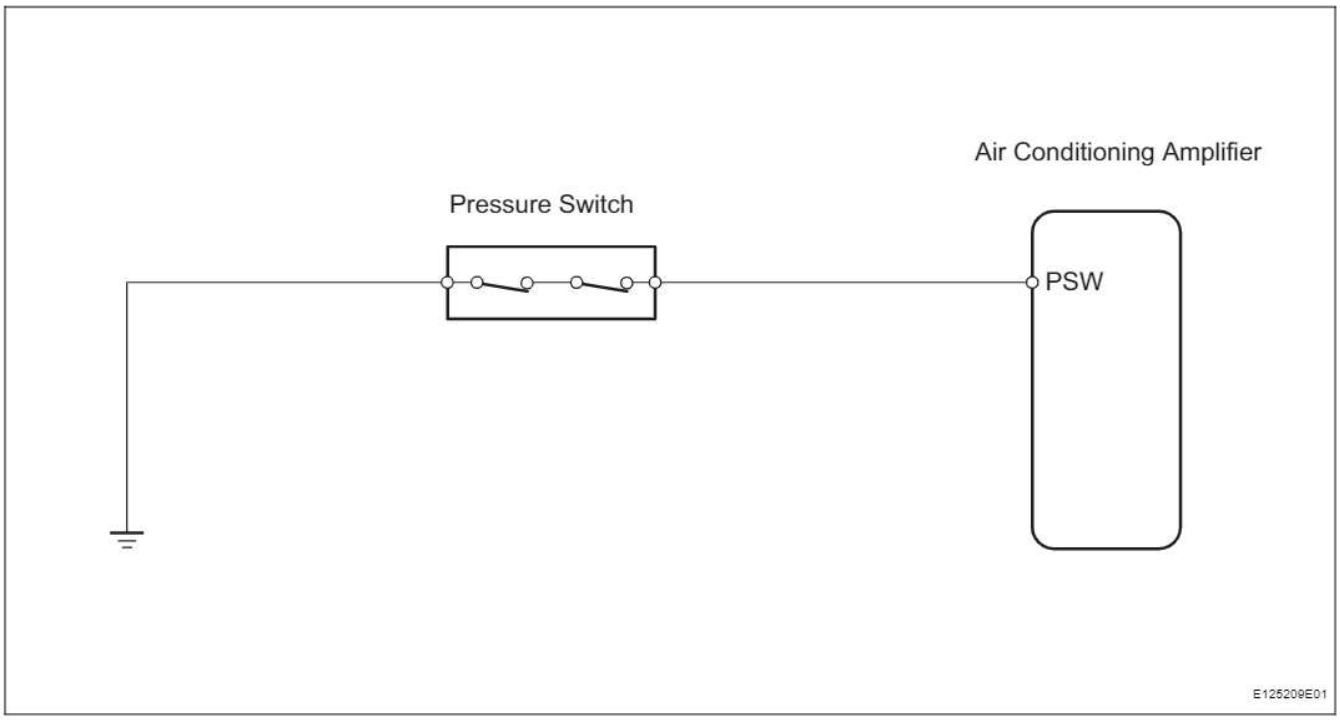


The pressure switch to detect the refrigerant pressure is located in the sight glass side of the pipe on the high-pressure side. This DTC is output when the refrigerant pressure is either significantly low (below 196 kPa (2.0 kgf/cm^2, 28 psi) or significantly high (over 3,140 kPa (32.0 kgf/cm^2, 455 psi). Then the pressure switch sends appropriate signals to the air conditioning amplifier. The pressure switch has built-in switches to detect high and low pressure and is turned off when either is determined to be defective. The air conditioning amplifier continuously monitors the pressure switch signal after the power switch is turned ON (IG). It stops compressor control and outputs the DTC when it detects the signal indicating that the switch is turned OFF.

DTC No.	Detection Condition	Trouble Area
B1423	When either condition below is met: • Open in pressure sensor circuit. • Abnormal refrigerant pressure: Below 196 kPa (2.0 kgf/cm^2, 28 psi) Over 3,140 kPa (32.0 kgf/cm^2, 455 psi)	• Pressure switch • Wire harness between pressure switch and body ground • Multiplex communication circuit • Refrigerant pipe line • Air conditioning amplifier

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK REFRIGERANT PRESSURE

(a) Set the manifold gauge.
(b) Read the manifold gauge pressure when these conditions are established.

Test conditions:
- Temperature at the air inlet with the switch set at RECIRC is 30 to 35°C (86 to 95°F)
- Power switch ON (IG)
- Blower speed control switch at "HI" position
- Temperature control dial at "COOL" position
- Air conditioning switch ON
- Fully open doors

Standard pressure:

Pressure on high pressure side:

1.37 to 1.57 MPa (13.9 to 16.0 kgf/cm^2, 198 to 228 psi)

HINT:

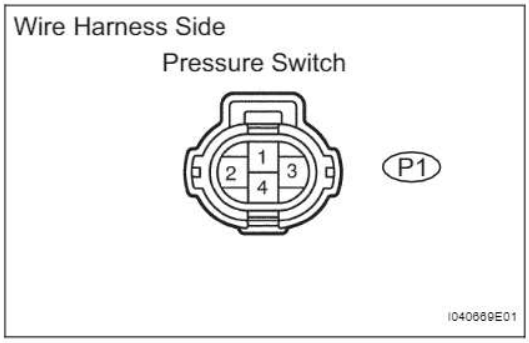
If the refrigerant pressure is below 196 kPa (2.0 kgf/cm^2, 28 psi), the refrigerant amount in the air conditioning cycle may have decreased significantly for reasons such as a gas leakage.

NG	INSPECT AND REPAIR AIR CONDITIONING CYCLE

AC

OK

2	CHECK AIR CONDITIONING OPERATION



(a) Disconnect the P1 pressure switch connector.
(b) Connect terminals 1 and 4 of the connector of the pressure switch on the vehicle wire harness side using a service wire.
(c) Turn the power switch ON (IG).
(d) Turn the air conditioning switch ON and check that the compressor is operated.
(e) Check that the compressor is not operated when disconnecting terminals 1 and 4 (that were connected in the prior step).

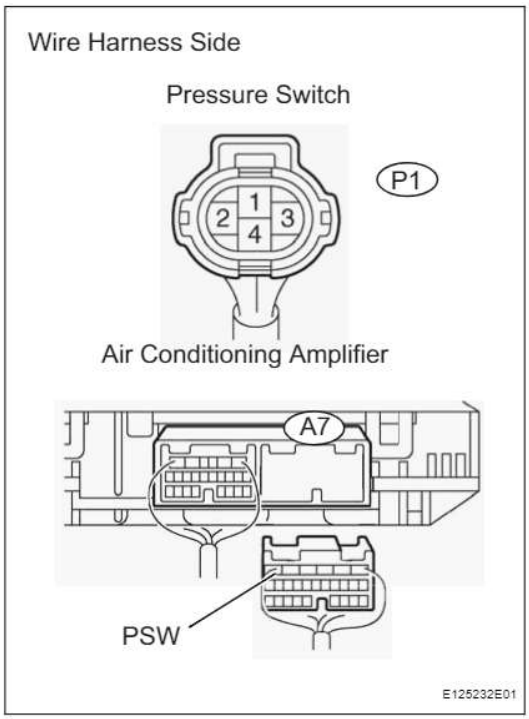
OK:

Terminals 1 and 4 connected: the compressor is operated
Terminals 1 and 4 disconnected: the compressor is not operated

OK	REPLACE PRESSURE SWITCH

NG

3	CHECK WIRE HARNESS (PRESSURE SWITCH - AIR CONDITIONING AMPLIFIER AND BODY GROUND)



(a) Disconnect the P1 pressure switch connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-6 (PSW) - P1-4	Below 1 Ω
P1-1 - Body ground	Below 1 Ω
A7-6 (PSW) - Body ground	10 kΩ or higher

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

A	REPAIR OR REPLACE HARNESS AND CONNECTOR

B	PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

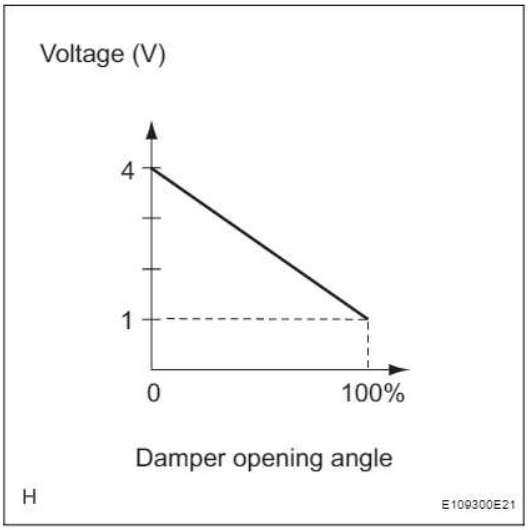
AC

C

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1431	Air Mix Damper Position Sensor Circuit (Passenger Side)

DESCRIPTION

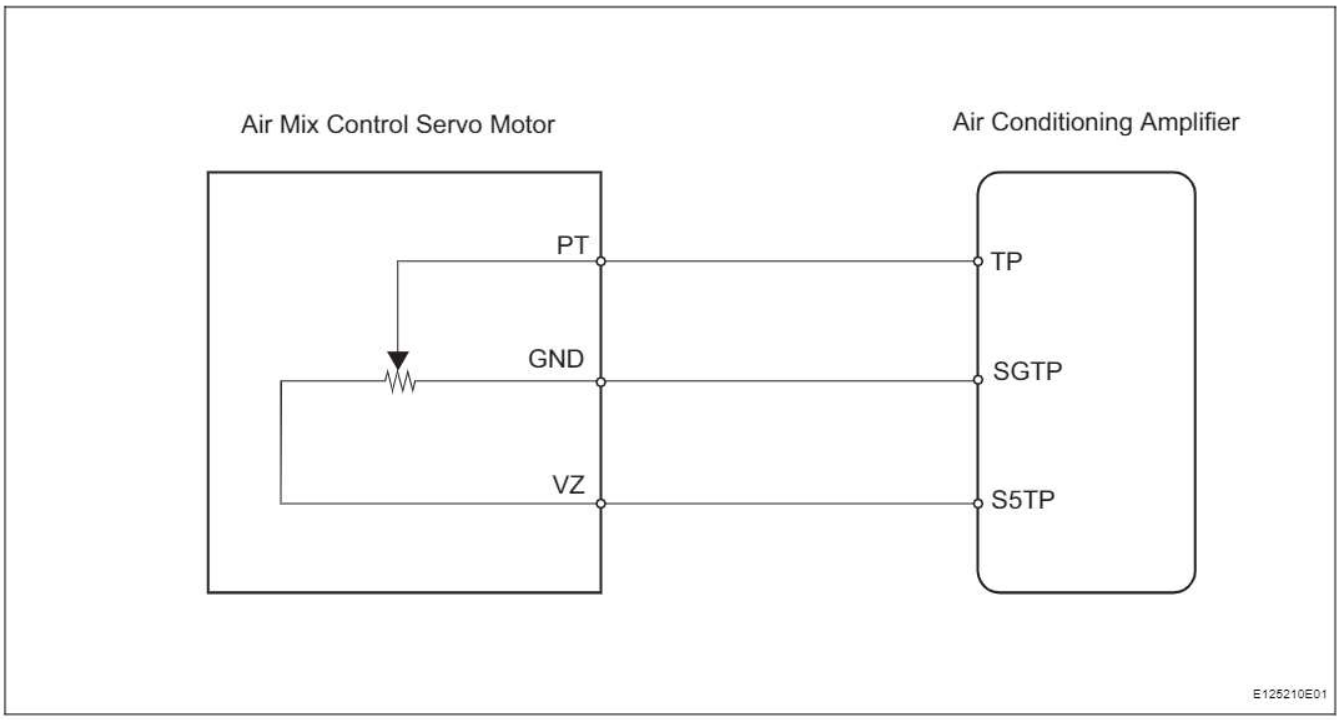


This sensor detects the position of the air mix control servo motor (air mix damper) and sends the appropriate signals to the air conditioning amplifier. The position sensor is built into the air mix control servo motor. The position sensor resistance changes as the air mix control servo motor arm moves. It outputs voltage (5 V) that is input to terminal 1 (VZ) and terminal 3 (PT) via the variable resistor, and then to the air conditioning amplifier. The air conditioning amplifier reads the arm position with the input voltage from the position sensor.

DTC No.	Detection Condition	Trouble Area
B1431	Open or short in power source circuit in air mix damper position sensor circuit.	• Air mix control servo motor (air mix damper position sensor) • Wire harness between air mix control servo motor and air conditioning amplifier • Air conditioning amplifier

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (A/M DAMP POS-P, TARG-P)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/M DAMP POS-P	Air mix damper position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. COOL": -10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	-
A/M DAMP TARG-P	Air mix damper target position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. COOL": -10.0% Damper is at "MAX. HOT": 100.0% or 71.0%	-

OK:
The displayed is as specified in the normal condition.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

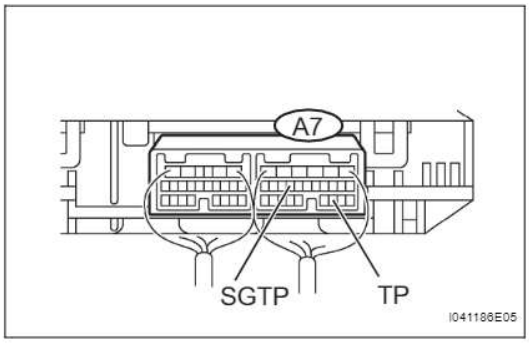
AC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK AIR CONDITIONING AMPLIFIER (TP VOLTAGE)



(a) Remove the air conditioning amplifier with its connectors still connected.
(b) Change the set temperature to activate the air mix servo motor.
(c) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
A7-20 (TP) - A7-14 (SGTP)	Power switch ON (IG) MAX. HOT position	0.97 to 1.03 V
A7-20 (TP) - A7-14 (SGTP)	Power switch ON (IG) MAX. COOL position	3.97 to 4.03 V

HINT:
As the set temperature increases, the voltage decreases gradually without interruption.

Result

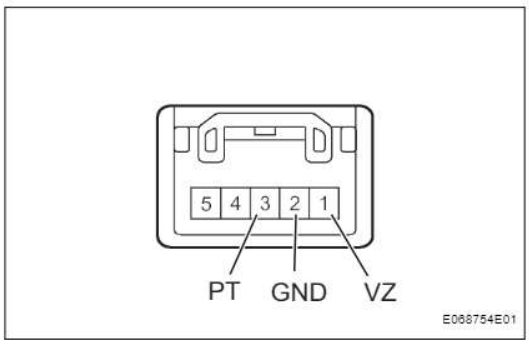
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

3 INSPECT AIR MIX CONTROL SERVO MOTOR

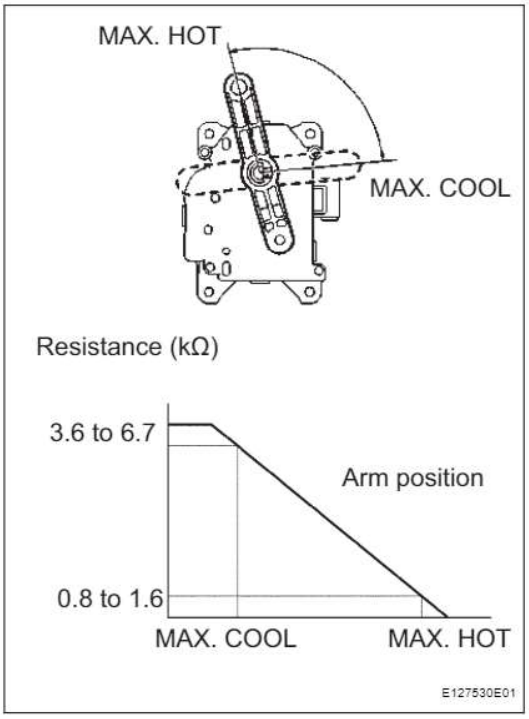


(a) Remove the air mix control servo motor.
(b) Measure the resistance of the servo motor.

Standard resistance

Tester Connection	Specified Condition
A15-1 (VZ) - A15-2 (GND)	4.2 to 7.8 kΩ

AC



(c) Measure the resistance of the servo motor.
Standard resistance

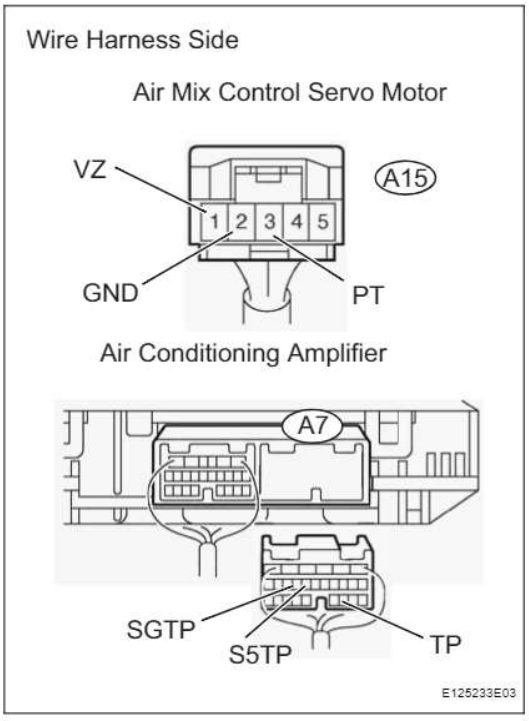
Tester Connection	Condition	Specified Condition
A15-3 (PT) - A15-2 (GND)	MAX. COOL Position	3.6 to 6.7 kΩ
A15-3 (PT) - A15-2 (GND)	MAX. HOT Position	0.8 to 1.6 kΩ

HINT:
- Refer to the operation procedure for air mix control servo motor (see page AC-83).
- As the air mix control servo motor moves from the COOL position to HOT position, the resistance decreases gradually without interruption.

NG → **REPLACE AIR MIX CONTROL SERVO MOTOR**

OK

4 CHECK WIRE HARNESS (AIR MIX CONTROL SERVO MOTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A15 servo connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
A7-20 (TP) - A15-3 (PT)	Below 1 Ω
A7-14 (SGTP) - A15-2 (GND	Below 1 Ω
A7-13 (S5TP) - A15-1 (VZ)	Below 1 Ω
A7-20 (TP) - Body ground	10 kΩ or higher
A7-14 (SGTP) - Body ground	10 kΩ or higher
A7-13 (S5TP) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

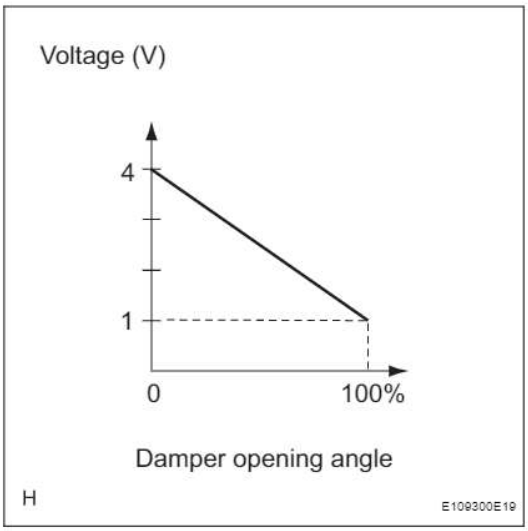
OK

AC

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1432	Air Inlet Damper Position Sensor Circuit

DESCRIPTION

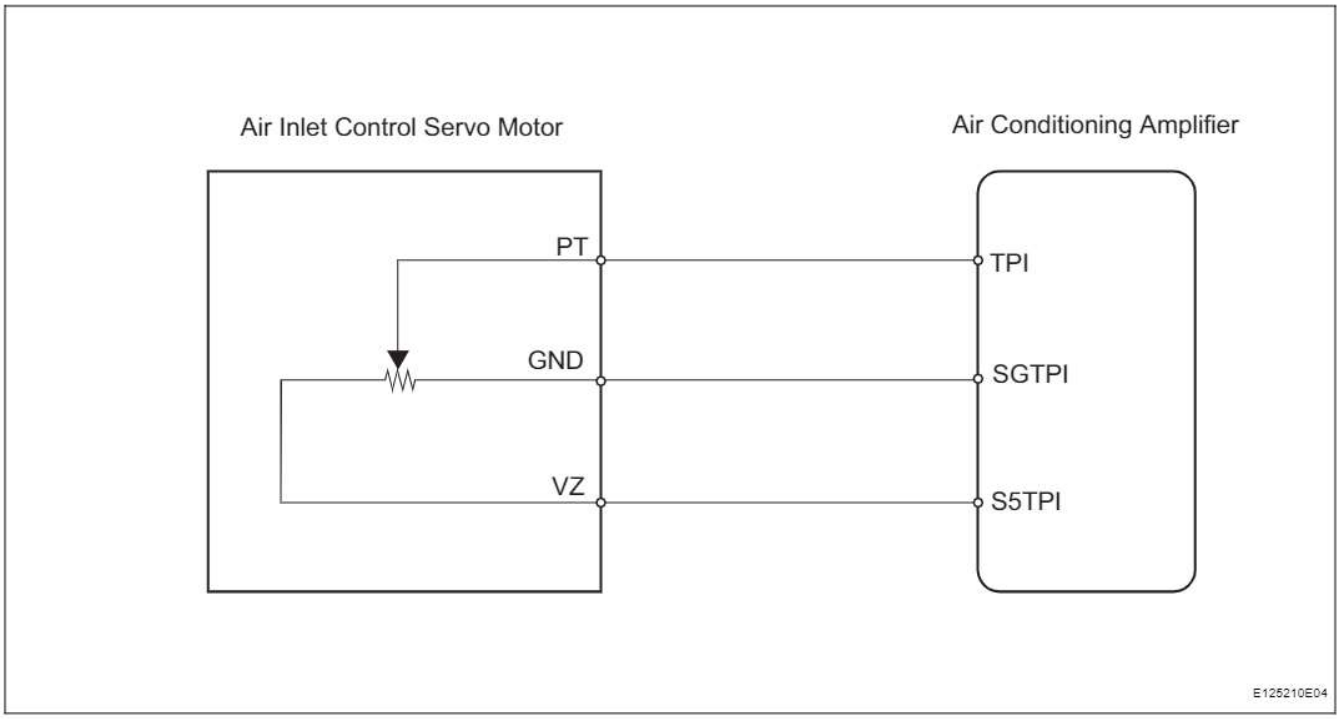


This sensor detects the position of the air inlet control servo motor and sends the appropriate signals to the air conditioning amplifier. The position sensor is built into the air inlet control servo motor.
The position sensor's resistance changes as the air inlet control servo motor arm moves.
It outputs voltage (5 V) that is input to terminal 3 (VZ) and terminal 3 (PT) via the variable resistor, and then to the air conditioning amplifier. The air conditioning amplifier reads the arm position with the input voltage from the position sensor.

DTC No.	Detection Condition	Trouble Area
B1432	Open or short in power source circuit in air inlet damper position sensor circuit.	• Air inlet control servo motor (air inlet damper position sensor) • Wire harness between air inlet control servo motor and air conditioning amplifier • Air conditioning amplifier

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (A/I DAMP POS, TARG)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/I DAMP POS	Air inlet damper position / min.: -14% max.: 113.5%	Damper is at "RECIRCULATION": -1.0% Damper is at "FRESH": 110.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
A/I DAMP TARG	Air inlet damper target position / min.: -14% max.: 113.5%	Damper is at "RECIRCULATION": -1.0% Damper is at "FRESH": 110.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

OK:
The displayed is as specified in the normal condition.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B

AC

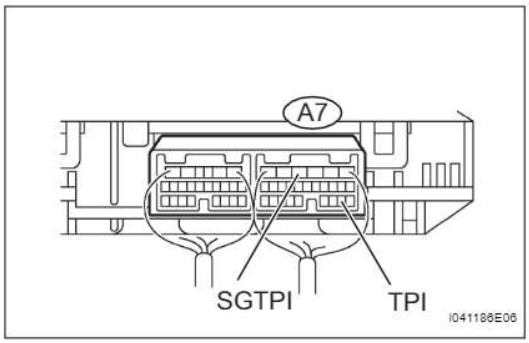
Result	Proceed to
OK (Checking from the DTC)	C

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

2 CHECK AIR CONDITIONING AMPLIFIER (TPI VOLTAGE)



(a) Remove the air conditioning amplifier with connectors still connected.
(b) Change the set REC / FRS to activate the air inlet servo motor.
(c) Measure the voltage of the wire harness side connector.

Standard voltage

Tester Connection	Condition	Specified Condition
A7-19 (TPI) - A7-4 (SGTPI)	Power switch ON (IG) RECIRC position	3.5 to 4.5 V
A7-19 (TPI) - A7-4 (SGTPI)	Power switch ON (IG) FRESH position	0.5 to 1.8 V

HINT:
As the air inlet servo motor is moved from REC position to FRS position, the voltage decreases gradually without interruption.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

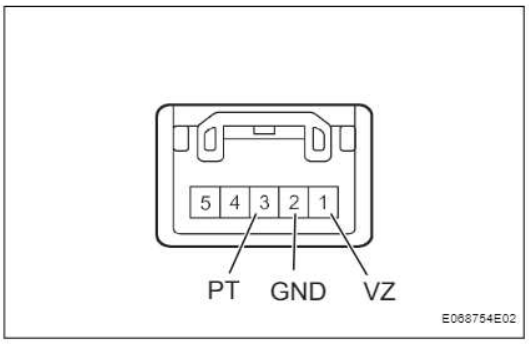
B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

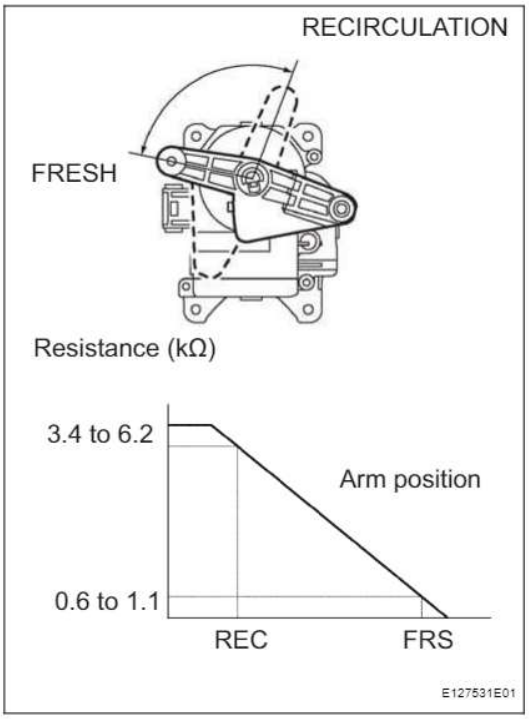
AC

3 INSPECT AIR INLET CONTROL SERVO MOTOR



(a) Remove the air inlet control servo motor.
(b) Measure the resistance of the servo motor.
Standard resistance

Tester Connection	Specified Condition
A14-1 (VZ) - A14-2 (GND)	4.2 to 7.8 kΩ



(c) Measure the resistance of the servo motor.
Standard resistance

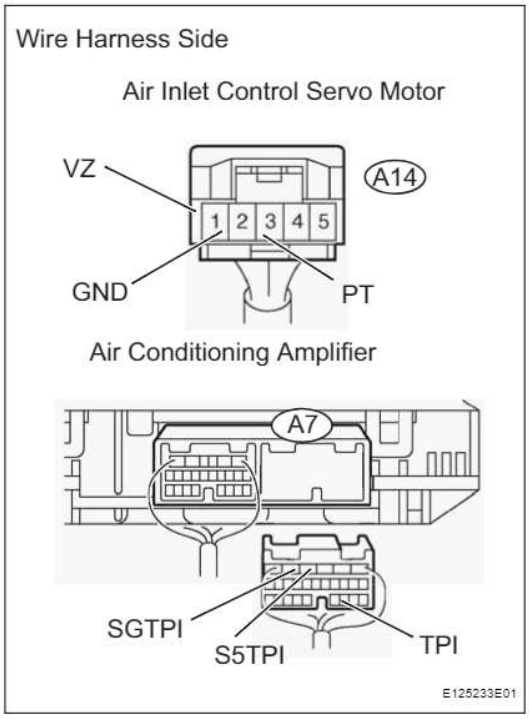
Tester Connection	Condition	Specified Condition
A14-3 (PT) - A14-2 (GND)	RECIRCULATION position	3.4 to 6.2 kΩ
A14-3 (PT) - A14-2 (GND)	FRESH position	0.6 to 1.1 kΩ

HINT:
- Refer to the operation procedure of the air inlet control servo motor (see page AC-87).
- As the air inlet control servo motor moves from FRESH position to RECIRCULATION position, the resistance decreases gradually without interruption.

NG → **REPLACE AIR INLET CONTROL SERVO MOTOR**

OK

4	CHECK WIRE HARNESS (AIR INLET CONTROL SERVO MOTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A14 servo connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-19 (TPI) - A14-3 (PT)	Below 1 Ω
A7-4 (SGTPI) - A14-2 (GND)	Below 1 Ω
A7-3 (S5TPI) - A14-1 (VZ)	Below 1 Ω
A7-19 (TPI) - Body ground	10 kΩ or higher
A7-4 (SGTPI) - Body ground	10 kΩ or higher
A7-3 (S5TPI) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

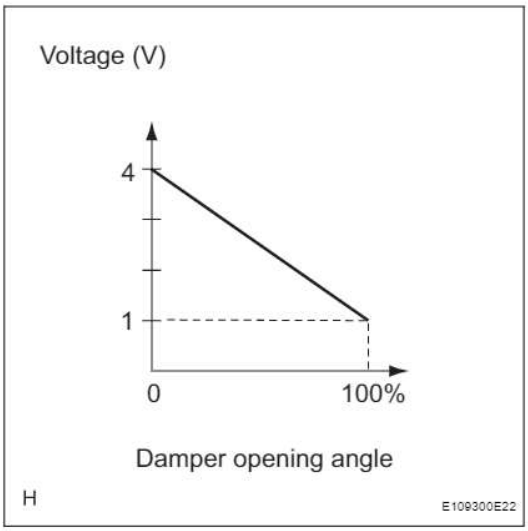
OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

DTC	B1433	Air Outlet Damper Position Sensor Circuit

DESCRIPTION

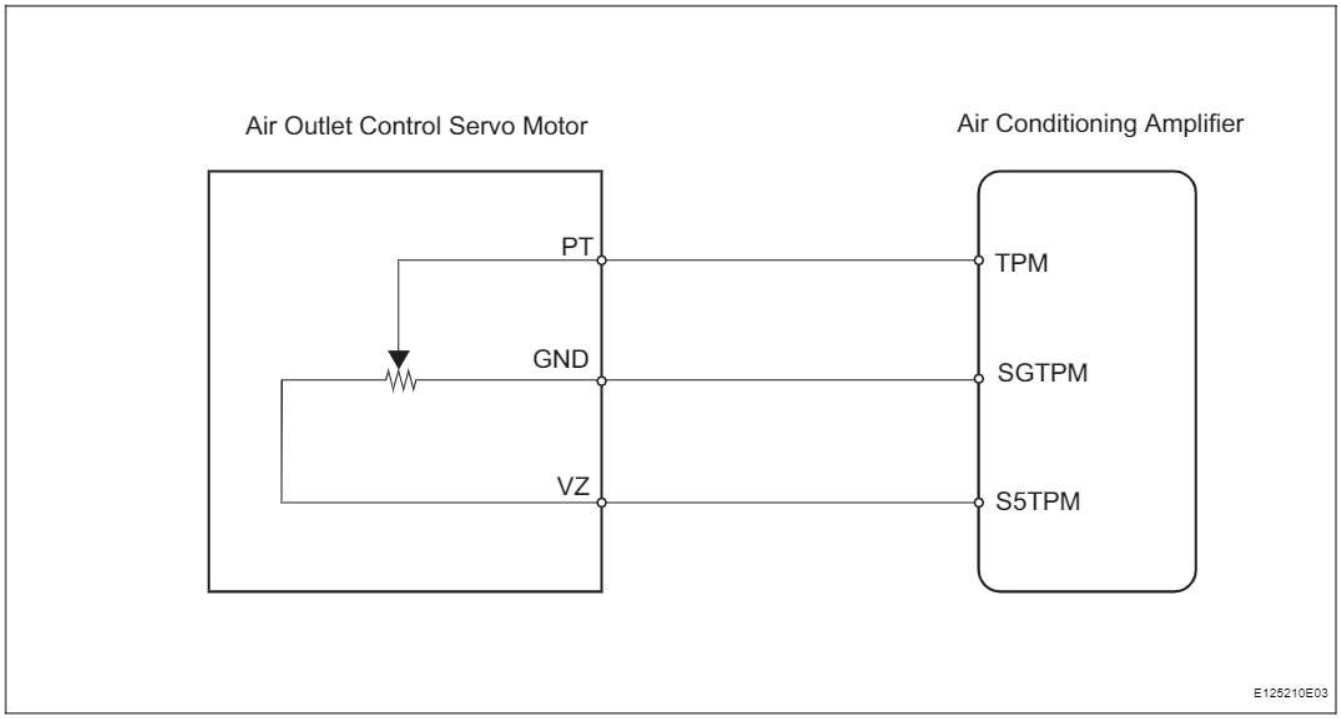


This sensor detects the position of the air outlet control servo motor and sends the appropriate signals to the air conditioning amplifier. The position sensor is built into the air outlet control servo motor. The potentiometer's resistance changes as the air outlet control servo motor arm moves.
It outputs voltage (5 V) that is input to terminal 1 (VZ) and terminal 3 (PT) via the variable resistor, and then to the air conditioning amplifier. The air conditioning amplifier reads the arm position with the input voltage from the potentiometer.

DTC No.	Detection Condition	Trouble Area
B1433	Open or short in power source circuit in air outlet damper position sensor circuit.	• Air outlet control servo motor (air outlet damper position sensor) • Wire harness between air outlet control servo motor and air conditioning amplifier • Air conditioning amplifier

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (A/O DAMP POS, TARG)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the items below in the DATA LIST, and read the displays on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/O DAMP POS	Air outlet damper position / min.: -14% max.: 113.5%	Damper is at "FACE": -10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0% Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%
A/O DAMP TARG	Air outlet damper target position / min.: -14% max.: 113.5%	Damper is at "FACE": -10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0 % Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%

AC

OK:
The displayed is as specified in the normal condition.

Result

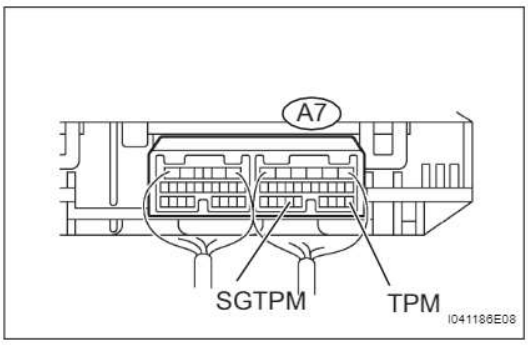
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 CHECK AIR CONDITIONING AMPLIFIER (TPM VOLTAGE)



(a) Remove the air condition amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-18 (TPM) - A7-23 (SGTPM)	Power switch ON (IG) FACE position	3.97 to 4.07 V
A7-18 (TPM) - A7-23 (SGTPM)	Power switch ON (IG) DEF position	0.97 to 1.03 V

HINT:
As the air outlet servo motor is moved from the FACE position to the DEF position, the voltage decreases gradually without interruption.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

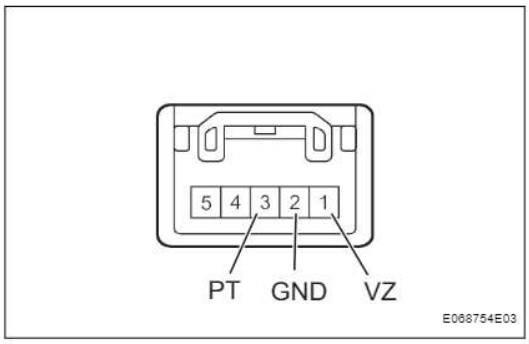
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

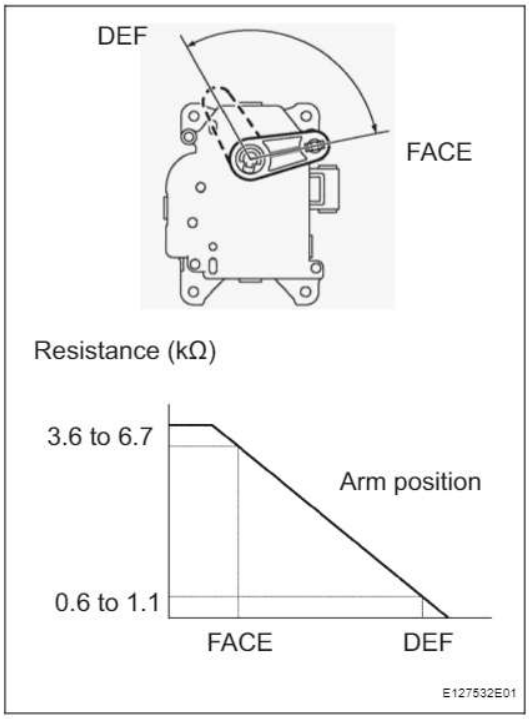
AC

3 INSPECT AIR OUTLET CONTROL SERVO MOTOR



(a) Remove the air outlet control servo motor.
(b) Measure the resistance of the servo motor.
Standard resistance

Tester Connection	Specified Condition
A16-1 (VZ) - A16-2 (GND)	4.2 to 7.2 kΩ



(c) Measure the resistance of the servo motor.
Standard resistance

Tester Connection	Condition	Specified Condition
A16-3 (PT) - A16-2 (GND)	DEF position	0.6 to1.1 kΩ
A16-3 (PT) - A16-2 (GND)	FACE position	3.6 to 6.7 kΩ

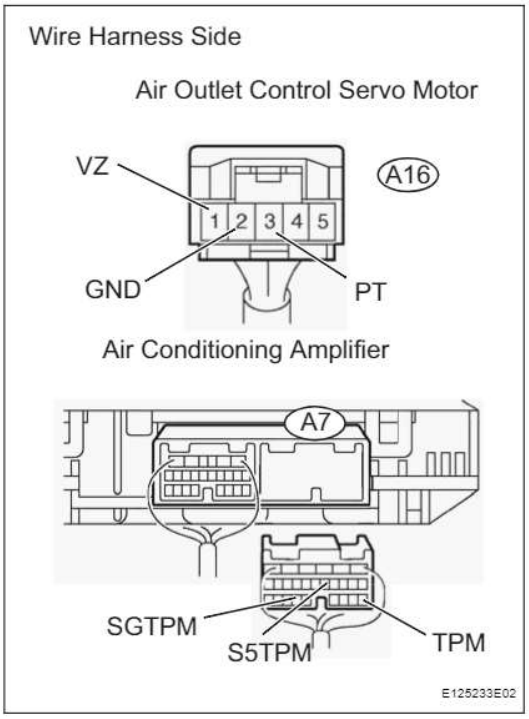
HINT:
- Refer to the operation procedure for air outlet control servo motor (see page AC-91).
- As the air outlet control servo motor moved from DEF position to FACE position, the resistance decreases gradually without interruption.

NG → **REPLACE AIR OUTLET CONTROL SERVO MOTOR**

OK

AC

4	CHECK WIRE HARNESS (AIR OUTLET CONTROL SERVO MOTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A16 servo connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-18 (TPM) - A16-3 (PT)	Below 1 Ω
A7-23 (SGTPM) - A16-2 (GND)	Below 1 Ω
A7-11 (S5TPM) - A16-1 (VZ)	Below 1 Ω
A7-18 (TPM) - Body ground	10 kΩ or higher
A7-23 (SGTPM) - Body ground	10 kΩ or higher
A7-11 (S5TPM) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC

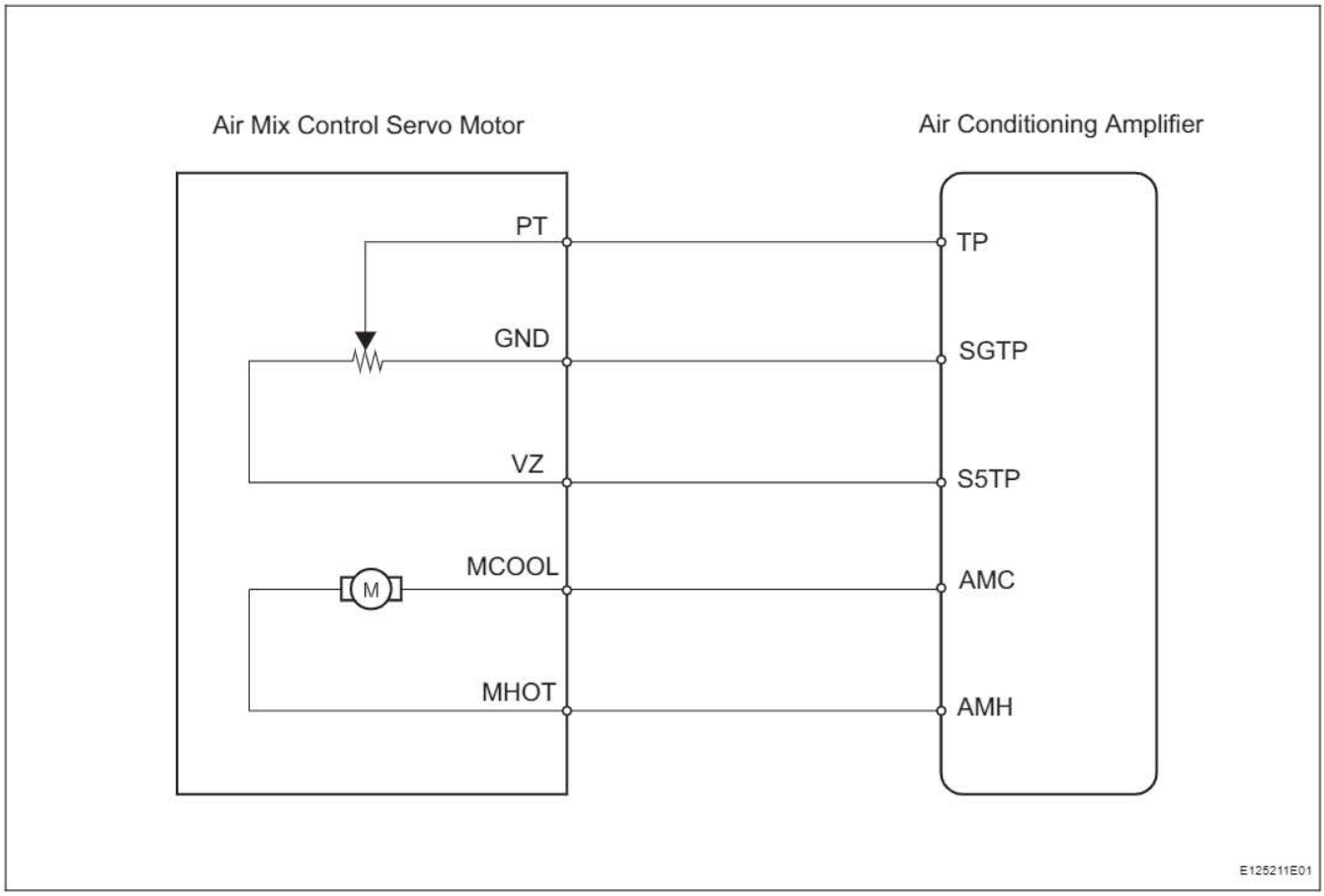
DTC	B1441	Air Mix Damper Control Servo Motor Circuit (Passenger Side)

DESCRIPTION

The air mix control servo motor (air mix damper servo) is controlled by the air conditioning amplifier.
The air mix control servo motor moves the air mix damper by rotating (normal, reverse) the motor with electrical power from the air conditioning amplifier.
This adjusts the mix ratio of the air that passes through the evaporator and heater core and controls the airflow temperature. Air flow temperature changes when moving the air mix damper to the target point.
The target point can be detected with the air mix damper position sensor.

DTC No.	Detection Condition	Trouble Area
B1441	Air mix damper position sensor value does not change even if air conditioning amplifier assembly operates air mix servo motor.	• Air mix control servo motor • Wire harness between air mix control servo motor and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (A/M DAMP POS-P, TARG-P)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.

AC

(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/M DAMP POS-P	Air mix damper position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. COOL": -10.0%	-
A/M DAMP TARG-P	Air mix damper target position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. COOL": -10.0%	-

OK:
When the target position is at the "MAX. COOL" (-10.0%), the actual opening angle is 19.0% or less.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 READ VALUE OF INTELLIGENT TESTER (A/M DAMP POS-P, TARG-P)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/M DAMP POS-P	Air mix damper position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. HOT": 100.0% or 71.0%	-
A/M DAMP TARG-P	Air mix damper target position (Passenger side) / min.: -14% max.: 113.5%	Damper is at "MAX. HOT": 100.0% or 71.0%	-

OK:
When the target position is at the "MAX. HOT" (100.0%), the actual opening angle is 81.0% or more.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

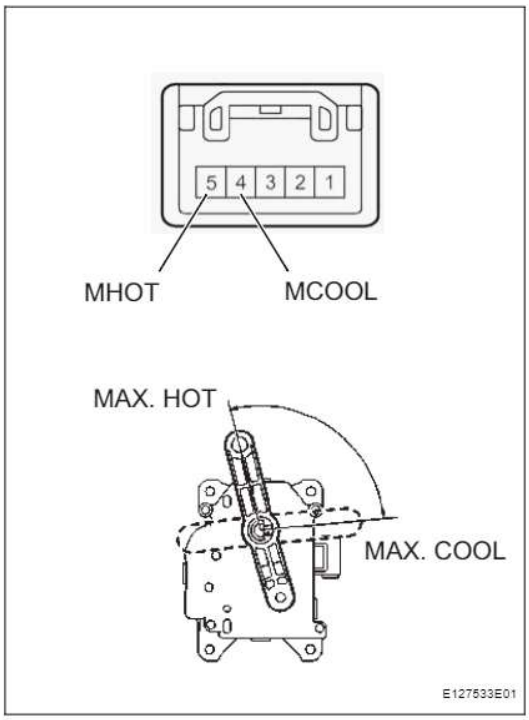
AC

B → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

C → REPLACE AIR CONDITIONING AMPLIFIER

A

3 INSPECT AIR MIX CONTROL SERVO MOTOR



(a) Remove the air mix control servo motor.
(b) Connect the battery's positive (+) lead to terminal 5 and negative (-) lead to terminal 4, then check that lever turns to "MAX. HOT" position smoothly.
(c) Measure the resistance of the servo motor.

Standard resistance

Tester Connection	Condition	Specified Condition
A15-3 (PT) - A15-2 (GND)	MAX. HOT position	0.8 to 1.6 kΩ

(d) Connect the battery's positive (+) lead to terminal 4 and negative (-) lead to terminal 5, then check that lever turns to "MAX. COOL" position smoothly.
(e) Measure the resistance of the servo motor.

Standard resistance

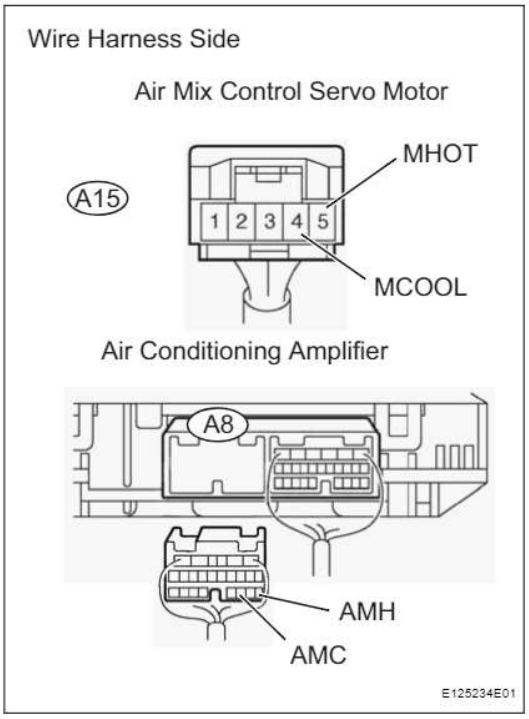
Tester Connection	Condition	Specified Condition
A15-3 (PT) - A15-2 (GND)	MAX. COOL position	3.6 to 6.7 kΩ

NG → REPLACE AIR MIX CONTROL SERVO MOTOR

OK

AC

4	CHECK WIRE HARNESS (AIR MIX CONTROL SERVO MOTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A15 servo connector.
(b) Disconnect the A8 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A8-19 (AMC) - A15-4 (MCOOL)	Below 1 Ω
A8-17 (AMH) - A15-5 (MHOT)	Below 1 Ω
A8-19 (AMC) - Body ground	10 kΩ or higher
A8-17 (AMH) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

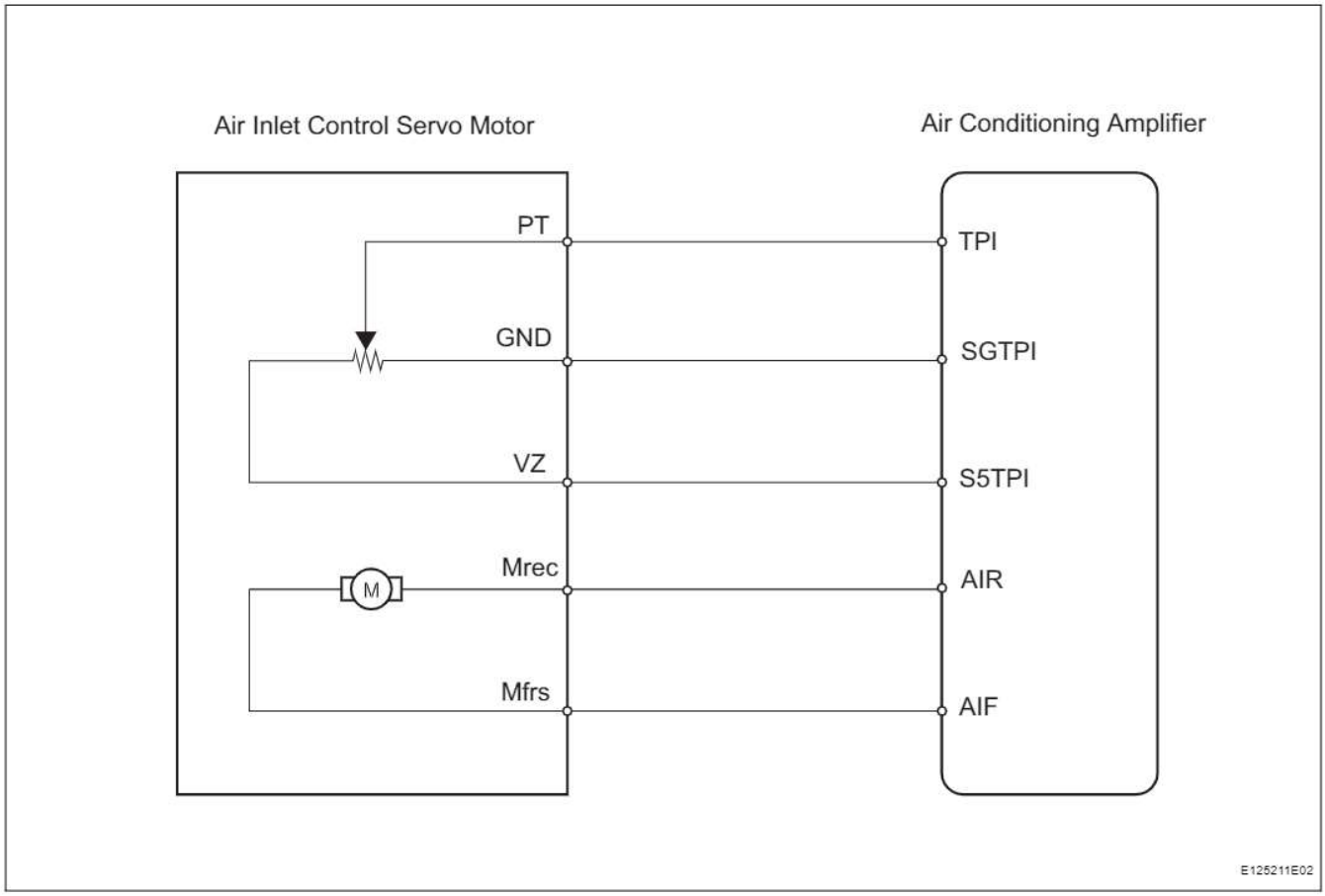
DTC	B1442	Air Inlet Damper Control Servo Motor Circuit

DESCRIPTION

The air inlet control servo motor is controlled by the air conditioning amplifier and moves the air inlet control servo motor to the desired position.
The air inlet control servo motor switches between "RECIRCULATION" and "FRESH" by rotating the motor (normal, reverse) with electrical power from the air conditioning amplifier. This controls intake air and switches "RECIRCULATION", "FRESH" and "HALF-RECIRCULATION".

DTC No.	Detection Condition	Trouble Area
B1442	Air outlet damper position sensor valve does not change even if air conditioning amplifier operated air outlet damper control servo motor.	• Air inlet control servo motor • Wire harness between air inlet control servo motor and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (A/I DAMP POS, TARG)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON and push the intelligent tester main switch ON.

AC

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/I DAMP POS	Air inlet damper position / min.: -14% max.: 113.5%	Damper is at "RECIRCULATION": -1.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
A/I DAMP TARG	Air inlet damper target position / min.: -14% max.: 113.5%	Damper is at "RECIRCULATION": -1.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

OK:
When the target position is at the "RECIRCULATION" (-1.0%), the actual opening angle is 19.0% or less.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 READ VALUE OF INTELLIGENT TESTER (A/I DAMP POS, TARG)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/I DAMP POS	Air inlet damper position / min.: -14% max.: 113.5%	Damper is at "FRESH": 110.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%
A/I DAMP TARG	Air inlet damper target position / min.: -14% max.: 113.5%	Damper is at "FRESH": 110.0% Damper is at "HALF-RECIRCULATION": 20.0 to 102.0%	Open in the circuit: 50.0%

OK:
When the target position is at the "FRESH" (110.0%), the actual opening angle is 81.0% or more.

AC

Result

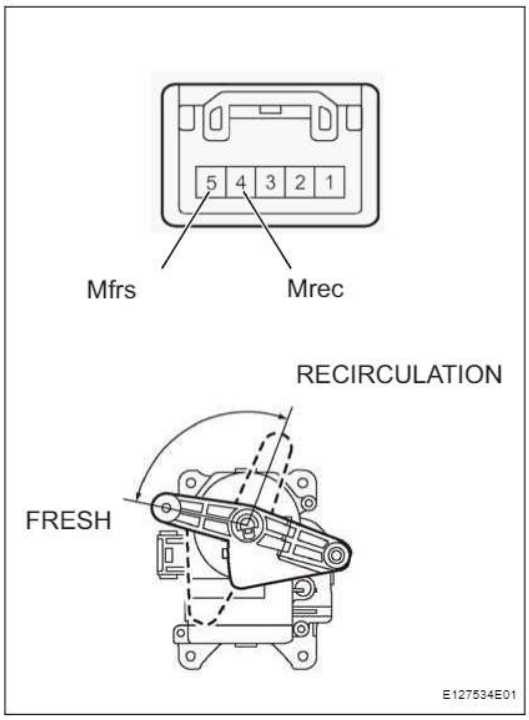
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

3 INSPECT AIR INLET CONTROL SERVO MOTOR



(a) Remove the damper air inlet servo motor.
(b) Connect the battery's positive (+) lead to terminal 5 and negative (-) lead to terminal 4 then check that the lever turns to "FRESH" position smoothly.
(c) Measure the resistance of the servo motor.
Standard resistance

Tester Connection	Condition	Specified Condition
A14-3 (PT) - A14-2 (GND)	FRESH position	0.6 to 1.1 kΩ

(d) Connect the battery's positive (+) lead to terminal 4 and negative (-) lead to terminal 5 then check that the lever turns to "RECIRCULATION" position smoothly.
(e) Measure the resistance of the servo motor.
Standard resistance

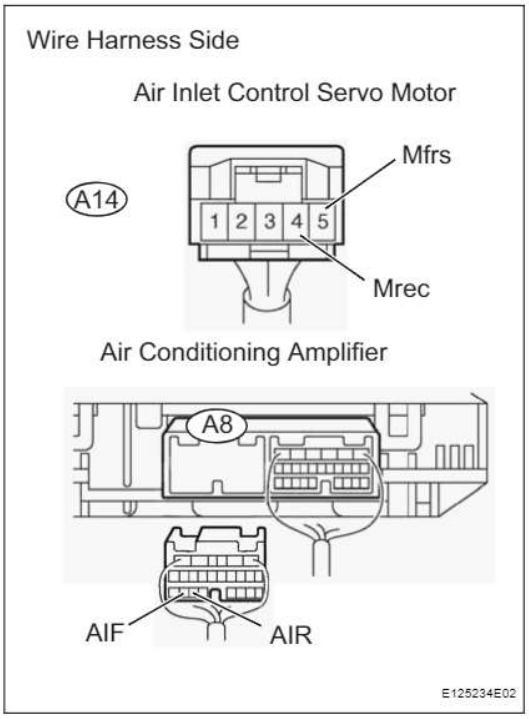
Tester Connection	Condition	Specified Condition
A14-3 (PT) - A14-2 (GND)	RECIRCULATION position	3.4 to 6.2 kΩ

NG → **REPLACE AIR INLET CONTROL SERVO MOTOR**

OK

AC

4	CHECK WIRE HARNESS (AIR INLET CONTROL SERVO MOTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A14 servo connector.
(b) Disconnect the A8 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A8-22 (AIR) - A14-4 (Mrec)	Below 1 Ω
A8-23 (AIF) - A14-5 (Mfrs)	Below 1 Ω
A8-22 (AIR) - Body ground	10 kΩ or higher
A8-23 (AIF) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE AIR CONDITIONING AMPLIFIER

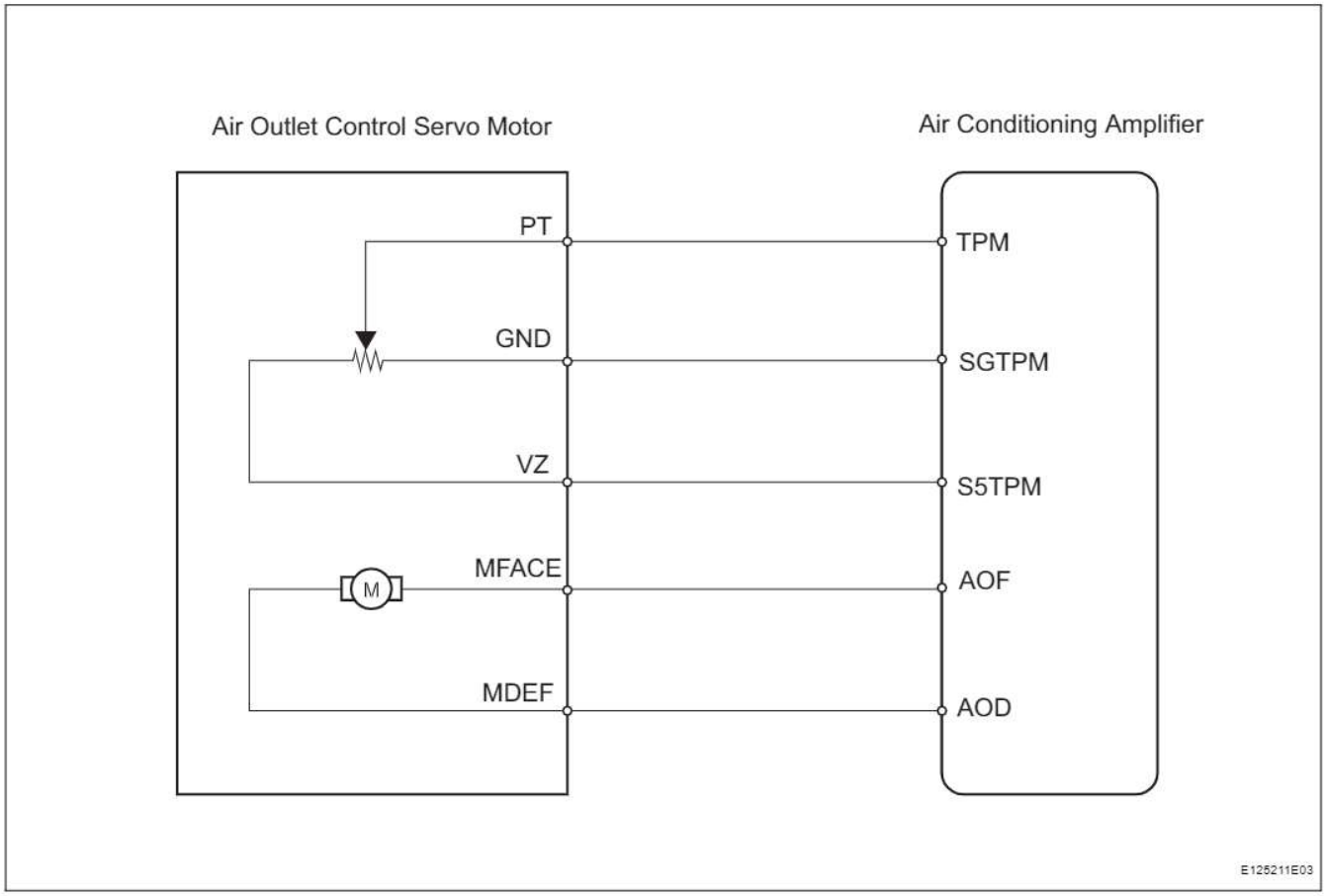
DTC	B1443	Air Outlet Damper Control Servo Motor Circuit

DESCRIPTION

This circuit turns the servo motor and changes each damper position by receiving the signals from the air conditioning amplifier.
The air outlet damper servo switches the air outlet by rotating the motor (normal, reverse) with electrical power from the air conditioning amplifier.
When the AUTO switch is on, the air conditioning amplifier changes the mode between "FACE", "BI-LEVEL" and "FOOT" according to the temperature setting.

DTC No.	Detection Condition	Trouble Area
B1443	Air outlet damper position sensor valve does not change even if air conditioning amplifier operated air outlet damper control servo motor.	• Air outlet control servo motor • Wire harness between air outlet control servo motor and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (A/O DAMP POS, TARG)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.

AC

(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/O DAMP POS	Air outlet damper position / min.: -14% max.: 113.5%	Damper is at "FACE": -10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0% Damper is at "FACE/DEF": 69.0% or 95.0%	Open in the circuit: 50.0%
A/O DAMP TARG	Air outlet damper target position / min.: -14% max.: 113.5%	Damper is at "FACE": -10.0% Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0% Damper is at "FACE/DEF": 69.0% or 95.0%	Open in the circuit: 50.0%

OK:

When the target position is at the "FACE" (-10.0%), the actual opening angle is 19.0% or less.

Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 READ VALUE OF INTELLIGENT TESTER (A/O DAMP POS, TARG)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/O DAMP POS	Air outlet damper position / min.: -14% max.: 113.5%	Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0% Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%

AC

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
A/O DAMP TARG	Air outlet damper target position / min.: -14% max.: 113.5%	Damper is at "FACE/FOOT": 12.0% Damper is at "FOOT" (Manual): 33.5% or 69.0% Damper is at "FOOT" (Auto): 49.0% or 69.0% Damper is at "FACE/DEF": 69.0% or 95.0% Damper is at "DEF": 110.0%	Open in the circuit: 50.0%

OK:
When the target position is at the "DEF" (110.0%), the actual opening angle is 81.0% or more.

Result

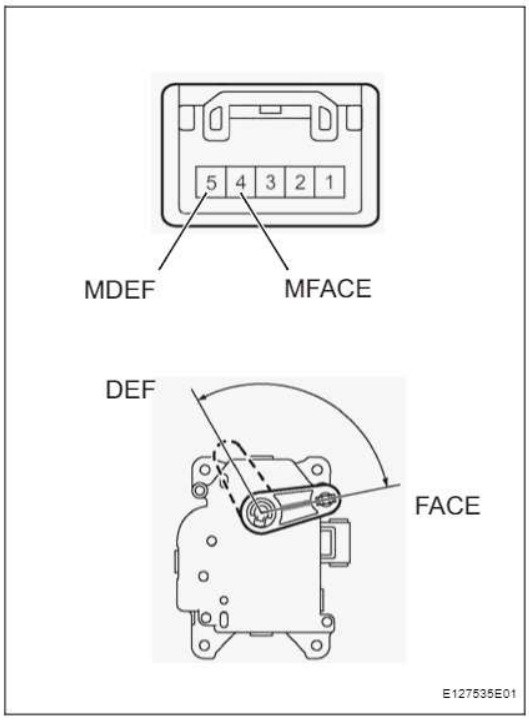
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

3 INSPECT AIR OUTLET CONTROL SERVO MOTOR



(a) Remove the air outlet control servo motor.
(b) Connect the battery's positive (+) lead to terminal 4 and negative (-) lead to terminal 5 then check that the lever turns to "FACE" position smoothly.
(c) Measure the resistance of the servo motor.
Standard resistance

Tester Connection	Condition	Specified Condition
A8-3 (PT) - A8-2 (GND)	FACE position	3.6 to 6.7 kΩ

(d) Connect the battery's positive (+) lead to terminal 5 and negative (-) lead to terminal 4 then check that the lever turn to "DEF" position smoothly.
(e) Measure the resistance of the servo motor.
Standard resistance

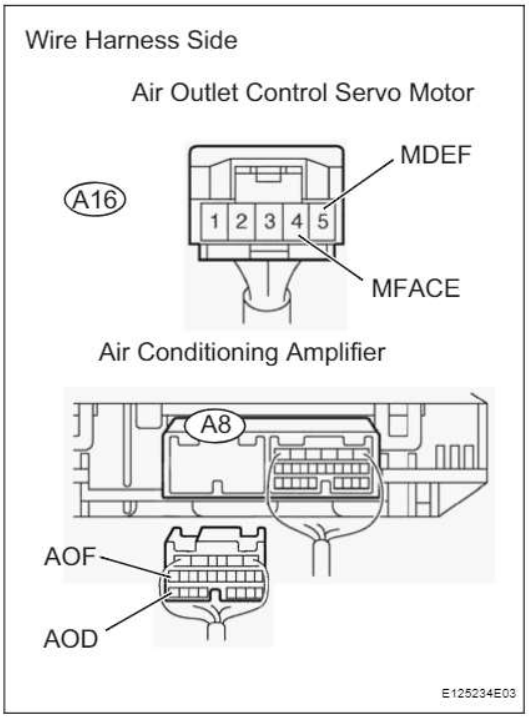
Tester Connection	Condition	Specified Condition
A8-3 (PT) - A8-2 (GND)	DEF position	0.6 to 1.1 kΩ

NG → **REPLACE AIR OUTLET CONTROL SERVO MOTOR**

OK

AC

4	CHECK WIRE HARNESS (AIR OUTLET CONTROL SERVO MOTOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A16 servo connector.
(b) Disconnect the A8 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A8-16 (AOF) - A16-4 (MFACE)	Below 1 Ω
A8-24 (AOD) - A16-5 (MDEF)	Below 1 Ω
A8-16 (AOF) - Body ground	10 kΩ or higher
A8-24 (AOD) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE AIR CONDITIONING AMPLIFIER

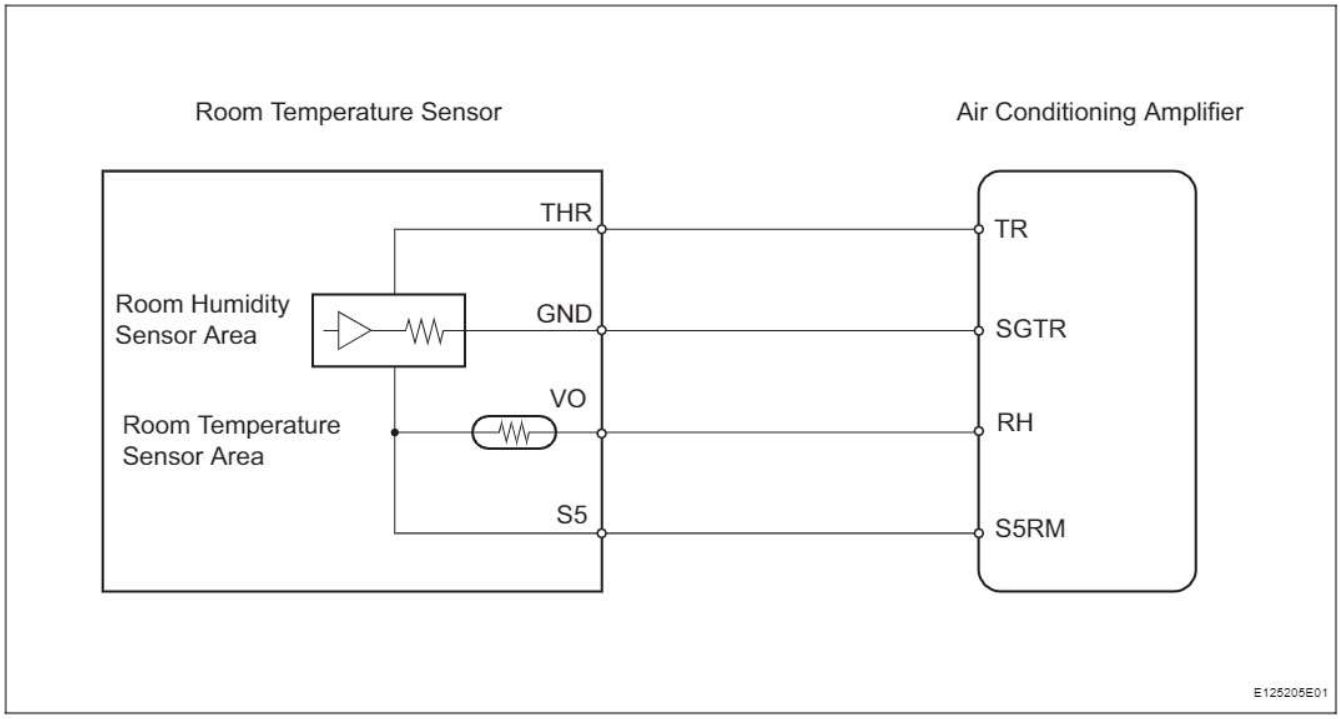
DTC	B1462	Room Humidity Sensor Circuit

DESCRIPTION

The room humidity sensor detects room humidity. The voltage of the room humidity sensor changes in accordance with room humidity. The air conditioning amplifier reads changes in the room humidity sensor. The room humidity sensor is integrated with room temperature sensor.

DTC No.	Detection Condition	Trouble Area
B1462	Open or short in room humidity sensor circuit	• Room humidity sensor (room temperature sensor) • Wire harness between room humidity sensor (room temperature sensor) and air conditioning amplifier • Air conditioning amplifier

WIRING DIAGRAM



INSPECTION PROCEDURE

1	READ VALUE OF INTELLIGENT TESTER (HUMIDITY SENS)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the DATA LIST, and read the display on the intelligent tester.

Air conditioning amplifier

Item	Measurement Item / Display (Range)	Normal Condition	Diagnostic Note
HUMIDITY SENS	Humidity sensor / min.: 0% max.: 100%	Actual room humidity is displayed	-

AC

OK:
The displayed is as specified in the normal condition.

Result

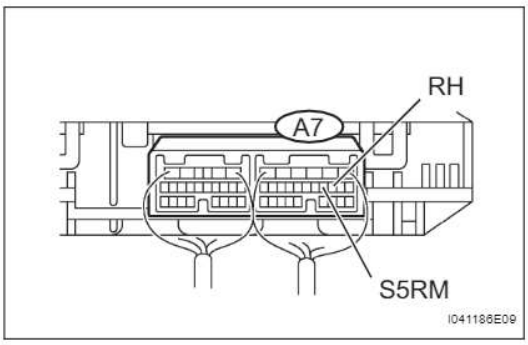
Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

2 CHECK AIR CONDITIONING AMPLIFIER (RH VOLTAGE)



(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-9 (RH) - A7-10 (S5RM)	Power switch ON (IG) at 25°C (77°F)	1.8 to 2.2 V
A7-9 (RH) - A7-10 (S5RM)	Power switch ON (IG) at 40°C (104°F)	1.2 to 1.6 V

HINT:
As the temperature increases, the voltage decreases.
Result

Result	Proceed to
NG	A
OK (Checking from the PROBLEM SYMPTOMS TABLE)	B
OK (Checking from the DTC)	C

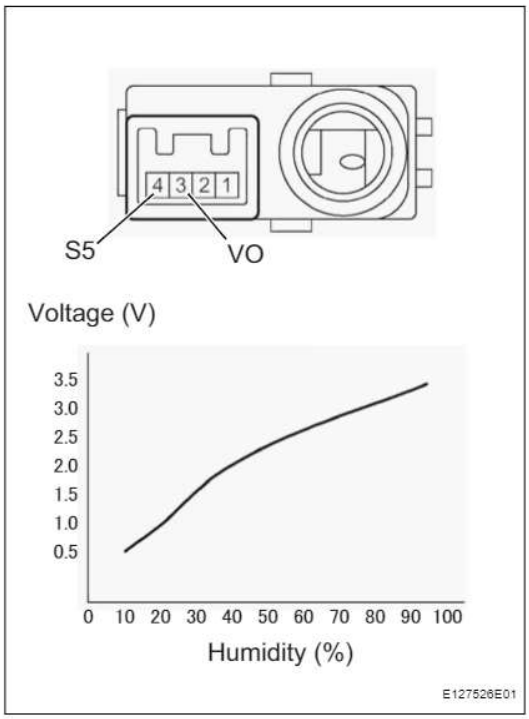
B → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

C → **REPLACE AIR CONDITIONING AMPLIFIER**

A

AC

3 INSPECT ROOM TEMPERATURE SENSOR (HUMIDITY SENSOR)

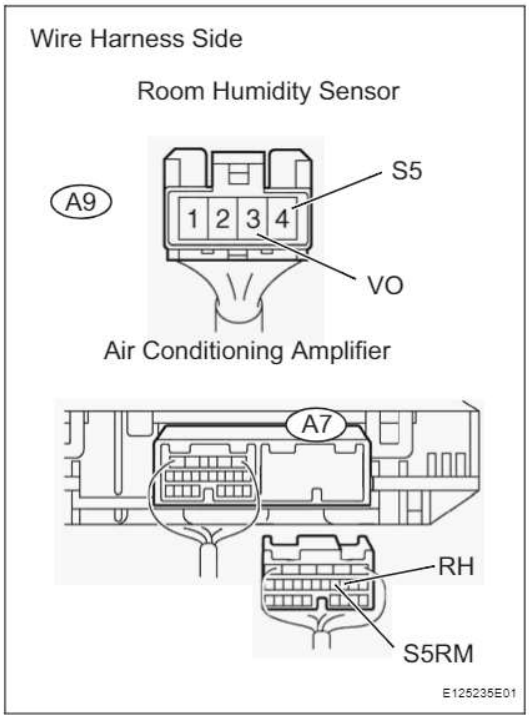


(a) Remove the room temperature sensor.
(b) Measure the voltage of the sensor.
Standard voltage:
at 25°C (77°F) Humidity 40%: 1.61 to 2.24 V
at 25°C (77°F) Humidity 60%: 2.26 to 2.66 V
HINT:
As the humidity increases, the voltage increases (see the graph).

NG → **REPLACE ROOM TEMPERATURE SENSOR**

OK

4 CHECK WIRE HARNESS (ROOM HUMIDITY SENSOR - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the A9 sensor connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.
Standard resistance

Tester Connection	Specified Condition
A7-9 (RH) - A9-3 (VO)	Below 1 Ω
A7-10 (S5RM) - A9-4 (S5)	Below 1 Ω
A7-9 (RH) - Body ground	10 kΩ or higher
A7-10 (S5RM) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

AC

OK

REPLACE AIR CONDITIONING AMPLIFIER

DTC	B1471	A/C Inverter High Voltage Power Resource System Malfunction

DESCRIPTION

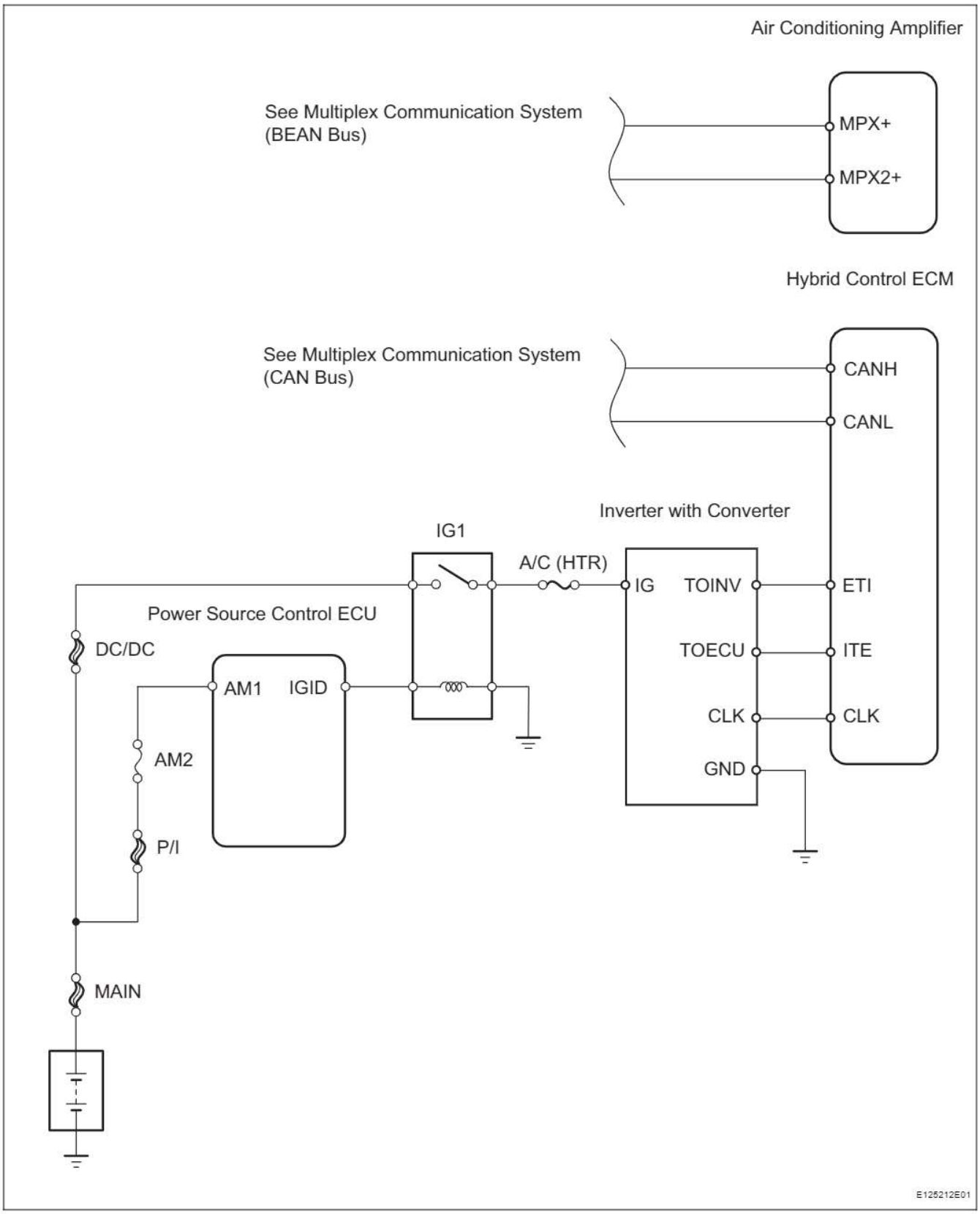
The A/C inverter monitors the power voltage from the main battery in the self circuit. It stops compressor control and outputs the DTC when the monitored voltage is outside the specified range.
The output DTC is memorized as previous trouble. Compressor control may not resume unless the power switch is turned OFF.
HINT:
The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flowchart for the hybrid control system first if any DTCs from those systems are output simultaneously.

DTC No.	Detection Condition	Trouble Area
B1471	Open or short in A/C inverter high voltage power resource system	• Hybrid control ECU • A/C inverter (inverter with converter)

NOTICE:
The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

AC

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester.
OK:
DTCs are not output in the hybrid control system.

NG → GO TO HYBRID CONTROL SYSTEM

OK ↓

REPLACE A/C INVERTER

AC

DTC	B1472	A/C Inverter High Voltage Output System Malfunction

DESCRIPTION

The high voltage is output from the A/C inverter to the electric inverter compressor for driving the motor. Compressor control is stopped and the DTC is output if there is an open or short to ground in the output circuit.

The output DTC is memorized as previous trouble. Compressor control remains stopped unless the past and current DTCs are cleared by intelligent tester.

CAUTION:

Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors.

HINT:

The hybrid vehicle system and air conditioning system output DTCs separately. Inspect DTCs following the flowchart for the hybrid system first if any DTCs from those systems are output simultaneously.

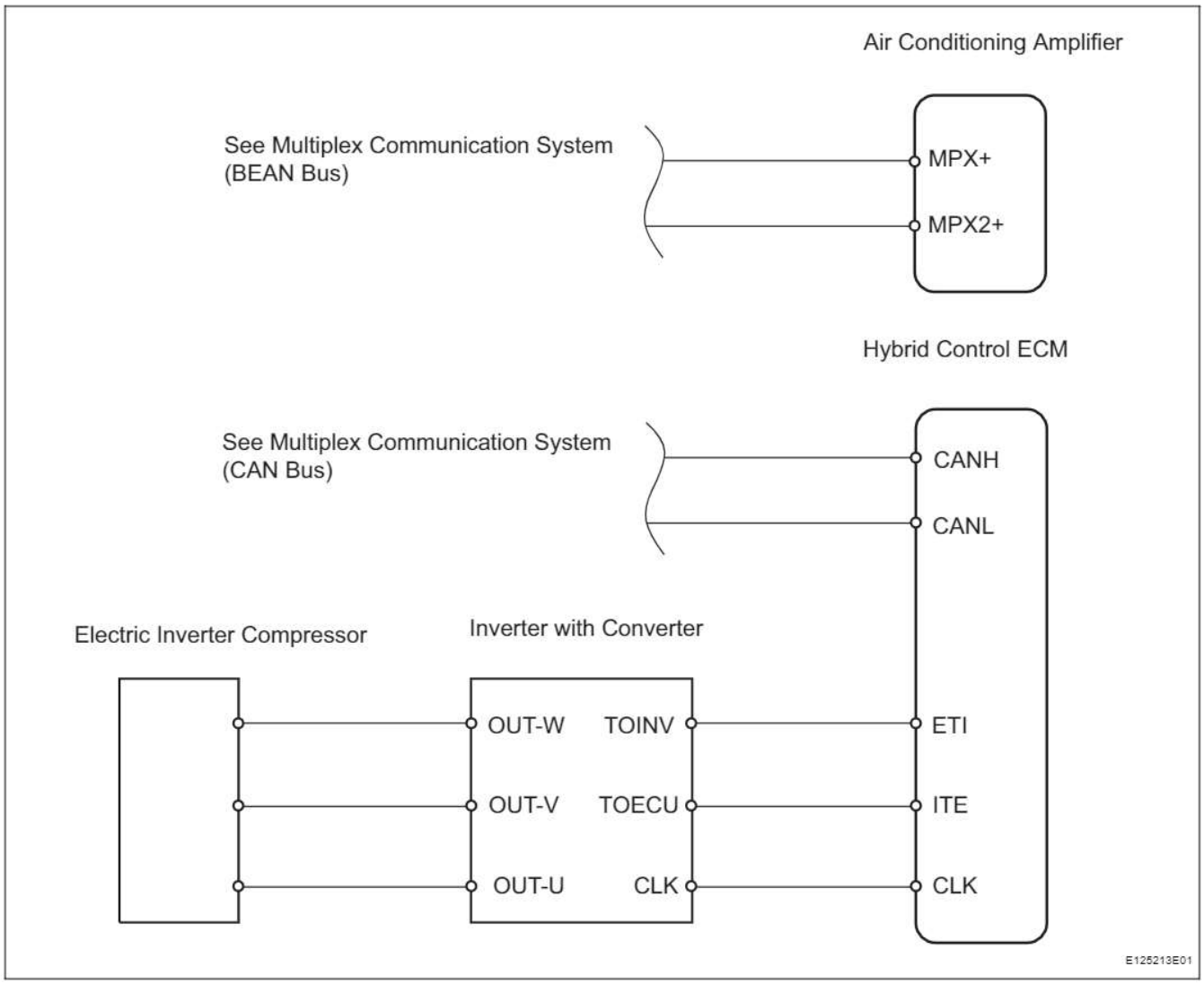
DTC No.	Detection Condition	Trouble Area
B1472	Open or short in A/C inverter high voltage output system	• Hybrid control ECU • Electric inverter compressor (w/ motor compressor) • A/C inverter (inverter with converter)

NOTICE:

The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

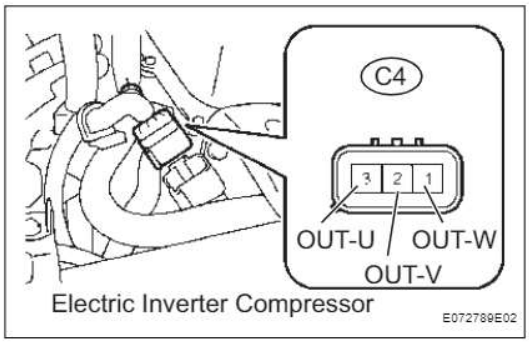
AC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK ELECTRIC INVERTER COMPRESSOR



(a) Remove the service plug grip.
CAUTION:
Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug to cut the high-voltage circuit before inspection.

(b) Disconnect the C4 electric inverter compressor connector.

(c) Measure the resistance of the inverter compressor immediately after the compressor is stopped.
Standard resistance

Tester Connection	Specified Condition
C4-1 (OUT-W) - C4-2 (OUT-V)	0.5 to 0.8 Ω
C4-1 (OUT-W) - C4-3 (OUT-U)	0.5 to 0.8 Ω
C4-2 (OUT-V) - C4-3 (OUT-U)	0.5 to 0.8 Ω

AC

NG → REPLACE ELECTRIC INVERTER COMPRESSOR

OK

REPLACE A/C INVERTER

DTC	B1473	A/C Inverter Start-up Signal System Malfunction

DESCRIPTION

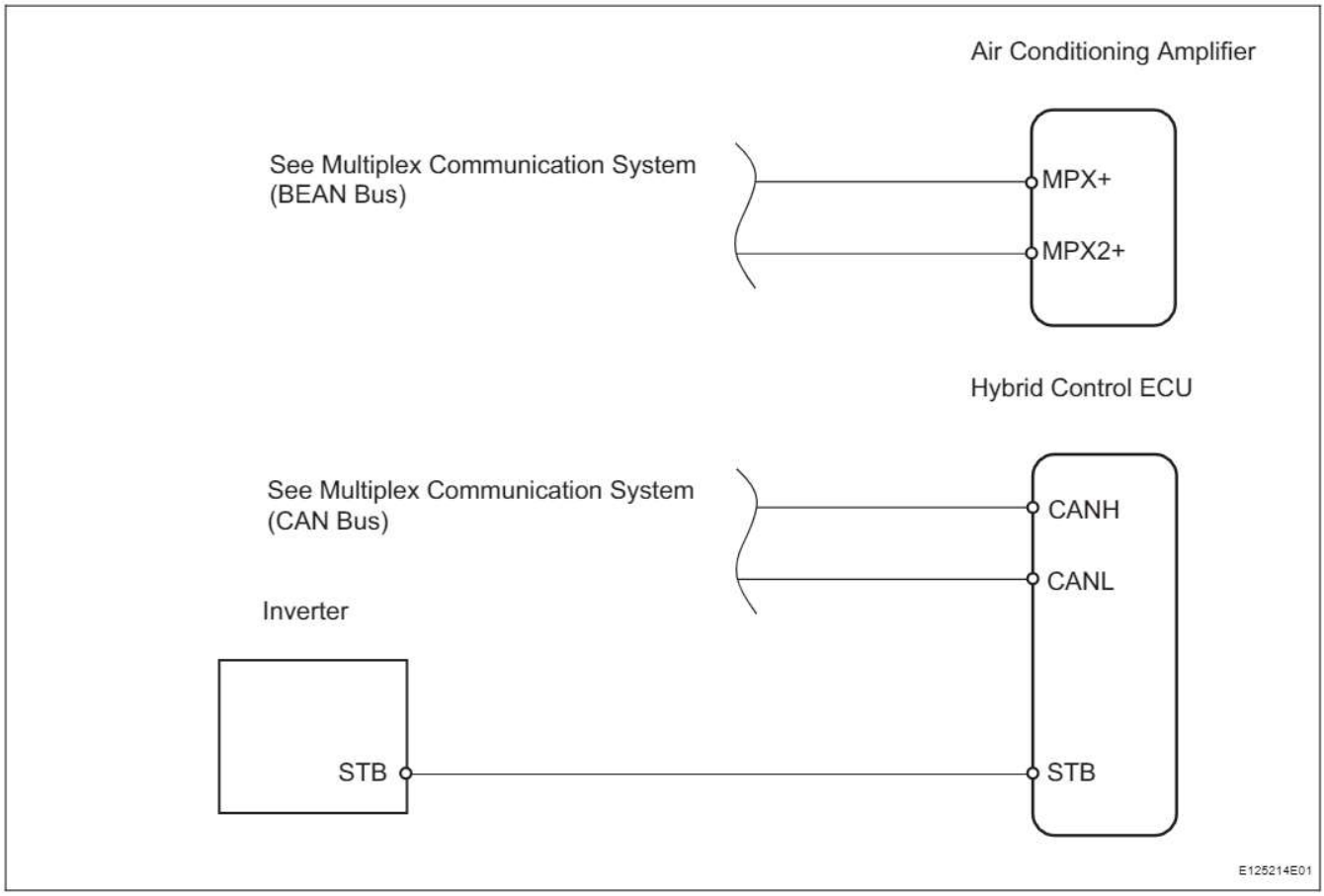
The inverter activation signal is sent to the A/C inverter from the hybrid control ECU. Compressor control is stopped and the DTC is output if there is an open or short in the signal circuit.

DTC No.	Detection Condition	Trouble Area
B1473	Open or short in A/C inverter start-up signal system	• Wire harness between hybrid control ECU and A/C inverter (inverter with converter) • A/C inverter (inverter with converter) • Hybrid control ECU

NOTICE:

The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester.

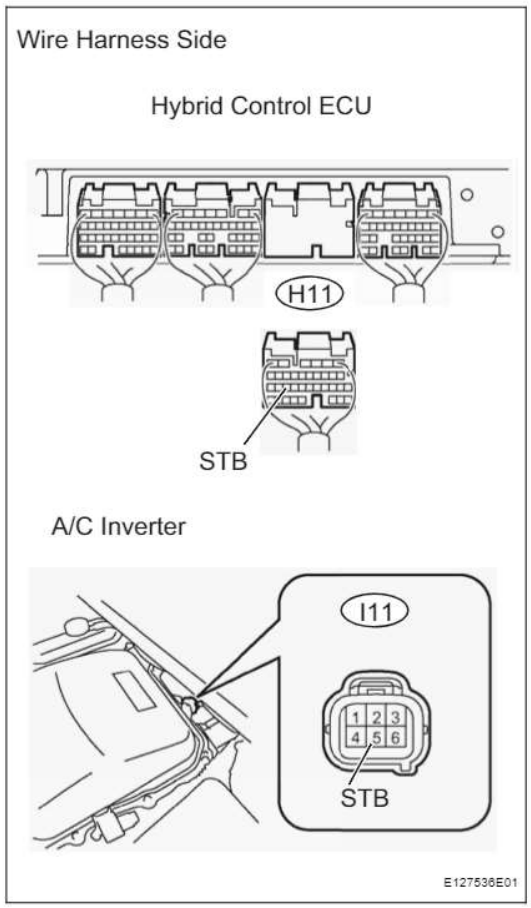
AC

OK:
DTCs are not output in the hybrid control system.

NG → **GO TO HYBRID CONTROL SYSTEM**

OK

2 CHECK WIRE HARNESS (HYBRID CONTROL ECU - A/C INVERTER)



(a) Disconnect the H11 ECU connector.
(b) Disconnect the I11 inverter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
H11-25 (STB) - I11-5 (STB)	0.5 to 0.8 Ω
H11-25 (STB) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE A/C INVERTER

AC

DTC	B1475	A/C Inverter Cooling / Heating System Malfunction

DESCRIPTION

The A/C inverter in the A/C inverter monitors the cooling water temperature with the temperature sensor. It stops compressor control and outputs the DTC when the monitored temperature is outside specified range (too high or too low).
The hybrid system and the air conditioning system monitor the cooling water temperature separately. If DTCs referring to an inverter cooling system malfunction are output simultaneously, there may be trouble such as insufficient cooling water.
If DTCs are output only for the air conditioning system, there may be an open or short in the temperature sensor circuit in the inverter.

DTC No.	Detection Condition	Trouble Area
B1475	Cooling water temperature in the inverter is outside the specified range (temperature is too high), or there is an open or short to ground in the temperature sensor circuit.	A/C inverter (inverter with converter)

NOTICE:
The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

INSPECTION PROCEDURE

1	CHECK COOLING WATER

NOTICE:
Even if DTCs are output only for the air conditioning system, inspect the cooling system first and check that it is normal as there may be trouble such as insufficient cooling water.

NG → ADD COOLING WATER

OK

2	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester.
OK:
DTCs are not output in the hybrid control system.

NG → GO TO HYBRID CONTROL SYSTEM

OK

REPLACE A/C INVERTER

AC

DTC	B1476	A/C Inverter Load System Malfunction

DESCRIPTION

The A/C inverter stops compressor control and outputs the DTC if the rotation load is too great or too small while controlling motor rotation in the A/C inverter.
HINT:
Possible reasons could be as follows: Load is low when the refrigerant gas leaks, or load is too great when refrigerant gas is excessively charged, insufficient cooling performance due to condenser fan circuit trouble, or the compressor locked up.

DTC No.	Detection Condition	Trouble Area
B1476	Motor's rotation load while the compressor is operating is too great or too small.	• Volume of refrigerant • Electric inverter compressor (w/ motor compressor) • Cooling fan circuit

NOTICE:
The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

INSPECTION PROCEDURE

1	CHECK COOLER CONDENSER ASSEMBLY

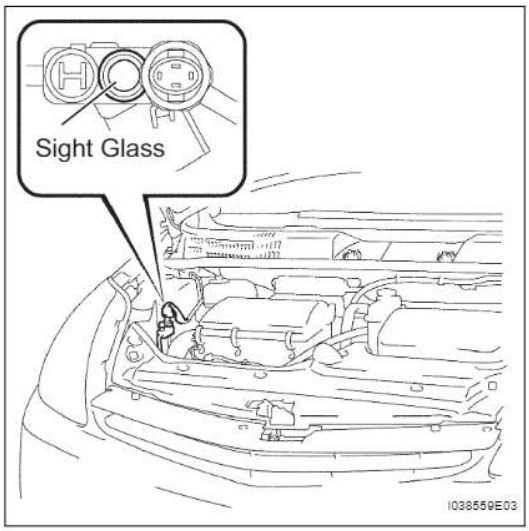
(a) Turn the power switch OFF and ON (READY).
(b) Set the A/C temperature setting to "MAX. COOL" and the blower to " LO", and turn the A/C switch ON.
(c) Check operation of the condenser fan.
OK:
The condenser fan rotates.

NG → INSPECT COOLING FAN SYSTEM

OK

AC

2	CHECK HFC-134A (R134A)



(a) Inspect refrigerant volume.
(1) Check the sight glass of the cooler unit refrigerant liquid pipe E.
(2) Set the vehicle according to the conditions below.

Item	Condition
All Doors	Fully open
Temperature Setting	Max. COOL
Blower Speed	HI
A/C	ON

(3) Check the sight glass.

Item	Symptom	Amount of refrigerant	Corrective Actions
1	Bubbles exist	Insufficient*	(1) Check for gas leakage and repair if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles exist (DTC B1476 is output)	Empty, insufficient or excessive	Refer to 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet	Proper or excessive	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant remains clear	Excessive	(1) Discharge refrigerant (2) Remove air and supply proper amount of purified refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Proper	-

HINT:
*: Bubbles in the sight glass with room temperature higher than usual can be considered normal if cooling is sufficient.

NG → CHARGE REFRIGERANT

OK →

REPLACE ELECTRIC INVERTER COMPRESSOR

AC

DTC	B1477	A/C Inverter Low Voltage Power Resource System Malfunction

DESCRIPTION

The A/C inverter monitors the controlling power voltage in the self circuit. It stops compressor circuit and outputs the DTC when the monitored voltage is outside the specified range.
The output DTC is memorized as previous trouble. The compressor control may not resume unless the power switch is turned OFF.

DTC No.	Detection Condition	Trouble Area
B1477	An open or short to ground in the inverter's controlling power voltage circuit.	A/C inverter (inverter with converter)

NOTICE:
The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

INSPECTION PROCEDURE

1	CHECK DIAGNOSTIC TROUBLE CODE

(a) Check if DTCs for the hybrid control system are output using intelligent tester.
OK:
DTCs are not output in the hybrid control system.

NG → GO TO HYBRID CONTROL SYSTEM

OK ↓

REPLACE A/C INVERTER

AC

DTC	B1498	Communication Malfunction (A/C Inverter Local)

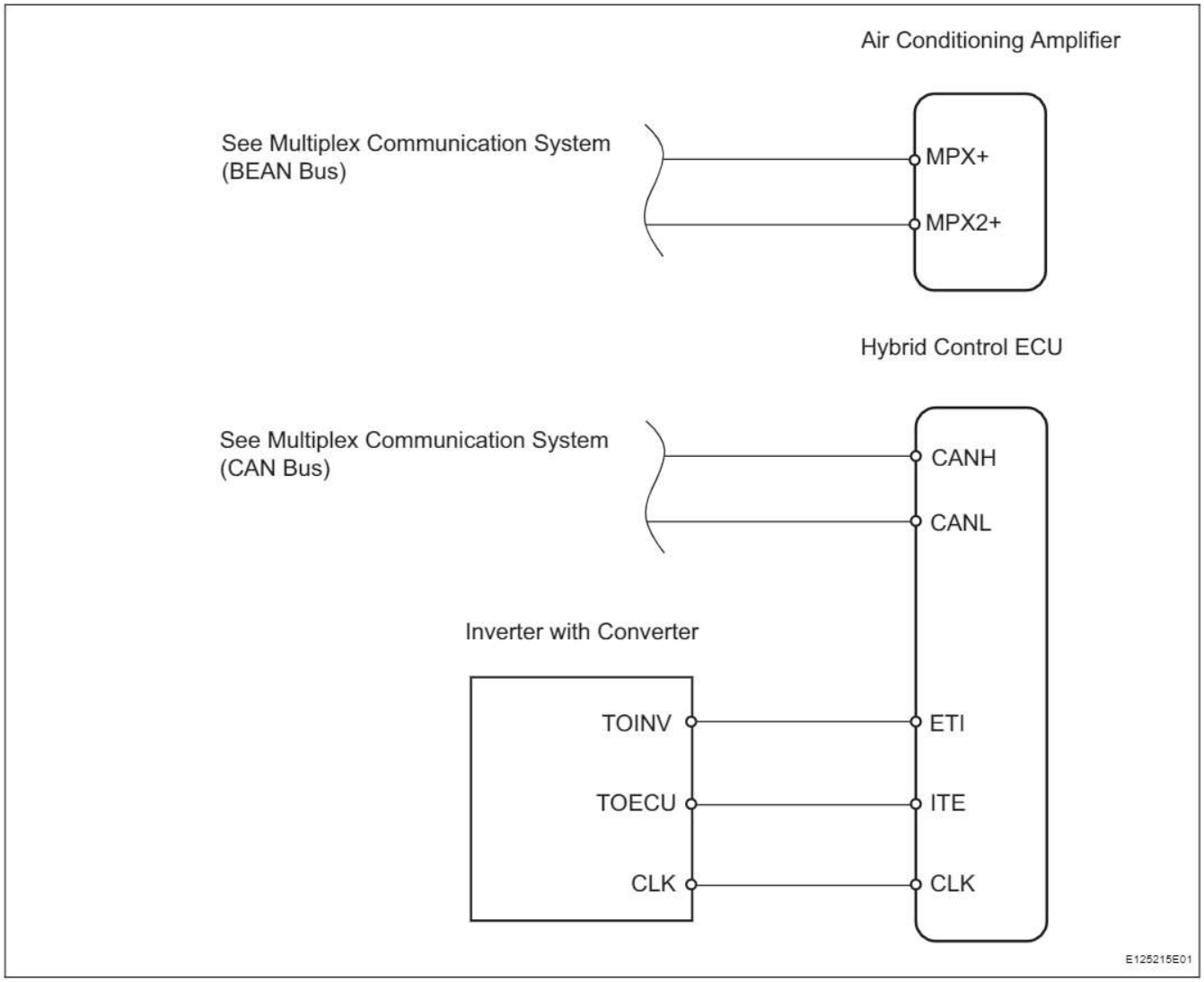
DESCRIPTION

The hybrid control ECU and A/C inverter transmit information to one another via communication line. Compressor control is stopped and the DTC is output if communication information is cut off or abnormal information occurs.
The output DTC is memorized as previous trouble.

DTC No.	Detection Condition	Trouble Area
B1498	Communication line error or open between the hybrid control ECU and the A/C inverter (inverter with converter)	• Wire harness between hybrid control ECU and A/C inverter (inverter with converter) • Hybrid control ECU • A/C inverter (inverter with converter)

NOTICE:
The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

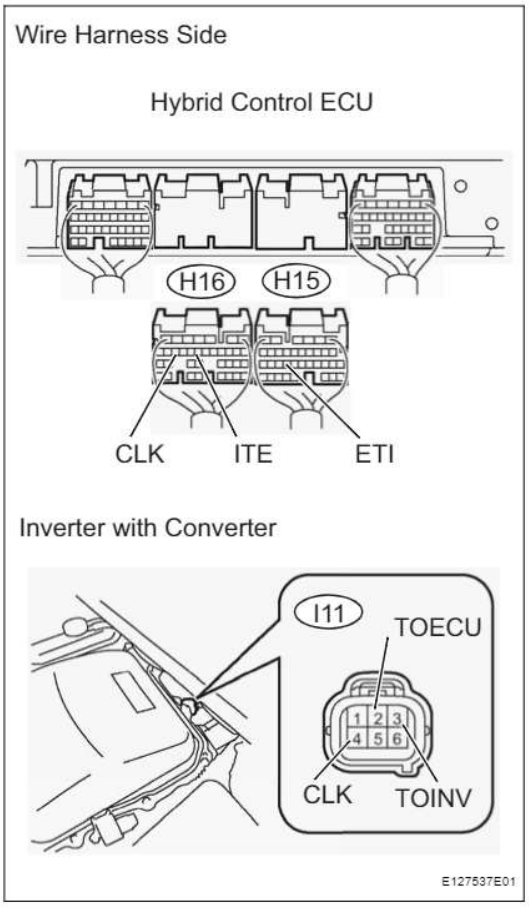
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1 CHECK WIRE HARNESS (HYBRID CONTROL ECU - INVERTER WITH CONVERTER)



(a) Disconnect the H15 and H16 ECU connectors.
(b) Disconnect the I11 inverter connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
H15-24 (ETI) - I11-3 (TOINV)	Below 1 Ω
H16-14 (ITE) - I11-2 (TOECU)	Below 1 Ω
H16-17 (CLK) - I11-4 (CLK)	Below 1 Ω
H15-24 (ETI) - Body ground	10 kΩ or higher
H16-14 (ITE) - Body ground	10 kΩ or higher
H16-17 (CLK) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

2 CHECK DIAGNOSTIC TROUBLE CODE

(a) Connect the H15 and H16 ECU connectors.
(b) Connect the I11 inverter connector.
(c) Check if DTCs for the hybrid control system are output using intelligent tester.

OK:

DTCs are not output in the hybrid control system.

NG → **GO TO HYBRID CONTROL SYSTEM**

OK

REPLACE A/C INVERTER

AC

DTC	P0AA6-611	Hybrid Battery Voltage System Isolation Fault

DESCRIPTION

The DTC is output if there is insulation trouble with the high-voltage circuits in the air conditioning system. Insulation trouble with the electric inverter compressor or A/C inverter may be the cause. Any oil other than ND-OIL 11 may have entered the refrigeration cycle.

The motor driven with high-voltage is built into the electrical compressor and is cooled directly with refrigerant. Compressor oil (ND-OIL 11) with high insulation performance is used because a leakage of electrical power may occur if regular compressor oil (ND-OIL 8) is used.

NOTICE:

- **Electrical insulation performance may decrease significantly if even a small amount of oil other than ND-OIL 11 is used or enters the refrigeration cycle, causing the DTC to be output.**
- **If other oil is accidentally used and a DTC is output, collect the oil in the refrigeration cycle into the compressor and replace it with ND-OIL 11 to increase the ND-OIL 11 ratio amount.**
- **Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND-OIL 11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing the DTC to be output.**

CAUTION:

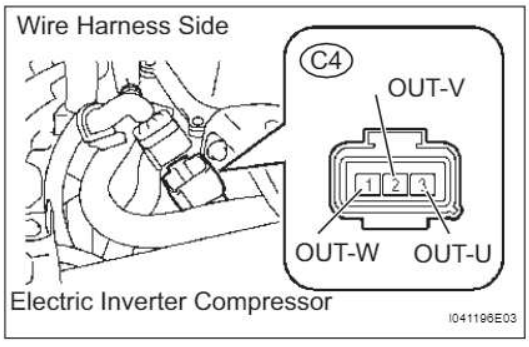
Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors.

DTC No.	Detection item	Trouble Area
P0AA6-611	High voltage system insulation malfunction.	• Electric inverter compressor (w/ motor compressor) • A/C inverter (inverter with converter) • Compressor oil

NOTICE:

The A/C inverter is integrated with the inverter with converter. It is necessary to replace the PCU box if the A/C inverter (inverter with converter) needs to be replaced because the A/C inverter (inverter with converter) cannot be replaced alone.

1	CHECK A/C INVERTER



(a) Remove the service plug grip.
CAUTION:
Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug to cut the high-voltage circuit before inspection.

(b) Disconnect the C4 inverter connector.

(c) Measure the resistance of the wire harness side connector immediately after the compressor is stopped.
Standard resistance

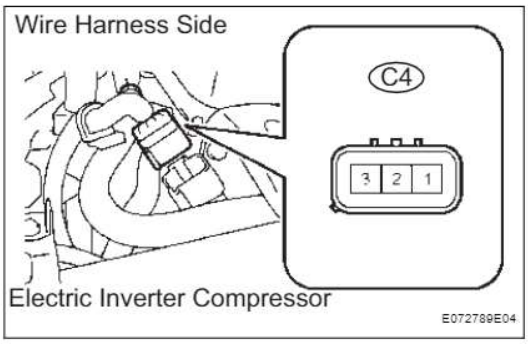
Tester Connection	Specified Condition
C4-1 (OUT-W) - Body ground	2 MΩ or higher
C4-2 (OUT-V) - Body ground	2 MΩ or higher
C4-3 (OUT-U) - Body ground	2 MΩ or higher

NG → REPLACE A/C INVERTER

OK

AC

2	CHECK ELECTRIC INVERTER COMPRESSOR



(a) Remove the service plug grip.
CAUTION:
Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug to cut the high-voltage circuit before inspection.
(b) Disconnect the C4 compressor connector.
(c) Measure the resistance of the connector.
Standard resistance

Tester Connection	Specified Condition
C4-1 - Body ground	2 MΩ or higher
C4-2 - Body ground	2 MΩ or higher
C4-3 - Body ground	2 MΩ or higher

NG → **REPLACE ELECTRIC INVERTER COMPRESSOR**

OK

3	CHECK ELECTRIC INVERTER COMPRESSOR

(a) Connect the electric inverter compressor connector.
(b) Install the service plug grip.
CAUTION:
Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug to cut the high-voltage circuit before inspection.
(c) Turn the power switch ON (IG).
(d) Set the A/C setting temperature to 25°C (77°F) and the blower switch LO. Then operate the compressor for 10 minutes to circulate the refrigerant cycle with refrigerant and collect as much compressor oil remaining in each component into the compressor as possible.
HINT:
Inspect with sufficient oil in the compressor since the insulation resistance of the compressor changes depending on the amount of oil in the compressor.
(e) Turn the power switch OFF, and leave the vehicle for a night to cool down the compressor's internal temperature.
NOTICE:
Do not operate the compressor before inspection.
HINT:
- Leave the vehicle until the compressor temperature decreases below ambient temperature. (As the compressor temperature decreases below the temperature of the condenser and evaporator, more oil can be stored in the compressor.)

AC

- If there is significant difference in temperature between day and night time, it will take approximately 4 hours to cool down the compressor. Remove the service plug grip.

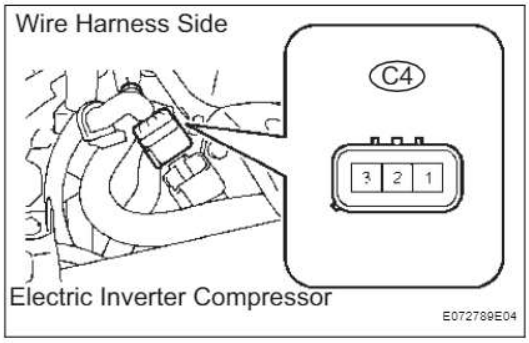
(f) Remove the service plug grip.

CAUTION:
Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug to cut the high-voltage circuit before inspection.

(g) Disconnect the C4 compressor connector.

(h) Measure the resistance of the connector.

Standard resistance



Tester Connection	Specified Condition
C4-1 - Body ground	3 MΩ or higher
C4-2 - Body ground	3 MΩ or higher
C4-3 - Body ground	3 MΩ or higher

NOTICE:
If the results are out of the specified range, replace the compressor without operating.

NG → **REPLACE ELECTRIC INVERTER COMPRESSOR**

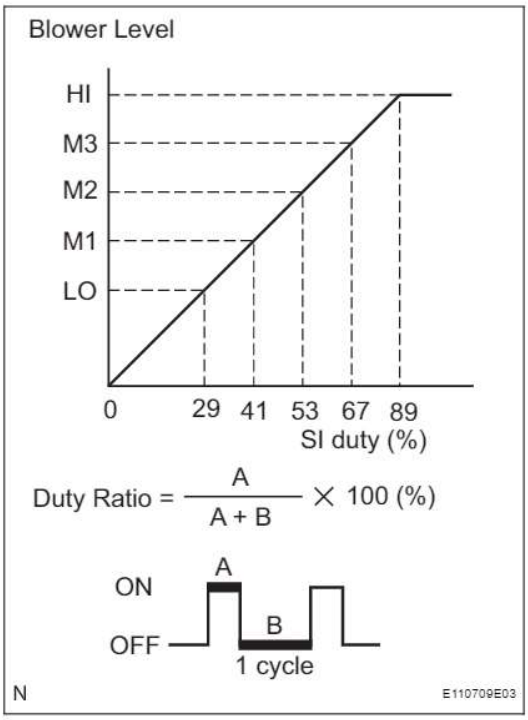
OK

SYSTEM IS OK

AC

Blower Motor Circuit

DESCRIPTION



The blower motor is operated by signals from the air conditioning amplifier. Blower motor speed signals are transmitted by changes in the duty ratio.

Duty Ratio

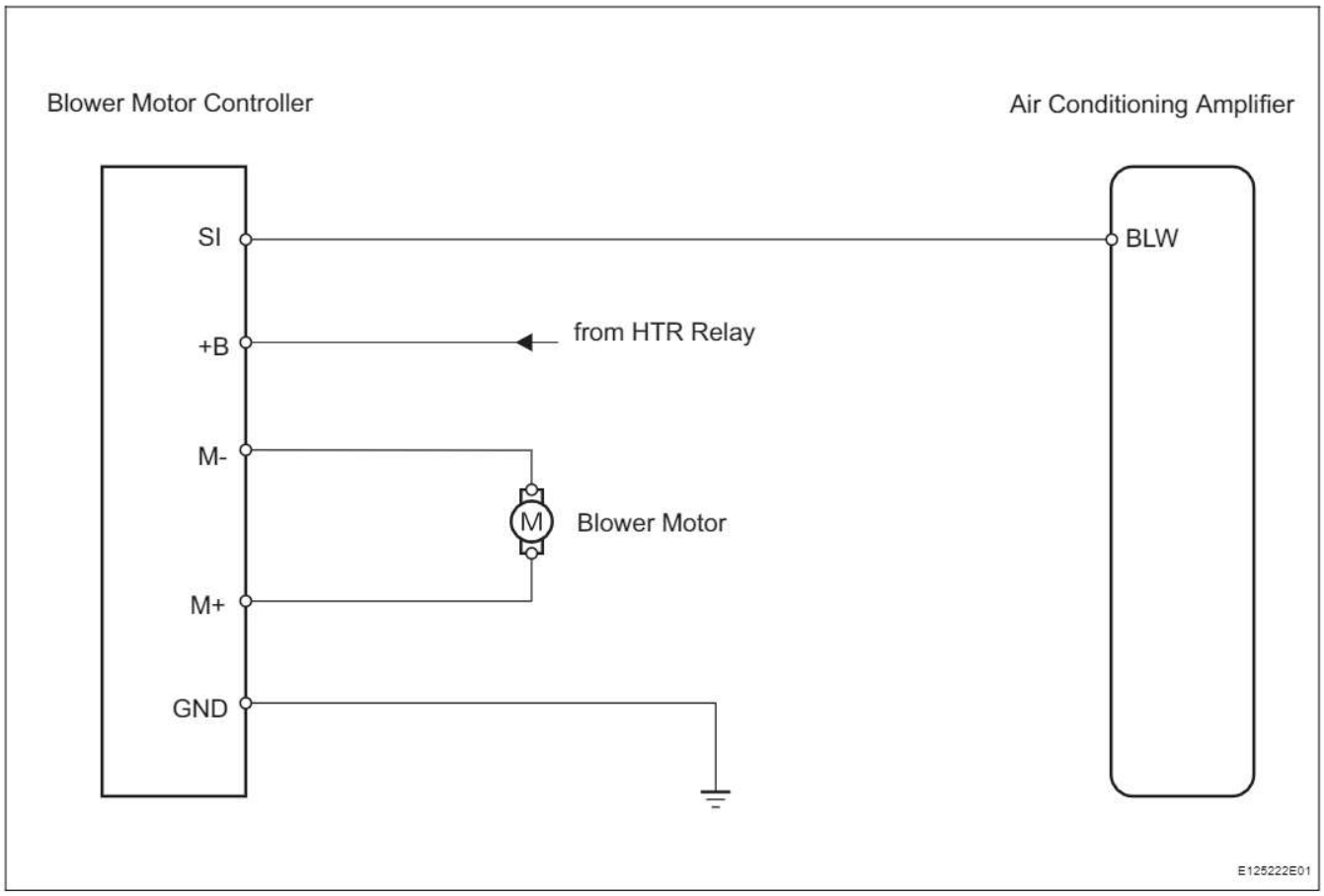
The duty ratio is the ratio of the period of continuity in one cycle. For example, A is the period of continuity in one cycle, and B is the period of non-continuity.

The blower motor controller controls the blower motor speed.

The blower motor controller reads the signal from the air conditioning amplifier and controls rotation and speed.

AC

WIRING DIAGRAM



INSPECTION PROCEDURE

1	PERFORM ACTIVE TEST BY INTELLIGENT TESTER (BLOWER MOTOR)

(a) Connect the intelligent tester (with CAN VIM) to DLC3.
(b) Turn the power switch ON (IG) and push the intelligent tester main switch ON.
(c) Select the item below in the ACTIVE TEST and then check that the relay operates.

Air conditioning amplifier

Item	Test Details / Display (Range)	Diagnostic Note
BLOWER MOTOR	Blower motor / min.: 0 max.: 31	-

Result

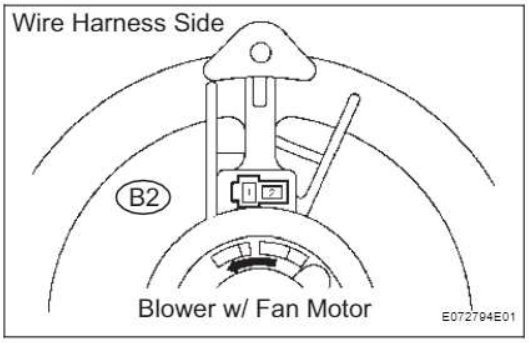
Result	Proceed to
NG (Blower motor does not operate)	A
NG (Blower motor operate but does not change speed)	B
OK	C

B	Go to step 6
C	PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

AC

A

2 INSPECT BLOWER W/ FAN MOTOR SUB-ASSEMBLY

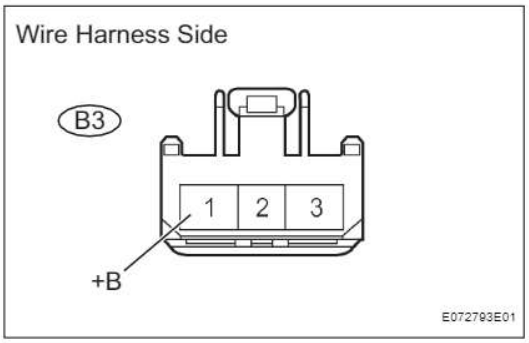


(a) Remove the cooling unit motor w/ fan.
(b) Connect the battery's positive (+) lead to terminal 1 of blower motor and negative (-) lead to terminal 2.
OK:
Blower motor operates smoothly.

NG → **REPLACE BLOWER W/ FAN MOTOR SUB-ASSEMBLY**

OK

3 CHECK WIRE HARNESS (BLOWER MOTOR CONTROLLER - BATTERY)



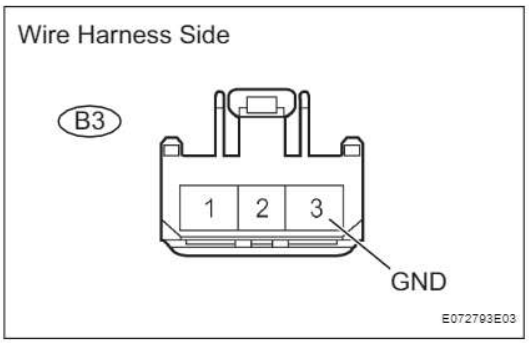
(a) Disconnect the B3 controller connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
B3-1 (+B) - Body ground	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK WIRE HARNESS (BLOWER MOTOR CONTROLLER - BODY GROUND)



(a) Disconnect the B3 controller connector.
(b) Measure the resistance of the wire harness side connector.
Standard resistance

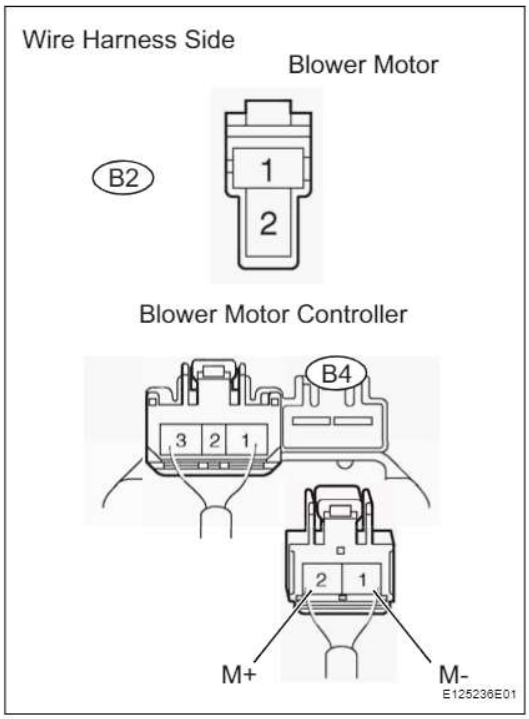
Tester Connection	Specified Condition
B3-3 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

AC

5 CHECK WIRE HARNESS (BLOWER MOTOR - BLOWER MOTOR CONTROLLER)



(a) Disconnect the B2 motor connector.
(b) Disconnect the B4 controller connector.
(c) Measure the resistance of the wire harness side connectors.

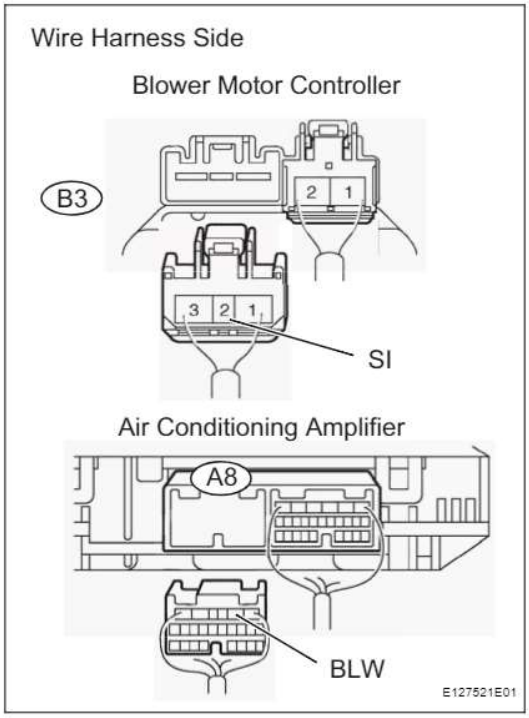
Standard resistance

Tester Connection	Specified Condition
B4-1 (M-) - B2-2	Below 1 Ω
B4-2 (M+) - B2-1	Below 1 Ω
B4-1 (M-) - Body ground	10 kΩ or higher
B4-2 (M+) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

6 CHECK WIRE HARNESS (BLOWER MOTOR CONTROLLER - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the B3 controller connector.
(b) Disconnect the A8 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

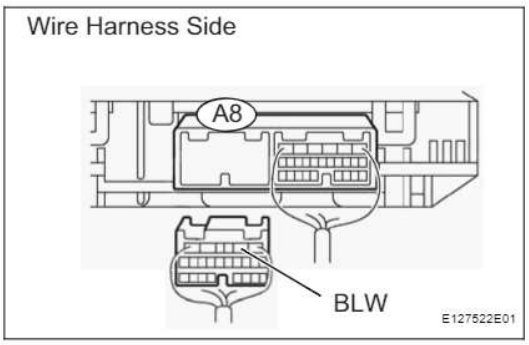
Tester Connection	Specified Condition
A8-2 (BLW) - B3-2 (SI)	Below 1 Ω
A8-2 (BLW) - Body ground	10 kΩ or higher

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

AC

OK

7 CHECK BLOWER MOTOR CONTROLLER (BLW VOLTAGE)



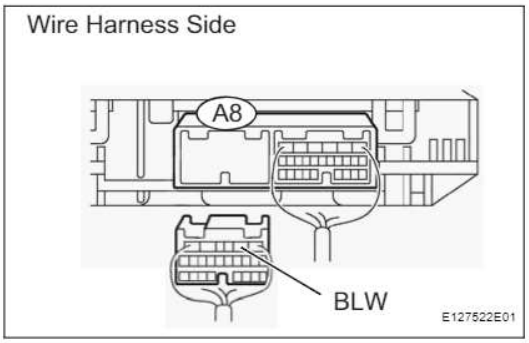
(a) Disconnect the A8 amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
B3-1 (+B) - Body ground	10 to 14 V

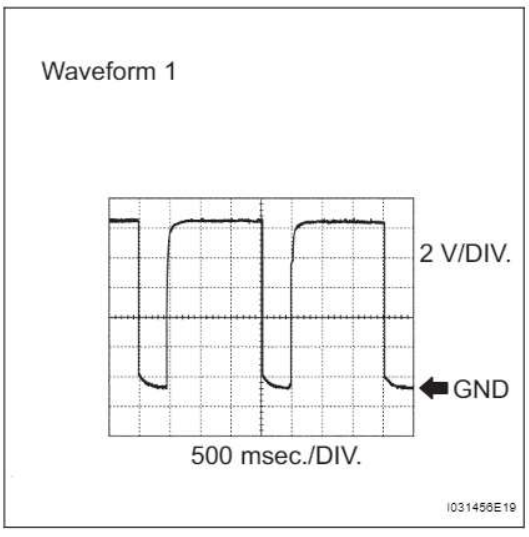
NG → REPLACE BLOWER MOTOR CONTROLLER

OK

8 CHECK AIR CONDITIONING AMPLIFIER (BLW - BODY GROUND)



(a) Remove the air conditioning amplifier with its connectors still connected.
(b) Turn the power switch ON (IG).
(c) Turn the blower switch ON (Lo).



(d) Using an oscilloscope, measure the waveform of the amplifier.
OK:
Waveform is as shown in the illustration.

Item	Content
Tester Connection	A8-2 (BLW) - Body ground
Tool Setting	2 V/DIV., 500 msec./DIV.
Condition	Blower switch ON (Lo)

HINT:
Waveform varies depending on the blower switch setting.

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

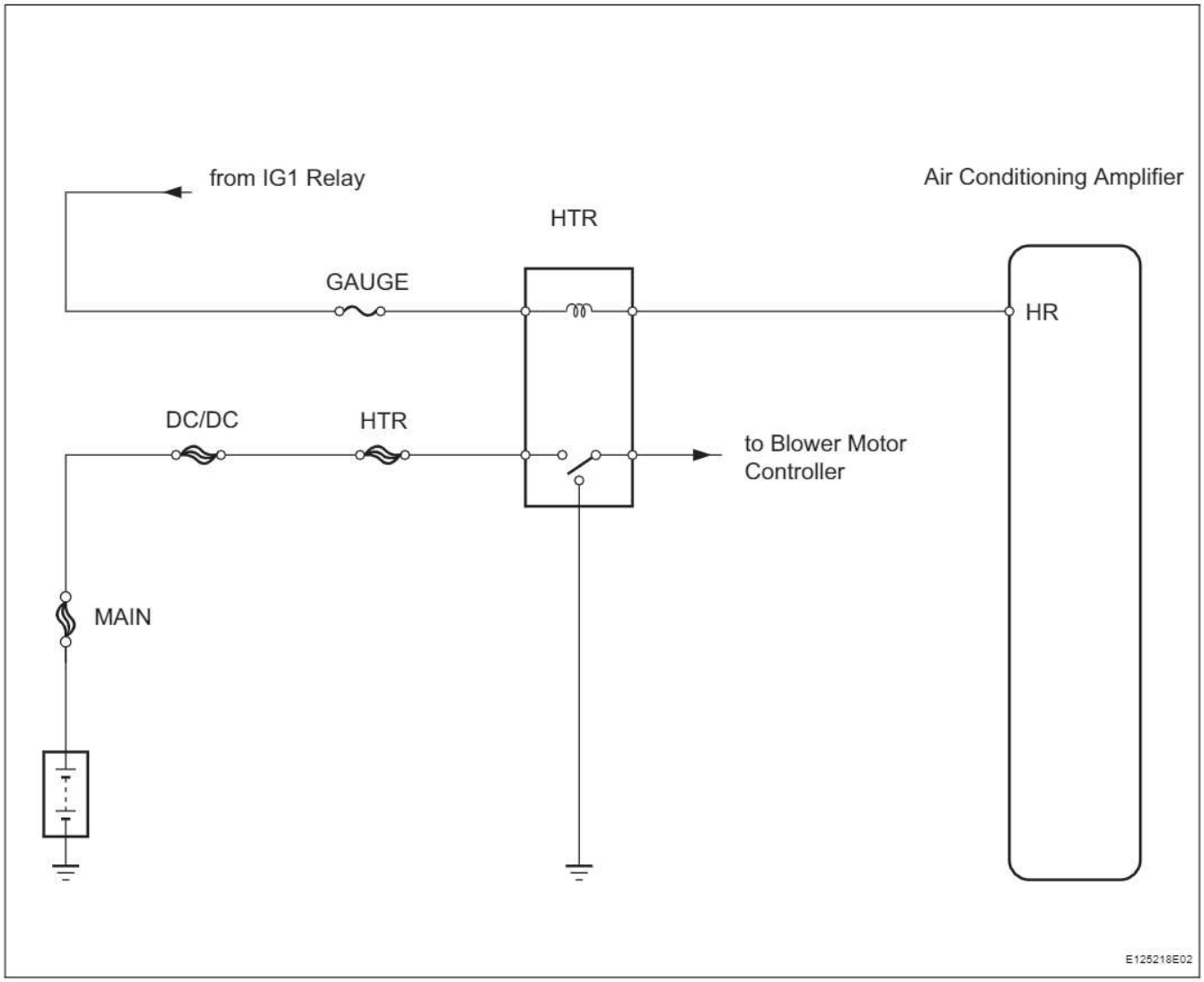
AC REPLACE BLOWER MOTOR CONTROLLER

Heater Relay Circuit

DESCRIPTION

The heater relay is turned on by signals from the air conditioning amplifier. It supplies power to the blower motor controller.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (GAUGE, HTR)

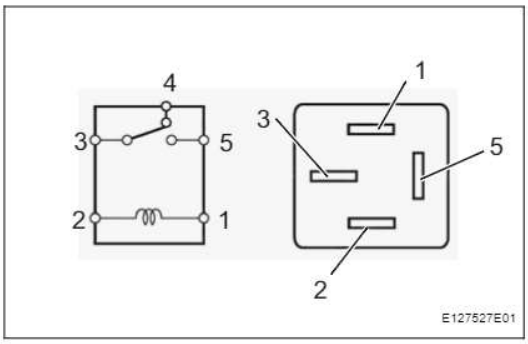
(a) Remove the GAUGE fuse from the driver side junction block.
(b) Remove the HTR H-fuse from the engine room junction block.
(c) Measure the resistance of the fuses.
Standard resistance:
Below 1 Ω

AC

NG → REPLACE FUSE

OK

2 INSPECT HEATER RELAY (Marking: HTR)



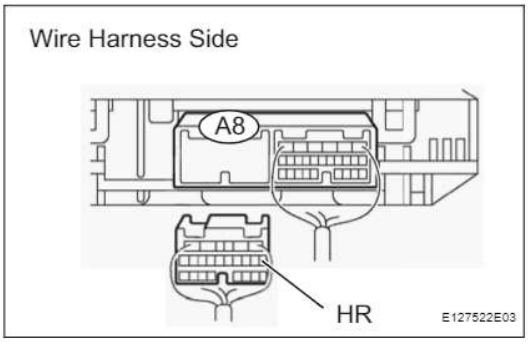
(a) Remove the heater relay from the driver side junction block.
(b) Measure the resistance of the relay.
Standard resistance

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage applied to terminals 1 and 2)
3 - 4	Below 1 Ω
3 - 5	10 kΩ or higher (When battery voltage applied to terminals 1 and 2)

NG → REPLACE HEATER RELAY

OK

3 CHECK WIRE HARNESS (BATTERY - AIR CONDITIONING AMPLIFIER)



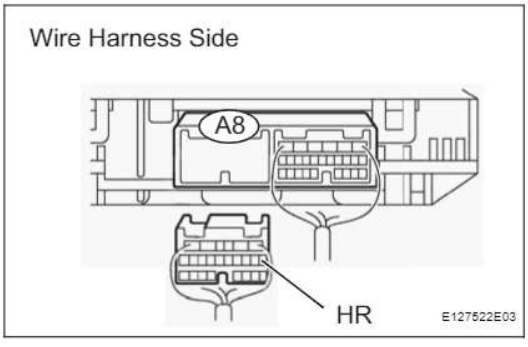
(a) Disconnect the A8 amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A8-7 (HR) - Body ground	Power switch ON (IG)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

4 CHECK AIR CONDITIONING AMPLIFIER (HR VOLTAGE)



(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A8-7 (HR) - Body ground	Power switch OFF Blower switch position ON	Below 1 V
A8-7 (HR) - Body ground	Power switch ON (IG) Blower switch position ON	Below 1 V

AC

Tester Connection	Condition	Specified Condition
A8-7 (HR) - Body ground	Power switch ON (IG) Blower switch position OFF	10 to 14 V

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

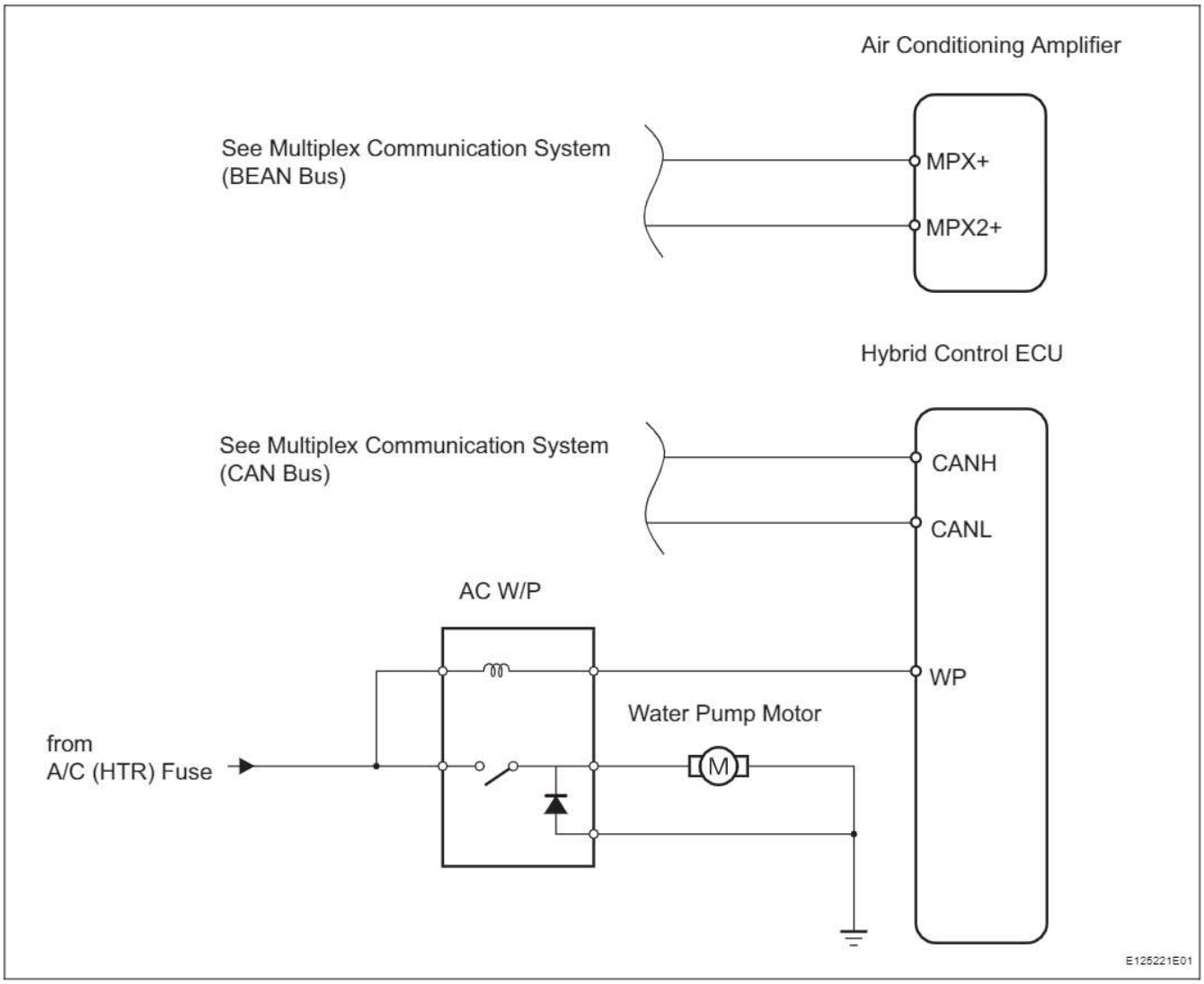
AC

Heater Water Pump Circuit

DESCRIPTION

The heater water pump sends engine coolant to the heater core while the engine is stopped to prevent heater effectiveness from becoming low.
Directed by the air conditioning amplifier, hybrid control ECU operates the water pump relay and drives the heater water pump.

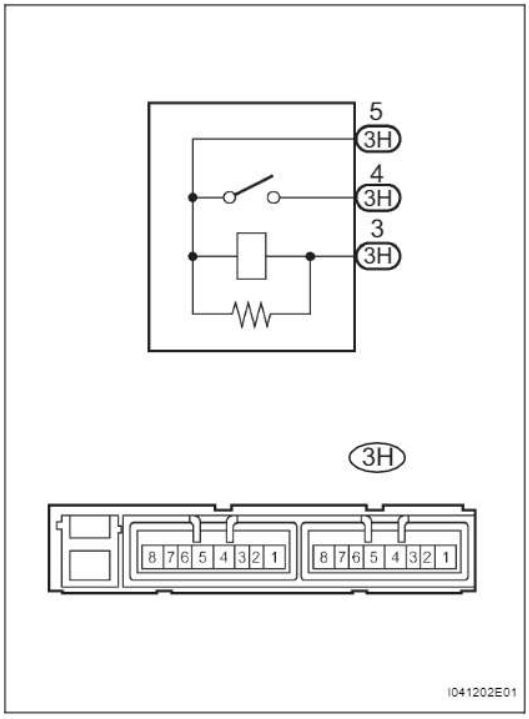
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1 INSPECT INTEGRATION RELAY (UNIT C: AC W/P)



(a) Remove the integration relay from the engine room junction block.
NOTICE:
As the integration relay is connected to the relays and fuses in the other systems, remove it with the power switch OFF. (A DTC may be output if the power switch is ON (IG).

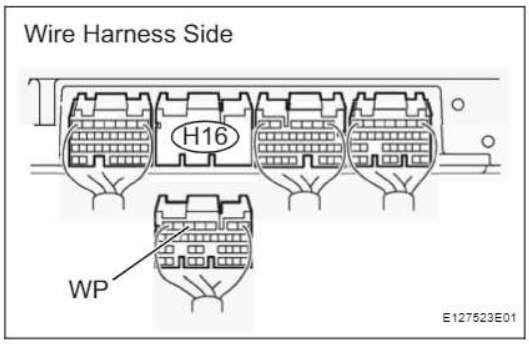
(b) Measure the resistance of the relay.
Standard resistance

Terminal No.	Specified Condition
3H-4 - 3H-5	10 kΩ or higher
3H-4 - 3H-5	Below 1 Ω (When battery voltage applied to terminals 3H-5 and 3H-3)

NG → REPLACE INTEGRATION RELAY

OK

2 CHECK WIRE HARNESS (HYBRID CONTROL ECU - BATTERY)



(a) Install the integration relay.
(b) Disconnect the H16 ECU connectors.
Measure the voltage of the wire harness side connector.

Standard voltage

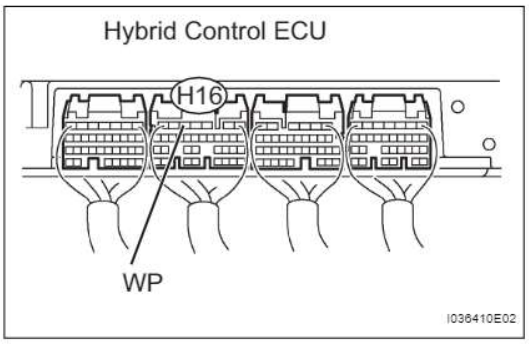
Tester Connection	Condition	Specified Condition
H16-5 (WP) - Body ground	Power switch ON (IG)	10 to 14 V

NG → REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

AC

3 CHECK HYBRID CONTROL ECU (WP VOLTAGE)



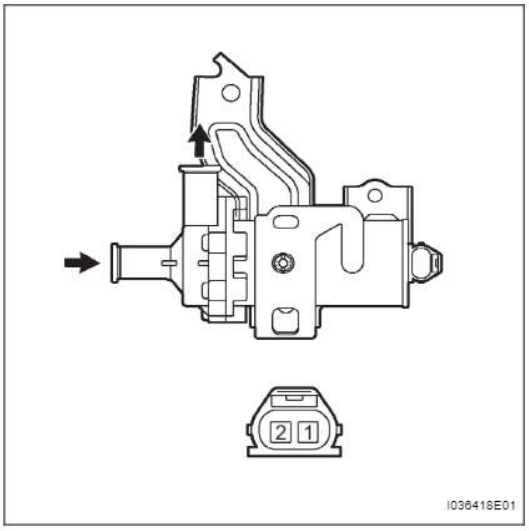
(a) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
H16-5 (WP) - Body ground	Heater water pump not operated	10 to 14 V
H16-5 (WP) - Body ground	Heater water pump operated	Below 1 V

NG → **REPLACE HYBRID CONTROL ECU**

OK

4 INSPECT HEATER WATER PUMP ASSEMBLY



(a) Remove the heater water pump.
(b) Connect positive (+) lead to terminal 1 of the heater water pump connector and negative (-) lead to terminal 2.
OK:
Heater water pump operates smoothly.
NOTICE:
Complete operation within 10 seconds if there is no water in the heater water pump.

NG → **REPLACE HEATER WATER PUMP ASSEMBLY**

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

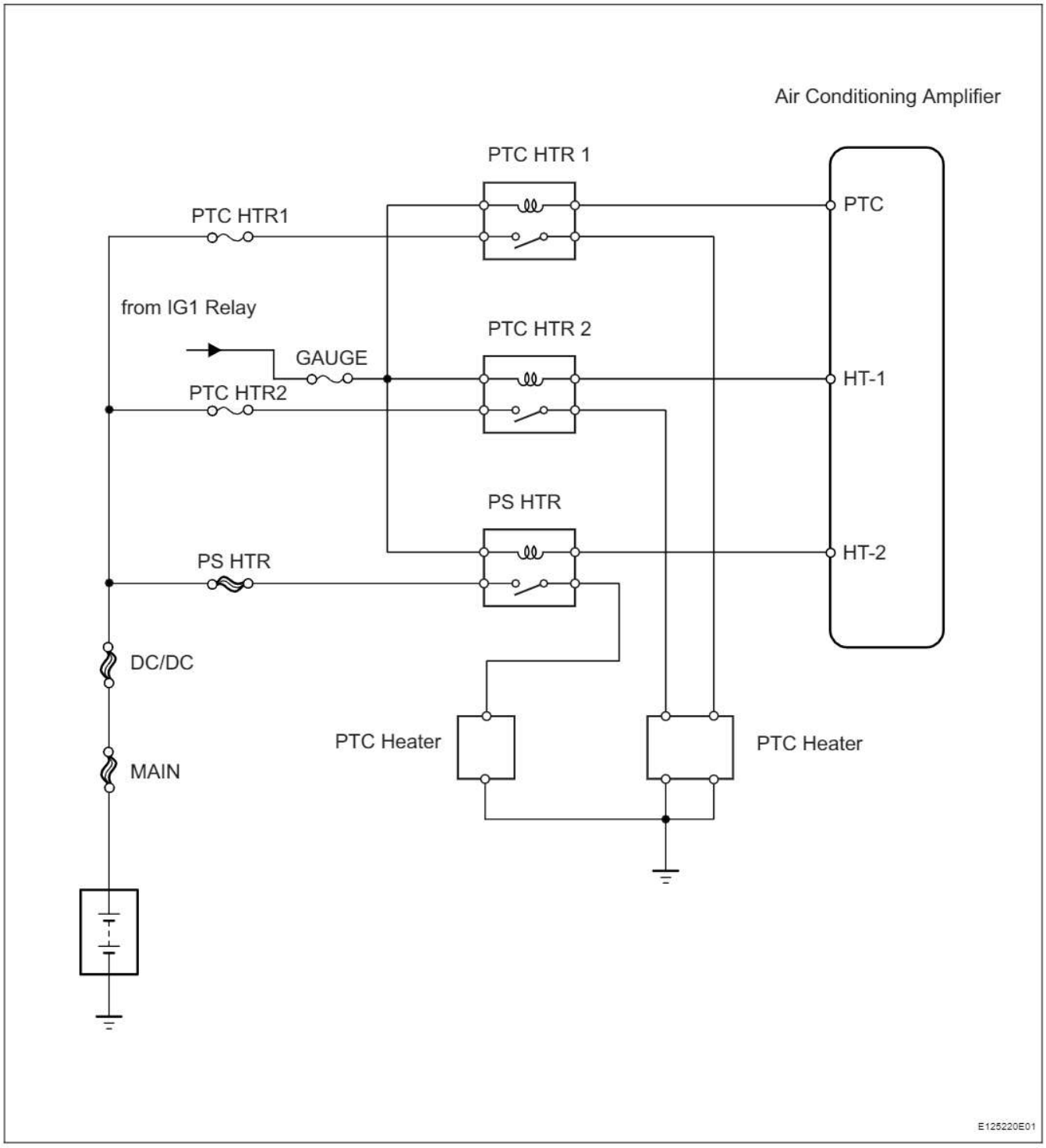
AC

PTC Heater Circuit

DESCRIPTION

The PTC heater is installed in the radiator in the heater unit on the driver and passenger's FOOT sides and operates when cooling water temperature is low and normal heater effectiveness is insufficient.
The air conditioning amplifier switches the circuit in the PTC relay and operates the PTC heater when the operating conditions (cooling water temperature is below 55°C (131°F), setting temperature is MAX. HOT, air outlet damper position is FOOT or FOOT / DEF and blower switch in not OFF) are met.

WIRING DIAGRAM



AC

INSPECTION PROCEDURE

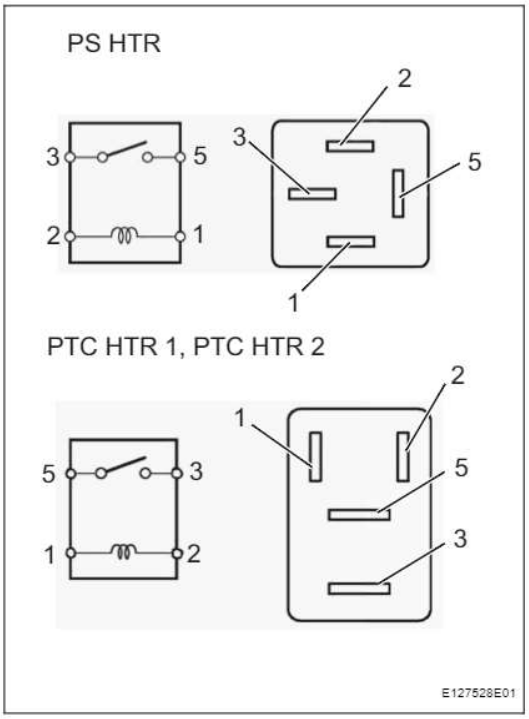
1	INSPECT FUSE (PS HTR, PTC HTR1, PTC HTR2, GAUGE)

(a) Remove the PS HTR H-fuse, PTC HTR1 and PTC HTR2 fuses from the engine room junction block.
(b) Remove the GAUGE fuse from the driver side junction block.
(c) Measure the resistance of the fuses.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2	INSPECT PTC HEATER RELAY (Marking: PS HTR, PTC HTR 1, PTC HTR 2)



(a) Remove the PS HTR, PTC HTR 1 and PTC HTR 2 heater relays from the engine room No. 2 relay block.
(b) Measure the resistance of the relays.
Standard resistance

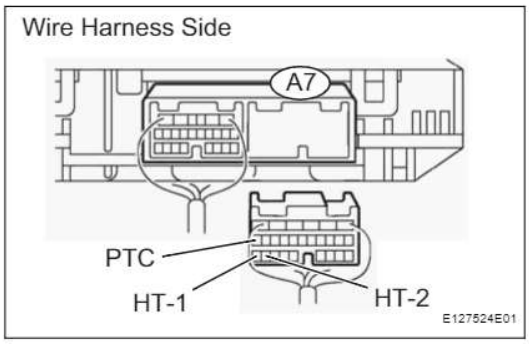
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage applied to terminals 1 and 2)

NG → **REPLACE PTC HEATER RELAY**

OK

AC

3 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY)



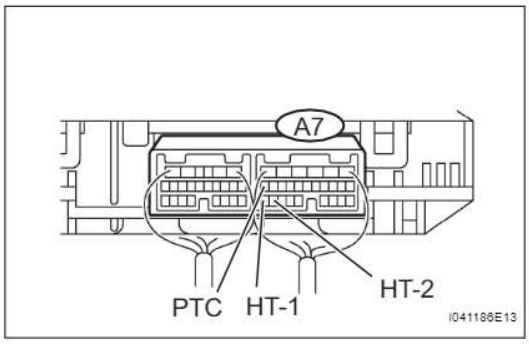
(a) Disconnect the A7 air conditioning amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-17 (PTC) - Body ground	Power switch ON (IG)	10 to 14 V
A7-26 (HT-1) - Body ground	Power switch ON (IG)	10 to 14 V
A7-25 (HT-2) - Body ground	Power switch ON (IG)	10 to 14 V

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

4 CHECK AIR CONDITIONING AMPLIFIER (PTC, HT-1, HT-2, VOLTAGE)



(a) Connect the connectors.
(b) Measure the voltage of the connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A7-17 (PTC) - Body ground	Power switch ON (READY) Temperature: Max. HOT Ventilator mode: FOOT Coolant temperature: 55°C (131°F) or lower Blower switch: OFF → LO (after 30 sec.)	Below 1 V → 10 to 14 V
A7-26 (HT-1) - Body ground	Power switch ON (READY) Temperature: Max. HOT Ventilator mode: FOOT Coolant temperature: 55°C (131°F) or lower Blower switch: OFF → LO (after 30 sec.)	Below 1 V → 10 to 14 V
A7-25 (HT-2) - Body ground	Power switch ON (READY) Temperature: Max. HOT Ventilator mode: FOOT Coolant temperature: 55°C (131°F) or lower Blower switch: OFF → LO (after 30 sec.)	Below 1 V → 10 to 14 V

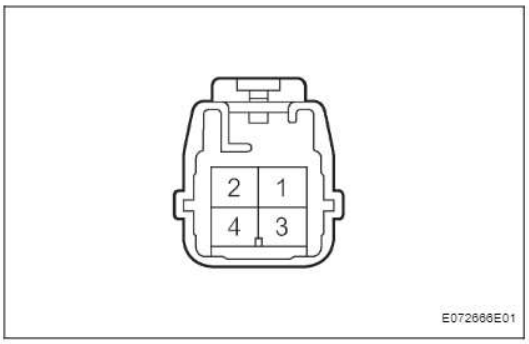
HINT:
- PTC operation may stop when the electric load on the vehicle is high. Perform the inspection under conditions with low electric load (such as with headlights turned OFF).
- Since the 2 PTC heaters are gradually turned to the ON position, perform the inspection 30 seconds after the blower switch is turned to the LO position.

AC

NG → REPLACE AIR CONDITIONING AMPLIFIER

OK

5 INSPECT PTC HEATER



(a) Disconnect the connector from the PTC heater.
(b) Check the continuity between each terminal.

Standard resistance

Tester Connection	Specified Condition
P12-1 - P12-2	Continuity (0.5 kΩ or higher)
P12-3 - P12-4	Continuity (0.5 kΩ or higher)

NG → REPLACE PTC HEATER

OK

REPAIR OR REPLACE HARNESS AND CONNECTOR

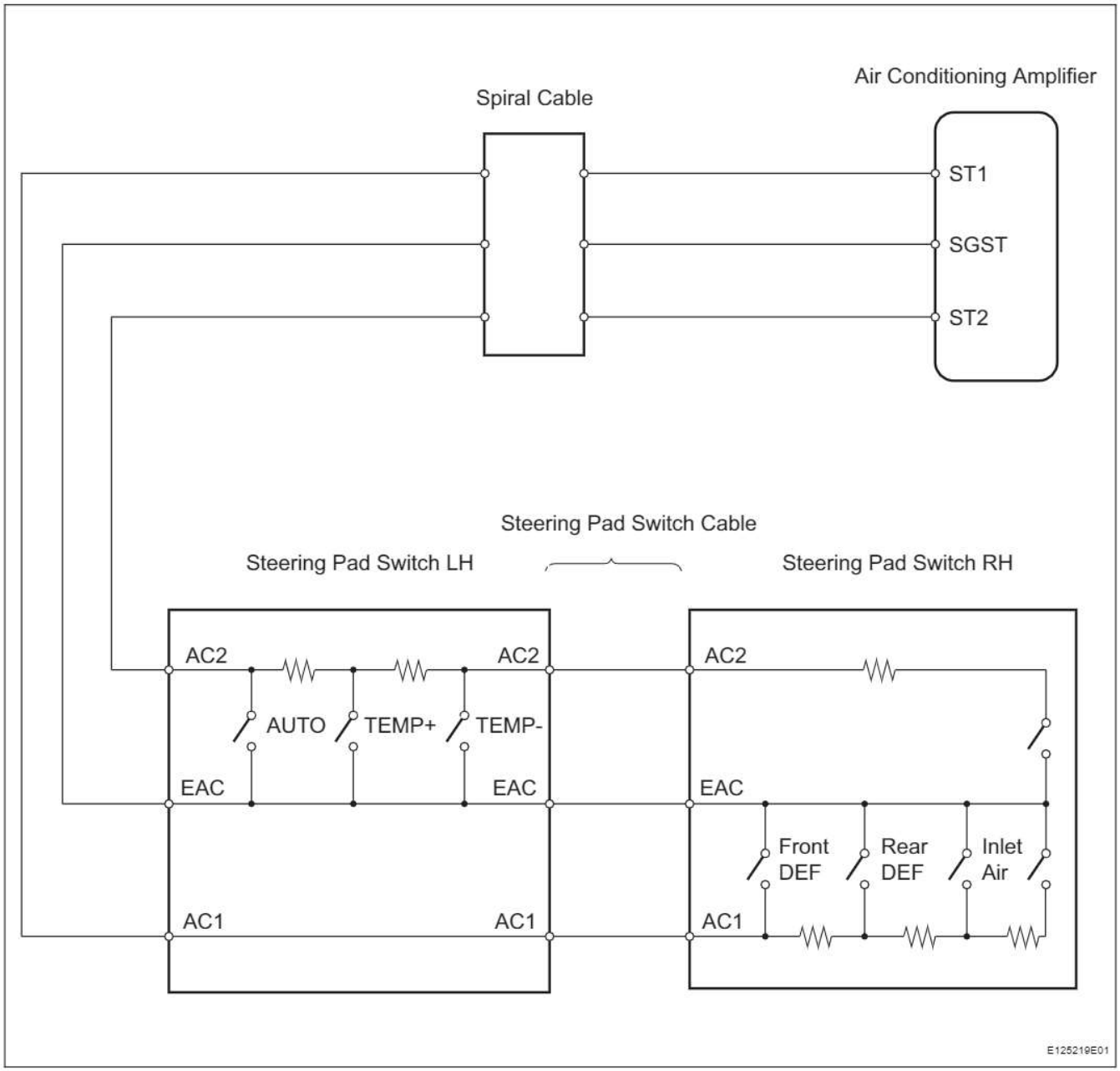
AC

Steering Pad Switch Circuit

DESCRIPTION

AUTO, TEMP UP (+), TEMP DOWN (-), Recirculation / Fresh, Fr. DEF and Rr. DEF switches are located on the steering pad switch.
The resistance of the steering pad switch changes in accordance with switch operation. The air conditioning amplifier outputs voltage to the steering pad switch and reads voltage changes according to the resistance changes with switch operation.

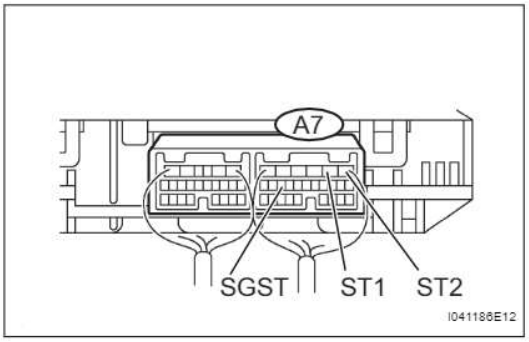
WIRING DIAGRAM



AC

INSPECTION PROCEDURE

1	CHECK AIR CONDITIONING AMPLIFIER (ST1, ST2 VOLTAGE)



(a) Remove the air conditioning with connectors still connected.
(b) Measure the voltage of the wire harness side connectors.

Standard voltage

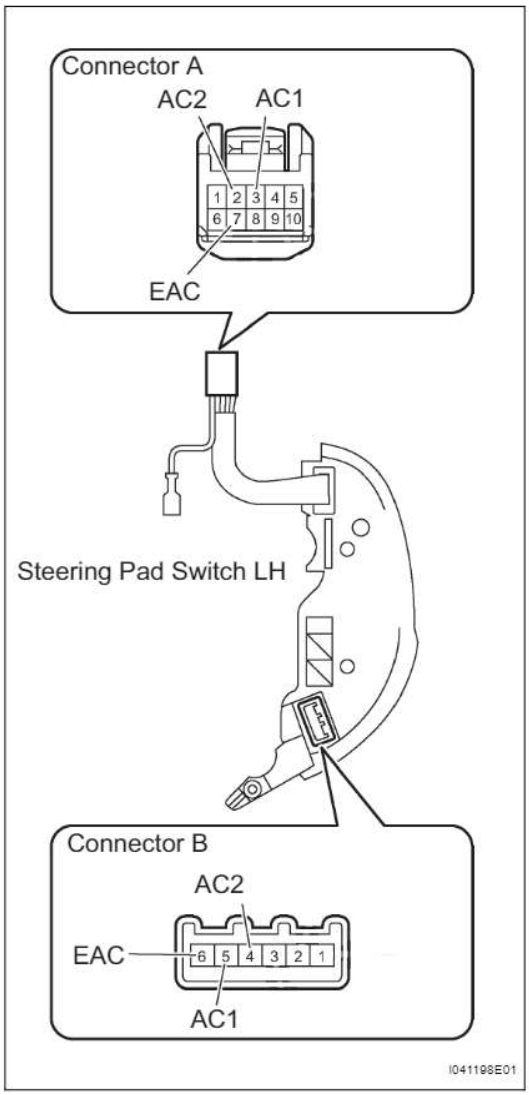
Tester Connection	Condition	Specified Condition
A7-2 (ST1) - A7-15 (SGST)	Power switch ON (IG) Fr. DEF switch ON	Below 0.3 V
A7-2 (ST1) - A7-15 (SGST)	Power switch ON (IG) Rr. DEF switch ON	0.8 to 1.5 V
A7-2 (ST1) - A7-15 (SGST)	Power switch ON (IG) Recirculation/Fresh switch ON	2.0 to 2.9 V
A7-1 (ST2) - A7-15 (SGST)	Power switch ON (IG) AUTO switch ON	Below 0.3 V
A7-1 (ST2) - A7-15 (SGST)	Power switch ON (IG) TEMP+ switch ON	0.8 to 1.5 V
A7-1 (ST2) - A7-15 (SGST)	Power switch ON (IG) TEMP- switch ON	2.0 to 2.9 V

OK → PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE

NG

AC

2 INSPECT STEERING PAD SWITCH LH



(a) Remove the steering pad switch LH.
(b) Measure the resistance of the connectors.

Standard resistance

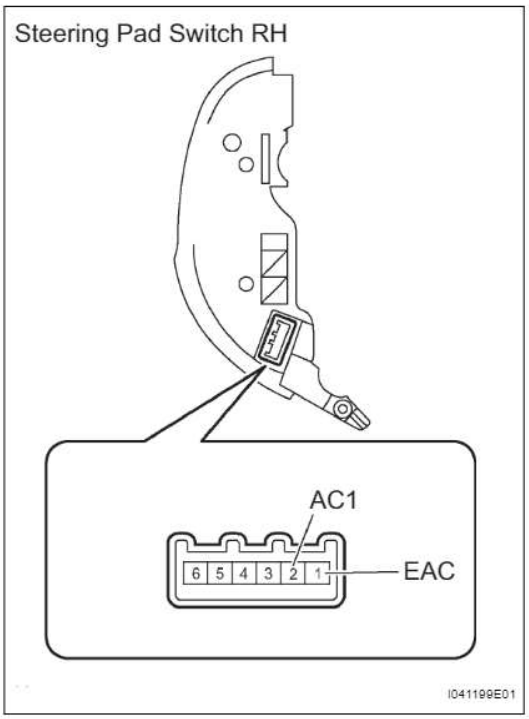
Tester Connection	Condition	Specified Condition
A2 (AC2) - B5 (AC1)	Always	1,210 Ω
A7 (EAC) - B6 (EAC)	Always	Below 1 Ω
A3 (AC1) - B5 (AC1)	Always	Below 1 Ω
A2 (AC2) - A7 (EAC)	AUTO switch ON	Below 1 Ω
A2 (AC2) - A7 (EAC)	TEMP + switch ON	300 Ω
A2 (AC2) - A7 (EAC)	TEMP - switch ON	1,210 Ω

NG → REPLACE STEERING PAD SWITCH LH

OK

AC

3	INSPECT STEERING PAD SWITCH RH



(a) Remove the steering pad switch RH.
(b) Measure the resistance of the connector.

Standard resistance

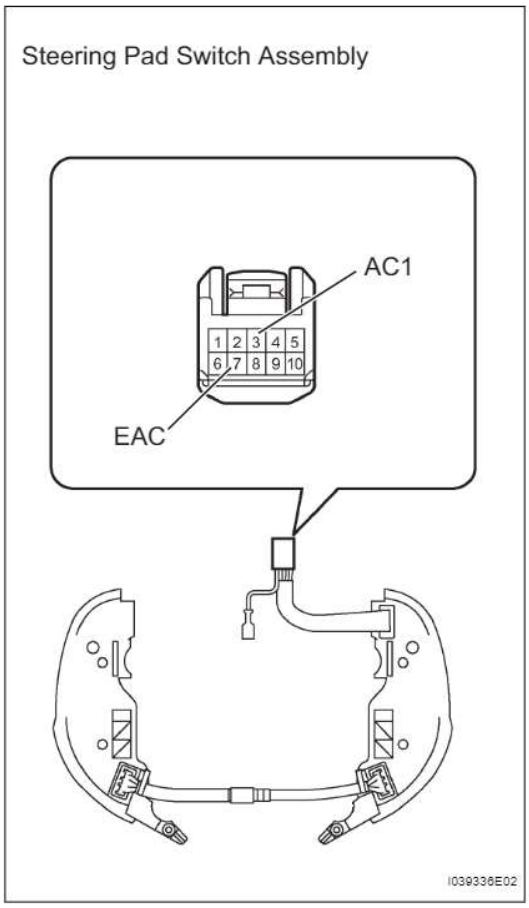
Tester Connection	Condition	Specified Condition
2 (AC1) -1 (EAC)	Fr. DEF switch ON	Below 1 Ω
2 (AC1) -1 (EAC)	Rr. DEF switch ON	300 Ω
2 (AC1) -1 (EAC)	Recirculation/Fresh switch ON	1,210 Ω

NG → REPLACE STEERING PAD SWITCH RH

OK

AC

4 INSPECT STEERING PAD SWITCH ASSEMBLY



(a) Connect the steering pad switch RH and LH to the steering pad switch cable.

(b) Measure the resistance of the connector.

Standard resistance

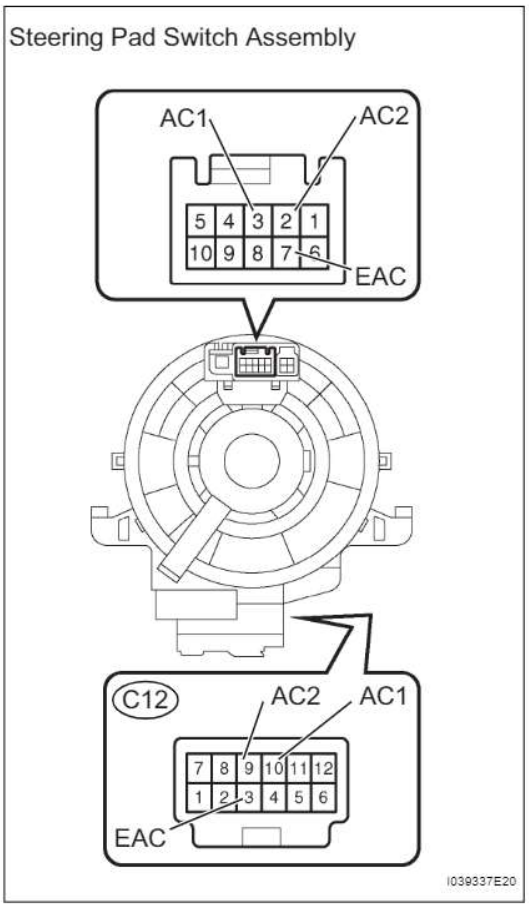
Tester Connection	Condition	Specified Condition
3 (AC1) - 7 (EAC)	Fr. DEF switch ON	Below 1 Ω
3 (AC1) - 7 (EAC)	Rr. DEF switch ON	300 Ω
3 (AC1) - 7 (EAC)	Recirculation/Fresh switch ON	1,210 Ω

NG → **REPLACE STEERING PAD SWITCH ASSEMBLY**

OK

AC

5	INSPECT SPIRAL CABLE SUB-ASSEMBLY



(a) Remove the spiral cable.
(b) Measure the resistance of the connectors.

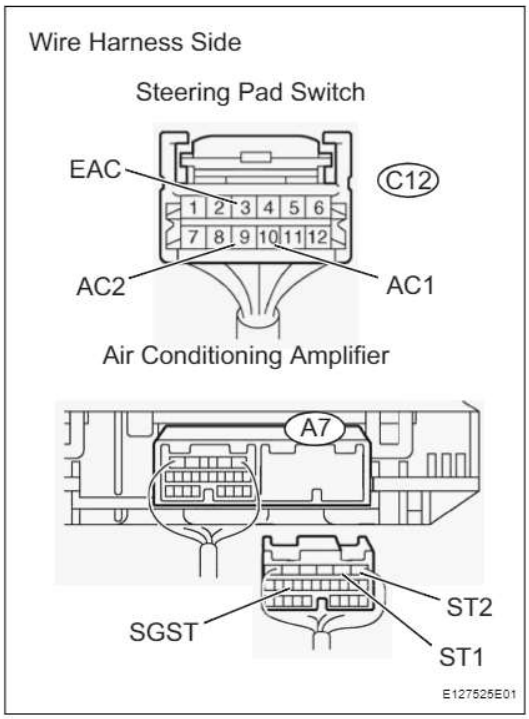
Standard resistance

Tester Connection	Specified Condition
C12-3 (EAC) - 7 (EAC)	Below 1 Ω
C12-9 (AC2) - 2 (AC2)	Below 1 Ω
C12-10 (AC1) - 3 (AC1)	Below 1 Ω

NG → REPLACE SPIRAL CABLE SUB-ASSEMBLY

OK

6 CHECK WIRE HARNESS (STEERING PAD SWITCH - AIR CONDITIONING AMPLIFIER)



(a) Disconnect the C12 steering pad connector.
(b) Disconnect the A7 amplifier connector.
(c) Measure the resistance of the wire harness side connectors.

Standard resistance

Tester Connection	Specified Condition
A7-2 (ST1) - C12-10 (AC1)	Below 1 Ω
A7-15 (SGST) - C12-3 (EAC)	Below 1 Ω
A7-1 (ST2) - C12-9 (AC2)	Below 1 Ω
A7-2 (ST1) - Body ground	10 kΩ or higher
A7-15 (SGST) - Body ground	10 kΩ or higher
A7-1 (ST2) - Body ground	10 kΩ or higher

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

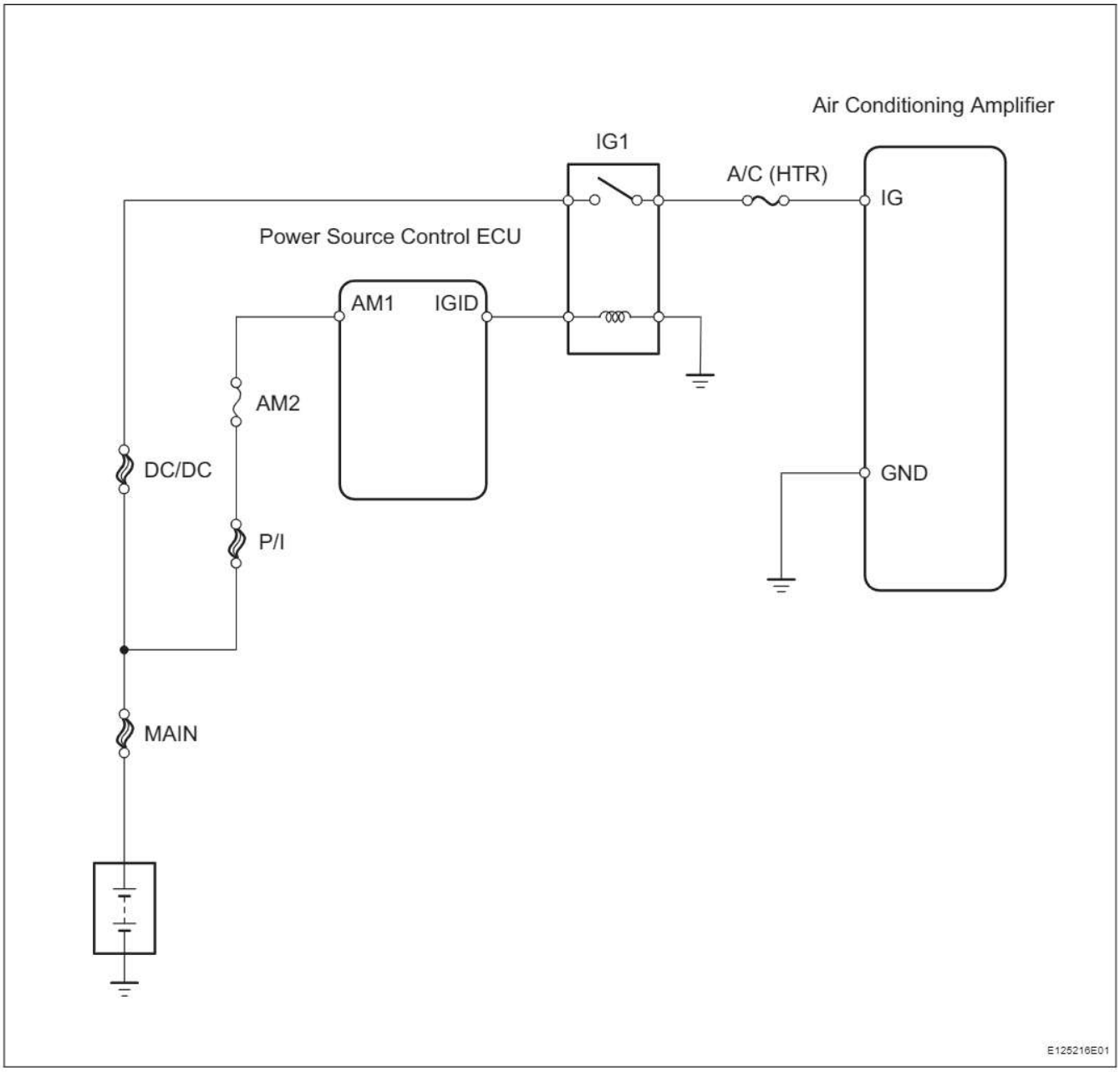
AC

IG Power Source Circuit

DESCRIPTION

This is the main power source supplied to the air conditioning amplifier when the power switch is turned ON (IG). The power source supplied is used for operating the air conditioning amplifier, servo motor, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (A/C (HTR))

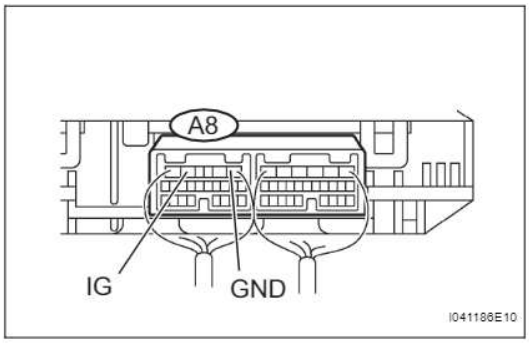
(a) Remove the A/C (HTR) fuse from the driver side junction block.

(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

2 CHECK AIR CONDITIONING AMPLIFIER (IG VOLTAGE)



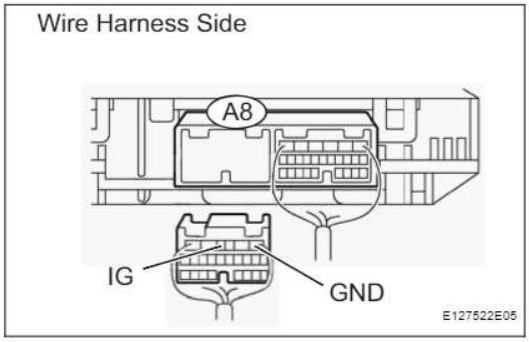
(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A8-5 (IG) - A8-1 (GND)	Power switch ON (IG)	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

3 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY AND BODY GROUND)



(a) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Condition	Specified Condition
A8-5 (IG) - Body ground	Power switch ON (IG)	10 to 14 V

(b) Measure the resistance of the wire harness side connector.
Standard resistance

Tester Connection	Specified Condition
A8-1 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

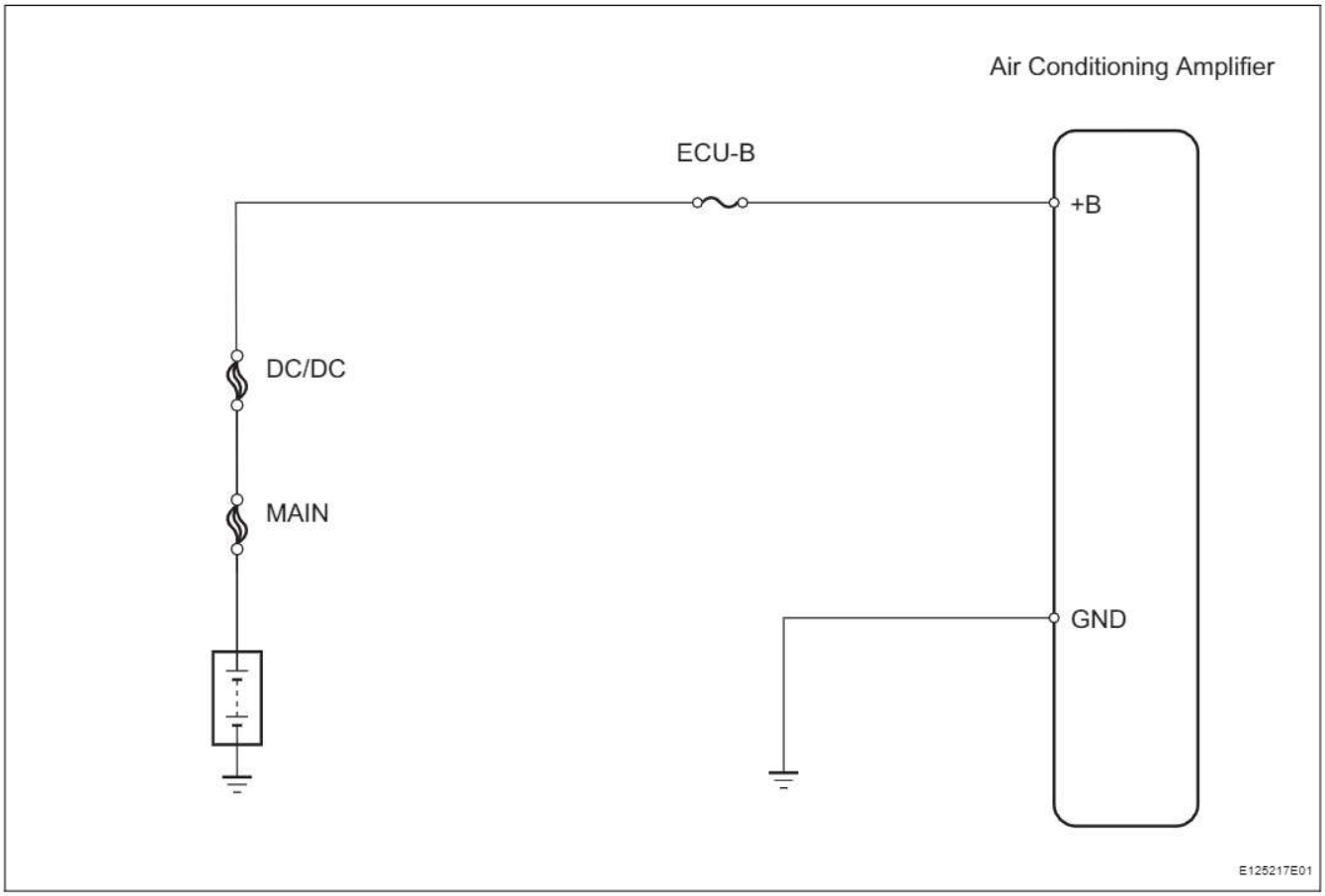
AC

Back-up Power Source Circuit

DESCRIPTION

This is the back-up power source circuit for the air conditioning amplifier. Power is supplied even when turning the power switch OFF and is used for diagnostic trouble code memory, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	INSPECT FUSE (ECU-B)

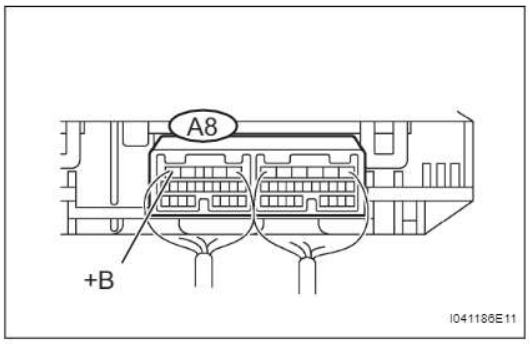
(a) Remove the ECU-B fuse from the driver side junction block.
(b) Measure the resistance of the fuse.
Standard resistance:
Below 1 Ω

NG → **REPLACE FUSE**

OK

AC

2 CHECK AIR CONDITIONING AMPLIFIER (+B VOLTAGE)



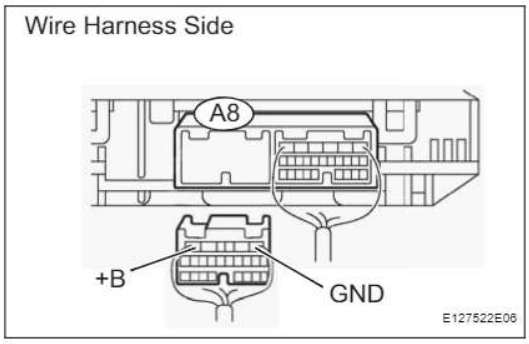
(a) Remove the air conditioning amplifier with connectors still connected.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
A8-6 (+B) - Body ground	10 to 14 V

OK → **PROCEED TO NEXT CIRCUIT INSPECTION SHOWN IN PROBLEM SYMPTOMS TABLE**

NG

3 CHECK WIRE HARNESS (AIR CONDITIONING AMPLIFIER - BATTERY AND BODY GROUND)



(a) Disconnect the A8 amplifier connector.
(b) Measure the voltage of the wire harness side connector.
Standard voltage

Tester Connection	Specified Condition
A8-6 (+B) - Body ground	10 to 14 V

(c) Measure the resistance of the wire harness side connector.
Standard resistance

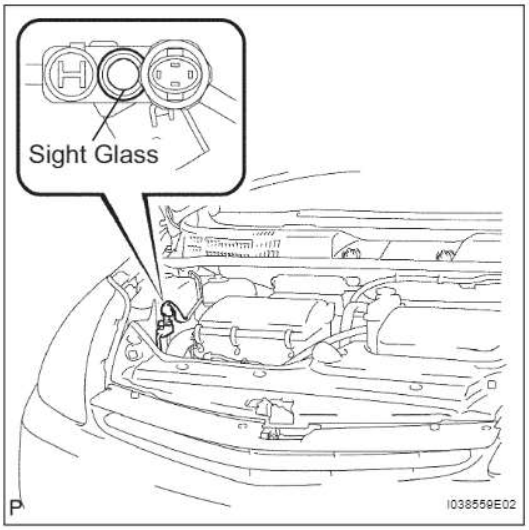
Tester Connection	Specified Condition
A8-1 (GND) - Body ground	Below 1 Ω

NG → **REPAIR OR REPLACE HARNESS AND CONNECTOR**

OK

REPLACE AIR CONDITIONING AMPLIFIER

AC



REFRIGERANT

ON-VEHICLE INSPECTION

1. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

(a) Check the sight glass of the cooler unit refrigerant liquid pipe E.

(1) Set the vehicle according to the conditions below.

Item	Condition
All doors	Fully open
Temperature setting	MAX COLD
Blower speed	HI
A/C switch	ON

(2) Check the sight glass under these conditions.

Item	Symptom	Amount of refrigerant	Corrective Actions
1	Bubbles exist	Insufficient*	1. Check for gas leakage and repair if necessary 2. Add refrigerant until bubbles disappear
2	No bubbles exist (DTC 76 is output)	Empty, insufficient or excessive	Refer to 3 and 4
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty	1. Check for gas leakage and repair if necessary 2. Add refrigerant until bubbles disappear
4	Considerable temperature difference between compressor inlet and outlet	Proper or excessive	Refer to 5 and 6
5	Immediately after air conditioning is turned off, refrigerant remains clear	Excessive	1. Discharge refrigerant 2. Remove air and supply proper amount of purified refrigerant
6	Immediately after air conditioning is turned off, refrigerant foams and then becomes clear	Proper	-

HINT:
Bubbles in the sight glass with the room temperature higher than usual can be considered normal if cooling is sufficient.

2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

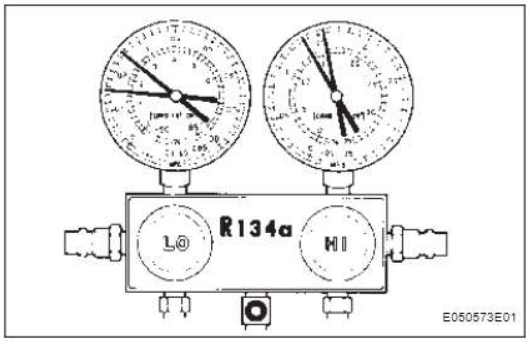
(a) This is a method in which the trouble is located by using a manifold gauge set. Read the manifold gauge pressure when these conditions are established.

Gauge readings (Reference)

Test conditions:

- Temperature at the air inlet with the switch set at RECIRC is 30 to 35°C (86 to 95°F)
- Blower speed control switch at "HI" position
- Temperature control switch at "MAX COLD" position
- A/C switch ON
- Fully open doors

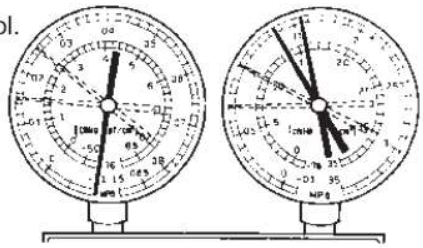
AC



(1) The refrigeration system functions normally
Gauge reading:
Low-pressure side:
0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm^2)
High-pressure side:
1.37 to 1.57 MPa (14 to 16 kgf/cm^2)

(2) Moisture present in refrigeration system

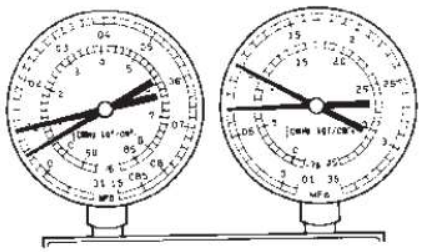
Condition:
Periodically cools and then fails to cool.



Symptoms	Probable Cause	Diagnosis	Corrective Actions
During operation, pressure on low-pressure side cycles between normal and vacuum	Moisture in refrigerating system freezes at expansion valve orifice, causing a temporary stop of cycle. However, when it melts, normal state is restored.	- Cooler dryer in oversaturated state Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant	1. Replace cooler dryer 2. Remove moisture in cycle by repeatedly evacuating air 3. Supply proper amount of new refrigerant

(3) Insufficient cooling

Condition: Coolig system does not function effectively.

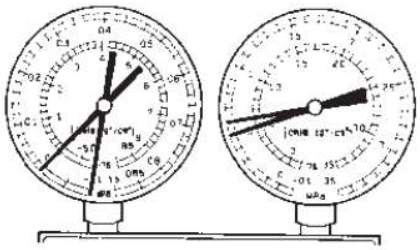


Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure is low on both low and high-pressure sides - Bubbles are continuously seen through sight glass - Insufficient cooling performance	Gas leakage in refrigeration system	- Insufficient refrigerant - Refrigerant leaking	1. Check for gas leakage and repair if necessary 2. Supply proper amount of new refrigerant 3. If the indicated pressure value is close to 0 when connected to the gauge, create a vacuum after inspecting and repairing location of leakage

AC

(4) Poor circulation of refrigerant

Condition: Cooling system does not function effectively.

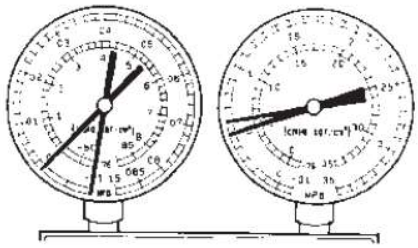


I022119E12

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure low on both low and high-pressure sides - Frost exists on pipe from cooler condenser to A/C unit	Refrigerant flow is obstructed by dirt in cooler condenser core	Cooler condenser core is clogged	Replace cooler condenser core

(5) Refrigerant does not circulate

Condition: Cooling system does not function. (Sometimes it may function)

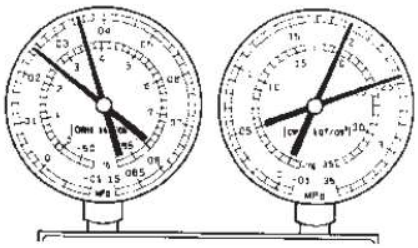


I022120E11

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Vacuum is indicated on low-pressure side and very low pressure is indicated on high-pressure side - Frost or condensation is seen on piping on both sides of cooler condenser core or expansion valve	- Refrigerant flow is obstructed by moisture or dirt in refrigeration system - Refrigerant flow obstructed by gas leaked from cooler expansion valve	Refrigerant does not circulate	1. Check expansion valve 2. Clean out dirt in cooler expansion valve by blowing air 3. Replace cooler condenser core 4. Evacuate and charge new refrigerant 5. For gas leakage from cooler expansion valve, replace cooler expansion valve

(6) Refrigerant overcharged or insufficient cooling of condenser

Condition: Cooling system does not function effectively.



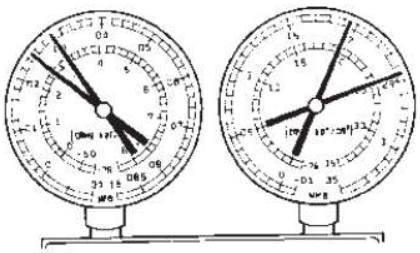
I022121E09

AC

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure is too high on both low and high-pressure sides - No air bubbles are seen through the sight glass when compressor speed decreases	- Excessive refrigerant - Insufficient cooling of cooler condenser core	- Excessive refrigerant in cycle (excessive refrigerant is supplied) - Insufficient cooling of cooler condenser core	1. Clean cooler condenser core fins 2. Check cooling fan with condenser fan motor operation 3. If 1 and 2 normal, check the amount of refrigerant and supply proper amount of refrigerant

(7) Air present in refrigeration system

Condition: Cooling system does not function.



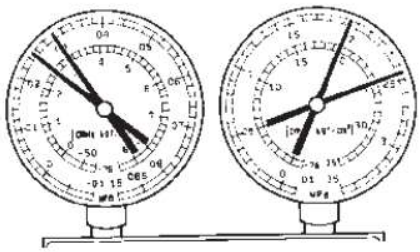
NOTE: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging.

I022122E08

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure is too high on both low and high-pressure sides - Low-pressure piping is too hot to touch Bubbles are seen through sight glass	Air in system	- Air present in refrigeration system - Insufficient vacuum purging	1. Check compressor oil to see if it is dirty or insufficient 2. Evacuate and charge new refrigerant

(8) Expansion valve malfunction

Condition: Insufficient Cooling



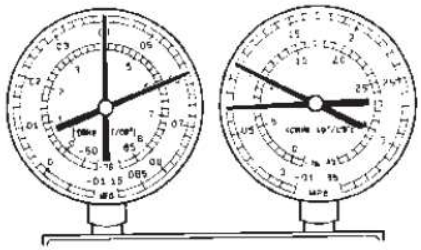
I022123E13

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure is too high on both low and high-pressure sides - Frost or large amount of condensation on piping on low-pressure side	Trouble in cooler expansion valve	- Excessive refrigerant in low pressure piping - Cooler expansion valve is opened too wide	Replace cooler expansion valve

AC

(9) Defective compression in compressor

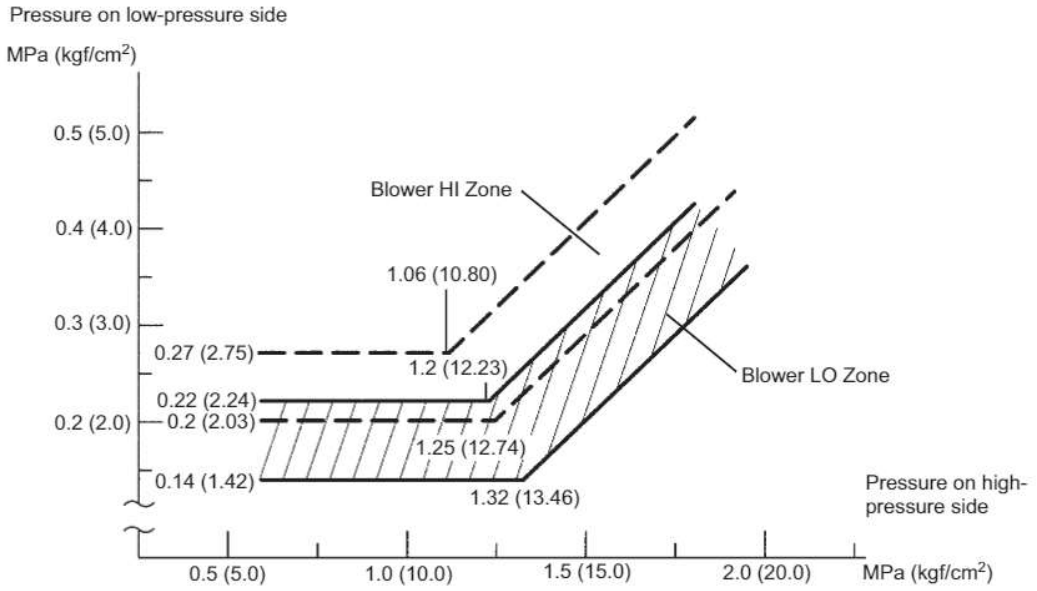
Condition: Insufficient Cooling



I022124E09

Symptoms	Probable Cause	Diagnosis	Corrective Actions
- Pressure is too high on both low and high-pressure sides - Pressure is too low on high-pressure side	Internal leak in cooler compressor	- Compression failure - Leakage from damaged valve or broken sliding parts	Repair or replace compressor

Gauge readings (Reference)



I030081E04

AC

REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

(a) Turn the A/C switch on.

(b) Operate the A/C with the setting temperature at 25 °C (77°F) and the blower level at LO for 10 minutes to circulate the refrigerant, and collect compressor oil remaining in each component into the cooler compressor as much as possible.

(c) Stop the engine.

(d) Using SST, let the refrigerant gas out.

SST 07110-58060 (07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)

2. CHARGE REFRIGERANT

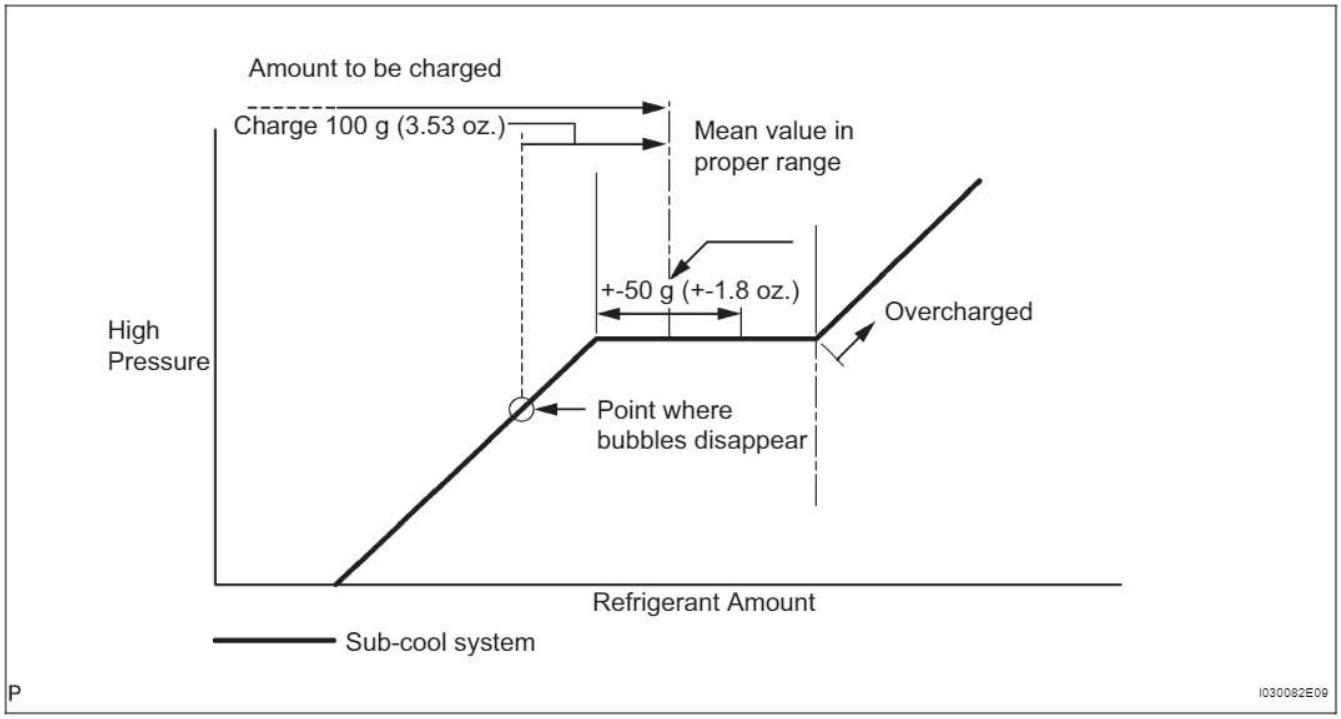
(a) Perform vacuum purging using a vacuum pump.

(b) Charge refrigerant HFC-134a (R134a).

Amount:

450 +-30 g (15.9 +-1.1 oz.)

SST 07110-58060 (07117-58060, 07117-58070, 07117-58080, 07117-58090, 07117-78050, 07117-88060, 07117-88070, 07117-88080)



NOTICE:

- **Do not turn the A/C on before charging refrigerant as the cooler compressor does not work properly without any refrigerant. Operating without any refrigerant causes it to overheat.**

AC

- **Approximately 100 g (3.53 oz.) of refrigerant may need to be charged after bubbles disappear. The refrigerant amount should be checked by quantity, and not with the sight glass.**

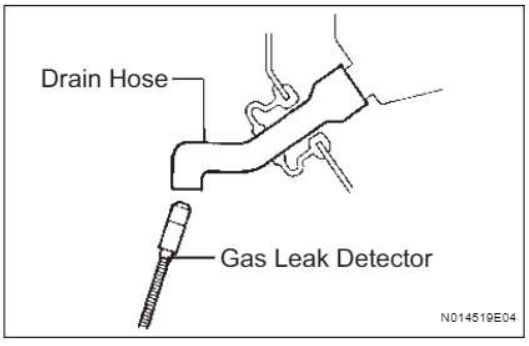
HINT:
Prepare a service can to recharge the refrigerant if using the refrigerant gas collected with the Freon collection/recycling device because the collective rate of the device is approximately 90%.

3. WARM UP COMPRESSOR

(a) Turn the A/C switch on for at least 1 minute to warm up the compressor.
NOTICE:
Be sure to warm up the compressor when turning the A/C on after removing and installing the cooler refrigerant lines (including the compressor) to prevent damage to the compressor.

4. INSPECT LEAKAGE OF REFRIGERANT

(a) After recharging the refrigerant gas, inspect leakage of refrigerant gas using a halogen leak detector.
(b) (b)After recharging the refrigerant gas, prepare the vehicle for a refrigerant gas leakage check by making sure the following conditions are met.
(1) The ignition switch is OFF.
(2) The vehicle is in a place with good air ventilation and without any volatile gases, such as evaporated gasoline or exhaust gas. The detector is very sensitive to volatile gases. If volatile gases are unavoidable, the vehicle must be lifted up.
(3) Some refrigerant remains in the refrigerant system.
(4) The compressor is OFF and its pressure is approximately 392 to 588 kPa (4 to 6 kgf/cm2).



(c) Bring the gas leak detector close to the drain hose with the detector's power off.
HINT:
- After the blower motor has stopped, leave the cooling unit as it is for more than 15 minutes.
- Expose the gas leak detector sensor under the drain hose.
- When bringing the gas leak detector close to the drain hose, make sure that the gas leak detector does not react to the volatile gases.

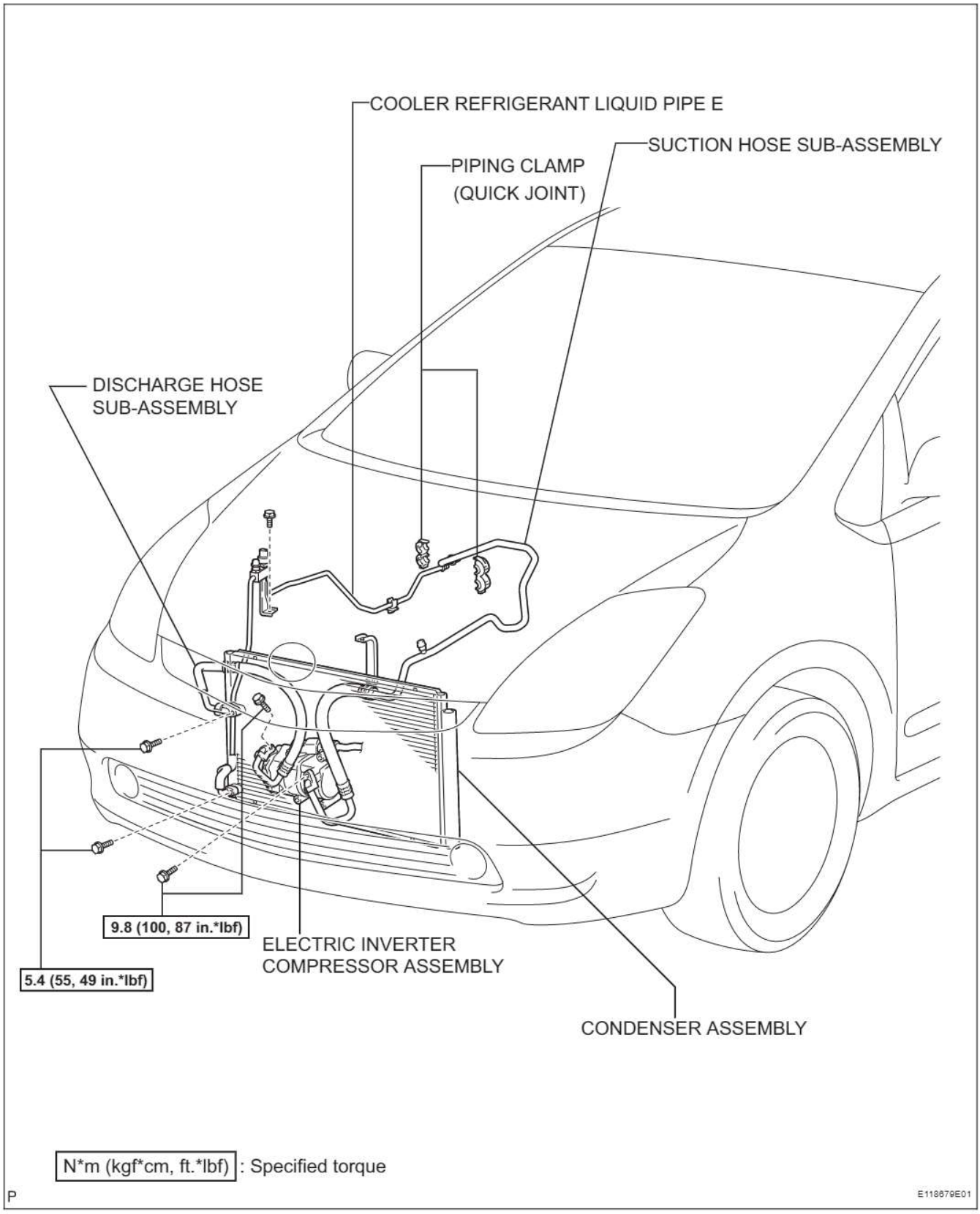
(d) If a gas leak is not detected on the drain hose, remove the blower motor control from the cooling unit. Insert the gas leak detector sensor into the unit and perform the test.

AC

(e) Disconnect the pressure switch connector and wait for approximately 20 minutes. Bring the gas leak detector close to the pressure switch and perform the test.

REFRIGERANT LINE

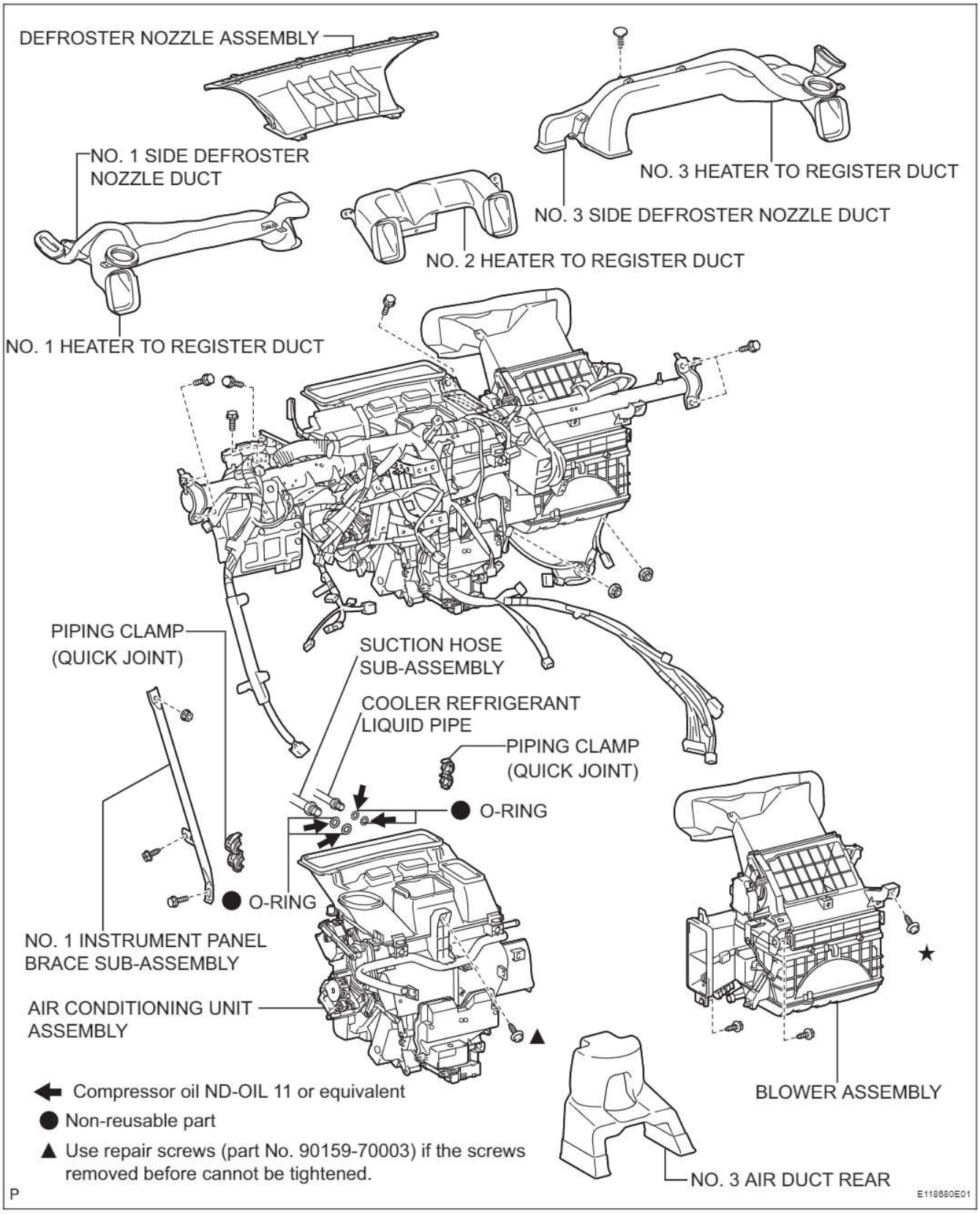
COMPONENTS



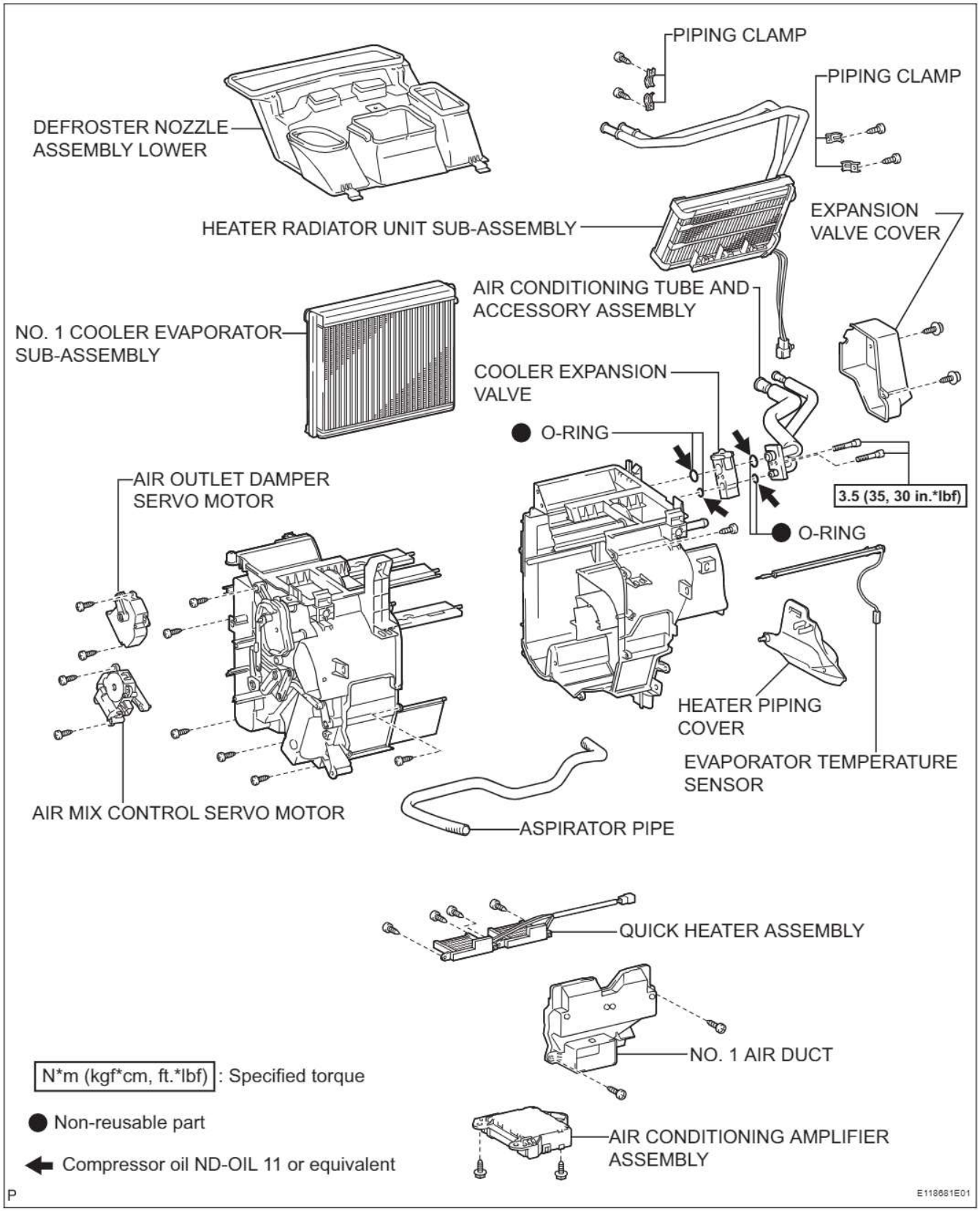
AC

AIR CONDITIONING UNIT

COMPONENTS



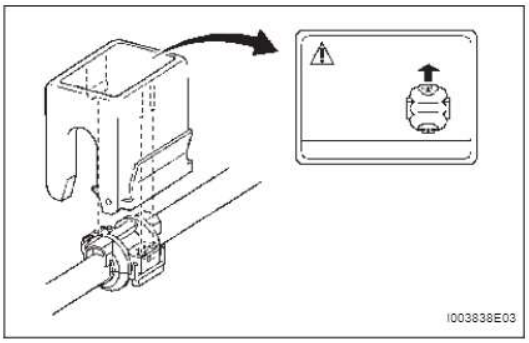
AC


PIPING CLAMP
PIPING CLAMP
DEFROSTER NOZZLE ASSEMBLY LOWER
HEATER RADIATOR UNIT SUB-ASSEMBLY
EXPANSION VALVE COVER
AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY
NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY
COOLER EXPANSION VALVE
O-RING
3.5 (35, 30 in.*lbf)
O-RING
AIR OUTLET DAMPER SERVO MOTOR
HEATER PIPING COVER
EVAPORATOR TEMPERATURE SENSOR
AIR MIX CONTROL SERVO MOTOR
ASPIRATOR PIPE
QUICK HEATER ASSEMBLY
NO. 1 AIR DUCT
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Compressor oil ND-OIL 11 or equivalent
AIR CONDITIONING AMPLIFIER ASSEMBLY
P
E118681E01

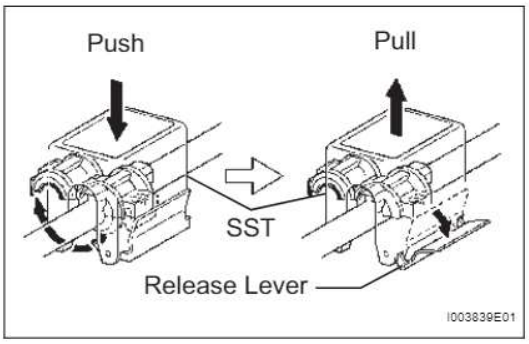
AC

REMOVAL

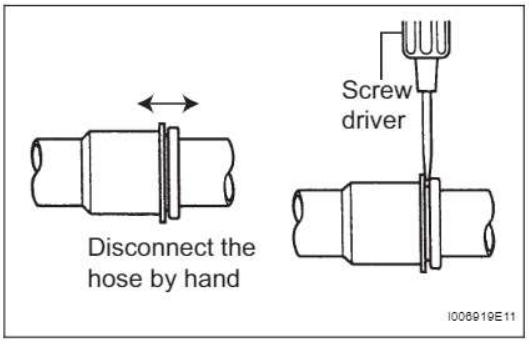
1. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-140)**



2. **DISCONNECT SUCTION HOSE SUB-ASSEMBLY**
   (a) Check SST installation direction.
   SST 09870-00015
   HINT:
   Set SST so that the stopper side is on the piping clamp lock side.
   (b) Install SST on the piping clamp.

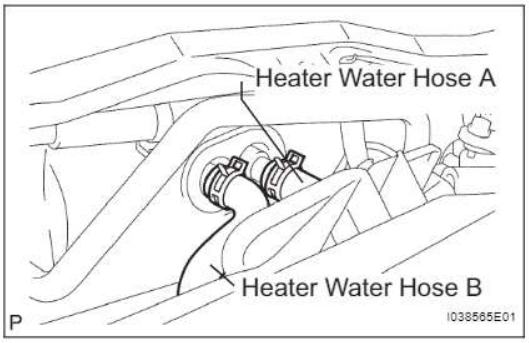


   (c) Push down on SST with your thumb while holding the pipe with both hands.
   NOTICE:
   Be careful not to bend the pipe.
   (d) Pull SST until the stopper touches the pipe.
   (e) Raise SST stopper and remove the piping clamp with SST from the pipe.
   (f) Remove the piping clamp from SST.



   (g) Disconnect the suction hose by hand or using a screwdriver.
   (h) Remove the 2 O-rings from the suction hose.
   NOTICE:
   - **Do not apply excessive force to the suction hose.**
   - **Seal the opening of the disconnected part using vinyl tape to prevent moisture and foreign matter from entering it.**

3. **DISCONNECT COOLER REFRIGERANT LIQUID PIPE E (TO COOLER UNIT)**
   SST 09870-00025
   HINT:
   Use the same procedures described for the suction hose.



4. **DISCONNECT HEATER WATER HOSE B**
   (a) Slide the clip and disconnect the heater water hose B.
   NOTICE:
   - **Do not apply excessive force to the water hose B.**
   - **Prepare a drain pan or cloth for when the cooling water leaks.**

AC

5. DISCONNECT HEATER WATER HOSE A

(a) Slide the clip and disconnect the heater water hose A.

NOTICE:

- **Do not apply excessive force to the water hose A.**
- **Prepare a drain pan or cloth for when the cooling water leaks.**

6. REMOVE INSTRUMENT PANEL SUB-ASSEMBLY WITH PASSENGER AIRBAG ASSEMBLY

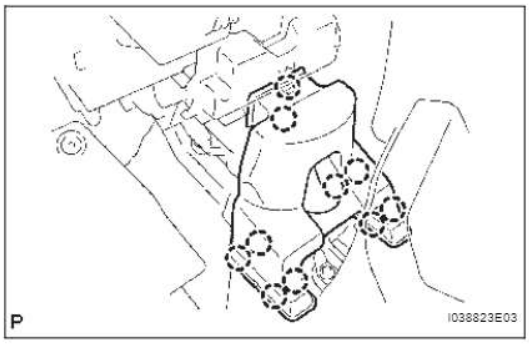
HINT:

Refer to the removal procedures for the instrument panel with the passenger airbag (see page IP-5).

7. REMOVE INSTRUMENT PANEL SUB-ASSEMBLY LOWER

HINT:

Refer to the removal procedures for the instrument panel lower (see page IP-17).



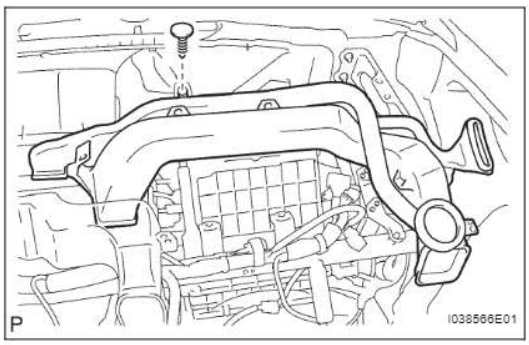
8. REMOVE NO. 3 AIR DUCT REAR

(a) Fold back the floor carpet.

HINT:

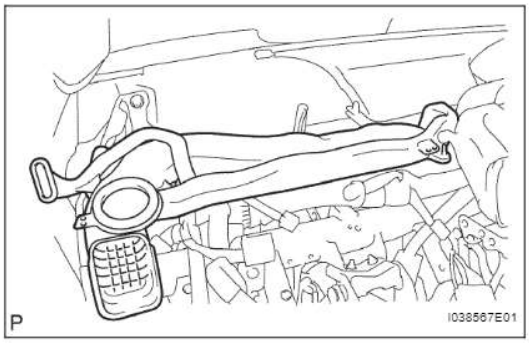
Fold back the floor carpet so that the No. 3 air duct rear can be removed.

(b) Detach the 10 claws and then remove the No. 3 air duct rear.



9. REMOVE NO. 3 HEATER TO REGISTER DUCT

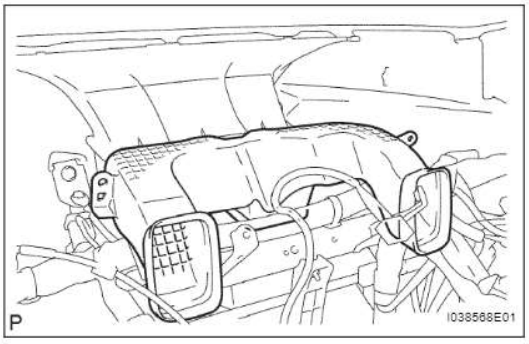
(a) Remove the clip and No. 3 heater to register duct with the No. 2 side defroster nozzle duct.



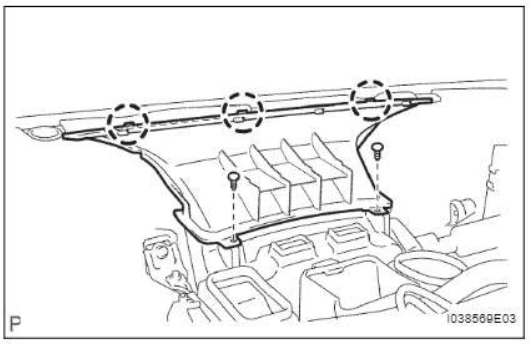
10. REMOVE NO. 1 HEATER TO REGISTER DUCT

(a) Remove the No. 1 duct with the No. 1 side defroster nozzle duct.

AC



11. REMOVE NO. 2 HEATER TO REGISTER DUCT



12. REMOVE DEFROSTER NOZZLE ASSEMBLY

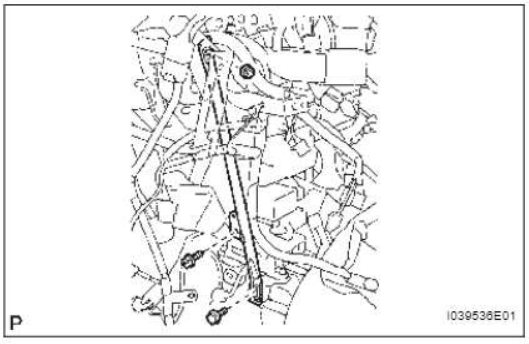
(a) Remove the 2 clips.

(b) Detach the 3 claws and then remove the defroster nozzle.

13. REMOVE TRANSMISSION CONTROL ECU ASSEMBLY

14. REMOVE ECM

15. REMOVE NETWORK GATEWAY ECU



16. REMOVE NO. 1 INSTRUMENT PANEL BRACE SUB-ASSEMBLY

(a) Detach the clamp and disconnect the harness.

(b) Remove the 2 bolts, nut and instrument panel brace.

17. REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY

(a) Remove the air conditioning amplifier (see page AC-179).

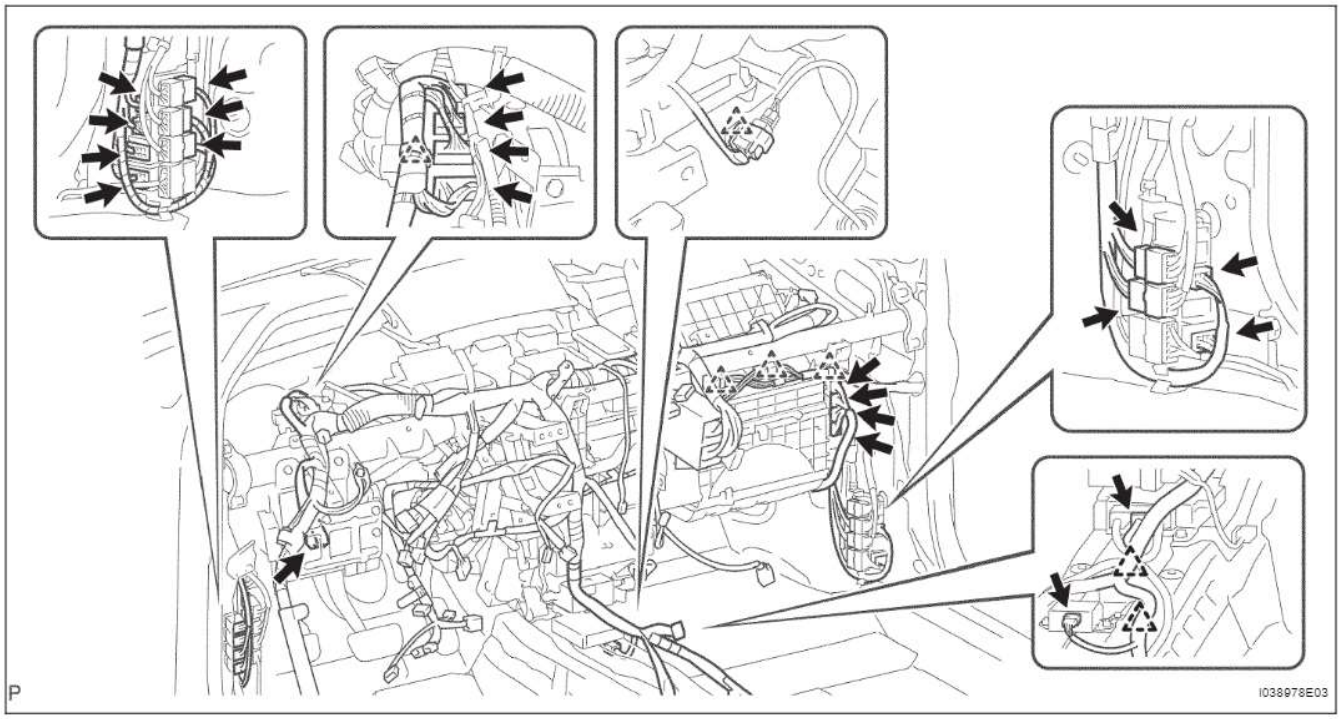
18. REMOVE STEERING COLUMN ASSEMBLY

(a) Remove the steering column (see page SR-7).

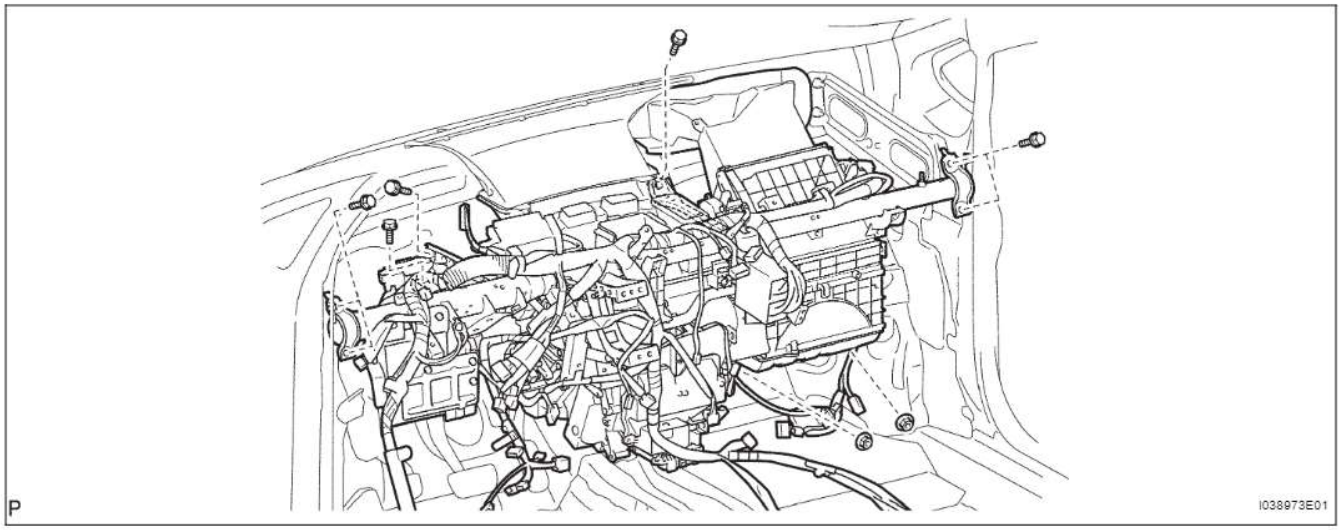
AC

19. REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

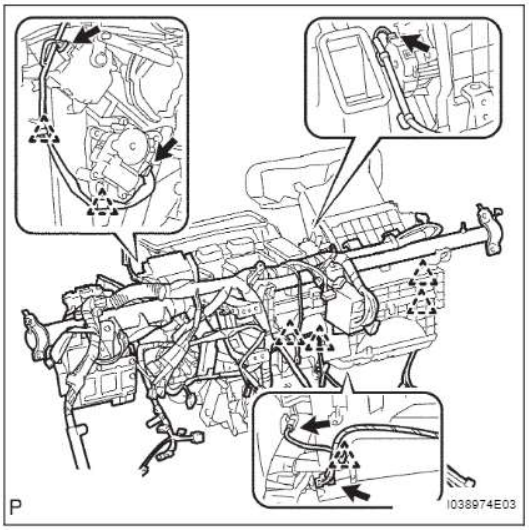
(a) Disconnect each connector and remove each clamp. Disconnect the wire harness.



(b) Remove the 7 bolts, 2 nuts and then remove the instrument panel reinforcement with the air conditioner unit.

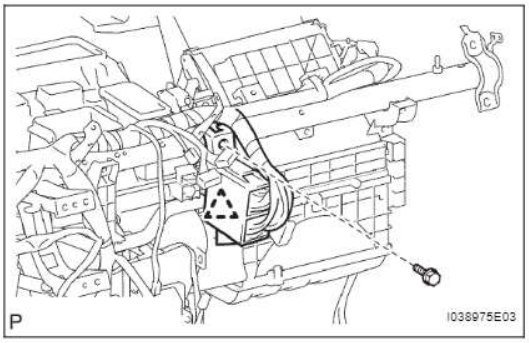


AC

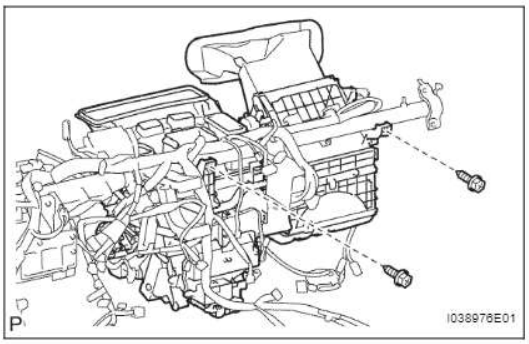


20. REMOVE AIR CONDITIONING UNIT ASSEMBLY

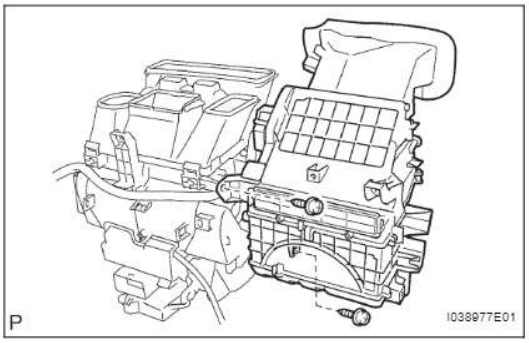
(a) Disconnect the 5 connectors.
(b) Detach the 9 clamps and disconnect the wire harness.



(c) Remove the bolt.
(d) Detach the clamp and disconnect the junction connector.



(e) Remove the 2 screws and air conditioning unit from the instrument panel reinforcement.

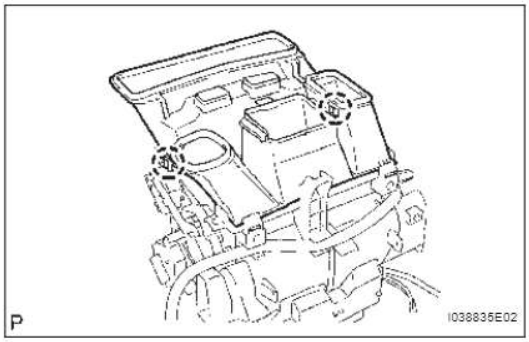


DISASSEMBLY

1. REMOVE BLOWER ASSEMBLY

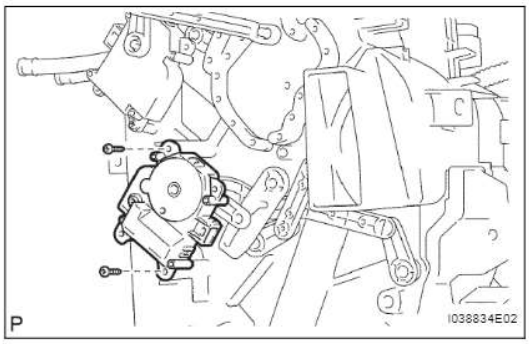
(a) Remove the 2 screws.
(b) Disengage the fittings with the air conditioner and then remove the blower.

AC



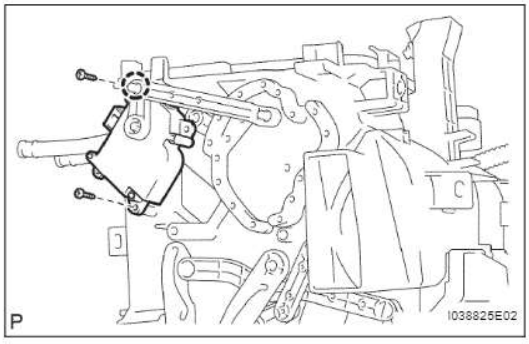
2. REMOVE DEFROSTER NOZZLE ASSEMBLY LOWER

(a) Detach the 2 claws and remove the defroster nozzle lower.



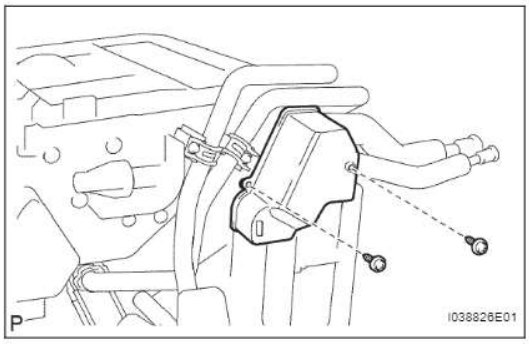
3. REMOVE AIR MIX CONTROL SERVO MOTOR

(a) Remove the 2 screws and air mix control servo motor.



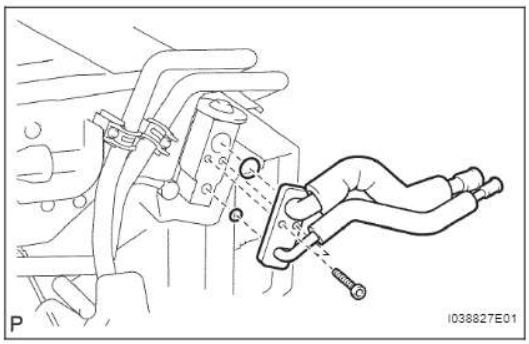
4. REMOVE AIR OUTLET CONTROL SERVO MOTOR

(a) Remove the 2 screws and disengage the claw.
(b) Detach the claw and remove the air outlet control servo motor.



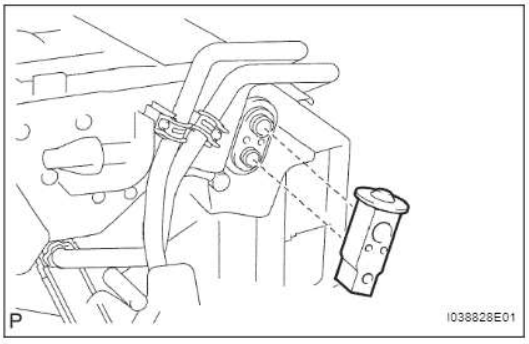
5. REMOVE AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY

(a) Remove the 2 screws and expansion valve cover.



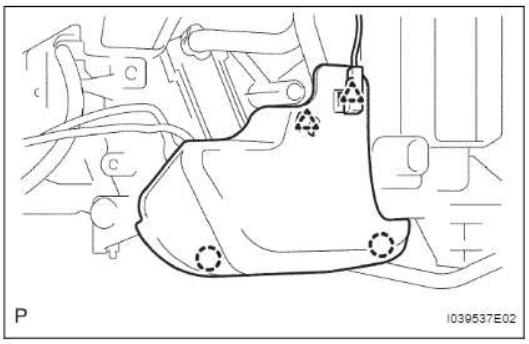
(b) Using a 4 mm hexagon wrench, remove the 2 hexagon bolts.
(c) Remove the air conditioning tube.
(d) Remove the 2 O-rings from the air conditioning tube assembly.

AC



6. REMOVE COOLER EXPANSION VALVE

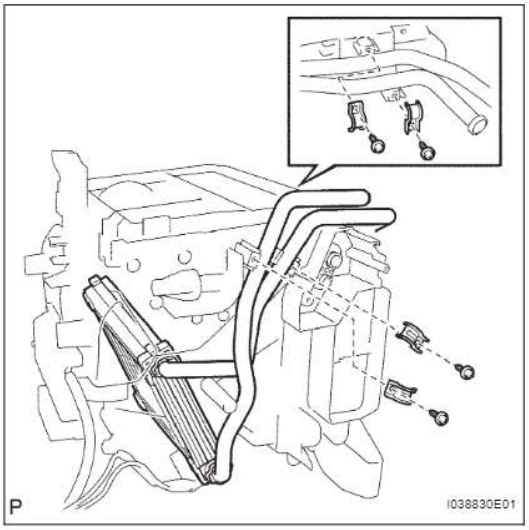
(a) Remove the cooler expansion valve from the No. 1 cooler evaporator.



7. REMOVE HEATER RADIATOR UNIT SUB-ASSEMBLY

(a) Detach the clamp and disconnect the evaporator temperature sensor connector.

(b) Detach the clamp and 2 claws, and remove the heater piping cover.

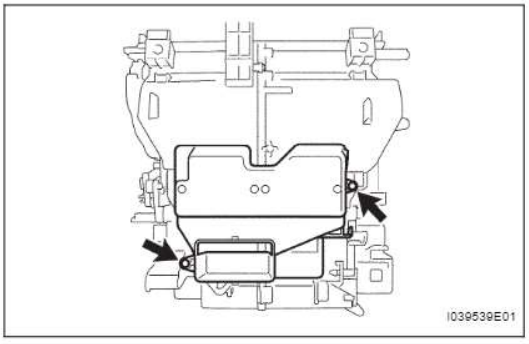


(c) Remove the 4 screws and 4 clamps.

(d) Remove the radiator heater unit from the air conditioner radiator.

NOTICE:

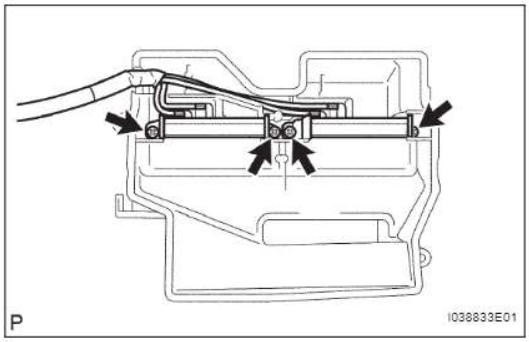
Prepare a drain pan or cloth for when the cooling water leaks.



8. REMOVE NO. 1 AIR DUCT

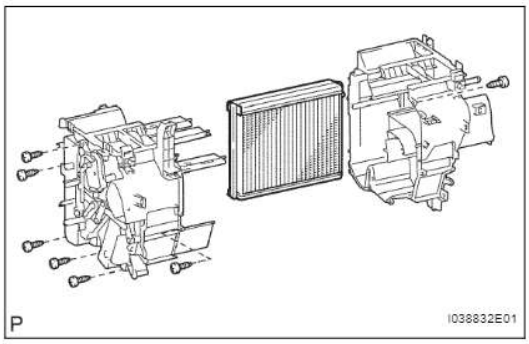
(a) Remove the 2 screws and No. 1 air duct.

AC



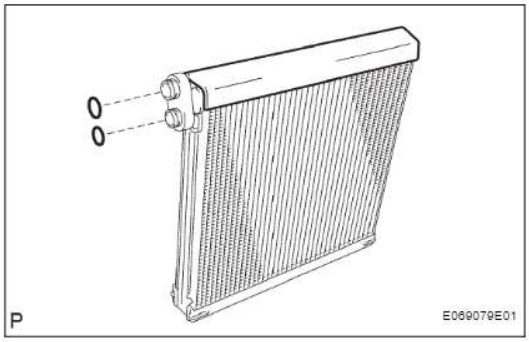
9. REMOVE QUICK HEATER ASSEMBLY

(a) Remove the 4 screws and quick heater.

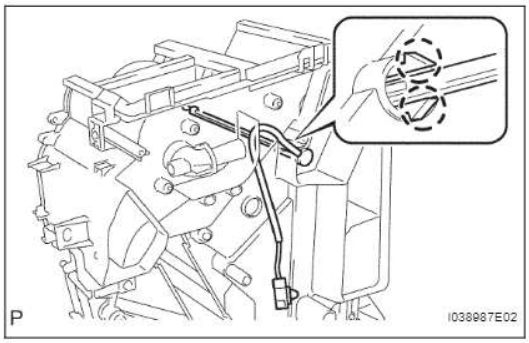


10. REMOVE NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY

(a) Remove the 7 screws and No. 1 cooler evaporator from the heater case.

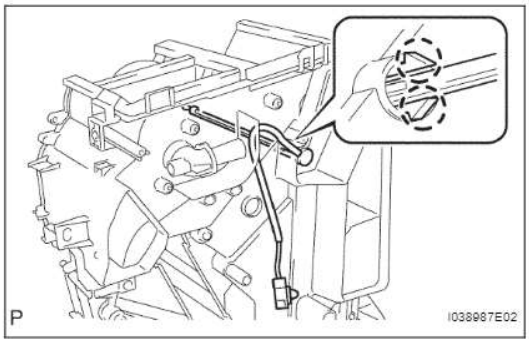


(b) Remove the 2 O-rings from the No. 1 cooler evaporator.



11. REMOVE EVAPORATOR TEMPERATURE SENSOR

(a) Detach the 2 claws and remove the evaporator temperature sensor.

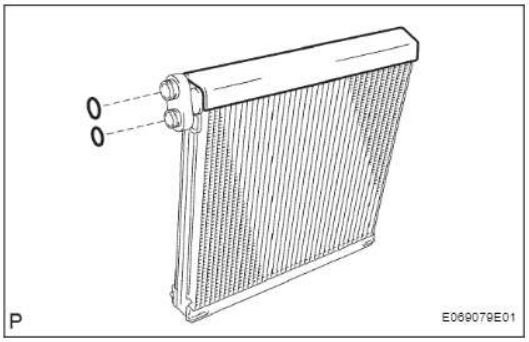


REASSEMBLY

1. INSTALL EVAPORATOR TEMPERATURE SENSOR

(a) Install the evaporator temperature sensor and attach the 2 claws.

AC



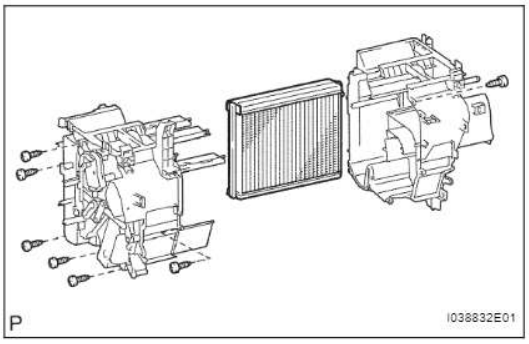
2. INSTALL NO. 1 COOLER EVAPORATOR SUB-ASSEMBLY

(a) Sufficiently apply compressor oil (ND-OIL 11) to 2 new O-rings and the fitting surface. Install the 2 O-rings to the No. 1 cooler evaporator.

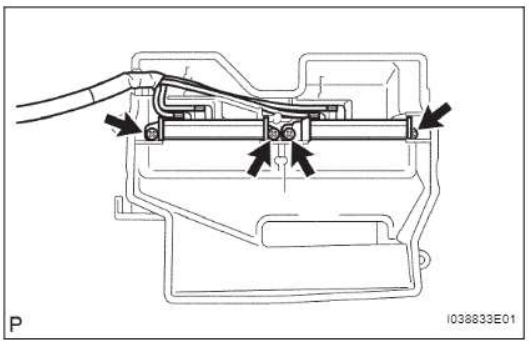
Compressor oil:
ND-OIL 11 or equivalent

NOTICE:

- **Do not use any compressor oil other than ND-OIL 11.**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**

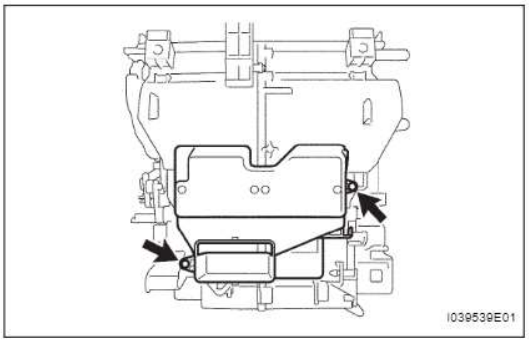


(b) Install the No. 1 cooler evaporator with the 7 screws.



3. INSTALL QUICK HEATER ASSEMBLY

(a) Install the quick heater with the 4 screws.



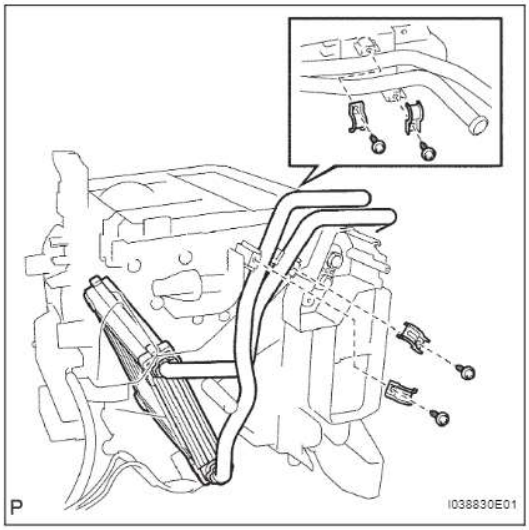
4. INSTALL NO. 1 AIR DUCT

(a) Install the No. 1 air duct with the 2 screws.

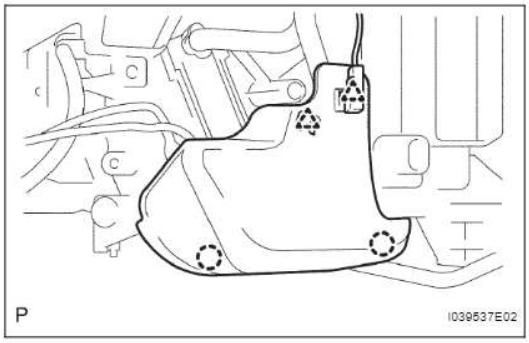
5. INSTALL HEATER RADIATOR UNIT SUB-ASSEMBLY

(a) Install the air conditioning radiator to the radiator heater unit.

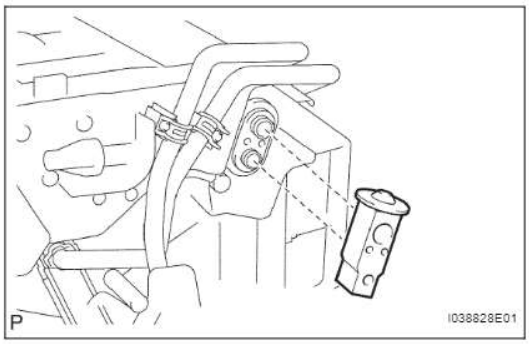
AC



(b) Install the 4 clamps and 4 screws.

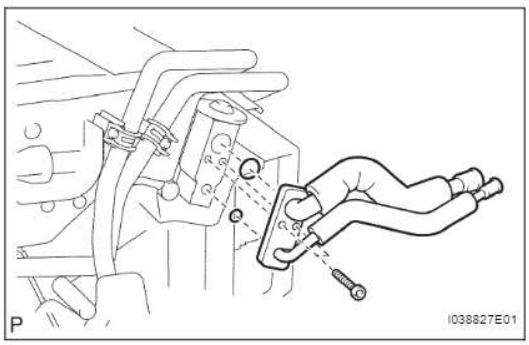


(c) Attach the 2 claws and clamp to install the heater piping cover.
(d) Attach the clamp and connect the evaporator temperature sensor connector.



6. INSTALL COOLER EXPANSION VALVE

(a) Install the cooler expansion valve to the No. 1 cooler evaporator.



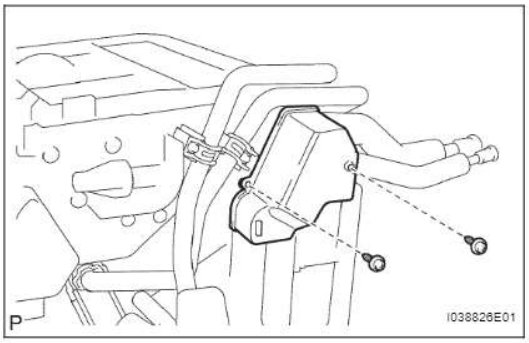
7. INSTALL AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY

(a) Sufficiently apply compressor oil (ND-OIL 11) to 2 new O-rings and the fitting surface. Install the 2 O-rings to the air conditioning tube assembly.
Compressor oil:
ND-OIL 11 or equivalent
NOTICE:
- **Do not use any compressor oil other than ND-OIL 11.**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**

AC

(b) Install the air conditioning tube to the No. 1 cooler evaporator, placing the cooler expansion valve between them. Using a 4 mm (0.16 in.) hexagon wrench, install the 2 hexagon bolts.
Torque: 3.5 N*m (35 kgf*cm, 30 in.*lbf)

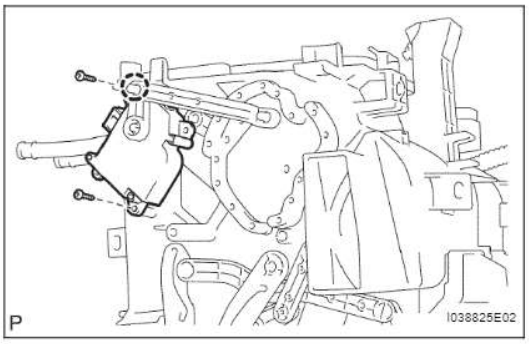
(c) Install the expansion cover with the 2 screws.



8. INSTALL AIR OUTLET CONTROL SERVO MOTOR

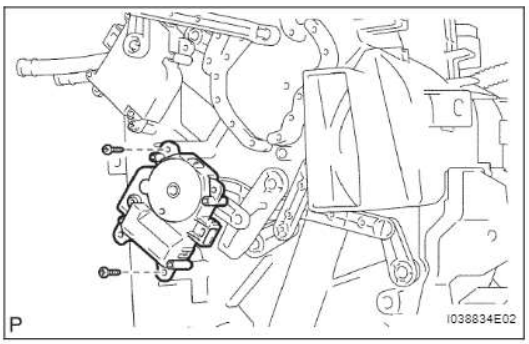
(a) Install the air outlet control servo motor and attach the claw.

(b) Attach the claw and install the 2 screws.



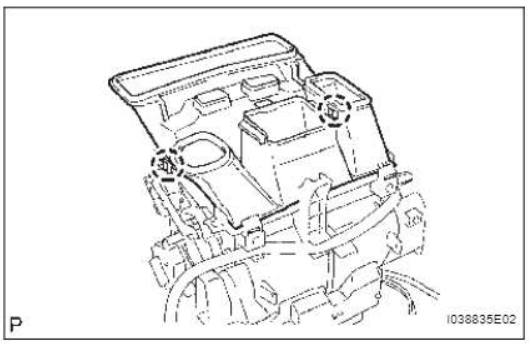
9. INSTALL AIR MIX CONTROL SERVO MOTOR

(a) Install the air mix control servo motor with the 2 screws.

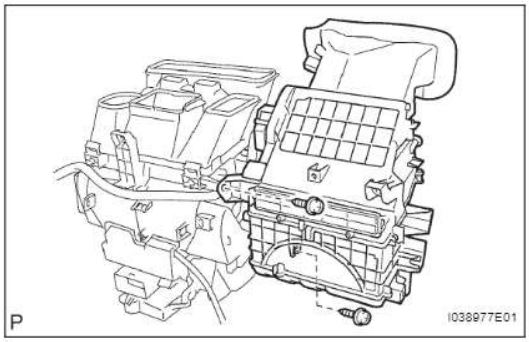


10. INSTALL DEFROSTER NOZZLE ASSEMBLY LOWER

(a) Install the defroster nozzle lower and attach the 2 claws.



AC

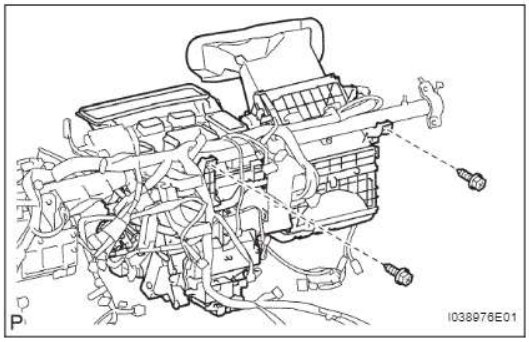


11. INSTALL BLOWER ASSEMBLY

(a) Install the blower and then attach the fittings with the air conditioner.

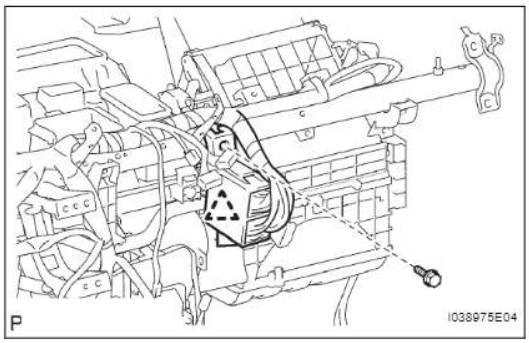
(b) Install the 2 screws.

INSTALLATION



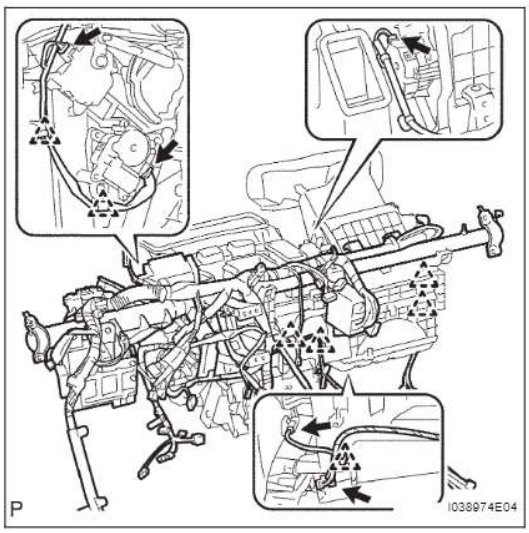
1. INSTALL AIR CONDITIONING UNIT ASSEMBLY

(a) Install the air conditioning unit to the instrument panel reinforcement with the 2 screws.
HINT:
Use repair screws (part No. 90159-70003) if the screws removed before cannot be tightened.



(b) Attach the clamp to connect the junction connector.

(c) Install the bolt.



(d) Attach the 9 clamps to connect the instrument panel wire harness.

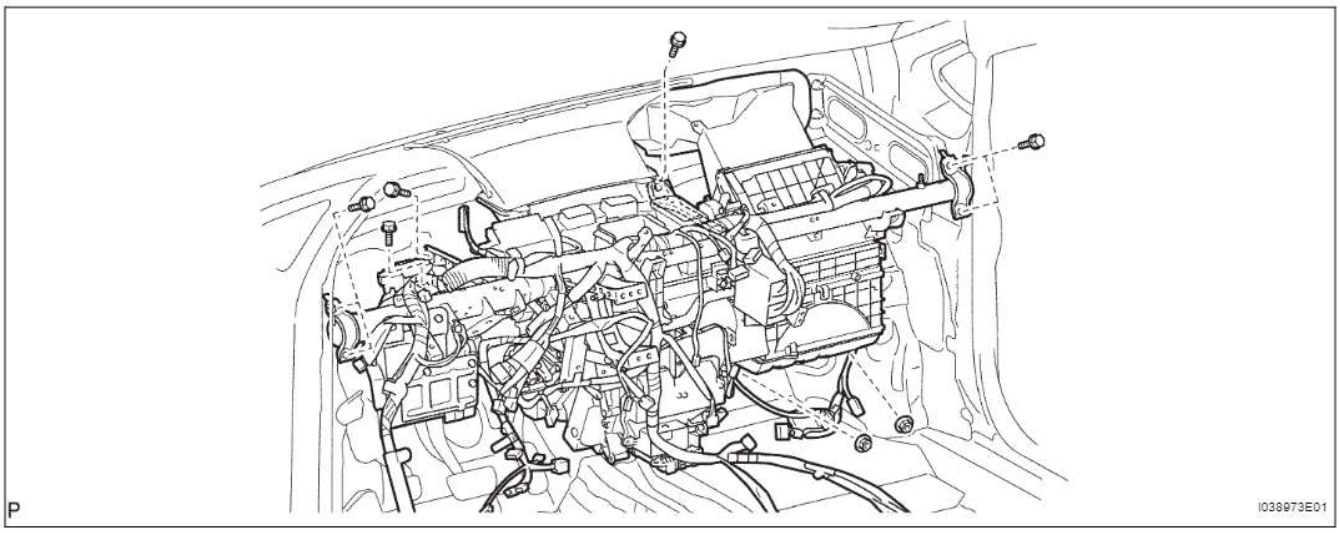
(e) Connect the 5 connectors.

2. INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

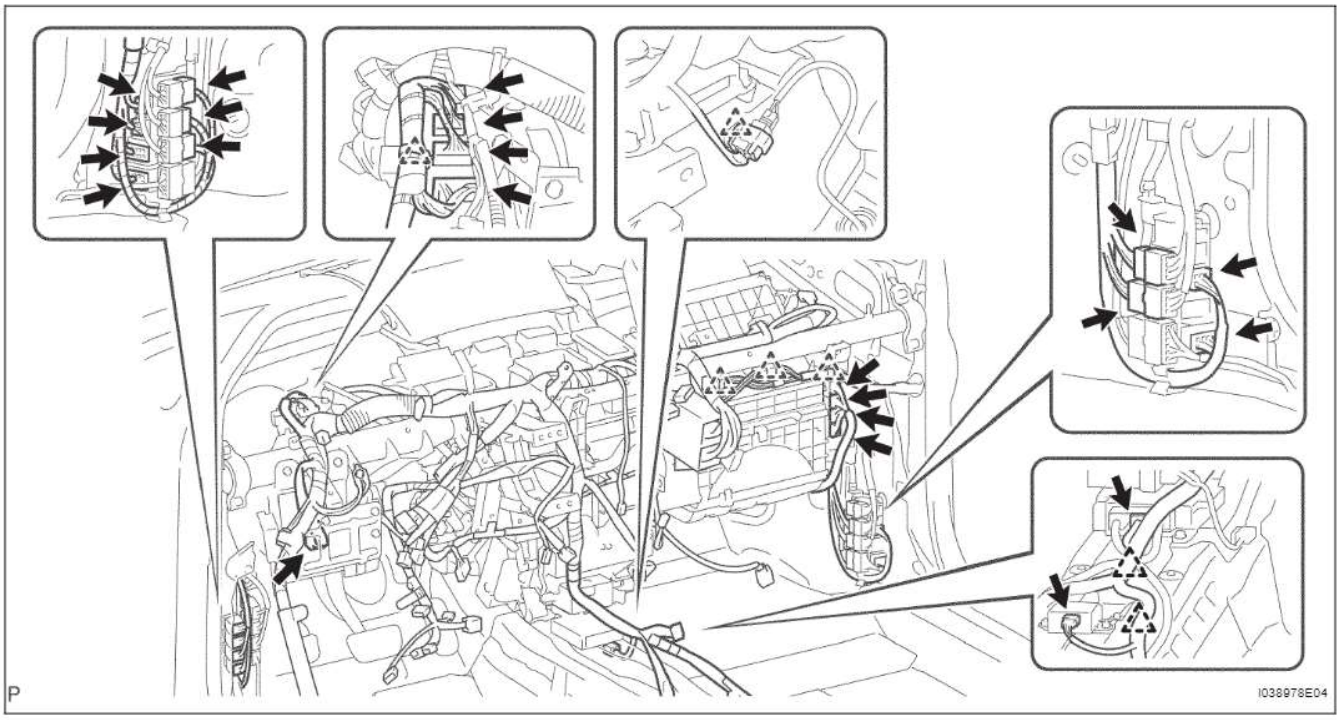
(a) Install the instrument panel reinforcement with the 7 bolts.

AC

(b) Install the 2 nuts to the air conditioning unit and temporarily tighten them.



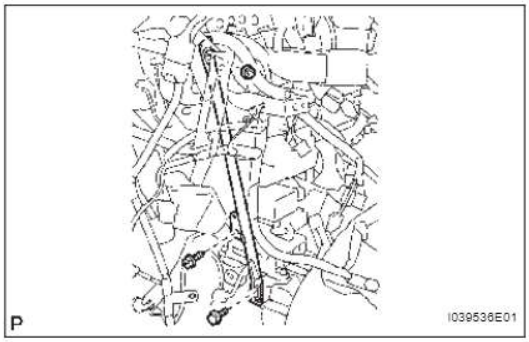
(c) Connect each connector and install each clamp. Then connect the wire harness.



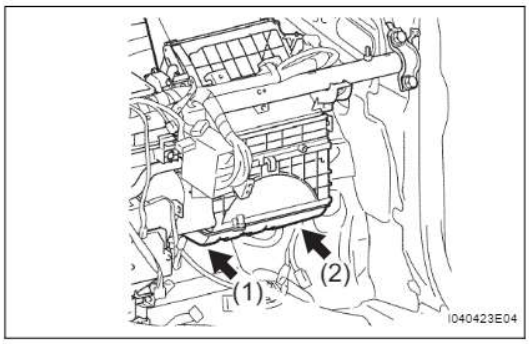
3. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Install the air conditioning amplifier (see page AC-179).

4. **INSTALL STEERING COLUMN ASSEMBLY**
   (a) Install the steering column (see page SR-12).

AC



5. **INSTALL NO. 1 INSTRUMENT PANEL BRACE SUB-ASSEMBLY**
   (a) Install the instrument panel brace with the 2 bolts and nut.
   (b) Attach the clamp to connect the harness.

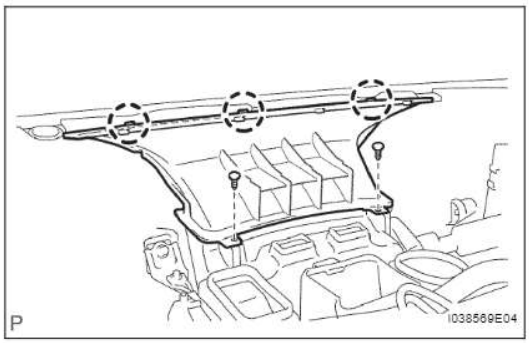


6. **FULLY TIGHTEN AIR CONDITIONING UNIT ASSEMBLY**
   (a) Fully tighten the air conditioning unit with the 2 nuts.
   NOTICE:
   Tighten the nuts in the order indicated in the illustration.

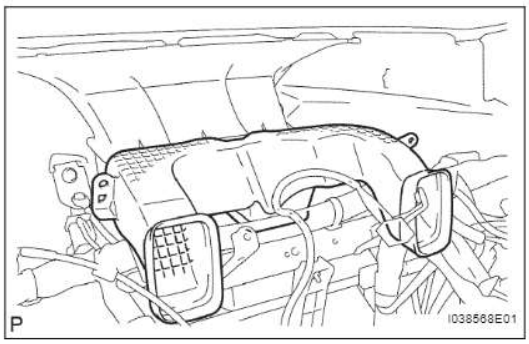
7. **INSTALL NETWORK GATEWAY ECU**

8. **INSTALL ECM**

9. **INSTALL TRANSMISSION CONTROL ECU ASSEMBLY**



10. **INSTALL DEFROSTER NOZZLE ASSEMBLY**
    (a) Install the defroster nozzle and attach the 3 claws.
    (b) Install the 2 clips.



11. **INSTALL NO. 2 HEATER TO REGISTER DUCT**

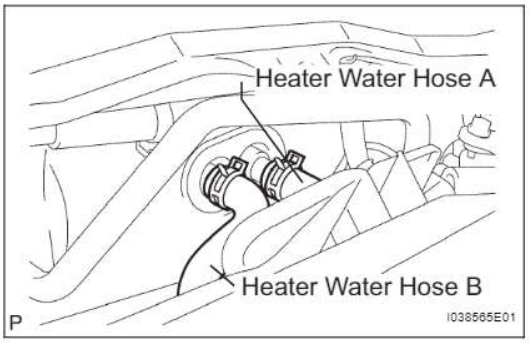
12. **INSTALL NO. 1 HEATER TO REGISTER DUCT**
    (a) Install the duct with the No. 1 side defroster nozzle duct.

13. **INSTALL NO. 3 HEATER TO REGISTER DUCT**
    (a) Install the clip and then the duct with the No. 2 side defroster nozzle duct.

14. **INSTALL NO. 3 AIR DUCT REAR**
    (a) Attach the 10 claws to install the No. 3 air duct rear.
    (b) Return the carpet to its original position.

15. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY LOWER**
    HINT:
    Refer to the installation procedures for the instrument panel lower (see page IP-20).

AC



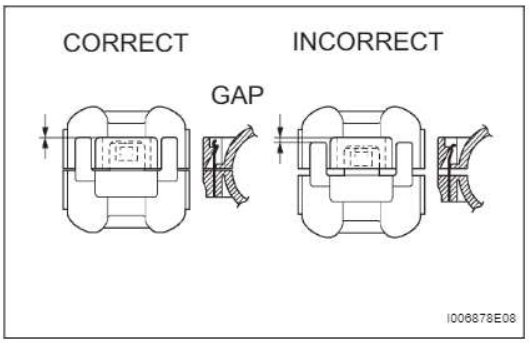
16. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY WITH PASSENGER AIRBAG ASSEMBLY**
HINT:
Refer to the installation procedures for the instrument panel with the passenger airbag (see page IP-11).

17. **CONNECT HEATER WATER HOSE A**
(a) Connect the heater water hose A and slide the clip.

18. **CONNECT HEATER WATER HOSE B**
(a) Connect the heater water hose B and slide the clip.

19. **CONNECT COOLER REFRIGERANT LIQUID PIPE E (TO COOLER UNIT)**
(a) Remove the attached vinyl tape from the pipe's disconnected part.
(b) Sufficiently apply compressor oil (ND-OIL 11) to 2 new O-rings and the pipe's connecting part.
NOTICE:
- **Do not use any compressor oil other than ND-OIL 11 (see page).**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**

(c) Install the O-rings to the pipe.
(d) Insert the pipe joint into the cooler unit fitting hole securely.



(e) Using the piping clamp, connect the cooler unit refrigerant liquid pipe E.
NOTICE:
Ensure that the piping clamp is securely engaged.

20. **CONNECT SUCTION HOSE SUB-ASSEMBLY**
HINT:
Use the same procedures described for the cooler unit refrigerant liquid pipe E.

21. **INSPECT LEAKAGE OF REFRIGERANT (See page AC-142)**

22. **ADD ENGINE COOLANT (See page CO-7)**

23. **CHECK FOR ENGINE COOLANT LEAKS (See page CO-9)**

24. **WARM UP COMPRESSOR (See page AC-142)**

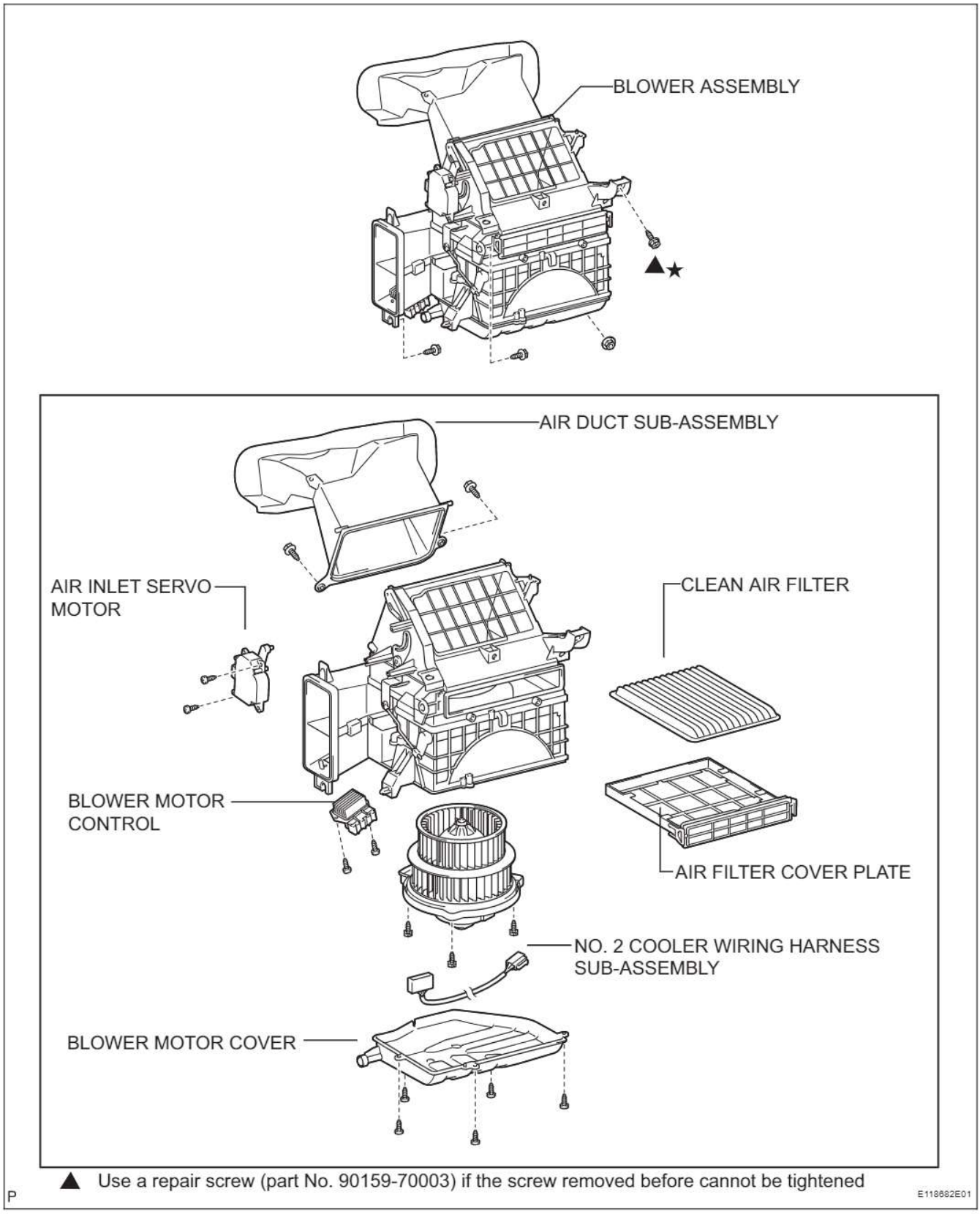
25. **INSPECT LEAKAGE OF REFRIGERANT (See page AC-142)**

26. **PERFORM CALIBRATION**
(a) Perform calibration (see page PS-13).

AC

BLOWER UNIT

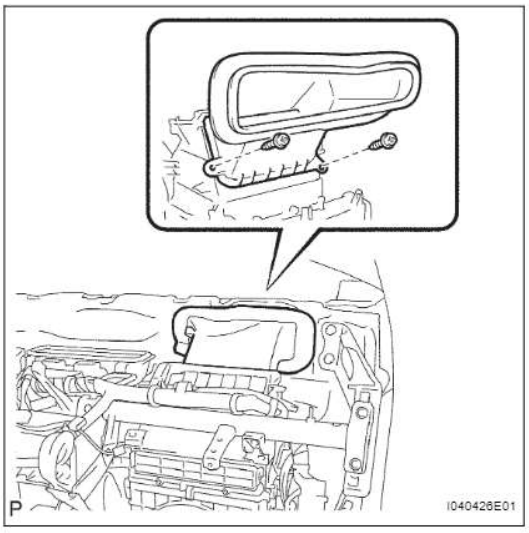
COMPONENTS



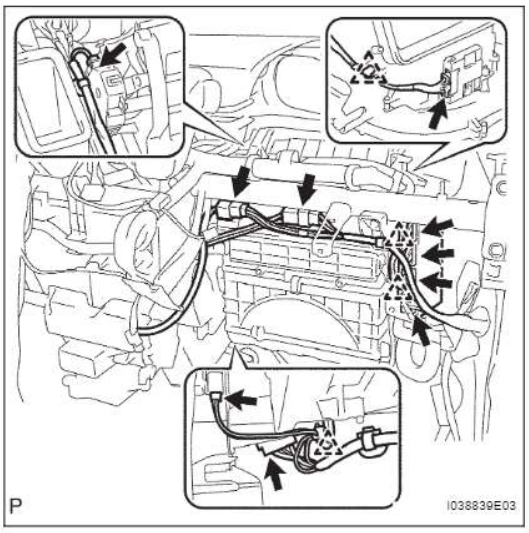
AC

REMOVAL

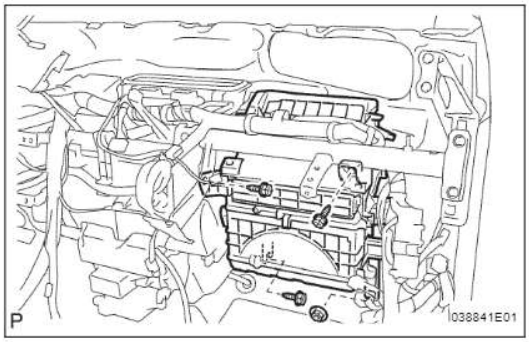
1. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY WITH PASSENGER AIRBAG ASSEMBLY**
   HINT:
   Refer to the removal procedures for the instrument panel with the passenger airbag (see page IP-5).
2. **REMOVE INSTRUMENT PANEL SUB-ASSEMBLY LOWER**
   HINT:
   Refer to the removal procedures for the instrument panel lower (see page IP-17).
3. **REMOVE TRANSMISSION CONTROL ECU ASSEMBLY**
4. **REMOVE ECM**
5. **REMOVE NETWORK GATEWAY ECU**
6. **REMOVE NO. 1 HEATER TO REGISTER DUCT**
7. **REMOVE AIR DUCT SUB-ASSEMBLY**
   (a) Remove the 2 screws and air duct.



8. **REMOVE BLOWER ASSEMBLY**
   (a) Disconnect the 10 connectors.
   (b) Detach the 4 clamps and disconnect the wire harness.



AC

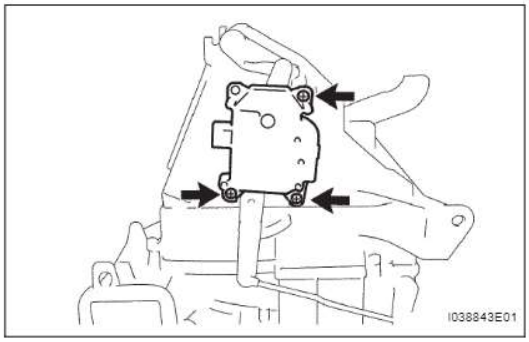


(c) Remove the 3 screws, nut and blower.

DISASSEMBLY

1. REMOVE AIR INLET SERVO MOTOR

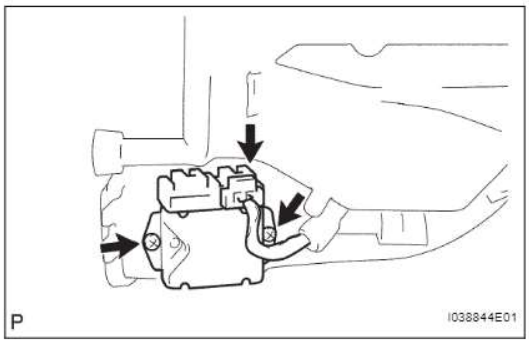
(a) Remove the 3 screws and air inlet servo motor.



2. REMOVE BLOWER MOTOR CONTROL

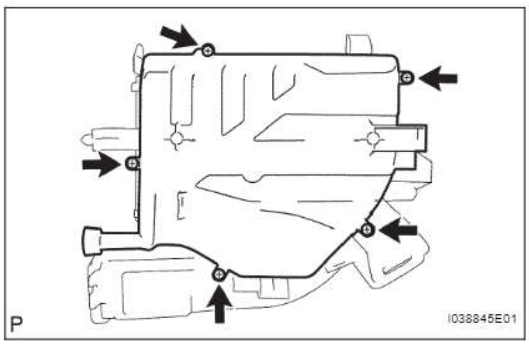
(a) Disconnect the connector.

(b) Remove the 2 screws and blower motor control.

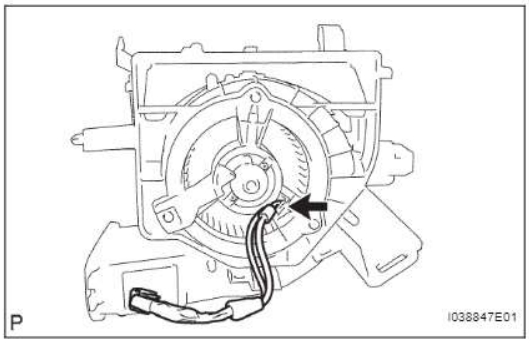


3. REMOVE NO. 2 COOLER WIRING HARNESS SUB-ASSEMBLY

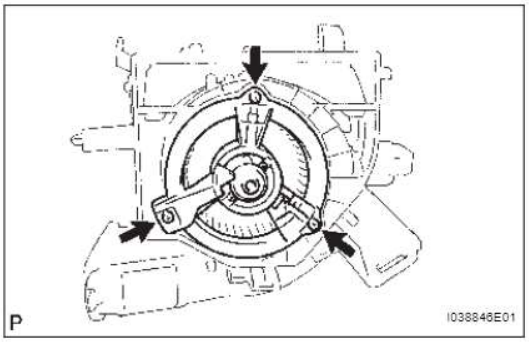
(a) Remove the 5 screws and blower motor cover.



(b) Remove the No. 2 cooler wiring harness from the blower with fan motor.

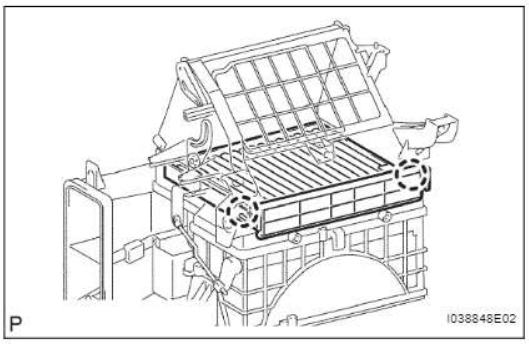


AC



4. REMOVE BLOWER WITH FAN MOTOR SUB-ASSEMBLY

(a) Remove the 3 screws and blower with fan motor.

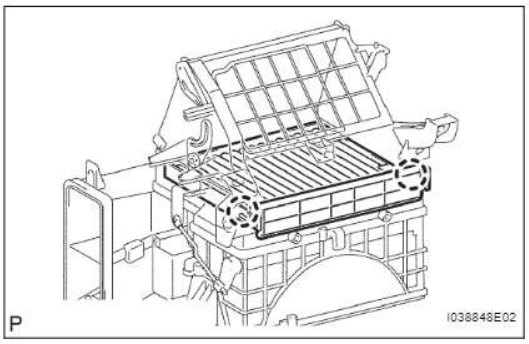


5. REMOVE CLEAN AIR FILTER

(a) Detach the 2 claws and then remove the air filter cover plate with the clean air filter.

(b) Remove the clean air filter from the air filter cover plate.

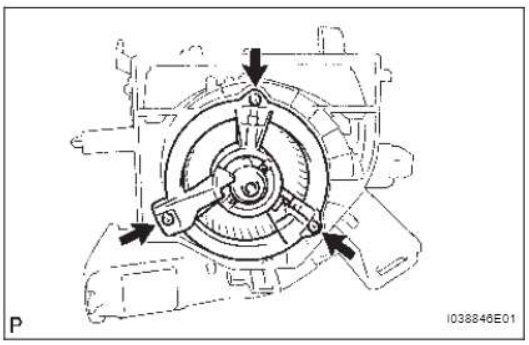
REASSEMBLY



1. INSTALL CLEAN AIR FILTER

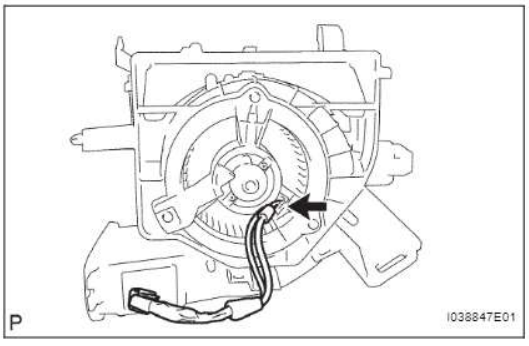
(a) Install the clean air filter to the air filter cover plate.

(b) Attach the 2 claws to install the air filter cover.



2. INSTALL BLOWER WITH FAN MOTOR SUB-ASSEMBLY

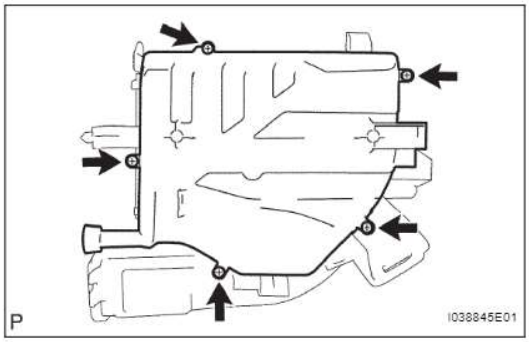
(a) Install the blower with fan motor with the 3 screws.



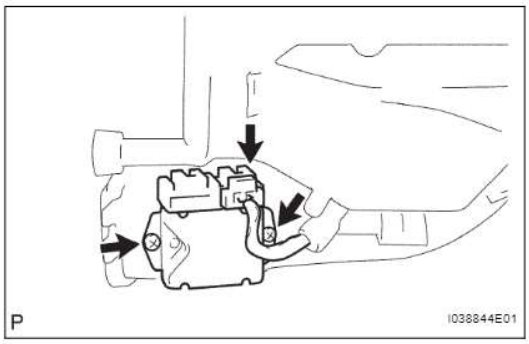
3. INSTALL NO. 2 COOLER WIRING HARNESS SUB-ASSEMBLY

(a) Install the No. 2 cooler wiring harness to the blower with fan motor.

AC



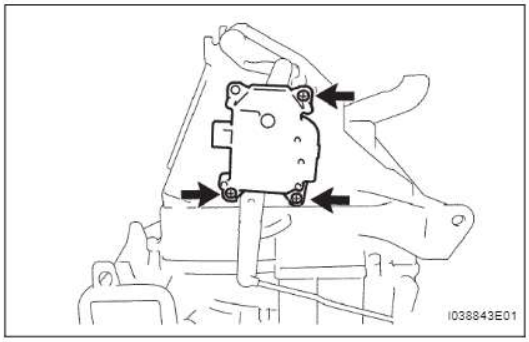
(b) Install the blower motor cover with the 5 screws.



4. INSTALL BLOWER MOTOR CONTROL

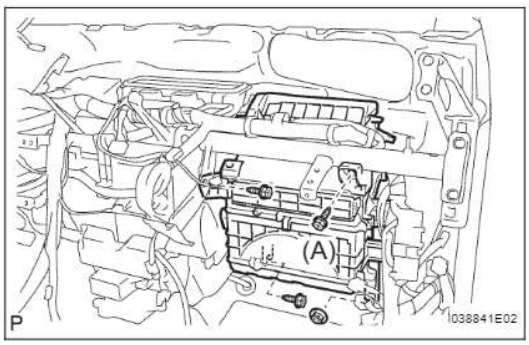
(a) Install the blower motor control with the 2 screws.

(b) Connect the connector.



5. INSTALL AIR INLET SERVO MOTOR

(a) Install the air inlet servo motor with the 3 screws.



INSTALLATION

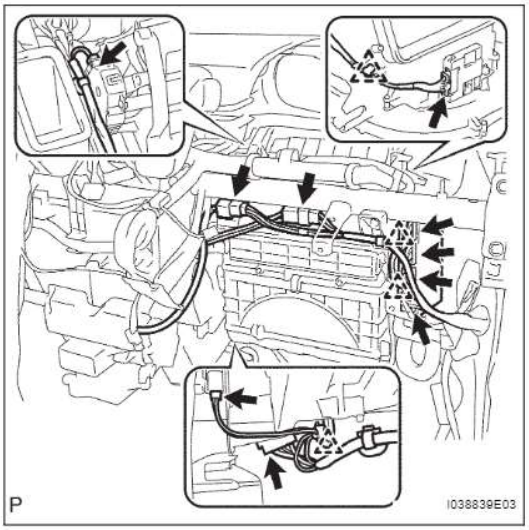
1. INSTALL BLOWER ASSEMBLY

(a) Install the blower with the 3 screws.

HINT:

Use a repair screw (part No. 90159-70003) if the screw (A) removed before cannot be tightened.

AC



(b) Attach the 4 clamps to connect the wire harness.
(c) Connect the connectors.
(d) Install the 10 connectors of the transponder key ECU.

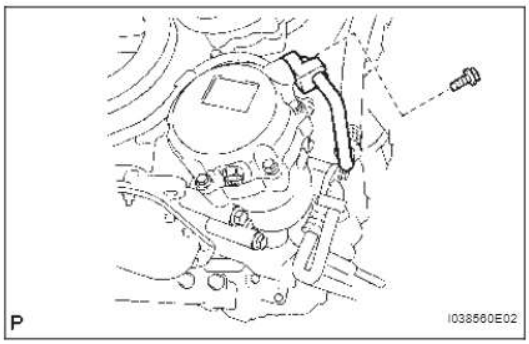
2. **INSTALL AIR DUCT SUB-ASSEMBLY**
   (a) Install the air duct with the 2 screws.
3. **INSTALL NO. 1 HEATER TO REGISTER DUCT**
4. **INSTALL NETWORK GATEWAY ECU**
5. **INSTALL ECU**
6. **INSTALL TRANSMISSION CONTROL ECU ASSEMBLY**
7. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY LOWER**
   HINT:
   Refer to the installation procedures for the instrument panel sub-assembly lower (see page)IP-20.
8. **INSTALL INSTRUMENT PANEL SUB-ASSEMBLY WITH PASSENGER AIRBAG ASSEMBLY**
   HINT:
   Refer to the installation procedures for the instrument panel with the passenger airbag assembly (see page IP-11).

AC

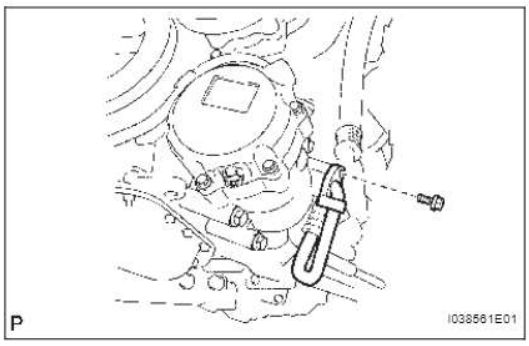
ELECTRIC INVERTER COMPRESSOR

REMOVAL

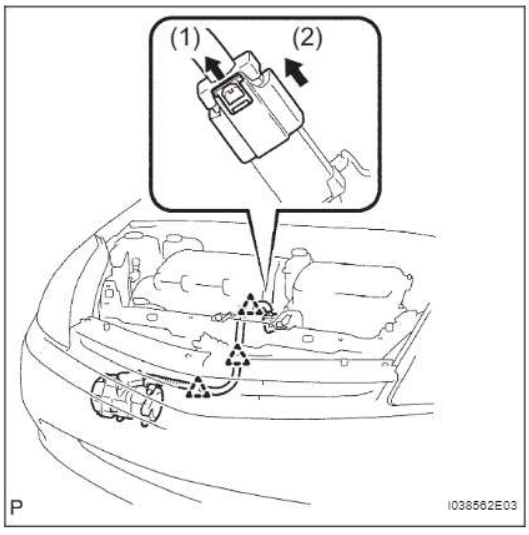
1. REMOVE REAR NO. 2 FLOOR BOARD
2. REMOVE DECK FLOOR BOX REAR
3. REMOVE REAR NO.3 FLOOR BOARD
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
5. REMOVE SERVICE PLUG GRIP
6. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-140)
7. DISCONNECT DISCHARGE HOSE SUB-ASSEMBLY
   (a) Remove the bolt and disconnect the discharge hose.
   (b) Remove the O-ring from the discharge hose.
   NOTICE:
   Seal the openings of the disconnected parts of the discharge hose and electric inverter compressor assembly using vinyl tape to prevent moisture and foreign matter from entering them.



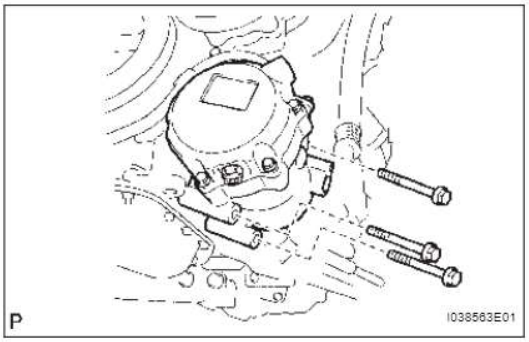
8. DISCONNECT SUCTION HOSE SUB-ASSEMBLY
   (a) Remove the bolt and disconnect the suction hose.
   (b) Remove the O-ring from the suction hose.
   NOTICE:
   Seal the openings of the disconnected parts of the suction hose and electric inverter compressor assembly using vinyl tape to prevent moisture and foreign matter from entering them.



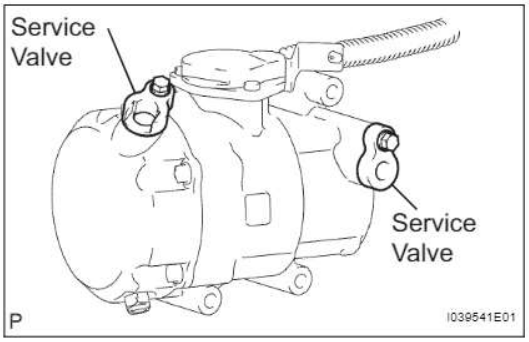
9. REMOVE ELECTRIC INVERTER COMPRESSOR ASSEMBLY
   (a) Release the green-colored lock. (1)
   (b) Disconnect the connector. (2)
   (c) Detach the 3 clamps and disconnect the wire harness.
   NOTICE:
   - **Wear insulated gloves when performing the procedures.**
   - **Insulate the connector by sealing it with tape.**



AC



(d) Remove the 3 bolts and electric inverter compressor.



INSTALLATION

1. INSPECT COMPRESSOR OIL

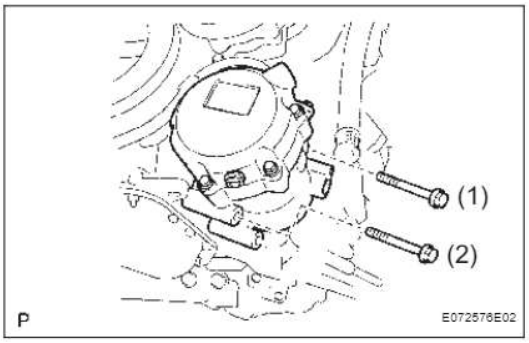
(a) Gradually discharge inert gas (helium) from the service valve when replacing the electric inverter compressor with a new one. Drain the following amount of oil from the new electric inverter compressor before installation.

Standard amount:

(Oil capacity inside new electric inverter compressor 100 + 15 cc (3.52 + 0.53 fl.oz.)) - (Remaining oil amount in the removed compressor assembly with the motor (with motor compressor assembly)) = (Oil amount to be removed before installation)

NOTICE:

- **Observe the precautions on the cooler removal/installation procedures when checking the amount of compressor oil.**
- **Because compressor oil remains in the pipes of the vehicle, if a new compressor is installed without removing the oil inside, the amount of oil becomes too great, preventing heat exchange in the refrigerant cycles and causing refrigerant failure and/or abnormal vibration.**
- **Check for oil leakage if the remaining oil amount in the removed compressor is too low.**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**



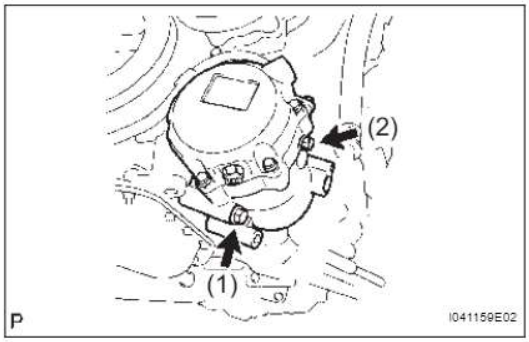
2. INSTALL ELECTRIC INVERTER COMPRESSOR ASSEMBLY

(a) Temporarily install the compressor with the 2 bolts.

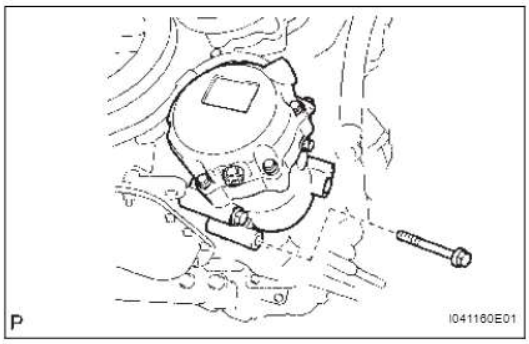
NOTICE:

Install the bolts in the order indicated in the illustration.

AC



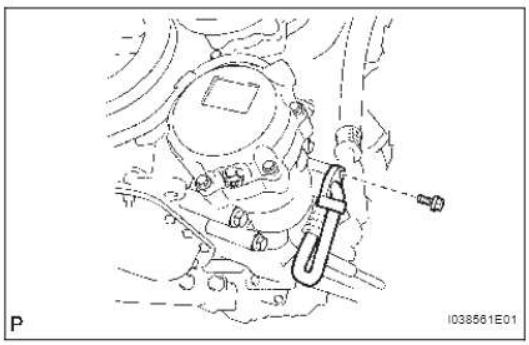
(b) Fully install the compressor with the 2 bolts.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
Tighten them in the order indicated in the illustration.



(c) Install the remaining bolt.
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)



(d) Connect the wire harness.
NOTICE:
Wear insulated gloves when performing the procedures.
(1) Connect the 3 wire harness clamps.
(2) Connect the connector. (1)
(3) Lock the green-colored lock. (2)

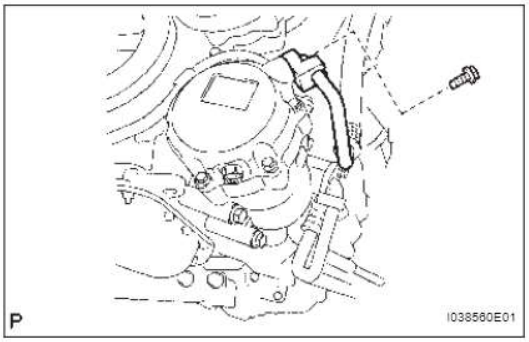


3. INSTALL SUCTION HOSE SUB-ASSEMBLY

(a) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the electric inverter compressor assembly.
Compressor oil:
ND-OIL 11 or equivalent
NOTICE:
- **Do not use any compressor oil other than ND-OIL 11.**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**

(b) Install the O-ring to the suction hose.
(c) Install the suction hose with the bolt.
Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)

AC

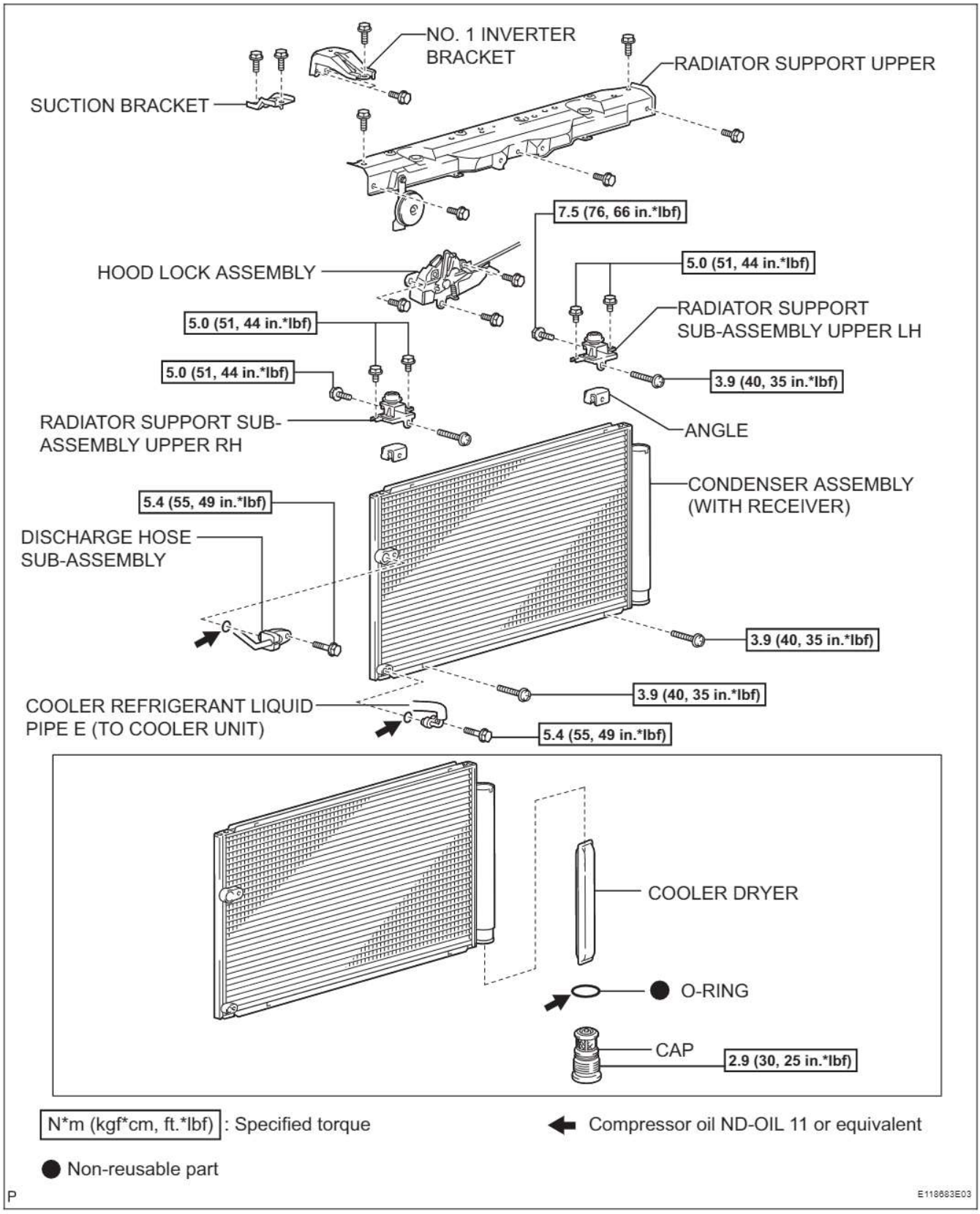


4. **INSTALL DISCHARGE HOSE SUB-ASSEMBLY**
   (a) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the electric inverter compressor.
   Compressor oil:
   ND-OIL 11 or equivalent
   NOTICE:
   - **Do not use any compressor oil other than ND-OIL 11.**
   - **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**
   (b) Install the O-ring to the discharge hose.
   (c) Install the discharge hose with the bolt.
   Torque: 9.8 N*m (100 kgf*cm, 87 in.*lbf)
5. **INSTALL SERVICE PLUG GRIP**
6. **CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**
7. **PERFORM INITIALIZATION**
   (a) Perform initialization (see page IN-32).
   NOTICE:
   Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
8. **INSTALL REAR NO. 3 FLOOR BOARD**
9. **INSTALL DECK FLOOR BOX REAR**
10. **INSTALL REAR NO.2 FLOOR BOARD**
11. **CHARGE REFRIGERANT (See page AC-141)**
12. **WARM UP COMPRESSOR (See page AC-142)**
13. **INSPECT LEAKAGE OF REFRIGERANT (See page AC-142)**

AC

CONDENSER

COMPONENTS



AC

ON-VEHICLE INSPECTION

1. INSPECT COOLER CONDENSER CORE

(a) If the fins of the condenser (with receiver) are dirty, clean them with water and dry them with compressed air.

NOTICE:

Do not damage the fins of the cooler condenser core.

(b) If the fins of the condenser (with receiver) are bent, straighten them using a screwdriver or pliers.

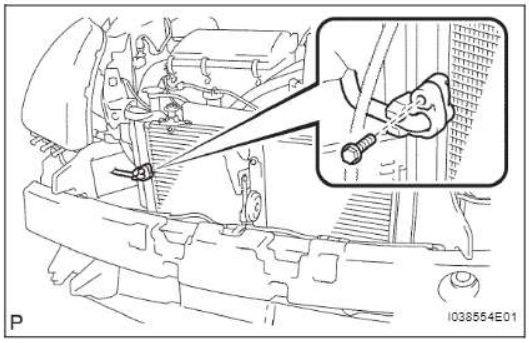
2. INSPECT LEAKAGE OF REFRIGERANT

(a) Using a halogen leak detector, check the pipe joints for gas leakage.

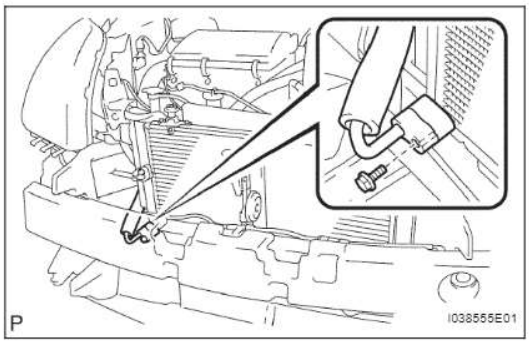
(b) Check the tightening torque of the joint if gas leakage is detected in a pipe joint.

REMOVAL

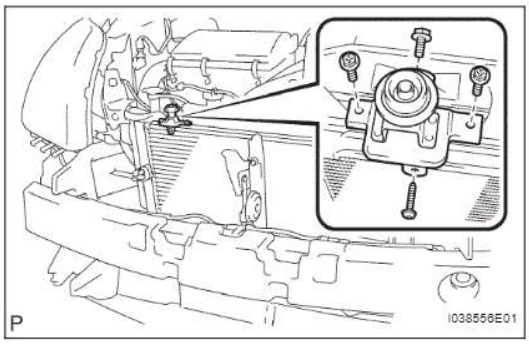
1. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM (See page AC-140)**
2. **REMOVE FRONT FENDER LINER LH (See page ET-3)**
3. **REMOVE FRONT FENDER LINER RH (See page ET-3)**
4. **REMOVE FRONT BUMPER COVER**
   (a) Remove the front bumper cover (see page ET-3).
5. **REMOVE NO. 1 INVERTER BRACKET**
6. **DISCONNECT DISCHARGE HOSE SUB-ASSEMBLY**
   (a) Remove the bolt and disconnect the discharge hose from the condenser (with receiver).
   (b) Remove the O-ring from the discharge hose.
   NOTICE:
   Seal the openings of the disconnected parts of the discharge hose and the condenser using vinyl tape to prevent moisture and foreign matter from entering them.



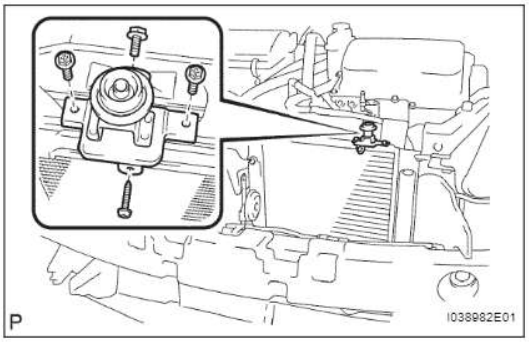
7. **DISCONNECT COOLER REFRIGERANT LIQUID PIPE E (TO COOLER UNIT)**
   (a) Remove the bolt and disconnect the cooler unit refrigerant liquid pipe E from the condenser (with receiver).
   (b) Remove the O-ring from the cooler refrigerant liquid pipe E.
   NOTICE:
   Seal the openings of the disconnected parts of the cooler unit refrigerant liquid pipe E and the condenser using vinyl tape to prevent moisture and foreign matter from entering them.



8. **REMOVE RADIATOR SUPPORT SUB-ASSEMBLY UPPER RH**
   (a) Remove the 4 bolts and radiator support upper.

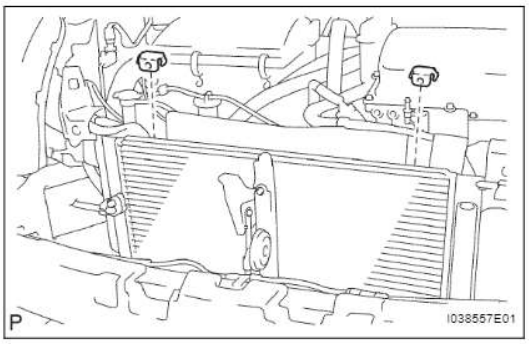


AC



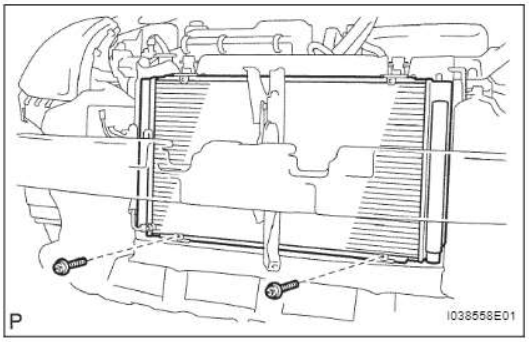
9. REMOVE RADIATOR SUPPORT SUB-ASSEMBLY UPPER LH

(a) Remove the 4 bolts and radiator support upper.



10. REMOVE CONDENSER ASSEMBLY WITH RECEIVER

(a) Remove the 2 angles.

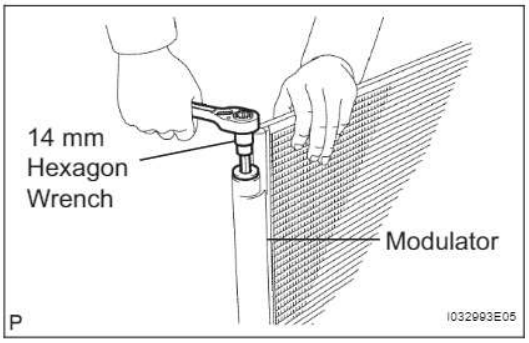


(b) Remove the 2 bolts and condenser (with receiver).

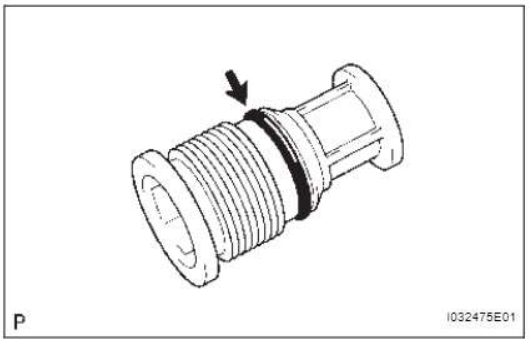
DISASSEMBLY

1. REMOVE COOLER DRYER

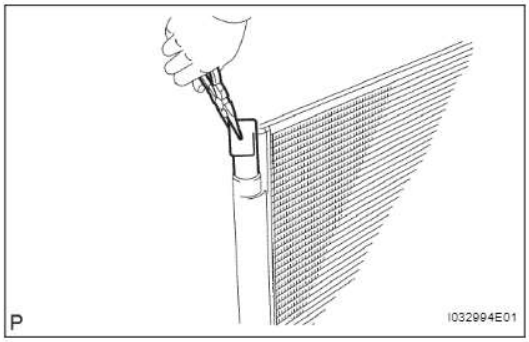
(a) Using a 14 mm hexagon wrench, remove the cap from the modulator.



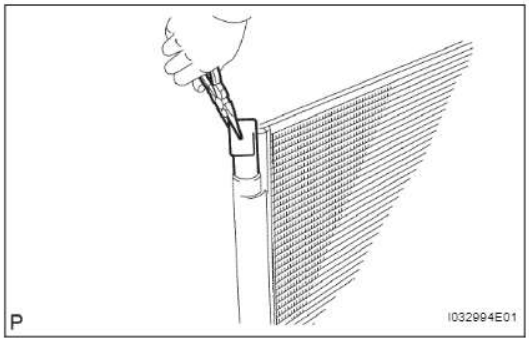
(b) Remove the O-ring from the cap.



AC



(c) Using pliers, remove the cooler dryer.

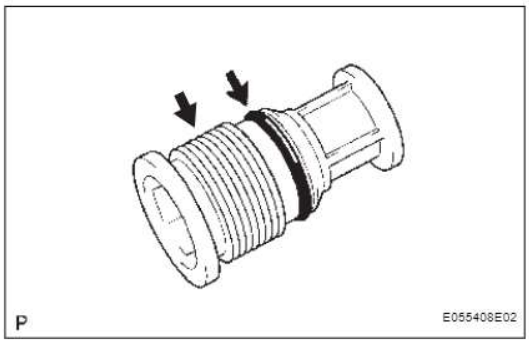


REASSEMBLY

1. INSTALL COOLER DRYER

(a) Using pliers, install the cooler dryer to the modulator.

(b) Install a new O-ring to the cap.

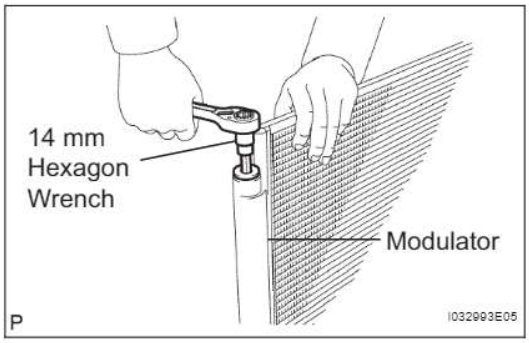


(c) Sufficiently apply compressor oil (ND-OIL 11) to the O-ring and cap fitting surface.

Compressor oil:
ND-OIL 11 or equivalent

NOTICE:

- **Do not use any compressor oil other than ND-OIL 11 (see page 55-1).**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**



(d) Using a 14 mm hexagon wrench, install the cap to the modulator.

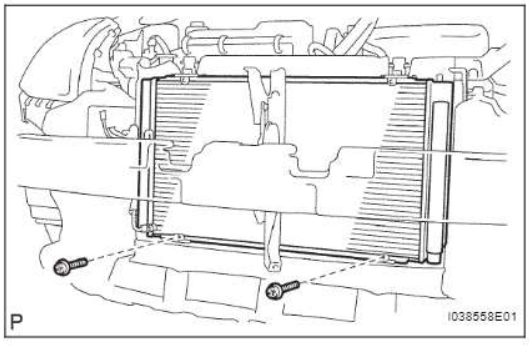
Torque: 2.9 N*m (30 kgf*cm, 25 in.*lbf)

INSTALLATION

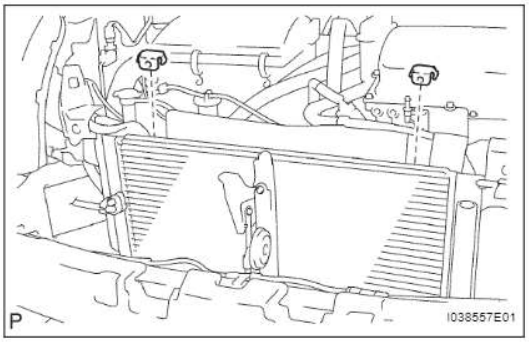
1. INSTALL CONDENSER ASSEMBLY WITH RECEIVER

(a) Install the condenser (with receiver) with the 2 bolts.

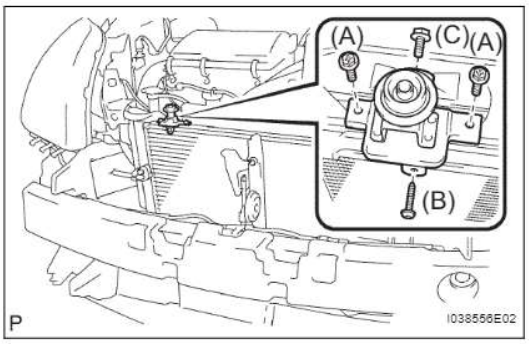
Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)



AC



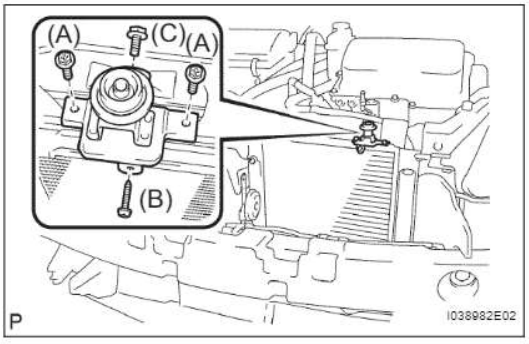
(b) Install the 2 angles to the condenser (with receiver).



2. INSTALL RADIATOR SUPPORT SUB-ASSEMBLY UPPER RH

(a) Install the radiator support upper with the 4 bolts.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf) for bolt A
3.9 N*m (40 kgf*cm, 35 in.*lbf) for bolt B
7.5 N*m (76 kgf*cm, 66 in.*lbf) for bolt C



3. INSTALL RADIATOR SUPPORT SUB-ASSEMBLY UPPER LH

(a) Install the radiator support upper with the 4 bolts.

Torque: 5.0 N*m (51 kgf*cm, 44 in.*lbf) for bolt A
3.9 N*m (40 kgf*cm, 35 in.*lbf) for bolt B
7.5 N*m (76 kgf*cm, 66 in.*lbf) for bolt C

4. CONNECT COOLER REFRIGERANT LIQUID PIPE E (TO COOLER UNIT)

(a) Remove the attached vinyl tape from the disconnected parts of the cooler refrigerant liquid pipe E and condenser assembly (with receiver).

(b) Install a new O-ring to the cooler refrigerant liquid pipe E.

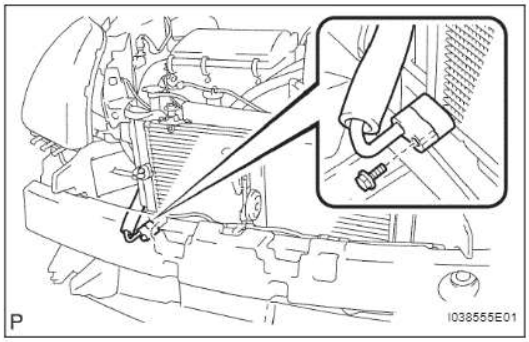
(c) Sufficiently apply compressor oil (ND-OIL 11) to the O-ring and the cooler refrigerant liquid pipe E fitting surface.

Compressor oil:
ND-OIL 11 or equivalent

NOTICE:

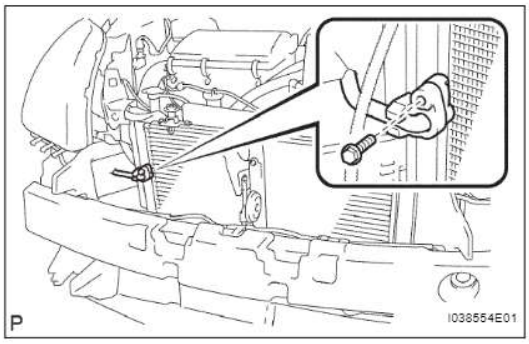
- **Do not use any compressor oil other than ND-OIL 11.**
- **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**

AC



(d) Connect the cooler refrigerant liquid pipe E to the condenser (with receiver) with the bolt.
Torque: 5.4 N*m (55 kgf*cm, 47 in.*lbf)

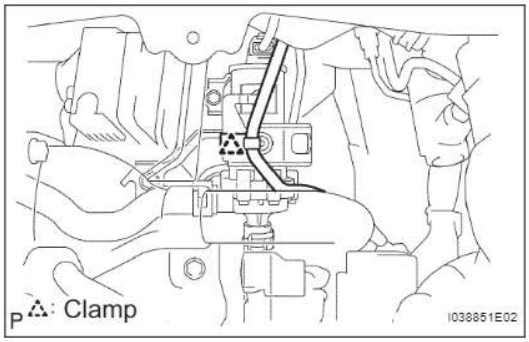
5. **CONNECT DISCHARGE HOSE SUB-ASSEMBLY**
   (a) Remove the attached vinyl tape from the disconnected parts of the discharge hose and the condenser (with receiver).
   (b) Install a new O-ring to the discharge hose.
   (c) Sufficiently apply compressor oil (ND-OIL 11) to the O-ring and the discharge hose fitting surface.
   NOTICE:
   - **Do not use any compressor oil other than ND-OIL 11.**
   - **If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.**



   (d) Connect the discharge hose to the condenser (with receiver) with the bolt.
   Torque: 5.4 N*m (55 kgf*cm, 47 in.*lbf)

6. **INSTALL NO. 1 INVERTER BRACKET**
7. **INSTALL FRONT BUMPER COVER**
   (a) Install the front bumper cover (see page ET-6).
8. **INSTALL FRONT FENDER LINER RH (See page ET-7)**
9. **INSTALL FRONT FENDER LINER LH (See page ET-7)**
10. **CHARGE REFRIGERANT (See page AC-141)**
11. **WARM UP COMPRESSOR (See page AC-142)**
12. **INSPECT LEAKAGE OF REFRIGERANT (See page AC-142)**

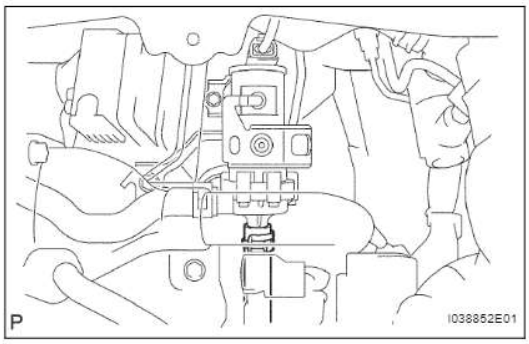
AC



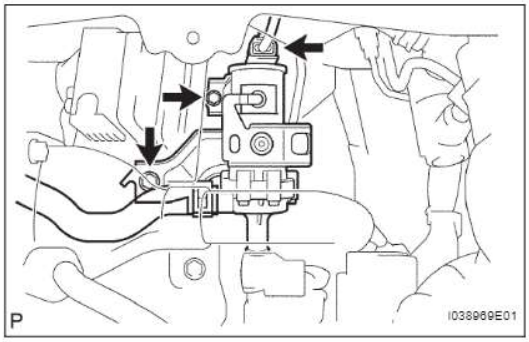
HEATER WATER PUMP

REMOVAL

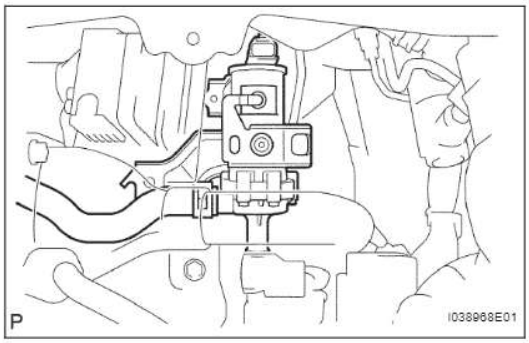
1. **DISCONNECT HEATER WATER HOSE C**
   (a) Detach the clamp and disconnect the wire harness.



   (b) Slide the hose clip and then disconnect the heater water hose C.
   NOTICE:
   - **Do not apply excessive force to the heater water hose C.**
   - **Prepare a drain pan or cloth for when the cooling water leaks.**

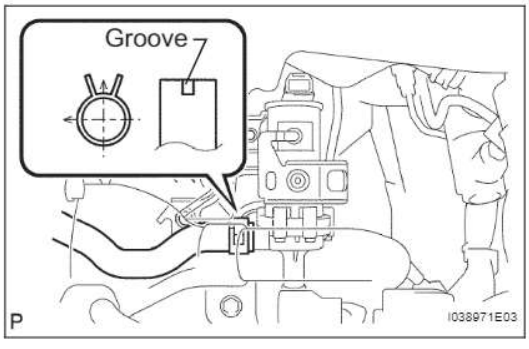


2. **REMOVE HEATER WATER PUMP ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 2 bolts and then disconnect the heater water pump.



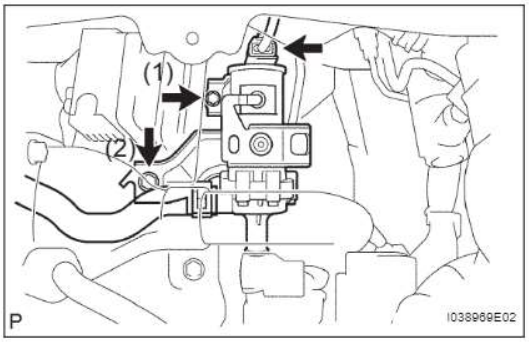
   (c) Slide the hose clip and then disconnect the heater water hose A.
   (d) Remove the heater water pump.
   NOTICE:
   - **Do not apply excessive force to the heater water hose A.**
   - **Prepare a drain pan or cloth for when the cooling water leaks.**

INSTALLATION

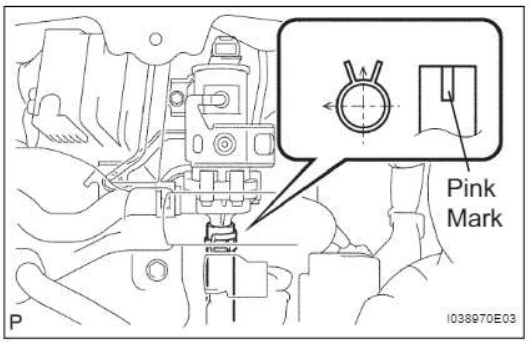


1. **INSTALL HEATER WATER PUMP ASSEMBLY**
   (a) Install the heater water hose A with the hose clip.
   NOTICE:
   - **Ensure that the hose groove faces upwards.**
   - **Install the hose clip in the direction shown in the illustration.**

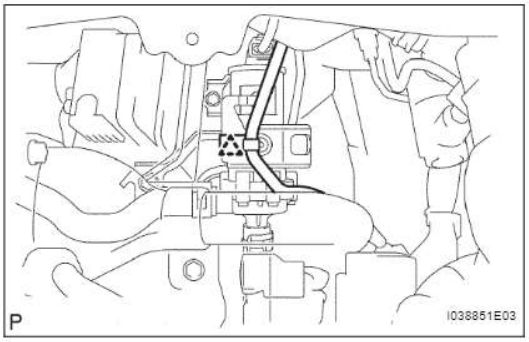
AC



(b) Install the heater water pump with the 2 bolts.
NOTICE:
Tighten them in the order indicated in the illustration.
(c) Connect the connector.



2. INSTALL HEATER WATER HOSE C
(a) Install the heater water hose C with the hose clip.
NOTICE:
- **Install the hose marking facing upwards.**
- **Install the hose clip in the direction shown in the illustration.**



(b) Connect the wire harness and attach the clamp.

3. ADD ENGINE COOLANT (See page CO-7)

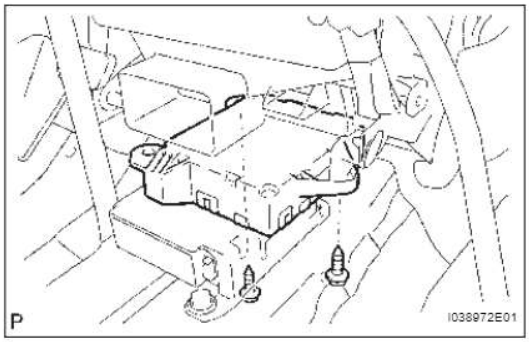
4. CHECK FOR ENGINE COOLANT LEAKS (See page CO-9)

AC

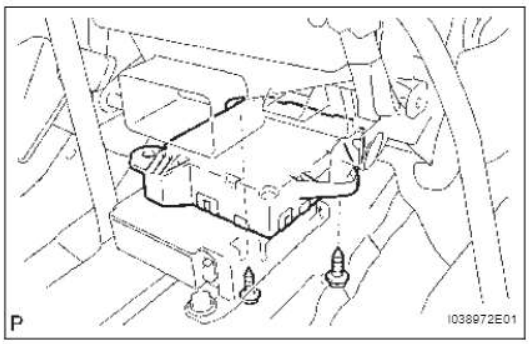
AIR CONDITIONING AMPLIFIER

REMOVAL

1. **REMOVE INSTRUMENT PANEL FINISH PANEL LOWER CENTER (See page IP-18)**
2. **REMOVE NO. 3 AIR DUCT REAR**
3. **REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Disconnect the connector.
   (b) Remove the 2 screws and air conditioning amplifier.



INSTALLATION



1. **INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY**
   (a) Install the air conditioning amplifier with the 2 screws.
   (b) Connect the connector.
2. **INSTALL NO. 3 AIR DUCT REAR**
3. **INSTALL INSTRUMENT PANEL FINISH PANEL LOWER CENTER (See page IP-21)**

AC