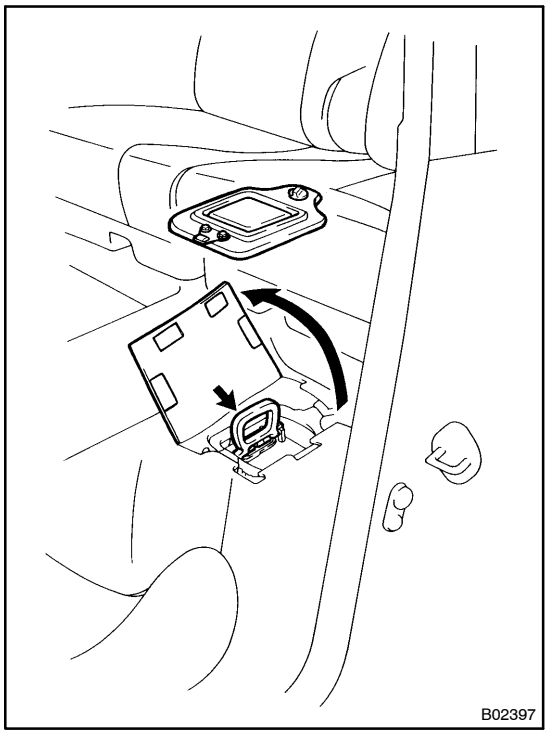
DI5R5–03

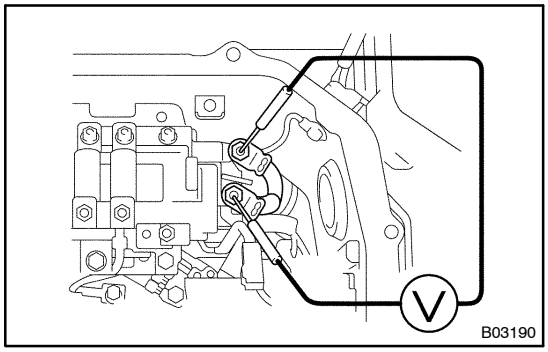
PRE–CHECK

1. PRECAUTION

(a) In order to find a trouble and replace that part, take a necessary operation to prevent electrical prevention (See page IN–4).


B02397

(b) Some portions of the wiring harness in the electric vehicle have the 300 VDC and 200 VAC circuits, to which high voltage is applied. In order to avoid receiving electrical shock, be sure to observe the following:
(1) Wear insulated gloves during the inspection.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(2) Remove the service plug and do not start any repair operation until 10 minutes have passed. Then confirm that the voltage at the output terminals has dropped down to 12 V or less.
(3) Use insulated tools during the inspection.
(4) When disconnecting wiring connectors, hold the connector bodies to avoid pulling the wires. When connecting wiring connectors, be sure to connect them securely.

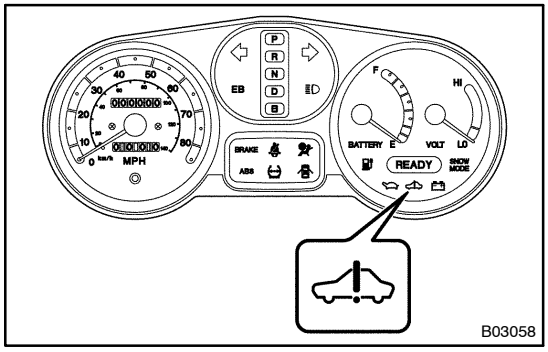
(c) Do not leave tools or parts (bolts, nuts, etc.) inside the cabin.

(d) Do not wear metallic objects such as mechanical pencils or scales.

2. DIAGNOSIS SYSTEM

(a) Description

The EV control ECU contains a built–in self–diagnosis system, by which a malfunction in the computer itself or in the motor drive system components can be detected and the Malfunction Indicator Light (MIL) on the instrument panel is caused to light up.



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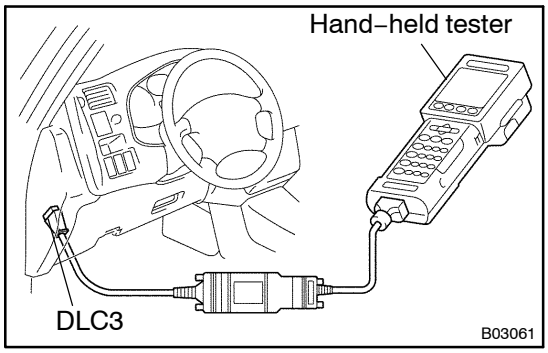
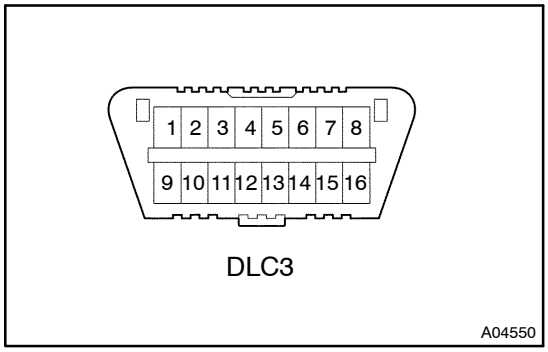


In order to check the Diagnostic Trouble Codes (DTC), connect the hand–held tester to the Data Link Connector 3 (DLC3) of the vehicle. The hand–held tester also enables you to erase the DTC and also check freeze frame data and various forms of EV control data.

Freeze frame data:

Freeze frame data records the driving condition when a malfunction was detected.

As freeze frame data records the driving conditions when a malfunction is detected, when troubleshooting, it is useful for determining whether the vehicle was running, braking, stopped or reversed, and how the main battery voltage was at the time of the malfunction.



(b) Check the DLC3.

The EV control ECU uses ISO 14230 for communication. The terminal arrangement of the DLC3 complies with SAEJ1962 and matches the ISO 14230 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus ⊕ Line/Pulse generation	During transmission
4	Chassis Ground ↔ Body Ground/1 Ω or less	Always
5	Signal Ground ↔ Body Ground/1 Ω or less	Always
16	Battery Positive ↔ Body Ground/10 – 15 V	Always

HINT:

If the display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the hand–held tester to the DLC3, turned the motor switch ON and operated the tester, there may be a problem on the vehicle side or tool side.

If the communication is normal when the tool is connected to other vehicle, inspect the DLC3 of the original vehicle.

If the communication is still impossible when the tool is connected to other vehicle, the problem may be in the tool itself. Consult the Service Department.

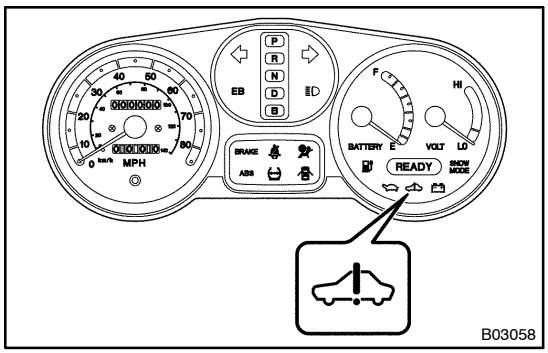
3. INSPECT DIAGNOSIS

(a) Check the auxiliary battery.

(1) Measure the voltage of the auxiliary battery.

Voltage: 10 – 15 V

(2) Inspect the conditions of the auxiliary battery, fuses, fusible links, wiring harness, connectors and ground.

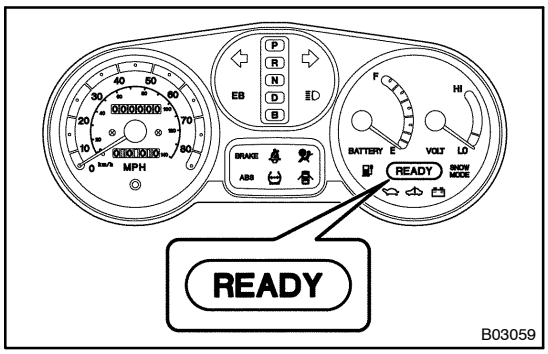


(b) Check the MIL.

(1) Turn the motor switch ON and confirm that the MIL comes on.

HINT:

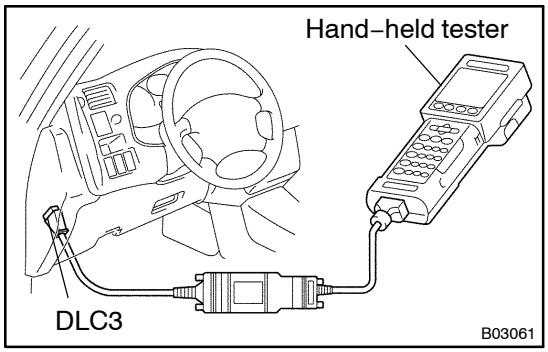
If the MIL does not come on, a burnt fuse, burnt bulb, or open in wiring harness may be a cause.



(2) When the READY is ON, the MIL goes off.

HINT:

If the MIL remains on, the diagnosis system has detected a malfunction or abnormality in the system.



(c) When using the hand–held tester:

Check the DTC.

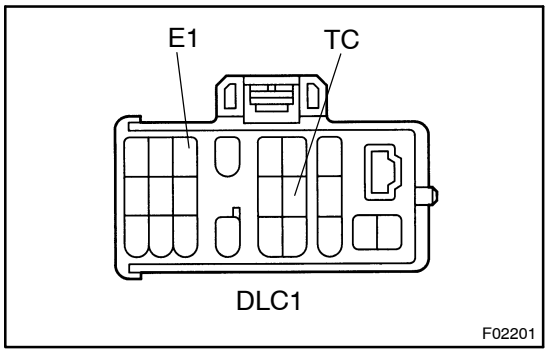
(1) Prepare the hand–held tester.

(2) Connect the hand–held tester to the DLC3.

(3) Turn the motor switch ON and push the hand–held tester main switch ON.

(4) Using the hand–held tester, check for DTCs and freeze frame data and make a note of the code and data that are output (For operating instructions, see the hand–held tester operator's manual).

(5) See page to confirm the details of the DTC.

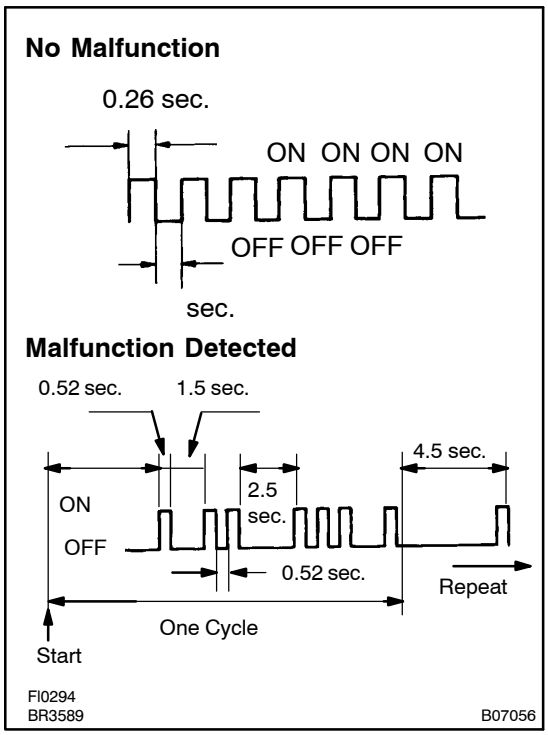


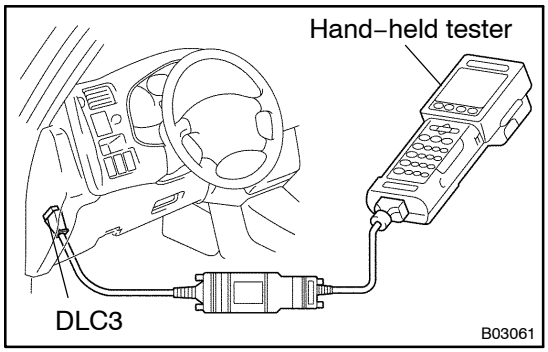
(d) When not using the hand–held tester:
Check the DTC.
(1) Shift into the P or N range.
(2) Using SST, connect terminals TC and E1 of the DLC1.
SST 09843–18020

NOTICE:
Connecting other terminals may result in a malfunction. Never make a mistake when choosing the terminals to be connected.

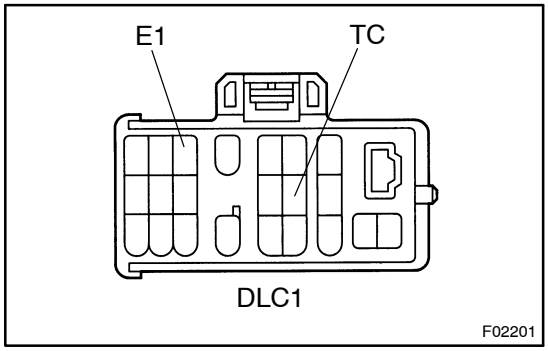
(3) Turn the motor switch ON. Then read the DTC as indicated by the number of flashes of the MIL.

If the lamp remains on, the EV control ECU has a malfunction in itself.



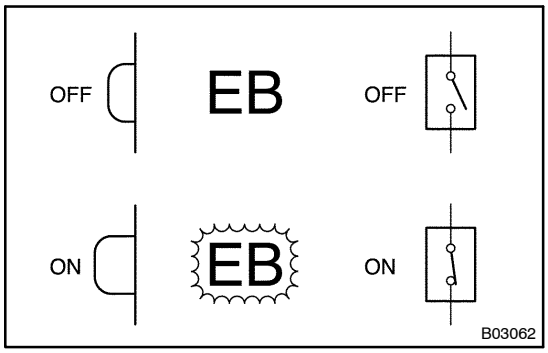


(e) When using the hand–held tester:
Clear the DTC.
(1) Connect the hand–held tester to the DLC3.
(2) Operate the hand–held tester to erase the DTC (See the hand–held tester operator's manual).



(f) When not using the hand–held tester:
Clear the DTC.
(1) Shift into the P or N range.
(2) Using SST, connect terminals TC and E1 of the DLC1.
SST 09843–18020

NOTICE:
Connecting other terminals may result in a malfunction. Never make a mistake when choosing the terminals to be connected.



(3) Turn the EB switch on the shift lever ON and OFF 3 times or more within 5 seconds.

NOTICE:

After doing any inspection or repair of the motor or related parts, be sure to erase the DTCs retained in the memory. Then test it again to confirm that a normal code is indicated on the MIL.

4. CHECK FOR INTERMITTENT PROBLEMS

(a) Clear the DTC (See step 3).
(b) Perform a simulation test (See page IN–18).
(c) Check the connector and terminal (See page IN–28).
(d) Handle the connector (See page IN–28).

5. EV OPERATING CONDITION

NOTICE:

The values given below for Normal Condition are representative values. So a vehicle may still be normal even if its value is different from those listed here. So, do not depend solely on the Normal Condition here when deciding whether a part is faulty or not.

Hand–held Tester Display	Measurement Item	Normal Condition
MAIN BATT VOLT	Traction Battery Voltage	Recharge or vehicle stopped and READY ON after 1 hour. SOC 100 %: 324 – 360 V SOC 50 %: 288 – 320 V SOC 0 %: 260 – 293 V
MAIN BATT CURRENT	Traction Battery Current	READY OFF: 0 A
MOTOR SPD	Number of Motor Rotating	Vehicle Stopped: 0 rpm
ACCELERATOR 1	Voltage Output of Accelerator Position Sensor No.1	Accelerator. Pedal Fully Depressed: 0.5 – 1.3 V Accelerator Pedal Released: 4.0 – 4.6 V
ACCELERATOR 2	Voltage Output of Accelerator Position Sensor No.2	Accelerator. Pedal Fully Depressed: 0.5 – 1.3 V Accelerator Pedal Released: 4.0 – 4.6 V
INVERTER TEMP	Motor Inverter Temp. Value	Ambient Temp. –95°C (203°F)
MASTER CYL PRESS	Oil Pressure Sensor Voltage used by Hydraulic Brake	Brake Pedal Released: 0.5 ± 0.12 V Brake Pedal Depressed: 4.5 ± 0.12 V
WHEEL CYL PRESS	Oil Pressure Sensor Voltage used by Hydraulic Brake	Brake Pedal Released: 0.5 ± 0.12 V Brake Pedal Depressed: 4.5 ± 0.12 V
WHEEL SPD FR	Wheel Speed for Front Right	Vehicle Stopped: 0 km/h (0 mph)
WHEEL SPD FL	Wheel Speed for Front Left	Vehicle Stopped: 0 km/h (0 mph)
WHEEL SPD DIFF	Wheel Speed Difference Output Value between Right and Left	Vehicle Stopped: 0 km/h (0 mph)
WHEEL SPD SYN	Both Right and Left Wheel Speed Addition Value for Motor Rotating Sensor Decision	Vehicle Stopped: 0 km/h (0 mph)
VEHICLE SPD	Vehicle Speed	Vehicle Stopped: 0 km/h (0 mph)
AUXILIARY VOLTAGE	Auxiliary Battery Voltage	READY ON: 12.0 – 14.5 V
PWR DOWN REQ	Motor Power Down Request Amount for Parts Protection (Battery ECU)	No Power Down Request: STATUS 1
PWR LIMT BATT	Selected Condition Item for Power Down (Battery ECU)	Power Down executed by Battery ECU: ON

PWR LIMT MOT TEMP	Selected Condition Item for Power Down (Motor Temp.)	Power Down Executed by Motor Temp.: ON
PWR LIMT MOT LOCK	Selected Condition Item for Power Down (Motor Lock)	Power Down Executed by Inverter Temp.: ON
PWR LIMT POWER VOL	Selected Condition Item for Power Down (Over Voltage of Traction Batteries)	Power Down Executed by Motor Lock: ON
PWR LIMT DIFF	Selected Condition Item for Power Down (Difference Limit)	Power Down Executed by Wheel Speed: ON
PWR LIMT ABS	Selected Condition Item for Power Down (ABS)	Power Down Executed by ABS: ON
SHIFT P1	Shift Position	P Position: ON
SHIFT R1	Shift Position	R Position: ON
SHIFT N1	Shift Position	N Position: ON
SHIFT D1	Shift Position	D Position: ON
SHIFT B1	Shift Position	B Position: ON
SHIFT R2	Shift Position	R Position: ON
SHIFT DB	Shift Position	D or B Position : ON
EB SWITCH	Regenerative Brake Switch Signal	EB Switch ON: ON
IG	ECU Power Source	Motor Switch ON: ON
CHARGE STATE	Charge State Signal	While Recharge: ON
START SIG	Start Signal	Motor Switch ST Position: ON
CHARGE CABLE	Charge Cable Connection Signal	Charger Cable Connected: ON
D DOOR CURTSEY	Driver Side Courtesy Signal	Driver Side Door Open: ON
INV START	Motor Inverter Start Warning Signal	Inverter Trouble (Start): ON
INV TEMP WARN	Motor Inverter Over Temp. Warning Signal	Inverter Trouble (High Temp.): ON
INV HI AMP WARN	Motor Inverter Over Current Warning Signal	Inverter Trouble (High Ampere): ON
INV SHORT WARN	Motor Inverter Short Circuit Warning Signal	Inverter Trouble (Load Short): ON
INV VOLT WARN	Motor Inverter Over Voltage Warning Signal	Inverter Trouble (High Voltage): ON
INV DRIVE	Motor Inverter Drive Signal	READY ON: ON
SERVICE PLUG	Interlock No.2 Signal	Install Service Plug: ON
CTRL COVER	Interlock No.1 Signal	Install PCU Cover: ON
AIRBAG CTRL	Airbag Control Signal	Airbag Operated: ON
VEHICLE COLLISION	Vehicle Collision Signal	Vehicle Collision: ON
CONVERTER TEMP HI	DC/DC Converter Over Temp. Signal	Low Temperature: OFF
CHARGER TEMP HI	Charger Over Temp. Signal	Low Temperature: OFF
STOP LIGHT SIG	Stop Lamp Switch Signal	Brake Pedal Depressed: ON
PKB	Parking Brake Switch Signal	PKB Lever Pulled: ON
READY	READY Lamp Drive Signal	READY ON: ON
SMR	EV Relay On Completion Signal	READY ON: ON
SYSTEM WARN	Malfunction Indicator Lamp Drive Signal	MIL ON: ON
MOTOR TEMP WARN	Power Down Indicator Drive Signal	While Power Down Executed: ON
BRAKE WARN LAMP	Brake Warning Lamp Drive Signal	PKB Lever Pulled: ON
INDICATE P	Shift Indicator P Drive signal	P Position: ON
INDICATE R	Shift Indicator R Drive signal	R Position: ON
INDICATE N	Shift Indicator N Drive signal	N Position: ON
INDICATE D	Shift Indicator D Drive signal	D Position: ON
INDICATE B	Shift Indicator B Drive signal	B Position: ON

INHIBIT	Reverse Inhibit Control Status	Reverse Inhibit Operated: ON
SOL PWR RELAY	Solenoid Valve Power Relay Drive Signal	READY ON: ON
SOL PWR RELAY MON	Solenoid Valve Power Relay ON Completion Signal	READY ON: ON
WATER PUMP RELAY	Water Pump Relay Drive Signal	Water Pump Operated: ON
PRE CHARGE RELAY	EV Relay No.1 Drive Signal	READY ON and after 5 seconds: OFF
MAIN PLUS RELAY	EV Relay No.2 Drive Signal	READY ON: ON
MAIN MINUS RELAY	EV Relay No.3 Drive Signal	READY ON: ON
R WHEEL ABS OPERATE	ABS Activation Signal from ABS ECU	Rear ABS Operated: ON
F WHEEL ABS OPERATE	ABS Activation Signal from ABS ECU	Front ABS Operated: ON