

TMS

SECTION

TRACTION MOTOR SYSTEM

A
B
TMS

CONTENTS

PRECAUTION	TRACTION MOTOR INVERTER : Protection Control	F
PRECAUTIONS	MOTOR POWER CONTROL	G
Precaution for Technicians Using Medical Electric.....	MOTOR POWER CONTROL : System Description	H
Point to Be Checked Before Starting Maintenance Work	MOTOR POWER CONTROL : Operating Principle	I
Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"	MOTOR REGENERATION CONTROL	J
Precaution for Procedure without Cowl Top Cover.....	MOTOR REGENERATION CONTROL : System Description	K
High Voltage Precautions	MOTOR REGENERATION CONTROL : Operating Principle	L
Precaution for Removing 12V Battery	DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)	M
General Precautions	DIAGNOSIS DESCRIPTION	N
PREPARATION	DIAGNOSIS DESCRIPTION : System Description	O
PREPARATION	DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data	P
Commercial Service Tools	DIAGNOSIS DESCRIPTION : Counter System	
SYSTEM DESCRIPTION	CONSULT Function	
DESCRIPTION	ECU DIAGNOSIS INFORMATION	
Description	TRACTION MOTOR INVERTER	
Specifications (Traction Motor)	Reference Value	
COMPONENT PARTS	Fail-Safe	
Component Parts Location	Protection Control	
Traction Motor Inverter	DTC Inspection Priority Chart	
Traction Motor	DTC Index	
High Voltage Warning Label	WIRING DIAGRAM	
STRUCTURE AND OPERATION	TRACTION MOTOR INVERTER	
Structural Drawing	Wiring Diagram	
OPERATION DESCRIPTION	BASIC INSPECTION	
SYSTEM	DIAGNOSIS AND REPAIR WORK FLOW	
TRACTION MOTOR INVERTER		
TRACTION MOTOR INVERTER : System Description		
TRACTION MOTOR INVERTER : Schematic		
TRACTION MOTOR INVERTER : Fail-Safe		

D
E
F
G
H
I
J
K
L
M
N
O
P

Work Flow	40	DTC Logic	63
Question sheet	41	Diagnosis Procedure	63
RESOLVER WRITE	43	P0AF0 DRIVE MOTOR INVERTER TEMP	
Description	43	SEN A	64
Work Procedure	43	DTC Logic	64
DTC/CIRCUIT DIAGNOSIS	45	Diagnosis Procedure	64
P0A1B DRIVE MOTOR A CONTROL MOD- ULE	45	P0BE6 D-MOTOR A PHASE U CURRENT	
DTC Logic	45	SEN	65
Diagnosis Procedure	45	DTC Logic	65
P0A2C DRIVE MOTOR A TEMP SENSOR	46	Diagnosis Procedure	65
DTC Logic	46	P0BEA D-MOTOR A PHASE V CURRENT	
Diagnosis Procedure	46	SEN	66
Component Inspection (Traction Motor Tempera- ture Sensor)	47	DTC Logic	66
P0A2D DRIVE MOTOR A TEMP SENSOR	48	Diagnosis Procedure	66
DTC Logic	48	P0BEE D-MOTOR A PHASE W CURRENT	
Diagnosis Procedure	48	SEN	67
Component Inspection (Traction Motor Tempera- ture Sensor)	49	DTC Logic	67
P0A2F DRIVE MOTOR A OVER TEMPERA- TURE	50	Diagnosis Procedure	67
DTC Logic	50	P0BFD D-MOTOR A PHASE UVW CURRENT	
Diagnosis Procedure	50	SEN	68
Component Inspection (Traction Motor Tempera- ture Sensor)	52	DTC Logic	68
Component Inspection (Traction Motor Stator Coil)	52	Diagnosis Procedure	68
P0A3C DRIVE MOTOR A INVERTER OVER TEMP	54	P0C79 DRIVE MOTOR A INVERTER VOLT- AGE	69
DTC Logic	54	DTC Logic	69
Diagnosis Procedure	54	Diagnosis Procedure	69
P0A3F DRIVE MOTOR A POSITION SEN- SOR	55	P318E CAN ERROR	71
DTC Logic	55	DTC Logic	71
Diagnosis Procedure	55	Diagnosis Procedure	71
Component Inspection (Traction Motor Resolver)..	56	P3193 CAN ERROR	72
P0A44 DRIVE MOTOR A OVER SPEED	58	DTC Logic	72
DTC Logic	58	Diagnosis Procedure	72
Diagnosis Procedure	58	P3197 CAN ERROR	73
Component Inspection (Traction Motor Resolver)..	59	DTC Logic	73
P0A78 DRIVE MOTOR A INVERTER	61	Diagnosis Procedure	73
DTC Logic	61	P3199 CAN ERROR	74
Diagnosis Procedure	61	DTC Logic	74
P0A8D 14VOLT POWER VOLTAGE	62	Diagnosis Procedure	74
DTC Logic	62	P319E CAN ERROR	75
Diagnosis Procedure	62	DTC Logic	75
P0AEF DRIVE MOTOR INVERTER TEMP SEN A	63	Diagnosis Procedure	75
		P31A2 CAN ERROR	76
		DTC Logic	76
		Diagnosis Procedure	76
		P31A4 CAN ERROR	77
		DTC Logic	77
		Diagnosis Procedure	77
		P31A9 CAN ERROR	78

DTC Logic	78	P3252 DRIVE MOTOR A INVERTER IGBT	102	
Diagnosis Procedure	78	DTC Logic	102	A
P31AD CAN ERROR	79	Diagnosis Procedure	102	
DTC Logic	79	P325A CAN ERROR	103	B
Diagnosis Procedure	79	DTC Logic	103	
P3240 DRIVE MOTOR A INVERTER CRNT		Diagnosis Procedure	103	
CONT	80	P325B DRIVE MOTOR A INVERTER	104	TMS
DTC Logic	80	DTC Logic	104	
Diagnosis Procedure	80	Diagnosis Procedure	104	
P3241 DRIVE MOTOR A INVERTER CRNT		P325C DRIVE MOTOR A POSITION	105	D
CONT	83	DTC Logic	105	
DTC Logic	83	Diagnosis Procedure	105	E
Diagnosis Procedure	83	P325D DRIVE MOTOR A POSITION	106	
P3244 DRIVE MOTOR A INVERTER	85	DTC Logic	106	F
DTC Logic	85	Diagnosis Procedure	106	
Diagnosis Procedure	85	P325E DRIVE MOTOR A POSITION	107	G
P3245 DRIVE MOTOR A INVERTER	87	DTC Logic	107	
DTC Logic	87	Diagnosis Procedure	107	
Diagnosis Procedure	87	P325F DRIVE MOTOR A POSITION	108	H
P3246 DRIVE MOTOR A INVERTER VOLT-		DTC Logic	108	
AGE	88	Diagnosis Procedure	108	
DTC Logic	88	U1000 CAN COMM CIRCUIT	109	I
Diagnosis Procedure	88	Description	109	
P3247 DRIVE MOTOR A INVERTER	90	DTC Logic	109	
DTC Logic	90	Diagnosis Procedure	109	J
Diagnosis Procedure	90	TRACTION MOTOR INSULATION RESIS-		
P3248 DRIVE MOTOR A INVERTER	91	TANCE CHECK	110	K
DTC Logic	91	Component Inspection	110	
Diagnosis Procedure	91	TRACTION MOTOR INVERTER INSULA-		
P3249 DRIVE MOTOR A INVERTER	92	TION RESISTANCE CHECK	112	L
DTC Logic	92	Component Inspection	112	
Diagnosis Procedure	92	SYMPTOM DIAGNOSIS	114	M
P324A DRIVE MOTOR A INVERTER VOLT-		ELECTROMAGNETIC SOUND IS AUDIBLE .	114	
AGE	93	DESCRIPTION	114	
DTC Logic	93	REMOVAL AND INSTALLATION	115	N
Diagnosis Procedure	93	TRACTION MOTOR INVERTER	115	
P324D DRIVE MOTOR A INVERTER IGBT	95	Exploded View	115	O
DTC Logic	95	Removal and Installation	115	
Diagnosis Procedure	95	Inspection	121	
Component Inspection (Traction Motor Stator		UNIT REMOVAL AND INSTALLATION ...	123	P
Coil)	97	TRACTION MOTOR	123	
P324F DRIVE MOTOR A INVERTER IGBT	98	Exploded View	123	
DTC Logic	98	Removal and Installation	123	
Diagnosis Procedure	98	Inspection	127	
Component Inspection (Traction Motor Stator				
Coil)	100			

PRECAUTIONS

< PRECAUTION >

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:000000007071845

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 on board charger at normal charge operation may effect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not enter the vehicle compartment (including luggage room) 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:000000007079410

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:000000007080034

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 "SRS AIR BAG" and "SEAT BELT" of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

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

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

WARNING:

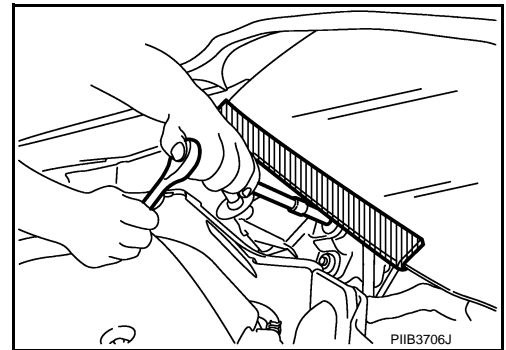
Always observe the following items for preventing accidental activation.

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

Precaution for Procedure without Cowl Top Cover

INFOID:000000006998321

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:000000006998322

WARNING:

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

CAUTION:

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

PRECAUTIONS

< PRECAUTION >

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

The colors of the high voltage harnesses and connectors are all orange. Orange "High Voltage" labels are applied to the Li-ion battery and other high voltage devices. Do not carelessly touch these harnesses and 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 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

Because this vehicle uses components that contain high voltage and powerful magnetism, do not carry any metal products which may cause short circuits, or any magnetic media (cash cards, prepaid cards, etc.) which may be damaged on your person when working.

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

PRECAUTIONS

< PRECAUTION >

To call the attention of other workers, indicate "High voltage work in progress. Do not touch!" on vehicles where work is being performed on the high voltage systems.

Person in charge: _____

DO NOT TOUCH!

REPAIR IN PROGRESS.

HIGH VOLTAGE

DANGER:

DANGER:

HIGH VOLTAGE

REPAIR IN PROGRESS.

DO NOT TOUCH!

Person in charge: _____

Copy this page and put it after folding on the roof of the vehicle in service.

JSAIA1600GB

A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

Precaution for Removing 12V Battery

INFOID:000000006998323

When removing the 12V battery, turn ON/OFF the power switch and check that the charging status indicator does not blink. The 12V battery must be removed within one hour after checking the indicator lamp.

NOTE:

- The automatic 12V battery charge control may start even when the power switch is in OFF state.

PRECAUTIONS

< PRECAUTION >

- The automatic 12V battery charge control does not start within approximately one hour when the power switch is turned ON/OFF.

General Precautions

INFOID:000000006998324

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-43, "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

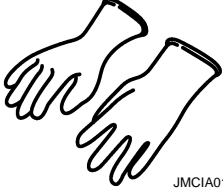
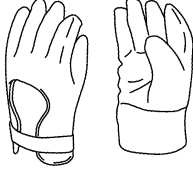

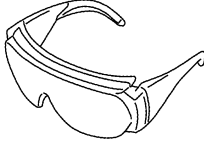
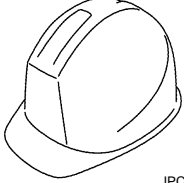
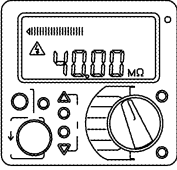
< PREPARATION >

PREPARATION

PREPARATION

Commercial Service Tools

INFOID:000000007080639

Tool name		Description
Insulated gloves [Guaranteed insulation performance for 1000V/300A]	 <p>JMCIA0149ZZ</p>	Removing and installing high voltage components
Leather gloves [Use leather gloves that can fasten the wrist tight]	 <p>JPCIA0066ZZ</p>	<ul style="list-style-type: none"> • Removing and installing high voltage components • Protect insulated gloves
Insulated safety shoes	 <p>JPCIA0011ZZ</p>	Removing and installing high voltage components
Safety glasses [ANSI Z87.1]	 <p>JPCIA0012ZZ</p>	<ul style="list-style-type: none"> • Removing and installing high voltage components • To protect eye from the spatter on the work to electric line
Insulated helmet	 <p>JPCIA0013ZZ</p>	Removing and installing high voltage components
Insulation resistance tester (Multi tester)	 <p>JPCIA0014ZZ</p>	Measuring voltage and insulation resistance

A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

O

P

DESCRIPTION

< SYSTEM DESCRIPTION >

SYSTEM DESCRIPTION

DESCRIPTION

Description

INFOID:000000006998326

- 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:000000006998327

Max torque	280 Nm
Max output	80 kW
Max speed	10,390 rpm
Cooling system	Water cooling type

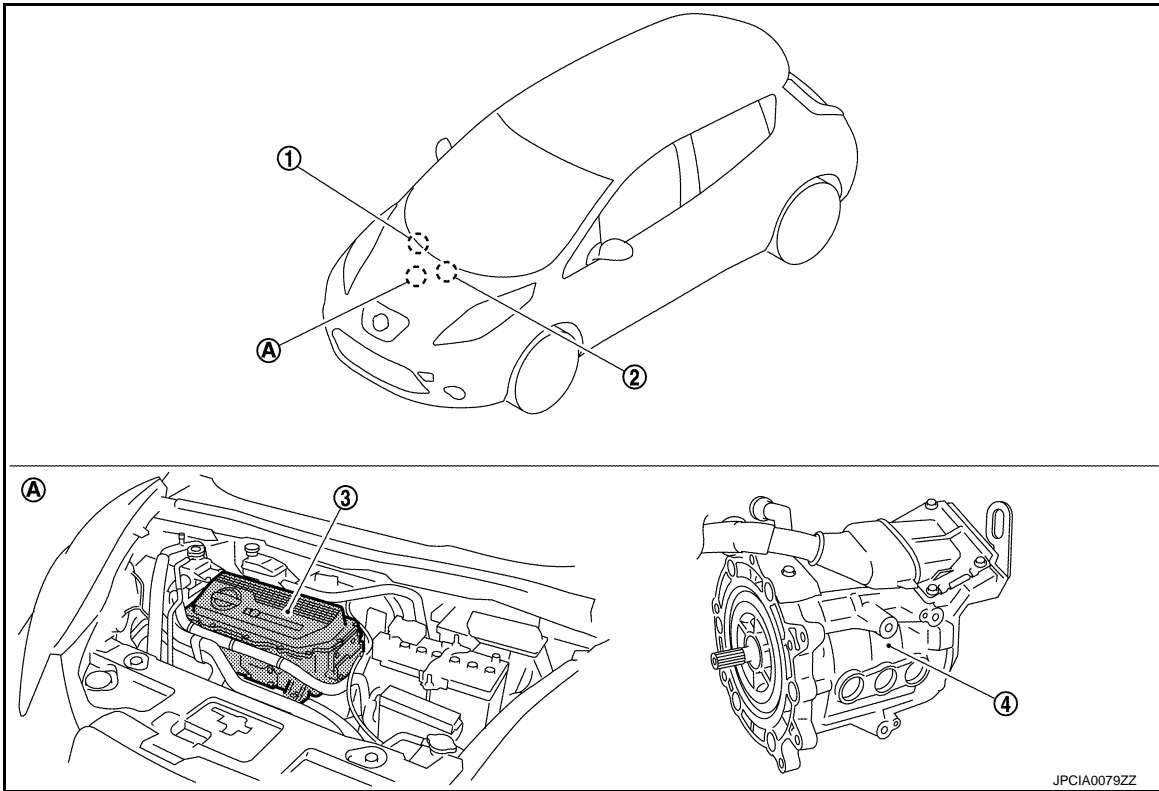
COMPONENT PARTS

< SYSTEM DESCRIPTION >

COMPONENT PARTS

Component Parts Location

INFOID:000000006998328



A. Motor room

Component Description

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 signal 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
2	Electric shift control module	<ul style="list-style-type: none"> • Receives mainly the following signal from electric shift control module via EV system CAN. <ul style="list-style-type: none"> - Shift position signal
3	Traction motor inverter	TMS-12. "Traction Motor Inverter"
4	Traction motor	TMS-12. "Traction Motor"

COMPONENT PARTS

< SYSTEM DESCRIPTION >

Traction Motor Inverter

INFOID:000000006998329

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, 3 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.
- 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 (12V) from the motor controller to a high voltage signal (300V) and drives the IGBT.

POWER MODULE

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

SMOOTHING CONDENSER

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

CURRENT SENSORS

One sensor each is installed at the U-phase, V-phase, and W-phase. They detect the current supplied to the traction motor and send the current values as feedback to the motor controller.

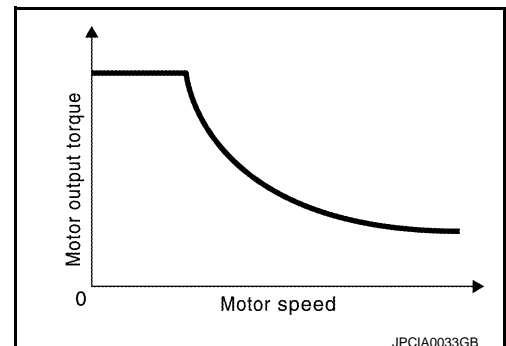
DISCHARGE RESISTER

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

Traction Motor

INFOID:000000006998330

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



TRACTION MOTOR RESOLVER

COMPONENT PARTS

< SYSTEM DESCRIPTION >

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 was replaced, be sure to perform writing of the traction motor resolver offset. Refer to [TMS-43, "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

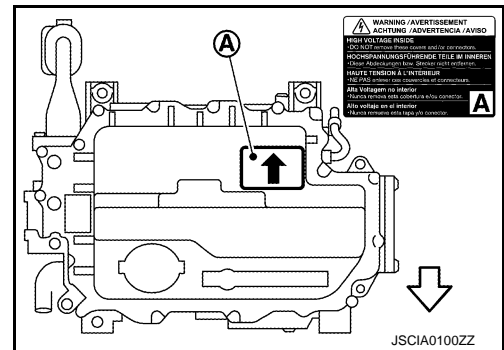
INFOID:000000006998331

- High voltage warning label is stuck on each component parts below.
- When replacing component parts make sure to stick it on original position.

TRACTION MOTOR INVERTER

The label (A) is stuck on the top of traction motor inverter.

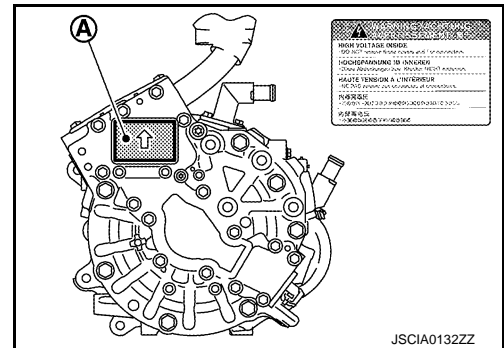
- ← : Vehicle front
- ← : Direction of the label



TRACTION MOTOR

The label (A) is stuck on the right side of traction motor.

- ← : Direction of the label



STRUCTURE AND OPERATION

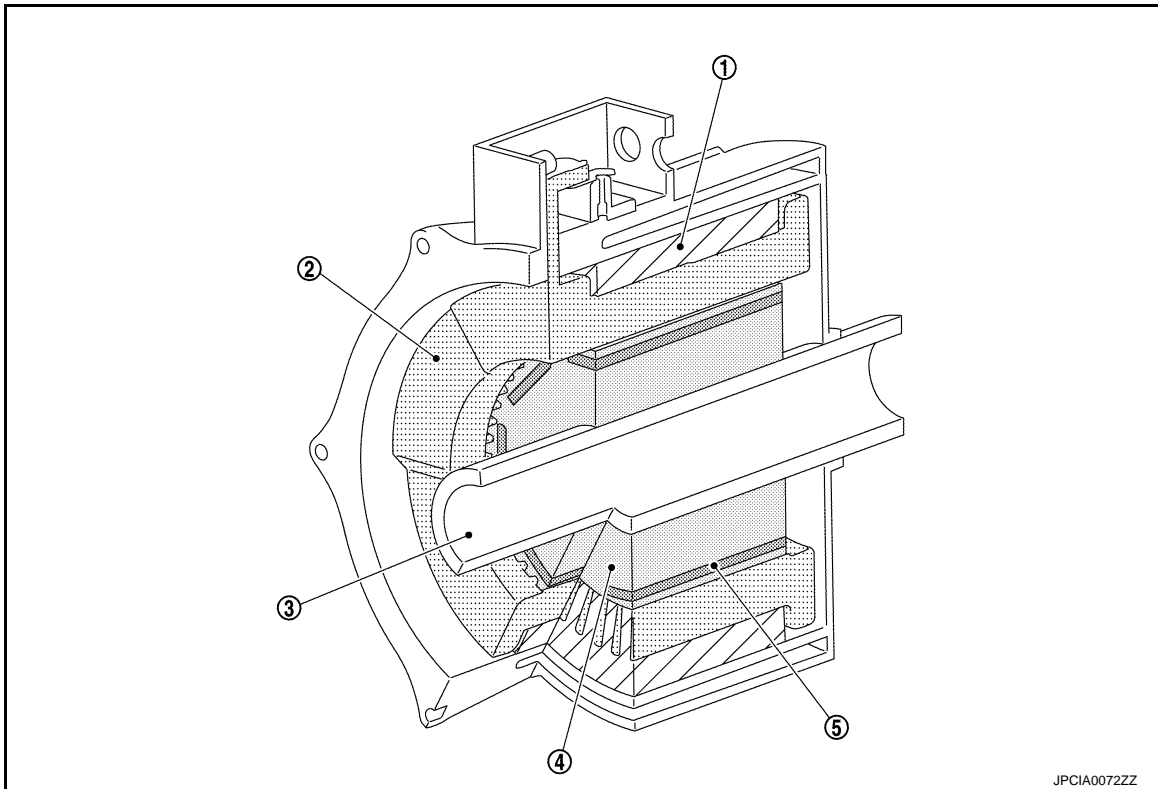
< SYSTEM DESCRIPTION >

STRUCTURE AND OPERATION

Structural Drawing

INFOID:000000006998332

MOTOR MECHANISM (DIAGRAM)



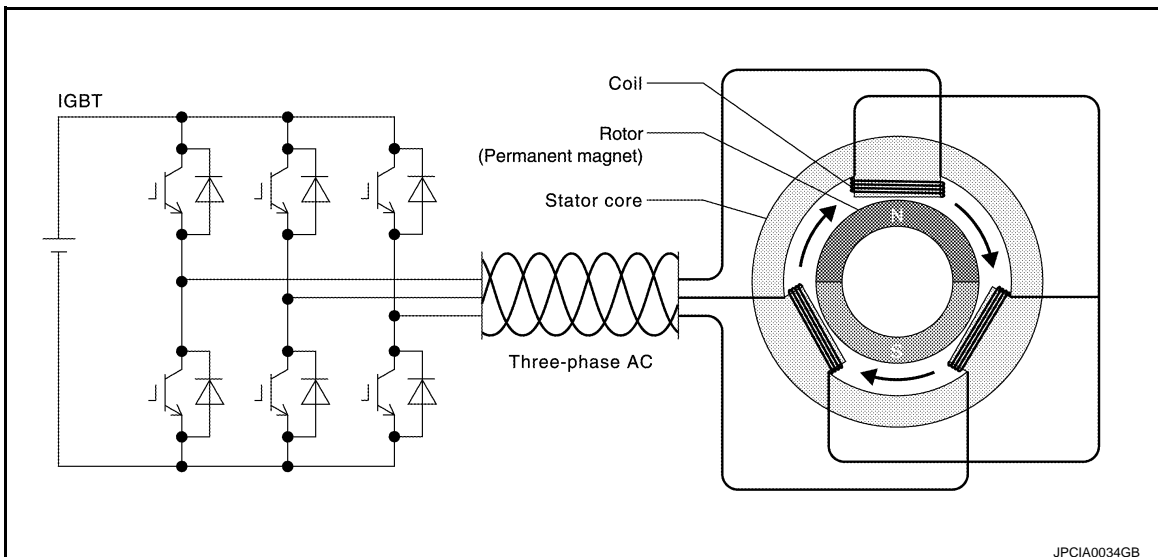
JPCIA0072ZZ

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

OPERATION DESCRIPTION

INFOID:000000006998333

OPERATION PRINCIPLE



JPCIA0034GB

- 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-

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.

A
B

TMS

D
E
F
G
H
I
J
K
L
M
N
O
P

SYSTEM

< SYSTEM DESCRIPTION >

SYSTEM

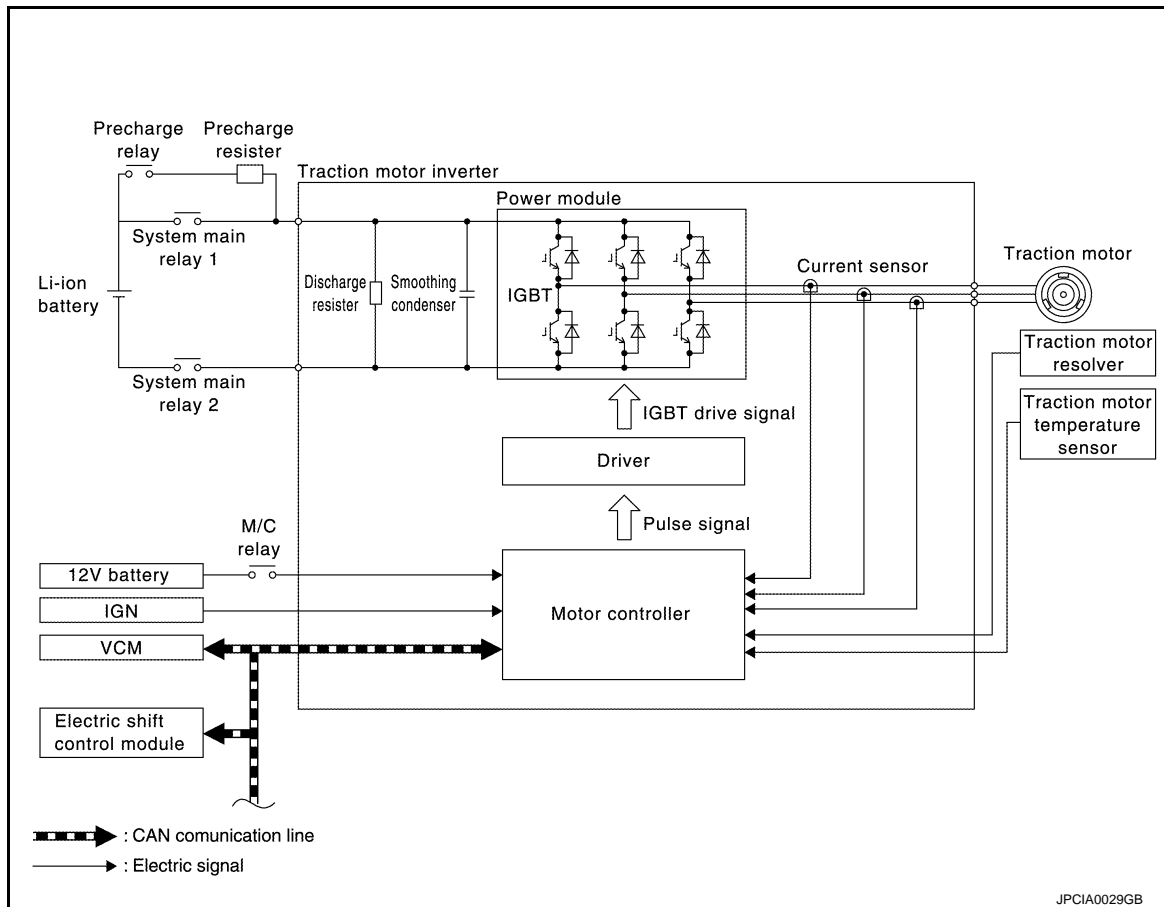
TRACTION MOTOR INVERTER

TRACTION MOTOR INVERTER : System Description

INFOID:000000006998334

- 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-31, "Fail-Safe"](#).

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL

SYSTEM

< SYSTEM DESCRIPTION >

Item	Signal name
VCM	<ul style="list-style-type: none"> • Transmits mainly the following signals toVCM via EV system CAN. - 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 signal from VCM via EV system CAN. - 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
Electric shift control module	<ul style="list-style-type: none"> • Receives mainly the following signal from electric shift control module via EV system CAN. - Shift position signal

A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

O

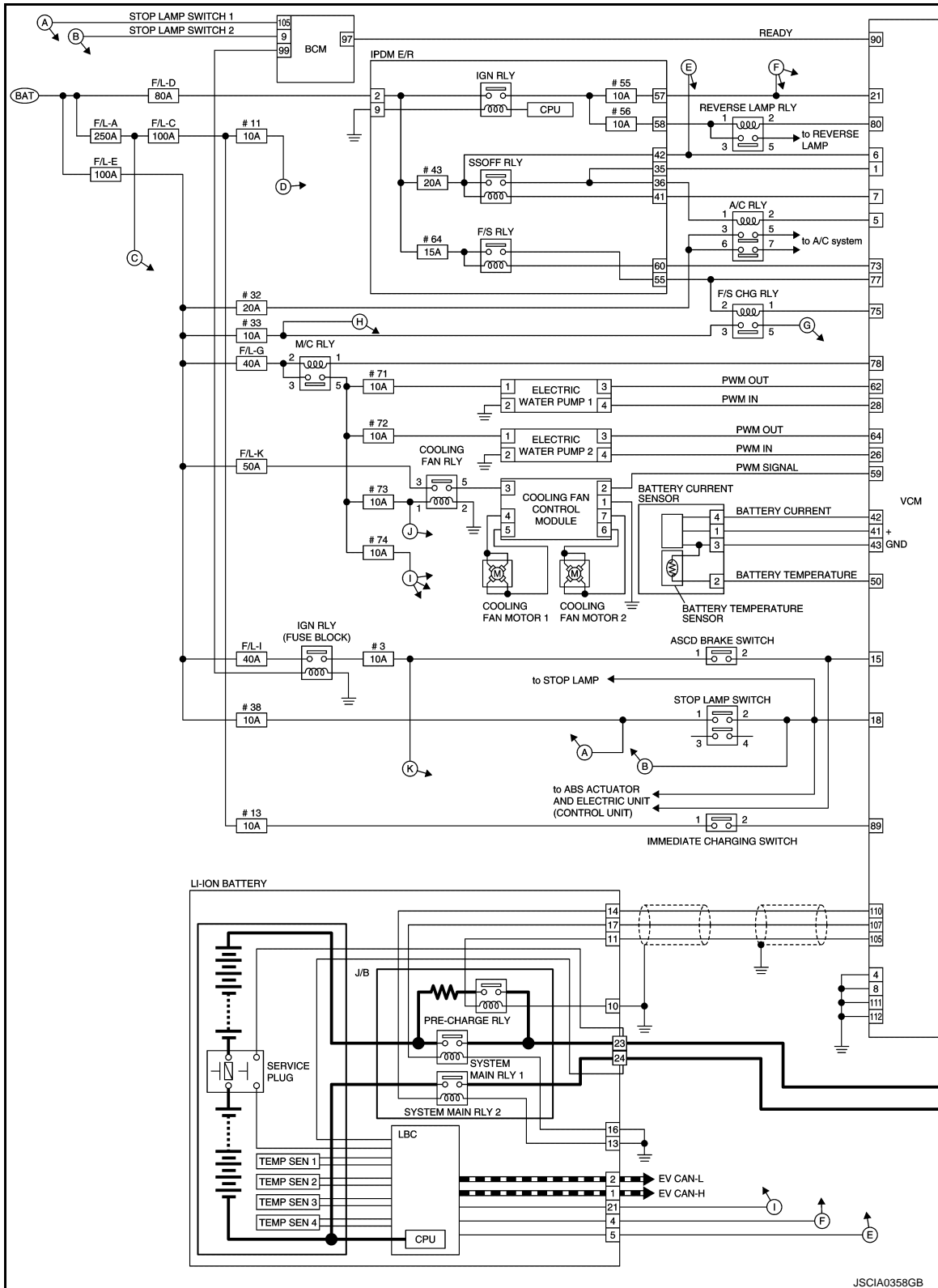
P

SYSTEM

< SYSTEM DESCRIPTION >

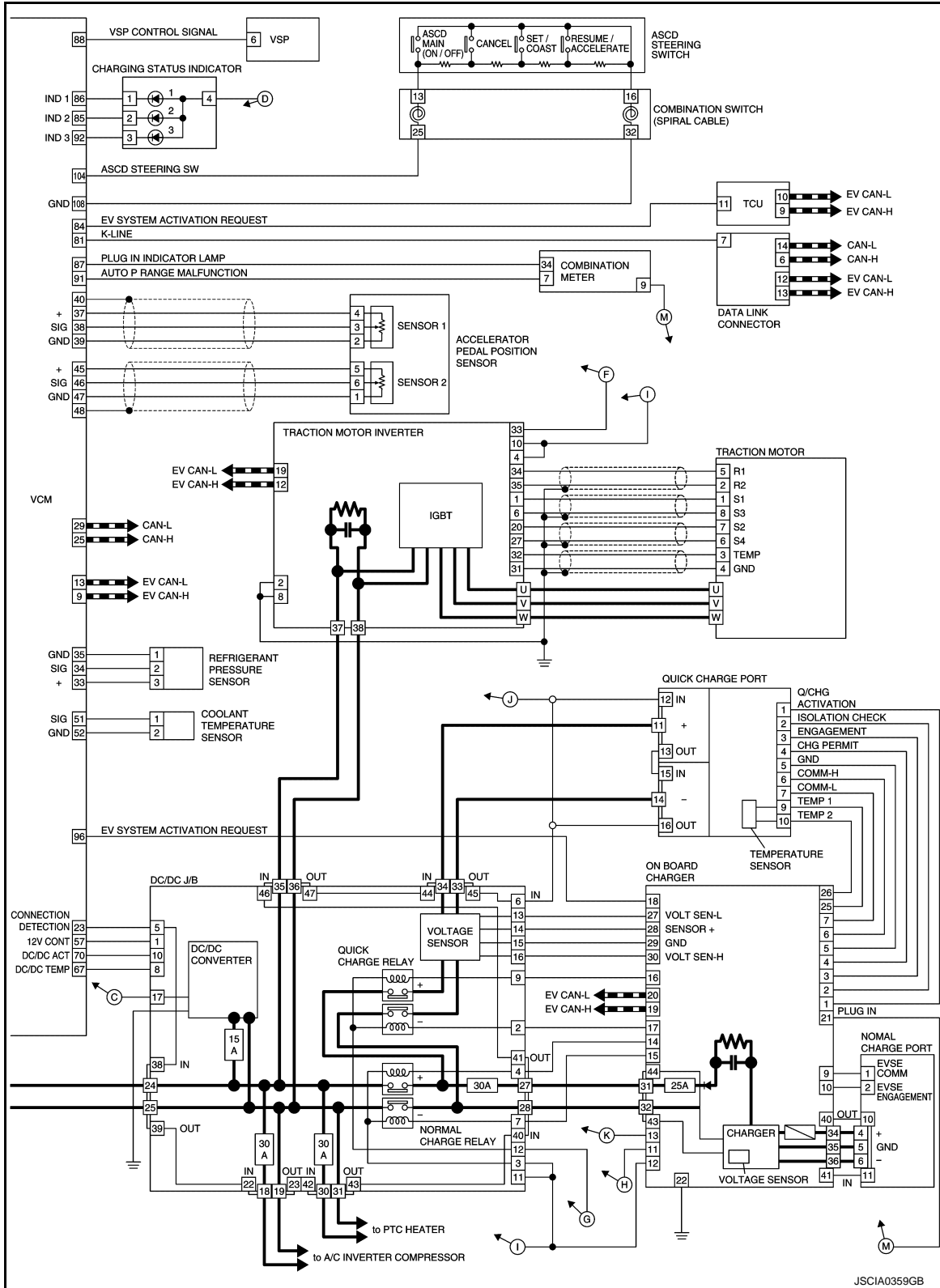
TRACTION MOTOR INVERTER : Schematic

INFOID:000000006998335



SYSTEM

< SYSTEM DESCRIPTION >



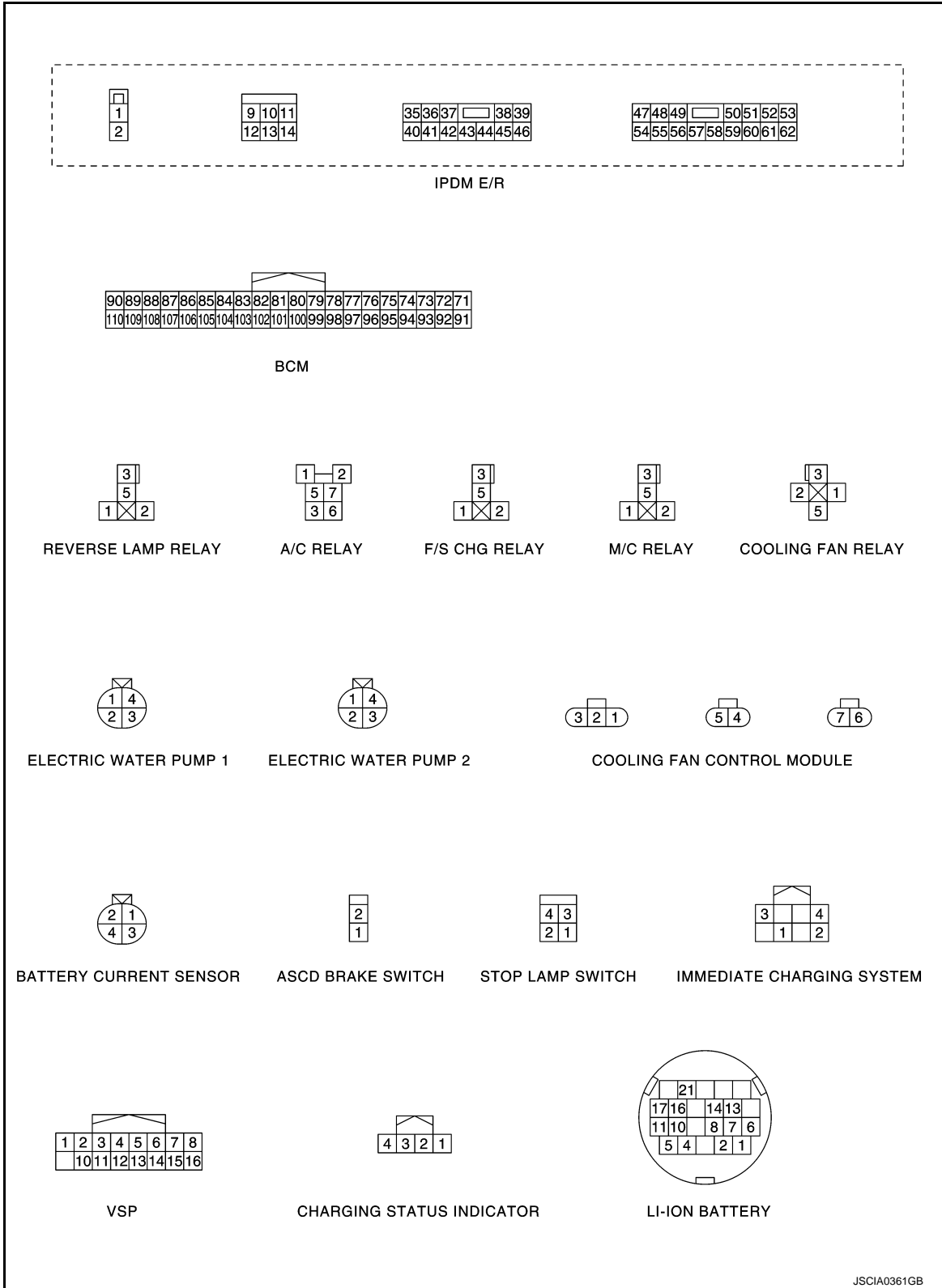
JSCIA0359GB

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P

TMS

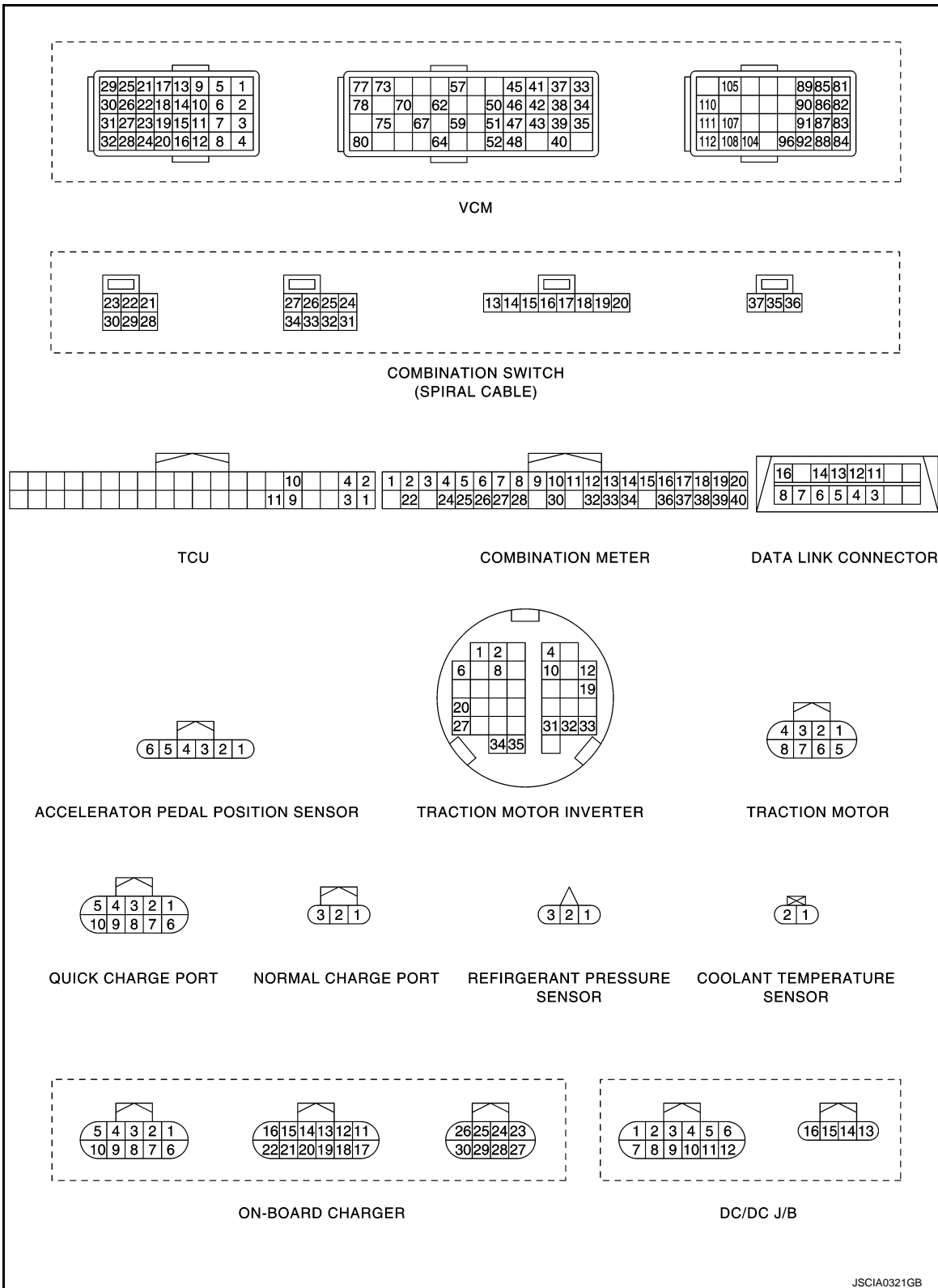
SYSTEM

< SYSTEM DESCRIPTION >



SYSTEM

< SYSTEM DESCRIPTION >



A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

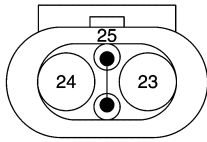
O

P

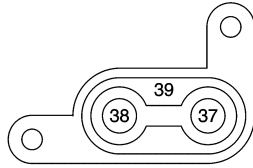
SYSTEM

< SYSTEM DESCRIPTION >

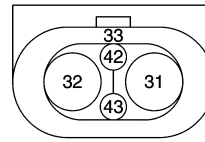
HIGH VOLTAGE HARNESS CONNECTOR



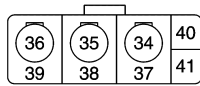
LI-ION BATTERY



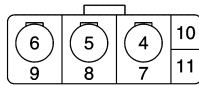
TRACTION MOTOR INVERTER



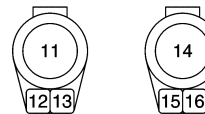
ON-BOARD CHARGER
(FROM DC/DC J/B)



ON-BOARD CHARGER
(TO NORMAL CHARGE PORT)

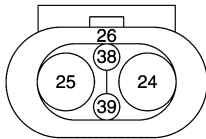


NORMAL CHARGE PORT

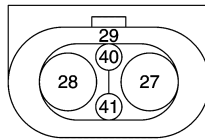


QUICK CHARGE PORT

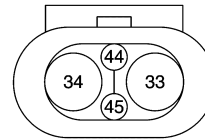
DC/DC J/B



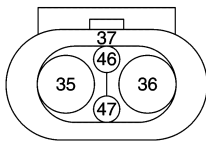
from LI-ION BATTERY



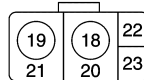
to ON-BOARD CHARGER



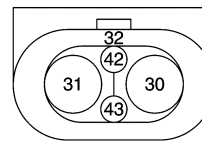
to QUICK CHARGE PORT



to TRACTION MOTOR INVERTER



to INVERTER COMPRESSOR



to PTC HEATER

JSCIA0322GB

SYSTEM

< SYSTEM DESCRIPTION >

TRACTION MOTOR INVERTER : Fail-Safe

INFOID:000000006998336

DTC	Vehicle behavior
P0A1B	Either of following status 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 10%
P0A2C	Limits the maximum torque of traction motor to 40%
P0A2D	Limits the maximum torque of traction motor to 40%
P0A2F	Stops drive control of traction motor
P0A3C	Stops drive control of traction motor
P0A3F	Stops drive control of traction motor
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
P0AEF	Stops drive control of traction motor
P0AF0	Stops drive control of traction motor
P0BE6	Stops drive control of traction motor
P0BEA	Stops drive control of traction motor
P0BEE	Stops drive control of traction motor
P0BFD	Stops drive control of traction motor
P0C79	Stops drive control of traction motor, and requires system main relay OFF to VCM
P318E	It can stop the drive control of traction motor
P3193	—
P3197	Either of following status is observed. <ul style="list-style-type: none"> Stops drive control of traction motor Limits the maximum torque of traction motor to 0%
P3199	It can stop the drive control of traction motor
P319E	—
P31A2	Either of following status is observed. <ul style="list-style-type: none"> Stops drive control of traction motor Limits the maximum torque of traction motor to 0%
P31A4	It can stop the drive control of traction motor
P31A9	—
P31AD	Either of following status 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
P3244	—
P3245	—
P3246	Stops drive control of traction motor, and requires system main relay OFF to VCM
P3247	Stops drive control of traction motor
P3248	Stops drive control of traction motor, and requires system main relay OFF to VCM
P3249	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324A	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324D	Stops drive control of traction motor, and requires system main relay OFF to VCM

A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

O

P

SYSTEM

< SYSTEM DESCRIPTION >

DTC	Vehicle behavior
P324F	Stops drive control of traction motor, and requires system main relay OFF to VCM
P3252	Limits the maximum torque of traction motor to 50%
P325A	—
P325B	—
P325C	—
P325D	Limits the maximum torque of traction motor to 10%
P325E	—
P325F	—
U1000	—

TRACTION MOTOR INVERTER : Protection Control

INFOID:000000006998337

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	Navigation display	Control	Normal return condition
Traction motor is overheated	Exists	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	Does not exist	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	Exists	Traction motor output torque is limited according to the IGBT temperature.	IGBT temperature drops
Smoothing condenser is overheated	Exists	Traction motor output torque is limited according to the smoothing condenser temperature.	Smoothing condenser temperature drops

MOTOR POWER CONTROL

MOTOR POWER CONTROL : System Description

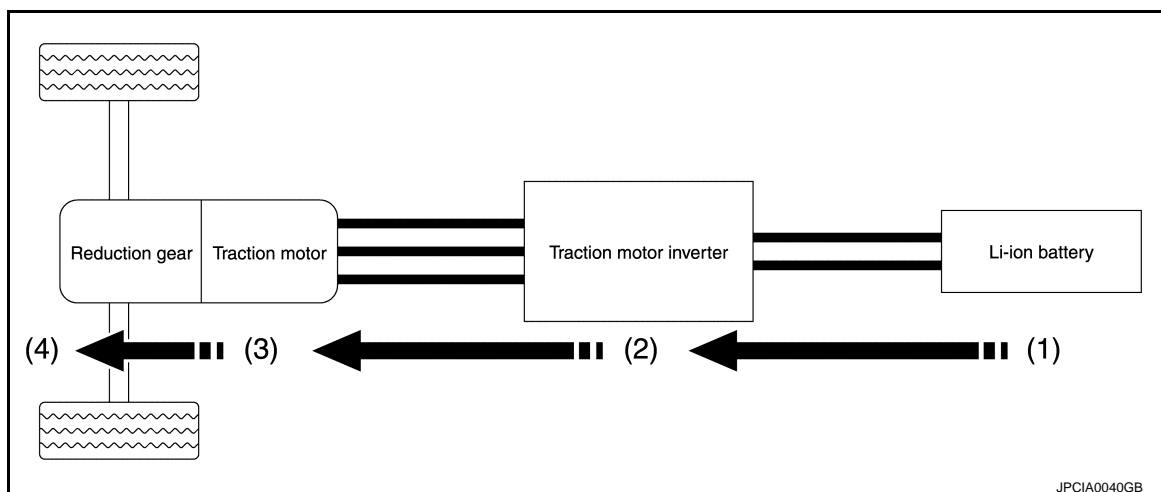
INFOID:000000006998338

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:000000006998339

Flow of energy



JPCIA0040GB

SYSTEM

< SYSTEM DESCRIPTION >

When the traction motor inverter receives the target motor torque signal from the VCM via EV system CAN.

(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.

A
B
TMS

MOTOR REGENERATION CONTROL

MOTOR REGENERATION CONTROL : System Description

INFOID:000000006998340

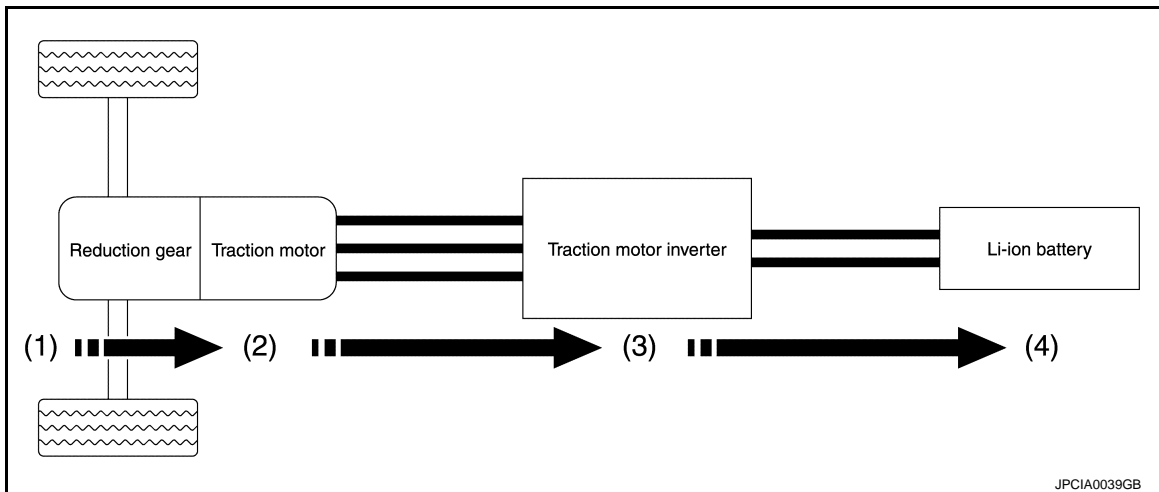
During deceleration, the traction motor inverter drives the traction motor to function as a generator based on the regenerative torque command signal sent via EV system CAN from the VCM, converting the kinetic torque generated by rotation of the tires into electrical energy. The converted electrical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

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:000000006998341

Flow of energy



D
E
F
G
H
I
J
K
L

When the traction motor inverter receives the regenerative torque command signal from the VCM via EV system CAN.

(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.

M
N
O
P

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

< SYSTEM DESCRIPTION >

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : System Description

INFOID:000000006998342

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:000000006998343

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-26, "CONSULT Function"](#).

DIAGNOSIS DESCRIPTION : Counter System

INFOID:000000006998344

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:000000006998345

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-35, "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
RESOLVER OFFSET VALUES (3rd and 4th symbols)	Displays 3rd and 4th symbols of traction motor resolver offset value written in traction motor inverter
RESOLVER OFFSET VALUES (5th and 6th symbols)	Displays 5th and 6th symbols of traction motor resolver offset value written in traction motor inverter
RESOLVER OFFSET VALUES (7th and 8th symbols)	Displays 7th and 8th symbols of traction motor resolver offset value written in traction motor inverter
RESOLVER OFFSET VALUES (9th and 10th symbols)	Displays 9th and 10th symbols of traction motor resolver offset value written in traction motor inverter
VIBRATION COMMAND TORQUE (Nm)	Displays the vibration control torque
DIAGNOSIS START HISTORY	Displays if DTC detection mode is started
DPA REQUEST	Displays the request status of DPA
TORQUE LIMIT RATE (%)	Displays the output torque limit rate
TORQUE LIMIT (UPPER) (Nm)	Displays the torque limitation (upper) signal value from VCM via EV system CAN
TORQUE LIMIT (LOWER) (Nm)	Displays the torque limitation (lower) signal value from VCM via EV system CAN
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
MIN MOTOR TEMPERATURE (°C or °F)	Displays the lowest temperature of traction motor detected
No. OF MOTOR OVER HEAT	Displays the number of times that traction motor temperature exceeds the standard value
INVERTER TEMPERATURE 2 (°C or °F)	Displays the inside temperature of traction motor inverter
MAX INV TEMPERATURE (°C or °F)	Displays the highest temperature of traction motor inverter detected
MIN INV TEMPERATURE (°C or °F)	Displays the lowest temperature of traction motor inverter detected
No. OF INV OVER HEAT 2	Displays the number of times that traction motor inverter temperature exceeds the standard value
INVERTER TEMPERATURE 5 (°C or °F)	Displays the inside temperature of traction motor inverter

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

< SYSTEM DESCRIPTION >

Monitored item (Unit)	Remarks
MAX INV TEMPERATURE 5 (°C or °F)	Displays the highest temperature of traction motor inverter detected
MIN INV TEMPERATURE 5 (°C or °F)	Displays the lowest temperature of traction motor inverter detected
No. OF INV OVER HEAT 5	Displays the number of times that traction motor inverter temperature exceeds the standard value
INVERTER TEMPERATURE 4 (°C or °F)	Displays the inside temperature of traction motor inverter
MAX INV TEMPERATURE 4 (°C or °F)	Displays the highest temperature of traction motor inverter detected
MIN INV TEMPERATURE 4 (°C or °F)	Displays the lowest temperature of traction motor inverter detected
No. OF INV OVER HEAT 4	Displays the number of times that traction motor inverter temperature exceeds the standard value
INVERTER TEMPERATURE 1 (°C or °F)	Displays the inside temperature of traction motor inverter
INVERTER TEMPERATURE 3 (°C or °F)	Displays the inside temperature of traction motor inverter
INV INPUT HIGH VOLTAGE (V)	Displays high voltage input to traction motor inverter
Li-ion BAT TOTAL VOLTAGE (V)	Displays the Li-ion battery voltage from Li-ion battery controller via EV system CAN
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
COMMAND MTR d CURRENT (A)	Displays the command value of current (d-axis) of traction motor
MOTOR d CURRENT (A)	Displays the detected value of current (d-axis) of traction motor
COMMAND MTR q CURRENT (A)	Displays the command value of current (q-axis) of traction motor
MOTOR q CURRENT (A)	Displays the detected value of current (q-axis) of traction motor
COMMAND MTR d VOLTAGE (V)	Displays the command value of voltage (d-axis) of traction motor
COMMAND MTR q VOLTAGE (V)	Displays the command value of voltage (q-axis) of traction motor
3 PHASE SUM (A)	Displays the sum of detected values of current (U-phase, V-phase, and W-phase) 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
W PHASE CURRENT (A)	Displays the W-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
FAIL-SAFE STATUS	Displays the fail safe status of traction motor inverter
DISCHARGE STATUS	Displays that high voltage circuit is under discharge
MOTOR CONTROL STATUS	Displays the set status of traction motor control
CHARGE JUDGE	Displays the charge status of high voltage circuit
CHARGE PERMIT	Displays the charge permission status
RESTART	Displays the restart status of traction motor inverter
HIGH VOLTAGE SUPPLY	Displays the high voltage supply status from VCM via EV system CAN
START/STOP REQUEST	Displays the start/stop request status from VCM via EV system CAN
CHARGE RELAY READY REQ	Displays the start request status of charge judgement of high voltage circuit from VCM via EV system CAN
SHIFT POSITION (VCM)	Displays the shift position from VCM via EV system CAN
SHIFT POSITION (E-SHIFT)	Displays the shift position from electric shift control module via EV system CAN
PWM OFF REQUEST	Displays the pulse signal off request status from VCM via EV system CAN

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

< SYSTEM DESCRIPTION >

Monitored item (Unit)	Remarks
SYSTEM CUT OFF COMPLETE	Displays the system cut off status from VCM via EV system CAN
DISCHARGE REQUEST	Displays the discharge request status from VCM via EV system CAN
VIBRATION CONT REQUEST	Displays the vibration control switching request status from VCM via EV system CAN
DIAG PROHIBIT	Displays the CAN diagnosis inhibition status from VCM via EV system CAN
WAKE UP SLEEP COMMAND	Displays the wake up/sleep request status from VCM via EV system CAN

A

B

TMS

DATA MONITOR

Monitored item (Unit)	Remarks
NUMBER OF DTC	Displays the number of DTCs detected
MOTOR TEMPERATURE (°C or °F)	Displays the temperature of traction motor
INVERTER TEMPERATURE 2 (°C or °F)	Displays the inside temperature of traction motor inverter
INVERTER TEMPERATURE 4 (°C or °F)	Displays the inside temperature of traction motor inverter
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

D

E

F

G

H

I

J

K

L

M

N

O

P

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

ECU DIAGNOSIS INFORMATION

TRACTION MOTOR INVERTER

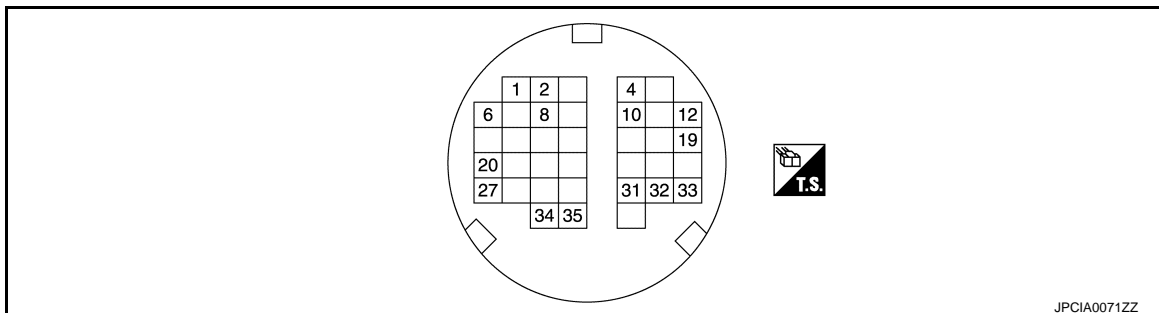
Reference Value

INFOID:000000006998346

CONSULT DATA MONITOR STANDARD VALUE

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.
INVERTER TEMPERATURE 2	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.
INVERTER TEMPERATURE 4	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

TERMINAL LAYOUT



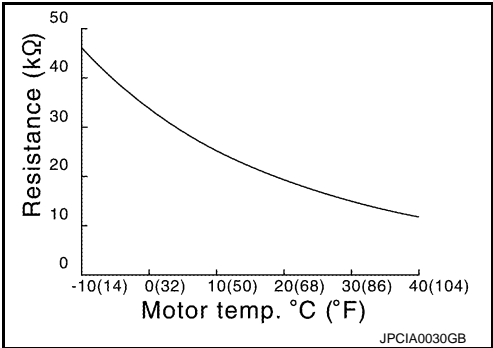
PHYSICAL VALUES

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		
1 (B)	6 (W)	Traction motor resolver signal (S1 – S3)	Input	Power switch OFF	27 – 49 Ω
2 (B)	Ground	Ground	—	Always	0 V
4 (G)	Ground	Power supply (BAT)	—	Power switch ON	9 – 16 V
8 (B)	Ground	Ground	—	Always	0 V
10 (G)	Ground	Power supply (BAT)	—	Power switch ON	9 – 16 V
12 (L)	—	EV system CAN-H	Input/ Output	—	—
19 (G)	—	EV system CAN-L	Input/ Output	—	—
20 (L)	27 (P)	Traction motor resolver signal (S2 – S4)	Input	Power switch OFF	27 – 49 Ω
31 (O)	32 (B/P)	Traction Motor Tem- perature Sensor	Input	Power switch OFF	Within ± 50% of temperature characteristics diagram 
33 (LG)	Ground	Power supply (IGN)	—	Power switch ON	9 – 16 V
				Power switch OFF	0 V
34 (R)	35 (G)	Traction motor resolver signal (R1 – R2)	Output	Power switch OFF	13 – 23 Ω

Fail-Safe

INFOID:000000006998347

DTC	Vehicle behavior
P0A1B	Either of following status 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 10%
P0A2C	Limits the maximum torque of traction motor to 40%
P0A2D	Limits the maximum torque of traction motor to 40%
P0A2F	Stops drive control of traction motor
P0A3C	Stops drive control of traction motor

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

DTC	Vehicle behavior
P0A3F	Stops drive control of traction motor
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
P0AEF	Stops drive control of traction motor
P0AF0	Stops drive control of traction motor
P0BE6	Stops drive control of traction motor
P0BEA	Stops drive control of traction motor
P0BEE	Stops drive control of traction motor
P0BFD	Stops drive control of traction motor
P0C79	Stops drive control of traction motor, and requires system main relay OFF to VCM
P318E	It can stop the drive control of traction motor
P3193	—
P3197	Either of following status is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P3199	It can stop the drive control of traction motor
P319E	—
P31A2	Either of following status is observed. <ul style="list-style-type: none"> • Stops drive control of traction motor • Limits the maximum torque of traction motor to 0%
P31A4	It can stop the drive control of traction motor
P31A9	—
P31AD	Either of following status 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
P3244	—
P3245	—
P3246	Stops drive control of traction motor, and requires system main relay OFF to VCM
P3247	Stops drive control of traction motor
P3248	Stops drive control of traction motor, and requires system main relay OFF to VCM
P3249	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324A	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324D	Stops drive control of traction motor, and requires system main relay OFF to VCM
P324F	Stops drive control of traction motor, and requires system main relay OFF to VCM
P3252	Limits the maximum torque of traction motor to 50%
P325A	—
P325B	—
P325C	—
P325D	Limits the maximum torque of traction motor to 10%
P325E	—
P325F	—
U1000	—

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

Protection Control

INFOID:000000006998348

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	Navigation display	Control	Normal return condition
Traction motor is overheated	Exists	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	Does not exist	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	Exists	Traction motor output torque is limited according to the IGBT temperature.	IGBT temperature drops
Smoothing condenser is overheated	Exists	Traction motor output torque is limited according to the smoothing condenser temperature.	Smoothing condenser temperature drops

DTC Inspection Priority Chart

INFOID:000000006998349

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

A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

Priority	Detected items (DTC)	Reference
1	P0A2C DRIVE MOTOR A TEMP SENSOR	TMS-46
	P0A2D DRIVE MOTOR A TEMP SENSOR	TMS-48
	P0A2F DRIVE MOTOR A OVER TEMPERATURE	TMS-50
	P0A3C DRIVE MOTOR A INVERTER OVER TEMP	TMS-54
	P0A3F DRIVE MOTOR A POSITION SENSOR	TMS-55
	P0A44 DRIVE MOTOR A OVER SPEED	TMS-58
	P0A78 DRIVE MOTOR A INVERTER	TMS-61
	P0A8D 14VOLT POWER VOLTAGE	TMS-62
	P0AEF DRIVE MOTOR INVERTER TEMP SEN A	TMS-63
	P0AF0 DRIVE MOTOR INVERTER TEMP SEN A	TMS-64
	P0C79 DRIVE MOTOR A INVERTER VOLTAGE	TMS-69
	P318E CAN ERROR	TMS-71
	P3193 CAN ERROR	TMS-72
	P3197 CAN ERROR	TMS-73
	P3199 CAN ERROR	TMS-74
	P319E CAN ERROR	TMS-75
	P31A2 CAN ERROR	TMS-76
	P31A4 CAN ERROR	TMS-77
	P31A9 CAN ERROR	TMS-78
	P31AD CAN ERROR	TMS-79
	P3241 DRIVE MOTOR A INVERTER CRNT CONT	TMS-83
	P3244 DRIVE MOTOR A INVERTER	TMS-85
	P3245 DRIVE MOTOR A INVERTER	TMS-87
	P3246 DRIVE MOTOR A INVERTER VOLTAGE	TMS-88
	P3247 DRIVE MOTOR A INVERTER	TMS-90
	P3248 DRIVE MOTOR A INVERTER	TMS-91
	P3249 DRIVE MOTOR A INVERTER	TMS-92
	P324A DRIVE MOTOR A INVERTER VOLTAGE	TMS-93
	P324D DRIVE MOTOR A INVERTER IGBT	TMS-95
	P3252 DRIVE MOTOR A INVERTER IGBT	TMS-102
	P325A CAN ERROR	TMS-103
	P325B DRIVE MOTOR A INVERTER	TMS-104
	P325C DRIVE MOTOR A POSITION	TMS-105
P325D DRIVE MOTOR A POSITION	TMS-106	
P325E DRIVE MOTOR A POSITION	TMS-107	
P325F DRIVE MOTOR A POSITION	TMS-108	
U1000 CAN COMM CIRCUIT	TMS-109	
2	P0A1B DRIVE MOTOR A CONTROL MODULE	TMS-45
	P0BE6 D-MOTOR A PHASE U CURRENT SEN	TMS-65
	P0BEA D-MOTOR A PHASE V CURRENT SEN	TMS-66
	P0BEE D-MOTOR A PHASE W CURRENT SEN	TMS-67
	P0BFD D-MOTOR A PHASE UVW CURRENT SEN	TMS-68
3	P3240 DRIVE MOTOR A INVERTER CRNT CONT	TMS-80
	P324F DRIVE MOTOR A INVERTER IGBT	TMS-98

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

DTC Index

INFOID:000000006998350

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-33, "DTC Inspection Priority Chart"](#).

DTC*	Items (CONSULT screen terms)	EV system warning lamp	Reference
CONSULT			
P0A1B	DRIVE MOTOR A CONTROL MODULE	Can illuminate	TMS-45
P0A2C	DRIVE MOTOR A TEMP SENSOR	—	TMS-46
P0A2D	DRIVE MOTOR A TEMP SENSOR	—	TMS-48
P0A2F	DRIVE MOTOR A OVER TEMPERATURE	ON	TMS-50
P0A3C	DRIVE MOTOR A INVERTER OVER TEMP	ON	TMS-54
P0A3F	DRIVE MOTOR A POSITION SENSOR	ON	TMS-55
P0A44	DRIVE MOTOR A OVER SPEED	ON	TMS-58
P0A78	DRIVE MOTOR A INVERTER	ON	TMS-61
P0A8D	14VOLT POWER VOLTAGE	ON	TMS-62
P0AEF	DRIVE MOTOR INVERTER TEMP SEN A	ON	TMS-63
P0AF0	DRIVE MOTOR INVERTER TEMP SEN A	ON	TMS-64
P0BE6	D-MOTOR A PHASE U CURRENT SEN	ON	TMS-65
P0BEA	D-MOTOR A PHASE V CURRENT SEN	ON	TMS-66
P0BEE	D-MOTOR A PHASE W CURRENT SEN	ON	TMS-67
P0BFD	D-MOTOR A PHASE UVW CURRENT SEN	ON	TMS-68
P0C79	DRIVE MOTOR A INVERTER VOLTAGE	ON	TMS-69
P318E	CAN ERROR	Can illuminate	TMS-71
P3193	CAN ERROR	—	TMS-72
P3197	CAN ERROR	Can illuminate	TMS-73
P3199	CAN ERROR	Can illuminate	TMS-74
P319E	CAN ERROR	—	TMS-75
P31A2	CAN ERROR	Can illuminate	TMS-76
P31A4	CAN ERROR	Can illuminate	TMS-77
P31A9	CAN ERROR	—	TMS-78
P31AD	CAN ERROR	Can illuminate	TMS-79
P3240	DRIVE MOTOR A INVERTER CRNT CONT	ON	TMS-80
P3241	DRIVE MOTOR A INVERTER CRNT CONT	ON	TMS-83
P3244	DRIVE MOTOR A INVERTER	—	TMS-85
P3245	DRIVE MOTOR A INVERTER	—	TMS-87
P3246	DRIVE MOTOR A INVERTER VOLTAGE	ON	TMS-88
P3247	DRIVE MOTOR A INVERTER	ON	TMS-90
P3248	DRIVE MOTOR A INVERTER	ON	TMS-91
P3249	DRIVE MOTOR A INVERTER	ON	TMS-92
P324A	DRIVE MOTOR A INVERTER VOLTAGE	ON	TMS-93
P324D	DRIVE MOTOR A INVERTER IGBT	ON	TMS-95
P324F	DRIVE MOTOR A INVERTER IGBT	—	TMS-98
P3252	DRIVE MOTOR A INVERTER IGBT	—	TMS-102
P325A	CAN ERROR	—	TMS-103
P325B	DRIVE MOTOR A INVERTER	—	TMS-104

TRACTION MOTOR INVERTER

< ECU DIAGNOSIS INFORMATION >

DTC*	Items (CONSULT screen terms)	EV system warning lamp	Reference
CONSULT			
P325C	DRIVE MOTOR A POSITION	ON	TMS-105
P325D	DRIVE MOTOR A POSITION	—	TMS-106
P325E	DRIVE MOTOR A POSITION	—	TMS-107
P325F	DRIVE MOTOR A POSITION	—	TMS-108
U1000	CAN COMM CIRCUIT	—	TMS-109

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

TRACTION MOTOR INVERTER

< WIRING DIAGRAM >

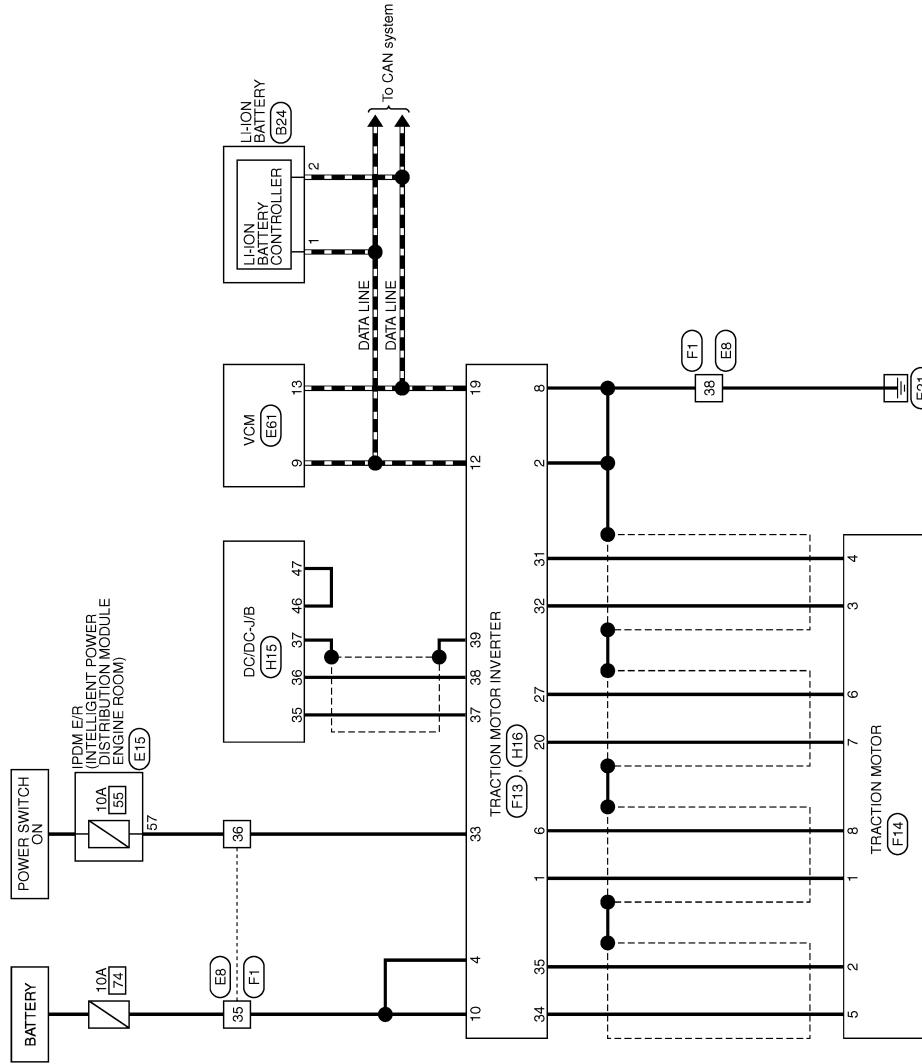
WIRING DIAGRAM

TRACTION MOTOR INVERTER

Wiring Diagram

INFOID:000000006998351

TRACTION MOTOR SYSTEM



2010/10/29

JCCWA0041GB

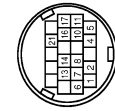
A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

TRACTION MOTOR INVERTER

< WIRING DIAGRAM >

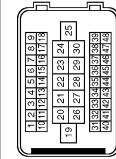
TRACTION MOTOR SYSTEM

Connector No.	B24
Connector Name	LI-ION BATTERY
Connector Type	Yazaki: 7283-8750-30



Terminal No.	Color of Wire	Signal Name [Specification]
1	L	EV CAN-H
2	G	EV CAN-L
4	R	IGN
5	R	BAT
6	B	GND3
7	B	GND2
8	B	GND1
10	B	PRE CHG GND
11	G	PRE CHG V
13	B	RLY2 GND
14	L	RLY2 V
16	B	RLY1 GND
17	Y	RLY1 V
21	R	CHG IGN

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Type	SAA318B-RS10-SJ22



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	-
2	L	-
3	GR	-
4	LG	-
5	P	-
6	B	-
8	BR	-
10	B	-

11	W	-
12	O	-
13	G	-
14	V	-
15	SB	-
16	R	-
17	L	-
18	LG	-
20	V	-
21	G	-
22	Y	-
23	B/R	-
26	V	-
27	P	-
28	B/R	-
29	W	-
30	B/R	-
31	LG	-
32	W	-
33	Y	-
34	P	-
35	P	-
36	R	-
37	G	-
38	B/R	-
40	BR	-
41	G	-
42	SB	-
43	L	-
44	O	-
47	V	-
48	P	-

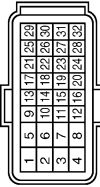
Connector No.	E15
Connector Name	SMILE INTELLIGENT POWER DISTRIBUTION MODULE (ENGINE ROOM)
Connector Type	NS16FTW-CS



Terminal No.	Color of Wire	Signal Name [Specification]
49	Y	-
50	G	-
51	L	-
52	P	-

55	LG	-
57	R	-
58	O	-
60	GR	-
61	Y	-
62	V	-

Connector No.	E61
Connector Name	VCM
Connector Type	RH24FGY-RZ8-RH



Terminal No.	Color of Wire	Signal Name [Specification]
1	G	POWER ON POWER SUPPLY
4	B/R	GROUND
5	SB	A/C RELAY
6	R	BATTERY POWER SUPPLY
7	W	SCOFF RELAY
8	B/R	GROUND
9	L	EV SYSTEM CAN-H
13	G	EV SYSTEM CAN-L
15	O	ASCD BRAKE SWITCH SIGNAL
18	SB	STOP LAMP SW SIGNAL
21	R	POWER ON POWER SUPPLY
23	P	HIGH VOLTAGE CABLE INTERLOCK
25	L	CAN-H
26	Y	WATER PUMP 2 SIGNAL
28	W	WATER PUMP 1 SIGNAL
29	P	CAN-L

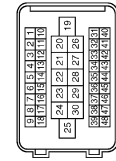
TRACTION MOTOR INVERTER

< WIRING DIAGRAM >

A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

TRACTION MOTOR SYSTEM

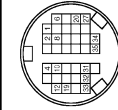
Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Type	3AA38FB-RS10-SJ22



Terminal No.	Color of Wire	Signal Name [Specification]
1	Y	
2	L	
3	GR	
4	LG	
5	P	
6	B	
8	W	
10	R	
11	W	
12	O	
13	G	
14	V	
15	SB	
16	LG	
17	BR	
18	Y	
20	V	
21	G	
22	LG	
23	B	
26	SB	
27	R	
28	Y	
29	W	
30	P	
31	L	
32	W	
33	Y	
34	R	
35	G	
36	LG	
37	G	- [With quick charge port] - [Without quick charge port]
38	B	
40	BR	
41	O	
42	SB	
43	L	

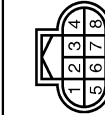
44	LG	
47	V	
48	P	

Connector No.	F13
Connector Name	TRACTION MOTOR INVERTER
Connector Type	RH38FG-GY



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	TRACTION MOTOR RESOLVER SIGNAL (S1)
2	B	GROUND
4	G	POWER SUPPLY (BATTERY)
6	W	TRACTION MOTOR RESOLVER SIGNAL (S3)
8	B	GROUND
10	G	POWER SUPPLY (BATTERY)
12	L	EV SYSTEM CAN-H
19	G	EV SYSTEM CAN-L
20	L	TRACTION MOTOR RESOLVER SIGNAL (S4)
31	O	TRACTION MOTOR TEMPERATURE SENSOR GROUND
32	B/P	TRACTION MOTOR TEMPERATURE SENSOR
33	LG	POWER SUPPLY (IGN)
34	R	TRACTION MOTOR RESOLVER SIGNAL (R1)
35	G	TRACTION MOTOR RESOLVER SIGNAL (R2)

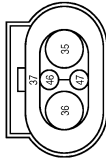
Connector No.	F14
Connector Name	TRACTION MOTOR
Connector Type	RH08FB



Terminal No.	Color of Wire	Signal Name [Specification]
1	B	
2	G	

3	B/P	
4	O	
5	R	
6	P	
7	L	
8	W	

Connector No.	H15
Connector Name	DC/DC-V/B
Connector Type	Z4342_3MA0B



Terminal No.	Color of Wire	Signal Name [Specification]
35	O	(+)
38	O	(-)
37	SHIELD	
46		HIGH VOLTAGE CABLE CONNECTION-DETECTING CIRCUIT (IN)
47		HIGH VOLTAGE CABLE CONNECTION-DETECTING CIRCUIT (OUT)

Connector No.	H16
Connector Name	TRACTION MOTOR INVERTER
Connector Type	Z4340_3MA1C



Terminal No.	Color of Wire	Signal Name [Specification]
37	O	
38	O	
39	SHIELD	

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000006998352

1. OBTAIN INFORMATION ABOUT SYMPTOM

Refer to [TMS-41, "Question sheet"](#) and interview the customer to obtain the malfunction information (conditions and environment when the malfunction occurred) as much as possible when the customer brings in the vehicle.

>> GO TO 2.

2. CHECK DTC

1. Before checking the malfunction, check whether any DTC exists.
2. If DTC exists, perform the following operations.
 - Record the DTC and freeze frame data. (Print out the data using CONSULT and affix them to the Work Order Sheet.)
 - Erase DTCs.
 - Check the relationship between the cause that is clarified with DTC and the malfunction information described by the customer.
3. Check the information of related service bulletins and others also.

Do malfunction information and DTC exist?

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

3. REPRODUCE MALFUNCTION SYMPTOM

Check any malfunction described by a customer, except those with DTC on the vehicle. Also investigate whether the symptom is a fail-safe or normal operation. Refer to [TMS-31, "Fail-Safe"](#). When a malfunction symptom is reproduced, the question sheet is effective. Refer to [TMS-41, "Question sheet"](#).

Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 5.

4. REPRODUCE MALFUNCTION SYMPTOM

Check the malfunction described by the customer on the vehicle. Also investigate whether the symptom is a normal operation. Refer to [TMS-33, "Protection Control"](#). When a malfunction symptom is reproduced, the question sheet is effective. Refer to [TMS-41, "Question sheet"](#).

Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 7.

5. PERFORM "DTC CONFIRMATION PROCEDURE"

Perform "DTC CONFIRMATION PROCEDURE" of the appropriate DTC to check if DTC is detected again. Refer to [TMS-33, "DTC Inspection Priority Chart"](#) when multiple DTCs are detected, and then determine the order for performing the diagnosis.

NOTE:

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

Is any DTC detected?

- YES >> GO TO 6.
- NO >> Check according to [GI-51, "Intermittent Incident"](#).

6. REPAIR OR REPLACE THE MALFUNCTIONING PARTS

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

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

>> GO TO 7.

7. FINAL CHECK

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

Is DTC or malfunction symptom reproduced?

YES >> GO TO 2.

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

Question sheet

INFOID:000000006998353

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					
	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. %)		

DIAGNOSIS AND REPAIR WORK FLOW

< BASIC INSPECTION >

Question Sheet	
Road conditions	<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
Shift position	<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"/> ECO mode
Driving conditions	<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)
Moments when malfunction disappears	<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
Other	

RESOLVER WRITE

< BASIC INSPECTION >

RESOLVER WRITE

Description

INFOID:000000006998354

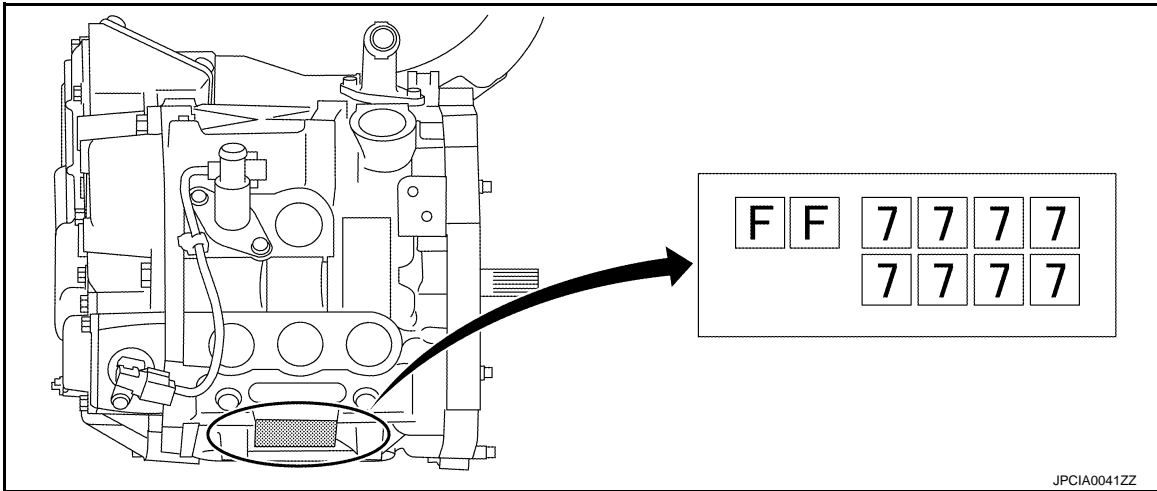
If the work listed below was performed, it is necessary to perform writing of the traction motor resolver offset to the traction motor inverter.

- 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:000000006998355

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. Power switch OFF to complete the work.
- NO >> Perform again STEP 2.

RESOLVER WRITE

< BASIC INSPECTION >

3. WRITING OF THE TRACTION MOTOR RESOLVER OFFSET

Ⓟ 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

Ⓟ 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:000000006998356

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A1B	Drive Motor "A" Control Module	A malfunction is detected in the traction motor inverter (motor controller)	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 "P0A1B" detected?

- YES >> Go to [TMS-45. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998357

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115. "Removal and Installation"](#).

>> END

P0A2C DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0A2C DRIVE MOTOR A TEMP SENSOR

DTC Logic

INFOID:000000006998358

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A2C	Drive Motor "A" Temperature Sensor Circuit Low	If the value detected for the traction motor temperature is too low	<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-46. "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998359

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 vehicle side harness connector		Ground	Resistance
Connector	Terminal		
F13	31	Ground	200 kΩ or more
	32		

Is the inspection result normal?

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

P0A2C DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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 vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
F13	31	F14	4	1 Ω or less
	32		3	

3. Check the harness for short.

Traction motor inverter vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
F13	31	F14	3	100 kΩ or more
	32		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-47, "Component Inspection \(Traction Motor Temperature Sensor\)"](#).

Is the inspection result normal?

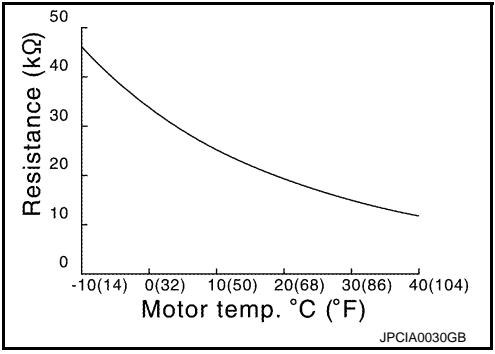
- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
 NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Temperature Sensor)

INFOID:000000006998360

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-123, "Removal and Installation"](#).

P0A2D DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0A2D DRIVE MOTOR A TEMP SENSOR

DTC Logic

INFOID:000000006998361

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A2D	Drive Motor "A" Temperature Sensor Circuit High	If the value detected for the traction motor temperature 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

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-48, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998362

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 vehicle side harness connector		Ground	Resistance
Connector	Terminal		
F13	31	Ground	200 kΩ or more
	32		

Is the inspection result normal?

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

POA2D DRIVE MOTOR A TEMP SENSOR

< DTC/CIRCUIT DIAGNOSIS >

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 vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
F13	31	F14	4	1 Ω or less
	32		3	

3. Check the harness for short.

Traction motor inverter vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
F13	31	F14	3	100 kΩ or more
	32		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-49, "Component Inspection \(Traction Motor Temperature Sensor\)"](#).

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
 NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Temperature Sensor)

INFOID:000000006998363

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 <p style="text-align: right; font-size: small;">JPCIA0030GB</p>

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-123, "Removal and Installation"](#).

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

P0A2F DRIVE MOTOR A OVER TEMPERATURE

DTC Logic

INFOID:000000006998364

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A2F	Drive Motor "A" Over Temperature	If traction motor temperature is too high	<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 "P0A2F" detected?

- YES >> Go to [TMS-50, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998365

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. CHECK DTC HIGH VOLTAGE COOLING SYSTEM

1. Power switch ON and wait 10 seconds or more.
2. Perform "Self Diagnostic Results" in "EV/HEV".

Is any DTC detected?

- YES >> Check DTC detected item. Refer to [EVC-78, "DTC Index"](#).

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-9, "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, DC/DC-J/B, and on board charger. Refer to [HCO-5, "High Voltage Cooling System"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4.PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



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



Standard

: 5 V or less

CAUTION:

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

>> GO TO 5.

5.CHECK TRACTION MOTOR INSULATION RESISTANCE

CAUTION:

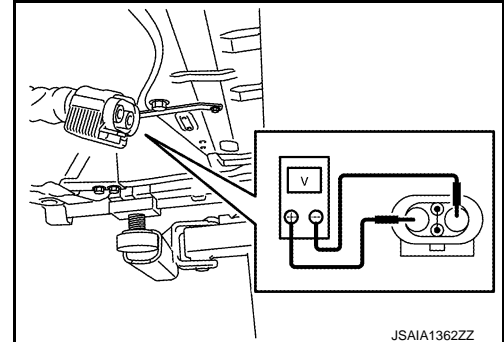
Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully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

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
2. Using an insulation resistance tester (500V range), measure the resistance according to the value in the table below.

CAUTION:

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

NOTE:



P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

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

3-phase harness	Ground	Resistance
Terminal		
U-phase	Ground	10 MΩ or more
V-phase		
W-phase		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

6.CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the traction motor temperature sensor. Refer to [TMS-52, "Component Inspection \(Traction Motor Temperature Sensor\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Remove the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

7.CHECK RESISTANCE OF TRACTION MOTOR STATOR COIL

Check the resistance of traction motor stator coil. Refer to [TMS-52, "Component Inspection \(Traction Motor Stator Coil\)"](#).

Is the inspection result normal?

YES >> 1. Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

2. If DTC "P0A2F" is still detected after traction motor replacement, replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

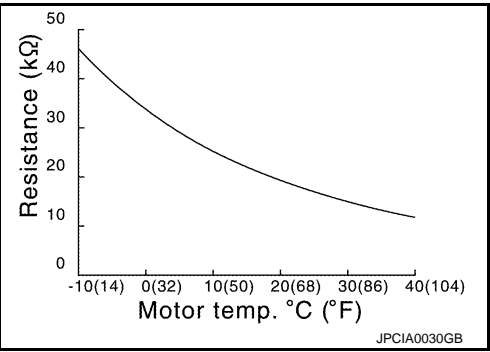
NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Temperature Sensor)

INFOID:000000006998366

1. CHECK TRACTION MOTOR TEMPERATURE SENSOR

Check the resistance between traction motor connector terminals.

Traction motor connector		Resistance
Terminal		
3	4	<p>Within ± 50% of temperature characteristics diagram</p>  <p>JPCIA0030GB</p>

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-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Stator Coil)

INFOID:000000006998367

1.CHECK RESISTANCE OF TRACTION MOTOR STATOR COIL

P0A2F DRIVE MOTOR A OVER TEMPERATURE

< DTC/CIRCUIT DIAGNOSIS >

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	11.6 – 14.3 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-123, "Removal and Installation"](#).

A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

P0A3C DRIVE MOTOR A INVERTER OVER TEMP

< DTC/CIRCUIT DIAGNOSIS >

P0A3C DRIVE MOTOR A INVERTER OVER TEMP

DTC Logic

INFOID:000000006998368

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A3C	Drive Motor "A" Inverter Over Temperature	If smoothing condenser temperature is too high	<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

Ⓟ 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 "P0A3C" detected?

- YES >> Go to [TMS-54. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998369

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-78. "DTC Index"](#).
NO >> GO TO 2.

2. CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-9. "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, DC/DC-J/B, and on board charger. Refer to [HCO-5. "High Voltage Cooling System"](#).

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115. "Removal and Installation"](#).
NO >> Repair or replace damaged parts.

P0A3F DRIVE MOTOR A POSITION SENSOR

< DTC/CIRCUIT DIAGNOSIS >

P0A3F DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:000000006998370

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A3F	Drive Motor "A" Position Sensor Circuit	If there is an abnormality in the traction motor resolver detection circuit	<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. Power switch ON and wait for 10 seconds or more.
2. Check DTC.

Is "P0A3F" detected?

- YES >> Go to [TMS-55, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998371

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 vehicle side harness connector		Ground	Resistance
Connector	Terminal		
F13	1	Ground	100 kΩ or more
	6		
	20		
	27		
	34		
	35		

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 vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
F13	1	F14	1	1 Ω or less
	6		8	
	20		7	
	27		6	
	34		5	
	35		2	

3. Check the harness for short.

Traction motor inverter vehicle side harness connector			Resistance
Connector	Terminal		
F13	1	6	100 kΩ or more
	20	27	
	34	35	

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-56, "Component Inspection \(Traction Motor Resolver\)"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Resolver)

INFOID:000000006998372

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	27 – 49 Ω
2	5	13 – 23 Ω
6	7	27 – 49 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-123](#).
["Removal and Installation"](#).

A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

O

P

P0A44 DRIVE MOTOR A OVER SPEED

< DTC/CIRCUIT DIAGNOSIS >

P0A44 DRIVE MOTOR A OVER SPEED

DTC Logic

INFOID:000000006998373

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A44	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

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-58, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998374

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 vehicle side harness connector		Ground	Resistance
Connector	Terminal		
F13	1	Ground	100 kΩ or more
	6		
	20		
	27		
	34		
	35		

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 vehicle side harness connector		Traction motor vehicle side harness connector		Resistance
Connector	Terminal	Connector	Terminal	
F13	1	F14	1	1 Ω or less
	6		8	
	20		7	
	27		6	
	34		5	
	35		2	

3. Check the harness for short.

Traction motor inverter vehicle side harness connector			Resistance
Connector	Terminal		
F13	1	6	100 kΩ or more
	20	27	
	34	35	

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-59, "Component Inspection \(Traction Motor Resolver\)"](#).

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
 NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Resolver)

INFOID:000000006998375

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	27 – 49 Ω
2	5	13 – 23 Ω
6	7	27 – 49 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-123](#), "[Removal and Installation](#)".

P0A78 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P0A78 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000006998376

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A78	Drive Motor "A" Inverter Performance	A malfunction is detected in the traction motor inverter (motor controller)	Traction motor inverter

A

B

TMS

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-61, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998377

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P0A8D 14VOLT POWER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P0A8D 14VOLT POWER VOLTAGE

DTC Logic

INFOID:000000006998378

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0A8D	14 Volt Power Module System Voltage Low	If the 12V battery voltage is too low	<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-62, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998379

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.

traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	F13	+	-
4		2	
	10	8	

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
NO >> Check the M/C relay. Refer to [EVC-281, "Diagnosis Procedure"](#).

P0AEF DRIVE MOTOR INVERTER TEMP SEN A

< DTC/CIRCUIT DIAGNOSIS >

P0AEF DRIVE MOTOR INVERTER TEMP SEN A

DTC Logic

INFOID:000000006998380

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0AEF	Drive Motor Inverter Temperature Sensor "A" Circuit Low	If the value detected by the smoothing condenser temperature sensor is too low	Traction motor inverter

A

B

TMS

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 "P0AEF" detected?

- YES >> Go to [TMS-63, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998381

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P0AF0 DRIVE MOTOR INVERTER TEMP SEN A

< DTC/CIRCUIT DIAGNOSIS >

P0AF0 DRIVE MOTOR INVERTER TEMP SEN A

DTC Logic

INFOID:000000006998382

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0AF0	Drive Motor Inverter Temperature Sensor "A" Circuit High	If the value detected by the smoothing condenser temperature sensor is too high	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 "P0AF0" detected?

- YES >> Go to [TMS-64, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998383

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "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:000000006998384

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BE6	Drive Motor "A" Phase U Current Sensor Circuit Range/Performance	If the value detected by the traction motor U-phase current sensor 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 "P0BE6" detected?

- YES >> Go to [TMS-65, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998385

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "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:000000006998386

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BEA	Drive Motor "A" Phase V Current Sensor Circuit Range/Performance	If the value detected by the traction motor V-phase current sensor 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 "P0BEA" detected?

- YES >> Go to [TMS-66, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998387

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

P0BEE D-MOTOR A PHASE W CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P0BEE D-MOTOR A PHASE W CURRENT SEN

DTC Logic

INFOID:000000006998388

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BEE	Drive Motor "A" Phase W Current Sensor Circuit Range/Performance	If the value detected by the traction motor W-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

 With CONSULT

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

Is "P0BEE" detected?

- YES >> Go to [TMS-67, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998389

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

P0BFD D-MOTOR A PHASE UVW CURRENT SEN

< DTC/CIRCUIT DIAGNOSIS >

P0BFD D-MOTOR A PHASE UVW CURRENT SEN

DTC Logic

INFOID:000000006998390

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0BFD	Drive Motor "A" Phase U-V-W Current Sensor Correlation	If the current sensor offset 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. 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 "P0BFD" detected?

- YES >> Go to [TMS-68. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998391

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115. "Removal and Installation"](#).

>> END

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:000000006998392

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P0C79	Drive Motor "A" Inverter Voltage Too High	If the high voltage DC voltage is too high	<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-69, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998393

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. CHECK DTC HIGH VOLTAGE SYSTEMS

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

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

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:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:

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



2. Measure voltage between high voltage harness terminals.

DANGER:

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

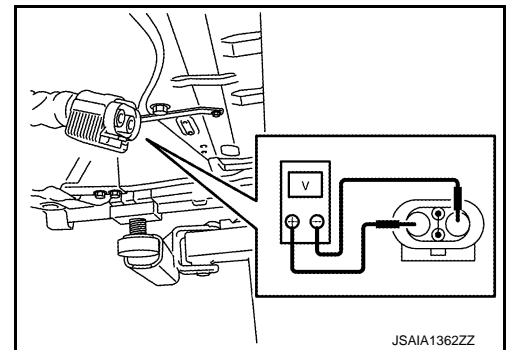


Standard

: 5 V or less

CAUTION:

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



>> GO TO 3.

3. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check the connection conditions of the traction motor inverter high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4. CHECK HIGH VOLTAGE HARNESS

Check for an open circuit or short circuit between DC/DC-J/B and Li-ion battery. Refer to [TMS-18, "TRACTION MOTOR INVERTER : Schematic"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

P318E CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P318E CAN ERROR

DTC Logic

INFOID:000000006998394

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P318E	CAN data error	If traction motor inverter detects CAN data error	VCM

A

B

TMS

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-71, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998395

1. REPLACE VCM

Replace the VCM. Refer to [EVC-315, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P3193 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P3193 CAN ERROR

DTC Logic

INFOID:000000006998396

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3193	CAN data error	If traction motor inverter detects CAN data error	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 "P3193" detected?

- YES >> Go to [TMS-72. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998397

1. REPLACE LI-ION BATTERY CONTROLLER

Replace the Li-ion battery controller. Refer to [EVB-143. "Exploded view"](#).

>> END

P3197 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P3197 CAN ERROR

DTC Logic

INFOID:000000006998398

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3197	CAN data error	If traction motor inverter detects CAN data error	Electric shift control module

A

B

TMS

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-73, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998399

1. REPLACE ELECTRIC SHIFT CONTROL MODULE

Replace the electric shift control module. Refer to [TM-130, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P3199 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P3199 CAN ERROR

DTC Logic

INFOID:000000006998400

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3199	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-74, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998401

1. REPLACE VCM

Replace the VCM. Refer to [EVC-315, "Removal and Installation"](#).

>> END

P319E CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P319E CAN ERROR

DTC Logic

INFOID:000000006998402

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P319E	CAN data error	If traction motor inverter detects CAN data error	Li-ion battery controller

A

B

TMS

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 "P319E" detected?

- YES >> Go to [TMS-75. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998403

1. REPLACE LI-ION BATTERY CONTROLLER

Replace the Li-ion battery controller. Refer to [EVb-143. "Exploded view"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P31A2 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31A2 CAN ERROR

DTC Logic

INFOID:000000006998404

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A2	CAN data error	If traction motor inverter detects CAN data error	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-76, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998405

1. REPLACE ELECTRIC SHIFT CONTROL MODULE

Replace the electric shift control module. Refer to [TM-130, "Removal and Installation"](#).

>> END

P31A4 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31A4 CAN ERROR

DTC Logic

INFOID:000000006998406

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A4	CAN data error	If traction motor inverter detects CAN data error	VCM

A

B

TMS

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-77, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998407

1. REPLACE VCM

Replace the VCM. Refer to [EVC-315, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P31A9 CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31A9 CAN ERROR

DTC Logic

INFOID:000000006998408

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31A9	CAN data error	If traction motor inverter detects CAN data error	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-78, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998409

1. REPLACE LI-ION BATTERY CONTROLLER

Replace the Li-ion battery controller. Refer to [EVB-143, "Exploded view"](#).

>> END

P31AD CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P31AD CAN ERROR

DTC Logic

INFOID:000000006998410

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P31AD	CAN data error	If traction motor inverter detects CAN data error	Electric shift control module

A

B

TMS

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.

D

E

>> GO TO 2.

2. CHECK DTC DETECTION

Ⓜ With CONSULT

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

F

G

Is "P31AD" detected?

- YES >> Go to [TMS-79. "Diagnosis Procedure"](#).
NO >> INSPECTION END

H

Diagnosis Procedure

INFOID:000000006998411

1. REPLACE ELECTRIC SHIFT CONTROL MODULE

Replace the electric shift control module. Refer to [TM-130. "Removal and Installation"](#).

I

J

>> END

K

L

M

N

O

P

P3240 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

P3240 DRIVE MOTOR A INVERTER CRNT CONT

DTC Logic

INFOID:000000006998412

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3240	Drive Motor "A" Inverter Performance/Motor Current Control Error	If the traction motor inverter output voltage is abnormal	<ul style="list-style-type: none">• Traction motor inverter• Traction motor• High voltage harness or connector• Li-ion battery• High voltage parts except for traction motor inverter

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always 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-80, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998413

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. CHECK DTC HIGH VOLTAGE SYSTEMS

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

P3240 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

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-43. "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-43. "Work Procedure"](#).

3.PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31. "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136. "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



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



Standard

: 5 V or less

CAUTION:

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

>> GO TO 4.

4.CHECK THE CONNECTION CONDITIONS OF THE TRACTION MOTOR INVERTER U-V-W TERMINALS

Remove the high voltage safety cover and 3-phase harness cover from the traction motor inverter, and check the 3-harness connection conditions. Refer to [TMS-115. "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Tighten the 3-phase harness to the specified torque. Refer to [TMS-115. "Exploded View"](#).

5.CHECK DISCONNECTION TRACTION MOTOR STATOR COIL

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to [TMS-115. "Removal and Installation"](#).

P3240 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

2. Check for an open circuit in the traction motor stator coil.

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

6. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check the connection conditions of the traction motor inverter high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace damaged parts.

7. CHECK HIGH VOLTAGE HARNESS

Check the following items. Refer to [TMS-18, "TRACTION MOTOR INVERTER : Schematic"](#).

- Check for an open circuit or short circuit between DC/DC-J/B and Li-ion battery.
- Check for an open circuit or short circuit between DC/DC-J/B and A/C inverter compressor.
- Check for an open circuit or short circuit between DC/DC-J/B and PTC element heater.
- Check for an open circuit or short circuit between DC/DC-J/B and on board charger.
- Check for an open circuit or short circuit between DC/DC-J/B and quick charge port.

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

P3241 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

P3241 DRIVE MOTOR A INVERTER CRNT CONT

DTC Logic

INFOID:000000006998414

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3241	Drive Motor "A" Inverter Performance/AC Error Detection	If no current is being applied to 1 phase of the traction motor	<ul style="list-style-type: none">• Traction motor inverter• Traction motor• High voltage harness or connector

DTC CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always 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. 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-83, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998415

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

P3241 DRIVE MOTOR A INVERTER CRNT CONT

< DTC/CIRCUIT DIAGNOSIS >

DANGER:



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



- Measure voltage between high voltage harness terminals.

DANGER:



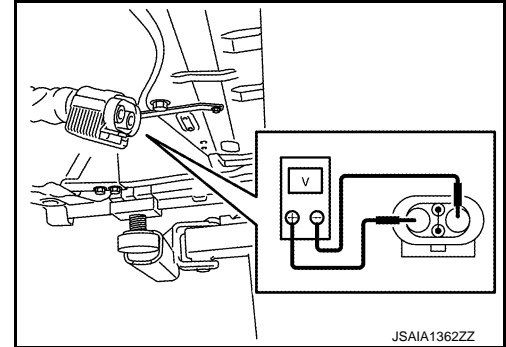
Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

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



>> GO TO 2.

2. CHECK THE CONNECTION CONDITIONS OF THE TRACTION MOTOR INVERTER U-V-W TERMINALS

Remove the high voltage safety cover and 3-phase harness cover from the traction motor inverter, and check the 3-phase harness connection conditions. Refer to [TMS-115. "Exploded View"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Tighten the 3-phase harness to the specified torque. Refer to [TMS-115. "Exploded View"](#).

3. CHECK DISCONNECTION TRACTION MOTOR STATOR COIL

- Disconnect the 3-phase harness from the traction motor inverter. Refer to [TMS-115. "Removal and Installation"](#).
- Check for an open circuit in the traction motor stator coil.

3-phase harness		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-115. "Removal and Installation"](#).

NO >> Remove the traction motor. Refer to [TMS-123. "Removal and Installation"](#).

P3244 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3244 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000006998416

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3244	Drive Motor "A" Inverter Voltage Sensor Performance	If the value detected by the high voltage DC voltage sensor is abnormal	<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 "P3244" detected?

- YES >> Go to [TMS-85. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998417

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32. "High Voltage Precautions"](#).

CAUTION:

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

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?

P3244 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Check DTC detected item.
NO >> GO TO 2.

2. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



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

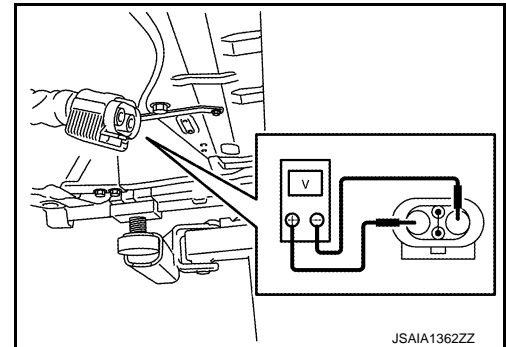


Standard

: 5 V or less

CAUTION:

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



>> GO TO 3.

3. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check the connection conditions of the traction motor inverter high voltage harness connector.

Is the inspection result normal?

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

4. CHECK HIGH VOLTAGE HARNESS

Check the following items. Refer to [TMS-18, "TRACTION MOTOR INVERTER : Schematic"](#).

- Check for an open circuit or short circuit between DC/DC-J/B and Li-ion battery.
- Check for an open circuit or short circuit between DC/DC-J/B and A/C inverter compressor.
- Check for an open circuit or short circuit between DC/DC-J/B and PTC element heater.
- Check for an open circuit or short circuit between DC/DC-J/B and on board charger.
- Check for an open circuit or short circuit between DC/DC-J/B and quick charge port.

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "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:000000006998418

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3245	Drive Motor "A" Inverter Voltage Sensor Circuit	If there is an abnormality in the high voltage DC voltage sensor	Traction motor inverter

A

B

TMS

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-87, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998419

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P3246 DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P3246 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:000000006998420

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3246	Drive Motor "A" Inverter Voltage Too Low	If the high voltage DC voltage is too low	<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 "P3246" detected?

- YES >> Go to [TMS-88. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998421

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32. "High Voltage Precautions"](#).

CAUTION:

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

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?

P3246 DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

- YES >> Check DTC detected item.
NO >> GO TO 2.

2. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



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



Standard

: 5 V or less

CAUTION:

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

>> GO TO 3.

3. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check the connection conditions of the traction motor inverter high voltage harness connector.

Is the inspection result normal?

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

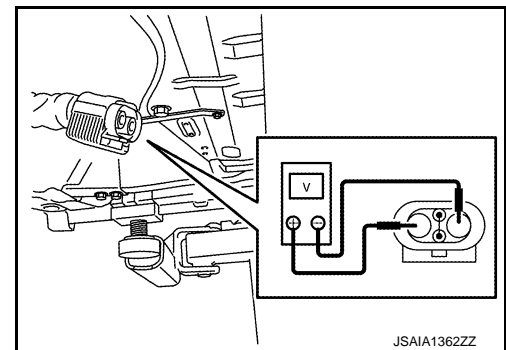
4. CHECK HIGH VOLTAGE HARNESS

Check the following items. Refer to [TMS-18, "TRACTION MOTOR INVERTER : Schematic"](#).

- Check for an open circuit or short circuit between DC/DC-J/B and Li-ion battery.
- Check for an open circuit or short circuit between DC/DC-J/B and A/C inverter compressor.
- Check for an open circuit or short circuit between DC/DC-J/B and PTC element heater.
- Check for an open circuit or short circuit between DC/DC-J/B and on board charger.
- Check for an open circuit or short circuit between DC/DC-J/B and quick charge port.

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
NO >> Repair or replace damaged parts.



P3247 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3247 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000006998422

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3247	Drive Motor "A" Inverter Driver Power Supply	If the IGBT drive circuit power does not start up	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-90, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998423

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

P3248 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3248 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000006998424

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3248	Drive Motor "A" Inverter Driver Power Supply Performance	If there is overcurrent or overvoltage in the IGBT drive circuit power	Traction motor inverter

A

B

TMS

DTC CONFIRMATION PROCEDURE

D

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 10 seconds or more.
2. Check DTC.

Is "P3248" detected?

H

- YES >> Go to [TMS-91, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998425

I

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

J

>> END

K

L

M

N

O

P

P3249 DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P3249 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000006998426

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3249	Drive Motor "A" Inverter Driver Signal	If the IGBT drive current circuit voltage is too low	<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 for 10 seconds or more.
2. Check DTC.

Is "P3249" detected?

- YES >> Go to [TMS-92, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998427

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.

traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	F13	+	-
4		2	
	10	8	

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
NO >> Check the M/C relay. Refer to [EVC-281, "Diagnosis Procedure"](#).

P324A DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

P324A DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:000000006998428

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324A	Drive Motor "A" Inverter Charge Error	If the high voltage DC circuit is not charged	<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. Power switch ON and wait for 10 seconds or more.
2. Check DTC.

Is "P324A" detected?

- YES >> Go to [TMS-93, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998429

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

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.
NO >> GO TO 2.

P324A DRIVE MOTOR A INVERTER VOLTAGE

< DTC/CIRCUIT DIAGNOSIS >

2. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



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

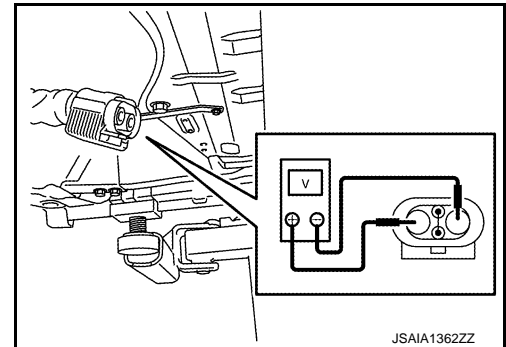


Standard

: 5 V or less

CAUTION:

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



>> GO TO 3.

3. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check the connection conditions of the traction motor inverter high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4. CHECK HIGH VOLTAGE HARNESS

Check the following items. Refer to [TMS-18, "TRACTION MOTOR INVERTER : Schematic"](#).

- Check for an open circuit or short circuit between DC/DC-J/B and Li-ion battery.
- Check for an open circuit or short circuit between DC/DC-J/B and A/C inverter compressor.
- Check for an open circuit or short circuit between DC/DC-J/B and PTC element heater.
- Check for an open circuit or short circuit between DC/DC-J/B and on board charger.
- Check for an open circuit or short circuit between DC/DC-J/B and quick charge port.

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-115, "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:000000006998430

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324D	Drive Motor "A" Inverter IGBT Over Load (Over Current/Over Temperature)	<ul style="list-style-type: none"> If an over current has occurred in the IGBT energizing current If IGBT temperature is too high 	<ul style="list-style-type: none"> Traction motor inverter Traction motor High voltage cooling system

A
B
TMS

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

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

Is "P324D" detected?

- YES >> Go to [TMS-95, "Diagnosis Procedure"](#).
- NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998431

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. CHECK DTC HIGH VOLTAGE COOLING SYSTEM

- Power switch ON and wait for 10 seconds or more.
- Perform "Self Diagnostic Results" in "EV/HEV".

Is any DTC detected?

- YES >> Check DTC detected item. Refer to [EVC-78, "DTC Index"](#).

D
E
F
G
H
I
J
K
L
M
N
O
P

P324D DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

NO >> GO TO 2.

2.CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-9, "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, DC/DC-J/B, and on board charger. Refer to [HCO-5, "High Voltage Cooling System"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace damaged parts.

4.PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:

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



2. Measure voltage between high voltage harness terminals.

DANGER:

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



Standard

: 5 V or less

CAUTION:

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

>> GO TO 5.

5.CHECK TRACTION MOTOR INSULATION RESISTANCE

CAUTION:

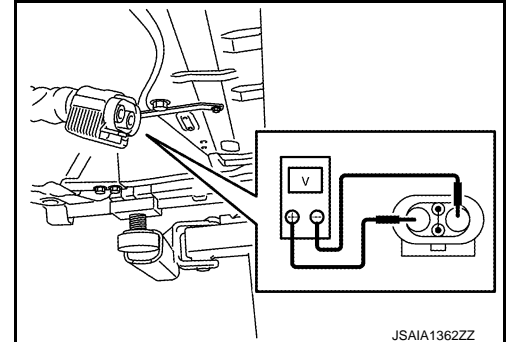
Unlike the ordinary tester, the insulation resistance tester applies 500V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully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

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
2. Using an insulation resistance tester (500V range), measure the resistance according to the value in the table below.

CAUTION:

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

NOTE:



P324D DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

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

3-phase harness	Ground	Resistance
Terminal		
U-phase	Ground	10 MΩ or more
V-phase		
W-phase		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

6.CHECK RESISTANCE TRACTION MOTOR STATOR COIL

Check the resistance traction motor stator coil. Refer to [TMS-97, "Component Inspection \(Traction Motor Stator Coil\)"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

NO >> Replace the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

Component Inspection (Traction Motor Stator Coil)

INFOID:000000006998432

1.CHECK RESISTANCE OF TRACTION MOTOR STATOR COIL

Using a milliohm meter 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	11.6 – 14.3 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-123, "Removal and Installation"](#).

P324F DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

P324F DRIVE MOTOR A INVERTER IGBT

DTC Logic

INFOID:000000006998433

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P324F	Drive Motor "A" Inverter IGBT Over Current / Over Temperature /Over Voltage	<ul style="list-style-type: none">• If an over current has occurred in the IGBT energizing current• If IGBT temperature is too high• If there is overvoltage in the high voltage DC voltage	<ul style="list-style-type: none">• Traction motor inverter• Traction motor• High voltage harness or connector• High voltage cooling system• 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. 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 "P324F" detected?

- YES >> Go to [TMS-98, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998434

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. CHECK DTC HIGH VOLTAGE SYSTEMS

P324F DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

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

Is any DTC detected?

- YES >> Check DTC detected item.
NO >> GO TO 2.

2.CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. [HCO-9. "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, DC/DC-J/B, and on board charger. Refer to [HCO-5. "High Voltage Cooling System"](#).

Is the inspection result normal?

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

4.PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31. "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136. "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



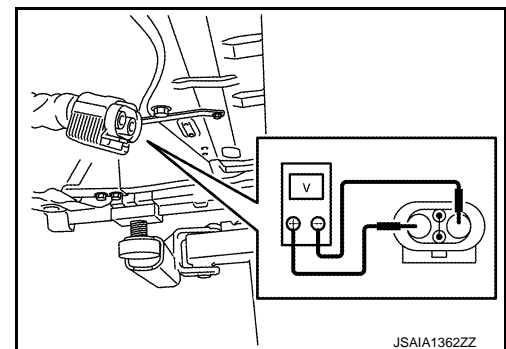
Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard : 5 V or less

CAUTION:

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



>> GO TO 5.

5.CHECK TRACTION MOTOR INSULATION RESISTANCE

CAUTION:

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

1. Disconnect the 3-phase harness from the traction motor inverter. [TMS-115. "Removal and Installation"](#).
2. Using an insulation resistance tester (500V range), measure the resistance according to the value in the table below.

CAUTION:

P324F DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

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

NOTE:

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

3-phase harness	Ground	Resistance
Terminal		
U-phase	Ground	10 MΩ or more
V-phase		
W-phase		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Remove the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

6. CHECK RESISTANCE TRACTION MOTOR STATOR COIL

Check resistance traction motor stator coil. Refer to [TMS-100, "Component Inspection \(Traction Motor Stator Coil\)"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Remove the traction motor. Refer to [TMS-123, "Removal and Installation"](#).

7. CHECK TRACTION MOTOR INVERTER HIGH VOLTAGE HARNESS CONNECTOR

Check the connection conditions of the traction motor inverter high voltage harness connector.

Is the inspection result normal?

YES >> GO TO 8.

NO >> Repair or replace damaged parts.

8. CHECK HIGH VOLTAGE HARNESS

Check for an open circuit or short circuit between DC/DC-J/B and Li-ion battery. Refer to [TMS-18, "TRACTION MOTOR INVERTER : Schematic"](#).

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

NO >> Repair or replace damaged parts.

Component Inspection (Traction Motor Stator Coil)

INFOID:000000006998435

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	11.6 – 14.3 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

P324F DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

- 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-123. "Removal and Installation"](#).

A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

O

P

P3252 DRIVE MOTOR A INVERTER IGBT

< DTC/CIRCUIT DIAGNOSIS >

P3252 DRIVE MOTOR A INVERTER IGBT

DTC Logic

INFOID:000000006998436

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P3252	Drive Motor "A" Inverter IGBT High Temperature	If IGBT temperature is too high	<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

Ⓟ 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-102, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998437

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-78, "DTC Index"](#).
NO >> GO TO 2.

2. CHECK COOLANT WATER

Check the coolant level and check for coolant leakage. Refer to [HCO-9, "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, DC/DC-J/B, and on board charger. Refer to [HCO-5, "High Voltage Cooling System"](#).

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
NO >> Repair or replace damaged parts.

P325A CAN ERROR

< DTC/CIRCUIT DIAGNOSIS >

P325A CAN ERROR

DTC Logic

INFOID:000000006998438

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P325A	CAN data error	If traction motor inverter detects CAN data error	VCM

A

B

TMS

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-103, "Diagnosis Procedure"](#).

NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998439

1. REPLACE VCM

Replace the VCM. Refer to [EVC-315, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P325B DRIVE MOTOR A INVERTER

< DTC/CIRCUIT DIAGNOSIS >

P325B DRIVE MOTOR A INVERTER

DTC Logic

INFOID:000000006998440

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P325B	Drive Motor "A" Inverter TEMP-M Circuit	If the IGBT high temperature detection signal is stuck	<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 for 10 seconds or more.
2. Check DTC.

Is "P325B" detected?

- YES >> Go to [TMS-104, "Diagnosis Procedure"](#).
 NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998441

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.

traction motor inverter vehicle side harness connector			Voltage
Connector	Terminal		
	F13	+	-
4		2	
	10	8	

Is the inspection result normal?

- YES >> Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
 NO >> Check the M/C relay. Refer to [EVC-281, "Diagnosis Procedure"](#).

P325C DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325C DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000006998442

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P325C	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

 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-105. "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998443

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

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

NOTE:

For the traction motor stamp location, refer to [TMS-43. "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-43. "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.

Do the values match?

- YES >> INSPECTION END
NO >> GO TO 1.

P325D DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325D DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000006998444

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P325D	Drive Motor "A" Position Off-set 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-106, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998445

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

P325E DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325E DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000006998446

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P325E	Drive Motor "A" Position Value Error 1	If the traction motor resolver offset stored by the traction motor inverter is abnormal	Traction motor inverter

A

B

TMS

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 "P325E" detected?

- YES >> Go to [TMS-107, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998447

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

D

E

F

G

H

I

J

K

L

M

N

O

P

P325F DRIVE MOTOR A POSITION

< DTC/CIRCUIT DIAGNOSIS >

P325F DRIVE MOTOR A POSITION

DTC Logic

INFOID:000000006998448

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	Malfunction detected condition	Possible causes
P325F	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-108, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998449

1. REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

>> END

U1000 CAN COMM CIRCUIT

< DTC/CIRCUIT DIAGNOSIS >

U1000 CAN COMM CIRCUIT

Description

INFOID:000000006998450

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:000000006998451

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always 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-109, "Diagnosis Procedure"](#).
NO >> INSPECTION END

Diagnosis Procedure

INFOID:000000006998452

For the diagnosis procedure, refer to [LAN-15, "Trouble Diagnosis Flow Chart"](#).

TRACTION MOTOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

TRACTION MOTOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:000000006998453

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:

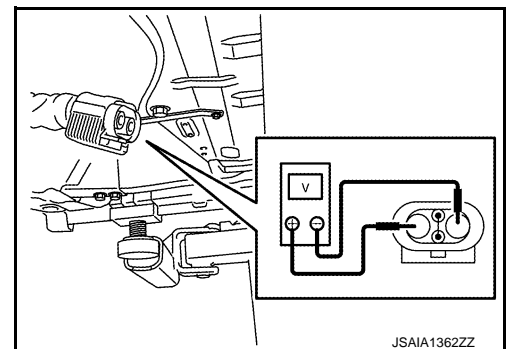


Touching high voltage components without using the appropriate protective equipment will cause electrocution.



Standard

: 5 V or less



CAUTION:

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

>> GO TO 2.

2. CHECK TRACTION MOTOR INSULATION RESISTANCE

WARNING:

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

TRACTION MOTOR INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to [TMS-115. "Removal and Installation"](#).
2. Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

CAUTION:

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

NOTE:

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

3-phase harness Terminal	Ground	Resistance
U-phase	Ground	10 MΩ or more
V-phase		
W-phase		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor. Refer to [TMS-123. "Removal and Installation"](#).

A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

Component Inspection

INFOID:000000006998454

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

1. PRECONDITIONING

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

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

1. Disconnect the high voltage connector from front side of Li-ion battery. Refer to [EVB-136, "Removal and Installation"](#).

DANGER:



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



2. Measure voltage between high voltage harness terminals.

DANGER:



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

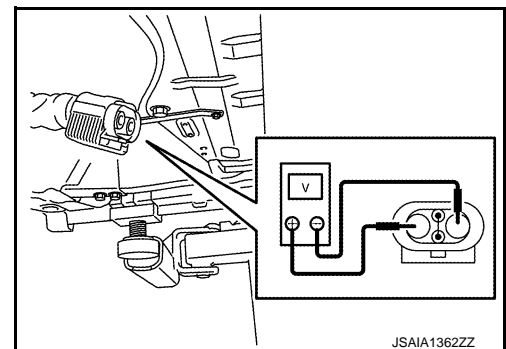


Standard

: 5 V or less

CAUTION:

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



>> GO TO 2.

2. CHECK TRACTION MOTOR INVERTER INSULATION RESISTANCE

WARNING:

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

1. Remove the traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).

TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

< DTC/CIRCUIT DIAGNOSIS >

- Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

CAUTION:

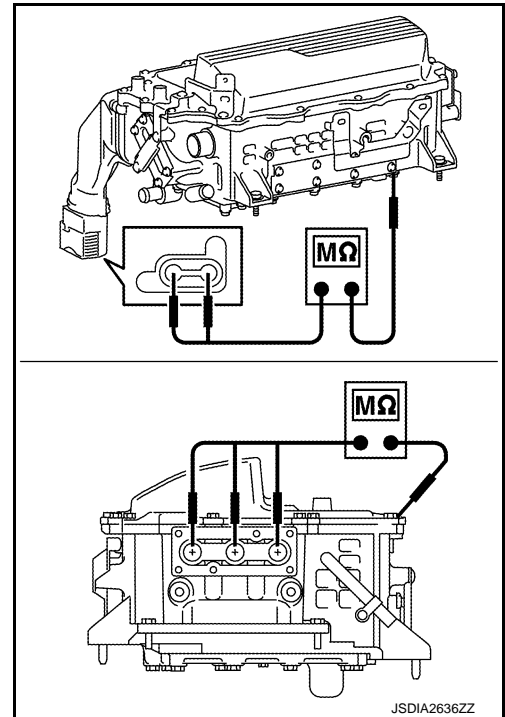
Be sure to set the insulation resistance tester to 500V when performing this test. Using a setting higher than 500V can result in damage to the component being inspected.

Traction motor inverter		Ground	Resistance
Item	Terminal		
High voltage connector	37	Traction motor in- verter case	14 MΩ or more
	38		
3-phase harness jack	U-phase		
	V-phase		
	W-phase		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor inverter. Refer to [TMS-115](#), "[Removal and Installation](#)".



A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

ELECTROMAGNETIC SOUND IS AUDIBLE

< SYMPTOM DIAGNOSIS >

SYMPTOM DIAGNOSIS

ELECTROMAGNETIC SOUND IS AUDIBLE

DESCRIPTION

INFOID:000000006998455

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-33, "Protection Control"](#).

TRACTION MOTOR INVERTER

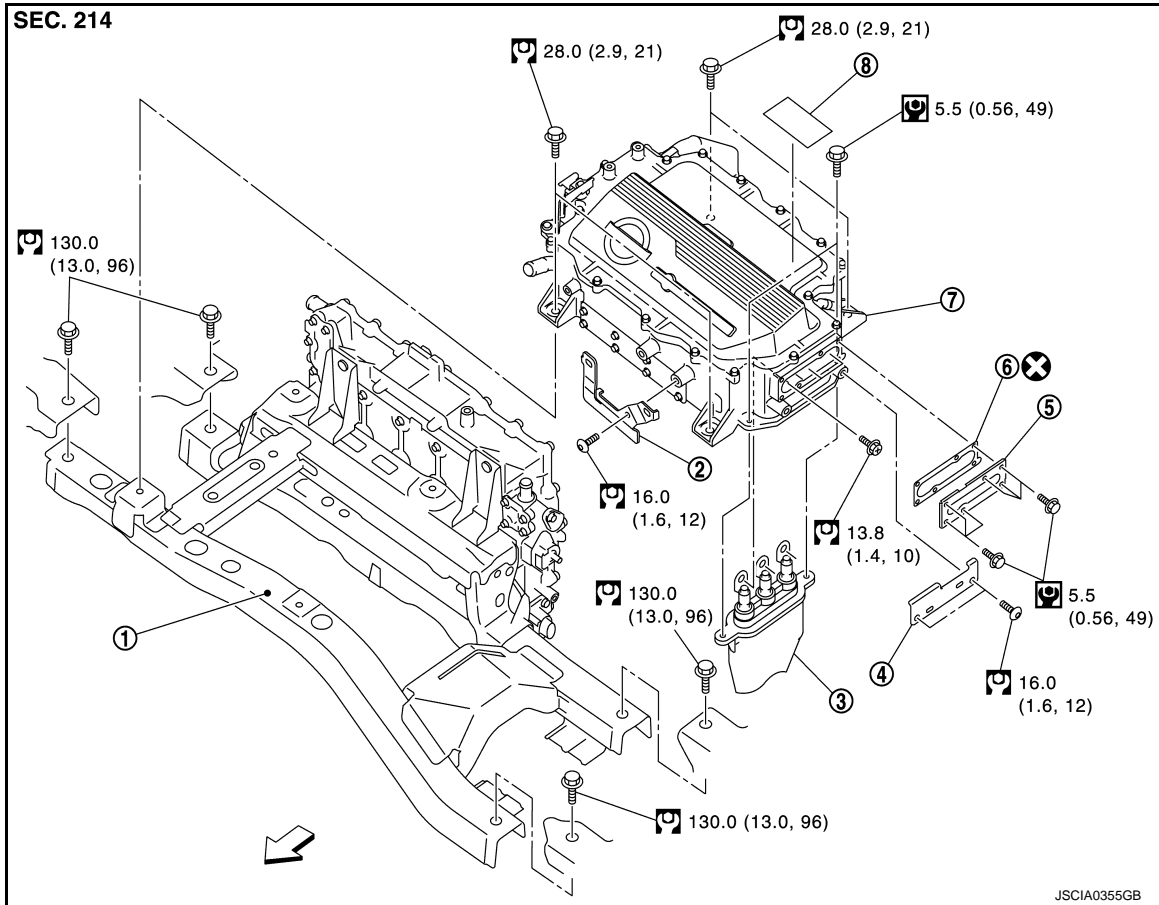
< REMOVAL AND INSTALLATION >

REMOVAL AND INSTALLATION

TRACTION MOTOR INVERTER

Exploded View

INFOID:000000006998456



- | | | |
|------------------------------|-------------------------------|--------------------|
| 1. Inverter member | 2. High voltage safety cover | 3. 3-phase harness |
| 4. High voltage safety cover | 5. 3-phase harness cover | 6. Gasket |
| 7. Traction motor inverter | 8. High voltage warning label | |

↔ : Vehicle front

⊗ : Always replace after every disassembly.

⊙ : N·m (kg-m, in-lb)

⊙ : N·m (kg-m, ft-lb)

Removal and Installation

INFOID:000000006998457

WARNING:

- Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.
- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.

TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

REMOVAL

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

1. Check voltage in high voltage circuit. (Check that condenser are discharged.)
 - a. Remove Li-ion battery under cover.

WARNING:



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



- b. Disconnect high voltage connector from front side of Li-ion battery.

DANGER:



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



- c. Measure voltage between high voltage harness terminals.

DANGER:



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

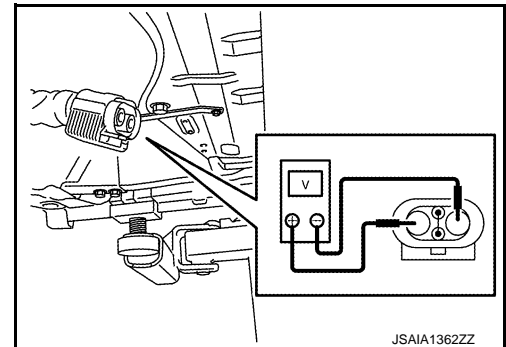


Standard

: 5 V or less

CAUTION:

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

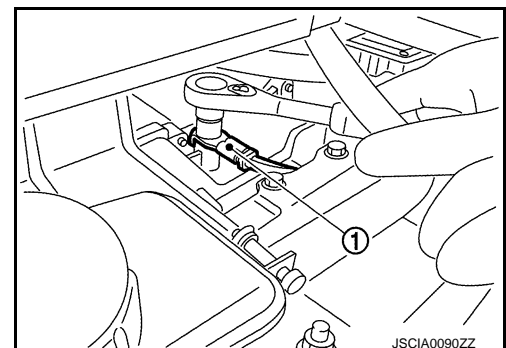


2. Remove front under cover. Refer to [EXT-21, "FRONT UNDER COVER : Exploded View"](#).
3. Drain coolant from radiator. Refer to [HCO-9, "Draining and Refilling"](#).
4. Remove 12V battery. Refer to [PG-104, "Removal and Installation"](#).
5. Move fuse box.
6. Remove ground cable from DC/DC-J/B.

WARNING:



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



TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

7. Remove motor room harness clip and water hose clip which are attached to traction motor inverter.

WARNING:

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



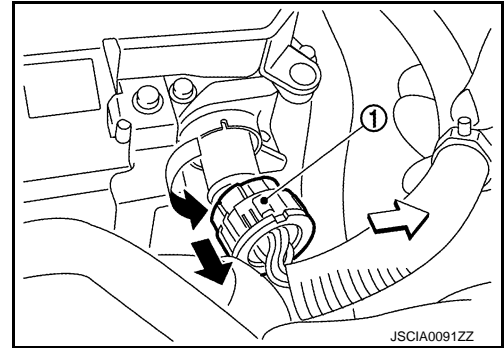
8. Turn traction motor inverter harness connector (1) of traction motor inverter counterclockwise to remove it.



: Vehicle front

WARNING:

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



9. Remove brake reservoir tank together with bracket, and move it in order to secure work space needed to remove traction motor inverter.

10. Remove degas tank, and move it in order to secure work space needed to remove traction motor inverter.

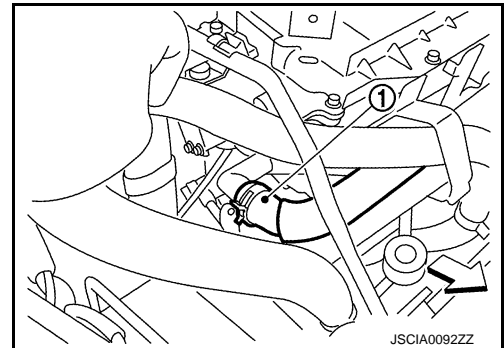
11. Disconnect water hose from OUT side of traction motor inverter.



: Vehicle front

WARNING:

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



CAUTION:

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

12. Disconnect water hose (1) at DC/DC-J/B OUT side.

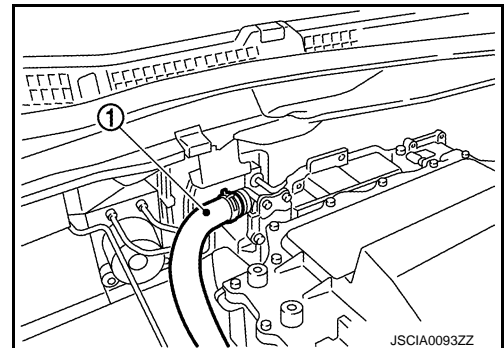
WARNING:

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



CAUTION:

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



A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P

TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

13. Remove torx bolts (A), and then remove high voltage safety cover (1).

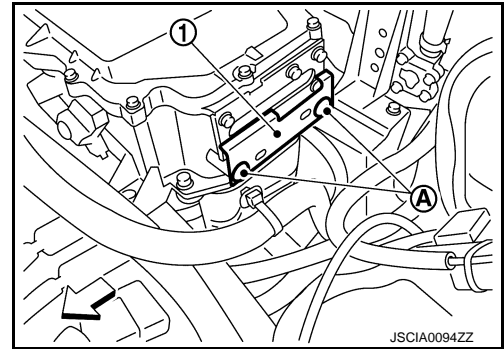


: Vehicle front

WARNING:



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



JSCIA0094ZZ

14. Remove 3-phase harness cover mounting bolts and remove 3-phase harness cover.

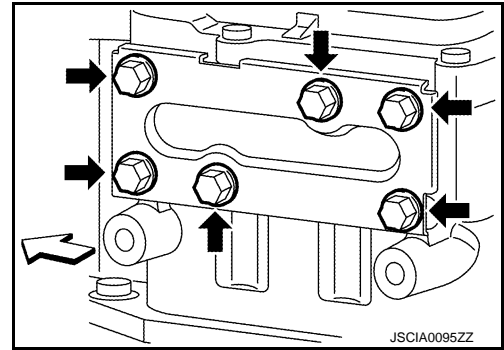


: Vehicle front

WARNING:



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



JSCIA0095ZZ

15. Remove 3-phase harness mounting bolts and remove 3-phase harness.

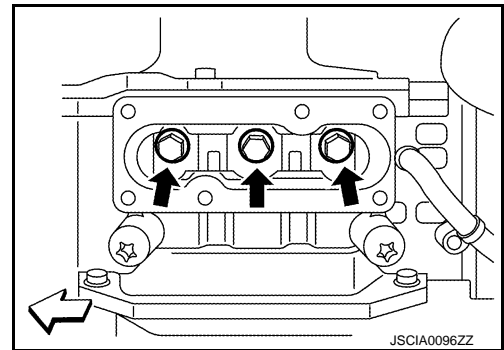


: Vehicle front

WARNING:



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



JSCIA0096ZZ

CAUTION:

- When removing 3-phase harness mounting bolts, take care not to drop them into traction motor inverter.
- Bolts cannot fall into the traction motor inverter until 3-phase harness is pulled downwards. Therefore if bolts look likely to fall, be sure to collect them with a magnet or other means before pulling 3-phase harness out downwards.
- If a bolt falls into traction motor inverter, do not invert traction motor inverter. (If inverted, bolt may contact PCB inside traction motor inverter, causing damage.)
- Incline so that 3-phase harness bolt insertion hole faces down in order to recover the fallen bolt.

16. Remove 3-phase harness grommet mounting bolts and pull 3-phase harness out downwards.

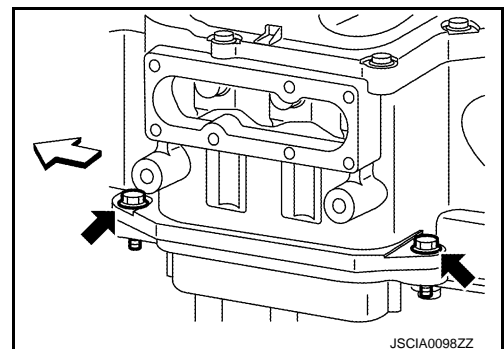


: Vehicle front

WARNING:



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



JSCIA0098ZZ

TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >




- Protect the terminals of disconnected high voltage harness connector with insulation tape so that they are not exposed.

17. Remove high voltage connector (3 step type) that is connected to DC/DC-J/B.



: Vehicle front

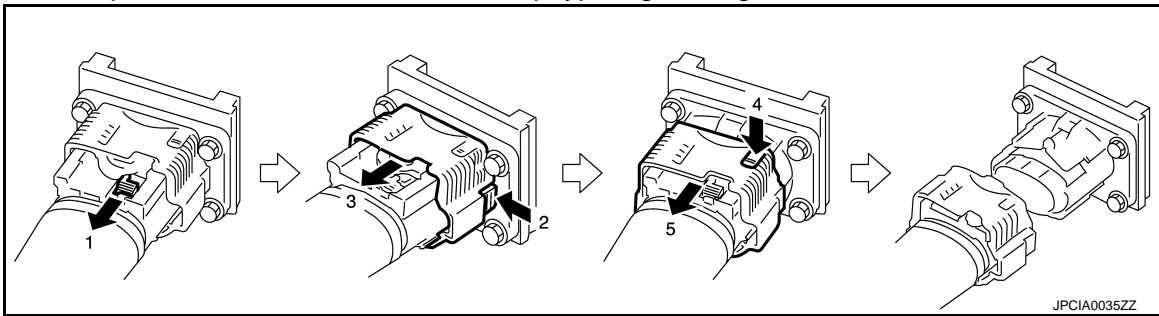
WARNING:

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



- Protect the terminals of disconnected high voltage harness connector with insulation tape so that they are not exposed.

- Follow steps shown below to remove a 3-step type high voltage connector.



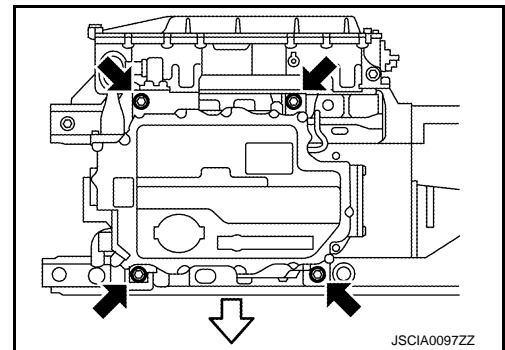
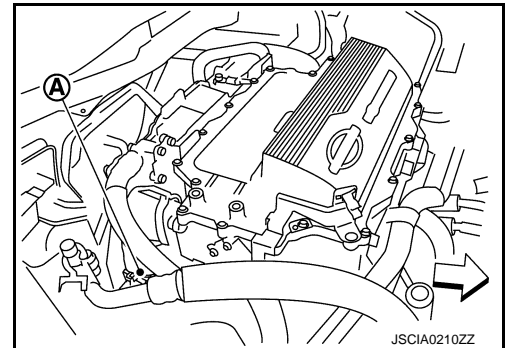
18. Remove traction motor inverter fastening bolts, then remove traction motor inverter.



: Vehicle front

WARNING:

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



CAUTION:

- When removing and transporting traction motor inverter, grasp part (A) shown in figure.

A

B

TMS

D

E

F

G

H

I

J

K

L

M

N

O

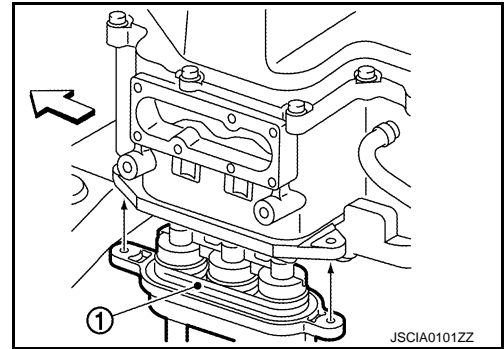
P

TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >

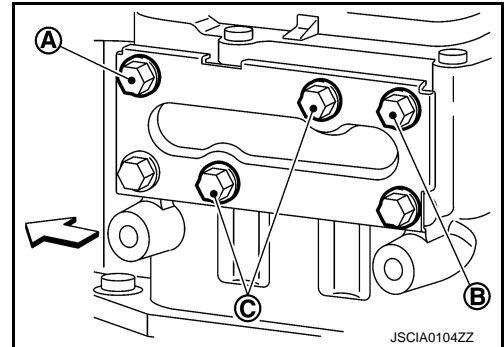
- When installing 3-phase harness, take care packing does not become displaced while inserting harness into inverter.

← : Vehicle front



- To tighten 3-phase harness cover bolt, temporarily tighten bolt (A) and (B) shown in the figure for positioning purpose before tightening two center bolts (C). After this, tighten four remaining bolts.

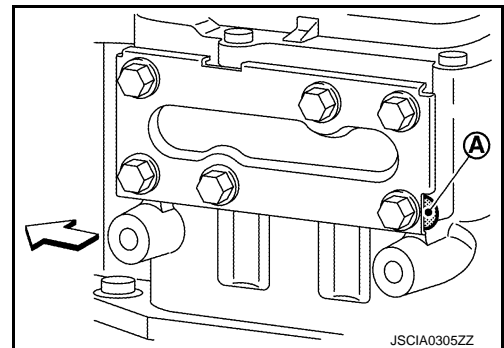
← : Vehicle front



CAUTION:

- To install, align gasket tab (A) as shown in the figure.
- Gasket of the 3-phase harness cover is not reusable. Be sure to replace it with a new part.

← : Vehicle front



- After all parts are installed, be sure to check equipotential. Refer to [TMS-121, "Inspection"](#).
- If traction motor inverter was replaced, perform resolver write. Refer to [TMS-43, "Work Procedure"](#).

Inspection

INFOID:000000006998458

INSPECTION AFTER INSTALLATION

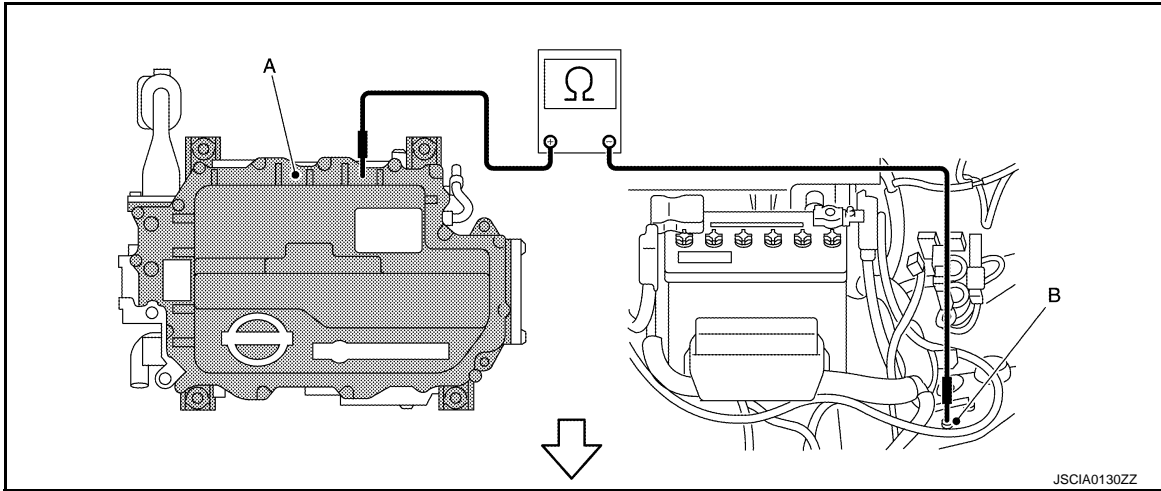
After installing traction motor inverter, measure resistance between traction motor inverter (A) and body (B), and check equipotential.

WARNING:

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

TRACTION MOTOR INVERTER

< REMOVAL AND INSTALLATION >



- A : Aluminum part on top of traction motor inverter
- B : Motor room ground bolt

Traction motor inverter – Ground : 0.1 Ω or less

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.

TRACTION MOTOR

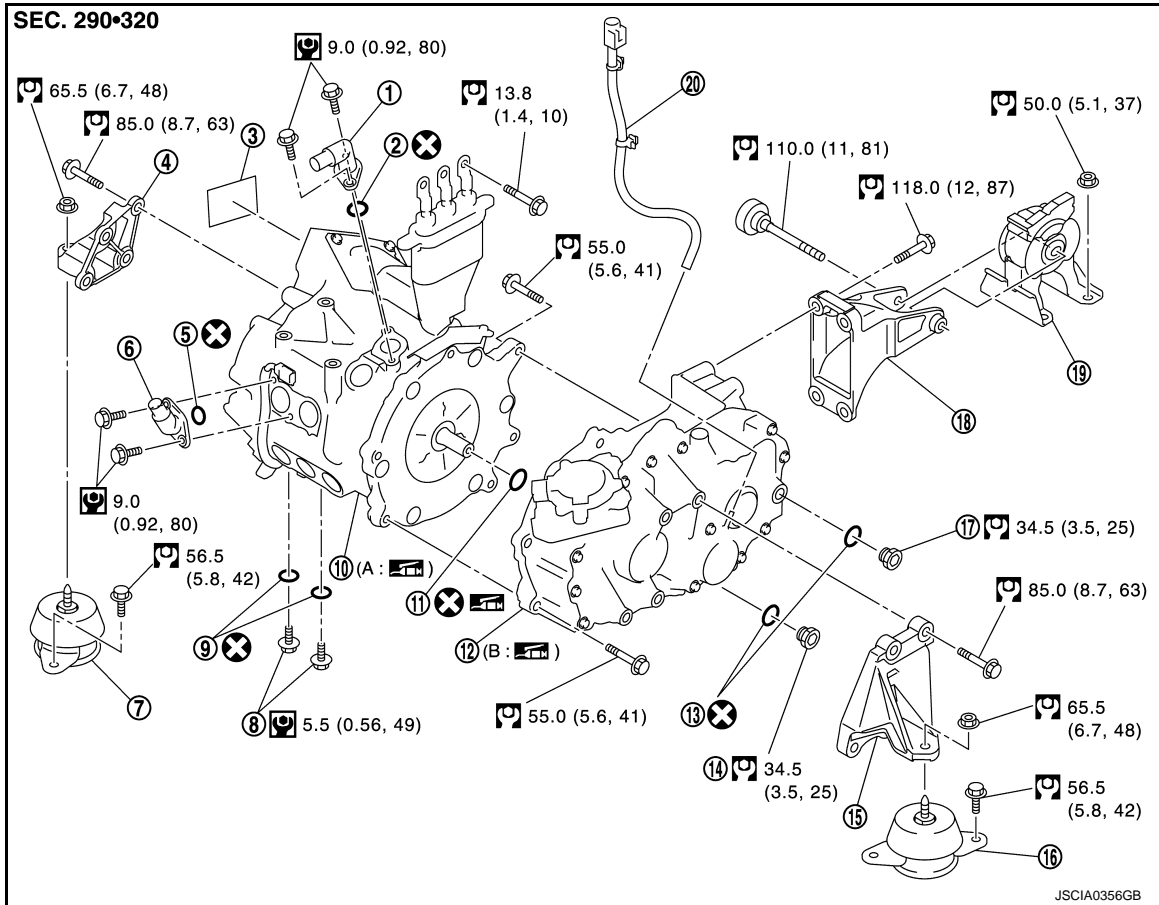
< UNIT REMOVAL AND INSTALLATION >

UNIT REMOVAL AND INSTALLATION

TRACTION MOTOR

Exploded View

INFOID:000000006998459



- | | | |
|------------------------------|---|---------------------------------|
| 1. Water outlet | 2. O-ring | 3. High voltage warning label |
| 4. Motor mounting RH bracket | 5. O-ring | 6. Water inlet |
| 7. Motor mounting RH | 8. Drain bolt | 9. Gasket |
| 10. Traction motor | 11. O-ring | 12. Reduction gear |
| 13. Gasket | 14. Drain plug | 15. Motor mounting LH bracket |
| 16. Motor mounting LH | 17. Filler plug | 18. Motor mounting rear bracket |
| 19. Motor mounting rear | 20. Breather hose | |
| 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:000000006998460

WARNING:

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

TRACTION MOTOR

< UNIT REMOVAL AND INSTALLATION >

- Be sure to remove the service plug in order to shut off the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.
- Be sure to put the removed service plug in your pocket and carry it with you so that another person does not accidentally connect it while work is in progress.
- Be sure to wear insulating protective equipment consisting of glove, shoes and glasses/face shield before beginning work on the high voltage system.
- Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.
- Refer to [GI-32, "High Voltage Precautions"](#).

CAUTION:

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

REMOVAL

WARNING:

Shut off high voltage circuit. Refer to [GI-31, "How to Cut Off High Voltage"](#).

1. Check voltage in high voltage circuit. (Check that condenser are discharged.)
 - a. Remove Li-ion battery under cover.

WARNING:



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



- b. Disconnect high voltage connector from front side of Li-ion battery.

DANGER:



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



- c. Measure voltage between high voltage harness terminals.

DANGER:



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

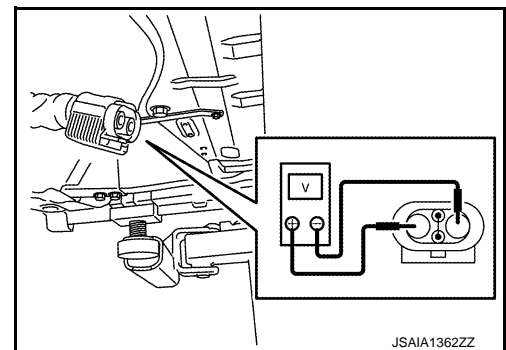


Standard

: 5 V or less

CAUTION:

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



2. Drain coolant. Refer to [HCO-9, "Draining and Refilling"](#).

TRACTION MOTOR

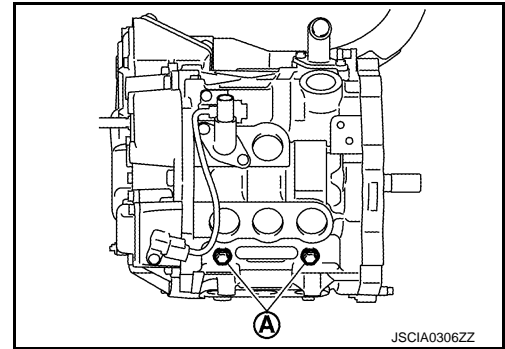
< UNIT REMOVAL AND INSTALLATION >

- Remove drain bolt (A) of traction motor to drain coolant.

WARNING:



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

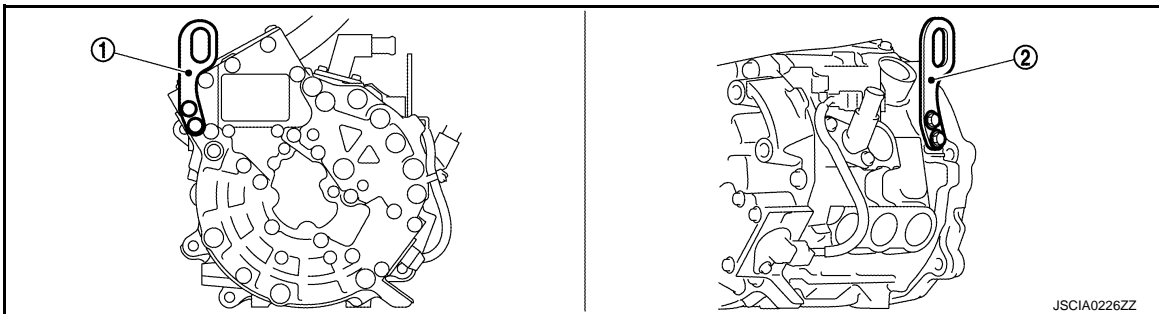


- Remove traction motor inverter. Refer to [TMS-115, "Removal and Installation"](#).
- Drain reduction gear oil. Refer to [TM-11, "Draining and Refilling"](#).
- Remove traction motor and reduction gear from vehicle together as suspension member assembly. Refer to [FSU-21, "Removal and Installation"](#).
- Remove reduction gear from suspension member. Refer to [TM-17, "Removal and Installation"](#).
- Attach slinger to traction motor, and prepare to lift up with hoist.

WARNING:



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



- 1 : Motor slinger (rear)
- 2 : Motor slinger (front)

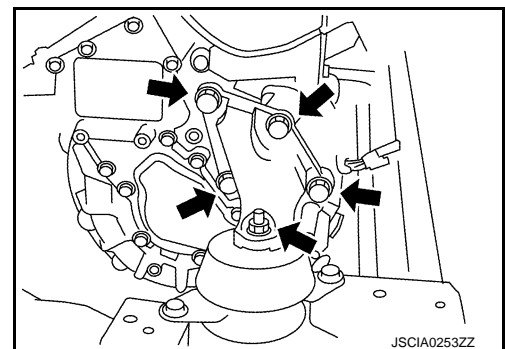
Tightening torque for mounting bolts : 28.0 N-m (2.9 kg-m, 21ft-lb)

- Remove right motor mounting bolt, then lift up traction motor with hoist and separate it from suspension member.

WARNING:



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



INSTALLATION

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

WARNING:

TRACTION MOTOR

< UNIT REMOVAL AND INSTALLATION >

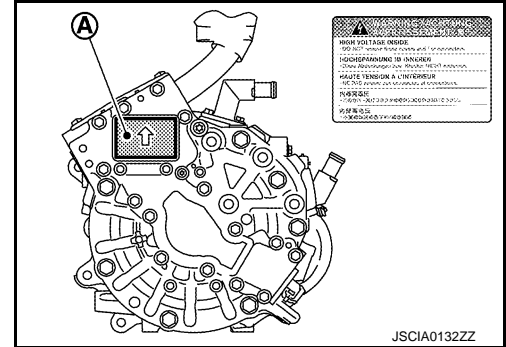


To prevent shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

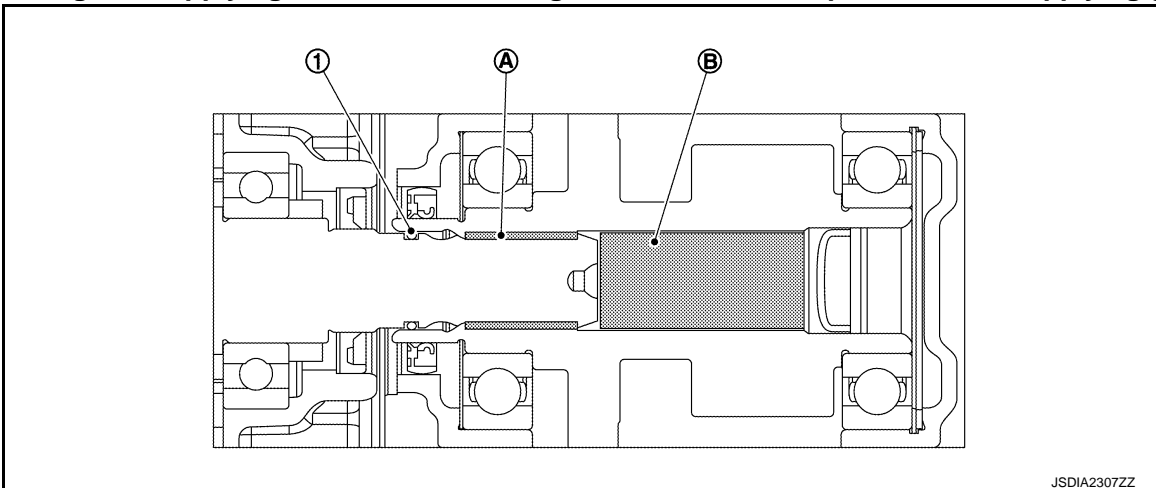
- Be sure to reinstall high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.
- Be sure to perform correct air bleeding after adding coolant. Refer to [HCO-9, "Draining and Refilling"](#).
- If traction motor was replaced, perform resolver correction value learning. Refer to [TMS-43, "Work Procedure"](#).
- If traction motor was replaced, apply high voltage warning label at position (A), with the top facing in the direction of the arrow.



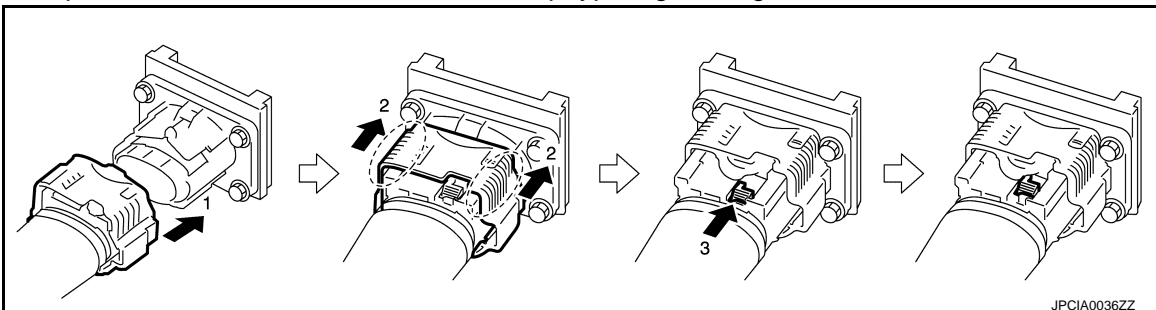
- Before installing reduction gear and traction motor, apply grease to full periphery of shaft spline (A), and also inject grease [minimum 8.5 g (0.3 oz), maximum less than 20 g (0.7 oz)] into reduction gear input shaft (inside spline) (B). Take care to prevent damage to O-ring (1) when installing.

CAUTION:

Clean the grease applying area to remove old grease and abrasion powder before applying grease.



- Follow the procedure below and connect the 3-step type high voltage harness connector.



- When all parts are installed, be sure to check equipotential of traction motor, electric compressor, and traction motor inverter.
 - Traction motor: Refer to [TMS-127, "Inspection"](#).

TRACTION MOTOR

< UNIT REMOVAL AND INSTALLATION >

- Electric compressor: Refer to [HA-49, "Inspection"](#).
- Traction motor inverter: Refer to [TMS-121, "Inspection"](#).

Inspection

INFOID:000000006998461

INSPECTION AFTER INSTALLATION

After installing traction motor, measure resistance between traction motor (aluminum part) and body (ground bolt), and check equipotential.

WARNING:

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



Traction motor – Ground : 0.1 Ω or less

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.

A
B
TMS
D
E
F
G
H
I
J
K
L
M
N
O
P