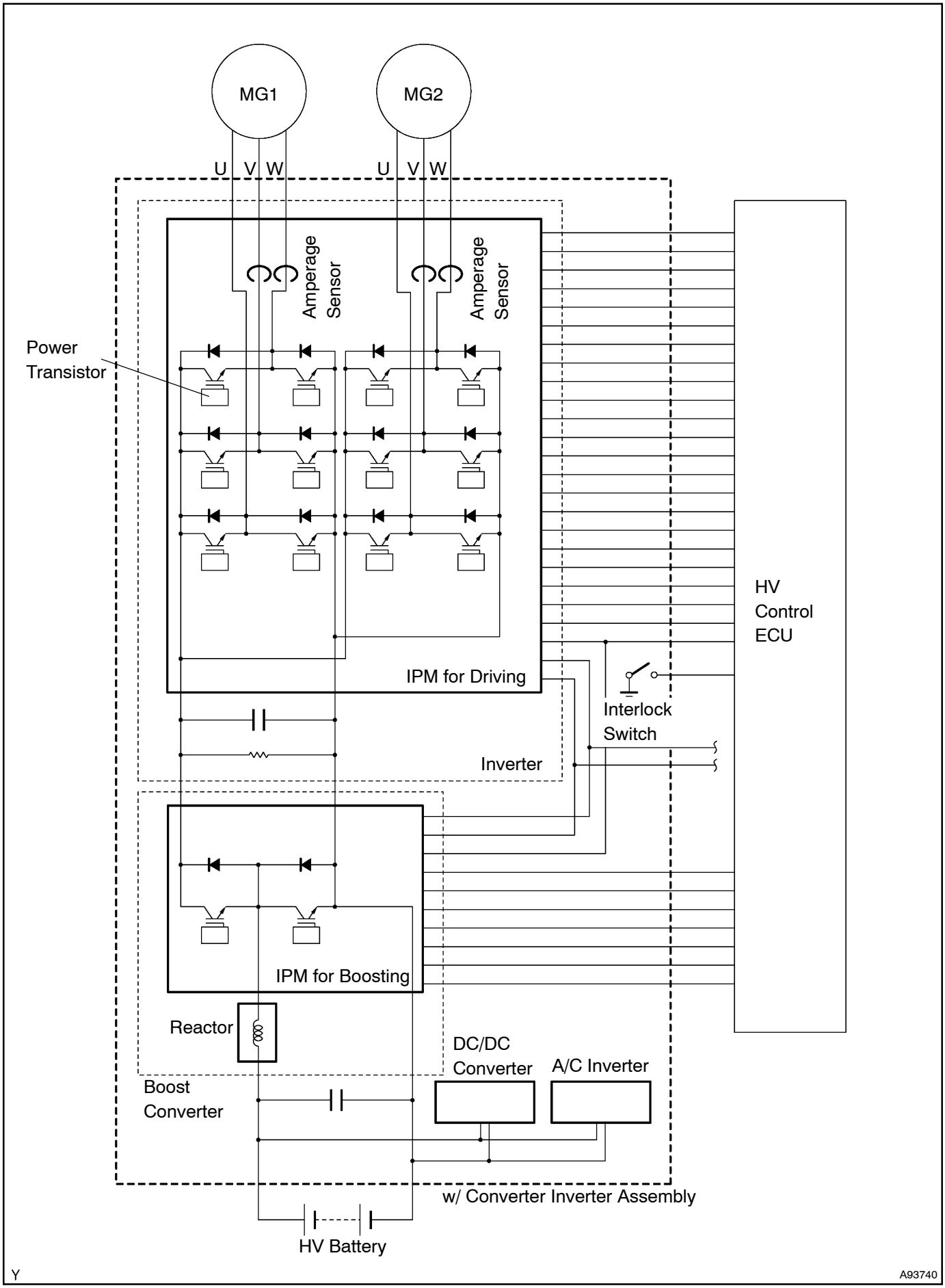
DTC	P0A78/266	DRIVE MOTOR ”A” INVERTER PERFORMANCE

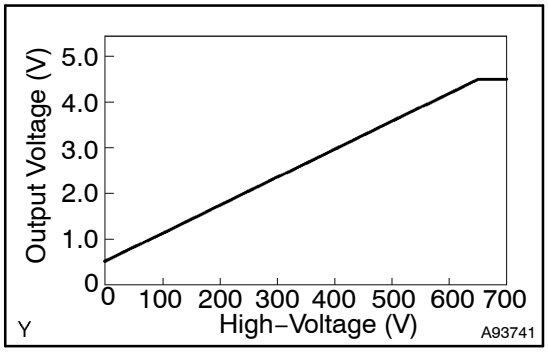
DTC	P0A78/267	DRIVE MOTOR ”A” INVERTER PERFORMANCE

CIRCUIT DESCRIPTION

The inverter converts the high–voltage direct current of the HV battery and the alternating current for the MG1/MG2. The inverter contains a three–phase bridge circuit, which consists of six power transistors each for the MG1 and the MG2, in order to convert the direct current and the three–phase alternating current. The HV control ECU controls the actuation of the power transistors.

The inverter transmits information that is necessary for effecting control, such as the amperage and voltage, to the HV control ECU.


MG1
MG2
U V W
U V W
Amperage Sensor
Amperage Sensor
Power Transistor
IPM for Driving
Inverter
HV Control ECU
Interlock Switch
IPM for Boosting
Reactor
DC/DC Converter
A/C Inverter
Boost Converter
w/ Converter Inverter Assembly
HV Battery
Y
A93740



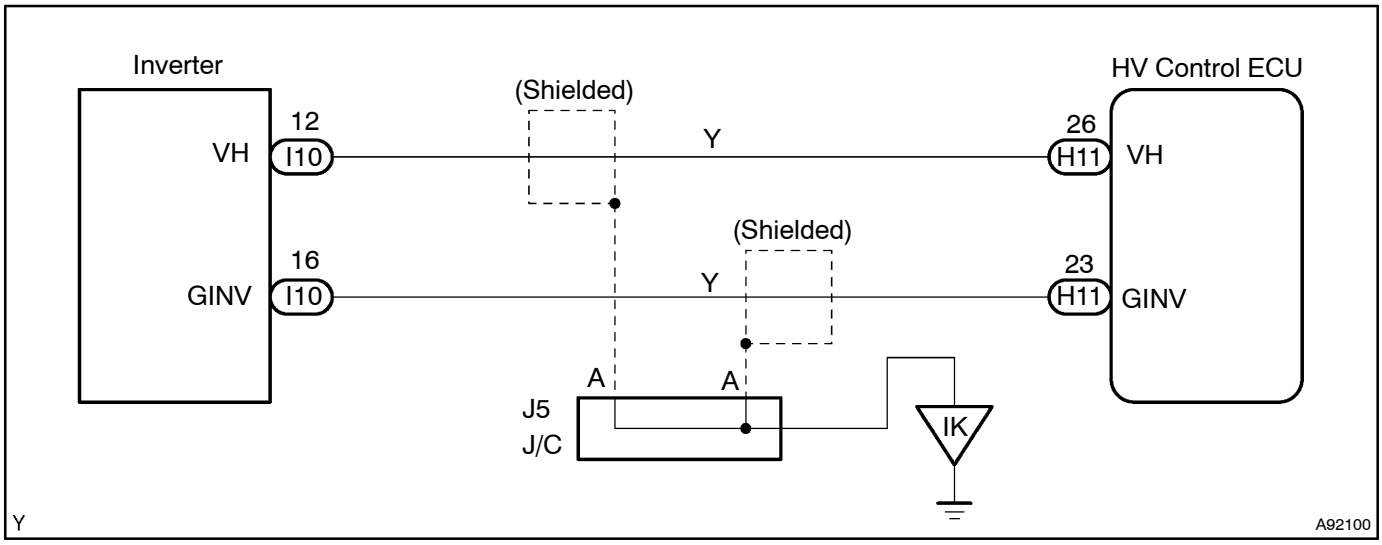
The HV control ECU uses a voltage sensor, which has been built into the inverter, to detect the high voltage after it is boosted and for boost control.
The inverter voltage sensor outputs a voltage that varies between 0 and 5 V in accordance with the changes in the high voltage. The higher the high voltage, the higher the output voltage, and the lower the high voltage, the lower the output voltage.
The HV control ECU monitors the inverter voltage and detects malfunction.

DTC No.	INF Code	DTC Detection Condition	Trouble Area
P0A78	266	Open or GND short in inverter voltage (VH) sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU
P0A78	267	+B short in inverter voltage (VH) sensor circuit	• Wire harness or connector • w/ converter inverter assembly • HV control ECU

HINT:
After confirming DTC P0A78 (INF 266 or 267), confirm VH–Voltage after Raise in Powertrain / Hybrid Control / Data List using the intelligent tester II.

Voltage Displayed	Malfunction
765 V	+B short circuit
0 V	Open or GND short circuit

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 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	READ OUTPUT DTC(HYBRID CONTROL)

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

YES → **GO TO RELEVANT DTC CHART (See page 05–268)**

NO

2	READ VALUE OF INTELLIGENT TESTER II(VH–VOLTAGE AFTER RAISE)

(a) Connect the intelligent tester II to the DLC3.
(b) Turn the power switch ON (IG).
(c) Turn the intelligent tester II ON.
(d) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(e) Read the VH–Voltage after Raise value on the intelligent tester II.
Result:

Voltage Displayed	Proceed to
765 V	A
0 V	B
1 to 764 V	C

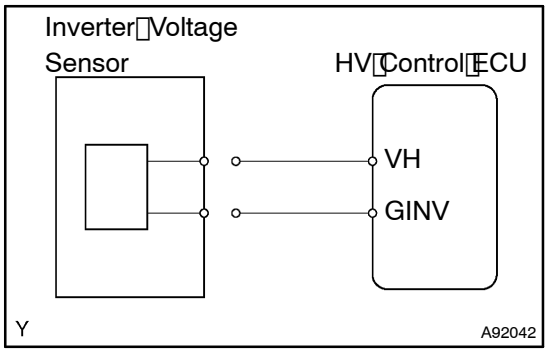
HINT:
- If there is a +B short circuit, the intelligent tester II indicates 765 V.
- If there is an open or GND short circuit, the intelligent tester II indicates 0 V.

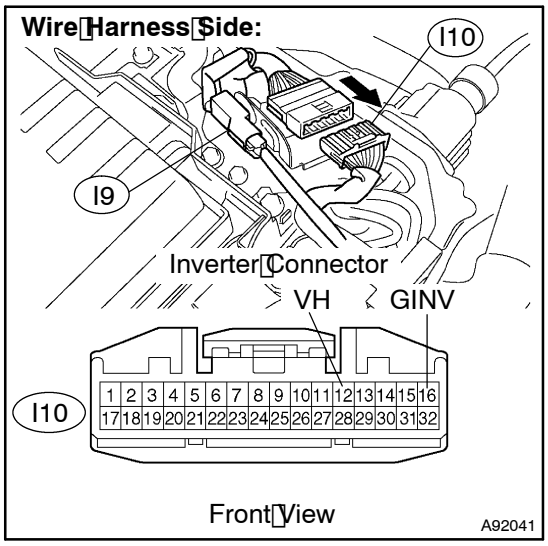
B → **Go to step 5**

C → **CHECK FOR INTERMITTENT PROBLEMS (See page 05–232)**

A

3	READ VALUE OF INTELLIGENT TESTER II (CHECK FOR +B SHORT IN WIRE HARNESS)





CAUTION:
Wear insulated gloves before performing the following operation.

(a) Turn the power switch OFF.
(b) Remove the service plug grip (see 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 page 21–25).
(d) Disconnect the I10 inverter connector.
(e) 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.

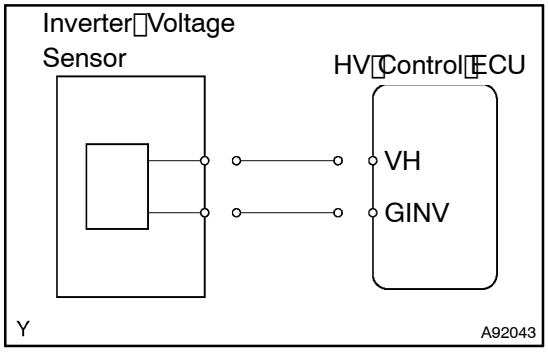
(f) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(g) Read the VH–Voltage after Raise value on the intelligent tester II.
Standard: 0 V
(h) Turn the power switch OFF.
(i) Reconnect the inverter connector.
(j) Reinstall the inverter cover (see page 21–25).
(k) Reinstall the service plug grip (see page 21–120).

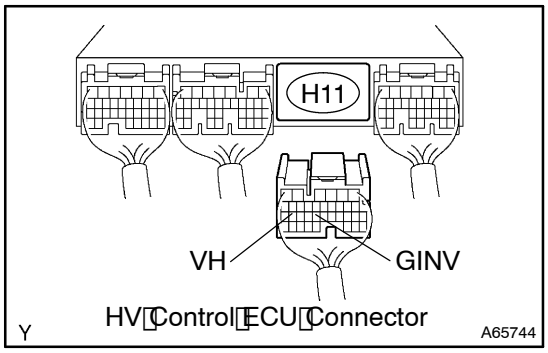
NG → **Go to step 4**

OK

REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)

4	READ VALUE OF INTELLIGENT TESTER II (CHECK FOR +B SHORT IN HYBRID VEHICLE CONTROL ECU)





(a) Disconnect the H11 HV control ECU connector.
(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) On the intelligent tester II, enter the following menus: Powertrain / Hybrid Control / Data List.
(d) Read the VH–Voltage after Raise value on the intelligent tester II.

Standard: 0 V

(e) Reconnect the HV control ECU connector.

NG → **REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)**

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

5	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 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 page 21–25).

(d) Disconnect the H11 HV control ECU connector.

(e) Disconnect the I10 inverter connector.

(f) Check the resistance between the wire harness side connectors.

Standard (Check for open):

Tester Connection	Specified Condition
VH (H11–26) – VH (I10–12)	Below 1 Ω
GINV (H11–23) – GINV (I10–16)	Below 1 Ω

Standard (Check for short):

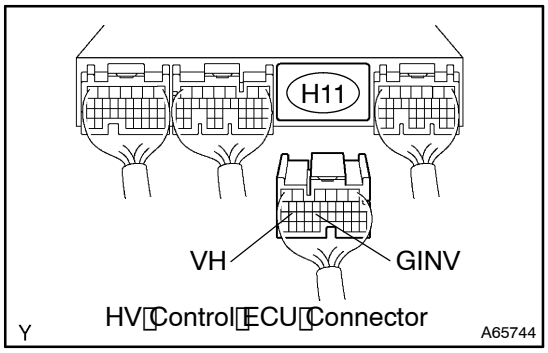
Tester Connection	Specified Condition
VH (H11–26) or VH (I10–12) – Body ground	10 kΩ or higher
GINV (H11–23) or GINV (I10–16) – Body ground	10 kΩ or higher

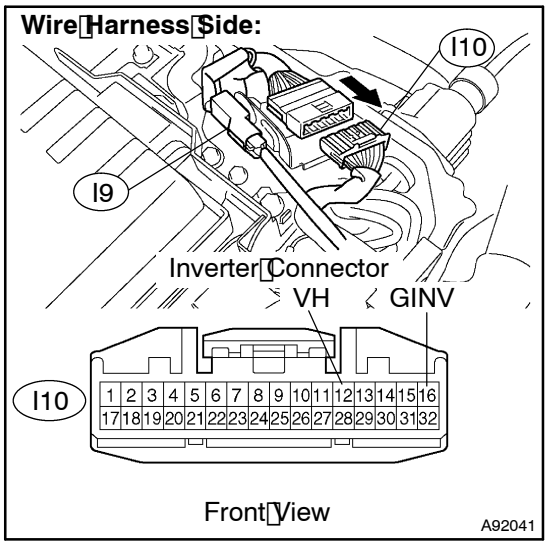
(g) Reconnect the inverter connector.

(h) Reconnect the HV control ECU connector.

(i) Reinstall the inverter cover (see page 21–25).

(j) Reinstall the service plug grip (see page 21–120).

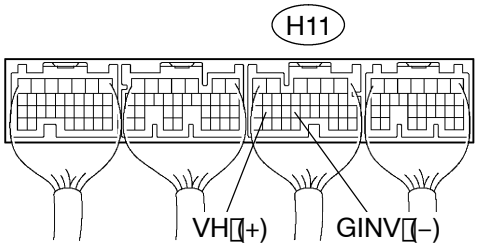




NG → **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK

6	INSPECT HYBRID VEHICLE CONTROL ECU (VH VOLTAGE)



HV Control ECU Connector
A18294

(a) Turn the power switch ON (READY).

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.

(b) Measure the voltage between the terminals of the H11 HV control ECU connector.

Standard:

Tester Connection	Specified Condition
VH (H11–26) – GINV (H11–23)	1.6 to 3.8 V

NG → **REPLACE W/CONVERTER INVERTER ASSY (See page 21–25)**

OK

REPLACE HYBRID VEHICLE CONTROL ECU (See page 21–128)