FULL AUTO AIR CONDITIONER [FULL-AUTO AIR CONDITIONER]

id0740a1320200

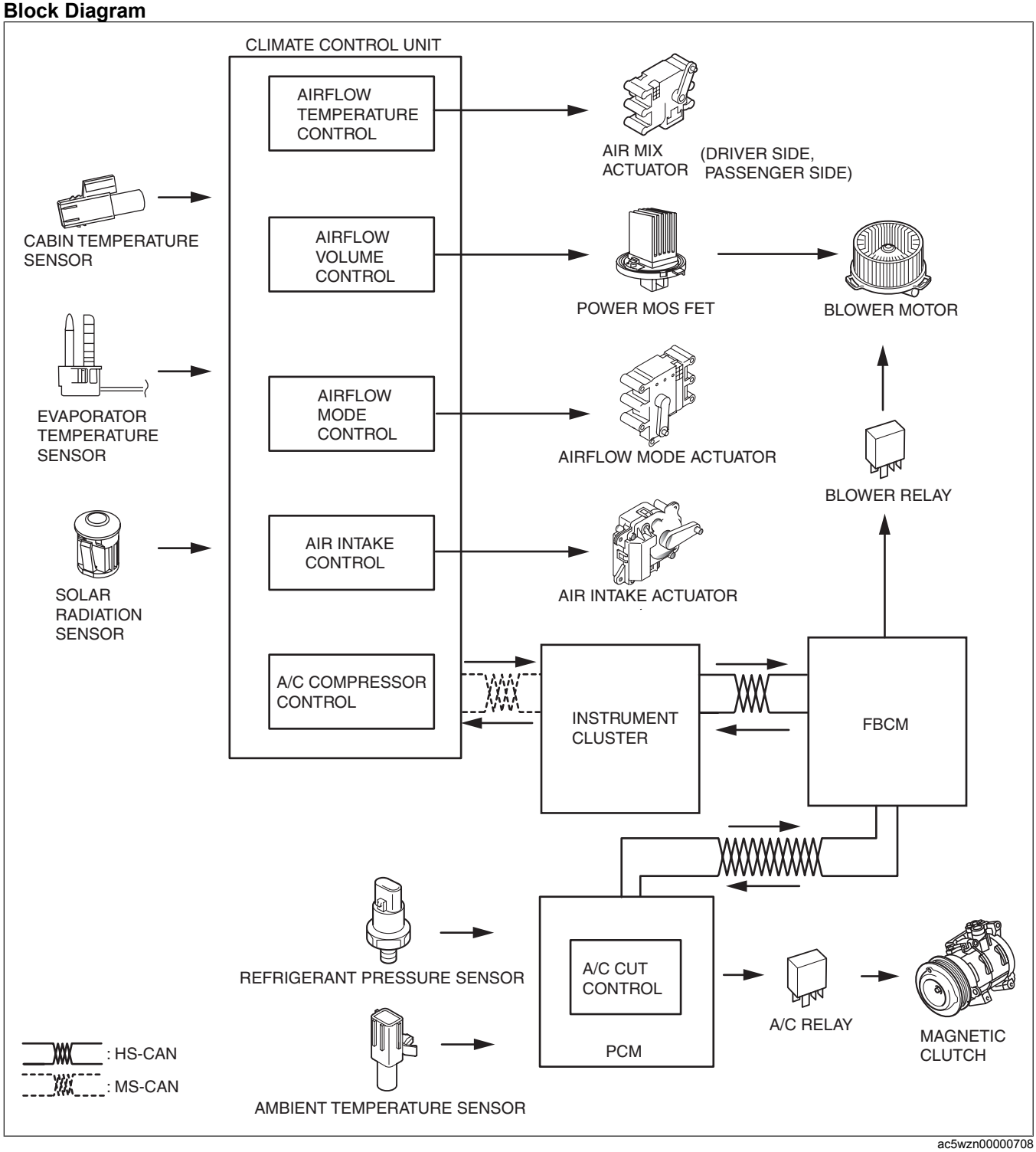
Outline

- The climate control unit performs the following controls based on the signals from each switch/dial and the sensor.
  - — Airflow temperature control
  - — Airflow volume control
  - — Airflow mode control
  - — Air intake control
  - — A/C compressor control

A/C cut-off control

- Controls the A/C operation by switching the A/C relay on/off at the optimal timing according to engine operation conditions. (See A/C CUT-OFF CONTROL [SKYACTIV-G 2.0, SKYACTIV-G 2.5].)

Block Diagram



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Control Table

- The full-auto air conditioner system functions based on the five basic types of controls and three supplementary functions.

Basic control	Control description	Correction control
Airflow temperature control	Airflow temperature automatic control	• MAX HOT and MAX COLD correction • Engine coolant temperature correction
Airflow volume control	Airflow volume automatic control	• Engine coolant temperature correction (warm-up correction) • Mild start correction • MAX HOT and MAX COLD correction • Defroster correction • Start-up window fogging prevention correction • Starting compensation correction • Start-up burn-out prevention function
	Airflow volume manual control	• Defroster correction • Start-up burn-out prevention function
Airflow mode control	Airflow mode automatic control	• Engine coolant temperature correction (warm-up correction)
	Airflow mode manual control	—
Air intake control	Air intake automatic control	• Defroster correction • Ambient temperature correction
	Air intake manual control	• Defroster correction
A/C compressor control	A/C compressor automatic control	• Defroster correction
	A/C compressor manual control	

Supplementary function
Fail-safe function
Sensor signal delay function
On-board diagnostic function

Control Type Transition by Switch Operation

Airflow temperature control, airflow volume control

Operation switch		Airflow temperature control	Airflow volume control								
		Control prior to switch operation	Control prior to switch operation								
		Automatic control	Automatic control	Defroster correction	Manual control						
					OFF	1	2	3	4	5	6	7
OFF switch		Automatic control	OFF	OFF	OFF							
AUTO switch		Automatic control	Automatic control	Automatic control	Automatic control							
Airflow volume control dial	HI	Automatic control	Manual control*4	Manual control*4	1	2	3	4	5	6	7	7
	LO	Automatic control	Manual control*5	Manual control*5	1	1	1	2	3	4	5	6
MODE switch		Automatic control	Automatic control	Automatic control*6	No change							
DEFROSTER switch		Automatic control	Defroster correction	Automatic control*6	Defroster correction							
A/C switch		Automatic control	Automatic control	No change	*7	No change						
RECIRCULATE switch		Automatic control	Automatic control	No change	No change							
FRESH switch		Automatic control	Automatic control	No change	No change							

Operation switch		Airflow temperature control	Airflow volume control								
		Control prior to switch operation	Control prior to switch operation								
		Automatic control	Automatic control	Defroster correction	Manual control						
					OFF	1	2	3	4	5	6	7
Driver-side temperature setting dial*1	15.0/60*2 18.0/64*3	MAX COLD	MAX HI	MAX HI	No change							
	15.5—28.5/61—83*2 18.5—31.5/65—89*3	Automatic control	Automatic control	No change	No change							
	29.0/84*2 32.0/90*3	MAX HOT	AUTO HI	AUTO HI	No change							
Passenger-side temperature setting dial *1	15.0/60*2 18.0/64*3	MAX COLD	MAX HI	MAX HI	No change							
	15.5—28.5/61—83*2 18.5—31.5/65—89*3	Automatic control	Automatic control	No change	No change							
	29.0/84*2 32.0/90*3	MAX HOT	AUTO HI	AUTO HI	No change							
Dual switch		Automatic control	No change	No change	No change							

*1 : Adjusted up or down in increments of 0.5 with a range of 15.0—29.0 or 1 with a range of 60—84.

*2 : European (L.H.D. U.K.) specs.

*3 : Except European (L.H.D. U.K.) specs.

*4 : Increases to the manual voltage that is closest to the auto or defroster correction voltage.

*5 : Decreases to the manual voltage that is closest to the auto or defroster correction voltage.

*6 : Returns to condition prior to defroster operation. However, if it had been off prior to defroster operation, it switches to automatic control.

*7 : Returns to fan condition before fan off. However, if it had been defroster correction (manual control) returns to condition as follows.

1. The condition before fan off defroster correction, the fan condition return to the condition before defroster correction.
2. The condition before fan off defroster correction and furthermore the condition before defroster correction is fan off, the fan condition change to the automatic control. (It has higher priority than 1)
3. The condition before fan off defroster correction and fan is manually operated during that defroster correction, the fan condition return to the manually operated condition. (It has higher priority than 1 and 2)

Airflow mode control, air intake control, A/C compressor control

Operation switch	Airflow mode control		Air intake control		A/C compressor control	
	Control prior to switch operation		Control prior to switch operation		Control prior to switch operation	
	Automatic control	Manual control	Automatic control	Manual control	Automatic control	Manual control
OFF switch	Fixed at mode before turned OFF	No change	Fixed at mode before turned OFF	No change	OFF	OFF
AUTO switch	Automatic control	Automatic control	Automatic control	Automatic control	Automatic control	Automatic control

Operation switch		Airflow mode control		Air intake control		A/C compressor control	
		Control prior to switch operation		Control prior to switch operation		Control prior to switch operation	
		Automatic control	Manual control	Automatic control	Manual control	Automatic control	Manual control
Airflow volume control dial	HI	Automatic control	No change	Automatic control	No change	Automatic control	No change
	LO	Automatic control	No change	Automatic control	No change	Automatic control	No change
MODE switch	UP 	VENT → BI-LEVEL BI-LEVEL → HEAT HEAT → DEF/HEAT DEF/HEAT → VENT	VENT → BI-LEVEL BI-LEVEL → HEAT HEAT → DEF/HEAT DEF/HEAT → VENT	Automatic control	No change	Automatic control	No change
	DOWN 	VENT → DEF/HEAT DEF/HEAT → HEAT HEAT → BI-LEVEL BI-LEVEL → VENT DEFROSTER (warm-up) → HEAT	VENT → DEF/HEAT DEF/HEAT → HEAT HEAT → BI-LEVEL BI-LEVEL → VENT DEFROSTER (warm-up) → HEAT	Automatic control	No change	Automatic control	No change
DEFROSTER switch		DEFROSTER	DEFROSTER	Defroster correction	Defroster correction	Defroster correction	Defroster correction
A/C switch		Automatic control	No change	Automatic control	No change	A/C→OFF OFF→A/C	A/C→OFF OFF→A/C
RECIRCULATE switch		Automatic control	No change	FRESH→REC	FRESH→REC	Automatic control	No change
FRESH switch		Automatic control	No change	REC→FRESH	REC→FRESH	Automatic control	No change
Driver-side temperature setting dial*1	15.0/60*2 18.0/64*3	Automatic control	No change	Automatic control	No change	Automatic control	No change
	15.5—28.5/61—83*2 18.5—31.5/65—89*3	Automatic control	No change	Automatic control	No change	Automatic control	No change
	29.0/84*2 32.0/90*3	Automatic control	No change	Automatic control	No change	Automatic control	No change
Passenger-side temperature setting dial *1	15.0/60*2 18.0/64*3	Automatic control	No change	Automatic control	No change	Automatic control	No change
	15.5—28.5/61—83*2 18.5—31.5/65—89*3	Automatic control	No change	Automatic control	No change	Automatic control	No change
	29.0/84*2 32.0/90*3	Automatic control	No change	Automatic control	No change	Automatic control	No change
Dual switch		Automatic control	No change	Automatic control	No change	No change	No change

*1 : Adjusted up or down in increments of 0.5 with a range of 15.0—29.0 or 1 with a range of 60—84.

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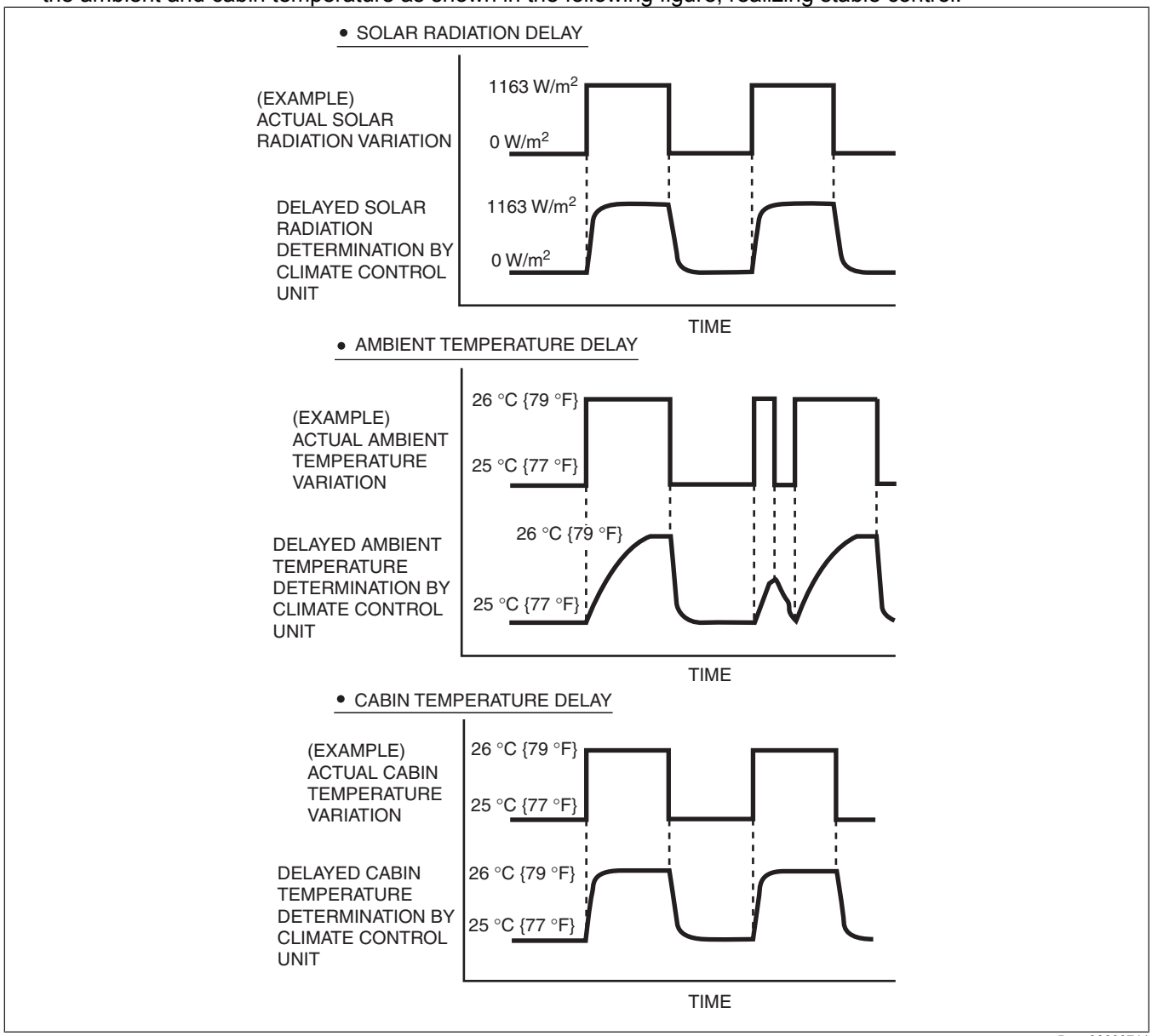
Sensor Signal Delay Function

- The amount of solar radiation, and the ambient and cabin temperatures may change due to factors such as direct and intermittent sunlight (traveling through a city or a highway tunnel), or radiant heat from the ground under parked vehicles as well as the opening and closing of doors.
- If control was performed based exactly on these variations, the air conditioning function would be negatively affected and smooth control could not occur.
- In order to prevent this, the climate control unit delays and smoothes the input signals for solar radiation, and the ambient and cabin temperature as shown in the following figure, realizing stable control.



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- When the engine is restarted after being temporarily stopped, the ambient temperature sensor may detect a temperature higher than the actual ambient temperature.
- To prevent this, if the engine coolant temperature exceeds **55 °C {131 °F}**, control of each system is performed based on the ambient temperature data before the engine was stopped, which is stored in the climate control unit.