ON-BOARD DIAGNOSTIC SYSTEM FUNCTION [ELECTRIC POWER STEERING (EPS)]

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Malfunction Detection Function

- The malfunction detection function detects malfunctions in the input/output signal system of the EPS control module when the ignition switched ON or driving the vehicle.

Malfunction Display Function

- When the malfunction detection function detects a malfunction, the power steering malfunction indicator light illuminates or flashes to advise the driver. Using the external tester communication function, DTCs can be output to the DLC-2 via the CAN line. At the same time, malfunction detection results are sent to the memory and fail-safe functions.
- The power steering malfunction indicator light may not illuminate depending on the detected malfunction.

Memory Function

- The memory function stores DTCs of malfunctions in input/output signal systems. With this function, once a DTC is stored it is not cleared after the ignition switch has been switched OFF, even if the malfunctioning signal system has returned to normal.
- Since the EPS control module has a built-in non-volatile memory, DTCs are not cleared even if the battery is removed. Therefore, it is necessary to clear the memory after performing repairs. Refer to the Workshop Manual for the DTC clearing procedure.

DTC Table

×: Applicable
—: Not applicable

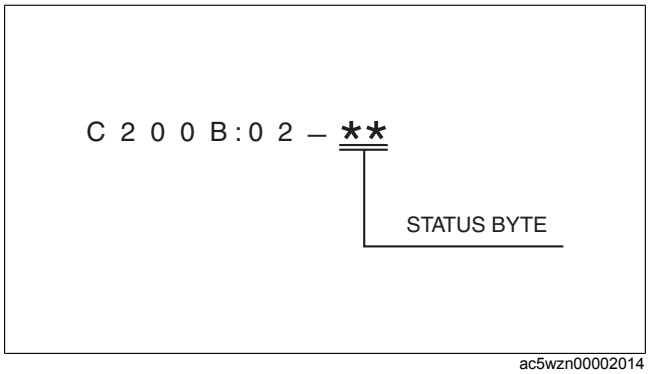
DTC M-MDS	Power steering malfunction indicator light illumination status	Diagnosis system component	Fail-safe	Drive cycle	Self test type*1	Memory function
C200B:02	Illuminated	Torque sensor	×	—	C, D	×
C200B:16	Illuminated	Torque sensor	×	—	C, D	×
C200B:1C	Illuminated	Torque sensor	×	—	C, D	×
C200B:62	Illuminated	Torque sensor	×	—	C, D	×
C200B:85	Illuminated	Torque sensor	×	—	C, D	×
C200C:1C	Illuminated	Torque sensor	×	—	C, D	×
C200D:1C	Illuminated	Resolver sensor	×	—	C, D	×
C200D:64	Illuminated	Resolver sensor	×	—	C, D	×
U0001:88	Illuminated	CAN system communication error	×	—	C, D	×
U0100:00	Illuminated	Communication error to PCM	×	—	C, D	×
U0121:00	—	Communication error to DSC CM	×	—	C, D	×
U0155:00	—	Communication error to instrument cluster	×	—	C, D	×
U0338:00	—	Signal error from start stop unit	×	—	C, D	×
U0401:00	Illuminated	Signal (vehicle speed) error from PCM	×	—	C, D	×
	—	Signal (engine speed) error from PCM	×	—	C, D	×
	—	Signal (i-stop status) error from PCM	×	—	C, D	×
U0415:00	—	Signal error from DSC CM	×	—	C, D	×
U0515:00	—	Signal error from start stop unit	×	—	C, D	×
U2011:19	Illuminated	EPS motor	×	—	C, D	×
U2011:1C	Illuminated	EPS motor	×	—	C, D	×
U2011:62	Illuminated	EPS motor	×	—	C, D	×
U2011:72	Illuminated	EPS motor	×	—	C, D	×
U2011:92	Illuminated	EPS motor	×	—	C, D	×
U2300:54	—	EPS configuration	×	—	C, D	×
U2300:55	Illuminated	EPS configuration	×	—	C, D	×
U2300:56	—	EPS configuration	×	—	C, D	×
U3000:16	Illuminated	EPS CM	×	—	C, D	×
U3000:1C	Illuminated	EPS CM	×	—	C, D	×
U3000:28	Illuminated	EPS CM	×	—	C, D	×
U3000:41	Illuminated	EPS CM	×	—	C, D	×
U3000:46	—	EPS CM	×	—	C, D	×
U3000:47	Illuminated	EPS CM	×	—	C, D	×
U3000:49	Illuminated	EPS CM	×	—	C, D	×

DTC M-MDS	Power steering malfunction indicator light illumination status	Diagnosis system component	Fail-safe	Drive cycle	Self test type*1	Memory function
U3000:4B	—	EPS CM	×	—	C, D	×
U3000:61	Illuminated	EPS CM	×	—	C, D	×
U3000:73	Illuminated	EPS CM	×	—	C, D	×
U3000:96	Illuminated	EPS CM	×	—	C, D	×
U3003:16	Illuminated	Battery power supply	×	—	C, D	×
U3003:17	Illuminated	Battery power supply	×	—	C, D	×

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

Status Byte for DTC

- The status byte is the two-digit code (two digits after hyphen (-)) after the 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 M-MDS when reading the DTC.



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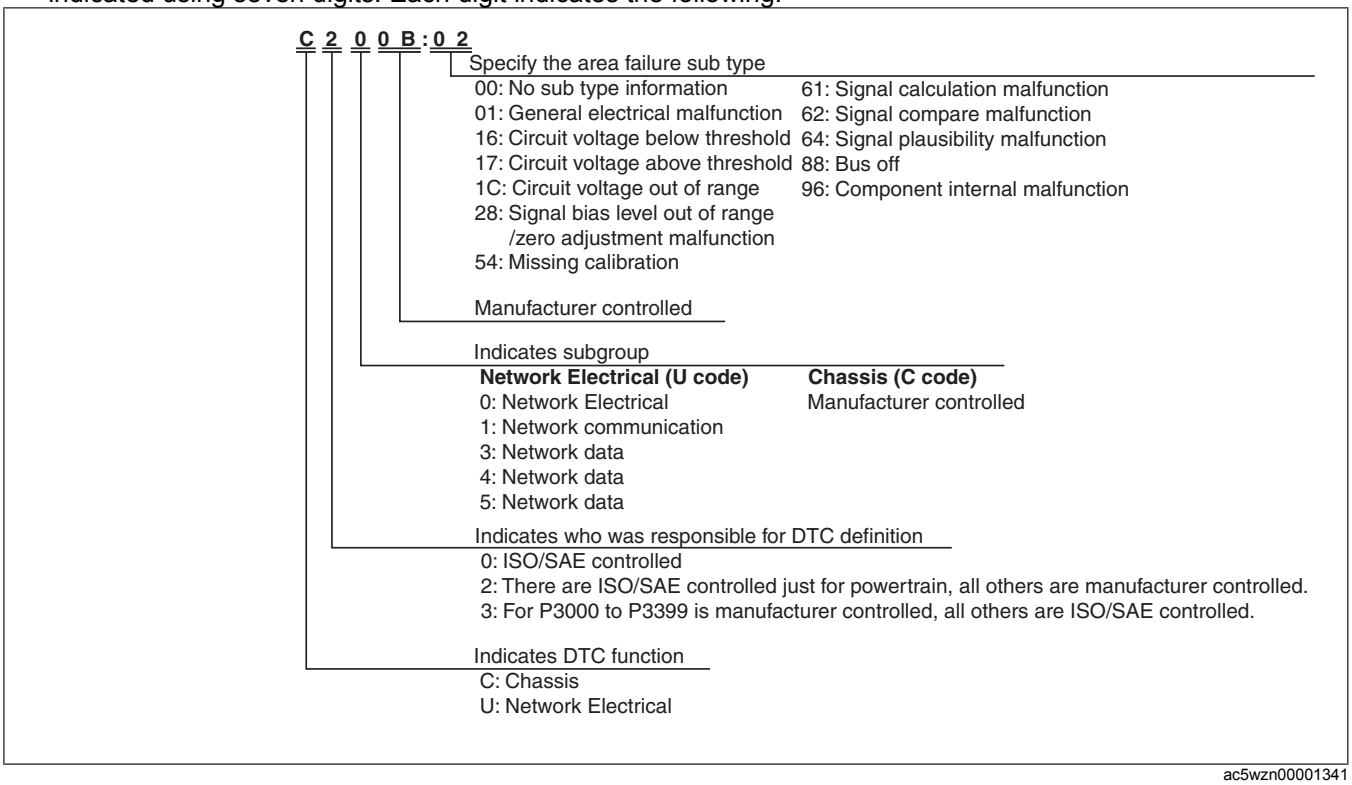
DTC 7-digit code definition

- 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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Fail-safe Function

- When the malfunction detection function determines a malfunction, the power steering malfunction indicator light illuminates to advise the driver. At this time, the fail-safe function disables system control or gradually reduces the assist power.

Fail-safe Function Table

DTC M-MDS	Fail-safe control status
C200B:02	Control disabled
C200B:16	Control disabled
C200B:1C	Control disabled
C200B:62	Control disabled
C200B:85	Control disabled
C200C:1C	Control disabled
C200D:1C	Control disabled
C200D:64	Control disabled
U0001:88	Control enabled
U0100:00	Control is maintained by gradually changing the controlled vehicle speed and setting it to **120 km/h {74.6 mph}**
U0121:00	Control enabled
U0155:00	Control enabled
U0338:00	Control enabled
U0401:00	• Vehicle speed signal malfunction — Control is maintained by gradually changing the controlled vehicle speed and setting it to **120 km/h** {74.6 mph} • Engine speed signal malfunction — Control enabled • i-stop status signal malfunction — EPS i-stop control is not operated, and normal control is maintained
U0415:00	Control enabled
U0515:00	Control enabled
U2011:19	Control disabled
U2011:1C	Control disabled
U2011:62	Control disabled
U2011:72	• Phase 1 open circuit malfunction is detected in the EPS motor — Control is maintained in the backup control • Other malfunction detected in EPS motor internal circuit — Control disabled
U2011:92	Control disabled
U2300:54	Control enabled
U2300:55	Control enabled
U2300:56	Control enabled
U3000:16	Control disabled
U3000:1C	Control disabled
U3000:28	Control disabled
U3000:41	Control disabled
U3000:46	Control is maintained in fail mode
U3000:47	Control disabled
U3000:49	Control disabled
U3000:4B	Control is maintained in fail mode
U3000:61	Control disabled
U3000:73	Control disabled
U3000:96	Control disabled
U3003:16	Control is maintained by gradually decreasing the motor control current However, control is inhibited if the power supply voltage is the specified value of less.
U3003:17	Control disabled

Snapshot Data

Note

- The EPS CM stores the following two types of information when a DTC is detected and displays snap shot data in the M-MDS.
  - — Vehicle information detected by EPS CM
  - — Vehicle information detected by instrument cluster and received by start stop unit via CAN signal

- The snapshot data stores the currently detected DTC data.

Snapshot data item	Unit	Data contents	Data read/use method	Corresponding data monitor items
AAT	°C, °F	Ambient air temperature	Not applicable	Not applicable
APP_STATUS	Accelerator Pedal Off/ Under 20%/ Over 20%/ FAIL	Accelerator pedal position	Not applicable	Not applicable
CEN_TRQ_S	Nm	Center value of torque sensor	CEN_TRQ_S	CEN_TRQ_S
CFG_STATUS	Config Complete/ Not Configured/ Config Error	Instrument cluster configuration status	Not applicable	Not applicable
ECT_STATUS	Under 0 degrees C/ 0 - Under 80 degrees C/ Over 80 degrees C/ FAIL	Engine coolant temperature status	Not applicable	Not applicable
ECU_IN_TMP	°C, °F	ECU internal temperature	ECU_IN_TMP	ECU_IN_TMP
ENG_RPM	RPM	Engine speed	ENG_RPM	ENG_RPM
IC_VPWR	V	Instrument cluster power supply	• The EPS CM constantly receives the power supply voltage value of the instrument cluster sent via CAN signal from the instrument cluster. • If a DTC is detected, the EPS CM records the power supply voltage of the instrument cluster when the DTC was detected, and it is displayed in the M-MDS.	VPWR*2
IG-ON_TIMER	hh:mm:ss*1	Elapsed time since ignition was switched ON **Note** • The instrument cluster records the elapsed time since the ignition was switched ON.	• The EPS CM constantly receives the elapsed time since the ignition was switched ON sent via CAN signal from the instrument cluster. • If a DTC is detected, the EPS CM records the elapsed time since the ignition was switched ON when the DTC was detected, and it is displayed in the M-MDS.	Not applicable
MT_CURRENT	A	Motor current	MT_CURRENT	MT_CURRENT
OH_CR_C	No/Yes	Current complete overheat protection	OH_CR_C	OH_CR_C
OH_CR_M	No/Yes	Current middle overheat protection	OH_CR_M	OH_CR_M
OH_HIST_C	No/Yes	History of complete overheat protection	OH_HIST_C	OH_HIST_C
OH_HIST_M	No/Yes	History of middle overheat protection	OH_HIST_M	OH_HIST_M
OH_IG_CNT_C	—	IG ON counter after complete overheat protection	OH_IG_CNT_C	OH_IG_CNT_C

Snapshot data item	Unit	Data contents	Data read/use method	Corresponding data monitor items
OH_IG_CNT_M	—	IG ON counter after middle overheat protection	OH_IG_CNT_M	OH_IG_CNT_M
PWR_MODE_KEY	Key Out/ Key Recently Out/ Key Approved (Position 0)/ Post Accessory (Position 0)/ Accessory (Position 1)/ Post Ignition (Position 1)/ Ignition On (Position 2)/ Running (Position 2)/ Running - Starting In Progress (Position 2)/ Crank (Position 3)	• Key Out: Ignition switched to off • Key Recently Out (Position 0): Elapsed time **within 3 s** since ignition was switched to off • Accessory (Position 1): Ignition is switched to ACC • Post Ignition (Position 2): Elapsed time **within 3 s** since ignition was switched ON • Ignition On (Position 2): Ignition switched ON (engine off) • Running (Position 2): Ignition switched ON (engine on) • Running - Starting: Cranking condition	• The EPS CM constantly receives the ignition switch status sent via CAN signal from the instrument cluster. • If a DTC is detected, the EPS CM records the ignition switch status when the DTC was detected, and it is displayed in the M-MDS.	Not applicable
RPM_STATUS	Engine Stop/ Under 1500rpm/ Over 1500rpm/ FAIL	Engine RPM status	• The EPS CM constantly receives the ignition switch status sent via CAN signal from the instrument cluster. • If a DTC is detected, the EPS CM records the ignition switch status when the DTC was detected, and it is displayed in the M-MDS.	TACHOMTR*2
SHIFT_STATUS	P/N D/ R/ FAIL	Shift position status	• The EPS CM constantly receives the selector lever position sent via CAN signal from the instrument cluster. • If a DTC is detected, the EPS CM records the selector lever position when the DTC was detected, and it is displayed in the M-MDS.	Not applicable
STR_ANG	°	Steering wheel angle	STR_ANG	STR_ANG
STR_ROT_SPD	°/s	Steering wheel rotation speed	STR_ROT_SPD	STR_ROT_SPD
STR_TRQ_S_M	Nm	Steering shaft torque (Main)	STR_TRQ_S_M	STR_TRQ_S_M
STR_TRQ_S_S	Nm	Steering shaft torque (Sub)	STR_TRQ_S_S	STR_TRQ_S_S

Snapshot data item	Unit	Data contents	Data read/use method	Corresponding data monitor items
TOTAL_DIST	km, ft, mi	Accumulated total traveled distance from completion of vehicle until EPS CM detects DTC (Odometer value in instrument cluster)	The distance traveled when the EPS CM detected a DTC can be calculated by performing the following procedure. 1. Verify the odometer value in the instrument cluster. 2. Verify the snap shot data item TOTAL_DIST. 3. Subtract 2 from 1.	Not applicable
TOTAL_TIME	hh:mm:ss*1	Accumulated total elapsed time since vehicle completion until EPS CM detects a DTC **Note** • When the ROOM removed, and the ignition is switched to off, the time is not included in the elapsed time.	The elapsed time when the EPS CM detected a DTC can be calculated by performing the following procedure. 1. Verify the PID item TOTAL_TIME of the instrument cluster. 2. Verify the snap shot data item TOTAL_TIME. 3. Subtract 2 from 1.	TOTAL_TIME*2
VPWR	V	Power supply	VPWR	VPWR
VSPD	KPH, MPH	Vehicle speed	VSPD	VSPD
VSPD_STATUS	Stop/ 0 - 10km/h/ Over 10km/h/ FAIL	Vehicle speed status	• The EPS CM constantly receives the vehicle speed sent via CAN signal from the instrument cluster. • If a DTC is detected, the EPS CM records the vehicle speed when the DTC was detected, and it is displayed in the M-MDS.	SPEEDOMTR*2

*1 : The seconds may be indicated after the decimal point.
*2 : Instrument cluster PID (See ON-BOARD DIAGNOSTIC [INSTRUMENT CLUSTER].)