TOYOTA SERVICE BULLETIN
Group: 09 No.: 24 Date: Oct, 14

Prius

Corrections to Repair Manual RM01S1E

Please ensure these pages are distributed to all relevant staff for their information; and a copy made available for future reference, with the above repair manual.

Section	Title	Paragraph
Please see the attached list on pages 2 & 3.		

The revised pages listed above are attached.
(The corrected parts are indicated by arrows.)

This Bulletin does not cause the Flat Rate Manual to be changed.

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Section	Title	Paragraph
P112 HYBRID VEHICLE CONTROL	HYBRID CONTROL SYSTEM	P0A08-264
		P0A09-265
		P0A09-591
		P0A60-288
		P0A72-326
		P0A78-266
		P0A78-272
		P0A78-278
		P0A78-279
		P0A78-282
		P0A78-283
		P0A78-284
		P0A78-286
		P0A78-287
		P0A78-304
		P0A78-306
		P0A78-508
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		P0A78-523
		P0A78-586
		P0A7A-309
		P0A7A-321
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P112 HYBRID VEHICLE CONTROL	HYBRID CONTROL SYSTEM	P0A90-509
		P0A92-521
		P0A94-442
		P0A94-545
		P0A94-547
		P0A94-550
		P0A94-551
		P0A94-553
		P0A94-554
		P0A94-557
		P0A94-558
		P0A94-561
		P0A94-583
		P0A94-585
		P0A94-587
		P0A94-588
		P0A94-589
		P0AA6-526
		P0AEE-276
		P0AEF-275
		P3221-314
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		P3226-562

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DTC	P0A08-264	DC / DC Converter Status Circuit

DESCRIPTION

This DTC is stored when the electric vehicle converter assembly stops due to a circuit malfunction or a fail-safe function and the auxiliary battery voltage is 11 V or less during READY ON. When the auxiliary battery voltage becomes low, the electric vehicle converter assembly sends a signal to the NODD terminal of the HV control ECU via the NODD signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A08	264	Either of the following conditions below is detected • Electric vehicle converter assembly internal circuit malfunction is detected • Electric vehicle converter assembly enters fail-safe mode • Auxiliary battery voltage drops below 11 V	• Auxiliary battery • FL block • Fuse (for 12 V electrical equipment) • Engine room relay block • Inverter cooling hose • Water pump w/ motor and bracket assembly • Cooling fan motor • No. 2 cooling fan motor • Wire harness or connector • Electric vehicle converter assembly

Related Data List

DTC No.	INF Code	ECU Data List
P0A08	264	• +B • Inverter Temp-(MG1)*1 • Inverter Temp-(MG2)*1 • Motor Temp No1*1 • Motor Temp No2*1 • Short Wave Highest Val

*1: When the inverter is overheating, the electric vehicle converter assembly has self-protection control that suspends the electric vehicle converter assembly control. As this time, this DTC may be stored.

HINT:

- When the NODD signal line is open, electric vehicle converter assembly control is prohibited and the auxiliary battery voltage will be approximately 12 V (or less).
- Regarding NODD signal circuit, when the transistor of the HV control ECU turns on, a signal is sent to the inverter to prohibit electric vehicle converter assembly control. Sends a malfunction signal to the hybrid vehicle control ECU when the inverter side transistor is on.

WIRING DIAGRAM

Refer to DTC P0A09 (INF 265) (see page).

INSPECTION PROCEDURE

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

[Deleted]

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.
- After repair, clear the DTCs, turn the power switch off and wait for 30 seconds or more and perform the following procedure to confirm that the auxiliary battery low voltage indicated by this DTC has been repaired.

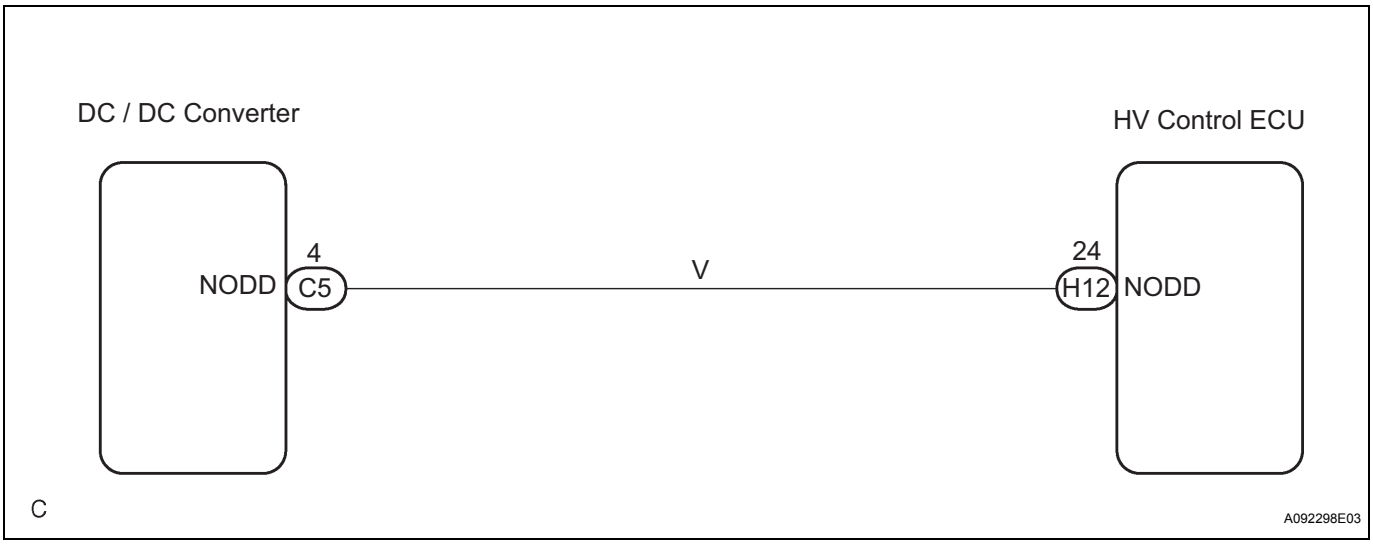
  (a) Wait for 2 minutes with park (P) selected, the power switch on (READY) and the following conditions met, then confirm that Data List item "+B" is between 13.0 and 15.0 V.

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The HV control ECU sends a signal to prohibit the electric vehicle converter assembly via the NODD signal line when a malfunction is detected. The w/ converter inverter assembly sends a signal to inform the HV control ECU of the charging system condition. A signal is sent to warn the driver if the auxiliary battery voltage is less than 11 V.
If the vehicle is being driven with an inoperative electric vehicle converter assembly, the voltage of the auxiliary battery will drop, which will prevent the continued operation of the vehicle. Therefore, the HV control ECU monitors the operation of the electric vehicle converter assembly and alerts the driver if it detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A09	265	Open or GND short in NODD signal circuit of electric vehicle converter assembly (1 trip detection logic)	• Wire harness or connector • HV control ECU • Electric vehicle converter assembly
P0A10	263	+B short in NODD signal circuit of electric vehicle converter assembly (1 trip detection logic)	• Wire harness or connector • HV control ECU • Electric vehicle converter assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a)Turn the power switch on (IG) and wait for 10 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly. [Deleted]
- When the NODD signal line is open, electric vehicle converter assembly control is prohibited and the auxiliary battery voltage will be approximately 12 V (or less).
- When the transistor of the HV control ECU turns on, a signal is sent to the inverter to prohibit electric vehicle converter assembly control. The w/ converter inverter assembly sends a malfunction signal to the HV control ECU when the inverter side transistor is on.

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INSPECTION PROCEDURE

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

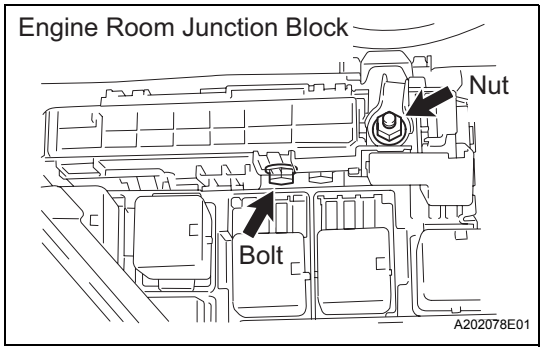
HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 10 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

HV

1 CHECK FUSIBLE LINK BLOCK (100A DC / DC)

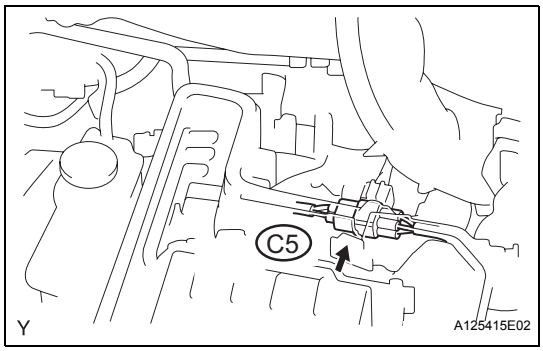


(a) Disconnect the battery negative terminal.
(b) Measure the resistance of the DC/DC fuse.
Standard resistance:
Below 1 Ω

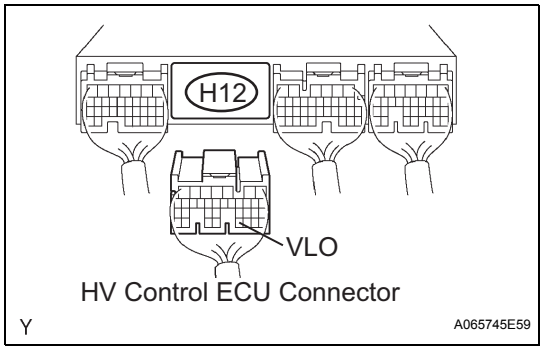
NG → **Go to step 4**

OK

2 CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - DC / DC CONVERTER)



(a) Connect the battery negative terminal.
(b) Disconnect the H12 HV control ECU connector.
(c) Disconnect the C5 DC / DC converter connector.
(d) Turn the power switch ON (IG).



(e) Measure the voltage between the terminal of the HV control ECU connector and body ground.
Standard voltage

Tester Connection	Specified Condition
VLO (H12-31) - Body ground	Below 1 V

(f) Turn the power switch OFF.

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait at least for 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

HV

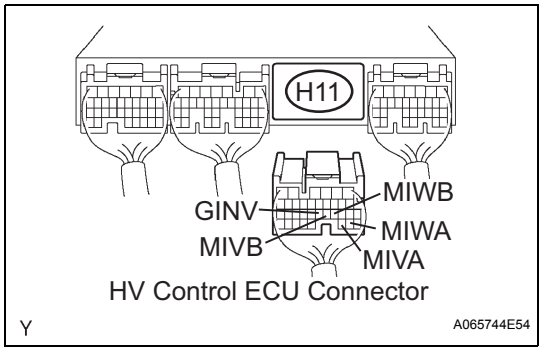
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
  (b) Turn the power switch on (READY) with park (P) selected and wait for 5 seconds or more.
  (c) Move the shift lever to N and wait for 5 seconds or more.
  (d) Depress the accelerator pedal of the vehicle with the engine stopped and park (P) selected to start the engine.
  (e) Drive the vehicle forward with the shift lever in D for 5 m or more.
  (f) Drive the vehicle backward with the shift lever in R for 5 m or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)



CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (See Pub. No. RM1076E, page 21-120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.

(d) Remove the inverter cover (See Pub. No. RM1076E, page 21-25).

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes is required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

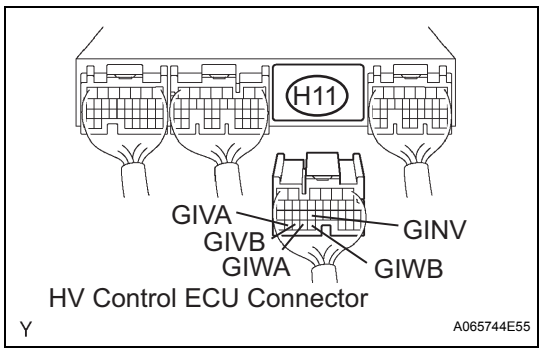
HV

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
  (b) Turn the power switch on (READY) with park (P) selected and wait for 5 seconds or more.
  (c) Move the shift lever to N and wait for 5 seconds or more.
  (d) Depress the accelerator pedal of the vehicle with the engine stopped and park (P) selected to start the engine.
  (e) Drive the vehicle forward with the shift lever in D for 5 m or more.
  (f) Drive the vehicle backward with the shift lever in R for 5 m or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)



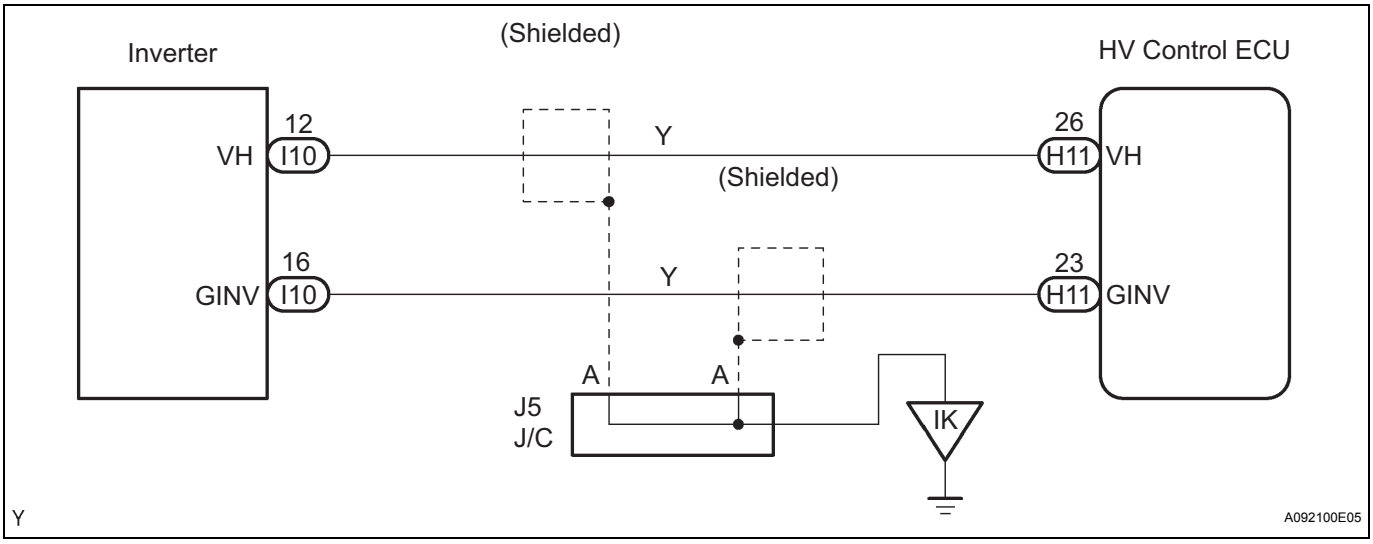
NOTICE:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (See Pub. No. RM1076E, page 21-120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (See Pub. No. RM1076E, page 21-25).

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WIRING DIAGRAM



HV

INSPECTION PROCEDURE

NOTICE:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes is required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (IG) and wait for 5 seconds or more.

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTC P0A1D is output

YES → **GO TO RELEVANT DTC CHART**

NO

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes is required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) After the vehicle is driven (required to use the motor) on urban roads at approximately 50 km/h (31 mph) or less for 5 minutes.

[Deleted]

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTC P0A1D is output

YES → **GO TO RELEVANT DTC CHART**

NO

2	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

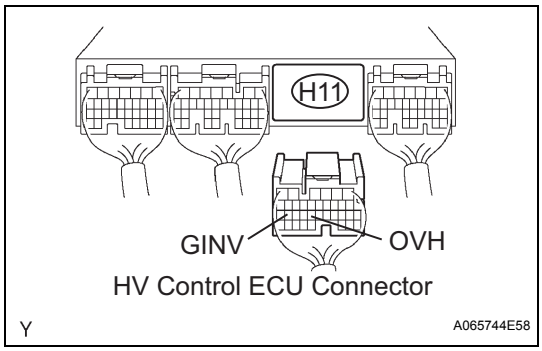
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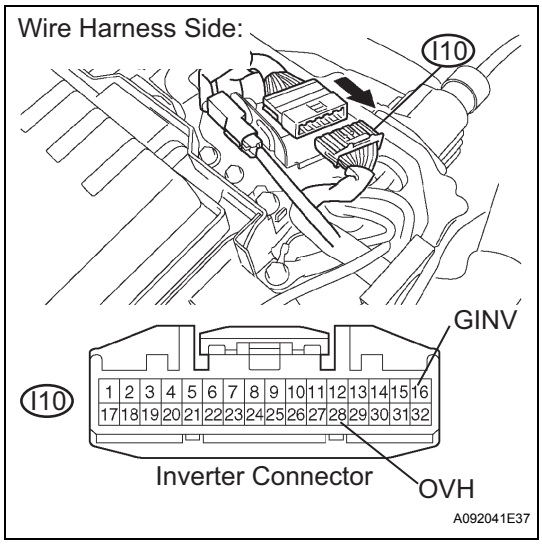
HV

1	CHECK HARNESS AND CONNECTOR (HYBRID CONTROL ECU - INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see Pub. No. RM1076E, page 21-25).





(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.
(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard voltage

Tester Connection	Specified Condition
OVH (H11-22) - Body ground	Below 1 V
GINV (H11-23) - Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Measure the resistance between the wire harness side connectors.

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NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.
HINT:
- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Depress the accelerator pedal of the vehicle with the engine stopped and park (P) selected to start the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

HV

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

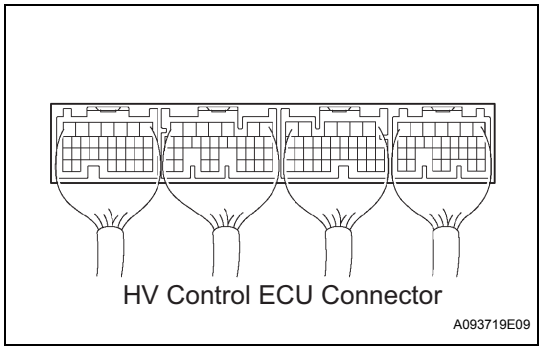
Result: DTCs listed in the table below are output

DTC No.	INF Code	Detection Item
P0A1F	123	Battery Energy Control Module
P0A78	266	Drive Motor "A" Inverter Performance
P0A94	545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 588 or 589	DC / DC Converter Performance
P0AA4	232	Hybrid Battery Negative Contactor Circuit Stuck Closed
P0ADB	227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADF	229	Hybrid Battery Negative Contactor Control Circuit Low
P3000	123, 125, 388, 389 or 603	HV Battery Malfunction
P3004	131 or 133	Power Cable Malfunction
U0111	208 or 531	Lost Communication with Battery Energy Control Module "A"

YES → **GO TO RELEVANT DTC CHART**

NO

2	CHECK CONNECTION CONDITION OF HYBRID VEHICLE CONTROL ECU CONNECTOR (LOOSENESS AND POOR CONTACT)


HV Control ECU Connector
A093719E09

(a) Check the connection condition of all the connectors at the HV control ECU.
OK:
Connectors have been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Depress the accelerator pedal of the vehicle with the engine stopped and park (P) selected to start the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

HV

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result: DTC listed in table below is output

DTC No.	INF Code	Detection Item	See Page
P0A78	278 or 280	Drive Motor "A" Inverter performance	

YES → **GO TO THE PAGE NUMBER SHOWN IN THE TABLE ABOVE**

NO

2	CHECK CONNECTION CONDITION OF INVERTER CONNECTOR (LOOSENESS AND POOR CONTACT)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Remove the inverter cover (see Pub. No. RM1076E, page 21-25).

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

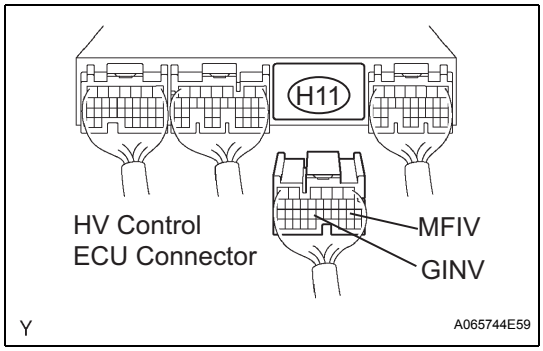
HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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HV

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

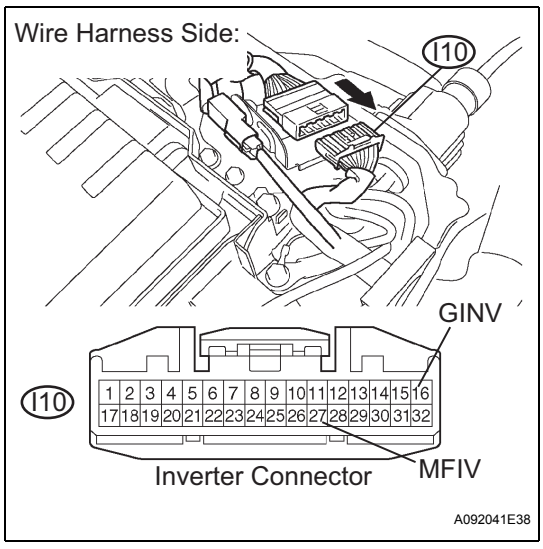


CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).

NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see Pub. No. RM1076E, page 21-25).



(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).

HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard voltage

Tester Connection	Specified Condition
MFIV (H11-18) - Body ground	Below 1 V
GINV (H11-23) - Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Measure the resistance between the wire harness side connectors.

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During the road test, check the Data List item "Inverter Temp-(MG2)" to prevent the motor inverter from overheating.

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- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A4	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC / DC Converter Malfunction
P0AA1, P0AA4, P0AE0, P0AE6, P0AE7, P0ADB or P0ADF	System Main Relay Circuit System
P0AA6, P3004	High Voltage System
P0AEE	Motor Inverter Temperature Sensor Malfunction
P3000	HV Battery System Malfunction
P3110	Integration Relay Malfunction
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC / DC Boost Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART. FIND PAGE NUMBER TO PROCEED TO DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.

OK:

There is a sufficient amount of coolant for the inverter

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DTC	P0A78-286	Drive Motor "A" Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
If the motor inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the MFIV terminal of the HV control ECU via the motor inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	286	Motor inverter fail (MFIV) signal detection (circuit malfunction) (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

If the motor inverter detects a circuit malfunction, it transmits a motor inverter fail signal to the HV control ECU. Upon receiving this signal, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (READY) and wait for 10 seconds or more.
  (b) Perform a road test according to the Freeze Frame Data "Vehicle Spd" for approximately 10 minutes.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result:
DTC listed in the table below is output

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 10 seconds or more.

  (b) Perform a road test according to the Freeze Frame Data "Vehicle Spd" for approximately 10 minutes.

[Deleted]

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A3F, P0A40 or P0A4	Drive Motor "A" Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A78 (Except for 284, 287, 505, 506, 279, 503 and 504)	Drive Motor "A" Inverter Performance
P0A90 (Except for 239, 240, 241, 242, 251, 602, 604 and 605)	Drive Motor "A" Performance
P0A93	Inverter Cooling System Malfunction
P0AA1, P0AA4, P0AE0, P0AE6, P0AE7, P0ADB, P0ADC or P0ADF	System Main Relay Circuit System
P0AA6, P3004	High Voltage System
P0AEE	Motor Inverter Temperature Sensor Malfunction
P3000 (Except for 388 and 389)	HV Battery System Malfunction
P3226	DC / DC Boost Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART. FIND PAGE NUMBER TO PROCEED TO DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes is required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

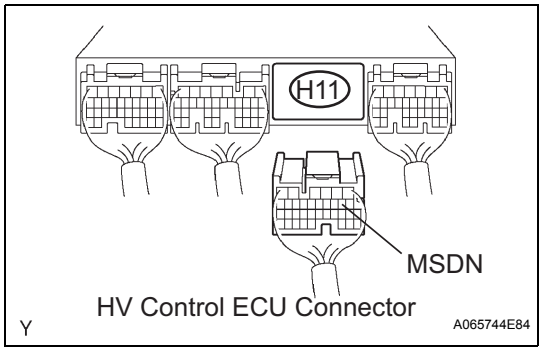
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.

  This DTC will not be stored if any inverter system related DTCs are stored.

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)



(a) Disconnect the H11 HV control ECU connector.

(b) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard voltage

Tester Connection	Specified Condition
MSDN (H11-8) - Body ground	Below 1 V

NG → **Go to step 4**

OK

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DTC	P0A78-306	Drive Motor "A" Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
The HV control ECU controls MG2 torque in accordance with the driving condition.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	306	Failure in monitoring MG2 torque performance Difference between the motor torque request value sent by the HV control ECU and actual motor torque is large. (1 trip detection logic)	• Hybrid vehicle motor • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A78	306	• Motor (MG2) Torq • M(MG2) Trq Exec Val • Vehicle Spd

MONITOR DESCRIPTION

If the difference between the requested MG2 torque and the actual MG2 torque exceeds a predetermined value, the HV control ECU determines that there is malfunction in the execution or monitoring of the MG2 torque. Then, the HV control ECU illuminates the MIL and sets a DTC.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (READY) and wait for 5 seconds or more.
  (b) Perform a road test according to the Freeze Frame Data "Vehicle Spd" for approximately 10 minutes.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).

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DTC	P0A78-508	Drive Motor "A" Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
Upon receiving a motor gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG2 by turning OFF the power transistors that are actuating the MG2.
The HV control ECU monitors the motor gate shutdown signal and detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	508	Motor gate shutdown (MSDN) signal malfunction Either of the following conditions is met: • Although a motor inverter gate shutdown signal has been sent, the motor inverter gate is not shut down. • Although a motor inverter gate shutdown signal has not been sent, the motor inverter gate is shut down.	• Wire harness or connector • HV control ECU • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

The HV control ECU monitors the motor gate shutdown (MSDN) signal. If the HV control ECU detects a fault in the MSDN signal, it illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 304) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a)Turn the power switch on (IG) and wait for 10 seconds or more.
  (b)Turn the power switch on (READY) and wait for 10 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.

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DTC	P0A78-510	Drive Motor "A" Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
Upon receiving a motor gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG2 by turning OFF the power transistors that are actuating the MG2.
The HV control ECU monitors the motor gate shutdown signal and detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	510	Motor inverter gate malfunction Although a shutdown signal has been sent to the motor inverter, current flows in the motor. (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A78	510	• MG2 Gate Status • M(MG2) Trq Exec Val

WIRING DIAGRAM

Refer to DTC P0A78 (INF 304) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
  (b) While driving the vehicle at a speed between 30 and 50 km/h (19 and 32 mph), move the shift lever to N and stop the vehicle.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.

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DTC	P0A78-523	Drive Motor "A" Inverter Performance

DESCRIPTION

Refer to DTC P0A78 (INF 266) (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	523	Inverter voltage (VH) sensor offset malfunction	• System main relay • Power module intelligent transistor set

MONITOR DESCRIPTION

The HV control ECU monitors the inverter voltage (VH) sensor signal. If the HV control ECU detects a fault in the sensor signal, the HV control ECU interprets this as a VH sensor failure. The HV control ECU then illuminates the MIL and sets a DTC.

HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTC P0A78 (INF 523) and other DTCs are output

HINT:

If any other codes besides P0A78 (INF 523) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART**

NO

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DTC	P0A78-586	Drive Motor "A" Inverter Performance

DESCRIPTION

Refer to DTC P0A78 (INF 266) (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	586	Inverter voltage (VH) sensor performance problem Difference between "VH-Voltage after Boosting" and "VL-Voltage before Boosting" is large and difference between "VH-Voltage after Boosting" and "Battery Voltage VB" is large. (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A78	586	• Boost Raite • VL-Voltage before Boosting • VH-Voltage after Boosting • Power Resource VB

MONITOR DESCRIPTION

The HV control ECU monitors the inverter voltage (VH) sensor signal. If the HV control ECU detects a fault in the sensor signal, the HV control ECU interprets this as a VH sensor failure. The HV control ECU then illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 266) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When the accelerator pedal is not depressed with the power switch on (READY) and park (P) selected, if "VH-Voltage after Boosting" and the "Power Resource VB" is approximately same after repair, the condition is judged as normal.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (READY), depress the accelerator pedal with park (P) selected to start the engine and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

HV

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result:
DTC P0A1D is output

YES → **GO TO RELEVANT DTC CHART**

NO

2	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.
(a) Turn the power switch OFF.
(b) Remove the service plug grip (See Pub. No. RM1076E, page 21-120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Remove the inverter cover (See Pub. No. RM1076E, page 21-25).

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

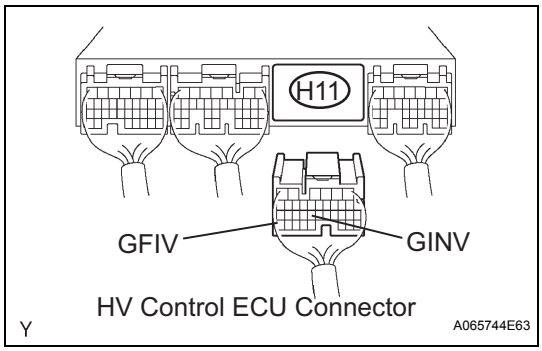
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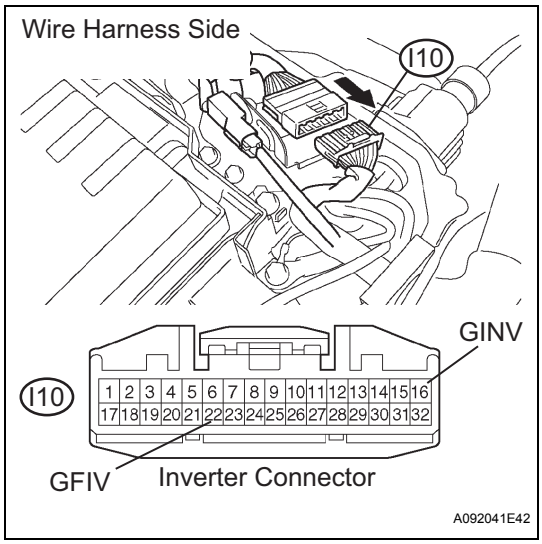
HV

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Disconnect the H11 HV control ECU connector.
(d) Remove the inverter cover (see Pub. No. RM1076E, page 21-25).





(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.
(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard voltage

Tester Connection	Specified Condition
GFIV (H11-35) - Body ground	Below 1 V
GINV (H11-23) - Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Measure the resistance between the wire harness side connectors.

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(b) Drive the vehicle for approximately 10 minutes mainly using the engine.
During the road test, check the Data List item "Inverter Temp-(MG1)" to prevent the motor inverter from overheating.

[Deleted]

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result:
DTCs listed in the table below are output

HV

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A4	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC / DC Converter Malfunction
P0AA1, P0AA4, P0AE0, P0AE6, P0AE7, P0ADB or P0ADF	System Main Relay Circuit System
P0AA6, P3004	High Voltage System
P0AEE	Motor Inverter Temperature Sensor Malfunction
P3000	HV Battery System Malfunction
P3110	Integration Relay Malfunction
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC / DC Boost Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART. FIND PAGE NUMBER TO PROCEED TO DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO

2	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.
OK:
There is a sufficient amount of coolant for the inverter

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DTC	P0A7A-324	Generator Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
If the generator inverter has a circuit malfunction, internal short, or overheats, the inverter transmits that information to the GFIV terminal of HV control ECU via the generator inverter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	324	Generator inverter fail (GFIV) signal detection (circuit malfunction) (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

If the generator inverter detects a circuit malfunction, it transmits an inverter fail signal to the HV control ECU. Upon receiving this signal, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (READY) and wait for 5 seconds or more.
  (b) Drive the vehicle for approximately 10 minutes mainly using the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTC listed in the table below is output

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 5 seconds or more.

  (b) Drive the vehicle for approximately 10 minutes mainly using the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A7A (Except for 322, 325, 517 and 518)	Generator Inverter Performance
P0A92 (Except for 261, 606 and 607)	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0AA1, P0AA4, P0AE0, P0AE6, P0AE7, P0ADB, P0ADC, or P0ADF	System Main Relay Circuit System
P0AA6, P3004	High Voltage System
P3000 (Except for 388 and 389)	HV Battery System Malfunction
P3221	Generator Inverter Temperature Sensor Circuit System
P3226	DC / DC Boost Converter Temperature Sensor Circuit System

YES → **GO TO DTC CHART. FIND PAGE NUMBER TO PROCEED TO DIAGNOSTIC TROUBLESHOOTING FLOWCHART**

NO →

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

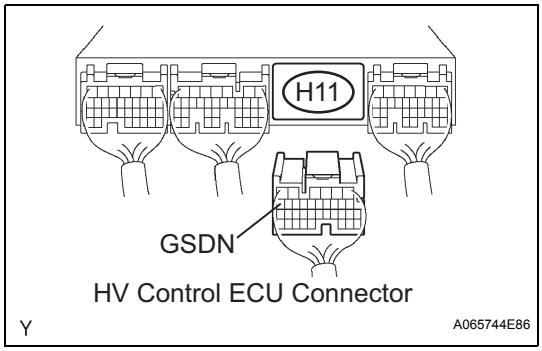
  (a) Turn the power switch on (IG) and wait for 5 seconds or more.

  This DTC will not be stored if any inverter system related DTCs are stored.

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)



(a) Disconnect the H11 HV control ECU connector.

(b) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard voltage

Tester Connection	Specified Condition
GSDN (H11-16) - Body ground	Below 1 V

NG → **Go to step 4**

OK

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DTC	P0A7A-344	Generator Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
The HV control ECU controls MG1 torque in accordance with the driving condition.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	344	Failure in monitoring MG1 torque performance Difference between the generator torque request value sent by the HV control ECU and actual generator torque is large. (1 trip detection logic)	• Hybrid vehicle generator • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A7A	344	• Generator(MG1) Torq • G(MG1) Trq Exec Val

MONITOR DESCRIPTION

If the difference between the requested MG1 torque and the actual MG1 torque exceeds a predetermined value, the HV control ECU determines that there is a malfunction in the execution or monitoring of the MG1 torque. Then, the HV control ECU illuminates the MIL and sets a DTC.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 5 seconds or more.

  (b) Drive the vehicle for approximately 10 minutes mainly using the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.

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DTC	P0A7A-520	Generator Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
Upon receiving a generator gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG1 by turning OFF the power transistors that are actuating the MG1.
The HV control ECU monitors the generator gate shutdown signal and detects a malfunction.

DTC No.	INF Code.	DTC Detection Condition	Trouble Area
P0A7A	520	Generator gate shutdown (GSDN) signal malfunction Either of the following conditions is met: • Although a generator shutdown signal has been sent to the w/ converter inverter assembly, the generator gate is not shut down. • Although a generator shutdown signal has not been sent to the w/ converter inverter assembly, the generator gate is shut down.	• Wire harness or connector • HV control ECU • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

The HV control ECU monitors the generator gate shutdown (GSDN) signal. If the HV control ECU detects a fault in the GSDN signal, it illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A7A (INF 342) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a)Turn the power switch on (IG) and wait for 10 seconds or more.
  (b)Turn the power switch on (READY) and wait for 10 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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DTC	P0A7A-522	Generator Inverter Performance

DESCRIPTION

See the description of the inverter (see page).
Upon receiving a generator gate shutdown signal from the HV control ECU, the inverter forcefully stops the operation of the MG1 by turning OFF the power transistors that are actuating the MG1.
The HV control ECU monitors the generator inverter gate and detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A7A	522	Generator inverter gate malfunction Although a generator shutdown signal has been sent to the w/ converter inverter assembly, current flows in the generator. (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A7A	522	• Inverter Temp-(MG1) • G(MG1) Trq Exec Val

WIRING DIAGRAM

Refer to DTC P0A7A (INF 342) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) While driving (EV driving) the vehicle at a speed between 30 and 50 km/h (19 and 32 mph), move the shift lever to N and stop the vehicle.

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

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DTC	P0A90-509	Drive Motor "A" Performance

DESCRIPTION

See the description of the MG1/MG2 (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A90	509	MG2 system malfunction (If current does not flow as commanded, the motor high voltage system may be malfunctioning.)	• Hybrid vehicle motor • Power module intelligent transistor set

HV

HINT:

Suspected malfunctioning parts:

- Open circuit in the motor coil or motor cable
- Insecure connection of the motor cable connector
- w/ converter inverter assembly output line malfunction

MONITOR DESCRIPTION

The HV control ECU monitors the hybrid vehicle motor (MG2) system. If the HV control ECU detects a malfunction in the MG2 system, it illuminates the MIL and sets a DTC.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- If a malfunction occurs after disconnecting and connecting the motor cable, check the cable connection.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Start the vehicle from a stop and drive the vehicle until the vehicle speed reaches approximately 10 km/h (6 mph). Repeat this procedure a few times.

[Deleted]

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.

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DTC	P0A92-521	Hybrid Generator Performance

DESCRIPTION

See the description of the MG1/MG2 (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A92	521	MG1 system malfunction (If current does not flow as commanded, the generator high voltage system may be malfunctioning.) (1 trip detection logic)	• Hybrid vehicle generator • Power module intelligent transistor set

HV

HINT:

Suspected malfunctioning parts:

- Open circuit in the generator coil or generator cable
- Insecure connection of the generator cable connector
- w/ converter inverter assembly output line malfunction

MONITOR DESCRIPTION

The HV control ECU monitors the hybrid vehicle generator (MG1) system. If the HV control ECU detects a malfunction in the MG1 system, it illuminates the MIL and sets a DTC.

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) with park (P) selected.

  (b) With the engine stopped, depress the accelerator pedal and start the engine.

  (c) Release the accelerator pedal immediately.

  If the accelerator pedal is depressed continuously, the engine speed increases and this DTC cannot be detected.

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.

(b) Turn the power switch ON (IG).

(c) Turn the intelligent tester ON.

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HINT:
"VH-Voltage after Boosting" will be approximately 500 V during cranking.

INSPECTION PROCEDURE

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.
HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a)Turn the power switch on (READY)
  (b)With the engine stopped and park (P) selected, depress the accelerator pedal and start the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

HV

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result:
DTC P0A94 (INF 442) and other DTCs are output
HINT:
If any other codes besides P0A94 (INF 442) are output, perform troubleshooting for those DTCs first.

YES → **GO TO RELEVANT DTC CHART**

NO

2	CHECK DTC OUTPUT

(a) Check the DTCs that were output when the vehicle was brought to the workshop.
NOTICE:
- **Refer to the DTC Malfunctioning Area Table (See page).**
- **Using only the DTCs listed in the DTC Malfunctioning Area Table, perform the following judgment.**

Result

Result	Proceed to
Only P0A94-442 is output.	A
Only power module intelligent transistor set related DTCs are output.	A
Electric vehicle converter assembly or w/ converter inverter assembly related DTCs are also output.	B

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

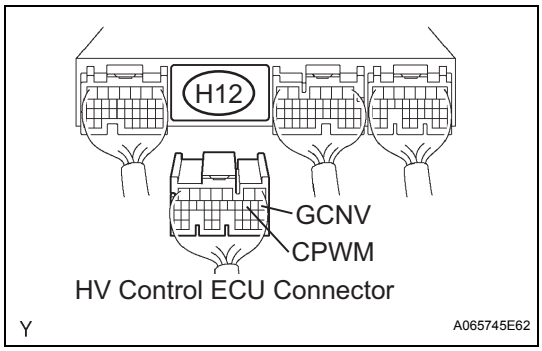
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (IG) and wait for 5 seconds or more.

[Deleted]

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)



CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.

(d) Remove the inverter cover (see Pub. No. RM1076E, page 21-25).

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (READY) and wait for 5 seconds or more.
  (b) With the engine stopped and park (P) selected, depress the accelerator pedal and start the engine.
  Note: When the boosting request is not given, the "VH-Voltage after Boosting" is approximately the same as the HV battery voltage.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

HV

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

DTC No.	INF Code	Detection Item
P0A1F	123	Battery Energy Control Module
P0A78	266	Drive Motor "A" Inverter Performance
P0A94	545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 588 or 589	DC / DC Converter Performance
P0AA4	232	Hybrid Battery Negative Contactor Circuit Stuck Closed
P0ADB	227	Hybrid Battery Positive Contactor Control Circuit Low
P0ADF	229	Hybrid Battery Negative Contactor Control Circuit Low
P3000	123, 125, 388, 389 or 603	HV Battery Malfunction
P3004	131 or 133	Power Cable Malfunction
U0111	208 or 531	Lost Communication with Battery Energy Control Module "A"

YES → **GO TO RELEVANT DTC CHART**

NO

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DTC	P0A94-550	DC / DC Converter Performance

DESCRIPTION

See the description of the boost converter (see page).
If the boost converter detects a circuit malfunction or over-voltage, the boost converter transmits that information to the OVL terminal of the HV control ECU via the boost converter over-voltage signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	550	Boost converter over-voltage (OVL) signal detection (circuit malfunction) "VL-Voltage before Boosting" overvoltage or a circuit malfunction is detected. (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

If the boost converter detects a circuit malfunction, it transmits a boost converter over-voltage signal to the HV control ECU. Upon receiving this signal, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 5 seconds or more.

  (b) With the engine stopped and park (P) selected, depress the accelerator pedal and start the engine.

  Note: When the boosting request is not given, the "VH-Voltage after Boosting" is approximately the same as the HV battery voltage.

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.

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- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes is required to discharge the high-voltage condenser inside the inverter.

NOTICE:
If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:
If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

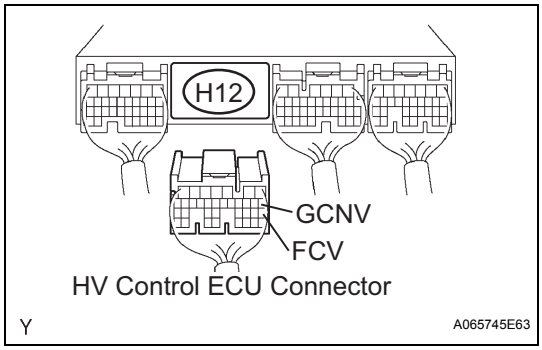
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HV

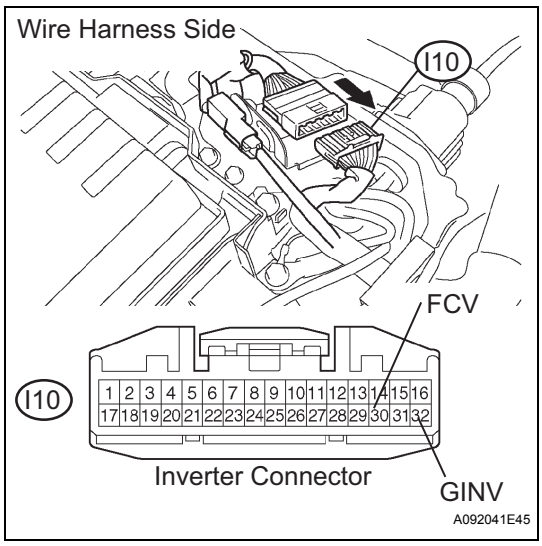
1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see Pub. No. RM1076E, page 21-120).
NOTICE:
Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.
(c) Disconnect the H12 HV control ECU connector.
(d) Remove the inverter cover (see Pub. No. RM1076E, page 21-25).



(e) Disconnect the I10 inverter connector.
(f) Turn the power switch ON (IG).
HINT:
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.
(g) Measure the voltage between the terminals of the HV control ECU connector and body ground.
Standard voltage



Tester Connection	Specified Condition
FCV (H12-20) - Body ground	Below 1 V
GCNV (H12-8) - Body ground	Below 1 V

(h) Turn the power switch OFF.
(i) Measure the resistance between the wire harness side connectors.

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DTC	P0A94-553	DC / DC Converter Performance

DESCRIPTION

See the description of the boost converter (see page).
If the boost converter has a circuit malfunction, internal short, or overheats, the boost converter transmits that information to the FCV terminal of the HV control ECU via the boost converter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	553	Boost converter fail (FCV) signal detection (boost converter overheating) Overheating or an internal short circuit of the boost converter is detected. (1 trip detection logic)	• Wire harness or connector • Inverter cooling system • Water pump w/ motor and bracket assembly • Cooling fan motor • No. 2 cooling fan motor • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A94	553	• Converter Temperature

MONITOR DESCRIPTION

If the boost converter is overheated, it transmits a boost converter fail signal to the HV control ECU. Upon receiving this signal, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 5 seconds or more.

  (b) With the engine stopped and park (P) selected, depress the accelerator pedal and start the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.



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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 5 seconds or more.

  (b) With the engine stopped and park (P) selected, depress the accelerator pedal and start the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

DTCs listed in the table below are output

DTC No.	Relevant Diagnosis
P0A1D	Hybrid Powertrain Control Module
P0A2B, P0A2C or P0A2D	Drive Motor "A" Temperature Sensor Circuit System
P0A37, P0A38 or P0A39	Generator Temperature Sensor Circuit System
P0A3F, P0A40 or P0A4	Drive Motor "A" Position Sensor Circuit System
P0A4B, P0A4C or P0A4D	Generator Position Sensor Circuit System
P0A60 or P0A63	Drive Motor "A" Current Sensor Circuit System
P0A72 or P0A75	Generator Current Sensor Circuit System
P0A78	Drive Motor "A" Inverter Performance
P0A7A	Generator Inverter Performance
P0A90	Drive Motor "A" Performance
P0A92	Hybrid Generator Performance
P0A93	Inverter Cooling System Malfunction
P0A94	DC / DC Converter Malfunction
P0AA1, P0AA4, P0AE0, P0AE6, P0AE7, P0ADB or P0ADF	System Main Relay Circuit System
P0AA6, P3004	High Voltage System
P0AEE	Motor Inverter Temperature Sensor Malfunction
P3000	HV Battery System Malfunction
P3110	Integration Relay Malfunction
P3221	Generator Inverter Temperature Sensor Circuit System

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DTC	P0A94-557	DC / DC Converter Performance

DESCRIPTION

See the description of the booster converter (see page).
If the boost converter has a circuit malfunction, internal short, or overheats, the boost converter transmits that information to the FCV terminal of the HV control ECU via the boost converter fail signal line.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	557	Boost converter fail (FCV) signal detection (circuit malfunction) (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

If the boost converter detects a circuit malfunction, it transmits a boost converter fail signal to the HV control ECU. Upon receiving this signal, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A78 (INF 282) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Turn the power switch on (READY) and wait for 5 seconds or more.
  (b) With the engine stopped and park (P) selected, depress the accelerator pedal and start the engine.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.
Result:
DTC listed in the table below is output

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

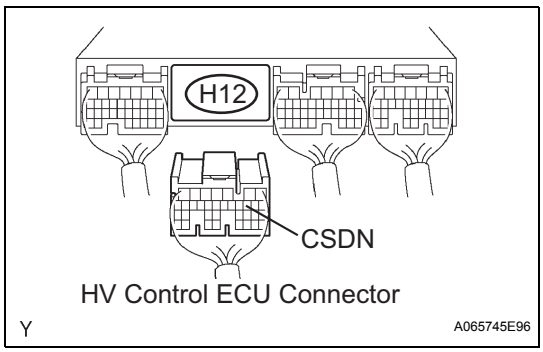
HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly

[Deleted]

1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)



(a) Disconnect the H12 HV control ECU connector.

(b) Measure the voltage between the terminal of the HV control ECU connector and body ground.

Standard voltage

Tester Connection	Specified Condition
CSDN (H12-9) - Body ground	Below 1 V

NG → **Go to step 4**

OK

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DTC	P0A94-561	DC / DC Converter Performance

DESCRIPTION

See the description of the boost converter (see page).
Upon receiving a boost converter gate shutdown signal from the HV control ECU, the boost converter forcefully stops the operation of the boost converter by turning OFF the power transistors that are actuating the boost converter.
The HV control ECU monitors the boost converter gate shutdown signal and detects a malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	561	Abnormal boost converter gate shutdown (CSDN) signal Either of the following conditions is met: • Although a boost converter gate shutdown signal has been sent, the boost converter gate is not shut down. • Although a boost converter gate shutdown signal has not been sent, the boost converter gate is shut down.	• Wire harness or connector • HV control ECU • Power module intelligent transistor set

HV

MONITOR DESCRIPTION

The HV control ECU monitors the boost converter gate shutdown (CSDN) signal. If the HV control ECU detects an abnormality in the CSDN signal, it illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A94 (INF 558) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**
  HINT:
  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a)Turn the power switch on (IG) and wait for 10 seconds or more.
  (b)Turn the power switch on (READY) and wait for 10 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

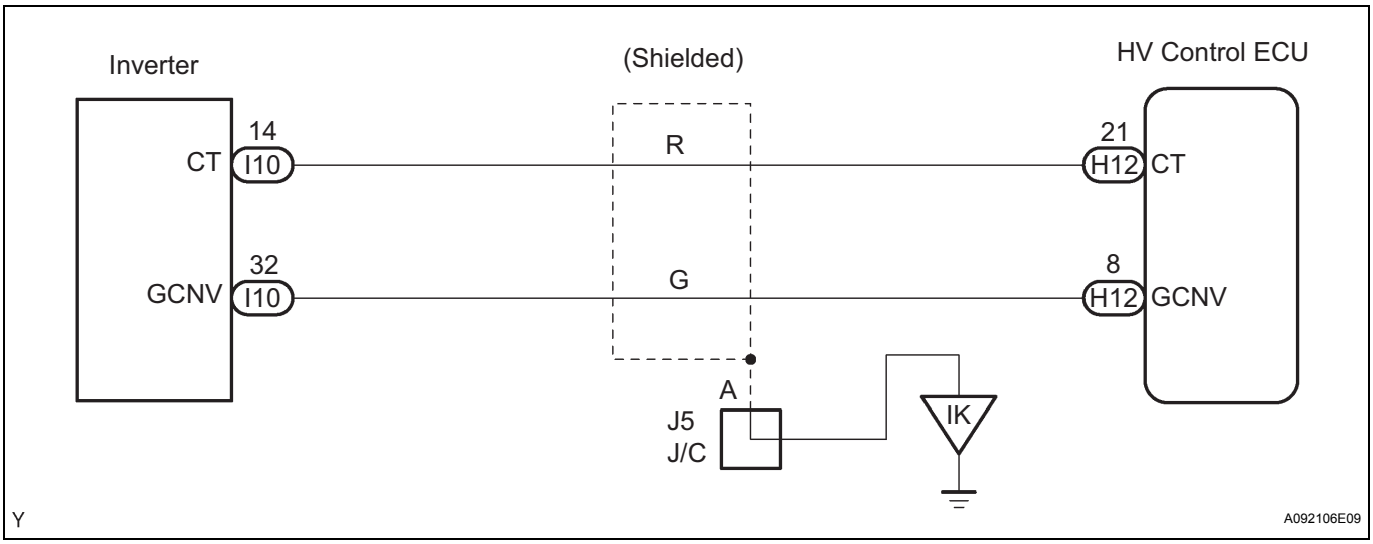
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MONITOR DESCRIPTION

The HV control ECU monitors the boost converter temperature sensor circuit. If the HV control ECU detects an open or short malfunction of the sensor circuit, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes is required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	**READ VALUE USING INTELLIGENT TESTER (CONVERTER TEMPERATURE)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / Data List.

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DTC	P0A94-585	DC / DC Converter Performance

DESCRIPTION

Refer to DTC P0A94 (INF 589) (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	585	Boost converter voltage (VL) sensor performance problem Difference between "VL-Voltage before Boosting" and "Power Resource VB" is large and difference between "VL-Voltage before Boosting" and "VH-Voltage after Boosting" when the boosting request is not given. (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set

HV

Related Data List

DTC No.	INF Code	Data List
P0A94	585	• VL-Voltage before Boosting • VH-Voltage after Boosting • Power Resource VB • Boost Ratio

MONITOR DESCRIPTION

The HV control ECU monitors the boost converter voltage sensor signal. If the HV control ECU detects an abnormality in the sensor signal, it illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A94 (INF 589) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When the accelerator pedal is not depressed with the power switch on (READY) and park (P) selected, if "VH-Voltage after Boosting" and the "Power Resource VB" is approximately same after repair, the condition is judged as normal.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.



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DTC	P0A94-587	DC / DC Converter Performance

DESCRIPTION

See the description of the boost converter (see page).
The HV control ECU uses two voltage sensors, VL and VB, to detect voltage levels. The VL sensor that has been built into the boost converter is used to detect the high voltage before it is boosted. The VB sensor that has been built into the battery ECU is used to detect voltage of the HV battery.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A94	587	Difference between "VL-Voltage before Boosting" and "Power Resource VB" is large when the boosting request is given. (1 trip detection logic)	• Wire harness or connector • Power module intelligent transistor set • Service plug grip • High voltage fuse • Battery ECU

HV

Related Data List

DTC No.	INF Code	Data List
P0A94	587	• Power Resource VB • VL-Voltage before Boosting • VH-Voltage after Boosting • Boost Ratio

MONITOR DESCRIPTION

The HV control ECU monitors signals of HV battery voltage (VB) and boost converter voltage (VL) sensors. When a large difference occurs between the voltages from the VB and VL sensors, the HV control ECU interprets this as a failure of either of the sensors. The HV control ECU then illuminates the MIL and sets a DTC.

WIRING DIAGRAM

Refer to DTC P0A94 (INF 589) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- When the accelerator pedal is not depressed with the power switch on (READY) and park (P) selected, if "VL-Voltage before Boosting" and the "Power Resource VB" is approximately same after repair, the condition is judged as normal.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HV

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.
  (a) Apply the parking brake and secure the wheels using chocks.
  (b) Turn the power switch on (READY).
  (c) While firmly depressing the brake pedal with drive (D) selected, depress and hold the accelerator pedal to operate the boost converter and wait for 5 seconds.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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1	CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU - INVERTER)

CAUTION:

Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.

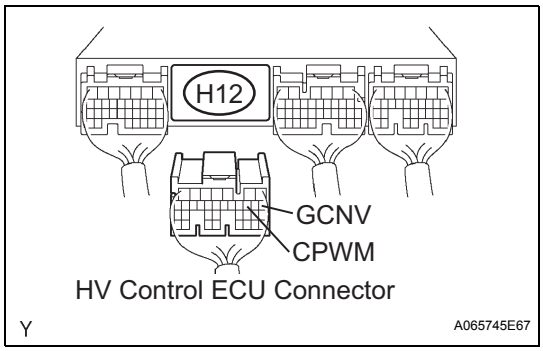
(b) Remove the service plug grip (See Pub. No. RM1076E, page 21-120).

NOTICE:

Turning the power switch ON (READY) with the service plug grip removed could cause malfunction. Therefore, never turn the power switch ON (READY) in this state.

(c) Disconnect the H12 HV control ECU connector.

(d) Remove the inverter cover (See Pub. No. RM1076E, page 21-25).

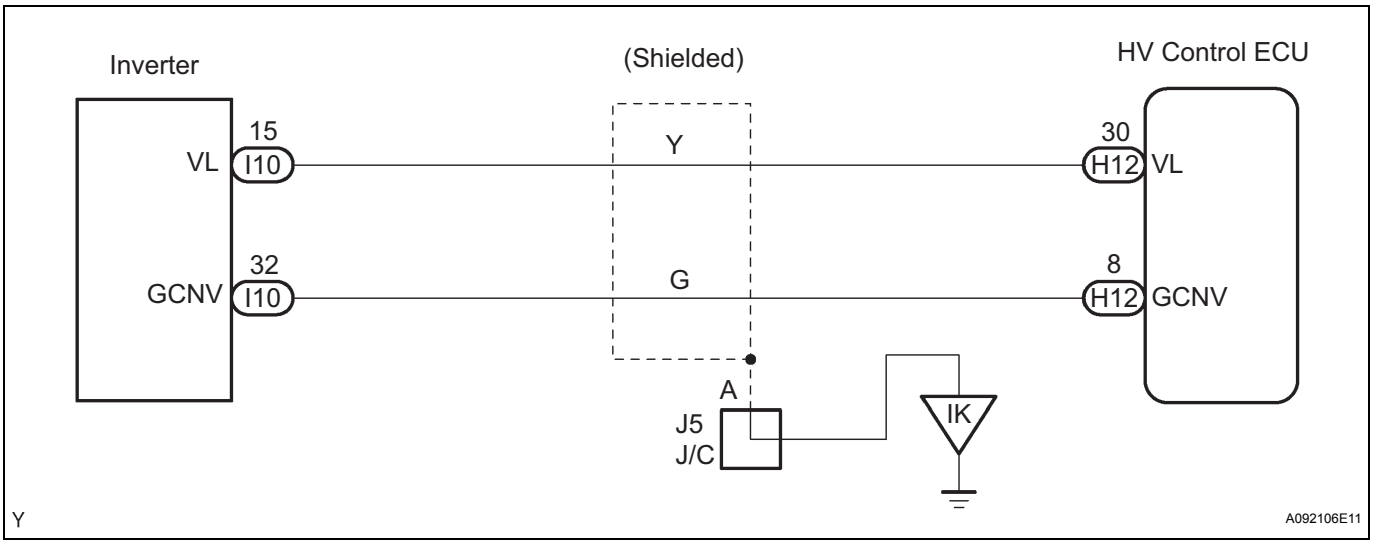


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MONITOR DESCRIPTION

The HV control ECU monitors the boost converter voltage (VL) sensor circuit. If the HV control ECU detects an open or short malfunction of the VL sensor circuit, the HV control ECU illuminates the MIL and sets a DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	**READ VALUE USING INTELLIGENT TESTER (VL VOLTAGE BEFORE RAISE)**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / Data List.

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INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the inverter with converter assembly.

HV

HINT:

- When measuring insulation resistance using a megohmmeter, set the megohmmeter to 500 V.
- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output. (Do not turn the power switch off during this inspection.)
  (a) Apply the parking brake and secure the wheels using chocks.
  (b) When the vehicle is stationary, turn the power switch on (READY) with park (P) selected and wait for 75 seconds or more.
  (c) Turn the air conditioning system on (MAX COLD, blower speed HI).
  (d) While depressing the brake pedal without depressing the accelerator pedal, move the shift lever to D and wait for 5 minutes.
  (If no DTCs are output, proceed to the next step.)
  (e) Drive the vehicle for approximately 5 minutes referring to the following freeze frame data items: "Vehicle Spd" "Shift Sensor Shift Pos" "Accel Pedal Pos #1" "Engine Revolution" "Engine Coolant Temp" "Master Cylinder Ctrl Trq" "Motor Temp MG2 (No2)" "Motor Temp MG2 (No1)"
  (If DTC P0AA6-526 is output, stop the vehicle, select park (P), turn the power switch on (READY), turn the air condition system on (Lo/COOL MAX, blower speed HI) and wait for 1 minute. Then turn the power switch off and wait for another 1 minute.)
  (If the freeze frame data item "Vehicle Spd" is 10 km/h or less, drive the vehicle at 10 km/h or more.)
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the inverter with converter assembly.

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1	READ OUTPUT DTC (HYBRID CONTROL)

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / DTC.
(e) Read DTCs.

Result:

Display (DTC Output)	Proceed to
Only DTC P0AA6	A
DTCs P0AA6 and P0A1D (HV control ECU malfunction)	B
DTCs P0AA6 and P0A1F (Battery ECU malfunction)	C

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DTC	P0AEE-276	Motor Inverter Temperature Sensor "A" Circuit Range / Performance

DTC	P0AEE-277	Motor Inverter Temperature Sensor "A" Circuit Range / Performance

DESCRIPTION

Refer to DTC P0AEF (INF 275) (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0AEE	276	Sudden change in motor inverter temperature sensor output*1 (1 trip detection logic)	• Wire harness or connector • Inverter cooling system • Water pump w/ motor and bracket assembly • Cooling fan motor • No. 2 cooling fan motor • Power module intelligent transistor set
P0AEE	277	Motor inverter temperature sensor output deviation The difference between the estimated motor inverter temperature and the temperature sensor output is large. (1 trip detection logic)	• Wire harness or connector • Inverter cooling system • Water pump w/ motor and bracket assembly • Cooling fan motor • No. 2 cooling fan motor • Power module intelligent transistor set

HV

HINT:

*1: If only DTC P0AEE-276 is output, a temperature sensor malfunction is more likely to be the cause than a sudden change in actual temperature.

WIRING DIAGRAM

Refer to DTC P0AEF (INF 275) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 30 seconds or more.

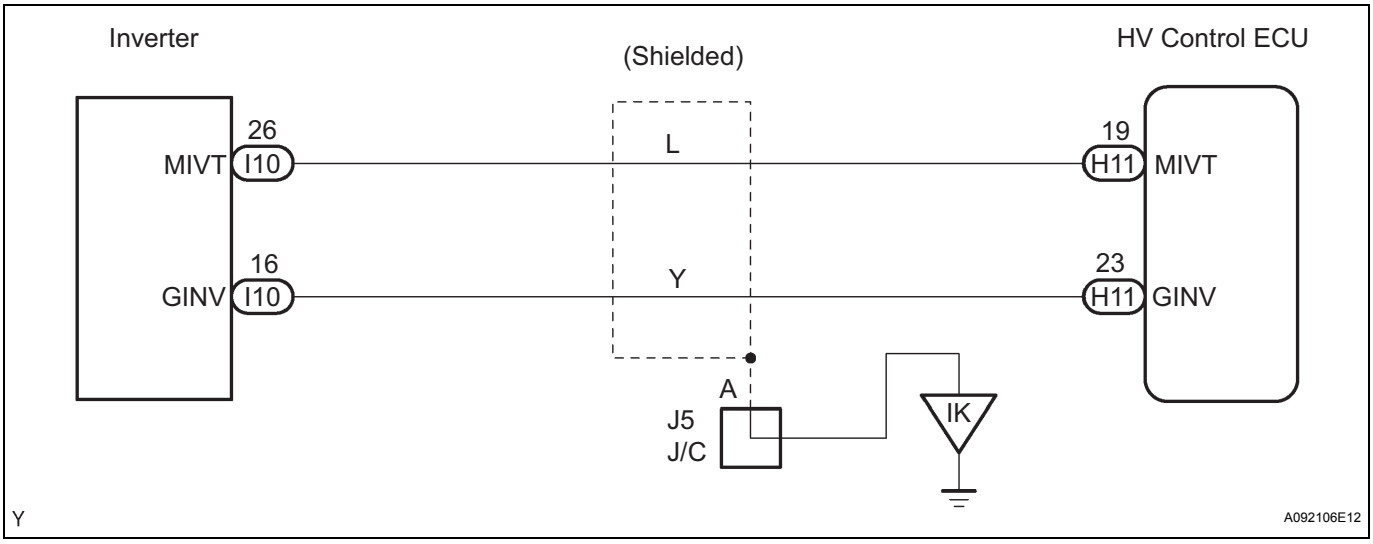
  (b) Drive the vehicle for approximately 5 minutes referring to the following freeze frame data or Data List items: "Vehicle Spd" "Inverter Temp-(MG2)" "Inverter Temp-(MG1)" "Converter Temperature".

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a)Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	READ VALUE USING INTELLIGENT TESTER (INVERTER TEMP-[MG2])

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Inverter Temp-(MG2) value.

Result:

Temperature Displayed	Proceed to
-50°C (-58°F)	A
205°C (401°F)	B
-49°C to 204°C (-57°F to 400°F)	C

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DTC	P3221-314	Generator Inverter Temperature Sensor Circuit Range / Performance

DTC	P3221-315	Generator Inverter Temperature Sensor Circuit Range / Performance

DESCRIPTION

Refer to DTC P3222 (INF 313) (see page).

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P3221	314	Sudden change in generator inverter temperature sensor output*1 (1 trip detection logic)	• Wire harness or connector • Inverter cooling system • Water pump w/ motor and bracket assembly • Cooling fan motor • No. 2 cooling fan motor • Power module intelligent transistor set
P3221	315	Generator inverter temperature sensor output deviation The difference between the estimated generator inverter temperature and the temperature sensor output is large. (1 trip detection logic)	• Wire harness or connector • Inverter cooling system • Water pump w/ motor and bracket assembly • Cooling fan motor • No. 2 cooling fan motor • Power module intelligent transistor set

HV

HINT:

*1: If only DTC P3221-314 is output, a temperature sensor malfunction is more likely to be the cause than a sudden change in actual temperature.

WIRING DIAGRAM

Refer to DTC P3222 (INF 313) (see page).

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a) Turn the power switch on (READY) and wait for 30 seconds or more.

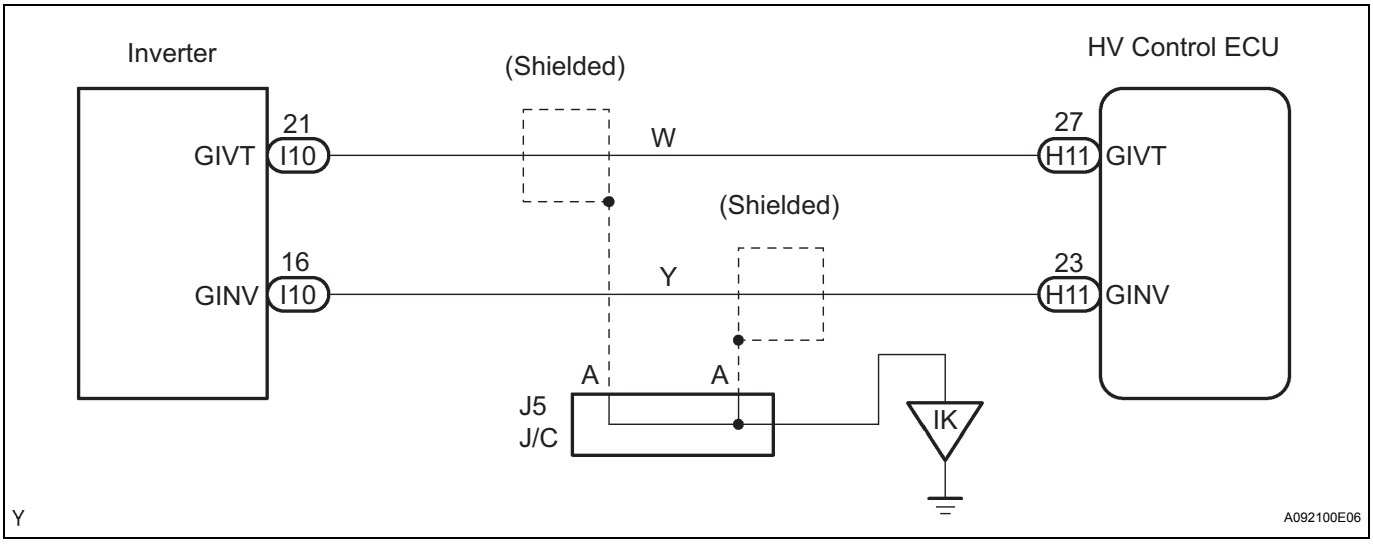
  (b) Drive the vehicle for approximately 5 minutes referring to the following freeze frame data or Data List items: "Vehicle Spd" "Inverter Temp-(MG2)" "Inverter Temp-(MG1)" "Converter Temperature".

- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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WIRING DIAGRAM



HV

INSPECTION PROCEDURE

CAUTION:

- **Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from reconnecting it while you are servicing the high-voltage system.**
- **After disconnecting the service plug grip, wait for at least 5 minutes before touching any of the high-voltage connectors or terminals.**

  HINT:

  At least 5 minutes are required to discharge the high-voltage condenser inside the inverter.

NOTICE:

If the power module intelligent transistor set or electric vehicle converter assembly is malfunctioning, remove the inverter cover and check for coolant leaks, water intrusion, excessive deposits and damage. If any of these items are found, replace the w/ converter inverter assembly.

HINT:

- After the repair, clear the DTCs and perform the following procedure to check that DTCs are not output.

  (a)Turn the power switch on (IG) and wait for 5 seconds or more.
- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

[Deleted]

1	**READ VALUE USING INTELLIGENT TESTER (INVERTER TEMP-[MG1])**

(a) Connect the intelligent tester to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester ON.
(d) Enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the Inverter Temp-(MG1) value.

Result

Temperature Displayed	Proceed to
-50°C (-58°F)	A
205°C (401°F)	B
-49°C to 204°C (-57°F to 400°F)	C

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- If the DTCs are stored again after the power module intelligent transistor set or electric vehicle converter assembly has been replaced, replace the w/ converter inverter assembly.

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1	CHECK QUANTITY OF HV COOLANT

(a) Check that there is a sufficient amount of coolant for the inverter.

OK:

There is a sufficient amount of coolant for the inverter

NG → **ADD HV COOLANT**

OK

2	CHECK COOLANT HOSE

(a) Check that the hoses of the cooling system are not bent or clogged (refer to the cooling system [see page]).

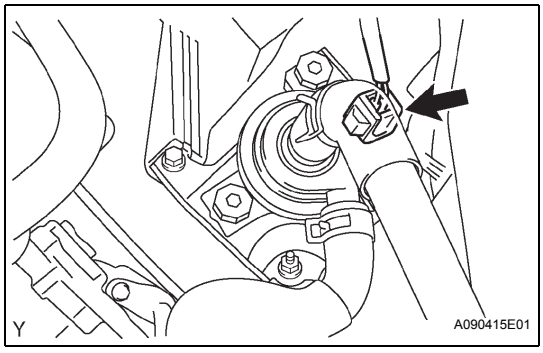
OK:

The hoses of the cooling system are not bent or clogged

NG → **CORRECT TO NORMAL CONDITION**

OK

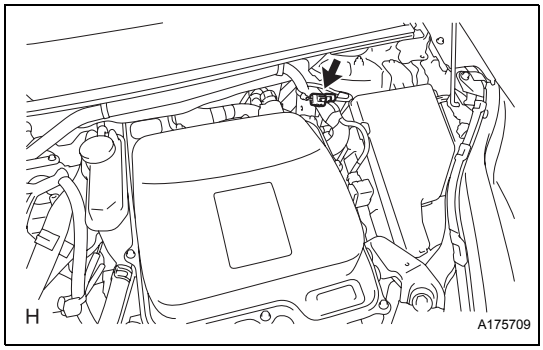
3	CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP CONNECTOR AND SHORT CONNECTOR)



(a) Check the connection condition of the water pump connector.

OK:

Connector has been connected securely and there is no poor connection.



(b) Check the connection condition of the short connector.

OK:

Connector has been connected securely and there is no poor connection.

NG → **CONNECT SECURELY**

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