SECTION TMS
TRACTION MOTOR SYSTEM

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PRECAUTION

PRECAUTIONS

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

INFOID:0000000014630814

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. Information necessary to service the system safely is included in the SR and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SR section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

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

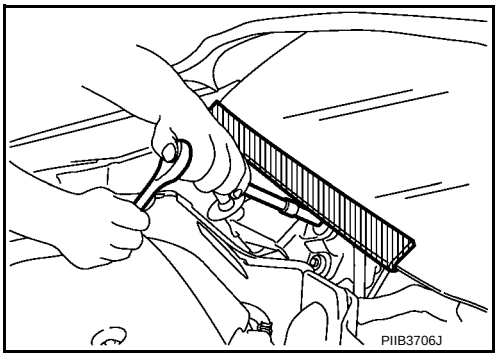
WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the Ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the Ignition OFF, disconnect the battery or batteries, and wait at least three minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000014630815

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



High Voltage Precautions

INFOID:0000000014630816

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulated protective equipment before beginning work on the high voltage system.**

- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**

CAUTION:

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

HIGH VOLTAGE HARNESS AND EQUIPMENT IDENTIFICATION

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

HANDLING OF HIGH VOLTAGE HARNESS AND TERMINALS

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

REGULATIONS ON WORKERS WITH MEDICAL ELECTRONICS

WARNING:

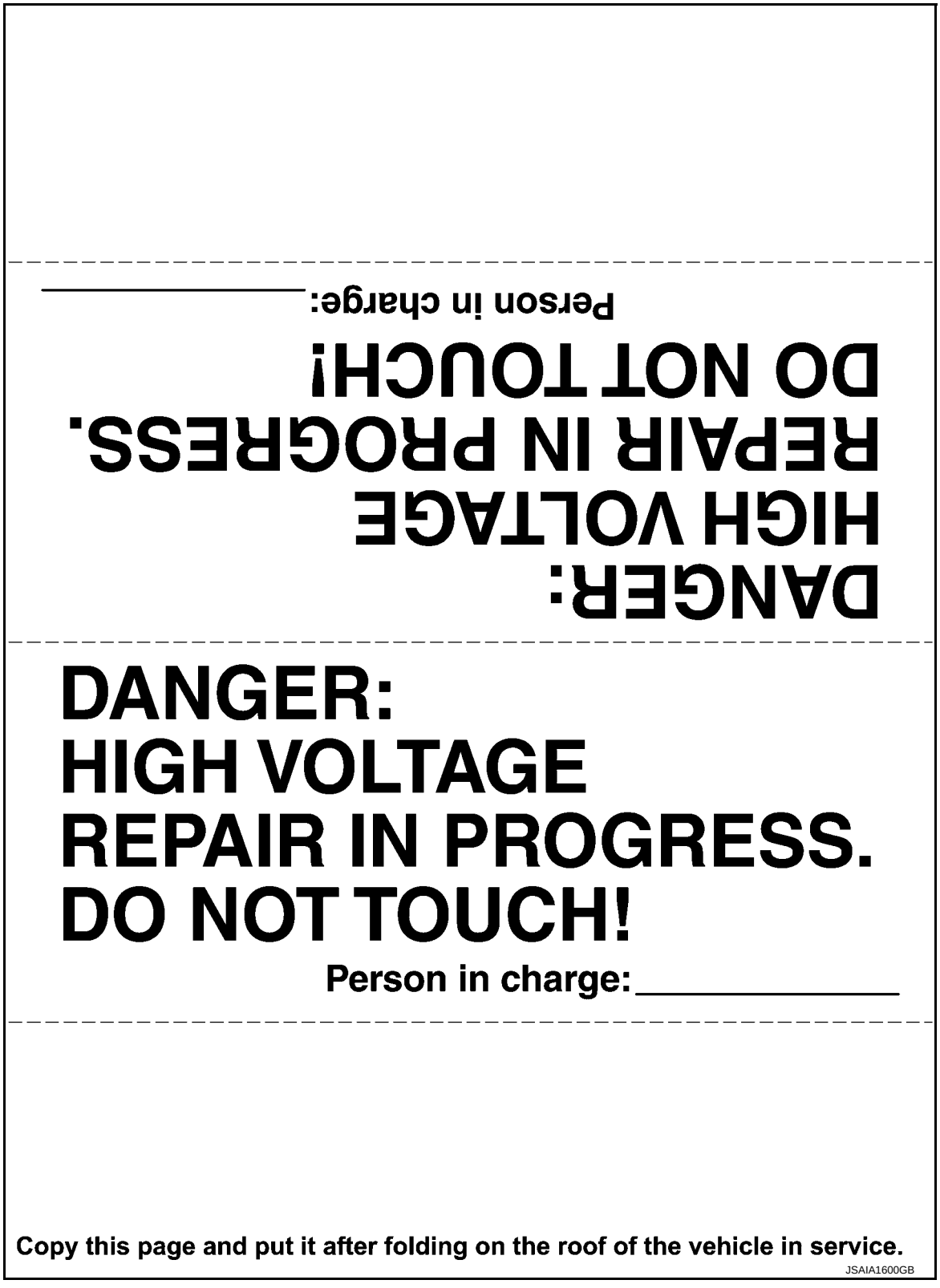
The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

PROHIBITED ITEMS TO CARRY DURING THE WORK

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

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

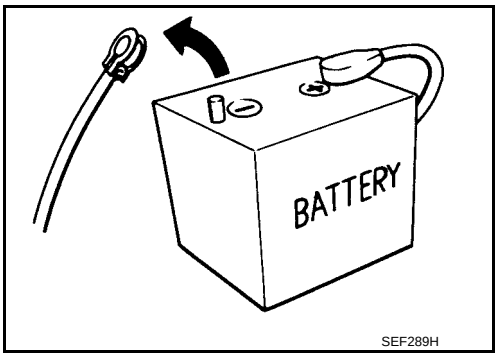
To call the attention of other workers, indicate "High voltage work in progress. Do not touch!" on vehicles where work is being performed on the high voltage systems.



Precautions for Removing Battery Terminal

INFOID:0000000014630817

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 5 minutes.
  NOTE:
  ECU may be active for several minutes after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- Disconnect 12V battery terminal according to the following steps.



WORK PROCEDURE

1. Turn the ignition switch OFF → ON → OFF. Get out of the vehicle. Close all doors (including trunk lid or back door).
2. Wait for 5 minutes or more.
   NOTE:
   If the battery is removed within 5 minutes after the ignition switch is turned OFF, plural DTCs may be detected.
3. Remove 12V battery terminal.

- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

Precautions Concerning On-board Servicing of Hybrid Systems

INFOID:0000000014630818

CAUTION:
Be sure to turn the ignition switch OFF before performing inspection and servicing inside the engine compartment or underneath the vehicle. If the ignition switch is ON (vehicle READY state), even if the engine is stopped, the conditions of the vehicle may cause the engine to start automatically.
If it is necessary to continually operate the engine during inspection or servicing, use the designated inspection mode. Refer to HBC-113, "Description".

General Precautions

INFOID:0000000014630819

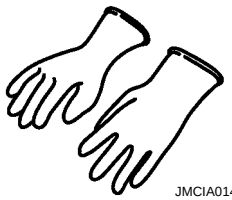
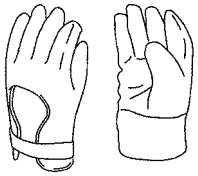
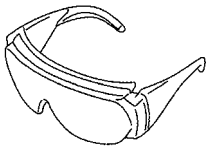
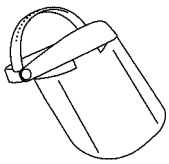
Take care when handling the traction motor inverter so that dust, dirt, and other substances do not enter into the inside from the opening.

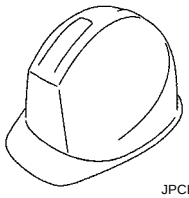
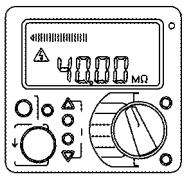
PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000014630820

Tool name		Description
Insulated gloves	 JMCIA0149ZZ	Removing and installing high voltage components [Guaranteed insulation performance for 1000V/300A]
Leather gloves	 JPCIA0066ZZ	• Removing and installing high voltage-components • Protect insulated gloves [Use leather gloves that can fasten the wrist tight]
Insulated safety shoes	 JPCIA0011ZZ	Removing and installing high voltage components
Safety glasses	 JPCIA0012ZZ	• Removing and installing high voltage components • To protect eye from the spatter on the work to electric line [ANSI Z87.1]
Face shield	 JPCIA0167ZZ	• Removing and installing high voltage components • To protect eyes and face from the spatter on the work to electric line

Tool name		Description
Insulated helmet	 JPCIA0013ZZ	Removing and installing high voltage components
Insulation resistance tester (Multi tester)	 JPCIA0014ZZ	Measuring voltage and insulation resistance

SYSTEM DESCRIPTION

DESCRIPTION

Description

INFOID:0000000014909994

- 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)

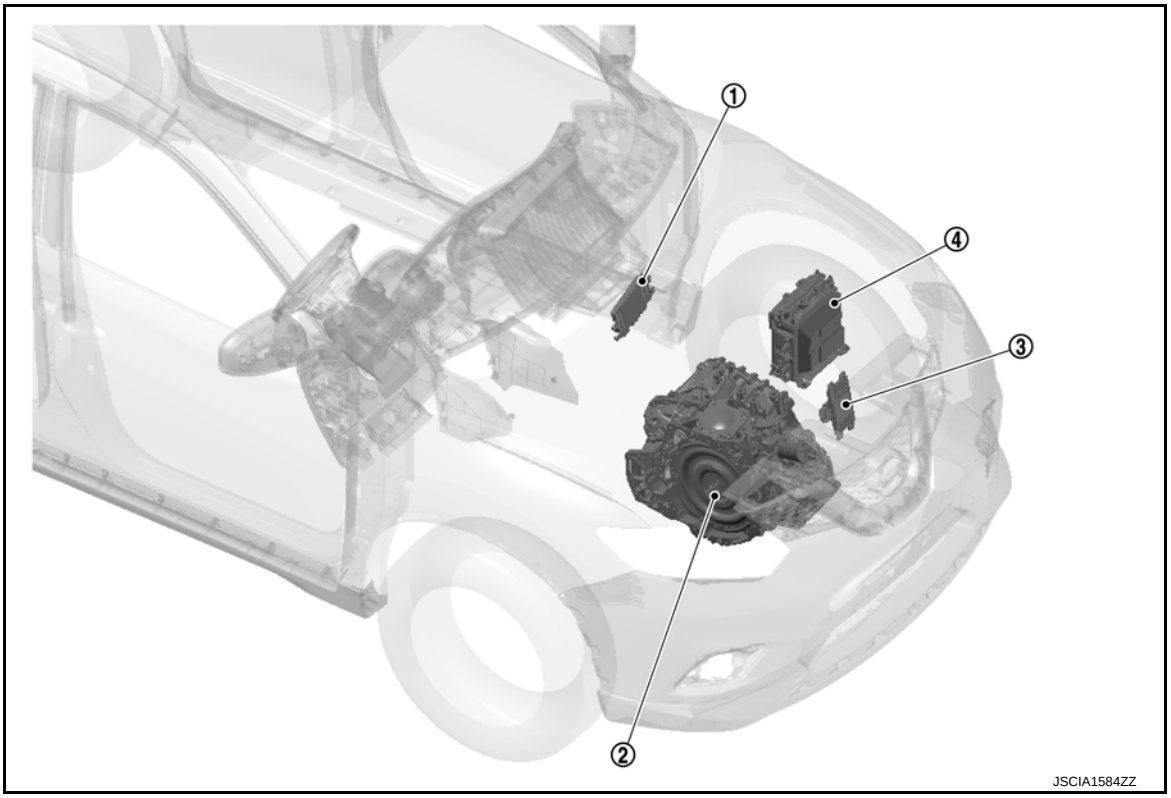
INFOID:0000000014909995

Moter type	RM31
Max torque	160 Nm (16 kg-m)
Max output	30 kW (41 PS)
Max speed	6,400 rpm
Cooling system	Water cooling type

COMPONENT PARTS

Component Parts Location

INFOID:0000000014909996



No.	Component	Function
①	HPCM	Transmits mainly the following signals to HPCM via HEV system CAN. • Malfunction indicator lamp signal • Motor output torque signal • Motor speed signal • Motor torque limit signal • Traction motor inverter voltage signal Receives mainly the following signal from HPCM via HEV system CAN. • Drive command signal • Target motor torque signal • Target motor speed signal Refer to HBC-12, "Component Parts Location" for detailed installation location.
②	Traction motor (This is included in transaxle)	TMS-12, "Traction Motor"
③	TCM	Transmits mainly the following signals to TCM via HEV system CAN. • Motor resolver offset request signal Receives mainly the following signal from TCM via HEV system CAN. • Output shaft revolution signal Refer to TM-15, "CVT CONTROL SYSTEM : Component Parts Location" for detailed installation location.
④	Traction motor inverter	TMS-11, "Traction Motor Inverter"

Traction Motor Inverter

INFOID:0000000014909997

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

- The traction motor inverter is composed of the motor controller, driver, smoothing condenser, current sensors, interlock connector, discharge resister, and power module.
- The traction motor inverter controls the traction motor based on the drive command signal transmitted by HEV system CAN from the HPCM.
- Traction motor inverter drives traction motor accurately based on resolver detection signal and current sensor detection signal.
- The traction motor inverter performs charging judgment for the high voltage circuit and also discharges the voltage inside the circuit.
- Traction motor inverter operates speed control according to command from HPCM. This control absorbs instantaneously the speed difference between engine and transaxle, and it allows driving with reduced shocks.
- The traction motor inverter performs vibration control in order to improve accelerator response and provide good acceleration while driving.

MOTOR CONTROLLER

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

DRIVER

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

POWER MODULE

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

SMOOTHING CONDENSER

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

CURRENT SENSORS

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

INTERLOCK CONNECTOR

The interlock connector is installed to the back of high voltage cover and detects the status of opening/closing of the high voltage cover.
The opening/closing status is detected by HPCM along with interlock connector.

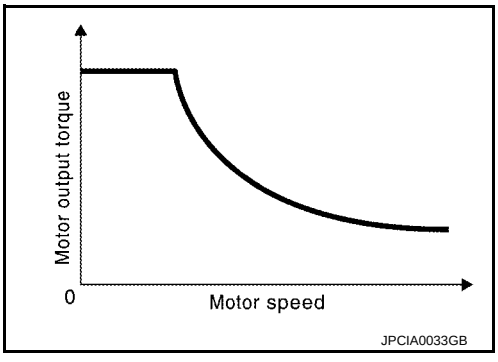
DISCHARGE RESISTER

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:0000000014909998

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



TRACTION MOTOR RESOLVER

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

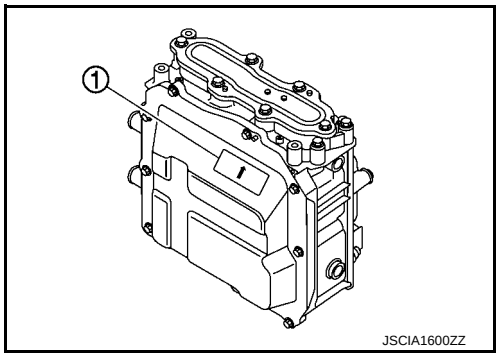
High Voltage Warning Label

INFOID:0000000014909999

- High voltage warning label is affixed to upper surface ① of traction motor inverter.

  ⬅ : The direction of high voltage warning label

- Always affix the label to the original position when replacing a part.

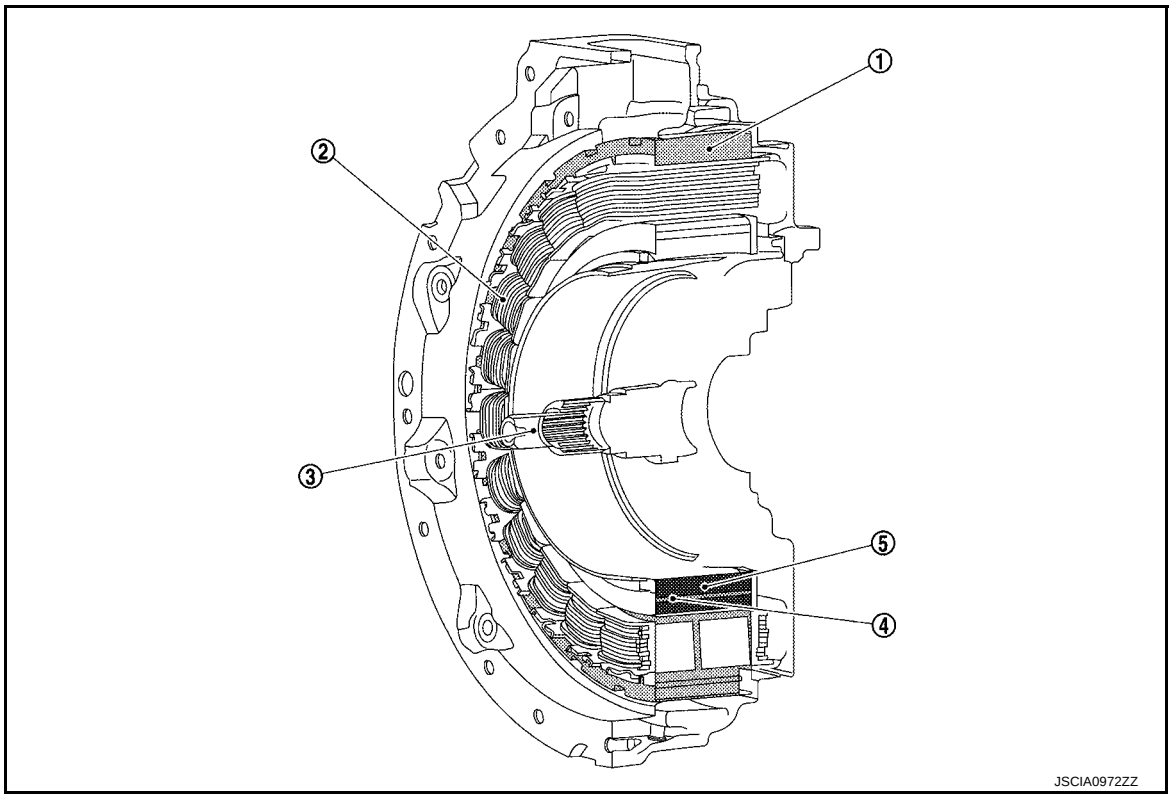


STRUCTURE AND OPERATION

Structural Drawing

INFOID:0000000014910000

MOTOR MECHANISM (DIAGRAM)

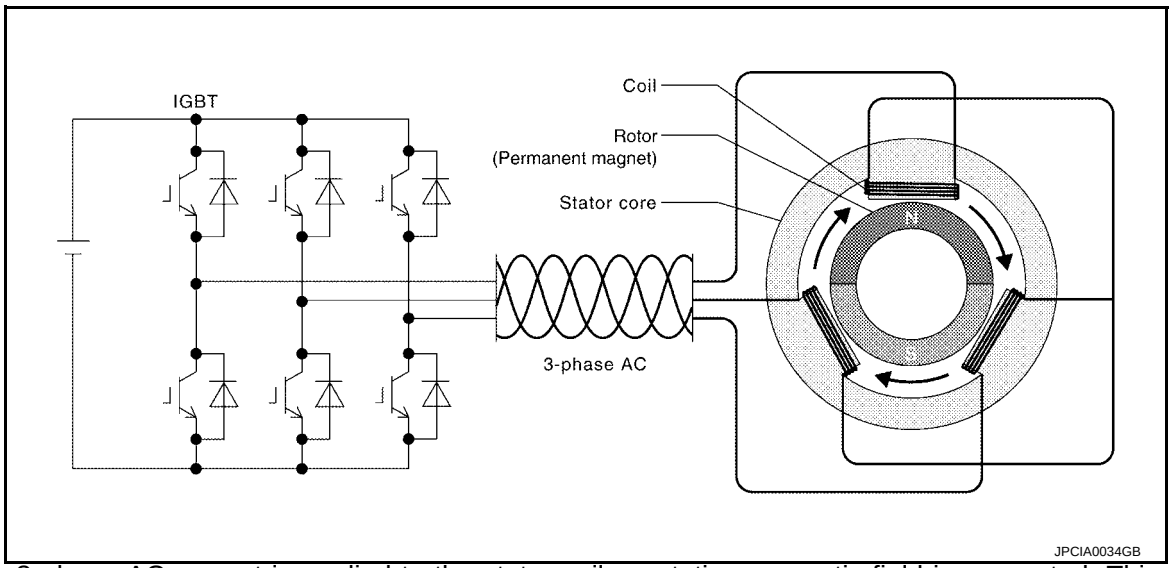


① Stator core ② Coil ③ Shaft
④ Permanent magnet ⑤ Rotor core

Opration Description

INFOID:0000000014910001

OPERATION PRINCIPLE



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

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

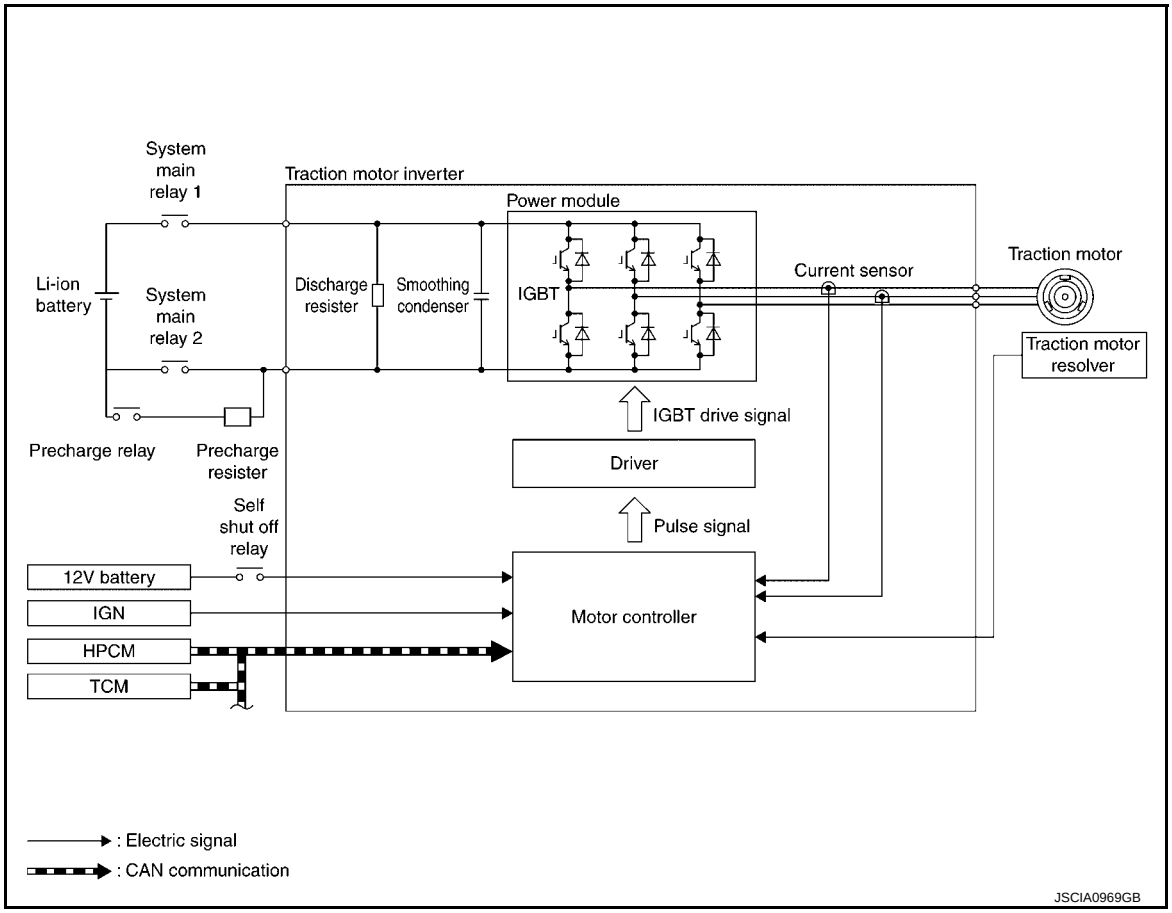
- In order to generate optimal rotor rotation, judgments regarding the position (angle) of the permanent magnet within the rotor core and the timing of current application to the coil are necessary. For this purpose, the traction motor resolver and current sensor are used in order to continually detect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

SYSTEM
TRACTION MOTOR INVERTER
TRACTION MOTOR INVERTER : System Description

INFOID:0000000014910002

- The traction motor inverter controls the traction motor based on the drive command signal transmitted by HEV system CAN from the HPCM.
- Traction motor inverter converts DC power from Li-ion battery to AC power, and drives traction motor accurately based on resolver detection signal and current sensor detection signal.
- At deceleration, traction motor is used as generator. It converts kinetic energy generated by rotary motion of tires (AC power) to electric energy (DC power) and charges Li-ion battery.
- If malfunction is detected, the system enters fail-safe mode. Refer to TMS-36, "Fail-Safe".

SYSTEM DIAGRAM

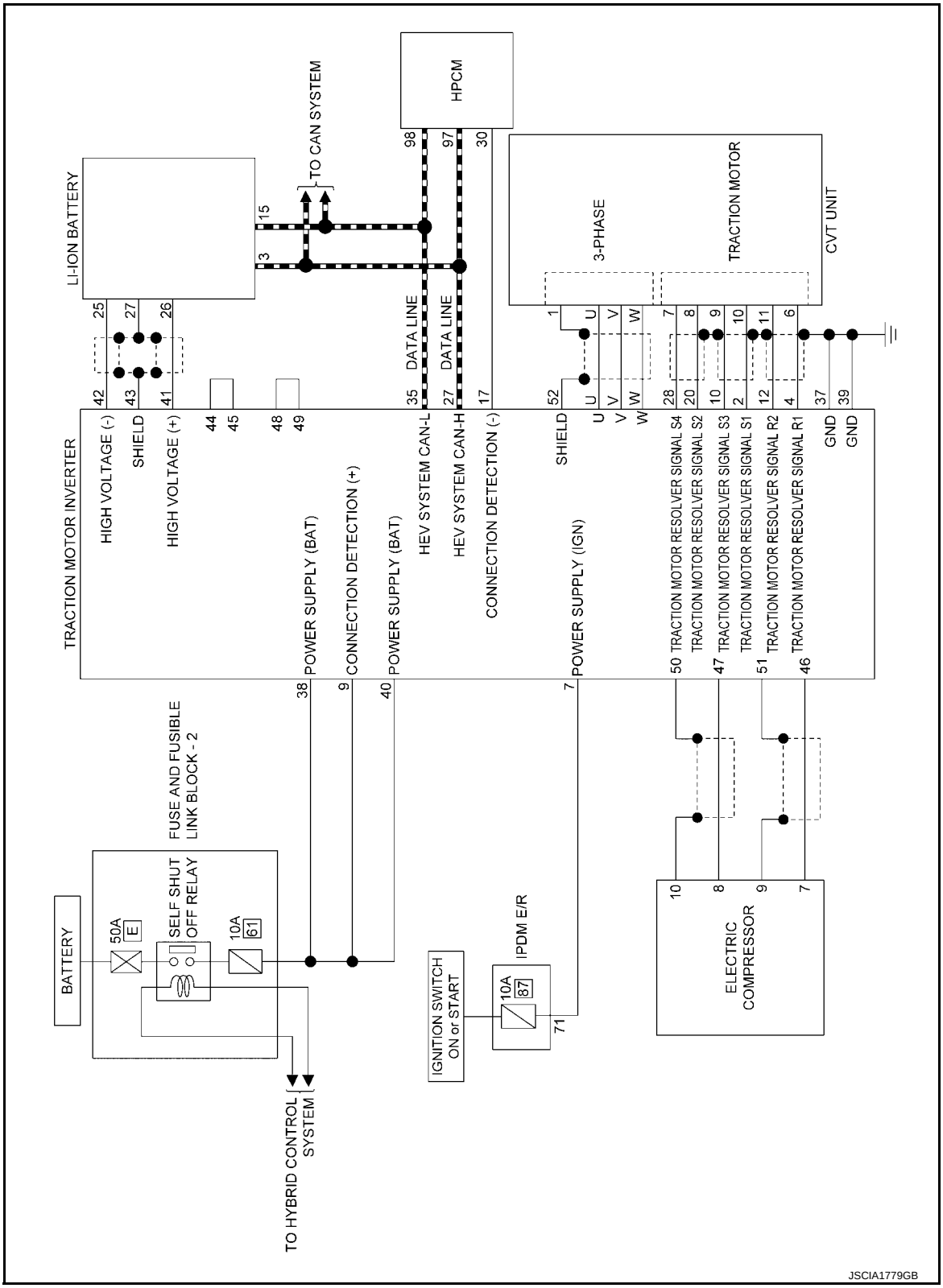


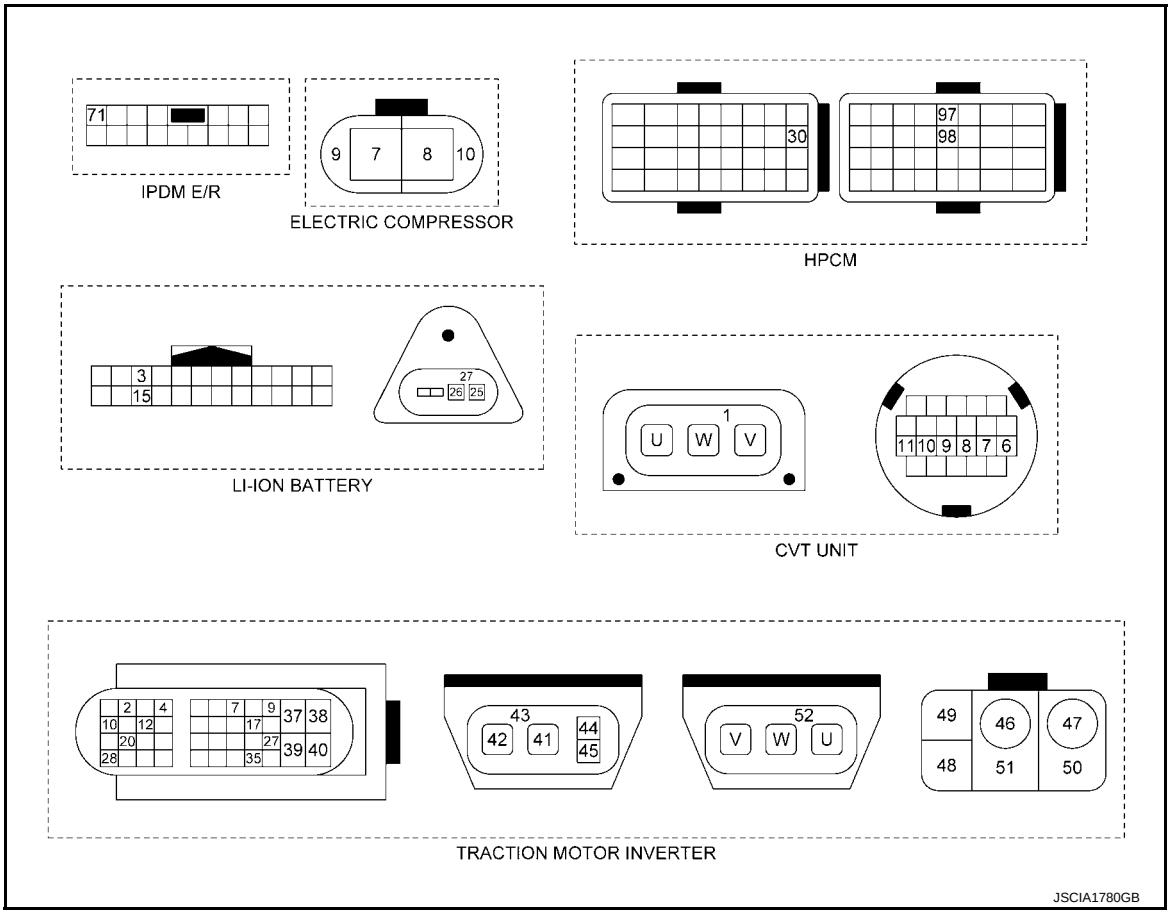
INPUT/OUTPUT SIGNAL

Item	Signal name
HPCM	Transmits mainly the following signals to HPCM via HEV system CAN. • Malfunction indicator lamp signal • Motor output torque signal • Motor speed signal • Motor torque limit signal • Traction motor inverter voltage signal Receives mainly the following signal from HPCM via HEV system CAN. • Drive command signal • Target motor torque signal • Target motor speed signal
TCM	Transmits mainly the following signals to TCM via HEV system CAN. • Motor resolver offset request signal Receives mainly the following signal from TCM via HEV system CAN. • Output shaft revolution signal

TRACTION MOTOR INVERTER : Circuit Diagram

INFOID:0000000014910003





TRACTION MOTOR INVERTER : Fail-Safe

INFOID:0000000014910004

DTC	Vehicle behavior
P0A01	Not changed from normal driving
P0A1B	Either of following status is observed • Stops drive control of traction motor, and requires system main relay OFF to HPCM • Stops drive control of traction motor
P0A3F	Stops drive control of traction motor
P0A41	Stops drive control of traction motor
P0A8D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0AED	Not changed from normal driving
P0BE9	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BEA	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BED	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BEE	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0C05	Stops drive control of traction motor
P0C19	Stops drive control of traction motor
P0C79	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P31A5	Either of following status is observed • Stops drive control of traction motor • Not changed from normal driving
P31A6	Not changed from normal driving

DTC	Vehicle behavior
P31A8	Either of following status is observed • Stops drive control of traction motor, and requires system main relay OFF to HPCM • Stops drive control of traction motor
P31A9	Stops drive control of traction motor
P323F	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3243	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3244	Not changed from normal driving
P3245	Not changed from normal driving
P3246	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324A	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3266	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3267	Not changed from normal driving
P3268	Stops drive control of traction motor
P3269	Stops drive control of traction motor
P326C	Either of following status is observed • Stops drive control of traction motor • Not changed from normal driving
P326D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
U0100	Not changed from normal driving
U0101	Stops drive control of traction motor
U0111	Stops drive control of traction motor
U0293	Either of following status is observed • Stops drive control of traction motor • Not changed from normal driving
U1000	Stops drive control of traction motor
U1321	Not changed from normal driving
U150E	Not changed from normal driving
U1513	Not changed from normal driving
U1920	Not changed from normal driving
U1921	Not changed from normal driving
U1922	Not changed from normal driving
U300A	Not changed from normal driving

TRACTION MOTOR INVERTER : Protection Control

INFOID:0000000014910005

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

Condition	Control	Normal return condition
Traction motor is overheated	Traction motor output torque is limited according to the traction motor temperature.	Traction motor temperature drops
Smoothing condensre is overheated	Traction motor output torque is limited according to the smoothing condenser temperature.	Smoothing condenser temperature drops

MOTOR POWER CONTROL

MOTOR POWER CONTROL : System Description

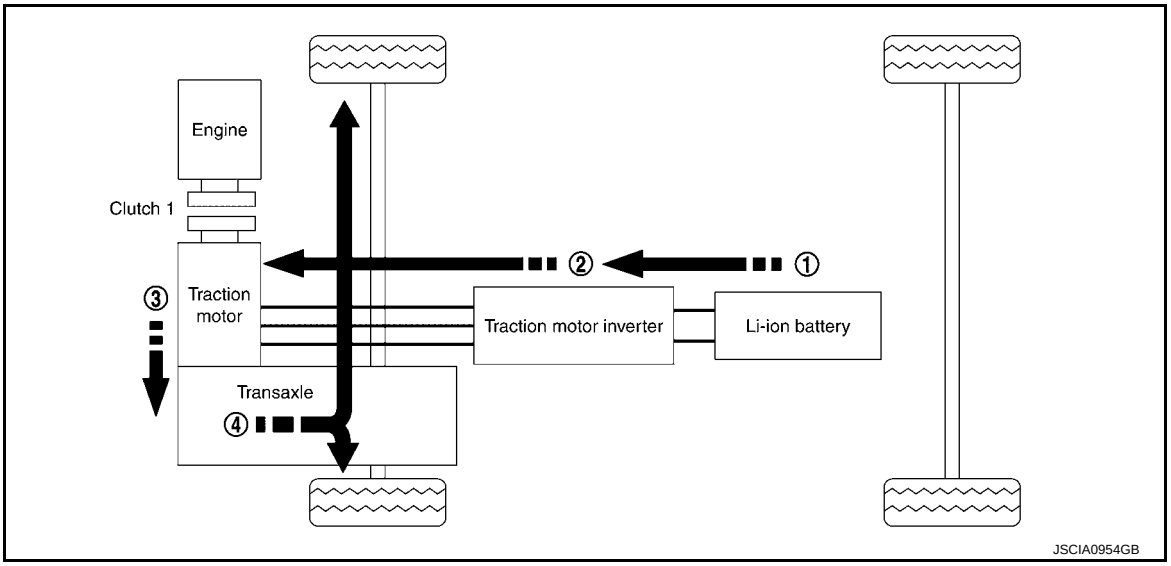
INFOID:0000000014910006

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

MOTOR POWER CONTROL : Operating Principle

INFOID:0000000014910007

FLOW OF ENERGY (DRIVE BY MOTOR)



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

MOTOR REGENERATION CONTROL

MOTOR REGENERATION CONTROL : System Description

INFOID:0000000014910008

REGENERATIVE BRAKE ELECTRIC GENERATION

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

ENGINE ELECTRIC GENERATION

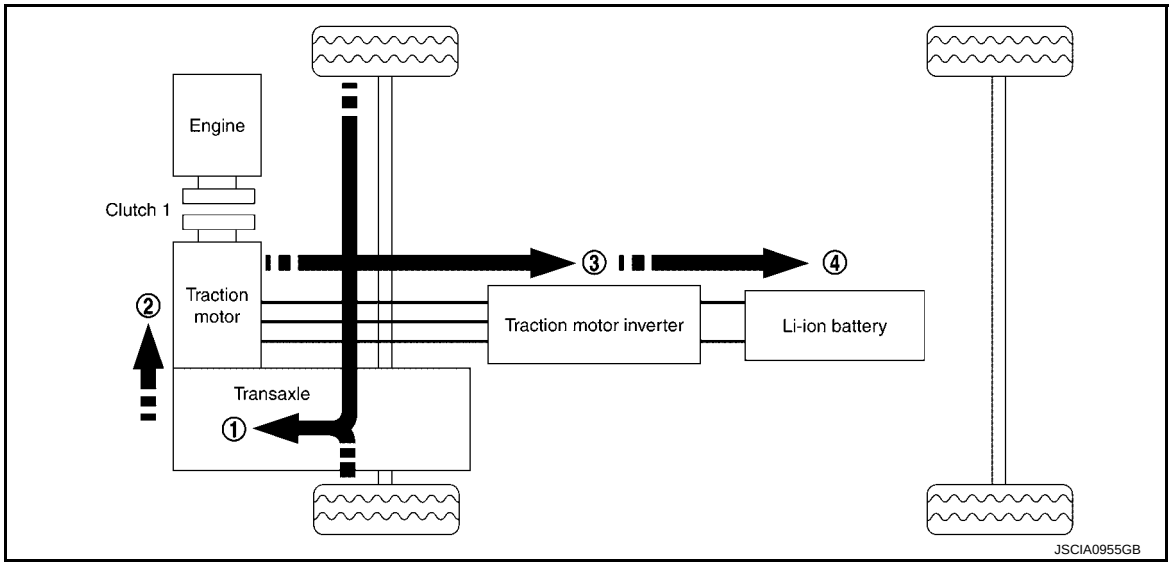
While the vehicle is driven by traction force from engine, traction motor inverter converts the engine drive force into electric energy. Converted electric energy is charged into Li-ion battery.

MOTOR REGENERATION CONTROL : Operating Principle

INFOID:0000000014910009

REGENERATIVE BRAKE ELECTRIC GENERATION

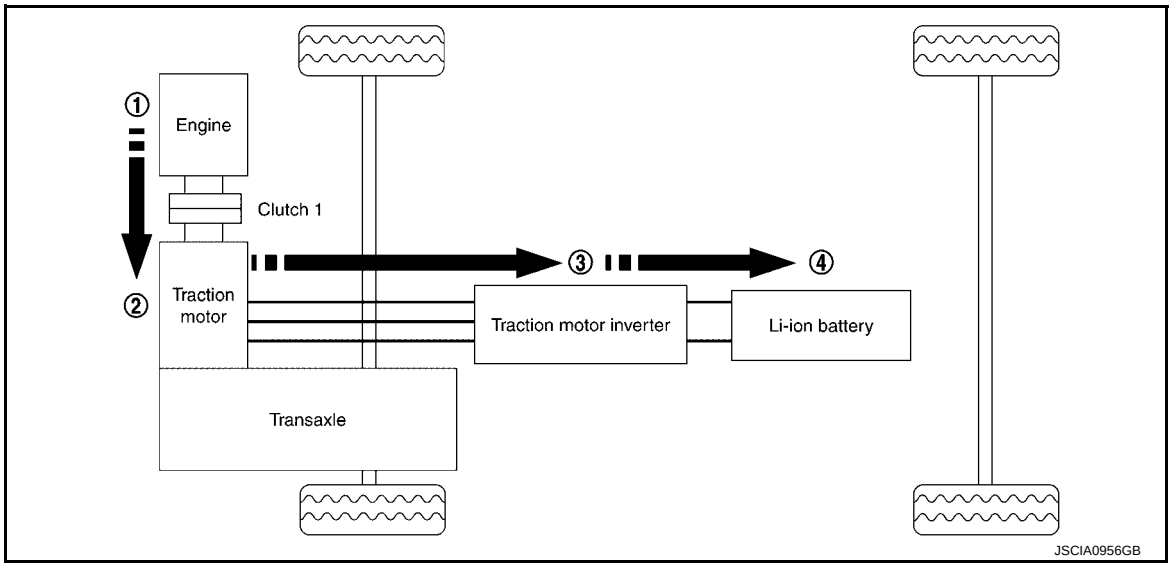
Flow of Energy



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

ENGINE ELECTRIC GENERATION

Flow of Energy



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

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000014910010

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

GST (Generic Scan Tool)

INFOID:0000000014910011

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-62, "Description".

NOTE:

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

DIAGNOSIS SYSTEM (TRACTION MOTOR INVERTER)

DIAGNOSIS DESCRIPTION

DIAGNOSIS DESCRIPTION : System Description

INFOID:0000000014910012

- This is an on-board trouble diagnosis system which automatically detects malfunction. Detected malfunction is memorized in control module as DTC. Diagnosis information can be confirmed using CONSULT.
- When malfunction is detected, traction motor inverter memorizes DTC and freeze frame data. In these diagnoses, some illuminate MIL and some do not. Refer to TMS-38, "DTC Index".

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000014910013

- DTC (P0A01, P0BE9, U0293, etc.) is specified by SAE J2012/ISO 15031-6.
- Traction motor inverter memorizes DTC and freeze frame data when malfunction is detected.
- Traction motor inverter can memorize plural DTCs but only 1 set of freeze frame data.
- The procedure to erase DTC from traction motor inverter memory is described in “How to Erase DTC”. Refer to TMS-25, "CONSULT Function".

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000014910014

- DTC and freeze frame data are displayed until 40 trips of “Driving Pattern A” are satisfied without detecting the same malfunction. DTC and freeze frame data are erased when 40 trips are satisfied.
- The illuminated MIL can be turned off by driving 3 trips with “Driving Pattern B” under condition that the concerned DTC is not detected (malfunction is absent).
- For driving pattern, refer to TMS-24, "DIAGNOSIS DESCRIPTION : Driving Pattern".

COUNTER SYSTEM LIST

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

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000014910015

DESCRIPTION

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

DRIVING PATTERN A

Driving pattern A is the driving pattern that provides warm-up.
In specific, count-up is performed when all of the following conditions are satisfied.

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (32°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:

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

DRIVING PATTERN B

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

- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.

- After experiencing the closed loop control with the hybrid system started (READY or engine started), vehicle speed of 4 km/h (2 MPH) or less and the status without stepping on the accelerator pedal are maintained for 12 seconds or more.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- The status with the hybrid system started (READY or engine started) is maintained for 22 minutes or more.
- The ignition switch is turned from ON to OFF.

NOTE:

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

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000014910016

When traction motor inverter detects a DTC which affects exhaust gas, it transmits malfunction indicator lamp (MIL) signal to HPCM via CAN communication.
For malfunction indicator lamp (MIL) description, refer to EC-77, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".

CONSULT Function

INFOID:0000000014910017

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.
Configuration	Function to READ/WRITE vehicle configuration.
ECU Identification	Display the ECU identification number (part number etc.) of the selected system.

WORK SUPPORT

Item	Description
RESOLVER OFFSET	Initializes offset values of traction motor resolver.

SELF DIAGNOSTIC RESULTS

Display Item List
Refer to TMS-38, "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.

How to Erase DTC

NOTE:

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

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

FREEZE FRAME DATA (FFD)
The following vehicle status is recorded when DTC is detected and is displayed on CONSULT.

Monitored item (Unit)		Remarks
12V POWER VOLTAGE	(V)	Displays 12V battery power voltage input to traction motor inverter
+2.5V POWER SUPPLY VALUE	(V)	Displays power supply voltage in the traction motor inverter

Monitored item (Unit)		Remarks
+6V POWER SUPPLY VALUE	(V)	Displays power supply voltage in the traction motor inverter
+30V POWER SUPPLY VALUE	(V)	Displays power supply voltage in the traction motor inverter
IGNITION STATUS	(ON/OFF)	Displays the status of ignition signal input to the traction motor inverter
LI-ION BATTERY VOLTAGE	(V)	Displays the li-ion battery voltage from LBC via HEV system CAN communication
PHASE V CURRENT SEN OUTPUT VALUE (Ach MTR)	(A)	Displays the current detection value of phase V current sensor (Ach)
PHASE V CURRENT SEN OUTPUT VALUE (Bch)	(A)	Displays the current detection value of phase V current sensor (Bch)
PHASE W CURRENT SEN OUTPUT VALUE (Ach MTR)	(A)	Displays the current detection value of phase W current sensor (Ach)
PHASE W CURRENT SEN OUTPUT VALUE (Bch)	(A)	Displays the current detection value of phase W current sensor (Bch)
PHASE V CURRENT VALUE DEVIATION (|Ach-Bch|)	(A)	Displays the absolute value of the difference between Ach and Bch of the phase V current sensor
PHASE W CURRENT VALUE DEVIATION (|Ach-Bch|)	(A)	Displays the absolute value of the difference between Ach and Bch of the phase W current sensor
GATE SHUT DOWN REQEST (MTR REV, TRQE REQ)		Displays the status of a gate shut down request in the motor controller, judged from the motor speed and a required torque
MOTOR SPEED	(rpm)	Displays the traction motor speed
SMOOTHING CONDENSER CHARGE FLAG		Displays the charging status of smoothing condenser
SMOOTHING CONDENSER DISCHARGE FLAG		Displays the discharging status of smoothing condenser
TORQUE/REV CONTROL CHANGE		Displays the command status of torque/rev control from HPCM via HEV system CAN communication
INVERTER TEMP	(°C or °F)	Displays the current temperature of IGBT
IGBT TEMPERATURE (MAX)	(°C or °F)	Displays the maximum temperature of IGBT on EEPROM
IGBT TEMPERATURE (ON START-UP)	(°C or °F)	Displays a startup temperature of IGBT on EEPROM
MOTOR CURRENT WHEN IGBT TEMP (MAX)	(A)	Displays a motor current (effective value) at the time when IGBT temperature (maximum temperature) is stored
CPU ANALOG REFERENCE VOLTAGE	(V)	Displays a CPU analog reference voltage in the traction motor inverter
INVERTER DC VOLTAGE	(V)	Displays a voltage of Li-ion battery input to the traction motor inverter
3-PHASE AC ABSOLUTE PEAK VALUE		Displays the peak absolute value of 3-Phase current flowing into the traction motor
MOTOR TORQUE REQUEST COMMAND VALUE	(Nm)	Displays the motor torque request value from HPCM via HEV system CAN communication
MOTOR TORQUE CALCULATION VALUE	(Nm)	Displays a motor torque estimated according to a current sensor value
MOTOR TEMPERATURE	(°C or °F)	• Displays the temperature of traction motor • Not applicable but displayed
HIGH VOLTAGE CHANGE RATE		Displays the difference with the previous Li-ion battery voltage (10ms ago data) stored in the traction motor inverter
MOTOR REVOLUTION REQUEST COMMAND VALUE	(rpm)	Displays the motor revolution request value from HPCM via HEV system CAN communication
CARRIER FREQUENCY	(usec)	Displays the carrier frequency
MOTOR LOWER LIMIT TORQUE (EFFECTIVE VALUE)	(Nm)	Displays motor lower limit control torque calculated in the motor controller

Monitored item (Unit)	Remarks
MOTOR UPPER LIMIT TORQUE (EFFECTIVE VALUE) (Nm)	Displays motor upper limit control torque calculated in the motor controller
MOTOR TORQUE COMMAND VALUE (Nm)	Displays the final command value of motor torque calculated and limit-placed according to a command value from HPCM
FEEDBACK CALCULATION MODE	Displays the torque control method
MOTOR CURRENT (EFFECTIVE VALUE) (A)	Displays the amplitude of current flowing in traction motor
MOTOR CONTROL MODE (TORQUE AND REV)	Displays the control mode of traction motor inverter from HPCM via HEV system CAN communication
STATUS TRANSITION NUMBER	Displays a number of internal state number
RESOLVER ERROR (OPEN)	Displays if a traction motor resolver signal is interrupted or not
RESOLVER ERROR (RANGE)	Displays if a traction motor resolver signal deviates from range or not
RESOLVER ANGLE (DIAG FROM PHASE-A, PHASE-B)	Displays a resolver angle calculated according to PHASE-A and PHASE-B output from the traction motor resolver
INVERTER COOLANT TEMP (MAX) (DIAG PEAK) (°C or °F)	Displays the maximum cooling water temperature of traction motor inverter received from HPCM via HEV system CAN communication during diagnosis
RESOLVER OFFSET VALUE (deg)	Displays a resolver offset value stored in the traction motor inverter
RESOLVER ANGLE (DIAG FROM SIN SIG, COS SIG)	Displays a resolver angle calculated according a sin signal and a cos signal output from the traction motor resolver
POSITION FOR MOTOR CONTROL	Displays a resolver angle used for motor control
PHASE-V ACTUAL CURRENT	Displays a value of PHASE-V current flowing in the traction motor
PHASE-W ACTUAL CURRENT	Displays a value of PHASE-W current flowing in the traction motor
CALCULATION LOAD TORQUE	Displays an estimated value of load torque applied to the traction motor during revolution control
CLUTCH ENGAGE STATUS	Displays the clutch 1 engagement status received from HPCM via HEV system CAN communication
MOTOR LOWER LIMIT TORQUE (CAN)	Displays motor lower limit control torque received from HPCM via HEV system CAN communication
MOTOR UPPER LIMIT TORQUE (CAN)	Displays motor upper limit control torque received from HPCM via HEV system CAN communication
+B VOLTAGE REDUCT ERROR	Displays the presence or absence of current error
+2.5V POWER SUPPLY ERROR	Displays the presence or absence of current error
+6V POWER SUPPLY ERROR	Displays the presence or absence of current error
+30V POWER SUPPLY ERROR	Displays the presence or absence of current error
CURRENT SEN OFFSET ERROR (PHASE-W Ach)	Displays the presence or absence of current error
CURRENT SEN OFFSET ERROR (PHASE-W Bch)	Displays the presence or absence of current error
CURRENT SEN RANGE ERROR (PHASE-V Ach)	Displays the presence or absence of current error
CURRENT SEN RANGE ERROR (PHASE-V Bch)	Displays the presence or absence of current error
CURRENT SEN RANGE ERROR (PHASE-W Ach)	Displays the presence or absence of current error
CURRENT SEN RANGE ERROR (PHASE-W Bch)	Displays the presence or absence of current error
CURRENT SEN DEVIATION ERROR (PHASE-V)	Displays the presence or absence of current error
CURRENT SEN DEVIATION ERROR (PHASE-W)	Displays the presence or absence of current error

Monitored item (Unit)	Remarks
CURRENT SEN OFFSET ERROR (PHASE-V Ach)	Displays the presence or absence of current error
CURRENT SEN OFFSET ERROR (PHASE-V Bch)	Displays the presence or absence of current error
INVERTER INPUT VOLTAGE SEN ERROR	Displays the presence or absence of current error
INVERTER TEMP SENSOR SIGNAL ERROR	Displays the presence or absence of current error
AD CONVERTER ERROR (MOTOR CONT ERROR)	Displays the presence or absence of current error
AD CONVERTER ERROR (HV COMM ERROR)	Displays the presence or absence of current error
WATCHDOG PULSE ERROR (MTR CONT ERROR)	Displays the presence or absence of current error
WATCHDOG PULSE ERROR (HV COMM ERROR)	Displays the presence or absence of current error
MTR CONT-HV COMM ERROR (MTR CONT JUDGE)	Displays the presence or absence of current error
MTR CONT-HV COMM ERROR (HV CONT JUDGE)	Displays the presence or absence of current error
ROM ERROR (MOTOR CONTROL ERROR)	Displays the presence or absence of current error
ROM ERROR (HV COMMUNICATION ERROR)	Displays the presence or absence of current error
RAM ERROR (MOTOR CONTROL ERROR)	Displays the presence or absence of current error
RAM ERROR (HV COMMUNICATION ERROR)	Displays the presence or absence of current error
CALCULATION ERROR (MOTOR CONTROL ERROR)	Displays the presence or absence of current error
CALCULATION ERROR (HV COMM ERROR)	Displays the presence or absence of current error
MEMORY ERROR (MEMORY ACCESS ERROR)	Displays the presence or absence of current error
INVERTER INPUT VOLTAGE ERROR	Displays the presence or absence of current error
INVERTER INPUT OVER VOLTAGE ERROR	Displays the presence or absence of current error
MAIM CIRCUIT ELEMENT ERROR	Displays the presence or absence of current error
OUTPUT OVER CURRENT ERROR	Displays the presence or absence of current error
R/D CONVERTER ZERO POINT STOP ERROR	Displays the presence or absence of current error
R/D CONVERTER SERIAL COMM ERROR (TIMEOUT)	• Displays the presence or absence of current error • Not applicable but displayed
R/D CONVERTER SERIAL COMM ERROR (DATA)	• Displays the presence or absence of current error • Not applicable but displayed
R/D CONVERTER RESOLVER ANGLE ERROR	Displays the presence or absence of current error
RESOLVER REF SIG OSCILLATION STOP ERROR	Displays the presence or absence of current error
RESOLVER REF SIGNAL CYCLE ERROR	Displays the presence or absence of current error

Monitored item (Unit)		Remarks
RESOLVER ERROR (INTERPHASE SHORT)		Displays the presence or absence of current error
RESOLVER ERROR (RANGE)		Displays the presence or absence of current error
RESOLVER ERROR (OPEN)		Displays the presence or absence of current error
TORQUE EXECUTION ERROR		Displays the presence or absence of current error
MOTOR TEMPERATURE SENSOR SIGNAL ERROR		Displays the presence or absence of current error
MOTOR OPEN ERROR		Displays the presence or absence of current error
SMOOTHING CONDENSER CHARGE ERROR		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 1		Displays the presence or absence of current error
CAN COMMUNICATION ERROR		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 2		Displays the presence or absence of current error
CAN COMMUNICATION ERROR		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 3		Displays the presence or absence of current error
CAN COMMUNICATION ERROR		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 4		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 5		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 6		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 7		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 8		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 9		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 10		Displays the presence or absence of current error
CAN COMMUNICATION ERROR 11		Displays the presence or absence of current error
MOTOR LOCK FLAG		Displays if the motor is locked or not
DTC		Displays the diagnosis trouble code
INVERTER COOLANT TEMPERATURE	(°C or °F)	Displays the coolant temperature of traction motor inverter from HPCM via HEV system CAN communication
COOLANT WATER PUMP CONDITION		Displays the operation status of coolant water pump from HPCM via HEV system CAN communication
COOLING CONDITION		Displays the malfunction status of coolant water pump from HPCM via HEV system CAN communication
IGNITION STATUS (HCM)		Displays the ignition status received from HPCM via HEV system CAN communication
PWM OFF REQUEST		Displays the pulse signal off request status from HPCM via HEV system CAN
STATUS OF HIGH VOLTAGE POWER SUPPLY		Displays the high voltage relay connection status received from HPCM via HEV system CAN communication
HEV START/STOP SYSTEM REQUEST		Displays the HEV system startup request status received from HPCM via HEV system CAN communication
INVERTER COOLANT TEMP (MAX) (RUNNING PEAK)	(°C or °F)	Displays the maximum temperature of cooling water of the traction motor inverter received from HPCM via HEV system CAN communication during startup
MOTOR CALCULATION TEMPERATURE	(°C or °F)	Displays an estimated motor temperature
LOAD CALCULATION VALUE	(%)	Displays the load calculation value of engine from ECM via HEV system CAN communication
ENGINE COOLANT TEMPERATURE	(°C or °F)	Displays the engine coolant temperature from ECM via HEV system CAN communication
ENGINE SPEED	(rpm)	Displays the engine speed from ECM via HEV system CAN communication

Monitored item (Unit)		Remarks
VEHICLE SPEED	(km/h or MPH)	Displays the vehicle speed from ECM via HEV system CAN communication
ABSOLUTE THROTTLE POSITION A	(%)	Displays the throttle position information from ECM via HEV system CAN communication
TIME OF AFTER ENGINE START	(sec)	Displays elapsed time of engine startup received from ECM via HEV system CAN communication
ENGINE CONTROL MODULE SYSTEM VOLTAGE	(V)	Displays a power supply voltage stored in the traction motor inverter
ABSOLUTE THROTTLE POSITION B	(%)	Displays the throttle position information from ECM via HEV system CAN communication
FUEL TYPE		Displays the drive mode

DATA MONITOR

NOTE:

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

Monitored item (Unit)		Remarks
12V POWER VOLTAGE	(V)	Displays 12V battery power voltage input to traction motor inverter
+2.5V POWER SUPPLY VALUE	(V)	Displays +2.5V power supply voltage in the traction motor inverter
+6V POWER SUPPLY VALUE	(V)	Displays +6V power supply voltage in the traction motor inverter
+30V POWER SUPPLY VALUE	(V)	Converts +30V power supply voltage in the traction motor inverter
IGNITION STATUS		Displays the status of ignition signal input to the traction motor inverter
LI-ION BATTERY VOLTAGE	(V)	Displays the li-ion battery voltage from LBC via HEV system CAN communication
PHASE V CURRENT SEN OUTPUT VALUE (Ach MTR)	(A)	Displays the current detection value of phase V current sensor (Ach)
PHASE W CURRENT SEN OUTPUT VALUE (Ach MTR)	(A)	Displays the current detection value of phase W current sensor (Ach)
GATE SHUT DOWN REQEST (MTR REV, TRQE REQ)		Displays the status of a gate shut down request in the motor controller, judged from the motor speed and a required torque
MOTOR SPEED	(rpm)	Displays the traction motor speed
TORQUE/REV CONTROL CHANGE		Displays the command status of torque/rev control from HPCM via HEV system CAN communication
INVERTER TEMP	(°C or °F)	Displays the current temperature of IGBT
IGBT TEMPERATURE (MAX)	(°C or °F)	Displays the maximum temperature of IGBT on EEPROM
IGBT TEMPERATURE (ON START-UP)	(°C or °F)	Displays a startup temperature of IGBT on EEPROM
MOTOR CURRENT WHEN IGBT TEMP (MAX)	(A)	Displays a motor current (effective value) at the time when IGBT temperature (maximum temperature) is stored
INVERTER DC VOLTAGE	(V)	Displays a voltage of Li-ion battery input to the traction motor inverter
MOTOR TORQUE REQUEST COMMAND VALUE	(Nm)	Displays the motor torque request value from HPCM via HEV system CAN communication
MOTOR TORQUE CALCULATION VALUE	(Nm)	Displays a motor torque estimated according to a current sensor value
MOTOR REVOLUTION REQUEST COMMAND VALUE	(rpm)	Displays the motor revolution request value from HPCM via HEV system CAN communication
CARRIER FREQUENCY	(usec)	Displays the carrier frequency
MOTOR LOWER LIMIT TORQUE (EFFECTIVE VALUE)	(Nm)	Displays motor lower limit control torque calculated in the motor controller
MOTOR UPPER LIMIT TORQUE (EFFECTIVE VALUE)	(Nm)	Displays motor upper limit control torque calculated in the motor controller

Monitored item (Unit)		Remarks
MOTOR TORQUE COMMAND VALUE	(Nm)	Displays the final command value of motor torque calculated and limit-placed according to a command value from HPCM
FEEDBACK CALCULATION MODE		Displays the torque control method
MOTOR CURRENT (EFFECTIVE VALUE)	(A)	Displays the amplitude of current flowing in traction motor
MOTOR CONTROL MODE (TORQUE AND REV)		Displays the control mode of traction motor inverter from HPCM via HEV system CAN communication
STATUS TRANSITION NUMBER		Displays a number of internal state number
INVERTER COOLANT TEMP (MAX) (DIAG PEAK)	(°C or °F)	Displays the maximum cooling water temperature of traction motor inverter received from HPCM via HEV system CAN communication during diagnosis
RESOLVER OFFSET VALUE	(deg)	Displays a resolver offset value stored in the traction motor inverter
DTC		Displays the diagnosis trouble code
INVERTER COOLANT TEMPERATURE	(°C or °F)	Displays the coolant temperature of traction motor inverter from HPCM via HEV system CAN communication
COOLANT WATER PUMP CONDITION		Displays the operation status of coolant water pump from HPCM via HEV system CAN communication
COOLING CONDITION		Displays the malfunction status of coolant water pump from HPCM via HEV system CAN communication
INVERTER COOLANT TEMP (MAX) (RUNNING PEAK)	(°C or °F)	Displays the maximum temperature of cooling water of the traction motor inverter received from HPCM via HEV system CAN communication during startup
MOTOR CALCULATION TEMPERATURE	(°C or °F)	Displays an estimated motor temperature
NUMBER OF P-DTC		Displays the number of permanent DTC
CNDNSER CALC TEMP (MAX)	(°C or °F)	Displays an estimated condenser temperature
NUMBER OF DTC		Displays the number of emission DTC
MIL	(ON/OFF)	Displays the MIL status
MISS FIRE MONITOR	(ON/OFF)	Displays the support status of miss fire monitor
FUEL SYSTEM MONITOR	(ON/OFF)	Displays the support status of fuel system monitor
CCM MONITOR	(ON/OFF)	Displays the support status of CCM monitor
DIESEL MONI (COMP IGN)	(ON/OFF)	Displays the support status of diesel monitor
MISS FIRE MONITOR STATUS	(OK/NG)	Displays the ready status of miss fire monitor
FUEL SYSTEM MONI STAT	(OK/NG)	Displays the ready status of fuel system monitor
CCM MONITOR STATUS	(OK/NG)	Displays the ready status of CCM monitor
CATALYTIC DIAGNOSIS	(ON/OFF)	Displays the support status of catalytic diagnosis
ELECT HEAT CATALYTIC DIAG	(ON/OFF)	Displays the support status of electric heat catalytic diagnosis
EVAP SYSTEM DIAGNOSIS	(ON/OFF)	Displays the support status of evaporate system diagnosis
SECOND AIR SYSTEM DIAG	(ON/OFF)	Displays the support status of second air system diagnosis
O2 SENSOR DIAGNOSIS	(ON/OFF)	Displays the support status of O2 sensor diagnosis
O2 SENSOR HEAT DIAGNOSIS	(ON/OFF)	Displays the support status of O2 sensor heat diagnosis
EGR/VVT SYSTEM DIAGNOSIS	(ON/OFF)	Displays the support status of EGR/VVT system diagnosis
CATALYTIC DIAGNOSIS-1	(OK/NG)	Displays the ready status of catalytic diagnosis
ELECT HEAT CATALYT DIAG-1	(OK/NG)	Displays the ready status of electric heat catalytic diagnosis
EVAP SYSTEM DIAGNOSIS-1	(OK/NG)	Displays the ready status of evaporate system diagnosis
SECOND AIR SYSTEM DIAG-1	(OK/NG)	Displays the ready status of second air system diagnosis
O2 SENSOR DIAGNOSIS-1	(OK/NG)	Displays the ready status of O2 sensor diagnosis
O2 SENSOR HEATER DIAG-1	(OK/NG)	Displays the ready status of O2 sensor heat diagnosis
EGR/VVT SYSTEM DIAG-1	(OK/NG)	Displays the ready status of EGR/VVT system diagnosis

Monitored item (Unit)		Remarks
LOAD CALCULATION VALUE	(%)	Displays the load calculation value of engine from ECM via CAN communication
ENGINE COOLANT TEMPERATURE	(°C or °F)	Displays the engine coolant temperature from ECM via CAN communication
ENGINE SPEED	(rpm)	Displays the engine speed from ECM via CAN communication
VEHICLE SPEED	(km/h or mph)	Displays the vehicle speed from ECM via CAN communication
ABSOLUTE THROTTLE POSITION A	(%)	Displays the throttle position information from ECM via CAN communication
OBD II		Displays the OBD supported
TIME OF AFTER ENGINE START	(sec)	Displays elapsed time of engine startup received from ECM via HEV system CAN communication
MILEAGE OF DURING MIL ON	(km/mile)	Displays the mileage of during MIL on
MISSFIRE MONITOR-1	(OK/NG)	Displays the authorization status of miss fire monitor
FUEL SYSTEM MONITOR-1	(OK/NG)	Displays the authorization status of fuel system monitor
CCM MONITOR-1	(OK/NG)	Displays the authorization status of CCM monitor
DIESEL MONI (COMP IGN)-1		Displays the authorization status of diesel monitor
MISSFIRE MONITR STATUS-1	(OK/NG)	Displays the completion status of miss fire monitor
FUEL SYSTEM MONI STAT-1	(OK/NG)	Displays the completion status of fuel system monitor
CCM MONITOR STATUS-1	(OK/NG)	Displays the completion status of CCM monitor
CATALYTIC DIAGNOSIS-2	(OK/NG)	Displays the authorization status of catalytic diagnosis
ELECT HEAT CATALYT DIAG-2	(OK/NG)	Displays the authorization status of electric heat catalytic diagnosis
EVAP SYSTEM DIAGNOSIS-2	(OK/NG)	Displays the authorization status of evaporate system diagnosis
SECOND AIR SYSTEM DIAG-2	(OK/NG)	Displays the authorization status of second air system diagnosis
O2 SENSOR DIAGNOSIS-2	(OK/NG)	Displays the authorization status of O2 sensor diagnosis
O2 SENSOR HEATER DIAG-2	(OK/NG)	Displays the authorization status of O2 sensor heat diagnosis
EGR/VVT SYSTEM DIAG-2	(OK/NG)	Displays the authorization status of EGR/VVT system diagnosis
CATALYTIC DIAGNOSIS-3	(OK/NG)	Displays the completion status of catalytic diagnosis
ELECT HEAT CATALYT DIAG-3	(OK/NG)	Displays the completion status of electric heat catalytic diagnosis
EVAP SYSTEM DIAGNOSIS-3	(OK/NG)	Displays the completion status of evaporate system diagnosis
SECOND AIR SYSTEM DIAG-3	(OK/NG)	Displays the completion status of second air system diagnosis
O2 SENSOR DIAGNOSIS-3	(OK/NG)	Displays the completion status of O2 sensor diagnosis
O2 SENSOR HEATER DIAG-3	(OK/NG)	Displays the completion status of O2 sensor heat diagnosis
EGR/VVT SYSTEM DIAG-3	(OK/NG)	Displays the completion status of EGR/VVT system diagnosis
ENGINE CONTROL MODULE SYSTEM VOLTAGE	(V)	Displays a power supply voltage stored in the traction motor inverter
ABSOLUTE THROTTLE POSITION B	(%)	Displays the throttle position information from ECM via CAN communication
FUEL TYPE		Displays the drive mode

ECU DIAGNOSIS INFORMATION

TRACTION MOTOR INVERTER

Reference Value

INFOID:0000000014910018

VALUES ON DIAGNOSIS TOOL

NOTE:

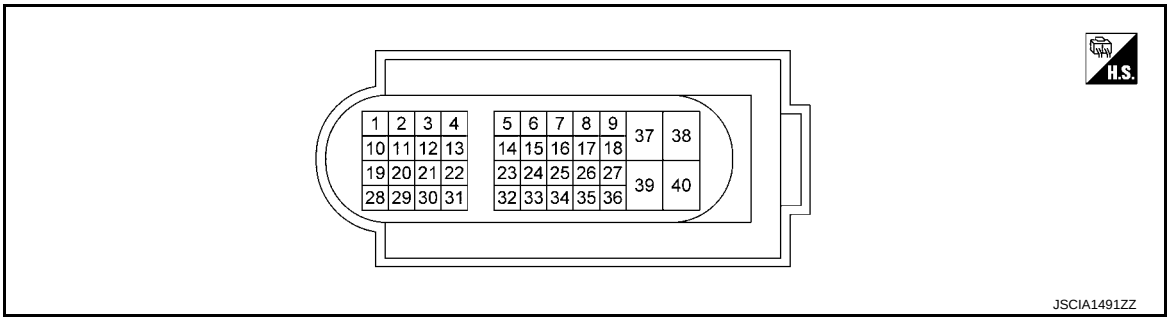
The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitor item	Condition	Value / Status (Approx.)
12V POWER VOLTAGE	Ignition switch ON	9 V or more
+2.5V POWER SUPPLY VALUE	Ignition switch ON	2.4 – 2.5 V
+6V POWER SUPPLY VALUE	Ignition switch ON	2.5 – 2.9 V
+30V POWER SUPPLY VALUE	Ignition switch ON	1.4 – 2.0 V
IGNITION STATUS	Ignition switch ON	ON
LI-ION BATTERY VOLTAGE	—	—
PHASE V CURRENT SEN OUTPUT VALUE (Ach MTR)	Ignition switch ON	(–52.5) – (52.5) A
PHASE W CURRENT SEN OUTPUT VALUE (Ach MTR)	Ignition switch ON	(–52.5) – (52.5) A
GATE SHUT DOWN REQEST (MTR REV, TRQE REQ)	Ignition switch ON	DRIVE
MOTOR SPEED	Ignition switch ON	(–10) – (10) rpm
TORQUE/REV CONTROL CHANGE	—	—
INVERTER TEMP	—	—
IGBT TEMPERATURE (MAX)	—	—
IGBT TEMPERATURE (ON START-UP)	—	—
MOTOR CURRENT WHEN IGBT TEMP (MAX)	—	—
INVERTER DC VOLTAGE	Ignition switch ON after a lapse of 5 minutes or more with the ignition switch OFF	50 V or less
MOTOR TORQUE REQUEST COMMAND VALUE	—	—
MOTOR TORQUE CALCULATION VALUE	—	—
MOTOR REVOLUTION REQUEST COMMAND VALUE	—	—
CARRIER FREQUENCY	—	—
MOTOR LOWER LIMIT TORQUE (EFFECTIVE VALUE)	—	—
MOTOR UPPER LIMIT TORQUE (EFFECTIVE VALUE)	—	—
MOTOR TORQUE COMMAND VALUE	—	—
FEEDBACK CALCULATION MODE	—	—
MOTOR CURRENT (EFFECTIVE VALUE)	—	—
MOTOR CONTROL MODE (TORQUE AND REV)	—	—
STATUS TRANSITION NUMBER	—	—

Monitor item	Condition	Value / Status (Approx.)
INVERTER COOLANT TEMP (MAX) (DIAG PEAK)	—	—
RESOLVER OFFSET VALUE	—	—
DTC	—	—
INVERTER COOLANT TEMPERATURE	—	—
COOLANT WATER PUMP CONDITION	—	—
COOLING CONDITION	—	—
INVERTER COOLANT TEMP (MAX) (RUNNING PEAK)	—	—
MOTOR CALCULATION TEMPERATURE	—	—
NUMBER OF P-DTC	—	—
CNDNSER CALC TEMP (MAX)	—	—
NUMBER OF DTC	—	—
MIL	—	—
MISS FIRE MONITOR	—	—
FUEL SYSTEM MONITOR	—	—
CCM MONITOR	—	—
DIESEL MONI (COMP IGN)	—	—
MISS FIRE MONITOR STATUS	—	—
FUEL SYSTEM MONI STAT	—	—
CCM MONITOR STATUS	—	—
CATALYTIC DIAGNOSIS	—	—
ELECT HEAT CATALYTIC DIAG	—	—
EVAP SYSTEM DIAGNOSIS	—	—
SECOND AIR SYSTEM DIAG	—	—
O2 SENSOR DIAGNOSIS	—	—
O2 SENSOR HEAT DIAGNOSIS	—	—
EGR/VVT SYSTEM DIAGNOSIS	—	—
CATALYTIC DIAGNOSIS-1	—	—
ELECT HEAT CATALYT DIAG-1	—	—
EVAP SYSTEM DIAGNOSIS-1	—	—
SECOND AIR SYSTEM DIAG-1	—	—
O2 SENSOR DIAGNOSIS-1	—	—
O2 SENSOR HEATER DIAG-1	—	—
EGR/VVT SYSTEM DIAG-1	—	—
LOAD CALCULATION VALUE	—	—
ENGINE COOLANT TEMPERATURE	—	—
ENGINE SPEED	—	—
VEHICLE SPEED	—	—
ABSOLUTE THROTTLE POSITION A	—	—
OBD II	—	—
TIME OF AFTER ENGINE START	—	—
MILEAGE OF DURING MIL ON	—	—
MISSFIRE MONITOR-1	—	—

Monitor item	Condition	Value / Status (Approx.)
FUEL SYSTEM MONITOR-1	—	—
CCM MONITOR-1	—	—
DIESEL MONI (COMP IGN)-1	—	—
MISSFIRE MONITR STATUS-1	—	—
FUEL SYSTEM MONI STAT-1	—	—
CCM MONITOR STATUS-1	—	—
CATALYTIC DIAGNOSIS-2	—	—
ELECT HEAT CATALYT DIAG-2	—	—
EVAP SYSTEM DIAGNOSIS-2	—	—
SECOND AIR SYSTEM DIAG-2	—	—
O2 SENSOR DIAGNOSIS-2	—	—
O2 SENSOR HEATER DIAG-2	—	—
EGR/VVT SYSTEM DIAG-2	—	—
CATALYTIC DIAGNOSIS-3	—	—
ELECT HEAT CATALYT DIAG-3	—	—
EVAP SYSTEM DIAGNOSIS-3	—	—
SECOND AIR SYSTEM DIAG-3	—	—
O2 SENSOR DIAGNOSIS-3	—	—
O2 SENSOR HEATER DIAG-3	—	—
EGR/VVT SYSTEM DIAG-3	—	—
ENGINE CONTROL MODULE SYSTEM VOLTAGE	—	—
ABSOLUTE THROTTLE POSITION B	—	—
FUEL TYPE	—	—

TERMINAL LAYOUT



PHYSICAL VALUES

Terminal No. (Color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/Output		
2 (V)	10 (LG)	Traction motor resolver signal (S1 – S3)	Input	Ignition switch OFF	1.5 kΩ or more
4 (G)	12 (Y)	Traction motor resolver signal (R1 – R2)	Output	Ignition switch OFF	10 kΩ or more
7 (R)	Ground	Power supply (IGN)	—	Ignition switch ON	9 – 16 V
				Ignition switch OFF	0 V

Terminal No. (Color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/Output		
9 (P)	17 (W)	Connection detection	Input/Output	—	—
20 (W)	28 (B)	Traction motor resolver signal (S2 – S4)	Input	Ignition switch OFF	1.5 kΩ or more
27 (L)	—	HEV system CAN-H	Input/Output	—	—
35 (G)	—	HEV system CAN-L	Input/Output	—	—
37 (B)	Ground	GND	—	Always	0 V
38 (P)	Ground	Power supply (BAT)	—	Ignition switch ON	9 – 16 V
				Ignition switch OFF	0 V
39 (B)	Ground	GND	—	Always	0 V
40 (P)	Ground	Power supply (BAT)	—	Ignition switch ON	9 – 16 V
				Ignition switch OFF	0 V

Fail-Safe

INFOID:0000000014910019

DTC	Vehicle behavior
P0A01	Not changed from normal driving
P0A1B	Either of following status is observed • Stops drive control of traction motor, and requires system main relay OFF to HPCM • Stops drive control of traction motor
P0A3F	Stops drive control of traction motor
P0A41	Stops drive control of traction motor
P0A8D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0AED	Not changed from normal driving
P0BE9	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BEA	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BED	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0BEE	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P0C05	Stops drive control of traction motor
P0C19	Stops drive control of traction motor
P0C79	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P31A5	Either of following status is observed • Stops drive control of traction motor • Not changed from normal driving
P31A6	Not changed from normal driving
P31A8	Either of following status is observed • Stops drive control of traction motor, and requires system main relay OFF to HPCM • Stops drive control of traction motor
P31A9	Stops drive control of traction motor
P323F	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3243	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3244	Not changed from normal driving
P3245	Not changed from normal driving

DTC	Vehicle behavior
P3246	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324A	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P324D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3266	Stops drive control of traction motor, and requires system main relay OFF to HPCM
P3267	Not changed from normal driving
P3268	Stops drive control of traction motor
P3269	Stops drive control of traction motor
P326C	Either of following status is observed • Stops drive control of traction motor • Not changed from normal driving
P326D	Stops drive control of traction motor, and requires system main relay OFF to HPCM
U0100	Not changed from normal driving
U0101	Stops drive control of traction motor
U0111	Stops drive control of traction motor
U0293	Either of following status is observed • Stops drive control of traction motor • Not changed from normal driving
U1000	Stops drive control of traction motor
U1321	Not changed from normal driving
U150E	Not changed from normal driving
U1513	Not changed from normal driving
U1920	Not changed from normal driving
U1921	Not changed from normal driving
U1922	Not changed from normal driving
U300A	Not changed from normal driving

Protection Control

INFOID:0000000014910020

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

Condition	Control	Normal return condition
Traction motor is overheated	Traction motor output torque is limited according to the traction motor temperature.	Traction motor temperature drops
Smoothing condensre is overheated	Traction motor output torque is limited according to the smoothing condenser temperature.	Smoothing condenser temperature drops

DTC Inspection Priority Chart

INFOID:0000000014910021

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

Priority	Detected items		Reference
1	P0A8D	14VOLT POWER VOLTAGE	TMS-68

Priority	Detected items		Reference
2	P0A1B	DRIVE MOTOR A CONTROL MODULE	TMS-60
	P31A5	CAN ERROR	TMS-81
	P31A6	CAN ERROR	TMS-83
	P31A8	CAN ERROR	TMS-85
	P31A9	CAN ERROR	TMS-87
	P326C	EEPROM	TMS-106
	P326D	RESOLVER OFFSET	TMS-107
	U0100	LOST COMMUNICATION ECM	TMS-108
	U0101	LOST COMMUNICATION TCM	TMS-110
	U0111	LOST COMMUNICATION LBC	TMS-112
	U0293	LOST COMMUNICATION HCM	TMS-114
	U1000	CAN COMM CIRCUIT	TMS-116
	U150E	CAN ERROR	TMS-118
	U1513	CAN ERROR	TMS-119
	U1920	CAN ERROR	TMS-120
	U1921	CAN ERROR	TMS-121
	U1922	CAN ERROR	TMS-123
3	P0A3F	DRIVE MOTOR A POSITION SENSOR	TMS-62
	P0A41	DRIVE MOTOR A POSITION SENSOR	TMS-65
	P3266	RESOLVER OFFSET	TMS-100
	P3267	RESOLVER OFFSET	TMS-101
	P3268	RESOLVER SIGNAL	TMS-102
	U1321	CONFIG UNFINISH	TMS-117
	U300A	IGNITION SWITCH	TMS-125
4	P0A01	MTR ELECTRO COOLANT TEMP SEN	TMS-58
	P0AED	DRIVE MOTOR INV TEMP SENSOR A	TMS-70
	P0BE9	D-MOTOR A PHASE V CURRENT SEN	TMS-71
	P0BEA	D-MOTOR A PHASE V CURRENT SEN	TMS-72
	P0BED	D-MOTOR A PHASE W CURRENT SEN	TMS-73
	P0BEE	D-MOTOR A PHASE W CURRENT SEN	TMS-74
	P0C79	DRIVE MOTOR A INVERTER VOLTAGE	TMS-79
	P323F	D-MOTOR A PHASE W CURRENT SEN	TMS-89
	P3243	D-MOTOR A PHASE V CURRENT SEN	TMS-90
	P3246	DRIVE MOTOR A INVERTER VOLTAGE	TMS-94
	P324A	DRIVE MOTOR A INVERTER VOLTAGE	TMS-96
	P3269	DRIVE MOTOR A POSITION SENSOR	TMS-105
5	P3245	DRIVE MOTOR A INVERTER	TMS-93
6	P0C05	DRIVE MOTOR A PHASE U-V-W	TMS-75
	P0C19	D-MOTOR A TORQUE DELIVERED	TMS-77
	P3244	DRIVE MOTOR A INVERTER	TMS-91
7	P324D	DRIVE MOTOR A INVERTER IGBT	TMS-98

DTC Index

INFOID:0000000014910022

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-37, "DTC Inspection Priority Chart".

DTC*1 CONSULT	Items (CONSULT screen terms)	Trip	MIL*2	Hybrid system warning lamp	Reference
P0A01	MTR ELECTRO COOLANT TEMP SEN	1	ON	ON	TMS-58
P0A1B	DRIVE MOTOR A CONTROL MODULE	1	ON	ON	TMS-60
P0A3F	DRIVE MOTOR A POSITION SENSOR	1	ON	ON	TMS-62
P0A41	DRIVE MOTOR A POSITION SENSOR	1	ON	ON	TMS-65
P0A8D	14VOLT POWER VOLTAGE	1	—	ON	TMS-68
P0AED	DRIVE MOTOR INV TEMP SENSOR A	1	ON	ON	TMS-70
P0BE9	D-MOTOR A PHASE V CURRENT SEN	1	ON	ON	TMS-71
P0BEA	D-MOTOR A PHASE V CURRENT SEN	1	ON	ON	TMS-72
P0BED	D-MOTOR A PHASE W CURRENT SEN	1	ON	ON	TMS-73
P0BEE	D-MOTOR A PHASE W CURRENT SEN	1	ON	ON	TMS-74
P0C05	DRIVE MOTOR A PHASE U-V-W	1	ON	ON	TMS-75
P0C19	D-MOTOR A TORQUE DELIVERED	1	ON	ON	TMS-77
P0C79	DRIVE MOTOR A INVERTER VOLTAGE	1	ON	ON	TMS-79
P31A5	CAN ERROR	1	ON	ON	TMS-81
P31A6	CAN ERROR	1	ON	ON	TMS-83
P31A8	CAN ERROR	1	ON	ON	TMS-85
P31A9	CAN ERROR	1	ON	ON	TMS-87
P323F	D-MOTOR A PHASE W CURRENT SEN	1	ON	ON	TMS-89
P3243	D-MOTOR A PHASE V CURRENT SEN	1	ON	ON	TMS-90
P3244	DRIVE MOTOR A INVERTER	1	ON	ON	TMS-91
P3245	DRIVE MOTOR A INVERTER	1	ON	ON	TMS-93
P3246	DRIVE MOTOR A INVERTER VOLTAGE	1	ON	ON	TMS-94
P324A	DRIVE MOTOR A INVERTER VOLTAGE	1	—	ON	TMS-96
P324D	DRIVE MOTOR A INVERTER IGBT	1	ON	ON	TMS-98
P3266	RESOLVER OFFSET	1	—	ON	TMS-100
P3267	RESOLVER OFFSET	1	—	ON	TMS-101
P3268	RESOLVER SIGNAL	1	ON	ON	TMS-102
P3269	DRIVE MOTOR A POSITION SENSOR	1	ON	ON	TMS-105
P326C	EEPROM	1	ON	ON	TMS-106
P326D	RESOLVER OFFSET	1	ON	ON	TMS-107
U0100	LOST COMMUNICATION ECM	1	ON	ON	TMS-108
U0101	LOST COMMUNICATION TCM	1	ON	ON	TMS-110
U0111	LOST COMMUNICATION LBC	1	ON	ON	TMS-112
U0293	LOST COMMUNICATION HCM	1	ON	ON	TMS-114
U1000	CAN COMMUNICATION CIRCUIT	1	—	ON	TMS-116
U1321	CONFIG UNFINISH	1	—	ON	TMS-117
U150E	CAN ERROR	1	—	ON	TMS-118
U1513	CAN ERROR	1	—	ON	TMS-119
U1920	CAN ERROR	1	—	ON	TMS-120
U1921	CAN ERROR	1	—	ON	TMS-121

DTC*1 CONSULT	Items (CONSULT screen terms)	Trip	MIL*2	Hybrid system warning lamp	Reference
U1922	CAN ERROR	1	—	ON	TMS-123
U300A	IGNITION SWITCH	1	—	ON	TMS-125

*1: These numbers are prescribed by SAE J2012/ISO 15031-6.
*2: Refer to EC-77, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)"

Index of HPCM-detected DTC

INFOID:0000000014910023

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

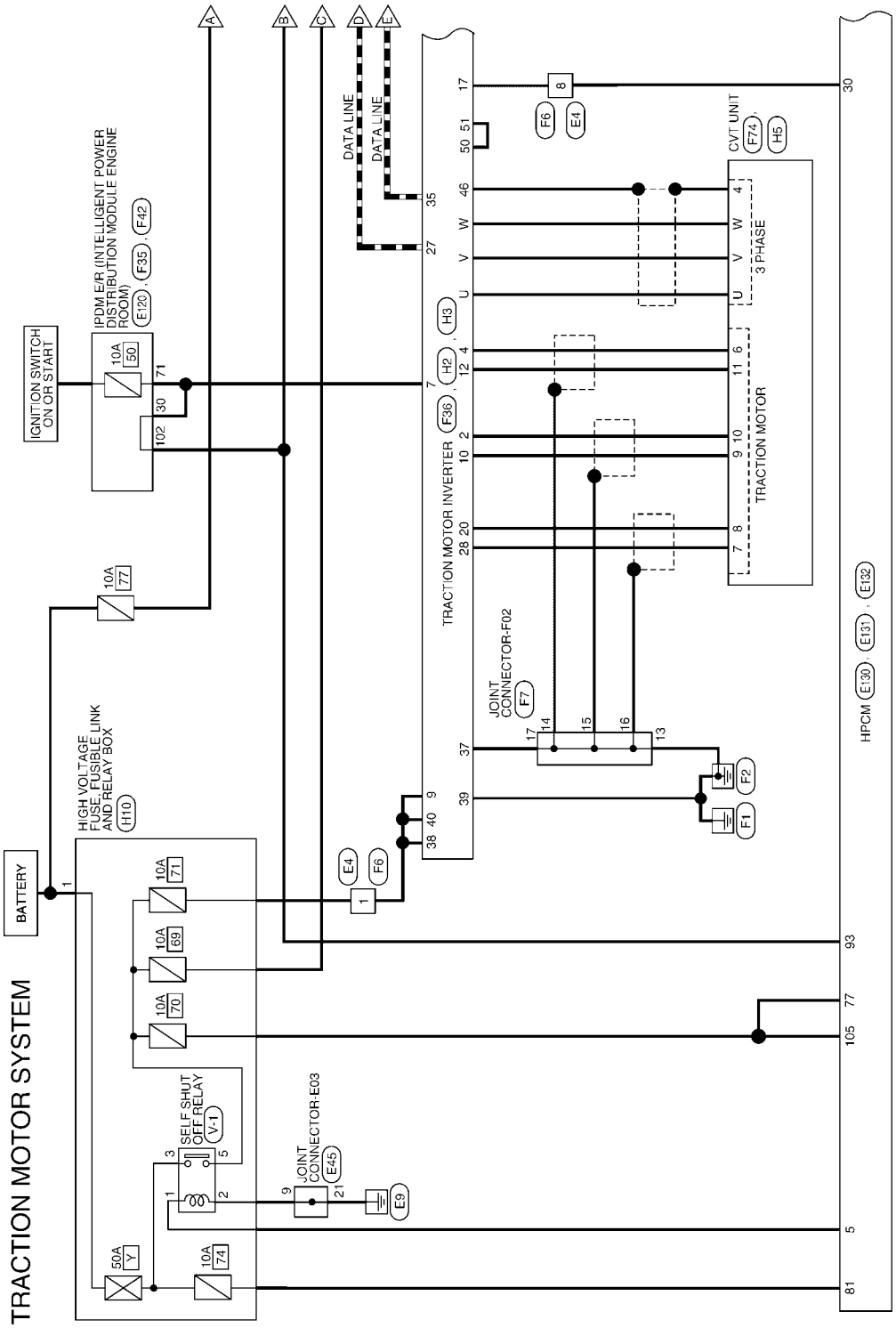
DTC	DTC of HPCM
P324A	P3176
P0A1B, P0A8D	P3177
P0A1B, P0A8D	P3178
P0A01, P0AED, P31A5, P31A6, P3244, P3245, P3267, P326C, U0100, U0293, U1321, U150E, U1513, U1920, U1921, U1922, U300A	P3179
P0A1B, P0A3F, P0A41, P0C05, P0C19, P31A5, P31A8, P31A9, P3268, P3269, P326C, U0101, U0111, U0293, U1000	P317A
P0A1B, P0A8D, P0BE9, P0BEA, P0BED, P0BEE, P0C79, P31A8, P323F, P3243, P3246, P324A, P324D, P3266, P326D	P317B

WIRING DIAGRAM

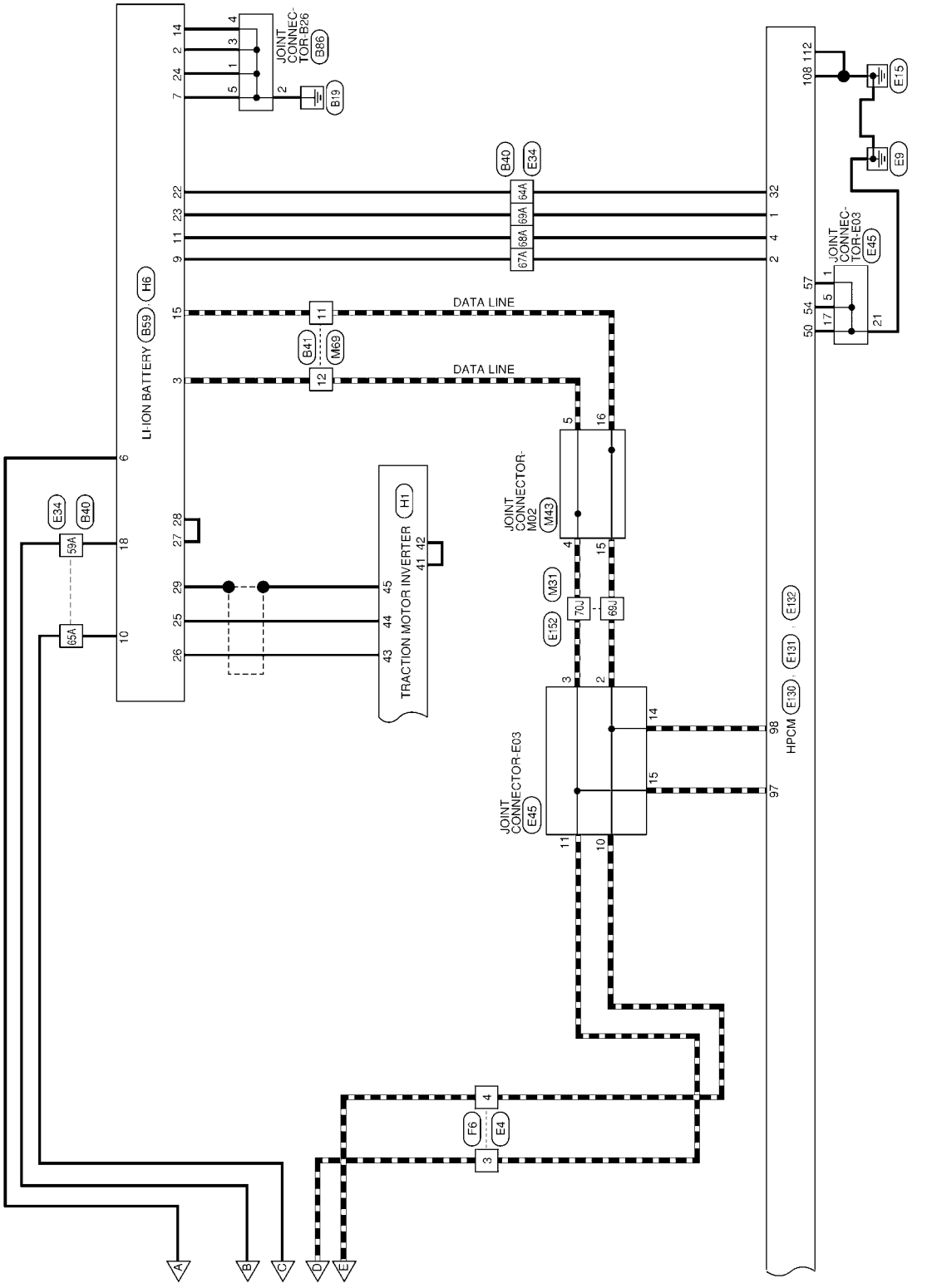
TRACTION MOTOR INVERTER

Wiring Diagram

INFOID:0000000014630851



AABWA1232GB

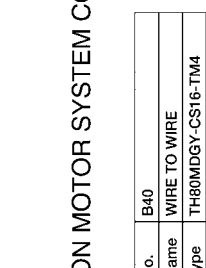


AABWA1233GB

TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	B40
Connector Name	WIRE TO WIRE
Connector Type	TH80MDGY-CS16-TM4
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1A	–	TO ENGINE ROOM HARNESS
2A	–	TO ENGINE ROOM HARNESS
3A	–	TO ENGINE ROOM HARNESS
4A	–	TO ENGINE ROOM HARNESS
5A	–	TO ENGINE ROOM HARNESS
6A	LG	TO ENGINE ROOM HARNESS
7A	Y	TO ENGINE ROOM HARNESS
8A	GR	TO ENGINE ROOM HARNESS
9A	BR	TO ENGINE ROOM HARNESS
10A	–	TO ENGINE ROOM HARNESS
11A	–	TO ENGINE ROOM HARNESS
12A	–	TO ENGINE ROOM HARNESS
13A	–	TO ENGINE ROOM HARNESS
14A	–	TO ENGINE ROOM HARNESS
15A	–	TO ENGINE ROOM HARNESS
16A	–	TO ENGINE ROOM HARNESS
17A	–	TO ENGINE ROOM HARNESS
18A	–	TO ENGINE ROOM HARNESS
19A	–	TO ENGINE ROOM HARNESS
20A	–	TO ENGINE ROOM HARNESS
21A	–	TO ENGINE ROOM HARNESS
22A	–	TO ENGINE ROOM HARNESS
23A	–	TO ENGINE ROOM HARNESS
24A	–	TO ENGINE ROOM HARNESS
25A	–	TO ENGINE ROOM HARNESS
26A	–	TO ENGINE ROOM HARNESS
27A	–	TO ENGINE ROOM HARNESS
28A	–	TO ENGINE ROOM HARNESS
29A	–	TO ENGINE ROOM HARNESS
30A	–	TO ENGINE ROOM HARNESS
31A	–	TO ENGINE ROOM HARNESS
32A	–	TO ENGINE ROOM HARNESS
33A	–	TO ENGINE ROOM HARNESS
34A	–	TO ENGINE ROOM HARNESS
35A	–	TO ENGINE ROOM HARNESS
36A	–	TO ENGINE ROOM HARNESS
37A	–	TO ENGINE ROOM HARNESS
38A	–	TO ENGINE ROOM HARNESS
39A	–	TO ENGINE ROOM HARNESS
40A	–	TO ENGINE ROOM HARNESS
41A	–	TO ENGINE ROOM HARNESS
42A	–	TO ENGINE ROOM HARNESS
43A	–	TO ENGINE ROOM HARNESS
44A	–	TO ENGINE ROOM HARNESS
45A	–	TO ENGINE ROOM HARNESS
46A	–	TO ENGINE ROOM HARNESS
47A	–	TO ENGINE ROOM HARNESS
48A	–	TO ENGINE ROOM HARNESS
49A	–	TO ENGINE ROOM HARNESS
50A	–	TO ENGINE ROOM HARNESS
51A	–	TO ENGINE ROOM HARNESS
52A	–	TO ENGINE ROOM HARNESS
53A	–	TO ENGINE ROOM HARNESS
54A	R	TO ENGINE ROOM HARNESS
55A	L	TO ENGINE ROOM HARNESS
56A	BR	TO ENGINE ROOM HARNESS
57A	W	TO ENGINE ROOM HARNESS
58A	B	TO ENGINE ROOM HARNESS
59A	LG	TO ENGINE ROOM HARNESS
60A	B	TO ENGINE ROOM HARNESS
61A	SHIELD	TO ENGINE ROOM HARNESS
62A	–	TO ENGINE ROOM HARNESS
63A	LG	TO ENGINE ROOM HARNESS
64A	Y	TO ENGINE ROOM HARNESS
65A	P	TO ENGINE ROOM HARNESS
66A	R	TO ENGINE ROOM HARNESS
67A	SB	TO ENGINE ROOM HARNESS
68A	BG	TO ENGINE ROOM HARNESS
69A	GR	TO ENGINE ROOM HARNESS
70A	G	TO ENGINE ROOM HARNESS
71A	–	TO ENGINE ROOM HARNESS
72A	–	TO ENGINE ROOM HARNESS
73A	–	TO ENGINE ROOM HARNESS
74A	–	TO ENGINE ROOM HARNESS
75A	B	TO ENGINE ROOM HARNESS
76A	G	TO ENGINE ROOM HARNESS
77A	SB	TO ENGINE ROOM HARNESS
78A	BG	TO ENGINE ROOM HARNESS
79A	Y	TO ENGINE ROOM HARNESS
80A	BR	TO ENGINE ROOM HARNESS
81A	R	TO ENGINE ROOM HARNESS
82A	–	TO ENGINE ROOM HARNESS
83A	–	TO ENGINE ROOM HARNESS
84A	–	TO ENGINE ROOM HARNESS
85A	–	TO ENGINE ROOM HARNESS
86A	–	TO ENGINE ROOM HARNESS
87A	–	TO ENGINE ROOM HARNESS
88A	–	TO ENGINE ROOM HARNESS
89A	–	TO ENGINE ROOM HARNESS
90A	–	TO ENGINE ROOM HARNESS
91A	–	TO ENGINE ROOM HARNESS
92A	–	TO ENGINE ROOM HARNESS
93A	–	TO ENGINE ROOM HARNESS
94A	–	TO ENGINE ROOM HARNESS
95A	–	TO ENGINE ROOM HARNESS
96A	BG	TO ENGINE ROOM HARNESS
97A	–	TO ENGINE ROOM HARNESS
98A	GR	TO ENGINE ROOM HARNESS
99A	LA/BR	TO ENGINE ROOM HARNESS
100A	G	TO ENGINE ROOM HARNESS
17	R	TO MAIN HARNESS
18	W	TO MAIN HARNESS
19	R	TO MAIN HARNESS
20	–	TO MAIN HARNESS
21	–	TO MAIN HARNESS
22	–	TO MAIN HARNESS
23	–	TO MAIN HARNESS
24	P	TO MAIN HARNESS
25	L	TO MAIN HARNESS
26	G	TO MAIN HARNESS
27	R	TO MAIN HARNESS
28	L	TO MAIN HARNESS
29	SHIELD	TO MAIN HARNESS
30	W	TO MAIN HARNESS
31	B	TO MAIN HARNESS
32	R	TO MAIN HARNESS

Connector No.	B41
Connector Name	WIRE TO WIRE
Connector Type	TH32MW-NH
Connector Color	WHITE

H.S.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

Terminal No.	Color of Wire	Signal Name
1	SB	TO MAIN HARNESS
2	SB	TO MAIN HARNESS
3	L	TO MAIN HARNESS
4	L	TO MAIN HARNESS
5	W	TO MAIN HARNESS
6	Y	TO MAIN HARNESS
7	LG	TO MAIN HARNESS
8	BG	TO MAIN HARNESS
9	BR	TO MAIN HARNESS
10	Y	TO MAIN HARNESS
11	G	TO MAIN HARNESS
12	L	TO MAIN HARNESS
13	W	TO MAIN HARNESS
14	GR	TO MAIN HARNESS
15	Y	TO MAIN HARNESS
16	P	TO MAIN HARNESS

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	B59
Connector Name	LI-ION BATTERY
Connector Type	TH24FW-NH
Connector Color	WHITE

H.S.

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24

Terminal No.	Color of Wire	Signal Name
1	SB	SIO
2	B	GND1
3	L	CAN-H
4	–	–
5	–	–
6	P	BAT
7	B	RLY2 GND
8	–	–
9	SB	PRE CHG RLY V
10	P	SDSW (+)
11	BG	RLY1 V
12	–	–
13	V	VM0
14	B	GND2
15	G	CAN-L
16	–	–
17	R	FCTL
18	LG	VIGN
19	–	–
20	–	–
21	–	–
22	Y	SDSW (-)
23	GR	RLY2 V
24	B	RLY1 GND

Connector No.	B86
Connector Name	JOINT CONNECTOR-B26
Connector Type	SAC08JW
Connector Color	WHITE

H.S.

8	7	6	5	4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	B	GROUND
2	B	GROUND
3	B	GROUND
4	B	GROUND
5	B	GROUND
6	–	–
7	–	–
8	–	–

Connector No.	E4
Connector Name	WIRE TO WIRE
Connector Type	RS08MGY-PR
Connector Color	GRAY

H.S.

1	2	3	4
5	6	7	8

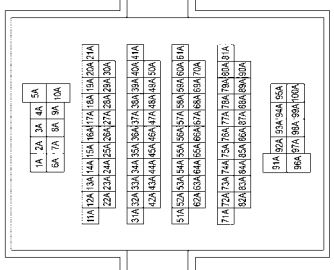
Terminal No.	Color of Wire	Signal Name
1	Y	TO ENGINE CONTROL HARNESS
2	–	TO ENGINE CONTROL HARNESS
3	L	TO ENGINE CONTROL HARNESS
4	G	TO ENGINE CONTROL HARNESS
5	–	TO ENGINE CONTROL HARNESS
6	–	TO ENGINE CONTROL HARNESS
7	–	TO ENGINE CONTROL HARNESS
8	–	TO ENGINE CONTROL HARNESS

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	E34
Connector Name	WIRE TO WIRE
Connector Type	TH80FDGY-CS16-TM4
Connector Color	GRAY

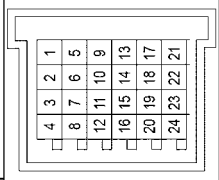
H.S.



Terminal No.	Color of Wire	Signal Name
1A	–	TO BODY HARNESS
2A	–	TO BODY HARNESS
3A	–	TO BODY HARNESS
4A	–	TO BODY HARNESS
5A	–	TO BODY HARNESS
6A	L	TO BODY HARNESS
7A	R	TO BODY HARNESS
8A	GR	TO BODY HARNESS
9A	BR	TO BODY HARNESS
10A	–	TO BODY HARNESS
11A	–	TO BODY HARNESS
12A	–	TO BODY HARNESS
13A	–	TO BODY HARNESS
14A	–	TO BODY HARNESS
15A	–	TO BODY HARNESS
16A	–	TO BODY HARNESS
17A	–	TO BODY HARNESS
18A	–	TO BODY HARNESS
19A	–	TO BODY HARNESS
20A	–	TO BODY HARNESS
21A	–	TO BODY HARNESS
22A	–	TO BODY HARNESS
23A	–	TO BODY HARNESS
24A	–	TO BODY HARNESS
25A	–	TO BODY HARNESS
26A	–	TO BODY HARNESS
27A	–	TO BODY HARNESS
28A	–	TO BODY HARNESS
29A	–	TO BODY HARNESS
30A	–	TO BODY HARNESS
31A	–	TO BODY HARNESS
32A	–	TO BODY HARNESS
33A	–	TO BODY HARNESS
34A	–	TO BODY HARNESS
35A	–	TO BODY HARNESS
36A	–	TO BODY HARNESS
37A	–	TO BODY HARNESS
38A	–	TO BODY HARNESS
39A	–	TO BODY HARNESS
40A	–	TO BODY HARNESS
41A	–	TO BODY HARNESS
42A	–	TO BODY HARNESS
43A	–	TO BODY HARNESS
44A	–	TO BODY HARNESS
45A	–	TO BODY HARNESS
46A	–	TO BODY HARNESS
47A	–	TO BODY HARNESS
48A	–	TO BODY HARNESS
49A	–	TO BODY HARNESS
50A	–	TO BODY HARNESS
51A	–	TO BODY HARNESS
52A	–	TO BODY HARNESS
53A	–	TO BODY HARNESS
54A	R	TO BODY HARNESS
55A	L	TO BODY HARNESS
56A	BR	TO BODY HARNESS
57A	W	TO BODY HARNESS
58A	V	TO BODY HARNESS
59A	Y	TO BODY HARNESS
60A	B	TO BODY HARNESS
61A	SHIELD	TO BODY HARNESS
62A	–	TO BODY HARNESS
63A	L	TO BODY HARNESS
64A	Y	TO BODY HARNESS
65A	P	TO BODY HARNESS
66A	R	TO BODY HARNESS
67A	SB	TO BODY HARNESS
68A	BG	TO BODY HARNESS
69A	GR	TO BODY HARNESS
70A	LG	TO BODY HARNESS
71A	–	TO BODY HARNESS
72A	–	TO BODY HARNESS
73A	–	TO BODY HARNESS
74A	–	TO BODY HARNESS
75A	B	TO BODY HARNESS
76A	G	TO BODY HARNESS
77A	SB	TO BODY HARNESS
78A	BG	TO BODY HARNESS
79A	LG	TO BODY HARNESS
80A	BR	TO BODY HARNESS
81A	G	TO BODY HARNESS
82A	–	TO BODY HARNESS
83A	–	TO BODY HARNESS
84A	–	TO BODY HARNESS
85A	–	TO BODY HARNESS
86A	–	TO BODY HARNESS
87A	–	TO BODY HARNESS
88A	–	TO BODY HARNESS
89A	–	TO BODY HARNESS
90A	–	TO BODY HARNESS
91A	–	TO BODY HARNESS
92A	–	TO BODY HARNESS
93A	–	TO BODY HARNESS
94A	–	TO BODY HARNESS
95A	–	TO BODY HARNESS
96A	G	TO BODY HARNESS
97A	–	TO BODY HARNESS
98A	GR	TO BODY HARNESS
99A	W	TO BODY HARNESS
100A	G	TO BODY HARNESS

Connector No.	E45
Connector Name	JOINT CONNECTOR-E03
Connector Type	NH24FW-J
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
1	B	GROUND
2	G	CAN-L
3	L	CAN-H
4	–	–
5	B	GROUND
6	G	HEV CAN-L
7	L	HEV CAN-H
8	–	–
9	B	GROUND
10	G	CAN-L
11	L	CAN-H
12	–	–
13	SHIELD	SHIELD
14	G	CAN-L
15	L	CAN-H
16	–	–
17	B	GROUND
18	G	HEV CAN-L
19	L	HEV CAN-H
20	–	–
21	B	GROUND
22	–	–
23	–	–
24	–	–

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	E120
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FGY-NH
Connector Color	GRAY

H.S.

30	29	28	27	26	25	24	23	22	21	20	19
42	41	40	39	38	37	36	35	34	33	32	31

Terminal No.	Color of Wire	Signal Name
19	LG	IGN ECM
20	–	–
21	–	–
22	P	CAN-L
23	–	–
24	L	CAN-H
25	–	–
26	–	–
27	SB	CABIN MOTOR 5
28	R	CABIN MOTOR 6
29	LG	CABIN MOTOR 7
30	Y	CABIN MOTOR 8
31	B	2ND SIGNAL GROUND
32	GR	LI PUSH SW
33	BR	AUTO STOP WIPER
34	–	–
35	–	–
36	–	–
37	–	–
38	–	–
39	L	HEV CAN-H
40	G	HEV CAN-L
41	W	CABIN MOTOR 3
42	R	CABIN MOTOR 4

Connector No.	E130
Connector Name	HPCM
Connector Type	RH24FB-RZ8-L-RH
Connector Color	BLACK

H.S.

81	85	89	93	97	101	105	109
82	86	90	94	98	102	106	110
83	87	91	95	99	103	107	111
84	88	92	96	100	104	108	112

Terminal No.	Color of Wire	Signal Name
81	R	12V BATTERY VOLTAGE
82	–	–
83	P	CAN-L
84	L	CAN-H
85	–	–
86	–	–
87	–	–
88	B	DC/DC CONVERTER VOLTAGE STABILIZER SIGNAL
89	–	–
90	–	–
91	–	–
92	–	–
93	Y	IGNITION SIGNAL
94	G	ASCD STEERING SWITCH
95	BR	ASCD STEERING SWITCH GROUND
96	–	–
97	L	HEV SYSTEM CAN-H
98	G	HEV SYSTEM CAN-L
99	R	STOP LAMP SWITCH
100	W	BRAKE PEDAL POSITION SWITCH
101	–	–
102	SB	SENSOR POWER SUPPLY
103	BR	ACCELERATOR PEDAL POSITION SENSOR 2
104	LG	SENSOR GROUND
105	BR	POWER SUPPLY FOR HPCM
106	V	SENSOR POWER SUPPLY
107	–	–
108	B	HPCM GND
109	–	–
110	GR	ACCELERATOR PEDAL POSITION SENSOR 1
111	R	SENSOR GROUND
112	GR	HPCM GND

Connector No.	E131
Connector Name	HPCM
Connector Type	RH24FGY-RZ8-R-RH
Connector Color	GRAY

H.S.

1	5	9	13	17	21	25	28
2	6	10	14	18	22	26	30
3	7	11	15	19	23	27	31
4	8	12	16	20	24	28	32

Terminal No.	Color of Wire	Signal Name
1	GR	SYSTEM MAIN RELAY 2
2	SB	PRE-CHARGE SIGNAL
3	–	–
4	BG	SYSTEM MAIN RELAY 1
5	V	SELF SHUT OFF RELAY
6	–	–
7	–	–
8	–	–
9	–	–
10	–	–
11	–	–
12	–	–
13	–	–
14	–	–
15	–	–
16	–	–
17	–	–
18	W	ELECTRIC WATER PUMP
19	–	–
20	–	–
21	B	ELECTRIC WATER PUMP (FEED BACK)
22	–	–
23	–	–
24	R	HIGH VOLTAGE COOLING WATER TEMPERATURE SENSOR
25	LG	SENSOR GROUND
26	–	–
27	–	–
28	–	–
29	–	–
30	W	CONNECTION DETECTING CIRCUIT
31	–	–
32	Y	SERVICE PLUG

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	E132
Connector Name	HPCM
Connector Type	RH40FBR-RZ8-L-RH
Connector Color	BROWN

H.S.

33	37	41	45	49	53	57	61	65	69	73	77
34	38	42	46	50	54	58	62	66	70	74	78
35	39	43	47	51	55	59	63	67	71	75	79
36	40	44	46	52	56	60	64	68	72	76	80

Terminal No.	Color of Wire	Signal Name
33	–	–
34	–	–
35	–	–
36	SB	P/N SIGNAL
37	–	–
38	–	–
39	–	–
40	–	–
41	–	–
42	–	–
43	–	–
44	–	–
45	–	–
46	–	–
47	–	–
48	–	–
49	–	–
50	B	HPCM GROUND
51	SHIELD	SHIELD
52	–	–
53	–	–
54	B	HPCM GROUND
55	–	–
56	–	–
57	B	HPCM GROUND
58	–	–
59	–	–
60	–	–
61	–	–
62	–	–
63	LG	12V BATTERY TEMPERATURE SENSOR
64	–	–
65	–	–
66	–	–
67	–	–
68	–	–
69	V	12V BATTERY CURRENT SENSOR
70	W	SENSOR GROUND
71	–	–
72	BR	SENSER POWER SUPPLY
73	–	–
74	–	–
75	–	–
76	–	–
77	L	POWER SUPPLY FOR HPCM
78	–	–
79	GR	SHIFT LOCK SOLENOID
80	–	–

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4
Connector Color	WHITE

H.S.

1J	2J	3J	4J	5J					
6J	7J	8J	9J	10J					
11J	12J	13J	14J	15J	16J	17J	18J	19J	20J	21J
22J	23J	24J	25J	26J	27J	28J	29J	30J		
31J	32J	33J	34J	35J	36J	37J	38J	39J	40J	41J
42J	43J	44J	45J	46J	47J	48J	49J	50J		
51J	52J	53J	54J	55J	56J	57J	58J	59J	60J	61J
62J	63J	64J	65J	66J	67J	68J	69J	70J		
71J	72J	73J	74J	75J	76J	77J	78J	79J	80J	81J
82J	83J	84J	85J	86J	87J	88J	89J	90J		
91J	92J	93J	94J	95J						
96J	97J	98J	99J	100J						

Terminal No.	Color of Wire	Signal Name
1J	–	TO MAIN HARNESS
2J	Y	TO MAIN HARNESS
3J	–	TO MAIN HARNESS
4J	–	TO MAIN HARNESS
5J	–	TO MAIN HARNESS
6J	–	TO MAIN HARNESS
7J	–	TO MAIN HARNESS
8J	–	TO MAIN HARNESS
9J	BR	TO MAIN HARNESS
10J	–	TO MAIN HARNESS
11J	–	TO MAIN HARNESS
12J	–	TO MAIN HARNESS
13J	–	TO MAIN HARNESS
14J	–	TO MAIN HARNESS
15J	–	TO MAIN HARNESS
16J	–	TO MAIN HARNESS
17J	–	TO MAIN HARNESS
18J	–	TO MAIN HARNESS
19J	–	TO MAIN HARNESS
20J	–	TO MAIN HARNESS
21J	GR	TO MAIN HARNESS
22J	SHIELD	TO MAIN HARNESS
23J	LG	TO MAIN HARNESS
24J	V	TO MAIN HARNESS
25J	L	TO MAIN HARNESS
26J	BR	TO MAIN HARNESS
27J	G	TO MAIN HARNESS
28J	R	TO MAIN HARNESS
29J	L	TO MAIN HARNESS
30J	V	TO MAIN HARNESS
31J	–	TO MAIN HARNESS
32J	–	TO MAIN HARNESS
33J	R	TO MAIN HARNESS
34J	L	TO MAIN HARNESS
35J	BG	TO MAIN HARNESS
36J	LG	TO MAIN HARNESS
37J	GR	TO MAIN HARNESS
38J	BR	TO MAIN HARNESS
39J	–	TO MAIN HARNESS
40J	–	TO MAIN HARNESS
41J	G	TO MAIN HARNESS
42J	W	TO MAIN HARNESS
43J	L	TO MAIN HARNESS
44J	B	TO MAIN HARNESS
45J	SB	TO MAIN HARNESS
46J	BR	TO MAIN HARNESS
47J	W	TO MAIN HARNESS
48J	W	TO MAIN HARNESS
49J	L	TO MAIN HARNESS
50J	P	TO MAIN HARNESS
51J	W	TO MAIN HARNESS
52J	R	TO MAIN HARNESS
53J	SB	TO MAIN HARNESS
54J	LG	TO MAIN HARNESS
55J	W	TO MAIN HARNESS
56J	BG	TO MAIN HARNESS
57J	R	TO MAIN HARNESS
58J	V	TO MAIN HARNESS
59J	BR	TO MAIN HARNESS
60J	P	TO MAIN HARNESS
61J	L	TO MAIN HARNESS
62J	P	TO MAIN HARNESS
63J	L	TO MAIN HARNESS
64J	R	TO MAIN HARNESS
65J	L	TO MAIN HARNESS
66J	BG	TO MAIN HARNESS
67J	–	TO MAIN HARNESS
68J	–	TO MAIN HARNESS
68J	G	TO MAIN HARNESS
70J	L	TO MAIN HARNESS
71J	–	TO MAIN HARNESS
72J	–	TO MAIN HARNESS
73J	–	TO MAIN HARNESS
74J	–	TO MAIN HARNESS
75J	–	TO MAIN HARNESS
76J	–	TO MAIN HARNESS
77J	–	TO MAIN HARNESS
78J	–	TO MAIN HARNESS
79J	SHIELD	TO MAIN HARNESS
80J	B	TO MAIN HARNESS
81J	W	TO MAIN HARNESS
82J	–	TO MAIN HARNESS
83J	–	TO MAIN HARNESS
84J	–	TO MAIN HARNESS
85J	–	TO MAIN HARNESS
86J	–	TO MAIN HARNESS
87J	–	TO MAIN HARNESS
88J	–	TO MAIN HARNESS
89J	–	TO MAIN HARNESS
90J	–	TO MAIN HARNESS
91J	–	TO MAIN HARNESS
92J	LG	TO MAIN HARNESS
93J	L	TO MAIN HARNESS
94J	L	TO MAIN HARNESS
95J	BR	TO MAIN HARNESS
96J	–	TO MAIN HARNESS
97J	GR	TO MAIN HARNESS
98J	P	TO MAIN HARNESS
99J	W	TO MAIN HARNESS
100J	Y	TO MAIN HARNESS

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	F6
Connector Name	WIRE TO WIRE
Connector Type	RS08FGY-PR
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
1	P	TO ENGINE ROOM HARNESS
2	–	TO ENGINE ROOM HARNESS
3	L	TO ENGINE ROOM HARNESS
4	G	TO ENGINE ROOM HARNESS
5	–	TO ENGINE ROOM HARNESS
6	–	TO ENGINE ROOM HARNESS
7	–	TO ENGINE ROOM HARNESS
8	–	TO ENGINE ROOM HARNESS

Connector No.	F7
Connector Name	JOINT CONNECTOR-F02
Connector Type	SAA24FB-J
Connector Color	BLACK

H.S.

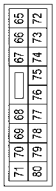


Terminal No.	Color of Wire	Signal Name
1	–	–
2	W	REFRIGERANT PRESSURE SENSOR
3	W	REFRIGERANT PRESSURE SENSOR
4	B	SENSOR GROUND
5	B	SENSOR GROUND
6	B	SENSOR GROUND
7	B	SENSOR GROUND
8	–	–
9	Y	SENSOR POWER SUPPLY
10	Y	SENSOR POWER SUPPLY
11	Y	SENSOR POWER SUPPLY
12	Y	SENSOR POWER SUPPLY
13	B	GROUND

14	SHIELD	SHIELD
15	SHIELD	SHIELD
16	SHIELD	SHIELD
17	B	GROUND
18	–	–
19	–	–
20	G	ENGINE OIL PRESSURE SENSOR
21	G	ENGINE OIL PRESSURE SENSOR
22	–	–
23	G	FUEL RAIL PRESSURE SENSOR
24	G	FUEL RAIL PRESSURE SENSOR

Connector No.	F35
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS
Connector Color	WHITE

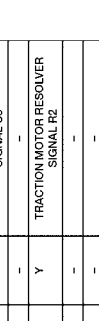
H.S.



Terminal No.	Color of Wire	Signal Name
65	–	–
66	W	ACTUATOR1 1 (3FBI)
67	V	LI ECM ACT5 DRIVER
68	–	–
69	–	–
70	R	IGN AT LPG
71	Y	IGN REVERSE SW AC VALVE
72	LG	ACTUATOR5 (3FBA)
73	G	ACTUATOR1 2 (3FB)
74	–	–
75	R	ACTUATOR3 (3FB3)
76	P	LI FUEL PUMP DRIVER
77	–	–
78	BR	ACTUATOR2 (3FB2)
79	G	LI LIGHT REVERSE SW
80	–	–

Connector No.	F36
Connector Name	TRACTION MOTOR INVERTER
Connector Type	SAZ36FB-HS4-1V-LH
Connector Color	BLACK

H.S.

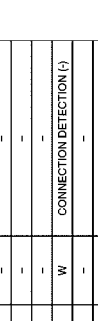


Terminal No.	Color of Wire	Signal Name
1	–	–
2	V	TRACTION MOTOR RESOLVER SIGNAL S1
3	–	–
4	G	TRACTION MOTOR RESOLVER SIGNAL R1
5	–	–
6	–	–
7	R	POWER SUPPLY (IGN)
8	–	–
9	P	CONNECTION DETECTION (+)
10	LG	TRACTION MOTOR RESOLVER SIGNAL S3
11	–	–
12	Y	TRACTION MOTOR RESOLVER SIGNAL R2
13	–	–
14	–	–
15	–	–
16	–	–
17	W	CONNECTION DETECTION (-)
18	–	–
19	–	–
20	W	TRACTION MOTOR RESOLVER SIGNAL S2
21	–	–
22	–	–
23	–	–
24	–	–
25	–	–
26	–	–
27	L	HEV SYSTEM CAN-H
28	B	TRACTION MOTOR RESOLVER SIGNAL S4
29	–	–
30	–	–
31	–	–
32	–	–
33	–	–

34	–	–
35	G	HEV SYSTEM CAN-L
36	–	–
37	B	GND
38	P	POWER SUPPLY (BAT)
39	B	GND
40	P	POWER SUPPLY (BAT)

Connector No.	F42
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH24FB-NH
Connector Color	BLACK

H.S.



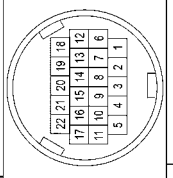
Terminal No.	Color of Wire	Signal Name
87	L	HEV CAN-H
88	G	HEV CAN-L
89	W	MOTOR CABIN 3
90	R	MOTOR CABIN 4
91	–	–
92	BG	LI NP SW
93	P	LI ECM DRIVER
94	–	–
95	–	–
96	–	–
97	–	–
98	–	–
99	BG	MOTOR CABIN 5
100	GR	MOTOR CABIN 6
101	LG	MOTOR CABIN 7
102	Y	MOTOR CABIN 8
103	W	HOOD SW2
104	–	–
105	–	–
106	BR	LO FAN RELAY2(PWM)
107	–	–
108	–	–
109	–	–
110	–	–

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	F74
Connector Name	CVT UNIT
Connector Type	RK22FGY
Connector Color	GRAY

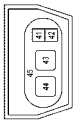
H.S.



Terminal No.	Color of Wire	Signal Name
1	BR	LINEAR SOL 1
2	V	LINEAR SOL 2
3	SB	LINEAR SOL 3
4	BG	LINEAR SOL 4
5	GR	LINEAR SOL 5
6	G	R1
7	B	S4
8	W	S2
9	LG	S3
10	V	S1
11	Y	R2
12	LG	ATF TEMP SENSOR
13	L	OIL PRES SENS (PRI)
14	R	OIL PRES SENS (SEC)
15	–	–
16	–	–
17	–	–
18	W	SENS GND
19	–	–
20	–	–
21	–	–
22	P	SENS SPLY +5 (5V)

Connector No.	H1
Connector Name	TRACTION MOTOR INVERTER
Connector Type	24340_3JV1A
Connector Color	ORANGE

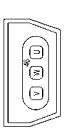
H.S.



Terminal No.	Color of Wire	Signal Name
41	–	CONNECTION DETECTION
42	–	CONNECTION DETECTION
43	O	HIGH VOLTAGE (+)
44	O	HIGH VOLTAGE (-)
45	SHIELD	SHIELD

Connector No.	H2
Connector Name	TRACTION MOTOR INVERTER
Connector Type	24340_3JV0B
Connector Color	ORANGE

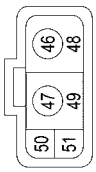
H.S.



Terminal No.	Color of Wire	Signal Name
4	SHIELD	SHIELD
U	B/O	V
V	B/W	U
W	W/B	W

Connector No.	H3
Connector Name	TRACTION MOTOR INVERTER
Connector Type	TM02FOR-3V
Connector Color	ORANGE

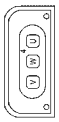
H.S.



Terminal No.	Color of Wire	Signal Name
46	O	AC COMP N
47	O	AC COMP P
48	SHIELD	SHIELD
49	SHIELD	SHIELD
50	B	CONNECTION DETECTION
51	B	CONNECTION DETECTION

Connector No.	H5
Connector Name	CVT UNIT (MOTOR GENERATOR)
Connector Type	24340_3JV0C
Connector Color	ORANGE

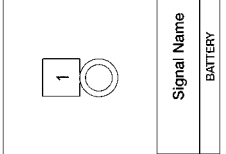
H.S.



Terminal No.	Color of Wire	Signal Name
4	SHIELD	SHIELD
U	B/O	V
V	B/W	U
W	W/B	W

Connector No.	H6
Connector Name	LI-ION BATTERY
Connector Type	24342-3JV1A
Connector Color	ORANGE

H.S.



Terminal No.	Color of Wire	Signal Name
25	O	HIGH VOLTAGE (-)
26	O	HIGH VOLTAGE (+)
27	–	CONNECTION DETECTION
28	–	CONNECTION DETECTION
29	SHIELD	SHIELD

Connector No.	H10
Connector Name	HIGH VOLTAGE FUSE, FUSIBLE LINK AND RELAY BOX
Connector Type	24340_JA04D
Connector Color	–

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	BATTERY

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1J	–	TO ENGINE ROOM HARNESS
2J	R	TO ENGINE ROOM HARNESS
3J	–	TO ENGINE ROOM HARNESS
4J	–	TO ENGINE ROOM HARNESS
5J	–	TO ENGINE ROOM HARNESS
6J	–	TO ENGINE ROOM HARNESS
7J	–	TO ENGINE ROOM HARNESS
8J	–	TO ENGINE ROOM HARNESS
9J	W	TO ENGINE ROOM HARNESS
10J	–	TO ENGINE ROOM HARNESS
11J	–	TO ENGINE ROOM HARNESS
12J	–	TO ENGINE ROOM HARNESS
13J	–	TO ENGINE ROOM HARNESS
14J	–	TO ENGINE ROOM HARNESS
15J	–	TO ENGINE ROOM HARNESS
16J	–	TO ENGINE ROOM HARNESS
17J	–	TO ENGINE ROOM HARNESS
18J	–	TO ENGINE ROOM HARNESS
19J	–	TO ENGINE ROOM HARNESS
20J	–	TO ENGINE ROOM HARNESS
21J	LA/L	TO ENGINE ROOM HARNESS
22J	SHIELD	TO ENGINE ROOM HARNESS
23J	LG	TO ENGINE ROOM HARNESS
24J	V	TO ENGINE ROOM HARNESS
25J	L	TO ENGINE ROOM HARNESS
26J	BR	TO ENGINE ROOM HARNESS
27J	G	TO ENGINE ROOM HARNESS
28J	Y	TO ENGINE ROOM HARNESS
29J	L	TO ENGINE ROOM HARNESS
30J	V	TO ENGINE ROOM HARNESS
31J	–	TO ENGINE ROOM HARNESS
32J	–	TO ENGINE ROOM HARNESS
33J	R	TO ENGINE ROOM HARNESS
33J	Y	TO ENGINE ROOM HARNESS - (WITH DRIVER ASSISTNACE SYSTEM)
34J	L	TO ENGINE ROOM HARNESS
35J	BG	TO ENGINE ROOM HARNESS
36J	GR	TO ENGINE ROOM HARNESS
37J	Y	TO ENGINE ROOM HARNESS
38J	LA/BR	TO ENGINE ROOM HARNESS
39J	–	TO ENGINE ROOM HARNESS
40J	–	TO ENGINE ROOM HARNESS
41J	LA/R	TO ENGINE ROOM HARNESS
42J	W	TO ENGINE ROOM HARNESS
43J	L	TO ENGINE ROOM HARNESS
44J	B	TO ENGINE ROOM HARNESS
45J	SB	TO ENGINE ROOM HARNESS
46J	BR	TO ENGINE ROOM HARNESS
47J	W	TO ENGINE ROOM HARNESS
48J	R	TO ENGINE ROOM HARNESS
49J	SB	TO ENGINE ROOM HARNESS
50J	GR	TO ENGINE ROOM HARNESS
51J	W	TO ENGINE ROOM HARNESS
52J	R	TO ENGINE ROOM HARNESS
53J	BR	TO ENGINE ROOM HARNESS
54J	LG	TO ENGINE ROOM HARNESS
55J	LA/Y	TO ENGINE ROOM HARNESS
56J	LA/V	TO ENGINE ROOM HARNESS
57J	LA/R	TO ENGINE ROOM HARNESS
58J	W	TO ENGINE ROOM HARNESS
59J	BR	TO ENGINE ROOM HARNESS
60J	P	TO ENGINE ROOM HARNESS
61J	L	TO ENGINE ROOM HARNESS
62J	R	TO ENGINE ROOM HARNESS
63J	L	TO ENGINE ROOM HARNESS
64J	R	TO ENGINE ROOM HARNESS
65J	L	TO ENGINE ROOM HARNESS
66J	BG	TO ENGINE ROOM HARNESS
67J	–	TO ENGINE ROOM HARNESS
68J	–	TO ENGINE ROOM HARNESS
69J	G	TO ENGINE ROOM HARNESS
70J	L	TO ENGINE ROOM HARNESS
71J	–	TO ENGINE ROOM HARNESS
72J	–	TO ENGINE ROOM HARNESS
73J	–	TO ENGINE ROOM HARNESS
74J	–	TO ENGINE ROOM HARNESS
75J	–	TO ENGINE ROOM HARNESS
76J	–	TO ENGINE ROOM HARNESS
77J	–	TO ENGINE ROOM HARNESS
78J	–	TO ENGINE ROOM HARNESS
79J	SHIELD	TO ENGINE ROOM HARNESS
80J	B	TO ENGINE ROOM HARNESS
81J	W	TO ENGINE ROOM HARNESS
82J	–	TO ENGINE ROOM HARNESS
83J	–	TO ENGINE ROOM HARNESS
84J	–	TO ENGINE ROOM HARNESS
85J	–	TO ENGINE ROOM HARNESS
86J	–	TO ENGINE ROOM HARNESS
87J	–	TO ENGINE ROOM HARNESS
88J	–	TO ENGINE ROOM HARNESS
89J	–	TO ENGINE ROOM HARNESS
90J	–	TO ENGINE ROOM HARNESS
91J	–	TO ENGINE ROOM HARNESS
92J	Y	TO ENGINE ROOM HARNESS
93J	G	TO ENGINE ROOM HARNESS
94J	L	TO ENGINE ROOM HARNESS
95J	P	TO ENGINE ROOM HARNESS
96J	–	TO ENGINE ROOM HARNESS
97J	SB	TO ENGINE ROOM HARNESS
98J	P	TO ENGINE ROOM HARNESS
99J	LA/R	TO ENGINE ROOM HARNESS
100J	R	TO ENGINE ROOM HARNESS

15	G	CAN-L
16	G	CAN-L
17	–	–
18	P	CAN-L
19	P	CAN-L
20	P	CAN-L

Connector No.	M43
Connector Name	JOINT CONNECTOR-M02
Connector Type	NH20FG-DC
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	–	–
2	–	–
3	L	CAN-H
4	L	CAN-H
5	L	CAN-H
6	–	–
7	L	CAN-H
8	L	CAN-H
9	L	CAN-H
10	–	–
11	–	–
12	–	–
13	–	–
14	G	CAN-L

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TRACTION MOTOR SYSTEM CONNECTORS

Connector No.	M69
Connector Name	WIRE TO WIRE
Connector Type	TH32FW-NH
Connector Color	WHITE

H.S.

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Terminal No.	Color of Wire	Signal Name
1	SB	TO BODY HARNESS
2	BR	TO BODY HARNESS
3	L	TO BODY HARNESS
4	L	TO BODY HARNESS
5	W	TO BODY HARNESS
6	Y	TO BODY HARNESS
7	LG	TO BODY HARNESS
8	BG	TO BODY HARNESS
9	BR	TO BODY HARNESS
10	Y	TO BODY HARNESS
11	G	TO BODY HARNESS
12	L	TO BODY HARNESS
13	W	TO BODY HARNESS
14	GR	TO BODY HARNESS
15	Y	TO BODY HARNESS
16	P	TO BODY HARNESS
17	R	TO BODY HARNESS
18	W	TO BODY HARNESS
19	R	TO BODY HARNESS
20	–	TO BODY HARNESS
21	–	TO BODY HARNESS
22	–	TO BODY HARNESS
23	–	TO BODY HARNESS
24	P	TO BODY HARNESS
25	L	TO BODY HARNESS
26	BR	TO BODY HARNESS
27	R	TO BODY HARNESS
28	L	TO BODY HARNESS
29	SHIELD	TO BODY HARNESS
30	W	TO BODY HARNESS
31	B	TO BODY HARNESS
32	R	TO BODY HARNESS

AABIA2548GB

BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000014910024

1.OBTAIN INFORMATION ABOUT SYMPTOM

Refer to TMS-53, "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-36, "Fail-Safe".
When a malfunction symptom is reproduced, the question sheet is effective. Refer to TMS-53, "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-36, "Fail-Safe".
When a malfunction symptom is reproduced, the question sheet is effective. Refer to TMS-53, "Question sheet".
Verify the relationship between the symptom and the conditions in which the malfunction described by the customer occurs.

>> GO TO 6.

5.PERFORM “DTC CONFIRMATION PROCEDURE”

Perform “DTC CONFIRMATION PROCEDURE” of the appropriate DTC to check if DTC is detected again.
Refer to TMS-37, "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 7.
NO >> Check according to GI-54, "Intermittent Incident".

6.IDENTIFY MALFUNCTIONING SYSTEM WITH “DIAGNOSIS CHART BY SYMPTOM”

Identify where to start performing the diagnosis based on possible causes and symptoms from the symptom inspection result in step 4.

>> GO TO 8.

7. REPAIR OR REPLACE THE MALFUNCTIONING PARTS

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

>> GO TO 8.

8. FINAL CHECK

Perform “DTC CONFIRMATION PROCEDURE” again to make sure that the repair is correctly performed.
Check that malfunctions are not reproduced when obtaining the malfunction information from the customer, referring to the symptom inspection result in step 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:0000000014910025

DESCRIPTION

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

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

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

Question Sheet

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

Other

ADDITIONAL SERVICE WHEN REPLACING TRACTION MOTOR INVERTER

Description

INFOID:0000000014910026

Perform the following work after the traction motor inverter is replaced. For work procedure, refer to TMS-55, "Work Procedure".

CONFIGURATION
- After replacing the traction motor inverter, it is required to set country information by using CONSULT.

RESOLVER OFFSET
- After replacing the traction motor inverter, it is required to Initializes offset values of traction motor resolver by using CONSULT.

Work Procedure

INFOID:0000000014910027

1.PERFORM CONFIGURATION

With CONSULT
1. Turn ignition switch ON.
2. Select “Re/programming, Configuration”.
3. Select “Read/Write Configuration”.
4. Select “After Replace ECU”.
5. Perform configuration according to the CONSULT display.

>> GO TO 2.

2.PERFORM RESOLVER OFFSET

Refer to TMS-56, "Description".

>> WORK END

RESOLVER OFFSET

Description

INFOID:0000000014910028

Traction motor resolver offset must be performed when the following operation is performed. For work procedure, refer to TMS-56, "Work Procedure".

- Replacement of traction motor inverter
- Replacement of transaxle assembly
- Replacement of TCM

Work Procedure

INFOID:0000000014910029

1.PERFORM RESOLVER OFFSET

With CONSULT

1. Turn ignition switch ON.
2. Select “Work Support” in “MOTOR CONTROL”.
3. Select “RESOLVER OFFSET”.
4. Perform resolver offset according to the CONSULT display.

>> GO TO 2.

2.CHECK DTC

With CONSULT

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

Is “P3266”, “P3267” detected?

YES >> Erase the detected DTC.
NO >> WORK END

HOW TO ERASE PERMANENT DTC

Description

INFOID:0000000014630858

Permanent DTC can be erased by driving each driving pattern.
ECM recognizes each driving pattern; it transmits signals to each control module when the driving is complete. Each control module erases permanent DTC based on those signals. For details, refer to HBC-107, "Description".

DTC/CIRCUIT DIAGNOSIS

P0A01 MTR ELECTRO COOLANT TEMP SEN

DTC Description

INFOID:0000000014910032

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A01	MTR ELECTRO COOLANT TEMP SEN (Motor Electronics Coolant Temperature Sensor Circuit Range/Performance)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When a difference is detected between values of coolant temperature and IGBT temperature
		Diagnosis delay time	—

POSSIBLE CAUSE

- Coolant temperature sensor
- HPCM
- IGBT
- Traction motor inverter
- High voltage cooling system

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0A01” detected?

YES >> Proceed to TMS-58, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY and wait for 300 seconds or more.
2. Check DTC.

Is “P0A01” detected?

YES >> Proceed to TMS-58, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910033

1.CHECK DTC OF HPCM

1. Turn ignition switch ON.
2. Perform “Self Diagnostic Results” in “EV/HEV”

Is any DTC detected?

YES >> Check DTC detected item. Refer to HBC-71, "DTC Index".
NO >> GO TO 2.

2.CHECK HIGH VOLTAGE COOLING SYSTEM

Check the following items.
- Inverter coolant level and leakage (Refer to HCO-9, "Inspection".)
- Electric water pump condition
- Check the coolant circulation. Refer to HCO-6, "High Voltage Cooling System".
- Sub radiator condition (Refer to HCO-8, "Inspection".)
- Cooling fan condition
- Make sure the coolant temperature is following value when malfunction occurs.

Freeze Frame Data (FFD)

INVERTER COOLANT TEMPERATURE : 95°C (203°F) or less

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Repair or replace damaged parts.

P0A1B DRIVE MOTOR A CONTROL MODULE

DTC Logic

INFOID:0000000014910034

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A1B	DRIVE MOTOR A CONTROL MODULE (Drive Motor “A” Control Module)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	• When inner power supply voltage of traction motor inverter is too low • A malfunction is detected in the traction motor inverter (motor controller)
		Diagnosis delay time	—

POSSIBLE CAUSE

- Traction motor inverter
- HPCM

FAIL-SAFE

Either of following status is observed

- Stops drive control of traction motor, and requires system main relay OFF to HPCM
- Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0A1B” detected?

YES >> Proceed to TMS-60, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P0A1B” detected?

YES >> Proceed to TMS-60, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK DTC DETECTION-3

1. Wait until the engine started.
2. Check DTC.

Is “P0A1B” detected?

YES >> Proceed to TMS-60, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910035

1.CHECK DTC OF HPCM

1. Turn ignition switch ON.
2. Perform “Self Diagnostic Results” in “EV/HEV”

Is any DTC detected?

YES >> Check DTC detected item. Refer to HBC-71, "DTC Index".
NO >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

P0A3F DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000014910036

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A3F	DRIVE MOTOR A POSITION SENSOR (Drive Motor “A” Position Sensor Circuit)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the output voltage detected by the resolver signal is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connector (Each circuit is open or shorted.)
- Traction motor
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0A3F” detected?

YES >> Proceed to TMS-62, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P0A3F” detected?

YES >> Proceed to TMS-62, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910037

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor inverter harness connector.

2. Check the continuity between traction motor inverter vehicle side harness connector terminals and ground.
CAUTION:
Never damage connector terminals.

Traction motor inverter		—	Continuity
Connector	Terminal		
F36	2	Ground	Not existed
	4		
	10		
	12		
	20		
	28		

Is the inspection result normal?

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

3. CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the CVT unit harness connector.
2. Check the continuity between traction motor inverter vehicle side harness connector terminals and CVT unit (traction motor) vehicle side harness connector terminals.
CAUTION:
Never damage connector terminals.

Traction motor inverter		CVT unit (Traction motor)		Continuity
Connector	Terminal	Connector	Terminal	
F36	2	F24	10	Existed
	4		6	
	10		9	
	12		11	
	20		8	
	28		7	

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

Traction motor inverter			Continuity
Connector	Terminal		
F36	2	4	Not existed
		10	
		12	
		20	
		28	
	4	10	
		12	
		20	
		28	
	10	12	
		20	
		28	
	12	20	
		28	
	20	28	

Is the inspection result normal?

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

4. CHECK TRACTION MOTOR RESOLVER

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

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Replace the transaxle assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-244, "Removal and Installation".

Component Inspection (Traction Motor Resolver)

INFOID:0000000014910038

1. CHECK TRACTION MOTOR RESOLVER

1. Disconnect the CVT unit (traction motor) connector.
2. Check the continuity between CVT unit (traction motor) connector terminals.

CVT unit (Traction motor)		Continuity (Reference value)
Terminal		
6	11	Existed (60 Ω or less)
7	8	Existed (200 Ω or less)
9	10	Existed (200 Ω or less)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the transaxle assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-244, "Removal and Installation".

P0A41 DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000014910039

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A41	DRIVE MOTOR A POSITION SENSOR (Drive Motor “A” Position Sensor Circuit Low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When a short circuit is detected between signals of traction motor resolver
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connector (Each circuit is open or shorted.)
- Traction motor
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0A41” detected?

YES >> Proceed to TMS-65, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P0A41” detected?

YES >> Proceed to TMS-65, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910040

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor inverter harness connector.

2. Check the continuity between traction motor inverter vehicle side harness connector terminals and ground.
CAUTION:
Never damage connector terminals.

Traction motor inverter		—	Continuity
Connector	Terminal		
F36	2	Ground	Not existed
	4		
	10		
	12		
	20		
	28		

Is the inspection result normal?

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

3. CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the CVT unit harness connector.
2. Check the continuity between traction motor inverter vehicle side harness connector terminals and CVT unit (traction motor) vehicle side harness connector terminals.
CAUTION:
Never damage connector terminals.

Traction motor inverter		CVT unit (Traction motor)		Continuity
Connector	Terminal	Connector	Terminal	
F36	2	F24	10	Existed
	4		6	
	10		9	
	12		11	
	20		8	
	28		7	

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

Traction motor inverter			Continuity
Connector	Terminal		
F36	2	4	Not existed
		10	
		12	
		20	
		28	
	4	10	
		12	
		20	
		28	
	10	12	
		20	
		28	
	12	20	
		28	
	20	28	

Is the inspection result normal?

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

4. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to TMS-67, "Component Inspection (Traction Motor Resolver)".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Replace the transaxle assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-244, "Removal and Installation".

Component Inspection (Traction Motor Resolver)

INFOID:0000000014910041

1. CHECK TRACTION MOTOR RESOLVER

1. Disconnect the CVT unit (traction motor) connector.
2. Check the continuity between CVT unit (traction motor) connector terminals.

CVT unit (Traction motor)		Continuity (Reference value)
Terminal		
6	11	Existed (60 Ω or less)
7	8	Existed (200 Ω or less)
9	10	Existed (200 Ω or less)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the transaxle assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-244, "Removal and Installation".

P0A8D 14VOLT POWER VOLTAGE

DTC Logic

INFOID:0000000014910042

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0A8D	14VOLT POWER VOLTAGE (14 Volt Power Module System Voltage Low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	If the 12V battery voltage is too low
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness, connector, or fuse (Each circuit is open.)
- Traction motor inverter
- Self shut off relay
- 12V battery
- DC/DC converter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is “P0A8D” detected?

YES >> Proceed to TMS-68, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910043

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK POWER CIRCUIT

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

CAUTION:
Never damage connector terminals.

Traction motor inverter			Voltage
Connector	Terminal		
	+	–	
F36	38	37	9 – 16 V
	40	39	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> GO TO 3.

3. DETECTION OF MALFUNCTION ITEMS

Check the following items:
- DC/DC converter (Refer to HBC-75, "Reference Value")
- Harness open circuit or short circuit between traction motor inverter vehicle side harness connector terminals and 10A fuse (# 61).
- 10A fuse (# 61)
- 50A fusible link (# E)
- Self shut off relay circuit (Refer to HBC-251, "Diagnosis Procedure")
- 12V battery

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace damaged parts.

P0AED DRIVE MOTOR INV TEMP SENSOR A

DTC Logic

INFOID:0000000014910044

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0AED	DRIVE MOTOR INV TEMP SENSOR A (Drive Motor Inverter Temperature Sensor “A” Circuit)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	If the value detected by the IGBT temperature sensor is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

- IGBT temperature sensor
- IGBT temperature detection circuit
- Traction motor inverter

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P0AED” detected?

YES >> Proceed to TMS-70, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910045

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P0BE9 D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:0000000014910046

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0BE9	D-MOTOR A PHASE V CURRENT SEN (Drive Motor “A” Phase V Current Sensor Circuit)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	If the value detected by the traction motor V-phase current sensor is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P0BE9” detected?

YES >> Proceed to TMS-71, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910047

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P0BEA D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:0000000014910048

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0BEA	D-MOTOR A PHASE V CURRENT SEN 1 (Drive Motor “A” Phase V Current Sensor Circuit Range/Performance)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	• When a difference is detected between values of traction motor V-phase current sensor 1 and current sensor 2 • If the traction motor V-phse current sensor output off set is too big
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P0BEA” detected?

YES >> Proceed to TMS-72, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910049

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P0BED D-MOTOR A PHASE W CURRENT SEN

DTC Logic

INFOID:0000000014910050

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0BED	D-MOTOR A PHASE W CURRENT SEN (Drive Motor “A” Phase W Current Sensor Circuit)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	If the value detected by the traction motor W-phase current sensor is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P0BED” detected?

YES >> Proceed to TMS-73, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910051

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P0BEE D-MOTOR A PHASE W CURRENT SEN

DTC Logic

INFOID:0000000014910052

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0BEE	D-MOTOR A PHASE W CURRENT SEN (Drive Motor “A” Phase W Current Sensor Circuit Range/Perfomance)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	• When a difference is detected between values of traction motor W-phase current sensor 1 and current sensor 2 • If the traction motor W-phse current sensor output off set is too big
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P0BEE” detected?

YES >> Proceed to TMS-74, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910053

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P0C05 DRIVE MOTOR A PHASE U-V-W

DTC Logic

INFOID:0000000014910054

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0C05	DRIVE MOTOR A PHASE U-V-W (Drive Motor “A” Phase U-V-W Circuit/ Open)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	No current flow to 3-phase harness
		Diagnosis delay time	—

POSSIBLE CAUSE

- 3-phase harness or coil (Each circuit is open)
- IGBT
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0C05” detected?

YES >> Proceed to TMS-75, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P0C05” detected?

YES >> Proceed to TMS-75, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK DTC DETECTION-3

1. Wait until the engine started.
2. Check DTC.

Is “P0C05” detected?

YES >> Proceed to TMS-75, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910055

DANGER:

Since hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are

handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1. CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 3.

3. CHECK CONNECTION CONDITION

Check the connection conditions of the 3-phase harness. Refer to TMS-132, "Exploded View".

Is the inspection result normal?

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

4. CHECK TRACTION MOTOR STATOR COIL

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-132, "Removal and Installation".
2. Check for an open circuit in the traction motor stator coil.

Traction motor inverter 3-phase			Continuity
Connector	Terminal		
H2	U	V	Existed
	V	W	
	W	U	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Replace the transaxle assembly due to malfunction in the traction motor. Refer to TM-244, "Removal and Installation".

P0C19 D-MOTOR A TORQUE DELIVERED

DTC Logic

INFOID:0000000014910056

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0C19	D-MOTOR A TORQUE DELIVERED (Drive Motor “A” Torque Delivered Performance)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When motor torque estimated from 3-phase current differs from motor torque command value
		Diagnosis delay time	—

POSSIBLE CAUSE

- 3-phase harness or coil (Each circuit is open.)
- IGBT
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0C19” detected?

YES >> Proceed to TMS-77, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P0C19” detected?

YES >> Proceed to TMS-77, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK DTC DETECTION-3

1. Wait until the engine started.
2. Check DTC.

Is “P0C19” detected?

YES >> Proceed to TMS-77, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910057

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1. CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 3.

3. CHECK CONNECTION CONDITION

Check the connection conditions of the 3-phase harness. Refer to TMS-132, "Exploded View" .

Is the inspection result normal?

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

4. CHECK TRACTION MOTOR STATOR COIL

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-132, "Removal and Installation".
2. Check for an open circuit in the traction motor stator coil.

Traction motor inverter 3-phase			Continuity
Connector	Terminal		
H2	U	V	Existed
	V	W	
	W	U	

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Replace the transaxle assembly due to malfunction in the traction motor. Refer to TM-244, "Removal and Installation".

P0C79 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000014910058

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P0C79	DRIVE MOTOR A INVERTER VOLTAGE (Drive Motor “A” Inverter Voltage Too Hight)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When high voltage value is too high
		Diagnosis delay time	—

POSSIBLE CAUSE

- High voltage harness open
- System main relay
- Service plug
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P0C79” detected?

YES >> Proceed to TMS-79, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P0C79” detected?

YES >> Proceed to TMS-79, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK DTC DETECTION-3

1. Wait until the engine started.
2. Check DTC.

Is “P0C79” detected?

YES >> Proceed to TMS-79, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910059

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK DTC HIGH VOLTAGE SYSTEMS

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

- HPCM (HBC-71, "DTC Index")
- LBC (HBB-37, "DTC Index")

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

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

3.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4.CHECK CONNECTION CONDITION

Check the connection conditions of the traction motor inverter high voltage harness connector and the 3-phase harness. Refer to TMS-132, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Repair or replace damaged parts.

P31A5 CAN ERROR

DTC Logic

INFOID:0000000014910060

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A5	CAN ERROR (CAN communication data error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- ECM
- Li-ion battery controller
- HPCM
- Traction motor inverter

FAIL-SAFE

Either of following status is observed

- Stops drive control of traction motor
- Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

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

Is “P31A5” detected?

YES >> Proceed to TMS-81, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910061

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

1. Turn ignition switch ON.

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

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

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

P31A6 CAN ERROR

DTC Logic

INFOID:0000000014910062

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A6	CAN ERROR (CAN communication data error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- ECM
- HPCM
- Traction motor inverter

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P31A6” detected?

YES >> Proceed to TMS-83, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910063

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

1. Turn ignition switch ON.
2. Perform “All DTC Reading”.
3. Check diagnosis results.

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

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

P31A8 CAN ERROR

DTC Logic

INFOID:0000000014910064

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A8	CAN ERROR (CAN communication data error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- TCM
- HPCM
- Traction motor inverter

FAIL-SAFE

Either of following status is observed

- Stops drive control of traction motor, and requires system main relay OFF to HPCM
- Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P31A8” detected?

YES >> Proceed to TMS-85, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910065

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

1. Turn ignition switch ON.
2. Perform “All DTC Reading”.

3. Check diagnosis results.

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

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

P31A9 CAN ERROR

DTC Logic

INFOID:0000000014910066

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P31A9	CAN ERROR (CAN communication data error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication.
		Diagnosis delay time	—

POSSIBLE CAUSE

- HPCM
- Li-ion battery controller
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P31A9” detected?

YES >> Proceed to TMS-87, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910067

1.CHECK DTC PRIORITY

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

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PERFORM ALL DTC READING

1. Turn ignition switch ON.
2. Perform “All DTC Reading”.
3. Check diagnosis results.

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

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

P323F D-MOTOR A PHASE W CURRENT SEN

DTC Logic

INFOID:0000000014910068

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P323F	D-MOTOR A PHASE W CURRENT SEN (Drive Motor “A” Phase W Current Sensor)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	If the value detected by the traction motor W-phase current sensor is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P323F” detected?

YES >> Proceed to TMS-89, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910069

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P3243 D-MOTOR A PHASE V CURRENT SEN

DTC Logic

INFOID:0000000014910070

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3243	D-MOTOR A PHASE U CURRENT SEN 2 (Drive Motor “A” V Phase Current Sensor Circuit Performance Error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	If the value detected by the traction motor V-phase current sensor is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P3243” detected?

YES >> Proceed to TMS-90, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910071

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P3244 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000014910072

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3244	DRIVE MOTOR A INVERTER (Drive Motor “A” Inverter Voltage Sensor Performance)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When a difference is detected between high voltage values of traction motor inverter and li-ion battery controller
		Diagnosis delay time	—

POSSIBLE CAUSE

- High voltage harness open
- System main relay
- Service plug
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P3244” detected?

YES >> Proceed to TMS-91, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P3244” detected?

YES >> Proceed to TMS-91, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910073

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK DTC HIGH VOLTAGE SYSTEMS

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

- HPCM (HBC-71, "DTC Index")
- LBC (HBB-37, "DTC Index")

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

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

3.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4.CHECK CONNECTION CONDITION

Check the connection condition of the traction motor inverter high voltage harness connector. Refer to TMS-132, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Repair or replace damaged parts.

P3245 DRIVE MOTOR A INVERTER

DTC Logic

INFOID:0000000014910074

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3245	DRIVE MOTOR A INVERTER (Drive Motor “A” Inverter VoltageSensor Circuit)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When high voltage value is an abnormality
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Not changed from normal driving.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P3245” detected?

YES >> Proceed to TMS-93, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910075

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P3246 DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000014910076

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3246	DRIVE MOTOR A INVERTER VOLTAGE (Drive Motor “A” Inverter Voltage Too Low)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When high voltage value is too low
		Diagnosis delay time	—

POSSIBLE CAUSE

- High voltage harness open
- System main relay
- Service plug
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P3246” detected?

YES >> Proceed to TMS-94, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P3246” detected?

YES >> Proceed to TMS-94, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK DTC DETECTION-3

1. Wait until the engine started.
2. Check DTC.

Is “P3246” detected?

YES >> Proceed to TMS-94, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910077

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK DTC HIGH VOLTAGE SYSTEMS

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

- HPCM (HBC-71, "DTC Index")
- LBC (HBB-37, "DTC Index")

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

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

3.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4.CHECK CONNECTION CONDITION

Check the connection conditions of the traction motor inverter high voltage harness connector and the 3-phase harness. Refer to TMS-132, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Repair or replace damaged parts.

P324A DRIVE MOTOR A INVERTER VOLTAGE

DTC Logic

INFOID:0000000014910078

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P324A	DRIVE MOTOR A INVERTER VOLTAGE (Drive Motor “A” Inverter Charge Error)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When high voltage is not changed during charging condenser
		Diagnosis delay time	—

POSSIBLE CAUSE

- High voltage harness open
- System main relay
- Traction motor inverter
- Li-ion battery controller

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is “P324A” detected?

YES >> Proceed to TMS-96, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P324A” detected?

YES >> Proceed to TMS-96, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910079

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**

- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK DTC HIGH VOLTAGE SYSTEMS

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

- HPCM (HBC-71, "DTC Index")
- LBC (HBB-37, "DTC Index")

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

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

3.PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 4.

4.CHECK CONNECTION CONDITION

Check the connection condition of the traction motor inverter high voltage harness connector. Refer to TMS-132, "Exploded View".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Repair or replace damaged parts.

P324D DRIVE MOTOR A INVERTER IGBT

DTC Logic

INFOID:0000000014910080

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P324D	DRIVE MOTOR A INVERTER IGBT [Drive Motor “A” Inverter IGBT Over Load (Over Current/Over Temperature)]	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	• When an over current has occurred in the IGBT energizing current • When IGBT temperature is too high • When IGBT power supply voltage is too low
		Diagnosis delay time	—

POSSIBLE CAUSE

- 3-phase harness or coil (Each circuit is short)
- High voltage cooling system
- 12V battery
- Traction motor
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P324D” detected?

YES >> Proceed to TMS-99, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P324D” detected?

YES >> Proceed to TMS-99, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK DTC DETECTION-3

1. Wait until the engine started.
2. Check DTC.

Is “P324D” detected?

YES >> Proceed to TMS-99, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910081

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK DTC HIGH VOLTAGE COOLING SYSTEM

1. Set the vehicle to READY and wait for 10 seconds or more.
2. Perform “Self Diagnostic Results” in “EV/HEV”.

Is any DTC detected?

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

3.CHECK COOLANT WATER

Check the high voltage coolant level and check for coolant leakage. Refer to HCO-9, "Inspection".

Is the inspection result normal?

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

4.CHECK COOLANT HOSE

Check for clogging of fluid paths and twisting of hoses in traction motor inverter and transaxle assembly. Refer to HCO-6, "High Voltage Cooling System".

Is the inspection result normal?

YES >> 1. Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
2. If a malfunction still occurs after replacement of the traction motor inverter, replace transaxle assembly. Refer to TM-244, "Removal and Installation".
NO >> Repair or replace damaged parts.

P3266 RESOLVER OFFSET

DTC Logic

INFOID:0000000014910082

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3266	RESOLVER OFFSET (Resolver Offset)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	Resolver offset value stored in the traction motor inverter differs from a resolver offset value received from TCM via CAN communication
		Diagnosis delay time	—

POSSIBLE CAUSE

The initialization of resolver offset value is incomplete after the replacement of traction motor inverter, TCM, or transaxle assembly

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is “P3266” detected?

YES >> Proceed to TMS-100, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910083

1.PERFORM RESOLVER OFFSET

Perform resolver offset. Refer to TMS-56, "Description".

>> WORK END

P3267 RESOLVER OFFSET

DTC Logic

INFOID:0000000014910084

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3267	RESOLVER OFFSET (Resolver Offset)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	The initialization of resolver offset values of traction motor inverter and TCM are complete
		Diagnosis delay time	—

POSSIBLE CAUSE

Resolver offset value is not written in TCM

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is “P3267” detected?

YES >> Proceed to TMS-101, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910085

1.CHECK TRANSAXLE

Check the work performed before “P3267” is detected and securely perform “ADDITIONAL SERVICE” according to the work.

Replaced the TCM>>Refer to TM-93, "Description".
Replaced the transaxle assembly>>Refer to TM-95, "Description".
Replaced the TCM and transaxle assembly>>Refer to TM-97, "Description".

P3268 RESOLVER SIGNAL

DTC Logic

INFOID:0000000014910086

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3268	RESOLVER SIGNAL (Resolver Signal)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When the output voltage detected by the resolver signal is abnormal
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connector (Each circuit is open or shorted.)
- Traction motor
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P3268” detected?

YES >> Proceed to TMS-102, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P3268” detected?

YES >> Proceed to TMS-102, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910087

1.CHECK CONNECTION CONDITION

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

Is the inspection result normal?

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

2.CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the traction motor inverter harness connector.

2. Check the continuity between traction motor inverter vehicle side harness connector terminals and ground.
CAUTION:
Never damage connector terminals.

Traction motor inverter		—	Continuity
Connector	Terminal		
F36	2	Ground	Not existed
	4		
	10		
	12		
	20		
	28		

Is the inspection result normal?

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

3. CHECK TRACTION MOTOR RESOLVER CIRCUIT

1. Disconnect the CVT unit harness connector.
2. Check the continuity between traction motor inverter vehicle side harness connector terminals and CVT unit (traction motor) vehicle side harness connector terminals.
CAUTION:
Never damage connector terminals.

Traction motor inverter		CVT unit (Traction motor)		Continuity
Connector	Terminal	Connector	Terminal	
F36	2	F74	10	Existed
	4		6	
	10		9	
	12		11	
	20		8	
	28		7	

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

Traction motor inverter			Continuity
Connector	Terminal		
F36	2	4	Not existed
		10	
		12	
		20	
		28	
	4	10	
		12	
		20	
		28	
	10	12	
		20	
		28	
	12	20	
		28	
	20	28	

Is the inspection result normal?

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

4. CHECK TRACTION MOTOR RESOLVER

Check the traction motor resolver. Refer to TMS-104, "Component Inspection (Traction Motor Resolver)".

Is the inspection result normal?

YES >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".
NO >> Replace the transaxle assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-244, "Removal and Installation".

Component Inspection (Traction Motor Resolver)

INFOID:0000000014910088

1. CHECK TRACTION MOTOR RESOLVER

1. Disconnect the CVT unit (traction motor) connector.
2. Check the continuity between CVT unit (traction motor) connector terminals.

CVT unit (Traction motor)		Continuity (Reference value)
Terminal		
6	11	Existed (60 Ω or less)
7	8	Existed (200 Ω or less)
9	10	Existed (200 Ω or less)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the transaxle assembly due to malfunction in the traction motor resolver (traction motor). Refer to TM-244, "Removal and Installation".

P3269 DRIVE MOTOR A POSITION SENSOR

DTC Logic

INFOID:0000000014910089

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P3269	DRIVE MOTOR A POSITION SENSOR (Drive Motor “A” Position Sensor)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor resolver detection circuit malfunctions
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION-1

1. Turn ignition switch ON.
2. Check DTC.

Is “P3269” detected?

YES >> Proceed to TMS-105, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK DTC DETECTION-2

1. Set the vehicle to READY.
2. Check DTC.

Is “P3269” detected?

YES >> Proceed to TMS-105, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910090

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P326C EEPROM

DTC Logic

INFOID:0000000014910091

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P326C	EEPROM (Electronically Erasable and Programmable Read only Memory)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	A malfunction is detected in the traction motor inverter (EEPROM)
		Diagnosis delay time	—

POSSIBLE CAUSE

Traction motor inverter

FAIL-SAFE

Either of following status is observed

- Stops drive control of traction motor
- Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P326C” detected?

YES >> Proceed to TMS-106, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910092

1.REPLACE TRACTION MOTOR INVERTER

Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

>> WORK END

P326D RESOLVER OFFSET

DTC Logic

INFOID:0000000014910093

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
P326D	RESOLVER OFFSET (Resolver Offset)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter cannot receive a resolver offset value via HEV system CAN communication from TCM
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open)
- TCM
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor, and requires system main relay OFF to HPCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “P326D” detected?

YES >> Proceed to TMS-107, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910094

1.CHECK DTC OF TCM

1. Turn ignition switch ON.
2. Perform “Self Diagnostic Results” in “TRANSMISSION”.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TM-70, "DTC Index".
NO >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

U0100 LOST COMMUNICATION ECM

DTC Logic

INFOID:0000000014910095

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U0100	LOST COMMUNICATION ECM (Lost Communication With ECM/PCM "A")	Diagnosis condition	When ignition switch is ON
		Signal (terminal)	CAN communication signal
		Threshold	Traction motor inverter cannot receive a CAN communication signal from ECM
		Diagnosis delay time	—

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted.)

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If "DTC CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Perform "INSPECTION MODE 5". Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform "All DTC Reading".
4. Check DTC of "MOTOR CONTROL".

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in "MOTOR CONTROL" at the time of receiving.)>> GO TO 3.
NO-2 (Confirmation after repair)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT

1. Perform "CAN Diagnosis".
2. Check diagnosis results.

>> Go to TMS-108, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014910096

CAUTION:

- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-16, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check "CAN Diagnosis" results).

Are there any current or past malfunctions?

YES >> Refer to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit, traction motor inverter branch lines*1, and HPCM branch lines) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U0101 LOST COMMUNICATION TCM

DTC Logic

INFOID:0000000014910097

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U0101	LOST COMMUNICATION TCM (Lost Communication With TCM)	Diagnosis condition	When ignition switch is ON
		Signal (terminal)	CAN communication signal
		Threshold	Traction motor inverter cannot receive a CAN communication signal from TCM
		Diagnosis delay time	—

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted.)

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Confirmation after repair)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT

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

>> Go to TMS-110, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014910098

CAUTION:

- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-16, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN Diagnosis” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit, traction motor inverter branch lines*1, and HPCM branch lines) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U0111 LOST COMMUNICATION LBC

DTC Logic

INFOID:0000000014910099

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U0111	LOST COMMUNICATION LBC (Lost Communication Lithium-ion Battery Controller)	Diagnosis condition	When ignition switch is ON
		Signal (terminal)	CAN communication signal
		Threshold	When traction motor inverter cannot receive a CAN communication signal from Li-ion battery controller
		Diagnosis delay time	—

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted.)

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Confirmation after repair)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT

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

>> Go to TMS-112, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014910100

CAUTION:

- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-16, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN Diagnosis” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit, traction motor inverter branch lines*1, and HPCM branch lines) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U0293 LOST COMMUNICATION HCM

DTC Logic

INFOID:0000000014910101

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U0293	LOST COMMUNICATION HCM (Lost Communication With Hybrid Powertrain Control Module)	Diagnosis condition	When ignition switch is ON
		Signal (terminal)	CAN communication signal
		Threshold	Traction motor inverter cannot receive a CAN communication signal from HPCM
		Diagnosis delay time	—

POSSIBLE CAUSE

Harness or connectors (CAN communication line is open or shorted.)

FAIL-SAFE

Either of following status is observed

- Stops drive control of traction motor
- Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

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

YES >> GO TO 3.
NO-1 (DTC U0100, U0101, U0111, or U0293 is stored in “MOTOR CONTROL” at the time of receiving.)>> GO TO 3.
NO-2 (Repaired after performing TMS-114, "Diagnosis Procedure".)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

With CONSULT

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

>> Go to TMS-114, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014910102

CAUTION:

- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-16, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN Diagnosis” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> GO TO 2.

2. IDENTIFY MALFUNCTIONING PART

WITH CONSULT
Check “Self Diagnostic Result” of “MOTOR CONTROL”.

Detected DTC	Malfunction part
DTC U0100, U0101, U0111 and U0293	• CAN communication system (Short circuit, traction motor inverter branch lines*1, and HPCM branch lines) • ECM • HPCM • TCM • LBC • Traction motor inverter
DTC U0100	• ECM branch lines*2 • ECM
DTC U0101	• TCM branch lines • TCM
DTC U0111	• LBC branch lines • LBC
DTC U0293	• HPCM branch lines • HPCM*3

NOTE:
- *1: If DTC “U0110” is detected by “EV/HEV”, check traction motor inverter branch lines first.
- *2: If DTC “U0293” is detected by “ENGINE”, check ECM branch lines first.
- *3: When replacing HPCM, replace li-ion battery together with HPCM.

>> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U1000 CAN COMM CIRCUIT

DTC Logic

INFOID:0000000014910103

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

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1000	CAN COMMUNICATION CIRCUIT (CAN communication line)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When CAN communication signals continuously cannot be transmitted
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (CAN communication line is open or shorted.)
- Traction motor inverter

FAIL-SAFE

Stops drive control of traction motor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is “U1000” detected?

YES >> Proceed to TMS-116, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910104

For the diagnosis procedure, refer to LAN-26, "Trouble Diagnosis Flow Chart".

U1321 CONFIG UNFINISH

DTC Logic

INFOID:0000000014910105

DTC DETECTION LOGIC

CAUTION:
If this DTC is detected, then vehicle must be driven at traction motor speed 3,000 rpm or less.

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1321	CONFIG UNFINISH (Configuration Unfinish)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When configuration data memorized by traction motor inverter is the initial value
		Diagnosis delay time	—

POSSIBLE CAUSE

The configuration data has not been written to the traction motor inverter

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “U1321” detected?

YES >> Proceed to TMS-117, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910106

CAUTION:
If this DTC is detected, then vehicle must be driven at traction motor speed 3,000 rpm or less.

1.PERFORM CONFIGURATION

Programming the configuration data to the traction motor inverter. Refer to TMS-55, "Description".

>> GO TO 2.

2.CHECK DTC DETECTION

Perform DTC confirmation procedure. Refer to TMS-117, "DTC Logic".

>> INSPECTION END

U150E CAN ERROR

DTC Logic

INFOID:0000000014910107

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U150E	CAN ERROR (CAN communication data error))	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication
		Diagnosis delay time	—

POSSIBLE CAUSE

BCM

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.CONFIRM DTC PRIORITY

If DTC U150E is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “U150E” detected?

YES >> Proceed to TMS-118, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910108

1.CONFIRM DTC PRIORITY

If DTC U150E is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.REPLACE BCM

Replace the BCM. Refer to BCS-73, "Removal and Installation".

>> INSPECTION END

U1513 CAN ERROR

DTC Logic

INFOID:0000000014910109

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1513	CAN ERROR (CAN communication data error))	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication
		Diagnosis delay time	—

POSSIBLE CAUSE

Combination meter

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.CONFIRM DTC PRIORITY

If DTC U1513 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “U1513” detected?

YES >> Proceed to TMS-119, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910110

1.CONFIRM DTC PRIORITY

If DTC U1513 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.REPLACE COMBINATION METER

Replace the combination meter. Refer to MWI-81, "Removal and Installation".

>> INSPECTION END

U1920 CAN ERROR

DTC Logic

INFOID:0000000014910111

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1920	CAN ERROR (CAN communication data error))	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	When traction motor inverter detected data error of CAN communication
		Diagnosis delay time	—

POSSIBLE CAUSE

Combination meter

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.CONFIRM DTC PRIORITY

If DTC U1920 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 3.

3.CHECK DTC DETECTION

1. Turn ignition switch ON.
2. Check DTC.

Is “U1920” detected?

YES >> Proceed to TMS-120, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910112

1.CONFIRM DTC PRIORITY

If DTC U1920 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.

Is any DTC detected?

YES >> Check DTC detected item. Refer to TMS-38, "DTC Index".
NO >> GO TO 2.

2.REPLACE COMBINATION METER

Replace the combination meter. Refer to MWI-81, "Removal and Installation".

>> INSPECTION END

U1921 CAN ERROR

DTC Logic

INFOID:0000000014910113

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1921	CAN ERROR (CAN communication data error))	Diagnosis condition	When ignition switch is ON
		Signal (terminal)	CAN communication signal
		Threshold	Traction motor inverter cannot receive a CAN communication signal from combination meter
		Diagnosis delay time	—

POSSIBLE CAUSE

Harness or connector
(CAN communication line is open or shorted.)

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U1921 detected?

YES >> GO TO 3.
NO-1 (DTC U1921 is stored in “MOTOR CONTROL” at the time of receiving.)>>GO TO 3.
NO-2 (Confirmation after repair)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

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

>> Go to TMS-121, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014910114

CAUTION:
- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-16, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN Diagnosis” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U1922 CAN ERROR

DTC Logic

INFOID:0000000014910115

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U1922	CAN ERROR (CAN communication data error))	Diagnosis condition	When ignition switch is ON
		Signal (terminal)	CAN communication signal
		Threshold	Traction motor inverter cannot receive a CAN communication signal from BCM
		Diagnosis delay time	—

POSSIBLE CAUSE

Harness or connector
(CAN communication line is open or shorted.)

FAIL-SAFE

Not changed from normal driving

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT
1. Perform “INSPECTION MODE 5”. Refer to HBC-113, "Description".
2. Start engine and wait at least 5 seconds.
3. Perform “All DTC Reading”.
4. Check DTC of “MOTOR CONTROL”.

Is the DTC U1922 detected?

YES >> GO TO 3.
NO-1 (DTC U1922 is stored in “MOTOR CONTROL” at the time of receiving.)>>GO TO 3.
NO-2 (Confirmation after repair)>>INSPECTION END

3.PERFORM CAN DIAGNOSIS

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

>> Go to TMS-123, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000014910116

CAUTION:
- **To perform diagnosis, observe the cautions in performing diagnoses. Refer to LAN-16, "Precautions for Trouble Diagnosis".**
- **To repair harnesses, observe the cautions in repairing harnesses. Refer to LAN-16, "Precautions for Harness Repair".**

1.START INSPECTION

Check for malfunctions (Check “CAN Diagnosis” results).

Are there any current or past malfunctions?

YES >> Refer to LAN-26, "Trouble Diagnosis Flow Chart".
NO >> Because of intermittent malfunction, check malfunctioning parts, based on the intermittent incident. Refer to GI-54, "Intermittent Incident".

U300A IGNITION SWITCH

DTC Logic

INFOID:0000000014910117

DTC DETECTION LOGIC

DTC	CONSULT screen terms (Trouble diagnosis content)	DTC detection condition	
U300A	IGNITION SWITCH (Ignition Switch)	Diagnosis condition	—
		Signal (terminal)	—
		Threshold	Ignition signal recognized by HPCM differs from the one recognized by traction motor inverter
		Diagnosis delay time	—

POSSIBLE CAUSE

- Harness or connectors (Circuit is open)
- HPCM
- Traction motor inverter

FAIL-SAFE

Not changed from normal driving.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If “DTC CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.CHECK DTC DETECTION

With CONSULT

1. Turn ignition switch ON.
2. Check DTC.

Is “U300A” detected?

YES >> Proceed to TMS-125, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-54, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000014910118

1.CHECK POWER CIRCUIT OF TRACTION MOTOR INVERTER

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

Traction motor inverter		—	Condition	Voltage (Approx.)
Connector	Terminal			
F36	7	Ground	Turn ignition switch ON	9 – 16 V
			Turn ignition switch OFF	0 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECTION OF MALFUNCTION ITEMS

Check the following items:
- Open circuit or short circuit in harness between IPDM E/R harness connector terminal 71 and traction motor inverter harness connector terminal 7.
- Harness open circuit or short circuit between IPDM E/R and ignition switch
- 10A fuse (# 87, IPDM E/R)
- Ignition switch
- IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace damaged parts.

3. CHECK POWER CIRCUIT OF HPCM

Check power circuit. Refer to HBC-117, "HPCM : Diagnosis Procedure".

Is the inspection result normal?

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

4. CHECK DTC OF HPCM

1. Turn ignition switch ON.
2. Perform “Self Diagnostic Results” in “EV/HEV”

Is any DTC detected?

YES >> Check DTC detected item. Refer to HBC-71, "DTC Index".
NO >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

TRACTION MOTOR INSULATION RESISTANCE CHECK

Component Inspection

INFOID:0000000014910119

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 2.

2. CHECK TRACTION MOTOR INSULATION RESISTANCE

WARNING:

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

1. Disconnect the 3-phase harness from the traction motor inverter. Refer to TMS-132, "Removal and Installation".
2. Use 500V range of insulation resistance tester to measure insulation resistance. Wait for 30 seconds until the value becomes stable.

   CAUTION:

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

Traction motor inverter 3-phase		Ground	Resistance
Connector	Terminal		
H2	U	Transaxle housing case	20 MΩ or more
	V		
	W		

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the transaxle assembly due to malfunction in the traction motor. Refer to TM-244, "Removal and Installation".

TRACTION MOTOR INVERTER INSULATION RESISTANCE CHECK

Component Inspection

INFOID:0000000014910120

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Never allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

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

1. PRECONDITIONING

WARNING:

Follow the instructions below before starting the procedure.

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".
2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

>> GO TO 2.

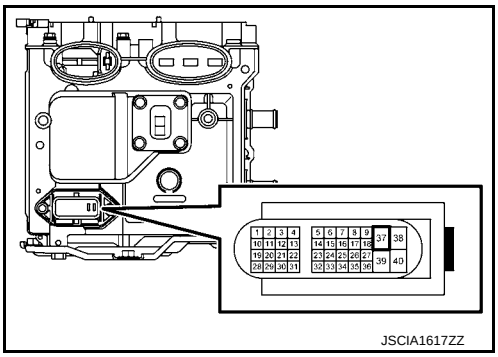
2. CHECK TRACTION MOTOR INVERTER INSULATION RESISTANCE

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. Disconnect the traction motor inverter harness connector, 3-phase harness and high voltage harness from traction motor inverter. Refer to TMS-132, "Removal and Installation".
2. Short out between terminals shown below.

- Between traction motor inverter connector terminal 37 and traction motor inverter case.

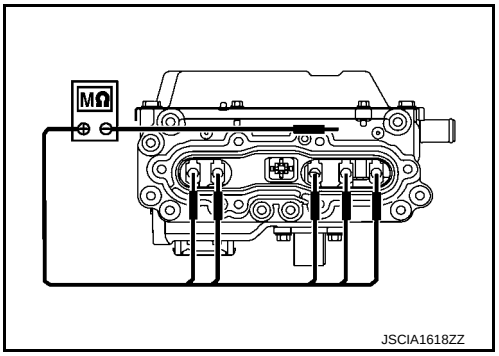


3. Use 500V range of insulation resistance tester to measure insulation resistance.

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.**
- **Wait for 30 seconds until the value becomes stable.**

+	–	Resistance
High voltage terminal	Traction motor inverter case	1.8 MΩ or more
3-phase harness jack		



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace the traction motor inverter. Refer to TMS-132, "Removal and Installation".

SYMPTOM DIAGNOSIS

ELECTROMAGNETIC NOISE IS AUDIBLE

DESCRIPTION

INFOID:0000000014910122

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

ELECTRIC WATER PUMP OPERATING NOISE IS AUDIBLE

DESCRIPTION

INFOID:0000000014910123

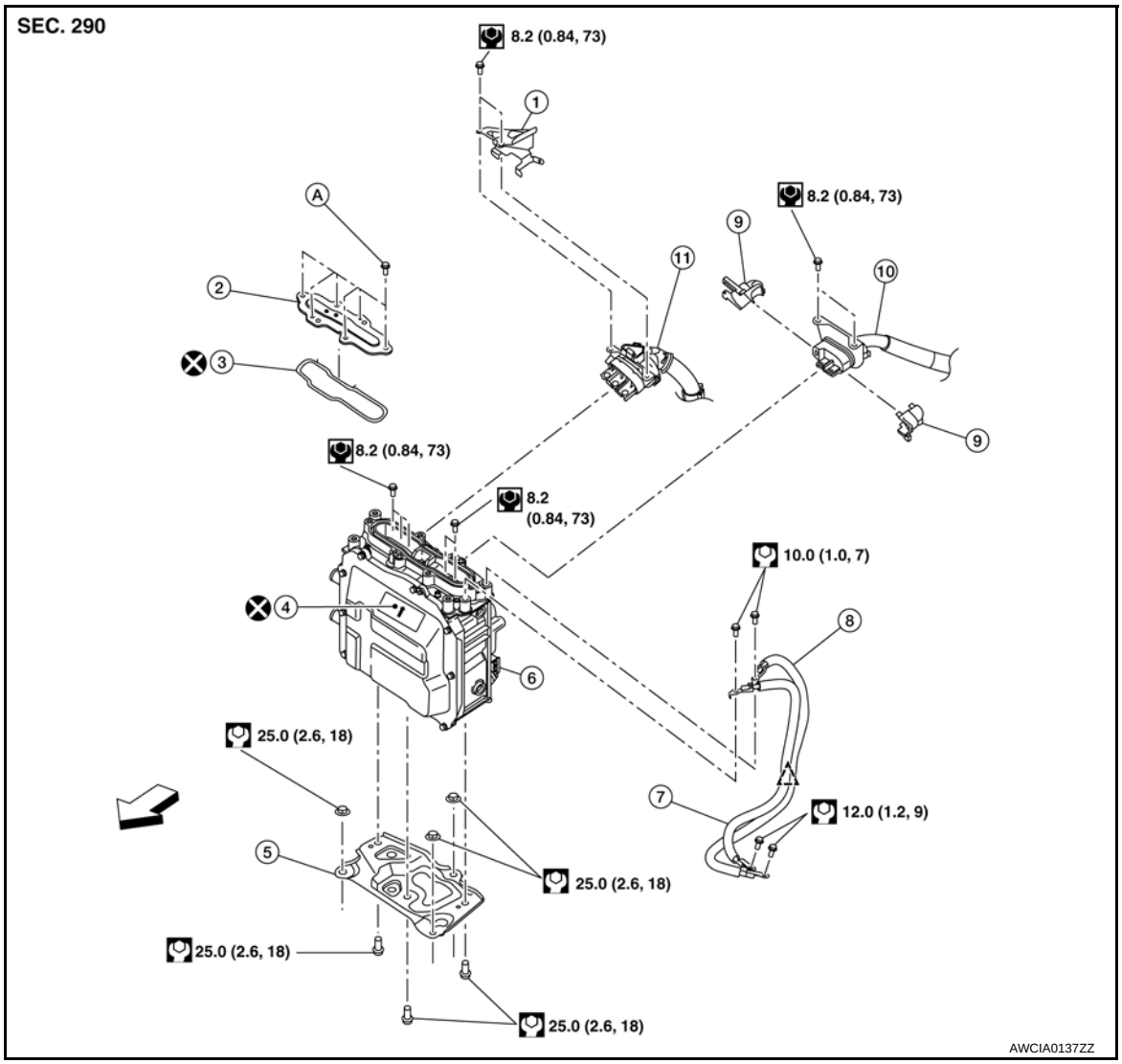
After performing a heavy-load driving, such as driving up a hill, driving noise of electric water pump may be generated for approximately three minutes even when the ignition switch is turned OFF. This is a characteristic of drive motor inverter and a normal operation.

REMOVAL AND INSTALLATION

TRACTION MOTOR INVERTER

Exploded View

INFOID:0000000014630941



1.	3-phase harness cover	2.	High voltage cover	3.	High voltage cover gasket
4.	High voltage warning label	5.	Traction motor inverter bracket	6.	Traction motor inverter
7.	Ground wire 1	8.	Ground wire 2	9.	High voltage harness cover
10.	High voltage harness	11.	3-phase harness	A.	Refer to INSTALLATION
⇦	Front	△	Clip		

Removal and Installation

INFOID:0000000014630942

DANGER:

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

WARNING:

- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **The removed service plug must always be carried in a pocket of the responsible worker or placed in the tool box during the procedure to prevent the plug from being connected by mistake.**
- **Be sure to wear insulating protective equipment before beginning work on the high voltage system.**
- **Do not allow workers other than the responsible person to touch the vehicle containing high voltage parts. To keep others from touching the high voltage parts, these parts must be covered with an insulating sheet except when using them.**
- **Refer to TMS-4, "High Voltage Precautions".**

CAUTION:

Do not bring the vehicle into the READY status with the service plug removed unless otherwise instructed in the Service Manual. A malfunction may occur if this is not observed.

NOTE:

When removing components such as hoses, tubes/lines, etc., cap or plug opening to prevent fluid from spilling.

REMOVAL

1. Disconnect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".

   WARNING:

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

   - **Disconnect high voltage circuit before checking voltage in high voltage circuit.**

2. Check voltage in high voltage circuit. Refer to GI-31, "Check Voltage in High Voltage Circuit".

   WARNING:

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

   - **Check voltage in high voltage circuit before draining the high voltage coolant.**

3. Drain the high voltage cooling system coolant. Refer to HCO-9, "Draining and Refilling".

   WARNING:

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

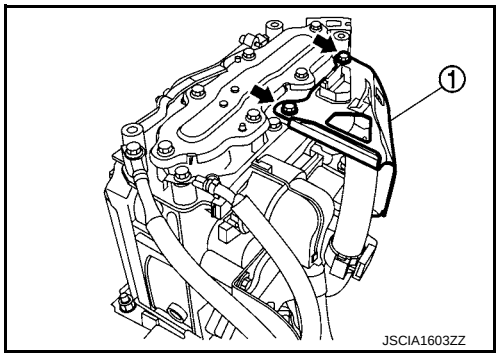
   

4. Remove bolts (⬅) and 3-phase harness cover (1).

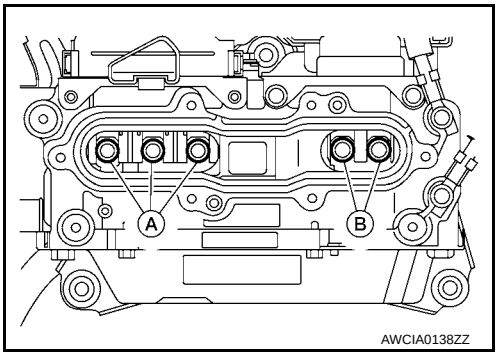
   WARNING:

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



5. Remove 3-phase bus bar bolts (A) and high voltage bus bar bolts (B).



WARNING:

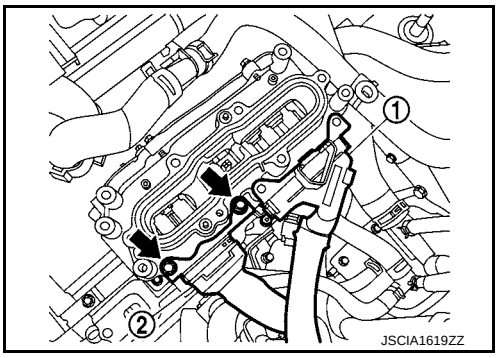
To prevent electric shock hazards, be sure to wear protective gear.



CAUTION:

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

6. Remove bolts (⬅) and 3-phase harness connector (1) and high voltage harness connector (2).



WARNING:

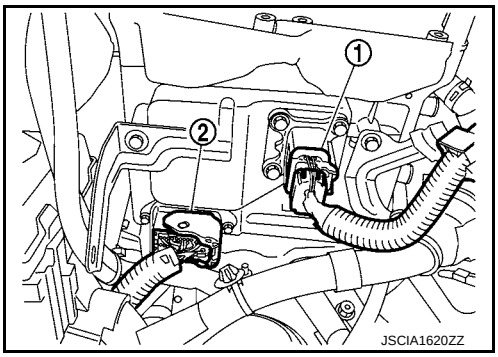
To prevent electric shock hazards, be sure to wear protective gear.



CAUTION:

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

7. Remove electric compressor high voltage harness connector (1) and traction motor inverter harness connector (2).



WARNING:

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



8. Remove each harness from harness bracket, and then remove harness bracket.

WARNING:

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



9. Remove water hoses (1) and (2).

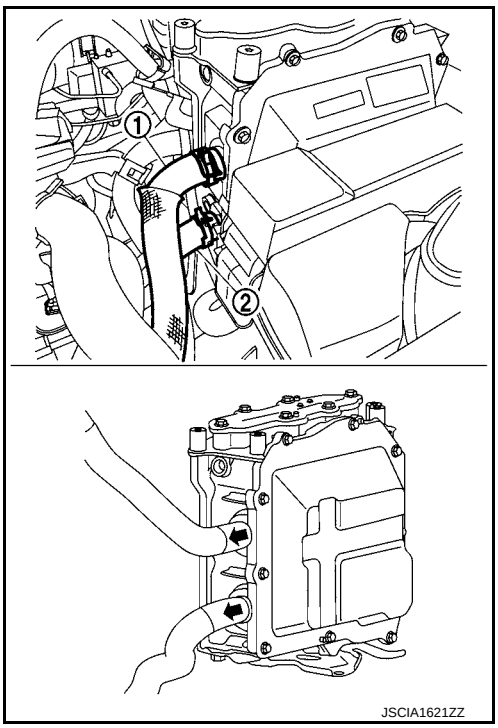
WARNING:

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



CAUTION:

- **Do not damage pipe connector. Take care to pull water hoses straight out in the direction shown, or pipe connector will be damaged.**
- **Do not use any sharp tools to remove water hoses, or pipe connector will be damaged.**
- **Do not apply any load to pipe connector with tool, or pipe connector will become crushed.**
- **Do not apply any side load to pipe connector, or pipe connector will become deformed.**
- **Do not apply any excessive load to pipe connector, or pipe connector will bend.**
- **Take care that coolant does not contact the high voltage harness connector or 3-phase harness connector.**
- **To prevent performance degradation, if coolant contacts a high voltage harness connector or 3-phase harness connector, immediately dry the high voltage harness connector or 3-phase harness connector completely with an air blow gun.**

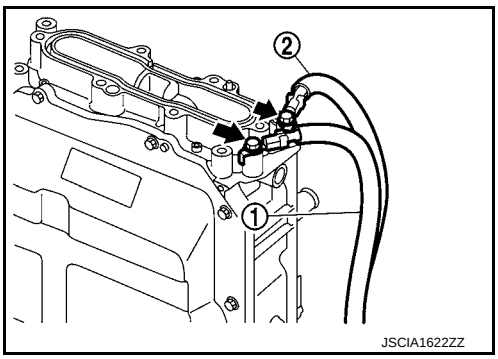


10. Remove bolts (⬅) and ground wires (1) and (2).

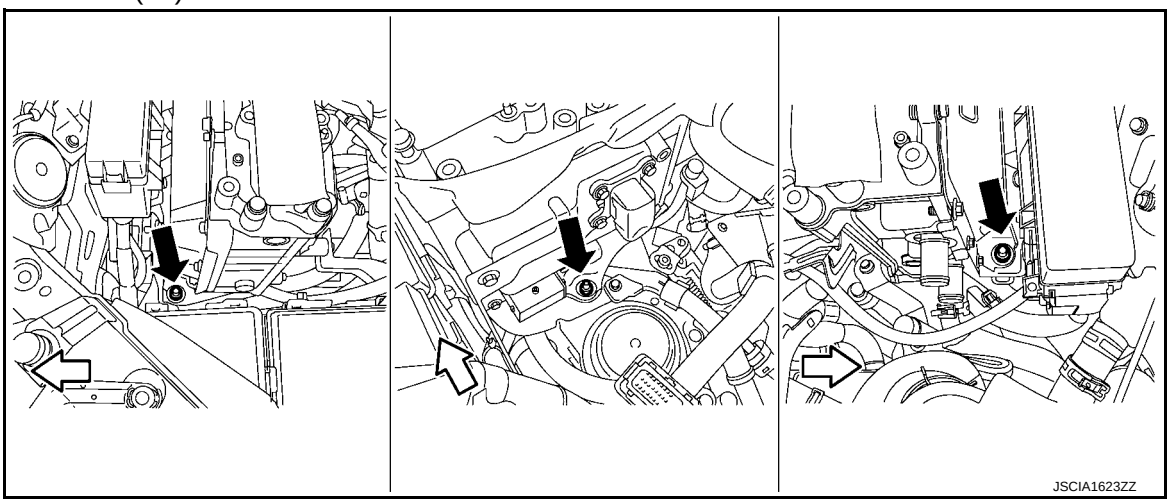
WARNING:

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





11. Remove nuts (⬅) and traction motor inverter.



⇦ : Front

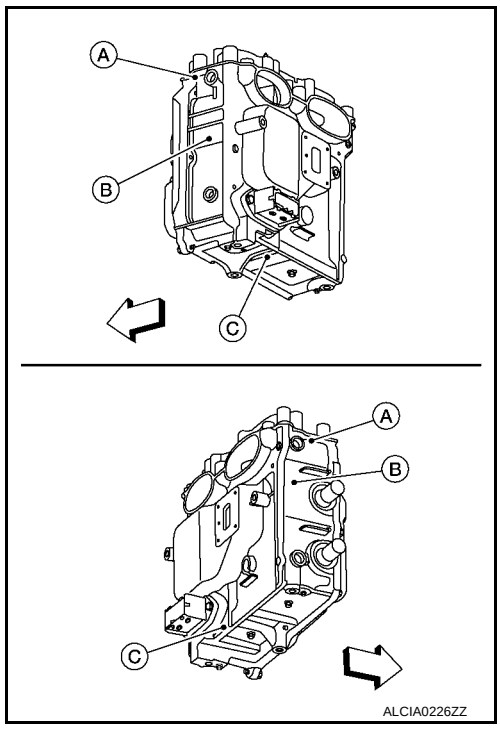
WARNING:

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

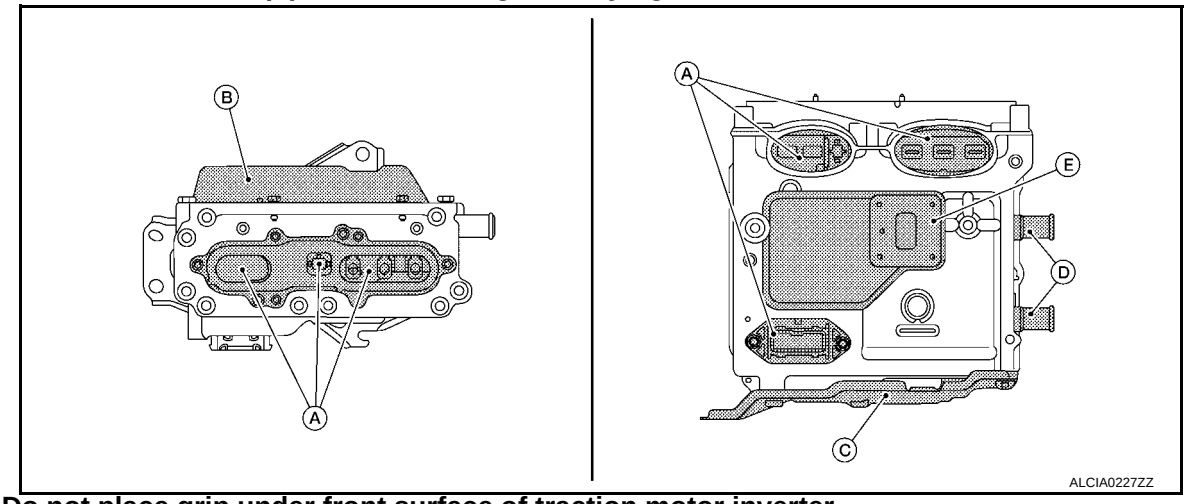
CAUTION:

- **When carrying traction motor inverter, grip the following positions.**

(A) : Side grip
(B) : Side surface
(C) : Lower surface
⇦ : Front

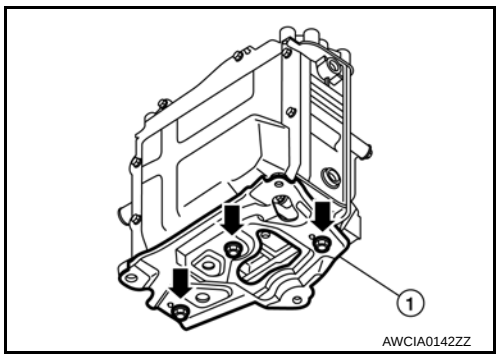


- **Do not grip the hole for suitable tool or harness connection points and openings (A), pipe connectors (D), steel panel (B), traction motor inverter bracket and mounting point (C) and boss section of rear surface (E) when removing or carrying traction motor inverter.**



- **Do not place grip under front surface of traction motor inverter.**

12. Remove bolts (⬅) and traction motor inverter bracket (1).



INSTALLATION

1. If the traction motor inverter was replaced, first make sure that there is no dust or dirt on the surface of the traction motor inverter.

WARNING:

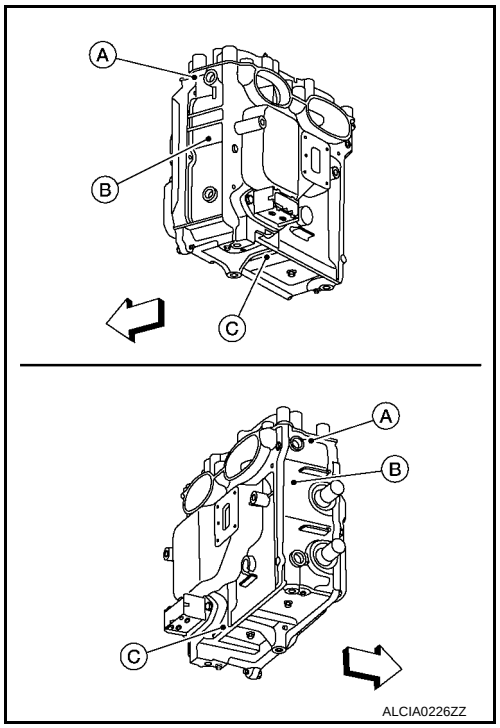
To prevent electric shock hazards, be sure to wear protective gear.



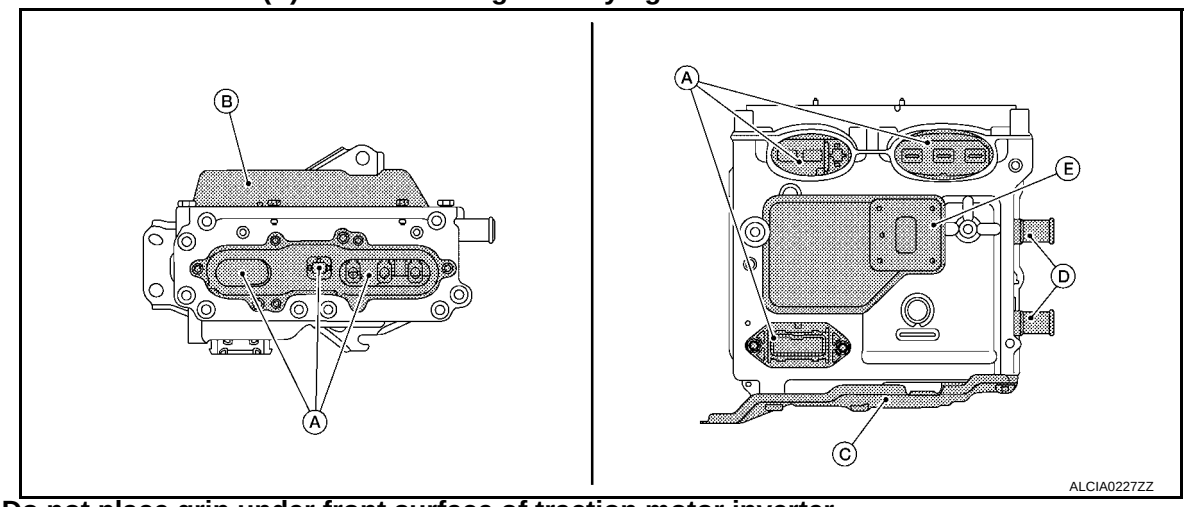
CAUTION:

- **When carrying traction motor inverter, grip the following positions.**

(A) : Side grip
(B) : Side surface
(C) : Lower surface
⇦ : Front



- **Do not grip the hole for suitable tool or harness connection points and openings (A), pipe connectors (D), steel panel (B), traction motor inverter bracket and mounting point (C) and boss section of rear surface (E) when installing or carrying traction motor inverter.**



- **Do not place grip under front surface of traction motor inverter.**

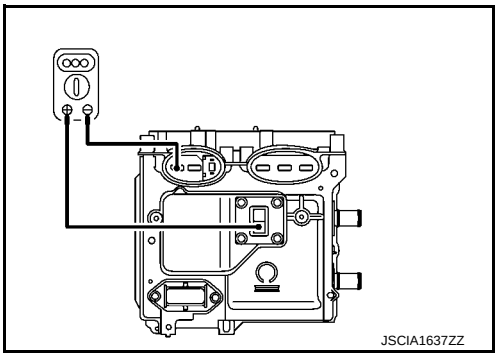
2. Check continuity of fuse with continuity test range of tester as shown before installing traction motor inverter.

Continuity : Exists

WARNING:

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





3. If the traction motor inverter was replaced, apply the high voltage warning label (1) as shown, with the direction indicated by the arrow facing up.

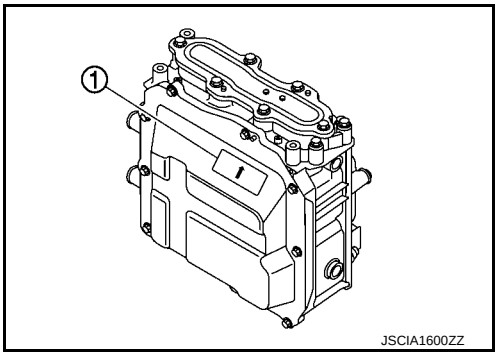
WARNING:

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



CAUTION:

Do not reuse high voltage warning label.

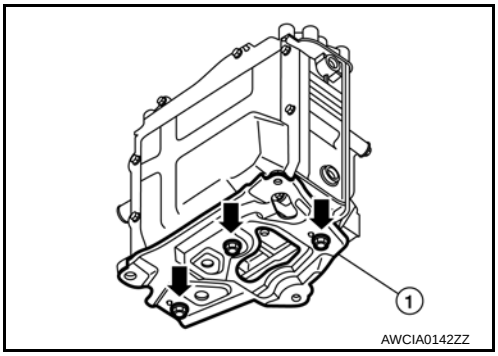


4. Install traction motor inverter bracket (1) and bolts (⬅).

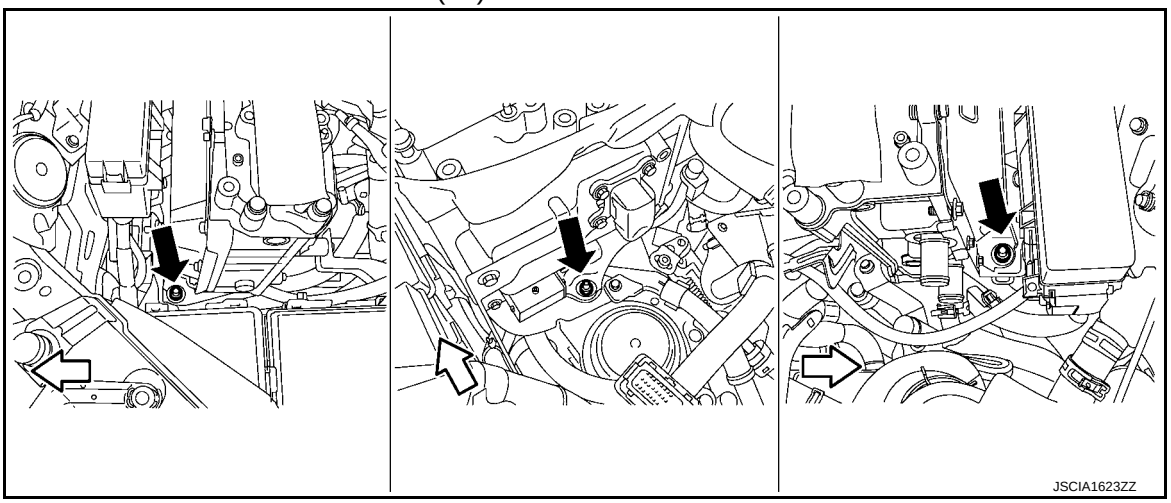
WARNING:

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





5. Install traction motor inverter and nuts (⬅).



⇦ : Front

WARNING:

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

6. Install harness bracket.

WARNING:

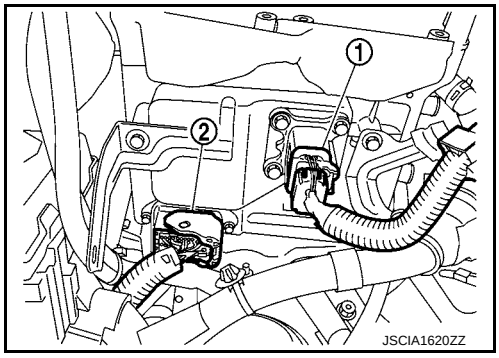
To prevent electric shock hazards, be sure to wear protective gear.

7. Install each harness to harness bracket.

WARNING:

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

8. Install electric compressor high voltage harness connector (1) and traction motor inverter harness connector (2).



WARNING:

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

9. Make sure high voltage harness connector clips and 3-phase harness connector clips are in their original positions and not damaged.

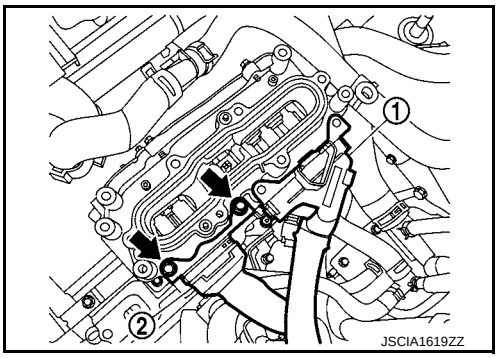
WARNING:

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

CAUTION:

Make sure the high voltage harness connector clips and 3-phase harness connector clips are in their original positions. If a clip is damaged, replace it with a new clip before installing harnesses.

10. Remove tape and install the high voltage harness connector (2) and 3-phase harness connector (1) to traction motor inverter. Install bolts (⬅).

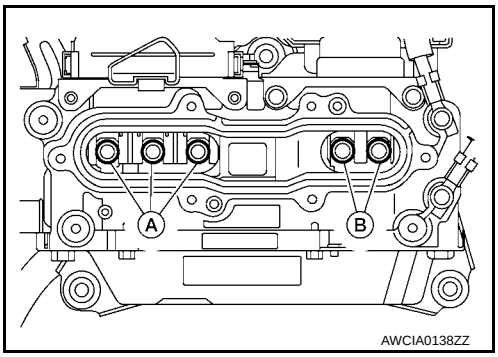


WARNING:

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



11. Remove tape and install 3-phase bus bar bolts (A) and high voltage bus bar bolts (B).

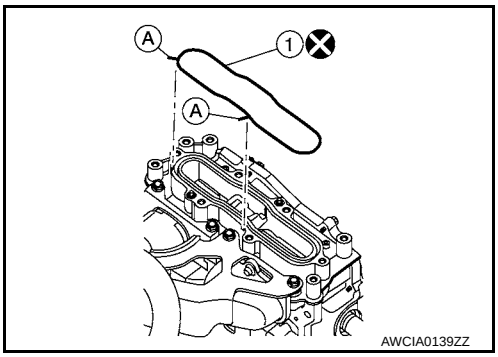


WARNING:

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



12. Align tabs (A) and install high voltage cover gasket (1) to traction motor inverter.



WARNING:

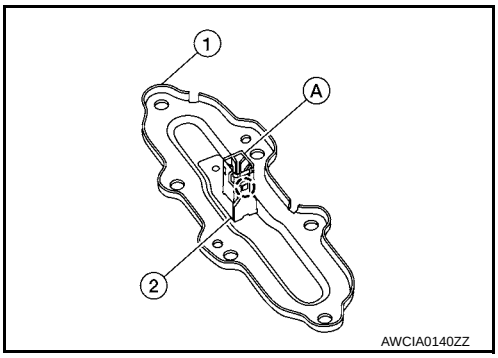
To prevent electric shock hazards, be sure to wear protective gear.



CAUTION:

Do not reuse high voltage cover gasket.

13. Insert the connector (A) to the metal panel (2) of the high voltage cover (1).



: Pawl

WARNING:

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

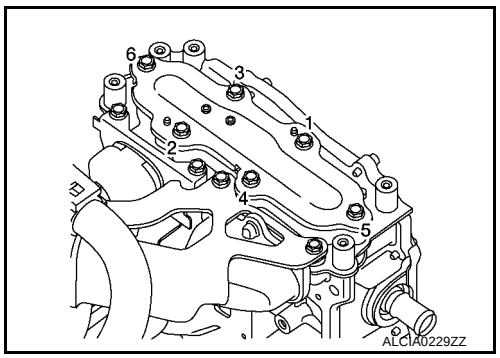


CAUTION:

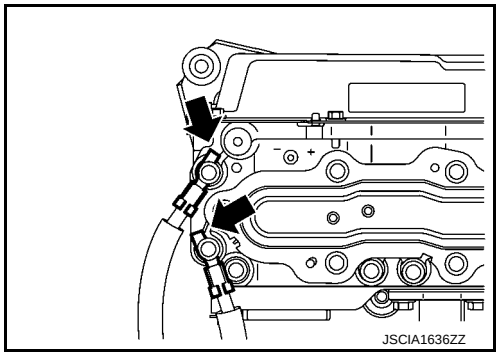
- **Do not twist or bend metal panel when inserting the connector.**
- **Do not use oil on the connector.**

14. Install high voltage cover and bolts. Tighten bolts in numerical order as shown.

High voltage cover bolt torque : 10.0 N·m (1.0 kg–m, 7 ft–lb)



15. Align the grounding wire terminals as shown (⬅). Install bolts.

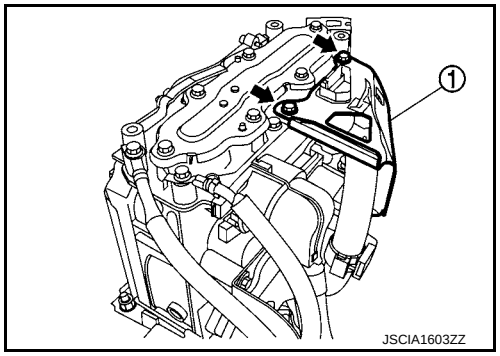


16. Install 3-phase harness cover (1) and bolts (⬅).

WARNING:

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





17. Install water hoses in the direction shown (⬅).

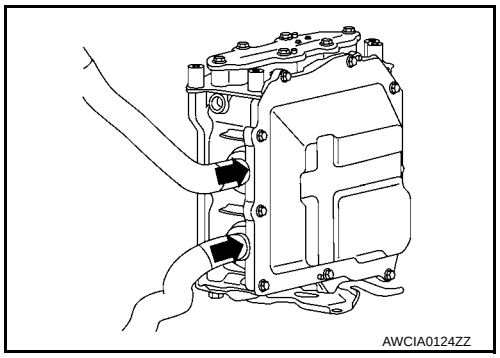
WARNING:

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



CAUTION:

- **Do not damage pipe connector. Take care to install water hoses straight in the direction shown, or pipe connector will be damaged.**
- **Do not use any sharp tools to install water hoses, or pipe connector will be damaged.**
- **Do not apply any load to pipe connector with tool, or pipe connector will become crushed.**
- **Do not apply any side load to pipe connector, or pipe connector will become deformed.**
- **Do not apply any excessive load to pipe connector, or pipe connector will bend.**
- **Take care that coolant does not contact the high voltage harness connector or 3-phase harness connector.**
- **To prevent performance degradation, if coolant contacts a high voltage harness connector or 3-phase harness connector, immediately dry the high voltage harness connector or 3-phase harness connector completely with an air blow gun.**



18. Refill the high voltage cooling system coolant. Refer to HCO-9, "Draining and Refilling".

WARNING:

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



19. Perform INSPECTION AFTER INSTALLATION. Refer to TMS-142, "Inspection".

WARNING:

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



20. Connect high voltage circuit. Refer to GI-29, "How to Disconnect High Voltage".

WARNING:

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



21. Perform ADDITIONAL SERVICE WHEN REPLACING TRACTION MOTOR INVERTER. Refer to TMS-55, "Description".

WARNING:

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



Inspection

INFOID:0000000014630943

INSPECTION AFTER INSTALLATION

EQUIPOTENTIAL TEST

After installing traction motor inverter, measure resistance below.

WARNING:

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



- Between the upper surface (aluminum) of traction motor inverter and upper surface (aluminum) of transaxle assembly (aluminum).

Standard : 0.1 Ω or less

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

Standard : 0.05 Ω or less

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