

DTC	P0A94/547	DC/DC CONVERTER PERFORMANCE
------------	------------------	------------------------------------

DTC	P0A94/548	DC/DC CONVERTER PERFORMANCE
------------	------------------	------------------------------------

DTC	P0A94/549	DC/DC CONVERTER PERFORMANCE
------------	------------------	------------------------------------

CIRCUIT DESCRIPTION

See the description of booster converter on page 05-691.

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	547	Boost converter over-voltage (OVL) signal detection (over-voltage by HV control ECU malfunction)	<ul style="list-style-type: none"> • Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A94	548	Boost converter over-voltage (OVL) signal detection (over-voltage by inverter assembly malfunction)	<ul style="list-style-type: none"> • Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly
P0A94	549	Boost converter over-voltage (OVL) signal detection (over-voltage by HV transaxle assembly malfunction)	<ul style="list-style-type: none"> • Wire harness or connector • HV transaxle assembly • Hybrid vehicle motor • Hybrid vehicle generator • HV control ECU • w/ converter inverter assembly

MONITOR DESCRIPTION

If the boost converter detects over-voltage, 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.

MONITOR STRATEGY

Related DTCs	P0A94 (INF 547/548/549): Boost converter/OVL detection over-voltage
Required sensor/components	Boost converter
Frequency of operation	Continuous
Duration	TOYOTA's intellectual property
MIL operation	Immediately
Sequence of operation	None

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	TOYOTA's intellectual property
Other conditions belong to TOYOTA's intellectual property	–

TYPICAL MALFUNCTION THRESHOLDS

Boost converter	Over-voltage
-----------------	--------------

COMPONENT OPERATING RANGE

Boost converter	DTC P0A94 (INF 547/548/549) is not detected
-----------------	---

WIRING DIAGRAM

Refer to DTC P0A78 (INF 279) on page [05-577](#).

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 is required to discharge the high-voltage condenser inside the inverter.

1 CONFIRM INFORMATION(EXCLUSIVE INFO 3)

- Connect the hand-held tester to the DLC3.
- Turn the power switch ON (IG).
- Turn the hand-held tester ON.
- On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DTC INFO / TROUBLE CODES.
- Select DTC P0A94 to display its freeze frame data.
- Select the item that has INF code 547, 548, or 549 from among INFORMATION 1 to 5, and press ENTER.
- Read EXCLUSIVE INFO 3.

Result: -32 to 32 (during driving without battery power)

HINT:

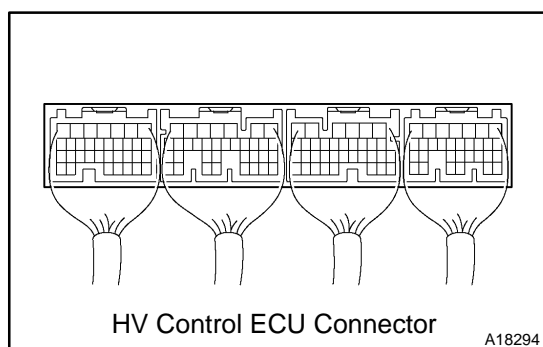
If the value is inside the range shown above, DTCs other than P0A78 (INF 547, 548 and 549) have been detected as well. Perform troubleshooting for those DTCs first.

YES

GO TO RELEVANT DTC CHART
(See page [05-440](#))

NO

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



- 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**

OK

3 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 page 21-116).

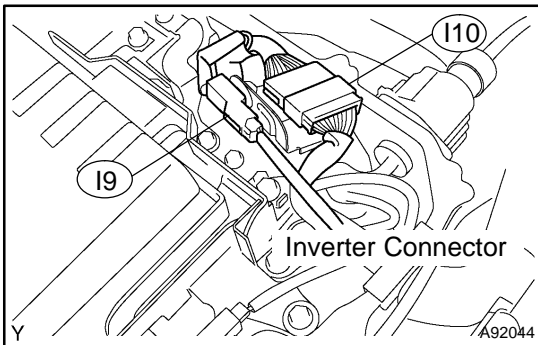
NOTICE:

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 page 21-23).
- (d) Check the connection condition of the I9 and I10 inverter connectors.

OK: Connectors have been connected securely and there is no poor connection.

- (e) Reinstall the inverter cover (see page 21-23).
- (f) Reinstall the service plug grip (see page 21-116).



NG **CONNECT SECURELY**

OK

4 CONFIRM INFORMATION(EXCLUSIVE INFO 4)

- (a) Connect the hand-held tester to the DLC3.
- (b) 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.

- (c) Turn the hand-held tester ON.
- (d) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DTC INFO / TROUBLE CODES.
- (e) Select DTC P0A94 to display its freeze frame data.
- (f) Select the item that has INF code 547, 548, or 549 from among INFORMATION 1 to 5, and press ENTER.
- (g) Read EXCLUSIVE INFO 4.

Result:

Displayed in Exclusive Information 4	Proceed to
-127 to -120, -95 to -88, -63 to -56, -31 to -24, 1 to 8, 33 to 40, 65 to 72, 97 to 104	A
-119 to -112, -87 to -80, -55 to -48, -23 to -16, 9 to 16, 41 to 48, 73 to 80, 105 to 112	B
-111 to -104, -79 to -72, -47 to -40, -15 to -8, 17 to 24, 49 to 56, 81 to 88, 113 to 120	C
-103 to -96, -71 to -64, -39 to -32, -7 to 0, 25 to 32, 57 to 64, 89 to 96, 121 to 127	D

B**REPLACE HYBRID VEHICLE CONTROL ECU
(See page 21-124)****C****REPLACE W/CONVERTER INVERTER ASSY
(See page 21-23)****D****REPLACE HYBRID VEHICLE TRANSAXLE
ASSY (See page 22-11)****A****5 READ OUTPUT DTC(HV ECU)**

- (a) Connect the hand-held tester to the DLC3.
 (b) 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.

- (c) Turn the hand-held tester ON.
 (d) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / DTC INFO / TROUBLE CODES.
 (e) Read DTCs.

Result: DTCs listed in the table below are output

DTC No.	INF Code	Detection Item	See Page
P0A78	266	Drive Motor "A" Inverter Performance	05-562
P0A94	558 or 560	DC/DC Converter Malfunction	05-730
P0A94	588	DC/DC Converter Malfunction	05-751
P0A94	589	DC/DC Converter Malfunction	05-754
P0AA2	227	Hybrid Battery Positive Contactor Circuit Stuck Open	05-763
P0AA5	229	Hybrid Battery Negative Contactor Circuit Stuck Open	05-767
P3000	125	Battery Control System Malfunction	05-777
P3004	131	High Voltage Power Resource Malfunction	05-781

YES**GO TO THE PAGE NUMBER SHOWN IN THE
TABLE ABOVE****NO**

6 INSPECT HYBRID VEHICLE MOTOR ASSY

CAUTION:

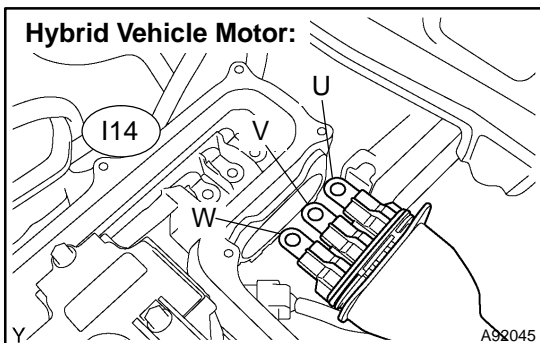
Wear insulated gloves before performing the following operation.

- (a) Turn the power switch OFF.
- (b) Remove the service plug grip (see page 21-116).

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 page 21-23).
- (d) Disconnect the three-phase alternating current cable for the hybrid vehicle motor from the inverter.
- (e) Using a milliohm meter, measure the resistance between the three-phase alternating current cable terminals of the hybrid vehicle motor.



NOTICE:

If the motor temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I14-1) - V (I14-2)	Below 135 mΩ at 20°C
V (I14-2) - W (I14-3)	Below 135 mΩ at 20°C
W (I14-3) - U (I14-1)	Below 135 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$$R20 = Rt \div (1 + 0.00393 \times (T - 20))$$

R20: Resistance converted to 20 °C (mΩ)

Rt: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

- (f) Calculate the difference between the maximum and minimum resistance between terminals U - V, V - W, and W - U.

Standard: Below 2 mΩ

- (g) Using a megohmmeter, check the insulation resistance between the three-phase alternating current cable terminals of the hybrid vehicle motor and the body ground.

Standard:

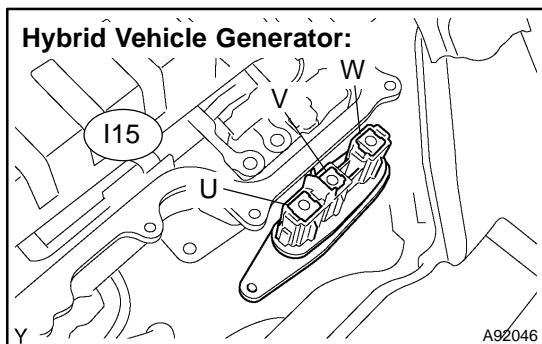
Tester Connection	Specified Condition
U (I14-1) - Body ground	10 MΩ or higher
V (I14-2) - Body ground	10 MΩ or higher
W (I14-3) - Body ground	10 MΩ or higher

- (h) Reconnect the three-phase alternating current cable for the hybrid vehicle motor.

NG REPLACE HYBRID VEHICLE MOTOR ASSY

OK

7	INSPECT HYBRID VEHICLE GENERATOR ASSY
----------	--

**CAUTION:**

Wear insulated gloves before performing the following operation.

- (a) Check that the service plug grip and inverter cover have been removed.
- (b) Disconnect the three-phase alternating current cable for the hybrid vehicle generator from the inverter.
- (c) Using a milliohm meter, measure the resistance between the three-phase alternating current cable terminals of the hybrid vehicle generator.

NOTICE:

If the generator temperature is too high, the resistance varies considerably, which hinders determining malfunction. Therefore, measure the resistance at a minimum 8 hours after the vehicle has been stopped.

Standard:

Tester Connection	Specified Condition*
U (I15-1) – V (I15-2)	Below 109 mΩ at 20°C
V (I15-2) – W (I15-3)	Below 109 mΩ at 20°C
W (I15-3) – U (I15-1)	Below 109 mΩ at 20°C

*: Apply the formula given below to correct the resistance.

$$R_{20} = R_t \div (1 + 0.00393 \times (T - 20))$$

R₂₀: Resistance converted to 20 °C (mΩ)

R_t: Resistance between measured lines (mΩ)

T: Ambient air temperature during measurement (°C)

- (d) Calculate the difference between the maximum and minimum resistance between terminals U – V, V – W, and W – U.

Standard: Below 2 mΩ

- (e) Using a megohmmeter, check the insulation resistance between the three-phase alternating current cable terminals of the hybrid vehicle generator and the body ground.

Standard:

Tester Connection	Specified Condition
U (I15-1) – Body ground	10 MΩ or higher
V (I15-2) – Body ground	10 MΩ or higher
W (I15-3) – Body ground	10 MΩ or higher

- (f) Reconnect the three-phase alternating current cable for the hybrid vehicle generator.

NG

REPLACE HYBRID VEHICLE GENERATOR ASSY
--

OK

8 PERFORM ACTIVE TEST BY HAND-HELD TESTER(INVERTER STOP)

CAUTION:

Wear insulated gloves before performing the following operation.

- (a) Check that the service plug grip and inverter cover have been removed.
- (b) Connect the hand-held tester to the DLC3.
- (c) Turn the power switch ON (IG).

HINT:

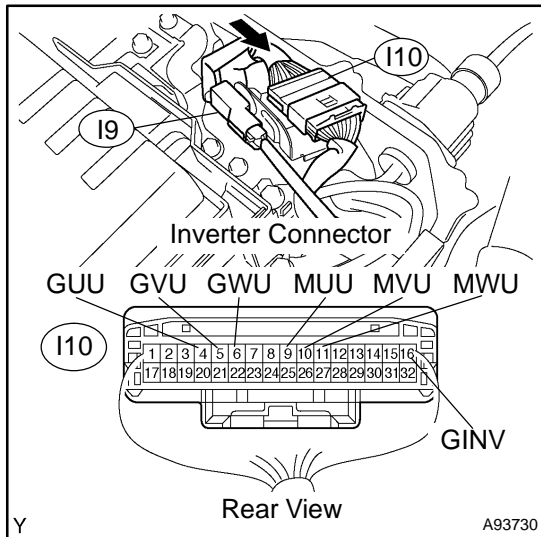
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

- (d) Turn the hand-held tester ON.
- (e) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / ACTIVE TEST.
- (f) Measure the voltage between the terminals of the inverter connector while effecting INVERTER STOP.

Standard:

Tester Connection	Specified Condition
MUU (I10-9) – GINV (I10-16)	12 to 16 V
MVU (I10-10) – GINV (I10-16)	12 to 16 V
MWU (I10-11) – GINV (I10-16)	12 to 16 V
GUU (I10-4) – GINV (I10-16)	12 to 16 V
GVU (I10-5) – GINV (I10-16)	12 to 16 V
GWU (I10-6) – GINV (I10-16)	12 to 16 V

- (g) Turn the power switch OFF.



NG → Go to step 9

OK

REPLACE HYBRID VEHICLE CONTROL ECU AND W/CONVERTER INVERTER ASSY (See page 21-124 and 21-23)

9 | PERFORM ACTIVE TEST BY HAND-HELD TESTER(INVERTER STOP)

CAUTION:

Wear insulated gloves before performing the following operation.

- (a) Check that the service plug grip and inverter cover have been removed.
- (b) Disconnect the I10 inverter connector.
- (c) Connect the hand-held tester to the DLC3.
- (d) Turn the power switch ON (IG).

HINT:

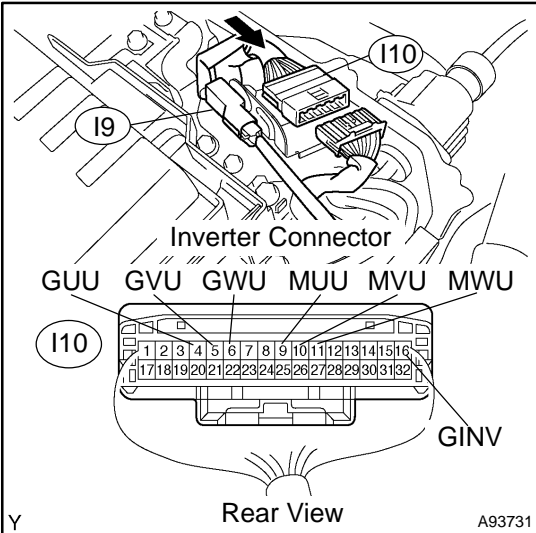
DTCs for the interlock switch system are output when turning the power switch ON (IG) with both service plug grip and inverter cover removed.

- (e) Turn the hand-held tester ON.
- (f) On the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / HV ECU / ACTIVE TEST.
- (g) Measure the voltage between the terminals of the inverter connector while effecting INVERTER STOP.

Standard:

Tester Connection	Specified Condition
MUU (I10-9) – GINV (I10-16)	14 to 16 V
MVU (I10-10) – GINV (I10-16)	14 to 16 V
MWU (I10-11) – GINV (I10-16)	14 to 16 V
GUU (I10-4) – GINV (I10-16)	14 to 16 V
GVU (I10-5) – GINV (I10-16)	14 to 16 V
GWU (I10-6) – GINV (I10-16)	14 to 16 V

- (h) Turn the power switch OFF.
- (i) Reconnect the inverter connector.
- (j) Reinstall the inverter cover (see page 21-23).
- (k) Reinstall the service plug grip (see page 21-116).



NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21-23)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21-124)