

TMS

SECTION

TRACTION MOTOR SYSTEM

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TMS

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PRECAUTIONS

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Precaution for Technicians Using Medical Electric

INFOID:000000010120883

OPERATION PROHIBITION

WARNING:

- Parts with strong magnet is used in this vehicle.
- Technicians using a medical electric device such as pacemaker must never perform operation on the vehicle, as magnetic field can affect the device function by approaching to such parts.

NORMAL CHARGE PRECAUTION

WARNING:

- If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.
- As radiated electromagnetic wave generated by PDM (Power Delivery Module) at normal charge operation may affect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not approach motor room [PDM (Power Delivery Module)] at the hood-opened condition during normal charge operation.

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of TCU might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), when using the service, etc.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of TCU might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before TCU use.

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

- If a technician uses implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), avoid the device implanted part from approaching within approximately 220 mm (8.66 in) from interior/exterior antenna.
- The electromagnetic wave of Intelligent Key might affect the function of the implantable cardiac pacemaker or the implantable cardioverter defibrillator (ICD), at door operation, at each request switch operation, or at engine starting.
- If a technician uses other medical electric devices than implantable cardiac pacemaker or implantable cardioverter defibrillator (ICD), the electromagnetic wave of Intelligent Key might affect the function of the device. The possible effects on the devices must be checked with the device manufacturer before Intelligent Key use.

Point to Be Checked Before Starting Maintenance Work

INFOID:000000010120884

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.

NOTE:

If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:000000010120885

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

PRECAUTIONS

< PRECAUTION >

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 SR and SB section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which 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 the SR section.
- Do not 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

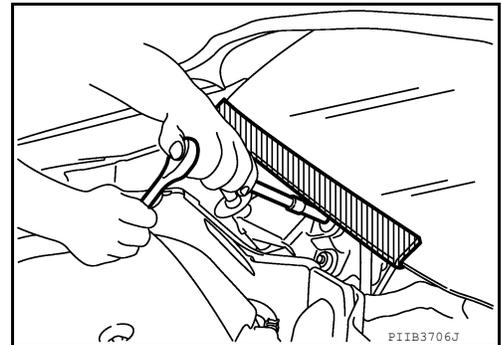
WARNING:

- When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the Ignition ON or engine running, DO NOT 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 battery and wait at least three minutes before performing any service.

Precaution for Procedure without Cowl Top Cover

INFOID:000000010120886

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:000000010120887

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 insulated protective equipment 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

PRECAUTIONS

< PRECAUTION >

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”

PRECAUTIONS

< PRECAUTION >

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

Person in charge: _____
DO NOT TOUCH!
REPAIR IN PROGRESS.
HIGH VOLTAGE
DANGER:
DANGER:
HIGH VOLTAGE
REPAIR IN PROGRESS.
DO NOT TOUCH!
Person in charge: _____
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<small>JSAIA1600GB</small>

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PRECAUTIONS

< PRECAUTION >

Precautions for Removing Battery Terminal

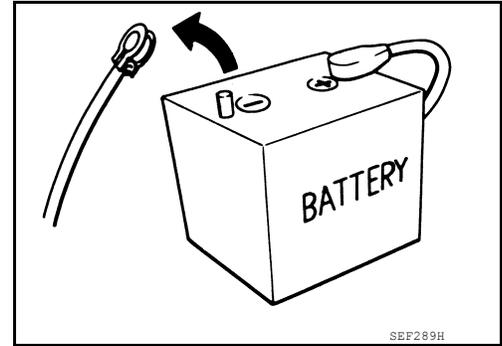
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- When removing the 12V battery terminal, turn OFF the power switch and wait at least 5 minutes.

NOTE:

ECU may be active for several minutes after the power switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- Always disconnect the battery terminal within 60 minutes after turning OFF the power switch. Even when the power switch is OFF, the 12V battery automatic charge control may automatically start after a lapse of 60 minutes from power switch OFF.
- Disconnect 12V battery terminal according to the following steps.



WORK PROCEDURE

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 terminal within 60 minutes after turning the power switch OFF → ON → OFF.

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.

NOTE:

Once the power switch is turned ON → OFF, the 12V battery automatic charge control does not start for approximately 1 hour.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the power switch.

NOTE:

If the power switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.

- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:

The removal of 12V battery may cause a DTC detection error.

General Precautions

INFOID:000000010120889

CAUTION:

If the traction motor inverter or traction motor was replaced, be sure to perform writing of the traction motor resolver offset. Refer to [TMS-39, "Description"](#).

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

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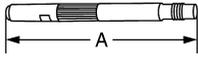
PREPARATION

PREPARATION

Special Service Tool

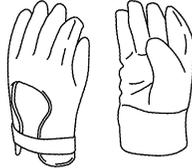
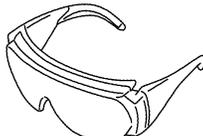
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The actual shape of the tools may differ from those illustrated here.

Tool number (TechMate No.) Tool name	Description
KV99112300 (J-51050) Guide pin  JPCIA0332ZZ	Removing and installing traction motor inverter 3 pins/set A: 106 mm (4.17 in) (1 pin) / 96 mm (3.78 in) (2 pins)

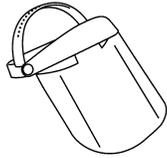
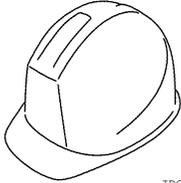
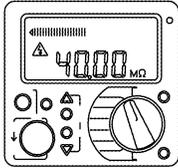
Commercial Service Tools

INFOID:0000000010120891

Tool name	Description
Insulated gloves  JMCIA0149ZZ	Removing and installing high voltage components [Guaranteed insulation performance for 1000V/300A]
Leather gloves  JPCIA0066ZZ	<ul style="list-style-type: none"> Removing and installing high voltage components Protect insulated gloves [Use leather gloves that can fasten the wrist tight]
Insulated safety shoes  JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses  JPCIA0012ZZ	<ul style="list-style-type: none"> Removing and installing high voltage components To protect eye from the spatter on the work to electric line [ANSI Z87.1]

PREPARATION

< PREPARATION >

Tool name	Description
<p data-bbox="159 197 277 222">Face shield</p>  <p data-bbox="862 415 954 432">JPCIA01672Z</p>	<ul data-bbox="1060 197 1466 306" style="list-style-type: none">• Removing and installing high voltage components• To protect face from the spatter on the work to electric line
<p data-bbox="159 449 329 474">Insulated helmet</p>  <p data-bbox="862 667 954 684">JPCIA00132Z</p>	<p data-bbox="1060 449 1430 506">Removing and installing high voltage components</p>
<p data-bbox="159 701 431 758">Insulation resistance tester (Multi tester)</p>  <p data-bbox="862 919 954 936">JPCIA00142Z</p>	<p data-bbox="1060 701 1466 758">Measuring insulation resistance, voltage, and resistance</p>

DESCRIPTION

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

DESCRIPTION

Description

INFOID:000000010120892

- 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.

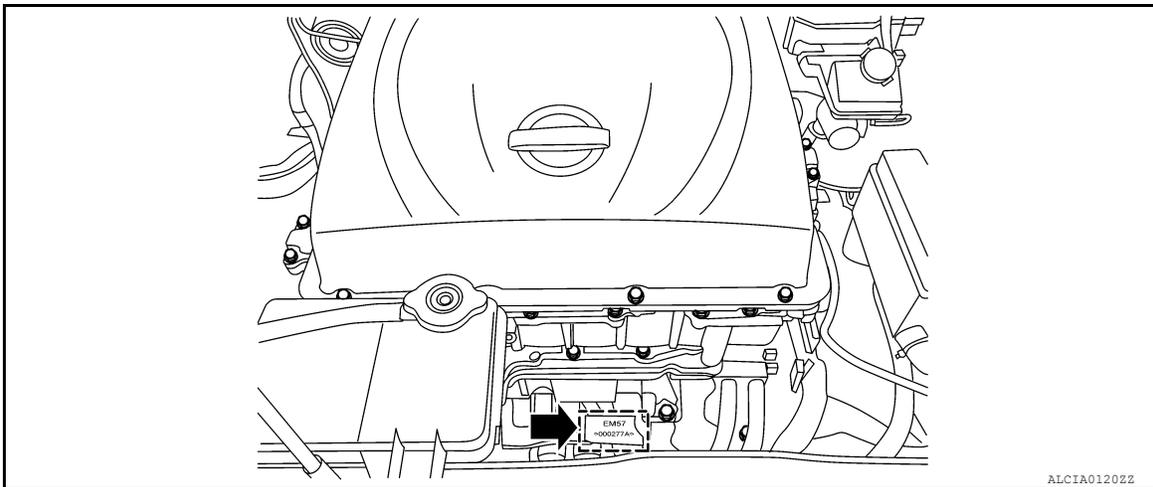
Specifications (Traction Motor)

INFOID:000000010120893

Max torque	254 Nm
Max output	80 kW
Max speed	10,500 rpm
Cooling system	Water cooling type

Location of Traction Motor Model Number and Serial Number Stamps

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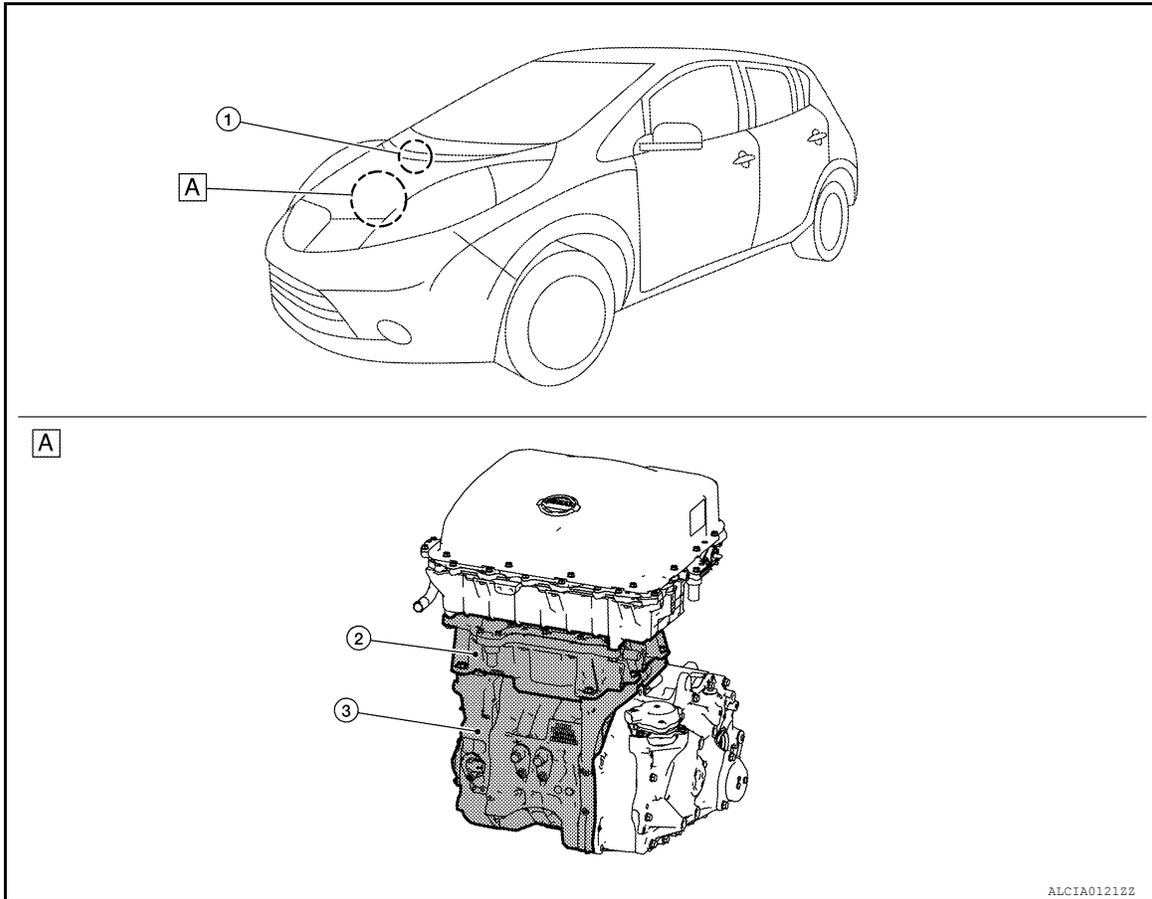
COMPONENT PARTS

< SYSTEM DESCRIPTION >

COMPONENT PARTS

Component Parts Location

INFOID:000000010120895



A Motor room

No.	Item	Function
①	VCM	<ul style="list-style-type: none"> • Transmits mainly the following signals to VCM via EV system CAN. <ul style="list-style-type: none"> - Motor speed signal - Motor torque limit signal - Motor discharge status signal - High voltage power supply preparation completion signal - Input high voltage signal • Receives mainly the following signals from VCM via EV system CAN. <ul style="list-style-type: none"> - Target motor torque signal - Pulse signal OFF signal - High voltage power supply status signal - System cut off signal - Vibration control switching signal - Motor charge preparation request signal - Motor discharge request signal - Regenerative torque command signal - Shift position signal • Refer to EVC-15, "Component Parts Location" for detailed installation location. • Refer to EVC-18, "VCM" for details.
	Electric shift control module	<ul style="list-style-type: none"> • The electric shift control module is built into the VCM. • Receives mainly the following signal from electric shift control module via EV system CAN. <ul style="list-style-type: none"> - Shift position signal • Refer to TM-33, "Electric Shift Control Module" for details.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

No.	Item	Function
②	Traction motor inverter	TMS-13, "Traction Motor Inverter"
③	Traction motor	TMS-13, "Traction Motor"

Traction Motor Inverter

INFOID:000000010120896

NOTE:

Control of the traction motor and control of EV 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, 2 current sensors, and power module.
- The traction motor inverter controls the traction motor based on the target motor torque signal transmitted by EV system CAN from the VCM.
- 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.
- 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 (Insulated Gate Bipolar Transistor).
- The motor controller detects the traction motor temperature by means of the traction motor temperature sensor, and limits the output torque (protection control) according to the level of heat in the traction motor.

DRIVER

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

POWER MODULE

- The power module is composed of 6 power semiconductor IGBTs.
- 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

The smoothing condenser controls the voltage ripple which occurs as a result of IGBT switching.

CURRENT SENSOR

Current sensors are located in Phase U and V, respectively. These sensors detect a current supplied to the drive motor and feed back a current value to the motor controller. The current sensors have two built-in sensors.

A current of Phase W is calculated according to the values of Phase U and V.

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

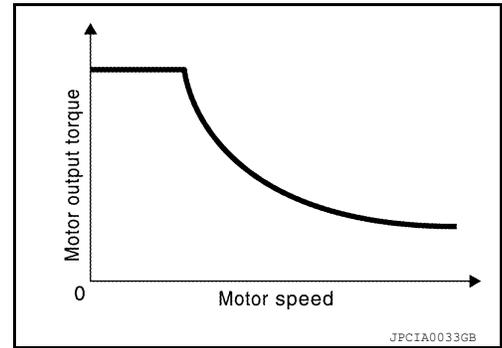
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- The traction motor contains an "Interior Permanent Magnet Synchronous Motor (IPMSM)". A permanent magnet is embedded inside the rotor core, and the rotating magnetic field generated by the stator coil is used to generate rotational torque.

COMPONENT PARTS

< SYSTEM DESCRIPTION >

- 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.

CAUTION:

If the traction motor inverter or traction motor is replaced, be sure to perform writing of the traction motor resolver offset. Refer to [TMS-39, "Description"](#).

TRACTION MOTOR TEMPERATURE SENSOR

The traction motor temperature sensor detects the temperature of the stator inside the traction motor, and sends that temperature information to the motor controller.

High Voltage Warning Label

INFOID:000000010120898

When replacing component parts make sure to affix the label in the original position.

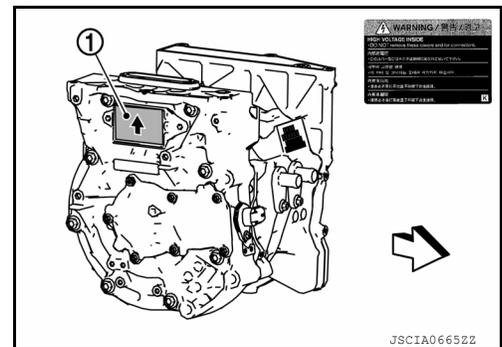
The label ① is affixed to the right side of traction motor.



: Vehicle front



: Direction of the label



STRUCTURE AND OPERATION

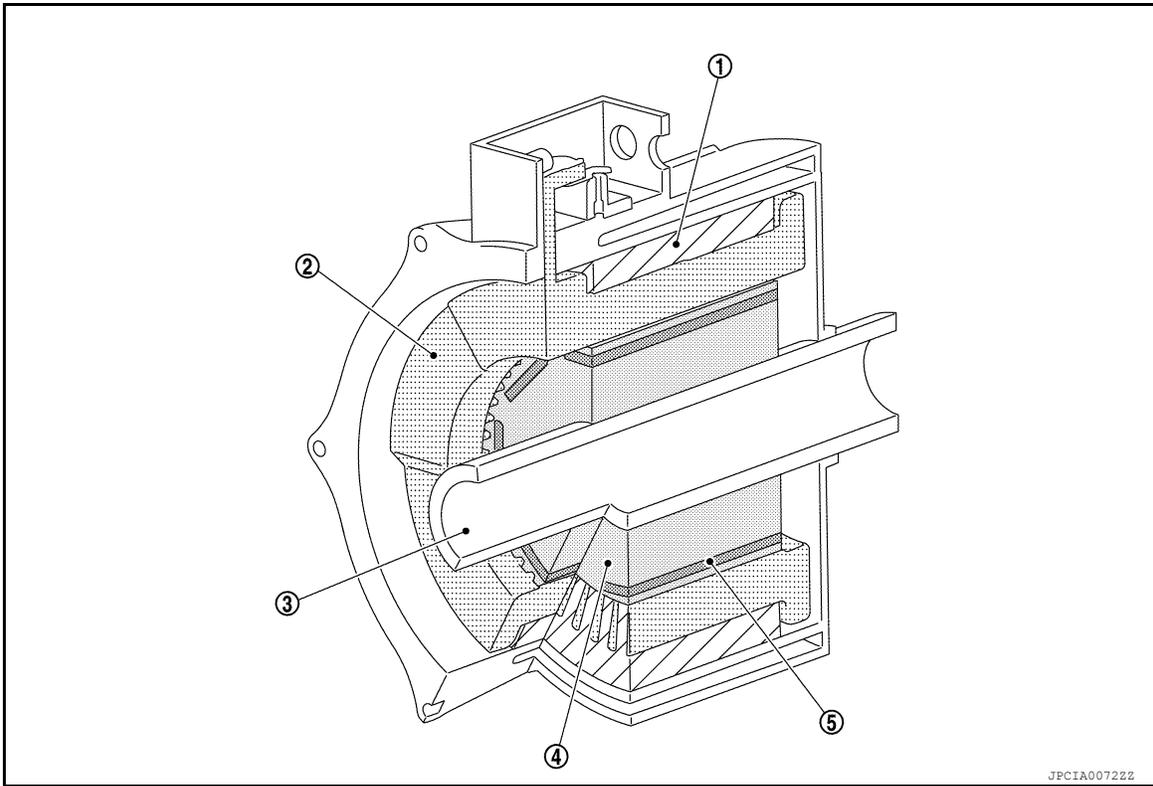
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STRUCTURE AND OPERATION

Structural Drawing

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MOTOR MECHANISM (DIAGRAM)

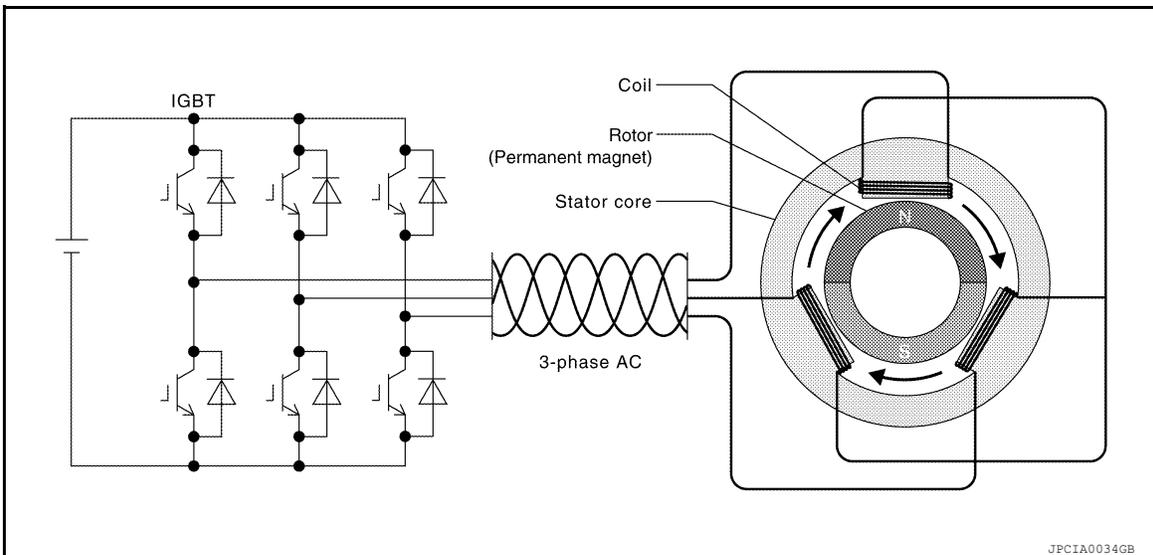


- | | | |
|---------------|--------------------|---------|
| ① Stator core | ② Coil | ③ Shaft |
| ④ Rotor core | ⑤ Permanent magnet | |

Operation Description

INFOID:000000010120900

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-

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STRUCTURE AND OPERATION

< SYSTEM DESCRIPTION >

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

< SYSTEM DESCRIPTION >

SYSTEM

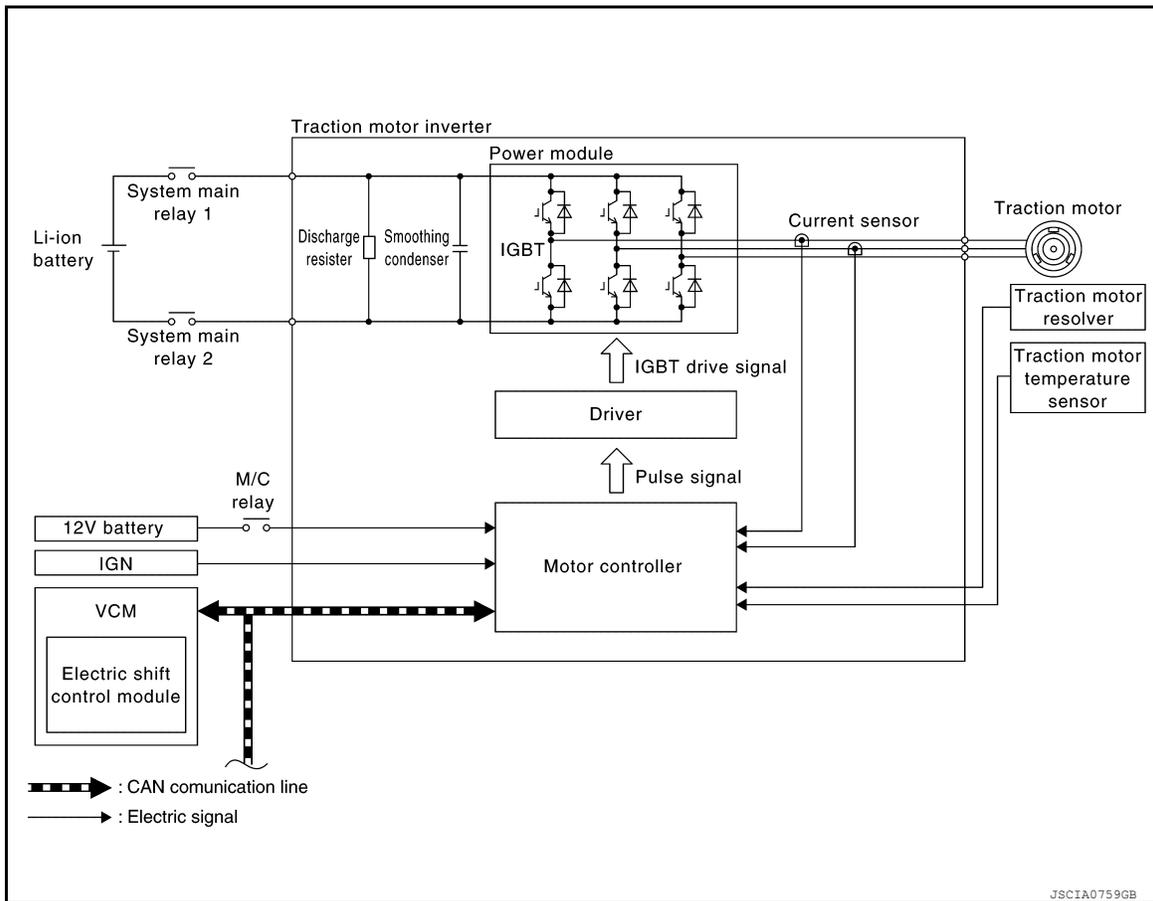
TRACTION MOTOR INVERTER

TRACTION MOTOR INVERTER : System Description

INFOID:000000010120901

- The traction motor inverter controls the traction motor based on the target motor torque signal transmitted by EV system CAN from the VCM.
- 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-25, "Fail-safe"](#).

SYSTEM DIAGRAM



TRACTION MOTOR INVERTER : Fail-safe

INFOID:000000010120902

DTC	Vehicle behavior
P0A1B	Any of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor • Stops drive control of traction motor, and requires system main relay OFF to VCM • Limits the maximum torque of traction motor to 40% or less
P0A2C	Limits the maximum torque of traction motor to 40% or less
P0A2D	Limits the maximum torque of traction motor to 40% or less
P0A2F	Stops drive control of traction motor
P0A3F	Stops drive control of traction motor
P0A44	Stops drive control of traction motor

SYSTEM

< SYSTEM DESCRIPTION >

DTC	Vehicle behavior
P0A78	Stops drive control of traction motor
P0A8D	Stops drive control of traction motor, and requires system main relay OFF to VCM
P0BE5	Stops drive control of traction motor
P0BE6	Stops drive control of traction motor
P0BE9	Stops drive control of traction motor
P0BEA	Stops drive control of traction motor
P0C79	Stops drive control of traction motor
P318E	Either of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor
P3193	No impact to vehicle behavior
P3197	Either of the following statuses is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P3199	Either of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor
P319E	No impact to vehicle behavior
P31A2	Either of the following statuses is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P31A4	Either of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor
P31A9	No impact to vehicle behavior
P31AD	Either of the following statuses is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P3240	Stops drive control of traction motor
P3241	Stops drive control of traction motor
P3242	Stops drive control of traction motor
P3243	Stops drive control of traction motor
P3244	No impact to vehicle behavior
P3245	No impact to vehicle behavior
P3247	Stops drive control of traction motor
P3249	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324A	Stops drive control of traction motor
P324D	Stops drive control of traction motor
P3252	No impact to vehicle behavior
P325A	No impact to vehicle behavior
P325B	No impact to vehicle behavior
P325C	No impact to vehicle behavior
P325D	Limits the maximum torque of traction motor to 40% or less
P325E	No impact to vehicle behavior
P325F	No impact to vehicle behavior
U1000	No impact to vehicle behavior

SYSTEM

< SYSTEM DESCRIPTION >

TRACTION MOTOR INVERTER : Protection Control

INFOID:000000010120903

When temperature of traction motor inverter or traction motor components rises, the traction motor inverter temporarily enters a protective control state in order to protect the system. It automatically returns to the normal status if the safety is secured.

Condition	Control	Normal return condition
Traction motor is overheated	Traction motor output torque is limited according to the traction motor temperature.	Traction motor temperature drops
IGBT high temperatures seen when traction motor speed is extremely low	IGBT switching frequency is reduced. NOTE: Traction motor electromagnetic noise increases.	<ul style="list-style-type: none"> 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

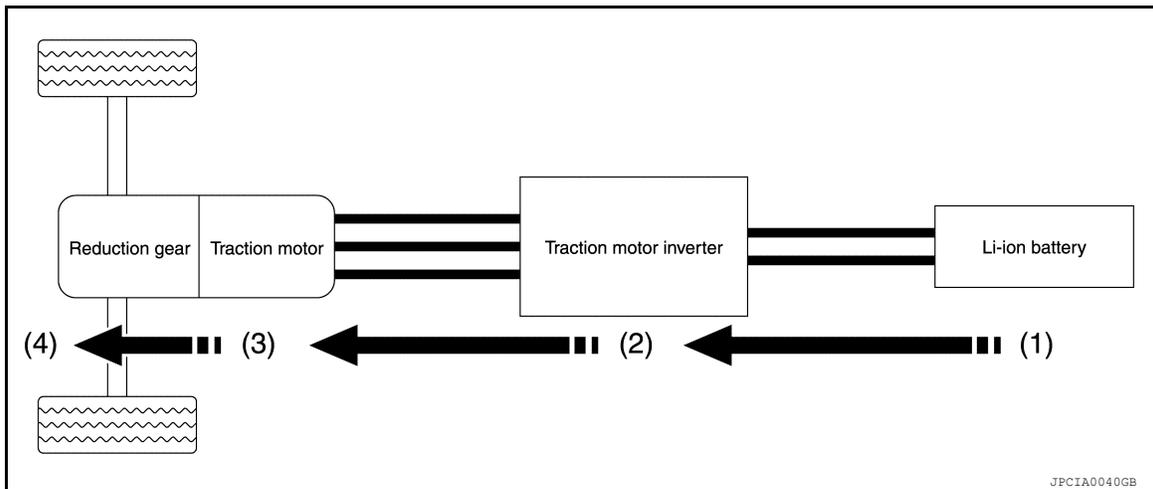
INFOID:000000010120904

The traction motor inverter applies AC power to the traction motor according to the target motor torque signal calculated by VCM in order to generate drive force.

MOTOR POWER CONTROL : Operating Principle

INFOID:000000010120905

Flow of energy



(4)	(3)	(2)	(1)
The drive torque from the traction motor is output as kinetic energy.	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.	The traction motor inverter (IGBT) switches in order to convert the DC power from the Li-ion battery to AC power.	The DC power from the Li-ion battery is input to the traction motor inverter.

MOTOR REGENERATION CONTROL

MOTOR REGENERATION CONTROL : System Description

INFOID:000000010120906

During deceleration, the traction motor inverter drives the traction motor to function as a generator based on the regenerative torque command signal sent via EV system CAN from the VCM, converting the kinetic torque generated by rotation of the tires into electrical energy. The converted electrical energy charges the Li-ion battery.

SYSTEM

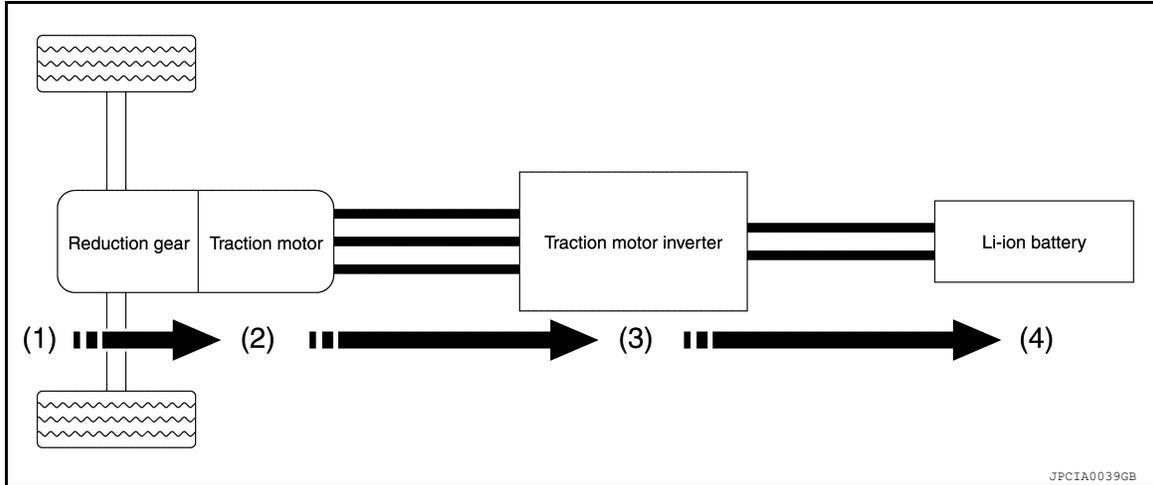
< SYSTEM DESCRIPTION >

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.

MOTOR REGENERATION CONTROL : Operating Principle

INFOID:000000010120907

Flow of energy



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(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.

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : System Description

INFOID:000000010120908

This is an on-board trouble diagnosis system which automatically detects malfunction. Detected malfunction is memorized in ECU as DTC. Diagnosis information can be confirmed using CONSULT.

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:000000010120909

NOTE:

Operate the power switch from OFF to ON. This operation is defined as 1 trip.

- DTC (P0A1B, P0A8D, P0C79, 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 not updated even if a different DTC is detected in another trip. The first memorized data is kept as freeze frame data.
- The procedure to erase DTC from traction motor inverter memory is described in "How to Erase DTC". Refer to [TMS-21, "CONSULT Function"](#).

DIAGNOSIS DESCRIPTION : Counter System

INFOID:000000010120910

Counter system counts up at every operation of power switch from OFF to ON under condition that the same malfunction is not detected. On the other hand, if the same DTC as memorized one is detected again, the count is reset and the counter system counts up again from "0".

CONSULT Function

INFOID:000000010120911

APPLICATION ITEM

Item	Function
All DTC Reading	Display all DTCs or diagnostic items that all ECUs are recording and judging.
Work Support	This mode enables a technician to adjust some devices faster and more accurately.
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.

WORK SUPPORT

Item	Description
RESOLVER WRITE	Performs writing of traction motor resolver offset.
CLEAR OUTPUT LIMIT REASON	Resets output limit history of traction motor and traction motor inverter. NOTE: Resets "OUTPUT LIMIT MOTOR TEMP" and "OUTPUT LIMIT INV TEMP" values of data monitor.

SELF DIAGNOSTIC RESULTS

Display Item List

Refer to [TMS-28, "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".

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

< SYSTEM DESCRIPTION >

How to Erase DTC

NOTE:

If the power switch is kept ON after repair operation, operate the power switch to OFF. Operate the power 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

IGN counter is displayed in "FFD". It displays the number of operations of power switch from OFF to ON after DTC recovery to normal.

- If malfunction (DTC) is currently detected, "0" is displayed.
- The displayed number counts up at each operation of power switch from OFF to ON after recovery to normal, such as 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 FFD memory
12V POWER VOLTAGE (V)	Displays 12V battery power voltage input to traction motor inverter
CODE IN INVERTER	Displays the trouble code inside traction motor inverter
RESOLVER OFFSET VALUES (1st and 2nd symbols)	Displays 1st and 2nd symbols of traction motor resolver offset value written in traction motor inverter
DIAGNOSIS START HISTORY 1	Displays if DTC detection mode is started
DIAGNOSIS START HISTORY 2	
DPA REQUEST	Displays the request status of DPA
TORQUE LIMIT RATE 1 (%)	Displays the motoring torque limit rate
TORQUE LIMIT RATE 2 (%)	Displays the regeneration torque limit rate
MOTOR TEMPERATURE (°C or °F)	Displays the temperature of traction motor
MAX MOTOR TEMPERATURE (°C or °F)	Displays the highest temperature of traction motor detected
INV INPUT HIGH VOLTAGE (V)	Displays high voltage input to traction motor inverter
COMMAND TORQUE (Nm)	Displays the torque command value from VCM via EV system CAN
INSIDE COMMAND TORQUE (Nm)	Displays the torque command value in motor controller
MOTOR SPEED (rpm)	Displays the traction motor speed
MOTOR d CURRENT (A)	Displays the detected value of current (d-axis) of traction motor
MOTOR q CURRENT (A)	Displays the detected value of current (q-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
PHASE ANGLE (deg)	Displays the turning angle position of rotor
SEQUENCE MODE	Displays the sequence number in motor controller
CARRIER FREQUENCY	Displays the carrier frequency
IGBT HIGH TEMP DETECT	Displays the status of high temperature detection of IGBT
HIGH VOLTAGE SUPPLY	Displays the high voltage supply status from VCM via EV system CAN
VOLTAGE (S1-S3) (V)	Displays the S1-S3 of resolver detected voltage
VOLTAGE (S2-S4) (V)	Displays the S2-S4 of resolver detected voltage
ERROR LEVEL 1	Displays the diagnosis flag of resolver IC
ERROR LEVEL 2	
ERROR LEVEL 3	

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

< SYSTEM DESCRIPTION >

Monitored item (Unit)	Remarks
ERROR CODE 1	Displays the diagnosis results of resolver IC
ERROR CODE 2	
RESOLVER VOLTAGE (V)	Displays the power supply voltage of resolver
5V POWER SUPPLY (V)	Displays the 5V control power supply voltage
3V POWER SUPPLY (V)	Displays the 3V control power supply voltage

DATA MONITOR

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitored item (Unit)	Remarks
MOTOR TEMPERATURE (°C or °F)	Displays the temperature of traction motor
12V POWER VOLTAGE (V)	Displays 12V battery power voltage input to traction motor inverter
INV INPUT HIGH VOLTAGE (V)	Displays high voltage input to traction motor inverter
COMMAND TORQUE (Nm)	Displays the torque command value from VCM via EV system CAN
MOTOR SPEED (rpm)	Displays the traction motor speed
SEQUENCE MODE	Displays the sequence number in motor controller
OUTPUT LIMIT MOTOR TEMP	<ul style="list-style-type: none"> • Displays presence of output limit due to traction motor temperature increase after last deletion of output limit history • Values can be reset using "CLEAR OUTPUT LIMIT REASON" of work support
OUTPUT LIMIT INV TEMP	<ul style="list-style-type: none"> • Displays presence of output limit due to temperature increase inside traction motor inverter after last deletion of output limit history • Values can be reset using "CLEAR OUTPUT LIMIT REASON" of work support
CARRIER FREQUENCY	Displays the carrier frequency
HIGH VOLTAGE SUPPLY	Displays the high voltage supply status from VCM via EV system CAN
CHARGE RELAY READY REQ	Displays the state of charge judgment start request of high voltage circuit
SHIFT POSITION (VCM)	Displays the shift position from VCM via EV system CAN

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

ECU DIAGNOSIS INFORMATION

TRACTION MOTOR INVERTER

Reference Value

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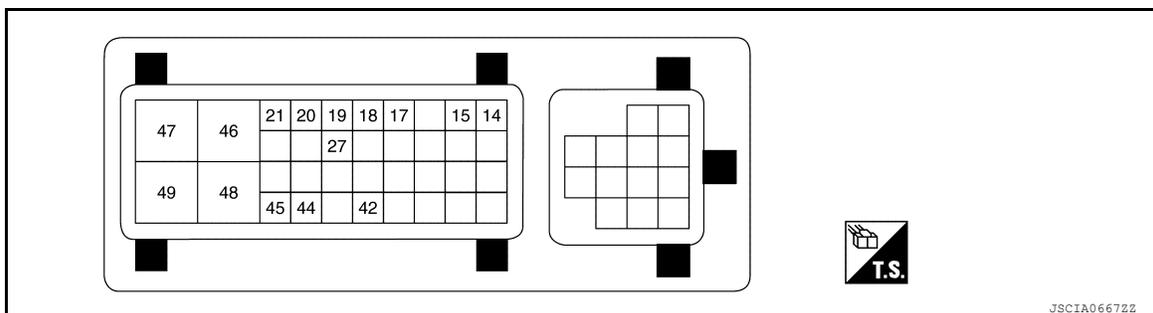
CONSULT DATA MONITOR STANDARD VALUE

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item	Condition	Value / Status (Approx.)	
MOTOR TEMPERATURE	READY (stop the vehicle)	Almost same as coolant temperature after temperature saturation. [approximately within 10°C (50°F) of coolant temperature]	
	During driving	The value changes along with acceleration/deceleration.	
12V POWER VOLTAGE	Power switch ON	9 – 16 V	
INV INPUT HIGH VOLTAGE	READY (stop the vehicle) and during driving	240 – 403 V	
COMMAND TORQUE	During driving	The value changes along with acceleration/deceleration.	
MOTOR SPEED	READY (stop the vehicle)	0 rpm	
	During driving	The value changes along with acceleration/deceleration.	
SEQUENCE MODE	READY (stop the vehicle)	11	
OUTPUT LIMIT MOTOR TEMP	When the vehicle has history of output limit	Yes	
	When output limit is reset	None	
OUTPUT LIMIT INV TEMP	When the vehicle has history of output limit	Yes	
	When output limit is reset	None	
CARRIER FREQUENCY	READY (stop the vehicle)	5k	
HIGH VOLTAGE SUPPLY	READY (stop the vehicle)	SUPPLY	
CHARGE RELAY READY REQ	READY (stop the vehicle)	ON	
SHIFT POSITION (VCM)	READY (stop the vehicle)	P position	P
		R position	R
		N position	N
		D position	D

TERMINAL LAYOUT



PHYSICAL VALUES

CAUTION:

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

- Check them with vehicle side harness connector, removing traction motor inverter connector. Never touch terminals of traction motor inverter side connector at this operation.
- If power switch is pushed ON with traction motor inverter connector removed, other control modules might detect malfunction of traction motor inverter.

Terminal No. (Color)		Description		Condition	Value (Approx.)
+	-	Signal name	Input/ Output		
14 (L)	—	EV system CAN-H	Input/ Output	—	—
15 (G)	—	EV system CAN-L	Input/ Output	—	—
18 (L)	17 (P)	Traction motor resolver signal (S2 – S4)	Input	Power switch OFF	20 – 35 Ω
19 (R)	27 (G)	Traction motor resolver signal (R1 – R2)	Output	Power switch OFF	8 – 15 Ω
20 (B)	21 (W)	Traction motor resolver signal (S1 – S3)	Input	Power switch OFF	20 – 35 Ω
42 (LG)	Ground	Power ON power supply	—	Power switch ON	9 – 16 V
				Power switch OFF	0 V
45 (Y)	44 (O)	Traction motor tempera- ture sensor	Input	Power switch OFF	Within ± 50% of temperature characteristics diagram
46 (G)	Ground	12V battery power supply	—	Power switch ON	9 – 16 V
47 (B)	Ground	GND	—	Always	0 V
48 (G)	Ground	12V battery power supply	—	Power switch ON	9 – 16 V
49 (B)	Ground	GND	—	Always	0 V

Fail-safe

INFOID:000000010120913

DTC	Vehicle behavior
P0A1B	Any of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor • Stops drive control of traction motor, and requires system main relay OFF to VCM • Limits the maximum torque of traction motor to 40% or less
P0A2C	Limits the maximum torque of traction motor to 40% or less
P0A2D	Limits the maximum torque of traction motor to 40% or less
P0A2F	Stops drive control of traction motor
P0A3F	Stops drive control of traction motor

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

DTC	Vehicle behavior
P0A44	Stops drive control of traction motor
P0A78	Stops drive control of traction motor
P0A8D	Stops drive control of traction motor, and requires system main relay OFF to VCM
P0BE5	Stops drive control of traction motor
P0BE6	Stops drive control of traction motor
P0BE9	Stops drive control of traction motor
P0BEA	Stops drive control of traction motor
P0C79	Stops drive control of traction motor
P318E	Either of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor
P3193	No impact to vehicle behavior
P3197	Either of the following statuses is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P3199	Either of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor
P319E	No impact to vehicle behavior
P31A2	Either of the following statuses is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P31A4	Either of the following statuses is observed. <ul style="list-style-type: none"> • No impact to vehicle behavior • Stops drive control of traction motor
P31A9	No impact to vehicle behavior
P31AD	Either of the following statuses is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P3240	Stops drive control of traction motor
P3241	Stops drive control of traction motor
P3242	Stops drive control of traction motor
P3243	Stops drive control of traction motor
P3244	No impact to vehicle behavior
P3245	No impact to vehicle behavior
P3247	Stops drive control of traction motor
P3249	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324A	Stops drive control of traction motor
P324D	Stops drive control of traction motor
P3252	No impact to vehicle behavior
P325A	No impact to vehicle behavior
P325B	No impact to vehicle behavior
P325C	No impact to vehicle behavior
P325D	Limits the maximum torque of traction motor to 40% or less
P325E	No impact to vehicle behavior
P325F	No impact to vehicle behavior
U1000	No impact to vehicle behavior

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

Protection Control

INFOID:000000010120914

When temperature of traction motor inverter or traction motor components rises, the traction motor inverter temporarily enters a protective control state in order to protect the system. It automatically returns to the normal status if the safety is secured.

Condition	Control	Normal return condition
Traction motor is overheated	Traction motor output torque is limited according to the traction motor temperature.	Traction motor temperature drops
IGBT high temperatures seen when traction motor speed is extremely low	IGBT switching frequency is reduced. NOTE: Traction motor electromagnetic noise increases.	<ul style="list-style-type: none"> IGBT temperature drops Traction motor speed increases
IGBT is overheated	Traction motor output torque is limited according to the IGBT temperature.	IGBT temperature drops

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DTC Inspection Priority Chart

INFOID:000000010120915

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 (DTC)	Reference
1	P0A8D 14VOLT POWER VOLTAGE	TMS-57

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M

N

O

P

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)	Reference
2	P0A2C DRIVE MOTOR A TEMP SENSOR	TMS-42
	P0A2D DRIVE MOTOR A TEMP SENSOR	TMS-44
	P0A2F DRIVE MOTOR A OVER TEMPERATURE	TMS-46
	P0A3F DRIVE MOTOR A POSITION SENSOR	TMS-50
	P0A44 DRIVE MOTOR A OVER SPEED	TMS-53
	P0A78 DRIVE MOTOR A INVERTER	TMS-56
	P0C79 DRIVE MOTOR A INVERTER VOLTAGE	TMS-62
	P318E CAN ERROR	TMS-64
	P3193 CAN ERROR	TMS-65
	P3197 CAN ERROR	TMS-66
	P3199 CAN ERROR	TMS-67
	P319E CAN ERROR	TMS-68
	P31A2 CAN ERROR	TMS-69
	P31A4 CAN ERROR	TMS-70
	P31A9 CAN ERROR	TMS-71
	P31AD CAN ERROR	TMS-72
	P3241 DRIVE MOTOR A INVERTER CRNT CONT	TMS-76
	P3244 DRIVE MOTOR A INVERTER	TMS-80
	P3245 DRIVE MOTOR A INVERTER	TMS-82
	P3247 DRIVE MOTOR A INVERTER	TMS-83
	P3249 DRIVE MOTOR A INVERTER	TMS-84
	P324A DRIVE MOTOR A INVERTER VOLTAGE	TMS-85
	P324D DRIVE MOTOR A INVERTER IGBT	TMS-87
	P3252 DRIVE MOTOR A INVERTER IGBT	TMS-90
	P325A CAN ERROR	TMS-91
	P325B DRIVE MOTOR A INVERTER	TMS-92
	P325C DRIVE MOTOR A POSITION	TMS-93
	P325D DRIVE MOTOR A POSITION	TMS-94
	P325E DRIVE MOTOR A POSITION	TMS-95
	P325F DRIVE MOTOR A POSITION	TMS-96
U1000 CAN COMM CIRCUIT	TMS-97	
3	P0A1B DRIVE MOTOR A CONTROL MODULE	TMS-41
	P0BE5 D-MOTOR A PHASE U CURRENT SEN	TMS-58
	P0BE6 D-MOTOR A PHASE U CURRENT SEN	TMS-59
	P0BE9 D-MOTOR A PHASE V CURRENT SEN	TMS-60
	P0BEA D-MOTOR A PHASE V CURRENT SEN	TMS-61
	P3242 D-MOTOR A PHASE U CURRENT SEN 2	TMS-78
	P3423 D-MOTOR A PHASE V CURRENT SEN 2	TMS-79
4	P3240 DRIVE MOTOR A INVERTER CRNT CONT	TMS-73

DTC Index

INFOID:0000000010120916

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-27, "DTC Inspection Priority Chart"](#).

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

DTC*	Items (CONSULT screen terms)	EV system warning lamp	Reference
CONSULT			
P0A1B	DRIVE MOTOR A CONTROL MODULE	Can illuminate	TMS-41
P0A2C	DRIVE MOTOR A TEMP SENSOR	—	TMS-42
P0A2D	DRIVE MOTOR A TEMP SENSOR	—	TMS-44
P0A2F	DRIVE MOTOR A OVER TEMPERATURE	ON	TMS-46
P0A3F	DRIVE MOTOR A POSITION SENSOR	ON	TMS-50
P0A44	DRIVE MOTOR A OVER SPEED	ON	TMS-53
P0A78	DRIVE MOTOR A INVERTER	ON	TMS-56
P0A8D	14VOLT POWER VOLTAGE	ON	TMS-57
P0BE5	D-MOTOR A PHASE U CURRENT SEN	ON	TMS-58
P0BE6	D-MOTOR A PHASE U CURRENT SEN	ON	TMS-59
P0BE9	D-MOTOR A PHASE V CURRENT SEN	ON	TMS-60
P0BEA	D-MOTOR A PHASE V CURRENT SEN	ON	TMS-61
P0C79	DRIVE MOTOR A INVERTER VOLTAGE	ON	TMS-62
P318E	CAN ERROR	Can illuminate	TMS-64
P3193	CAN ERROR	—	TMS-65
P3197	CAN ERROR	Can illuminate	TMS-66
P3199	CAN ERROR	Can illuminate	TMS-67
P319E	CAN ERROR	—	TMS-68
P31A2	CAN ERROR	Can illuminate	TMS-69
P31A4	CAN ERROR	Can illuminate	TMS-70
P31A9	CAN ERROR	—	TMS-71
P31AD	CAN ERROR	Can illuminate	TMS-72
P3240	DRIVE MOTOR A INVERTER CRNT CONT	ON	TMS-73
P3241	DRIVE MOTOR A INVERTER CRNT CONT	ON	TMS-76
P3242	D-MOTOR A PHASE U CURRENT SEN 2	ON	TMS-78
P3243	D-MOTOR A PHASE V CURRENT SEN 2	ON	TMS-79
P3244	DRIVE MOTOR A INVERTER	—	TMS-80
P3245	DRIVE MOTOR A INVERTER	—	TMS-82
P3247	DRIVE MOTOR A INVERTER	ON	TMS-83
P3249	DRIVE MOTOR A INVERTER	ON	TMS-84
P324A	DRIVE MOTOR A INVERTER VOLTAGE	ON	TMS-85
P324D	DRIVE MOTOR A INVERTER IGBT	ON	TMS-87
P3252	DRIVE MOTOR A INVERTER IGBT	—	TMS-90
P325A	CAN ERROR	—	TMS-91
P325B	DRIVE MOTOR A INVERTER	—	TMS-92
P325C	DRIVE MOTOR A POSITION	ON	TMS-93
P325D	DRIVE MOTOR A POSITION	—	TMS-94
P325E	DRIVE MOTOR A POSITION	—	TMS-95
P325F	DRIVE MOTOR A POSITION	—	TMS-96
U1000	CAN COMM CIRCUIT	—	TMS-97

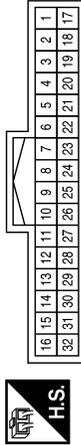
*: These numbers are prescribed by SAE J2012/ISO 15031-6.

TRACTION MOTOR INVERTER

< WIRING DIAGRAM >

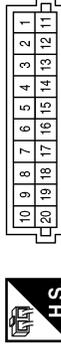
TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	M21
Connector Name	WIRE TO WIRE
Connector Color	WHITE



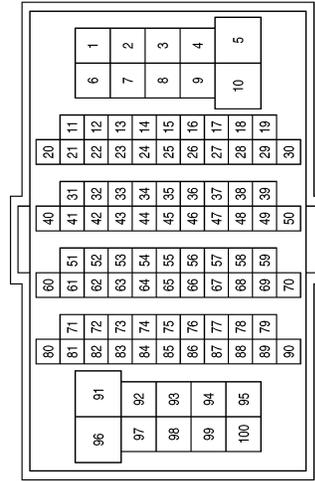
Terminal No.	Color of Wire	Signal Name
15	L	-
16	G	-

Connector No.	M50
Connector Name	JOINT CONNECTOR-M03
Connector Color	PINK



Terminal No.	Color of Wire	Signal Name
14	G	-
15	G	-
19	L	-
20	L	-

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Color	WHITE

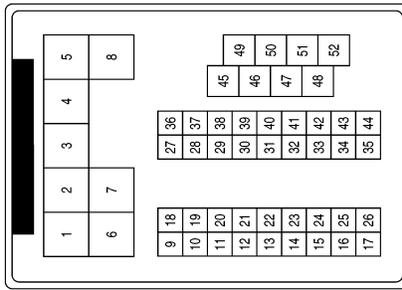


Terminal No.	Color of Wire	Signal Name
49	G	-
50	L	-

TRACTION MOTOR INVERTER

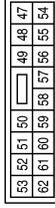
< WIRING DIAGRAM >

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Color	BLACK



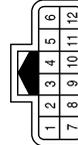
Terminal No.	Color of Wire	Signal Name
35	R	-
44	B/W	-
45	P	-
46	B/R	-

Connector No.	E15
Connector Name	JOINT CONNECTOR-M03
Connector Color	BLUE



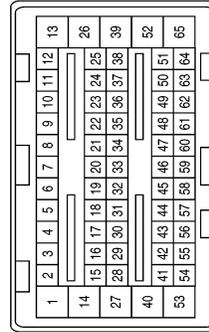
Terminal No.	Color of Wire	Signal Name
57	R	VCM IGN

Connector No.	E60
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
3	L	-
4	G	-
5	L	-
6	G	-

Connector No.	E61
Connector Name	VCM
Connector Color	BLACK

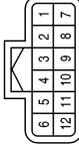


Terminal No.	Color of Wire	Signal Name
24	L	EV CAN-H
25	G	EV CAN-L

TRACTION MOTOR INVERTER

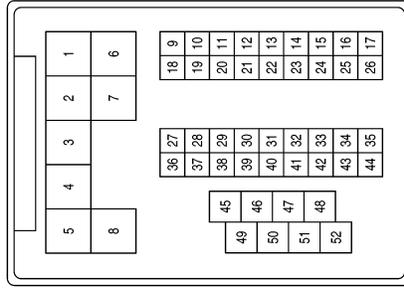
< WIRING DIAGRAM >

Connector No.	F2
Connector Name	WIRE TO WIRE
Connector Color	BLACK



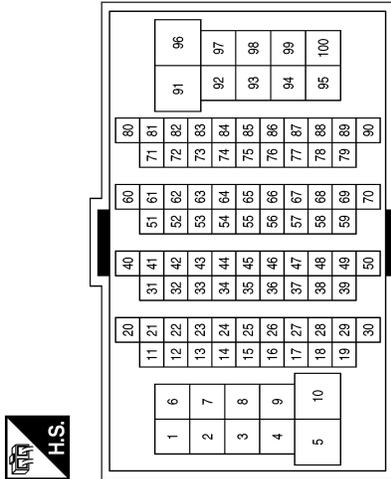
Terminal No.	Color of Wire	Signal Name
3	L	-
4	G	-
5	L	-
6	G	-

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
35	LG	-
45	G	-
44	SHIELD	-
46	B	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
49	G	-
50	L	-

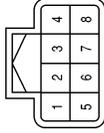
AABIA1223GB

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TRACTION MOTOR INVERTER

< WIRING DIAGRAM >

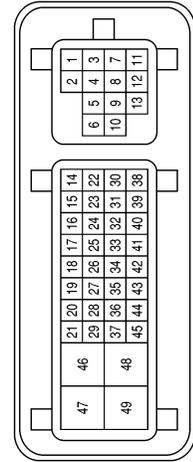
Connector No.	F14
Connector Name	TRACTION MOTOR
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	B	-
2	G	-
3	Y	-
4	O	-
5	R	-
6	P	-
7	L	-
8	W	-

Terminal No.	Color of Wire	Signal Name
21	W	TRACTION MOTOR RESOLVER SIGNAL (S1-S3)
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	G	TRACTION MOTOR RESOLVER SIGNAL (R1-R2)
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	-	-
42	LG	POWER ON POWER SUPPLY
43	-	-
44	O	TRACTION MOTOR TEMPERATURE SENSOR
45	Y	TRACTION MOTOR TEMPERATURE SENSOR
46	G	12V BATTERY POWER SUPPLY
47	B	GND
48	G	12V BATTERY POWER SUPPLY
49	B	GND

Connector No.	F13
Connector Name	TRACTION MOTOR INVERTER
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	L	EV SYSTEM CAN-H
15	G	EV SYSTEM CAN-L
16	-	-
17	P	TRACTION MOTOR RESOLVER SIGNAL (S2-S4)
18	L	TRACTION MOTOR RESOLVER SIGNAL (S2-S4)
19	R	TRACTION MOTOR RESOLVER SIGNAL (R1-R2)
20	B	TRACTION MOTOR RESOLVER SIGNAL (S1-S3)

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TRACTION MOTOR INVERTER

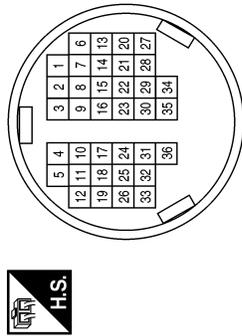
< WIRING DIAGRAM >

Connector No.	H12
Connector Name	TRACTION MOTOR INVERTER
Connector Color	ORANGE



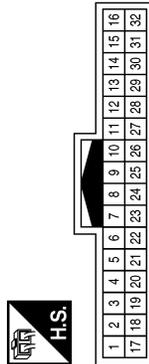
Terminal No.	Color of Wire	Signal Name
U	O	-
V	O	-
W	O	-

Connector No.	B24
Connector Name	LI-ION BATTERY
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
1	L	EV CAN-H
2	G	EV CAN-L

Connector No.	B3
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
15	L	-
16	G	-

Connector No.	H17
Connector Name	PDM (POWER DELIVERY MODULE)
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
49	O	-
50	O	-

Connector No.	H14
Connector Name	TRACTION MOTOR
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
U	O	-
V	O	-
W	O	-

Connector No.	H13
Connector Name	TRACTION MOTOR INVERTER
Connector Color	ORANGE



Terminal No.	Color of Wire	Signal Name
50	O	-
51	O	-

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DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000010120918

1. OBTAIN INFORMATION ABOUT SYMPTOM

Refer to [TMS-37, "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 IN VCM

1. Check DTC in VCM.
2. Check related service bulletins for information.

Are any DTCs detected?

- YES >> Check the DTC. Refer to [EVC-102, "DTC Index"](#).
NO >> GO TO 3.

3. CHECK DTC IN TRACTION MOTOR INVERTER

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 4.
Malfunction information exists, but no DTC. >>GO TO 5.
No malfunction information, but DTC exists. >>GO TO 6.

4. 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-25, "Fail-safe"](#). When a malfunction symptom is reproduced, the question sheet is effective. Refer to [TMS-37, "Question sheet"](#).
Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 6.

5. 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-27, "Protection Control"](#). When a malfunction symptom is reproduced, the question sheet is effective. Refer to [TMS-37, "Question sheet"](#).
Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 8.

6. PERFORM "DTC CONFIRMATION PROCEDURE"

Perform "DTC CONFIRMATION PROCEDURE" of the appropriate DTC to check if DTC is detected again. Refer to [TMS-27, "DTC Inspection Priority Chart"](#) when multiple DTCs are detected, and then determine the order for performing the diagnosis.

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

NOTE:

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

Is any DTC detected?

YES >> GO TO 7.

NO >> Check according to [GI-53, "Intermittent Incident"](#).

7. 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 8.

8. 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 4 or 5.

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:0000000010120919

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.		
	Incident Date		VIN		
	Model & Year		In Service Date		
	Trans.		Mileage	km/mile	
Symptoms	<input type="checkbox"/> Does not to READY		<input type="checkbox"/> EV system warning lamp is on		
	<input type="checkbox"/> Power limitation indicator lamp is on				
	<input type="checkbox"/> Water leak*	<input type="checkbox"/> Noise*	<input type="checkbox"/> Vibration*	<input type="checkbox"/> Shock*	<input type="checkbox"/> Gear noise*
	<input type="checkbox"/> Non driving*	<input type="checkbox"/> Poor acceleration*	<input type="checkbox"/> Poor torque*	<input type="checkbox"/> Radio noise*	
	<input type="checkbox"/> Does not charge	<input type="checkbox"/> Other*	*: If applied, enter in detail		
	Detailed symptom				
Onomatopoeia					
Frequency	<input type="checkbox"/> All the time	<input type="checkbox"/> Once	<input type="checkbox"/> Sometimes (times a day)	<input type="checkbox"/> Other	
Weather conditions	<input type="checkbox"/> Not affected				

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

Question Sheet																															
	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Weather</td> <td><input type="checkbox"/> Fine</td> <td><input type="checkbox"/> Clouding</td> <td><input type="checkbox"/> Raining</td> <td><input type="checkbox"/> Snowing</td> <td><input type="checkbox"/> Other ()</td> </tr> <tr> <td>Temp.</td> <td><input type="checkbox"/> Hot</td> <td><input type="checkbox"/> Warm</td> <td><input type="checkbox"/> Cool</td> <td><input type="checkbox"/> Cold</td> <td><input type="checkbox"/> Temp. [Approx. °C (°F)]</td> </tr> <tr> <td>Humidity</td> <td><input type="checkbox"/> High</td> <td><input type="checkbox"/> Middle</td> <td><input type="checkbox"/> Low</td> <td colspan="2"><input type="checkbox"/> Humidity (Approx. %)</td> </tr> </table>	Weather	<input type="checkbox"/> Fine	<input type="checkbox"/> Clouding	<input type="checkbox"/> Raining	<input type="checkbox"/> Snowing	<input type="checkbox"/> Other ()	Temp.	<input type="checkbox"/> Hot	<input type="checkbox"/> Warm	<input type="checkbox"/> Cool	<input type="checkbox"/> Cold	<input type="checkbox"/> Temp. [Approx. °C (°F)]	Humidity	<input type="checkbox"/> High	<input type="checkbox"/> Middle	<input type="checkbox"/> Low	<input type="checkbox"/> Humidity (Approx. %)													
Weather	<input type="checkbox"/> Fine	<input type="checkbox"/> Clouding	<input type="checkbox"/> Raining	<input type="checkbox"/> Snowing	<input type="checkbox"/> Other ()																										
Temp.	<input type="checkbox"/> Hot	<input type="checkbox"/> Warm	<input type="checkbox"/> Cool	<input type="checkbox"/> Cold	<input type="checkbox"/> Temp. [Approx. °C (°F)]																										
Humidity	<input type="checkbox"/> High	<input type="checkbox"/> Middle	<input type="checkbox"/> Low	<input type="checkbox"/> Humidity (Approx. %)																											
Road conditions	<table style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> Not affected</td> <td><input type="checkbox"/> In town</td> <td><input type="checkbox"/> Freeway</td> <td><input type="checkbox"/> Off road (Up / Down)</td> <td><input type="checkbox"/> Deplorable road</td> </tr> <tr> <td><input type="checkbox"/> Flat road</td> <td colspan="2"><input type="checkbox"/> While turning (Right / Left)</td> <td colspan="2"><input type="checkbox"/> Bump</td> </tr> <tr> <td colspan="5"><input type="checkbox"/> Other</td> </tr> </table>	<input type="checkbox"/> Not affected	<input type="checkbox"/> In town	<input type="checkbox"/> Freeway	<input type="checkbox"/> Off road (Up / Down)	<input type="checkbox"/> Deplorable road	<input type="checkbox"/> Flat road	<input type="checkbox"/> While turning (Right / Left)		<input type="checkbox"/> Bump		<input type="checkbox"/> Other																			
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Shift position	<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="5"><input type="checkbox"/> Not affected</td> </tr> <tr> <td><input type="checkbox"/> P position</td> <td><input type="checkbox"/> R position</td> <td><input type="checkbox"/> N position</td> <td><input type="checkbox"/> D position</td> <td><input type="checkbox"/> B position</td> </tr> <tr> <td colspan="5"><input type="checkbox"/> ECO mode</td> </tr> </table>	<input type="checkbox"/> Not affected					<input type="checkbox"/> P position	<input type="checkbox"/> R position	<input type="checkbox"/> N position	<input type="checkbox"/> D position	<input type="checkbox"/> B position	<input type="checkbox"/> ECO mode																			
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<input type="checkbox"/> ECO mode																															
Driving conditions	<table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="5"><input type="checkbox"/> Not affected</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> Power switch ON → OFF</td> <td colspan="2"><input type="checkbox"/> Power switch OFF → ON</td> <td><input type="checkbox"/> READY (stop the vehicle)</td> </tr> <tr> <td><input type="checkbox"/> While cruising</td> <td><input type="checkbox"/> While decelerating</td> <td><input type="checkbox"/> Just before stopping</td> <td><input type="checkbox"/> Just after stopping</td> <td><input type="checkbox"/> D position (stop the vehicle)</td> </tr> <tr> <td colspan="2"><input type="checkbox"/> While recharging</td> <td colspan="3"><input type="checkbox"/> Other</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Vehicle speed [km/h (MPH)]</td> <td colspan="2"><input type="checkbox"/> Accelerator pedal (/ 8)</td> </tr> <tr> <td colspan="5"><input type="checkbox"/> Battery level (Low / Middle / High)</td> </tr> </table>	<input type="checkbox"/> Not affected					<input type="checkbox"/> Power switch ON → OFF		<input type="checkbox"/> Power switch OFF → ON		<input type="checkbox"/> READY (stop the vehicle)	<input type="checkbox"/> While cruising	<input type="checkbox"/> While decelerating	<input type="checkbox"/> Just before stopping	<input type="checkbox"/> Just after stopping	<input type="checkbox"/> D position (stop the vehicle)	<input type="checkbox"/> While recharging		<input type="checkbox"/> Other			<input type="checkbox"/> Vehicle speed [km/h (MPH)]			<input type="checkbox"/> Accelerator pedal (/ 8)		<input type="checkbox"/> Battery level (Low / Middle / High)				
<input type="checkbox"/> Not affected																															
<input type="checkbox"/> Power switch ON → OFF		<input type="checkbox"/> Power switch OFF → ON		<input type="checkbox"/> READY (stop the vehicle)																											
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<input type="checkbox"/> Battery level (Low / Middle / High)																															
Moments when mal-function disappears	<table style="width: 100%; border-collapse: collapse;"> <tr> <td><input type="checkbox"/> Disappears while driving</td> <td><input type="checkbox"/> Disappears when stopped</td> <td><input type="checkbox"/> Disappears with select operation</td> </tr> <tr> <td><input type="checkbox"/> Disappears when power switch is pushed OFF</td> <td><input type="checkbox"/> Disappears when battery charge is stopped</td> <td><input type="checkbox"/> Does not disappear</td> </tr> <tr> <td colspan="3"><input type="checkbox"/> Other</td> </tr> </table>	<input type="checkbox"/> Disappears while driving	<input type="checkbox"/> Disappears when stopped	<input type="checkbox"/> Disappears with select operation	<input type="checkbox"/> Disappears when power switch is pushed OFF	<input type="checkbox"/> Disappears when battery charge is stopped	<input type="checkbox"/> Does not disappear	<input type="checkbox"/> Other																							
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<input type="checkbox"/> Other																															
Other	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="height: 40px;"></td> </tr> </table>																														

RESOLVER WRITE

< BASIC INSPECTION >

RESOLVER WRITE

Description

INFOID:000000010120920

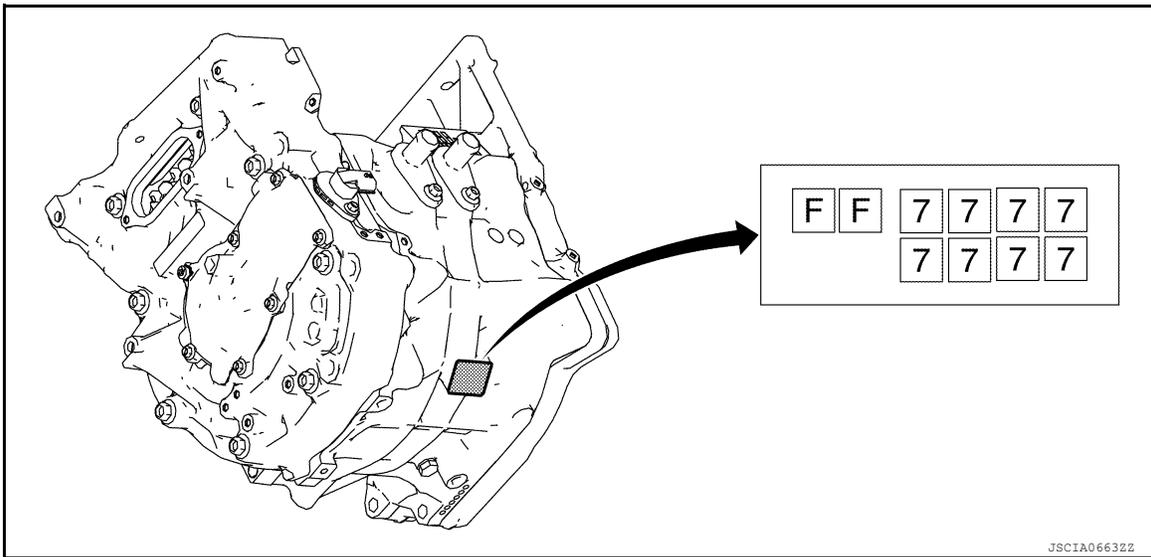
If the work listed below was performed, it is necessary to perform writing of the traction motor resolver offset to the traction motor inverter.

- Replacement of traction motor
- Replacement of traction motor inverter
- Replacement of traction motor and traction motor inverter

Location of traction motor resolver offset stamp

NOTE:

Because the traction motor resolver offset stamp is located on the lower side of the traction motor, it is necessary to remove the under cover in order to check it.



Work Procedure

INFOID:000000010120921

CAUTION:

If the traction motor inverter was replaced, then the EV system warning lamp illuminates when the power switch is turned ON, and DTC "P325C" is detected. Therefore after writing of the traction motor resolver offset is completed, verify that the EV system warning lamp has turned off and erase DTC "P325C".

1. CHECK BEFORE PERFORMING WRITING OF THE TRACTION MOTOR RESOLVER OFFSET

Check the replaced parts.

Which parts were replaced?

- Traction motor >> GO TO 2.
- Traction motor inverter >> GO TO 3.
- Traction motor and traction motor inverter >> GO TO 3.

2. WRITING OF THE TRACTION MOTOR RESOLVER OFFSET

Ⓜ With CONSULT

1. Power switch ON.
2. Select "Work Support" in "MOTOR CONTROL".
3. Select "RESOLVER WRITE".
4. Enter the traction motor resolver offset.
5. Touch "WRITE".

Is "Writing is complete" displayed?

- YES >>
1. Power switch OFF.
 2. Power switch ON and wait 2 seconds or more.
 3. Confirm the value is changed according to the correction value input.

RESOLVER WRITE

< BASIC INSPECTION >

4. Power switch OFF to complete the work.

NO >> Perform again STEP 2.

3. WRITING OF THE TRACTION MOTOR RESOLVER OFFSET

④ With CONSULT

1. Power switch ON.

NOTE:

EV system warning lamp turns on.

2. Select "Work Support" in "MOTOR CONTROL".

3. Select "RESOLVER WRITE".

4. Enter the traction motor resolver offset.

5. Touch "WRITE".

Is "Writing is complete" displayed?

YES >> GO TO 4.

NO >> Perform again STEP 3.

4. STEPS AFTER WRITING OF THE TRACTION MOTOR RESOLVER OFFSET

④ With CONSULT

1. Power switch OFF.

2. Power switch ON and wait 2 seconds or more.

3. Verify that the EV system warning lamp is off.

4. Select "Work Support" in "MOTOR CONTROL".

5. Select "RESOLVER WRITE".

6. Confirm the value is changed according to the correction value input.

7. Perform "Self Diagnostic Results" in "MOTOR CONTROL".

8. Erase the DTC "P325C".

9. Power switch OFF.

>> END

P0A1B DRIVE MOTOR A CONTROL MODULE

< DTC/CIRCUIT DIAGNOSIS >

DTC/CIRCUIT DIAGNOSIS

P0A1B DRIVE MOTOR A CONTROL MODULE

DTC Logic

INFOID:000000010120922

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0A1B	DRIVE MOTOR A CONTROL MODULE (Drive Motor "A" Control Module)	A malfunction is detected in the traction motor inverter (motor controller)	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

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

Is "P0A1B" detected?

YES >> Go to [TMS-41, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120923

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P0A2C DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0A2C DRIVE MOTOR A TEMP SENSOR

DTC Logic

INFOID:000000010120924

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P0A2C	DRIVE MOTOR A TEMP SENSOR (Drive Motor "A" Temperature Sensor Circuit Low)	Traction motor temperature sensor signal interruption for 2 seconds or more	<ul style="list-style-type: none"> • Harness or connectors (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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓟ With CONSULT

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

Is "P0A2C" detected?

YES >> Go to [TMS-42, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120925

1. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Power 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 TRACTION MOTOR HARNESS CONNECTOR

Check the connection conditions of the traction motor harness connector.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace damaged parts.

3. CHECK TRACTION MOTOR TEMPERATURE SENSOR CIRCUIT

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

Traction motor inverter		Ground	Resistance
Connector	Terminal		
F13	44	Ground	200 kΩ or more
	45		

Is the inspection result normal?

YES >> GO TO 4.

P0A2C DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace damaged parts.

4. CHECK TRACTION MOTOR TEMPERATURE SENSOR 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.

Traction motor inverter		Traction motor		Resistance
Connector	Terminal	Connector	Terminal	
F13	44	F14	4	1 Ω or less
	45		3	

3. Check the harness for short.

Traction motor inverter		Traction motor		Resistance
Connector	Terminal	Connector	Terminal	
F13	44	F14	3	100 kΩ or more
	45		4	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the traction motor temperature sensor. Refer to [TMS-43. "Component Inspection \(Traction Motor Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103. "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-109. "Removal and Installation"](#).

Component Inspection (Traction Motor Temperature Sensor)

INFOID:000000010120926

1. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
3	4	Within ± 50% of temperature characteristics diagram

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the traction motor temperature sensor. Refer to [TMS-109. "Removal and Installation"](#).

P0A2D DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0A2D DRIVE MOTOR A TEMP SENSOR

DTC Logic

INFOID:000000010120927

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P0A2D	DRIVE MOTOR A TEMP SENSOR (Drive Motor "A" Temperature Sensor Circuit High)	A maximum value signal from the traction motor temperature sensor is detected for 2 seconds or more	<ul style="list-style-type: none">• Harness or connectors (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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P0A2D" detected?

- YES >> Go to [TMS-44, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120928

1. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Power 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 TRACTION MOTOR HARNESS CONNECTOR

Check the connection conditions of the traction motor harness connector.

Is the inspection result normal?

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

3. CHECK TRACTION MOTOR TEMPERATURE SENSOR CIRCUIT

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

Traction motor inverter		Ground	Resistance
Connector	Terminal		
F13	44	Ground	200 kΩ or more
	45		

Is the inspection result normal?

- YES >> GO TO 4.

P0A2D DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

NO >> Repair or replace damaged parts.

4. CHECK TRACTION MOTOR TEMPERATURE SENSOR 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.

Traction motor inverter		Traction motor		Resistance
Connector	Terminal	Connector	Terminal	
F13	44	F14	4	1 Ω or less
	45		3	

3. Check the harness for short.

Traction motor inverter		Traction motor		Resistance
Connector	Terminal	Connector	Terminal	
F13	44	F14	3	100 kΩ or more
	45		4	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the traction motor temperature sensor. Refer to [TMS-45, "Component Inspection \(Traction Motor Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

Component Inspection (Traction Motor Temperature Sensor)

INFOID:000000010120929

1. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
3	4	Within ± 50% of temperature characteristics diagram

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the traction motor temperature sensor. Refer to [TMS-109, "Removal and Installation"](#).

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

P0A2F DRIVE MOTOR A OVER TEMPERATURE

DTC Logic

INFOID:000000010120930

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P0A2F	DRIVE MOTOR A OVER TEMPERATURE (Drive Motor "A" Over Temperature)	Traction motor temperature is higher than the usable temperature for 2 consecutive seconds or more	<ul style="list-style-type: none">• Traction motor inverter• Traction motor• High voltage cooling system

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Drive during 20 minutes for warm-up.
3. Repeat driving of 0 km/h (0 MPH) → 60 km/h (37 MPH) with full acceleration 10 times without interval.
4. Stop the vehicle.
5. Check DTC.

Is "P0A2F" detected?

- YES >> Go to [TMS-46, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120931

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

1. CHECK DTC HIGH VOLTAGE COOLING SYSTEM

1. Power switch ON and wait 10 seconds or more.

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

2. Perform "Self Diagnostic Results" in "EV/HEV".

Is any DTC detected?

- YES >> Check DTC detected item. Refer to [EVC-102, "DTC Index"](#).
- NO >> GO TO 2.

2.CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-11, "Inspection"](#).

Is the inspection result normal?

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

3.CHECK COOLANT HOSE

Check for clogging of fluid paths and twisting of hoses in traction motor inverter, traction motor, and PDM (Power Delivery Module). Refer to [HCO-7, "High Voltage Cooling System"](#).

Is the inspection result normal?

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

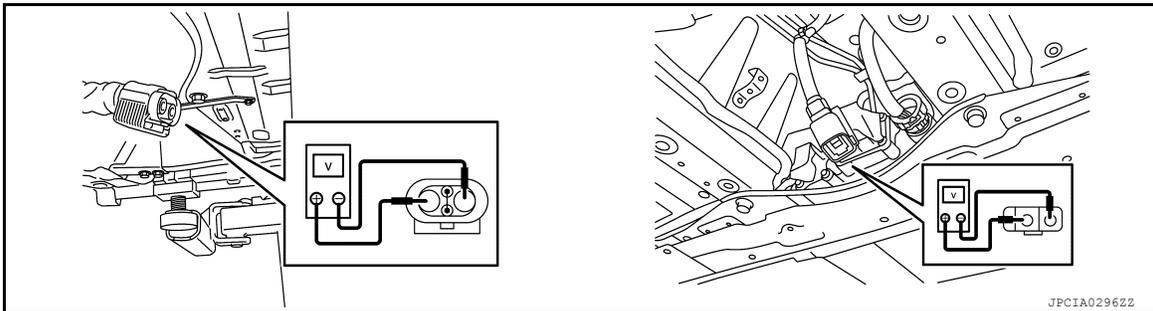
4.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 5.

5.CHECK TRACTION MOTOR INSULATION RESISTANCE

Check the traction motor insulation resistance. Refer to [TMS-98, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
- NO >> Remove the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

6. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the traction motor temperature sensor. Refer to [TMS-48. "Component Inspection \(Traction Motor Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Remove the traction motor. Refer to [TMS-109. "Removal and Installation"](#).

7. CHECK RESISTANCE OF TRACTION MOTOR STATOR COIL

Check the resistance of traction motor stator coil. Refer to [TMS-48. "Component Inspection \(Traction Motor Stator Coil\)"](#).

Is the inspection result normal?

YES >> 1. Replace the traction motor. Refer to [TMS-109. "Removal and Installation"](#).

2. If DTC "P0A2F" is still detected after traction motor replacement, replace the traction motor inverter. Refer to [TMS-103. "Removal and Installation"](#).

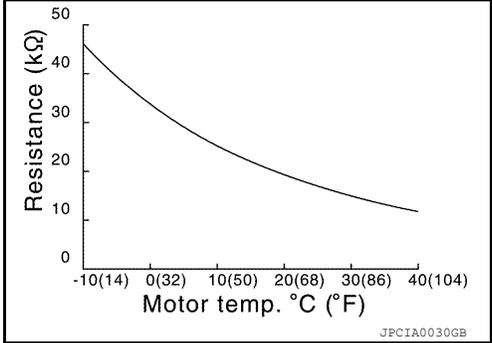
NO >> Replace the traction motor. Refer to [TMS-109. "Removal and Installation"](#).

Component Inspection (Traction Motor Temperature Sensor)

INFOID:000000010120932

1. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
3	4	Within ± 50% of temperature characteristics diagram 

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the traction motor temperature sensor. Refer to [TMS-109. "Removal and Installation"](#).

Component Inspection (Traction Motor Stator Coil)

INFOID:000000010120933

1. CHECK RESISTANCE OF TRACTION MOTOR STATOR COIL

Using a milliohmmeter and check the resistance traction motor stator coil.

CAUTION:

As resistance of stator coil is affected by temperature, check it at least 8 hour after removal of service plug.

3-phase bus-bar		Resistance*
Terminal		
U-phase	V-phase	14.1 – 17.9 mΩ
V-phase	W-phase	
W-phase	U-phase	

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

*: The value is at 20°C (68°F). Calculate the resistance standard value based on actual ambient temperature at operation based on the below calculation formula.

Calculating formula

- $R_{20} = R / [1 + 0.00393 \times (T - 20)]$
- R₂₀: Resistance value (mΩ) at 20°C (68°F)
- R: Resistance value (mΩ) at actual ambient temperature at operation
- T: Actual ambient temperature [°C (°F)] at operation

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the stator coil. Refer to [TMS-109, "Removal and Installation"](#).

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P0A3F DRIVE MOTOR A POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0A3F DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:000000010120934

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0A3F	DRIVE MOTOR A POSITION SENSOR (Drive Motor "A" Position Sensor Circuit)	If there is an abnormality in the traction motor resolver detection circuit	<ul style="list-style-type: none">• Harness or connectors (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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓟ With CONSULT

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

Is "P0A3F" detected?

- YES >> Go to [TMS-50, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120935

1. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Power 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 TRACTION MOTOR HARNESS CONNECTOR

Check the connection conditions of the traction motor harness connector.

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

P0A3F DRIVE MOTOR A POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Traction motor inverter		Ground	Resistance
Connector	Terminal		
F13	17	Ground	100 kΩ or more
	18		
	19		
	20		
	21		
	27		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4. 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.

Traction motor inverter		Traction motor		Resistance
Connector	Terminal	Connector	Terminal	
F13	17	F14	6	1 Ω or less
	18		7	
	19		5	
	20		1	
	21		8	
	27		2	

3. Check the harness for short.

Traction motor inverter			Resistance
Connector	Terminal		
F13	17	18	100 kΩ or more
	19	27	
	20	21	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to [TMS-51. "Component Inspection \(Traction Motor Resolver\)".](#)

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103. "Removal and Installation".](#)

NO >> Replace the traction motor. Refer to [TMS-109. "Removal and Installation".](#)

Component Inspection (Traction Motor Resolver)

INFOID:0000000010120936

1. CHECK TRACTION MOTOR RESOLVER

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

P0A3F DRIVE MOTOR A POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

Traction motor connector		Resistance
Terminal		
1	8	20 – 35 Ω
2	5	8 – 15 Ω
6	7	20 – 35 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the traction motor resolver. Refer to [TMS-109](#).
["Removal and Installation"](#).

P0A44 DRIVE MOTOR A OVER SPEED

< DTC/CIRCUIT DIAGNOSIS >

P0A44 DRIVE MOTOR A OVER SPEED

DTC Logic

INFOID:000000010120937

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P0A44	DRIVE MOTOR A OVER SPEED (Drive Motor "A" Position Sensor Circuit Overspeed)	If the value detected for motor speed at the traction motor resolver is too high	<ul style="list-style-type: none">• Harness or connectors (Each circuit is open or shorted.)• Traction motor• 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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Accelerate to 60 km/h (37 MPH).
3. Stop the vehicle.
4. Check DTC.

Is "P0A44" detected?

- YES >> Go to [TMS-53, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120938

1. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Power 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 TRACTION MOTOR HARNESS CONNECTOR

Check the connection conditions of the traction motor harness connector.

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

P0A44 DRIVE MOTOR A OVER SPEED

< DTC/CIRCUIT DIAGNOSIS >

Traction motor inverter		Ground	Resistance
Connector	Terminal		
F13	17	Ground	100 kΩ or more
	18		
	19		
	20		
	21		
	27		

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4. 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.

Traction motor inverter		Traction motor		Resistance
Connector	Terminal	Connector	Terminal	
F13	17	F14	6	1 Ω or less
	18		7	
	19		5	
	20		1	
	21		8	
	27		2	

3. Check the harness for short.

Traction motor inverter			Resistance
Connector	Terminal		
F13	17	18	100 kΩ or more
	20	21	
	19	27	

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to [TMS-54, "Component Inspection \(Traction Motor Resolver\)"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

Component Inspection (Traction Motor Resolver)

INFOID:000000010120939

1. CHECK TRACTION MOTOR RESOLVER

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

P0A44 DRIVE MOTOR A OVER SPEED

< DTC/CIRCUIT DIAGNOSIS >

Traction motor connector		Resistance
Terminal		
1	8	20 – 35 Ω
2	5	8 – 15 Ω
6	7	20 – 35 Ω

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the traction motor resolver. Refer to [TMS-109](#).
["Removal and Installation"](#).

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P0A78 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P0A78 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000010120940

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0A78	DRIVE MOTOR A INVERTER (Drive Motor "A" Inverter Performance)	A malfunction is detected in the traction motor inverter (motor controller)	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P0A78" detected?

- YES >> Go to [TMS-56, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120941

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P0A8D 14VOLT POWER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P0A8D 14VOLT POWER VOLTAGE

DTC Logic

INFOID:000000010120942

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P0A8D	14VOLT POWER VOLTAGE (14 Volt Power Module System Voltage Low)	The voltage of 12V battery drops to approx. 8 V or less	<ul style="list-style-type: none"> • Harness, fuse, or connectors (Each circuit is open or shorted.) • Traction motor inverter • M/C relay

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Power switch ON and wait 10 seconds or more.
2. Check DTC.

Is "P0A8D" detected?

YES >> Go to [TMS-57, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120943

1. CHECK TRACTION MOTOR INVERTER HARNESS CONNECTOR

1. Power 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 SUPPLY CIRCUIT

1. Disconnect the traction motor inverter harness connector.
2. Check the 10A fuse (#74).
3. Power switch ON.
4. Check the voltage between traction motor inverter vehicle side harness connector terminals.

Connector	Traction motor inverter Terminal		Voltage
	+	-	
F13	46	47, 49	9 – 16 V
	48		

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Check the M/C relay. Refer to [EVC-371, "Diagnosis Procedure"](#).

P0BE5 D-MOTOR A PHASE U CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P0BE5 D-MOTOR A PHASE U CURRENT SEN

DTC Logic

INFOID:000000010120944

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0BE5	D-MOTOR A PHASE U CURRENT SEN (Drive Motor "A" Phase U Current Sensor Circuit)	Detection values differ between the current sensors (inner sensor 1 and 2) of the traction motor U-phase	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P0BE5" detected?

- YES >> Go to [TMS-60, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120945

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P0BE6 D-MOTOR A PHASE U CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P0BE6 D-MOTOR A PHASE U CURRENT SEN

DTC Logic

INFOID:000000010120946

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0BE6	D-MOTOR A PHASE U CURRENT SEN (Drive Motor "A" Phase U Current Sensor Circuit Range/Performance)	If the value detected by the traction motor U-phase current sensor is abnormal	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

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

Is "P0BE6" detected?

YES >> Go to [TMS-59, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120947

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P0BE9 D-MOTOR A PHASE V CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P0BE9 D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:000000010120948

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0BE9	D-MOTOR A PHASE V CURRENT SEN (Drive Motor "A" Phase V Current Sensor Circuit)	Detection values differ between the current sensors (inner sensor 1 and 2) of the traction motor V-phase	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P0BE9" detected?

YES >> Go to [TMS-60, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120949

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P0BEA D-MOTOR A PHASE V CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P0BEA D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:000000010120950

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P0BEA	D-MOTOR A PHASE V CURRENT SEN (Drive Motor "A" Phase V Current Sensor Circuit Range/Performance)	If the value detected by the traction motor V-phase current sensor is abnormal	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

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

Is "P0BEA" detected?

YES >> Go to [TMS-61, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120951

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:000000010120952

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P0C79	DRIVE MOTOR A INVERTER VOLTAGE (Drive Motor "A" Inverter Voltage Too High)	High voltage value is any of the following conditions: <ul style="list-style-type: none">• Approx. 500 V or more• More than the traction motor inverter operable voltage range for 100 ms or more continuously	<ul style="list-style-type: none">• Traction motor inverter• 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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Accelerate to 60 km/h (37 MPH).
3. Stop the vehicle.
4. Check DTC.

Is "P0C79" detected?

YES >> Go to [TMS-62, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120953

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

1. CHECK DTC HIGH VOLTAGE SYSTEMS

1. Power 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 2.

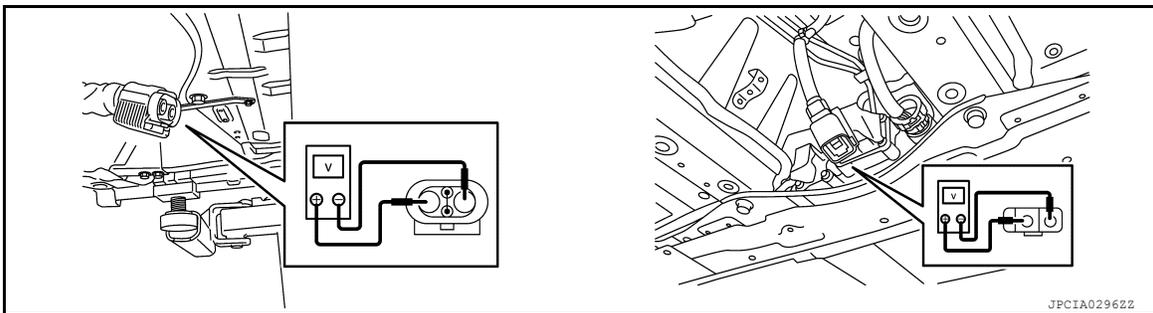
2. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 3.

3. CHECK HIGH VOLTAGE HARNESS

Check for an open circuit or short circuit between PDM (Power Delivery Module) and Li-ion battery. Refer to [VC-37, "Wiring Diagram"](#).

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).
NO >> Repair or replace damaged parts.

P318E CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P318E CAN ERROR

DTC Logic

INFOID:0000000010120954

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P318E	CAN ERROR (CAN data error)	Traction motor inverter is unable to receive the EV system CAN signal from VCM	VCM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

Is "P318E" detected?

- YES >> Go to [TMS-64, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000010120955

1. REPLACE VCM

Replace the VCM. Refer to [EVC-423, "Removal and Installation"](#).

>> END

P3193 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P3193 CAN ERROR

DTC Logic

INFOID:000000010120956

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3193	CAN ERROR (CAN data error)	Traction motor inverter is unable to receive the EV system CAN signal from Li-ion battery controller continuously for 2 seconds or more	Li-ion battery controller

A

B

TMS

D

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

E

>> GO TO 2.

F

2. CHECK DTC DETECTION

 With CONSULT

G

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

H

Is "P3193" detected?

- YES >> Go to [TMS-65, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

I

Diagnosis Procedure

INFOID:000000010120957

1. REPLACE LI-ION BATTERY CONTROLLER

J

Replace the Li-ion battery controller. Refer to [EVB-181, "Exploded View"](#).

K

>> END

L

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P

P3197 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P3197 CAN ERROR

DTC Logic

INFOID:000000010120958

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3197	CAN ERROR (CAN data error)	Traction motor inverter is unable to receive the EV system CAN signal from VCM (Electric shift control module) continuously for 2 seconds or more	VCM (Electric shift control module)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P3197" detected?

- YES >> Go to [TMS-66, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120959

1. REPLACE VCM

Replace the VCM due to malfunction in the electric shift control module built in VCM. Refer to [EVC-423, "Removal and Installation"](#).

>> END

P3199 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P3199 CAN ERROR

DTC Logic

INFOID:000000010120960

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3199	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error	VCM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P3199" detected?

YES >> Go to [TMS-67. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120961

1. REPLACE VCM

Replace the VCM. Refer to [EVC-423. "Removal and Installation"](#).

>> END

P319E CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P319E CAN ERROR

DTC Logic

INFOID:000000010120962

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P319E	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error continuously for 2 seconds or more	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

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

Is "P319E" detected?

- YES >> Go to [TMS-68, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120963

1. REPLACE LI-ION BATTERY CONTROLLER

Replace the Li-ion battery controller. Refer to [EVB-181, "Exploded View"](#).

>> END

P31A2 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31A2 CAN ERROR

DTC Logic

INFOID:000000010120964

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P31A2	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error continuously for 2 seconds or more	VCM (Electric shift control module)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

Is "P31A2" detected?

- YES >> Go to [TMS-69, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120965

1. REPLACE VCM

Replace the VCM due to malfunction in the electric shift control module built in VCM. Refer to [EVC-423, "Removal and Installation"](#).

>> END

P31A4 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31A4 CAN ERROR

DTC Logic

INFOID:000000010120966

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P31A4	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.CHECK DTC DETECTION

 With CONSULT

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

Is "P31A4" detected?

- YES >> Go to [TMS-70, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120967

1.REPLACE VCM

Replace the VCM. Refer to [EVC-423, "Removal and Installation"](#).

>> END

P31A9 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31A9 CAN ERROR

DTC Logic

INFOID:000000010120968

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P31A9	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error continuously for 2 seconds or more	Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

Is "P31A9" detected?

- YES >> Go to [TMS-71, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120969

1. REPLACE LI-ION BATTERY CONTROLLER

Replace the Li-ion battery controller. Refer to [EVB-181, "Exploded View"](#).

>> END

P31AD CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31AD CAN ERROR

DTC Logic

INFOID:000000010120970

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P31AD	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error continuously for 2 seconds or more	VCM (Electric shift control module)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓟ With CONSULT

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

Is "P31AD" detected?

- YES >> Go to [TMS-72, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120971

1. REPLACE VCM

Replace the VCM due to malfunction in the electric shift control module built in VCM. Refer to [EVC-423, "Removal and Installation"](#).

>> END

P3240 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

P3240 DRIVE MOTOR A INVERTER CRNT CONT

DTC Logic

INFOID:000000010120972

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P3240	DRIVE MOTOR A INVERTER CRNT CONT (Drive Motor "A" Inverter Performance/Motor Current Control Error)	Abnormal output voltage of traction motor inverter due to abnormal current flow to the traction motor	<ul style="list-style-type: none">• Traction motor inverter• Traction motor• High voltage harness or connector• Li-ion battery

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Fully open the accelerator and accelerate the vehicle to 60 km/h (37 MPH).
3. Stop the vehicle.
4. Check DTC.

Is "P3240" detected?

YES >> Go to [TMS-73, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120973

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

1. CHECK DTC HIGH VOLTAGE SYSTEMS

P3240 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

1. Power 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 2.

2.CHECK TRACTION MOTOR RESOLVER OFFSET DATA

1. Use CONSULT to read the traction motor resolver offset, and record the result.

NOTE:

“Work support” - “RESOLVER WRITE” can be used to check the traction motor resolver offset that is currently stored by the traction motor inverter.

2. Remove the under cover and record the traction motor resolver offset that is stamped on the traction motor.

NOTE:

For the location of traction motor resolver offset stamping, refer to [TMS-39. "Description"](#).

3. Check whether or not the value read with CONSULT matches the value which was stamped on the traction motor.

Do the values match?

- YES >> GO TO 3.
NO >> Write the traction motor resolver offset to the traction motor inverter. Refer to [TMS-39. "Work Procedure"](#).

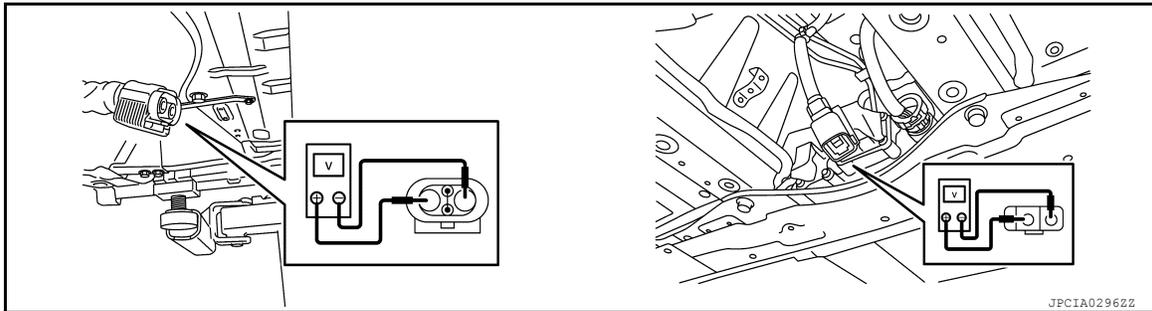
3.PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33. "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181. "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181. "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 4.

4.CHECK HIGH VOLTAGE HARNESS

P3240 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

Check for an open circuit or short circuit between PDM (Power Delivery Module) and Li-ion battery. Refer to [VC-37, "Wiring Diagram"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace damaged parts.

5. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE BUS BAR

Remove bus bar cover from PDM (Power Delivery Module) and check the tightness of high voltage bus bar. Refer to [VC-109, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Tighten the high voltage bus bar to the specified torque. Refer to [VC-109, "Exploded View"](#).

6. CHECK THE CONNECTION CONDITIONS OF THE 3-PHASE BUS BAR

Remove bus bar cover from traction motor and check the tightness of the 3-phase bus bar. Refer to [TMS-109, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Tighten the 3-phase bus bar to the specified torque. Refer to [TMS-109, "Exploded View"](#).

7. CHECK DISCONNECTION TRACTION MOTOR STATOR COIL

1. Remove the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).
2. Check stator coil for open circuit from the opening of the traction motor 3-phase bus bar.

3-phase bus bar		Resistance
Terminal		
U-phase	V-phase	1Ω or less
V-phase	W-phase	
W-phase	U-phase	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

P3241 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

P3241 DRIVE MOTOR A INVERTER CRNT CONT

DTC Logic

INFOID:000000010120974

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P3241	DRIVE MOTOR A INVERTER CRNT CONT (Drive Motor "A" Inverter Performance/AC Error Detection)	If no current is being applied to 1 phase of the traction motor	<ul style="list-style-type: none">• Traction motor inverter• Traction motor

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Fully open the accelerator and accelerate the vehicle to 10 km/h (6 MPH).
3. Stop the vehicle.
4. Check DTC.

Is "P3241" detected?

- YES >> Go to [TMS-76, "Diagnosis Procedure"](#).
- NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
- NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120975

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

1. PRECONDITIONING

WARNING:

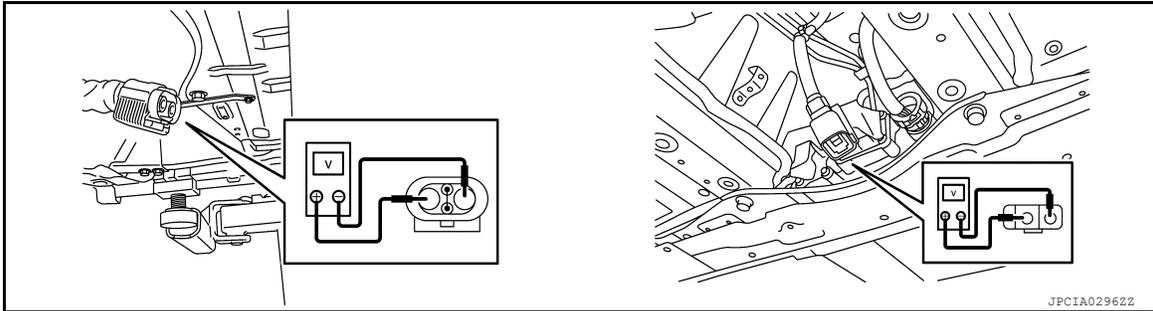
Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

P3241 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 2.

2. CHECK THE CONNECTION CONDITIONS OF THE 3-PHASE BUS BAR

Remove bus bar cover from traction motor and check the tightness of the 3-phase bus bar. Refer to [TMS-109, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Tighten the 3-phase bus bar to the specified torque. Refer to [TMS-109, "Exploded View"](#).

3. CHECK DISCONNECTION TRACTION MOTOR STATOR COIL

1. Remove the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).
2. Check stator coil for open circuit from the opening of the traction motor 3-phase bus bar.

3-phase bus bar		Resistance
Terminal		
U-phase	V-phase	1Ω or less
V-phase	W-phase	
W-phase	U-phase	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

P3242 D-MOTOR A PHASE U CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P3242 D-MOTOR A PHASE U CURRENT SEN

DTC Logic

INFOID:000000010120976

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3242	D-MOTOR A PHASE U CURRENT SEN 2 (Drive Motor "A" Phase U Current Sensor Circuit)	Abnormal detection value of the traction motor U-phase current sensor 2	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P3242" detected?

- YES >> Go to [TMS-78, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120977

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P3243 D-MOTOR A PHASE V CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P3243 D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:000000010120978

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3243	D-MOTOR A PHASE V CURRENT SEN 2 (Drive Motor "A" Phase V Current Sensor Circuit)	Abnormal detection value of the traction motor V-phase current sensor 2	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

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

Is "P3243" detected?

YES >> Go to [TMS-79, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120979

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P3244 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3244 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000010120980

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P3244	DRIVE MOTOR A INVERTER (Drive Motor "A" Inverter Voltage Sensor Performance)	High voltage detection value of Li-ion battery controller differs largely from that of traction motor inverter for 10 consecutive seconds or more	<ul style="list-style-type: none">• Traction motor inverter• 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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

1. Set the vehicle to READY and wait for 15 seconds or more.
2. Accelerate to 60 km/h (37 MPH).
3. Stop the vehicle.
4. Check DTC.

Is "P3244" detected?

- YES >> Go to [TMS-80, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120981

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

1. CHECK DTC HIGH VOLTAGE SYSTEMS

P3244 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

1. Power 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 2.

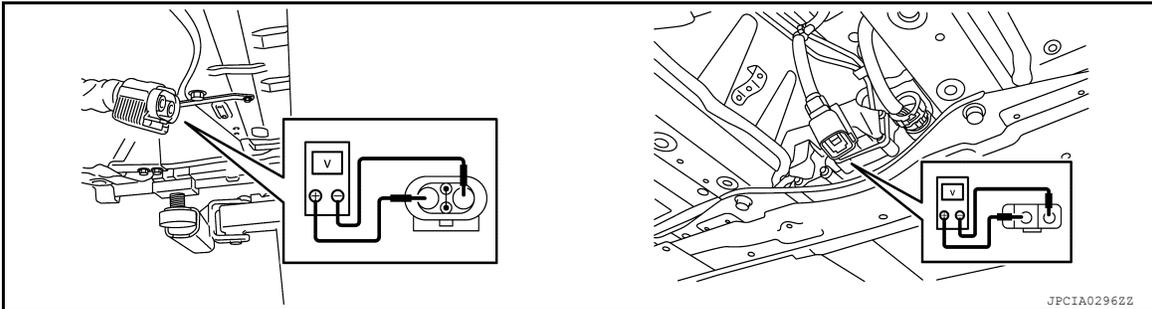
2. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 3.

3. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE BUS BAR

Remove bus bar cover from PDM (Power Delivery Module) and check the tightness of high voltage bus bar. Refer to [VC-109, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Tighten the high voltage bus bar to the specified torque. Refer to [VC-109, "Exploded View"](#).

4. CHECK HIGH VOLTAGE HARNESS

Check for an open circuit or short circuit between PDM (Power Delivery Module) and Li-ion battery. Refer to [VC-37, "Wiring Diagram"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

P3245 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3245 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000010120982

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3245	DRIVE MOTOR A INVERTER (Drive Motor "A" Inverter Voltage Sensor Circuit)	A malfunction is detected in high voltage sensor for 0.3 seconds or more	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P3245" detected?

YES >> Go to [TMS-82, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120983

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P3247 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3247 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000010120984

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible cause
P3247	DRIVE MOTOR A INVERTER (Drive Motor "A" Inverter Driver Power Supply)	Driver circuit power does not come ON when starting EV system	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

Is "P3247" detected?

YES >> Go to [TMS-83. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120985

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103. "Removal and Installation"](#).

>> END

P3249 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3249 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000010120986

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P3249	DRIVE MOTOR A INVERTER (Drive Motor "A" Inverter Driver Signal)	Power supply voltage of the driver circuit is low or stopped	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P3249" detected?

- YES >> Go to [TMS-84, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120987

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P324A DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P324A DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:000000010120988

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P324A	DRIVE MOTOR A INVERTER VOLTAGE (Drive Motor "A" Inverter Charge Error)	Precharging does not start for 10 consecutive seconds or more when starting EV system	<ul style="list-style-type: none">• 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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Power switch ON and wait for 15 seconds or more.
2. Check DTC.

Is "P324A" detected?

YES >> Go to [TMS-85, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120989

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

1. CHECK DTC HIGH VOLTAGE SYSTEMS

1. Power 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.

P324A DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

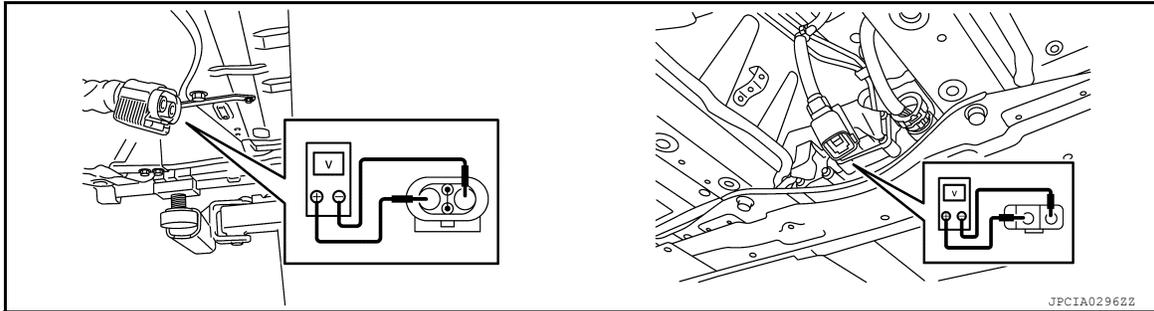
2. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 3.

3. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE BUS BAR

Remove bus bar cover from PDM (Power Delivery Module) and check the tightness of high voltage bus bar. Refer to [VC-109, "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Tighten the high voltage bus bar to the specified torque. Refer to [VC-109, "Exploded View"](#).

4. CHECK HIGH VOLTAGE HARNESS

Check for an open circuit or short circuit between PDM (Power Delivery Module) and Li-ion battery. Refer to [VC-37, "Wiring Diagram"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

P324D DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

P324D DRIVE MOTOR A INVERTER IGBT

DTC Logic

INFOID:000000010120990

DTC DETECTION LOGIC

DTC	CONSULT screen terms [Trouble diagnosis content]	Malfunction detected condition	Possible causes
P324D	DRIVE MOTOR A INVERTER IGBT [Drive Motor "A" Inverter IGBT Over Load (Over Current/Over Temperature)]	Traction motor inverter detects any of the following conditions: <ul style="list-style-type: none">• Overcurrent to IGBT• IGBT temperature exceeds the usable temperature	<ul style="list-style-type: none">• Traction motor inverter• Traction motor• High voltage cooling system

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Drive during 20 minutes for warm-up.
3. Repeat driving of 0 km/h (0 MPH) → 60 km/h (37 MPH) with full acceleration 10 times without interval.
4. Stop the vehicle.
5. Check DTC.

Is "P324D" detected?

YES >> Go to [TMS-87, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120991

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

P324D DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

1. CHECK DTC HIGH VOLTAGE COOLING SYSTEM

1. Power 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 [EVC-102. "DTC Index"](#).
NO >> GO TO 2.

2. CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-11. "Inspection"](#).

Is the inspection result normal?

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

3. CHECK COOLANT HOSE

Check for clogging of fluid paths and twisting of hoses in traction motor inverter, traction motor, and PDM (Power Delivery Module). Refer to [HCO-7. "High Voltage Cooling System"](#).

Is the inspection result normal?

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

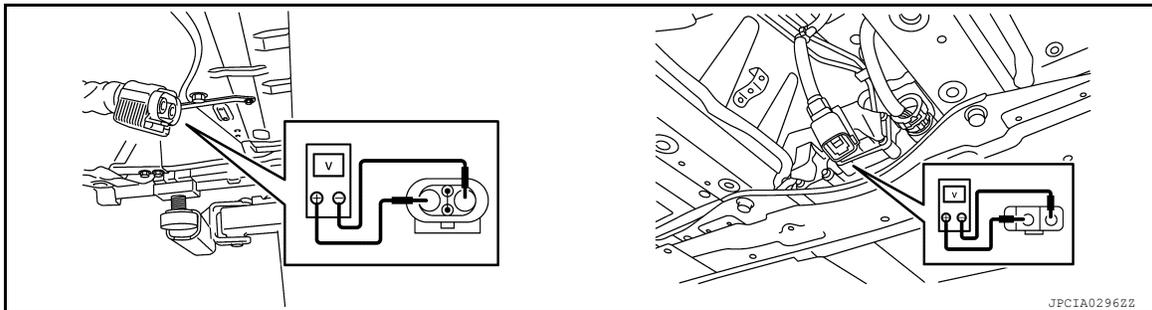
4. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33. "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181. "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181. "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 5.

5. CHECK TRACTION MOTOR INSULATION RESISTANCE

Check the traction motor insulation resistance. Refer to [TMS-98. "Component Inspection"](#).

P324D DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

6. CHECK RESISTANCE TRACTION MOTOR STATOR COIL

Check the resistance traction motor stator coil. Refer to [TMS-89, "Component Inspection \(Traction Motor Stator Coil\)"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

Component Inspection (Traction Motor Stator Coil)

INFOID:000000010120992

1. CHECK RESISTANCE OF TRACTION MOTOR STATOR COIL

Using a milliohmmeter and check the resistance traction motor stator coil.

CAUTION:

As resistance of stator coil is affected by temperature, check it at least 8 hour after removal of service plug.

3-phase harness		Resistance*
Terminal		
U-phase	V-phase	14.1 – 17.9 mΩ
V-phase	W-phase	
W-phase	U-phase	

*: The value is at 20°C (68°F). Calculate the resistance standard value based on actual ambient temperature at operation based on the below calculation formula.

Calculating formula

$$R_{20} = R / [1 + 0.00393 \times (T - 20)]$$

- R₂₀: Resistance value (mΩ) at 20°C (68°F)

- R: Resistance value (mΩ) at actual ambient temperature at operation

- T: Actual ambient temperature [°C (°F)] at operation

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor due to malfunction in the stator coil. Refer to [TMS-109, "Removal and Installation"](#).

P3252 DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

P3252 DRIVE MOTOR A INVERTER IGBT

DTC Logic

INFOID:000000010120993

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P3252	DRIVE MOTOR A INVERTER IGBT (Drive Motor "A" Inverter IGBT High Temperature)	The amount of rise in IGBT temperature is excessively large compared with that of normal condition	<ul style="list-style-type: none">• Traction motor inverter• High voltage cooling system

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Drive during 20 minutes for warm-up.
3. Repeat driving of 0 km/h (0 MPH) → 60 km/h (37 MPH) with full acceleration 10 times without interval.
4. Stop the vehicle.
5. Check DTC.

Is "P3252" detected?

YES >> Go to [TMS-90, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120994

1. CHECK DTC HIGH VOLTAGE COOLING SYSTEM

1. Power 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 [EVC-102, "DTC Index"](#).

NO >> GO TO 2.

2. CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-11, "Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace damaged parts.

3. CHECK COOLANT HOSE

Check for clogging of fluid paths and twisting of hoses in traction motor inverter, traction motor, and PDM (Power Delivery Module). Refer to [HCO-7, "High Voltage Cooling System"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

P325A CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P325A CAN ERROR

DTC Logic

INFOID:000000010120995

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P325A	CAN ERROR (CAN data error)	If traction motor inverter detects CAN data error continuously for 2 seconds or more	VCM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

Is "P325A" detected?

- YES >> Go to [TMS-91, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120996

1. REPLACE VCM

Replace the VCM. Refer to [EVC-423, "Removal and Installation"](#).

>> END

P325B DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P325B DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000010120997

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P325B	DRIVE MOTOR A INVERTER (Drive Motor "A" Inverter TEMP-M Circuit)	IGBT high temperature detection signal sticks when starting EV system	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P325B" detected?

- YES >> Go to [TMS-92, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010120998

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P325C DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325C DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000010120999

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P325C	DRIVE MOTOR A POSITION (Drive Motor "A" Position Value Unrecorded)	When correction value memorized by traction motor inverter is the initial value	The traction motor resolver offset has not been written to the traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

1. Power switch OFF and wait for 10 seconds or more.
2. Power switch ON and wait for 10 seconds or more.
3. Check DTC.

Is "P325C" detected?

YES >> Go to [TMS-93. "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53. "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010121000

1. RECORDING THE TRACTION MOTOR RESOLVER OFFSET THAT IS STAMPED ON THE TRACTION MOTOR

1. Power switch OFF.
2. Write down the traction motor resolver correction value inscribed on traction motor.

NOTE:

For the traction motor stamp location, refer to [TMS-39. "Description"](#).

>> GO TO 2.

2. WRITING OF TRACTION MOTOR RESOLVER OFFSET

Write the traction motor resolver offset to the traction motor inverter. Refer to [TMS-39. "Work Procedure"](#).

>> GO TO 3.

3. READING AND CHECKING TRACTION MOTOR RESOLVER OFFSET

1. Power switch OFF and wait for 10 seconds or more.
2. Power switch ON.
3. Use CONSULT to read the traction motor offset that is written to the traction motor inverter.
4. Check whether or not the read value matches the value which is stamped on the traction motor.

>> INSPECTION END

P325D DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325D DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000010121001

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P325D	DRIVE MOTOR A POSITION (Drive Motor "A" Position Offset Value Error)	If the traction motor resolver angle data stored by the traction motor inverter is abnormal	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P325D" detected?

- YES >> Go to [TMS-94, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010121002

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P325E DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325E DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000010121003

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P325E	DRIVE MOTOR A POSITION (Drive Motor "A" Position Value Error 1)	If the traction motor resolver offset stored by the traction motor inverter is abnormal	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

④ With CONSULT

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

Is "P325E" detected?

YES >> Go to [TMS-95, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010121004

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

P325F DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325F DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000010121005

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
P325F	DRIVE MOTOR A POSITION (Drive Motor "A" Position Value Error)	If the traction motor resolver offset stored by the traction motor inverter is abnormal	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

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

>> GO TO 2.

2. CHECK DTC DETECTION

 With CONSULT

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

Is "P325F" detected?

- YES >> Go to [TMS-96, "Diagnosis Procedure"](#).
NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010121006

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

>> END

U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U1000 CAN COMM CIRCUIT

Description

INFOID:000000010121007

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 links with 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:000000010121008

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	Malfunction detected condition	Possible causes
U1000	CAN COMM CIRCUIT (CAN communication line)	If CAN communications signals continuously for 2 seconds or more 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 power switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

Is "U1000" detected?

YES >> Go to [TMS-97, "Diagnosis Procedure"](#).

NO-1 >> To check malfunction symptom before repair: Refer to [GI-53, "Intermittent Incident"](#).

NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:000000010121009

For the diagnosis procedure, refer to [LAN-17, "Trouble Diagnosis Flow Chart"](#).

TRACTION MOTOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

TRACTION MOTOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:000000010121010

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.
- Refer to [TMS-5. "High Voltage Precautions"](#).

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.

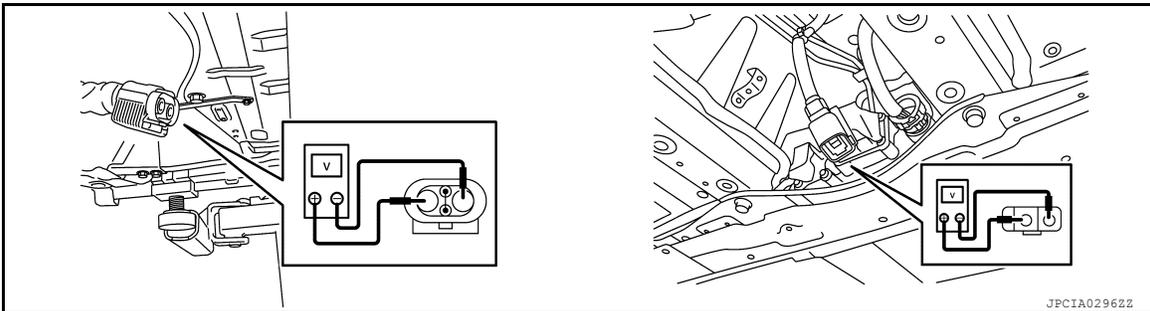
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33. "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181. "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181. "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 2.

TRACTION MOTOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK TRACTION MOTOR INSULATION RESISTANCE

WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V 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.

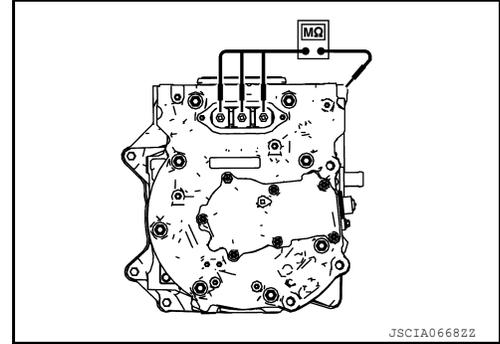
1. Remove the traction motor. Refer to [TMS-109, "Removal and Installation"](#).
2. Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

CAUTION:

Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

NOTE:

As each bus bar (U-phase, V-phase, and W-phase) contacts to each other inside the traction motor, check resistance of a phase.



3-phase bus bar Terminal	Ground	Resistance
U-phase	Traction motor case	10 MΩ or more
V-phase		
W-phase		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor. Refer to [TMS-109, "Removal and Installation"](#).

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TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

Component Inspection

INFOID:000000010121011

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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

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.

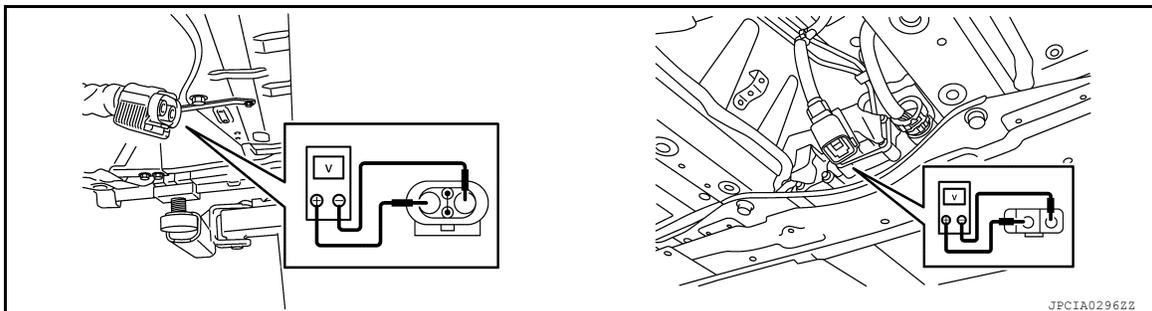
1. PRECONDITIONING

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
2. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
3. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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.

>> GO TO 2.

TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

2. CHECK TRACTION MOTOR INVERTER INSULATION RESISTANCE

WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V 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. Remove the traction motor inverter. Refer to [TMS-103. "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:

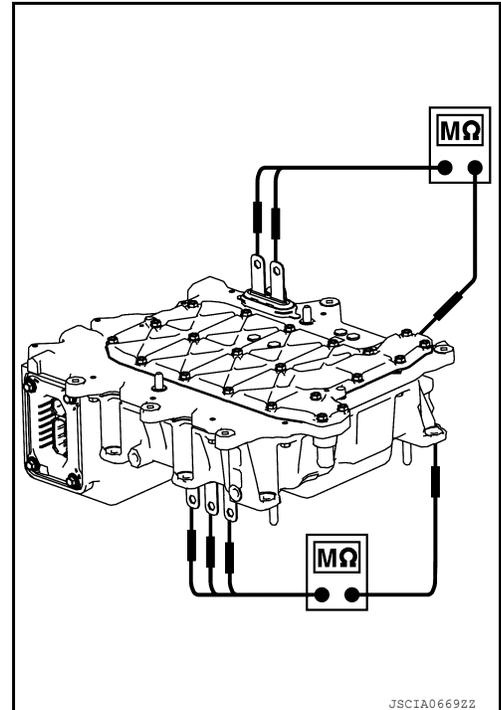
Be sure to set the insulation resistance tester to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Traction motor inverter		Ground	Resistance
Item	Terminal		
High voltage bus bar	50	Traction motor in- verter case	14 MΩ or more
3-phase bus bar	U-phase		
	V-phase		
	W-phase		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor inverter. Refer to [TMS-103. "Removal and Installation"](#).



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ELECTROMAGNETIC SOUND IS AUDIBLE

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

ELECTROMAGNETIC SOUND IS AUDIBLE

DESCRIPTION

INFOID:000000010121012

The electromagnetic noise of the traction motor may become more noticeable when accelerating on a steep slope (large output torque).

This occurs when the IGBT switching frequency is lowered by the traction motor inverter due to high temperature of the IGBT inside the traction motor inverter. This does not indicate a problem with the traction motor inverter characteristics or control.

This phenomenon is one of the protective controls. Refer to [TMS-27, "Protection Control"](#).

TRACTION MOTOR INVERTER

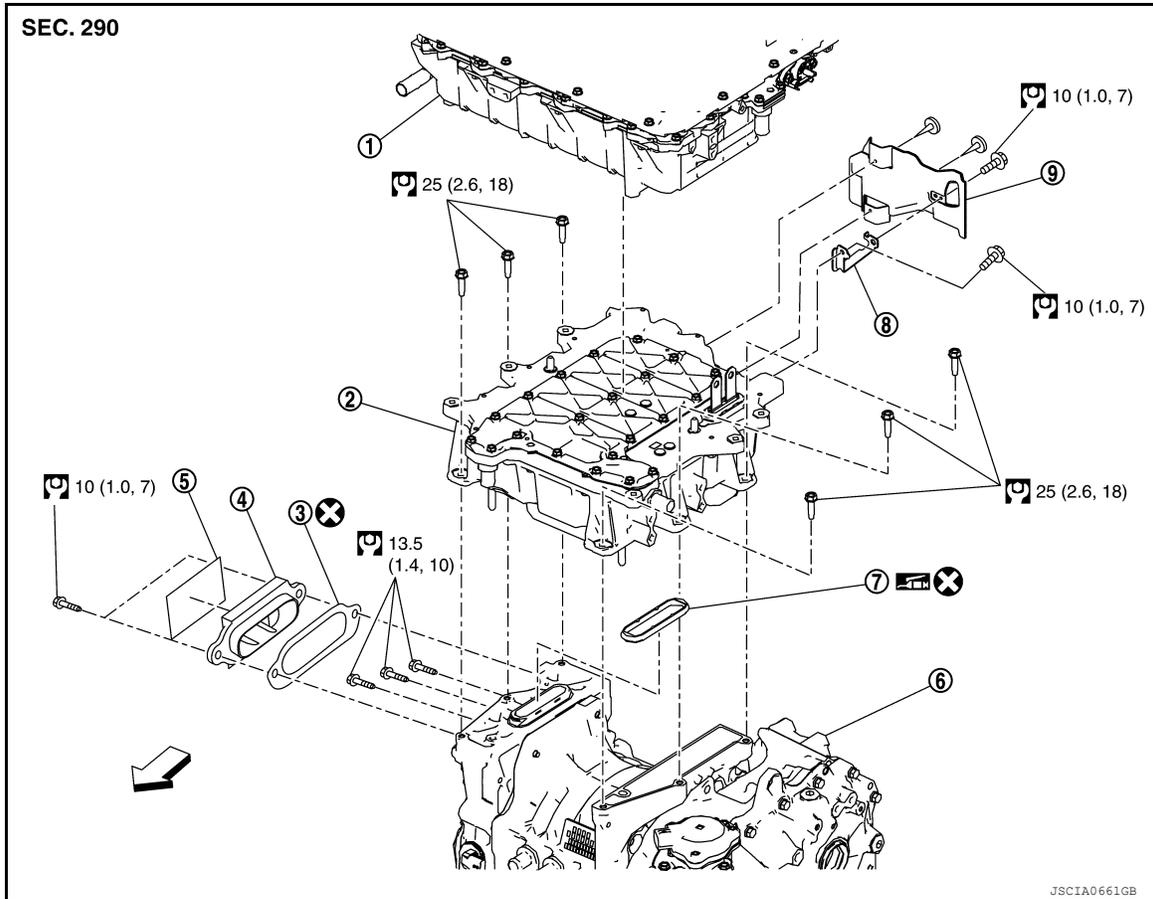
< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

TRACTION MOTOR INVERTER

Exploded View

INFOID:0000000010121013



- | | | |
|-------------------------------|------------------------------|-------------------------------------|
| ① PDM (Power Delivery Module) | ② Traction motor inverter | ③ Gasket |
| ④ 3-phase bus bar cover | ⑤ High voltage warning label | ⑥ Traction motor and reduction gear |
| ⑦ Seal | ⑧ Bracket | ⑨ Sound insulating board |

← : Vehicle front

⊗ : Always replace after every disassembly.

Ⓜ : N·m (kg·m, ft·lb)

⚡ : Apply lithium-based grease including molybdenum disulphide.

Removal and Installation

INFOID:0000000010121014

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.

TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

- 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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

CAUTION:

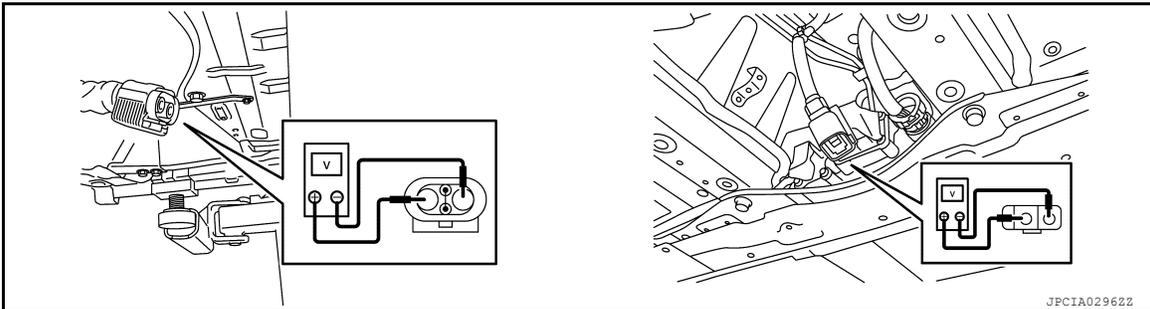
Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

REMOVAL

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

1. Check voltage in high voltage circuit. (Check that condenser are discharged.)
 - a. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
 - b. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
 - c. Measure voltage between high voltage harness connector terminals and PTC heater harness connector terminals.



DANGER:



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



Standard

: 5 V or less

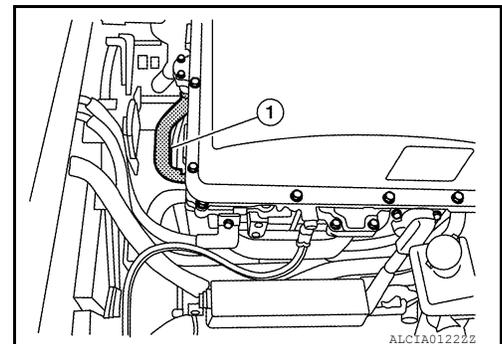
CAUTION:

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

2. Remove the PDM (Power Delivery Module). Refer to [VC-112, "Removal and Installation"](#).
3. Remove the water hose ① between traction motor inverter and traction motor.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



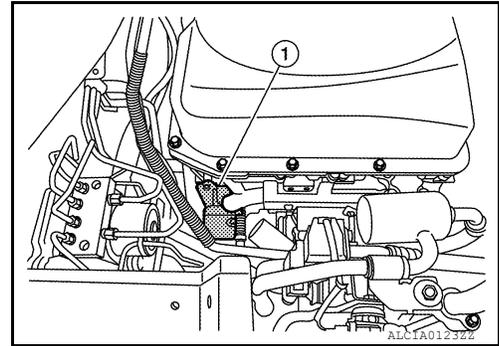
TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

4. Remove the traction motor inverter connector cover ①.

WARNING:

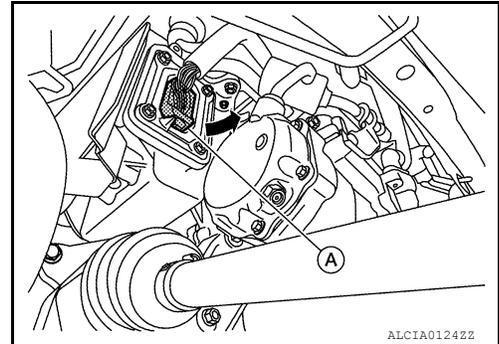
To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



5. Disconnect the traction motor inverter connect ①.

WARNING:

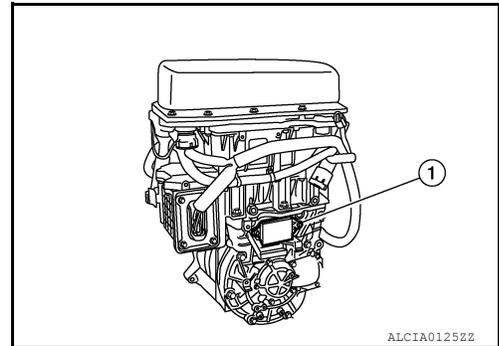
To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



6. Remove the 3-phase bus bar cover ① and gasket.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



7. Remove the 3-phase bus bar mounting bolts (←).

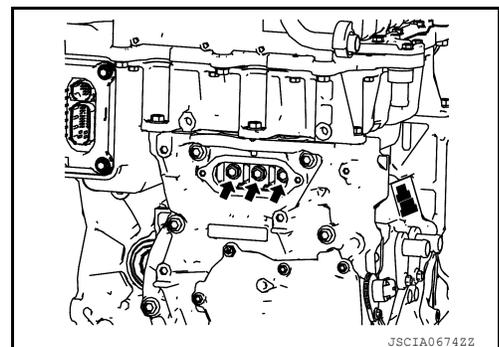
WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

- When removing the 3-phase bus bar mounting bolt, never drop the bolt into the traction motor.
- After the 3-phase bus bar mounting bolt is removed, close off the opening using tape or an equivalent to prevent dirt, dust, or foreign material from entering the traction motor. When leaving workspace for a long time, install the 3-phase bus bar cover.



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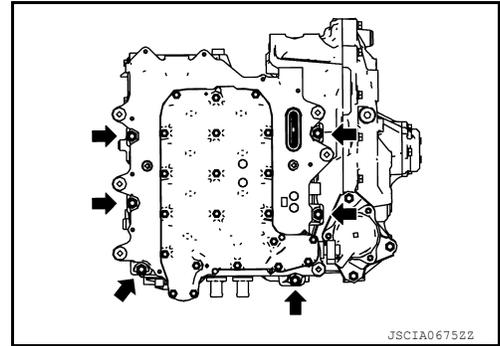
TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

8. Remove the traction motor inverter mounting bolts (←).

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



9. Install the guide pin (SST: KV99112300) (A) to the traction motor inverter mounting bolt hole (2 holes located in vehicle rear).

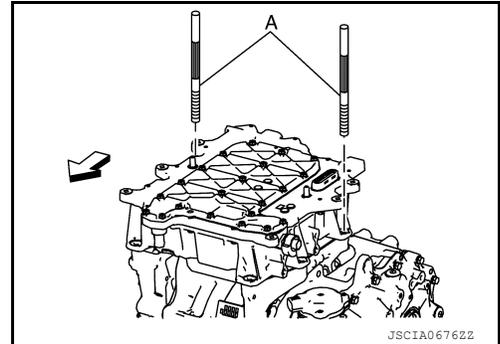
WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



Guide pin (A) : 96 mm (3.78 in)

← : Vehicle front



NOTE:

Perform installation and removal of guide pins manually.

10. Remove the traction motor inverter by hands.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

- Remove the traction motor inverter in the vertical direction.
- Never damage the 3-phase bus bar.
- Never damage the bolt hole threaded portion located on the traction motor side, where the guide pin is installed.

NOTE:

Dowel pins are located around the traction motor inverter mounting bolt hole (two locations) in vehicle front.

11. When leaving the traction motor inverter, use wooden blocks to prevent 3-phase bus bar interference.

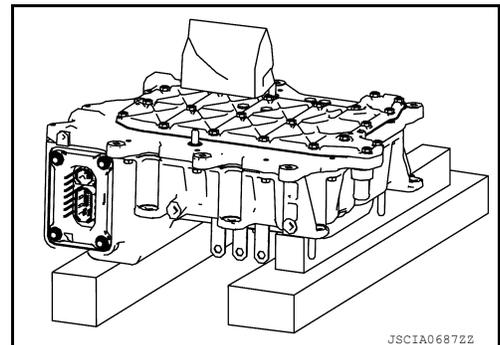
WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

Never set the traction motor inverter on wood blocks in a position in which it is supported by dowel pins.



TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

12. Cover the 3-phase bus bar with shop cloth (A).

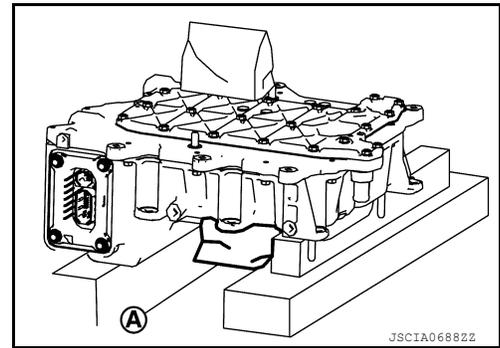
WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

Always protect the bus bar section with a clean shop cloth. If the bus bar is touched or dirty, clean it using ethanol.



13. Remove the seal (1) from the opening of traction motor side 3-phase bus bar.

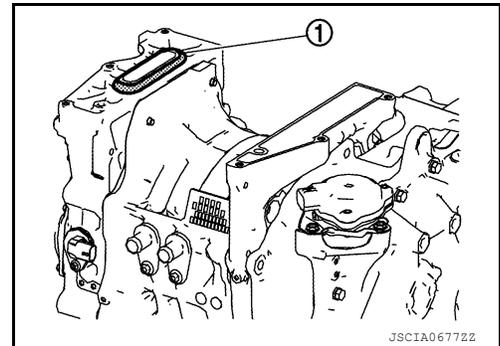
WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

Close off the opening using tape or an equivalent, for preventing dirt, dust, or foreign material from entering the drive motor.



INSTALLATION

Pay attention to the following and install by following the procedure for removal in the reverse order.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

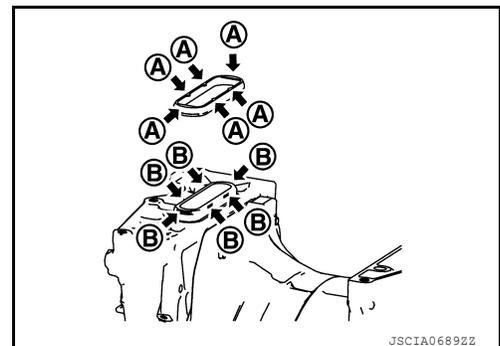
It is necessary to perform writing of the traction motor resolver offset to the traction motor inverter after the traction motor inverter is replaced. Refer to [TMS-39, "Work Procedure"](#).

- When installing the drive motor inverter, always use the guide pin (SST: KV99112300). After installation, be sure to remove the guide pin.

CAUTION:

Never damage the 3-phase bus bar.

- Check that the dowel pin is inserted to the end position completely.
- When attaching the seal to the opening of traction motor side 3-phase bus bar, be sure to install the convex portion (A) of the seal to the installation groove (B) completely.
- Never reuse the seal for the opening of traction motor side 3-phase bus bar.
- Never reuse gasket of 3-phase bus bar cover.



Inspection and Adjustment

INFOID:000000010121015

INSPECTION AFTER INSTALLATION

After installing traction motor inverter, measure resistance below.

- Between traction motor inverter and other high voltage system.
- Between traction motor inverter and body.

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TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



Standard : Less than 0.1 Ω

If result deviates from standard values, check that no paint, oil, dirt, or other substance is adhering to bolts or conductive mounting parts. If any such substance is adhering, clean the surrounding area and remove the substance.

ADJUSTMENT AFTER INSTALLATION

It is necessary to perform writing of the traction motor resolver offset to the traction motor inverter after the traction motor inverter is replaced. Refer to [TMS-39, "Work Procedure"](#).

TRACTION MOTOR

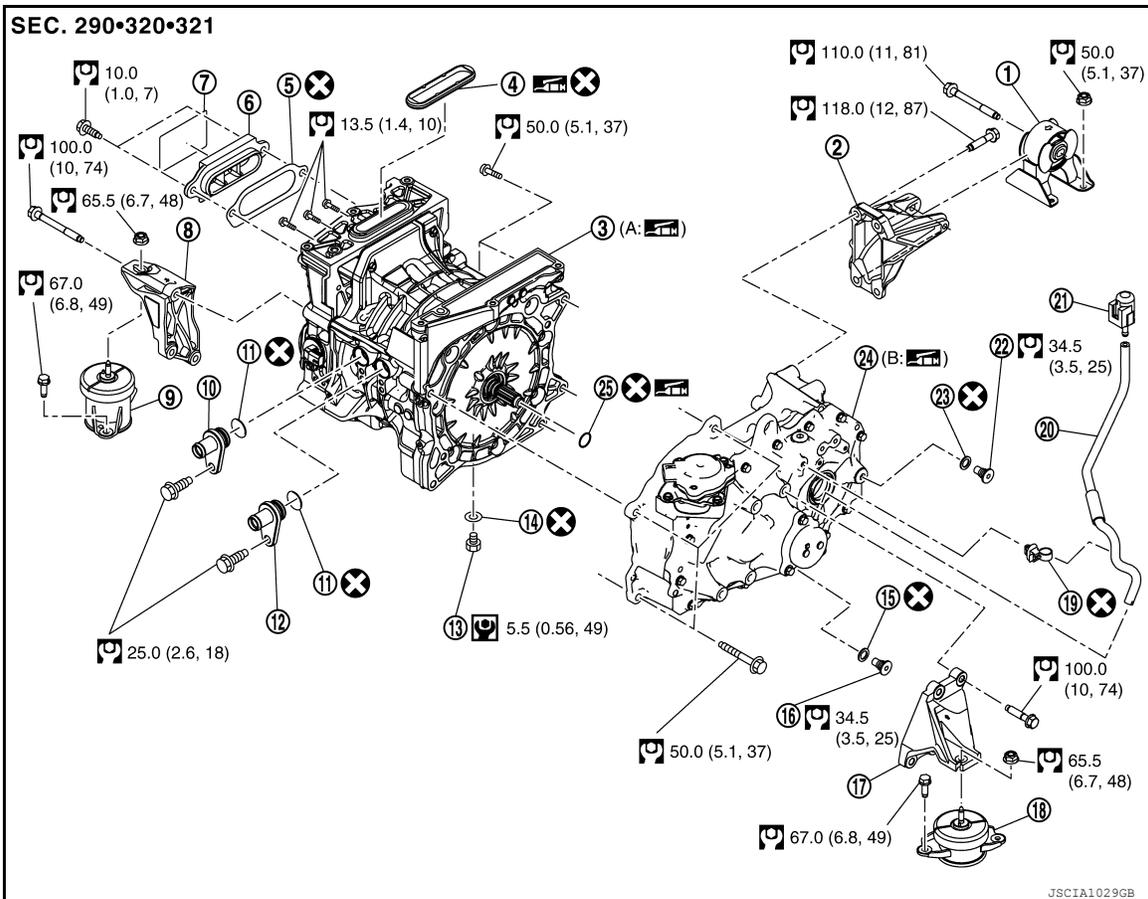
< UNIT REMOVAL AND INSTALLATION >

UNIT REMOVAL AND INSTALLATION

TRACTION MOTOR

Exploded View

INFOID:0000000010121016



- | | | |
|------------------------------|---|-------------------------|
| ① Motor mounting rear | ② Motor mounting rear bracket | ③ Traction motor |
| ④ Seal | ⑤ Gasket | ⑥ 3-phase bus bar cover |
| ⑦ High voltage warning label | ⑧ Motor mounting RH bracket | ⑨ Motor mounting RH |
| ⑩ Water inlet | ⑪ O-ring | ⑫ Water outlet |
| ⑬ Drain plug | ⑭ Copper washer | ⑮ Gasket |
| ⑯ Drain plug | ⑰ Motor mounting LH bracket | ⑱ Motor mounting LH |
| ⑲ Clip | ⑳ Breather hose | ㉑ Breather box |
| ㉒ Filler plug | ㉓ Gasket | ㉔ Reduction gear |
| ㉕ O-ring | | |
| A. Shaft spline | B. Inside of input shaft (inside of spline) | |

: N·m (kg-m, in-lb)

: N·m (kg-m, ft-lb)

: Always replace after every disassembly.

: Apply lithium-based grease including molybdenum disulphide.

Removal and Installation

INFOID:0000000010121017

DANGER:

Revision: May 2014

TMS-109

2014 LEAF

TRACTION MOTOR

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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.
- Refer to [TMS-5, "High Voltage Precautions"](#).

CAUTION:

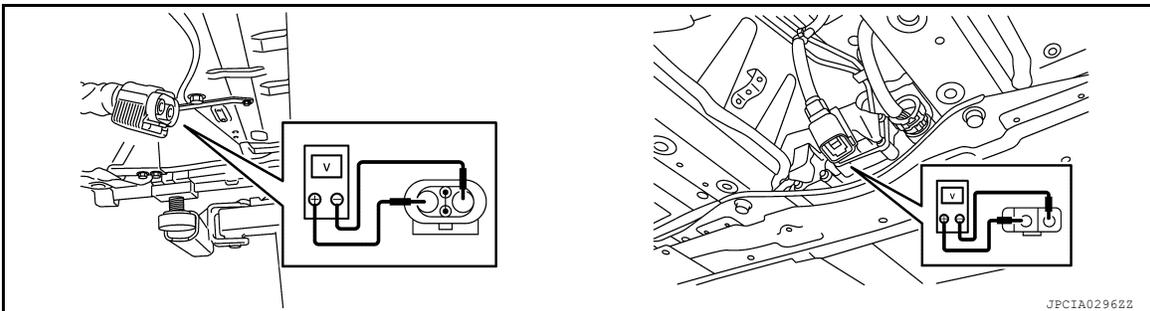
Never bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

REMOVAL

WARNING:

Disconnect the high voltage. Refer to [GI-33, "How to Disconnect High Voltage"](#).

1. Check voltage in high voltage circuit. (Check that condenser are discharged.)
 - a. Lift up the vehicle and remove the Li-ion battery under covers. Refer to [EVB-181, "Exploded View"](#).
 - b. Disconnect high voltage harness connector and PTC heater harness connector from front side of Li-ion battery. Refer to [EVB-181, "Removal and Installation"](#).
 - c. Measure voltage between high voltage harness connector terminals and PTC heater harness connector 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. Remove front under cover. Refer to [EXT-23, "FRONT UNDER COVER : Exploded View"](#).

TRACTION MOTOR

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3. Remove drain bolt ① of traction motor to drain coolant.

WARNING:

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4. Drain reduction gear oil. Refer to [TM-13, "Draining and Refilling"](#).

5. Remove electric power train and reduction gear from vehicle together as suspension member assembly. Refer to [FSU-22, "Removal and Installation"](#).

6. Remove PDM (Power Delivery Module). Refer to [VC-112, "Removal and Installation"](#).

7. Remove traction motor inverter. Refer to [TMS-103, "Removal and Installation"](#).

8. Remove joint bolt (◀) of motor mounting rear bracket and motor mounting rear.

WARNING:

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9. Remove joint bolt (◀) of motor mounting LH bracket and motor mounting LH.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



10. Remove joint bolt (◀) of motor mounting RH bracket and motor mounting RH.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.

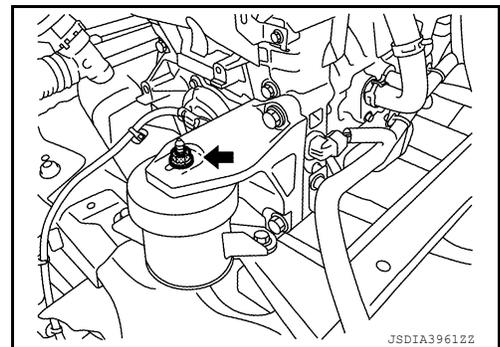
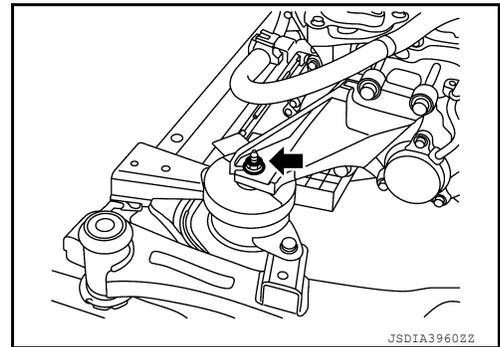
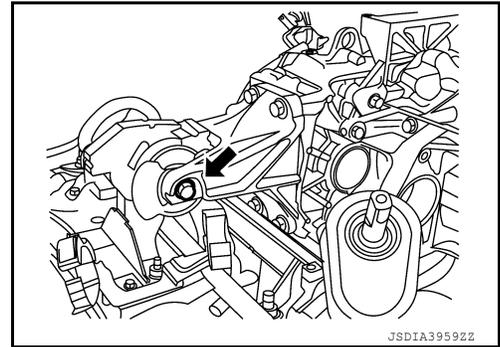
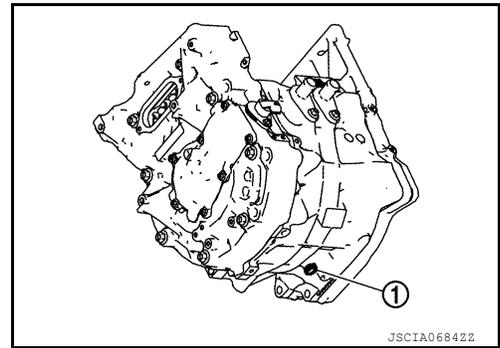


11. Hook the sling belt to each motor mounting bracket and prepare to disconnect the traction motor and reduction gear from the front suspension member assembly.

12. Hoist the traction motor and reduction gear and disconnect them from the front suspension member assembly.

WARNING:

To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



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TRACTION MOTOR

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CAUTION:

When hoisting the traction motor and reduction gear, insert a long bolt into the motor mounting bracket to prevent the sling belt from slipping out. At that time, be sure to install a nut.

13. Remove support bearing bracket of drive shaft (right side). Refer to [FAX-19, "RIGHT SIDE : Removal and Installation"](#).

WARNING:

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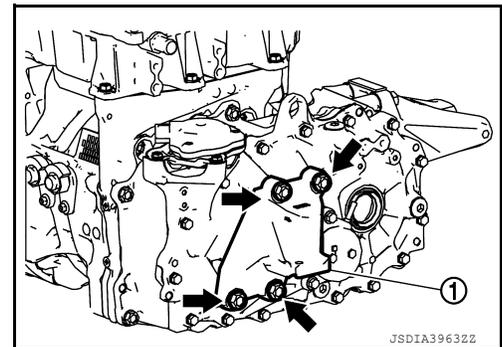
14. Remove motor mounting LH bracket ①.

WARNING:

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← : Bolt



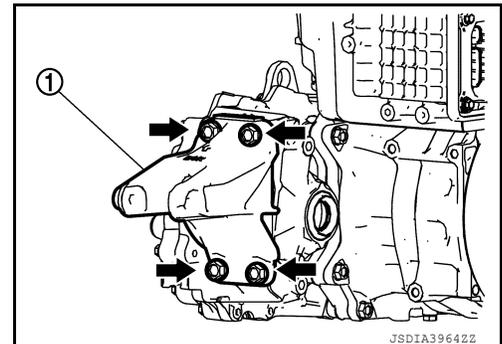
15. Remove motor mounting rear bracket ①.

WARNING:

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← : Bolt



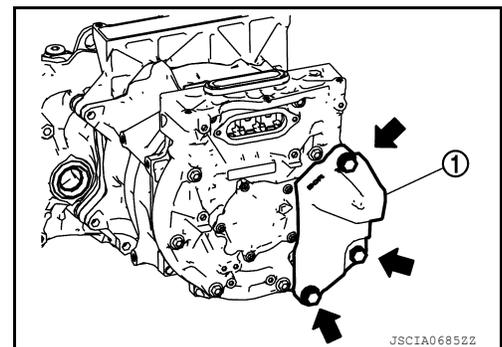
16. Remove motor mounting RH bracket ①.

WARNING:

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← : Bolt



17. Remove joint bolts traction motor and reduction gear.

WARNING:

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18. Separate traction motor from reduction gear.

WARNING:

TRACTION MOTOR

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INSTALLATION

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

WARNING:

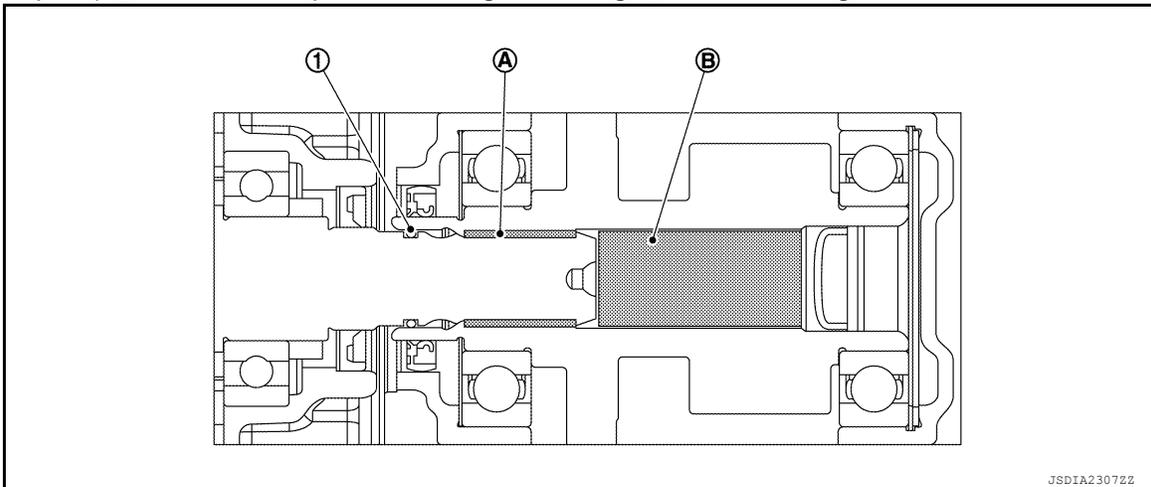
To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

When assembling the reduction gear and traction motor, clean the mating surface and be sure that no dust, dirt, or foreign material is between the surfaces.

- Before installing reduction gear and traction motor, apply grease to full periphery of shaft spline (A), and also inject grease [minimum 10 g (0.4 oz), maximum less than 20 g (0.7 oz)] into reduction gear input shaft (inside spline) (B). Take care to prevent damage to O-ring (1) when installing.



CAUTION:

- Before applying grease, clean old grease and wear particles, that are adhered to the grease applying parts.
- When installing O-ring, clean the O-ring installation groove completely, and then install.
- When all parts are installed, be sure to check equipotential of traction motor, PDM (Power Delivery Module), and traction motor inverter.
 - Traction motor: Refer to [TMS-113, "Inspection and Adjustment"](#).
 - PDM (Power Delivery Module): Refer to [VC-125, "Inspection"](#).
 - Traction motor inverter: Refer to [TMS-107, "Inspection and Adjustment"](#).

Inspection and Adjustment

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INSPECTION AFTER INSTALLATION

After installing traction motor, measure resistance below.

- Between traction motor (aluminum part) and body (ground bolt).
- Between traction motor (aluminum part) and other high voltage system.

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ADJUSTMENT AFTER INSTALLATION

It is necessary to perform writing of the traction motor resolver offset to the traction motor inverter after the traction motor is replaced. Refer to [TMS-39, "Work Procedure"](#).