SECTION EVC
EV CONTROL SYSTEM

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HOW TO USE THIS MANUAL

APPLICATION NOTICE

How to Check VCM Group

INFOID:0000000008525518

The control specification depends on a VCM part number identified by “ECU Identification” of CONSULT. For reason, VCM numbers in this manual are divided into a number of groups as follows:
NOTE:
The numbers shown below are old numbers. Those not included are described as “except for Group XX”.

Group A

VCM part number
- 237D0 3NA0B – 237D0 3NA0E
- 237D0 3NA1A – 237D0 3NA1C

Group B

VCM part number
237D0 3NA2A, 237D0 3NA1D

PRECAUTION

PRECAUTIONS

Precaution for Technicians Using Medical Electric

INFOID:0000000007633634

OPERATION PROHIBITION

WARNING:

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

NORMAL CHARGE PRECAUTION

WARNING:

- **If a technician uses a medical electric device such as an implantable cardiac pacemaker or an implantable cardioverter defibrillator, the possible effects on the devices must be checked with the device manufacturer before starting the charge operation.**
- **As radiated electromagnetic wave generated by on board charger at normal charge operation may effect medical electric devices, a technician using a medical electric device such as implantable cardiac pacemaker or an implantable cardioverter defibrillator must not enter the vehicle compartment (including luggage room) during normal charge operation.**

PRECAUTION AT TELEMATICS SYSTEM OPERATION

WARNING:

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

PRECAUTION AT INTELLIGENT KEY SYSTEM OPERATION

WARNING:

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

Point to Be Checked Before Starting Maintenance Work

INFOID:0000000007633635

The high voltage system may starts automatically. It is required to check that the timer air conditioner and timer charge (during EVSE connection) are not set before starting maintenance work.
NOTE:
If the timer air conditioner or timer charge (during EVSE connection) is set, the high voltage system starts automatically even when the power switch is in OFF state.

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

INFOID:0000000007633636

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS

system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

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

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

WARNING:

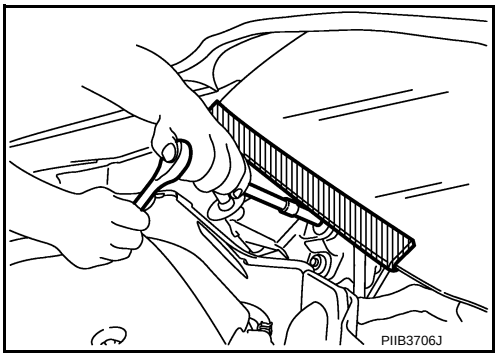
Always observe the following items for preventing accidental activation.

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

Precaution for Procedure without Cowl Top Cover

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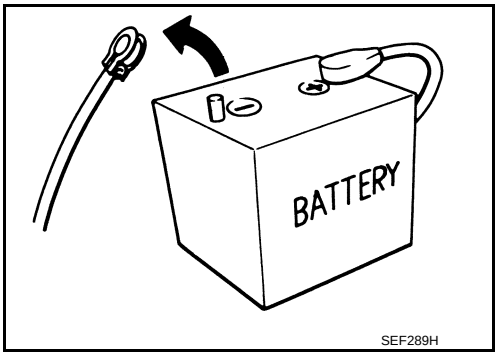
When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions for Removing Battery Terminal

INFOID:0000000007633638

- When removing the 12V battery terminal, turn OFF the power switch and wait at least 5 minutes.
  NOTE:
  ECU may be active for several minutes after the power switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- Always disconnect the battery terminal within 60 minutes after turning OFF the power switch. Even when the power switch is OFF, the 12V battery automatic charge control may automatically start after a lapse of 60 minutes from power switch OFF.
- Disconnect 12V battery terminal according to the following steps.



WORK PROCEDURE

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

3. Check that the charge status indicator lamp does not blink and wait for 5 minutes or more.
   NOTE:
   If the battery is removed within 5 minutes after the power switch is turned OFF, plural DTCs may be detected.
4. Remove 12V battery terminal within 60 minutes after turning the power switch OFF → ON → OFF.
   CAUTION:
   - **After all doors (including back door) are closed, if a door (including back door) is opened before battery terminals are disconnected, start over from Step 1.**
   - **After turning the power switch OFF, if "Remote A/C" is activated by user operation, stop the air conditioner and start over from Step 1.**

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

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

High Voltage Precautions

INFOID:0000000007633639

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:

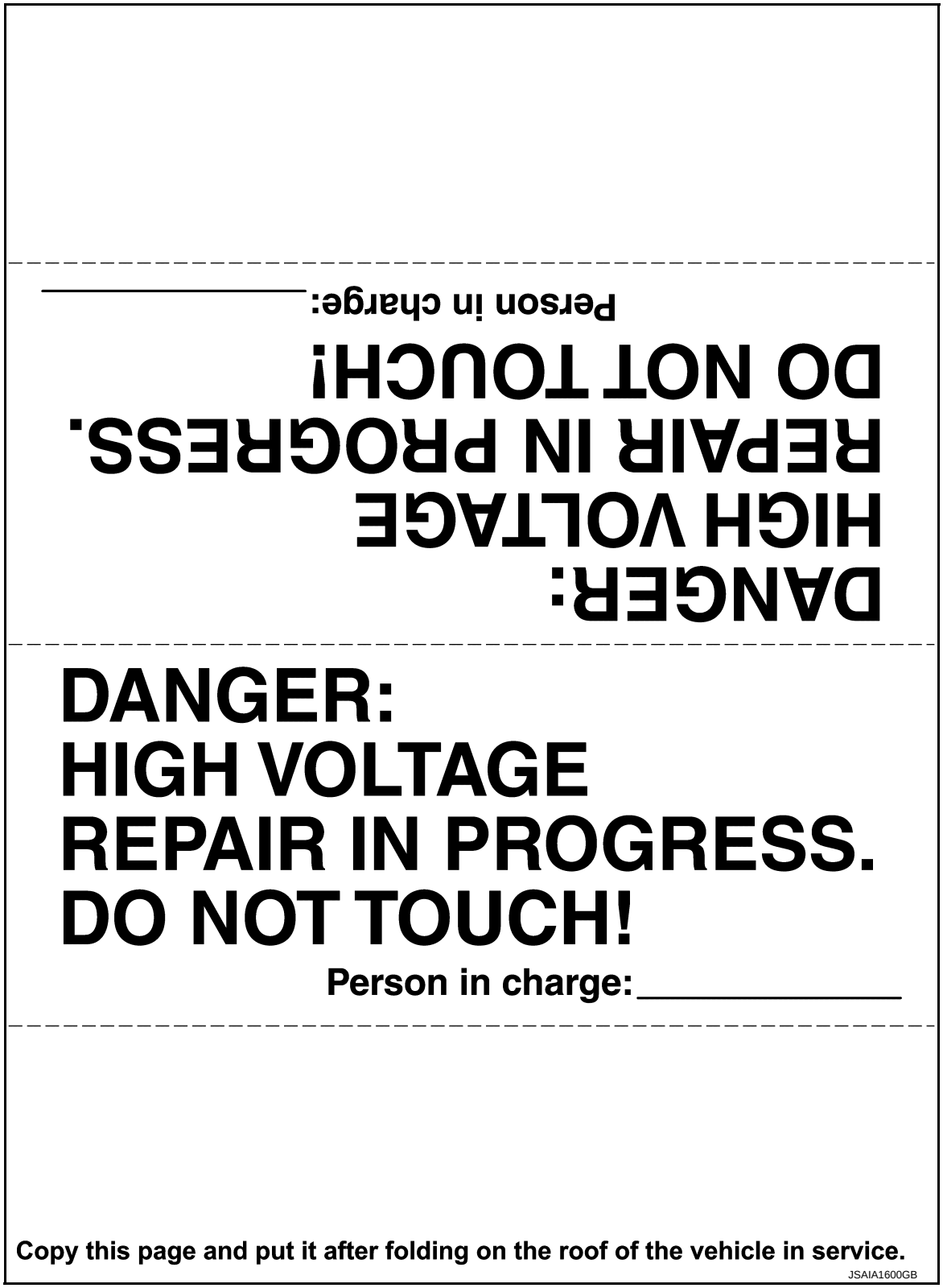
The vehicle contains parts that contain powerful magnets. If a person who is wearing a heart pacemaker or other medical device is close to these parts, the medical device may be affected by the magnets. Such persons must not perform work on the vehicle.

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”

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

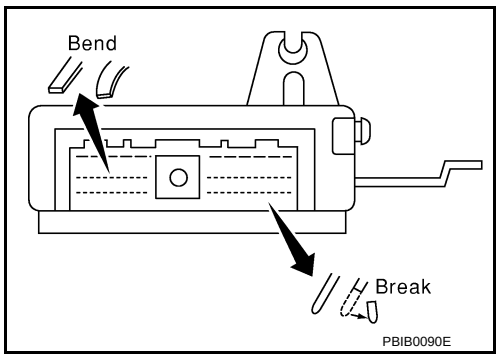


General Precautions

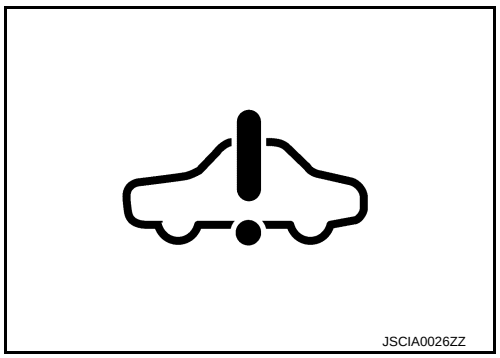
INFOID:0000000007633640

- **Never disassemble VCM and DC/DC junction box.**
- **If the 12V battery is disconnected, the diagnostic information will be lost within 3 minutes.**

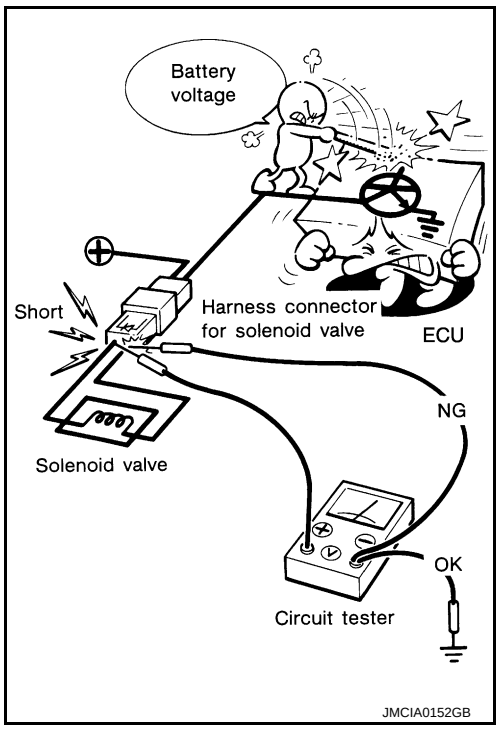
- **When connecting or disconnecting harness connectors into or from VCM, take care not to damage pin terminals (bend or break).**
  Check that there are not any bends or breaks on VCM pin terminal, when connecting harness connectors.



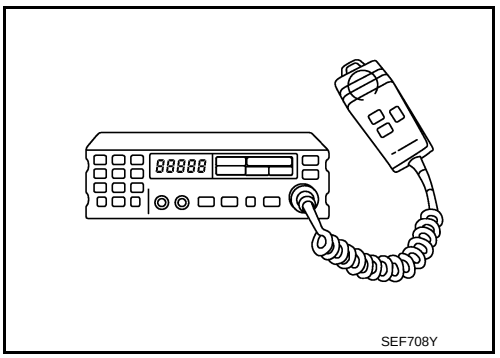
- **After performing each TROUBLE DIAGNOSIS, perform DTC confirmation procedure or Component Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



- **When measuring ECU signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECU power transistor.



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Do not let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**

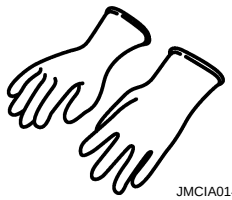
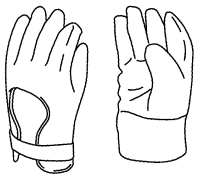
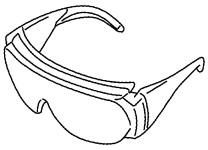
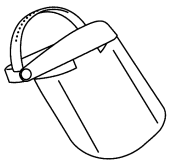


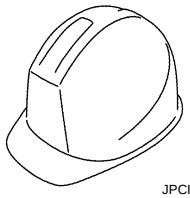
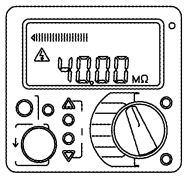
PREPARATION

PREPARATION

Commercial Service Tools

INFOID:0000000007633641

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

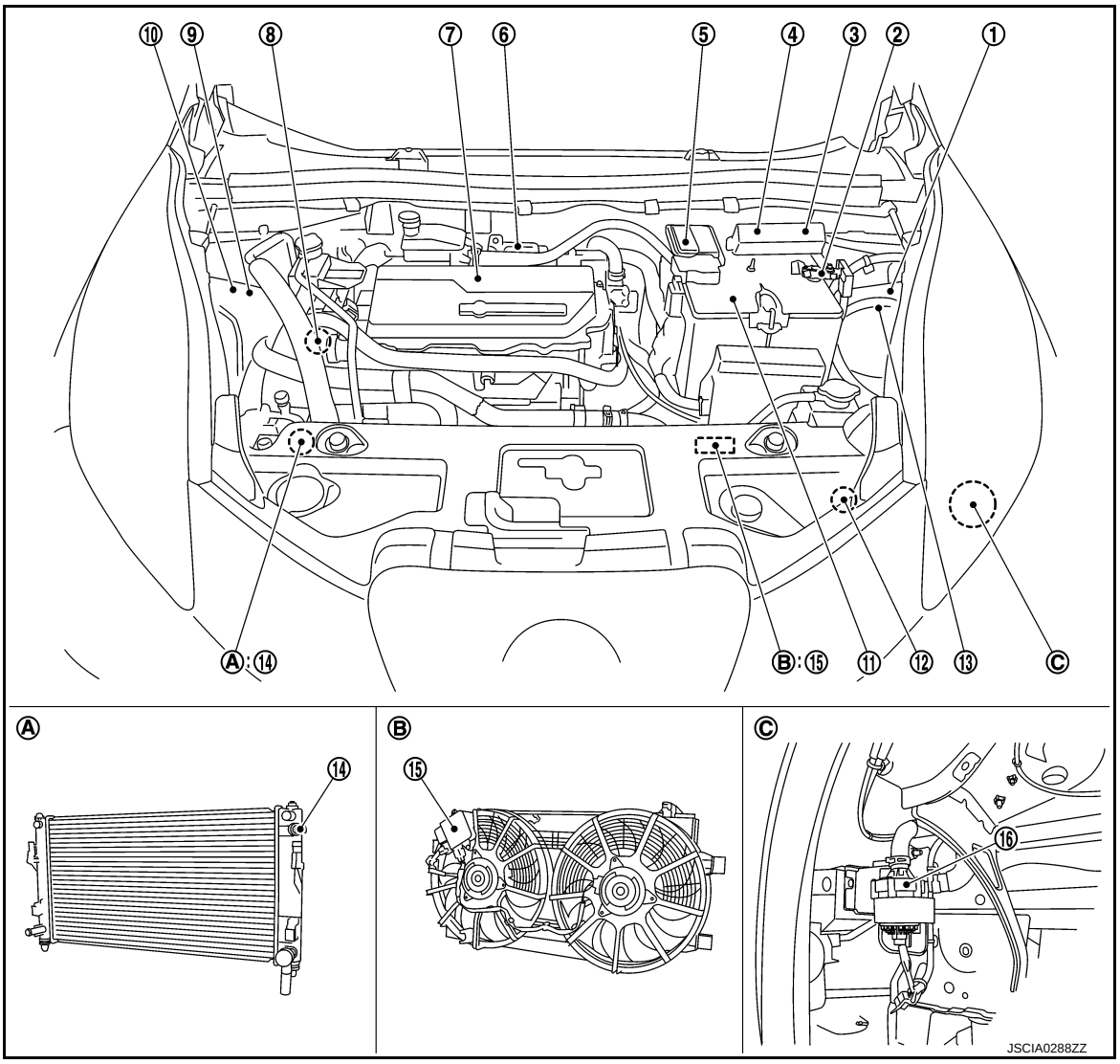
SYSTEM DESCRIPTION

COMPONENT PARTS

Component Parts Location

INFOID:0000000007633642

MOTOR ROOM COMPARTMENT



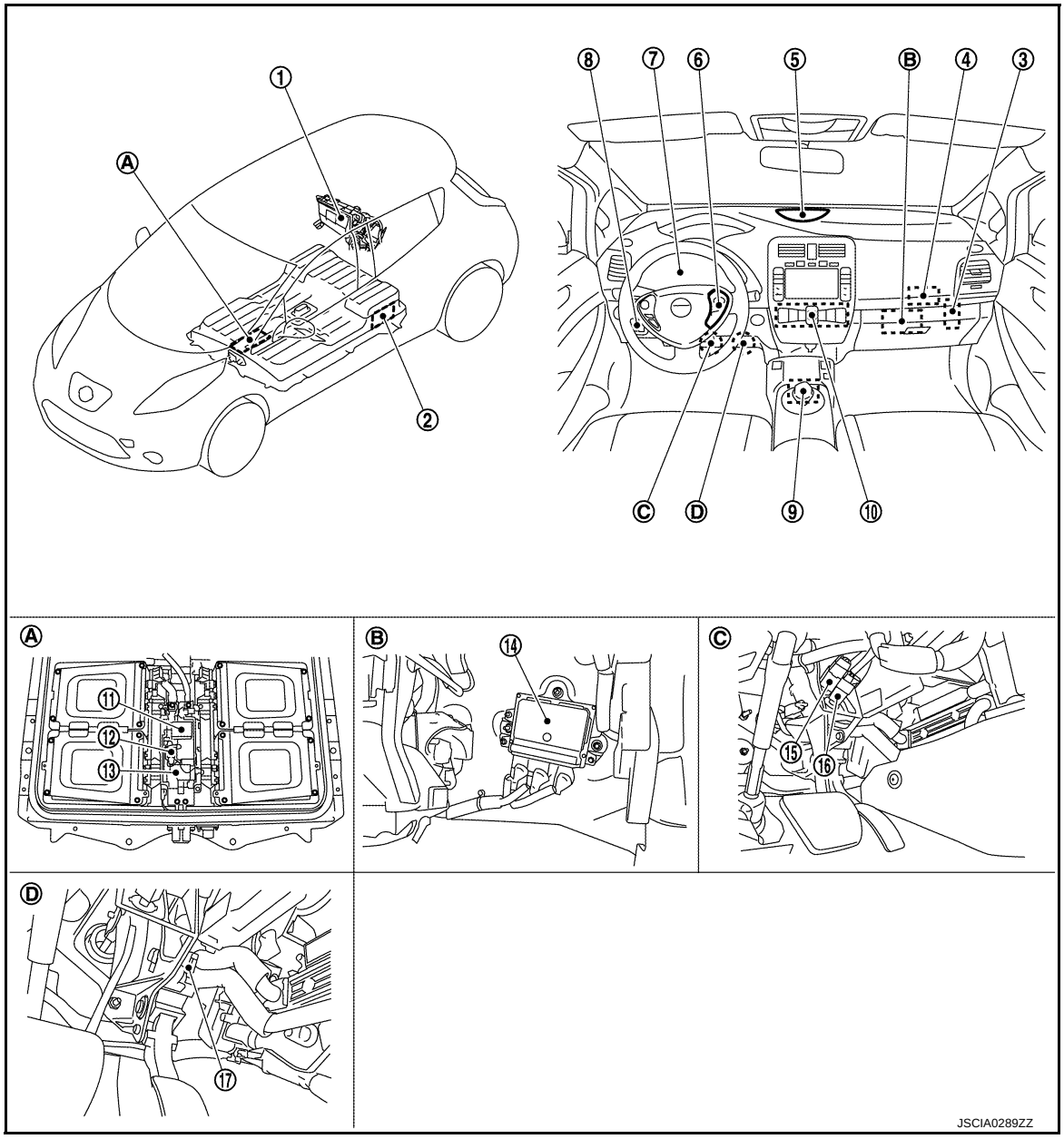
A. Radiator assembly
B. Cooling fan assembly
C. Front fender protector LH remove condition

Component Parts Description

No.	Component parts	Function
1	F/S relay (IPDM E/R)	EVC-19, "F/S Relay"
2	Battery Current Sensor (With Battery Temperature Sensor)	EVC-22, "Battery Current Sensor (With Battery Temperature Sensor)"
3	M/C relay	EVC-19, "M/C Relay"
4	Reverse lamp relay	EVC-20, "Reverse Lamp Relay"
5	Electrically-driven intelligent brake unit	BR-11, "Electrically-driven Intelligent Brake Unit"
6	DC/DC-J/B	EVC-21, "DC/DC Junction Box"

No.	Component parts	Function
7	Traction Motor Inverter	TMS-13, "Traction Motor Inverter"
8	Electric water pump 1	EVC-23, "Electric Water Pump"
9	F/S CHG relay	EVC-19, "F/S CHG Relay"
10	A/C relay	EVC-20, "A/C Relay"
11	12V battery	PG-9, "12V Battery"
12	Refrigerant pressure sensor	EVC-20, "Refrigerant Pressure Sensor"
13	SSOFF relay (IPDM E/R)	EVC-20, "SSOFF Relay"
14	Water temperature sensor	EVC-22, "Coolant Temperature Sensor"
15	Cooling fan control module	EVC-23, "Cooling Fan Control Module"
16	Electric water pump 2	EVC-23, "Electric Water Pump"

BODY COMPARTMENT



A. Li-ion battery junction box
B. Grove box cover is removed.
C: Brake pedal upper part
D. Accelerator pedal upper part

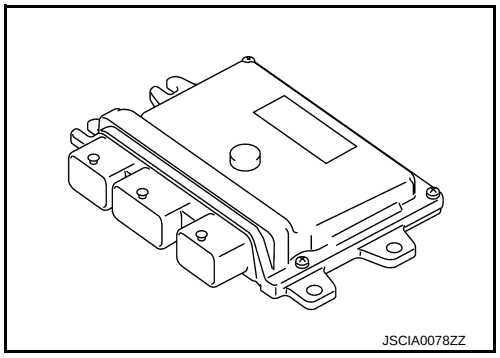
Component Parts Description

No.	Component parts	Function
1	On-board charger	VC-10, "On-board Charger"
2	Li-ion battery controller	EVB-26, "Li-ion Battery Controller" (TYPE 1), EVB-229, "Li-ion Battery Controller" (TYPE 2), EVB-458, "Li-ion Battery Controller" (TYPE 3) or EVB-676, "Li-ion Battery Controller"(TYPE 4)
3	TCU (telematics communication unit)	AV-135, "TCU"
4	VSP control unit	VSP-9, "Approaching Vehicle Sound For Pedestrians (VSP) Control Unit"
5	Charging status indicator	VC-12, "Charging Status Indicator"
6	ASCD steering switch	EVC-21, "ASCD Steering Switch"
7	Combination meter	EVC-23, "Combination Meter"
8	Immediate charging switch	VC-11, "Immediate Charging Switch"
9	Electric shift control module	TM-29, "Electric Shift Control Module"
10	A/C auto amp.	HAC-13, "A/C Auto Amp."
11	System main relay 2	EVC-20, "System Main Relay 2"
12	Pre-charge relay	EVC-20, "Pre-charge Relay"
13	System main relay 1	EVC-20, "System Main Relay 1"
14	VCM (vehicle control module)	EVC-19, "VCM"
15	Stop lamp switch	EVC-21, "Stop Lamp Switch"
16	ASCD brake switch	EVC-21, "ASCD Brake Switch"
17	Accelerator pedal position sensor	EVC-20, "Accelerator Pedal Position Sensor"

VCM

INFOID:0000000007633643

VCM (Vehicle control module) judges the vehicle status according to signals from various sensors and ECUs, and VCM controls EV system in a comprehensive manner. VCM also has a gateway function for EV system CAN communication and CAN communication, which enables communication between an ECU performing EV system CAN communication and an ECU performing CAN communication.



M/C Relay

INFOID:0000000007633644

The M/C (motor control) relay supplies the main power to the EV system. VCM activates the M/C relay and supplies power to the EV system when the EV system needs to be started.

F/S Relay

INFOID:0000000007633645

The F/S (fail-safe) relay supplies the driving power for the system main relay inside the Li-ion battery. VCM activates the F/S relay to make the system main relay controllable when the system is set to READY or when the battery is charged.
When VCM detects a malfunction in the EV system and judges that the system main relay must be deactivated, VCM deactivates the F/S relay to shut off the system main relay driving power.

F/S CHG Relay

INFOID:0000000007633646

The F/S CHG (fail-safe charge) relay supplies the driving power for the quick charge relay inside the DC/DC junction box. When VCM recognizes a quick charge start, VCM activates the F/S CHG relay to make the quick

charge relay operable. During driving, F/S CHG relay remains OFF so that the quick charge relay is not activated.

SSOFF Relay

INFOID:0000000007633647

The SSOFF (self shutoff) relay supplies power to VCM and the coil of the A/C relay. The SSOFF relay is controlled by VCM so that VCM can shut off VCM power (self shutoff).

A/C Relay

INFOID:0000000007633648

The A/C (air conditioner) relay supplies power to the air conditioner system. VCM activates the A/C relay to supply power to the air conditioner system when the power is turned on or an air conditioner operation request signal is received.

System Main Relay 1

INFOID:0000000007633649

The system main relay 1 is integrated in the Li-ion battery and controlled by VCM. The system main relay 1 connects and disconnects the high-voltage circuit (+) side and Li-ion battery.
If the pre-charge to the inverter condenser is complete while high voltage power is supplied, VCM activates the system main relay 1 to supply power from the Li-ion battery to the EV system. Also when charging, VCM activates the system main relay 1 to supply power from an external charger to the Li-ion battery.

System Main Relay 2

INFOID:0000000007633650

The system main relay 2 is integrated in the Li-ion battery and controlled by VCM. The system main relay 2 connects and disconnects the high-voltage circuit (–) side and Li-ion battery. When high voltage power is supplied, VCM activates the system main relay 2 to supply power from the Li-ion battery to the EV system. When charging, power from an external charger is supplied from the system main relay 2 to the Li-ion battery.

Pre-charge Relay

INFOID:0000000007633651

The pre-charge relay is integrated in the Li-ion battery and controlled by VCM. When high voltage power is required, VCM activates the pre-charge relay before activating the system main relay to prevent abrupt application of high voltage.

Reverse Lamp Relay

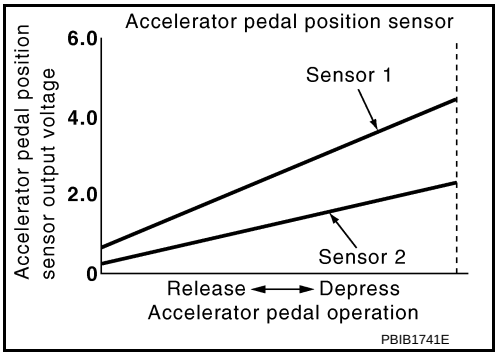
INFOID:0000000007633652

When VCM receives a reverse range information from the electric shift control module, VCM activates the reverse lamp relay to turn ON the reverse lamp.

Accelerator Pedal Position Sensor

INFOID:0000000007633653

The accelerator pedal sensor is integrated with the accelerator pedal. This sensor is a potentiometer that detects the acceleration pedal stroke, converts it to a voltage signal, and transmits the signal to VCM. The sensor transmits its signals through dual lines, providing a minimum driving function even if either line malfunctions.
Upon a POWER ON cycle, VCM learns the fully closed position of the acceleration pedal from the accelerator pedal position sensor signal.

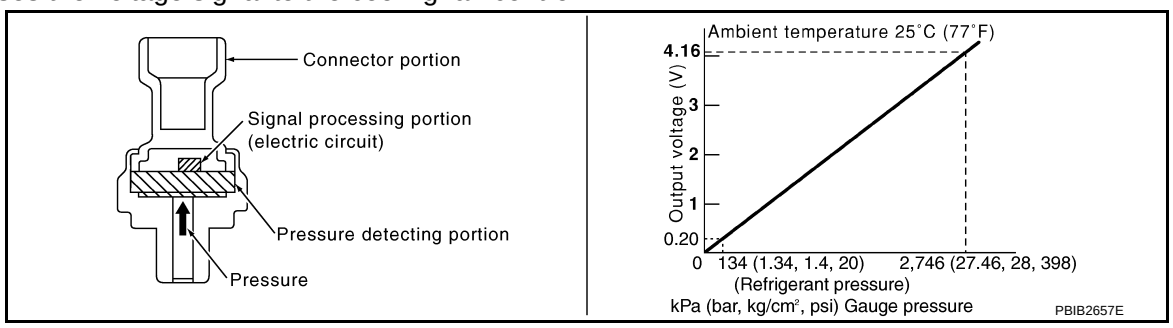


Refrigerant Pressure Sensor

INFOID:0000000007633654

The refrigerant pressure sensor is installed to the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. VCM calculates refrigerant

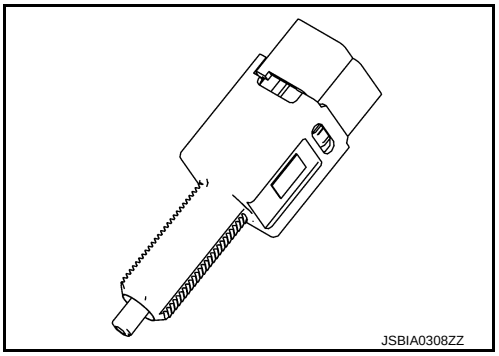
pressure based on the voltage and sends a refrigerant pressure signal to the A/C auto amp. Furthermore, VCM uses the voltage signal to the cooling fan control.



Stop Lamp Switch

INFOID:0000000007633655

The stop lamp switch is installed to the brake pedal bracket. The switch detects the state of the brake pedal and transmits an ON/OFF signal to VCM.
The contact of the stop lamp switch is usually open. When the brake pedal is depressed, it closes and the stop lamp switch signal is transmitted as a voltage signal.



ASCD Steering Switch

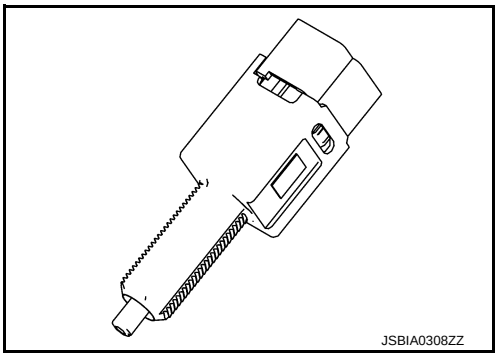
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ASCD steering switch has various values of electrical resistance for each button. VCM reads voltage variation of switch, and determines which button is operated.

ASCD Brake Switch

INFOID:0000000007633657

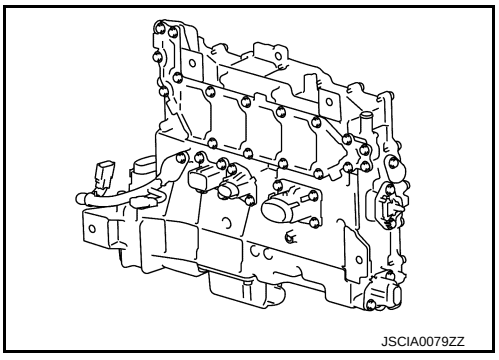
The ASCD brake switch is installed to the brake pedal bracket. The switch detects the state of the brake pedal and transmits an ON/OFF signal to VCM.
The contact of the ASCD brake switch is usually closed. When the brake pedal is depressed, it opens to disconnect the circuit, and shut off the output voltage. This constitutes an ASCD brake switch signal.



DC/DC Junction Box

INFOID:0000000007633658

The DC/DC junction box integrates a DC/DC converter to supply electric power to the 12 V power system and charge the 12V battery in addition to distributing high voltage power from the Li-ion battery to systems.
The DC/DC junction box has a normal charge relay and a quick charge relay so that the circuits are changed over according to the charge mode.
The DC/DC junction box has an internal cooling fin used to cool the DC/DC converter by water cooling.



DC/DC CONVERTER

The DC/DC converter steps down the high voltage DC current of the Li-ion battery to a 12 V DC current, which is used to supply power to the 12 V electrical system and charge the 12V battery. In addition, the DC/DC converter changes the output voltage according to VCM signals so that appropriate voltage is supplied depending on the vehicle condition.

Battery Current Sensor (With Battery Temperature Sensor)

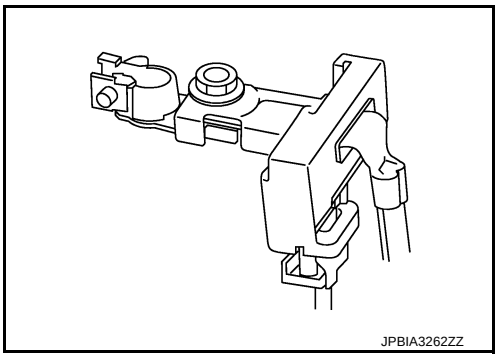
INFOID:0000000007633659

BATTERY CURRENT SENSOR

The battery current sensor is installed to the negative cable of the battery. The battery current sensor detects the battery charge/discharge current and transmits signals to VCM. VCM judges the battery load based on these signals and controls the power generation by converting the target generation voltage to a power generation command signal and transmitting it to the DC/DC converter.

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power voltage variable control, and may cause the battery to discharge.

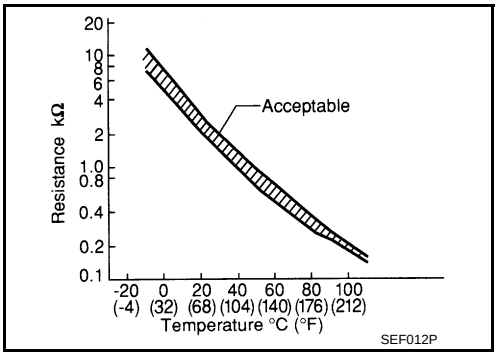


BATTERY TEMPERATURE SENSOR

Battery temperature sensor is integrated in battery current sensor.
The sensor measures temperature around the battery.
This sensor uses a thermistor and its electrical resistance varies as the temperature varies. VCM detects a voltage change caused by the change in electrical resistance.

<Reference data>

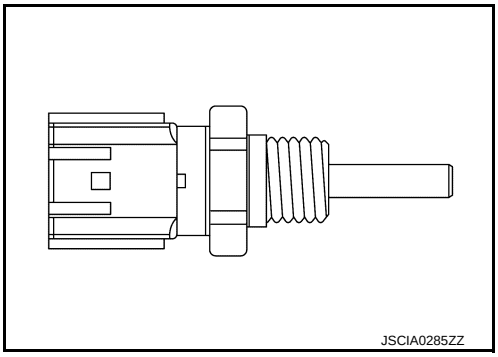
Temperature [°C (°F)]	Voltage (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258



Coolant Temperature Sensor

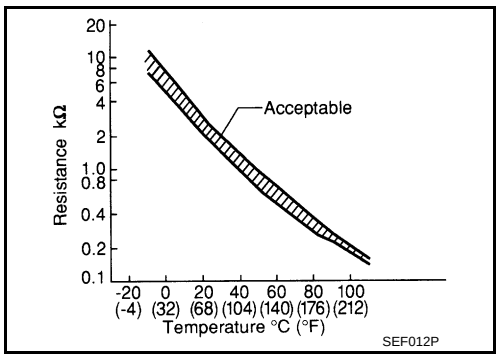
INFOID:0000000007633660

The coolant temperature sensor is detects the coolant temperature. This sensor uses a thermistor that changes its electrical resistance according to the temperature. VCM detects a voltage change according to electrical resistance change.



<Reference value>

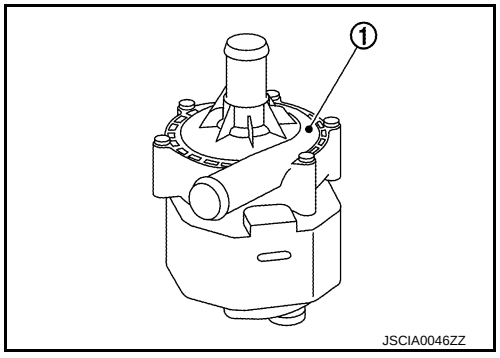
Coolant temperature [°C (°F)]	Voltage (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.35 - 2.73
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260



Electric Water Pump

INFOID:0000000007633661

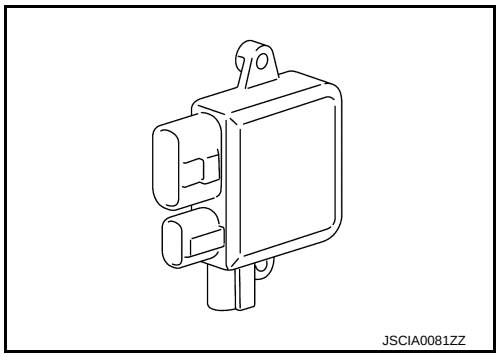
The electric water pump (1) feeds coolant by pressure, which circulates in the high voltage system cooling circuit. The high voltage system cooling circuit includes two cooling pumps. They are controlled by VCM independently so that the amount of pressure feed is adjusted according to the vehicle speed and water temperature.
The electric water pump also integrates an interface circuit that monitors the pump function for any malfunction, and it transmits a malfunction signal to VCM if necessary.



Cooling Fan Control Module

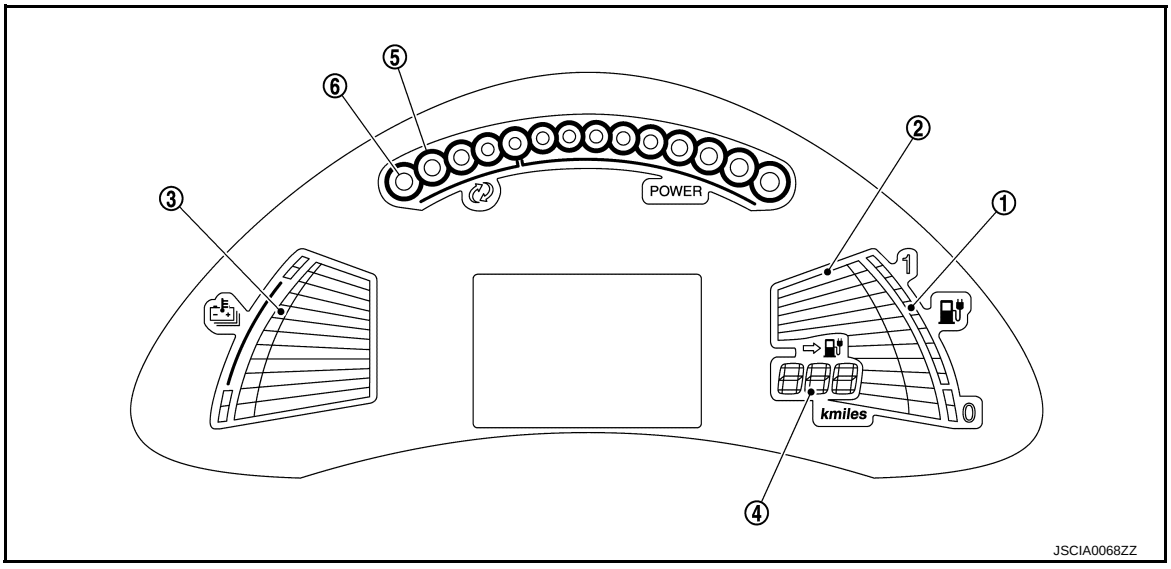
INFOID:0000000007633662

The cooling fan control module is mounted on the cooling fan and drives the cooling fan motor.
The cooling fan control module conducts communication between VCM via the PWM communication. The cooling fan control module drives the cooling fan motor so that the cooling fan speed is controlled in accordance with the control signal from VCM.



Combination Meter

INFOID:0000000007633663



VCM controls the following items on the combination meter in addition to the warning lamps and indicator lamps.

LI-ION BATTERY INFORMATION

Li-ion Battery Capacity Level Gauge (1)
VCM receives the Li-ion battery capacity signal from the Li-ion battery controller, and VCM transmits the signal to the combination meter to display the maximum capacity of the Li-ion battery. When the capacity of the Li-ion battery decreases with age and usage, the level of the gauge is also decreased.

Li-ion Battery Available Charge Gauge (2)
VCM receives the Li-ion battery available charge signal from the Li-ion battery controller, and VCM transmits the signal to the combination meter to display the available Li-ion battery charge to run the vehicle.

Li-ion Battery Temperature Gauge (3)
VCM receives the Li-ion battery temperature signal from the Li-ion battery controller, and VCM transmits the signal to the combination meter to display the Li-ion battery temperature.

Distance Range (4)
The driving range (km or miles) provides an estimated distance that the vehicle can be driven before recharging is necessary. The driving range is constantly being calculated, based on the amount of available Li-ion battery charge and the actual power consumption average.
VCM calculates average electricity consumption at a specified travel distance, according to total power consumption of the vehicle. Based on the average electricity consumption and the Li-ion battery available charge signal received from the Li-ion battery, VCM calculates driving range and transmits a driving range signal to the combination meter.

POWER METER

Maximum Power (5)
VCM receives a maximum motor output power signal from the traction motor inverter and a maximum regenerative power signal from the Li-ion battery controller. VCM transmits these signals to the combination meter and displays the upper limit of available output power and regenerative electric power.

Current Motor Power (6)
VCM receives the current motor power signal from the traction motor inverter, and VCM transmits the signal to the combination meter to display the power currently being output.

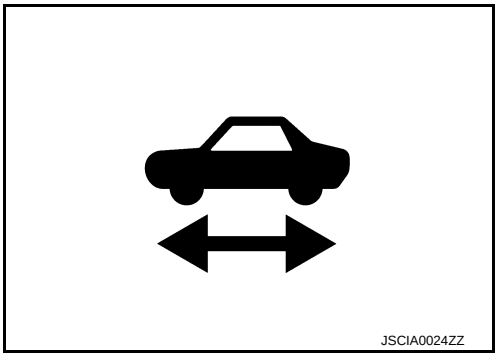
Warning/Indicator Lamp

INFOID:0000000007633664

VCM controls the following warning lamps and indicator lamps.

READY TO DRIVE INDICATOR LAMP

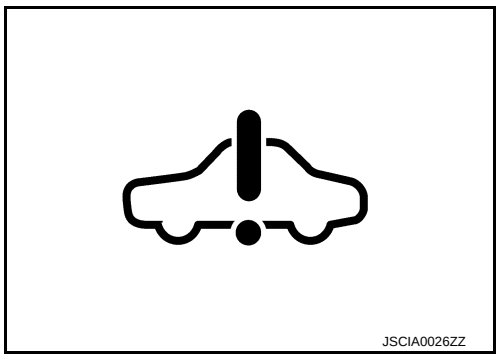
The READY to drive indicator lamp indicates that the vehicle is in a state allowing vehicle travel. VCM transmits a READY to drive indicator lamp request signal to the combination meter via CAN communication to turn ON the READY to drive indicator lamp.
The READY to drive indicator lamp operates as follows.



Condition	Illumination status
A few seconds after operation of POWER ON to READY.	Blink
READY	ON
Except above	OFF

EV SYSTEM WARNING LAMP

The EV system warning lamp turns ON if a malfunction occurs with the EV system.
If VCM detects a malfunction or receives an EV system warning lamp request signal from any other ECUs, VCM transmits an EV system warning lamp request signal to the combination meter via CAN communication.
The EV system warning lamp operates as follows.


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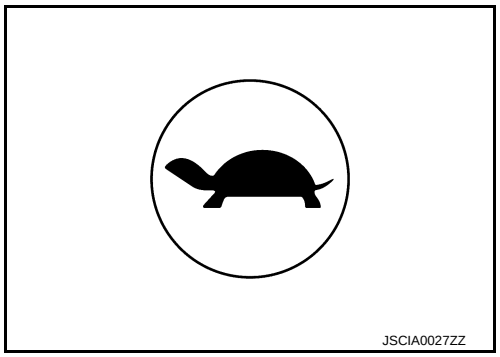
Condition	Illumination status
2 seconds after turn power switch ON	ON (bulb check)
If malfunction is present in EV system *1	ON
POWER ON just after occurrence of malfunction in EV system during charging (POWER OFF) *2	ON
Except above	OFF

*1: When the EV system warning lamp turns ON, it remains ON until the power switch is turned OFF. (Depending on diagnosis, the EV system warning lamp may turns OFF soon after the system returns to normal.)

*2: Because the EV system warning lamp cannot turn ON during charging (POWER OFF), it turns ON at a next POWER ON cycle.

POWER LIMITATION INDICATOR LAMP

The output limit indicator turns ON when the traction motor output is limited.
When the traction motor output is limited, VCM sends an output limit indicator ON request signal to the combination meter via CAN communication.
The power limitation indicator lamp operates as follows.

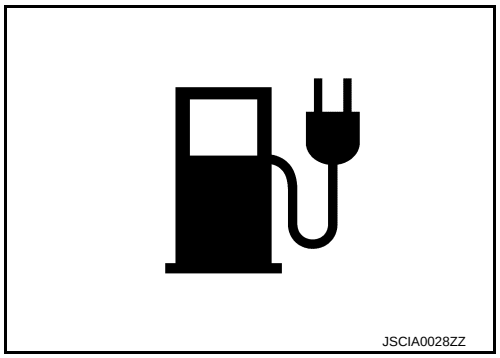

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Condition	Illumination status
2 seconds after POWER ON	ON (bulb check)
When vehicle power is lowered	ON
Except above	OFF

For output limit conditions, refer to EVC-38, "MOTOR POWER CONTROL : System Description".

LOW BATTERY CHARGE WARNING LAMP

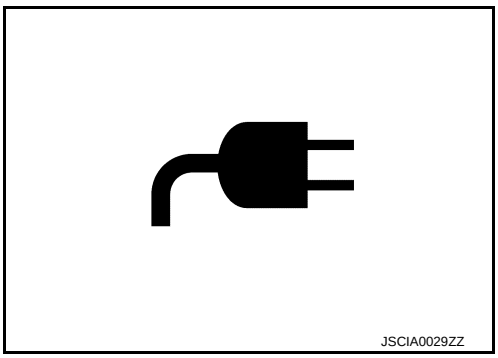
The low battery charge warning lamp turns ON when the Li-ion battery remaining energy is lowered. When VCM detects that Li-ion battery remaining energy is approximately 4kWh or less, VCM transmits a low battery charge warning lamp request signal to the combination meter via CAN communication.
The low battery charge warning lamp operates as follows.


JSCIA0028ZZ

Condition	Illumination status
When Li-ion battery remaining energy is Approx. 4kWh or less.	ON
When Li-ion battery remaining energy recovers to 4.5 kWh or more while warning lamp is ON.	ON ⇒ OFF
Except above	OFF

PLUG IN INDICATOR LAMP

The plug in indicator lamp turns ON when a charge connector is connected to the normal charge port or the quick charge port. VCM supplies power to the plug in indicator lamp in the combination meter to turn on the lamp when VCM receives the EVSE connecting signal or the quick charger connecting signal from the on-board charger.
The plug in indicator lamp operates as follows.



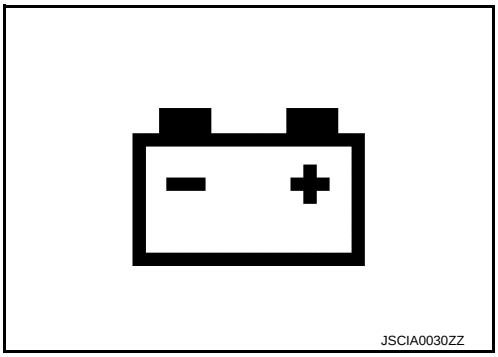
Condition	Illumination status
2 seconds after POWER ON	ON (bulb check)
When charge connector is connected	ON
Charging	Blink
Except above	OFF

NOTE:
When EVSE is connected, the indicator lamp turns ON immediately. The indicator lamp turns OFF after the 10 seconds passes in non-operating state.

12V BATTERY CHARGE WARNING LAMP

When DC/DC converter is malfunctioning, the 12V battery charge warning lamp turns ON.
NOTE:
- If the 12V battery voltage lowers during READY, the READY state is also cancelled.
- If VCM judges that the vehicle is running (transmission in a position except P range and parking brake released) when the 12V battery voltage lowers, it turns ON the 12V battery charge warning lamp and alerts the driver by sounding a buzzer.

The 12V battery charge warning lamp operates as follows.

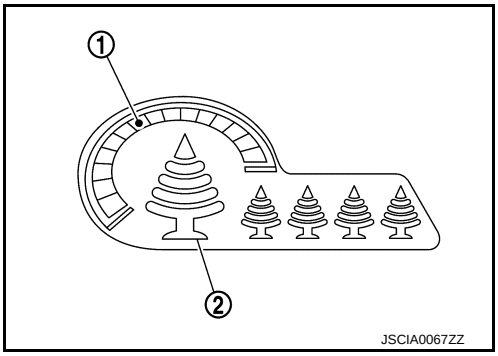


Condition	Illumination status
When power switch is turned ON	ON (bulb check)⇒OFF⇒ON
When 12V battery voltage lowers	ON
Except above	OFF

ECO Indicator

INFOID:0000000007633665

The ECO indicator shows the instantaneous ECO drivability in the instant ECO indicator (1), and shows the cumulative ECO drivability, during 1 trip in the ECO tree (2).
For information regarding control, refer to EVC-51, "ECO INDICATOR CONTROL : System Description".



Information Display

INFOID:0000000007633666

Information necessary to control the information display is transmitted from each relevant control unit and entered into the combination meter. Based on this information, warning or other information appears on the information display. VCM displays the following items.

Display item	Display content
Cruise set indicator	Displays the setting status of ASCD and set speed.
Shift position indicator	Displays the current shift position.
Remove charge connector warning	This warning is displayed when the power switch is turned from OFF to ON/READY with the charging connector connected.
DC/DC converter warning	Displays when the voltage of the 12V battery is low.
Timer setting status	Displays the setting status of timer charge/timer air conditioner stored in VCM.
Charging time	Displays the expected time till the target charge level is achieved in VCM timer.
Charging timer setting confirmation	This shows the next scheduled time when timer charging will be conducted.
A/C heater timer (Climate Ctrl. Timer) setting confirmation	This shows the next scheduled timer air conditioner time.
SHIFT “P” warning*	This warning is displayed when the vehicle is under following conditions: • Shift position: Except for P range • Front door (driver side): Open

*: Apply to VCM other than those in Group A. For VCM Groups, refer to EVC-8, "How to Check VCM Group".

Approaching Vehicle Sound for Pedestrians (VSP)

INFOID:0000000007633667

VSP informs the user of various information by electronic sounds.
In the following cases, VCM transmits a operation signal to VSP.

Condition	Operation status
EVSE is connected to the normal charge port	Short beep (once)
When normal charging starts	Short beeps in sequence (twice)

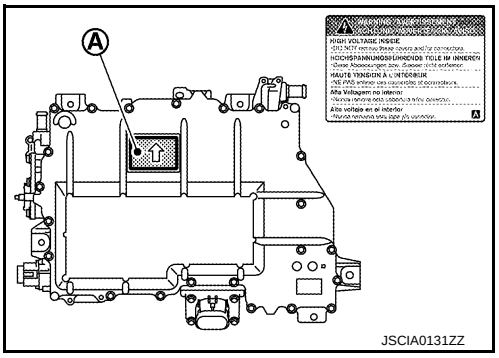
High Voltage Warning Label

INFOID:0000000007633668

- The high voltage warning label is affixed to the rear side (A) of DC/DC-J/B.

  ⇦ : Direction of the label

- When replacing DC/DC-J/B, make sure to affix the label in the original position.



SYSTEM
ELECTRIC POWER TRAIN SYSTEM
ELECTRIC POWER TRAIN SYSTEM : System Description

INFOID:0000000007633669

CONTROL OUTLINE

EV requires electric power for the operation of all its systems.
The power stored in the Li-ion battery is supplied as high-voltage direct current to the high-voltage system while also being converted to 13-15 V by the DC/DC converter and supplied to the 12 V power system.
VCM judges the vehicle status from various information and performs various EV system controls in a comprehensive manner.

Main Control Contents of EV

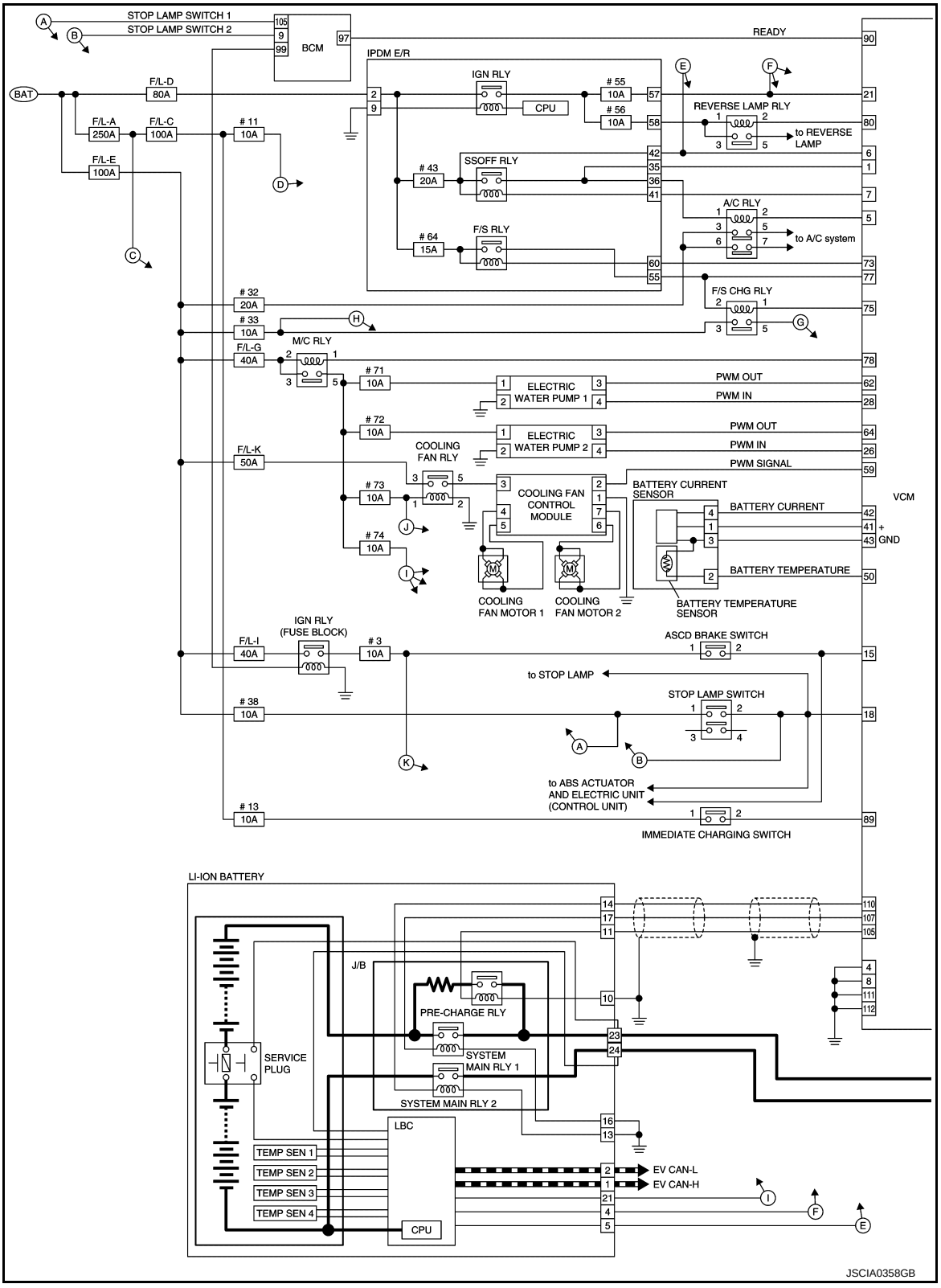
Control	Reference
EV system start-up control	EVC-34, "EV SYSTEM START UP CONTROL : System Description"
High voltage power supply control	EVC-37, "HIGH VOLTAGE POWER SUPPLY CONTROL : System Description"
Motor power control	EVC-38, "MOTOR POWER CONTROL : System Description"
Motor regeneration control	EVC-39, "MOTOR REGENERATION CONTROL : System Description"
Li-ion battery charge control	EVC-39, "LI-ION BATTERY CHARGE CONTROL : System Description"
Cooperative Regenerative brake control	BR-13, "System Description"
High voltage system cooling control	EVC-43, "HIGH VOLTAGE SYSTEM COOLING CONTROL : System Description"
Air conditioner control	EVC-46, "AIR CONDITIONER CONTROL : System Description"
Power voltage variable control	EVC-48, "POWER VOLTAGE VARIABLE CONTROL SYSTEM : System Description"
Automatic 12V battery charge control	EVC-48, "AUTOMATIC 12V BATTERY CHARGE CONTROL : System Description"
Power cut off control	EVC-49, "POWER CUT OFF CONTROL : System Description"
ASCD (automatic speed control device)	EVC-50, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
ECO indicator control	EVC-51, "ECO INDICATOR CONTROL : System Description"

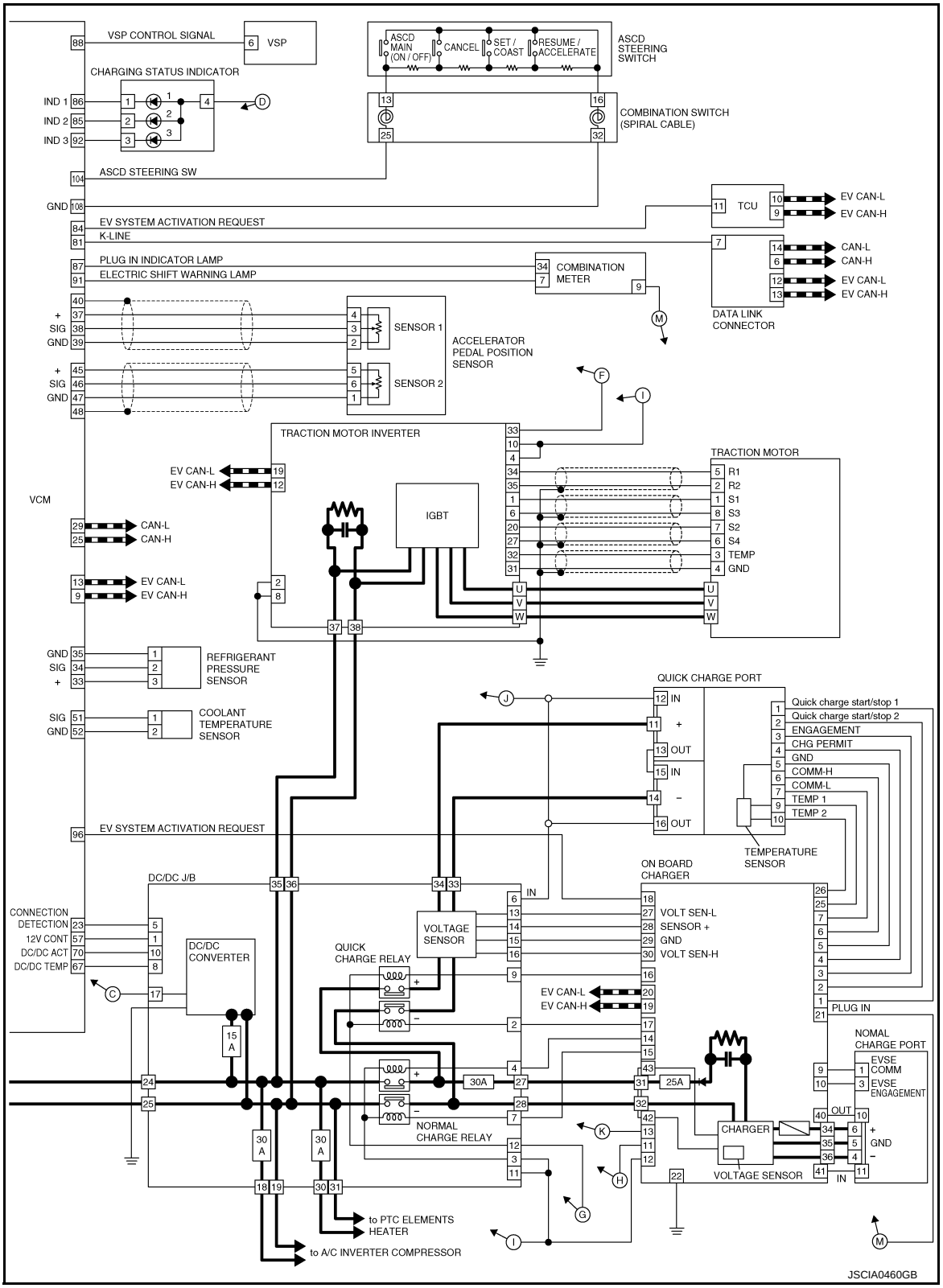
ELECTRIC POWER TRAIN SYSTEM : Circuit Diagram

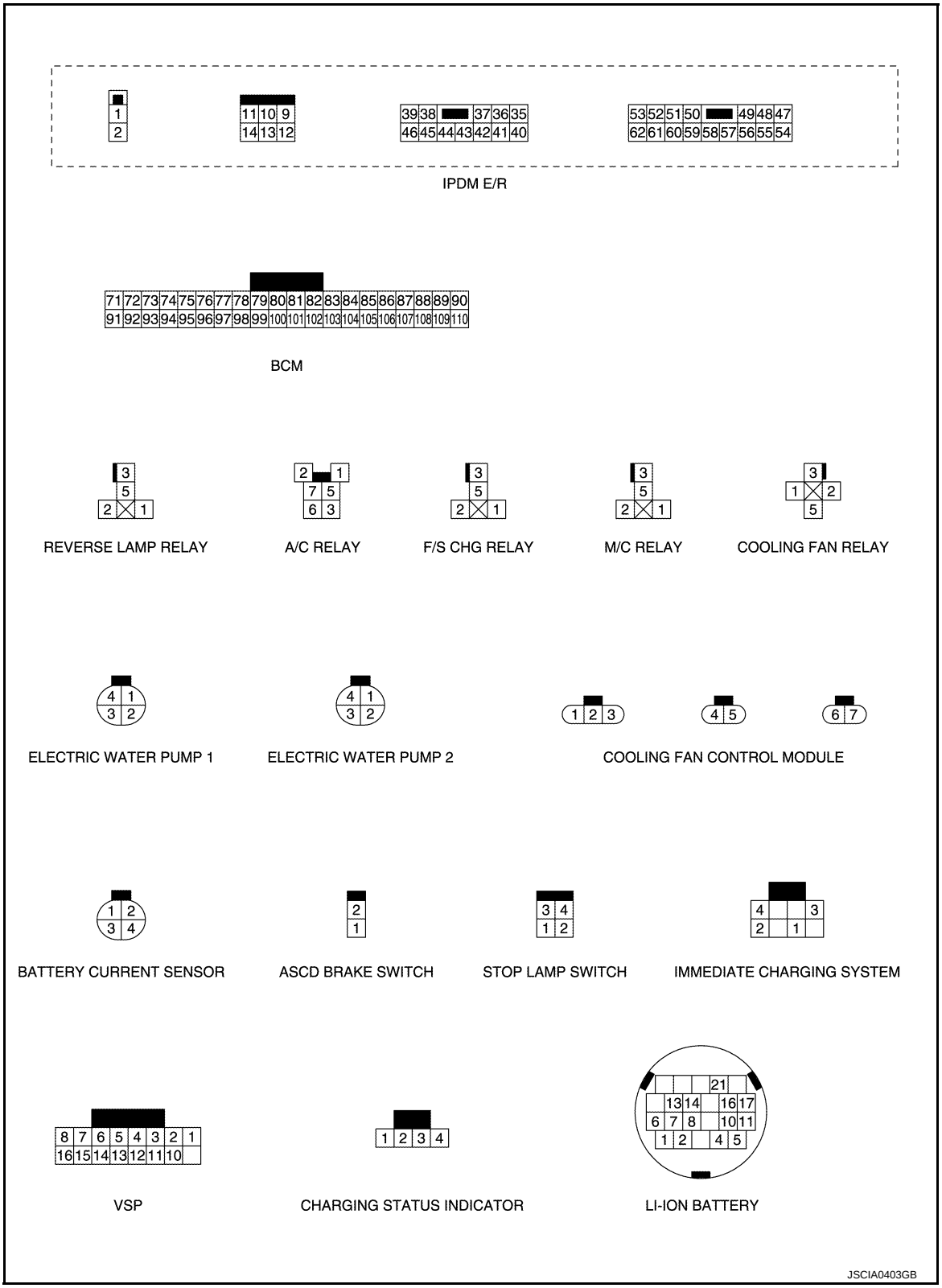
INFOID:0000000007633670

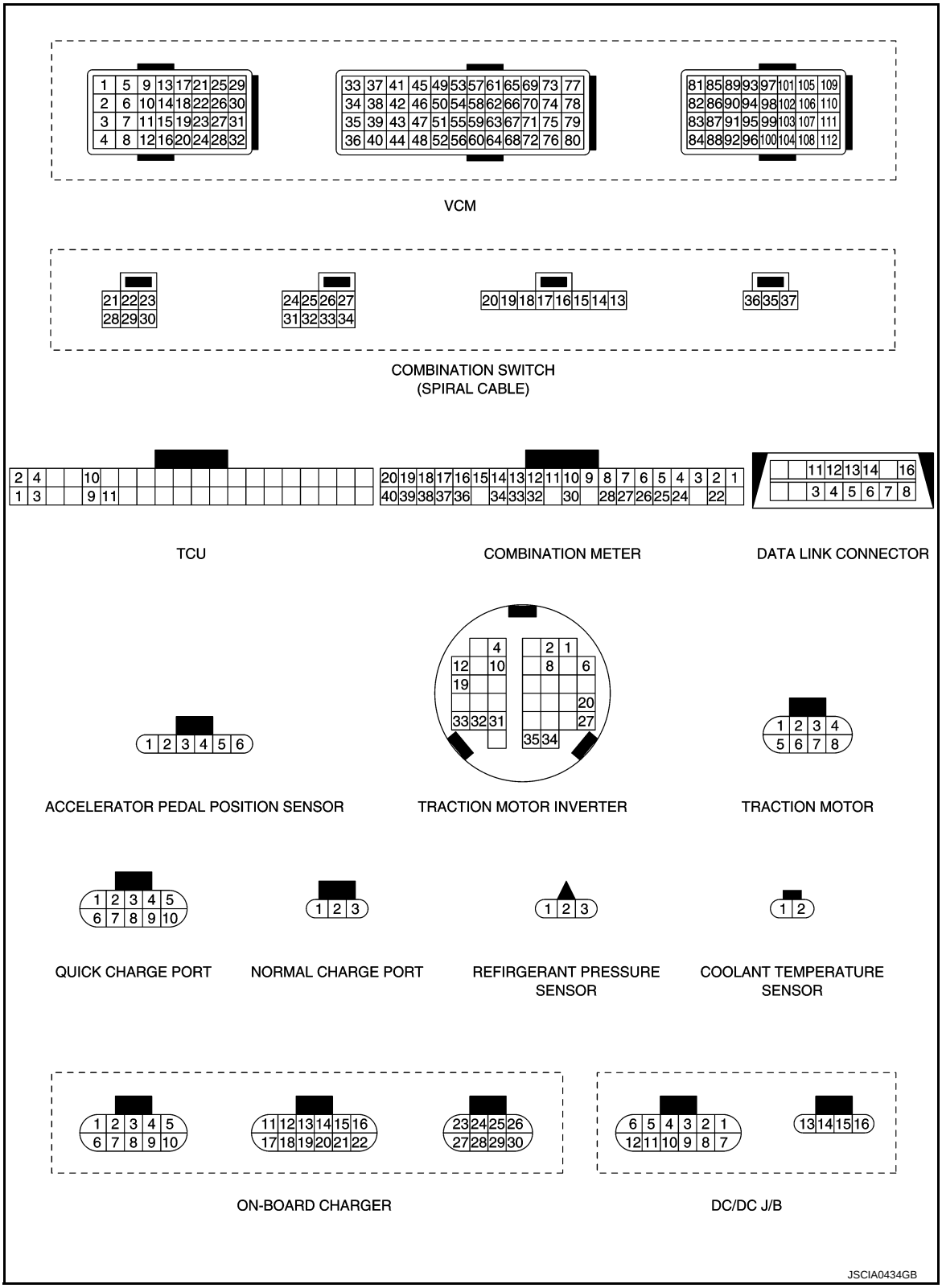
NOTE:

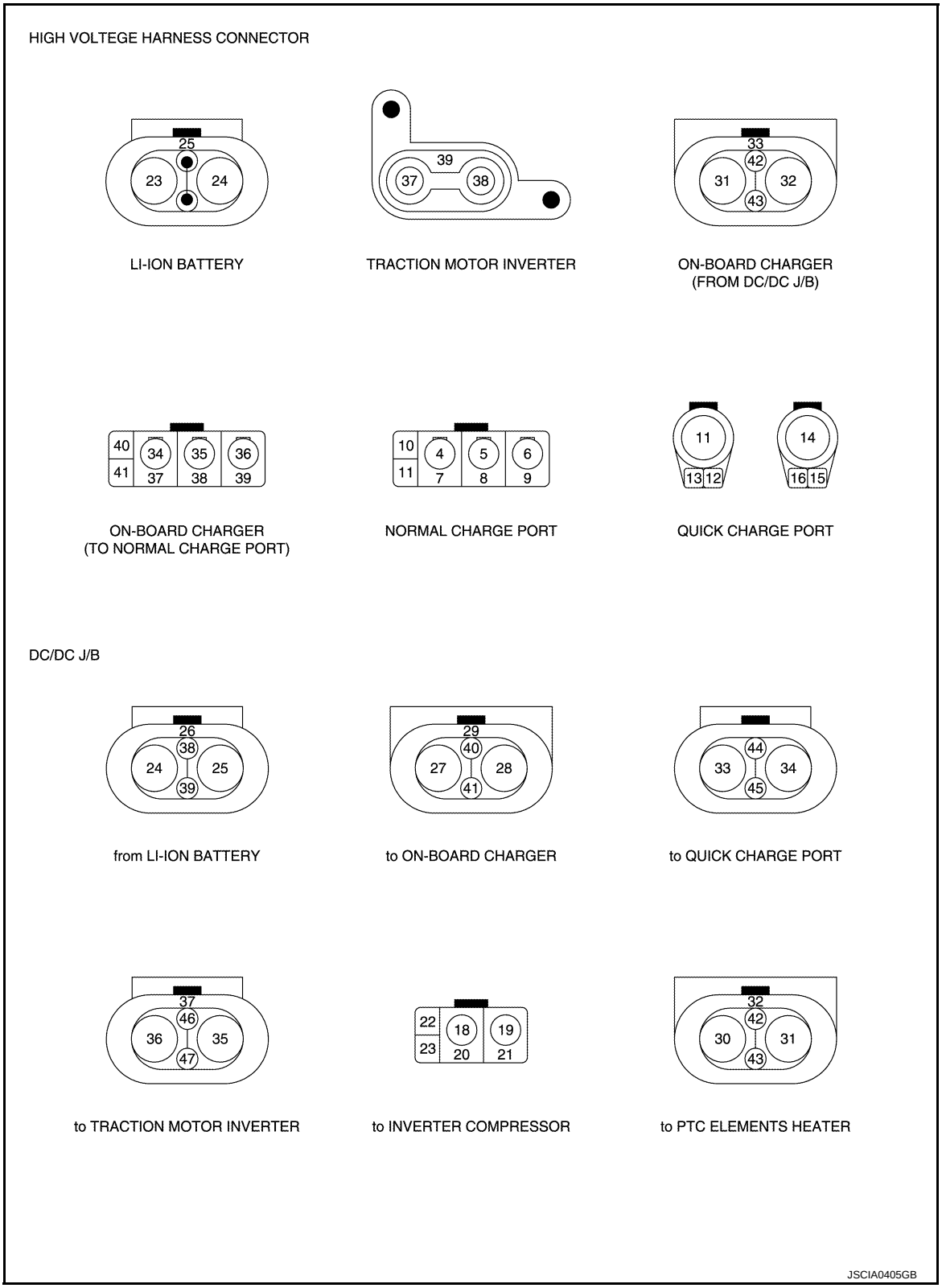
For Li-ion battery heater circuit, refer to EVB-240, "Circuit Diagram" (TYPE 2), EVB-687, "Circuit Diagram" (TYPE4). To identify vehicle type, refer to EVB-14, "How to Check Vehicle Type".




VSP CONTROL SIGNAL
VSP
CHARGING STATUS INDICATOR
IND 1
IND 2
IND 3
ASCD MAIN (ON / OFF)
CANCEL
SET / COAST
RESUME / ACCELERATE
ASCD STEERING SWITCH
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SW
GND
EV SYSTEM ACTIVATION REQUEST
K-LINE
TCU
EV CAN-L
EV CAN-H
PLUG IN INDICATOR LAMP
ELECTRIC SHIFT WARNING LAMP
COMBINATION METER
CAN-L
CAN-H
DATA LINK CONNECTOR
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
TRACTION MOTOR INVERTER
TRACTION MOTOR
R1
R2
S1
S3
S2
S4
TEMP
GND
VCM
IGBT
REFRIGERANT PRESSURE SENSOR
COOLANT TEMPERATURE SENSOR
QUICK CHARGE PORT
Quick charge start/stop 1
Quick charge start/stop 2
ENGAGEMENT
CHG PERMIT
COMM-H
COMM-L
TEMP 1
TEMP 2
TEMPERATURE SENSOR
DC/DC J/B
ON BOARD CHARGER
CONNECTION DETECTION
12V CONT
DC/DC ACT
DC/DC TEMP
DC/DC CONVERTER
VOLTAGE SENSOR
QUICK CHARGE RELAY
NORMAL CHARGE RELAY
VOLT SEN-L
SENSOR +
VOLT SEN-H
PLUG IN
NOMAL CHARGE PORT
EVSE COMM
EVSE ENGAGEMENT
CHARGER
15 A
30A
25A
30 A
to PTC ELEMENTS HEATER
to A/C INVERTER COMPRESSOR
JSCIA0460GB


IPDM E/R
BCM
REVERSE LAMP RELAY
A/C RELAY
F/S CHG RELAY
M/C RELAY
COOLING FAN RELAY
ELECTRIC WATER PUMP 1
ELECTRIC WATER PUMP 2
COOLING FAN CONTROL MODULE
BATTERY CURRENT SENSOR
ASCD BRAKE SWITCH
STOP LAMP SWITCH
IMMEDIATE CHARGING SYSTEM
VSP
CHARGING STATUS INDICATOR
LI-ION BATTERY
JSCIA0403GB


VCM
COMBINATION SWITCH
(SPIRAL CABLE)
TCU
COMBINATION METER
DATA LINK CONNECTOR
ACCELERATOR PEDAL POSITION SENSOR
TRACTION MOTOR INVERTER
TRACTION MOTOR
QUICK CHARGE PORT
NORMAL CHARGE PORT
REFIRGERANT PRESSURE SENSOR
COOLANT TEMPERATURE SENSOR
ON-BOARD CHARGER
DC/DC J/B
JSCIA0434GB

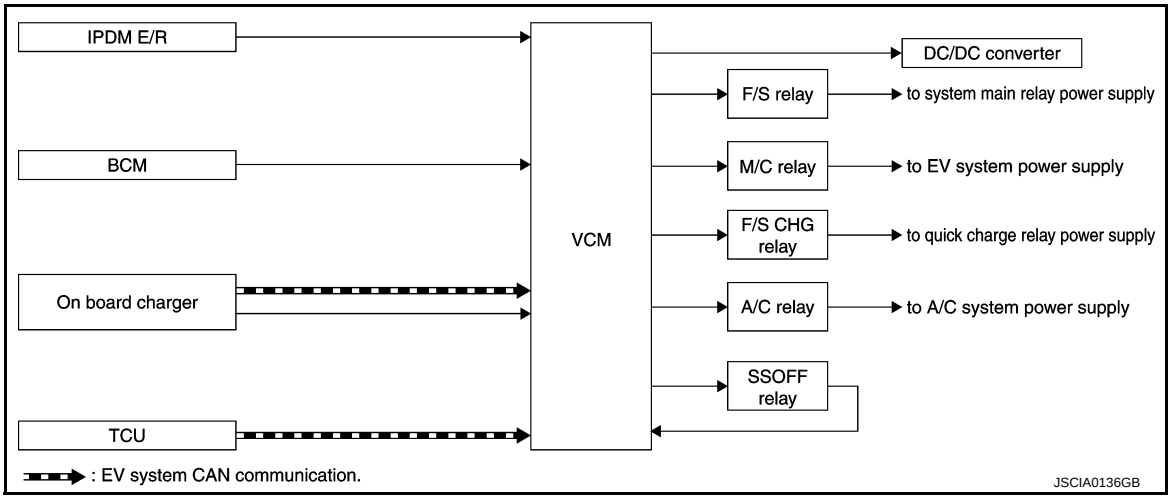


EV SYSTEM START UP CONTROL

EV SYSTEM START UP CONTROL : System Description

INFOID:0000000007633671

SYSTEM DIAGRAM



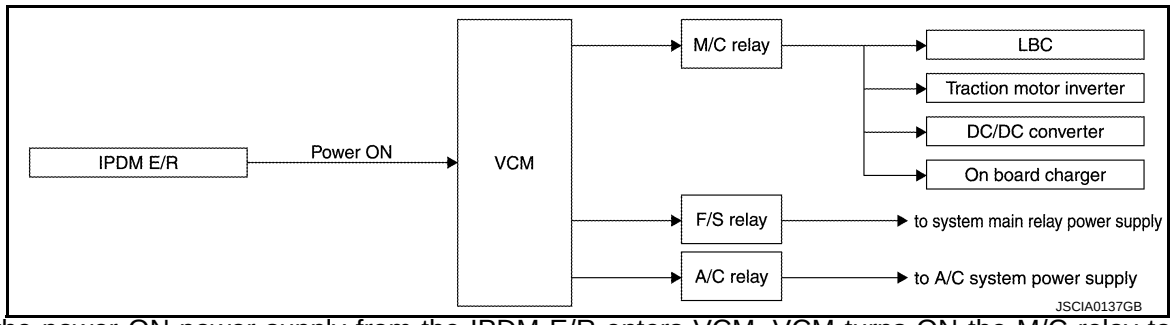
INPUT/OUTPUT SIGNAL CHART

Output sensor/ECU	Signal name	Input ECU/actuator	Signal form
IPDM E/R	Power ON	VCM	Voltage
BCM	READY signal		
On-board charger	Quick charger connecting signal		EV system CAN
	EVSE connecting signal		
	EV system activation request signal		Voltage
TCU	EV system activation request signal		
VCM	DC/DC converter activation request	DC/DC converter	PWM

EV SYSTEM START UP CONTROL

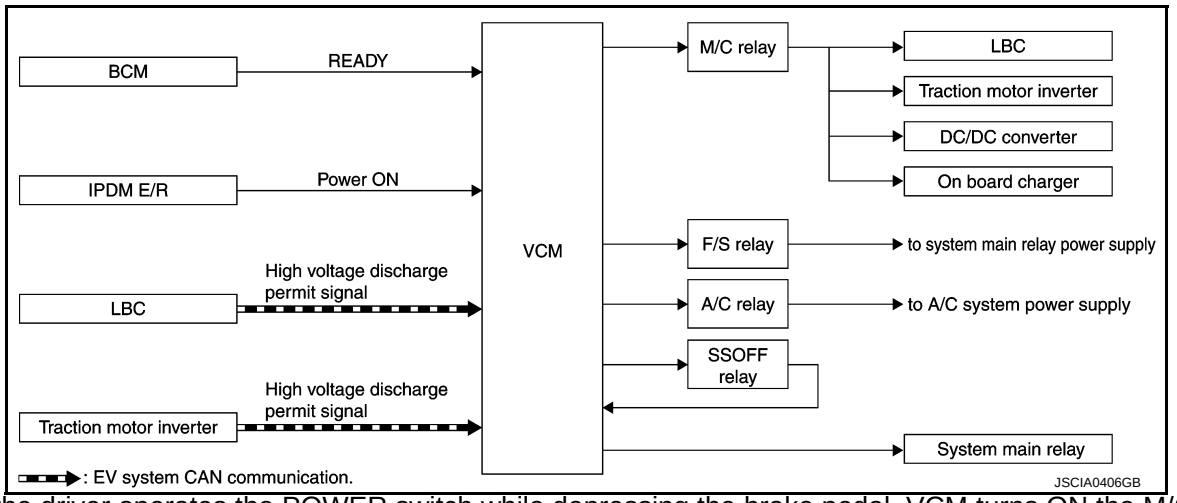
VCM judges the operation mode from signals sent by various sensors, switches and ECUs, and controls the start/stop of the EV system by activating the relays accordingly. VCM also activates the SSOFF relay so that it can shut off VCM power when VCM stops (self shutoff).

Power switch ON



When the power ON power supply from the IPDM E/R enters VCM, VCM turns ON the M/C relay to supply power to each ECU in the EV system.

READY



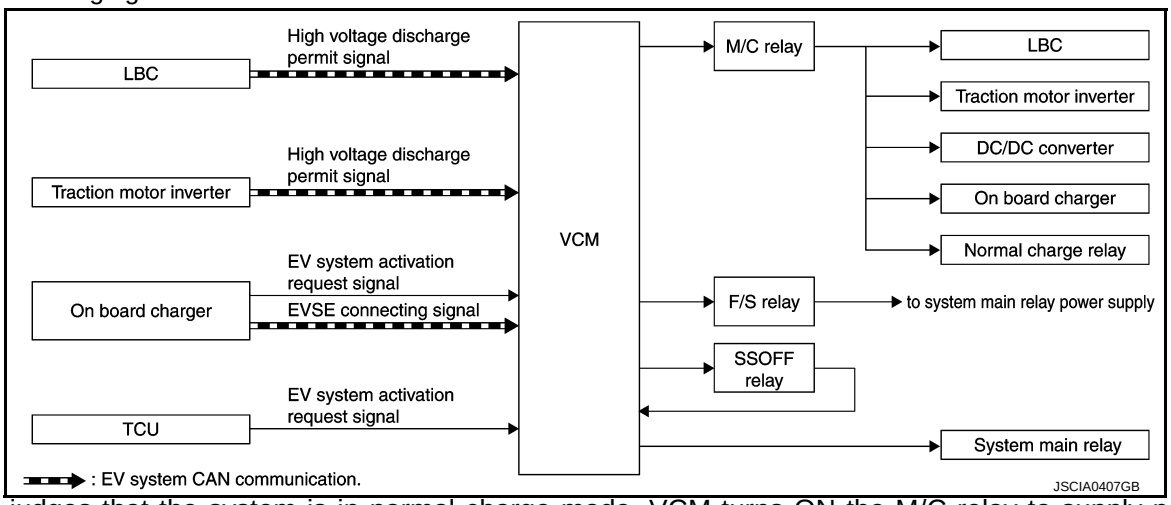
When the driver operates the POWER switch while depressing the brake pedal, VCM turns ON the M/C relay to supply power to each ECU in the EV system. Furthermore, VCM activates the F/S relay to start the power supply to the system main relay.

NOTE:

VCM inhibits the vehicle is set to READY in following conditions:

- Charge connector is connected
- Li-ion battery remaining energy is too low.
- Li-ion battery temperature is too low. [Approximately -25°C (-13°F)]

In Normal Charging

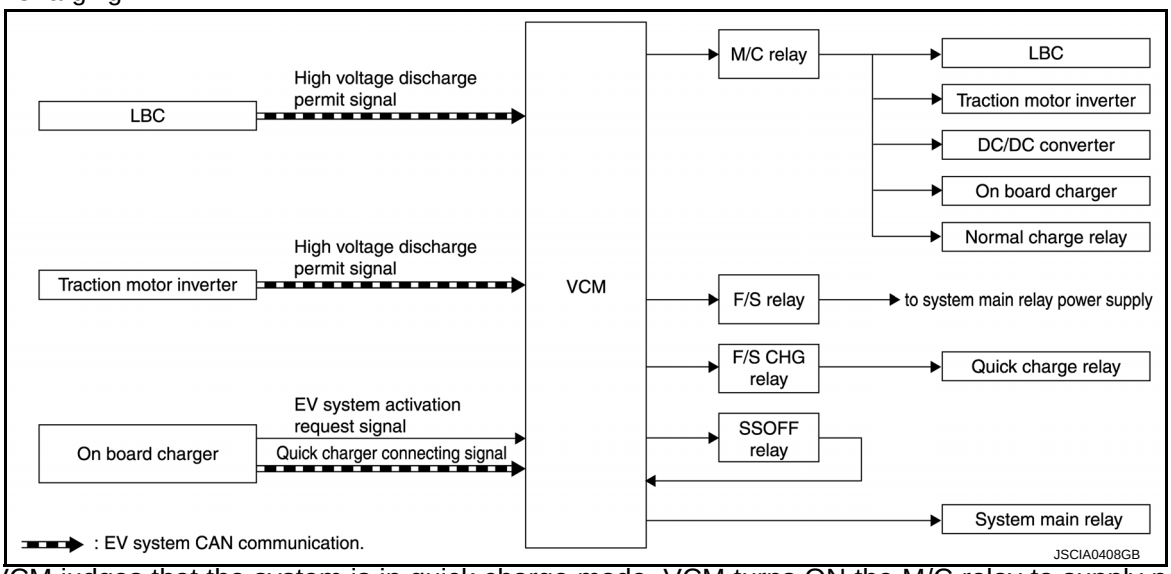


If VCM judges that the system is in normal charge mode, VCM turns ON the M/C relay to supply power to each ECU in the EV system and to the normal charge relay in the DC/DC junction box. Furthermore, VCM activates the F/S relay to start the power supply to the system main relay.

NOTE:

Normal charging does not start with the power switch ON.

In Quick Charging



When VCM judges that the system is in quick charge mode, VCM turns ON the M/C relay to supply power to each ECU in the EV system. VCM also activates the F/S CHG relay to supply power to the quick charge relay inside DC/DC J/B. Furthermore, VCM activates the F/S relay to start the power supply to the system main relay.

When Air Conditioner Is Operating (Power OFF)

When VCM receives an air conditioner operation command, VCM turns ON the M/C relay to start the EV system. VCM also activates the A/C relay to supply power to the air conditioner system. Furthermore, VCM activates the F/S relay to start the power supply to the system main relay.

When Automatic 12V Battery Charge Control is Operating

When VCM judges that the 12V battery requires automatic charging, VCM turns ON the M/C relay to start the EV system. Furthermore, VCM activates the F/S relay to start the power supply to the system main relay.

Relay Activation Matrix

POWER ON

Relay	Condition					
	POWER ON	READY	Charging		When 12V battery is charged	Timer A/C
			Normal charge	Quick charge		
F/S relay	ON	ON	ON	ON	ON	ON
M/C relay	ON	ON	ON	ON	ON	ON
A/C relay	ON	ON	ON	ON	ON	ON
F/S CHG relay	OFF	OFF	OFF	ON	OFF	OFF

POWER OFF

Relay	Condition				
	Charging		When 12V battery is charged	Timer A/C	Remote A/C
	Normal charge	Quick charge			
F/S relay	ON	ON	ON	ON	ON
M/C relay	ON	ON	ON	ON	ON
A/C relay	OFF	OFF	OFF	ON	ON
F/S CHG relay	OFF	ON	OFF	OFF	ON*

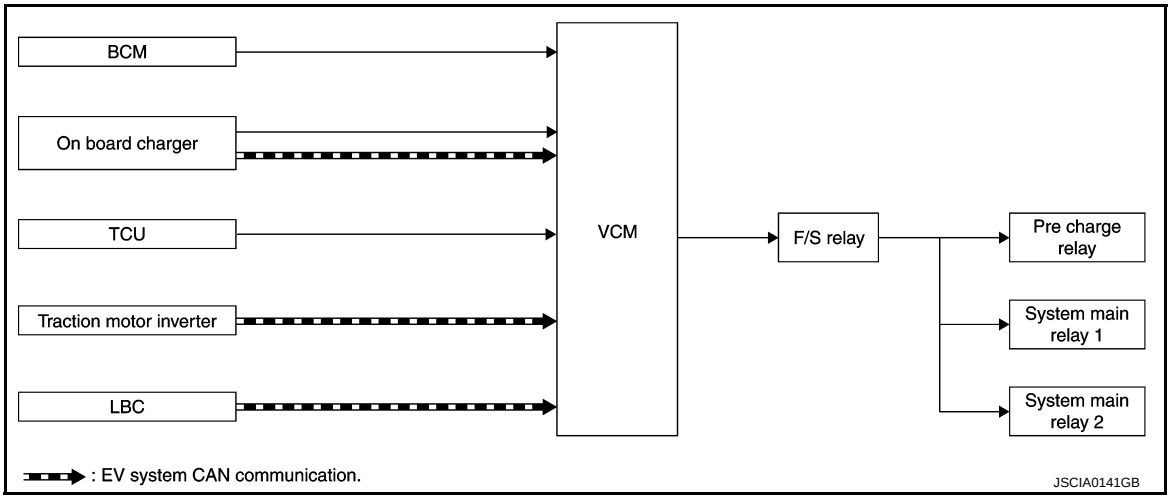
*: Only during quick charging

HIGH VOLTAGE POWER SUPPLY CONTROL

HIGH VOLTAGE POWER SUPPLY CONTROL : System Description

INFOID:0000000007633672

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

Output sensor/ECU	Signal name	Input ECU/actuator	Signal form
BCM	Power switch operation	VCM	Voltage
On-board charger	Quick charger connecting signal		EV system CAN
	EVSE connecting signal		
	EV system activation request signal		Voltage
TCU	EV system activation request signal		
Traction Motor Inverter	High voltage power supply preparation completion signal		EV system CAN
	High voltage discharge permit signal		
Li-ion battery controller	High voltage discharge permit signal		

DESCRIPTION

VCM activates system main relay 1, system main relay 2, and the pre-charge relay inside the Li-ion battery to connect the high voltage circuit to the Li-ion battery in response to the READY operation, a driver operation, like connecting the charge cable to the charging port, or VCM timer function.
Moreover, the high voltage circuit of the EV system has a pre-charge circuit to protect the high voltage circuit from sudden application of high voltage current.

CONTROL FLOW

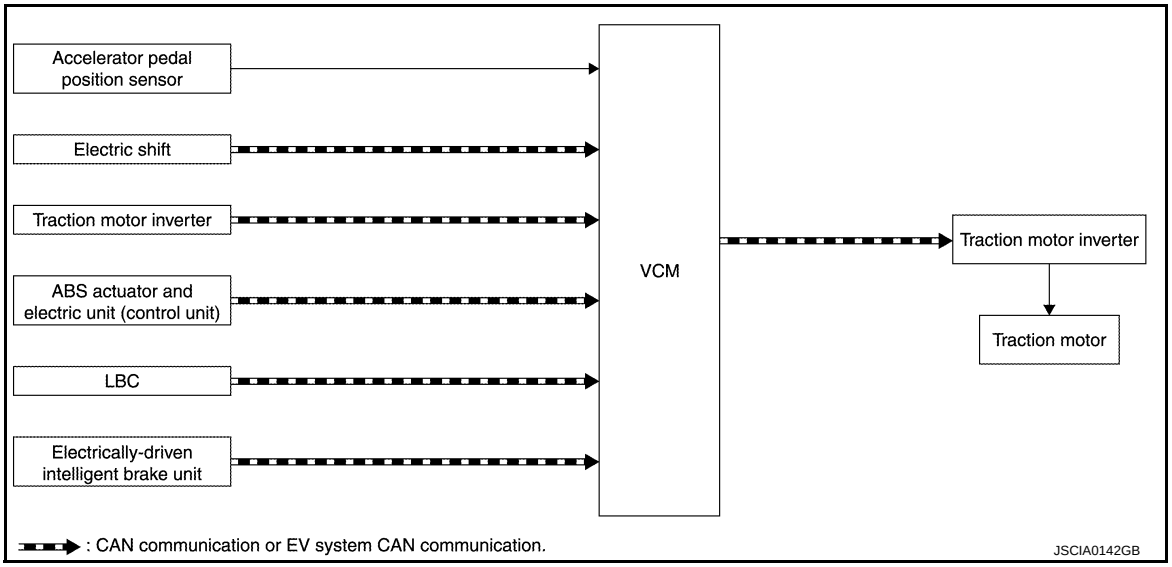
To connect the high voltage circuit, VCM first activates the system main relay 2 and pre-charge relay. As a result, the high voltage power is supplied to the respective systems via the pre-charge resistor in the pre-charge circuit. When the condenser inside the traction motor inverter is fully charged by the applied power, the traction motor inverter transmits a high voltage power supply preparation completion signal to VCM. Receiving the signal, VCM activates the system main relay 1 and deactivates the pre-charge relay. Then, normal power is supplied to the respective systems.

MOTOR POWER CONTROL

MOTOR POWER CONTROL : System Description

INFOID:0000000007633673

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

Output sensor/ECU	Signal name	Input ECU/actuator	Signal form
Accelerator pedal position sensor	Accelerator pedal position	VCM	Voltage
Electric shift	Shift position signal		EV system CAN
Traction Motor Inverter	Motor speed signal		
	Motor torque limit signal		
ABS actuator and electric unit (control unit)	ABS operation signal		
	VDC operation signal		
	TCS operation signal		
Electrically-driven intelligent brake unit	Target braking force signal		
VCM	Target motor torque signal	Traction Motor Inverter	

DESCRIPTION

The EV system generates traction force by converting the direct current from the Li-ion battery to an alternating current by the traction motor inverter and operating the traction motor with the alternating current.
VCM calculates target traction force, based on an accelerator pedal position, vehicle speed, and shift position. After this, VCM adds creep force to the calculated target traction force.
Subsequently, VCM adds torque limitations to the calculated driving force, based on torque down signals received from each system, to decide a motor torque request signal.
This motor torque request signal is transmitted to the traction motor inverter via EV system CAN communication.
For the operation principle of the motor, refer to TMS-15, "OPERATION DESCRIPTION".

OUTPUT LIMIT AND OUTPUT STOP REQUEST LIST

Request ECU	Output limit cause	Power limitation indicator lamp	Condition
Traction Motor Inverter	Traction motor temperature high	ON	When the traction motor or traction motor inverter reaches an abnormally high temperature
	Input power low	ON	When the high voltage power input to the traction motor inverter is 240 V or less
	DTC detected	OFF	Refer to TMS-32, "Fail-Safe".

Request ECU	Output limit cause	Power limitation indicator lamp	Condition
Li-ion battery controller	Li-ion battery remained energy low	ON	When the Li-ion battery cell voltage is low
	Li-ion battery temperature high	ON	When the Li-ion battery reaches an abnormally high temperature (Reference value: Approx. 55°C)
	Li-ion battery temperature low	ON	When the Li-ion battery reaches an abnormally low temperature. (Reference value: Approx. –10°C)
	DTC detected	OFF	Refer to EVB-45, "Fail-safe" (TYPE 1), EVB-253, "Fail-safe" (TYPE 2), EVB-476, "Fail-safe" (TYPE 3) or EVB-700, "Fail-safe" (TYPE 4).
VCM	Acceleration/brake signal plausibility error	OFF	When the accelerator pedal position sensor signal and stop lamp switch signal are input at the same time
	Power train system protection function	OFF	—
	DTC detected	OFF	Refer to EVC-79, "Fail-Safe".

MOTOR REGENERATION CONTROL

MOTOR REGENERATION CONTROL : System Description

INFOID:0000000007633674

DESCRIPTION

The regenerative brake system is a function that operates the traction motor as a generator during deceleration, not for generating traction force as in normal driving, and converts the kinetic energy from the vehicle wheels to electric energy that is used to charge the Li-ion battery. At the same time, it utilizes the rotational resistance from the power generation as a part of the braking force.
For the operation principle, refer to TMS-15, "OPERATION DESCRIPTION".

REGENERATIVE BRAKE CONTROL

When the driver depresses the brake pedal during driving, Electrically-driven Intelligent Brake Unit transmits a target braking force signal to VCM. VCM calculates a target regenerative torque based on the signal and transmits a target motor torque signal to the traction motor inverter. Moreover, VCM transmits the current regenerative torque signal to Electrically-driven Intelligent Brake Unit so that the Electrically-driven Intelligent Brake Unit can control the overall braking force.
For information on the Electrically-driven Intelligent Brake collaborative control, refer to BR-13, "System Description".

REGENERATION CHARGE CONTROL

VCM determines the regenerative charging amount from the Li-ion battery maximum chargeable power signal sent from the Li-ion battery. Moreover, VCM determines the energy recovery amount while performing a collaborative control with the electrically-driven intelligent brake system so that a suitable braking force is provided according to the brake pedal operation amount.
After determining the energy recovery amount, VCM transmits a target motor torque signal to the traction motor inverter and starts regeneration charge.
If the Li-ion battery remaining energy is sufficient, VCM stops the regeneration charge control.
NOTICE:
VCM performs the regenerative charge control constantly at deceleration. However, when the Li-ion battery is in the fully charged state, VCM stops the regenerative charge control. Accordingly, deceleration may be felt weak when the accelerator pedal is released during driving.

LI-ION BATTERY CHARGE CONTROL

LI-ION BATTERY CHARGE CONTROL : System Description

INFOID:0000000007633675

CONTROL OUTLINE

VCM activates the EV system by connecting the charging connector, performing remote control, or using the built-in timer to start charging to the Li-ion battery. The following charge modes are available.

Methods of charging		Description
Normal charge	Immediate charge	VC-14, "System Description"
	Timer charge	
	Remote charge	
Quick charge		
Regeneration charge		EVC-39, "MOTOR REGENERATION CONTROL : System Description"

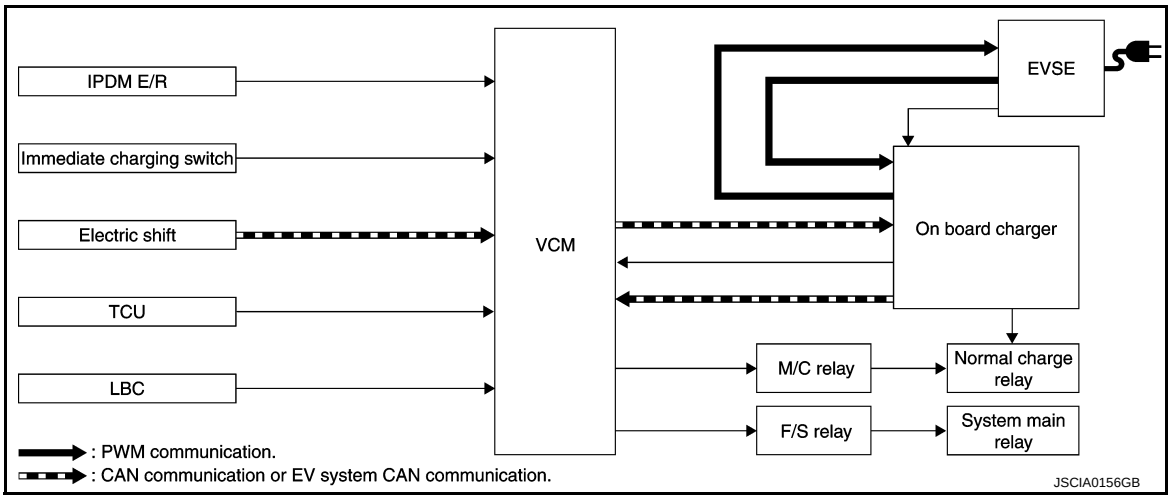
CAUTION:
The cooling fan may operate while charging even when the power switch is OFF, so keep your hands away from the cooling fan.
NOTE:
- Li-ion battery charge does not start when the power switch is ON. When it is required to charge with the power switch ON, start charging before turning ON the power switch.
- When the charging connector is connected to the charge port in the READY state, READY is turned OFF, the power switch is turned ON, and the shift position is changed to N position.
- VCM group*: except for A
  When the charging connector is connected to the charge port, the shift position remains in P position even when the selector lever knob is operated with the power switch ON.

*: For VCM groups, refer to EVC-8, "How to Check VCM Group".

LI-ION BATTERY CHARGE CONTROL : Normal Charge Control

INFOID:0000000007633676

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL TABLE

Output sensor/ECU	Signal name	Input ECU/actuator	Signal form
IPDM E/R	Power ON	VCM	Voltage
Immediate charging switch	Immediate charging switch signal		
TCU	EV system activation request signal		
Electric shift	Shift position signal		EV system CAN
Li-ion battery controller	Li-ion battery chargeable power signal		
	Li-ion battery charge completion signal		
On-board charger	On-board charger chargeable power signal		
	EVSE connecting signal		
	AC input type signal		
	EV system activation request signal		Voltage
	Charge current request signal	EVSE	PWM communication
EVSE	Maximum input current signal	On-board charger	
	EVSE connector lock		Voltage
VCM	Maximum charge power signal		EV system CAN

BASIC CONTROL

When EVSE is connected under the power switch OFF condition, VCM judges that the system is in a charge mode and activates the F/S relay and M/C relay to allow charging operation.
Then, VCM determines the charge power based on the Li-ion battery chargeable power signal received from the Li-ion battery controller and the on-board charger chargeable power signal received from the on-board charger. VCM then sends the maximum charge power signal to the on-board charger.
The on-board charger determines a charge power based on the maximum charge power signal and the maximum input current signal sent by the EVSE control box.
Concurrently, the on-board charger activates the normal charge relay and VCM activates the system main relay 1 and system main relay 2. Consequently, Li-ion battery charge starts.

NOTE:

- Li-ion battery charge does not start when the power switch is ON. When it is required to charge with the power switch ON, start charging before turning ON the power switch.
- VCM group*: except for A
  When the charging connector is connected to the charge port, the shift position remains in P position even when the selector lever knob is operated with the power switch ON.
- VCM group*: except for A
  When the charging connector is connected to the charge port in the READY state, READY is turned OFF, the power switch is turned ON, and the shift position is changed to N position.

*: For VCM groups, refer to EVC-8, "How to Check VCM Group".

IMMEDIATE CHARGE MODE

When EVSE is connected to the normal charge port, the on-board charger transmits an EV system activation signal to VCM. Li-ion battery charge then starts immediately.
When the timer charge is set, Li-ion battery charge does not start just after the on-board charger transmits an EV system activation signal to VCM. When VCM detects an ON signal from the immediate charging switch in that state, VCM judges that the immediate charge mode is selected and starts charging.
When the charge is finished and VCM receives a Li-ion battery charge completion signal from Li-ion battery controller, VCM stops the charge control.

TIMER CHARGE MODE

VCM starts up automatically and starts charging at the set time.
When VCM receives a Li-ion battery charge completion signal from Li-ion battery controller or at a set timer charge finish time, VCM stops the charge control.

NOTE:

When timer charge and the timer air conditioner operate simultaneously, VCM distributes power to the air conditioner system and the charge system according to the priority set on the navigation screen.

REMOTE CHARGE MODE

When TCU transmits an EV system activation signal to VCM, VCM judges that the remote charge mode is selected and starts charge control.
When VCM receives a Li-ion battery charge completion signal from Li-ion battery controller, VCM stops the charge control.

CANCEL CONDITIONS

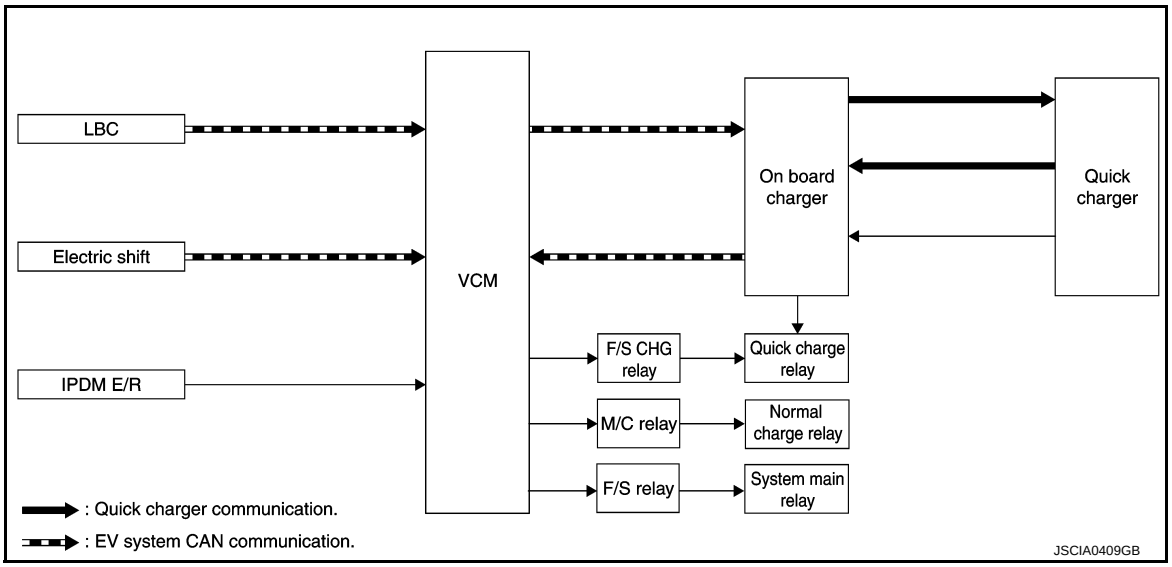
VCM stops the normal charging when VCM detects the EVSE is disconnected.
In addition, under the following conditions, VCM temporarily stops the normal charging and enters standby status.

- When the AC voltage and PWM communication from the EVSE are interrupted.
- When the EVSE connector release switch is pressed.
- When the Li-ion battery temperature reaches 60°C (140°F) or higher.

LI-ION BATTERY CHARGE CONTROL : Quick Charge Control

INFOID:0000000007633677

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL TABLE

Output sensor/ECU	Signal name	Input ECU/actuator	Signal form
IPDM E/R	Power ON	VCM	Voltage
Electric shift	Shift position signal		EV system CAN
Li-ion battery controller	Li-ion battery chargeable power signal		
	Li-ion battery charge completion signal		
On-board charger	On-board charger chargeable power signal		
	Quick charger connecting signal		
	EV system activation request signal		Voltage
	Charge current request signal	Quick charger	Quick charger communication
	Quick charge permit signal		
Quick charger	Diagnosis information signal	On-board charger	
	Charge start switch		Voltage
	Isolation check		
VCM	Maximum charge power signal		EV system CAN

BASIC CONTROL

When the quick charge connector is connected to the quick charge port and the start switch of quick charger is pressed, the on-board charger transmits an EV system activation request signal to VCM. VCM then activates the F/S relay, M/C relay, and F/S CHG relay.

Next, VCM determines the target charge power based on the Li-ion battery chargeable power signal received from the Li-ion battery controller and the on-board charger chargeable power signal received from the on-board charger. VCM then sends the maximum charge power signal to the on-board charger.
The on-board charger converts the Maximum charge power signal to a charge current request signal and transmits it to the quick charger.
Simultaneously, the on-board charger activates the normal charge relay and the quick charge relay, and VCM activates system main relay 1 and system main relay 2. Consequently, the quick charge starts.
When the charge amount reaches the prescribed amount and VCM receives the Li-ion battery charge completion signal from the Li-ion battery controller, VCM stops the charging.

NOTE:

- Even if the Li-ion battery remaining energy does not reach the predetermined level, VCM may stop the charge control after a certain period of time.
- When the Li-ion battery temperature reaches 60ºC (140°F) or higher, VCM temporarily stops quick charging and enters standby status.

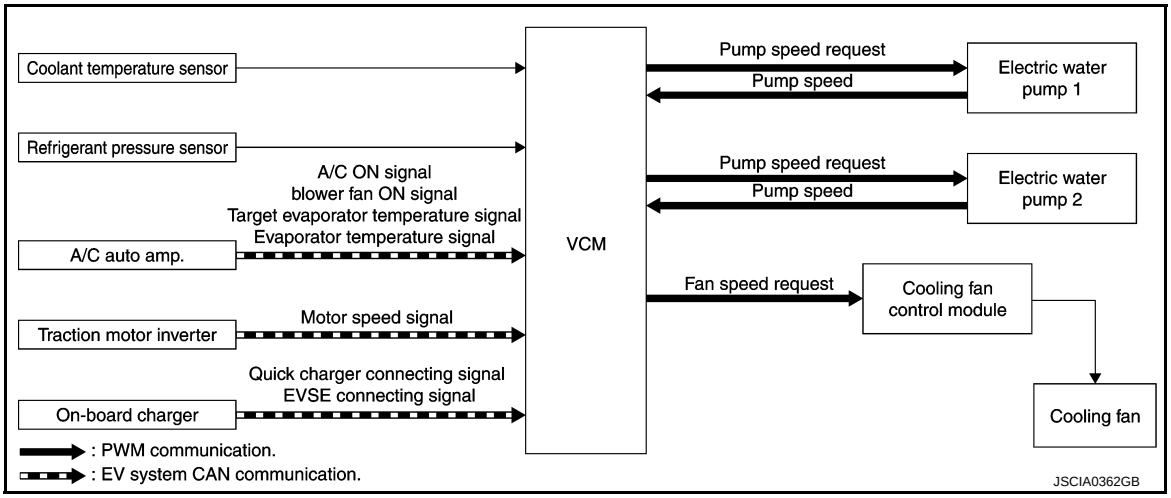
HIGH VOLTAGE SYSTEM COOLING CONTROL

HIGH VOLTAGE SYSTEM COOLING CONTROL : System Description

INFOID:0000000007633678

VCM controls water pump 1, water pump 2, and cooling fan according to information from various sensors and ECUs.

SYSTEM DIAGRAM



WATER PUMP CONTROL

Control Description

The cooling system includes two pumps. By driving these two pumps individually, VCM controls the coolant flow rate according to the coolant temperature and vehicle speed. In addition, if one of the pumps malfunctions, VCM increases the rotation speed of the other to prevent a decrease in the coolant flow rate.
VCM controls the water pump as per the following.

Condition	Control status	Pump 1 control duty (%)	Pump 2 control duty (%)
During normal driving	Normal control	73	66
At low vehicle speed	Low vehicle speed and low temperature coolant flow rate control	43	38
Charging	Charge mode control	39	44

NOTE:

- VCM performs the low vehicle speed and low temperature coolant flow control at approximately 30 km/h (19 MPH) or less. The low vehicle speed and low temperature coolant flow control is switched to the normal control when vehicle speed becomes approximately 35 km/h (22 MPH) or more.
- VCM performs the low vehicle speed and low temperature coolant flow control when coolant temperature is less than 30°C (86°F). The low vehicle speed and low temperature coolant flow control is switched to normal control when coolant temperature is 30°C (86°F) or more.

Fail-Safe

If either water pump malfunctions, VCM controls the water pumps as per the following.

Feedback to VCM (Feedback duty)		Control status
Low pump speed (4 – 6 %)	Only one pump malfunctions	• Continues normal control for the malfunctioning pump. • For the normally functioning pump, controls the duty to 80 % during driving or 60 % during charging.
	Both pumps malfunction	Continues normal control.
High pump speed (84 – 90 %)	Only one pump malfunctions	• For the relevant pump, controls the duty to 10 % (stop command). • For the normally functioning pump, controls the duty to 80 % during driving or 60 % during charging.
	Both pumps malfunction	For the relevant pump, controls the duty to 10% (stop command).
Pump speed does not match VCM command	Only one pump malfunctions	Continues normal control.
	Both pumps malfunction	
Input signal error or no input (diagnosis on pump side)	Only one pump malfunctions	Operates the pump at the maximum speed (maximum output control triggered by pump self-diagnosis)
	Both pumps malfunction	

COOLING FAN CONTROL

Control Description

VCM calculates the required cooling fan speed from the operation status of the air conditioner, coolant temperature, refrigerant pressure, and vehicle speed. VCM transmits the PWM signal to the cooling fan control module according to the calculated value.

During normal driving or Li-ion battery charging, VCM determines a cooling fan speed by selecting the highest value from a coolant temperature request value and the sum of an air conditioner request value and an evaporator temperature correction value, as shown in the following table.

Coolant temperature request

Unit: %

Coolant temperature	Vehicle speed (km/h)			
	0 – 20	20 – 50	50 – 80	80 or more
60.5°C or more	100	100	100	100
57°C or more and less than 60.5°C	40 – 85	40 – 85	40 – 85	0
Less than 57 °C	0	0	0	0

Air conditioner request (MIN)

Unit: %

Refrigerant pressure	Vehicle speed (km/h)			
	0 – 20	20 – 50	50 – 80	80 or more
1.68 MPa or more	85	100	100	100
1.38 MPa or more and less than 1.68 MPa	65	55	55	0
1.00 MPa or more and less than 1.38 MPa	65	40	40	0
Less than 1.38 MPa	65	0	0	0

Air conditioner request (MAX)

Unit: %

Refrigerant pressure	Vehicle speed (km/h)			
	0 – 20	20 – 50	50 – 80	80 or more
1.68 MPa or more	85	100	100	100
1.38 MPa or more and less than 1.68 MPa	85	85	85	0
1.00 MPa or more and less than 1.38 MPa	65	70	70	0
Less than 1.38 MPa	65	70	70	0

Evaporator temperature correction

Target - actual evaporator temperature difference	Correction duty (%)
Less than 2°C	0
2°C or more and less than 5°C	15
5°C or more and less than 8°C	35
8°C or more	100

During timer A/C mode or remote A/C mode, VCM determines a cooling fan speed by selecting the highest value from a coolant temperature request value and the sum of an air conditioner request value and an evaporator temperature correction value, as shown in the following table.

Coolant temperature request

Coolant temperature	Fan duty (%)
62°C or more	100
60.5°C or more and less than 62°C	40 – 100
Less than 60.5°C	0

Air conditioner request (MIN)

Refrigerant pressure	Fan duty (%)
2.40 MPa or more	75
2.00 MPa or more and less than 2.40 MPa	55
1.38 MPa or more and less than 2.00 MPa	40
1.00 MPa or more and less than 1.38 MPa	40
Less than 1.00 MPa	40

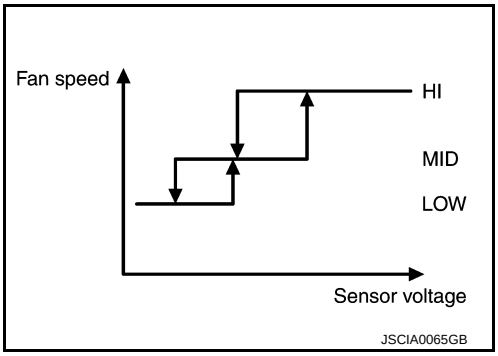
Air conditioner request (MAX)

Refrigerant pressure	Fan duty (%)
2.40 MPa or more	75
2.00 MPa or more and less than 2.40 MPa	55
1.38 MPa or more and less than 2.00 MPa	55
1.00 MPa or more and less than 1.38 MPa	55
Less than 1.00 MPa	55

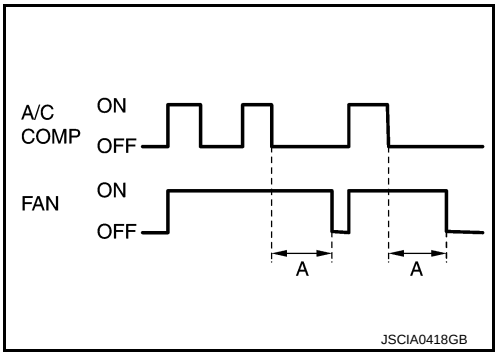
Evaporator temperature correction

Target - actual evaporator temperature difference	Correction duty (%)
Less than 2°C	0
2°C or more and less than 5°C	15
5°C or more and less than 8°C	15
8°C or more	15

The cooling fan speed control reduces the cooling fan speed fluctuation by having a range for the operating conditions.



When the vehicle speed is 10km/h or less, VCM reduces the frequency of ON/OFF cycles by setting a period of time (A) in which the cooling fan continuously operates after the A/C compressor is turned OFF.

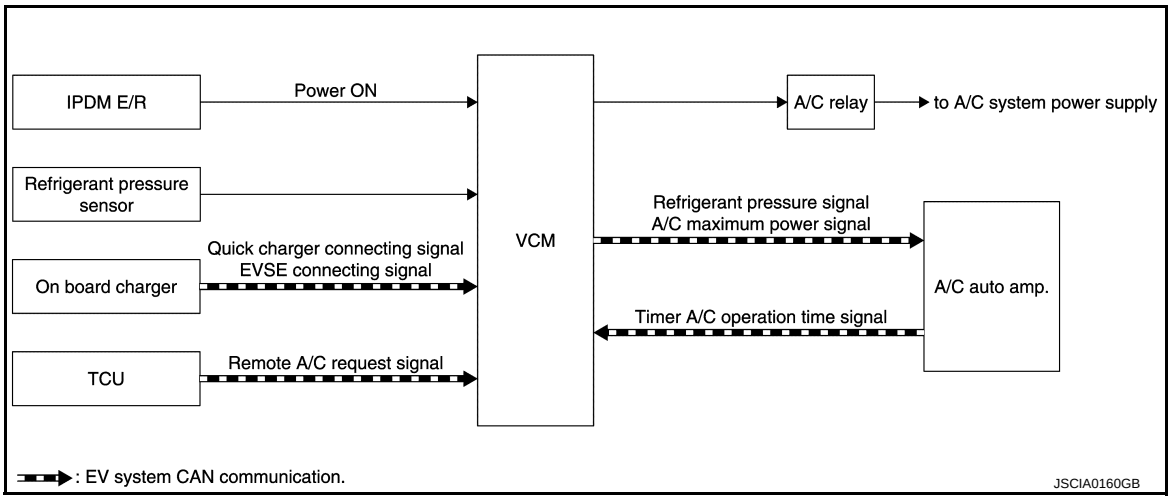


AIR CONDITIONER CONTROL

AIR CONDITIONER CONTROL : System Description

INFOID:0000000007633679

SYSTEM DIAGRAM



DESCRIPTION

In EV, VCM controls the A/C relay so that the air conditioner can operate even in the POWER OFF state. The remote air conditioner and timer air conditioner functions are enabled by this control. When VCM judges a need of air conditioner activation in response to driver operation, timer air conditioner function, or remote air

conditioner function, VCM activates M/C relay to start the EV system. VCM also activates the A/C relay to supply power to the A/C system.
In addition, VCM calculates the power that can be used by the air conditioning system based on the Li-ion battery status and vehicle status and sends it to the A/C auto amp.
When ECO mode is selected, VCM sends the ECO mode signal to the A/C auto amp. to control the air conditioner at a lower rate than normal.
For an overview of air conditioner types, refer to HAC-15, "AUTOMATIC AIR CONDITIONING SYSTEM : System Description".

CONTROL DESCRIPTION

Air Conditioner Control During Charging (For Group A and Group B)

VCM allows the air conditioner to be used during charging. In this case, the air conditioner stops when charging is completed.
NOTE:
If the Li-ion battery available charge gauge level is lower than Level 2, the A/C does not operate during battery charge.

Cooling/heating Function Control During Power Supply Position ON (Except for Group A and Group B)

When the power supply position is ON, VCM allows the operation of cooling/heating function control in the status that EVSE is connected.However, start of cooling/heating function is allowed only while charging is in progress. Refer to HAC-28, "Description" for details of cooling/heating function control during power supply position ON.
NOTE:
If the Li-ion battery available charge gauge level is lower than Level 2, the A/C does not operate during battery charge.

Timer Air Conditioning Control

When all of the following conditions are satisfied, VCM activates the timer air conditioner so that the room temperature reaches 25°C (77°F) before the scheduled departure time.
- Timer air conditioner timer is ON
- There is AC power input during charging (or in a state where AC power input is possible).

VCM activates the EV system 2 hours before the scheduled departure time. The A/C auto amp. judges the necessary operating time of timer air conditioner within the range between 0 and 2 hours according to the ambient temperature and interior temperature and sends the data to VCM. VCM calculates and judges the operating time required for activating the timer air conditioner, according to the scheduled departure time and the received data.
NOTE:
- When turning ON the power switch during timer air conditioning, the air conditioning control switches to normal.
- When timer charge and the timer air conditioner operate simultaneously, VCM distributes power to the air conditioner system and the charge system according to the priority set on the navigation screen.

Remote Air Conditioning Control

When VCM receives the remote air conditioning request signal from the TCU, the air conditioning is operated. Remote air-conditioning operates as follows.

Condition	Operating time (min)
Charge connector is not connected.	15
When connecting EVSE (with AC input)	15 – 120
During quick charge	15 – 120

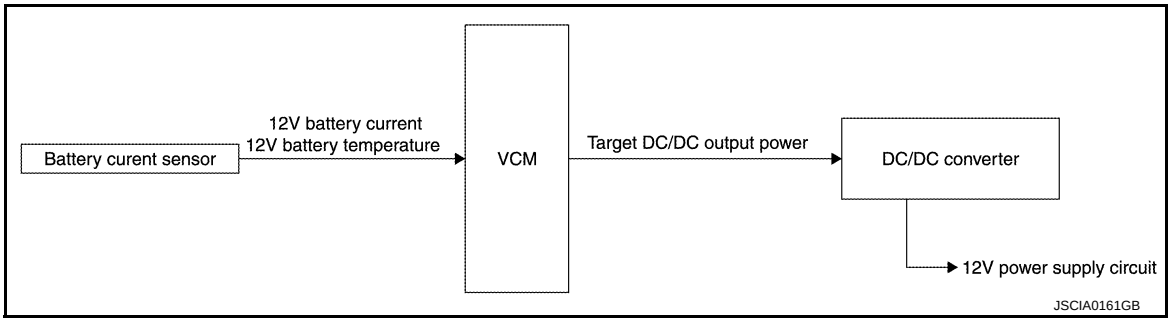
NOTE:
When the power is turned ON during remote air conditioning, the remote air conditioning is ended.

POWER VOLTAGE VARIABLE CONTROL SYSTEM

POWER VOLTAGE VARIABLE CONTROL SYSTEM : System Description

INFOID:0000000007633680

SYSTEM DIAGRAM



DESCRIPTION

The power voltage variable control system reduces the electric power consumption from the Li-ion battery by varying the DC/DC converter output in a range from 13 V to 15 V according to the use status of electric equipment and the 12V battery status.

CONTROL DESCRIPTION

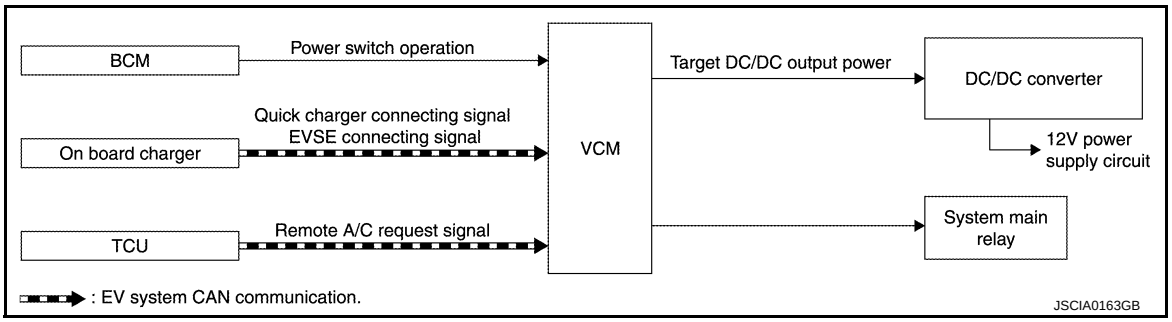
The battery current sensor (with battery temperature sensor) measures the battery charge/discharge current and the battery ambient temperature.
VCM judges the battery status and the use status of electric equipment based on those signals, determines a target output voltage, and transmits a target DC/DC output power signal to the DC/DC converter.
The DC/DC converter adjusts the output voltage to the target power generation voltage based on the received target DC/DC output power signal.
In addition, when there is no power voltage signal or when some error is occurs in the variable voltage control system, the DC/DC converter outputs 14 V.

AUTOMATIC 12V BATTERY CHARGE CONTROL

AUTOMATIC 12V BATTERY CHARGE CONTROL : System Description

INFOID:0000000007633681

SYSTEM DIAGRAM



DESCRIPTION

The automatic 12V battery charge control is a control to reduce the frequency of battery discharge by automatically charging the 12V battery in case the 12V battery voltage is low when the key switch is turned to ON or the vehicle is left unattended for a long time.
When VCM judges a need for automatic charge, VCM controls the DC/DC converter and the system main relay and charges the 12V battery using the Li-ion battery power.
For 12V battery charge control during READY condition, refer to EVC-48, "POWER VOLTAGE VARIABLE CONTROL SYSTEM : System Description".

Vehicle state	12V battery charge	Shift position
READY	Always charged.	Any position
Normal charge ON		“P” position only
Quick charge ON		
Timer A/C or remote A/C ON		
Power switch ON	Automatically started when 12V battery voltage is low.	
Power switch OFF	Charge for 5 minutes when the vehicle is not used for a long time.	

NOTE:
When any of the following operations is performed, the 12V battery automatic charge control is canceled: 1) Vehicle to the READY state, 2) Normal charge, 3) Quick charge, 4) Timer/remote A/C ON.

CONTROL DESCRIPTION

Power ON

VCM monitors the 12V battery voltage during POWER ON cycle and immediately starts charging when VCM judges that the voltage is lowered.

NOTE:
VCM does not perform the automatic 12V battery charge control when the shift position is in a range other than “P” range.

When Vehicle is Not Used for A Long Time

- VCM group*: A and B
  VCM measures the time of no operation using its internal timer. If the time of no operation reaches 120 hours, VCM performs automatic charge for 5 minutes.
- VCM group*: except for A and B
  VCM measures the time of no operation using its internal timer. If the time of no operation reaches 24 hours, VCM performs automatic charge for 4 minutes.

*: For VCM groups, refer to EVC-8, "How to Check VCM Group".

VCM resets the no operation status continuous time when the vehicle satisfies one of the following conditions.

- READY continues for more than 5 minutes.
- Normal charge continues for more than 5 minutes.
- Quick charge continues for more than 5 minutes.
- Timer air conditioning or remote air conditioning continues for more than 5 minutes.

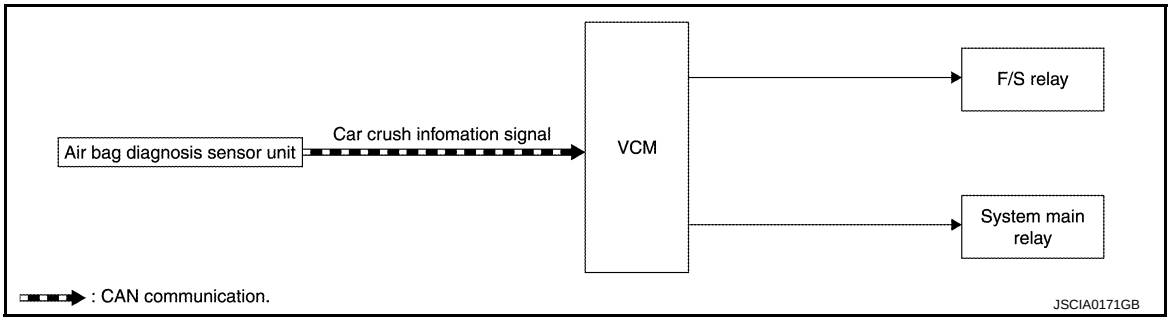
NOTE:
- During automatic 12V battery charge, the charging status indicator blinks.
- The automatic 12V battery charge control does not start within approximately one hour when the power switch is turned ON/OFF.

POWER CUT OFF CONTROL

POWER CUT OFF CONTROL : System Description

INFOID:0000000007633682

SYSTEM DIAGRAM



DESCRIPTION

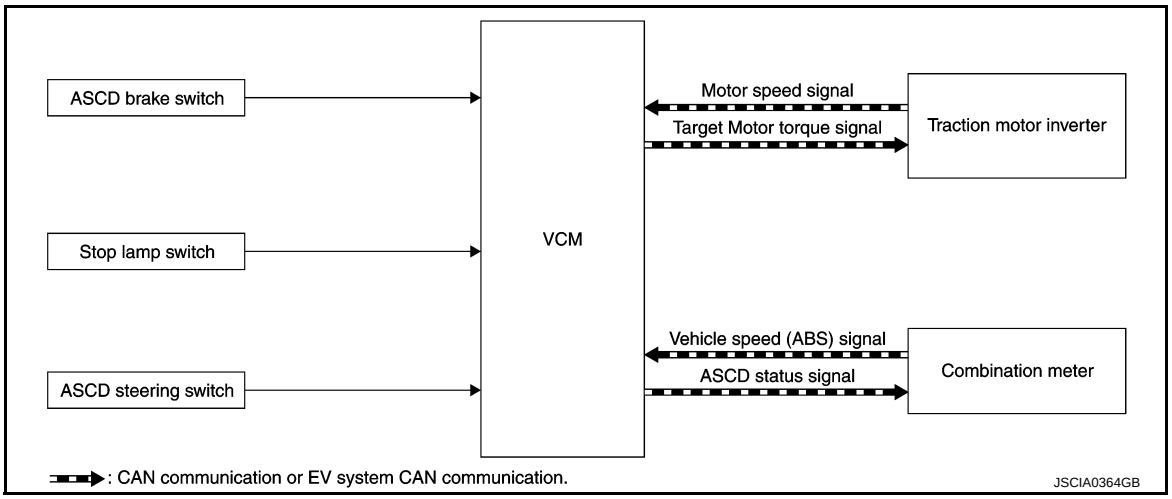
Because EV uses high voltage power, there is a risk of electric shock if the high voltage circuit is shorted to a body ground during a collision. To avoid such risks, if VCM detects a car crush information signal, VCM deactivates the system main relay to cut off the Li-ion battery from the high voltage circuit so that the risk of electric shock is reduced.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000007633683

SYSTEM DIAGRAM



BASIC ASCD SYSTEM

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at a predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
VCM controls the traction motor to regulate vehicle speed.
Operation status of ASCD is indicated on the information display in the combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
For the switch function, Refer to EVC-53, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function".

CAUTION:

Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

CANCEL OPERATION

When any of following conditions exist, cruise operation is cancelled.

- CANCEL switch is pressed
- More than two switches on ASCD steering switch are pressed at the same time (Set speed is cleared)
- Brake pedal is depressed
- Selector lever position is N, P or R position
- TCS system is operated

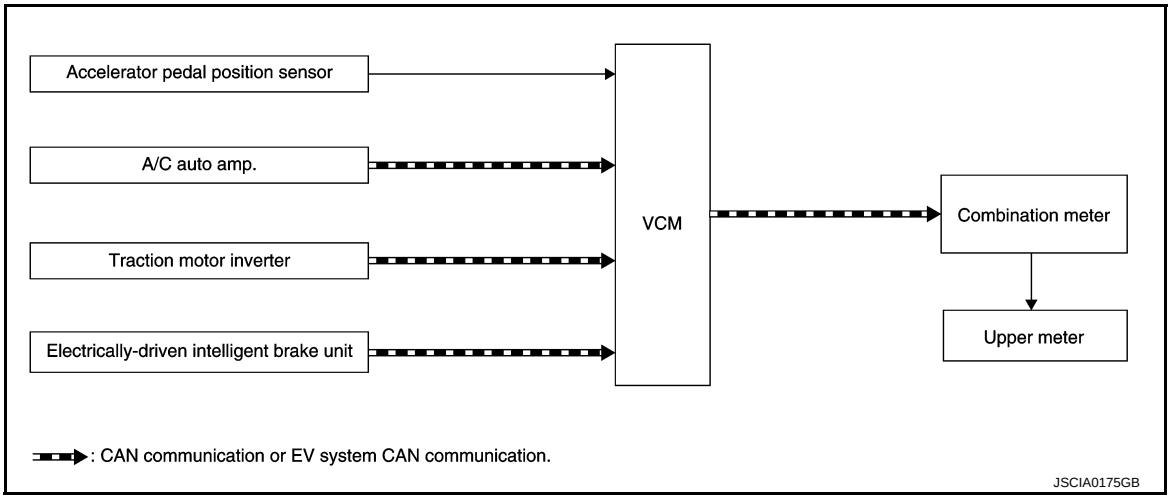
When VCM detects malfunction for some self-diagnoses regarding ASCD system, VCM cancels the cruise operation and informs the driver by blinking SET indicator lamp quickly.
If ASCD MAIN switch is turned to OFF while ASCD is activated, all of ASCD operations are cancelled and vehicle speed memory is erased.

ECO INDICATOR CONTROL

ECO INDICATOR CONTROL : System Description

INFOID:0000000007633684

SYSTEM DIAGRAM



INPUT/OUTPUT SIGNAL CHART

Output sensor/ECU	Signal name	Input ECU/actuator	Signal form
Accelerator pedal position sensor	Accelerator pedal position	VCM	Voltage
A/C auto amp.	Ambient temperature signal		EV system CAN
	Air conditioner ON signal		
	A/C maximum power signal		
	PTC maximum power signal		
Traction motor inverter	Motor speed signal		
	Regeneration brake torque signal		
Electrically-driven intelligent brake unit	Target brake force signal		CAN
VCM	ECO indicator signal	Combination meter	
	ECO tree signal		

DESCRIPTION

VCM calculates the instantaneous ECO operability based on the driver accelerator operation, brake operation, vehicle idle time, and air conditioner operation status and displays this in the instant ECO indicator.
Furthermore, VCM samples the instantaneous ECO operability every second and compares it to the map stored by VCM to calculate the cumulative ECO drivability, and if this value exceeds the set value, then the ECO tree segment is illuminates.

NOTE:
Once the ECO tree segment is illuminated, it does not turn OFF (dim) during the current trip.

NOTICE:
The idle time is the status when not driving in the READY state.
For details regarding the ECO indicator functions, refer to MWI-29, "ECO INDICATOR : System Description".

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000007633685

DESCRIPTION

- 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 error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). 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.

- VCM includes a gateway function and communicates signals between the CAN communication circuit and EV system CAN circuit.

For CAN communication details, Refer to LAN-28, "CAN COMMUNICATION SYSTEM : System Description".

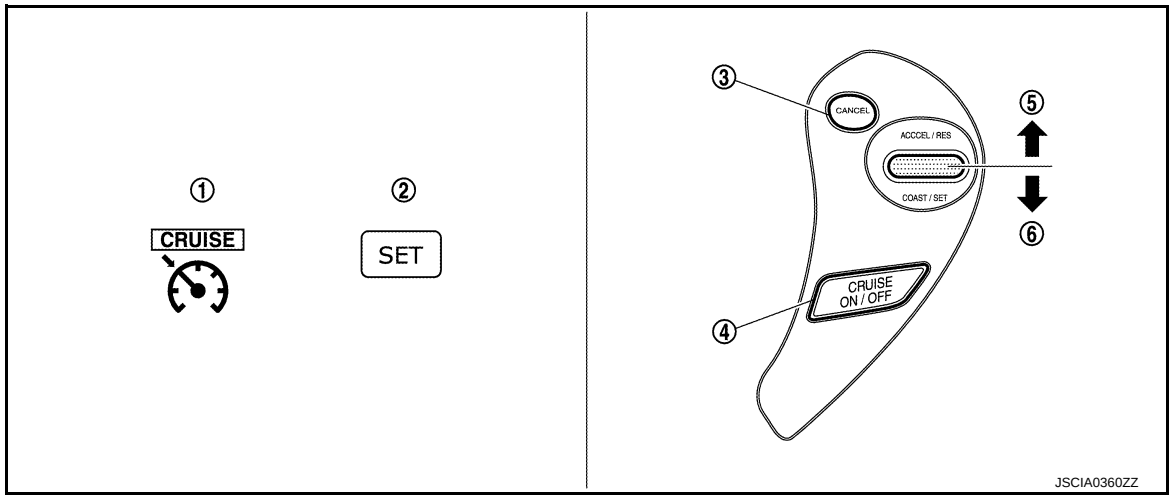
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:0000000007633686

SWITCHES AND DISPLAYS



1. Cruise indicator
2. SET indicator
3. CANCEL switch
4. ASCD MAIN switch
5. SET/COAST switch
6. RESUME/ACCEL switch

A. Information display
B. On the steering wheel

SWITCH OPERATION

Name	Function
ASCD MAIN switch	Turns the ASCD ON/OFF.
RESUME/ACCEL switch	• When the switch is pressed after the cruise control is cancelled in any method other than main switch operation, the vehicle speed is reset to the previous speed setting before the cancellation*. • When the switch is pressed during cruise control, the setting speed is increased and the vehicle speed increases.
SET/COAST switch	• When the switch is pressed at the preferred vehicle speed, the cruise control starts to operate. • When the switch is pressed during cruise control, the set speed is reduced and the vehicle speed reduces.
CANCEL switch	When the switch is pressed, the ASCD control is cancelled.

*: To reset vehicle speed, the vehicle condition must be as follows:

- Brake pedal is released
- Selector lever position is D or ECO.
- Vehicle speed is greater than 40 km/h (25 MPH) and 130 km/h (80 MPH)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000007633687

This system is an on-board diagnostic system that detects a malfunction automatically. A malfunction is stored in ECU memory as a DTC. The diagnostic information can be obtained with CONSULT.

Counter System

INFOID:0000000007633688

In this system, “Power switch is turned OFF⇒ON” is defined as 1 trip. VCM detects malfunctions while saving the DTC and freeze frame data and continues saving this data for a maximum of 40 trips. In addition, if a DTC that is the same as the saved DTC is detected again, the counter is reset and the count up starts from “0” again.

DTC and Freeze Frame Data

INFOID:0000000007633689

VCM can save multiple DTC but can only save 1 freeze frame data record.
When VCM detects a certain malfunction, if it detects a different malfunction after saving the DTC and freeze frame data, multiple DTC can be confirmed, but only the freeze frame data that is saved first can be confirmed.
The DTC and freeze frame data are deleted when the self-diagnostic is deleted.

DIAGNOSIS SYSTEM (VCM)

CONSULT Function

INFOID:0000000007633690

FUNCTION

Diagnostic test mode	Function
ECU Identification	VCM part number can be read.
Self-diagnostic result*1	Self-diagnostic results and freeze frame data can be read and erased quickly.*2
Data monitor	Input/Output data in VCM can be read.
Active test	Diagnostic Test Mode in which CONSULT drives some actuators apart from VCM and also shifts some parameters in a specified range.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT.
Load battery ID	Refer to “Li-ion Battery ID Registration Operation Manual”.

*1: For VCM other than those in Group A or Group B, DTC P0AA1 is not cleared even when “Self-diagnostic Result” is cleared. To clear DTC P0AA1, perform “SPECIFIC DTC CLEAR” in “WORK SUPPORT”. For VCM groups, refer to EVC-8, "How to Check VCM Group".

*2: The following diagnosis information is cleared when the VCM memory is erased.

- Diagnostic trouble codes
- Freeze frame data

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
SAVE DATA FOR CPU REPLACE	In this mode, the data saved in VCM is stored in CONSULT.	When VCM is replaced.
WRITE DATA AFTER REPLACE CPU	In this mode, write data stored by “SAVE DATA FOR CPU REPLACE” in work support mode to VCM.	When VCM is replaced.
BATTERY GRADUAL CAP LOSS DATA CLEAR	Li-ion Battery deterioration data stored in VCM is cleared.	Always perform after Li-ion Battery controller is replaced as new one.
HV BATT J/B DATA CLEAR	System Main Relay cutoff count stored in VCM is cleared.	Always perform after Li-ion Battery Junction Box is replaced as new one.
WRITE VIN DATA	VIN is registered in VCM.	When registering VIN in VCM.
SPECIFIC DTC CLEAR*	Self-diagnosis results of DTC P0AA1 and Freeze Frame Data are cleared.	When DTC P0AA1 is detected.

*: When this is performed, all self-diagnosis results in VCM and Freeze Frame Data are cleared. This function is not displayed for VCMs in Group A or Group B. For VCM Groups, refer to EVC-8, "How to Check VCM Group".

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC, refer to EVC-84, "DTC Index".

How to Erase DTC

- If power is continuously in the ON position after a DTC is detected, turn power switch OFF for at least 20 seconds before turning power switch to the ON position again, and then erase DTC.
- Check the all self-diagnostic screen to confirm there are no DTCs in other ECUs.

CAUTION:

For VCM other than those in Group A and Group B, DTC P0AA1 is not cleared even when “Self-diagnostic Result” is cleared. To clear DTC P0AA1, perform “SPECIFIC DTC CLEAR” in “WORK SUPPORT”. For VCM groups, refer to EVC-8, "How to Check VCM Group".

Freeze Frame Data

The Freeze Frame Data shows the state of the vehicle at the time a DTC is detected and is useful in re-creating the circumstances that caused the malfunction.

Freeze Frame Data Item List

Freeze frame data item	Description
DTC	Displays a DTC.
VCM MODE	Displays VCM status. • 0-7: During VCM starts-up • 10: Power switch is ON and the charge connector is not connected. • 11-29: Mode changing to READY • 30: READY • 31-68: During system shutdown • 109, 110: Power switch is ON and the charge connector is not connected. • 111-129: Mode changing to charge mode. • 130: During charging • 131-144: During system shutdown • 211-229: Mode changing to automatic 12V battery charging or remote charging mode without charging connector connection. • 230: During automatic 12V battery charging or remote charging mode without charging connector connection. • 231-246: During system shutdown
VCM ACTIVAT TRIG	Displays the cause of VCM start-up.
CHG PORT CONNECT	Displays the connection status of the charge connector • 1: Quick charge connector is connected. • 2: Normal charge connector is connected
VEHICLE SPEED [km/h] or [mph]	Displays the vehicle speed that is calculated from the motor speed.
SHIFT POSITION	Displays the shift position.
COOLANT TEMP [degC]	Displays the coolant temperature.
MOTOR SPEED [rpm]	Displays the traction motor speed.
ACCEL OPEN ANGLE [deg]	Displays the accelerator pedal openness.
TRG TORQ [Nm]	Displays the target motor torque.
TRG POWER [N]	Displays the target motor output.
TRG REGE TORQ [Nm]	Displays the target motor regeneration torque.
HV BATT VOLT [V]	Displays the Li-ion battery voltage.
HV BATT CURRENT [A]	Displays the Li-ion battery current.
HV BATT TEMP [degC]	Displays the Li-ion battery temperature.
REGENERABLE PWR [kW]	Displays the Li-ion battery regenerable power.
CHARGEABLE PWR MAX [kW]	Displays the Li-ion battery chargeable power.
AVAILABLE HV BAT PWR [kW]	Displays the Li-ion battery available discharge power.
ERROR TYPE [Ah]	The item is indicated, but not used.

DATA MONITOR MODE

Monitored Item

X: Applicable

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
POWER LIMIT CAUSE	• B/T-LOW • B/T-HI • B LEV • B CAP • MOT-V • MOT-T • ##			When the motor power is limited, this shows the reason the power is being limited. • B/T-LOW: Li-ion battery temperature is too low. • B/T-HI: Li-ion battery temperature is too high. • B LEV: The Li-ion battery remaining energy is low. • B CAP: The Li-ion battery capacity is low. • MOT-V: The input voltage to the traction motor or traction motor inverter is low. • MOT-T: Traction motor temperature or traction motor inverter temperature is too high. • ##: No torque limitation.
VEHICLE SPEED	km/h or mph	X	X	The vehicle speed computed by the motor speed signal sent from the traction motor inverter is displayed.
12V BATTERY VOLTAGE	V	X	X	The 12 V power supply voltage of VCM is displayed.
WATER PUMP 1 TRG DUTY	%	X		Displays the water pump 1 target rotation command duty.
W/P 1 CRNT SPD DUTY	%		X	Displays the water pump 1 actual rotation duty.
WATER PUMP 2 TRG DUTY	%	X		Displays the water pump 2 target rotation command duty.
W/P 2 CRNT SPD DUTY	%		X	Displays the water pump 2 actual rotation duty.
VCM POWER SUPPLY (ACT)	V	X		Displays the 12 V power supply voltage of VCM when VCM is started.
DC/DC CONV TEMP	µsec			Displays the DC/DC converter temperature status signal duty.
DC/DC CONV TEMP STATUS	0/1/2/3/7			Displays the DC/DC converter temperature status. • 0: The DC/DC converter power is being limited. • 1: The DC/DC converter is at a high temperature. • 2: The DC/DC converter is at an intermediate temperature. • 3: The DC/DC converter is at a low temperature. • 7: The DC/DC converter system is malfunctioning.
F/S RELAY VOLT	V	X		Displays the voltage on the F/S relay contact side that is being input to VCM.
COOLANT TEMP	degC	X	X	The coolant temperature (determined by the signal voltage of the coolant temperature sensor) is displayed.
VCM MODE	—		X	Displays VCM status. • 0-7: During VCM starts-up • 10: Power switch is ON and the charge connector is not connected. • 11-29: Mode changing to READY • 30: READY • 31-68: During system shutdown • 109, 110: Power switch is ON and the charge connector is not connected. • 111-129: Mode changing to charge mode. • 130: During charging • 131-144: During system shutdown • 211-229: Mode changing to automatic 12V battery charging or remote charging mode without charging connector connection. • 230: During automatic 12V battery charging or remote charging mode without charging connector connection. • 231-246: During system shutdown

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
TRG MOTOR TORQ 1	N·m		X	Displays the motor torque demand value VCM is requesting of the traction motor inverter.
VCM ACTIVATION	On/READY			Displays that VCM has the EV system READY. • On: Other than READY • READY: READY control in progress
NEXT GEAR POSITION	• R • N/P • D			Displays the position of the selected selector lever. • R: When R range is selected • N/P: When N or P range is selected • D: When D or ECO range is selected
GEAR POSITION	• R • N/P • D			Displays the position of the currently selected selector lever. • R: R range • N/P: N or P range • D: D or ECO range
READY LAMP SIGNAL	On/BLINK/Off		X	Displays the READY to drive indicator lamp operation request status. • On: This causes the READY to drive indicator lamp to light up. • BLINK: This causes the READY to drive indicator lamp to flash. • Off: No operation request
CHARGE LAMP SIGNAL	On/BLINK/Off		X	Displays the 12V battery charge warning lamp operation request status. • On: The causes the 12V battery charge warning lamp to light up. • BLINK: The causes the 12V battery charge warning lamp to flash. • Off: No operation request
EV SYSTEM W/L SIGNAL	On/BLINK/Off		X	This displays the EV system warning lamp operation request status. • On: This causes the EV system warning lamp to light up • BLINK: This causes the EV system warning lamp to flash. • Off: No operation request
AVAILABLE MOT OUTPUT MAX	kW			Displays the maximum value that can currently be output by the traction motor.
MOTOR REGE PWR MAX	kW			Displays the maximum value that is currently regenerable by the traction motor.
POWER CONSUM (MOTOR)	kW			Displays the traction motor estimated power consumption calculated by VCM from the traction motor torque and vehicle speed.
CHARGE MODE	100V/200V/QUICK/NG/Off			Displays the charging status. • 100V: Charging using AC 100-120 V • 200V: Charging using AC 200-240 V • QUICK: During quick charge • NG: When in a state where charging is not possible • Off: Except above
ECO INDICATOR	—			Displays the number of segments indicated by the instant ECO indicator.
ECO TREE	—			Displays the number of segments indicated by the ECO tree.
POWER CONSUMPTION (A/C)	kW			Displays the power consumption of the air conditioner system.
POWER CONSUM (AUXS)	kW			Displays the power consumption of the auxiliaries.

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
GEAR POSITION DISPLAY	P/R/N/D/B	X	X	Displays the in-meter gear display request status. • P: When there is a P display request • R: When there is an R display request • N: When there is an N display request • D: When there is a D display request • B: When there is an ECO display request
AMBIENT TEMP	degC	X		Displays the outside air temperature received from the A/C auto amp.
DC/DC CONV STATUS	1/2/3			Displays the status of the DC/DC operation signal being used for communication between VCM and the DC/DC converter. • 1: When normal operation • 2: VCM is detecting a DC/DC converter error. • 3: VCM is prohibiting DC/DC converter operation.
DC/DC CONV REQ VOLT	V			Displays the power generation request voltage being requested to the DC/DC converter.
COOLING FAN REQ DUTY	%		X	Displays the cooling fan operation request duty.
ACCEL OPEN ANGLE	deg			The accelerator pedal opening angle (determined by the signal voltage of the accelerator pedal position sensor) is displayed.
12V BATTERY TEMP	degC	X		The 12V battery temperature (determined by the signal voltage of the battery temperature sensor) is displayed.
12V BATTERY CURRENT AVG	A	X	X	Displays the average current of 12V battery.
READY COUNT*	count			Displays the cumulative READY count from the time the vehicle is new.
INTEG READY TIME*	sec			Displays the cumulative READY time from the time the vehicle is new.
QUICK CHG COUNT*	count			Displays the cumulative quick charge count from the time the vehicle is new.
INTEG Q/CHG TIME*	sec			Displays the cumulative quick charge time from the time the vehicle is new.
NORMAL CHG COUNT*	count			Displays the cumulative normal charge count from the time the vehicle is new.
INTEG N/CHG TIME*	sec			Displays the cumulative normal charge time from the time the vehicle is new.
ACCEL SENSOR 1 VOLT	V	X	X	Accelerator pedal position sensor 1 signal voltage is displayed.
ACCEL SENSOR 2 VOLT	V	X	X	Accelerator pedal position sensor 2 signal voltage is displayed.
HI SPEC VEHICLE SPEED	km/h or mph			Displays the high accuracy vehicle speed from “VEHICLE SPEED”
REFRIGERANT PRESS	MPa	X		The refrigerant pressure (determined by the signal voltage of the refrigerant pressure sensor) is displayed.
ASCD SET VEHICLE SPEED*1	km/h or mph			The preset ASCD vehicle speed is displayed
N/CHG PORT CONNECTION	On/HALF/ Off	X	X	Displays the normal charge connector engagement state. • On: The normal charge connector is connected correctly. • HALF: The normal charge connector is semi-engaged. • Off: The normal charge connector is not connected.

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
ENABLE OBC OUT PWR	kW			Displays the power that can be output by the on-board charger.
OBC OUT PWR	kW	X	X	Displays the power being output by the on-board charger.
AC POWER TYPE	100V/200V/ NONE			Displays the type of AC power supply that is connected to the normal charge port. • 100V: A 100-120 V power supply is connected. • 200V: A 200-240 V power supply is connected. • NONE: An AC power supply is not connected.
HV BATT LEVEL (%)	%	X	X	The Li-ion battery remained energy rate is displayed. **NOTE:** Battery power indication method of VCM differs from that of quick charger. A value displayed for this item may not agree with a value displayed by quick charger.
HV BATT VOLT	V		X	Displays the Li-ion battery voltage received from the Li-ion battery controller.
HV BATT CURRENT	A			Displays the Li-ion battery current received from the Li-ion battery controller.
HV BATTERY TEMP	°C or °F		X	Displays the Li-ion battery temperature received from the Li-ion battery controller.
HV BATT LEVEL	kWh	X	X	The Li-ion battery remained energy is displayed.
IR SENSOR SIGNAL P-P	mV			Displays the peak to peak of the signal sent from the on-board isolation resistance monitoring system.
INVERTER DC INPUT VOLT	V			Displays the high-voltage power supply voltage being input to the traction motor inverter.
MOTOR PWR LIMIT REQ (INV)	%			Displays the traction motor output limit value received from the traction motor inverter.
CURRENT MOTOR TORQ	N·m			Displays the traction motor actual output value (estimated value) received from the traction motor inverter.
MOTOR SPEED	rpm	X	X	Displays the traction motor revolution received from the traction motor inverter.
ESTMT PWR CNSM (A/C CMP)	kW	X		Displays the A/C compressor estimated power consumption.
ESTMT PWR CNSM (PTC HTR)	kW	X		Displays the PTC elements heater estimated power consumption.
FRONT WIPER	LOW/HIGH/ Off/INVALID			Displays the front wiper operation status received from the IPDM E/R • LOW: Front wiper is operating at low speed • HIGH: Front wiper is operating at high speed • Off: Front wiper is not operating • INVALID: IPDM E/R cannot detect front wiper status.
CLASH DETECT INFO	• MID • HEAVY • ##	X		Displays the car crush information received from the air bag diagnosis sensor unit. • MID: A non-serious impact was detected. • HEAVY: A serious impact was detected. • ##: When the impact is not detected
POWER SW	On/Off	X		Displays the POWER switch operation status. • On: When the POWER switch is operated • Off: On: When the POWER switch is not operated
START SIGNAL	On/Off	X	X	Displays the BCM start signal status. • On: Start signal input. • Off: Start signal does not input.

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
EV SYS ACT REQ (OBC)	On/Off	X		Displays the status of the EV system activation request signal received from the on-board charger. • On: When a signal is received • Off: When a signal is not received
IMMEDIATE CHG SW	On/Off	X		Displays the operation status of the immediate charging switch. • On: When the switch is operated • Off: When the switch is not operated
EV SYS ACT REQ (TCU)	On/Off	X		Displays the status of the EV system activation request signal received from the TCU. • On: When a signal is received. • Off: When a signal is not received
HV INTERLOCK (DC/DC)	On/Off			Displays the connection status of the high voltage connector connected to the DC/DC junction box. • On: The high voltage connector is connected correctly. • Off: Except above.
F/S RELAY	On/Off		X	Displays the F/S relay operation status. • On: F/S relay is ON • Off: F/S relay is OFF
M/C RELAY	On/Off		X	Displays the M/C relay operation status. • On: M/C relay is ON • Off: M/C relay is OFF
F/S CHG RELAY	On/Off		X	Displays the F/S CHG relay operation status. • On: F/S CHG relay is ON • Off: F/S CHG relay is OFF
REVERSE LAMP RELAY	On/Off	X		Displays the reverse lamp relay operation status. • On: Reverse lamp relay is ON • Off: Reverse lamp relay is OFF
REVERSE LAMP RELAY MONI	On/Off			Displays the status that VCM is operating the reverse lamp relay. • On: Operation voltage is being output by VCM. • Off: Operation voltage is not being output by VCM.
A/C RELAY	On/Off		X	Displays the A/C relay operation status. • On: A/C relay is ON • Off: A/C relay is OFF
HV P MAIN RLY ACTIV	On/Off		X	Displays the system main relay (+) operation status. • On: System main relay (+) is ON • Off: System main relay (+) is OFF
HV P MAIN RLY ACTIV MONI	On/Off	X		Displays the status that VCM is operating the system main relay (+). • On: Operation voltage is being output by VCM. • Off: Operation voltage is not being output by VCM.
HV N MAIN RLY ACTIV	On/Off		X	Displays the system main relay (-) operation status. • On: System main relay (-) is ON • Off: System main relay (-) is OFF
HV N MAIN RLY ACTIV MONI	On/Off	X		Displays the status that VCM is operating the system main relay (-). • On: Operation voltage is being output by VCM. • Off: Operation voltage is not being output by VCM.
HV PRE CHG RLY ACTIV	On/Off		X	Displays the pre-charge relay operation status. • On: pre-charge relay is ON • Off: pre-charge relay is OFF

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
HV PRE CHG RLY ACTIV MONI	On/Off	X		Displays the status that VCM is operating the pre-charge relay. • On: Operation voltage is being output by VCM. • Off: Operation voltage is not being output by VCM.
PLUG IN INDI LAMP	On/Off		X	Displays the plug in indicator lamp operation request status. • On: The plug in indicator lamp is lit. • Off: No operation request
CHARGE STAT INDI 1	On/Off		X	Displays the charging status indicator 1 operation request status. • On: The charging status indicator 1 is lit. • Off: No operation request
CHARGE STAT INDI 2	On/Off		X	Displays the charging status indicator 2 operation request status. • On: The charging status indicator 2 is lit. • Off: No operation request
CHARGE STAT INDI 3	On/Off		X	Displays the charging status indicator 3 operation request status. • On: The charging status indicator 3 is lit. • Off: No operation request
ASCD MAIN SW	On/Off	X		Displays the ASCD MAIN switch operation status. • On: When the ASCD MAIN switch is operated • Off: When the ASCD MAIN switch is not operated
ASCD CANCEL SW	On/Off	X		Displays the CANCEL switch operation status. • On: When the CANCEL switch is operated • Off: When the CANCEL switch is not operated
RESUME/ACC SW	On/Off	X		Displays the RESUME/ACCELERATE switch operation status. • On: When the RESUME/ACCELERATE switch is operated • Off: When the RESUME/ACCELERATE switch is not operated
ASCD SET SW	On/Off	X		Displays the SET/COAST switch operation status. • On: When the SET/COAST switch is operated • Off: When the SET/COAST switch is not operated
ASCD BRAKE SW	On/Off	X		Displays the ASCD brake switch operation status. • On: The brake pedal is not depressed. • Off: The brake pedal is depressed.
STOP LAMP SW	On/Off	X		Displays the operation status of the stop lamp switch. • On: The brake pedal is depressed. • Off: The brake pedal is not depressed.
ASCD SET LAMP	On/Off			Displays the SET indicator operation request status. • On: The SET indicator is lit. • Off: No operation request
ASCD CRUISE LAMP	On/Off			Indicates [ON/OFF] condition of CRUISE lamp determined by the VCM according to the input signals.
ASCD CANCEL (LOW SPEED)	NON/CUT			Indicates the vehicle cruise condition. • NON: Vehicle speed is maintained at the ASCD set speed. • CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
ASCD CANCEL (SPEED DIFF)	NON/CUT			Indicates the vehicle cruise condition. • NON: Vehicle speed is maintained at the ASCD set speed. • CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.
DC/DC CONV STAT	On/STOP			Displays the status of the operation request sent by VCM to the DC/DC converter. • On: When there is a DC/DC converter operation request • Off: No operation request
VARIABLE V/CONT PERMIT	On/Off			Displays the power voltage variable control authorization status of VCM. • On: Authorized • Off: Prohibited
KICK DOWN	On/Off			Displays Kick Down decision state. • On: Accelerator pedal is depressed. • Off: Accelerator pedal is fully released
TRG HV BATT CHG LEVEL	100%/80%			Displays the selected Li-ion battery charging level.
REAR DEFOGGER	On/Off			Displays the rear window defogger operation status received from the IPDM E/R. • On: When the rear window defogger is operating • Off: When the rear window defogger is not operating
PWR LIMIT INDICAT LAMP	On/Off		X	Displays the power limit indicator lamp operation request status. • On: The power limit indicator lamp is lit. • Off: No operation request
A/C SW	On/Off	X	X	Displays the A/C switch operation status received from the A/C auto amp. • On: When the A/C switch is operating • Off: When the A/C switch is not operating
EVSE COMM	COMM/ NO COM			Displays the communication status between VCM and the EVSE.
Q/CHG INTERLOCK	On/Off	X	X	Displays the quick charger connector engagement status. • On: The quick charger connector is connected correctly. • Off: The quick charger connector is not connected.
Q/CHG RELAY	On/Off			Displays the quick charge relay operation status. • On: Quick charge relay is ON • Off: Quick charge relay is OFF
HV CNCTR INTRLCK (OBC)	On/Off	X		Displays the connection status of the high voltage connector connected to the on-board charger. • On: The high voltage connector is connected correctly. • Off: Except above.
BLOWER FAN ACTIV	On/Off			Displays the operation status of the blower fan received from the A/C auto amp. • On: When the blower fan is operating • Off: When the blower fan is not operating
HEAD LAMP LOW SIG	On/Off			Displays the operation status of the headlamp received from the IPDM E/R. • On: When the low beam is operating • Off: When the low beam is not operating

MONITOR ITEM	Unit	Monitor Item Selection		Description
		ECU INPUT SIGNALS	MAIN SIGNALS	
HEAD LAMP HI SIG	On/Off			Displays the operation status of the headlamp received from the IPDM E/R. • On: When the high beam is operating • Off: When the high beam is not operating
HV CNCTR INTRLCK (HV BAT)	On/Off	X		Displays the connection status of the high voltage connector connected to the Li-ion battery pack. • On: The high voltage connector is connected correctly. • Off: Except above.
HV BATT EMPTY	OK/EMPTY			Displays that the Li-ion battery remaining energy is low. • OK: Normal • EMPTY: When low
PRTCTN CNT OPERAT HIST 1*2	0/1/2/3			The operation history of the Charge Insulation Resistance Loss Protection Control is indicated. For details of the protection control, refer to EVC-360, "Description". • 1-3: Operation history exists. (The number of operations is indicated.) • 0: No operation history **NOTE:** This history can be cleared by “Self-diagnostic Result-Clear”.

*1: Not applicable where VCM number identified by “ECU Identification” of CONSULT is “237D0 3NA0B”.

*2: Not Displayed for VCM Group A and Group B. For VCM groups, refer to EVC-8, "How to Check VCM Group".

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
PLUG IN INDICATOR	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• VCM • Combination meter • CAN communication
CHARGE STAT INDICATOR 1	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• Harness and connectors • Bulb and LED • VCM
CHARGE STAT INDICATOR 2	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• Harness and connectors • Bulb and LED • VCM
CHARGE STAT INDICATOR 3	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• Harness and connectors • Bulb and LED • VCM
F/S CHG RLY*	• POWER ON • This turns ON and OFF the F/S CHG relay used by the ACTIVE TEST.	Check that the F/S CHG relay makes the operating sound.	• Harness and connectors • F/S CHG relay • VCM
REVERSE LAMP RLY	• POWER ON • This turns ON and OFF the reverse lamp relay used by the ACTIVE TEST.	• Check that the reverse lamp relay makes the operating sound. • Check that the reverse lamp is turned ON.	• Harness and connectors • Bulb and LED • Reverse lamp relay • VCM
DC/DC CONV DUTY	• POWER ON • This changes the duty ratio used by the ACTIVE TEST.	Check that the 12V battery power supply voltage changes.	• Harness and connectors • DC/DC converter • VCM
VOLTAGE CONTROL	• POWER ON • This changes the voltage used by the ACTIVE TEST.	Check that the 12V battery power supply voltage changes.	• Harness and connectors • DC/DC converter • VCM

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
READY INDICATOR	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• VCM • Combination meter • CAN communication
POWER LIMITATION INDICATOR	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• VCM • Combination meter • CAN communication
EV SYSTEM W/L	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• VCM • Combination meter • CAN communication
12V BATTERY CHARGE W/L	• POWER ON • This turns ON and OFF the indicator used by the ACTIVE TEST.	This confirms the indicator is ON/OFF.	• Harness and connectors • VCM • Combination meter
ECO INDICATOR	• POWER ON • This changes the display value used by the ACTIVE TEST.	Confirm that the ECO indicator display in the upper meter changes.	• VCM • Combination meter • Upper meter • CAN communication
ECO TREE	• POWER ON • This changes the display value used by the ACTIVE TEST.	Confirm that the ECO tree display in the upper meter changes.	• VCM • Combination meter • Upper meter • CAN communication
WATER PUMP 1	• POWER ON • This turns changes the duty ratio used by the ACTIVE TEST.	Check that the water pump 1 operation speed changes.	• Harness and connectors • Water pump 1 • VCM
WATER PUMP 2	• POWER ON • This turns changes the duty ratio used by the ACTIVE TEST.	Check that the water pump 2 operation speed changes.	• Harness and connectors • Water pump 2 • VCM
COOLING FAN	• POWER ON • This turns changes the duty ratio used by the ACTIVE TEST.	Check that the cooling fan operation speed changes.	• Harness and connectors • Cooling fan system • VCM

*: Not applicable where VCM number identified by “ECU Identification” of CONSULT is “237D0 3NA0B”.

ECU DIAGNOSIS INFORMATION

VCM

Reference Value

INFOID:0000000007633691

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- Specification data are reference values.
- The displayed data may differ from an actual signal/value/operation, as some of them are calculated by VCM, based on signals transmitted from VCM-related sensors to VCM.
- Li-ion battery charge does not start when the power switch is ON. When it is required to charge with the power switch ON, start charging before turning ON the power switch.

MONITOR ITEM	CONDITION		Values/Status
POWER LIMIT CAUSE	Output being limited	Li-ion battery temperature is too low.	B/T-LOW
		Li-ion battery temperature is too high.	B/T-HI
		When the Li-ion battery remaining energy is low	B LEV
		When the Li-ion battery capacity is low	B CAP
		When the voltage input to the traction motor or traction motor inverter is low	MOT-V
		Traction motor temperature or traction motor inverter temperature is too high.	MOT-T
	No torque limitation		##
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication.
12V BATTERY VOLTAGE	Power ON (not READY)		11 – 15 V
	READY		13 – 15 V
WATER PUMP 1 TRG DUTY	Power ON	Pump is stopped	10%
	READY	Pump speed 750 rpm – 4700rpm	20 – 80%
W/P 1 CRNT SPD DUTY	Power ON	Pump is stopped	10%
	READY	Pump speed 750 rpm – 4700rpm	20 – 80%
WATER PUMP 2 TRG DUTY	Power ON	Pump is stopped	10%
	READY	Pump speed 750 rpm – 4700rpm	20 – 80%
W/P 2 CRNT SPD DUTY	Power ON	Pump is stopped	10%
	READY	Pump speed 750 rpm – 4700rpm	20 – 80%
VCM POWER SUPPLY (ACT)	Power ON		11 – 15 V
DC/DC CONV TEMP	Power ON	When output over current is limited	1800 – 2200 µsec
		DC/DC converter temperature: High	2400 – 3000 µsec
		DC/DC converter temperature: Middle	3600 – 4400 µsec
		DC/DC converter temperature: Low	7300 – 8900 µsec
		When the signal circuit is open or shorted	##

MONITOR ITEM	CONDITION		Values/Status
DC/DC CONV STATUS	Power ON	When output over current is limited	0
		DC/DC converter temperature: High	1
		DC/DC converter temperature: Middle	2
		DC/DC converter temperature: Low	3
		When the signal circuit is open or shorted	7
F/S RELAY VOLT	Power ON		11 – 15 V
	READY		12 – 15 V
COOLANT TEMP	After 2 minutes have expired since READY		Above the outside temperature and below 80°C (Value in accordance with the cooling water temperature)
VCM MODE	Power ON	Charge connector is not connected	10
		Charge connector is connected	110
	READY		30
	Charging		130
TRG MOTOR TORQ 1	READY		0 – 280 N·m (Depending on accelerator pedal opening angle)
VCM ACTIVATION	READY		READY
	Except READY		On
NEXT GEAR POSITION	Power ON	Selector lever: R	R
		Selector lever: N or P	N/P
		Selector lever: D or ECO	D position
GEAR POSITION	Power ON	Selector lever: R	R
		Selector lever: N or P	N/P
		Selector lever: D or ECO	D position
READY LAMP SIGNAL	READY		On
	When READY is started		Blinks
	Except above		Off
CHARGE LAMP SIGNAL	Power ON		On
	READY		Off
EV SYSTEM W/L SIGNAL	Power ON	When VCM has detected an error.	On
		Except above	Off
AVAILABLE MOT OUTPUT MAX	READY		0 – 90 kW
MOTOR REGE PWR MAX	READY		0 – 51 kW
POWER CONSUM (MOTOR)	READY		0 – 90 kW

MONITOR ITEM	CONDITION		Values/Status
CHARGE MODE	Charging using AC 100-120 V		100V
	Charging using AC 200-240 V		200V
	During quick charge		QUICK
	When in a state where charging is not possible		NG
	Except above		Off
ECO INDICATOR	Displays the same value as in the instant ECO indicator.		
ECO TREE	Displays the same value as in the ECO tree.		
POWER CONSUMPTION (A/C)	• READY • When the air conditioner is used		0 – 5 kW
POWER CONSUM (AUXS)	Power ON		0 – 0.6 V
	READY		0.2 – 0.8 V
	Charging		0.1 – 0.7 V
GEAR POSITION DISPLAY	READY	Selector lever: P Range	P
		Selector lever: R range	R
		Selector lever: N Range	N
		Selector lever: D range	D position
		Selector lever: ECO range	B
AMBIENT TEMP	Power: ON		Indicates depending on ambient temperature.
DC/DC CONV STATUS	Power ON	When normal operation	1
		When VCM detects a DC/DC converter error	2
		When VCM prohibits the DC/DC converter operation	3
DC/DC CONV REQ VOLT	Power ON		14,000 mV
	READY		13000 – 15,000 mV
COOLING FAN REQ DUTY	READY		15 – 85%
ACCEL OPEN ANGLE	Power ON	Accelerator pedal: Fully depressed	80 – 90 deg
		Accelerator pedal: Fully released	0 – 5 deg
12V BATTERY TEMP	Power ON		Indicates depending on motor room air temperature.
12V BATTERY CURRENT AVG	• READY (at idle[*1]) • Li-ion battery remained energy: Full • Selector lever: P or N • A/C switch: OFF • Electrical load: No load		0 – 50 A
READY COUNT[*2]	Power ON		This shows the READY cumulative count
INTEG READY TIME[*2]	Power ON		This shows the READY cumulative operation time
QUICK CHG COUNT[*2]	Power ON		This shows the quick charge cumulative count
INTEG Q/CHG TIME[*2]	Power ON		This shows the quick charge cumulative operation time
NORMAL CHG COUNT[*2]	Power ON		This shows the normal charge cumulative count

MONITOR ITEM	CONDITION		Values/Status
INTEG N/CHG TIME*2	Power ON		This shows the normal charge cumulative operation time
ACCEL SENSOR 1 VOLT	Power ON	Accelerator pedal: Fully depressed	4.0 – 4.8 V
		Accelerator pedal: Fully released	0.6 – 0.9 V
ACCEL SENSOR 2 VOLT	Power ON	Accelerator pedal: Fully depressed	3.9 – 4.8 V
		Accelerator pedal: Fully released	0.6 – 0.9 V
HI SPEC VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication.
REFRIGERANT PRESS	• READY • Both the A/C switch and blower fan switch are ON (A/C compressor is operating)		0.6 – 2.6 MPa
ASCD SET VEHICLE SPEED*2	ASCD: Operating		The preset vehicle speed is displayed
N/CHG PORT CONNECTION	Normal charge connector is connected.		On
	Normal charge connector is half-engaged		HALF
	Except above		Off
ENABLE OBC OUT PWR	Power ON		0 – 3.3 kW
OBC OUT PWR	In Normal Charging		0 – 3.3 kW
	In Quick Charging		0 – 50 kW
AC POWER TYPE	When an AC power supply is not connected		OFF
	When an AC 100-120 V power supply is connected		100V
	When an AC 200-240 V power supply is connected		200V
HV BATT LEVEL (%)	Depending on Li-ion battery remained energy.		0 – 100%
HV BATT VOLT	Power ON		200 – 403 V
HV BATT CURRENT	• READY (at idle*1) • Electrical load: No load		0 – 10 A
HV BATTERY TEMP	Power ON		Between the outside air temperature and 60°C (140°F)
HV BATT LEVEL	Power ON		0 – 24 kWh
IR SENSOR SIGNAL P-P	Power ON		3150 mV or more
INVERTER DC INPUT VOLT	Power ON		200 – 403 V
MOTOR PWR LIMIT REQ (INV)	Normal		100%
	When output is limited		0 – 99%
CURRENT MOTOR TORQ	READY		0 – 280 N·m (Depending on accelerator pedal opening angle)
MOTOR SPEED	When vehicle speed is 0 km/h		0 rpm
	When vehicle speed is 60 km/h		4200 rpm (Approx.)
SL TARGET VEHICLE SPEED	Speed limiter: Operating		The preset vehicle speed is displayed
ESTMT PWR CNSM (A/C CMP)	• READY • A/C switch: ON		0 – 5 kW
ESTMT PWR CNSM (PTC HTR)	• When the air conditioner is operating • Set temperature: HOT side maximum		0 – 10 kW

MONITOR ITEM	CONDITION		Values/Status
FRONT WIPER	Power ON	Front wiper operation status Low	LOW
		Front wiper operation status High	HIGH
		Front wiper operation status Not operation	OFF
CLASH DETECT INFO	When a non-serious collision is detected		MID
	When a serious collision is detected		HEAVY
	No collision is detected		##
POWER SW	Power switch operation: ON⇒OFF⇒ON		On⇒Off⇒On
START SIGNAL	Power switch operation: ON⇒START⇒ON		Off⇒On⇒On
EV SYS ACT REQ (OBC)	When the charge gun is inserted/power supply plug is inserted		On⇒Off
	Except above.		Off
IMMEDIATE CHG SW	Power ON	Immediate charging switch: Pressed	On
		Immediate charging switch: Released	Off
EV SYS ACT REQ (TCU)	Power switch operation: OFF⇒ON		Off⇒On⇒Off
HV INTERLOCK (DC/DC)	When the DC/DC converter's high voltage connector is engaged correctly		On
	Except above		Off
F/S RELAY	Power ON		On
M/C RELAY	Power ON		On
F/S CHG RELAY	During quick charge		On
	Except above		Off
REVERSE LAMP RELAY	Power ON	Selector lever: R range	On
		Selector lever: Except R range	Off
REVERSE LAMP RELAY MONI	Power ON	Selector lever: R range	On
		Selector lever: Except R range	Off
A/C RELAY	Power ON		On
	Power OFF		Off
HV P MAIN RLY ACTIV	READY		On
	Power ON		Off
HV P MAIN RLY ACTIV MONI	READY		On
	Power ON		Off
HV N MAIN RLY ACTIV	READY		On
	Power ON		Off
HV N MAIN RLY ACTIV MONI	READY		On
	Power ON		Off
HV PRE CHG RLY ACTIV	Immediately after the power OFF⇒READY operation		Off⇒On⇒Off
HV PRE CHG RLY ACTIV MONI	Immediately after the power OFF⇒READY operation		Off⇒On⇒Off
PLUG IN INDI LAMP	Plug in indicator lamp: ON		On
	Plug in indicator lamp: OFF		Off
CHARGE STAT INDI 1	Charging status lamp 1: ON		On
	Charging status lamp 1: OFF		Off
CHARGE STAT INDI 2	Charging status lamp 2: ON		On
	Charging status lamp 2: OFF		Off

MONITOR ITEM	CONDITION		Values/Status
CHARGE STAT INDI 3	Charging status lamp 3: ON		On
	Charging status lamp 3: OFF		Off
ASCD MAIN SW	Power ON	ASCD MAIN switch: Pressed	On
		ASCD MAIN switch: Released	Off
ASCD CANCEL SW	Power ON	CANCEL switch: Pressed	On
		CANCEL switch: Released	Off
RESUME/ACC SW	Power ON	RESUME/ACCELERATE switch: Pressed	On
		RESUME/ACCELERATE switch: Released	Off
ASCD SET SW	Power ON	SET/COAST switch: Pressed	On
		SET/COAST switch: Released	Off
ASCD BRAKE SW	Power ON	Brake pedal: Fully released	On
		Brake pedal: Depressed	Off
STOP LAMP SW	Power ON	Brake pedal: Fully released	Off
		Brake pedal: Depressed	On
ASCD SET LAMP	After the ASCD MAIN switch has been pressed once, press it again.		On⇒Off
ASCD CRUISE LAMP	Power ON	ASCD MAIN switch: Pressed at the 1st time → at the 2nd time	On⇒Off
ASCD CANCEL (LOW SPEED)	Power ON		NON
ASCD CANCEL (SPEED DIFF)	Power ON		NON
DC/DC CONV STAT	READY		On
	Power ON		STOP
VARIABLE V/CONT PERMIT	• READY • The 12V battery is sufficiently charged • Wiper not operating		On
	Except above.		Off
KICK DOWN	Power ON	Accelerator pedal: Depressed	On
		Accelerator pedal: Released	Off
TRG HV BATT CHG LEVEL	Selected 100% charge		100%
	Selected 80% charge		80%
REAR DEFOGGER	Rear defogger: Operates		On
	Rear defogger: Not operate		Off
PWR LIMIT INDICAT LAMP	Power limitation indicator lamp: ON		On
	Power limitation indicator lamp: OFF		Off
A/C SW	Power ON	A/C switch: ON	On
		A/C switch: OFF	Off
EVSE COMM	When PWM communication is established between VCM and EVSE		COMM
	Except above		NO COM
Q/CHG INTERLOCK	Quick charger connector is connected.		On
	Except above		Off
Q/CHG RELAY	Quick charging		On
	Except above		Off
HV CNCTR INTRLCK (OBC)	Power ON	When the on board charger's high voltage connector is connected correctly	On
		Except above	Off

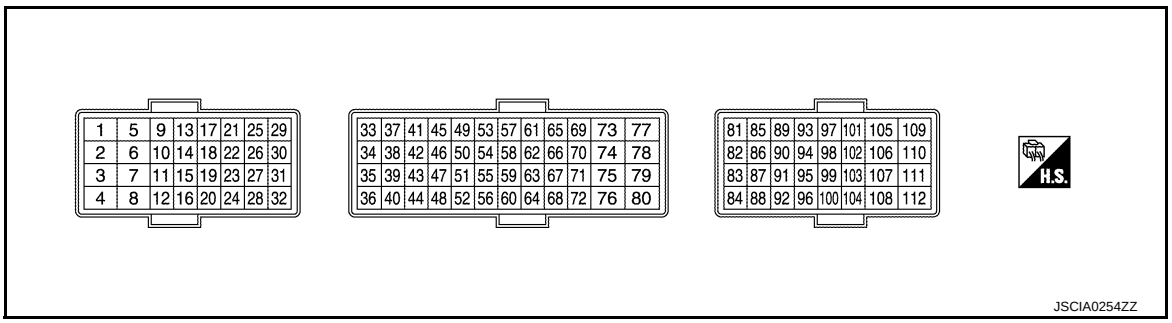
MONITOR ITEM	CONDITION		Values/Status
BLOWER FAN ACTIV	Blower fan: Operates		On
	Blower fan: Not operate		Off
HEAD LAMP LOW SIG	When the combination switch's low beam was selected		On
	Except above		Off
HEAD LAMP HI SIG	When the combination switch 's high beam was selected		On
	Except above		Off
HV CNCTR INTRLCK (HV BAT)	Power ON	When the Li-ion battery's high voltage connector is connected correctly	On
		Except above	Off
HV BATT EMPTY	Power ON	The Li-ion battery remaining energy is sufficient.	OK
		The Li-ion battery remaining energy is low.	EMPTY
PRTCTN CNT OPERAT HIST 1*3	The operation history of the Charge Insulation Resistance Loss Protection Control exists.		1 – 3
	Except above		0

*1: Idle is the state when not driving in the READY state.

*2: Not applicable where VCM number identified by “ECU Identification” of CONSULT is “237D0 3NA0B”.

*3: Not displayed for VCMs in Group A and group B. For VCM groups, refer to EVC-8, "How to Check VCM Group".

TERMINAL LAYOUT

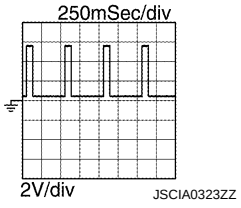
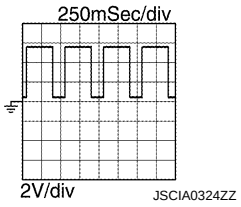


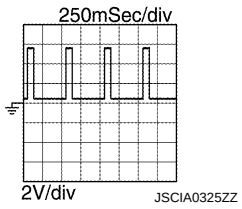
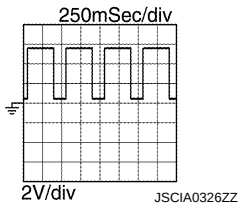
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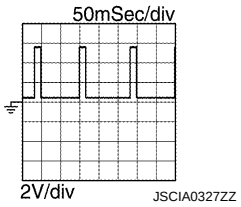
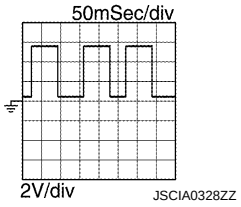
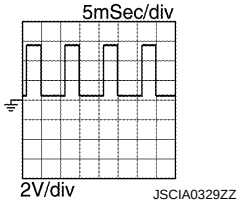
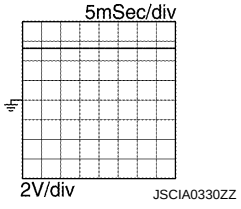
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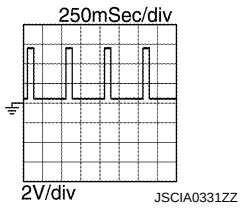
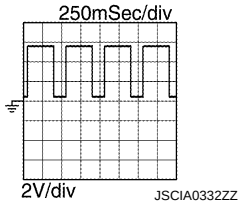
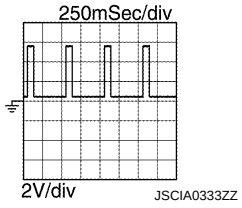
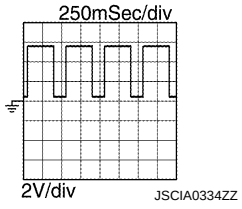
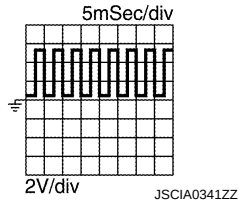
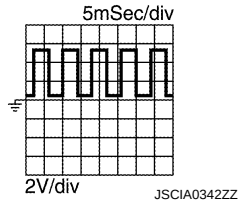
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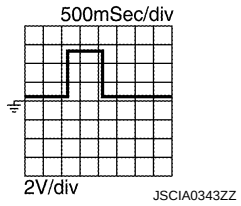
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (G)	Ground	Power ON power supply	Input	Power switch: ON	12V BATTERY VOLTAGE (12 - 15 V)
4 (B/R)	—	VCM ground	—	—	—
5 (SB)	Ground	A/C relay	Output	Power switch: ON	0 V (Approx.)
				A few seconds after turning power switch OFF	11 – 14 V
6 (R)	Ground	Battery power supply	Input	Always	12V BATTERY VOLTAGE (11 – 14 V)
7 (W)	Ground	SSOFF relay	Output	Power switch: ON	0 V
				More than 20 seconds after turning power OFF.	12V BATTERY VOLTAGE (11 – 14 V)

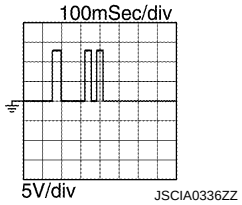
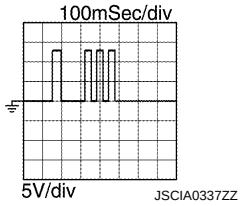
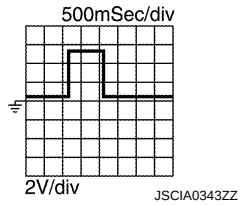
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
8 (B/R)	—	VCM ground	—	—	—
9 (L)	—	EV system CAN-H	Input/ Output	—	—
13 (G)	—	EV system CAN-L	Input/ Output	—	—
15 (O)	Ground	ASCD brake switch	Input	• Power switch: ON • Brake pedal: depress	0 V
				• Power switch: ON • Brake pedal: Fully released	12V BATTERY VOLTAGE (11 – 14 V)
18 (SB)	Ground	Stop lamp switch	Input	• Power switch: ON • Brake pedal: depress	12V BATTERY VOLTAGE (11 – 14 V)
				• Power switch: ON • Brake pedal: Fully released	0 V
21 (R)	Ground	Power ON power supply	Input	Power switch: ON	12V BATTERY VOLTAGE (11 – 14 V)
23 (P)	Ground	High voltage connector interlock	Input	When all the high voltage connectors are connected	12V BATTERY VOLTAGE (11 – 14 V)
				When one of the high voltage connectors is disconnected	0 V
25 (L)	—	CAN-H	Input/ Output	—	—
26 (Y)	4 (B/R)	Water pump 2 signal	Input	• Power switch ON • Pump operation duty: 0%	
				• Power switch ON • Pump operation duty: Approx. 70%	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
28 (W)	4 (B/R)	Water pump 1 signal	Input	• Power switch ON • Pump operation duty: 0%	
				• Power switch ON • Pump operation duty: Approx. 70%	
29 (P)	—	CAN-L	Input/ Output	—	—
33 (L)	4 (B/R)	Sensor power supply (Refrigerant pressure sensor)	Output	Power switch: ON	5 V
34 (B)	35 (BR)	Refrigerant pressure sensor	Input	A/C compressor operating.	1.0 – 4.0 V
35 (BR)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
37 (W)	39 (B)	Sensor power supply (Accelerator pedal position sensor 1)	Output	Power switch: ON	5 V (Approx.)
38 (R)	39 (B)	Accelerator pedal position sensor 1	Input	• Power switch: ON • Accelerator pedal: Fully released	0.45 – 1.0 V
				• Power switch: ON • Accelerator pedal: Fully depressed	4.4 – 4.8 V
39 (B)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
40	—	Shield	—	—	—
41 (R)	43 (L)	Sensor power supply (Battery current sensor)	Output	Power switch: ON	5 V (Approx.)
42 (Y)	43 (L)	Battery current sensor	Input	• READY • 12V battery is fully charged	2.6 – 3.5 V
43 (L)	—	Sensor ground (Battery current sensor)	—	—	—
45 (W)	47 (B)	Sensor power supply (Accelerator pedal position sensor 2)	Output	Power switch: ON	5 V (Approx.)
46 (R)	47 (B)	Accelerator pedal position sensor 2	Input	• Power switch: ON • Accelerator pedal: Fully released	0.22 – 0.5 V
				• Power switch: ON • Accelerator pedal: Fully depressed	2.1 – 2.5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
47 (B)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
48	—	Shield	—	—	—
50 (L)	43 (L)	Battery temperature sensor	Input	READY	0 – 4.8 V Output voltage varies with motor room air temperature.
51 (O)	52 (W)	Coolant temperature sensor	Input	READY	0 – 4.8 V Output voltage varies with coolant temperature.
52 (W)	—	Sensor ground (Coolant temperature sensor)	—	—	—
57 (LG)	4 (B/R)	Power voltage variable control signal	Output	DC/DC converter output power: 13 V	
				DC/DC converter output power: 15 V	
59 (V)	4 (B/R)	Cooling fan control signal	Output	Fan duty: 40%	
				Fan duty: 100%	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
62 (G)	4 (B/R)	Water pump 1 signal	Input	Pump operation duty: 0%	
				Pump operation duty: Approx. 70%	
64 (R)	4 (B/R)	Water pump 2 signal	Input	Pump operation duty: 0%	
				Pump operation duty: Approx. 70%	
67 (Y)	4 (B/R)	DC/DC converter temperature signal	Input	DC/DC converter temperature: High	
				DC/DC converter temperature: Low	

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
70 (W)	4 (B/R)	DC/DC converter activation signal	Output	• READY • DC/DC converter is operating normally	5 V (Approx.)
				• READY • When VCM has detected an error in the DC/DC converter	3 V (Approx.)
				Power switch: ON	Less than 1 V
73 (GR)	Ground	F/S relay	Output	Power switch: OFF	12V BATTERY VOLTAGE (11 – 14 V)
				Power switch: ON	0 V (Approx.)
75 (W)	Ground	F/S CHG relay	Output	During quick charge	0 V (Approx.)
				Except above	12V BATTERY VOLTAGE (11 – 14 V)
77 (LG)	Ground	F/S relay power supply	Input	Power switch: OFF	0 V
				Power switch: ON	12V BATTERY VOLTAGE (11 – 14 V)
78 (G)	Ground	M/C relay	Output	Power switch: OFF	12V BATTERY VOLTAGE (11 – 14 V)
				Power switch: ON	0 V (Approx.)
80 (SB)	Ground	Reverse lamp relay	Output	• Power ON • Selector lever: R range	0 V (Approx.)
				• Power ON • Selector lever: Except R range	12V BATTERY VOLTAGE (11 – 14 V)
81 (GR)	—	K-Line	—	—	—
84 (LG)	4 (B/R)	EV system activation request signal	Input	Power switch: OFF⇒ON **NOTE:** When turn power switch OFF to ON, TCU sends the voltage signal to check the system for approximately 1 second.	
85 (P)	Ground	Charging status indicator 2	Output	Charging status indicator 2: ON	0 V (Approx.)
				Charging status indicator 2: OFF	12V BATTERY VOLTAGE (11 – 14 V)
86 (V)	Ground	Charging status indicator 1	Output	Charging status indicator 1: ON	0 V (Approx.)
				Charging status indicator 1: OFF	12V BATTERY VOLTAGE (11 – 14 V)
87 (L)	Ground	Plug in indicator lamp	Output	Plug in indicator lamp: ON	0 V (Approx.)
				Plug in indicator lamp: OFF	12V BATTERY VOLTAGE (11 – 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
88 (Y)	4 (B/R)	VSP control signal	Output	EVSE is connected.	
				Charge start	
89 (V)	Ground	Immediate charging switch	Input	Immediate charging switch: Pressed	12V BATTERY VOLTAGE (11 – 14 V)
				Immediate charging switch: Released	0 V
90 (W)	Ground	READY signal	Input	For Approx. 2 seconds after power switch ON under following condition: • Selector lever: P or N • Brake pedal: Depressed	0 V (Approx.)
				Except above	12V BATTERY VOLTAGE (11 – 14 V)
91 (O)	Ground	Electric shift warning lamp	Output	Immediately after the power OFF⇒READY operation	0 V (Approx.)
				Except above (Power ON or READY)	12 V
92 (G)	Ground	Charging status indicator 3	Output	Charging status indicator 3: ON	0 V (Approx.)
				Charging status indicator 3: OFF	12V BATTERY VOLTAGE (11 – 14 V)
96 (GR)	4 (B/R)	EV system activation request signal	Input	When the charge gun is inserted/ power supply plug is inserted	
104 (SB)	4 (B/R)	ASCD steering switch	Input	• Power ON • ASCD steering switch: All OFF	4 V (Approx.)
				• Power ON • RESUME/ACCELERATE switch: Pressed	3 V (Approx.)
				• Power ON • SET/COAST switch: Pressed	2 V (Approx.)
				• Power ON • CANCEL switch: Pressed	1 V (Approx.)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
105 (L/O)	4 (B/R)	Pre-charge relay	Output	Immediately after the power OFF⇒READY operation	12V BATTERY VOLTAGE* (11 – 14 V)
				Except above	0 V
107 (W/L)	4 (B/R)	System main relay 1	Output	During READY or during charging	12V BATTERY VOLTAGE (11 – 14 V)
				Except above	0 V
108 (BR)	—	ASCD steering switch ground	—	—	—
110 (L/Y)	4 (B/R)	System main relay 2	Output	During READY or during charging	12V BATTERY VOLTAGE (11 – 14 V)
				Except above	0 V
111 (B/R)	—	VCM ground	—	—	—
112 (B/R)	—	VCM ground	—	—	—

*: This signal can be confirmed with oscilloscope.

Fail-Safe

INFOID:0000000007633692

FAIL-SAFE PATTERN

- Pattern A: Quick charge prohibited
- Pattern B: Normal charge prohibited
- Pattern C: READY OFF
- Pattern D: High-voltage power supply stop

FAIL-SAFE LIST

×:Applicable

DTC		Pattern				Others
		A	B	C	D	
U1010	TYPE 1			×		
	TYPE 2	×	×	×	×	
P0643				×		
P0A8D		×	×	×	×	
P0A8E		×	×	×	×	
P0AA0		×	×	×	×	
P0AA1		×	×	×	×	
P0AA2		×	×	×	×	
P0AA4		×	×	×	×	
P0AA5		×	×	×	×	
P0AA6						Doing READY again is prohibited.
P1564						ASCD operation prohibited
P1572						ASCD operation prohibited
P1574						ASCD operation prohibited
P1610						Start not possible
P1611						Start not possible
P1612						Start not possible
P1613						Start not possible

DTC		Pattern				Others
		A	B	C	D	
P1614						Start not possible
P1615						Start not possible
P2122 P2123 P2127 P2128						• Traction motor output is limited. • Reduced responsiveness during accelerator operation
P2138	TYPE 1			×		
	TYPE 2					• Traction motor output is limited. • Reduced responsiveness during accelerator operation
P3100		×	×	×	×	
P3101	TYPE 1			×		
	TYPE 2	×	×	×	×	
	TYPE 3					No fail-safe.
P3102						Traction motor output is limited.
P3117						• VCM inhibits the operation of the electric compressor. • VCM inhibits the operation of the PTC elements heater.
P312A		×	×	×	×	
P312B		×	×	×	×	
P312C		×	×	×	×	
P312D		×	×	×	×	
P312E		×	×	×	×	
P312F		×	×	×	×	
P3130		×	×	×	×	
P3131		×	×	×	×	
P3137		×	×	×	×	
P3141*			×			
P315C	TYPE 1		×			
	TYPE 2	×	×			
	TYPE 3	×	×	×	×	
	TYPE 4					No fail-safe.
P316A				×		
P316F	TYPE 1	×	×	×	×	
	TYPE 2	×	×			
P3170		×	×			
P3173	TYPE 1	×	×			Traction motor output is limited.
	TYPE 2	×	×			
	TYPE 3	×				
	TYPE 4		×			
	TYPE 5	×	×	×		
	TYPE 6					No fail-safe.
P3175				×		
P3176		×	×	×	×	
P3177		×	×	×	×	
P3178		×	×	×	×	
P3179						

DTC		Pattern				Others
		A	B	C	D	
P317A				×		
P317B		×	×	×	×	
P317D				×		
P317E		×	×			
P3182		×	×	×	×	
P3183		×	×			
P3188				×		
P318B	TYPE 1			×		
	TYPE 2					Put the gear position in neutral.
P3191	TYPE 1			×		
	TYPE 2					No fail-safe.
P3193	TYPE 1	×	×			Only driving in creep is possible.
	TYPE 2					No fail-safe.
P3196	TYPE 1	×				
	TYPE 2	×	×			Traction motor output is limited.
P3197				×		
P319C				×		
P319E		×	×			Only driving in creep is possible.
P31A1	TYPE 1	×				
	TYPE 2	×	×			Traction motor output is limited.
P31A2				×		
P31A7				×		
P31A9		×	×			Only driving in creep is possible.
P31AD				×		
P31AE	TYPE 1	×				
	TYPE 2	×	×			Traction motor output is limited.
P31B0	TYPE 1					VCM inhibits the timer charge.
	TYPE 2					VCM inhibits the timer charge and the pre-air conditioner.
	TYPE 3					No fail-safe.
P31B3	TYPE 1					When the power is turned on and the vehicle is charging, the cooling fan is operated at a constant speed.
	TYPE 2					No fail-safe.
P31B4	TYPE 1					VCM inhibits the timer charge.
	TYPE 2					VCM inhibits the pre-air conditioner.
	TYPE 3					No fail-safe.
P31B5	TYPE 1					• ASCD operation prohibited **NOTE:** The ECO meter display value also becomes extremely poor.
	TYPE 2					No fail-safe.
P31B6						VCM sets the DC/DC converter output power to a constant 14 V.
P31C5						• VCM inhibits the timer charge and the pre-air conditioner. • VCM inhibits the automatic 12V battery charge control.
P31C6						• VCM inhibits the timer charge and the pre-air conditioner. • VCM inhibits the automatic 12V battery charge control.

DTC		Pattern				Others
		A	B	C	D	
P31C7						• VCM inhibits the timer charge and the pre-air conditioner. • VCM inhibits the automatic 12V battery charge control.
P31CA			×			
P31CB			×			
P31D4		×	×	×	×	
P31D5						• Traction motor output is limited. • Vehicle speed is limited. [Approx. 40 km/h (25 MPH)]
P31DB		×	×	×	×	
P31DC		×	×	×	×	
P31DE	TYPE 1					Traction motor output is limited.
	TYPE 2	×	×	×	×	
P31E0	TYPE 1	×	×	×	×	
	TYPE 2					No fail-safe.
P31E1	TYPE 1	×	×	×	×	
	TYPE 2					No fail-safe.
P31E2	TYPE 1	×	×	×	×	
	TYPE 2					No fail-safe.
P31E7						Doing READY again is prohibited.
P31F2						VCM inhibits the timer charge and the pre-air conditioner.

*: Not displayed for VCMs in Group A and Group B. For VCM groups, refer to EVC-8, "How to Check VCM Group".

DTC Inspection Priority Chart

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If multiple DTC are displayed at the same time, check each of them one at a time in accordance with the following priority table.

Priority	DTC	Detection items
1	U1000	CAN COMM CIRCUIT
	U1010	CONTROL UNIT (CAN)
	P0603	INTERNAL CONTROL MODULE
	P0616	STARTER RELAY
	P0643	SENSOR POWER SUPPLY
	P0A00	COOLANT TEMPERATURE SENSOR
	P0A08	DC/DC CONVERTER
	P1551, P1552	BATTERY CURRENT SENSOR
	P1556, P1557	BATTERY TEMPERATURE SENSOR
	P2122, P2123	APP SENSOR D
	P2127, P2128	APP SENSOR E
	P3101	VCM
	P3137	CAR CRASH
	P3175	VCM
	P318D, P3191, P3193, P3194, P3195, P3196, P3197, P319C, P319E, P319F, P31A0, P31A1, P31A2, P31A7, P31A9, P31AA, P31AB, P31AD, P31AE, P31AF, P31B0, P31B3, P31B4, P31B5, P31B6, P31B7, P31B8, P31B9	COMMUNICATION ERROR
	P31C4	VCM TIMER
	P31C5, P31C6, P31C7	VCM

Priority	DTC	Detection items
2	P0A0B	HV SYSTEM INTERLOCK ERROR
	P0A8D, P0A8E	14V POWER SUPPLY
	P0A94	DC/DC CONVERTER
	P0AA0, P0AA1, P0AA2	HYBRID BATT POSITIVE CONTACTOR
	P0AA4, P0AA5	HYBRID BATT NEGATIVE CONTACTOR
	P1550, P1554	BATTERY CURRENT SENSOR
	P155A	BATTERY TEMPERATURE SENSOR
	P1564	ASCD SWITCH
	P1572	ASCD BRAKE SWITCH
	P1574	ASCD VEHICLE SPEED SENSOR
	P1805	BRAKE SWITCH
	P2138	APP SENSOR
	P3102	INVALID BATTERY
	P315C	CHARGE RELAY
	P315E	VDC SYSTEM
	P316A	MOTOR SPEED
	P3172, P3173	ON BOARD CHARGER SYSTEM
	P317A, P317B, P317D	MOTOR SYSTEM
	P317E, P3180, P3182, P3183	HV BATTERY SYSTEM
	P3188	ELECTRIC SHIFT SYSTEM
	P318A, P318B	ELECTRIC SHIFT SYSTEM
	P31C0	ON BOARD CHARGER SYSTEM
	P31C1, P31C2	TCU
	P31C8, P31C9, P31CA, P31CB	ON BOARD CHARGER SYSTEM
	P31D4, P31D5	PRE CHARGE RELAY
	P31D6, P31D7	F/S RELAY
	P31DB	HV BATT MAIN RELAY +
	P31DC	HV BATT MAIN RELAY -
	P31DD	PRE CHARGE RELAY
	P31E8, P31E9, P31EC	WATER PUMP 1
	P31EA, P31EB, P31ED	WATER PUMP 2
	P31EE	REFRIGERANT PRESSURE SENSOR
	P31F0	DC/DC CONVERTER COMM LINE
	P31F2	AV SET INFORMATION

Priority	DTC	Detection items
3	P0A8F	14V POWER SUPPLY
	P0AA6	HYBRID BATT VOLT SYS ISOLATION
	P3100, P312A	COMMUNICATION ERROR
	P3117	A/C SYSTEM
	P311C	HIGH VOLTAGE SYSTEM
	P312B	RESTART ERROR
	P312C	INVERTER DISCHARGE ERROR
	P312D	QUICK CHARGE RELAY
	P312E	READY OFF ERROR
	P312F	CHARGE OFF ERROR
	P3130	INVERTER DISCHARGE ERROR
	P3131	SYSTEM SHUTOFF TIMEOUT
	P3141*	ON-BOARD CHAGER
	P3160	ELECTRICALLY-DRIVEN INTELLIGENT BRAKE SYSTEM
	P316F	ON BOARD CHARGER SYSTEM
	P3176	INVERTER CONDENSER
	P3177, P3178	ECU ACTIVATION ERROR
	P31DE	HV BATT MAIN RELAY
	P31E0, P31E1, P31E2	HV SYSTEM INTERLOCK ERROR
	P31E7	RESTART INHIBITION

*: Not displayed for VCMs in Group A and Group B. For VCM Groups, refer to EVC-8, "How to Check VCM Group".

DTC Index

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×:Applicable —: Not applicable

DTC	Items (CONSULT screen terms)	EV system warning lamp	Trip	Reference page
U1000	CAN COMM CIRCUIT	—	1	EVC-107
U1010	CONTROL UNIT (CAN)	×	1	EVC-108
P0603	INTERNAL CONTROL MODULE	—	1	EVC-109
P0616	STARTER RELAY	—	1	EVC-111
P0643	SENSOR POWER SUPPLY	×	1	EVC-113
P0A00	COOLANT TEMPERATURE SENSOR	—	1	EVC-115
P0A08	DC/DC CONVERTER	—	1	EVC-118
P0A0B	HV SYSTEM INTERLOCK ERROR	×	1	EVC-120
P0A8D	14V POWER SUPPLY	×	1	EVC-124
P0A8E	14V POWER SUPPLY	×	1	EVC-126
P0A8F	14V POWER SUPPLY	×	1	EVC-128
P0A94	DC/DC CONVERTER	—	1	EVC-131
P0AA0	HYBRID BATT POSITIVE CONTACTOR	×	1	EVC-133
P0AA1*1*3	HYBRID BATT POSITIVE CONTACTOR	×	1	EVC-137
P0AA2	HYBRID BATT POSITIVE CONTACTOR	×	1	EVC-141
P0AA4	HYBRID BATT NEGATIVE CONTACTOR	×	1	EVC-143
P0AA5	HYBRID BATT NEGATIVE CONTACTOR	×	1	EVC-147
P0AA6	HYBRID BATT VOLT SYS ISOLATION	×	1	EVC-149

DTC	Items (CONSULT screen terms)	EV system warning lamp	Trip	Reference page
P1550	BATTERY CURRENT SENSOR	—	1	EVC-157
P1551	BATTERY CURRENT SENSOR	—	1	EVC-157
P1552	BATTERY CURRENT SENSOR	—	1	EVC-157
P1554	BATTERY CURRENT SENSOR	—	1	EVC-161
P1556	BATTERY TEMPERATURE SENSOR	—	1	EVC-165
P1557	BATTERY TEMPERATURE SENSOR	—	1	EVC-165
P155A	BATTERY TEMPERATURE SENSOR	—	1	EVC-167
P1564	ASCD SWITCH	—	1	EVC-169
P1572	ASCD BRAKE SWITCH	—	1	EVC-171
P1574	ASCD VEHICLE SPEED SENSOR	—	1	EVC-177
P1610	LOCK MODE	—	1	SEC-49
P1611	ID DISCORD, IMMU-VCM	—	1	SEC-50
P1612	CHAIN OF VCM-IMMU	—	1	SEC-51
P1805	BRAKE SWITCH	×	1	EVC-179
P2122	APP SENSOR D	×	1	EVC-182
P2123	APP SENSOR D	×	1	EVC-182
P2127	APP SENSOR E	×	1	EVC-185
P2128	APP SENSOR E	×	1	EVC-185
P2138	APP SENSOR	×	1	EVC-188
P3100	COMMUNICATION ERROR	×	1	EVC-190
P3101	VCM	× or —	1	EVC-192
P3102	INVALID BATTERY	×	1	EVC-193
P3117	A/C SYSTEM	—	1	EVC-195
P311C	HIGH VOLTAGE SYSTEM	—	1	EVC-197
P312A	COMMUNICATION ERROR	×	1	EVC-201
P312B	RESTART ERROR	×	1	EVC-204
P312C	INVERTER DISCHARGE ERROR	×	1	EVC-206
P312D	QUICK CHARGE RELAY	×	1	EVC-208
P312E	READY OFF ERROR	×	1	EVC-209
P312F	CHARGE OFF ERROR	×	1	EVC-211
P3130	INVERTER DISCHARGE ERROR	×	1	EVC-206
P3131	SYSTEM SHUTOFF TIMEOUT	×	1	EVC-213
P3137	CAR CRASH	×	1	EVC-216
P3141*2*3	ON-BOARD CHARGER	×	1	EVC-217
P315C	CHARGE RELAY	×	1	EVC-223
P315E	VDC SYSTEM	—	1	EVC-224
P3160	E-DIB SYSTEM	—	1	EVC-225
P316A	MOTOR SPEED	×	1	EVC-226
P316F	ON BOARD CHARGER SYSTEM	×	1	EVC-227
P3172	ON BOARD CHARGER SYSTEM	×	1	EVC-229
P3173	ON BOARD CHARGER SYSTEM	× or —	1	EVC-229
P3175	VCM	×	1	EVC-230
P3176	INVERTER CONDENSER	×	1	EVC-231

DTC	Items (CONSULT screen terms)	EV system warning lamp	Trip	Reference page
P3177	ECU ACTIVATION ERROR	× (group A and B)*3 — (except for group A and B)*3	1	EVC-235
P3178	ECU ACTIVATION ERROR	×	1	EVC-238
P3179	MOTOR SYSTEM	×	1	EVC-240
P317A	MOTOR SYSTEM	×	1	EVC-240
P317B	MOTOR SYSTEM	×	1	EVC-240
P317D	MOTOR SYSTEM	×	1	EVC-241
P317E	HV BATTERY SYSTEM	—	1	EVC-242
P3180	HV BATTERY SYSTEM	×	1	EVC-242
P3182	HV BATTERY SYSTEM	—	1	EVC-242
P3183	HV BATTERY SYSTEM	×	1	EVC-243
P3188	ELECTRIC SHIFT SYSTEM	×	1	EVC-244
P318A	ELECTRIC SHIFT SYSTEM	×	1	EVC-245
P318B	ELECTRIC SHIFT SYSTEM	×	1	EVC-247
P318D	COMMUNICATION ERROR	×	1	EVC-249
P3191	COMMUNICATION ERROR	× or —	1	EVC-250
P3193	COMMUNICATION ERROR	× or —	1	EVC-251
P3194	COMMUNICATION ERROR	—	1	EVC-252
P3195	COMMUNICATION ERROR	—	1	EVC-253
P3196	COMMUNICATION ERROR	×	1	EVC-254
P3197	COMMUNICATION ERROR	×	1	EVC-255
P319C	COMMUNICATION ERROR	×	1	EVC-250
P319E	COMMUNICATION ERROR	×	1	EVC-251
P319F	COMMUNICATION ERROR	—	1	EVC-252
P31A0	COMMUNICATION ERROR	—	1	EVC-253
P31A1	COMMUNICATION ERROR	×	1	EVC-254
P31A2	COMMUNICATION ERROR	×	1	EVC-255
P31A7	COMMUNICATION ERROR	×	1	EVC-250
P31A9	COMMUNICATION ERROR	×	1	EVC-251
P31AA	COMMUNICATION ERROR	—	1	EVC-252
P31AB	COMMUNICATION ERROR	—	1	EVC-253
P31AD	COMMUNICATION ERROR	×	1	EVC-255
P31AE	COMMUNICATION ERROR	×	1	EVC-254
P31AF	COMMUNICATION ERROR	×	1	EVC-256
P31B0	COMMUNICATION ERROR	—	1	EVC-257
P31B3	COMMUNICATION ERROR	× or —	1	EVC-256
P31B4	COMMUNICATION ERROR	—	1	EVC-257
P31B5	COMMUNICATION ERROR	—	1	EVC-258
P31B6	COMMUNICATION ERROR	—	1	EVC-259
P31B7	COMMUNICATION ERROR	×	1	EVC-260
P31B8	COMMUNICATION ERROR	—	1	EVC-261
P31B9	COMMUNICATION ERROR	—	1	EVC-263
P31C0	ON BOARD CHARGER SYSTEM	×	1	EVC-264

DTC	Items (CONSULT screen terms)	EV system warning lamp	Trip	Reference page
P31C1	TCU	×	1	EVC-266
P31C2	TCU	—	1	EVC-266
P31C4	VCM TIMER	×	1	EVC-268
P31C5	VCM	—	1	EVC-270
P31C6	VCM	—	1	EVC-270
P31C7	VCM	×	1	EVC-272
P31C8	ON BOARD CHARGER SYSTEM	×	1	EVC-274
P31C9	ON BOARD CHARGER SYSTEM	×	1	EVC-274
P31CA	ON BOARD CHARGER SYSTEM	×	1	EVC-276
P31CB	ON BOARD CHARGER SYSTEM	×	1	EVC-276
P31D4	PRE CHARGE RELAY	×	1	EVC-278
P31D5	PRE CHARGE RELAY	×	1	EVC-280
P31D6	F/S RELAY	×	1	EVC-284
P31D7	F/S RELAY	×	1	EVC-286
P31DB	HV BATT MAIN RELAY +	×	1	EVC-289
P31DC	HV BATT MAIN RELAY -	×	1	EVC-290
P31DD	PRE CHARGE RELAY	×	1	EVC-291
P31DE	HV BATT MAIN RELAY	×	1	EVC-292
P31E0	HV SYSTEM INTERLOCK ERROR	×	1	EVC-293
P31E1	HV SYSTEM INTERLOCK ERROR	×	1	EVC-298
P31E2	HV SYSTEM INTERLOCK ERROR	×	1	EVC-301
P31E7	RESTART INHIBITION	×	1	EVC-303
P31E8	WATER PUMP 1	×	1	EVC-304
P31E9	WATER PUMP 1	×	1	EVC-307
P31EA	WATER PUMP 2	×	1	EVC-309
P31EB	WATER PUMP 2	×	1	EVC-312
P31EC	WATER PUMP 1	—	1	EVC-314
P31ED	WATER PUMP 2	—	1	EVC-315
P31EE	REFRIGERANT PRESSURE SENSOR	—	1	EVC-316
P31F0	DC/DC CONVERTER COMM LINE	—	1	EVC-319
P31F2	AV SET INFORMATION	—	1	EVC-321

*1: To clear DTC P0AA1, perform “SPECIFIC DTC CLEAR” in “WORK SUPPORT” of CONSULT. (for VCM other than those in Group A and Group B)

*2: Not displayed for VCMs in Group A and Group B.

*3: For VCM groups, refer to EVC-8, "How to Check VCM Group".

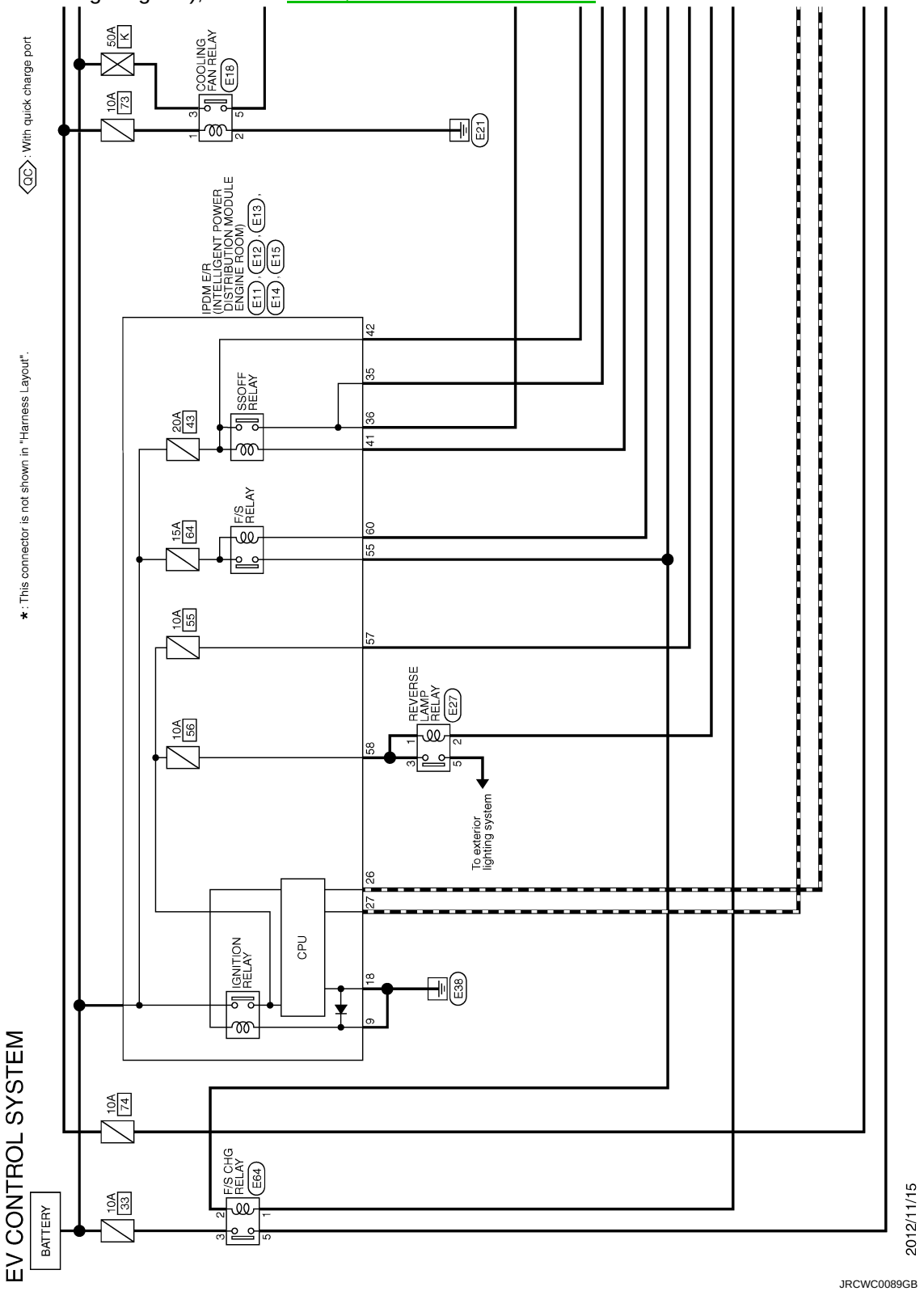
WIRING DIAGRAM

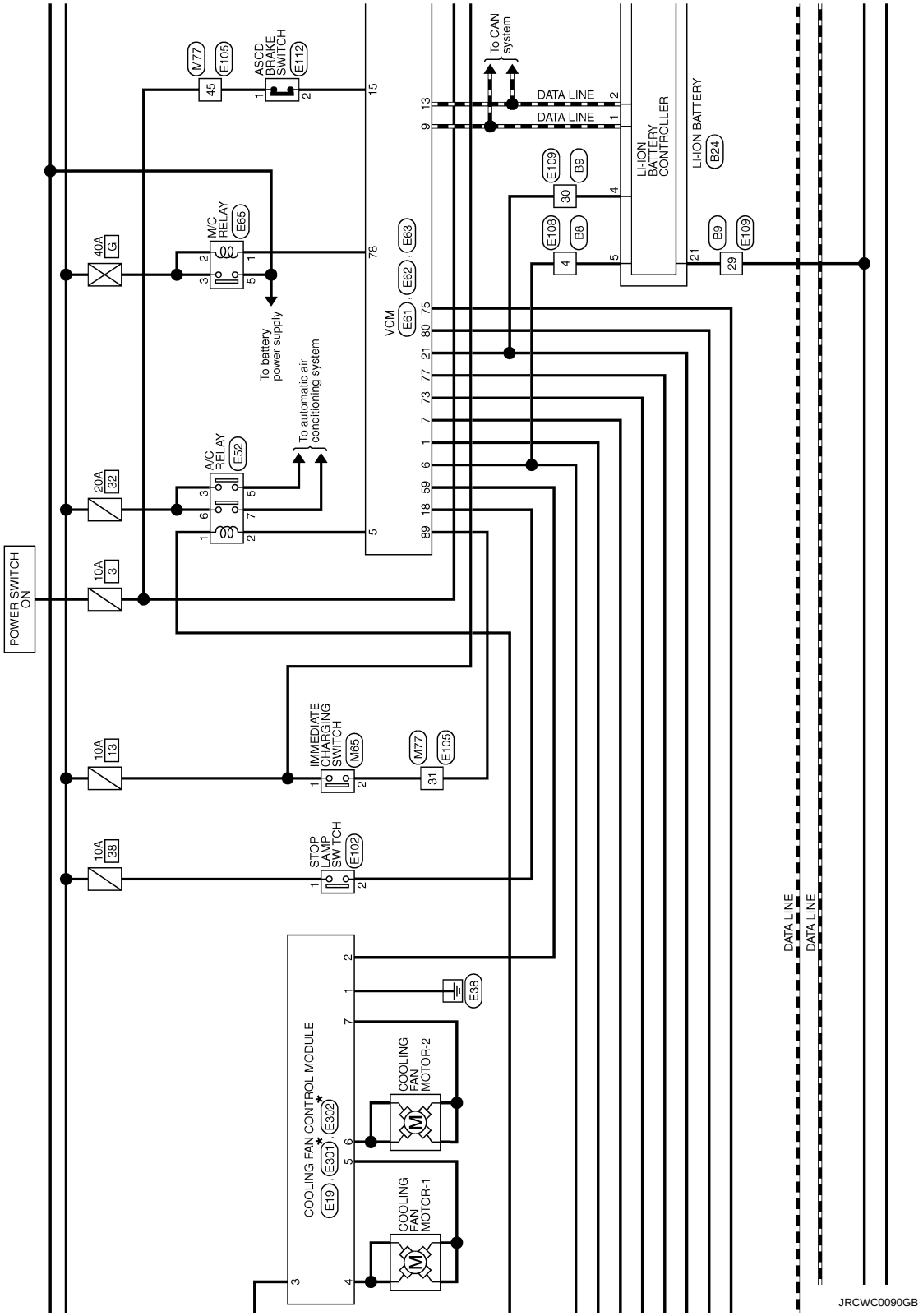
VCM

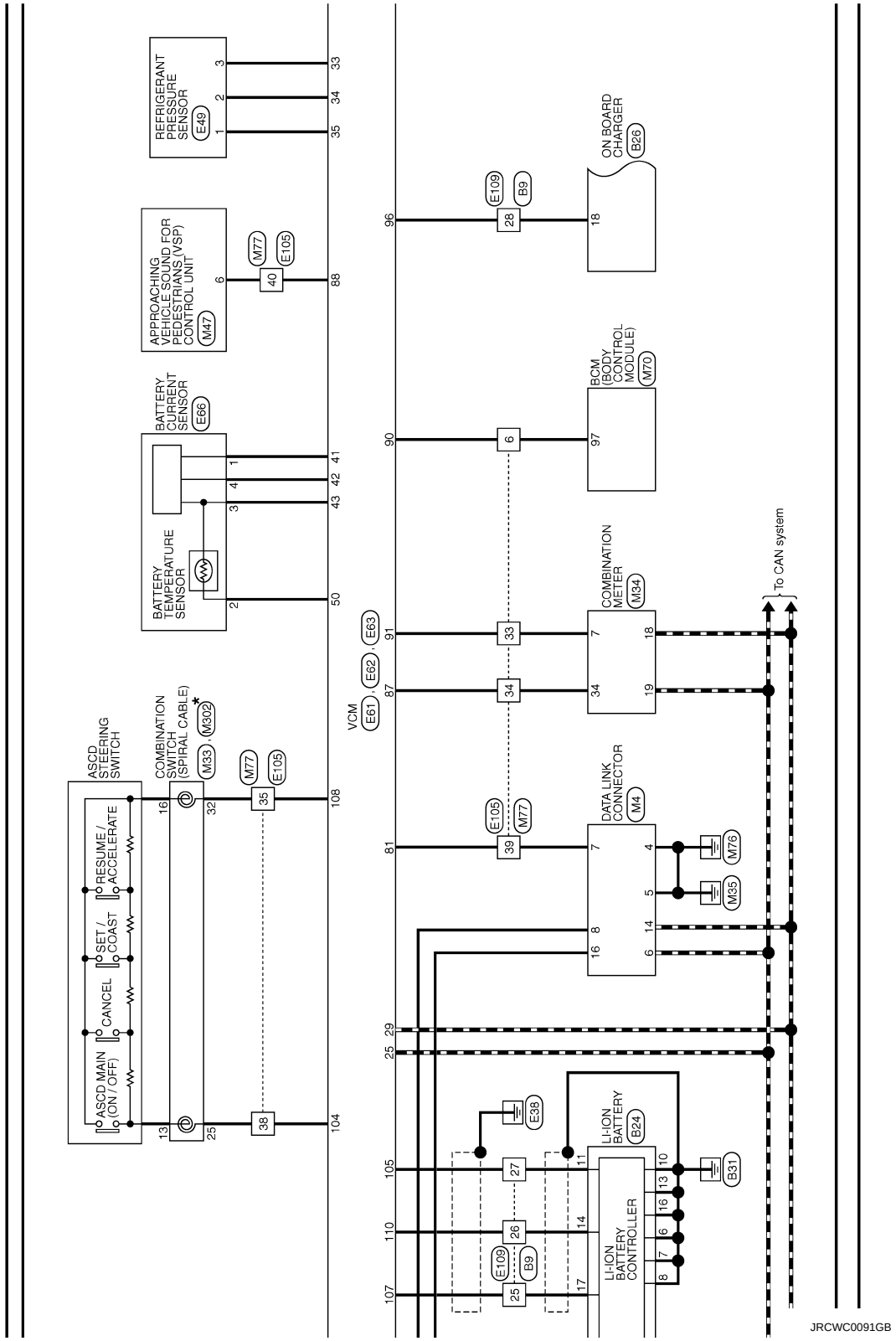
Wiring Diagram

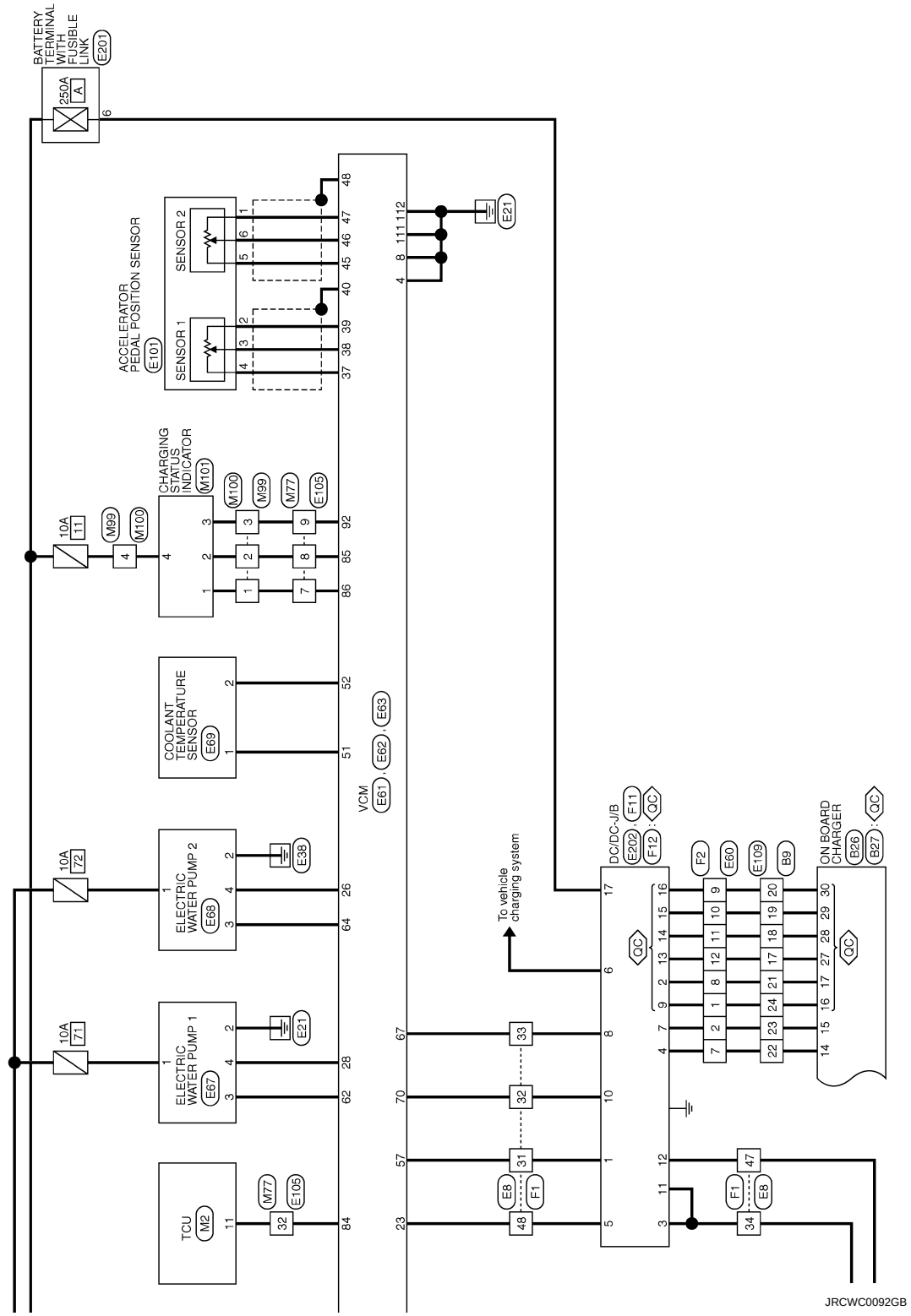
INFOID:0000000007633695

For connector terminal arrangements, harness layouts, and alphabets in a ⬡ (option abbreviation; if not described in wiring diagram), refer to GI-12, "Connector Information".




POWER SWITCH ON
40A G
20A 32
10A 3
10A 13
10A 38
M/C RELAY E65
A/C RELAY E52
IMMEDIATE CHARGING SWITCH M65
STOP LAMP SWITCH E102
ASCD BRAKE SWITCH E112
M77 E105
To battery power supply
To automatic air conditioning system
To CAN system
DATA LINE
LI-ION BATTERY CONTROLLER
LI-ION BATTERY B24
VCM E61, E62, E63
COOLING FAN CONTROL MODULE E19, E301*, E302*
COOLING FAN MOTOR-1
COOLING FAN MOTOR-2
E38
JRCWC0090GB


REFRIGERANT PRESSURE SENSOR E49
APPROACHING VEHICLE SOUND FOR PEDESTRIANS (VSP) CONTROL UNIT M47
BATTERY CURRENT SENSOR E66
BATTERY TEMPERATURE SENSOR
ASCD STEERING SWITCH
ASCD MAIN (ON / OFF)
CANCEL
SET / COAST
RESUME / ACCELERATE
COMBINATION SWITCH (SPIRAL CABLE) M33 M302
VCM E61, E62, E63
ON BOARD CHARGER B26
BCM (BODY CONTROL MODULE) M70
COMBINATION METER M34
DATA LINK CONNECTOR M4
LI-ION BATTERY B24
LI-ION BATTERY CONTROLLER
E38
B31
M76
M35
M77
E105
E109
B9
M302
To CAN system
JRCWC0091GB


BATTERY TERMINAL WITH FUSIBLE LINK E201
250A A
ACCELERATOR PEDAL POSITION SENSOR E101
SENSOR 1
SENSOR 2
CHARGING STATUS INDICATOR M101
10A 11
10A 72
10A 71
ELECTRIC WATER PUMP 2 E68
ELECTRIC WATER PUMP 1 E67
COOLANT TEMPERATURE SENSOR E69
TCU M2
VCM E61, E62, E63
DC/DC-J/B E202, F11, F12
ON BOARD CHARGER B26, B27
To vehicle charging system
JRCWC0092GB

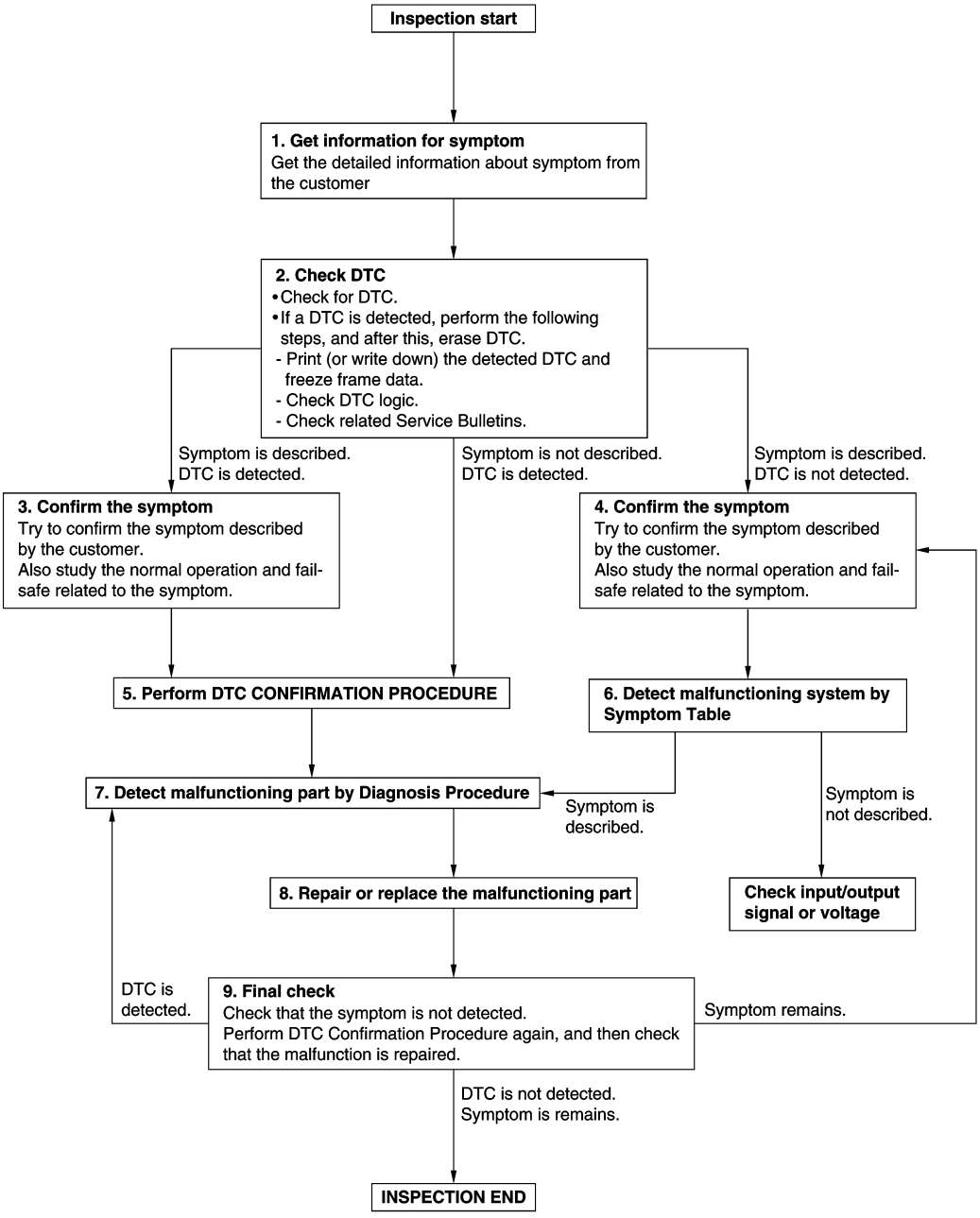
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000007633696

OVERALL SEQUENCE



JSCIA0443GB

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the “Diagnostic Work Sheet”. (Refer to EVC-94, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. If a DTC is detected, perform the following steps, and after this, erase DTC.

- Print (or write down) the detected DTC and freeze frame data.
- Check DTC logic. Refer to EVC-84, "DTC Index".
- Check related Service Bulletins.
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Diagnosis is useful. Refer to EVC-347, "Symptom Index".)

Are any symptoms described and any DTCs detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail-safe related to the symptom. Refer to EVC-347, "Symptom Index" and EVC-79, "Fail-Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail-safe related to the symptom. Refer to EVC-347, "Symptom Index" and EVC-79, "Fail-Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.
If two or more DTCs are detected, refer to EVC-82, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 7.
NO >> Check according to GI-51, "Intermittent Incident".

6.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EVC-347, "Symptom Index" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

Is the symptom described?

YES >> GO TO 7.
NO >> Monitor input data from related sensors or check voltage of related VCM terminals using CONSULT. Refer to EVC-66, "Reference Value".

7. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

Is a malfunctioning part detected?

YES >> GO TO 8.
NO >> Monitor input data from related sensors or check voltage of related VCM terminals using CONSULT. Refer to EVC-66, "Reference Value".

8. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it.

>> GO TO 9.

9. FINAL CHECK

When DTC was detected in step 3, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then check that the malfunction have been completely repaired.
When symptom was described from the customer, refer to confirmed symptom in step 4 or 5, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 7.
YES-2 >> Symptom remains: GO TO 4.
NO >> Before returning the vehicle to the customer, always erase DTC.

Diagnostic Work Sheet

INFOID:0000000007633697

DESCRIPTION

There are many operating conditions that lead to the malfunction of “EV control system” components. A good grasp of such conditions can make troubleshooting faster and more accurate.

KEY POINTS	
WHAT	Vehicle and parts
WHEN	Date, Frequencies
WHERE	Road conditions
HOW	Operating conditions, Weather conditions, Symptoms

In general, each customer feels differently about symptoms. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize the diagnostic worksheet in order to organize all the information for troubleshooting.

NOTE:
Some conditions may cause a DTC to be detected.

DIAGNOSTIC WORKSHEET

Diagnostic worksheet

Customer name		License plate No.		Date of first registration	
		Model			
Acceptance Date		VIN		Mileage	km (mile)

Question	Group	Information from the customer	
Vehicle condition at malfunction occurrence	R/Q/N/O	☐ READY (R) ☐ Quick charge (Q) ☐ Normal charge (N) ☐ Others (O)	
Symptom	R	☐ "READY" not enabled ☐ Poor drivability ☐ Shock ☐ Vibration ☐ Driving impossible ☐ Noise ☐ Poor shifting ☐ Poor braking ☐ Poor acceleration ☐ Low electricity consumption ☐ Switch malfunction ☐ Warning lamp ON ☐ Others ( )	
		Details of symptom	
		Information display indication	
		Electricity consumption	km (mile)/kW
		Li-ion battery remaining energy	/
	Q, N	☐ Charging unable ☐ Charging discontinued ☐ Slow charging ☐ Poor timer charging ☐ Poor remote charging ☐ Immediate charging unable ☐ Others ( )	
		Details of symptom	
		Quick charger monitor indication	
	O	☐ A/C inoperative ☐ Poor A/C ☐ Dead 12V battery ☐ Others ( )	
		Details of symptom	
Location/status of occurrence	R/O	☐ Not applicable ☐ Ordinary road ☐ Highway ☐ Mountain pass ☐ Rough road ☐ Level road ☐ Uphill ☐ Downhill ☐ Left/right turn ☐ Others ( )	
	Q/N/O	☐ Start of charge ☐ During charging ☐ After the end of charging ☐ During standby of timer charging ☐ During timer charging ☐ At the end of timer charging ☐ During remote charging ☐ Others ( )	
Driving condition	R	☐ At the system startup ☐ During READY (Vehicle stopped) ☐ At start ☐ During acceleration ☐ During driving with a constant speed ☐ During coasting ☐ During braking ☐ Right before stopping ☐ Right after stopping ☐ During POWER OFF operation ☐ A/C ON ☐ During shift change ☐ Others ( )	
		Vehicle speed	km (MPH)
		Accelerator pedal opening angle	/ 8

Question	Group	Information from the customer	
Quick charger	Q	Quick charger maker	☐ Not applicable ☐ Applicable ( )
		Location	
		Model number	
		Serial number	
		Setting	
		Others	
Wall outlet	N	☐ Not applicable ☐ Applicable	
		Location	
		Voltage	V
		Breaker	A
		Other information	
Li-ion battery remaining energy	Q/N/O	☐ Not applicable ☐ Applicable ( )	
Shift position/operation	R	☐ P ☐ R ☐ N ☐ D ☐ ECO ☐ When operating (⇒)	
Weather condition	R/Q/N/O	☐ Not applicable ☐ Applicable	
		Weather	
		Temperature	°C (or °F)
Occurrence frequency		☐ All the time ☐ Once ☐ Sometimes (times in the past) ☐ Others ( )	
Timing of recovery from malfunction		☐ POWER OFF ☐ Removal of 12V battery terminal ☐ Shift lever operation ☐ During driving ☐ READY ☐ Others ( )	

ADDITIONAL SERVICE WHEN REMOVING 12V BATTERY NEGATIVE TERMINAL

Description

INFOID:0000000007633698

When the 12V battery negative terminal is disconnected, the timer mounted in VCM cannot be controlled normally because timer information stored in VCM is erased. In such case, the timer must be reset to correct time.

NOTE:

If timer charge setting is previously set to ON, the timer charge ON setting can be cancelled by disconnecting the 12 V battery negative terminal.

Work Procedure

INFOID:0000000007633699

1.PERFORM VCM TIMER ADJUSTMENT

Perform VCM timer adjustment. Refer to AV-73, "ADDITIONAL SERVICE WHEN REMOVING BATTERY NEGATIVE TERMINAL : Work Procedure".

>> END

ADDITIONAL SERVICE WHEN REPLACING VCM

Description

INFOID:0000000007633700

When replacing VCM, this procedure must be performed.
NOTE:
The necessary operation is different depending on the operation result of VCM data save or write. Always perform the operation according to procedures. Refer to EVC-98, "Work Procedure".

Work Procedure

INFOID:0000000007633701

1.SAVE VCM DATA

1. Turn off the power and wait at least 20 seconds.
2. Turn power switch ON.
3. Select “SAVE DATA FOR CPU REPLACE” in “WORK SUPPORT” mode using CONSULT.
4. Follow the instruction of CONSULT display.
   NOTE:
   Necessary data in VCM is copied and saved to CONSULT.

Is operation completed successfully?

YES >> GO TO 2.
NO >> GO TO 5.

2.REPLACE VCM

1. Turn off the power and wait at least 20 seconds.
2. Replace VCM. Refer to EVC-369, "Removal and Installation".

>> GO TO 3.

3.PERFORM VCM KEY ID REGISTRATION

Refer to SEC-47, "VCM : Work Procedure".

>> GO TO 4.

4.WRITE VCM DATA

1. Select “WRITE DATA AFTER REPLACE CPU” in “WORK SUPPORT” mode using CONSULT.
2. Follow the instruction of CONSULT display.
   NOTE:
   The data saved by “SAVE DATA FOR CPU REPLACE” is written to VCM.

Is operation completed successfully?

YES >> GO TO 9.
NO >> GO TO 7.

5.REPLACE VCM

1. Turn off the power and wait at least 20 seconds.
2. Replace VCM. Refer to EVC-369, "Removal and Installation".

>> GO TO 6.

6.PERFORM VCM KEY ID REGISTRATION

Refer to SEC-47, "VCM : Work Procedure".

>> GO TO 7.

7.WRITE VIN DATA

Perform EVC-103, "Work Procedure".

>> GO TO 8.

8. LI-ION BATTERY ID REGISTRATION

Refer to “Li-ion Battery Registration Operation Manual”.

>> GO TO 9.

9. PERFORM ACCELERATE PEDAL CLOSED POSITION LEARNING

Perform EVC-100, "Work Procedure".

>> GO TO 10.

10. SET VCM TIMER

Refer to AV-73, "ADDITIONAL SERVICE WHEN REMOVING BATTERY NEGATIVE TERMINAL : Work Procedure".

>> GO TO 11.

11. CHECK DTC

1. Turn off the power and wait at least 20 seconds.
2. Turn power switch ON.
3. Check DTC. If DTC is displayed, erase it.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000007633702

Accelerator Pedal Closed Position Learning is a function of VCM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. This work must be performed each time the harness connector of the accelerator pedal position sensor or VCM harness connector is disconnected.

Work Procedure

INFOID:0000000007633703

1.START

1. Check that accelerator pedal is fully released.
2. Turn power switch ON.and wait at least 2 seconds.
3. Turn power switch OFF and wait at least 20 seconds.
4. Repeat steps 2 and 3 for 4 times.
5. Turn power switch OFF and wait at least 20 seconds.

>> END

LI-ION BATTERY GRADUAL CAPACITY LOSS DATA CLEAR

Description

INFOID:0000000007633704

Perform Li-ion Battery Gradual Capacity Loss Data Clear when the Li-ion battery or Li-ion battery controller is replaced with a new one. VCM saves the Li-ion battery deterioration information sent from the Li-ion battery controller and manages the Li-ion battery replacement timing. When the Li-ion battery or Li-ion battery controller is replaced with a new one, there is a difference between the Li-ion battery deterioration data stored in VCM and the actual Li-ion battery deterioration level. In this case, VCM will incorrectly manage the Li-ion battery replacement timing. So perform Li-ion Battery Deterioration Data Clear to clear the Li-ion battery deterioration data stored in VCM.

CAUTION:

Never perform Li-ion Battery Deterioration Data Clear when the Li-ion battery or Li-ion battery controller is not replaced as new one.

Work Procedure

INFOID:0000000007633705

1. LI-ION BATTERY GRADUAL CAPACITY LOSS DATA CLEAR

With CONSULT

1. Turn power switch ON.
2. On the CONSULT screen, select “EV/HEV” >> “WORK SUPPORT” >> “BATTERY GRADUAL CAP LOSS DATA CLEAR”.
3. Touch “START” and wait a few seconds.
4. Make sure that “COMPLETE” is displayed on CONSULT screen.

>> END

LI-ION BATTERY JUNCTION BOX DATA CLEAR

Description

INFOID:0000000007633706

Perform Li-ion Battery Junction Box Data Clear when the Li-ion Battery Junction Box is replaced with a new one. VCM counts the times system main relay is turned off due to a large current and use this information to manage the system main relay deterioration status. As the system main relay deterioration status progresses, a DTC “P31DE” is detected and notification that the Li-ion battery junction box needs to be replaced is given. When the Li-ion Battery Junction Box is replaced with a new one, there is a difference between the System Main Relay cutoff count stored in VCM and the actual System Main Relay cutoff count. In this case, VCM will detect the DTC with incorrect timing. So perform Li-ion Battery Junction Box Data Clear to clear the System Main Relay cutoff count stored in VCM.

Work Procedure

INFOID:0000000007633707

1. LI-ION BATTERY JUNCTION BOX DATA CLEAR

With CONSULT

1. Turn power switch ON.
2. On the CONSULT screen, select “EV/HEV” >> “WORK SUPPORT” >> “LI-ION BATTERY JUNCTION BOX DATA CLEAR”.
3. Touch “START” and wait a few seconds.
4. Make sure that “COMPLETE” is displayed on CONSULT screen.

>> END

WRITE VEHICLE IDENTIFICATION NUMBER DATA

Description

INFOID:0000000007633708

VIN Registration is an operation to register the VIN in VCM.
NOTE:
If there is an error in the VIN recorded in VCM, the telematics system may not operate correctly.

Work Procedure

INFOID:0000000007633709

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-22, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT
1. Turn power switch ON (not READY).
2. On the CONSULT screen, select “EV/HEV” >> “WORK SUPPORT” >> “VIN REGISTRATION”.
3. Follow the instructions on the CONSULT display.

>> END

LOAD BATTERY IDENTIFICATION DATA

Description

INFOID:0000000007633710

Load Battery Identification Data must be performed after the following operation.
- Li-ion battery is replaced.
- Li-ion battery controller is replaced.
- VCM is replaced.

NOTE:
If Load Battery Identification Data is not performed, VCM detects the DTC “P3102”.

Work Procedure

INFOID:0000000007633711

Refer to “Li-ion Battery Registration Operation Manual”.

DTC/CIRCUIT DIAGNOSIS

POWER SUPPLY AND GROUND CIRCUIT

VCM

VCM : Diagnosis Procedure

INFOID:0000000007633712

1.CHECK FUSE

Check that the following fuse is not fusing.

Power supply	Fuse No.
Battery	43
Power switch ON	55

Is the fuse fusing?

YES >> Replace the fuse after repairing the applicable circuit.
NO >> GO TO 2.

2.CHECK VCM GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

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

3.CHECK 12V BATTERY POWER SUPPLY

Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	6	Ground	12V battery power supply

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK BATTERY POWER SUPPLY CIRCUIT

1. Check the continuity between VCM harness connector and fuse terminal.

+		–	Continuity
VCM			
Connector	Terminal		
E61	6	#43 fuse terminal	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check power supply circuit for battery power supply.
NO >> Repair or replace error-detected parts.

5.CHECK POWER ON POWER SUPPLY

1. Turn power switch ON.
2. Check the voltage between VCM harness connector and ground.

+		–	Voltage (Approx.)
VCM			
Connector	Terminal		
E61	21	Ground	11 – 14 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6.CHECK POWER ON POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between VCM harness connector and IPDM E/R harness connector.

+		–		Continuity
VCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E61	21	E15	57	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000007633713

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 error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000007633714

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1000	CAN COMM CIRCUIT (CAN communication line)	When VCM is not transmitting or receiving CAN communication signal or EV system CAN communication for 2 seconds or more.	• CAN communication system • EV system CAN communication system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-107, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633715

Perform the trouble diagnosis for CAN communication system. Refer to LAN-32, "CAN COMMUNICATION SYSTEM : CAN System Specification Chart".

U1010 CONTROL MODULE (CAN)

DTC Logic

INFOID:0000000007633716

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1010	CONTROL UNIT (CAN) (CAN communication line)	Detecting error during the initial diagnosis of CAN controller of VCM.	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.DTC REPRODUCTION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-108, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633717

1.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Turn power switch ON.
2. Erase self-diagnostic result.
3. Perform DTC confirmation procedure again. Refer to EVC-108, "DTC Logic".
4. Check self-diagnostic result.

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P0603 VCM

DTC Logic

INFOID:0000000007633718

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	INTERNAL CONTROL MODULE (Internal control module RAM error)	VCM back-up RAM system does not function properly.	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Turn power switch OFF and wait at least 20 seconds.
3. Turn power switch ON and wait at least 10 seconds.
4. Repeat steps 2 and 3 for 2 times.
5. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-109, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633719

1.INTERVIEW THE CUSTOMER

Interview the customer to see if there is a removal history of 12V battery terminals immediately after turning OFF the power switch.

NOTE:

DTC “P0603” may be detected when 12 V battery terminals are removed before VCM is shut off.

Is there a removal history of 12V battery terminals immediately after turning OFF the power switch?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK 12V BATTERY POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	6	Ground	12V battery voltage

Is the inspection result normal?

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

3.CHECK 12V BATTERY POWER SUPPLY CIRCUIT

1. Pull out #43 fuse.
2. Check the continuity between VCM harness connector and fuse terminal.

+		–	Continuity
VCM			
Connector	Terminal		
E61	6	#43 fuse terminal	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.PERFORM CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Reconnect all harness connectors disconnected.
2. Turn power switch ON.
3. Erase DTC.
4. Perform DTC confirmation procedure again. Refer to EVC-109, "DTC Logic".

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P0616 READY SIGNAL

DTC Logic

INFOID:0000000007633720

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0616	STARTER RELAY (Starter relay circuit low)	VCM receives READY signal during power switch is OFF.	• Harness or connectors (READY signal circuit is shorted) • BCM • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON.
2. Turn power switch OFF and wait at least 20 seconds.
3. Turn power switch ON.
4. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-111, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633721

1.CHECK READY SIGNAL VOLTAGE-I

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E63	90	Ground	0 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK READY SIGNAL VOLTAGE-II

1. Disconnect BCM harness connector.
2. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E63	90	Ground	0 V

Is the inspection result normal?

YES >> Replace BCM. Refer to BCS-77, "Removal and Installation".
NO >> GO TO 3.

3. CHECK READY SIGNAL CIRCUIT

1. Check the continuity between VCM harness connector and BCM harness connector.

+		–		Continuity
VCM		BCM		
Connector	Terminal	Connector	Terminal	
E63	90	M70	97	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000007633722

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0643	SENSOR POWER SUPPLY (Sensor reference voltage A circuit high)	• VCM detects that a voltage of power source for sensor remains 5.6 V or more. • VCM detects a voltage of power source for sensor remains less than 4.6 V.	• Harness or connectors (Sensor power supply circuit is shorted.) • Accelerator pedal position sensor • Battery current sensor • Refrigerant pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-113, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633723

1.CHECK SENSOR POWER SUPPLY VOLTAGE

1. Turn power switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E66	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK VCM POWER SUPPLY AND GROUND

Perform trouble diagnosis for VCM power supply and ground. Refer to EVC-105, "VCM : Diagnosis Procedure".

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT

1. Turn power switch OFF.
2. Disconnect following sensor harness connector and check harness for short to ground and short to power.

VCM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E62	41	Battery current sensor	E66	1
	33	Refrigerant pressure sensor	E49	33
	37	Accelerator pedal position sensor	E101	4

Is the inspection result normal?

YES >> Check sensors for short to ground and short to power.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A00 COOLANT TEMPERATURE SENSOR

DTC Logic

INFOID:0000000007633724

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A00	COOLANT TEMPERATURE SENSOR (Coolant temperature sensor circuit)	• VCM detects that coolant temperature sensor voltage remains less than 0.1 V for 2.5 seconds. • VCM detects coolant temperature sensor voltage remains more than 4.9 V for 2.5 seconds.	• Harness or connectors (The sensor circuit is open or shorted.) • Coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-115, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633725

1.CHECK COOLANT TEMPERATURE SENSOR POWER SUPPLY-I

1. Turn power switch OFF.
2. Disconnect coolant temperature sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between coolant temperature sensor harness connector terminals.

Coolant temperature sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E69	1	2	5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK COOLANT TEMPERATURE SENSOR POWER SUPPLY-II

Check the voltage between coolant temperature sensor harness connector and ground.

+		–	Voltage (Approx.)
Coolant temperature sensor			
Connector	Terminal		
E69	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 5.

3. CHECK COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and coolant temperature sensor harness connector.

+		–		Continuity
VCM		Coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
E62	52	E69	2	Existed

Is the inspection result normal?

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

4. CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
Coolant temperature sensor			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

5. CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and coolant temperature sensor harness connector.

+		–		Continuity
VCM		Coolant temperature sensor		
Connector	Terminal	Connector	Terminal	
E62	51	E69	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK VCM POWER SUPPLY CIRCUIT

Check VCM power supply circuit. Refer to EVC-105, "VCM : Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

7. CHECK COOLANT TEMPERATURE SENSOR

Check coolant temperature sensor. Refer to EVC-117, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace coolant temperature sensor. Refer to HCO-15, "Exploded View".

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

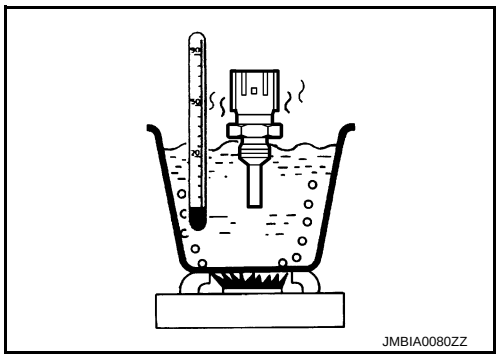
YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000007633726

1. CHECK COOLANT TEMPERATURE SENSOR

1. Turn power switch OFF.
2. Disconnect coolant temperature sensor harness connector.
3. Remove coolant temperature sensor.
4. Check resistance between coolant temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
1 and 2	Temperature [°C (°F)]	20 (68)	2.35 - 2.73 kΩ
		50 (122)	0.68 - 1.00 kΩ
		90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace coolant temperature sensor. Refer to HCO-15, "Exploded View".

P0A08 DC/DC CONVERTER

DTC Logic

INFOID:0000000007633727

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A08	DC/DC CONVERTER (DC/DC converter status circuit)	VCM detects that coolant temperature sensor voltage remains less than 0.1 V for 2.5 seconds.	• Harness or connectors (The sensor circuit is open or shorted.) • DC/DC converter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-118, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633728

1.CHECK DC/DC CONVERTER POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect DC/DC junction box harness connector.
3. Turn power switch ON.
4. Check the voltage between DC/DC junction box harness connector and ground.

+		–	Voltage
DC/DC J/B			
Connector	Terminal		
F11	10	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #74 fuse and check fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-I

1. Check the continuity between fuse terminal and DC/DC junction box harness connector.

+	–		Continuity
	DC/DC J/B		
	Connector	Terminal	
#74 fuse terminal	F11	10	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

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

4.CHECK DC/DC CONVERTER POWER SUPPLY CIRCUIT-II

1. Remove M/C relay.
2. Check the continuity between M/C relay harness connector and fuse terminal.

+		–	Continuity
M/C relay			
Connector	Terminal		
E65	5	#74 fuse terminal	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

5.CHECK DC/DC CONVERTER ACTIVATION SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and DC/DC junction box harness connector.

+		–		Continuity
VCM		DC/DC J/B		
Connector	Terminal	Connector	Terminal	
E62	70	F11	10	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.REPLACE DC/DC JUNCTION BOX

1. Replace DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EVC-118, "DTC Logic".

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

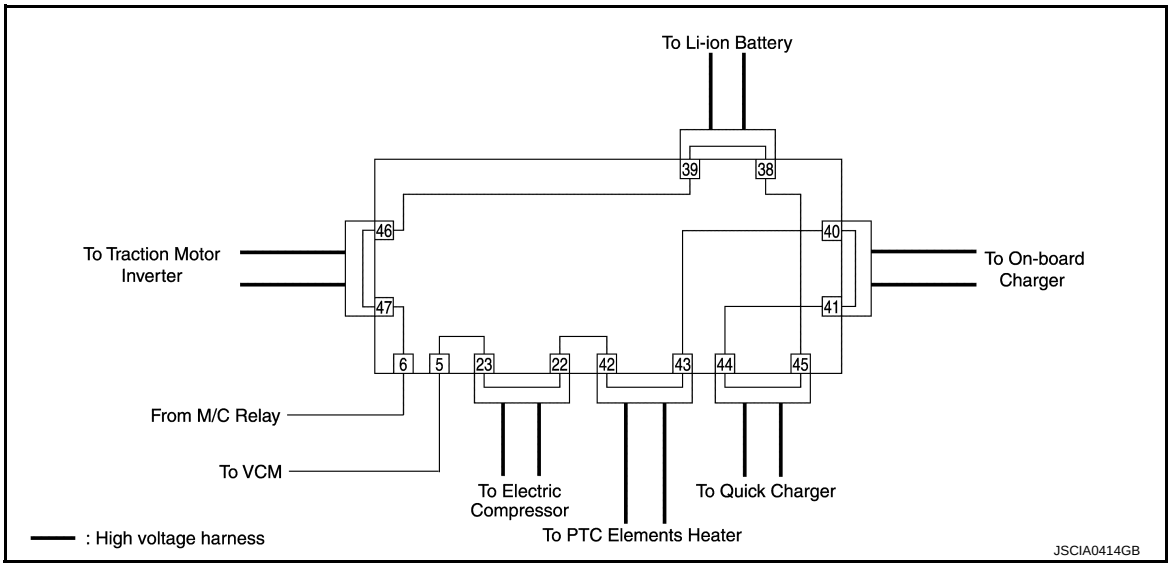
P0A0B HIGH VOLTAGE CONNECTOR INTERLOCK DETECT CIRCUIT

Description

INFOID:0000000007633729

The high voltage connector connection detecting circuit is integrated into DC/DC junction box and detects the connection status of the high voltage harness connectors connected to DC/DC junction box.
The high voltage connector connection detecting circuit is designed so that the power from the M/C relay is supplied to VCM via all of the high voltage harness connectors connected to DC/DC-J/B. When all of the high voltage harness connectors are connected, this circuit is energized. If one of the high voltage harness connectors is disconnected, the high voltage connector connection detecting circuit becomes broken. VCM detects the connection status of the high voltage harness connectors, according to a voltage applied from this circuit.

HIGH VOLTAGE CONNECTOR CONNECTION DETECTING CIRCUIT DIAGRAM



DTC Logic

INFOID:0000000007633730

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A0B	HV SYSTEM INTERLOCK ERROR (High voltage system interlock circuit performance)	VCM detects that high voltage harness connector interlock circuit voltage remains excessively high for 0.5 seconds or more immediately before M/C relay turns ON.	• Harness or connectors • VCM • Quick charge port (With Quick charge port models) • DC/DC-J/B

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON.
2. Turn power switch OFF and wait at least 20 seconds.
3. Turn power switch ON and wait at least 5 seconds.
4. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-121, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633731

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1. PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

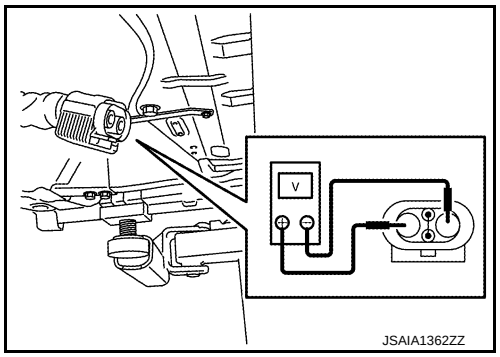
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.

DANGER:

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





Standard : 5 V or less

CAUTION:

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

>> GO TO 2.

2. CHECK HIGH VOLTAGE HARNESS CONNECTOR CONNECTION DETECTING CIRCUIT POWER SUPPLY-I

1. Reconnect 12V battery negative terminal.
2. Disconnect VCM harness connector.
3. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	23	Ground	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK HIGH VOLTAGE HARNESS CONNECTOR INTERLOCK DETECTING CIRCUIT POWER SUPPLY-II

1. Remove M/C relay.
2. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	23	Ground	0 V

Is the inspection result normal?

YES >> Perform trouble diagnosis for M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO-1 (with quick charge port)>>GO TO 4.
NO-2 (without quick charge port)>>GO TO 5.

4.CHECK HIGH VOLTAGE HARNESS CONNECTOR INTERLOCK DETECTING CIRCUIT POWER SUPPLY-III

1. Disconnect quick charge port high voltage harness connector (H12).
2. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	23	Ground	0 V

Is the inspection result normal?

YES >> Check harness between M/C relay and quick charge port. If OK, check quick charge port for short to power.
NO >> GO TO 5.

5.CHECK HIGH VOLTAGE HARNESS CONNECTOR INTERLOCK DETECTING CIRCUIT POWER SUPPLY-IV

1. Disconnect DC/DC-J/B harness connector (F11).
2. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	23	Ground	0 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> Check harness for short to power, between VCM harness connector and DC/DC-J/B harness connector.

6.CHECK HIGH VOLTAGE HARNESS CONNECTOR INTERLOCK DETECTING CIRCUIT POWER SUP-

PLY-V

Check the voltage between DC/DC junction box harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
F11	6	Ground	0 V

Is the inspection result normal?

YES >> Check DC/DC junction box for short to power.

NO-1 (with quick charge port)>>Check harness for short to power, between DC/DC junction box harness connector and quick charge port harness connector.

NO-2 (without quick charge port)>>Check harness for short to power, between DC/DC junction box harness connector and M/C relay harness connector.

P0A8D 12V BATTERY POWER SUPPLY

DTC Logic

INFOID:0000000007633732

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A8D	14V POWER SUPPLY (14 V power module system voltage low)	VCM detects that a voltage of 12V battery power supply remains less than 10 V for 10 seconds during READY state.	• Harness or connectors (The sensor circuit is open or shorted.) • DC/DC J/B

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and wait at least 30 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-124, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633733

1.CHECK 12V BATTERY POWER SUPPLY-I

1. Turn power switch OFF.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E14	42	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK 12V BATTERY POWER SUPPLY-II

1. Disconnect IPDM E/R harness connector (E14).
2. Check the voltage between IPDM E/R connector and ground.

+	–	Voltage
IPDM E/R		
Terminal		
42	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK IPDM E/R

1. Remove IPDM E/R.
2. Check the continuity between IPDM E/R connector terminals.

IPDM E/R		Continuity
+	–	
Terminal		
2	42	Existed

Is the inspection result normal?

YES >> Check 12V battery power supply circuit.
NO >> GO TO 4.

4.CHECK FUSE

1. Pull out #43 fuse.
2. Check the fuse is not fusing.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

5.CHECK 12V BATTERY POWER SUPPLY CIRCUIT

1. Disconnect VCM harness connector.
2. Check the harness for short to ground, between IPDM E/R harness connector and VCM harness connector.

+		–	Continuity
IPDM E/R			
Connector	Terminal		
E14	42	Ground	Not Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.DC/DC-J/B OUTPUT POWER CIRCUIT

1. Disconnect DC/DC-J/B terminal (E202).
2. Disconnect F/L-A.
3. Check the continuity between DC/DC-J/B harness terminal and F/L-A terminal.

+		–	Continuity
DC/DC-J/B			
Connector	Terminal		
E202	17	F/L-A terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC-J/B. Refer to EVC-361, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A8E 12V BATTERY POWER SUPPLY

DTC Logic

INFOID:0000000007633734

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A8E	14V POWER SUPPLY (14 V power module system voltage high)	VCM detects that a voltage of 12V battery power supply remains more than 16 V for 25.5 seconds during READY state.	• 12V battery • Harness or connectors (The signal circuit is open or shorted.) • DC/DC J/B

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and wait at least 30 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-126, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633735

1.CHECK 12V BATTERY

Check that the correct 12V battery is installed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace 12V battery with a correct one.

2.DC/DC CONVERTER POWER VOLTAGE VARIABLE CONTROL SIGNAL

With CONSULT

1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “DC/DC CONV REQ VOLT”.
2. Check that the value of “DC/DC CONV REQ VOLT” is less than 16 V.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace VCM. Refer to EVC-369, "Removal and Installation".

3.CHECK DC/DC CONVERTER POWER VOLTAGE VARIABLE CONTROL SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector and DC/DC junction box harness connector.
3. Check the continuity between VCM harness connector and DC/DC junction box harness connector.

+		–		Continuity
VCM		DC/DC-J/B		
Connector	Terminal	Connector	Terminal	
E62	57	F11	1	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Replace DC/DC junction box. Refer to EVC-361, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A8F 12V BATTERY POWER SUPPLY

DTC Logic

INFOID:0000000007633736

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A8F	14V POWER SUPPLY (14 V power module system performance)	When shift is except P range and parking brake is released, VCM detects that a voltage of 12V battery power supply remains less than 12 V for 10 seconds.	• Harness or connectors (The sensor circuit is open or shorted.) • DC/DC-J/B

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Under the following conditions, and wait at least 30 seconds.

Power switch	READY
Shift position	Except P range
Parking brake	Released

2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-128, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633737

1.INTERVIEW THE CUSTOMER

Interview the customer to see if there is a history that all of the following conditions are satisfied for a long time.

Power switch	ON
Shift position	Except P range
Parking brake	Released

NOTE:
This DTC may be detected if the above state continues for a long time.

Is the inspection result normal?

YES >> Explain the customer that this is the normal operation.
NO >> GO TO 2.

2.CHECK 12V BATTERY POWER SUPPLY-I

1. Turn power switch OFF.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E14	42	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK 12V BATTERY POWER SUPPLY-II

1. Disconnect IPDM E/R harness connector (E14).
2. Check the voltage between IPDM E/R connector and ground.

+	–	Voltage
IPDM E/R		
Terminal		
42	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK IPDM E/R

1. Remove IPDM E/R.
2. Check the continuity between IPDM E/R connector terminals.

IPDM E/R		Continuity
+	–	
Terminal		
2	42	Existed

Is the inspection result normal?

YES >> Check 12V battery power supply circuit.
NO >> GO TO 5.

5.CHECK FUSE

1. Pull out #43 fuse.
2. Check the fuse is not fusing.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

6.CHECK 12V BATTERY POWER SUPPLY CIRCUIT

1. Disconnect VCM harness connector.
2. Check the harness for short to ground, between IPDM E/R harness connector and VCM harness connector.

+		–	Continuity
IPDM E/R			
Connector	Terminal		
E14	42	Ground	Not Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

NO >> Repair or replace error-detected parts.

7. DC/DC-J/B OUTPUT POWER CIRCUIT

1. Disconnect DC/DC-J/B terminal (E202).
2. Disconnect F/L-A.
3. Check the continuity between DC/DC-J/B harness terminal and F/L-A terminal.

+		–	Continuity
DC/DC-J/B			
Connector	Terminal		
E202	17	F/L-A terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC-J/B. Refer to EVC-361, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0A94 DC/DC CONVERTER

DTC Logic

INFOID:0000000007633738

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0A94	DC/DC CONVERTER	During READY, the following state continues for 2.5 seconds or more: The VCM power supply voltage is less than 12.48 V and VCM detects a malfunction in the DC/DC converter.	DC/DC-J/B

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and wait at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-131, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633739

1.CHECK VCM GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.DC/DC-J/B OUTPUT POWER CIRCUIT

1. Disconnect DC/DC-J/B terminal.
2. Disconnect F/L-A.
3. Check the continuity between DC/DC-J/B harness terminal and F/L-A terminal.

+		–	Continuity
DC/DC-J/B			
Connector	Terminal		
E202	17	F/L-A terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO3.
NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace DC/DC-J/B. Refer to EVC-361, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P0AA0 SYSTEM MAIN RELAY

DTC Logic

INFOID:0000000007633740

DTC DETECTION LOGIC

NOTE:
If DTC P0AA0 is displayed with DTC P0AA2, P0AA5, P31D4, P31DB, P31DC, or P31DD, perform diagnosis for DTC P0AA2, P0AA5, P31D4, P31DB, P31DC, or P31DD.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA0	HYBRID BATT POSITIVE CONTACTOR (System main relay circuit stuck closed)	• A traction motor inverter input voltage is 240 V or more for 9 seconds or more while starting the EV system. • A traction motor inverter input voltage is 190 V or more for 1 minute or more while starting the EV system.	• Harness or connectors • Battery J/B • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

CAUTION:
Since this DTC may be displayed if a malfunction is detected in other systems, check them for malfunction before performing this diagnosis.
- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn power switch ON and wait at least 90 seconds.
2. Check self-diagnostic result.

Is DTC “P0AA0” detected?

YES >> Proceed to EVC-133, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633741

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:
- **There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.**
- **Erase DTC after the work is completed.**

1.CHECK SYSTEM MAIN RELAY DRIVE POWER VOLTAGE

1. Turn power switch ON.

2. Disconnect Li-ion battery harness connector.
3. Check the voltage between Li-ion battery harness connector and ground.

Relay	+		–	Voltage
	Li-ion battery			
	Connector	Terminal		
System main relay 1	B24	17	Ground	0 V
System main relay 2		14		
Pre-charge relay		11		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check harness for short to power.

2.PRECONDITIONING

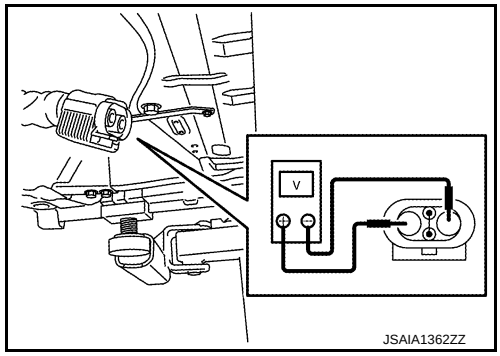
WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation". (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.

DANGER:

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





Standard : 5 V or less

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

>> GO TO 3.

3.CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor high voltage harness connector.
2. Check the short circuit between electric compressor terminals.

Electric compressor		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".

2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
18	24	Existed

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation". And then, GO TO 10.
NO >> Replace electric compressor and DC/DC junction box. And then, GO TO 10. Refer to HA-46, "Removal and Installation" (electric compressor), EVC-361, "Removal and Installation" (DC/DC-J/B).

5. CHECK PTC ELEMENTS HEATER

1. Disconnect PTC elements heater high voltage harness connector.
2. Check the short circuit between PTC elements heater terminals.

PTC elements heater		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
30	24	Existed

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation". And then, GO TO 10.
NO >> Replace PTC elements heater and DC/DC junction box. And then, GO TO 10. Refer to HA-68, "Removal and Installation" (PTC elements heater), EVC-361, "Removal and Installation" (DC/DC-J/B).

7. CHECK TRACTION MOTOR INVERTER

1. Disconnect DC/DC junction box high voltage harness connector (H15).
2. Check the short circuit between DC/DC junction box harness connector terminals.

DC/DC-J/B			Resistance
Connector	+	–	
	Terminal		
H15	35	36	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation". And then, GO TO 10.

8. CHECK HIGH VOLTAGE HARNESS

1. Remove DC/DC junction box.
2. Check the short circuit between high voltage harness terminals.

Connected to:	DC/DC-J/B			Resistance
	Connector	+	–	
		Terminal		
Electric compressor	H2	18	19	3 kΩ or more
Li-ion battery	H4	24	25	
PTC elements heater	H9	30	31	

Is the inspection result normal?

YES-1 (with Li-ion battery heater)>>GO TO 9.
YES-2 (without Li-ion battery heater)>>GO TO 10.
NO >> Replace malfunctioning harness. And then, GO TO 10.

9.CHECK LI-ION BATTERY HEATER CIRCUIT

Check the short circuit between Li-ion battery terminals.

Li-ion battery		Resistance
+	–	
Terminal		
23	24	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check Li-ion battery heater system.

10.REPLACE BATTERY JUNCTION BOX

Replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

>> INSPECTION END

P0AA1 SYSTEM MAIN RELAY +

DTC Logic

INFOID:0000000007633742

DTC DETECTION LOGIC

WARNING:

- **When this DTC is detected, the implementation of the DTC confirmation procedure may damage other parts. To prevent damage from occurring, perform EVC-137, "Diagnosis Procedure" first. After repairing malfunctioning part, perform the DTC confirmation procedure.**
- **To erase DTC, always repair malfunctioning part first.**

NOTE:

- To Clear DTC P0AA1, perform “SPECIFIC DTC CLEAR” in “WORK SUPPORT” of CONSULT. (For VCM other than those in Group A and Group B. For VCM groups, refer to EVC-8, "How to Check VCM Group".)
- If DTC P0AA1 is displayed with DTC P0AA2, P31D4, P31DB, or P31DD, perform diagnosis for DTC P0AA2, P31D4, P31DB, or P31DD.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA1	HYBRID BATT POSITIVE CONTACTOR (System main relay 1 circuit stuck closed)	The voltage of the traction motor inverter is 160 V or more and the voltage does not decreases 100 V or more even after a lapse of the specified time after starting diagnosis.	• Harness or connectors • Battery J/B • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

WARNING:

- **When this DTC is detected, the implementation of the DTC confirmation procedure may damage other parts. To prevent damage from occurring, perform EVC-137, "Diagnosis Procedure" first. After repairing malfunctioning part, perform the DTC confirmation procedure.**
- **To erase DTC, always repair malfunctioning part first.**

1. PRECONDITIONING

CAUTION:

Since this DTC may be displayed if a malfunction is detected in other systems, check them for malfunction before performing this diagnosis.

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and perform test drive.
2. Turn power switch OFF and wait at least 20 seconds.
3. Turn power switch ON.
4. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-137, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633743

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**

- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1.CHECK SYSTEM MAIN RELAY DRIVE POWER VOLTAGE

1. Turn power switch ON.
2. Disconnect Li-ion battery harness connector.
3. Check the voltage between Li-ion battery harness connector and ground.

Relay	+		–	Voltage
	Li-ion battery			
	Connector	Terminal		
System main relay 1	B24	17	Ground	0 V
System main relay 2		14		
Pre-charge relay		11		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check harness for short to power.

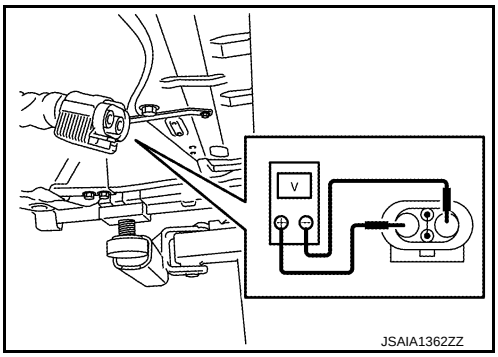
2.PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

CAUTION:

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

>> GO TO 3.

3.CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor high voltage harness connector.
2. Check the short circuit between electric compressor terminals.

Electric compressor		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
18	24	Existed

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation". And then, GO TO 10.
NO >> Replace electric compressor and DC/DC junction box. And then, GO TO 10. Refer to HA-46, "Removal and Installation" (electric compressor), EVC-361, "Removal and Installation" (DC/DC-J/B).

5. CHECK PTC ELEMENTS HEATER

1. Disconnect PTC elements heater high voltage harness connector.
2. Check the short circuit between PTC elements heater terminals.

PTC elements heater		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
30	24	Existed

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation". And then, GO TO 10.
NO >> Replace PTC elements heater and DC/DC junction box. And then, GO TO 10. Refer to HA-68, "Removal and Installation" (PTC elements heater), EVC-361, "Removal and Installation" (DC/DC-J/B).

7. CHECK TRACTION MOTOR INVERTER

1. Disconnect DC/DC junction box high voltage harness connector (H15).
2. Check the short circuit between DC/DC junction box harness connector terminals.

DC/DC-J/B			Resistance
Connector	+	–	
	Terminal		
H15	35	36	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation". And then, GO TO 10.

8.CHECK HIGH VOLTAGE HARNESS

1. Remove DC/DC junction box.
2. Check the short circuit between high voltage harness terminals.

Connected to:	DC/DC-J/B			Resistance
	Connector	+	–	
		Terminal		
Electric compressor	H2	18	19	3 kΩ or more
Li-ion battery	H4	24	25	
PTC elements heater	H9	30	31	

Is the inspection result normal?

YES-1 (with Li-ion battery heater)>>GO TO 9.
YES-2 (without Li-ion battery heater)>>GO TO 10.
NO >> Replace malfunctioning harness. And then, GO TO 10.

9.CHECK LI-ION BATTERY HEATER CIRCUIT

Check the short circuit between Li-ion battery terminals.

Li-ion battery		Resistance
+	–	
Terminal		
23	24	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check Li-ion battery heater system.

10.REPLACE BATTERY JUNCTION BOX

Replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

>> GO TO 11.

11.ERASE SELF-DIAGNOSTIC RESULT

With CONSULT

1. Reconnect parts and harness connectors disconnected.
2. Turn power switch ON.
3. Erase the DTC. Refer to EVC-55, "CONSULT Function".

>> INSPECTION END

P0AA2 SYSTEM MAIN RELAY +

DTC Logic

INFOID:0000000007633744

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA2	HYBRID BATT POSITIVE CONTACTOR (System main relay 1 circuit stuck open)	VCM detects a break in the drive circuit of System main relay 1 or an extremely high resistance for 2.5 seconds or more.	• Harness or connectors • Battery J/B • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait a least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-141, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633745

1.CHECK SYSTEM MAIN RLY GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	terminal		
B24	16	Ground	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK SYSTEM MAIN RLY CIRCUIT

Check continuity between Li-ion battery connector terminals.

Li-ion battery		Continuity
terminals		
16	17	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check the relay circuit of Li-ion battery for malfunction. If no malfunction is found, replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2),

EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

3.CHECK HARNESS

1. Disconnect VCM harness connector.
2. Check the continuity between VCM harness connector and Li-ion battery harness connector.

+		–		Continuity
VCM		Li-ion battery		
Connector	terminal	Connector	terminal	
E63	107	B24	17	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair harness or connector.

P0AA4 SYSTEM MAIN RELAY -

DTC Logic

INFOID:0000000007633746

DTC DETECTION LOGIC

NOTE:
If DTC P0AA4 is displayed with DTC P0AA5 or P31DC, perform diagnosis for DTC P0AA5 or P31DC.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA4	HYBRID BATT POSITIVE CONTACTOR (System main relay 2 circuit stuck closed)	During the stop state from READY or charging state, the voltage of the traction monitor inverter is 100 V or more.	• Harness or connectors • Battery J/B • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

CAUTION:
Since this DTC may be displayed if a malfunction is detected in other systems, check them for malfunction before performing this diagnosis.
- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Set the vehicle to READY.
2. Turn power switch OFF and wait at least 60 seconds.
3. Turn power switch ON.
4. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-143, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633747

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:
- **There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.**
- **Erase DTC after the work is completed.**

1. CHECK SYSTEM MAIN RELAY DRIVE POWER VOLTAGE

1. Turn power switch ON.
2. Disconnect Li-ion battery harness connector.
3. Check the voltage between Li-ion battery harness connector and ground.

Relay	+		–	Voltage
	Li-ion battery			
	Connector	Terminal		
System main relay 1	B24	17	Ground	0 V
System main relay 2		14		
Pre-charge relay		11		

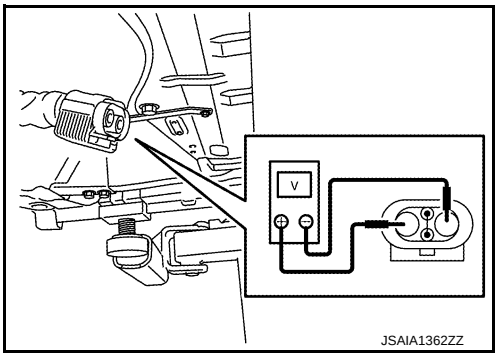
Is the inspection result normal?

YES >> GO TO 2.
NO >> Check harness for short to power.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



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



Standard : 5 V or less

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

>> GO TO 3.

3.CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor high voltage harness connector.
2. Check the short circuit between electric compressor terminals.

Electric compressor		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
18	24	Existed

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation". And then, GO TO 10.
NO >> Replace electric compressor and DC/DC junction box. And then, GO TO 10. Refer to HA-46, "Removal and Installation" (electric compressor), EVC-361, "Removal and Installation" (DC/DC-J/B).

5. CHECK PTC ELEMENTS HEATER

1. Disconnect PTC elements heater high voltage harness connector.
2. Check the short circuit between PTC elements heater terminals.

PTC elements heater		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
30	24	Existed

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation". And then, GO TO 10.
NO >> Replace PTC elements heater and DC/DC junction box. And then, GO TO 10. Refer to HA-68, "Removal and Installation" (PTC elements heater), EVC-361, "Removal and Installation" (DC/DC-J/B).

7. CHECK TRACTION MOTOR INVERTER

1. Disconnect DC/DC junction box high voltage harness connector (H15).
2. Check the short circuit between DC/DC junction box harness connector terminals.

DC/DC-J/B			Resistance
Connector	+	–	
	Terminal		
H15	35	36	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation". And then, GO TO 10.

8. CHECK HIGH VOLTAGE HARNESS

1. Remove DC/DC junction box.
2. Check the short circuit between high voltage harness terminals.

Connected to:	DC/DC-J/B			Resistance
	Connector	+	–	
		Terminal		
Electric compressor	H2	18	19	3 kΩ or more
Li-ion battery	H4	24	25	
PTC elements heater	H9	30	31	

Is the inspection result normal?

YES-1 (with Li-ion battery heater)>>GO TO 9.
YES-2 (without Li-ion battery heater)>>GO TO 10.
NO >> Replace malfunctioning harness. And then, GO TO 10.

9.CHECK LI-ION BATTERY HEATER CIRCUIT

Check the short circuit between Li-ion battery terminals.

Li-ion battery		Resistance
+	–	
Terminal		
23	24	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check Li-ion battery heater system.

10.REPLACE BATTERY JUNCTION BOX

Replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2) EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

>> INSPECTION END

P0AA5 SYSTEM MAIN RELAY -

DTC Logic

INFOID:0000000007633748

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA5	HYBRID BATT NEGATIVE CONTACTOR (System main relay 2 circuit stuck open)	VCM detects a break in the drive circuit of the system main relay or an extremely high resistance for 2.5 seconds or more when the F/S relay is ON with the system main relay OFF.	• Harness or connectors • Battery J/B • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON wait at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-147, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633749

1.CHECK SYSTEM MAIN RLY GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and ground.

+		–	Continuity
Li-ion battery			
Connector	terminal		
B24	13	Ground	Existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK SYSTEM MAIN RLY CIRCUIT

Check continuity between Li-ion battery connector terminals.

Li-ion battery		Continuity
terminals		
13	14	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check the relay circuit of Li-ion battery for malfunction. If no malfunction is found, replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2),

EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

3.CHECK HARNESS

1. Disconnect VCM harness connector.
2. Check the continuity between VCM harness connector and Li-ion battery harness connector.

+		–		Continuity
VCM		Li-ion battery		
Connector	terminal	Connector	terminal	
E63	110	B24	14	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair harness or connector.

P0AA6 HIGH VOLTAGE SYSTEM ISOLATION

Description

INFOID:0000000007633750

Li-ion battery is equipped with the IR (Insulation resistance) sensing system. VCM receives the IR sensor signal sent from Li-ion battery controller and monitors the insulation resistance of the high voltage circuit.

DTC Logic

INFOID:0000000007633751

DTC DETECTION LOGIC

NOTE:

DTC “P0AA6” is not detected when insulation resistance decreases between quick charge relay and quick charge port. In this case, insulation check performed by the quick charger becomes NG, resulting in no implementation of quick charge.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0AA6	HYBRID BATT VOLT SYS ISOLATION (High voltage circuit insulation is low)	VCM detects a insulation resistance calculated based on IR sensor signal sent from Li-ion battery is 380 kΩ or less.	• High voltage harness or connectors • Electric compressor • PTC elements heater • Traction motor • On-board charger • Li-ion battery • DC/DC J/B

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Set the vehicle to READY and wait at least 80 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-150, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Maintain the following conditions for at least 75 seconds.

Power switch	READY
Shift position	P range
A/C set temperature	Full cold

2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-150, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

With CONSULT

1. Maintain the following conditions for at least 75 seconds.

Power switch	READY
Shift position	P range
A/C set temperature	Full hot

2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-150, "Diagnosis Procedure".
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-IV

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Perform normal charging (charge status indicator is ON) at least 50 seconds.
3. Turn power switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-150, "Diagnosis Procedure".
NO-1(with Li-ion battery heater)>>GO TO 6.
NO-2 (without Li-ion battery heater)>>INSPECTION END

6. PERFORM DTC CONFIRMATION PROCEDURE-V

1. Perform component function check of Li-ion battery heater. Refer to EVC-150, "Component Function Check".
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-150, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000007633752

1. PERFORM LI-ION BATTERY HEATER CIRCUIT INSULATION CHECK

With CONSULT

1. Turn power switch ON.
2. On the CONSULT screen, select “HV BAT” >> “ACTIVE TEST” >> “HEATER RELAY UNIT”.
3. Turn ON the heater relay unit and wait at least 35 seconds.
4. Check self-diagnostic result in “EV/HEV”.

Is DTC detected?

YES >> Proceed to EVC-150, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633753

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1. CHECK HIGH VOLTAGE PART

1. Turn power switch OFF.
2. Visually check that there is no damage in each high voltage part.

Is the inspection result normal?

YES >> GO TO 2
NO >> Repair or replace the error-detected part.

2. IDENTIFY THE MODE USED AT THE OCCURRENCE OF MALFUNCTION-I

With CONSULT

1. Turn power switch ON.
2. Check “VCM MODE” of freeze frame data to identify the mode where “P0AA6” is detected.

At which mode is “P0AA6” detected?

Normal charge mode>>GO TO 3.
Other than normal charge mode>>GO TO 9.

3. PERFORM DTC CONFIRMATION PROCEDURE AGAIN (NORMAL CHARGING)

1. Erase DTC.
2. Perform normal charging (charge status indicator is ON) at least 50 seconds.
3. Turn power switch ON.
4. Check DTC.

Is DTC “P0AA6” detected again?

YES >> GO TO 4.
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

4. PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

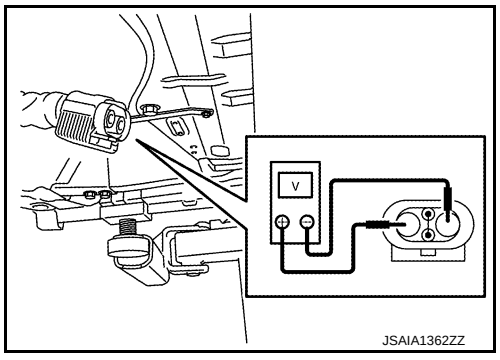
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.

DANGER:

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





Standard : 5 V or less

CAUTION:

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

>> GO TO 5.

5. CHECK INSULATION RESISTANCE OF ON-BOARD CHARGER-I

Check insulation resistance of on-board charger. Refer to VC-95, "Component Insulation Resistance Check".

CAUTION:

- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6. CHECK INSULATION RESISTANCE OF ON-BOARD CHARGER-II

1. Disconnect on-board charger high voltage harness connector (H6).
2. Check insulation resistance of on-board charger. Refer to VC-95, "Component Insulation Resistance Check".

CAUTION:

- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace on-board charger. Refer to VC-105, "Removal and Installation".

7. CHECK INSULATION RESISTANCE OF HIGH VOLTAGE HARNESS-I

1. Disconnect normal charge port high voltage harness connector (H8).
2. Check the insulation resistance of high voltage harness with an insulation resistance tester (Multi tester), between normal charge port and on-board charger.

WARNING:

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

CAUTION:

- **Use 500V range of insulation resistance tester to measure insulation resistance.**
- **Wait for 30 seconds until the value becomes stable.**
- **If the inspection results show no continuity, check the parts for proper installation.**

+		–	Resistance
On-board charger			
Connector	Terminal		
H6	34	Ground	∞ Ω
	35		
	36		

Is the inspection result normal?

YES >> Replace normal charge port. Refer to VC-115, "Removal and Installation".
NO >> Replace high voltage harness.

8. CHECK INSULATION RESISTANCE OF HIGH VOLTAGE HARNESS-II

1. Disconnect DC/DC junction box high voltage harness connector (H7).
2. Check the insulation resistance of high voltage harness with an insulation resistance tester (Multi tester), between DC/DC junction box and on-board charger.

WARNING:

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

CAUTION:

- **Use 500V range of insulation resistance tester to measure insulation resistance.**
- **Wait for 30 seconds until the value becomes stable.**
- **If the inspection results show no continuity, check the parts for proper installation.**

+		–	Resistance
On-board charger			
Connector	Terminal		
H7	27	Ground	∞ Ω
	28		

Is the inspection result normal?

YES >> Replace normal charge port. Refer to VC-115, "Removal and Installation".
NO >> Replace high voltage harness.

9. IDENTIFY THE MODE USED AT THE OCCURRENCE OF MALFUNCTION-II

With CONSULT

1. Maintain the following conditions for at least 75 seconds.

Power switch	READY
Shift position	P range
A/C switch	OFF

2. Check DTC.

Is DTC “P0AA6” detected?

YES >> GO TO 10.
NO >> GO TO 17.

10. IDENTIFY THE MODE USED AT THE OCCURRENCE OF MALFUNCTION-III

With CONSULT

1. Erase DTC.
2. Turn power switch OFF and wait at least 20 seconds.
3. Turn power switch ON and wait at least 35 seconds.
4. Check DTC.

Is DTC “P0AA6” detected again?

YES >> Perform Li-ion battery insulation resistance loss check. Refer to EVB-146, "Component Inspection" (TYPE 1), EVB-359, "Component Inspection" (TYPE 2), EVB-582, "Component Inspection" (TYPE 3) or EVB-811, "Component Inspection" (TYPE 4).
NO-1 (with Li-ion battery heater)>>GO TO 11.
NO-2 (without Li-ion battery heater)>>GO TO 12.

11. IDENTIFY THE MODE USED AT THE OCCURRENCE OF MALFUNCTION-IV

1. Perform component function check of Li-ion battery heater. Refer to EVC-150, "Component Function Check".
2. Check DTC.

Is DTC “P0AA6” detected again?

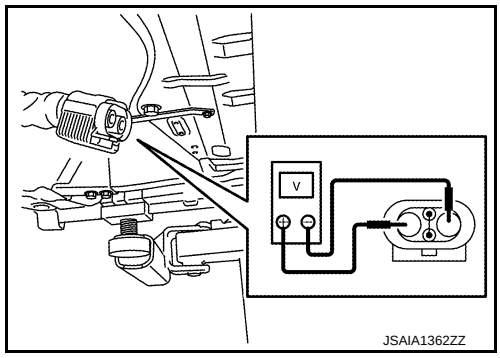
YES >> Check Li-ion battery heater routing circuit. Refer to EVB-369, "Diagnosis Procedure".
NO >> GO TO 12.

12. PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).

2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

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

>> GO TO 13.

13. CHECK INSULATION RESISTANCE OF ELECTRIC COMPRESSOR

Check insulation resistance of electric compressor. Refer to HAC-126, "Component Inspection".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace electric compressor. Refer to HA-46, "Removal and Installation".

14. CHECK INSULATION RESISTANCE OF PTC ELEMENTS HEATER

Check insulation resistance of PTC elements heater. Refer to HAC-128, "Component Inspection".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation".

15. CHECK INSULATION RESISTANCE OF TRACTION MOTOR INVERTER

Check insulation resistance of traction motor inverter. Refer to TMS-112, "Component Inspection".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".

16. CHECK INSULATION RESISTANCE OF HIGH VOLTAGE HARNESS-III

1. Remove traction motor inverter. Refer to TMS-115, "Removal and Installation".
2. Remove DC/DC junction box.
3. Check the insulation resistance of high voltage harness with an insulation resistance tester (Multi tester).

WARNING:

Unlike the ordinary tester, the insulation resistance tester applies 500 V when measuring. If used incorrectly, there is the danger of electric shock. If used in the vehicle 12V system, there is

the danger of damage to electronic devices. Read the insulation resistance tester instruction manual carefully and be sure to work safely.

CAUTION:

- **Use 500V range of insulation resistance tester to measure insulation resistance.**
- **Wait for 30 seconds until the value becomes stable.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Connected to:	+		–	Resistance
	Connector	Terminal		
Li-ion battery	H4	24	Ground	∞ Ω
		25		
Electric compressor	H2	18		
		19		
PTC elements heater	H9	30		
		31		

Is the inspection result normal?

YES >> Replace DC/DC junction box. Refer to EVC-361, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

17. IDENTIFY THE MODE USED AT THE OCCURRENCE OF MALFUNCTION-V

With CONSULT

1. Maintain the following conditions for at least 75 seconds.

Power switch	READY
Shift position	P range
A/C set temperature	Full cold

2. Check DTC.

Is DTC “P0AA6” detected?

YES >> GO TO 18.
NO >> GO TO 20.

18. CHECK REFRIGERANT GAS

Interview the customer and check maintenance records to see if there is the possibility that coolant a gas other than EV specific refrigerant gas is mixed in A/C refrigerant gas.

NOTE:

If A/C refrigerant gas other than EV specific refrigerant gas is used, insulation resistance may decrease.

Is the inspection result normal?

YES >> GO TO 19.
NO >> Change refrigerant gas and compressor oil.

19. PERFORM DTC CONFIRMATION PROCEDURE AGAIN (ELECTRIC COMPRESSOR)

With CONSULT

1. Erase DTC.
2. Turn power switch OFF and wait at least 20 seconds.
3. Maintain the following conditions for at least 75 seconds.

Power switch	READY
Shift position	P range
A/C set temperature	Full cold

4. Check DTC.

Is DTC “P0AA6” detected again?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

20. IDENTIFY THE MODE USED AT THE OCCURRENCE OF MALFUNCTION-VI

With CONSULT

1. Maintain the following conditions for at least 75 seconds.

Power switch	READY
Shift position	P range
A/C set temperature	Full hot

2. Check DTC.

Is DTC “P0AA6” detected?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation".
NO >> GO TO 21.

21. PERFORM TEST DRIVE

1. Continue driving for 35 seconds or more at 11 km/h (7 MPH) or more.
2. Check DTC.

Is DTC "P0AA6" detected?

YES >> GO TO 22.
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

22. CHECK INSULATION RESISTANCE OF TRACTION MOTOR

Check insulation resistance of traction motor. Refer to TMS-110, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace the traction motor. Refer to TMS-123, "Removal and Installation".

P1550, P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000007633754

DTC DETECTION LOGIC

NOTE:
If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BATTERY CURRENT SENSOR (Battery current sensor circuit range/performance)	The output voltage of the battery current sensor remains within the specified range during READY or charging.	• Harness or connectors (Battery current sensor circuit is open or shorted.) • Battery current sensor
P1551	BATTERY CURRENT SENSOR (Battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to VCM.	
P1552	BATTERY CURRENT SENSOR (Battery current sensor circuit high input)	An excessively high voltage from the sensor is sent to VCM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn power switch ON and wait at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-157, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn power switch OFF and wait at least 20 seconds.
2. Maintain the following conditions for at least 60 seconds.

Power switch	READY
Selector lever	P range
Brake pedal	Fully released
Ambient air temperature	10°C (50°F) or more

3. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-157, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633755

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY-I

1. Turn power switch OFF.

2. Disconnect battery current sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between battery current sensor harness connector terminals.

Battery current sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E66	1	3	5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY-II

Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E66	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK VCM GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

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

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	3	E62	43	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and battery current sensor harness connector.

–		+		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	1	E62	41	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

VCM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E62	33	Refrigerant pressure sensor	E49	3
	37	Accelerator pedal position sensor	E101	4

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EVC-105, "VCM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	4	E62	42	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts

8.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EVC-159, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

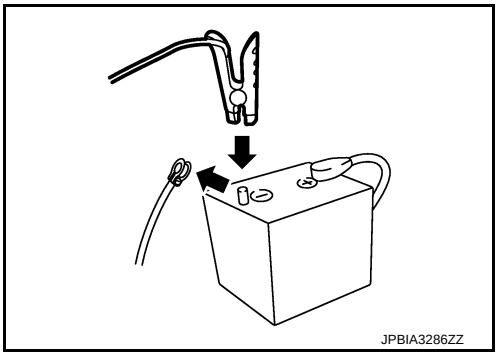
Component Inspection

INFOID:0000000007633756

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.

4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between VCM harness connector terminals.



VCM			Voltage (Approx.)
Connector	+	-	
	Terminal		
E62	42 (Battery current sensor signal)	43	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-96, "How to Handle 12V Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000007633757

DTC DETECTION LOGIC

NOTE:
If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BATTERY CURRENT SENSOR (Battery current sensor performance)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	• Harness or connectors (Battery current sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EVC-161, "Component Function Check".
NOTE:
Use component function check to check the overall function of the battery current sensor circuit. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-161, "Diagnosis Procedure".

Component Function Check

INFOID:0000000007633758

1.PRECONDITIONING

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 12.8 V while power switch ON.**
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

1. Turn power switch ON.
2. Check the voltage between VCM harness connector terminals.

VCM			Voltage
Connector	+	-	
	Terminal	Terminal	
E62	42 (Battery current sensor signal)	43	Above 2.3 V at least once

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-161, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633759

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY-I

1. Turn power switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn power switch ON.

4. Check the voltage between battery current sensor harness connector terminals.

Battery current sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E66	1	3	5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY-II

Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E66	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 5.

3.CHECK VCM GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

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

4.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	3	E62	43	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Turn power switch OFF.

2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and battery current sensor harness connector.

–		+		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	1	E62	41	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

VCM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E62	33	Refrigerant pressure sensor	E49	3
	37	Accelerator pedal position sensor	E101	4

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EVC-105, "VCM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	4	E62	42	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts

8.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EVC-163, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

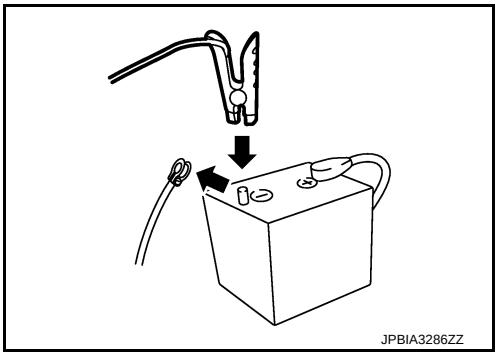
Component Inspection

INFOID:0000000007633760

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.

4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between VCM harness connector terminals.



VCM			Voltage (Approx.)
Connector	+	-	
	Terminal		
E62	42 (Battery current sensor signal)	43	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-96, "How to Handle 12V Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:0000000007633761

DTC DETECTION LOGIC

NOTE:
If DTC P1556 or P1557 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1556	BATTERY TEMPERATURE SENSOR (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.	• Harness or connectors [Battery current sensor (Battery temperature sensor) circuit is shorted.] • Battery current sensor (Battery temperature sensor)
P1557	BATTERY TEMPERATURE SENSOR (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn power switch ON at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-165, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633762

1.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E66	2	Ground	5 V

Is the inspection result normal?

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

2.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	2	E62	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EVC-105, "VCM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	3	E62	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK BATTERY TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EVC-166, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

Component Inspection

INFOID:0000000007633763

1.CHECK BATTERY TEMPERATURE SENSOR

1. Turn power switch OFF.
2. Disconnect battery current sensor harness connector.
3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		Condition	Resistance
+	–		
Terminal			
2	3	Temperature: 25°C (77°F)	1.9 – 2.1 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

P155A BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:0000000007633764

DTC DETECTION LOGIC

NOTE:
If DTC P155A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P155A	BATTERY TEMPERATURE SENSOR (Battery temperature sensor circuit range/performance)	A ambient temperature of 12V battery remains 50°C (122°F) or more for 10 seconds or more.	• Harness or connectors [Battery current sensor (Battery temperature sensor) circuit is shorted.] • Battery current sensor (Battery temperature sensor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Drive the vehicle under the following conditions.

Coolant temperature	20°C (68°F)
Vehicle speed	20 km/h (13 MPH) or more

2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-167, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633765

1.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
E66	2	Ground	5 V

Is the inspection result normal?

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

2.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	2	E62	50	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit. Refer to EVC-105, "VCM : Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between battery current sensor harness connector and VCM harness connector.

+		–		Continuity
Battery current sensor		VCM		
Connector	Terminal	Connector	Terminal	
E66	3	E62	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK BATTERY TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EVC-168, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

Component Inspection

INFOID:0000000007633766

1.CHECK BATTERY TEMPERATURE SENSOR

1. Turn power switch OFF.
2. Disconnect battery current sensor harness connector.
3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		Condition	Resistance
+	–		
Terminal			
2	3	Temperature: 25°C (77°F)	1.9 – 2.1 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery current sensor. Refer to PG-103, "Removal and Installation".

P1564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000007633767

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SWITCH (ASCD steering switch)	• An excessively high voltage signal from the ASCD steering switch is sent to VCM. • VCM detects that input signal from the ASCD steering switch is out of the specified range. • VCM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (The switch circuit is open or shorted.) • ASCD steering switch • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power ON and wait at least 10 seconds.
2. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-169, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633768

1.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

1. Turn power switch ON.
2. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “ASCD CANCEL SW”, “RESUME/ACC SW”, and “ASCD SET SW”.
3. Check each item indication under the following conditions.

Monitor item	Condition		Indication
ASCD CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF
RESUME/ACC SW	RESUME/ACCELERATE switch	Pressed	ON
		Released	OFF
ASCD SET SW	SET/COAST switch	Pressed	ON
		Released	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Disconnect combination switch harness connector.
4. Check the continuity between combination switch and VCM harness connector.

+		–		Continuity
Combination switch		VCM		
Connector	Terminal	Connector	Terminal	
M302	16	E63	108	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

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

3.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between combination switch and VCM harness connector.

+		–		Continuity
Combination switch		VCM		
Connector	Terminal	Connector	Terminal	
M302	13	E63	104	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

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

4.CHECK ASCD STEERING SWITCH

Refer to EVC-170, "Component Inspection (ASCD STEERING SWITCH)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to SR-19, "Exploded View".

Component Inspection (ASCD STEERING SWITCH)

INFOID:0000000007633769

1.CHECK ASCD STEERING SWITCH

1. Turn power switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch (spiral cable) harness connector terminals under the following conditions.

Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M302	13 and 16	ASCD main switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to SR-19, "Exploded View".

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000007633770

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1572	ASCD BRAKE SWITCH (ASCD brake switch)	A	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to the VCM at the same time.	• Harness or connectors (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • VCM
		B	ASCD brake switch signal is not sent to VCM for extremely long time while the vehicle is being driven.	

DTC CONFIRMATION PROCEDURE

NOTE:

The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition that causes malfunction B can be detected.

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON (VDC switch OFF).
2. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “VEHICLE SPEED” and “GEAR POSITION”.
3. Press ASCD MAIN switch and check that CRUISE lamp illuminates.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
   CAUTION:
   Always drive vehicle at a safe speed.

VEHICLE SPEED	More than 30 km/h (19 MPH)
GEAR POSITION	D or R

5. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-172, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Drive the vehicle for at least 5 consecutive seconds under the following conditions.
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VEHICLE SPEED	More than 30 km/h (19 MPH)
GEAR POSITION	D or R
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-172, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633771

1.CHECK OVERALL FUNCTION-I

With CONSULT

1. Turn power switch ON.
2. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “ASCD BRAKE SW”.
3. Check “ASCD BRAKE SW” indication under the following conditions.

Monitor item	Condition		Indication
ASCD BRAKE SW	Brake pedal	Slightly de-pressed	OFF
		Fully released	ON

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn power switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.

+		–	Voltage
ASCD brake switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Pull out #3 fuse.
3. Check the continuity between ASCD brake switch harness connector and fuse terminal.

+		–	Continuity
ASCD brake switch			
Connector	Terminal		
E112	1	#3 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check power supply circuit for power ON power supply.
NO >> Repair or replace error-detected parts.

4. CHECK ASCD BRAKE SWITCH SIGNAL

1. Turn power switch OFF.
2. Reconnect ASCD brake switch harness connector.
3. Disconnect VCM harness connector.
4. Turn power switch ON.
   NOTE:
   Brake pedal is fully released.
5. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	15	Ground	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 5.

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch harness connector and VCM harness connector.

+		–		Continuity
ASCD brake switch		VCM		
Connector	Terminal	Connector	Terminal	
E112	2	E61	15	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK ASCD BRAKE SWITCH

Refer to EVC-175, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace ASCD brake switch. Refer to BR-248, "Exploded View".

7. CHECK OVERALL FUNCTION-II

With CONSULT
Select “STOP LAMP SW” and check indication under the following conditions.

Monitor item	Condition		Indication
STOP LAMP SW	Brake pedal	Slightly de-pressed	ON
		Fully released	OFF

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 8.

8. CHECK STOP LAMP SWITCH POWER SUPPLY

1. Turn power switch OFF.

2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E102	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Pull out #38 fuse.
2. Check the continuity between stop lamp switch harness connector and fuse terminal.

+		–	Continuity
Stop lamp switch			
Connector	Terminal		
E102	1	#38 fuse terminal	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check power supply circuit for battery power supply.
NO >> Repair or replace error-detected parts.

10. CHECK STOP LAMP SWITCH SIGNAL

1. Turn power switch OFF.
2. Reconnect stop lamp switch harness connector.
3. Disconnect VCM harness connector.
4. Depress the brake pedal.
5. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	18	Ground	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 11.

11. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Check the continuity between stop lamp switch harness connector and VCM harness connector.

+		–		Continuity
Stop lamp switch		VCM		
Connector	Terminal	Connector	Terminal	
E112	2	E61	18	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12.CHECK STOP LAMP SWITCH

Refer to EVC-175, "Component Inspection (Stop Lamp Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-248, "Exploded View".

Component Inspection (ASCD Brake Switch)

INFOID:0000000007633772

1.CHECK ASCD BRAKE SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-249, "Inspection and Adjustment".
2. Check the continuity between ASCD brake switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Existed
		Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD brake switch. Refer to BR-248, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000007633773

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-249, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-248, "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000007633774

The VCM receives two vehicle speed sensor signals via CAN communication. One is sent from the electrically-driven intelligent brake unit, and the other is from the traction motor inverter (motor speed signal). The VCM uses these signals for ASCD control. Refer to EVC-50, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000007633775

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VEHICLE SPEED SENSOR (ASCD vehicle speed sensor)	The difference between the two vehicle speed signals is out of the specified range.	• Electrically-driven intelligent brake unit • Traction motor • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY.
2. Push the VDC OFF switch to stop the VDC control.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
4. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-177, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633776

1.CHECK DTC IN TRACTION MOTOR INVERTER

Check DTC in traction motor inverter.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check the DTC. Refer to TMS-36, "DTC Index".

2.CHECK DTC IN ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

Check DTC in electrically-driven intelligent brake unit.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check the DTC. Refer to BR-27, "DTC Index".

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".

NO >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000007633777

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SWITCH (Brake switch)	Stop lamp signal is not sent to VCM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:
Since this DTC is difficult to be confirmed, check component function to judge the normality.

>> Proceed to EVC-179, "Component Function Check".

Component Function Check

INFOID:0000000007633778

1.CHECK BRAKE SWITCH FUNCTION

With CONSULT
1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “STOP LAMP SW”.
2. Check “STOP LAMP SW” indication under the following conditions.

Monitor item	Condition		Indication
STOP LAMP SW	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-179, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633779

1.CHECK STOP LAMP SWITCH OPERATION

1. Turn power switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E102	1	Ground	Battery voltage

3. Also check harness for short to ground.

Is the inspection result normal?

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

3.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Pull out #38 fuse.
2. Check that the fuse is not fusing.
3. Check the continuity between stop lamp switch harness connector and fuse terminal.

+		–	Continuity
Stop lamp switch			
Connector	Terminal		
E102	1	#38 fuse terminal	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check power supply circuit for 12V battery power supply.
NO >> Repair or replace error-detected parts.

4.CHECK STOP LAMP SWITCH

Check stop lamp switch. Refer to EVC-180, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace stop lamp switch. Refer to BR-248, "Exploded View".

5.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Disconnect VCM harness connector.
3. Check the continuity between stop lamp switch harness connector and VCM harness connector.

+		–		Continuity
Stop lamp switch		VCM		
Connector	Terminal	Connector	Terminal	
E102	2	E61	18	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection (Stop Lamp Switch)

INFOID:0000000007633780

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-249, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-248, "Exploded View".

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000007633781

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2122	APP SENSOR D (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the accelerator pedal position sensor 1 is sent to VCM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor 1
P2123	APP SENSOR D (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the accelerator pedal position sensor 1 is sent to VCM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn power switch ON and wait at least 1 second.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-182, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633782

1.CHECK APP SENSOR 1 POWER SUPPLY-I

1. Turn power switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between APP sensor harness connector terminals.

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E101	4	2	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY-II

Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between APP sensor harness connector and VCM harness connector.

+		–		Continuity
APP sensor		VCM		
Connector	Terminal	Connector	Terminal	
E101	4	E62	37	Existed

4. Also check harness for short to ground and snort to power.

Is the inspection result normal?

YES >> Check power supply circuit for SSOFF relay routing circuit. Refer to EVC-332, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between APP sensor harness connector and VCM harness connector.

+		–		Continuity
APP sensor		VCM		
Connector	Terminal	Connector	Terminal	
E101	2	E62	39	Existed

4. Also check harness for snort to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between APP sensor harness connector and VCM harness connector.

+		–		Continuity
APP sensor		VCM		
Connector	Terminal	Connector	Terminal	
E101	3	E62	38	Existed

4. Also check harness for short to ground and snort to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK APP SENSOR

Refer to EVC-184, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace Accelerator pedal. Refer to ACC-4, "Removal and Installation".

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000007633783

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

1. Turn power switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn power switch ON.
4. Check the voltage VCM harness connector terminals under the following conditions.

VCM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E62	38 (APP sensor 1)	141	Accelerator pedal	Fully released	0.6 - 0.9
				Fully depressed	3.9 - 4.7
	46 (APP sensor 2)			Fully released	0.3 - 0.6
				Fully depressed	1.95 - 2.4

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-4, "Removal and Installation".

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000007633784

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2127	APP SENSOR E (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to VCM.	• Harness or connectors (Accelerator pedal position sensor 2 circuit is shorted.) • Accelerator pedal position sensor 2
P2128	APP SENSOR E (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to VCM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch ON and wait at least 1 second.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-185, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633785

1.CHECK APP SENSOR 2 POWER SUPPLY-I

1. Turn power switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between APP sensor harness connector terminals.

APP sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
E101	5	1	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK APP SENSOR 2 POWER SUPPLY-II

Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	5	Ground	5 V

Is the inspection result normal?

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

3. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between APP sensor harness connector and VCM harness connector.

+		–		Continuity
APP sensor		VCM		
Connector	Terminal	Connector	Terminal	
E101	5	E62	45	Existed

4. Also check harness for short to ground and snort to power.

Is the inspection result normal?

YES >> Check power supply circuit for SSOFF relay routing circuit. Refer to EVC-332, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK APP SENSOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between APP sensor harness connector and VCM harness connector.

+		–		Continuity
APP sensor		VCM		
Connector	Terminal	Connector	Terminal	
E101	1	E62	47	Existed

4. Also check harness for snort to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6. CHECK APP SENSOR SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between APP sensor harness connector and VCM harness connector.

+		–		Continuity
APP sensor		VCM		
Connector	Terminal	Connector	Terminal	
E101	6	E62	46	Existed

4. Also check harness for short to ground and snort to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK APP SENSOR

Refer to EVC-187, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace Accelerator pedal. Refer to ACC-4, "Removal and Installation".

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000007633786

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

1. Turn power switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn power switch ON.
4. Check the voltage VCM harness connector terminals under the following conditions.

VCM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E62	38 (APP sensor 1)	141	Accelerator pedal	Fully released	0.6 - 0.9
				Fully depressed	3.9 - 4.7
	46 (APP sensor 2)			Fully released	0.3 - 0.6
				Fully depressed	1.95 - 2.4

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-4, "Removal and Installation".

P2138 APP SENSOR

DTC Logic

INFOID:0000000007633787

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal position sensor circuit range/performance)	VCM detects abnormal signal of APP sensor 1 and APP sensor 2 at a time.	• Harness or connectors (APP sensor 1 or 2 circuit is open or shorted.) • APP sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch ON and wait at least 1 second.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-188, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633788

1.CHECK VCM GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR SIGNAL CIRCUIT

1. Disconnect APP sensor harness connector.
2. Check the continuity between APP sensor harness connector terminals.

APP sensor			Continuity
Connector	+	–	
	Terminal		
E101	3	6	Not existed

3. Also check harness for short to ground and snort to power.

Is the inspection result normal?

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

3.CHECK APP SENSOR

Refer to EVC-189, "Component Inspection (Accelerator Pedal Position Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace Accelerator pedal. Refer to ACC-4, "Removal and Installation".

Component Inspection (Accelerator Pedal Position Sensor)

INFOID:0000000007633789

1.CHECK ACCELERATOR PEDAL POSITION (APP) SENSOR

1. Turn power switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn power switch ON.
4. Check the voltage VCM harness connector terminals under the following conditions.

VCM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E62	38 (APP sensor 1)	141	Accelerator pedal	Fully released	0.6 - 0.9
				Fully depressed	3.9 - 4.7
	46 (APP sensor 2)			Fully released	0.3 - 0.6
				Fully depressed	1.95 - 2.4

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal. Refer to ACC-4, "Removal and Installation".

P3100 EV SYSTEM CAN COMMUNICATION

Description

INFOID:0000000007633790

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 error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000007633791

DTC DETECTION LOGIC

NOTE:
If DTC P3100 is displayed with DTC P3191 or P3193, perform diagnosis for DTC P3191 or P3193.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3100	COMMUNICATION ERROR (EV system CAN communication error)	VCM cannot receive EV system CAN communication signal from LBC and traction motor inverter for 5 seconds or more when VCM starts-up.	• Harness or connectors • LBC • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Turn power switch ON and wait at least 20 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-190, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 20 seconds.
4. Turn power switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-190, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633792

1.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT
1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-190, "DTC Logic".

Is DTC“ P3100” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3101 VCM

DTC Logic

INFOID:0000000007633793

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3101	VCM [Engine control module (Processor)]	VCM calculation function is malfunctioning.	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch ON wait at least 10 seconds.
2. Set the vehicle to READY.
3. Shift selector lever to the entire position from “P” to “D”.
4. Turn power switch OFF and wait at least 20 seconds.
5. Turn power switch ON wait at least 10 seconds.
6. Turn power switch OFF and wait at least 20 seconds.
7. Turn power switch ON.
8. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-192, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633794

1.PERFORM CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-192, "DTC Logic".
3. Check self-diagnostic result.

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3102 LI-ION BATTERY

Description

INFOID:0000000007633795

Li-ion Battery ID Registration must be performed if the Li-ion battery controller or VCM is replaced.

DTC Logic

INFOID:0000000007633796

DTC DETECTION LOGIC

CAUTION:

This DTC may be detected when the Li-ion battery is replaced. If this DTC is detected, check that the Li-ion battery is replaced by using the correct parts and method.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3102	INVALID BATTERY	Detects invalid Li-ion battery ID.	• Improper replacement of Li-ion battery or Li-ion battery controller. • Li-ion battery • Li-ion battery controller

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON and wait at least 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-193, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633797

1.CHECK SELF-DIAGNOSTIC RESULT OF LI-ION BATTERY CONTROLLER

With CONSULT

1. Turn power switch ON.
2. Check self-diagnostic result of the “HV BAT”.

Is any DTC detected?

YES >> Check the DTC. Refer to EVB-50, "DTC Index" (TYPE 1), EVB-258, "DTC Index" (TYPE 2), EVB-481, "DTC Index" (TYPE 3) or EVB-705, "DTC Index" (TYPE 4).
NO >> GO TO 2.

2.LI-ION BATTERY VISUALLY CHECK

CAUTION:

This DTC may be detected when the Li-ion battery is replaced. If this DTC is detected, check that the Li-ion battery is replaced by using the correct parts and method.

Visually check Li-ion battery for malfunction.

Is the inspection result normal?

YES >> Perform Li-ion Battery ID Registration. Refer to “Li-ion Battery Registration Operation Manual”.

NO >> Replace Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1) or EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).

P3117 A/C SYSTEM

Description

INFOID:0000000007747860

This DTC shows a decrease in insulation resistance of the high voltage circuit.
When detecting a decrease in insulation resistance of the high voltage circuit during use of air-conditioner, VCM turns ON/OFF the electric compressor and the PTC elements heater to check changes in insulation resistance and identifies a decrease in insulation resistance of the air-conditioning system.

DTC Logic

INFOID:0000000007747861

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3117	A/C SYSTEM	When VCM detects a decrease in insulation resistance of A/C system.	• Electric compressor • A/C refrigerant gas • PTC elements heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Set the vehicle as the following condition and wait at least 30 minutes.

Power switch	READY
Vehicle speed	0 km/h (0 MPH)
A/C switch	ON
A/C set temperature	Full cold

2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-196, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Set the vehicle as the following condition and wait at least 30 minutes.

Power switch	READY
Vehicle speed	0 km/h (0 MPH)
A/C switch	ON
A/C set temperature	Full hot

2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-196, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007747862

1. CHECK A/C REFRIGERANT GAS

Interview the customer and check maintenance records to see if there is possibility that a refrigerant gas other than EV specific refrigerant gas is mixed in A/C refrigerant gas.

NOTE:

If A/C refrigerant gas other than EV specific refrigerant gas is used, insulation resistance may decrease.

Is the inspection result normal?

YES-1 (DTC P3117 is detected during Step 1 of DTC CONFIRMATION PROCEDURE)>>Replace electric compressor. Refer to HA-46, "Removal and Installation".

YES-2 (DTC P3117 is detected during Step 1 of DTC CONFIRMATION PROCEDURE)>>Replace PTC elements heater. Refer to HA-68, "Removal and Installation".

NO >> Change A/C refrigerant gas and compressor oil.

P311C HIGH VOLTAGE CIRCUIT

DTC Logic

INFOID:0000000007633798

DTC DETECTION LOGIC

NOTE:
If DTC P311C is displayed with DTC P0AA2, P0AA5, P31D4, P31DB, P31DC, or P31DD, perform diagnosis for DTC P0AA2, P0AA5, P31D4, P31DB, P31DC, or P31DD.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P311C	HIGH VOLTAGE SYSTEM (High voltage system malfunction)	Remains all of following condition for 0.2 seconds. • Li-ion battery current: 5.5 A or more • Input voltage to traction motor inverter: 24 V or less • Pre-charge impossible	• High voltage circuit • Li-ion battery J/B
		Remains all of following condition for 0.5 seconds. • Li-ion battery current: less than 5.5 A • Input voltage to traction motor inverter: 24 V or less • Pre-charge impossible	
		Remains all of following condition for 0.5 seconds. • Difference between Li-ion battery voltage and input voltage to traction motor inverter 100 V or more. • Pre-charge impossible	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

CAUTION:
Since this DTC may be displayed if a malfunction is detected in other systems, check them for malfunction before performing this diagnosis.
- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EVC-197, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633799

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**

- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1. CHECK SELF-DIAGNOSTIC RESULT IN TRACTION MOTOR INVERTER

With CONSULT

Check self-diagnostic result in “MOTOR”.

Are any DTC detected?

YES >> Check the DTC. Refer to TMS-36, "DTC Index".
NO >> GO TO 2.

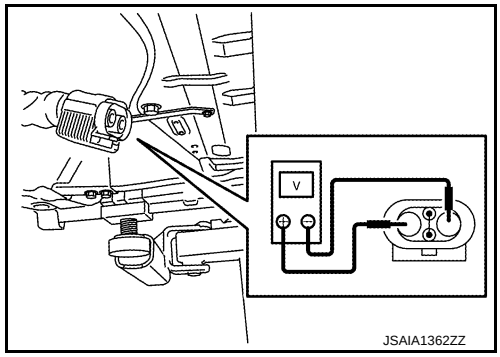
2. PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

CAUTION:

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

>> GO TO 3.

3. CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor high voltage harness connector.
2. Check the short circuit between electric compressor terminals.

Electric compressor		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
18	24	Existed

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation". And then, GO TO 10.
NO >> Replace electric compressor and DC/DC junction box. And then, GO TO 10. Refer to HA-46, "Removal and Installation" (electric compressor), EVC-361, "Removal and Installation" (DC/DC-J/B).

5.CHECK PTC ELEMENTS HEATER

1. Disconnect PTC elements heater high voltage harness connector.
2. Check the short circuit between PTC elements heater terminals.

PTC elements heater		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
30	24	Existed

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation". And then, GO TO 10.
NO >> Replace PTC elements heater and DC/DC junction box. And then, GO TO 10. Refer to HA-68, "Removal and Installation" (PTC elements heater), EVC-361, "Removal and Installation" (DC/DC-J/B).

7.CHECK TRACTION MOTOR INVERTER

1. Disconnect DC/DC junction box high voltage harness connector (H15).
2. Check the short circuit between DC/DC junction box harness connector terminals.

DC/DC-J/B			Resistance
Connector	+	–	
	Terminal		
H15	35	36	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation". And then, GO TO 10.

8.CHECK HIGH VOLTAGE HARNESS

1. Remove DC/DC junction box.
2. Check the short circuit between high voltage harness terminals.

Connected to:	DC/DC-J/B			Resistance
	Connector	+	–	
		Terminal		
Electric compressor	H2	18	19	3 kΩ or more
Li-ion battery	H4	24	25	
PTC elements heater	H9	30	31	

Is the inspection result normal?

YES-1 (with Li-ion battery heater)>>GO TO 9.
YES-2 (without Li-ion battery heater)>>GO TO 10.
NO >> Replace malfunctioning harness. And then, GO TO 10.

9.CHECK LI-ION BATTERY HEATER CIRCUIT

Check the short circuit between Li-ion battery terminals.

Li-ion battery		Resistance
+	–	
Terminal		
23	24	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check Li-ion battery heater system.

10.CHECK SERVICE PLUG FUSE

1. Turn power switch OFF.
2. Disconnect service plug.
3. Check service plug fuse fusing.

Is the fuse is fusing?

YES >> Replace service plug. And then, GO TO 11.
NO >> GO TO 11.

11.REPLACE LI-ION BATTERY JUNCTION BOX

Replace Li-ion battery junction box. Refer to EVB-168, "Exploded view" (without Li-ion battery heater), EVB-384, "Exploded view" (with Li-ion battery heater).

>> INSPECTION END

P312A EV SYSTEM CAN COMMUNICATION

Description

INFOID:0000000007633800

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 error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

DTC Logic

INFOID:0000000007633801

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P312A	COMMUNICATION ERROR (EV system CAN communication error)	CAN communication of the EV system CAN connecting unit does not stop for 25.5 seconds or more immediately before the VCM self-shutoff.	• Harness or connectors • LBC • Traction motor inverter • On board charger • Electric shift control module • A/C auto amp. • TCU • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON and wait at least 20 seconds.
2. Turn power switch OFF and wait at least 1 minutes.
3. Turn power switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-202, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 10 seconds.
4. Disconnect EVSE and wait at least 1 minutes.
5. Turn power switch ON.
6. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-202, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633802

1.CHECK VCM POWER SUPPLY CIRCUIT

1. Turn power switch ON.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E15	57	Ground	12V battery voltage

Is the inspection result normal?

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

2.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #55 fuse.
3. Check the fuse is not fusing.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK VCM POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Turn power switch ON.
4. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	21	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK VCM POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between VCM harness connector and IPDM E/R harness connector.

+		–		Continuity
IPDM E/R		VCM		
Connector	Terminal	Connector	Terminal	
E15	21	E61	21	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK TRACTION MOTOR INVERTER POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.

2. Reconnect VCM harness connector.
3. Disconnect traction motor inverter harness connector (F13).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P312A” detected?

YES >> GO TO 6.
NO >> Check traction motor inverter power supply (POWER ON) circuit for short to power.

6. CHECK LBC POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect traction motor inverter harness connector harness connector.
3. Disconnect LBC harness connector (B24).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is “P312A” detected?

YES >> GO TO 7.
NO >> Check LBC power supply (POWER ON) circuit for short to power.

7. CHECK ON BOARD CHARGER POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect LBC harness connector.
3. Disconnect on-board charger harness connector (B26).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P312A” detected?

YES >> GO TO 8.
NO >> Check on board charger power supply (POWER ON) circuit for short to power.

8. CHECK A/C AUTO AMP. POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect on-board charger harness connector.
3. Disconnect A/C auto amp. harness connector (M50).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P312A” detected?

YES >> GO TO 9.
NO >> Check A/C auto amp. power supply (POWER ON) circuit for short to power.

9. CHECK TCU POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect A/C auto amp. harness connector.
3. Disconnect TCU harness connector (M2).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P312A” detected?

YES >> GO TO 10.
NO >> Check TCU power supply (POWER ON) circuit for short to power.

10. CHECK ELECTRIC SHIFT CONTROL MODULE POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect TCU harness connector.
3. Disconnect electric shift control module harness connector (M59).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P312A” detected?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Check electric shift control module power supply (POWER ON) circuit for short to power.

P312B EV SYSTEM RESTART ERROR

DTC Logic

INFOID:0000000007633803

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P312B	RESTART ERROR	The traction motor inverter and the on-board charger cannot be activated for 30 seconds or more at a restart before the completion of VCM self shut off.	• Harness or connectors • Traction motor inverter • On board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Turn OFF the power switch. Between 5 seconds later and within 10 seconds, turn ON the power switch again. Wait at least 1 minute.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-204, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 10 seconds.
4. Disconnect EVSE and wait at least 1 minutes.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-204, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633804

1.PERFORM SELF-DIAGNOSIS OF TRACTION MOTOR INVERTER

With CONSULT

Perform self-diagnosis of traction motor inverter.

Is DTC detected?

YES >> Check the DTC. Refer to TMS-36, "DTC Index".
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS OF ON BOARD CHARGER

Perform self-diagnosis of on board charger.

Is DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-204, "DTC Logic".

Is DTC “P312B” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P312C, P3130 TRACTION MOTOR INVERTER CONDENSER DISCHARGE ERROR

DTC Logic

INFOID:0000000007633805

DTC DETECTION LOGIC

NOTE:
If DTC P312C or P3130 is displayed with DTC P0AA0 or P0AA1, perform diagnosis for DTC P0AA0 or P0AA1.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P312C P3130	INVERTER DISCHARGE ERROR	Traction motor inverter voltage is 54 V or more for 14 seconds during stop of READY or charge	• Battery J/B • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Set the vehicle to READY and perform test drive.
2. Turn power switch OFF and wait at least 20 seconds.
3. Turn power switch ON and wait at least 1 minutes.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-206, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 1 minutes.
4. Disconnect EVSE and wait at least 1 minutes.
5. Turn power switch ON and wait at least 1 minutes.
6. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-206, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633806

1.PERFORM SELF-DIAGNOSIS OF TRACTION MOTOR INVERTER

With CONSULT
Perform self-diagnosis of traction motor inverter.

Is DTC detected?

YES >> Check the DTC. Refer to TMS-36, "DTC Index".
NO >> GO TO 2.

2.PERFORM CONFIRMATION PROCEDURE AGAIN

Perform confirmation procedure again. Refer to EVC-206, "DTC Logic"

Is DTC “P312C” or “P3030” detected?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P312D QUICK CHARGE ERROR

DTC Logic

INFOID:0000000007633807

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P312D	QUICK CHARGE RELAY	Immediately before starting quick charge, the quick charger cannot be ready for 60 seconds.	• Harness or connector • On-board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
2. Connect quick charge connector.
3. Start the quick charging and wait at least 2 minutes.
4. Turn power switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-208, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633808

1.PERFORM SELF-DIAGNOSIS OF ON-BOARD CHARGER

With CONSULT

Perform self-diagnosis of on-board charger.

Is DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-208, "DTC Logic".

Is DTC detected?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P312E READY OFF ERROR

DTC Logic

INFOID:0000000007633809

DTC DETECTION LOGIC

NOTE:
If DTC P312E is displayed with DTC P0A08, P317A, P3191, P31A7, or P319C, perform diagnosis for DTC P0A08, P317A, P3191, P31A7, or P319C.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P312E	READY OFF ERROR	• During the shutdown from READY, battery current remains 5.5 A or more for 25.5 seconds or more. • During the shutdown from READY, traction motor inverter is not ready for discharge for 25.5 seconds or more.	• Harness or connector • LBC • Traction motor inverter • A/C auto amp. • DC/DC-J/B • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Set the vehicle to READY.
2. Operate the automatic air conditioning system (A/C switch ON).
3. Turn power switch OFF as automatic air conditioning system ON condition
4. Wait at least 30 seconds.
5. Turn power switch ON.
6. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-209, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633810

1.PERFORM SELF-DIAGNOSIS OF A/C AUTO AMP.

With CONSULT
Perform self-diagnosis of A/C auto amp.

Is DTC detected?

YES >> Check the DTC. Refer to HAC-40, "DTC Index".
NO >> GO TO 2.

2.PERFORM SELF-DIAGNOSIS OF TRACTION MOTOR INVERTER

With CONSULT
Perform self-diagnosis of traction motor inverter.

Is DTC detected?

YES >> Check the DTC. Refer to TMS-36, "DTC Index".
NO >> GO TO 3.

3.PERFORM SELF-DIAGNOSIS OF LBC

With CONSULT
Perform self-diagnosis of LBC.

Is DTC detected?

YES >> Check the DTC. Refer to EVB-50, "DTC Index" (TYPE 1), EVB-258, "DTC Index" (TYPE 2), EVB-481, "DTC Index" (TYPE 3) or EVB-705, "DTC Index" (TYPE 4).
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT
1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-209, "DTC Logic".

Is DTC “P312E” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P312F CHARGE OFF ERROR

DTC Logic

INFOID:0000000007633811

DTC DETECTION LOGIC

NOTE:
If DTC P312F is displayed with DTC P0A08, P317A, P3191, P3196, P319C, P31A1, P31A7, or P31AE, perform diagnosis for DTC P0A08, P317A, P3191, P3196, P319C, P31A1, P31A7, or P31AE.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P312F	CHARGE OFF ERROR	During the shutdown from charging, 10 seconds pass without satisfying the following conditions: • Battery current is 5.5 A or less • Traction motor inverter is ready for discharge. • Quick charge relay OFF	• Harness or connector • LBC • Traction motor inverter • A/C auto amp. • DC/DC-J/B • On board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
2. Connect EVSE (with AC power input) and wait at least 60 seconds.
3. Disconnect EVSE and wait at lease 30 seconds.
4. Turn power switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-211, "Diagnosis Procedure".
NO-1 (with quick charge port)>>GO TO 3.
NO-2 (without quick charge port)>>INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect quick charge connector.
4. Start quick charging and wait at least 60 seconds.
5. Stop quick charge and wait at lease 30 seconds.
6. Turn power switch ON.
7. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-211, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633812

1.PERFORM SELF-DIAGNOSIS OF A/C AUTO AMP.

With CONSULT
Perform self-diagnosis of A/C auto amp.

Is DTC detected?

YES >> Check the DTC. Refer to HAC-40, "DTC Index".

NO >> GO TO 2.

2. PERFORM SELF-DIAGNOSIS OF ON-BOARD CHARGER

With CONSULT

Perform self-diagnosis of on-board charger.

Is DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 3.

3. PERFORM SELF-DIAGNOSIS OF TRACTION MOTOR INVERTER

With CONSULT

Perform self-diagnosis of traction motor inverter.

Is DTC detected?

YES >> Check the DTC. Refer to TMS-36, "DTC Index".
NO >> GO TO 4.

4. PERFORM SELF-DIAGNOSIS OF LBC

With CONSULT

Perform self-diagnosis of LBC.

Is DTC detected?

YES >> Check the DTC. Refer to EVB-50, "DTC Index" (TYPE 1), EVB-258, "DTC Index" (TYPE 2), EVB-481, "DTC Index" (TYPE 3) or EVB-705, "DTC Index" (TYPE 4).
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-209, "DTC Logic".

Is DTC “P312F” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P3131 SYSTEM SHUTOFF ERROR

DTC Logic

INFOID:0000000007633813

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3131	SYSTEM SHUTOFF TIMEOUT	When before shutdown, all of the following conditions are fulfilled for 31 minutes or more. • VCM does not receive a EV system activation request signal. • Either of EV system CAN connection unit is not shut-down	• Harness or connectors • LBC • Traction motor inverter • On board charger • Electric shift control module • A/C auto amp. • TCU • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON.
2. Turn power switch OFF and wait at least 35 minutes.
   NOTE:
   Proceeding to the next step is allowed without waiting for 35 minutes when checked that the SSOFF relay is OFF.
3. Turn power switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-213, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 10 seconds.
4. Disconnect EVSE and wait at least 35 minutes.
   NOTE:
   Proceeding to the next step is allowed without waiting for 35 minutes when checked that the SSOFF relay is OFF.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-213, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633814

1.CHECK VCM POWER SUPPLY CIRCUIT

1. Turn power switch ON.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E15	57	Ground	12V battery voltage

Is the inspection result normal?

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

2.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #55 fuse.
3. Check the fuse is not fusing.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Replace the fuse after repairing the applicable circuit.

3.CHECK VCM POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Turn power switch ON.
4. Check the voltage between VCM harness connector and ground.

+		–	Voltage
VCM			
Connector	Terminal		
E61	21	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK VCM POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between VCM harness connector and IPDM E/R harness connector.

+		–		Continuity
IPDM E/R		VCM		
Connector	Terminal	Connector	Terminal	
E15	21	E61	21	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK TRACTION MOTOR INVERTER POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect VCM harness connector.
3. Disconnect traction motor inverter harness connector (F13).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P3131” detected?

YES >> GO TO 6.
NO >> Check traction motor inverter power supply (POWER ON) circuit for short to power.

6. CHECK LBC POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect traction motor inverter harness connector harness connector.
3. Disconnect LBC harness connector (B24).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is “P3131” detected?

YES >> GO TO 7.
NO >> Check LBC power supply (POWER ON) circuit for short to power.

7. CHECK ON BOARD CHARGER POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect LBC harness connector.
3. Disconnect on-board charger harness connector (B26).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P3131” detected?

YES >> GO TO 8.
NO >> Check on board charger power supply (POWER ON) circuit for short to power.

8. CHECK A/C AUTO AMP. POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect on-board charger harness connector.
3. Disconnect A/C auto amp. harness connector (M50).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P3131” detected?

YES >> GO TO 9.
NO >> Check A/C auto amp. power supply (POWER ON) circuit for short to power.

9. CHECK TCU POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect A/C auto amp. harness connector.
3. Disconnect TCU harness connector (M2).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P3131” detected?

YES >> GO TO 10.
NO >> Check TCU power supply (POWER ON) circuit for short to power.

10. CHECK ELECTRIC SHIFT CONTROL MODULE POWER SUPPLY (POWER ON) CIRCUIT

1. Turn power switch OFF.
2. Reconnect TCU harness connector.
3. Disconnect electric shift control module harness connector (M59).
4. Perform confirmation procedure. Refer to EVC-201, "DTC Logic".

Is DTC “P3131” detected?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Check electric shift control module power supply (POWER ON) circuit for short to power.

P3137 CAR CRASH DETECTION

DTC Logic

INFOID:0000000008525519

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3137	CAR CLASH	VCM received car crash information signal from air bag diagnosis sensor unit	• Air bag inflated • CAN communication signal • Air bag diagnosis sensor unit • VCM

DTC CONFIRMATION PROCEDURE

1.CHECK AIR BAG MODULE

Check that the air bag modules are not inflating.

Is air bag module inflating?

YES >> Refer to SR-13, "FOR FRONTAL COLLISION : When SRS is activated in a collision".
NO >> GO TO 2.

2.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

Turn power switch ON and wait at least 5 seconds.

Is DTC detected?

YES >> Proceed to EVC-216, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000008525520

1.CHECK THE IMPLEMENTATION OF AIR BAG MODULE REPLACEMENT

Check to see if there is a record of air bag module replacement.

Is there a record of air bag module replacement?

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

2.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-216, "DTC Logic".

Is DTC “P3137” detected again?

YES >> GO TO 3.
NO >> INSPECTION END

3.CHECK CAR CRASH INFORMATION SIGNAL

With CONSULT

On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “CLASH DETECT INFO”.

Is indicated ##?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Replace air bag diagnosis sensor unit. Refer to SR-35, "Removal and Installation".

P3141 ON-BOARD CHARGER

Description

INFOID:0000000008525521

If the situation is not improved under the operation of the Charge Insulation Resistance Loss Protection Control, VCM stops charging and detects DTC P3141. For details of the protection control, refer to EVC-360, "Description".

DTC Logic

INFOID:0000000008525522

DTC DETECTION LOGIC

NOTE:
If DTC P3141 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3141	ON-BOARD CHARGER	The Charge Insulation Resistance Loss Protection Control is repeated more than the specified number of times or active for 255 consecutive seconds or more.	• High voltage harness or connectors • Electric compressor • PTC elements heater • Traction motor • On-board charger • Li-ion battery • DC/DC J/B • On-board charger

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

NOTE:
Since this DTC is difficult to be confirmed, check component function to judge the normality.

>> Proceed to EVC-217, "Component Function Check".

Component Function Check

INFOID:0000000008525523

1.CHECK OPERATIONAL HISTORY OF CHARGE INSULATION RESISTANCE LOSS PROTECTION CONTROL

With CONSULT
1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “PRTCTN CNT OPERAT HIST 1”.
4. Check that “0” is indicated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-217, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000008525524

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**

- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

NOTE:

If DTC P3141 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

1. IDENTIFY ON BOARD CHARGER DIAGNOSIS OCCURRENCE MODE-I

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “IR SENSOR SIGNAL P-P”.

Is the indicated value 3,550 mV or less?

YES >> Perform Li-ion battery insulation resistance loss check. Refer to EVB-146, "Component Inspection" (TYPE 1), EVB-359, "Component Inspection" (TYPE 2), EVB-582, "Component Inspection" (TYPE 3) or EVB-811, "Component Inspection" (TYPE 4).

NO >> GO TO 2.

2. IDENTIFY ON BOARD CHARGER DIAGNOSIS OCCURRENCE MODE-II

1. Turn power switch OFF and wait at least 20 seconds.
2. Perform normal charging (charge status indicator is ON) at least 5 minutes.
   CAUTION:
   - **Never perform normal charge for 6 minutes or more continuously.**
   - **Never turn ON the power switch or air conditioner while performing normal charge.**
3. Turn power switch ON.
4. Check self-diagnostic result in “EV/HEV”.

Is DTC “P3141” detected?

YES >> GO TO 4.

NO >> GO TO 3.

3. REPLACE ON-BOARD CHARGER

1. Replace on-board charger. Refer to VC-105, "Removal and Installation".
2. Turn power switch ON.
3. Erase self-diagnostic result.
4. Turn power switch OFF.
5. Perform normal charge at least 5 minutes.
   CAUTION:
   Never turn ON the power switch or air conditioner while performing normal charge.
6. Check that normal charge operates normally.
7. Stop normal charge.
8. Check self-diagnostic result of VCM and On-board charger.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index" (VCM), VC-27, "DTC Index" (on-board charger).

NO >> INSPECTION END

4. PRECONDITIONING

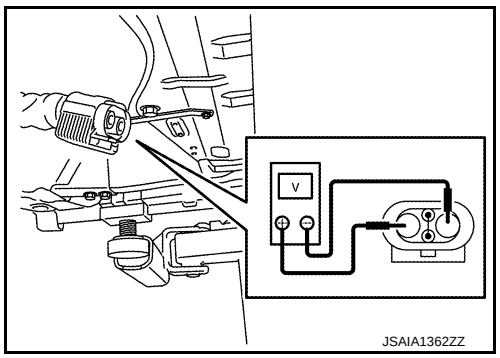
WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).

3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

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

>> GO TO 5.

5. CHECK INSULATION RESISTANCE OF ON-BOARD CHARGER-I

Check insulation resistance of on-board charger. Refer to VC-95, "Component Insulation Resistance Check".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 6.

6. CHECK INSULATION RESISTANCE OF ON-BOARD CHARGER-II

1. Disconnect on-board charger high voltage harness connector (H6).
2. Check insulation resistance of on-board charger. Refer to VC-95, "Component Insulation Resistance Check".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace on-board charger. Refer to VC-105, "Removal and Installation".

7. CHECK INSULATION RESISTANCE OF HIGH VOLTAGE HARNESS-I

1. Disconnect normal charge port high voltage harness connector (H8).
2. Check the insulation resistance of high voltage harness with an insulation resistance tester (Multi tester), between normal charge port and on-board charger.

WARNING:

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

CAUTION:
- **Use 500V range of insulation resistance tester to measure insulation resistance.**
- **Wait for 30 seconds until the value becomes stable.**
- **If the inspection results show no continuity, check the parts for proper installation.**

+		–	Resistance
On-board charger			
Connector	Terminal		
H6	34	Ground	∞ Ω
	35		
	36		

Is the inspection result normal?

YES >> Replace normal charge port. Refer to VC-115, "Removal and Installation".
NO >> Replace high voltage harness.

8.CHECK INSULATION RESISTANCE OF HIGH VOLTAGE HARNESS-II

1. Disconnect DC/DC junction box high voltage harness connector (H7).
2. Check the insulation resistance of high voltage harness with an insulation resistance tester (Multi tester), between DC/DC junction box and on-board charger.

WARNING:

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

CAUTION:

- **Use 500V range of insulation resistance tester to measure insulation resistance.**
- **Wait for 30 seconds until the value becomes stable.**
- **If the inspection results show no continuity, check the parts for proper installation.**

+		–	Resistance
On-board charger			
Connector	Terminal		
H7	27	Ground	∞ Ω
	28		

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace high voltage harness.

9.PRECONDITIONING

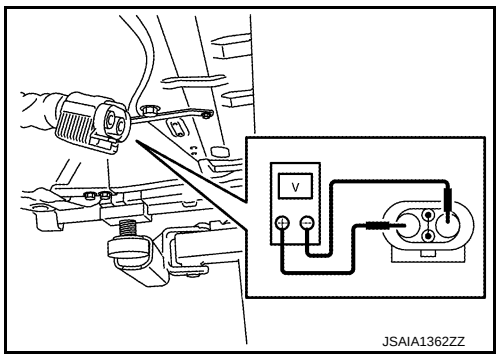
WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).

3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

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

>> GO TO 10.

10. CHECK INSULATION RESISTANCE OF ELECTRIC COMPRESSOR

Check insulation resistance of electric compressor. Refer to HAC-126, "Component Inspection".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace electric compressor. Refer to HA-46, "Removal and Installation".

11. CHECK INSULATION RESISTANCE OF PTC ELEMENTS HEATER

Check insulation resistance of PTC elements heater. Refer to HAC-128, "Component Inspection".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation".

12. CHECK INSULATION RESISTANCE OF TRACTION MOTOR INVERTER

Check insulation resistance of traction motor inverter. Refer to TMS-112, "Component Inspection".

CAUTION:
- **Since testers are polarized, check the polarity of the tester and connect it in the forward direction to the circuit.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".

13. CHECK INSULATION RESISTANCE OF HIGH VOLTAGE HARNESS-III

1. Remove traction motor inverter. Refer to TMS-115, "Removal and Installation".
2. Remove DC/DC junction box.
3. Check the insulation resistance of high voltage harness with an insulation resistance tester (Multi tester).

WARNING:

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

CAUTION:

- **Use 500V range of insulation resistance tester to measure insulation resistance.**
- **Wait for 30 seconds until the value becomes stable.**
- **If the inspection results show no continuity, check the parts for proper installation.**

Connected to:	+		–	Resistance
	Connector	Terminal		
Li-ion battery	H4	24	Ground	∞ Ω
		25		
Electric compressor	H2	18		
		19		
PTC elements heater	H9	30		
		31		

Is the inspection result normal?

YES >> Replace DC/DC junction box. Refer to EVC-361, "Removal and Installation".
NO >> Replace high voltage harness.

P315C CHARGE RELAY

DTC Logic

INFOID:0000000007633817

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P315C	CHARGE RELAY	VCM detected P31C8, P31C9, P31CA or P31CB.	• Harness or connectors • Normal charge relay • Quick charge relay • On-board charger

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
This DTC is detected when DTC P31C8, P31C9, P31CA or P31CB. If this DTC is detected, perform trouble diagnosis for DTC P31C8, P31C9, P31CA or P31CB.

>> Proceed to EVC-223, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633818

Perform diagnosis for P31C8, P31C9, P31CA or P31CB.
- P31C8 or P319C: Refer to EVC-274, "DTC Logic".
- P31CA or P31CB: Refer to EVC-276, "DTC Logic".

P315E ABS/VDC

DTC Logic

INFOID:0000000007633819

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P315E	VDC SYSTEM	VCM detected torque request signal error for 2 seconds	• CAN communication signal • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF and wait at least 60 seconds.
2. Turn power switch OFF and wait at least 10 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-224, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633820

1.PERFORM SELF-DIAGNOSIS OF VCM

Perform self-diagnosis of VCM.

Is DTC detected other than P315E?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.REPLACE ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

1. Replace ABS actuator and electric unit (control unit). Refer to BRC-151, "Removal and Installation".
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EVC-224, "DTC Logic".

Is DTC “P315E” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3160 ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

DTC Logic

INFOID:0000000007805124

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3160	E-DIB SYSTEM	VCM received an error signal sent from the electrically-driven intelligent brake unit.	• Electrically-driven intelligent brake system • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF and wait at least 60 seconds.
2. Turn power switch ON and wait at least 10 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-225, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007805125

1.PERFORM SELF-DIAGNOSIS OF ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

With CONSULT

Check self-diagnostic result in “BRAKE”.

Is DTC detected?

YES >> Perform diagnosis procedure of detected DTC. Refer to BR-27, "DTC Index".
NO >> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Erase all DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-225, "DTC Logic".

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P316A MOTOR SPEED

DTC Logic

INFOID:0000000007633821

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P316A	MOTOR SPEED	VCM received motor speed invalid value from traction motor inverter	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Set the vehicle to READY and wait at least 60 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-226, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Perform test drive.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-226, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633822

1.PERFORM SELF-DIAGNOSIS OF TRACTION MOTOR INVERTER

With CONSULT

Perform self-diagnosis of traction motor.

>> Perform diagnosis procedure of detected DTC. Refer to TMS-36, "DTC Index".

P316F ON-BOARD CHARGER

DTC Logic

INFOID:0000000007633823

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P316F	ON BOARD CHARGER SYSTEM	The charge electricity of the on-board charger is less than 0.1KW	• Harness or connector • On-board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Perform normal charging and wait at least 10 minutes.
2. Turn power switch ON.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-227, "Diagnosis Procedure".
NO (Without quick charge port)>>INSPECTION END
NO (With quick charge port)>>GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn power switch OFF.
2. Perform quick charging and wait at least 10 minutes.
3. Turn power switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-227, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633824

1.CHECK ON-BOARD CHARGER OUTPUT POWER-I

With CONSULT

1. Turn power switch OFF.
2. Perform normal charging.
3. Turn power switch ON.
4. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “OBC OUT PWR”.

Is value 0kW?

YES >> GO TO 3.
NO-1 (with quick charge port)>>GO TO 2.
NO-2 (without quick charge port)>>Replace VCM. Refer to EVC-369, "Removal and Installation".

2.CHECK ON-BOARD CHARGER OUTPUT POWER-I

With CONSULT

1. Turn power switch OFF.
2. Perform quick charging.
3. Turn power switch ON.
4. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “OBC OUT PWR”.

Is value 0kW?

YES >> INSPECTION END (quick charger malfunction)
NO >> Replace VCM. Refer to EVC-369, "Removal and Installation".

3. PERFORM SELF-DIAGNOSIS OF ON-BOARD CHARGER

Perform self-diagnosis of on-board charger.

Is any DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> Check to see if there is a factor causing a situation that battery charge does not start. Refer to EVC-347, "Symptom Index".

P3172, P3173 ON-BOARD CHARGER

DTC Logic

INFOID:0000000007633825

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3172 P3173	ON BOARD CHARGER SYSTEM	VCM detects an error signal that is received from on-board charger via CAN communication.	On-board charger

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
This DTC is detected when on-board charger detects DTC. If this DTC detected, perform trouble diagnosis for a DTC that detected by on-board charger.

>> Proceed to EVC-229, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633826

Perform the self-diagnosis of on-board charger.

P3175 VCM

DTC Logic

INFOID:0000000007633827

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3175	VCM	VCM detects a CAN error signal that is received from electric shift control module via CAN communication for 0.1 seconds or more.	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-230, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633828

1.REPLACE VCM

1. Replace the VCM. Refer to EVC-369, "Removal and Installation".
2. Turn power switch ON.
3. Erase DTC.
4. Perform confirmation procedure. Refer to EVC-230, "DTC Logic".

Is DTC detected?

YES >> Replace the electric shift control module. Refer to TM-130, "Removal and Installation".
NO >> INSPECTION END

P3176 TRACTION MOTOR INVERTER CONDENSER

DTC Logic

INFOID:0000000007633829

DTC DETECTION LOGIC

NOTE:
If DTC P3176 is displayed with DTC P0A94, P0A08, P311C, P317A, P3191, P319C, P31A7, P31D4, P31D7, or P31DD, perform diagnosis for DTC P0A94, P0A08, P311C, P317A, P3191, P319C, P31A7, P31D4, P31D7, or P31DD.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3176	INVERTER CONDENSER	Immediately before READY or the start of charge, pre-charging cannot be performed for 5 seconds or more.	• Harness or connectors • Li-ion battery J/B • LBC • DC/DC-J/B • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Set the vehicle to READY and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-231, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 10 seconds.
4. Turn power switch ON.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-231, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633830

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**

- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1. PERFORM SELF-DIAGNOSIS OF VCM

Perform self-diagnosis of VCM.

Is DTC detected other than P3176?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

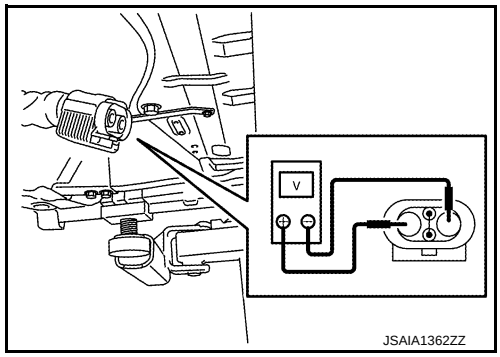
2. PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

CAUTION:

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

>> GO TO 3.

3. CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor high voltage harness connector.
2. Check the short circuit between electric compressor terminals.

Electric compressor		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".

2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
18	24	Existed

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation".
NO >> Replace electric compressor and DC/DC junction box. Refer to HA-46, "Removal and Installation" (electric compressor), EVC-361, "Removal and Installation" (DC/DC-J/B).

5. CHECK PTC ELEMENTS HEATER

1. Disconnect PTC elements heater high voltage harness connector.
2. Check the short circuit between PTC elements heater terminals.

PTC elements heater		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
30	24	Existed

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation".
NO >> Replace PTC elements heater and DC/DC junction box. Refer to HA-68, "Removal and Installation" (PTC elements heater), EVC-361, "Removal and Installation" (DC/DC-J/B).

7. CHECK TRACTION MOTOR INVERTER

1. Disconnect DC/DC junction box high voltage harness connector (H15).
2. Check the short circuit between DC/DC junction box harness connector terminals.

DC/DC-J/B			Resistance
Connector	+	–	
	Terminal		
H15	7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".

8. CHECK HIGH VOLTAGE HARNESS

1. Remove DC/DC junction box.
2. Check the short circuit between high voltage harness terminals.

Connected to:	DC/DC-J/B			Resistance
	Connector	+	–	
		Terminal		
Electric compressor	H2	18	19	3 kΩ or more
Li-ion battery	H4	24	25	
PTC elements heater	H9	30	31	

Is the inspection result normal?

YES-1 (with Li-ion battery heater)>>GO TO 9.
YES-2 (without Li-ion battery heater)>>Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Replace malfunctioning harness.

9.CHECK LI-ION BATTERY HEATER CIRCUIT

Check the short circuit between Li-ion battery terminals.

Li-ion battery		Resistance
+	–	
Terminal		
23	24	3 kΩ or more

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check Li-ion battery heater system.

P3177 ECU ACTIVATION ERROR

DTC Logic

INFOID:0000000007633831

DTC DETECTION LOGIC

NOTE:
If DTC P3177 is displayed with DTC P3173, P317A, or P3191, perform diagnosis for DTC P3173, P317A, or P3191.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3177	ECU ACTIVATION ERROR (EV system start error)	When EV system starts up, on-board charger or traction motor inverter does not permit EV system activation.	• Charging system • Traction motor system • EVSE • Quick charger • External input

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Set the vehicle to READY and wait at least 200 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-236, "TYPE 1 : Diagnosis Procedure".
NO-1 (with quick charge port)>>GO TO 3.
NO-2 (without quick charge port)>>GO TO 4.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect quick charge connector.
4. Start quick charging and wait at least 200 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-236, "TYPE 2 : Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

With CONSULT
1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect normal charge connector (with AC power input) and wait at least 200 seconds.
   CAUTION:
   When performing the DTC Confirmation Procedure before Diagnosis Procedure, use the EVSE used at the occurrence of malfunction.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-237, "TYPE 3 : Diagnosis Procedure".
NO-1 (before diagnosis procedure)>>EVC-237, "TYPE 3 : Diagnosis Procedure"
NO-2 (after diagnosis procedure)>>INSPECTION END

TYPE 1

TYPE 1 : Diagnosis Procedure

INFOID:0000000007633832

1.CHECK DTC

With CONSULT
Check other DTC is detected.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT IN TRACTION MOTOR INVERTER

With CONSULT
Check self-diagnostic result in “MOTOR”.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 3.

3.CHECK SELF-DIAGNOSTIC RESULT IN ON-BOARD CHARGER

With CONSULT
Check self-diagnostic result in “CHARGER”.

Are any DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

TYPE 2

TYPE 2 : Diagnosis Procedure

INFOID:0000000007633834

1.CHECK CONDITION

Check and study the quick charger to see that it is within the specification.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Erase DTC. (Quick charger malfunction)

2.CHECK DTC

With CONSULT
Check other DTC detected.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 3.

3.CHECK SELF-DIAGNOSTIC RESULT IN TRACTION MOTOR INVERTER

With CONSULT
Check self-diagnostic result in “MOTOR”.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 4.

4.CHECK SELF-DIAGNOSTIC RESULT IN ON-BOARD CHARGER

With CONSULT
Check self-diagnostic result in “CHARGER”.

Are any DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

TYPE 3

TYPE 3 : Diagnosis Procedure

INFOID:0000000007633833

1.PERFORM NORMAL CHARGING

1. Erase DTC of all ECU.
2. Turn power switch OFF.
3. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.l
4. Connect normal charge connector (with AC power input) and wait at least 200 seconds.
   CAUTION:
   - **Use an EVSE other than the one used for the previous DTC confirmation procedure.**
   - **Use NISSAN genuine EVSE or an equivalent.**
5. Check DTC.

Is DTC detected again?

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

2.CHECK CONDITION

Check adherence to the following conditions at the occurrence of the malfunction:
- No interruption in the indoor power and EVSE.
- Use of the specified EVSE.
- Proper connection of EVSE.
- EVSE LED (FAULT) is not ON or blinking.

>> INSPECTION END (Malfunctions except for vehicle)

3.CHECK DTC

With CONSULT
Check other DTC detected.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 4.

4.CHECK SELF-DIAGNOSTIC RESULT IN ON-BOARD CHARGER

With CONSULT
Check self-diagnostic result in “CHARGER”.

Are any DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 5.

5.CHECK SELF-DIAGNOSTIC RESULT IN TRACTION MOTOR INVERTER

With CONSULT
Check self-diagnostic result in “MOTOR”.

Are any DTC detected?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 6.

6.CHECK CONDITION

Check and study the following items:
- No interruption in the indoor power and EVSE.
- Use of the specified EVSE.
- Proper connection of EVSE.
- The charger remains cold.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P3178 ECU ACTIVATION ERROR

DTC Logic

INFOID:0000000007633835

DTC DETECTION LOGIC

NOTE:
If DTC P3178 is displayed with DTC P0AA0, P317A, P3191, P3193, P319C, P319E, P31A7, or P31A9, perform diagnosis for DTC P0AA0, P317A, P3191, P3193, P319C, P319E, P31A7, or P31A9.

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P3178	ECU ACTIVATION ERROR (EV system start error)	When EV system starts up, Li-ion battery or traction motor inverter does not permit EV system activation.	• Harness or connectors • Li-ion battery system • Traction motor system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Turn power switch ON and wait at least 20 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-238, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Turn power switch OFF.
2. Check that the charging status indicator is not illuminating, and wait at least 20 seconds.
3. Connect EVSE (with AC power input) and wait at least 20 seconds.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-238, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633836

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT
Perform self-diagnosis of VCM.

Is DTC detected other than P3178?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT IN TRACTION MOTOR INVERTER

With CONSULT
Check self-diagnostic result in “MOTOR”.

Are any DTC detected?

YES >> Check the DTC. Refer to TMS-36, "DTC Index".
NO >> GO TO 3.

3. CHECK SELF-DIAGNOSTIC RESULT IN LI-ION BATTERY CONTROLLER

With CONSULT

Check self-diagnostic result in “HV BAT”.

Are any DTC detected?

YES >> Check the DTC. Refer to EVB-50, "DTC Index" (TYPE 1), EVB-258, "DTC Index" (TYPE 2), EVB-481, "DTC Index" (TYPE 3) or EVB-705, "DTC Index" (TYPE 4).

NO >> Check high voltage harness connector installation condition of Li-ion battery and traction motor inverter.

P3179, P317A, P317B TRACTION MOTOR INVERTER

DTC Logic

INFOID:0000000007633837

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3179	MOTOR SYSTEM	VCM detects an error signal that is received from traction motor inverter via CAN communication for 0.01 seconds or more.	Traction motor inverter
P317A			
P317B			

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
This DTC is detected when the traction motor inverter detects DTC. If this DTC detected, perform trouble diagnosis for a DTC that detected by traction motor inverter.

>> Proceed to EVC-240, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633838

Perform the self-diagnosis of traction motor inverter.

P317D TRACTION MOTOR INVERTER

DTC Logic

INFOID:0000000007633839

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P317D	MOTOR SYSTEM	• The estimated torque value from the traction motor inverter to VCM remains greater/smaller than the torque command value from VCM to the traction motor inverter for the specified time. • The difference between the estimated power consumption calculated based on a torque value from VCM to the traction motor inverter and the actual power consumption calculated based on a high voltage battery voltage and current is 20 kW or more.	Traction motor inverter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and perform test drive.
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   DTC can be reproduced more easily when vehicle speed is higher.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-241, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633840

1.CHECK TRACTION MOTOR TORQUE

With CONSULT

1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “TRG MOTOR TORQ 1” and “CURRENT MOTOR TORQ”.
2. Shift selector lever in P range.
3. Set the vehicle to READY.
4. Check that the difference between values indicated by “TRG MOTOR TORQ 1” and “CURRENT MOTOR TORQ” is within 20 N·m.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".

2.REPLACE VCM

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Turn power switch ON and erase DTC.
3. Perform DTC confirmation procedure. Refer to EVC-241, "DTC Logic".

Is DTC “P317D” detected again?

YES >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".
NO >> INSPECTION END

P317E, P3180, P3182 LI-ION BATTERY

DTC Logic

INFOID:0000000007633841

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P317E	HV BATTERY SYSTEM	VCM detects an error signal that is received from LBC via CAN communication for 0.02 seconds or more.	LBC
P3180			
P3182			

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
This DTC is detected when LBC detects DTC. If this DTC detected, perform trouble diagnosis for a DTC that detected by LBC.

>> Proceed to EVC-242, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633842

Perform the self-diagnosis of LBC.

P3183 LI-ION BATTERY

DTC Logic

INFOID:0000000007633843

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3183	HV BATTERY SYSTEM	After a lapse of 0.3 seconds from M/C RELAY ON, the following state remains for 2.8 seconds or more: LBC's calculation result to the VCM-set example question is incorrect.	• LBC • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-243, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633844

1.REPLACE LBC

1. Replace LBC. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-616, "LI-ION BATTERY CONTROLLER : Exploded View" (TYPE 3) or EVB-848, "LI-ION BATTERY CONTROLLER : Exploded View" (TYPE 4).
2. Turn power switch ON and erase DTC.
3. Perform DTC confirmation procedure. Refer to EVC-243, "DTC Logic".

Is DTC “P3183” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3188 ELECTRIC SHIFT

DTC Logic

INFOID:0000000007633845

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3188	ELECTRIC SHIFT SYSTEM	VCM receives a DTC detection signal sent from electric shift control module.	Electric shift control module

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
This DTC is detected when the electric shift control module detects DTC. If this DTC detected, perform trouble diagnosis for a DTC that detected by electric shift control module.

>> Proceed to EVC-244, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633846

Perform self-diagnosis of electric shift control module.

P318A ELECTRIC SHIFT

DTC Logic

INFOID:0000000007633847

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P318A	ELECTRIC SHIFT SYSTEM (Shift position signal invalid)	Difference between target shift position signal and current shift position signal for 1.2 seconds.	• Electric shift system • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. Shift selector lever in N range and wait at least 20 seconds.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-245, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Shift the selector lever to the entire position from P to D, and shift it to N position.
   NOTE:
   Hold the lever at each position for 3 seconds or more.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-245, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633848

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is DTC detected other than P318A?

YES >> Check the DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK SELF-DIAGNOSTIC RESULT IN ELECTRIC SHIFT CONTROL MODULE

Check self-diagnostic result in “SHIFT”.

Is any DTC detected?

YES >> Check the DTC. Refer to TM-47, "DTC Index".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-245, "DTC Logic".

Is the DTC “P318A” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P318B ELECTRIC SHIFT

DTC Logic

INFOID:0000000007633849

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P318B	ELECTRIC SHIFT SYSTEM (Electric shift malfunction)	• VCM detects invalid signal of shift position signal sent from electric shift control module. • VCM receives abnormal shift position signal for 0.1 seconds or more.	• Electric shift system • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-248, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Shift the selector lever to the entire position from P to D, and shift it to P position.
   NOTE:
   Hold the lever at each position for 15 seconds or more.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-248, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

With CONSULT

1. Set the vehicle to READY.
2. Drive the vehicle at 15 km/h (10 MPH) with the selector lever in D range. From this condition, shift the selector lever in R range.
   CAUTION:
   Always drive vehicle at safe speed.
3. Stop the vehicle.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-248, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-IV

With CONSULT

1. Drive the vehicle at 15 km/h (10 MPH) with the selector lever in R range. From this condition, shift the selector lever in D range.
   CAUTION:
   Always drive vehicle at safe speed.

2. Stop the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-248, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633850

1. CHECK SELF-DIAGNOSTIC RESULT IN ELECTRIC SHIFT CONTROL MODULE

With CONSULT

Check self-diagnostic result in “SHIFT”.

Are any DTC detected?

YES >> Check the DTC. Refer to TM-47, "DTC Index".
NO >> GO TO 2.

2. REPLACE ELECTRIC SHIFT CONTROL MODULE

1. Replace electric shift control module. Refer to TM-130, "Removal and Installation".
2. Power switch ON and erase DTC.
3. Perform DTC confirmation procedure again. Refer to EVC-247, "DTC Logic".

Is the DTC “P318B” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P318D CAN COMMUNICATION

DTC Logic

INFOID:0000000007633851

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P318D	COMMUNICATION ERROR	When VCM is not transmitting CAN communication signal for 2 seconds or more.	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-249, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633852

1.PERFORM CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Perform confirmation procedure again. Refer to EVC-249, "DTC Logic".

Is DTC “P318D” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

P3191, P319C, P31A7 EV SYSTEM CAN COMMUNICATION

DTC Logic

INFOID:0000000007633853

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3191 P319C P31A7	COMMUNICATION ERROR	When VCM detects an error signal that is received from traction motor inverter via CAN communication	• Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-250, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633854

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any EV system CAN error (U1000 excluded) other than DTC P3191, P3191C, and P31A7 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-250, "DTC Logic".

Is DTC P3191, P319C, or P31A7 detected again?

YES >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE TRACTION MOTOR INVERTER

With CONSULT

1. Replace traction motor inverter. Refer to TMS-115, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-250, "DTC Logic".

Is DTC P3191, P319C, or P31A7 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3193, P319E, P31A9 EV SYSTEM CAN COMMUNICATION

DTC Logic

INFOID:0000000007633855

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3193 P319E P31A9	COMMUNICATION ERROR	When VCM detects an error signal that is received from LBC via CAN communication	• LBC • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-251, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633856

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any EV system CAN error (U1000 excluded) other than DTC P3193, P3191E, and P31A9 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-251, "DTC Logic".

Is DTC P3193, P319E, or P31A9 detected again?

YES >> Replace LBC. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-616, "LI-ION BATTERY CONTROLLER : Exploded View" (TYPE 3) or EVB-848, "LI-ION BATTERY CONTROLLER : Exploded View" (TYPE 4).
NO >> INSPECTION END

3.REPLACE LBC

With CONSULT

1. Replace LBC. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-616, "LI-ION BATTERY CONTROLLER : Exploded View" (TYPE 3) or EVB-848, "LI-ION BATTERY CONTROLLER : Exploded View" (TYPE 4).
2. Perform DTC confirmation procedure again. Refer to EVC-251, "DTC Logic".

Is DTC P3193, P319E, or P31A9 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3194, P319F, P31AA CAN COMMUNICATION

DTC Logic

INFOID:0000000007633857

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3194 P319F P31AA	COMMUNICATION ERROR	When VCM detects an error signal that is received from ABS actuator and electric unit (control unit) via CAN communication	• ABS actuator and electric unit (control unit) • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-252, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633858

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P3194, P3191F, and P31AA detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-252, "DTC Logic".

Is DTC P3194, P319F, or P31AA detected again?

YES >> Replace ABS actuator and electric unit (control unit). Refer to BRC-151, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

With CONSULT

1. Replace ABS actuator and electric unit (control unit). Refer to BRC-151, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-252, "DTC Logic".

Is DTC P3194, P319F, or P31AA detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3195, P31A0, P31AB CAN COMMUNICATION

DTC Logic

INFOID:0000000007633859

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3195 P31A0 P31AB	COMMUNICATION ERROR	When VCM detects an error signal that is received from electrically-driven intelligent brake unit via CAN communication	• Electrically-driven intelligent brake unit • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-253, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633860

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P3195, P319A0, and P31AB detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-253, "DTC Logic".

Is DTC P3195, P31A0, or P31AB detected again?

YES >> Replace electrically-driven intelligent brake unit. Refer to BR-258, "Removal and installation".
NO >> INSPECTION END

3.REPLACE ELECTRICALLY-DRIVEN INTELLIGENT BRAKE UNIT

With CONSULT

1. Replace electrically-driven intelligent brake unit. Refer to BR-258, "Removal and installation".
2. Perform DTC confirmation procedure again. Refer to EVC-253, "DTC Logic".

Is DTC P3195, P31A0, or P31AB detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3196, P31A1, P31AE EV SYSTEM CAN COMMUNICATION

DTC Logic

INFOID:0000000007633861

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3196 P31A1 P31AE	COMMUNICATION ERROR	When VCM detects an error signal that is received from on-board charger via CAN communication	• On-board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-254, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633862

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any EV system CAN error (U1000 excluded) other than DTC P3196, P319A1, and P31E7 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-254, "DTC Logic".

Is DTC P3196, P31A1, or P31AE7 detected again?

YES >> Replace on-board charger. Refer to VC-105, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE ON-BOARD CHARGER

With CONSULT

1. Replace on-board charger. Refer to VC-105, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-254, "DTC Logic".

Is DTC P3196, P31A1, or P31AE7 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P3197, P31A2, P31AD EV SYSTEM CAN COMMUNICATION

DTC Logic

INFOID:0000000007633863

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P3197 P31A2 P31AD	COMMUNICATION ERROR	When VCM detects an error signal that is received from electric shift control module via CAN communication	• Electric shift control module • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-255, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633864

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any EV system CAN error (U1000 excluded) other than DTC P3197, P319A2, and P31AD detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-255, "DTC Logic".

Is DTC P3197, P31A2, or P31AD detected again?

YES >> Replace electric shift control module. Refer to TM-130, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE ELECTRIC SHIFT CONTROL MODULE

With CONSULT

1. Replace electric shift control module. Refer to TM-130, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-255, "DTC Logic".

Is DTC P3197, P31A2, or P31AD detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31AF, P31B3 EV SYSTEM CAN COMMUNICATION

DTC Logic

INFOID:0000000007633865

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31AF P31B3	COMMUNICATION ERROR	When VCM detects an error signal that is received from A/C auto amp. via CAN communication	• A/C auto amp. • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-256, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633866

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any EV system CAN error (U1000 excluded) other than DTC P31AF and P31B3 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-256, "DTC Logic".

Is DTC P31AF or P31B3 detected again?

YES >> Replace A/C auto amp. Refer to HAC-135, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE A/C AUTO AMP.

With CONSULT

1. Replace A/C auto amp. Refer to HAC-135, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-256, "DTC Logic".

Is DTC P31AF or P31B3 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31B0, P31B4 CAN COMMUNICATION

DTC Logic

INFOID:0000000007633867

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31B0 P31B4	COMMUNICATION ERROR	When VCM detects an error signal that is received from AV control unit via CAN communication	• AV control unit • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-257, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633868

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P31B0 and P31B4 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-257, "DTC Logic".

Is DTC P31B0 or P31B4 detected again?

YES >> Replace AV control unit. Refer to AV-110, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE AV CONTROL UNIT

With CONSULT

1. Replace AV control unit. Refer to AV-110, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-257, "DTC Logic".

Is DTC P31B0 or P31B4 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31B5 CAN COMMUNICATION

DTC Logic

INFOID:0000000007633869

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31B5	COMMUNICATION ERROR	VCM detects an error signal that is received from combination meter via CAN communication	• Combination meter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF.
2. Turn power switch ON and wait at least 10 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-258, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633870

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P31B5 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-258, "DTC Logic".

Is DTC P31B5 detected again?

YES >> Replace combination meter. Refer to MWI-96, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE COMBINATION METER

With CONSULT

1. Replace combination meter. Refer to MWI-96, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-258, "DTC Logic".

Is DTC P31B5 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31B6 CAN COMMUNICATION

DTC Logic

INFOID:0000000007633871

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31B6	COMMUNICATION ERROR	When VCM detects an error signal that is received from IPDM E/R via CAN communication	• IPDM E/R • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-259, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633872

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P31B6 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-259, "DTC Logic".

Is DTC P31B6 detected again?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE IPDM E/R

With CONSULT

1. Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-259, "DTC Logic".

Is DTC P31B6 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31B7 CAN COMMUNICATION

DTC Logic

INFOID:0000000007633873

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31B7	COMMUNICATION ERROR	When VCM detects an error signal that is received from air bag diagnosis sensor unit via CAN communication	• Air bag diagnosis sensor unit • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-260, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633874

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P31B7 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-260, "DTC Logic".

Is DTC P31B7 detected again?

YES >> Replace air bag diagnosis sensor unit. Refer to SR-35, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE AIR BAG DIAGNOSIS SENSOR UNIT

With CONSULT

1. Replace air bag diagnosis sensor unit. Refer to SR-35, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-260, "DTC Logic".

Is DTC P31B7 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31B8 EV SYSTEM CAN COMMUNICATION

DTC Logic

INFOID:0000000007633875

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31B8	COMMUNICATION ERROR	When VCM detects an error signal that is received from TCU via CAN communication	• TCU • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-261, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633876

1.CHECK TCU CONDITION

Check that the TCU activation is performed normally. Refer to AV-169, "ADDITIONAL SERVICE WHEN USING TELEMATICS SYSTEM FOR THE FIRST TIME/RE-SUBSCRIPTION : Description".

Is TCU activation performed normally?

YES >> GO TO 2.
NO >> Perform TCU activation. Refer to AV-169, "ADDITIONAL SERVICE WHEN USING TELEMATICS SYSTEM FOR THE FIRST TIME/RE-SUBSCRIPTION : Work Procedure".

2.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any EV system CAN error (U1000 excluded) other than DTC P31B8 detected?

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

3.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-261, "DTC Logic".

Is DTC P31B8 detected again?

YES >> Replace TCU. Refer to AV-194, "Removal and Installation".
NO >> INSPECTION END

4.REPLACE TCU

With CONSULT

1. Replace TCU. Refer to AV-194, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-261, "DTC Logic".

Is DTC P31B8 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31B9 CAN COMMUNICATION

DTC Logic

INFOID:0000000007633877

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31B9	COMMUNICATION ER-ROR	When VCM detects an error signal that is received from electric parking brake control module via CAN communication	• Electric parking brake control module • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-263, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633878

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

With CONSULT

Check self-diagnostic result in “EV/HEV”.

Is any CAN error (U1000 excluded) other than DTC P31B9 detected?

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

2.REPLACE VCM

With CONSULT

1. Replace VCM. Refer to EVC-369, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-263, "DTC Logic".

Is DTC P31B9 detected again?

YES >> Replace electric parking brake control module. Refer to PB-83, "Removal and Installation".
NO >> INSPECTION END

3.REPLACE ELECTRIC PARKING BRAKE CONTROL MODULE

With CONSULT

1. Replace electric parking brake control module. Refer to PB-83, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-263, "DTC Logic".

Is DTC P31B9 detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31C0 ON-BOARD CHARGER

DTC Logic

INFOID:0000000007633879

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31C0	ON BOARD CHARGER SYSTEM	The voltage of a starting signal received from the charger remains HIGH for 5 seconds or more.	• Harness or connectors • On-board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check the DTC.

Is DTC detected?

YES >> Proceed to EVC-264, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Connect EVSE (with AC power input) and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-264, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633880

1.CHECK EV SYSTEM ACTIVATION REQUEST SIGNAL-I

With CONSULT

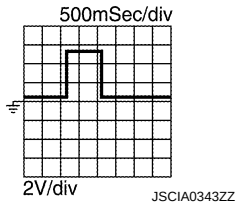
1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “EV SYS ACT REQ (OBC)”.
2. Disconnect EVSE.
3. Reconnect EVSE (with AC power input).
4. Check that “EV SYS ACT REQ (OBC)” indicates “On” for 1 second after EVSE connected.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK EV SYSTEM ACTIVATION REQUEST SIGNAL-II

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the voltage between VCM harness connector and ground under the following condition.

+		–	Condition	Value
VCM				
Connector	Terminal			
E63	96	Ground	• Power switch ON • Immediately after EVSE is connected (with AC power input)	

Is inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> GO TO 3.

3. CHECK EV SYSTEM ACTIVATION REQUEST SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect on-board charger harness connector.
3. Check continuity VCM harness connector and on board charger harness connector.

+		–		Continuity
VCM		On board charger		
Connector	Terminal	Connector	Terminal	
E63	96	B26	18	Existed

4. Also check harness for short to ground and power.

Is inspection result normal?

YES >> Replace on-board charger. Refer to VC-105, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P31C1, P31C2 TCU

DTC Logic

INFOID:0000000007633881

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31C1	TCU	VCM detects the EV system activation request signal (from TCU) is Approx. 5 V for 5 seconds.	• Harness • VCM • TCU
P31C2		VCM detects the EV system activation request signal (from TCU) is 0 V for 3 seconds after power switch OFF → ON.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-266, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633882

1.CHECK TCU CONDITION

Check that the TCU activation is performed normally. Refer to AV-169, "ADDITIONAL SERVICE WHEN USING TELEMATICS SYSTEM FOR THE FIRST TIME/RE-SUBSCRIPTION : Description".

Is TCU activation performed normally?

YES >> GO TO 2.
NO >> Perform TCU activation. Refer to AV-169, "ADDITIONAL SERVICE WHEN USING TELEMATICS SYSTEM FOR THE FIRST TIME/RE-SUBSCRIPTION : Work Procedure".

2.CHECK EV SYSTEM ACTIVATION REQUEST SIGNAL-I

With CONSULT

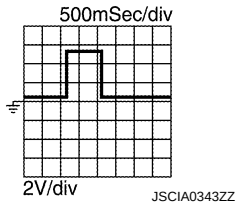
1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “EV SYS ACT REQ (TCU)”.
2. Turn power switch OFF.
3. Turn power switch ON.
4. Check that “EV SYS ACT REQ (TCU)” indicates “On” for 1 second after EVSE connected.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK EV SYSTEM ACTIVATION REQUEST SIGNAL-II

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the voltage between VCM harness connector and ground under the following condition.

+		–	Condition	Value
VCM				
Connector	Terminal			
E63	84	Ground	Power switch: OFF⇒ON	

Is inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> GO TO 4.

4. CHECK EV SYSTEM ACTIVATION REQUEST SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect TCU harness connector.
3. Check the continuity between VCM harness terminal and TCU harness terminal.

+		–		Continuity
VCM		TCU		
Connector	Terminal	Connector	Terminal	
E63	84	M2	11	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Replace TCU. Refer to AV-194, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P31C4 VCM TIMER

DTC Logic

INFOID:0000000007633883

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31C4	VCM TIMER	When VCM starts, the setting of timer charge time is cleared even when it is stored.	• VCM power supply circuit • 12V battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Turn power switch OFF and wait at least 20 seconds.
3. Repeat steps 1 and 2 for 3 times.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-268, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633884

1.CHECK VCM POWER SUPPLY

Check VCM power supply (battery power). Refer to EVC-105, "VCM : Diagnosis Procedure"

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.INTERVIEW THE CUSTOMER

Interview the customer to see if there is a removal history of 12V battery terminals.

NOTE:

DTC “P31C4” may be detected when 12V battery terminal is disconnected.

Is there a removal history of 12V battery terminals?

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

3.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

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

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Reconnect all harness connector disconnected.
2. Turn power switch ON.
3. Erase DTC.
4. Perform DTC confirmation procedure again.

Is DTC “P31C4” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31C5, P31C6 VCM

DTC Logic

INFOID:0000000007633885

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31C5 P31C6	VCM	VCM malfunction is detected	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-270, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-270, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633886

1.CHECK VCM-I

With CONSULT

1. Erase DTC.
2. Turn power switch OFF and wait at least 20 seconds.
3. Disconnect 12V battery negative terminal and wait at least 1 minute. Refer to EVC-10, "Precautions for Removing Battery Terminal".
4. Reconnect 12V battery negative terminal.
5. Turn power switch ON and wait at least 5 minutes.
6. Check DTC.

Is DTC “P31C5” or P31C6” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> GO TO 2.

2.CHECK VCM-II

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON and wait at least 60 seconds.
3. Check DTC.

Is DTC “P31C5” or P31C6” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31C7 VCM

DTC Logic

INFOID:0000000007633887

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31C7	VCM	VCM malfunction is detected	VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-272, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Set timer charge start time to 5 minutes later.
2. Turn power switch OFF.
3. Connect EVSE (With AC power input) and wait until battery charge starts.
4. Wait at least 10 minutes after starting timer charge.
5. Turn the power switch ON while charging.
6. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-272, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633888

1.CHECK VCM-I

With CONSULT

1. Erase DTC.
2. Turn power switch OFF and wait at least 20 seconds.
3. Disconnect 12V battery negative terminal and wait at least 1 minute. Refer to EVC-10, "Precautions for Removing Battery Terminal".
4. Reconnect 12V battery negative terminal.
5. Turn power switch ON and wait at least 6 minutes.
6. Check DTC.

Is DTC “P31C7” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> GO TO 2.

2.PERFORM CONFIRMATION PROCEDURE AGAIN

With CONSULT

Perform confirmation procedure again. Refer to EVC-272, "DTC Logic".

Is DTC “P31C7” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".

NO >> INSPECTION END

P31C8, P31C9 NORMAL CHARGE RELAY

DTC Logic

INFOID:0000000007633889

DTC DETECTION LOGIC

NOTE:
If DTC P31C8 or P31C9 is displayed with DTC P3101, first perform diagnosis for DTC P3101.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31C8	ON BOARD CHARGER SYSTEM	VCM received normal charge relay (-) stuck signal from on-board charger.	• Harness or connectors • Normal charge relay • On-board charger
P31C9		VCM received normal charge relay (+) stuck signal from on-board charger.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and wait at least 180 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-274, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633890

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1.PERFORM SELF-DIAGNOSIS OF ON-BOARD CHARGER

Perform self-diagnosis of on-board charger.

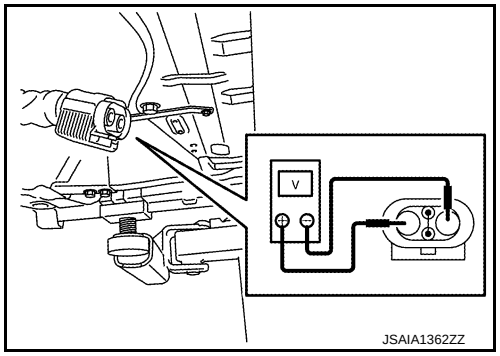
Is DTC detected?

YES >> Perform diagnosis procedure of detected DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 2.

2.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



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



Standard : 5 V or less

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

>> GO TO 3.

3.CHECK NORMAL CHARGE RELAY

1. Remove DC/DC-J/B.
2. Check the continuity between DC/DC-J/B connector terminals.

Check Item	DC/DC J/B Terminals		Continuity
Normal charge relay (+)	24	27	Not existed
Normal charge relay (–)	25	28	

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Replace DC/DC-J/B. Refer to EVC-361, "Removal and Installation".

P31CA, P31CB QUICK CHARGE RELAY

DTC Logic

INFOID:0000000007633891

DTC DETECTION LOGIC

NOTE:
If DTC P31CA or P31CB is displayed with DTC P3101, first perform diagnosis for DTC P3101.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31CA	ON BOARD CHARGER SYSTEM	VCM received quick charge relay (-) stuck signal from on board charger.	• Harness or connectors • Quick charge relay • On-board charger
P31CB		VCM received quick charge relay (+) stuck signal from on board charger.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Start quick charging and wait at least 30 seconds.
2. Stop quick charging and wait at least 30 seconds.
3. Turn power switch ON.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-276, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633892

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:
- **There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.**
- **Erase DTC after the work is completed.**

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Erase DTC.

2. Perform the DTC confirmation procedure again using a quick charger other than the one that is used for the initial confirmation procedure. Refer to EVC-276, "DTC Logic".

Is DTC “P31CA” or “P31CB” detected again?

YES >> GO TO 2.
NO >> INSPECTION END (Quick charger malfunction)

2.PERFORM SELF-DIAGNOSIS OF ON-BOARD CHARGER

Perform self-diagnosis of on-board charger.

Are any DTC detected?

YES >> Perform diagnosis procedure of detected DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 3.

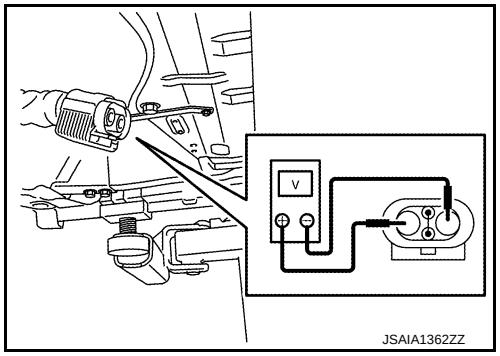
3.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.

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





Standard : 5 V or less

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

>> GO TO 4.

4.CHECK QUICK CHARGE RELAY

1. Remove DC/DC-J/B.
2. Check the continuity between DC/DC-J/B connector terminals.

Check Item	DC/DC J/B Terminals		Continuity
Quick charge relay (+)	34	27	Not existed
Quick charge relay (–)	33	28	

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Replace DC/DC-J/B. Refer to EVC-361, "Removal and Installation".

P31D4 PRE-CHARGE RELAY

DTC Logic

INFOID:0000000007633893

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31D4	PRE CHARGE RELAY	After operating the power switch from OFF to READY, a break occurs in the pre-charge relay drive circuit or resistance remains extremely high for 0.2 seconds or more.	• Harness or connectors • Li-ion battery J/B • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF and wait at least 60 seconds.
2. Turn power switch ON and wait at least 10 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-278, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633894

1.CHECK PRE-CHARGE RELAY GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the continuity between Li-ion battery harness connector and ground.

Li-ion battery		Ground	Continuity
Connector	Terminal		
B24	10	Ground	Existed

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK PRE-CHARGE RELAY DRIVE CIRCUIT-I

Check the resistance between Li-ion battery connector terminals.

Li-ion battery		Resistance
+	–	
Terminal		
10	11	Less than 5 kΩ

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check the relay circuit of Li-ion battery for malfunction. If no malfunction is found, replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2),

EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

3. CHECK PRE-CHARGE RELAY DRIVE CIRCUIT-II

1. Disconnect VCM harness connector.
2. Check continuity between VCM harness connector and Li-ion battery harness connector.

+		–		Continuity
VCM		Li-ion battery		
Connector	Terminal	Connector	Terminal	
E63	105	B24	11	Existed

3. Also check harness for short to power.

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P31D5 PRE-CHARGE RELAY

DTC Logic

INFOID:0000000007633895

DTC DETECTION LOGIC

NOTE:
If DTC P31D5 is displayed with DTC P0AA2, P31D4, P31DB, or P31DD, perform diagnosis for DTC P0AA2, P31D4, P31DB, or P31DD.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31D5	PRE CHARGE RELAY	• The voltage of the traction motor inverter is 100 V or more immediately before starting charging or immediately before READY. • The voltage of the traction motor inverter is 100 V or more when only the system main relay 2 is ON.	• Harness or connectors • Battery J/B • Traction motor inverter • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Set the vehicle to READY and perform test drive.
2. Turn power switch OFF and wait at least for 60 seconds.
3. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-280, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633896

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:
- **There is the possibility of a malfunction occurring if the vehicle is changed to READY status while the service plug is removed. Therefore do not change the vehicle to READY status unless instructed to do so in the Service Manual.**
- **Erase DTC after the work is completed.**

1.PERFORM SELF-DIAGNOSIS OF TRACTION MOTOR INVERTER

With CONSULT
Perform self-diagnosis of traction motor inverter.

Is DTC detected?

YES >> Perform detected DTC diagnosis procedure. Refer to TMS-36, "DTC Index".
NO >> GO TO 2.

2.CHECK SYSTEM MAIN RELAY DRIVE CIRCUIT

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check the voltage between Li-ion battery harness connector and ground.

Check item	+		–	Voltage
	Li-ion battery			
	Connector	Terminal		
System main relay 1	B24	17	ground	0 V
System main relay 2		14		
Pre-charge relay		11		

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check harness for short to power.

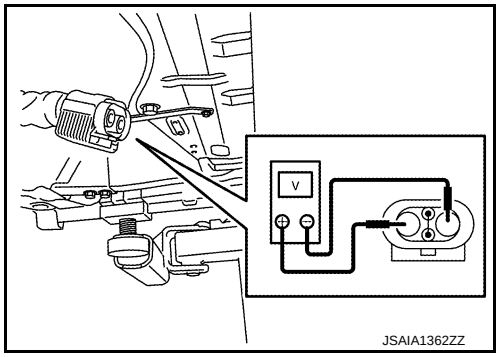
3.PRECONDITIONING

WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.

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





Standard : 5 V or less

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

>> GO TO 4.

4.CHECK ELECTRIC COMPRESSOR

1. Disconnect electric compressor high voltage harness connector.
2. Check the short circuit between electric compressor terminals.

Electric compressor		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
18	24	Existed

Is the inspection result normal?

YES >> Replace electric compressor. Refer to HA-46, "Removal and Installation". And then, GO TO 10.
NO >> Replace electric compressor and DC/DC junction box. And then, GO TO 10. Refer to HA-46, "Removal and Installation" (electric compressor), EVC-361, "Removal and Installation" (DC/DC-J/B).

6. CHECK PTC ELEMENTS HEATER

1. Disconnect PTC elements heater high voltage harness connector.
2. Check the short circuit between PTC elements heater terminals.

PTC elements heater		Resistance
+	–	
Terminal		
7	8	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. CHECK DC/DC JUNCTION BOX

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between DC/DC junction box connector terminals.

DC/DC-J/B		Continuity
+	–	
Terminal		
30	24	Existed

Is the inspection result normal?

YES >> Replace PTC elements heater. Refer to HA-68, "Removal and Installation". And then, GO TO 10.
NO >> Replace PTC elements heater and DC/DC junction box. And then, GO TO 10. Refer to HA-68, "Removal and Installation" (PTC elements heater), EVC-361, "Removal and Installation" (DC/DC-J/B).

8. CHECK TRACTION MOTOR INVERTER

1. Disconnect DC/DC junction box high voltage harness connector (H15).
2. Check the short circuit between DC/DC junction box harness connector terminals.

DC/DC-J/B			Resistance
Connector	+	–	
	Terminal		
H15	35	36	3 kΩ or more

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace traction motor inverter. Refer to TMS-115, "Removal and Installation". And then, GO TO 10.

9. CHECK HIGH VOLTAGE HARNESS

1. Remove DC/DC junction box.
2. Check the short circuit between high voltage harness terminals.

Connected to:	DC/DC-J/B			Resistance
	Connector	+	–	
		Terminal		
Electric compressor	H2	18	19	3 kΩ or more
Li-ion battery	H4	24	25	
PTC elements heater	H9	30	31	

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning harness. And then, GO TO 10.

10. REPLACE BATTERY JUNCTION BOX

Replace battery junction box. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

>> INSPECTION END

P31D6 F/S RELAY

DTC Logic

INFOID:0000000007633897

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31D6	F/S RELAY	VCM detected the F/S relay stuck	• Harness or connectors • IPDM E/R • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-284, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633898

1.CHECK F/S RELAY OUTPUT VOLTAGE-I

1. Turn power switch OFF.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	terminal		
E15	55	Ground	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK F/S RELAY DRIVE CIRCUIT VOLTAGE-I

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	terminal		
E15	60	Ground	12V battery voltage

Is the inspection result normal?

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

3.CHECK F/S RELAY DRIVE CIRCUIT VOLTAGE-II

1. Disconnect VCM harness connector.

2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	terminal		
E15	60	Ground	12V battery voltage

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check harness for short to ground, between VCM harness connector and IPDM E/R harness connector.

4. CHECK F/S RELAY OUTPUT VOLTAGE-II

1. Disconnect IPDM E/R harness connector.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	terminal		
E15	55	Ground	0 V

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> GO TO 5.

5. CHECK F/S RELAY OUTPUT VOLTAGE-III

1. Disconnect VCM harness connector.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	terminal		
E15	55	Ground	0 V

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Check harness for short to power, between VCM harness connector and IPDM E/R harness connector.

P31D7 F/S RELAY

DTC Logic

INFOID:0000000007633899

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31D7	F/S RELAY	VCM detected the F/S relay open	• Harness or connectors • IPDM E/R • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-286, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633900

1.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #64 fuse.
3. Make sure that fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK 12V BATTERY POWER SUPPLY

1. Insert the fuse which pulled out.
2. Disconnect IPDM E/R harness connector (E9).
3. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E9	2	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check 12V battery power supply routing circuit.

3.CHECK F/S RELAY OUTPUT VOLTAGE

1. Reconnect IPDM E/R harness connector (E9).
2. Turn power switch ON.
3. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	terminal		
E15	55	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 4.

4. CHECK F/S RELAY DRIVE CIRCUIT VOLTAGE-I

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage (Approx.)
IPDM E/R			
Connector	terminal		
E15	60	Ground	0 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 5.

5. CHECK F/S RELAY DRIVE CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector and IPDM E/R harness connector.
3. Check continuity between VCM harness connector and IPDM E/R harness connector.

+		–		Continuity
VCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E62	73	E15	60	Existed

Is inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E62	4	Ground	Existed
	8		
E63	111		
	112		

Is inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

7. CHECK F/S RELAY DRIVE CIRCUIT VOLTAGE-II

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector (E15).
3. Check the voltage between IPDM E/R connector and ground.

+		
IPDM E/R	–	Voltage
terminal		
60	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".

8.CHECK F/S RELAY OUTPUT CIRCUIT-I

1. Disconnect VCM harness connector.
2. Check harness for short to ground, between IPDM E/R harness connector and VCM harness connector.

+		–	Continuity
IPDM E/R			
Connector	terminal		
E15	55	Ground	Not existed

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9.CHECK F/S RELAY OUTPUT CIRCUIT-II

1. Turn power switch OFF.
2. Disconnect VCM harness connector and IPDM E/R harness connector.
3. Check continuity between VCM harness connector and IPDM E/R harness connector.

+		–		Continuity
VCM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E62	77	E15	55	Existed

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P31DB SYSTEM MAIN RELAY +

DTC Logic

INFOID:0000000007633901

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31DB	HV BATT MAIN RELAY +	System main relay 1 drive circuit remains short to ground for 2.5 seconds or more.	• Harness or connectors • Li-ion battery J/B • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Set the vehicle to READY and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-289, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633902

1.CHECK SYSTEM MAIN RLY 1 DRIVE CIRCUIT-I

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check continuity between Li-ion battery connector terminal and ground.

+	–	Continuity
Li-ion battery terminals		
17	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check short circuit between Li-ion battery harness and ground.

2.CHECK SYSTEM MAIN RLY 1 DRIVE CIRCUIT-II

1. Disconnect VCM harness connector.
2. Check harness for short to ground, between VCM harness connector and Li-ion battery harness connector.

+		–	Continuity
Li-ion battery			
Connector	terminal		
B24	17	Ground	Not existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P31DC SYSTEM MAIN RELAY -

DTC Logic

INFOID:0000000007633903

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31DC	HV BATT MAIN RELAY –	System main relay 2 drive circuit remains short to ground for 2.5 seconds or more.	• Harness or connectors • Li-ion battery J/B • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-290, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633904

1.CHECK SYSTEM MAIN RLY 2 DRIVE CIRCUIT-I

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check continuity between Li-ion battery connector terminal and ground.

+	–	Continuity
Li-ion battery terminals		
14	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check short circuit between Li-ion battery harness and ground.

2.CHECK SYSTEM MAIN RLY 2 DRIVE CIRCUIT-II

1. Disconnect VCM harness connector.
2. Check harness for short to ground, between VCM harness connector and Li-ion battery harness connector.

+		–	Continuity
Li-ion battery			
Connector	terminal		
B24	14	Ground	Not existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P31DD PRE-CHARGE RELAY

DTC Logic

INFOID:0000000007633905

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31DD	PRE CHARGE RELAY (Pre-charge relay circuit range/performance)	Pre-charge relay drive circuit remains short to ground for 2.5 seconds or more.	• Harness or connectors (Pre-charge relay drive circuit is shorted) • Pre-charge relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Set the vehicle to READY and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-291, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633906

1.CHECK PRE-CHARGE RELAY DRIVE CIRCUIT-I

1. Turn power switch OFF.
2. Disconnect Li-ion battery harness connector.
3. Check continuity between Li-ion battery connector terminal and ground.

+	–	Continuity
Li-ion battery terminals		
11	Ground	Not existed

Is the inspection result normal?

YES >> GO TO 2.
NO >> Check short circuit between Li-ion battery harness and ground.

2.CHECK PRE-CHARGE RELAY DRIVE CIRCUIT-II

1. Disconnect VCM harness connector.
2. Check harness for short to ground, between VCM harness connector and Li-ion battery harness connector.

+		–	Continuity
Li-ion battery			
Connector	terminal		
B24	11	Ground	Not existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P31DE SYSTEM MAIN RELAY

DTC Logic

INFOID:0000000007633907

DTC DETECTION LOGIC

NOTE:
This DTC shows a forced system main relay disconnection by fail-safe.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31DE	HV BATT MAIN RELAY	When the system main relay is shut off, VCM accumulates high voltage current value, and the accumulated value reaches the specified value.	• Li-ion battery J/B • Li-ion battery system • A/C system • DC/DC-J/B • Traction motor system • VCM system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-292, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633908

1.PERFORM SELF-DIAGNOSIS OF VCM

With CONSULT
Perform self-diagnosis of VCM.

Is DTC detected other than P31DE?

YES >> Perform diagnosis procedure of detected DTC and then replace battery J/B. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).
NO >> Replace Li-ion battery J/B. Refer to EVB-168, "Exploded view" (TYPE 1), EVB-384, "Exploded view" (TYPE 2), EVB-619, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 3) or EVB-851, "BATTERY JUNCTION BOX AND BATTERY HARNESS : Exploded View" (TYPE 4).

P31E0 HIGH VOLTAGE CIRCUIT INTERLOCK ERROR

Description

INFOID:0000000007633909

The high voltage connector connection detecting circuit monitors the connection status of the high voltage connector.
The high voltage connector connection detecting circuit is composed of 2 circuits: the input side and output side. When the high voltage connector is connected, the input side and outputs side are connected via the contacts inside the high voltage connector, forming the circuit.

DTC Logic

INFOID:0000000007633910

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31E0	HV SYSTEM INTERLOCK ERROR (High voltage harness connection detecting circuit low input)	VCM detects an excessively low voltage of the high voltage harness connection detecting circuit for 2.5 seconds during READY.	• Harness or connectors (High voltage harness connection detection circuit is open or shorted.) • High voltage harness connectors • Quick charge port
		VCM detects an excessively low voltage of the high voltage harness connection detecting circuit for 0.5 seconds during power switch ON.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Turn power switch ON at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-293, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Set the vehicle to READY at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-293, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633911

WARNING:
- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**

- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**
- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

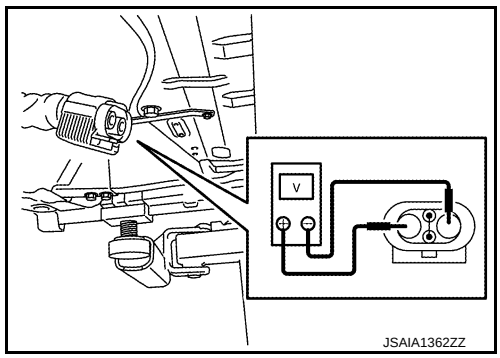
1.PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

CAUTION:

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

>> GO TO 2.

2.CHECK HIGH VOLTAGE HARNESS CONNECTOR INSTALLATION CONDITION

Check high voltage harness connectors installation condition visually and tactually.

CAUTION:

When reconnecting the high voltage harness connector, insert it slowly and directly.

Is the inspection result normal?

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

3.CHECK FUSE

Pull out #73 fuse and check that the fuse is not fusing.

Is the inspection result normal?

YES-1 (With quick charge port)>>GO TO 4.
YES-2 (Without quick charge port)>>GO TO 8.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK CONNECTION DETECTING CIRCUIT POWER SUPPLY-I

1. Insert the fuse which pulled out.
2. Disconnect quick charge port harness connector (+) side.
3. Reconnect 12V battery cable.

4. Turn power switch ON.
5. Check the voltage between quick charge port and ground.

+		–	Voltage
Quick charge port			
Connector	Terminal		
H13	12	Ground	12V battery power supply

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. CHECK CONNECTION DETECTING CIRCUIT POWER SUPPLY CIRCUIT-I

1. Turn power switch OFF.
2. Remove M/C relay.
3. Check the continuity between quick charge port harness connector and M/C relay harness connector terminal.

+		–		Continuity
Quick charge port		M/C relay		
Connector	Terminal	Connector	Terminal	
H13	12	E65	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

6. CHECK CONNECTION DETECTING CIRCUIT POWER SUPPLY CIRCUIT-II

1. Disconnect quick charge port harness connector (-) side.
2. Check the continuity between quick charge port harness connectors.

+		–		Continuity
Quick charge port				
Connector	Terminal	Connector	Terminal	
H13	13	H14	15	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK CONNECTION DETECTING CIRCUIT POWER SUPPLY CIRCUIT-III

1. Disconnect DC/DC junction box harness connector.
2. Check the continuity between quick charge port harness connector and DC/DC junction box harness connector.

+		–		Continuity
Quick charge port		DC/DC J/B		
Connector	Terminal	Connector	Terminal	
H14	16	F11	6	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair or replace error-detected parts.

8. CHECK CONNECTION DETECTING CIRCUIT POWER SUPPLY-II

1. Insert the fuse which pulled out.
2. Disconnect DC/DC junction box harness connector.
3. Reconnect 12V battery cable.
4. Turn power switch ON.
5. Check the voltage between DC/DC junction box and ground.

+		–	Voltage
DC/DC J/B			
Connector	Terminal		
F11	6	Ground	12V battery power supply

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. CHECK CONNECTION DETECTING CIRCUIT POWER SUPPLY CIRCUIT-IV

1. Turn power switch OFF.
2. Remove M/C relay.
3. Check the continuity between DC/DC harness connector and M/C relay harness connector terminal.

+		–		Continuity
DC/DC J/B		M/C relay		
Connector	Terminal	Connector	Terminal	
F11	6	E65	5	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Check M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

10. CHECK CONNECTION DETECTION CIRCUIT-V

1. Disconnect VCM harness connector.
2. Check the continuity between VCM harness connector and DC/DC junction box harness connector.

+		–		Continuity
VCM		DC/DC J/B		
Connector	Terminal	Connector	Terminal	
E61	23	F11	5	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK HIGH VOLTAGE HARNESS CONNECTOR

1. Remove DC/DC junction box. Refer to EVC-361, "Removal and Installation".
2. Check the continuity between following connector terminals.

High voltage harness				Continuity
Harness	Connector	+	–	
		Terminal		
To A/C compressor	H2	22	23	Existed
To Li-ion battery	H4	38	39	
To on-board charger	H7	40	41	
To PTC elements heater	H9	42	43	
To Quick charge port*	H11	44	45	
To traction motor inverter	H15	46	47	

*: With Quick charge port models

Is the inspection result normal?

YES >> Replace DC/DC junction box. Refer to EVC-361, "Removal and Installation".
NO >> Replace malfunctioning high voltage harness.

P31E1 HIGH VOLTAGE CIRCUIT INTERLOCK ERROR

Description

INFOID:0000000007633912

VCM receives high voltage harness connector connection malfunction information via EV system CAN communication sent from Li-ion battery controller. When Li-ion battery controller detects the connection malfunction of high voltage harness or detects the connection detecting system malfunction, Li-ion battery controller sends a high voltage harness connector connection malfunction information to VCM.

DTC Logic

INFOID:0000000007633913

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31E1	HV SYSTEM INTERLOCK ERROR (High voltage harness connection malfunction)	VCM receives the connection malfunction signal via EV system CAN communication sent from Li-ion battery controller.	• Harness and connector (Connection detecting circuit within Li-ion battery) • High voltage harness • Service plug

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-298, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM CONFIRMATION PROCEDURE-II

With CONSULT

1. Set the vehicle to READY at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-298, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633914

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**

- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1. CHECK SELF-DIAGNOSTIC RESULT IN LBC

Check self-diagnostic result in “HV BAT”.

Are any DTC detected?

YES >> Check the DTC. Refer to EVB-50, "DTC Index" (TYPE 1), EVB-258, "DTC Index" (TYPE 2), EVB-481, "DTC Index" (TYPE 3) or EVB-705, "DTC Index" (TYPE 4).

NO >> GO TO 2.

2. PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

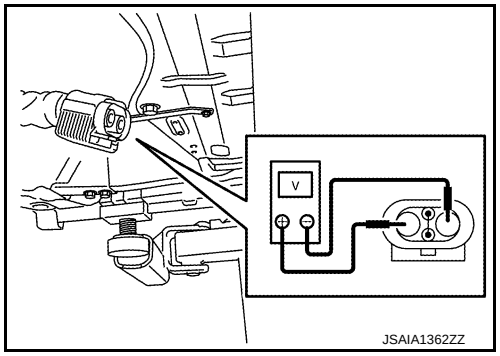
Check voltage in high voltage circuit. (Check that condenser are discharged.)

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-829, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.

DANGER:

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





Standard : 5 V or less

CAUTION:

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

>> GO TO 3.

3. CHECK HIGH VOLTAGE HARNESS CONNECTOR INSTALLATION

Check high voltage harness connectors installation condition visually and tactually.

CAUTION:

When reconnecting the high voltage harness connector, insert it slowly and directly.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK SERVICE PLUG

Check service plug connector terminals.

Service plug		Continuity
Terminal		
+	–	
3	4	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace service plug.

5. CHECK HIGH VOLTAGE HARNESS CONNECTOR

1. Disconnect high voltage harness connector from Li-ion battery.
2. Check high voltage harness connector visually and tactually.

Is the inspection result normal?

YES >> Check a circuit within the battery.
NO >> Replace high voltage harness.

P31E2 HIGH VOLTAGE CIRCUIT INTERLOCK ERROR

Description

INFOID:0000000007633915

VCM receives high voltage harness connector connection malfunction information via EV system CAN communication sent from on-board charger. When on-board charger detects the connection malfunction of high voltage harness or detects the connection detecting system malfunction, on-board charger sends a high voltage harness connector connection malfunction information to VCM.

DTC Logic

INFOID:0000000007633916

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31E2	HV SYSTEM INTERLOCK ERROR (High voltage harness connection malfunction)	VCM receives the connection malfunction signal via EV system CAN communication sent from on-board charger.	• High voltage harness • On-board charger • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch ON at least 5 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-301, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM CONFIRMATION PROCEDURE-II

With CONSULT

1. Set the vehicle to READY at least 10 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-301, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633917

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**

- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

CAUTION:

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

1. CHECK SELF-DIAGNOSTIC RESULT IN ON-BOARD CHARGER

Check self-diagnostic result in on-board charger.

Are any DTC detected?

YES >> Check the DTC. Refer to VC-27, "DTC Index".
NO >> GO TO 2.

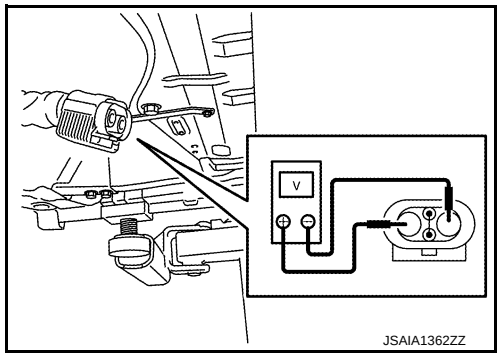
2. PRECONDITIONING

WARNING:

Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

1. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
2. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).
3. Measure voltage between high voltage harness connector terminals.



DANGER:

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



Standard : 5 V or less

CAUTION:

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

>> GO TO 3.

3. CHECK HIGH VOLTAGE HARNESS CONNECTOR INSTALLATION

Check high voltage harness connectors installation condition visually and tactually.

CAUTION:

When reconnecting the high voltage harness connector, insert it slowly and directly.

Is the inspection result normal?

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

4. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Erase DTC.
2. Turn power switch OFF and wait at least 20 seconds.
3. Perform DTC confirmation procedure again. Refer to EVC-301, "DTC Logic".

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31E7 RESTART INHIBITION

DTC Logic

INFOID:0000000007633918

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31E7	RESTART INHIBITION	VCM detects DTC “P0AA6”.	VCM detects DTC “P0AA6”.

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

NOTE:
This DTC is detected when VCM detects DTC “P0AA6”. If this DTC detected, perform trouble diagnosis for DTC “P0AA6”.

>> Proceed to EVC-303, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633919

Perform trouble diagnosis for DTC “P0AA6”. Refer to EVC-149, "DTC Logic".

P31E8 WATER PUMP 1

DTC Logic

INFOID:0000000007633920

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31E8	WATER PUMP 1	Electric water pump 1 feedback duty keeps either of the following conditions for 30 seconds. • Less than 2% • 98% or more • Between 13% and 17%	• Harness or connectors • Electric water pump 1 • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF and wait at least 60 seconds.
2. Set the vehicle to READY and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-304, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633921

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

Check self-diagnostic result in “EV/HEV”.

Is DTC detected other than P31E8?

YES >> Perform diagnosis procedure of detected DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK WATER PUMP 1 FEEDBACK DUTY-I

With CONSULT

1. Set the vehicle to READY.
2. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 1 CRNT SPD DUTY”.
3. Check “W/P 1 CRNT SPD DUTY” value.

Is value more than 98%?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK WATER PUMP 1 FEEDBACK DUTY-II

With CONSULT

Check “W/P 1 CRNT SPD DUTY” value.

Is value less than 2%?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK WATER PUMP 1 FEEDBACK DUTY-III

With CONSULT

1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 1 CRNT SPD DUTY” and “WATER PUMP 1 TRG DUTY”.
2. Check that “W/P 1 CRNT SPD DUTY” and “WATER PUMP 1 TRG DUTY” agree with the values listed below.

W/P 1 CRNT SPD DUTY	13 – 17%
WATER PUMP 1 TRG DUTY	20 – 80%

Are the above values satisfied?

YES >> GO TO 5.
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

5. CHECK WATER PUMP 1 SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect electric water pump 1 harness connector and VCM harness connector.
3. Check the continuity between electric water pump 1 harness connector and VCM harness connector.

Electric water pump 1		VCM		Continuity
Connector	Terminals	Connector	Terminals	
E67	3	E62	62	Existed
	4	E61	28	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK FUSE

1. Turn power switch OFF.
2. Pull out #71 fuse.
3. Make sure that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace the fuse after repairing the applicable circuit.

7. CHECK WATER PUMP 1 INPUT POWER VOLTAGE

1. Insert the fuse which pulled out.
2. Disconnect water pump 1 harness connector.
3. Turn power switch ON.
4. Check the voltage between water pump 1 harness connector and ground.

+		–	Voltage
Electric water pump 1			
Connector	Terminal		
E67	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> Replace electric water pump 1. Refer to HCO-24, "Removal and Installation".
NO >> GO TO 8.

8. CHECK WATER PUMP 1 INPUT POWER CIRCUIT-I

1. Turn power switch OFF.
2. Pull out #71 fuse.
3. Check the continuity between electric water pump 1 harness connector and fuse terminal.

+		–	Continuity
Electric water pump 1			
Connector	Terminal		
E67	1	#71 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK WATER PUMP 1 INPUT POWER CIRCUIT-II

1. Remove M/C relay.
2. Check the continuity between M/C relay harness connector and fuse terminal.

+		–	Continuity
M/C relay			
Connector	Terminal		
E65	5	#71 fuse terminal	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

P31E9 WATER PUMP 1

DTC Logic

INFOID:0000000007633922

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31E9	WATER PUMP 1	Electric water pump 1 feedback duty keeps between 83% and 91% for 30 seconds.	• Harness or connectors • Electric water pump 1 • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch OFF and wait at least 60 seconds.
2. Set the vehicle to READY and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-307, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633923

1.CHECK DTC

Perform self-diagnosis of VCM.

Is DTC detected other than P31E9?

YES >> Perform diagnosis procedure of detected DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK WATER PUMP 1 FEEDBACK DUTY

With CONSULT

On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 1 CRNT SPD DUTY”.

Is value between 83% and 91%?

YES >> GO TO 3.
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

3.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #71 fuse.
3. Make sure that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK WATER PUMP 1 INPUT POWER VOLTAGE

1. Insert the fuse which pulled out.
2. Disconnect water pump 1 harness connector.
3. Turn power switch ON.
4. Check the voltage between water pump 1 harness connector and ground.

+		–	Voltage
Electric water pump 1			
Connector	Terminal		
E67	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> Replace electric water pump 1. Refer to HCO-24, "Removal and Installation".
NO >> GO TO 5.

5. CHECK WATER PUMP 1 INPUT POWER CIRCUIT-I

1. Turn power switch OFF.
2. Pull out #71 fuse.
3. Check the continuity between electric water pump 1 harness connector and fuse terminal.

+		–	Continuity
Electric water pump 1			
Connector	Terminal		
E67	1	#71 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK WATER PUMP 1 INPUT POWER CIRCUIT-II

1. Remove M/C relay.
2. Check the continuity between M/C relay harness connector and fuse terminal.

+		–	Continuity
M/C relay			
Connector	Terminal		
E65	5	#71 fuse terminal	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

P31EA WATER PUMP 2

DTC Logic

INFOID:0000000007633924

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31EA	WATER PUMP 2	Electric water pump 2 feedback duty keeps either of the following conditions for 30 seconds. • Less than 2% • 98% or more • Between 13% and 17%	• Harness or connectors • Electric water pump 2 • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch OFF and wait at least 60 seconds.
2. Set the vehicle to READY and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-309, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633925

1.CHECK SELF-DIAGNOSTIC RESULT IN VCM

Check self-diagnostic result in “EV/HEV”.

Is DTC detected other than P31EA?

YES >> Perform diagnosis procedure of detected DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK WATER PUMP 2 FEEDBACK DUTY-I

With CONSULT

1. Set the vehicle to READY.
2. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 2 CRNT SPD DUTY”.
3. Check “W/P 2 CRNT SPD DUTY” value.

Is value more than 98%?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK WATER PUMP 2 FEEDBACK DUTY-II

With CONSULT

Check “W/P 2 CRNT SPD DUTY” value.

Is value less than 2%?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK WATER PUMP 2 FEEDBACK DUTY-III

With CONSULT

1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 2 CRNT SPD DUTY” and “WATER PUMP 2 TRG DUTY”.
2. Check that “W/P 2 CRNT SPD DUTY” and “WATER PUMP 2 TRG DUTY” agree with the values listed below.

W/P 2 CRNT SPD DUTY	13 – 17%
WATER PUMP 2 TRG DUTY	20 – 80%

Are the above values satisfied?

YES >> GO TO 5.
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

5.CHECK WATER PUMP 2 SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect electric water pump 2 harness connector and VCM harness connector.
3. Check the continuity between electric water pump 2 harness connector and VCM harness connector.

Electric water pump 2		VCM		Continuity
Connector	Terminals	Connector	Terminals	
E67	3	E62	62	Existed
	4	E61	28	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #72 fuse.
3. Make sure that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace the fuse after repairing the applicable circuit.

7.CHECK WATER PUMP 2 INPUT POWER VOLTAGE

1. Insert the fuse which pulled out.
2. Disconnect water pump 2 harness connector.
3. Turn power switch ON.
4. Check the voltage between water pump 2 harness connector and ground.

+		–	Voltage
Electric water pump 2			
Connector	Terminal		
E68	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> Replace electric water pump 2. Refer to HCO-24, "Removal and Installation".
NO >> GO TO 8.

8.CHECK WATER PUMP 2 INPUT POWER CIRCUIT-I

1. Turn power switch OFF.
2. Pull out #72 fuse.
3. Check the continuity between electric water pump 2 harness connector and fuse terminal.

+		–	Continuity
Electric water pump 2			
Connector	Terminal		
E68	1	#72 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK WATER PUMP 2 INPUT POWER CIRCUIT-II

1. Remove M/C relay.
2. Check the continuity between M/C relay harness connector and fuse terminal.

+		–	Continuity
M/C relay			
Connector	Terminal		
E65	5	#72 fuse terminal	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

P31EB WATER PUMP 2

DTC Logic

INFOID:0000000007633926

DTC DETECTION LOGIC

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31EB	WATER PUMP 2	Electric water pump 2 feedback duty keeps between 83% and 91% for 30 seconds.	• Harness or connectors • Electric water pump 2 • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch OFF and wait at least 60 seconds.
2. Set the vehicle to READY and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-312, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633927

1.CHECK DTC

Perform self-diagnosis of VCM.

Is DTC detected other than P31EB?

YES >> Perform diagnosis procedure of detected DTC. Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK WATER PUMP 2 FEEDBACK DUTY

With CONSULT

On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 2 CRNT SPD DUTY”.

Is value between 83% and 91%?

YES >> GO TO 3.
NO >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".

3.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #72 fuse.
3. Make sure that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK WATER PUMP 2 INPUT POWER VOLTAGE

1. Insert the fuse which pulled out.
2. Disconnect water pump 2 harness connector.
3. Turn power switch ON.
4. Check the voltage between water pump 2 harness connector and ground.

+		–	Voltage
Electric water pump 2			
Connector	Terminal		
E68	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> Replace electric water pump 2. Refer to HCO-24, "Removal and Installation".
NO >> GO TO 5.

5. CHECK WATER PUMP 2 INPUT POWER CIRCUIT-I

1. Turn power switch OFF.
2. Pull out #72 fuse.
3. Check the continuity between electric water pump 2 harness connector and fuse terminal.

+		–	Continuity
Electric water pump 2			
Connector	Terminal		
E68	1	#72 fuse terminal	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK WATER PUMP 2 INPUT POWER CIRCUIT-II

1. Remove M/C relay.
2. Check the continuity between M/C relay harness connector and fuse terminal.

+		–	Continuity
M/C relay			
Connector	Terminal		
E65	5	#72 fuse terminal	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform trouble diagnosis for M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

P31EC WATER PUMP 1

DTC Logic

INFOID:0000000007633928

DTC DETECTION LOGIC

NOTE:
This DTC may be detected where there is the mixing of air into coolant.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31EC	WATER PUMP 1	Electric water pump 1 feedback duty keeps between 3% and 7% for 30 seconds.	• Harness or connectors • Electric water pump 1 • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch OFF and wait at least 60 seconds.
2. Set the vehicle to READY and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-314, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633929

1.CHECK DTC

Perform self-diagnosis of VCM.

Is DTC detected other than P31EC?

YES >> Perform diagnosis procedure of detected DTC Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK WATER PUMP 1 FEEDBACK DUTY

On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 1 CRNT SPD DUTY”.

Is value between 3% and 7%?

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

3.CHECK COOLANT

1. Turn power switch OFF.
2. Check that the coolant is free from air mixture.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the air bleeding. Refer to HCO-11, "Draining and Refilling".

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Turn power switch ON and erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-314, "DTC Logic".

Is DTC “P31EC” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31ED WATER PUMP 2

DTC Logic

INFOID:0000000007633930

DTC DETECTION LOGIC

NOTE:
This DTC may be detected where there is the mixing of air into coolant.

DTC	Trouble diagnosis name	DTC detecting condition	Possible cause
P31ED	WATER PUMP 2	Electric water pump 2 feedback duty keeps between 3% and 7% for 30 seconds.	• Harness or connectors • Electric water pump 2 • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn power switch OFF and wait at least 60 seconds.
2. Set the vehicle to READY and wait at least 60 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-315, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633931

1.CHECK DTC

Perform self-diagnosis of VCM.

Is DTC detected other than P31ED?

YES >> Perform diagnosis procedure of detected DTC Refer to EVC-84, "DTC Index".
NO >> GO TO 2.

2.CHECK WATER PUMP 2 FEEDBACK DUTY

On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “W/P 2 CRNT SPD DUTY”.

Is value between 3% and 7%?

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

3.CHECK COOLANT

1. Turn power switch OFF.
2. Check that the coolant is free from air mixture.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the air bleeding. Refer to HCO-11, "Draining and Refilling".

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Turn power switch ON and erase DTC.
2. Perform DTC confirmation procedure again. Refer to EVC-315, "DTC Logic".

Is DTC “P31ED” detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31EE REFRIGERANT PRESSURE SENSOR

DTC Logic

INFOID:0000000007633932

DTC DETECTION LOGIC

NOTE:
If DTC P31EE is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EVC-113, "DTC Logic".

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31EE	REFRIGERANT PRESSURE SENSOR (Refrigerant pressure sensor circuit range/performance)	• Signal voltage from refrigerant pressure sensor remains Approx. 0 V for 2.5 seconds or more • Signal voltage from refrigerant pressure sensor remains Approx. 4.7 V or more for 2.5 seconds or more	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM CONFIRMATION PROCEDURE

With CONSULT
1. Turn power switch ON at least 20 seconds.
2. Check self-diagnostic result.

Is DTC detected?

YES >> Proceed to EVC-316, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633933

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY-I

1. Turn power switch OFF.
2. Disconnect refrigerant pressure sensor harness connector.
3. Turn power switch ON.
4. Check the voltage between refrigerant pressure sensor harness connector terminals.

Refrigerant pressure sensor			Voltage (Approx.)
Connector	+	–	
	terminal		
E49	3	1	5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY-II

Check the voltage between refrigerant pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
E49	3	Ground	5 V

Is the inspection result normal?

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

3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between refrigerant pressure sensor and VCM harness connector.

+		–		Continuity
Refrigerant pressure sensor		VCM		
Connector	Terminal	Connector	Terminal	
E49	3	E62	33	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check power supply circuit for sensor power supply. Refer to EVC-113, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between refrigerant pressure sensor and VCM harness connector.

+		–		Continuity
Refrigerant pressure sensor		VCM		
Connector	Terminal	Connector	Terminal	
E49	1	E62	35	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

7. REPLACE REFRIGERANT PRESSURE SENSOR

1. Replace refrigerant pressure sensor. Refer to HA-59, "REFRIGERANT PRESSURE SENSOR : Removal and Installation".
2. Reconnect all harness connector disconnected.
3. Turn power switch ON and erase DTC.
4. Perform DTC confirmation procedure again. Refer to EVC-316, "DTC Logic".

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

P31F0 DC/DC CONVERTER

DTC Logic

INFOID:0000000007633934

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31F0	DC/DC CONVERTER COMM LINE (DC/DC converter signal error)	VCM detects abnormal signal of DC/DC converter temperature for 2.5 seconds or more.	• Harness or connectors (DC/DC converter temperature signal circuit) • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn power switch ON and wait at least 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-319, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633935

1.CHECK DC/DC CONVERTER TEMPERATURE

With CONSULT

1. On the CONSULT screen, select “EV/HEV” >> “DATA MONITOR” >> “DC/DC CONV TEMP STATUS”.
2. Check that “DC/DC CONV TEMP STATUS”indicates a value other than “7”.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK VCM GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

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

3. CHECK DC/DC CONVERTER TEMPERATURE SIGNAL CIRCUIT

1. Disconnect DC/DC junction box harness connector.
2. Check the continuity between VCM harness connector and DC/DC junction box harness connector.

+		–		Continuity
VCM		DC/DC J/B		
Connector	Terminal	Connector	Terminal	
E62	67	F11	8	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

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

4. CHECK DC/DC JUNCTION BOX GROUND

1. Visually and tactually check DC/DC junction box negative terminal.
2. Disconnect DC/DC junction box negative terminal.
3. Check the continuity between DC/DC junction box negative terminal and ground.

+	–	Continuity
DC/DC J/B		
Terminal		
Negative terminal	Ground	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P31F2 AV INFORMATION MISMATCH

DTC Logic

INFOID:0000000007633936

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P31F2	AV SET INFORMATION (Timer malfunction)	• VCM detects a difference between VCM timer information and AV control unit timer information for 250 seconds. • Setting of timer charge does not succeed for 5 seconds after VCM receives a timer charge set signal.	• AV control unit • VCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

- Turn power switch OFF and wait at least 20 seconds.
- Make sure that 12V battery voltage is 11 V or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. Change the timer charge setting 1 on navigation display and wait at least 6 minutes.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-322, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. Change the timer charge setting 2 on navigation display and wait at least 6 minutes.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-322, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

With CONSULT

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. Change the timer air conditioner setting 1 on navigation display and wait at least 6 minutes.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-322, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-IV

1. Turn power switch OFF and wait at least 20 seconds.
2. Turn power switch ON.
3. Change the timer air conditioner setting 2 on navigation display and wait at least 6 minutes.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EVC-322, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000007633937

1. REPLACE AV CONTROL UNIT

1. Replace AV control unit. Refer to AV-110, "Removal and Installation".
2. Perform DTC confirmation procedure again. Refer to EVC-321, "DTC Logic".

Is the DTC detected again?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> INSPECTION END

COOLING FAN

Component Function Check

INFOID:0000000007633938

1.CHECK COOLING FAN FUNCTION

WITH CONSULT

1. Turn power switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-323, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633939

1.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY

1. Turn power switch OFF.
2. Disconnect cooling fan control module harness connector.
3. Turn power switch ON.
4. Check the voltage between cooling fan control module harness connector and ground.

+		–	Voltage
Cooling fan control module			
Connector	Terminal		
E19	3	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 2.

2.CHECK 12V BATTERY POWER SUPPLY

1. Turn power switch OFF.
2. Remove cooling fan relay.
3. Check the voltage between cooling fan relay harness connector and ground.

+		–	Voltage
Cooling fan relay			
Connector	Terminal		
E18	3	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check power supply circuit for battery power supply.

3.CHECK M/C RELAY OUTPUT VOLTAGE-I

1. Turn power switch ON.
2. Check the voltage between cooling fan relay harness connector and ground.

+		–	Voltage
Cooling fan relay			
Connector	Terminal		
E18	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 4.

4.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #73 fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace the fuse after repairing the applicable circuit.

5.CHECK M/C RELAY OUTPUT VOLTAGE-II

1. Turn power switch ON.
2. Check the voltage between fuse harness connector and ground.

+	–	Voltage
#73 fuse terminal	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.CHECK M/C RELAY OUTPUT CIRCUIT

1. Turn power switch OFF.
2. Remove M/C relay.
3. Check the continuity between M/C relay harness connector terminal and fuse harness connector.

+		–	Continuity
M/C relay			
Connector	Terminal		
E65	5	#73 fuse terminal	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check M/C relay routing circuit. Refer to EVC-327, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

7.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Check the continuity between cooling fan relay harness connector and fuse terminal.

+		–	Continuity
Cooling fan relay			
Connector	Terminal		
E18	1	#73 fuse terminal	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8.CHECK COOLING FAN RELAY GROUND CIRCUIT

1. Turn power switch OFF.

2. Check the continuity between cooling fan relay harness connector and ground.

+		–	Continuity
Cooling fan relay			
Connector	Terminal		
E18	2	Ground	Existed

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK COOLING FAN CONTROL MODULE INPUT POWER VOLTAGE

1. Check the continuity between cooling fan relay harness connector and cooling fan control module harness connector.

+		–		Continuity
Cooling fan control module		Cooling fan relay		
Connector	Terminal	Connector	Terminal	
E19	3	E18	5	Existed

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK COOLING FAN RELAY

Refer to EVC-326, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Replace cooling fan relay.

11. CHECK COOLING FAN RELAY GROUND CIRCUIT

1. Turn power switch OFF.
2. Check the continuity between cooling fan control module harness connector and ground.

+		–	Continuity
Cooling fan control module			
Connector	Terminal		
E19	1	Ground	Existed

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12. CHECK COOLING FAN MOTOR 1 AND 2

Check cooling fan motor. Refer to EVC-326, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace malfunctioning cooling fan motor. Refer to HCO-20, "Exploded View".

13. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect VCM harness connector.
2. Check the continuity between cooling fan control module harness connector and VCM harness connector.

+		–		Continuity
Cooling fan control module		VCM		
Connector	Terminal	Connector	Terminal	
E19	2	E62	59	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace error-detected parts.

14. REPLACE COOLING FAN CONTROL MODULE

1. Replace cooling fan control module. Refer to HCO-20, "Exploded View".
2. Erase the DTC.
3. Perform component function check. Refer to EVC-323, "Component Function Check".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace VCM. Refer to EVC-369, "Removal and Installation".

Component Inspection (Cooling Fan Motor)

INFOID:0000000007633940

1. CHECK COOLING FAN MOTOR

1. Turn power switch OFF.
2. Disconnect cooling fan control module harness connectors.
3. Supply cooling fan control module harness connector terminals with 12V battery voltage as per the following, and check operation.

Cooling fan control module				Operation
Motor	Connector	Terminal		
		+	–	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning cooling fan motor. Refer to HCO-20, "Exploded View".

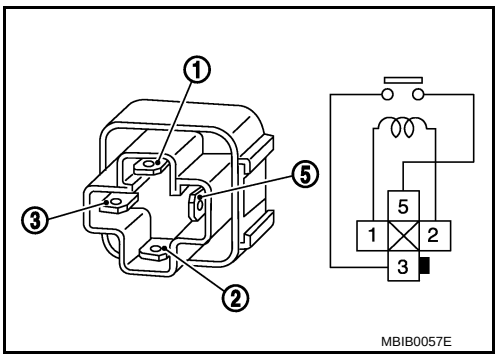
Component Inspection (Cooling Fan Relay)

INFOID:0000000007633941

1. CHECK COOLING FAN RELAY

1. Turn power switch OFF.
2. Remove cooling fan relay.
3. Check the continuity between cooling fan relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

M/C RELAY

Diagnosis Procedure

INFOID:0000000007633942

1.CHECK BATTERY POWER SUPPLY-I

1. Turn power switch OFF.
2. Disconnect M/C relay.
3. Check the voltage between M/C relay harness connector and ground.

+		–	Voltage
M/C relay			
Connector	Terminal		
E65	2	Ground	12V battery voltage
	3		

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK FUSIBLE LINK

1. Remove #G fusible link.
2. Check that the fusible link is not fusing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace the fusible link after repairing the applicable circuit.

3.CHECK BATTERY POWER SUPPLY-II

Check the voltage between fusible link harness connector and ground.

+	–	Voltage
#G fusible link terminal	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Check power supply circuit for battery power supply.

4.CHECK BATTERY POWER SUPPLY CIRCUIT-I

1. Check the continuity between M/C relay harness connector and fusible link harness connector.

+	–		Continuity
	M/C relay		
	Connector	Terminal	
#G fusible link terminal	E65	2	Existed
		3	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK M/C RELAY

Check M/C relay. Refer to EVC-328, "Component Inspection (M/C Relay)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace M/C relay.

6.CHECK M/C RELAY CONTROL SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between M/C relay harness connector and VCM harness connector.

+		–		Continuity
M/C relay		VCM		
Connector	Terminal	Connector	Terminal	
E65	1	E62	78	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

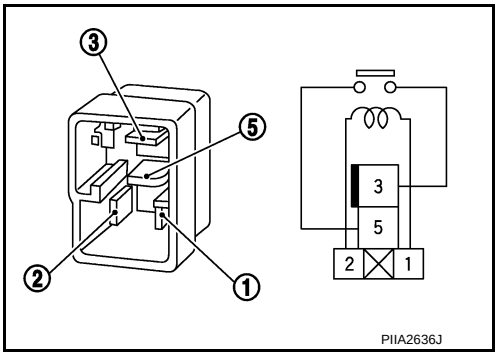
Component Inspection (M/C Relay)

INFOID:0000000007633943

1.CHECK M/C RELAY

1. Turn power switch OFF.
2. Remove M/C relay.
3. Check the continuity between M/C relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace M/C relay.

F/S CHG RELAY

Diagnosis Procedure

INFOID:0000000007633944

1.CHECK F/S CHG RELAY POWER SUPPLY-I

1. Turn power switch OFF.
2. Remove F/S CHG relay.
3. Turn power switch ON.
4. Check the voltage between F/S CHG relay harness connector and ground.

+		–	Voltage
F/S CHG relay			
Connector	Terminal		
E64	2	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK F/S CHG RELAY POWER SUPPLY-II

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E15	55	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check F/S relay routing circuit. Refer to EVC-286, "Diagnosis Procedure".

3.CHECK F/S CHG RELAY POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between F/S CHG relay harness connector and IPDM E/R harness connector.

+		–		Continuity
F/S CHG relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E64	2	E15	55	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.CHECK 12V BATTERY POWER SUPPLY-I

Check the voltage between F/S CHG relay harness connector and ground.

+		–	Voltage
F/S CHG relay			
Connector	Terminal		
E64	3	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #33 fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace the fuse after repairing the applicable circuit.

6.CHECK 12V BATTERY POWER SUPPLY-II

Check the voltage between #33 fuse harness connector and ground.

+	–	Voltage
#33 fuse terminal	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> Check power supply circuit for battery power supply.

7.CHECK BATTERY POWER SUPPLY CIRCUIT

1. Check the continuity between F/S CHG relay harness connector and #33 fuse harness connector.

+	–		Continuity
	F/S CHG relay		
	Connector	Terminal	
#33 fuse terminal	E64	3	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8.CHECK F/S CHG RELAY

Check F/S CHG relay. Refer to EVC-331, "Component Inspection (F/S CHG Relay)".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace F/S CHG relay.

9.CHECK F/S CHG RELAY CONTROL SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between F/S CHG relay harness connector and VCM harness connector.

+		–		Continuity
F/S CHG relay		VCM		
Connector	Terminal	Connector	Terminal	
E64	1	E62	75	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10.CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

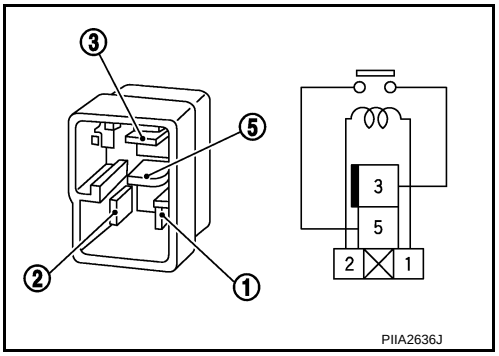
Component Inspection (F/S CHG Relay)

INFOID:0000000007633945

1.CHECK F/S CHG RELAY

1. Turn power switch OFF.
2. Remove F/S CHG relay.
3. Check the continuity between F/S CHG relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace F/S CHG relay.

SSOFF RELAY

Diagnosis Procedure

INFOID:0000000007633946

1.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #43 fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the fuse after repairing the applicable circuit.

2.CHECK BATTERY POWER SUPPLY-I

1. Insert the fuse which pulled out.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E14	41	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK BATTERY POWER SUPPLY-II

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E9	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK FUSIBLE LINK

1. Disconnect fusible link #D.
2. Check that the fusible link is not fusing.

Is the inspection result normal?

YES >> Check power supply circuit for battery power supply.
NO >> Replace the fusible link after repairing the applicable circuit.

5.CHECK SSOFF RELAY CONTROL CIRCUIT FOR SHORT TO GROUND

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check harness for short to ground, between IPDM E/R harness connector and VCM harness connector.

+		–	Continuity
IPDM E/R			
Connector	Terminal		
E14	41	Ground	Existed

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".

NO >> Repair or replace error-detected parts.

6.CHECK SSOFF RELAY CONTROL SIGNAL

1. Turn power switch ON.
2. Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage (Approx.)
IPDM E/R			
Connector	Terminal		
E14	41	Ground	0 V

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7.CHECK SSOFF RELAY CONTROL SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between IPDM E/R harness connector and VCM harness connector.

+		–		Continuity
IPDM E/R		VCM		
Connector	Terminal	Connector	Terminal	
E14	41	E61	7	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
IPDM E/R			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

10.CHECK SSOFF RELAY OUTPUT VOLTAGE

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E14	36	Ground	12V battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace IPDM E/R. Refer to PCS-29, "Removal and Installation".

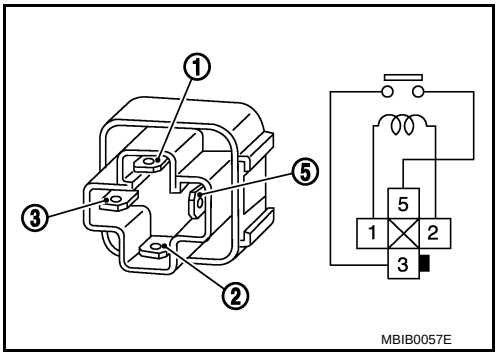
Component Inspection (SSOFF Relay)

INFOID:0000000007633947

1.CHECK SSOFF RELAY

1. Turn power switch OFF.
2. Remove SSOFF relay.
3. Check the continuity between SSOFF relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace SSOFF relay.

REVERSE LAMP RELAY

Component Function Check

INFOID:0000000007633948

1.CHECK REVERSE LAMP RELAY FUNCTION

1. Turn power switch ON.
2. Shift the selector lever in R position.
3. Check that the reverse lamp turns ON.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-335, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633949

1.CHECK POWER ON POWER SUPPLY-I

1. Shift the selector lever in P position.
2. Turn power switch OFF.
3. Remove reverse lamp relay.
4. Turn power switch ON.
5. Check the voltage between reverse lamp relay harness connector and ground.

+		–	Voltage
Reverse lamp relay			
Connector	Terminal		
E27	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK POWER ON POWER SUPPLY-II

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E15	58	Ground	12V battery voltage

Is the inspection result normal?

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

3.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #56 fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> Check power supply circuit for ignition power supply.
NO >> Replace the fuse after repairing the applicable circuit.

4.CHECK POWER ON POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between reverse lamp relay harness connector and IPDM E/R harness connector.

+		–		Continuity
Reverse lamp relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E27	1	E15	58	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

5.CHECK POWER ON POWER SUPPLY-II

Check the voltage between reverse lamp relay harness connector and ground.

+		–	Voltage
Reverse lamp relay			
Connector	Terminal		
E27	3	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.CHECK POWER ON POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between reverse lamp relay harness connector and IPDM E/R harness connector.

+		–		Continuity
Reverse lamp relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E27	3	E15	58	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK REVERSE LAMP RELAY

Refer to EVC-337, "Component Inspection (Reverse Lamp Relay)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace reverse lamp relay.

8.CHECK REVERSE LAMP RELAY CONTROL SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between reverse lamp relay harness connector and VCM harness connector.

+		–		Continuity
Reverse lamp relay		VCM		
Connector	Terminal	Connector	Terminal	
E27	2	E62	80	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace error-detected parts.

9.CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

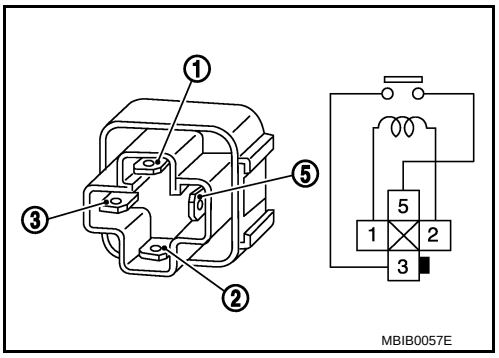
Component Inspection (Reverse Lamp Relay)

INFOID:0000000007633950

1.CHECK REVERSE LAMP RELAY

1. Turn power switch OFF.
2. Remove reverse lamp relay.
3. Check the continuity between reverse lamp relay terminals under the following conditions.

Terminals	Conditions	Continuity
3 and 5	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace reverse lamp relay.

A/C RELAY

Diagnosis Procedure

INFOID:0000000007633951

1.CHECK A/C RELAY POWER SUPPLY-I

1. Turn power switch OFF.
2. Remove A/C relay.
3. Turn power switch ON.
4. Check the voltage between A/C relay harness connector and ground.

+		–	Voltage
A/C relay			
Connector	Terminal		
E52	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK A/C RELAY POWER SUPPLY-II

Check the voltage between IPDM E/R harness connector and ground.

+		–	Voltage
IPDM E/R			
Connector	Terminal		
E14	36	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check SSOFF relay routing circuit. Refer to EVC-332, "Diagnosis Procedure".

3.CHECK A/C RELAY POWER SUPPLY CIRCUIT

1. Turn power switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between A/C relay harness connector and IPDM E/R harness connector.

+		–		Continuity
A/C relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E52	1	E14	36	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.CHECK 12V BATTERY POWER SUPPLY

Check the voltage between A/C relay harness connector and ground.

+		–	Voltage
A/C relay			
Connector	Terminal		
E52	3	Ground	12V battery voltage
	6		

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 5.

5. CHECK FUSE

1. Turn power switch OFF.
2. Pull out #32 fuse.
3. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace the fuse after repairing the applicable circuit.

6. CHECK 12V BATTERY POWER SUPPLY CIRCUIT

Check the continuity between A/C relay harness connector and fuse terminal.

+		–	Continuity
A/C relay			
Connector	Terminal		
E52	3	#32 fuse terminal	Existed
	6		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-51, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7. CHECK A/C RELAY

Refer to EVC-340, "Component Inspection (A/C Relay)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace A/C relay.

8. CHECK A/C RELAY CONTROL SIGNAL CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between A/C relay harness connector and VCM harness connector.

+		–		Continuity
A/C relay		VCM		
Connector	Terminal	Connector	Terminal	
E52	2	E61	5	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
IPDM E/R			
Connector	Terminal		
E61	4	Ground	Existed
	8		
E63	111		
	112		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

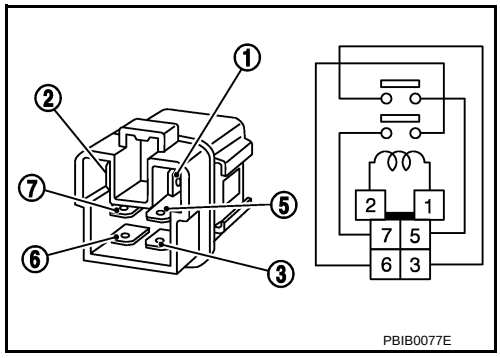
Component Inspection (A/C Relay)

INFOID:0000000007633952

1. CHECK A/C RELAY

1. Turn power switch OFF.
2. Remove A/C relay.
3. Check the continuity between A/C relay terminals under the following conditions.

Conditions	Terminals	Continuity
12 V direct current supply between terminals 1 and 2	3 – 5	Existed
	6 – 7	
No current supply	3 – 5	Not existed
	6 – 7	



PBIB0077E

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace A/C relay.

CHARGING STATUS INDICATOR

Component Function Check

INFOID:0000000007633953

1.CHECK CHARGING STATUS INDICATOR FUNCTION

With CONSULT

1. Turn power switch ON.
2. Select “CHARGE STAT INDICATOR 1” of “ACTIVE TEST” mode in “EV/HEV” with CONSULT.
3. Activate the charging status indicator 1 and check that the indicator illuminates.
4. Check charging status indicator 2 and 3 in the same way.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EVC-341, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000007633954

1.CHECK CHARGING STATUS INDICATOR CONTROL CIRCUIT

With CONSULT

1. Turn power switch OFF.
2. Disconnect charging status indicator.
3. Check the voltage between charging status indicator harness connector terminals.

Items	Charging status indicator			Voltage
	Connector	+	–	
		Terminal		
Charging status indicator 1	M101	4	1	0 V
Charging status indicator 2			2	
Charging status indicator 3			3	

4. Turn power switch ON.
5. Select “CHARGE STAT INDICATOR 1” of “ACTIVE TEST” mode in “EV/HEV” with CONSULT.
6. Activate the charging status indicator 1.
7. Check the voltage between charging status indicator harness connector terminals.
8. Check charging status indicator 2 and 3 in the same way.

Items	Charging status indicator			Voltage
	Connector	+	–	
		Terminal		
Charging status indicator 1	M101	4	1	12V battery voltage
Charging status indicator 2			2	
Charging status indicator 3			3	

Is the inspection result normal?

YES >> Replace charging status indicator. Refer to VC-121, "Removal and Installation".
NO >> GO TO 2.

2.CHECK CHARGING STATUS INDICATOR POWER SUPPLY

Check the voltage between charging status indicator harness connector and ground.

+		–	Voltage
Charging status indicator			
Connector	Terminal		
M101	4	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FUSE

1. Turn power switch OFF.
2. Pull out #11 fuse and check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repair the applicable circuit.

4.CHECK CHARGING STATUS INDICATOR POWER SUPPLY CIRCUIT

1. Check the continuity between charging status indicator and the fuse terminal.

+		–	Continuity
Charging status indicator			
Connector	Terminal		
M101	4	#11 fuse terminal	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check power supply circuit for battery power supply.
NO >> Repair or replace error-detected parts.

5.CHECK CHARGING STATUS INDICATOR GROUND CIRCUIT

1. Turn power switch OFF.
2. Disconnect VCM harness connector.
3. Check the continuity between charging status indicator harness connector and VCM harness connector.

Items	+		–		Continuity
	Charging status indicator		VCM		
	Connector	Terminal	Connector	Terminal	
Charging status indicator 1	M101	1	E63	86	Existed
Charging status indicator 2		2		85	
Charging status indicator 3		3		92	

4. Also check harness for short to ground and short to battery.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK VCM GROUND CIRCUIT

Check the continuity between VCM harness connector and ground.

+		–	Continuity
VCM			
Connector	Terminal		
E63	4	Ground	Existed
	8		
	111		
	112		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-51, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace VCM. Refer to EVC-369, "Removal and Installation".
NO >> Repair or replace error-detected parts.

IMMEDIATE CHARGING SWITCH

Diagnosis Procedure

INFOID:0000000007633955

1.CHECK IMMEDIATE CHARGING SWITCH ILLUMINATION FUNCTION

1. Turn power switch ON.
2. Turn ON the headlamp.
3. Check that the immediate charging switch illumination lights up.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK IMMEDIATE CHARGING SWITCH ILLUMINATION POWER SUPPLY

Check the voltage between immediate charging switch and ground.

+		–	Voltage
Immediate charging switch			
Connector	Terminal		
M65	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK FUSE

1. Turn power switch OFF.
2. Turn OFF the headlamp.
3. Pull out #47 fuse.
4. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace the fuse after repair the applicable circuit.

4.CHECK IMMEDIATE CHARGING SWITCH ILLUMINATION POWER SUPPLY CIRCUIT

1. Disconnect immediate charging switch harness connector.
2. Check the continuity between immediate charging switch harness connector and fuse harness connector.

+		–	Continuity
Immediate charging switch			
Connector	Terminal		
M65	3	#47 fuse terminal	Existed

Is the inspection result normal?

YES >> Check power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK IMMEDIATE CHARGING SWITCH GROUND CIRCUIT

1. Turn power switch OFF.
2. Turn OFF the headlamp.
3. Disconnect immediate charging switch harness connector.
4. Check the continuity between immediate charging switch harness connector and ground.

+		–	Continuity
Immediate charging switch			
Connector	Terminal		
M65	4	Ground	Existed

Is the inspection result normal?

YES >> Replace immediate switch. Refer to VC-120, "Removal and Installation".
NO >> Repair or replace error-detected parts.

6. CHECK IMMEDIATE CHARGING SWITCH POWER SUPPLY

1. Turn power switch OFF.
2. Turn OFF the headlamp.
3. Disconnect immediate charging switch harness connector.
4. Check the voltage between immediate charging switch harness connector and ground.

+		–	Voltage
Immediate charging switch			
Connector	Terminal		
M65	1	Ground	12V battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 7.

7. CHECK FUSE

1. Pull out #13 fuse.
2. Check that the fuse is not fusing.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace the fuse after repair the applicable circuit.

8. CHECK IMMEDIATE CHARGING SWITCH POWER SUPPLY CIRCUIT

Check the continuity between immediate charging switch harness connector and fuse harness connector.

+		–	Continuity
Immediate charging switch			
Connector	Terminal		
M65	1	#13 fuse terminal	Existed

Is the inspection result normal?

YES >> Check power supply circuit.
NO >> Repair or replace error-detected parts.

9. CHECK IMMEDIATE CHARGING SWITCH SIGNAL CIRCUIT

1. Disconnect VCM harness connector.
2. Check the continuity between immediate charging switch harness connector and VCM harness connector.

+		–		Continuity
Immediate charging switch		VCM		
Connector	Terminal	Connector	Terminal	
M65	1	E63	89	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

10. CHECK IMMEDIATE CHARGING SWITCH

Perform component inspection. Refer to EVC-346, "Component Inspection (Immediate Charging Switch)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace immediate charging switch. Refer to VC-120, "Removal and Installation".

Component Inspection (Immediate Charging Switch)

INFOID:0000000007633956

1. CHECK IMMEDIATE CHARGING SWITCH

1. Turn power switch OFF.
2. Disconnect immediate charging switch harness connector.
3. Check the continuity between immediate charging switch terminals under the following conditions.

Terminals	Condition		Continuity
1 and 2	Immediate charging switch	Released	Not existed
		Pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace immediate charging switch. Refer to VC-120, "Removal and Installation".

SYMPTOM DIAGNOSIS

EV CONTROL SYSTEM

Symptom Index

INFOID:0000000007633957

NOTE:
- Perform self-diagnoses with CONSULT before performing the symptom diagnosis.
- If any DTC is detected, perform the corresponding diagnosis.

Symptom	Reference page
READY status cannot be achieved.	EVC-348, "READY Status Cannot Be Achieved"
Unable to travel.	EVC-349, "Unable to Travel"
Low electrical consumption	EVC-350, "Low Electrical Consumption"
Power switch does not turn OFF.	EVC-351, "Power Switch Does Not Turn OFF"
No regeneration	EVC-352, "No Regeneration"
Decelerating force changes	EVC-353, "Decelerating Force Changes"
Normal charge does not start.	EVC-354, "Normal Charge Does Not Start"
Timer charge and remote control charge does not start.	EVC-356, "Timer Charge and Remote Charge Does Not Start"
Immediate charge does not start.	EVC-356, "Immediate Charge Does Not Start"
Normal charge is not completed.	EVC-356, "Normal Charge Is Not Completed"
Quick charge does not start.	EVC-357, "Quick Charge Does Not Start"
Quick charge is not completed.	EVC-357, "Quick Charge Is Not Completed"
Full charge cannot be achieved.	EVC-358, "Full Charge Cannot Be Achieved"
Timer air conditioner does not start.	EVC-358, "Timer Air Conditioner Does Not Start"
Remote air conditioner does not start.	EVC-359, "Remote Air Conditioner Does Not Start"

READY Status Cannot Be Achieved

INFOID:0000000007633958

Symptom			Possible cause	Action
READY status cannot be achieved.	READY condition are not satisfied	BCM does not output a READY signal.	Abnormal stop lamp switch.	EVC-179, "Component Function Check"
			Abnormal stop lamp switch signal line.	Check the signal line between stop lamp switch and BCM.
			Abnormal power switch	PCS-60, "Component Function Check"
			Abnormal power switch signal line.	Check the signal line between BCM and VCM.
		A READY signal is not input to VCM.	Abnormal READY signal line	Check the signal line between BCM and VCM.
		VCM recognizes that the selector lever is in a range other than P and N.	Electric shift control system error.	Perform self-diagnosis of Electric shift control module.
		VCM recognizes that the charge connector is connected.	• Abnormal normal charge connector connection detection circuit. • Abnormal quick charge connector connection detection circuit.	Perform self-diagnosis of On-board charger.
		Fail-safe of VCM prohibits READY.	EV control system error.	Perform self-diagnosis of VCM.
		VCM recognizes that Li-ion battery remaining energy is low.	Li-ion battery remaining energy is low.	Charge Li-ion battery.
			Abnormal LBC.	Perform self-diagnosis of LBC.
		VCM recognizes that steering lock is not released.	Abnormal steering lock mechanism.	Check steering lock system.
	The READY to drive indicator lamp does not turn ON despite READY state.		• Abnormal combination meter. • Abnormal LED. • Abnormal VCM.	Perform ACTIVE TEST of VCM to check the READY to drive indicator lamp. Refer to EVC-55, "CONSULT Function".

Unable to Travel

INFOID:0000000007633959

Symptom			Possible cause	Action
Unable to travel.	Drive force is not generated.	VCM recognizes that the accelerator pedal is not depressed.	Abnormal accelerator pedal position sensor.	EVC-182, "Diagnosis Procedure"
		VCM recognizes that brake pedal is depressed.	• Abnormal stop lamp switch. • Abnormal stop lamp switch signal line.	EVC-172, "Diagnosis Procedure"
		An output limit request signal of TCS/VDC/ABS is receiced.	TCS/VDC/ABS system error.	Perform self-diagnosis of ABS actuator and electric unit (control unit).
		Traction motor inverter requests the output limit.	Traction motor system error.	Check the “POWER LIMIT CAUSE” in DATA MONITOR item of VCM.
		LBC requests the output limit.	LBC system error.	
		Fail-safe of VCM prohibits READY.	EV control system error.	Perform self-diagnosis of VCM.
		Motor output is not conveyed to drive wheels.	Abnormal reduction gear.	Check reduction gear.
	Braking force is generated.	Brake applied.	Brake dragging.	Check for brake dragging.
		A brake signal is input to ABS actuator and electric unit (control unit).	Abnormal stop lamp switch signal line.	Check the signal line between stop lamp switch and ABS actuator and electric unit (control unit).
		Parking lock is ON.	• Abnormal electric shift control module. • Abnormal parking actuator.	Perform self-diagnosis of Electric shift control module.

Low Electrical Consumption

INFOID:0000000007633960

Symptom			Possible cause	Action
Low electrical consumption	Traction motor requires a large amount of power.	Running resistance of tires is high.	Low tire pressure.	Adjust tire pressure.
			Tire size is not of standard size.	Install standard-size tires.
		Parking brake is applied.	• Abnormal electric parking brake control module. • Abnormal parking brake actuator.	Perform self-diagnosis of Electric parking brake control module.
		Parking brake is applied.	Brake dragging.	Check reduction dragging.
		Sliding resistance of reduction gear is high.	Abnormal reduction gear.	Check reduction gear.
	Air conditioner requires a large amount of power.	Electric compressor requires a large amount of power.	The set temperature is low.	Adjust the set temperature.
			Abnormal A/C auto amp.	Perform self-diagnosis of A/C auto amp.
		PTC elements heater requires a large amount of power.	The set temperature is high.	Adjust the set temperature.
			Abnormal A/C auto amp.	Perform self-diagnosis of A/C auto amp.
	Auxiliaries requires a large amount of power.		High-capacity auxiliaries is connected.	Check vehicle condition.
	Low efficient Li-ion battery.		Incorrect service plug connection.	Check installation condition of the service plug.
	Lower energy storage, compared to meter indication.	Battery charge level at full charge is low.	Low Li-ion battery cell capacity.	Perform inspection according to the diagnosis procedure of DTC P33E6 of EV battery control system. Refer to EVB-138, "Diagnosis Procedure" (TYPE 1), EVB-347, "Diagnosis Procedure" (TYPE 2), EVB-573, "Diagnosis Procedure" (TYPE 3), EVB-798, "Diagnosis Procedure" (TYPE 4).
			Li-ion battery charged with its temperature low.	Charge Li-ion battery with its room-temperature condition.
	Available driving range becomes shorter.		Abnormal Li-ion battery.	Perform EV battery control system diagnosis by symptom. Refer to EVB-159, "Diagnosis Procedure" (TYPE 1), EVB-375, "Diagnosis Procedure" (TYPE 2), EVB-595, "Diagnosis Procedure" (TYPE 3), EVB-827, "Diagnosis Procedure" (TYPE 4).
			Low Li-ion battery cell capacity.	Perform inspection according to the diagnosis procedure of DTC P33E6 of EV battery control system. Refer to EVB-138, "Diagnosis Procedure" (TYPE 1), EVB-347, "Diagnosis Procedure" (TYPE 2), EVB-573, "Diagnosis Procedure" (TYPE 3), EVB-798, "Diagnosis Procedure" (TYPE 4).

Power Switch Does Not Turn OFF

INFOID:0000000007633961

Symptom			Possible cause	Action
Power switch does not turn OFF.	VCM recognizes that the power switch is not OFF.	Power is continuously supplied to the power ON power supply terminal of VCM.	Short circuit between the power ON power supply circuit of VCM and power.	Check the power ON power supply circuit.
			Abnormal IPDM E/R.	Perform self-diagnosis of IPDM E/R.
			Abnormal BCM.	Perform self-diagnosis of BCM.
			Abnormal power switch.	PCS-60, "Component Function Check"
			Abnormal SSOFF relay.	EVC-332, "Diagnosis Procedure"
	An EV system activation request signal is continuously received from TCU.		• Abnormal EV system activation request signal circuit between VCM and TCU. • Abnormal TCU.	EVC-266, "Diagnosis Procedure"
	An EV system activation request signal is continuously received from On-board charger.		• Abnormal EV system activation request signal circuit between VCM and On-board charger. • Abnormal On-board charger.	EVC-264, "Diagnosis Procedure"
	Immediate charging switch signal is continuously received.		• Abnormal immediate charging switch signal circuit. • Abnormal immediate charging switch.	VC-98, "Diagnosis Procedure"

No Regeneration

INFOID:0000000007633962

Symptom			Possible cause	Action
No regeneration	The amount of regeneration is limited.	Drive motor inverter limits output.	Fail-safe of traction motor inverter.	TMS-32, "Fail-Safe"
			The temperature of traction motor or traction motor inverter is high.	Check the “POWER LIMIT CAUSE” in the DATA MONITOR item of VCM.
		LBC limits output.	Fail-safe of LBC.	EVB-45, "Fail-safe" (TYPE 1), EVB-253, "Fail-safe" (TYPE 2), EVB-476, "Fail-safe" (TYPE 3), EVB-700, "Fail-safe" (TYPE 4).
			Damaged bus bar (connecting part of Li-ion battery module).	Check bus bar.
			Degradation in Li-ion battery temperature sensor characteristics.	Check the “POWER LIMIT CAUSE” in the DATA MONITOR item of VCM.
			The temperature of Li-ion battery is too high/low.	
			Li-ion battery is fully charged.	Normal operation.
		ABS actuator and electric unit (control unit) limits output.	ABS operates.	Normal operation.
		Electrically-driven intelligent brake unit limits output.	Fail-safe of electrically-driven intelligent brake unit.	BR-26, "Fail-Safe"
	The regeneration prohibit conditions are satisfied.	ABS actuator and electric unit (control unit) limits output.	VDC operates.	Normal operation.
		—	Vehicle speed is 14 km/h (9 MPH) or less.	Normal operation.
		—	Accelerator pedal is depressed.	Normal operation.
		—	Under full braking.	Normal operation.
	The amount of target regeneration changes.	Selector lever range position is changed.	• Range changes from ECO to D. • Range changes to N.	Normal operation.
		—	Brake applied during sharp turn.	Normal operation.
		—	Slip detected during ECO mode.	Normal operation.

Decelerating Force Changes

INFOID:0000000007633963

Symptom			Possible cause	Action
Deceleration G changes.	The amount of regeneration is limited.	Traction motor inverter limits output.	Fail-safe of traction motor inverter.	TMS-32, "Fail-Safe"
			The temperature of traction motor or traction motor inverter is high.	Check the “POWER LIMIT CAUSE” in the DATA MONITOR of VCM.
		LBC limits output.	Fail-safe of LBC.	EVB-45, "Fail-safe" (TYPE 1), EVB-253, "Fail-safe" (TYPE 2), EVB-476, "Fail-safe" (TYPE 3), EVB-700, "Fail-safe" (TYPE 4).
			Damaged bus bar (connecting part of Li-ion battery module).	Check bus bar.
			Degradation in Li-ion battery temperature	Check the “POWER LIMIT CAUSE” in the DATA MONITOR of VCM.
			The temperature of Li-ion battery is too high/low.	
			Li-ion battery is fully charged.	Normal operation.
	The amount of target regeneration changes.	Selector lever range position is changed.	Range changes from D to ECO or from ECO to D.	Normal operation.
		—	Accelerator pedal is depressed.	Normal operation.

Normal Charge Does Not Start

INFOID:0000000007633964

Symptom			Possible cause	Action
normal charge does not start.	Normal charge start conditions are not satisfied.	VCM recognizes that the selector lever is in a range other than P range.	Electric shift system error.	Perform self-diagnosis of Electric shift control module.
		—	Power switch is not OFF.	Normal operation.
		—	VCM receives a charge stop request signal from on-board charger.	Check to see if charge stop conditions are satisfied. Refer to EVC-40, "LI-ION BATTERY CHARGE CONTROL : Normal Charge Control".
		VCM recognizes that quick charge connector and normal charge connector are connected simultaneously.	Abnormal connection detection circuit of quick charge port.	Check quick charge port.
			Abnormal on-board charger.	Perform self-diagnosis of On-board charger.
		VCM prohibits charging.	Fail-safe of VCM.	EVC-79, "Fail-Safe"
		VCM recognizes that normal charge connector is not connected.	Abnormal connection detection circuit of normal charge port.	Check normal charge port.
			Abnormal on-board charger.	Perform self-diagnosis of on-board charger.
		VCM recognizes that a PWM signal is not received from EVSE.	AC power, no input. (Disconnect from outlet)	Check outlet.
			AC power, no input. (Blackout)	Check AC power.
			EVSE does not transmit a PWM signal.	Perform self-diagnosis of on-board charger.
			Abnormal on-board charger.	
		—	Timer charge is set.	• Cancel timer charge setting. • Turn ON the immediate charging switch.
	Judged as fully-charged.	—	Li-ion battery is fully charged.	Normal operation.
	EVSE does not activate.		EVSE detects electric leakage	• Plug EVSE alone into an outlet (AC source) and check that the **"Fault"** lamp on EVSE does **not blink**. If the lamp blinks, replace EVSE. • Check that no electric leakage exists between EVSE control box and on-board charger or in the on-board charger itself.
			EVSE has a malfunction	Plug EVSE alone into an outlet (AC source) and check that the **"Fault"** lamp of EVSE does **not turn ON**. If the lamp turns ON, replace EVSE.
			EVSE not energized	Plug EVSE alone into an outlet (AC source) and check that the **"Ready"** lamp of EVSE **turns ON**. If the lamp does not turn ON, replace EVSE.
			EVSE communication line has a malfunction	Plug EVSE alone into an outlet (AC source) and check that the **"Fault"** lamp on EVSE does **not blink**. If the lamp blinks, replace EVSE.

Timer Charge and Remote Charge Does Not Start

INFOID:0000000007633965

Symptom			Possible cause	Action
Timer charge or remote charge does not start.	The timer charge start conditions are not satisfied.	—	Timer charge is not set.	Set timer charge.
	The remote charge start conditions are not satisfied.	Remote charge request is not sent to the Information Center (Nissan CARWINGS Data Center).	The request is sent from an out of service area.	Send a remote charge request in a service area.
		Remote control charge request is not sent from the Information Center (Nissan CARWINGS Data Center).	The vehicle is located an out of service area.	Send a remote charge request in a service area.

Immediate Charge Does Not Start

INFOID:0000000007633966

Symptom			Possible cause	Action
Immediate charge does not start.	Immediate charge start condition are not satisfied.	—	Timer charge is set.	Turn ON the immediate charging switch.
		The operation of immediate charging switch does not start immediate charge.	Power switch is ON.	Turn power switch OFF.
			A lapse of more than 15 minutes to connect the charge connector after operating the immediate charging switch.	Connect charge connector within 15 minutes after operating the immediate charging switch.
			• Abnormal immediate charging switch. • Abnormal immediate charging switch signal circuit.	EVC-344, "Diagnosis Procedure"

Normal Charge Is Not Completed

INFOID:0000000007633967

Symptom		Possible cause	Action
Normal charge is not completed.	Normal charge is not completed despite full charge.	Abnormal LBC.	Perform self-diagnosis of LBC.
	Timer charge is not completed.	Timer charge end time is not set.	Set timer charge end time.

Quick Charge Does Not Start

INFOID:0000000007633968

Symptom			Possible cause	Action
Quick charge does not start.	Quick charge start conditions are not satisfied.	VCM recognizes that the selector lever is in a range other than P range.	Electric shift system error.	Perform self-diagnosis of electric shift control module.
		—	Power switch is not OFF.	Normal operation.
		—	VCM receives a charge stop request signal from on-board charger.	Check that charging condition is normal.
		VCM recognizes that the quick charge connector and the normal charge connector are simultaneously connected.	Abnormal connection detection circuit of normal charge port.	Check normal charge port.
			Abnormal on-board charger.	Perform self-diagnosis of on-board charger.
		VCM prohibits charging.	Fail-safe of VCM.	EVC-79, "Fail-Safe"
		VCM recognizes that the quick charge connector is not connected.	Abnormal connection detection circuit of quick charge port.	Check quick charge port.
			Abnormal on-board charger.	Perform self-diagnosis of on-board charger.
	Quick charger does not permit quick charge.	Quick charger detects insulation resistance degradation in high voltage circuit.	Insulation resistance degradation between DC/DC-J/B and quick charger.	• Check DC/DC-J/B. • Check high voltage harness. • Check quick charge port. • Check quick charger.

Quick Charge Is Not Completed

INFOID:0000000007633969

Symptom		Possible cause	Action
Quick charge is not completed.	Charging is not completed despite full charge.	Abnormal LBC.	Perform self-diagnosis of LBC.
	VCM does not receive a quick charge stop request signal.	Quick charger communication error.	Perform self-diagnosis of on-board charger.

Full Charge Cannot Be Achieved

INFOID:0000000007633970

Symptom			Possible cause	Action
Full charge cannot be achieved.	—	—	The setting of the timer charge charging rate is 80%.	Set charging rate to 100%
			Implementation of quick charge under a low Li-ion battery level.	Perform quick charge again.
	Charge power is low or charging stops.	Power consumption is large during charge.	A/C power consumption is large.	Refer to EVC-350, "Low Electrical Consumption".
			Power consumption of auxiliaries is large.	
		Charge power is limited.	Charge Insulation Resistance Loss Protection Control is active (except for VCM group A and B)*.	Perform inspection according to the diagnosis procedure of DTC P3141. Refer to EVC-217, "DTC Logic".
	Target charge level differs from the meter indication.	Indication decreases after the completion of charge.	Temperature change in Li-ion battery.	Normal operation. **NOTE:** Charge level depends on Li-ion battery temperature. For meter indication method, refer to MWI-26, "LI-ION BATTERY AVAILABLE CHARGE GAUGE : System Description".
		Meter indication does not reach max.	LED malfunction	MWI-50, "On Board Diagnosis Function"
		Charge level shown by the quick charger differs from meter indication.	**NOTE:** Charge level calculation method of meter differs from that of quick charger. This may cause different indication.	Normal operation.
	Charge level is low.	Chargeable electricity is limited.	LBC limits chargeable electricity.	Check “POWER LIMIT CAUSE” of DATA MONITOR item in VCM.

*: For VCM groups, refer to EVC-8, "How to Check VCM Group".

Timer Air Conditioner Does Not Start

INFOID:0000000007633971

Symptom			Possible cause	Action
Timer A/C does not start.	Timer A/C start conditions are not satisfied.		Timer A/C is not set.	Set timer A/C.
			remote A/C is set.	Normal operation. **NOTE:** If timer A/C and remote A/C are requested simultaneously, remote A/C is prioritized.
			EVSE is not connected.	Connect EVSE.
	A/C system does not start.	A/C auto amp. does not recognize timer A/C.	Abnormal A/C auto amp.	Perform self-diagnosis of A/C auto amp.
		—	Abnormal A/C system power supply.	HAC-117, "A/C AUTO AMP. : Diagnosis Procedure"

Remote Air Conditioner Does Not Start

INFOID:0000000007633972

Symptom			Possible cause	Action
Remote A/C does not start.	Remote A/C start conditions are not satisfied.	—	Li-ion battery level is low.*	• Connect EVSE. • Charge Li-ion battery.
		A remote A/C request signal cannot be received.	Remote A/C request is sent in an out of service area.	Send remote A/C request again in a service area.
			The vehicle is located in out of service area.	
	A/C system does not start.	A/C auto amp. does not recognize remote A/C.	Abnormal A/C auto amp.	Perform self-diagnosis of A/C auto amp.
		—	Abnormal A/C system power.	HAC-117, "A/C AUTO AMP. : Diagnosis Procedure"

*: Only during no AC power input.

NORMAL OPERATING CONDITION

Description

INFOID:0000000008525528

NOTE:
Protection control is applied to VCM other than those in Group A or Group B. For VCM groups, refer to EVC-8, "How to Check VCM Group".

CHARGE INSULATION RESISTANCE LOSS PROTECTION CONTROL

When the insulation resistance of the high voltage circuit decreases while charging due to a temporary cause, VCM limits the charging energy and waits until the insulation resistance state recovers. VCM restarts charging after the recovery of the insulation resistance status. If the situation is not improved after several repetitions of this control, VCM stops charging and detects DTC P3141.

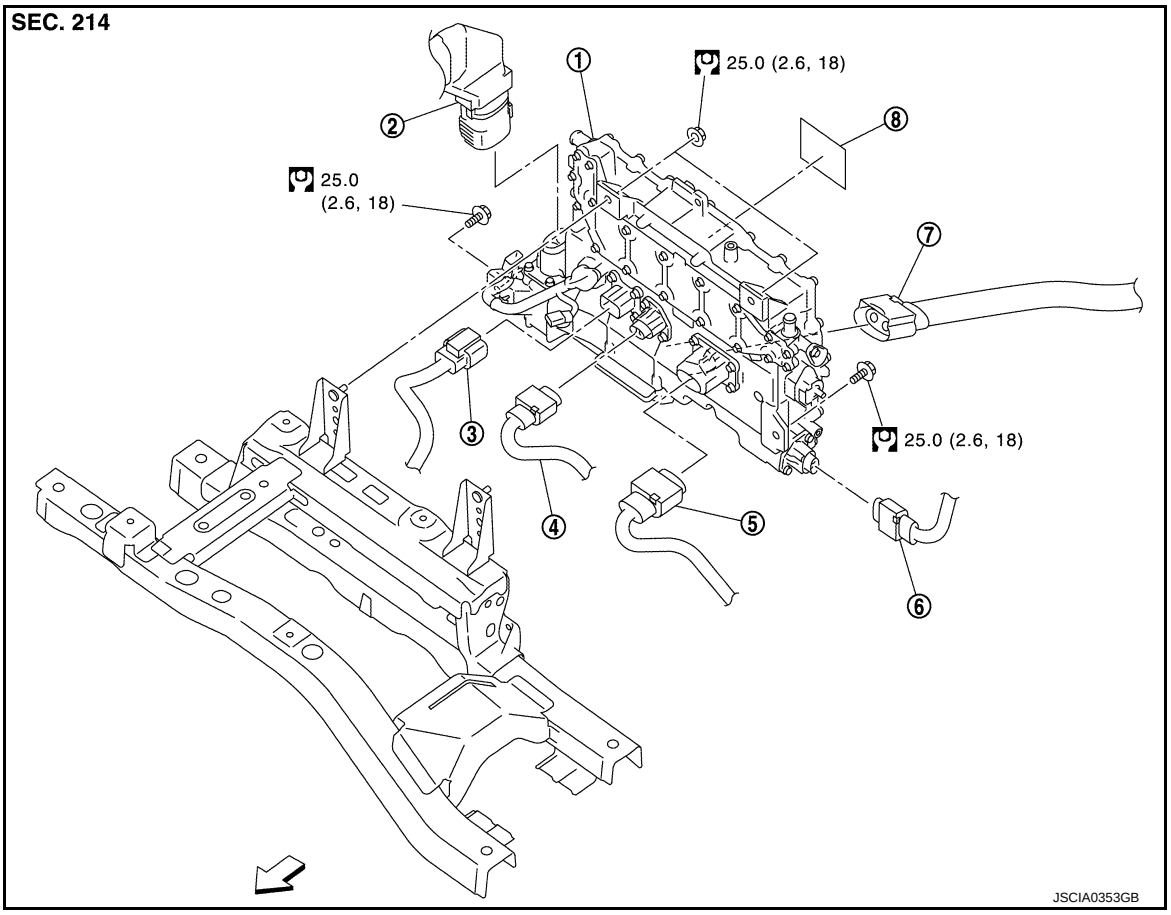
NOTE:
If the insulation resistance status does not recover despite the limitation of charging energy under protection control, DTC P0AA6 is detected.

REMOVAL AND INSTALLATION

DC/DC-J/B

Exploded View

INFOID:0000000007633973



1.	DC/DC-J/B	2.	Traction motor inverter high voltage connector	3.	Electric compressor high voltage connector
4.	PTC elements heater high voltage connector	5.	Quick charge port high voltage connector	6.	On board charger high voltage connector
7.	Li-ion battery high voltage connector	8.	High voltage warning label		

⇦ : Vehicle front

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000007633974

WARNING:

- **Because hybrid vehicles and electric vehicles contain a high voltage battery, there is the risk of electric shock, electric leakage, or similar accidents if the high voltage component and vehicle are handled incorrectly. Be sure to follow the correct work procedures when performing inspection and maintenance.**
- **Be sure to remove the service plug in order to disconnect the high voltage circuits before performing inspection or maintenance of high voltage system harnesses and parts.**
- **To prevent the removed service plug from being connected by mistake during the procedure, always carry it in your pocket or put it in the tool box.**
- **Be sure to wear insulating protective equipment consisting of glove, shoes, face shield and glasses before beginning work on the high voltage system.**

- **Clearly identify the persons responsible for high voltage work and ensure that other persons do not touch the vehicle. When not working, cover high voltage parts with an insulating cover sheet or similar item to prevent other persons from contacting them.**
- **Refer to EVC-11, "High Voltage Precautions".**

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

REMOVAL

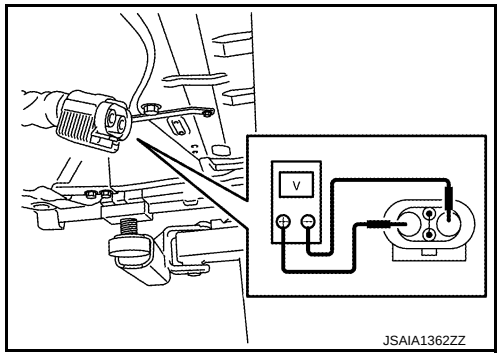
WARNING:
Disconnect high voltage. Refer to GI-31, "How to Disconnect High Voltage".

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

a. Lift up the vehicle and remove the Li-ion battery under covers. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).

b. Disconnect high voltage harness connector from front side of Li-ion battery. Refer to EVB-161, "Removal and Installation" (TYPE 1), EVB-377, "Removal and Installation" (TYPE 2), EVB-597, "Removal and Installation" (TYPE 3) or EVB-829, "Removal and Installation" (TYPE 4).

c. Measure voltage between high voltage harness connector terminals.



DANGER:

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

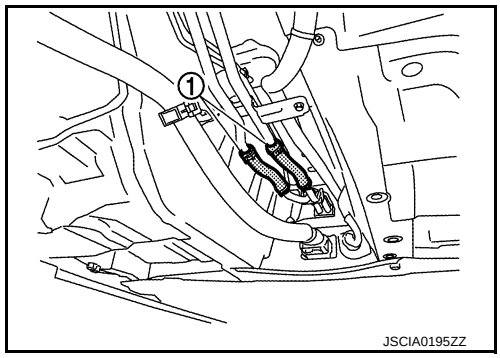


Standard : 5 V or less

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

2. Drain coolant from radiator. Refer to HCO-11, "Draining and Refilling".
3. Drain heater fluid. Refer to HA-43, "Draining and Refilling".
4. Remove traction motor inverter. Refer to TMS-115, "Removal and Installation".
5. Remove cowl top extension. Refer to EXT-19, "Exploded View".
6. Disconnect water hoses from the locations indicated below.

a. Disconnect water hose (1) below the floor.



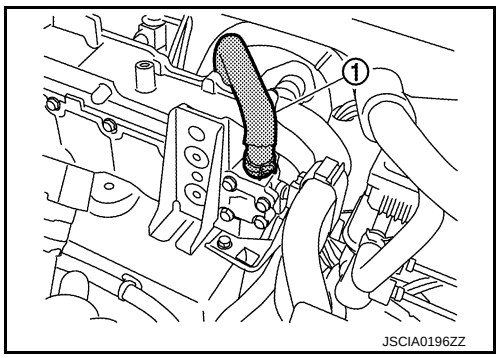
WARNING:

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



CAUTION:
- **Take care that coolant does not contact the high voltage harness connectors.**
- **If coolant contacts a high voltage harness connector, immediately dry the high voltage connector completely with an air blow gun.**

b. Disconnect water hose (1) at DC/DC-J/B IN side (top left).



WARNING:

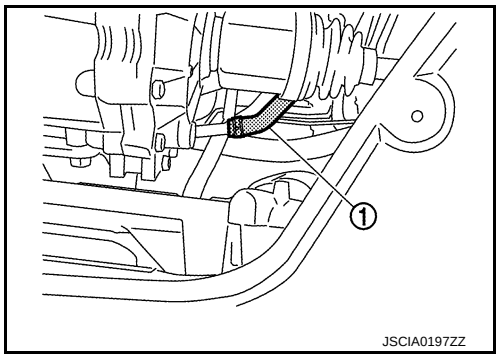
To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

- **Take care that coolant does not contact the high voltage harness connectors.**
- **If coolant contacts a high voltage harness connector, immediately use an air blow and fully remove the liquid.**

c. Disconnect water hose (1) between electric water pump 2 and water pipe.



WARNING:

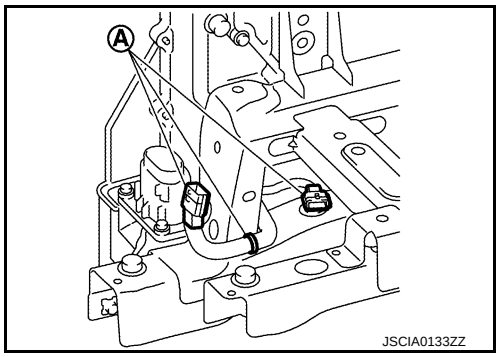
To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.



CAUTION:

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

7. Remove the 2 water pipe mounting screws so that water pipe is free. Refer to HCO-23, "Exploded View".
8. Disconnect 12V system connector and harness clips (A).

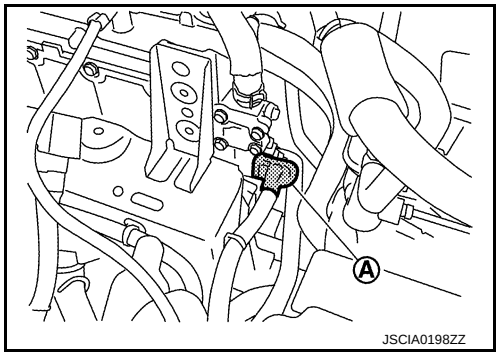


WARNING:

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



9. Disconnect 14V output terminal.



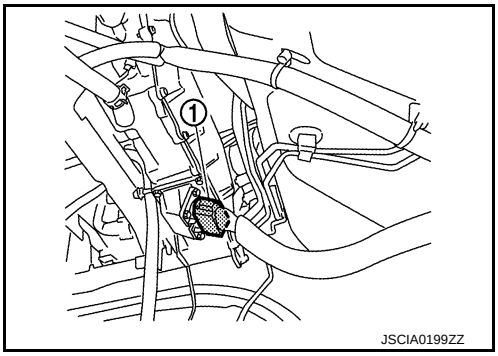
WARNING:

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



10. Disconnect high voltage connector from the following 5 locations at DC/DC-J/B.

a. From below the vehicle, disconnect high voltage harness connector (1) from Li-ion battery.



WARNING:

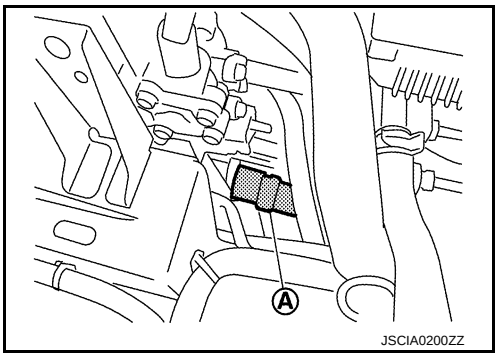
- **To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.**



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

High voltage harness connector from Li-ion battery	: 3 step type

b. Disconnect high voltage harness connector (1) for vehicle left-side on board charger.



WARNING:

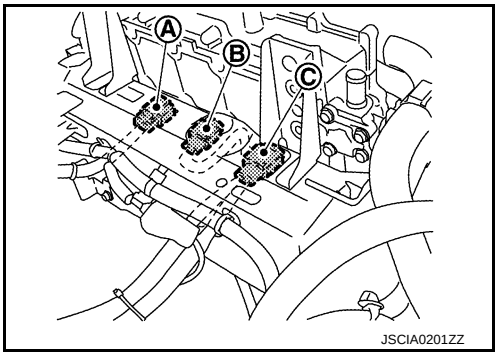
- **To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.**



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

High voltage harness connector for on board charger	: 3 step type

c. Disconnect high voltage harness connector (A) for vehicle front-side electric compressor, high voltage harness connector (B) for PTC elements heater, and high voltage harness connector (C) for quick charge port.



WARNING:

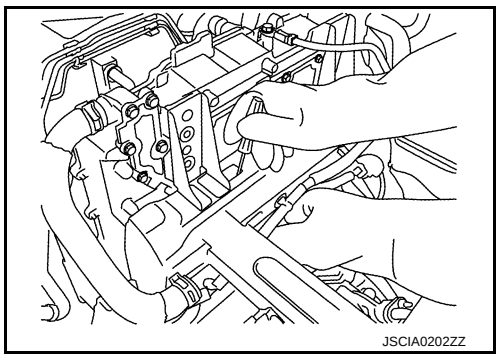
- **To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.**



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

High voltage harness connector for electric compressor	: 2 step type
High voltage harness connector for PTC elements heater	: 3 step type
High voltage harness connector for quick charge port	: 3 step type

i. When disconnecting high voltage harness connector for electric compressor, disconnect it by inserting a suitable tool into inspection hole in traction motor inverter member.


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WARNING:

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



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

ii. For high voltage harness connector for PTC elements heater and high voltage harness connector for quick charge port, check their positions from the inspection hole and remove by reaching in and feeling with your hand.

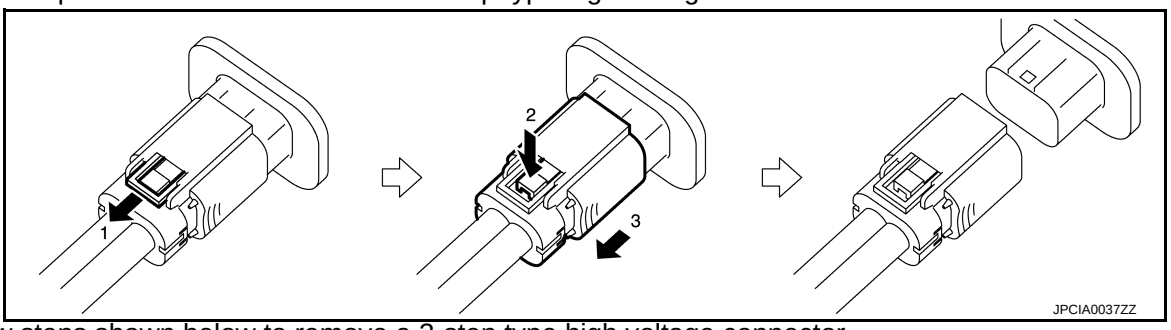
WARNING:

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



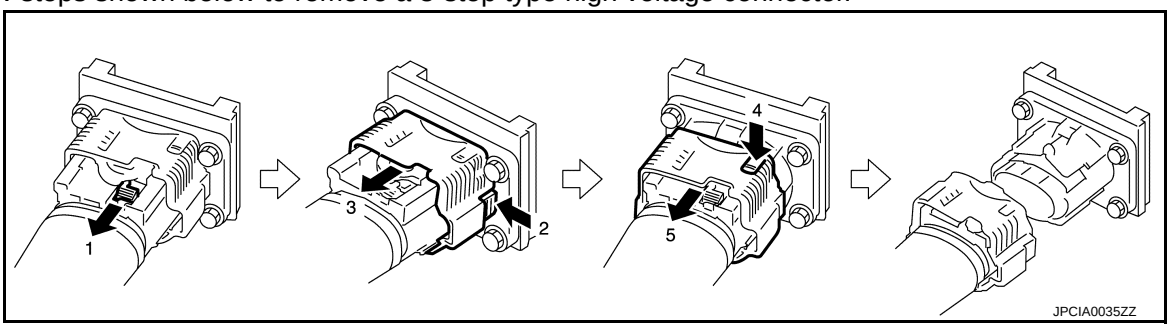
- **Protect the terminals of disconnected high voltage harness connector with insulation tape so that they are not exposed.**

- Follow steps shown below to remove a 2-step type high voltage connector.



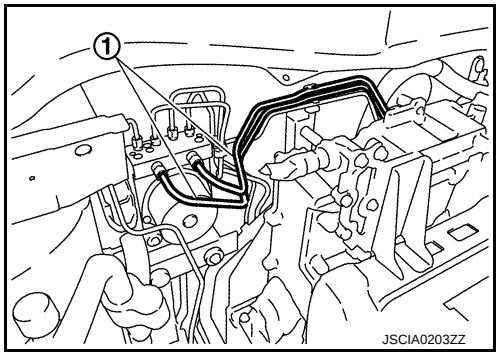
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- Follow steps shown below to remove a 3-step type high voltage connector.



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11. Disconnect 2 brake tubes (1). Refer to BR-251, "FRONT : Exploded View".



JSCIA0203ZZ

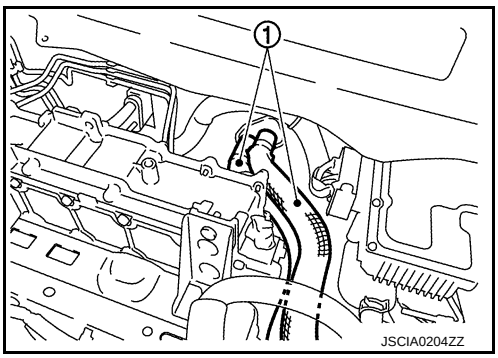
WARNING:

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



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

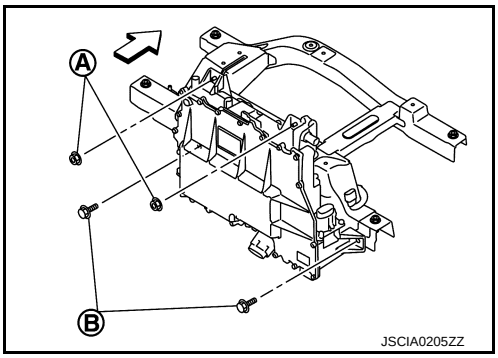
12. Disconnect heater hose (1) and move it out of the way to left side of vehicle.



CAUTION:

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

13. Remove DC/DC-J/B fastening nut (A) and fastening bolt (B).



⇦ :Vehicle front

WARNING:

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

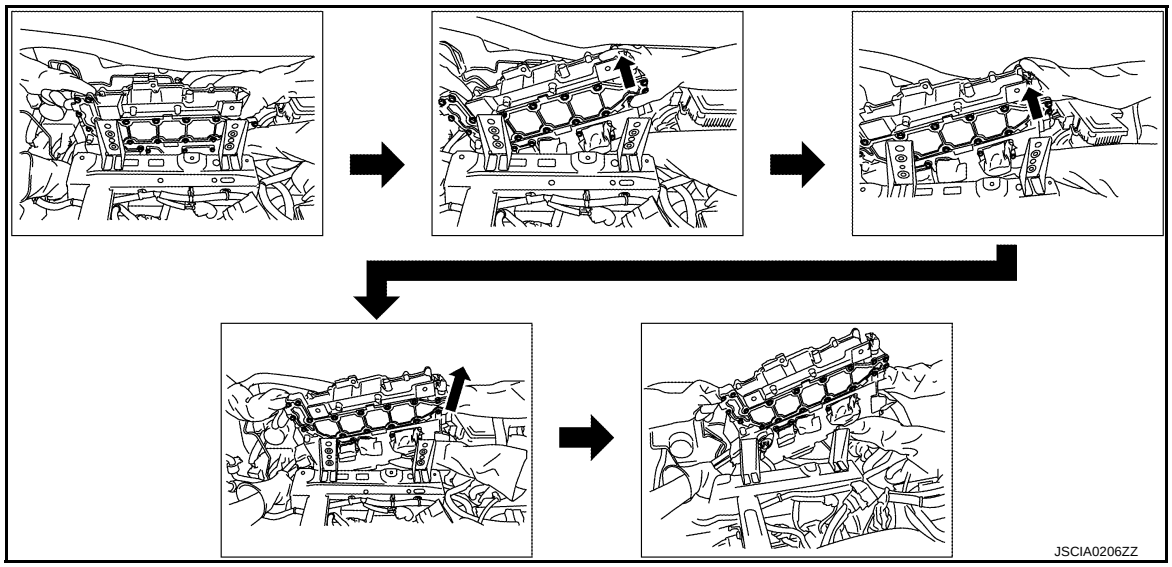


14. Move DC/DC-J/B to rear of vehicle. Then remove DC/DC-J/B, keeping the side on left of vehicle raised so that it does not contact high voltage harness connector for quick charge port or inverter member.

WARNING:

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





INSTALLATION

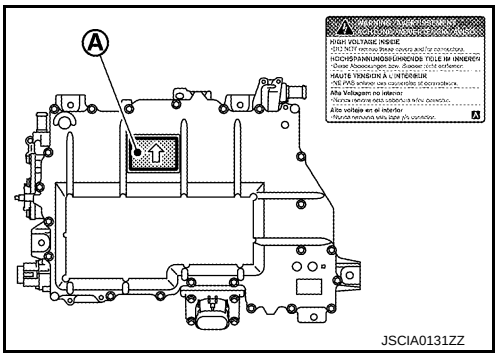
Pay attention to the following and install by following the procedure for removal in the reverse order.

WARNING:

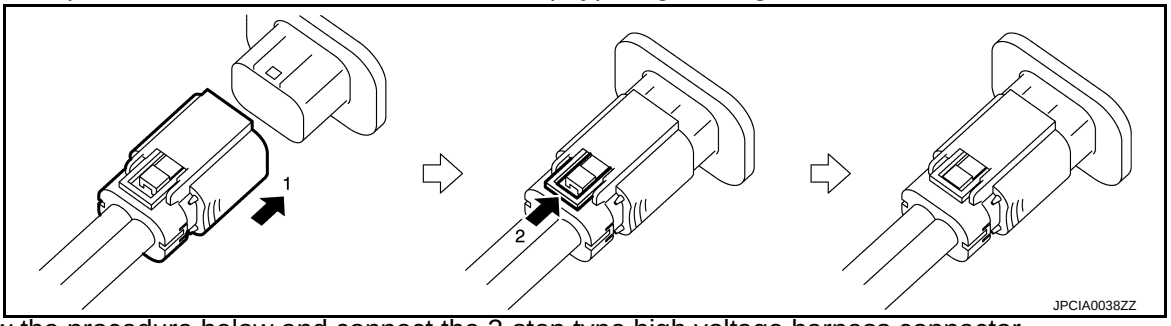
To prevent electric shock hazards, be sure to put on insulating protective gear before beginning work on the high voltage system.

CAUTION:

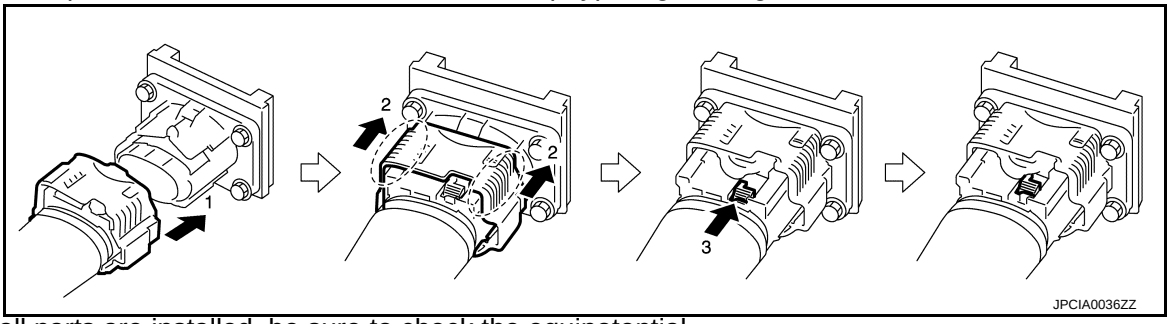
- **Be sure to reinstall high voltage harness clips in their original positions. If a clip is damaged, replace it with a new clip before installing.**
- **Be sure to perform correct air bleeding after adding coolant. Refer to HCO-11, "Draining and Refilling".**
- If DC/DC-J/B was replaced, apply high voltage warning label at position (A), with the top facing in the direction of the arrow.
  - Before applying label, verify that there is no dust or dirt on surface of DC/DC-J/B.



- Follow the procedure below and connect the 2-step type high voltage harness connector.



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



- After all parts are installed, be sure to check the equipotential.
  - DC/DC-J/B: Refer to EVC-367, "Inspection".
  - Traction motor inverter: Refer to TMS-121, "Inspection and Adjustment".

Inspection

INFOID:0000000007633975

EQUIPOTENTIAL TEST

After installing DC/DC-J/B, measure resistance below.

- Between DC/DC-J/B (aluminum part) and body (ground bolt)
- Between DC/DC-J/B (aluminum part) and traction motor inverter (aluminum part).

WARNING:

Be sure to put on insulating protective gear before beginning work on the high voltage system.

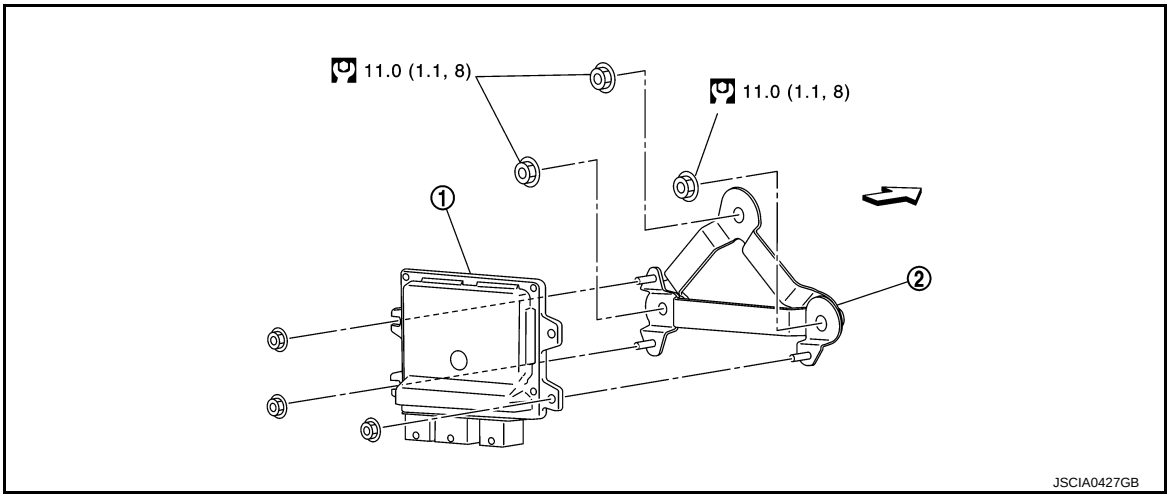
Standard : Less than 0.1 Ω

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

VCM

Exploded View

INFOID:0000000007633976



1. VCM
2. VCM bracket

⇦ Vehicle front

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000007633977

REMOVAL

CAUTION:

Before replacing VCM, perform “SAVE DATA FOR CPU REPLACE” in “WORK SUPPORT” of CONSULT to save the current VCM data in CONSULT. Refer to EVC-98, "Work Procedure".

1. Turn power switch OFF and wait at least 20 seconds.
2. Disconnect the 12V battery negative terminal.
3. Remove the glove box cover assembly. Refer to IP-13, "Exploded View".
4. Disconnect VCM harness connector.
5. Remove VCM mounting nuts.
6. Remove VCM.
7. Remove VCM bracket mounting bolts.
8. Remove VCM bracket.

INSTALLATION

Install in the reverse order of removal.

CAUTION:

Must be perform additional service when replacing VCM. Refer to EVC-98, "Work Procedure".