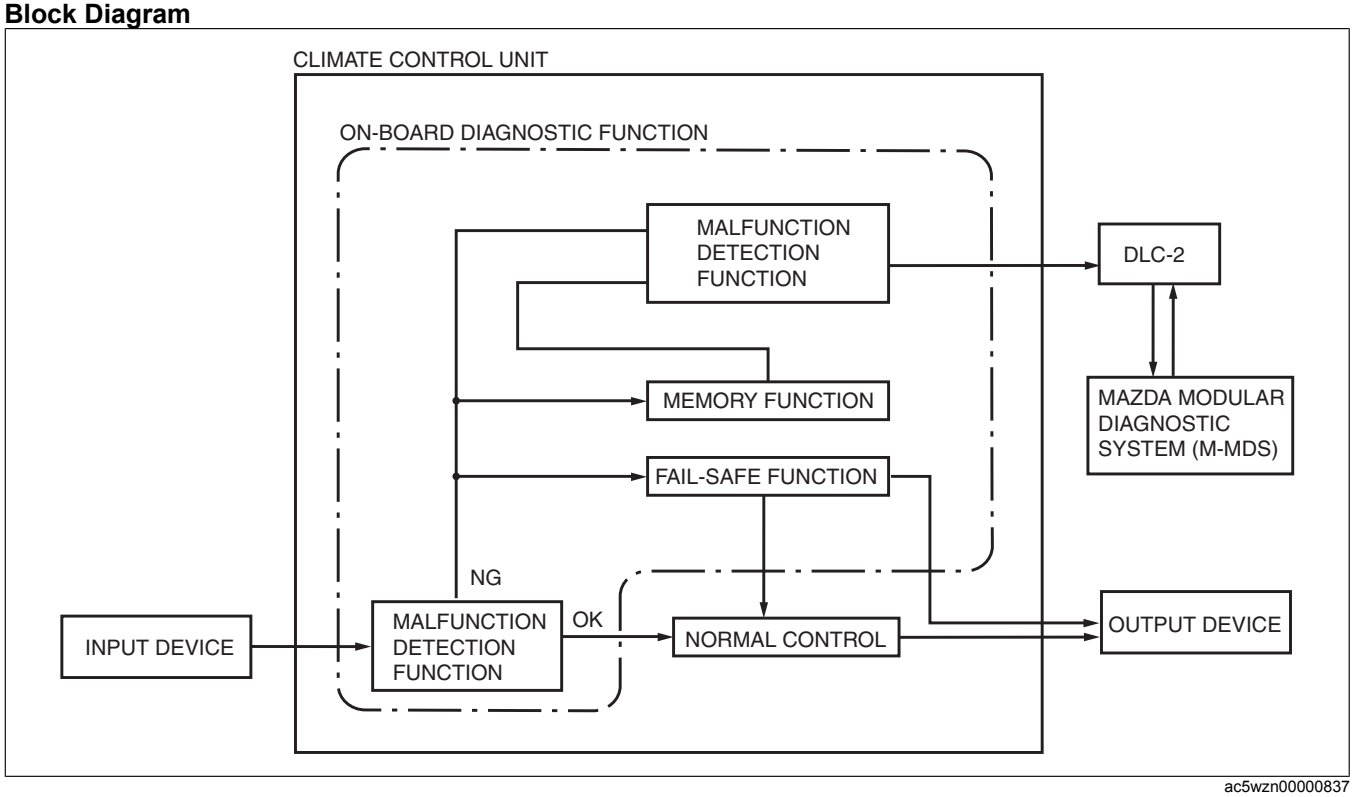
ON-BOARD DIAGNOSTIC

id070200126600

Outline

- The on-board diagnostic system has on-board diagnostic, PID/data monitor, and A/C operation check functions.
- The on-board diagnostic function has the following functions:
  - — Malfunction detection function
    - Detects errors in input and output signals
  - — Memory function
    - Stores detected malfunctions
  - — Malfunction indication function
    - Displays detected malfunctions
- The malfunction indication function, PID/data monitor, and A/C operation check functions can be performed by connecting the Mazda Modular Diagnostic System (M-MDS) to the DLC-2.

Block Diagram



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Function

Malfunction detection function

- The malfunction detection function detects errors in the input and output signals. (Ignition switched ON or engine is running)
- If a malfunction is detected, a DTC is output to the DLC-2 through the malfunction indication function.
- At the same time, malfunction detection results are sent to the fail-safe and memory functions.

Memory function

- The memory function stores malfunctioning signal systems which are detected to be malfunctioning by the malfunction detection function.
- The stored malfunction information is not cleared even when the ignition is switched off (LOCK) or the malfunction is repaired.
- The stored malfunction information can be cleared by connecting the Mazda Modular Diagnostic System (M-MDS) to the DLC-2 and operating it.

Malfunction indication function

- The malfunction indication function outputs present or past malfunctions to the DLC-2 as DTCs.
- The DTCs can be read by connecting the Mazda Modular Diagnostic System (M-MDS) to the DLC-2 and operating it.

Malfunction display mode

- The climate control unit detects present and past malfunctions in the control system circuits (open/short circuits) and indicates the DTCs shown in the table on the Mazda Modular Diagnostic System (M-MDS).

- Clear past malfunctions after completing repairs because once a past malfunction is stored, it will remain stored even after the malfunction has been repaired.
- The stored past malfunction can be cleared by connecting the Mazda Modular Diagnostic System (M-MDS) to the DLC-2 and operating it.

X: Applicable
−: Not applicable

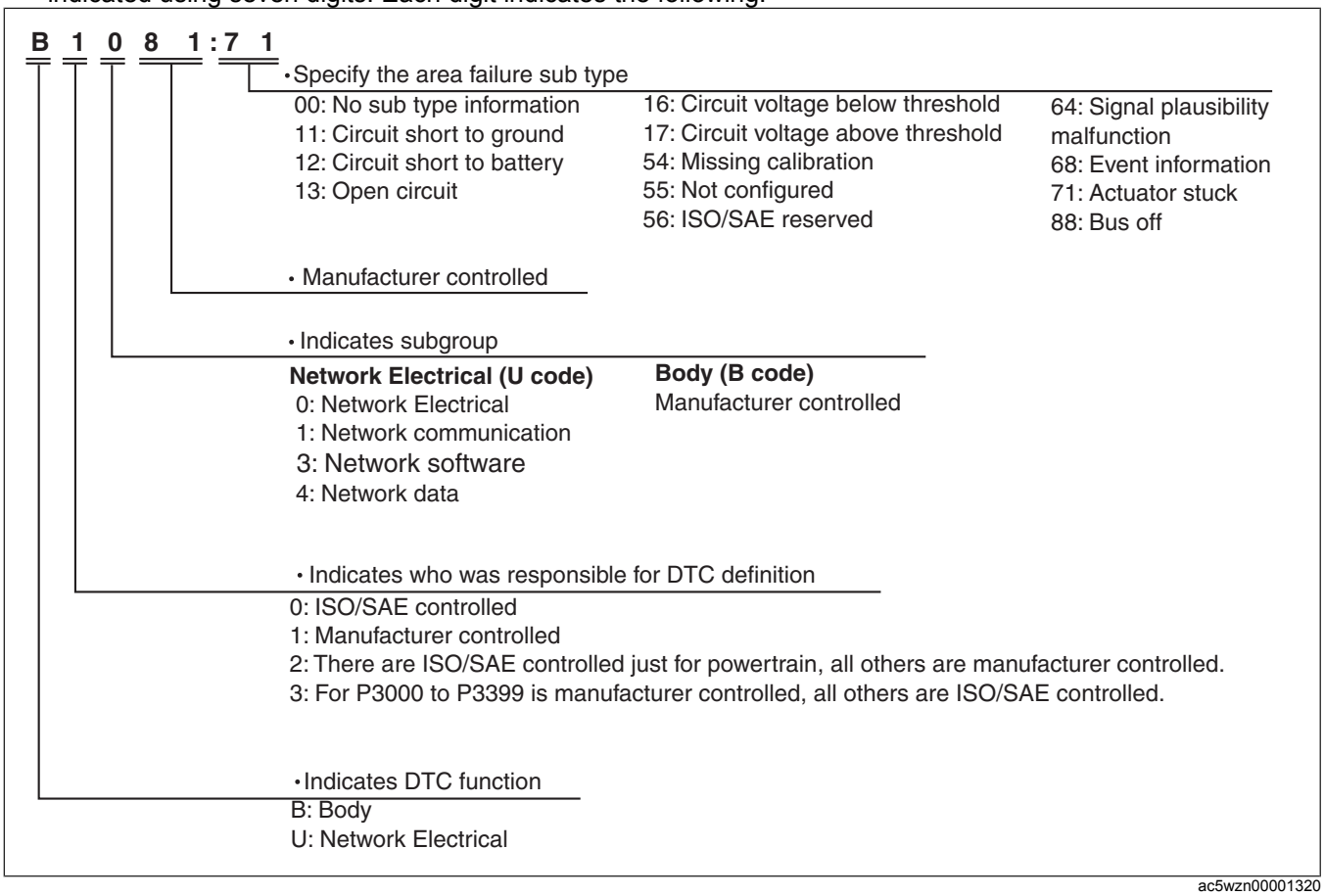
DTC	Warning lamp	Malfunction location	Detected condition	Fail safe	Drive cycle	Self test type*1	Memory function
B1081:71	—	• Driver-side air mix actuator (L.H.D.) • Passenger-side air mix actuator (R.H.D.)	Motor lock	X	—	C	X
B1082:71	—	• Passenger-side air mix actuator (L.H.D.) • Driver-side air mix actuator (R.H.D.)	Motor lock	X	—	C	X
B1086:71	—	Airflow mode actuator	Motor lock	X	—	C	X
B1A61:11	—	Cabin temperature sensor	Circuit short to ground	X	—	C, D	X
B1A61:13	—		Circuit open	X	—	C, D	X
B1A63:12	—	Solar radiation sensor (RH)	Circuit shot to power supply	—	—	C, D	X
B1A63:13	—		Circuit open	—	—	D	X
B1A64:12	—	Solar radiation sensor (LH)	Circuit shot to power supply	—	—	C, D	X
B1A64:13	—		Circuit open	—	—	D	X
B1B71:11	—	Evaporator temperature sensor	Circuit short to ground	X	—	C, D	X
B1B71:13	—		Circuit open	X	—	C, D	X
B1C1A:12	—	• Driver-side air mix actuator (potentiometer) (L.H.D.) • Passenger-side air mix actuator (potentiometer) (R.H.D.)	Circuit short to power supply	X	—	C, D	X
B1C1A:13	—		Circuit open	X	—	C, D	X
B1C1B:12	—	• Passenger-side air mix actuator (potentiometer) (L.H.D.) • Driver-side air mix actuator (potentiometer) (R.H.D.)	Circuit short to power supply	X	—	C, D	X
B1C1B:13	—		Circuit open	X	—	C, D	X
B1C1C:12	—	Airflow mode actuator (potentiometer)	Circuit short to power supply	X	—	C, D	X
B1C1C:13	—		Circuit open	X	—	C, D	X
B1D22:11	—	Heater core temperature sensor	Circuit short to ground	X	—	C, D	X
B1D22:13	—		Circuit open	X	—	C, D	X
U0010:88	—	CAN communication system	Bus off	X	—	C	X
U0155:00	—	Lost communication with instrument cluster	No sub type information	X	—	C, D	X
U0423:68	—	Invalid date received from Instrument cluster	Event information	X	—	C, D	X
U200D:11	—	Climate control unit circuit voltage (+5V)	Circuit short to ground	—	—	C, D	X
U2300:54	—	Configuration error	Data not received	—	—	C, D	X
U2300:55	—		Not configured	—	—	C, D	—
U2300:56	—		Ineffective/non-interchangeable data read	—	—	C, D	X
U2300:64	—		Error value read	—	—	C, D	X
U3003:16	—	Climate control unit power supply voltage (B+, IG1)	Power supply voltage decreases (**10 V or less**)	X	—	C, D	X

DTC	Warning lamp	Malfunction location	Detected condition	Fail safe	Drive cycle	Self test type*1	Memory function
U3003:17	—	Climate control unit power supply voltage (B+, IG1)	Power supply voltage increases (**17.3 V or more** (B+, IG1))	X	—	C, D	X

*1 : C: CMDTC self test, D: ODDTC self test

DTC 7-digit code definition

- When related systems or components have failed, the CM stores the DTC of the malfunctioning part in the CM memory, and allows for the retrieval of the store data using scanning tool when necessary. The DTCs are indicated using seven digits. Each digit indicates the following.



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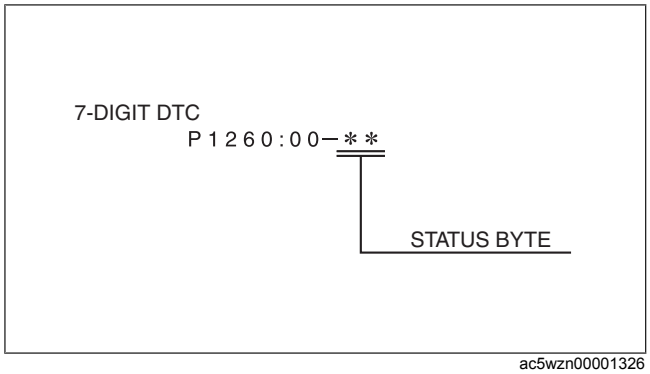
Status byte for DTC

- The status byte is the two digits (after hyphen) after the 7-digit DTC.
- The status byte is a code which indicates the pending code, current/past malfunction status, or warning illumination status.
- The status byte can be read by performing a CMDTC self-test using the Mazda Modular Diagnostic System (M-MDS).
- For details on the status byte, refer to the explanation on the Mazda Modular Diagnostic System (M-MDS) when reading the DTC.



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PID/data monitor

- The PID/data monitor function is used for optionally selecting input signal monitor items preset in the climate control unit/water heater unit and reading them out in real-time.

PID/data monitor table

PID name (definition)	Unit/Condition	Operation Status (Reference)	Input part
A/C_SW	Off/On	• A/C switch OFF: Off • A/C switch ON: On	Climate control unit
AUTO_SW	Off/On	• AUTO switch OFF: Off • AUTO switch ON: On	Climate control unit
B_MT_RLY_CS	Off/On	• Blower relay off: Off • Blower relay on: On	Climate control unit
DEF_SW	Off/On	• DEFROSTER switch OFF: Off • DEFROSTER switch ON: On	Climate control unit
DUAL_SW	Off/On	• DUAL switch OFF: Off • DUAL switch ON: On	Climate control unit
ELE_W/P	Off/On	• Water pump off: Off • Water pump on: On	Water pump
ENG_C_TMP	°C, °F	Engine coolant temperature is displayed	Engine coolant temperature sensor
EVA_TMP_SEN	°C, °F	Evaporator temperature is displayed	Evaporator temperature sensor
F_REC_CS	Off/On	• Forced recirculate control off: Off • Forced recirculate control on: On	Climate control unit
FRE_SW	Off/On	• FRESH switch OFF: Off • FRESH switch ON: On	Climate control unit
HC_TMP_SEN	°C, °F	Heater core temperature is displayed	Heater core temperature sensor
INC_TMP_SEN	°C, °F	Cabin temperature is displayed	Cabin temperature sensor
M_DOWN_SW	Off/On	• MODE switch (DOWN) OFF: Off • MODE switch (DOWN) ON: On	Climate control unit
M_UP_SW	Off/On	• MODE switch (UP) OFF: Off • MODE switch (UP) ON: On	Climate control unit
OFF_SW	Off/On	• OFF switch OFF: Off • OFF switch ON: On	Climate control unit
OUT_CAR_TMP	°C, °F	Ambient temperature is displayed	Ambient temperature sensor
R/DEF_CS	Off/On	• Rear defroster off: Off • Rear defroster on: On	Climate control unit
R/DEF_SW	Off/On	• Rear window defroster switch OFF: Off • Rear window defroster switch ON: On	Climate control unit
REC_SW	Off/On	• RECIRCULATE switch OFF: Off • RECIRCULATE switch ON: On	Climate control unit
S_HT_CUT_CS	No_Request/Cut	• Seat warmer signal cut control off: No_Request • Seat warmer signal cut control on: Cut	Climate control unit
SLR_R_SEN_L	W	Solar radiation amount is displayed	Solar radiation sensor
SLR_R_SEN_R			
STOP_ST	Available/ Not Available/ Error	• i-stop permit condition: Available • i-stop inhibit condition: Not Available • i-stop signal failure: Error	• Climate control unit • PCM
UNIT_TMP	deg_C/deg_F	• Centigrade: deg_C • Fahrenheit: deg_F	Climate control unit

A/C operation check mode

- The A/C operation check mode forcibly operates the output devices as shown in the operation check table regardless of the signals input to the climate control unit.
- During an A/C operation check mode operation, indication in the display panel and the illumination of the indicator light on the switches are automatically controlled.
- Determine the malfunctioning part by visual inspection, listening to the operation sound, placing a hand on the air vents, or checking that each transition is as indicated in the operation check table.

Mazda Modular Diagnostic System (M-MDS) display	Target part	Reference
Air Mix Actuator	• Air mix actuator • Air mix door	(See Air mix actuator)
Air conditioning compressor	• A/C compressor	(See A/C compressor)
Air Intake Actuator	• Air intake actuator • Air intake door	(See Air intake actuator)
Blower Motor Speed	• Blower motor	(See Blower motor)

Mazda Modular Diagnostic System (M-MDS) display	Target part	Reference
Air Flow Mode Actuator	• Airflow mode actuator • Airflow mode door	(See Airflow mode actuator)
Illumination of All Indicator Lights	• Climate control unit	(See Indicator light)
Electrical Water Pump	• Water pump*	(See Water pump)

*: With water pump

Air mix actuator

Operation

Step	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
1	0 %	VENT	5th	ON	FRESH
2	100 %				

Display

Step	Temperature (°C {° F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
1	20.0 {68}			Displayed	Not illuminated	Illuminated
2	21.0 {70}					

Note

- After approx. 22 s have elapsed the operation step moves to the next step.
- When the last step is finished, the operation is repeated from Step 1.
- To prevent super-cooling, the magnetic clutch turns off despite the A/C forced override.

A/C compressor

Operation

Step	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
1	0 %	VENT	5th	ON	FRESH
2				OFF	

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
1	4 {39}			Displayed	Not illuminated	Illuminated
2				Not displayed		

Note

- After the following times have elapsed, the operation step moves to the next step.
  - — Step 1: Approx. 5 s
  - — Step 2: Approx. 25 s
- When the last step is finished, the operation is repeated from Step 1.

Air intake actuator

Operation

Step	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
1	0 %	VENT	5th	ON	FRESH
2					RECIRCULATE
3				OFF	FRESH
4					RECIRCULATE

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
1	4 {39}			Displayed	Not illuminated	Illuminated
2					Illuminated	Not illuminated
3				Not displayed	Not illuminated	Illuminated
4					Illuminated	Not illuminated

Note

- After approx. 11 s have elapsed the operation step moves to the next step.
- When the last step is finished, the operation is repeated from Step 1.
- To prevent super-cooling, the magnetic clutch turns off despite the A/C forced override.

Blower motor

Operation

Step	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
1	50 %	VENT	OFF	OFF	FRESH
2			1st	ON	
3			3rd		
4			5th		
5			7th		

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
1	1 {34}		Not displayed	Not displayed	Not illuminated	Illuminated
2				Displayed		
3						
4						
5						

Note

- After approx. 4 s have elapsed the operation step moves to the next step.
- When the last step is finished, the operation is repeated from Step 1.
- To prevent super-cooling, the magnetic clutch turns off despite the A/C forced override.

Airflow mode actuator

Operation

Step	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
1	50 %	VENT	5th	ON	FRESH
2		BI-LEVEL			
3		HEAT			
4		DEF/HEAT			
5		DEFROSTER			

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
1	3 {37}			Displayed	Not illuminated	Illuminated
2						
3						
4						
5						

Note
- After approx. 11 s have elapsed the operation step moves to the next step.
- When the last step is finished, the operation is repeated from Step 1.
- To prevent super-cooling, the magnetic clutch turns off despite the A/C forced override.

Indicator light

Operation

Step	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
—	50 %	VENT	OFF	OFF	FRESH

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
—	All indicator displayed				Illuminated	Illuminated

Water pump

Operation

Step	Water pump	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
—	ON	50 %	VENT	OFF	OFF	FRESH

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
—	10 {50}		Not displayed	Not displayed	Not illuminated	Illuminated

A/C operation check stop

Note
- If "Stop" is selected while the A/C operation check is operating, the A/C stops at the conditions shown in the table.

Operation

Step	Water pump (with water pump)	Air mix actuator	Airflow mode actuator	Blower speed	Magnet clutch	Air intake actuator
—	OFF	50 %	VENT	OFF	OFF	FRESH

Display

Step	Temperature (°C {°F})	Airflow mode	Blower volume	A/C	Recirculate switch indicator light	Fresh switch indicator light
—	0 {32}		Not displayed	Not displayed	Not illuminated	Illuminated