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DTC P0046 **Turbocharger / Supercharger Boost Control Solenoid Circuit Range / Performance**

DESCRIPTION WIRING DIAGRAM

INSPECTION PROCEDURE INSPECT TURBO MOTOR DRIVER (for Bank 1 and Bank 2)

INSPECT TURBOCHARGER SUB-ASSEMBLY (DC MOTOR) (for Bank 1 or Bank 2)

CHECK HARNESS AND CONNECTOR (DC MOTOR - TURBO MOTOR DRIVER)

REPLACE TURBOCHARGER SUB-ASSEMBLY (for Bank 1 or Bank 2) **REPLACE TURBO MOTOR DRIVER**

(for Bank 1 or Bank 2) **REPAIR OR REPLACE HARNESS OR** CONNECTOR

CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED

INSPECT TURBOCHARGER SUB -ASSEMBLY

P0046 Turbocharger / Supercharger Boost DTC **Control Solenoid Circuit Range / Performance**

New

DTC P0047 **Turbocharger/Supercharger Boost Control "A" Circuit Low**

DTC **P0048** Turbocharger/Supercharger Boost **Control "A" Circuit High**

P004B Turbocharger/Supercharger Boost DTC **Control Solenoid "B" Circuit Range/Performance**

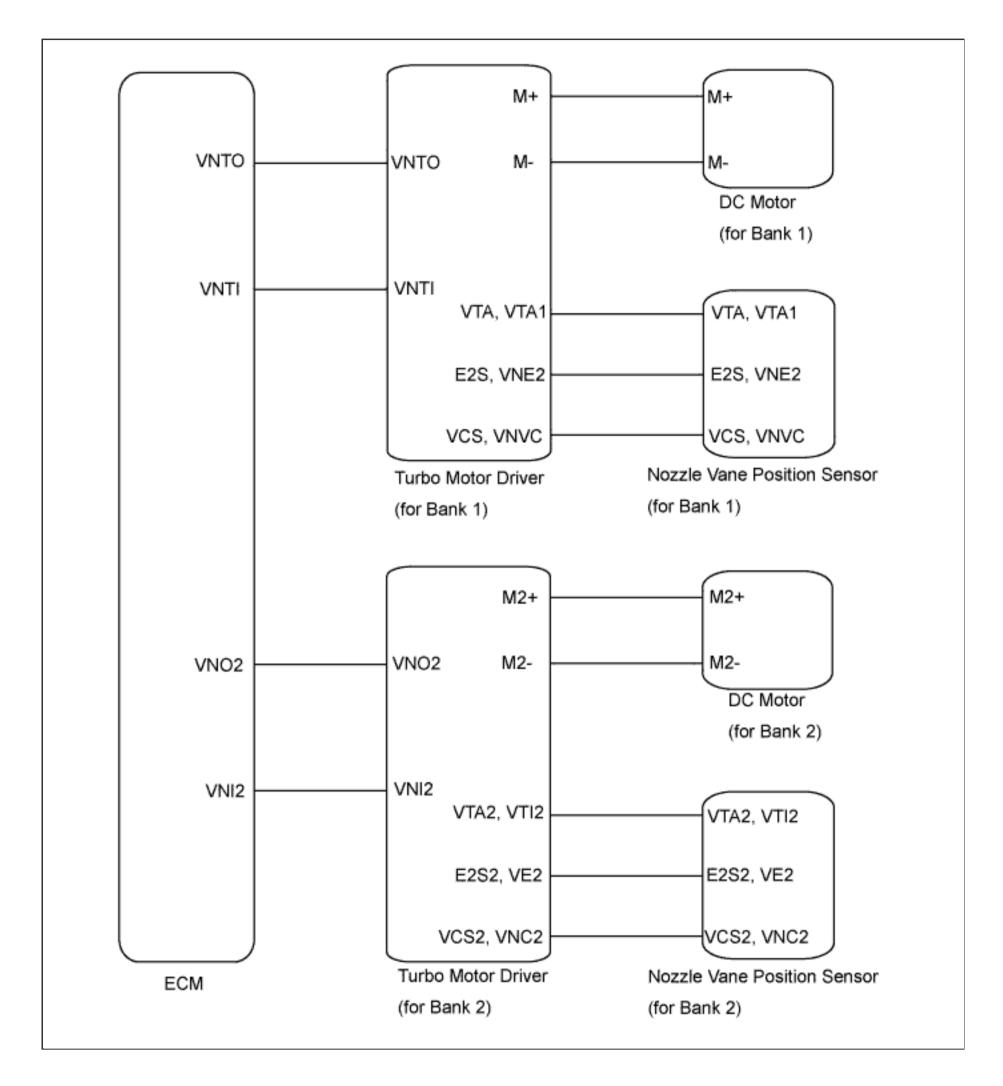
Turbocharger/Supercharger Boost DTC **P004C Control Solenoid "B" Circuit Low**

DTC **P004D** Turbocharger/Supercharger Boost **Control Solenoid "B" Circuit High**

for Preparation **<u>Click here</u>**

DESCRIPTION

These DTCs indicates that the DC motor of the turbocharger is malfunctioning. The ECM monitors the DC motor current to detect an open or short in the DC motor circuit. If the current meets the criteria, the ECM sets a DTC and illuminates the MIL immediately. The DC motor is used to operate the nozzle vane of the turbocharger. The nozzle vane opens and closes to change the velocity of exhaust emissions in order to control the turbo pressure. The ECM varies the duty-cycle of the DC motor in accordance with the driving condition. If the nozzle vane is stuck closed (DC motor stuck off), the drivability may deteriorate at wide open throttle. If the nozzle vane is stuck open (DC motor stuck on), the drivability may deteriorate at intermediate throttle or the engine power may be in sufficient.



P0046, P004B

DTC Detection Drive Pattern	DTC Detection Condition	Trouble Area
	Either of the following conditions are met when the motor is driving (1 trip detection logic):	 Open or short in DC motor (turbocharger sub- assembly) circuit
Engine switch on (IG) for 5 seconds	 DC motor duty ratio is +/-100% for 1.3 seconds or more. DC motor current is 2.2 A or more for 5 seconds or more. 	 Turbo motor driver DC motor (turbocharger sub-assembly) Turbocharger nozzle vane is stuck or movement is irregular

P0047, P004C

DTC Detection Drive Pattern	DTC Detection Condition	Trouble Area
Engine switch on (IG) for 1 second	 Both of following conditions are met for 1 second or more when the motor is driving (1 trip detection logic): DC motor duty ratio is 100%. DC motor current is 0.5 A or less. 	 Open in DC motor (turbocharger sub- assembly) circuit Turbo motor driver DC Motor (turbocharger sub-assembly) Turbocharger nozzle vane is stuck or movement is irregular

P0048, P004D

DTC Detection Drive Pattern	DTC Detection Condition	Trouble Area
Engine switch on (IG) for 1 second	DC motor current is 6.5 A or more for 0.5 seconds or more when the motor is operating (1 trip detection logic).	 Short in DC motor (turbocharger sub- assembly) circuit Turbo motor driver DC Motor (turbocharger sub-assembly) Turbocharger nozzle vane is stuck or movement is irregular

HINT:

If DTC P0046, P0047, P0048, P004B, P004C and/or P004D is stored, the following symptoms may appear.

Stuck closed malfunction: Vehicle surge when driving with full load **Stuck open malfunction:**

- Lack of power
- Vehicle surge or hesitation under light or medium
 - load

 - White smoke

WIRING DIAGRAM

M- 0 1 M+ 0 2	4 M- 3 M+
DC Motor	Turbo Motor Driver
(Turbocharger sub-assembly) (for Bank 1)	(Bank 1)
M2- 0	4 M2- 3 M2+
DC Motor	Turbo Motor Driver
(Turbocharger sub-assembly) (for Bank 2)	(Bank 2)

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the intelligent tester. Freeze frame data records the engine condition when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, and other data from the time the malfunction occurred.

1.INSPECT TURBO MOTOR DRIVER (for Bank 1 and Bank 2)

- a. Remove the rear fender splash shield sub-assembly RH.
- **b.** Remove the front fender liner LH.
- c. Connect the intelligent tester to the DLC3.
- d. Turn the engine switch on (IG) and turn the tester on.
- e. Enter the following menus: Powertrain / Engine / DTC.
- f. Read the DTCs.

HINT:

Record the output DTCs.

- g. Clear the DTCs (<u>Click here</u>).
- h. Turn the engine switch off.
- i. Interchange the connectors for the turbo motor driver of bank 1 and bank 2.
- j. Turn the engine switch on (IG) for 5 seconds or more.
- **k.** Enter the following menus: Powertrain / Engine / DTC.
- . Read the DTCs. **Result:**

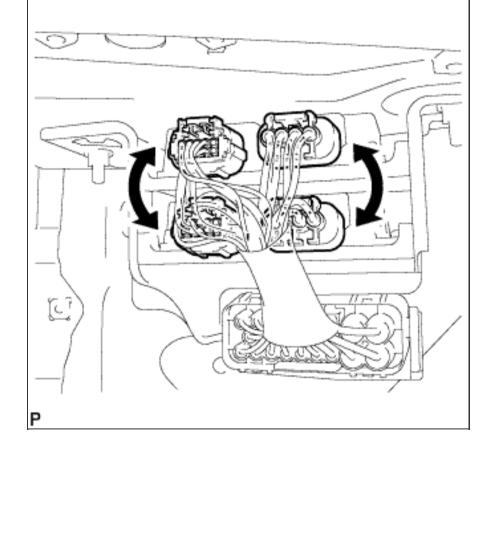
Α

OK

Display (DTC Output)	Proceed to
DTCs do not change	А
DTCs change	В
No DTC output	С

Β

С



2.INSPECT TURBOCHARGER SUB-ASSEMBLY (DC MOTOR) (for Bank 1 or Bank 2)

Go to step 5

Go to step 8

- a. Disconnect the DC motor connector.
- **b.** Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for Bank 1		
Tester Connection	Condition	Specified Condition
1 (M-) - 2 (M+)	Always	1 to 100 Ω

Standard Resistance:

for Bank 2			
	Tester Connection		Specified Condition
	1 (M2-) - 2 (M2+)	Always	1 to 100 Ω

(DC Motor) 2

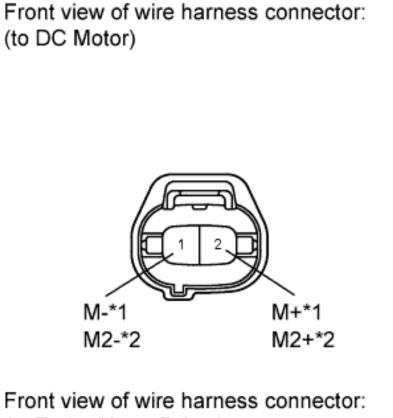
Component without harness connected:

3.CHECK HARNESS AND CONNECTOR (DC MOTOR - TURBO MOTOR DRIVER)

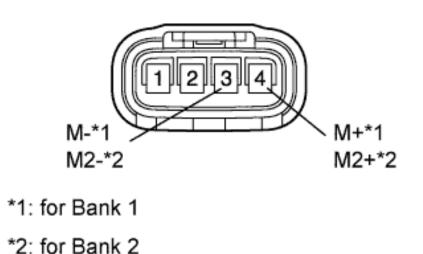
Go to step 4

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- a. Disconnect the DC motor connector.
- **b.** Disconnect the turbo motor driver connector.
- c. Measure the resistance according to the value(s) in the table below.



(to Turbo Motor Driver)



Standard Resistance (Check for Open):

for Bank 1			
Tester Connection	Condition	Specified Condition	
DC motor connector-1 (M-) - Turbo motor driver connector-4 (M-)	Always	Below 1 Ω	
DC motor connector-2 (M+) - Turbo motor driver connector-3 (M+)	Always	Below 1 Ω	
for Bank 2			
Tester Connection	Condition	Specified Condition	
DC motor connector-4 (M2-) - Turbo motor driver connector-4 (M2-)	Always	Below 1 Ω	
DC motor connector-8 (M2+) - Turbo motor driver connector-3 (M2+)	Always	Below 1 Ω	

Standard Resistance (Check for Short):

for Bank 1			
Tester Connection	Condition	Specified Condition	
DC motor connector-1 (M-) or Turbo motor driver connector-4 (M-) - Body ground	Always	10 kΩ or higher	
DC motor connector-2 (M+) or Turbo motor driver connector-3 (M+) - Body ground	Always	10 kΩ or higher	
for Bank 2			
Tester Connection	Condition	Specified Condition	
DC motor connector-4 (M2-) or Turbo motor driver connector-4 (M2-) - Body ground	Always	10 kΩ or higher	
DC motor connector-8 (M2+) or Turbo motor driver connector-3 (M2+) - Body ground	Always	10 kΩ or higher	

Go to step 8

Go to step 6

4.REPLACE TURBOCHARGER SUB-ASSEMBLY (for Bank 1 or Bank 2)

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NEXT

a. Replace turbocharger sub-assembly (for Bank 1 or Bank 2) (Click <u>here</u>).

Go to step 7

5.REPLACE TURBO MOTOR DRIVER (for Bank 1 or Bank 2)

a. Replace turbo motor driver (for Bank 1 or Bank 2) (Click here).

NEXT Go to step 7

6.REPAIR OR REPLACE HARNESS OR CONNECTOR NEXT

7.CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED

a. Connect the intelligent tester to the DLC3.

- **b.** Clear the DTCs (<u>Click here</u>).
- c. Turn the engine switch off.
- d. Turn the engine switch on (IG) for 5 seconds or more.
- e. Enter the following menus: Powertrain / Engine / DTC.
 - f. Confirm that the DTC is not output again.

NEXT **END**

8.INSPECT TURBOCHARGER SUB - ASSEMBLY

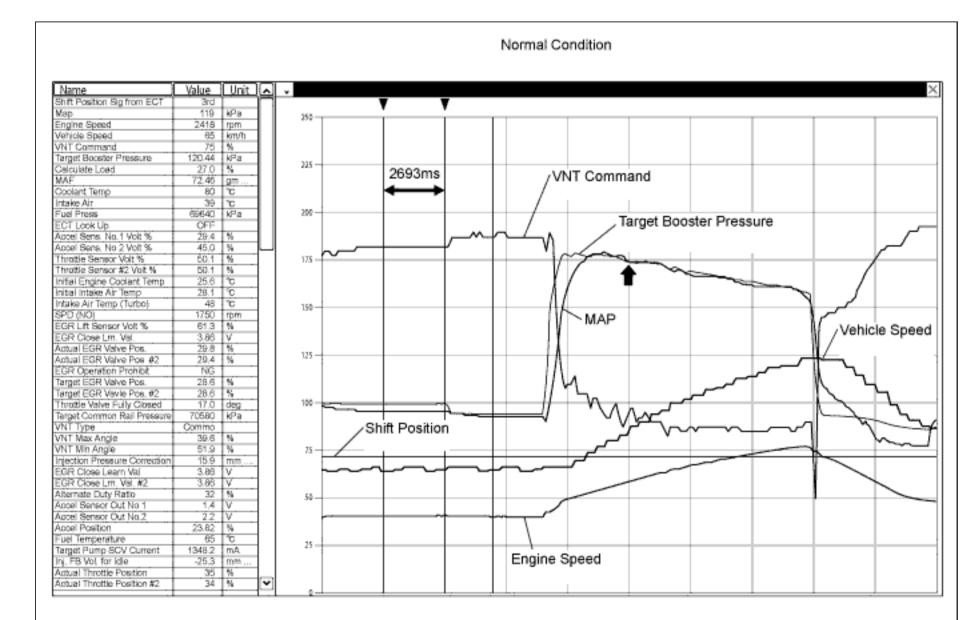
- a. Connect the intelligent tester to the DLC3.
- **b.** Turn the engine switch on (IG) and turn the tester on.
- c. Start the engine and warm up.
- d. Move the shift lever to 3rd and accelerate the vehicle with the accelerator fully open.
- e. Stop the vehicle
- f. Enter the following menus: Powertrain / Engine / DTC.

q. Read the DTCs.

Display (DTC Output)	Proceed to
DTC P0046, P0047, P0048, P004B, P004C and/or P004D are output	A
No DTC output	В

HINT:

- A snapshot can be used to compare vehicle data from the time of the malfunction to normal data and is very useful for troubleshooting.
- "Target Booster Pressure" and "MAP" in the snapshot can be used to heck the operation of the turbocharger. If "MAP" does not follow "Target **Booster Pressure**", the turbocharger nozzle vane may be stuck or the movement may be irregular.
- When the engine speed is 2500 to 3000 rpm with the accelerator pedal fully depressed, "MAP" is within +/- 10 kPa^{*} of "Target Booster Pressure" (not immediately after beginning of acceleration).
- * If the turbocharger pressure does not reach a specified value, it cannot be determined whether the system is normal by checking whether "MAP" is within +/-10 kPa of "Target Booster Pressure"



HINT:

В

Compare "MAP" with "Target Booster Pressure" at the point indicated by the arrow (\uparrow) in the illustration.

REPLACE TURBOCHARGER SUB - ASSEMBLY

CHECK FOR INTERMITTENT PROBLEMS

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