SECTION TMS
TRACTION MOTOR SYSTEM

CONTENTS

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000008140265

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the 12V battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation after 12V Battery Disconnect

INFOID:0000000008140266

For vehicle with steering lock unit, if the 12V battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
If turning the steering wheel is required with the 12V battery disconnected or discharged, follow the operation procedure below before starting the repair operation.

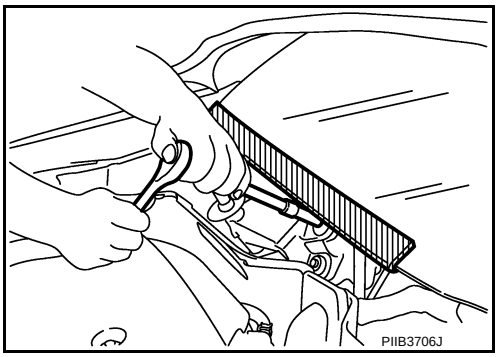
OPERATION PROCEDURE

1. Connect both 12V battery cables.
   NOTE:
   Supply power using jumper cables if 12V battery is discharged.
2. Turn the ignition switch to ACC position.
   (At this time, the steering lock will be released.)
3. Disconnect both 12V battery cables. The steering lock will remain released with both 12V battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both 12V battery cables. With the brake pedal released, turn the ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the ignition switch is turned to LOCK position.)
6. Perform All DTC Reading using CONSULT and delete DTC.
   NOTE:
   Multiple DTCs are detected when 12V battery cable is disconnected while ignition switch is in ACC position.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000008140267

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



High Voltage Precautions

INFOID:0000000008140268

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**

CAUTION:

Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

All the high voltage harnesses and connectors are orange. The Li-ion battery and other high voltage devices include an orange high voltage label. Never touch these harnesses and high voltage parts.

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

Immediately insulate disconnected high voltage connectors and terminals with insulating tape.

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

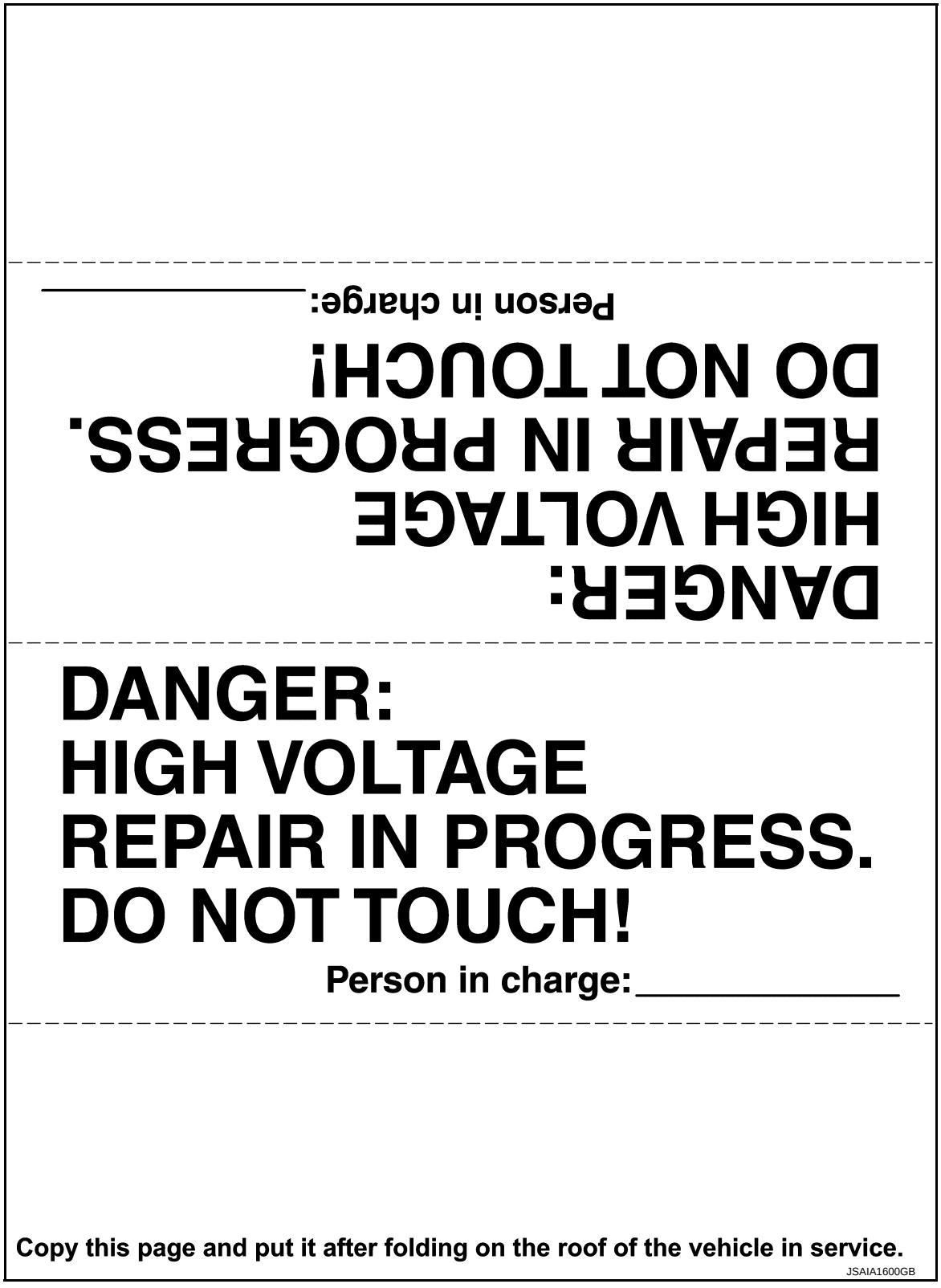
PROHIBITED ITEMS TO CARRY DURING THE WORK

Hybrid vehicles and electric vehicles contain parts with high voltage and intense magnetic force. Never carry metal products and magnetic recording media (e.g. cash card, prepaid card) to repair/inspect high voltage parts. If this is not observed, the metal products may create a risk of short circuit and the magnetic recording media may lose their magnetic recording.

POSTING A SIGN OF “DANGER! HIGH VOLTAGE AREA. KEEP OUT”

< PRECAUTION >

Indicate "HIGH VOLTAGE. DO NOT TOUCH" on the vehicle under repair/inspection to call attention to other workers.



Precaution for Removing 12V Battery

INFOID:0000000008140269

1. Check that EVSE is not connected.
   NOTE:
   If EVSE is connected, the air conditioning system may be automatically activated by the timer A/C function.
2. Turn the power switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including back door).

3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.
   NOTE:
   If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.
4. Remove 12V battery within 1 hour after turning the power switch OFF → ON → OFF.
   NOTE:
   - The 12V battery automatic charge control may start automatically even when the power switch is in OFF state.
   - Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.

   CAUTION:

   - **After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.**
   - **After turning the power switch OFF, if "Remote A/C" is activated by user operation, stop the air conditioner and start over from Step 1.**

General Precautions

INFOID:0000000008140270

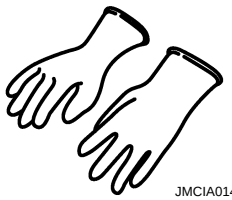
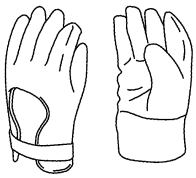
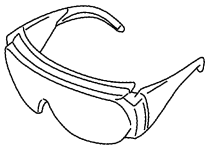
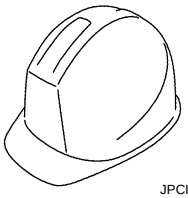
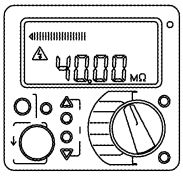
Take care when handling the traction motor inverter so that dust, dirt, and other substances do not enter into the inside from the opening.

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000008140271

Tool name		Description
Insulated gloves	 JMCIA0149ZZ	Removing and installing high voltage components
Leather gloves	 JPCIA0066ZZ	Protection of insulated gloves
Insulated safety shoes	 JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses / Face shield protection	 JPCIA0012ZZ	Removing and installing high voltage components
Insulated helmet	 JPCIA0013ZZ	Removing and installing high voltage components
Insulation resistance tester (Multi tester)	 JPCIA0014ZZ	Measuring voltage and insulation resistance

SYSTEM DESCRIPTION

DESCRIPTION

Description

INFOID:0000000008140272

- The traction motor contains a compact, lightweight, high output, high efficiency “Interior Permanent Magnet Synchronous Motor (IPMSM)”.
- The traction motor inverter is a device which converts DC power from the Li-ion battery to AC power, and drives the traction motor. Because the AC power frequency and voltage can be varied when the DC power is converted to AC power, it provides control performance with a high degree of freedom.

Specifications (Traction Motor)

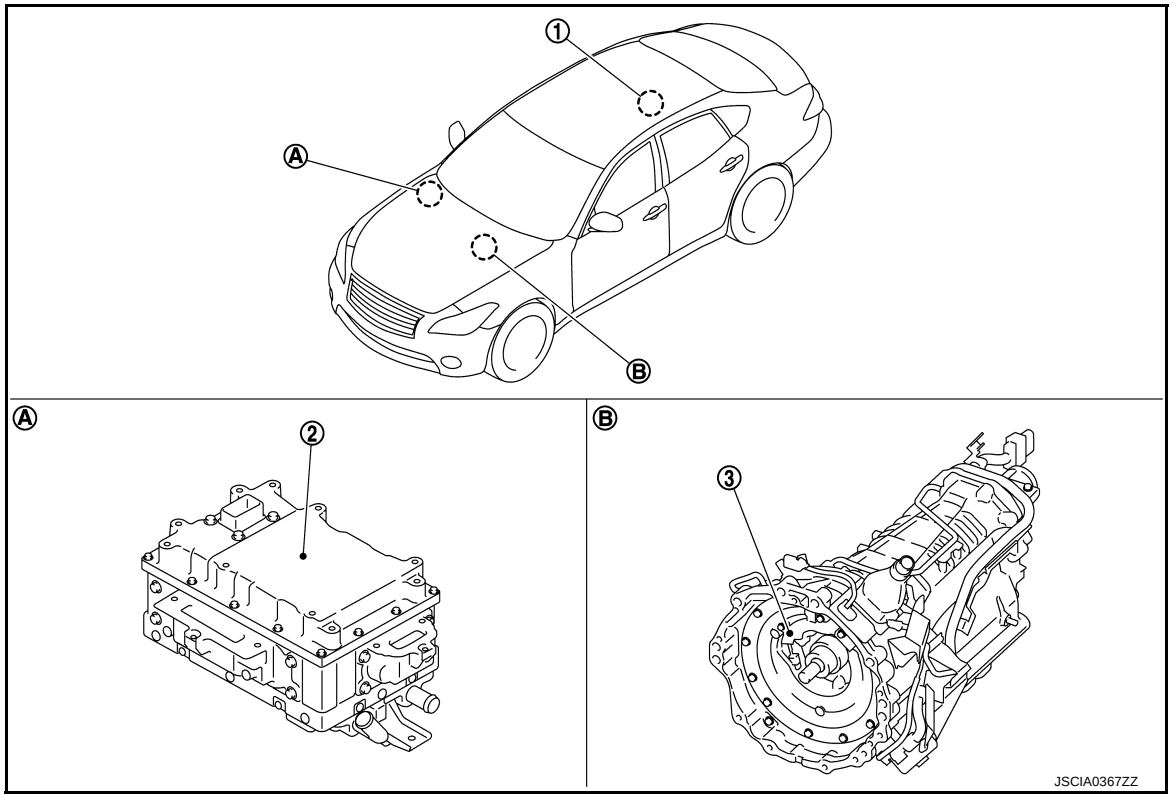
INFOID:0000000008140273

Max torque	270 Nm
Max output	50 kW
Max speed	7,200 rpm
Cooling system	Water cooling type

COMPONENT PARTS

Component Parts Location

INFOID:0000000008140274



A. Engine room B. Transmission assembly

COMPONENT DESCRIPTION

No.	Item	Function
1	HPCM	• Transmits mainly the following signals to HPCM via HEV system CAN. - Motor speed signal - Motor torque limit signal - Traction motor inverter status signal • Receives mainly the following signal from HPCM via HEV system CAN. - Drive command signal - High voltage power supply status signal - System cut off signal - Vibration control switching signal - Motor charge preparation request signal - Motor discharge request signal
2	Traction motor inverter	TMS-10, "Traction Motor Inverter"
3	Traction motor (This is included in transmission)	TMS-11, "Traction Motor"

Traction Motor Inverter

INFOID:0000000008140275

NOTE:
Control of the traction motor and control of HEV system CAN communications with other control modules is actually performed by the motor controller. However because the motor controller is installed inside the traction motor inverter, the motor controller is here referred to as the traction motor inverter.

- The traction motor inverter is composed of the motor controller, driver, smoothing condenser, current sensors, coolant temperature sensor, and power module.

- The traction motor inverter controls the traction motor based on the drive command signal transmitted by HEV system CAN from the HPCM.
- Traction motor inverter drives traction motor accurately based on resolver detection signal and current sensor detection signal.
- The traction motor inverter performs charging judgment for the high voltage circuit and also discharges the voltage inside the circuit.
- Traction motor inverter operates speed control according to command from HPCM. This control absorbs instantaneously the speed difference between engine and transmission, and it allows driving with reduced shift shocks
- The traction motor inverter performs vibration control in order to improve accelerator response and provide good acceleration while driving.

MOTOR CONTROLLER

The motor controller receives the rotor rotation angle from the traction motor resolver and the traction motor current value from the current sensor, and creates the pulse signal for driving the IGBT.

DRIVER

The driver converts the pulse signal (12V) from the motor controller to a high voltage signal (300V) and drives the IGBT.

POWER MODULE

- The power module is composed of 6 power semiconductor IGBT (Insulated Gate Bipolar Transistor).
- An IGBT Is a semiconductor switch that is capable of switching ON/OFF at high speed.
- An IGBT uses the IGBT drive signal from the driver to perform switching, converting the Li-ion battery DC power to AC power and supplying AC power to the traction motor.

SMOOTHING CONDENSER

- Smoothing condenser charges DC power from Li-ion battery.
- The smoothing condenser controls the voltage ripple which occurs as a result of IGBT switching.

CURRENT SENSORS

For U-phase and V-phase, 2 sensors each are allocated. Current sensor detects current supplied to traction motor and transmits current value feedback to motor controller. W-phase current is calculated from U-phase and V-phase values.

COOLANT TEMPERATURE SENSOR

Coolant temperature sensor detects coolant temperature in traction motor inverter.

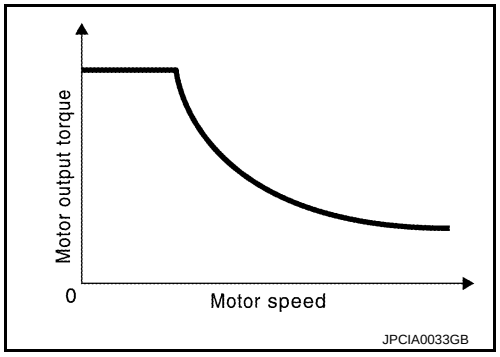
DISCHARGE RESISTER

The discharge resistor discharges the high voltage in case the traction motor inverter is unable to discharge the remaining high voltage in the high voltage circuit due to a malfunction.

Traction Motor

INFOID:0000000008140276

- The traction motor contains an “Interior Permanent Magnet Synchronous Motor (IPMSM)”. A permanent magnet is embedded inside the rotor core, and the rotating magnetic field generated by the stator coil is used to generate rotational torque.
- The traction motor is able to generate torque even when the vehicle is stopped, and outputs maximum drive torque when the vehicle starts moving in order to provide good initial acceleration.



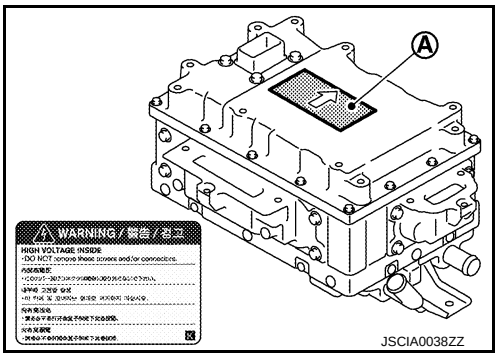
TRACTION MOTOR RESOLVER

The traction motor resolver is located coaxially with the traction motor, and detects the rotor rotation angle. The rotation angle is sent to the motor controller.

High Voltage Warning Label

INFOID:0000000008140277

- High voltage warning label is affixed to upper surface (A) of traction motor inverter.
- Always affix the label to the original position when replacing a part.

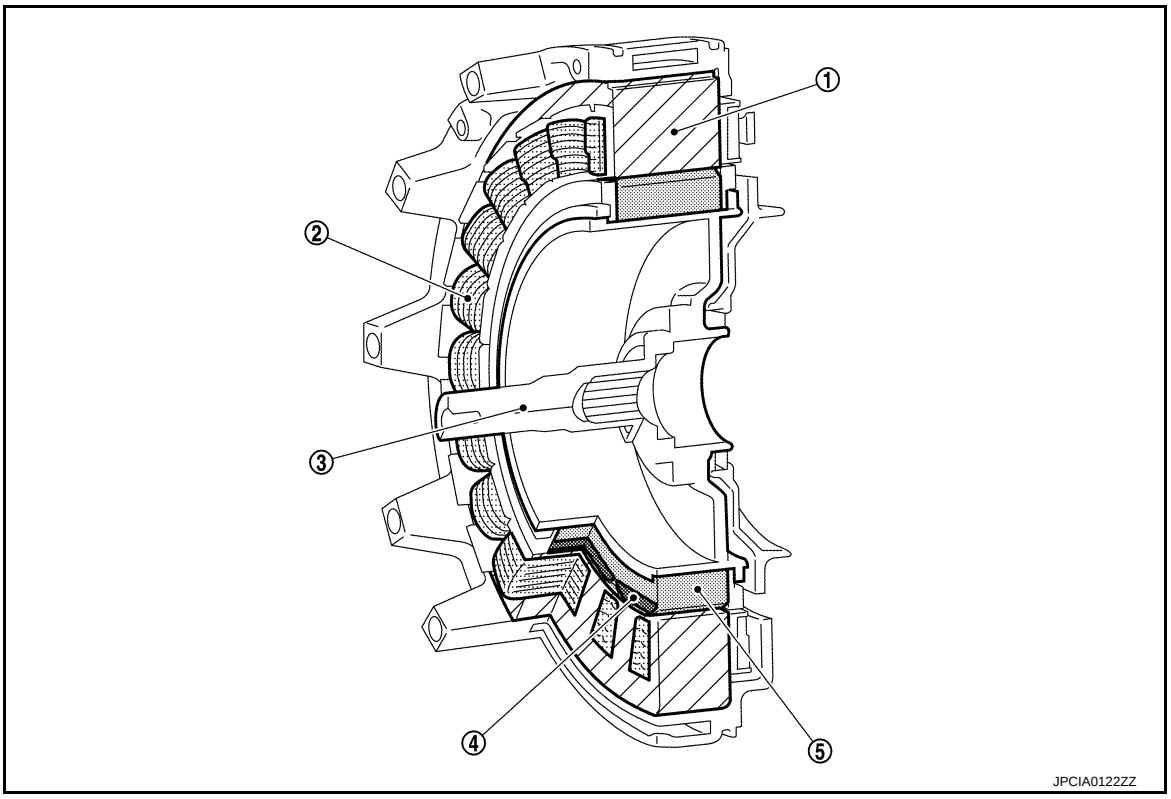


STRUCTURE AND OPERATION

Structural Drawing

INFOID:0000000008140278

MOTOR MECHANISM (DIAGRAM)

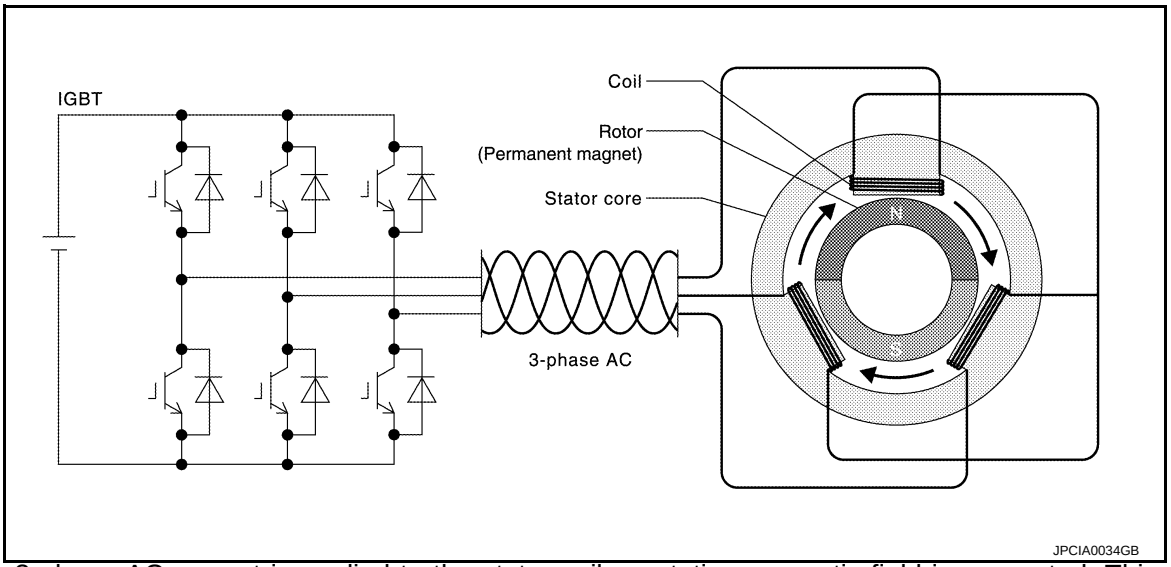


1. Stator core
2. Coil
3. Shaft
4. Permanent magnet
5. Rotor core

Opration Description

INFOID:0000000008140279

OPERATION PRINCIPLE



- When 3-phase AC current is applied to the stator coil, a rotating magnetic field is generated. This rotating magnetic field pulls on the permanent magnet inside the rotor core, generating rotational torque that is syn-

chronized with the rotating magnetic field. The generated torque is approximately proportional to the current, and the rotating speed depends on the frequency of the 3-phase current.

- In order to generate optimal rotor rotation, judgments regarding the position (angle) of the permanent magnet within the rotor core and the timing of current application to the coil are necessary. For this purpose, the traction motor resolver and current sensor are used in order to continually detect the rotating position of the rotor and control the timing of current application to the coil.

SYSTEM

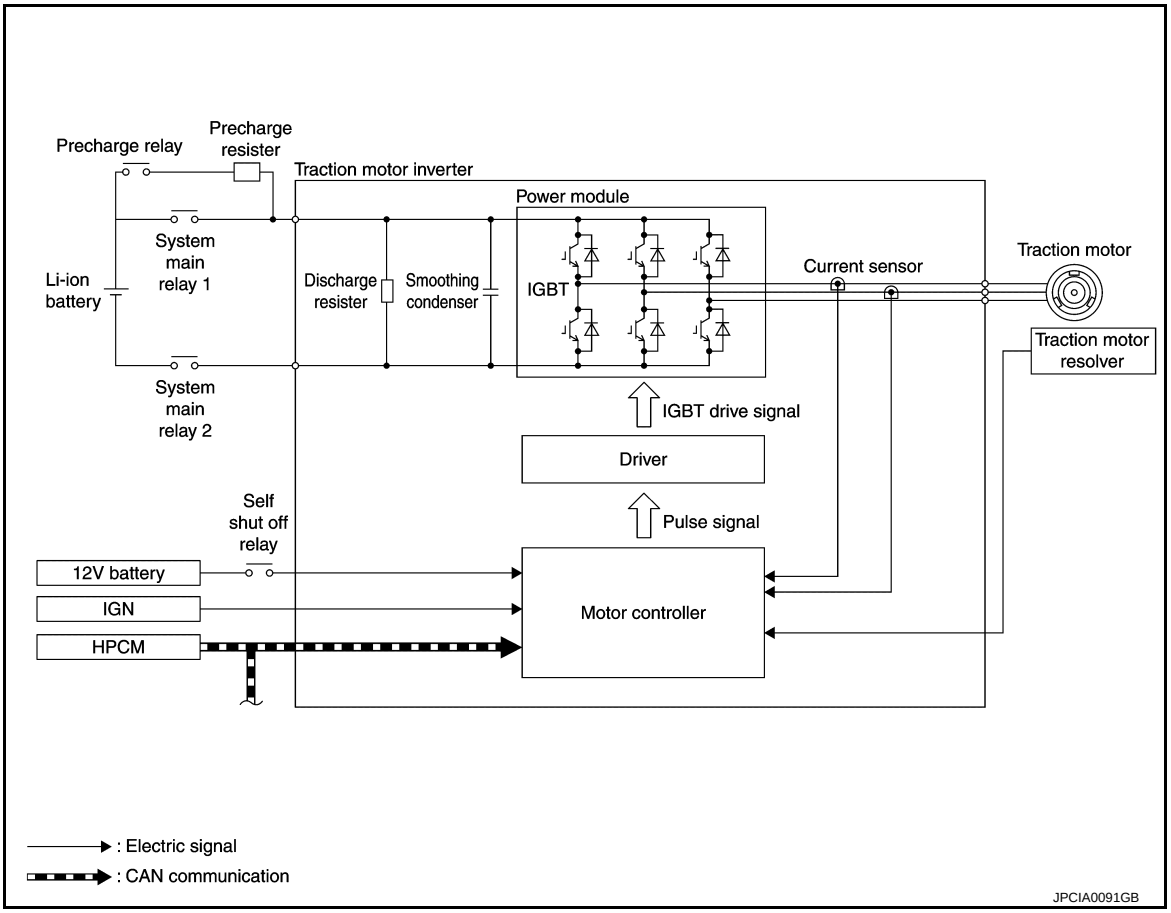
TRACTION MOTOR INVERTER

TRACTION MOTOR INVERTER : System Description

INFOID:0000000008140280

- The traction motor inverter controls the traction motor based on the drive command signal transmitted by HEV system CAN from the HPCM.
- Traction motor inverter converts DC power from Li-ion battery to AC power, and drives traction motor accurately based on resolver detection signal and current sensor detection signal.
- At deceleration, traction motor is used as generator. It converts kinetic energy generated by rotary motion of tires (AC power) to electric energy (DC power) and charges Li-ion battery.
- If malfunction is detected, the system enters fail-safe mode. Refer to TMS-28, "Fail-Safe".

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL

Item	Signal name
HPCM	• Transmits mainly the following signals to HPCM via HEV system CAN. - Motor speed signal - Motor torque limit signal - Traction motor inverter status signal • Receives mainly the following signal from HPCM via HEV system CAN. - Drive comand signal - High voltage power supply status signal - System cut off signal - Vibration control switching signal - Motor charge preparation request signal - Motor discharge request signal

TRACTION MOTOR INVERTER : Fail-Safe

INFOID:0000000008140281

DTC	Vehicle behavior
P0A02	Radiator fan Hi request is requested to HPCM (Radiator fan is always operated at Hi, regardless of engine coolant temperature and high voltage system coolant temperature.)
P0A03	Radiator fan Hi request is requested to HPCM (Radiator fan is always operated at Hi, regardless of engine coolant temperature and high voltage system coolant temperature.)
P0A1B	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0A3F	Stops drive control of traction motor
P0A40	Stops drive control of traction motor
P0A78	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0A8D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BE5	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BE6	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BE9	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BEA	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0C17	Either of following status is observed • Does not to READY • Stops drive control of traction motor
P0C4E	Does not to READY
P0C79	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P31A5	Stops drive control of traction motor
P31A6	—
P31A8	Stops drive control of traction motor
P31A9	—
P3240	Stops drive control of traction motor
P3241	Stops drive control of traction motor
P3242	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3243	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3244	—
P3245	—
P3246	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3247	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3248	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3249	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324A	Does not to READY
P324B	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324C	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324E	—
P324F	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3250	—
P3251	—
U0100	—
U0101	Stops drive control of traction motor

DTC	Vehicle behavior
U0111	—
U0293	Stops drive control of traction motor
U1000	Stops drive control of traction motor
U1002	Stops drive control of traction motor

TRACTION MOTOR INVERTER : Protection Control

INFOID:0000000008140282

Traction motor inverter, when its status is as shown in the following table, enters a protective control state in order to protect the system. It automatically returns to the normal state when safety is ensured.

Condition	Control	Normal return condition
IGBT high temperatures seen when traction motor speed is extremely low	IGBT switching frequency is reduced. **NOTE:** Traction motor electromagnetic noise increases.	• IGBT temperature drops • Traction motor speed increases
IGBT is overheated	Traction motor output torque is limited according to the IGBT temperature.	IGBT temperature drops

MOTOR POWER CONTROL

MOTOR POWER CONTROL : System Description

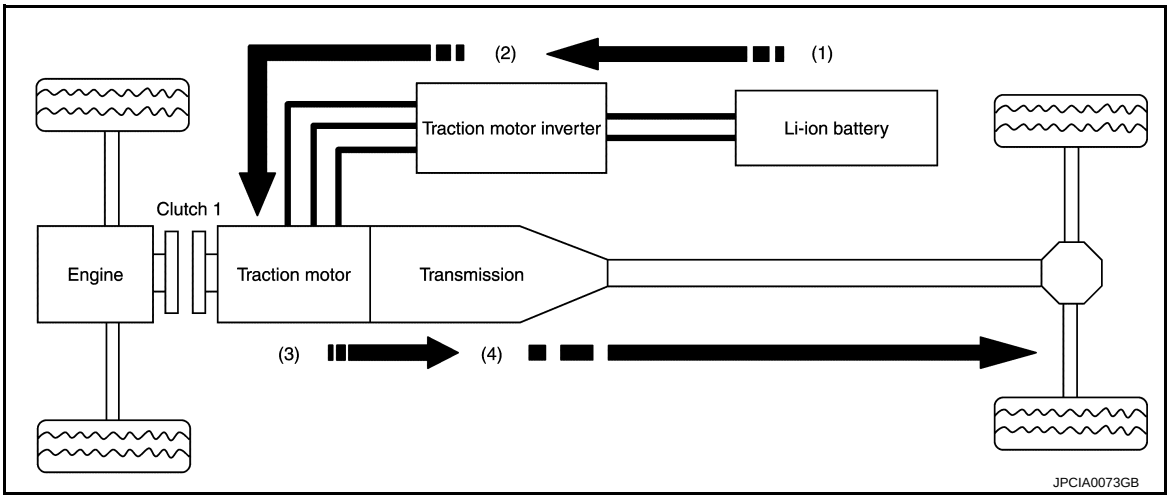
INFOID:0000000008140283

The traction motor inverter applies AC power to the traction motor according to the drive command signal calculated by HPCM in order to generate drive force.

MOTOR POWER CONTROL : Operating Principle

INFOID:0000000008140284

FLOW OF ENERGY (DRIVE BY MOTOR)



(1)		(2)		(3)		(4)
The DC power from the Li-ion battery is input to the traction motor inverter.	⇒	The traction motor inverter (IGBT) switches in order to convert the DC power from the Li-ion battery to AC power.	⇒	The AC power from the traction motor inverter is converted to magnetic energy and a rotating magnetic field is created in order to generate drive torque.	⇒	Transmission outputs traction torque from traction motor as kinetic energy.

MOTOR REGENERATION CONTROL

MOTOR REGENERATION CONTROL : System Description

INFOID:0000000008140285

REGENERATIVE BRAKE ELECTRIC GENERATION

During deceleration, the traction motor inverter drives the traction motor to function as a generator based on the signal sent via HEV system CAN from the HPCM, converting the kinetic torque generated by rotation of the tires into electrical energy. The converted electrical energy charges the Li-ion battery.
The regenerative torque that is generated when the traction motor is driven as a generator can be used as braking force, acting similar to engine braking and reducing the burden on the service brakes.

ENGINE ELECTRIC GENERATION

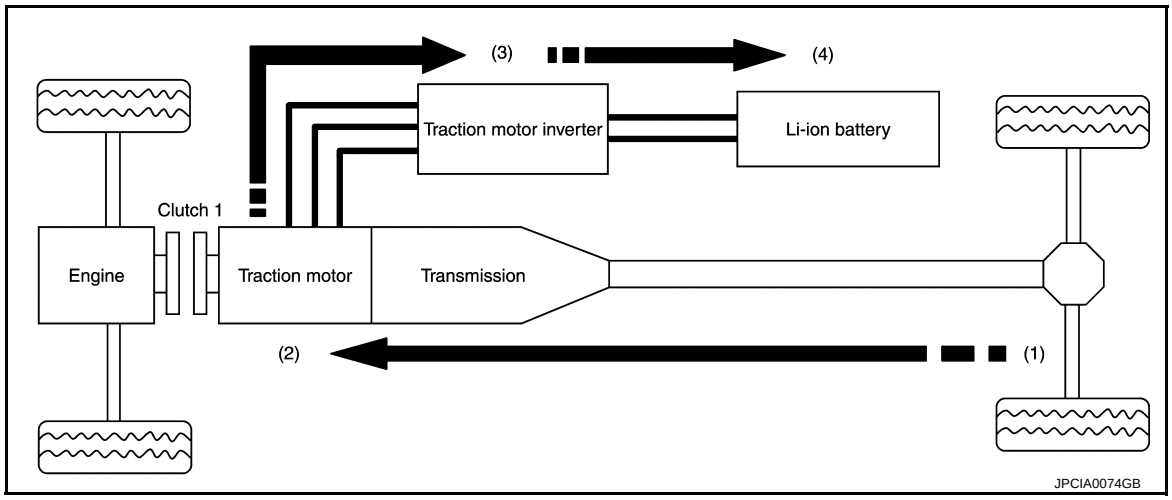
While the vehicle is driven by traction force from engine, traction motor inverter converts the engine drive force into electric energy. Converted electric energy is charged into Li-ion battery.

MOTOR REGENERATION CONTROL : Operating Principle

INFOID:0000000008140286

REGENERATIVE BRAKE ELECTRIC GENERATION

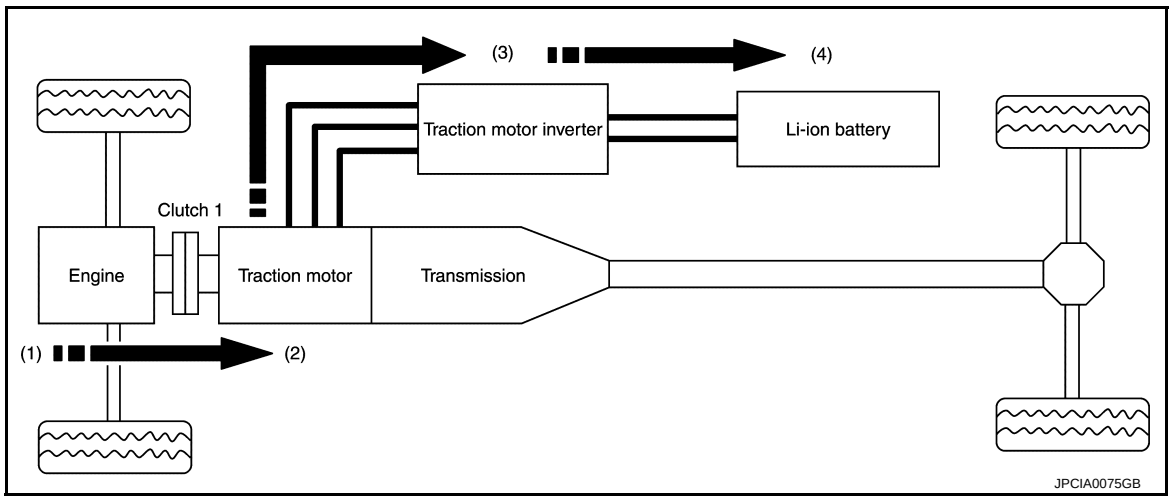
Flow of Energy



(1)		(2)		(3)		(4)
The kinetic energy generated by rotation of the tires operates the traction motor as a generator.	⇒	Rotation of the traction motor generates AC power.	⇒	The traction motor inverter (IGBT) switches in order to convert the AC power from the traction motor to DC power.	⇒	The DC power regenerated by the traction motor inverter is used to charge the Li-ion battery.

ENGINE ELECTRIC GENERATION

Flow of Energy



(1)		(2)		(3)		(4)
Traction motor is operated as a generator, according to kinetic energy generated by engine traction force.	⇒	Rotation of the traction motor generates AC power.	⇒	The traction motor inverter (IGBT) switches in order to convert the AC power from the traction motor to DC power.	⇒	The DC power regenerated by the traction motor inverter is used to charge the Li-ion battery.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000008140287

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in ECU memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

INFOID:0000000008140288

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-57, "Description".

NOTE:
Service $0A is not applied for regions where it is not mandated.

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : System Description

INFOID:0000000008140289

- This is an on-board trouble diagnosis system which automatically detects malfunction. Detected malfunction is memorized in control module as DTC. Diagnosis information can be confirmed using CONSULT.
- When malfunction is detected, traction motor inverter memorizes DTC and freeze frame data. In these diagnoses, some illuminate MIL and some do not. Refer to TMS-31, "DTC Index".

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000008140290

NOTE:
"Start the engine and turn OFF the ignition switch after warm-up." This is defined as 1 trip.
- DTC (P0A02, P0BE5, U0293, etc.) is specified by SAE J2012/ISO 15031-6.
- Traction motor inverter memorizes DTC and freeze frame data when malfunction is detected.
- Traction motor inverter can memorize plural DTCs but only 1 set of freeze frame data.
- Freeze frame data is prioritized.

Priority	DTC
1	Other than following items.
2	P0A02, P0A03, P0A8D, P0C17, P0C4E, P3247, P3248, P3249, P324A, P324B, P324C, P324E, P3250, P3251, U1000, U1002

- For example, when a priority 1 DTC is detected on another trip after a priority 2 DTC is detected and freeze frame data is recorded, freeze frame data is updated to the priority 1 DTC data, at the time it is detected. Freeze frame data is not updated and freeze frame data firstly memorized remains, when a same priority DTC is detected.
- The procedure to erase DTC from traction motor inverter memory is described in "How to Erase DTC". Refer to TMS-22, "CONSULT Function".

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000008140291

- DTC and freeze frame data are displayed until 40 trips of "Driving Pattern A" are satisfied without detecting the same malfunction. DTC and freeze frame data are erased when 40 trips are satisfied.
- The illuminated MIL can be turned off by driving 3 trips with "Driving Pattern B" under condition that the concerned DTC is not detected (malfunction is absent).

COUNTER SYSTEM LIST

Item	Driving pattern	Trip
DTC and Freeze frame data (Clear)	A	40
MIL (OFF)	B	3

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000008140292

DESCRIPTION

ECM recognizes each driving pattern; it transmits signals to each control module when the driving is complete. Each control module erases permanent DTC based on those signals.

DRIVING PATTERN A

Driving pattern A is the driving pattern that provides warm-up.
In specific, count-up is performed when all of the following conditions are satisfied.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (32°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:
- If the same malfunction is detected regardless of the driving pattern, reset the A counter.
- When the above is satisfied without detecting the same malfunction, count up the A counter.
- When MIL goes off due to the malfunction and the A counter reaches 40, the DTC is erased.

DRIVING PATTERN B

Driving pattern B is the driving pattern that performs all diagnoses once.
In specific, count-up is performed when all of the following conditions are satisfied.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- After experiencing the closed loop control with the hybrid system started (READY or engine started), vehicle speed of 4 km/h (2 MPH) or less and the status without stepping on the accelerator pedal are maintained for 12 seconds or more.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- The status with the hybrid system started (READY or engine started) is maintained for 22 minutes or more.
- The ignition switch is turned from ON to OFF.

NOTE:

- If the same malfunction is detected regardless of the driving pattern, reset the B counter.
- When the above is satisfied without detecting the same malfunction, count up the B counter.
- When the B counter reaches 3 without malfunction, MIL goes off.

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000008140293

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service $0A.
Control module stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until control module judges that there is no presence of malfunction.
Permanent DTCs cannot be erased by using the erase function of CONSULT or Generic Scan Tool (GST) and by disconnecting the 12V battery to shut off power to control module. This prevents a vehicle from passing the use inspection without repairing a malfunctioning part.
When not passing the use inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

- The important items in state emission inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

PERMANENT DTC SET TIMING

The setting timing of permanent DTC is stored in control module with the lighting of MIL when a DTC is confirmed.

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000008140294

When traction motor inverter detects a DTC which affects exhaust gas, it transmits malfunction indicator lamp (MIL) signal to HPCM via CAN communication.
For malfunction indicator lamp (MIL) description, refer toEC-52, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".

CONSULT Function

INFOID:0000000008140295

APPLICATION ITEM

Item	Function
All DTC Reading	Display all DTCs or diagnostic items that all ECUs are recording and judging.
Self Diagnostic Results	Retrieve DTC from ECU and display diagnostic items.
Data Monitor	Monitor the input/output signal of the control unit in real time.
CAN Diagnosis	This mode displays a network diagnosis result about CAN by diagram.
CAN Diagnosis Support Monitor	It monitors the status of CAN communication.
ECU Identification	Display the ECU identification number (part number etc.) of the selected system.

SELF DIAGNOSTIC RESULTS

Display Item List

Refer to TMS-31, "DTC Index".

How to Read DTC

DTC is displayed on “Self Diagnostic results” of CONSULT.

When DTC is currently detected, “CRNT” is displayed. If “PAST” is displayed, it shows a malfunction occurred in the past.The trip number of drive without malfunction of concerned DTC can be confirmed with “IGN counter” inside “FFD”.

How to Erase DTC

NOTE:

If the ignition switch is kept ON after repair operation, operate the ignition switch to OFF. Operate the ignition switch to ON again after waiting at least 10 seconds.

1. Touch “MOTOR CONTROL” of CONSULT.
2. Touch “Self Diagnostic Result”.
3. Touch “Erase”. (DTC memorized in electric traction motor inverter is erased.)

IGN Counter

The IGN counter is displayed in “FFD” and the number of times of satisfied “Driving condition A” is displayed after normal recovery of DTC.

- If malfunction (DTC) is currently detected, “0” is displayed.
- After normal recovery, every time “Driving condition A” is satisfied, the display value increases from 1 → 2 → 3...38 → 39...
- When the number reaches to 40, DTC is erased.

  NOTE:

  The counter display of “40” cannot be checked.

FREEZE FRAME DATA (FFD)

The following vehicle status is recorded when DTC is detected and is displayed on CONSULT.

Monitored item (Unit)		Remarks
DTC	(%)	Displays the DTC which caused freeze frame data memory
CALCULATE LOAD VALUE	(°C or °F)	Displays the calculation load value of engine from ECM via CAN communication
ENG COOLANT TEMP	(°C or °F)	Displays the engine coolant temperature from ECM via CAN communication
ENGINE SPEED	(rpm)	Displays the engine speed from ECM via CAN communication
VEHICLE SPEED	(km/h or MPH)	Displays the vehicle speed from ECM via CAN communication
THROTTLE ABSOLUTE POSITION	(%)	Displays the throttle position information from ECM via CAN communication
ENGINE RUN TIME	(sec)	Displays the elapsed time of after engine start from ECM via CAN communication
12V POWER VOLTAGE	(V)	Displays 12V battery power voltage input to traction motor inverter
THROTTLE ABSOLUTE POSITION B	(%)	Displays the throttle position information from ECM via CAN communication
DETAIL DTC		Displays the detailed diagnosis trouble code (DTC)
TORQUE LIMIT RATE	(%)	Displays the output torque limit rate
TORQUE LIMIT (UPPER)	(Nm)	Displays the torque limitation (upper) signal value from HPCM via HEV system CAN
TORQUE LIMIT (LOWER)	(Nm)	Displays the torque limitation (lower) signal value from HPCM via HEV system CAN
RESOLVER OFFSET VALUE	(deg)	Displays the resolver offset value from TCM via CAN communication
MOTOR TEMPERATURE	(°C or °F)	Displays the temperature of traction motor
MAX MOTOR TEMPERATURE	(°C or °F)	Displays the highest temperature of traction motor
MIN MOTOR TEMPERATURE	(°C or °F)	Displays the lowest temperature of traction motor
No. OF MOTOR OVER HEAT		Displays the number of times that traction motor temperature exceeds the standard value
INVERTER TEMPERATURE	(°C or °F)	Displays the inside temperature of traction motor inverter

Monitored item (Unit)		Remarks
MAX INV TEMPERATURE	(°C or °F)	Displays the highest temperature of traction motor inverter
MIN INV TEMPERATURE	(°C or °F)	Displays the lowest temperature of traction motor inverter
No. OF INV OVER HEAT		Displays the number of times that traction motor inverter temperature exceeds the standard value
HV WATER TEMP	(°C or °F)	Displays the inside coolant temperature of traction motor inverter
MAX WATER TEMP		Displays the highest inside coolant temperature of traction motor inverter
MIN WATER TEMP		Displays the lowest inside coolant temperature of traction motor inverter
No. OF WATER TEMP OVER HEAT		Displays the number of times that inside coolant temperature of traction motor inverter exceeds the standard value
INVERTER TEMPERATURE 5	(°C or °F)	Displays the inside temperature of traction motor inverter
MAX INV TEMPERATURE 5	(°C or °F)	Displays the highest temperature of traction motor inverter
No. OF INV OVER HEAT 5		Displays the number of times that traction motor inverter temperature exceeds the standard value
INVERTER TEMPERATURE 4	(°C or °F)	Displays the inside temperature of traction motor inverter
MAX INV TEMPERATURE 4	(°C or °F)	Displays the highest temperature of traction motor inverter
No. OF INV OVER HEAT 4		Displays the number of times that traction motor inverter temperature exceeds the standard value
INV INPUT HIGH VOLTAGE	(V)	Displays high voltage input to traction motor inverter
Li-ion BAT TOTAL VOLTAGE	(V)	Displays the Li-ion battery voltage from Li-ion battery controller via HEV system CAN
COMMAND TORQUE	(Nm)	Displays the torque command value from HPCM via HEV system CAN
COMMAND MOTOR SPEED	(rpm)	Displays the motor speed command value from HPCM via HEV system CAN
MOTOR SPEED	(rpm)	Displays the traction motor speed
COMMAND MTR d CURRENT	(A)	Displays the command value of current (d-axis) of traction motor
MOTOR d CURRENT	(A)	Displays the detected value of current (d-axis) of traction motor
COMMAND MTR q CURRENT	(A)	Displays the command value of current (q-axis) of traction motor
MOTOR q CURRENT	(A)	Displays the detected value of current (q-axis) of traction motor
COMMAND MTR d VOLTAGE	(V)	Displays the command value of voltage (d-axis) of traction motor
COMMAND MTR q VOLTAGE	(V)	Displays the command value of voltage (q-axis) of traction motor
COMMAND MTR d CURRENT	(A)	Displays the command value of current (d-axis) of traction motor
U PHASE CURRENT	(A)	Displays the U-phase current detected value
V PHASE CURRENT	(A)	Displays the V-phase current detected value
SEQUENCE MODE		Displays the sequence number in motor controller
RF CONTROL SIGNAL		Displays the radiator fun drive request status to HPCM via HEV system CAN
SLEEP REFUSE SIGNAL		Displays the sleep refuse status
MIL REQUEST		Displays the MIL request status to HPCM via HEV system CAN
FAIL-SAFE STATUS		Displays the fail safe status of traction motor inverter
DISCHARGE STATUS		Displays that high voltage circuit is under discharge
MOTOR CONTROL STATUS		Displays the set status of traction motor control
CHARGE JUDGE		Displays the charge status of high voltage circuit
CHARGE PERMIT		Displays the charge permission status
CONTROL MODE		Displays the torque control or speed control status of traction motor inverter
COAST JUDGEMENT		Displays the coast judgement status from HPCM via HEV system CAN
ENGINE START COLD		Displays the status of engine started at cold temperature from HPCM via HEV system CAN
TORQUE/REV CONTROL		Displays the command status of torque control or speed control from HPCM via HEV system CAN

Monitored item (Unit)	Remarks
CL1 CONDITION	Displays the clutch 1 condition from HPCM via HEV system CAN
EGVR OPERATION	Displays the EGVR control status from HPCM via HEV system CAN
HIGH VOLTAGE SUPPLY	Displays the high voltage supply status from HPCM via HEV system CAN
START/STOP REQUEST	Displays the start/stop request status from HPCM via HEV system CAN
CHARGE RELAY READY REQ	Displays the start request status of charge judgement of high voltage circuit from HPCM via HEV system CAN
NEXT GEAR POSITION	Displays the next gear position from TCM via HEV system CAN
PRESENT GEAR POSITION	Displays the present gear position from TCM via HEV system CAN
PWM OFF REQUEST	Displays the pulse signal off request status from HPCM via HEV system CAN
SYSTEM CUT OFF COMPLETE	Displays the system cut off status from HPCM via HEV system CAN
DISCHARGE REQUEST	Displays the discharge request status from HPCM via HEV system CAN
VIBRATION CONT REQUEST	Displays the vibration control switching request status from HPCM via HEV system CAN
DIAG PROHIBIT	Displays the CAN diagnosis inhibition status from HPCM via HEV system CAN
WAKE UP SLEEP COMMAND	Displays the wake up/sleep request status from HPCM via HEV system CAN

DATA MONITOR

Monitored item (Unit)		Remarks
DIAGNOSIS STATUS A		Displays the number of DTC of emission related
DIAGNOSIS STATUS B UPPER		Displays the diagnosis support status of emission related
DIAGNOSIS STATUS B LOWER		Displays the diagnosis support status of emission related
DIAGNOSIS STATUS C		Displays the diagnosis support status of emission related
DIAGNOSIS STATUS D		Displays the diagnosis support status of emission related
CALCULATE LOAD VALUE	(°C or °F)	Displays the calculation load value of engine from ECM via CAN communication
ENG COOLANT TEMP	(°C or °F)	Displays the engine coolant temperature from ECM via CAN communication
VEHICLE SPEED	(km/h or MPH)	Displays the vehicle speed from ECM via CAN communication
THROTTLE ABSOLUTE POS	(%)	Displays the throttle position information from ECM via CAN communication
NUMBER OF P-DTC		Displays the number of permanent DTC
EOBD/OBD II		Displays the OBD adaptation
RESERVE		—
MONITOR STATUS B UPPER		Displays the diagnosis support status of emission related
MONITOR STATUS B LOWER		Displays the diagnosis support status of emission related
MONITOR STATUS C		Displays the diagnosis support status of emission related
MONITOR STATUS D		Displays the diagnosis support status of emission related
THROTTLE ABSOLUTE POS B	(%)	Displays the throttle position information from ECM via CAN communication
MOTOR TEMPERATURE	(°C or °F)	Displays the temperature of traction motor
INVERTER TEMPERATURE	(°C or °F)	Displays the inside temperature of traction motor inverter
HV WATER TEMP	(°C or °F)	Displays the inside coolant temperature of traction motor inverter
INVERTER TEMPERATURE 4	(°C or °F)	Displays the inside temperature of traction motor inverter
ENGINE SPEED	(rpm)	Displays the engine speed from ECM via CAN communication
ENGINE RUN TIME	(sec)	Displays the elapsed time of after engine start from ECM via CAN communication
DTC ON RUN DISTANCE	(km or mile)	Displays the running distance from detected DTC
12V POWER VOLTAGE	(V)	Displays 12V battery power voltage input to traction motor inverter

Monitored item (Unit)		Remarks
INV INPUT HIGH VOLTAGE	(V)	Displays high voltage input to traction motor inverter
COMMAND TORQUE	(Nm)	Displays the torque command value from VCM via HEV system CAN
COMMAND MOTOR SPEED	(rpm)	Displays the motor speed command value from HPCM via HEV system CAN
MOTOR SPEED	(rpm)	Displays the traction motor speed
SEQUENCE MODE		Displays the sequence number in motor controller
RF CONTROL SIGNAL		Displays the radiator fun drive request status to HPCM via HEV system CAN
TORQUE/REV CONT CHANGE		Displays the command status of torque control or speed control from HPCM via HEV system CAN

ECU DIAGNOSIS INFORMATION

TRACTION MOTOR INVERTER

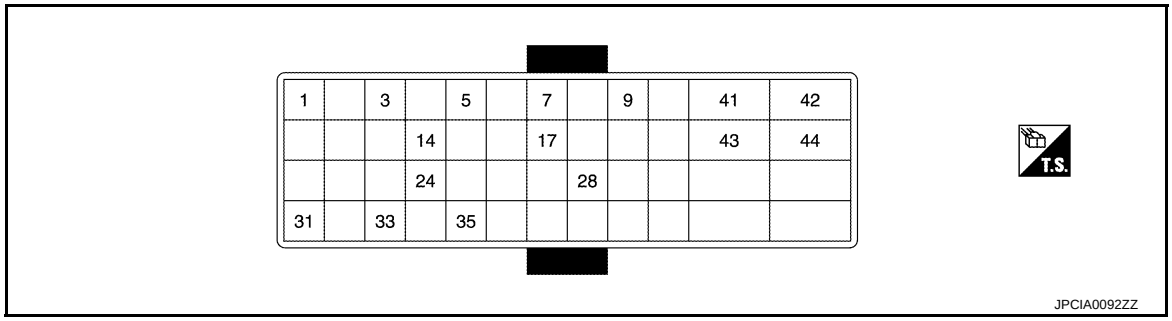
Reference Value

INFOID:0000000008140296

VALUES ON DIAGNOSIS TOOL

Monitor item	Condition	Value / Status (Approx.)
DIAGNOSIS STATUS A	Ignition switch ON	0
DIAGNOSIS STATUS B UPPER	Ignition switch ON	4
DIAGNOSIS STATUS B LOWER	Ignition switch ON	0
DIAGNOSIS STATUS C	Ignition switch ON	0
DIAGNOSIS STATUS D	Ignition switch ON	0
CALCULATE LOAD VALUE	—	—
ENG COOLANT TEMP	After engine warm-up	70°C (158°F) or more
VEHICLE SPEED	While driving	The value changes along with driving.
THROTTLE ABSOLUTE POS	Accelerator pedal released	0%
	Accelerator pedal fully depressed	100%
NUMBER OF P-DTC	—	—
EOBD/OBD II	Ignition switch ON	7
RESERVE	Ignition switch ON	0
MONITOR STATUS B UPPER	Ignition switch ON	4
MONITOR STATUS B LOWER	Ignition switch ON	0
MONITOR STATUS C	Ignition switch ON	0
MONITOR STATUS D	Ignition switch ON	0
THROTTLE ABSOLUTE POS B	Accelerator pedal released	0%
	Accelerator pedal fully depressed	100%
MOTOR TEMPERATURE	Drive by Motor	The value changes along with driving.
INVERTER TEMPERATURE	Drive by Motor	The value changes along with driving.
HV WATER TEMP	Drive by Motor	The value changes along with driving.
INVERTER TEMPERATURE 5	Drive by Motor	The value changes along with driving.
ENGINE SPEED	Drive by Engine	The value changes along with acceleration/deceleration.
ENGINE RUN TIME	—	—
DTC ON RUN DISTANCE	—	—
12V POWER VOLTAGE	Ignition switch ON	10 – 16 V
INV INPUT HIGH VOLTAGE	READY (stop the vehicle) and drive by motor	240 – 403 V
COMMAND TORQUE	Drive by Motor	The value changes along with acceleration/deceleration.
COMMAND MOTOR SPEED	Drive by Motor	The value changes along with acceleration/deceleration.
MOTOR SPEED	Drive by Motor	The value changes along with acceleration/deceleration.
SEQUENCE MODE	READY (stop the vehicle)	11
RF CONTROL SIGNAL	—	—
TORQUE/REV CONT CHANGE	—	—

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Color)		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
1 (G)	3 (L)	Traction motor resolver signal (S1 – S3)	Input	Ignition switch OFF	28 – 52 Ω
5 (R)	7 (W)	Traction motor resolver signal (S2 – S4)	Input	Ignition switch OFF	23 – 43 Ω
9 (L)	—	HEV system CAN-H	Input/ Output	—	—
17 (G)	35 (R)	Traction motor resolver signal (R1 – R2)	Output	Ignition switch OFF	7 – 14 Ω
24 (L)	14 (P)	Traction Motor Temperature Sensor	Input	—	—
28 (G)	—	HEV system CAN-L	Input/ Output	—	—
31 (Y)	Ground	Power supply (IGN)	—	Ignition switch ON	10 – 16 V
				Ignition switch OFF	0 V
33 (W)	—	Connection detection	Input/ Output	—	—
41 (B)	Ground	GND	—	Always	0 V
42 (P)	Ground	Power supply (BAT)	—	Ignition switch ON	10 – 16 V
				Ignition switch OFF	0 V
43 (B)	Ground	GND	—	Always	0 V
44 (P)	Ground	Power supply (BAT)	—	Ignition switch ON	10 – 16 V
				Ignition switch OFF	0 V

Fail-Safe

INFOID:0000000008140297

DTC	Vehicle behavior
P0A02	Radiator fan Hi request is requested to HPCM (Radiator fan is always operated at Hi, regardless of engine coolant temperature and high voltage system coolant temperature.)
P0A03	Radiator fan Hi request is requested to HPCM (Radiator fan is always operated at Hi, regardless of engine coolant temperature and high voltage system coolant temperature.)
P0A1B	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0A3F	Stops drive control of traction motor

DTC	Vehicle behavior
P0A40	Stops drive control of traction motor
P0A78	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0A8D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BE5	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BE6	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BE9	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BEA	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0C17	Either of following status is observed • Does not to READY • Stops drive control of traction motor
P0C4E	Does not to READY
P0C79	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P31A5	Stops drive control of traction motor
P31A6	—
P31A8	Stops drive control of traction motor
P31A9	—
P3240	Stops drive control of traction motor
P3241	Stops drive control of traction motor
P3242	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3243	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3244	—
P3245	—
P3246	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3247	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3248	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3249	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324A	Does not to READY
P324B	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324C	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324E	—
P324F	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3250	—
P3251	—
U0100	—
U0101	Stops drive control of traction motor
U0111	—
U0293	Stops drive control of traction motor
U1000	Stops drive control of traction motor
U1002	Stops drive control of traction motor

Protection Control

INFOID:0000000008140298

Traction motor inverter, when its status is as shown in the following table, enters a protective control state in order to protect the system. It automatically returns to the normal state when safety is ensured.

Condition	Control	Normal return condition
IGBT high temperatures seen when traction motor speed is extremely low	IGBT switching frequency is reduced. **NOTE:** Traction motor electromagnetic noise increases.	• IGBT temperature drops • Traction motor speed increases
IGBT is overheated	Traction motor output torque is limited according to the IGBT temperature.	IGBT temperature drops

DTC Inspection Priority Chart

INFOID:0000000008140299

If some DTCs are displayed at the same time, perform inspections one by one based on the priority as per the following list.

Priority	Detected items		Reference
1	P0A8D	14VOLT POWER VOLTAGE	TMS-53
2	P0A3F	DRIVE MOTOR A POSITION SENSOR	TMS-45
	P0A40	DRIVE MOTOR A POSITION SENSOR	TMS-48
	P0C17	DRIVE MOTOR A POSITION SENSOR	TMS-63
	P0C4E	DRIVE MOTOR A POSITION SENSOR	TMS-66
	P0C79	DRIVE MOTOR A INVERTER VOLTAGE	TMS-67
	P31A5	CAN ERROR	TMS-69
	P31A6	CAN ERROR	TMS-70
	P31A8	CAN ERROR	TMS-71
	P31A9	CAN ERROR	TMS-72
	P3240	DRIVE MOTOR A INVERTER CRNT CONT	TMS-73
	P3241	DRIVE MOTOR A INVERTER CRNT CONT	TMS-76
	P3244	DRIVE MOTOR A INVERTER	TMS-82
	P3246	DRIVE MOTOR A INVERTER VOLTAGE	TMS-86
	P324A	DRIVE MOTOR A INVERTER VOLTAGE	TMS-94
	P324B	DRIVE MOTOR A INVERTER VOLTAGE	TMS-96
	P324D	DRIVE MOTOR A INVERTER IGBT	TMS-99
	P324E	IGNITION SWITCH SIGNAL	TMS-101
	P3250	CAN ERROR	TMS-105
	P3251	CAN ERROR	TMS-106
	U0100	LOST COMMUNICATION ECM	TMS-107
	U0101	LOST COMMUNICATION TCM	TMS-109
	U0111	LOST COMMUNICATION LBC	TMS-111
	U0293	LOST COMMUNICATION HCM	TMS-113
	U1000	CAN COMMUNICATION CIRCUIT	TMS-115
	U1002	CAN ERROR	TMS-116

Priority	Detected items		Reference
3	P0A02	MOTOR COOLANT TEMP SENSOR	TMS-39
	P0A03	MOTOR COOLANT TEMP SENSOR	TMS-41
	P0A1B	DRIVE MOTOR A CONTROL MODULE	TMS-43
	P0A78	DRIVE MOTOR A INVERTER	TMS-51
	P0BE5	D-MOTOR A PHASE U CURRENT SEN	TMS-55
	P0BE6	D-MOTOR A PHASE U CURRENT SEN	TMS-57
	P0BE9	D-MOTOR A PHASE V CURRENT SEN	TMS-59
	P0BEA	D-MOTOR A PHASE V CURRENT SEN	TMS-61
	P3242	D-MOTOR A PHASE U CURRENT SEN	TMS-78
	P3243	D-MOTOR A PHASE V CURRENT SEN	TMS-80
	P3245	DRIVE MOTOR A INVERTER	TMS-84
	P3247	DRIVE MOTOR A INVERTER	TMS-88
	P3248	DRIVE MOTOR A INVERTER	TMS-90
	P3249	DRIVE MOTOR A INVERTER	TMS-92
4	P324C	DRIVE MOTOR A INVERTER CURRENT	TMS-98
	P324F	DRIVE MOTOR A INVERTER IGBT	TMS-103

DTC Index

INFOID:0000000008140300

NOTE:
If some DTCs are displayed at the same time, perform inspections one by one based on the priority as per the following list. Refer to TMS-30, "DTC Inspection Priority Chart".

DTC*	Items (CONSULT screen terms)	MIL*2	Permanent DTC group*3	Hybrid system warning lamp	Reference
CONSULT					
P0A02	MOTOR COOLANT TEMP SENSOR	—	—	—	TMS-39
P0A03	MOTOR COOLANT TEMP SENSOR	—	—	—	TMS-41
P0A1B	DRIVE MOTOR A CONTROL MODULE	ON	B	ON	TMS-43
P0A3F	DRIVE MOTOR A POSITION SENSOR	ON	B	ON	TMS-45
P0A40	DRIVE MOTOR A POSITION SENSOR	ON	B	ON	TMS-48
P0A78	DRIVE MOTOR A INVERTER	ON	B	ON	TMS-51
P0A8D	14VOLT POWER VOLTAGE	—	—	ON	TMS-53
P0BE5	D-MOTOR A PHASE U CURRENT SEN	ON	B	ON	TMS-55
P0BE6	D-MOTOR A PHASE U CURRENT SEN	ON	B	ON	TMS-57
P0BE9	D-MOTOR A PHASE V CURRENT SEN	ON	B	ON	TMS-59
P0BEA	D-MOTOR A PHASE V CURRENT SEN	ON	B	ON	TMS-61
P0C17	DRIVE MOTOR A POSITION SENSOR	—	—	ON	TMS-63
P0C4E	DRIVE MOTOR A POSITION SENSOR	—	—	ON	TMS-66
P0C79	DRIVE MOTOR A INVERTER VOLTAGE	ON	B	ON	TMS-67
P31A5	CAN ERROR	ON	B	ON	TMS-69
P31A6	CAN ERROR	ON	B	—	TMS-70
P31A8	CAN ERROR	ON	B	Can illuminate	TMS-71
P31A9	CAN ERROR	ON	B	—	TMS-72
P3240	DRIVE MOTOR A INVERTER CRNT CONT	ON	B	ON	TMS-73
P3241	DRIVE MOTOR A INVERTER CRNT CONT	ON	B	ON	TMS-76
P3242	D-MOTOR A PHASE U CURRENT SEN	ON	B	ON	TMS-78

DTC* CONSULT	Items (CONSULT screen terms)	MIL*2	Permanent DTC group*3	Hybrid system warning lamp	Reference
P3243	D-MOTOR A PHASE V CURRENT SEN	ON	B	ON	TMS-80
P3244	DRIVE MOTOR A INVERTER	ON	B	—	TMS-82
P3245	DRIVE MOTOR A INVERTER	ON	B	—	TMS-84
P3246	DRIVE MOTOR A INVERTER VOLTAGE	ON	B	ON	TMS-86
P3247	DRIVE MOTOR A INVERTER	—	—	ON	TMS-88
P3248	DRIVE MOTOR A INVERTER	—	—	ON	TMS-90
P3249	DRIVE MOTOR A INVERTER	—	—	ON	TMS-92
P324A	DRIVE MOTOR A INVERTER VOLTAGE	—	—	ON	TMS-94
P324B	DRIVE MOTOR A INVERTER VOLTAGE	—	—	ON	TMS-96
P324C	DRIVE MOTOR A INVERTER CURRENT	—	—	ON	TMS-98
P324D	DRIVE MOTOR A INVERTER IGBT	ON	B	ON	TMS-99
P324E	IGNITION SWITCH SIGNAL	—	—	ON	TMS-101
P324F	DRIVE MOTOR A INVERTER IGBT	ON	B	ON	TMS-103
P3250	CAN ERROR	—	—	—	TMS-105
P3251	CAN ERROR	—	—	—	TMS-106
U0100	LOST COMMUNICATION ECM	ON	B	—	TMS-107
U0101	LOST COMMUNICATION TCM	ON	B	Can illuminate	TMS-109
U0111	LOST COMMUNICATION LBC	ON	B	—	TMS-111
U0293	LOST COMMUNICATION HCM	ON	B	Can illuminate	TMS-113
U1000	CAN COMMUNICATION CIRCUIT	—	—	ON	TMS-115
U1002	CAN ERROR	—	—	ON	TMS-116

*1: These numbers are prescribed by SAE J2012/ISO 15031-6.

*2: Refer to EC-52, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".

*3: Refer to TMS-38, "Description".

Index of HPCM-detected DTC

INFOID:0000000008140301

When a DTC in the following table is detected by traction motor inverter, HPCM also detects a DTC.

DTC	DTC of HPCM
P324A	P3176
P0A3F, P0A40, P0C17, P0C4E	P3177
P0A1B, P0A78	P3178
P0A1B, P324E	P3179
P0A1B, P0A3F, P0A40, P0A78, P0C17, P0C4E, P31A5, P31A8, P3240, P3241, P3247, U0101, U0293, U1000, U1002	P317A
P0A1B, P0A8D, P0BE5, P0BE6, P0BE9, P0BEA, P0C79, P3242, P3243, P3246, P3248, P3249, P324A, P324B, P324C, P324D, P324F	P317B

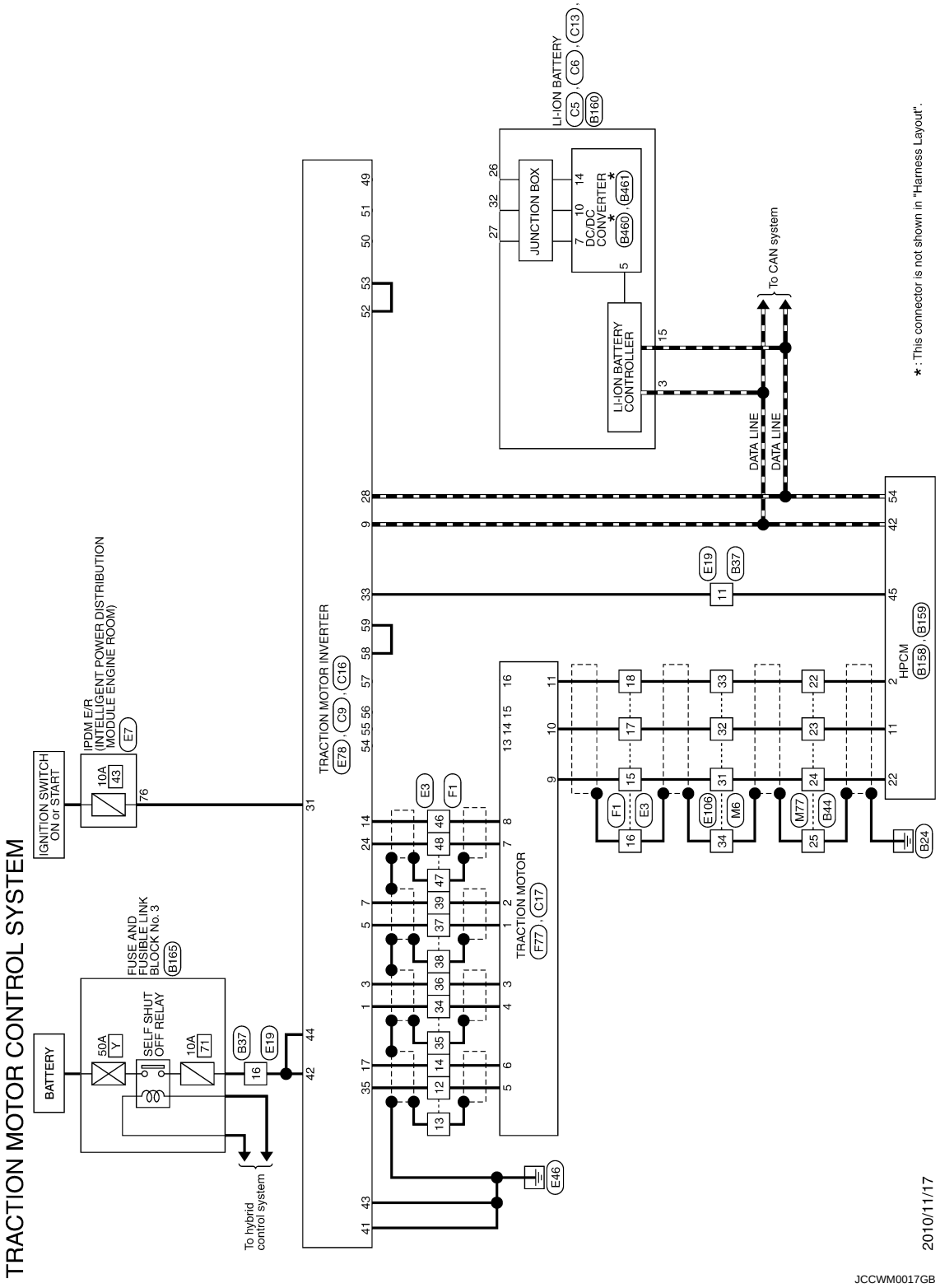
WIRING DIAGRAM

TRACTION MOTOR INVERTER

Wiring Diagram

INFOID:0000000008140302

For connector terminal arrangements, harness layouts, and alphabets in a ⬭ (option abbreviation; if not described in wiring diagram), refer to GI-13, "Connector Information".


TRACTION MOTOR CONTROL SYSTEM
IGNITION SWITCH ON or START
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E7
10A 43
76
BATTERY
50A Y
FUSE AND FUSIBLE LINK BLOCK No.3
B165
SELF SHUT OFF RELAY
10A 71
B37
E19
16
To hybrid control system
TRACTION MOTOR INVERTER
E78, C9, C16
TRACTION MOTOR
F77, C17
E3
F1
E46
LI-ION BATTERY
C5, C6, C13, B160
JUNCTION BOX
DC/DC CONVERTER
B460, B461
LI-ION BATTERY CONTROLLER
To CAN system
DATA LINE
DATA LINE
HPCM
B158, B159
E106
M6
M77
B44
B24
*: This connector is not shown in "Harness Layout".
2010/11/17
JCCWM0017GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000008140303

1.OBTAIN INFORMATION ABOUT SYMPTOM

Refer to TMS-36, "Question sheet" and interview the customer to obtain the malfunction information (conditions and environment when the malfunction occurred) as much as possible when the customer brings in the vehicle.

>> GO TO 2.

2.CHECK DTC

1. Before checking the malfunction, check whether any DTC exists.
2. If DTC exists, perform the following operations.

- Record the DTC and freeze frame data. (Print out the data using CONSULT and affix them to the Work Order Sheet.)
- Erase DTCs.
- Check the relationship between the cause that is clarified with DTC and the malfunction information described by the customer.

3. Check the information of related service bulletins and others also.

Do malfunction information and DTC exist?

Malfunction information and DTC exists. >>GO TO 3.
Malfunction information exists, but no DTC. >>GO TO 4.
No malfunction information, but DTC exists. >>GO TO 5.

3.REPRODUCE MALFUNCTION SYMPTOM

Check any malfunction described by a customer, except those with DTC on the vehicle.
Also investigate whether the symptom is a fail-safe or normal operation. Refer to TMS-28, "Fail-Safe".
When a malfunction symptom is reproduced, the question sheet is effective. Refer to TMS-36, "Question sheet".
Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 5.

4.REPRODUCE MALFUNCTION SYMPTOM

Check the malfunction described by the customer on the vehicle.
Also investigate whether the symptom is a normal operation. Refer to TMS-28, "Fail-Safe".
When a malfunction symptom is reproduced, the question sheet is effective. Refer to TMS-36, "Question sheet".
Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 7.

5.PERFORM “DTC CONFIRMATION PROCEDURE”

Perform “DTC CONFIRMATION PROCEDURE” of the appropriate DTC to check if DTC is detected again.
Refer to TMS-30, "DTC Inspection Priority Chart" when multiple DTCs are detected, and then determine the order for performing the diagnosis.

NOTE:
If no DTC is detected, refer to the freeze frame data.

Is any DTC detected?

YES >> GO TO 6.
NO >> Check according to GI-49, "Intermittent Incident".

6.REPAIR OR REPLACE THE MALFUNCTIONING PARTS

Repair or replace the detected malfunctioning parts.
Reconnect parts or connector after repairing or replacing, and then erase DTC if necessary.

>> GO TO 7.

7. FINAL CHECK

Perform “DTC CONFIRMATION PROCEDURE” again to make sure that the repair is correctly performed.
Check that malfunctions are not reproduced when obtaining the malfunction information from the customer, referring to the symptom inspection result in step 3 or 4.

Is DTC or malfunction symptom reproduced?

YES >> GO TO 2.
NO >> Before delivering the vehicle to the customer, make sure that DTC is erased.

Question sheet

INFOID:0000000008140304

DESCRIPTION

By understanding those conditions properly, a quick and exact diagnosis can be achieved.
In general, customers have their own criteria for a problem. Therefore, it is important to understand the symptom and status well enough by asking the customer about the concerns carefully. In order to systemize all the information for the diagnosis, prepare the question sheet referring to the question points.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

WORKSHEET SAMPLE

Question Sheet						
Customer name MR/MS		Motor No.			Inverter No.	
		Model & Year			Incident Date	
		VIN			Trans.	
		In Service Date			Mileage	km/mile
Symptoms		☐ Does not start	☐ Hybrid system warning lamp is on			☐ Does not to READY
		☐ Water leak*	☐ Noise*	☐ Vibration*	☐ Shock*	☐ Gear noise*
		☐ Non driving*	☐ Poor acceleration*		☐ Poor torque*	☐ Radio noise*
		☐ Other*				*: If applied, enter in detail
		Detailed symptom				
		Onomatopoeia				
Frequency		☐ All the time	☐ Once	☐ Sometimes (times a day)		☐ Other
Weather conditions		☐ Not affected				
	Weather	☐ Fine	☐ Clouding	☐ Raining	☐ Snowing	☐ Other ( )
	Temp.	☐ Hot	☐ Warm	☐ Cool	☐ Cold	☐ Temp. (Approx. °C/ °F)
	Humidity	☐ High	☐ Middle	☐ Low	☐ Humidity (Approx. %)	

Question Sheet					
Road conditions	☐ Not affected	☐ In town	☐ Freeway	☐ Off road (Up / Down)	☐ Deplorable road
	☐ Flat road	☐ While turning (Right / Left)		☐ Bump	
	☐ Other				
Shift position	☐ Not affected				
	☐ P position	☐ R position	☐ N position	☐ D position	☐ M mode
Gear position	☐ 1st	☐ 2nd	☐ 3rd	☐ 4th	☐ 5th
	☐ 6th	☐ 7th	☐ All gear		
	☐ Shift up ( ) → ( )			☐ Shift down ( ) → ( )	
Shift speed	☐ Slowly	☐ Usually	☐ Speedy	☐ Other	
Driving conditions	☐ Not affected				
	☐ Drive by engine		☐ Drive by motor		☐ Idling
	☐ Ignition switch ON → OFF		☐ Ignition switch OFF → ON		☐ READY (stop the vehicle)
	☐ While cruising	☐ While decelerating	☐ Just before stopping	☐ Just after stopping	☐ D position (stop the vehicle)
	☐ Other		☐ Engine speed (rpm)		
	☐ Vehicle speed [km/h (MPH)]			☐ Accelerator pedal (/ 8)	
Moments when malfunction disappears	☐ Disappears while driving		☐ Disappears when stopped		☐ Disappears with select operation
	☐ Disappears when ignition switch is OFF			☐ Does not disappear	
	☐ Other				
Other					

HOW TO ERASE PERMANENT DTC

Description

INFOID:0000000008140305

Permanent DTC can be erased by driving each driving pattern.
ECM recognizes each driving pattern; it transmits signals to each control module when the driving is complete. Each control module erases permanent DTC based on those signals. For details, refer to EC-123, "Description".

DTC/CIRCUIT DIAGNOSIS

P0A02 MOTOR COOLANT TEMP SENSOR

DTC Logic

INFOID:0000000008140306

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A02	Motor Electronics Coolant Temperature Sensor Circuit Low	When coolant temperature value is too low	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P0A02” detected?

YES >> Go to TMS-39, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140307

1. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3. DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0A03 MOTOR COOLANT TEMP SENSOR

DTC Logic

INFOID:0000000008140308

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A03	Motor Electronics Coolant Temperature Sensor Circuit High	When coolant temperature value is too high	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P0A03” detected?

YES >> Go to TMS-41, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140309

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0A1B DRIVE MOTOR A CONTROL MODULE

DTC Logic

INFOID:0000000008140310

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A1B	Drive Motor “A” Control Module	A malfunction is detected in the traction motor inverter (motor controller)	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P0A1B” detected?

YES >> Go to TMS-43, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140311

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0A3F DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000008140312

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A3F	Drive Motor “A” Position Sensor Circuit	If there is an abnormality in the traction motor resolver detection circuit	• Harness or connector (Each circuit is open or shorted.) • Traction motor • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P0A3F” detected?

YES >> Go to TMS-45, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140313

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector and the traction motor harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Check the resistance between traction motor inverter vehicle side harness connector terminals and ground.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector		Ground	Resistance
Connector	Terminal		
E78	1	Ground	100 kΩ or more
	3		
	5		
	7		
	17		
	35		

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace damaged parts.

3. CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor harness connector.
2. Check the resistance between traction motor inverter vehicle side harness connector terminals and traction motor vehicle side harness connector terminals.
   CAUTION:
   Never damage connector terminals.

Traction motor inverter vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
E78	1	F77	4	1 Ω or less
	3		3	
	5		1	
	7		2	
	17		6	
	35		5	

3. Check the harness for short.
   CAUTION:
   Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Resistance
Connector	Terminal		
E78	1	3	100 kΩ or more
		5	
		7	
		17	
		35	
	3	5	
		7	
		17	
		35	
	5	7	
		17	
		35	
	7	17	
		35	
	17	35	

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to TMS-47, "Component Inspection (Traction Motor Resolver)".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Replace the transmission assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-190, "Removal and Installation".

Component Inspection (Traction Motor Resolver)

INFOID:0000000008140314

1. CHECK TRACTION MOTOR RESOLVER

1. Disconnect the traction motor connector.
2. Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
1	2	28 – 52 Ω
4	3	23 – 43 Ω
5	6	7 – 14 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the transmission assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-190, "Removal and Installation".

P0A40 DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000008140315

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A40	Drive Motor “A” Position Sensor Circuit Range/Performance	When traction motor resolver detection circuit malfunctions	• Harness or connector (Each circuit is open or shorted.) • Traction motor • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC.

Is “P0A40” detected?

YES >> Go to TMS-48, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140316

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector and the traction motor harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

4. CHECK TRACTION MOTOR RESOLVER CIRCUIT

Check the resistance between traction motor inverter vehicle side harness connector terminals and ground.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector		Ground	Resistance
Connector	Terminal		
E78	1	Ground	100 kΩ or more
	3		
	5		
	7		
	17		
	35		

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace damaged parts.

5. CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor harness connector.
2. Check the resistance between traction motor inverter vehicle side harness connector terminals and traction motor vehicle side harness connector terminals.
   CAUTION:
   Never damage connector terminals.

Traction motor inverter vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
E78	1	F77	4	1 Ω or less
	3		3	
	5		1	
	7		2	
	17		6	
	35		5	

3. Check the harness for short.
   CAUTION:
   Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Resistance
Connector	Terminal		
E78	1	3	100 kΩ or more
		5	
		7	
		17	
		35	
	3	5	
		7	
		17	
		35	
	5	7	
		17	
		35	
	7	17	
		35	
	17	35	

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace damaged parts.

6. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to TMS-50, "Component Inspection (Traction Motor Resolver)".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Replace the transmission assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-190, "Removal and Installation".

Component Inspection (Traction Motor Resolver)

INFOID:0000000008140317

1. CHECK TRACTION MOTOR RESOLVER

1. Disconnect the traction motor connector.
2. Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
1	2	28 – 52 Ω
4	3	23 – 43 Ω
5	6	7 – 14 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the transmission assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-190, "Removal and Installation".

P0A78 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000008140318

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A78	Drive Motor “A” Inverter Performance	A malfunction is detected in the traction motor inverter (motor controller)	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P0A78” detected?

YES >> Go to TMS-51, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140319

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0A8D 14VOLT POWER VOLTAGE

DTC Logic

INFOID:0000000008140320

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A8D	14 Volt Power Module System Voltage Low	If the 12V battery voltage is too low	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC.

Is “P0A8D” detected?

YES >> Go to TMS-53, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140321

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3

- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0BE5 D-MOTOR A PHASE U CURRENT SEN

DTC Logic

INFOID:0000000008140322

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BE5	Drive Motor “A” Phase U Current Sensor Circuit	When a difference is detected between values of traction motor U-phase current sensor 1 and current sensor 2	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY.
2. Drive the vehicle by motor.
3. Fully open the accelerator and accelerate the vehicle to 60 km/h (37 MPH).
4. Stop the vehicle.
5. Check DTC.

Is “P0BE5” detected?

YES >> Go to TMS-55, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140323

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:

Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3. DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0BE6 D-MOTOR A PHASE U CURRENT SEN

DTC Logic

INFOID:0000000008140324

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BE6	Drive Motor "A" Phase U Current Sensor Circuit Range/ Performance	If the value detected by the traction motor U-phase current sensor 1 is abnormal	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform "INSPECTION MODE 5". Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is "P0BE6" detected?

YES >> Go to TMS-57, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140325

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0BE9 D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:0000000008140326

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BE9	Drive Motor "A" Phase V Current Sensor Circuit	When a difference is detected between values of traction motor V-phase current sensor 1 and current sensor 2	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY.
2. Drive the vehicle by motor.
3. Fully open the accelerator and accelerate the vehicle to 60 km/h (37 MPH).
4. Stop the vehicle.
5. Check DTC.

Is "P0BE9" detected?

YES >> Go to TMS-59, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140327

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:

Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3. DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0BEA D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:0000000008140328

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BEA	Drive Motor “A” Phase V Current Sensor Circuit Range/ Performance	If the value detected by the traction motor V-phase current sensor 1 is abnormal	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P0BEA” detected?

YES >> Go to TMS-61, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140329

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P0C17 DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000008140330

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0C17	Drive Motor “A” Position Sensor Not Learned	When the initial position of traction motor resolver is not determined	• Harness or connector (Each circuit is open or shorted.) • Traction motor • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC.

Is “P0C17” detected?

YES >> Go to TMS-63, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140331

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector and the traction motor harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Check the resistance between traction motor inverter vehicle side harness connector terminals and ground.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector		Ground	Resistance
Connector	Terminal		
E78	1	Ground	100 kΩ or more
	3		
	5		
	7		
	17		
	35		

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3. CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor harness connector.
2. Check the resistance between traction motor inverter vehicle side harness connector terminals and traction motor vehicle side harness connector terminals.
   CAUTION:
   Never damage connector terminals.

Traction motor inverter vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
E78	1	F77	4	1 Ω or less
	3		3	
	5		1	
	7		2	
	17		6	
	35		5	

3. Check the harness for short.
   CAUTION:
   Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Resistance
Connector	Terminal		
E78	1	3	100 kΩ or more
		5	
		7	
		17	
		35	
	3	5	
		7	
		17	
		35	
	5	7	
		17	
		35	
	7	17	
		35	
	17	35	

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to TMS-64, "Component Inspection (Traction Motor Resolver)".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Replace the transmission assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-190, "Removal and Installation".

Component Inspection (Traction Motor Resolver)

INFOID:0000000008140332

1. CHECK TRACTION MOTOR RESOLVER

1. Disconnect the traction motor connector.
2. Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
1	2	28 – 52 Ω
4	3	23 – 43 Ω
5	6	7 – 14 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the transmission assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-190, "Removal and Installation".

P0C4E DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000008140333

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0C4E	Drive Motor “A” Position Exceeded Learning Limit	When traction motor resolver offset value received from TCM via HEV system CAN is not normal	• Harness or connector (Each circuit is open or shorted.) • TCM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC.

Is “P0C4E” detected?

YES >> 1. Write down “RESOLVER OFFSET VALUE” of freeze frame data.
2. Go to TMS-66, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140334

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector and the A/T assembly harness connector.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace damaged parts.

2.CHECK TRACTION MOTOR RESOLVER OFFSET VALUE

1. Turn ignition switch ON.
2. Check “RESOLVER OFFSET VALUE” of the freeze frame data, that is recorded when DTC reproduction procedure is performed.

Is “22.32 deg” displayed?

YES >> Replace the transmission assembly due to malfunction in the TCM. Refer to TM-190, "Removal and Installation".

NO >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000008140335

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0C79	Drive Motor "A" Inverter Voltage Too Hight	If the high voltage value is too high	• Traction motor inverter • High voltage harness or connector • Li-ion battery • System main relay • High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Check DTC.

Is "P0C79" detected?

YES >> Go to TMS-67, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140336

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another persondoes not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shieldbefore beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do nottouch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while theservice plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait 10 seconds or more.
2. Check DTC of the high voltage systems.

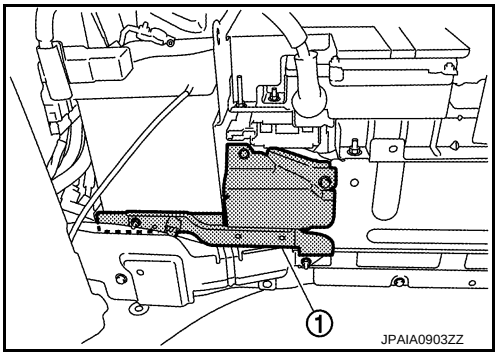
Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

YES >> Check DTC detected item.
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

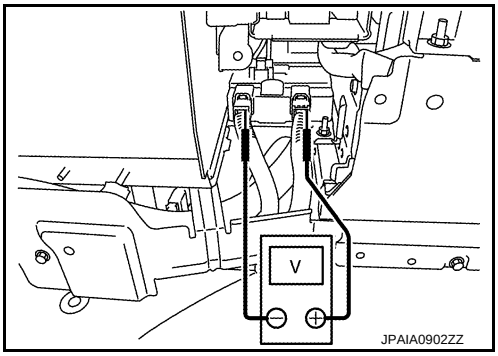


DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less



DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 4.

4. CHECK CONNECTION CONDITION

Check the connection conditions of the traction motor inverter high voltage harness connector and the 3-phase harness. Refer to TM-190, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TM-190, "Removal and Installation".
NO >> Repair or replace damaged parts.

P31A5 CAN ERROR

DTC Logic

INFOID:0000000008140337

DTC DETECTION LOGIC

NOTE:
If DTC P31A5 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A5	CAN communication data error	When traction motor inverter detected data error of CAN communication.	• ECM • Li-ion battery controller • Traction motor inverter • HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Go to TMS-69, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140338

1.PERFORM ALL DTC READING

1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC	DTC detection control module	Malfunctioning part
P31A5	“ENGINE” only	• ECM • HPCM
	“HV BATTERY” only	• Li-ion battery controller • HPCM
	“MOTOR CONTROL” only	• Traction motor inverter • HPCM
	• “ENGINE” • “MOTOR CONTROL”	HPCM
	• “ENGINE” • “HV BATTERY”	
	• “MOTOR CONTROL” • “HV BATTERY”	
	• “ENGINE” • “HV BATTERY” • “MOTOR CONTROL”	

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A5.

P31A6 CAN ERROR

DTC Logic

INFOID:0000000008140339

DTC DETECTION LOGIC

NOTE:
If DTC P31A6 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A6	CAN communication data error	When traction motor inverter detected data error of CAN communication.	• ECM • HPCM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Go to TMS-70, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140340

1.PERFORM ALL DTC READING

1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC	DTC detection control module	Malfunctioning part
P31A6	“MOTOR CONTROL” only	• ECM • Traction motor inverter
	“EV/HEV” only	HPCM
	• “MOTOR CONTROL” • “EV/HEV”	ECM

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A6.

P31A8 CAN ERROR

DTC Logic

INFOID:0000000008140341

DTC DETECTION LOGIC

NOTE:
If DTC P31A8 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A8	CAN communication data error	When traction motor inverter detected data error of CAN communication.	• HPCM • TCM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Go to TMS-71, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140342

1.PERFORM ALL DTC READING

1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC	DTC detection control module	Malfunctioning part
P31A8	“MOTOR CONTROL” only	• Traction motor inverter • TCM
	“EV/HEV” only	HPCM
	• “MOTOR CONTROL” • “EV/HEV”	TCM

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A8.

P31A9 CAN ERROR

DTC Logic

INFOID:0000000008140343

DTC DETECTION LOGIC

NOTE:
If DTC P31A9 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A9	CAN communication data error	When traction motor inverter detected data error of CAN communication.	• HPCM • Traction motor inverter • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Go to TMS-72, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140344

1.PERFORM ALL DTC READING

1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC	DTC detection control module	Malfunctioning part
P31A9	“MOTOR CONTROL” only	• Traction motor inverter • Li-ion battery controller
	“EV/HEV” only	• HPCM • Li-ion battery controller
	• “MOTOR CONTROL” • “EV/HEV”	Li-ion battery controller

>> Replace malfunctioning part corresponding to the control module detecting DTC P31A9.

P3240 DRIVE MOTOR A INVERTER CRNT CONT

DTC Logic

INFOID:0000000008140345

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3240	Drive Motor “A” Inverter Performance/Motor Current Control Error	If the traction motor inverter output voltage is abnormal	• Traction motor inverter • Traction motor • High voltage harness or connector • Li-ion battery • High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY.
2. Drive the vehicle by motor.
3. Fully open the accelerator and accelerate the vehicle to 60 km/h (37 MPH).
4. Stop the vehicle.
5. Check DTC.

Is “P3240” detected?

YES >> Go to TMS-73, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140346

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while theservice plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2. CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC of the high voltage systems.

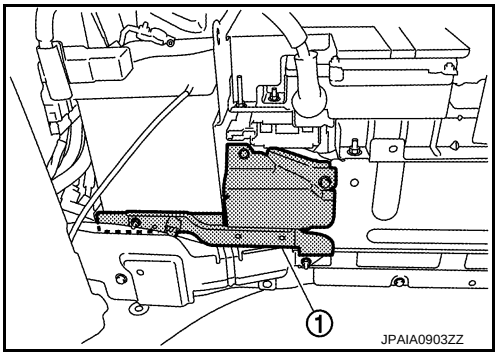
Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

YES >> Check DTC detected item.
NO >> GO TO 3.

3. PRECONDITIONING

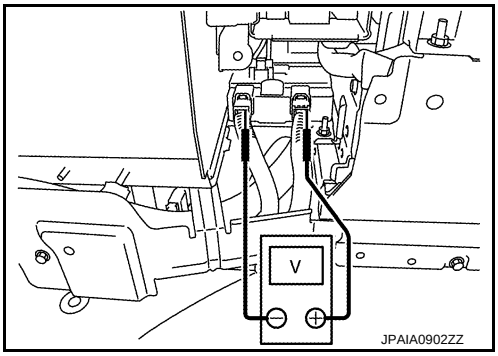
WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).



DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

3. Measure voltage between high voltage harness terminals.



Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.

>> GO TO 4.

4. CHECK CONNECTION CONDITION

Check the connection conditions of the traction motor inverter high voltage harness connector and the 3-phase harness. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace damaged parts.

5. CHECK DISCONNECTION TRACTION MOTOR STATOR COIL

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-121, "Removal and Installation".
2. Check for an open circuit in the traction motor stator coil.

Traction motor inverter 3-phase harness connector			Resistance
Connector	Terminal		
C16	54	55	1 Ω or less
	55	56	
	56	54	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Replace the transmission assembly due to malfunction in the traction motor. Refer to TM-190, "Removal and Installation".

P3241 DRIVE MOTOR A INVERTER CRNT CONT

DTC Logic

INFOID:0000000008140347

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3241	Drive Motor “A” Inverter Performance/AC Error Detection	If no current is being applied to 1 phase of the traction motor	• Traction motor inverter • Traction motor • High voltage harness or connector

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY.
2. Drive the vehicle by motor.
3. Fully open the accelerator and accelerate the vehicle to 60 km/h (37 MPH).
4. Stop the vehicle.
5. Check DTC.

Is “P3241” detected?

YES >> Go to TMS-76, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140348

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTOR CONNECTION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

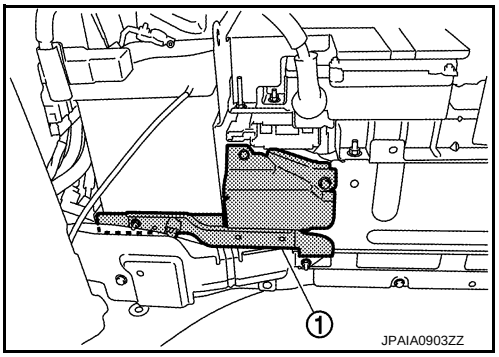
2.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



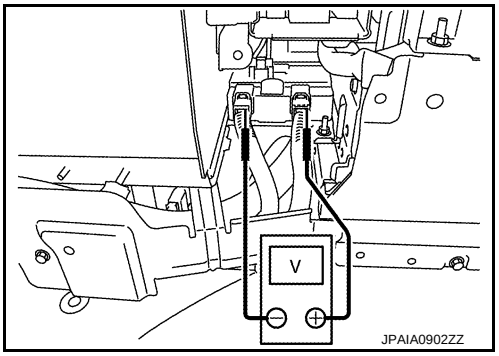
3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 3.

3.CHECK CONNECTION CONDITION

Check the connection condition of the 3-phase harness. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4.CHECK DISCONNECTION TRACTION MOTOR STATOR COIL

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-121, "Removal and Installation".
2. Check for an open circuit in the traction motor stator coil.

Traction motor inverter 3-phase harness connector			Resistance
Connector	Terminal		
C16	54	55	1 Ω or less
	55	56	
	56	54	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Replace the transmission assembly due to malfunction in the traction motor. Refer to TM-190, "Removal and Installation".

P3242 D-MOTOR A PHASE U CURRENT SEN

DTC Logic

INFOID:0000000008140349

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3242	Drive Motor "A" U Phase Current Sensor Circuit Performance Error	When detected value of traction motor U-phase sensor 2 is not normal	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform "INSPECTION MODE 5". Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is "P3242" detected?

YES >> Go to TMS-78, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140350

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P3243 D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:0000000008140351

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3243	Drive Motor “A” V Phase Current Sensor Circuit Performance Error	When detected value of traction motor V-phase sensor 2 is not normal	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P3243” detected?

YES >> Go to TMS-80, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140352

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P3244 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000008140353

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3244	Drive Motor “A” Inverter Voltage Sensor Performance	If the value detected by the high voltage sensor is abnormal	• Traction motor inverter • High voltage harness or connector • Li-ion battery • High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Check DTC.

Is “P3244” detected?

YES >> Go to TMS-82, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140354

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another persondoes not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shieldbefore beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do nottouch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while theservice plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait 10 seconds or more.

2. Check DTC of the high voltage systems.

Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

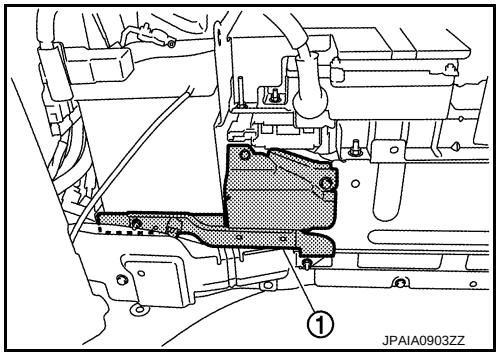
YES >> Check DTC detected item.
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

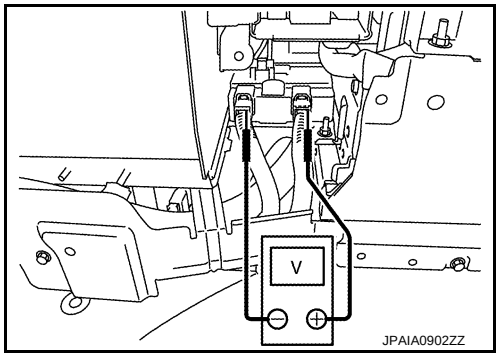


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK CONNECTION CONDITION

Check the connection condition of the traction motor inverter high voltage harness connector. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Repair or replace damaged parts.

P3245 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000008140355

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3245	Drive Motor “A” Inverter Voltage Sensor Circuit	If there is an abnormality in the high voltage sensor	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P3245” detected?

YES >> Go to TMS-84, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140356

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P3246 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000008140357

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3246	Drive Motor “A” Inverter Voltage Too Low	If the high voltage value is too low	• Traction motor inverter • High voltage harness or connector • Li-ion battery • High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Check DTC.

Is “P3246” detected?

YES >> Go to TMS-86, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140358

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another persondoes not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shieldbefore beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do nottouch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while theservice plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait 10 seconds or more.

2. Check DTC of the high voltage systems.

Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

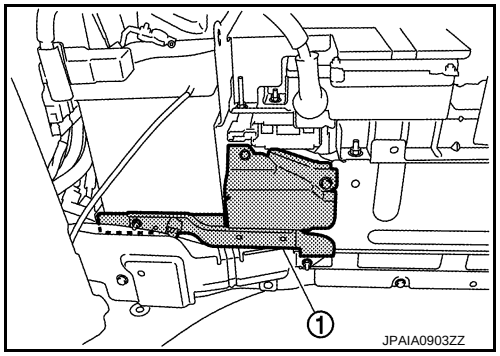
YES >> Check DTC detected item.
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

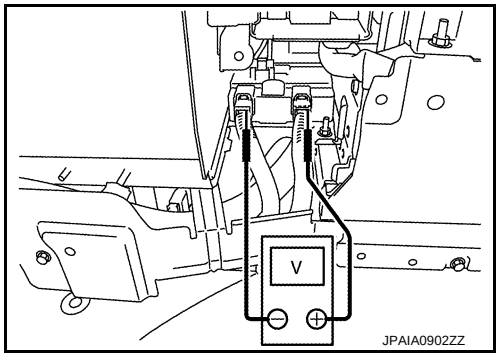


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK CONNECTION CONDITION

Check the connection condition of the traction motor inverter high voltage harness connector. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Repair or replace damaged parts.

P3247 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000008140359

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3247	Drive Motor “A” Inverter Driver Power Supply	If the IGBT drive circuit power does not start up	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P3247” detected?

YES >> Go to TMS-88, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140360

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P3248 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000008140361

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3248	Drive Motor “A” Inverter Driver Power Supply Performance	If there is overcurrent or overvoltage in the IGBT drive circuit power	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P3248” detected?

YES >> Go to TMS-90, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140362

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P3249 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000008140363

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3249	Drive Motor “A” Inverter Driver Signal	If the IGBT drive current circuit voltage is too low	• Harness, connector, or fuse (Each circuit is open or shorted.) • Traction motor inverter • Self shut off relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P3249” detected?

YES >> Go to TMS-92, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140364

1.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:
Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 3.

3.DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P324A DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000008140365

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324A	Drive Motor “A” Inverter Char-geError	If the high voltage circuit is not charged	• Traction motor inverter • High voltage harness or connector • Li-ion battery • High voltage parts except for trac-tion motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Check DTC.

Is “P324A” detected?

YES >> Go to TMS-94, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140366

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person-does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield-before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not-touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the-service plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait 10 seconds or more.

2. Check DTC of the high voltage systems.

Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

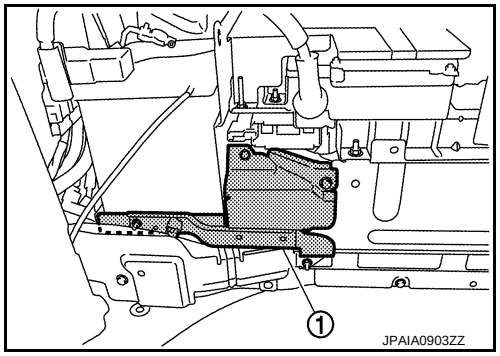
YES >> Check DTC detected item.
NO >> GO TO 3.

3. PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

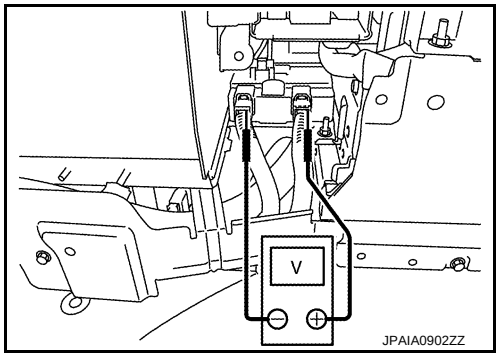


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4. CHECK CONNECTION CONDITION

Check the connection condition of the traction motor inverter high voltage harness connector. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Repair or replace damaged parts.

P324B DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000008140367

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324B	Drive Motor “A” Inverter Discharge Error	If the high voltage circuit is not discharged	• Traction motor inverter • High voltage harness or connector • Li-ion battery • High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Turn ignition switch OFF and wait for 30 seconds or more.
3. Turn ignition switch ON.
4. Check DTC.

Is “P324B” detected?

YES >> Go to TMS-96, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140368

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait 10 seconds or more.
2. Check DTC of the high voltage systems.

Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

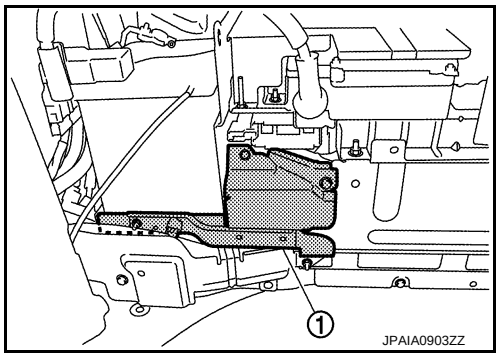
YES >> Check DTC detected item.
NO >> GO TO 3.

3.PRECONDITIONING

WARNING:
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

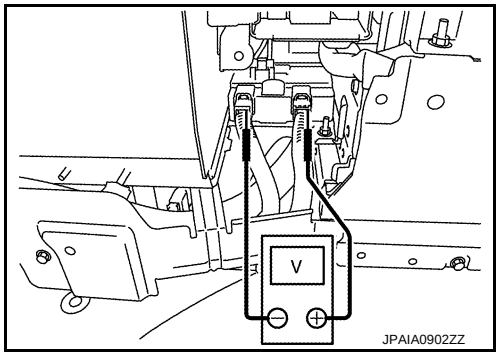


3. Measure voltage between high voltage harness terminals.

Standard : 5 V or less

DANGER:
Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:
For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 4.

4.CHECK CONNECTION CONDITION

Check the connection condition of the traction motor inverter high voltage harness connector. Refer to TMS-120, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> Repair or replace damaged parts.

P324C DRIVE MOTOR A INVERTER CURRENT

Description

INFOID:0000000008140369

- As this DTC is activated at fail-safe, repair the DTC which has caused entry to fail-safe. Refer to TMS-30, "DTC Inspection Priority Chart".
- When this DTC is detected individually, perform TMS-98, "Diagnosis Procedure".

DTC Logic

INFOID:0000000008140370

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324C	Drive Motor “A” Limp Form Current High	When current flows into 3-phase harness in fail safe mode	Traction motor inverter

DTC CONFIRMATION PROCEDURE

CAUTION:

- **“TMS-98, "Diagnosis Procedure"” must be performed before starting “DTC CONFIRMATION PROCEDURE”.**
- **Always drive vehicle at a safe speed.**

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Fully open the accelerator and drive the vehicle by motor.
3. Stop the vehicle.
4. Check DTC.

Is “P324C” detected?

YES >> Go to TMS-98, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140371

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE SYSTEMS

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC of the high voltage systems.

Were there any detected DTC related to a high voltage systems other than the traction motor inverter?

YES >> Check DTC detected item.
NO >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".

P324D DRIVE MOTOR A INVERTER IGBT

DTC Logic

INFOID:0000000008140372

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324D	Drive Motor “A” Inverter IGBTOver Load (Over Current/ OverTemperature)	• If an over current has occurred in theIGBT energizing current • If IGBT temperature is too high	• Traction motor inverter • Traction motor • High voltage coolant system

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Set the vehicle to READY.
2. Drive the vehicle by motor.
3. Fully open the accelerator and accelerate the vehicle to 60 km/h (37 MPH).
4. Stop the vehicle.
5. Check DTC.

Is “P324D” detected?

YES >> Go to TMS-99, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140373

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK DTC HIGH VOLTAGE COOLING SYSTEM

1. Turn switch ON and wait for 10 seconds or more.
2. Perform “Self Diagnostic Results” in “EV/HEV”.

Is any DTC detected?

YES >> Check DTC detected item. Refer to HBC-71, "DTC Index".
NO >> GO TO 3.

3.CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to HCO-7, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4.CHECK COOLANT HOSE

Check for clogging of fluid paths and twisting of hoses in traction motor inverter and transmission assembly. Refer to HCO-5, "High Voltage Cooling System".

Is the inspection result normal?

YES >> 1. Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
2. If a malfunction still occurs after replacement of the traction motor inverter, replace transmission assembly. Refer to TM-190, "Removal and Installation".

NO >> Repair or replace damaged parts.

P324E IGNITION SWITCH SIGNAL

DTC Logic

INFOID:0000000008140374

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324E	Drive Motor “A” Inverter IGN switch signal	When voltage from power switch is the specified value or less	• Harness or connector (Each circuit is open or shorted.) • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 10 seconds or more.
2. Check DTC.

Is “P324E” detected?

YES >> Go to TMS-101, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140375

1.CHECK CONNECTION CONDITION

1. Turn ignition switch OFF.
2. Check the connection condition of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace damaged parts.

2.CHECK POWER CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect the traction motor inverter harness connector.
3. Turn ignition switch ON.
4. Check the voltage between traction motor inverter vehicle side harness connector terminal and ground.

Traction motor inverter vehicle side harness connector		Ground	Condition	Voltage (Approx.)
Connector	Terminal			
E78	31	Ground	Turn ignition switch ON	10 – 16 V
			Turn ignition switch OFF	0 V

Is the inspection result normal?

YES >> 1. Check intermittent incident. Refer to GI-49, "Intermittent Incident".
2. If inspection result is OK, replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".

NO >> GO TO 3.

3.CHECK HARNESS BETWEEN TRACTION MOTOR INVERTER AND IPDM E/R

1. Turn ignition switch OFF.
2. Disconnect the IPDM E/R connector.
3. Check the resistance between traction motor inverter vehicle side harness connector terminal and IPDM E/R vehicle side harness connector terminal.

Traction motor inverter vehicle side harness connector		IPDM E/R vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
E78	31	E7	76	1 Ω or less

4. Check the resistance between traction motor inverter vehicle side harness connector terminal and ground.

Traction motor inverter vehicle side harness connector		Ground	Resistance
Connector	Terminal		
E78	31	Ground	100 kΩ or more

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace damaged parts.

4. DETECTION OF MALFUNCTION ITEMS

Check the following items:
- Harness open circuit or short circuit between IPDM E/R and ignition switch
- 10A fuse (#43, IPDM E/R)
- Ignition switch
- IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P324F DRIVE MOTOR A INVERTER IGBT

Description

INFOID:0000000008140376

This DTC is detected simultaneously with “P0C79” or “P324D”, firstly check either of DTC. Refer to TMS-30, "DTC Inspection Priority Chart".

DTC Logic

INFOID:0000000008140377

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324F	Drive Motor “A” Inverter IGBTOver Current/Over Temperature/Over Voltage	• If an over current has occurred in the IGBTenergizing current • If IGBT temperature is too high • If there is over voltage in the high voltage	• Traction motor inverter • Traction motor • High voltage coolant system • System main relay • Self shut off relay • High voltage harness or connector • Li-ion battery • High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start the engine and wait for 10 seconds or more.
3. Check DTC.

Is “P324F” detected?

YES >> Go to TMS-103, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140378

1.CHECK “P0C79” AND “P324D”

Firstly, check “P0C79” or “P324D”, according to “TMS-30, "DTC Inspection Priority Chart"”. Refer to TMS-67, "DTC Logic" (P0C79), TMS-99, "DTC Logic" (P324D).

>> GO TO 2.

2.CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Check the connection conditions of the traction motor inverter harness connector.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace damaged parts.

3.CHECK POWER CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Turn ignition switch ON.
3. Check the voltage between traction motor inverter vehicle side harness connector terminals.

CAUTION:

Never damage connector terminals.

Traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	+	–	
E78	42	41	10 – 16 V
	44	43	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-121, "Removal and Installation".
NO >> GO TO 4.

4. DETECTION OF MALFUNCTION ITEMS

Check the following items:

- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and fuse and fusible link block No.3
- Harness open circuit or short circuit between fuse and fusible link block No.3 and 12V battery
- 10A fuse (#71, Fuse and fusible link block No.3)
- 50A fusible link (#Y, Fuse and fusible link block No.3)
- Self shut off relay
- 12V battery

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-49, "Intermittent Incident".
NO >> Repair or replace damaged parts.

P3250 CAN ERROR

DTC Logic

INFOID:0000000008140379

DTC DETECTION LOGIC

NOTE:
If DTC P3250 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3250	CAN communication data error	When traction motor inverter detected data error of CAN communication.	• HPCM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Go to TMS-105, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140380

1.PERFORM ALL DTC READING

1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC detection control module and DTC	Malfunctioning part
Only “MOTOR CONTROL” detects P3250	Traction motor inverter
• “MOTOR CONTROL” detects P3250 • “HV BATTERY” detects P33E0	HPCM

>> Replace malfunctioning part corresponding to the control module detecting DTC.

P3251 CAN ERROR

DTC Logic

INFOID:0000000008140381

DTC DETECTION LOGIC

NOTE:
If DTC P3251 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3251	CAN communication data error	When traction motor inverter detected data error of CAN communication.	• ECM • Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Perform self-diagnosis.
3. Check DTC.

Is DTC detected?

YES >> Go to TMS-106, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140382

1.PERFORM ALL DTC READING

1. Perform “All DTC Reading”.
2. Check diagnosis results.

DTC detection control module and DTC	Malfunctioning part
Only “MOTOR CONTROL” detects P3251	Traction motor inverter
• “MOTOR CONTROL” detects P3251 • “HV BATTERY” detects P33E1	ECM

>> Replace malfunctioning part corresponding to the control module detecting DTC.

U0100 LOST COMMUNICATION ECM

DTC Logic

INFOID:0000000008140383

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
U0100	Lost Communication With ECM	Traction motor inverter cannot receive a CAN communication signal from ECM for 2 seconds or more in a row	Harness or connectors (CAN communication line is open or shorted)
		Traction motor inverter cannot receive a CAN communication signal from ECM for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN-communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111, or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Repaired after performing TMS-107, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Go to TMS-107, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008140384

CAUTION:
- **To perform diagnosis, observe LAN-27, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-27, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Go to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111, and U0293	• HEV system CAN line (Short circuit or traction motor inverter-branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111, and U0293	Main line between traction motor inverter- and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Referto GI-49, "Intermittent Incident".

U0101 LOST COMMUNICATION TCM

DTC Logic

INFOID:0000000008140385

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
U0101	Lost Communication With TCM	Traction motor inverter cannot receive a CAN communication signal from TCM for 2 seconds or more in a row	Harness or connectors (CAN communication line is open or shorted)
		Traction motor inverter cannot receive a CAN communication signal from TCM for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN-communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111, or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Repaired after performing TMS-109, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Go to TMS-109, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008140386

CAUTION:
- **To perform diagnosis, observe LAN-27, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-27, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Go to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111, and U0293	• HEV system CAN line (Short circuit or traction motor inverter-branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111, and U0293	Main line between traction motor inverter-and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Referto GI-49, "Intermittent Incident".

U0111 LOST COMMUNICATION LBC

DTC Logic

INFOID:0000000008140387

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
U0111	Lost Communication With Li-ion Battery Controller	Traction motor inverter cannot receive a CAN communication signal from Li-ion battery controller for 2 seconds or more in a row	Harness or connectors (CAN communication line is open or shorted)
		Traction motor inverter cannot receive a CAN communication signal from Li-ion battery controller for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN-communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111, or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Repaired after performing TMS-111, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Go to TMS-111, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008140388

CAUTION:
- **To perform diagnosis, observe LAN-27, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-27, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Go to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111, and U0293	• HEV system CAN line (Short circuit or traction motor inverter-branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111, and U0293	Main line between traction motor inverter-and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Referto GI-49, "Intermittent Incident".

U0293 LOST COMMUNICATION HCM

DTC Logic

INFOID:0000000008140389

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
U0293	Lost Communication With HPCM	Traction motor inverter cannot receive a CAN communication signal from HPCM for 2 seconds or more in a row	Harness or connectors (CAN communication line is open or shorted)
		Traction motor inverter cannot receive a CAN communication signal from HPCM for a short period of less than 2 seconds	Harness or connectors (Intermittent malfunction in the CAN-communication circuit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and waitat least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-89, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U0100, U0101, U0111, or U0293 detected?

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Repaired after performing TMS-113, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT
1. Perform “CAN Diagnosis”.
2. Check diagnosis results.

>> Go to TMS-113, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008140390

CAUTION:
- **To perform diagnosis, observe LAN-27, "Precautions for Trouble Diagnosis".**
- **To repair harness, observe LAN-27, "Precautions for Harness Repair".**

1.INSPECTION START

Confirm the detected malfunction (result of “CAN Diagnosis”).

Is there any malfunction at present or a malfunction history?

YES >> Go to LAN-19, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2.DETECT THE ROOT CAUSE

With CONSULT
Check DTC of “MOTOR CONTROL”.

Detected DTC	Root cause
DTC U0100, U0101, U0111, and U0293	• HEV system CAN line (Short circuit or traction motor inverter-branch line*) • ECM • HPCM • TCM • Li-ion battery controller • Traction motor inverter
DTC U0100	• ECM branch line • ECM
DTC U0101	• TCM branch line • TCM
DTC U0111	• Li-ion battery controller branch line • Li-ion battery controller
DTC U0293	• HPCM branch line • HPCM and battery junction box
DTC U0101, U0111, and U0293	Main line between traction motor inverter-and TCM
DTC U0111 and U0293	Main line between HPCM and TCM

NOTE:
*: If “EV/HEV” detects DTC U0110, check the traction motor inverter branch line first.

>> Intermittent malfunction. Check malfunctioning parts, according to the intermittent Incident. Referto GI-49, "Intermittent Incident".

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000008140391

CAN (Controller Area Network) is a serial communication line for real-time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent malfunction detection ability.Many electronic control units are equipped onto a vehicle, and each control unit shares information and linkswith other control units during operation (not independently). In CAN communication, control units are connected with 2 communication lines (CAN-H line, CAN-L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000008140392

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
U1000	CAN communication line	If CAN communications signals continuously cannot be transmitted	Harness or connectors (CAN communication line is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Check DTC.

Is “U1000” detected?

YES >> Go to TMS-115, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140393

For the diagnosis procedure, refer to LAN-19, "Trouble Diagnosis Flow Chart".

U1002 CAN ERROR

DTC Logic

INFOID:0000000008140394

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
U1002	CAN communication line	If CAN communications signals continuously cannot be transmitted	Harness or connectors (CAN communication line is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON and wait for 5 seconds or more.
2. Check DTC.

Is “U1002” detected?

YES >> Go to TMS-116, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008140395

For the diagnosis procedure, refer to LAN-19, "Trouble Diagnosis Flow Chart".

INSULATION RESISTANCE

Component Inspection

INFOID:0000000008140396

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection andmaintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another persondoes not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shieldbefore beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do nottouch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to GI-31, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while theservice plug is removed. Therefore do not change the vehicle to READY status unless instructed to doso in the Service Manual.

1.PRECONDITIONING

WARNING:

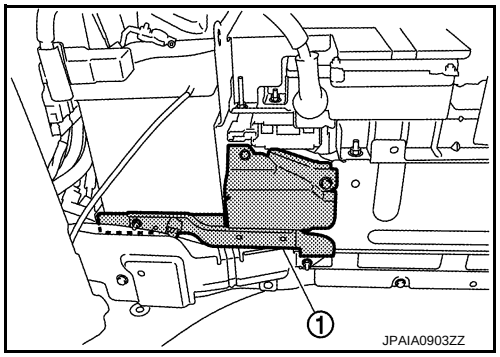
Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Remove trunk finisher front. Refer to INT-51, "Exploded View".
2. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.



3. Measure voltage between high voltage harness terminals.

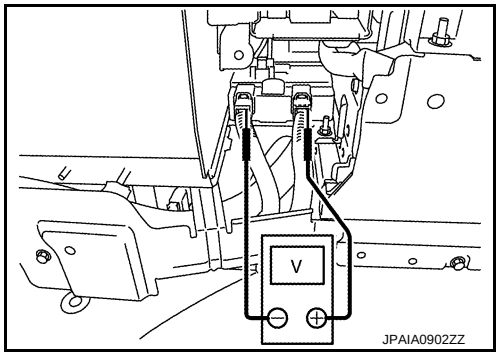
Standard : 5 V or less

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.



>> GO TO 2.

2.CHECK TRACTION MOTOR INSULATION RESISTANCE

WARNING:
Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-121, "Removal and Installation".
2. Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.
   CAUTION:
   Be sure to set the insulation resistance tester to 500V when performing this test. Using a setting higher than 500V can result in damage to the component being inspected.

Traction motor inverter 3-phase harness connector		Ground	Resistance
Connector	Terminal		
C16	54	Transmission housing case	20 MΩ or more
	55		
	56		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the transmission assembly due to malfunction in the traction motor. Refer to TM-190, "Removal and Installation".

SYMPTOM DIAGNOSIS

ELECTROMAGNETIC NOISE IS AUDIBLE

DESCRIPTION

INFOID:0000000008140397

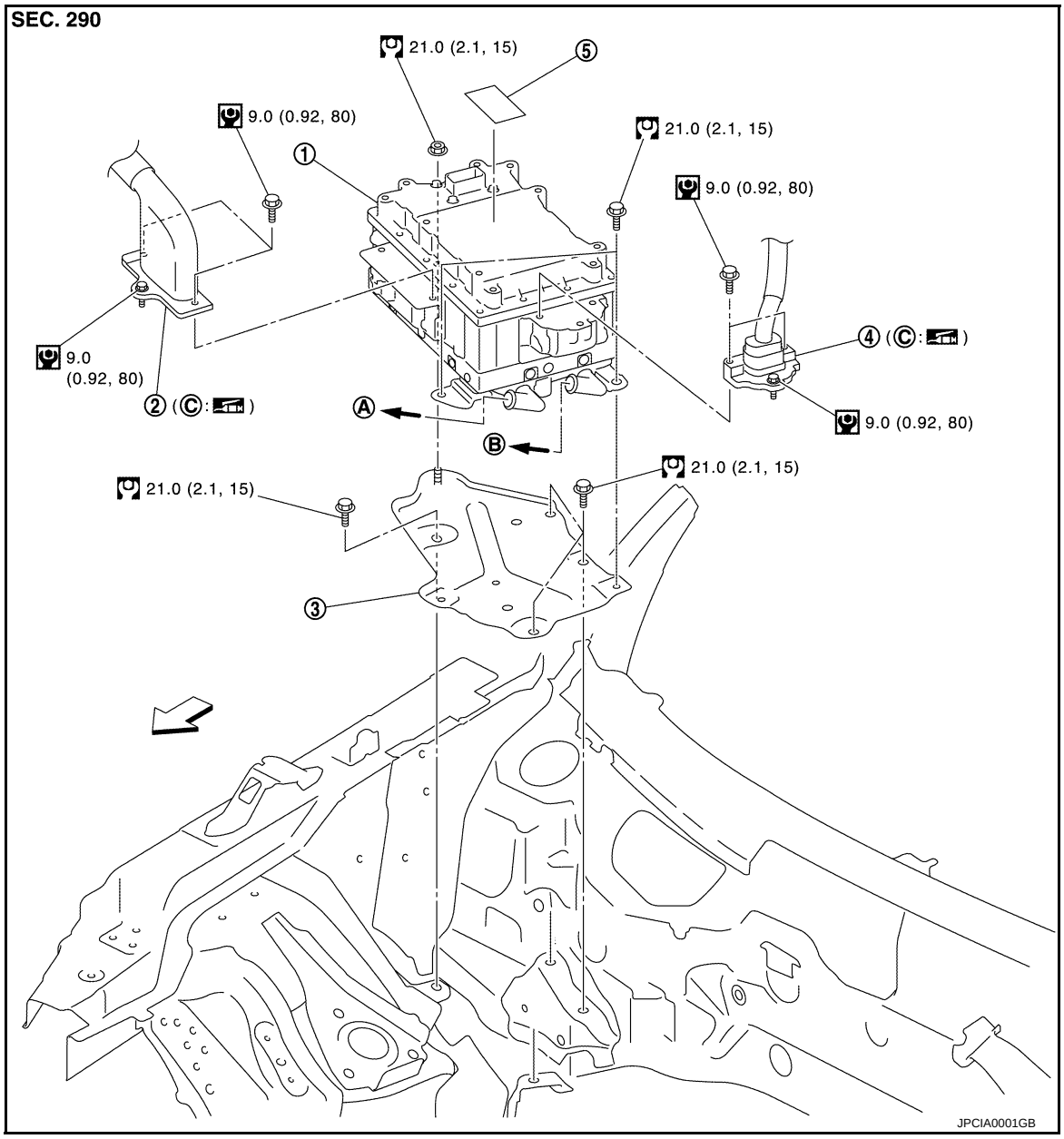
Electromagnetic noise of traction motor may be noticeable while starting the vehicle on a steep slope (when output torque is large). This is a characteristic or control process of traction motor inverter, and it is not a malfunction.

REMOVAL AND INSTALLATION

TRACTION MOTOR INVERTER

Exploded View

INFOID:0000000008140398



1. Traction motor inverter
2. 3-phase harness
3. Traction motor inverter bracket
4. High voltage harness
5. High voltage warning label

A. To traction motor
B. To sub radiator
C. O-ring

⇦ : Vehicle front

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Waterproof grease

Removal and Installation

INFOID:0000000008140399

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to TMS-5, "High Voltage Precautions".**

CAUTION:

There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.

REMOVAL

WARNING:

Shut off high voltage circuit. Refer to GI-30, "How to Cut Off High Voltage".

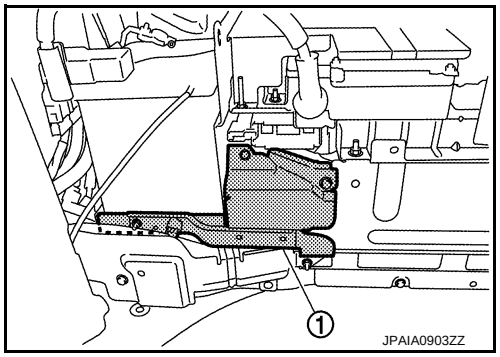
1. Check voltage in high voltage circuit. (Check that condenser are discharged.)

a. Remove trunk finisher front. Refer to INT-52, "TRUNK FINISHER FRONT : Removal and Installation".

b. Remove harness cover (1).

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

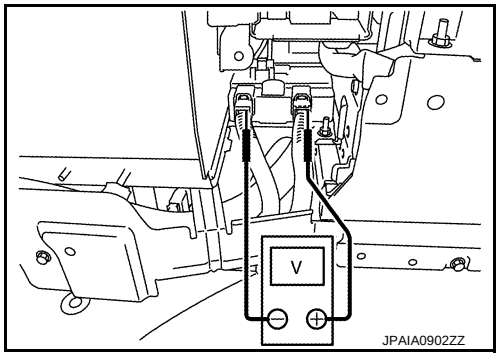


c. Measure voltage between high voltage harness terminals.

DANGER:

Touching high voltage components without using the appropriate protective equipment will cause electrocution.

Standard	**: 5 V or less**



CAUTION:

For voltage measurements, use a tester which can measure to 500 V or higher.

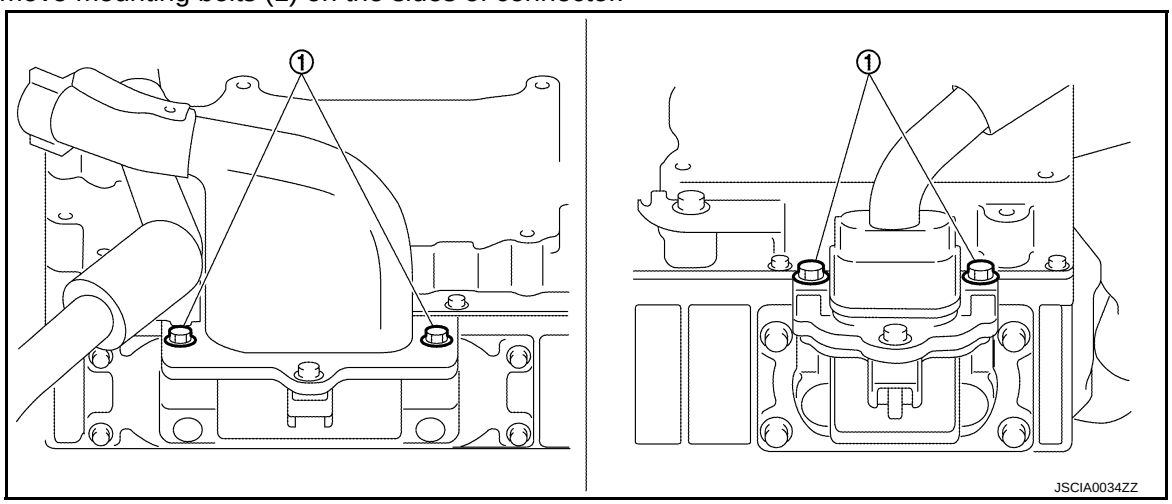
2. Drain coolant from high voltage cooling system. Refer to HCO-7, "Draining and Refilling".
3. Remove cowl top cover RH. Refer to EXT-21, "Removal and Installation".
4. Disconnect low voltage harness connector.
5. Remove IPDM E/R and displace it to the engine side to obtain space for removing the traction motor inverter.

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

6. Remove three-phase harness and high voltage harness, according to the following instructions.

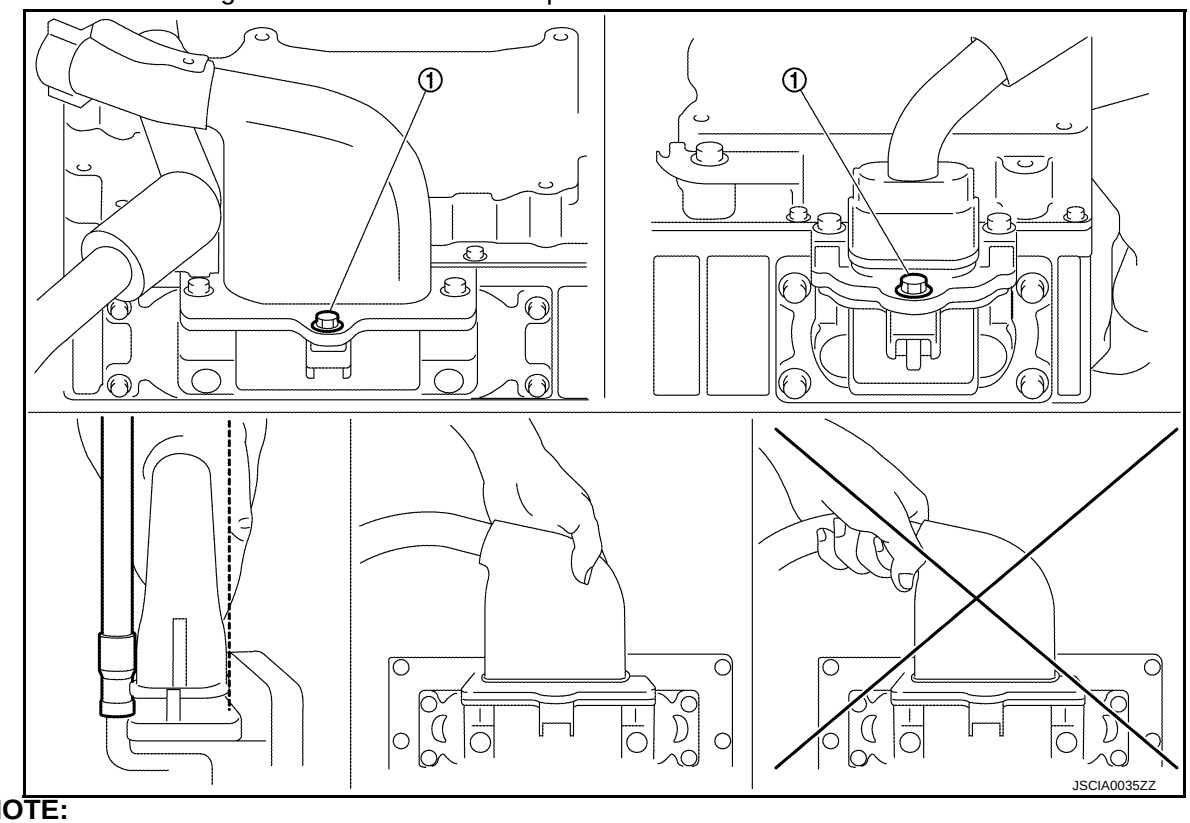
a. Remove mounting bolts (1) on the sides of connector.



WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

b. Remove high voltage harness connector by loosening the center bolt (1) of high voltage harness connector while maintaining the connector in vertical position.



NOTE:
This bolt is fixed on the connector housing.

CAUTION:

Never pull high voltage harness connector by holding the wiring part.

7. Remove harness bracket.

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

8. Remove the high voltage harness fixing clip and displace high voltage harness to obtain space for removing the traction motor inverter.

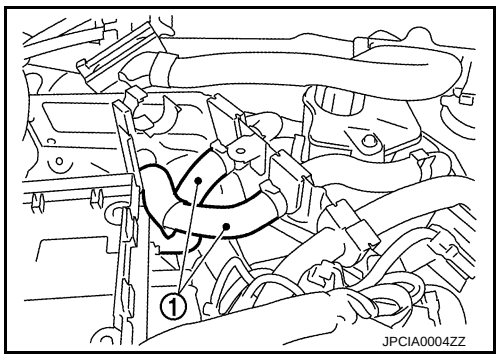
WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

9. Remove hose clump and disconnect water hose (1) from traction motor inverter.

WARNING:

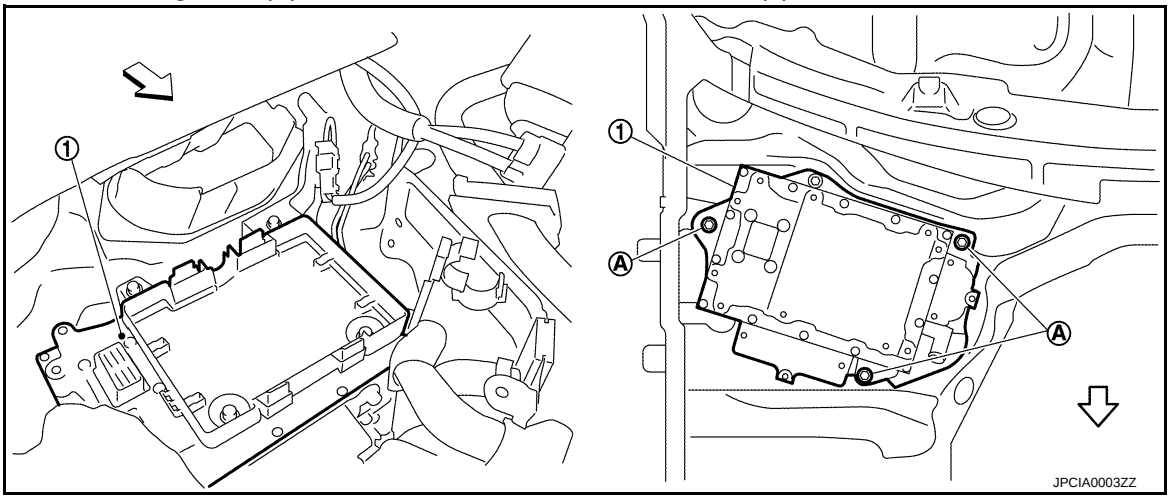
To prevent electric shock hazards, be sure to wear protective gear.



CAUTION:

- **Take care that coolant does not contact the high voltage harness connectors.**
- **To prevent performance degradation, if coolant contacts a high voltage harness connector, immediately dry the high voltage harness connector completely with an air blow gun.**

10. Remove mounting bolts (A), then remove traction motor inverter (1).



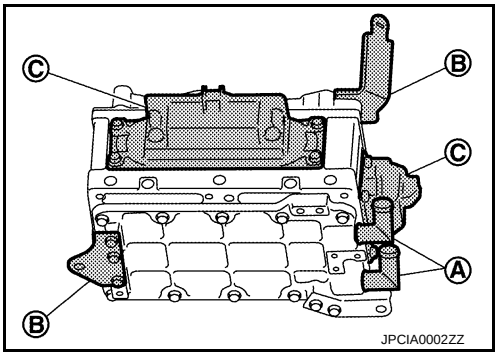
⇦ : Vehicle front

WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

CAUTION:

- **Never hold the cooling bulge (A) when removing or carrying traction motor inverter.**
- **To carry traction motor inverter, remove it by holding bracket (B). If it is hard to hold bracket (B), hold high voltage harness connector (C).**



INSTALLATION

Note the following, and install in the reverse order of removal.

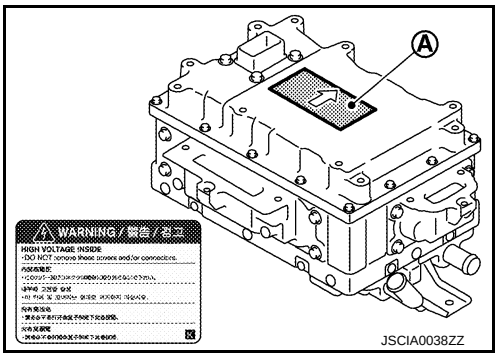
WARNING:

To prevent electric shock hazards, be sure to wear protective gear.

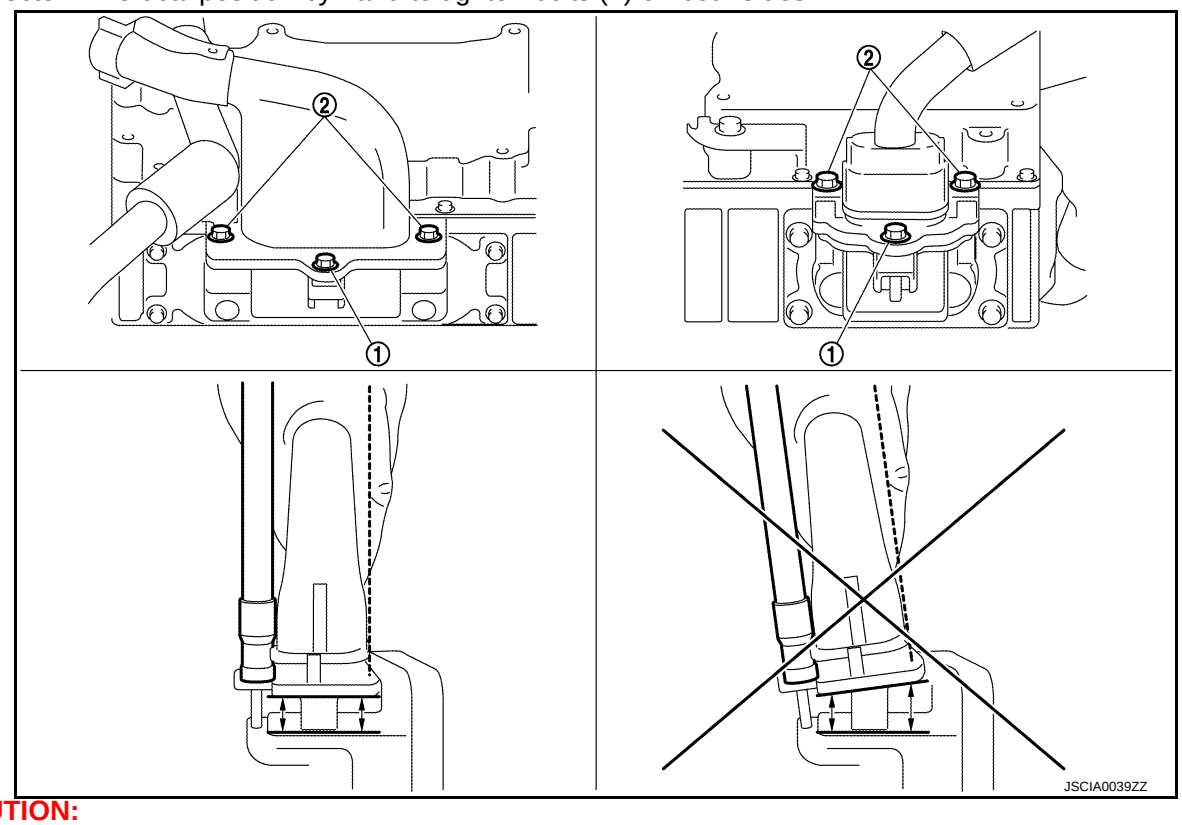
CAUTION:

Be sure to reinstall high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.

- If the traction motor inverter was replaced, first check that there is no dust or dirt on the surface of the traction motor inverter, then apply the new high voltage warning label at position (A), with the direction indicated by the arrow facing up.



- To install high voltage harness connector, tighten the center bolt (1) of the connector while maintaining the connector in vertical position by hand to tighten bolts (2) on both sides.



CAUTION:
Before installation, apply waterproof grease to O-ring of connector.

Mounting torque : 9.0 N·m (0.92kg-m, 80 in-lb)

- After all parts are installed, be sure to check the equipotential. Refer to TMS-125, "Inspection".

Inspection

INFOID:0000000008140400

INSPECTION AFTER INSTALLATION

EQUIPOTENTIAL TEST

After installing traction motor inverter, measure resistance below.

- Between the upper surface (aluminum) of traction motor inverter and the vehicle (body ground bolt).
- Between the upper surface (aluminum) of traction motor inverter and electric compressor (aluminum part).

WARNING:

To prevent shock hazards, be sure to wear protective gear.

Standard : Less than 0.1 Ω

If the result deviates from the standard value, check for paint, oil, dirt, or other substance adhering to the bolts or conductive mounting parts. If such substances are found, clean the surrounding area and remove the foreign substances.