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Model Year Start: 2023	Model: Prius Prime	Prod Date Range: [03/2023 -]
Title: M20A-FXS (ENGINE CONTROL): SFI SYSTEM: P001001; Camshaft Position "A" Actuator Bank 1 General Electrical Failure; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

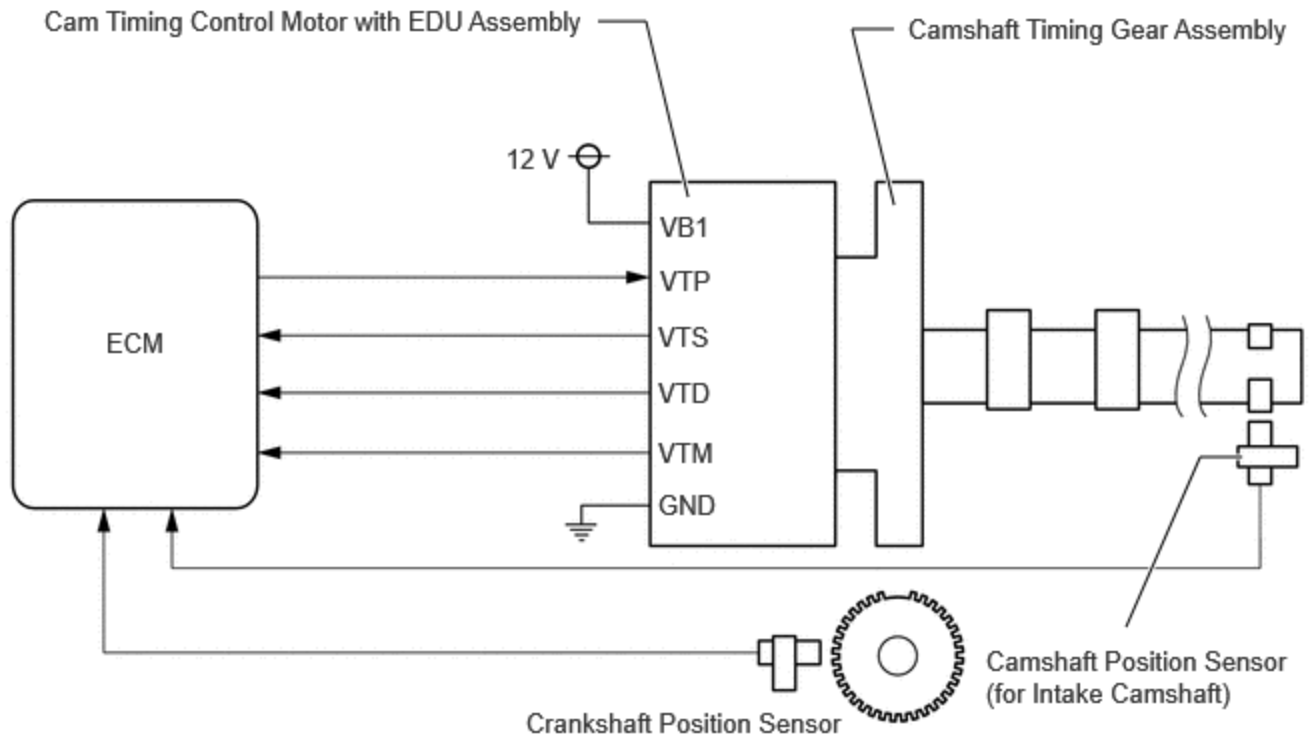
DTC	P001001	Camshaft Position "A" Actuator Bank 1 General Electrical Failure
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DESCRIPTION

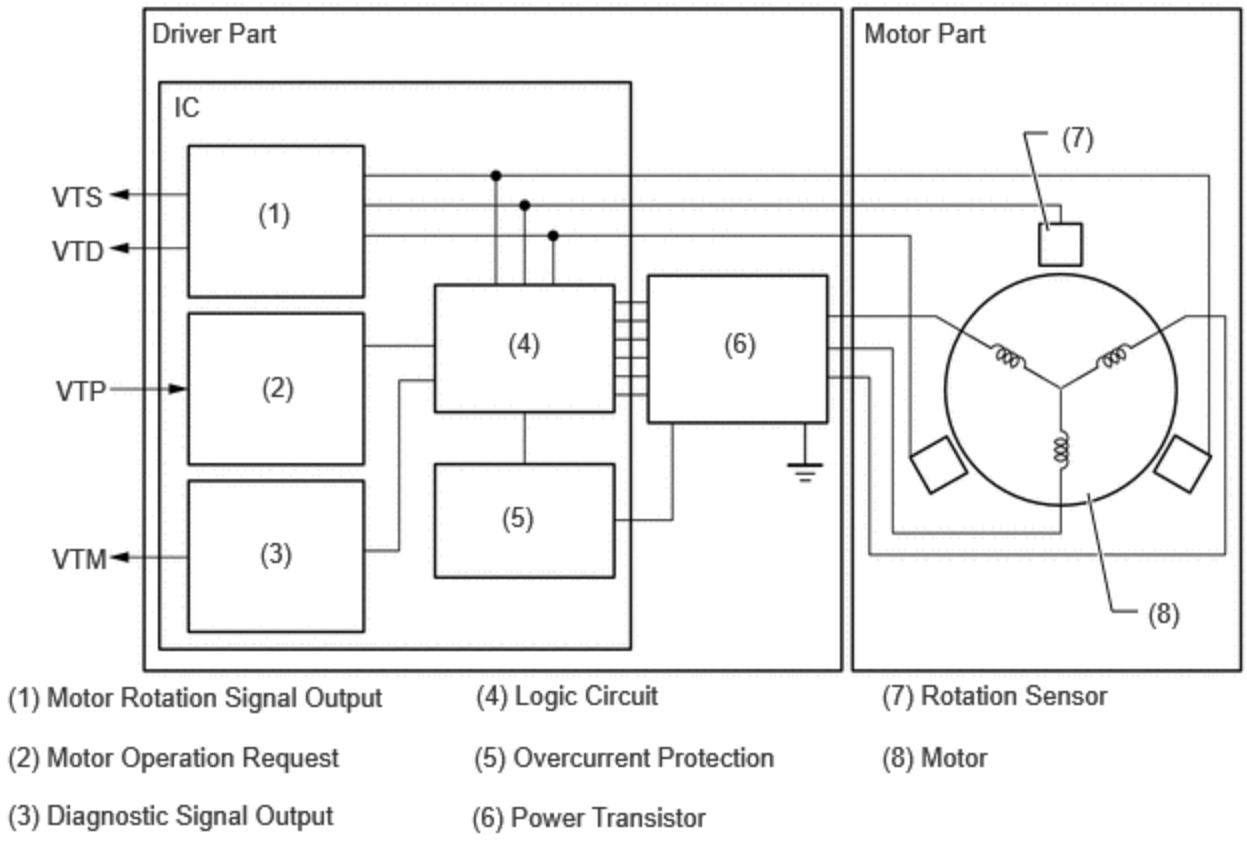
The VVT-iE system adjusts the intake valve timing using a motor. Compared to conventional hydraulic VVT systems, the valve timing can be adjusted within a wider range and can be retarded more when starting the engine. As the VVT-iE system can operate at low engine speeds and when the engine is cold, lower emissions, increased engine power and fuel economy and enhanced startability have been achieved.

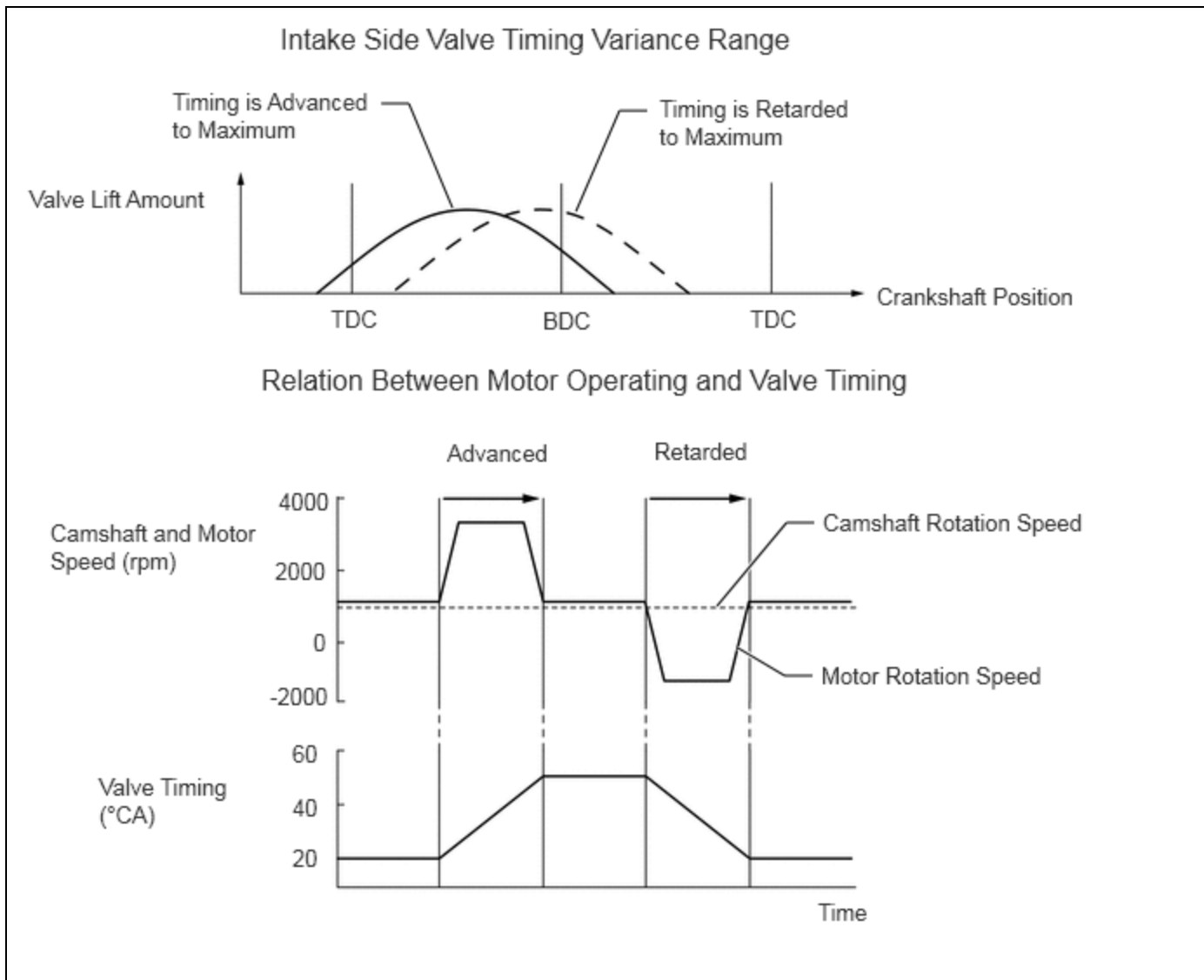
- If the cam timing control motor with EDU assembly is stuck to the advanced side, the valve overlap will be long and affect the internal EGR. This may lead to poor combustion, rough idling or engine stall.
- If the cam timing control motor with EDU assembly is stuck near the most retarded angle (Atkinson cycle), depending on the vehicle conditions, sufficient intake air may not be obtained, causing a lack of power.

VVT-iE System:



Cam Timing Control Motor with EDU Assembly:





PART AND TERMINAL NAME	FUNCTION
Cam timing control motor with EDU assembly	Through its electric motor, operates camshaft timing gear assembly. Internal driver detects and performs malfunction diagnosis of motor control, motor speed and rotation direction.
Camshaft timing gear assembly	Changes valve timing by rotating camshaft timing gear.
ECM	Outputs target speed and motor rotation direction in response to driving conditions.
VB1	Power supply (when ignition switch is ON, auxiliary battery voltage is 12 V or higher)
GND	Power supply ground
VTP	Inputs motor activation signal from ECM.
VTS	Outputs actual motor speed.
VTD	Outputs actual rotation direction.
VTM	Outputs malfunction diagnosis results as a duty ratio. <ul style="list-style-type: none"> • Open circuit in VTP and VTM • Normal

PART AND TERMINAL NAME	FUNCTION
	<ul style="list-style-type: none"> Internal malfunction in driver Malfunction in motor rotation sensor of driver

DTC NO.	DETECTION ITEM	DTC DETECTION CONDITION	TROUBLE AREA	MIL	DTC OUTPUT FROM	PRIORITY	NOTE
P001001	Camshaft Position "A" Actuator Bank 1 General Electrical Failure	<p>One of the following conditions is met for 3 seconds or more (1 trip detection logic).</p> <ul style="list-style-type: none"> Cam timing control motor IC has overheated. Open in cam timing control motor circuit. Overcurrent is detected in cam timing control motor. 	<ul style="list-style-type: none"> Cam timing control motor with EDU assembly Camshaft timing gear assembly 	Comes on	Engine	A	SAE Code: P0010

Symptoms and Fail-safe Operation During Cam Timing Control Motor Malfunction

VEHICLE CONDITION	FAIL-SAFE
<ul style="list-style-type: none"> Engine difficult to start Lack of power 	The cam timing control motor with EDU assembly is operated to the most retarded position.

MONITOR DESCRIPTION

This DTC is output when an IC overheat malfunction or an overcurrent malfunction is detected in the cam timing control motor with EDU assembly. The cam timing control motor with EDU assembly is equipped with a self diagnostic function, which is used to output diagnosis signals (VTM) to the ECM. If the ECM receives a motor driver interior malfunction signal, the ECM will illuminate the MIL and store this DTC.

MONITOR STRATEGY

Related DTCs	P0010: Camshaft position actuator (motor drive VVT system) range check
Required Sensors/Components (Main)	Cam timing control motor with EDU assembly
Required Sensors/Components (Related)	-
Frequency of Operation	Continuous
Duration	3 seconds

MIL Operation	Immediate
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

Monitor runs whenever the following DTCs are not stored	None
All of the following conditions are met	-
Auxiliary battery voltage	11 V or higher
Ignition switch	ON
Engine speed	100 rpm or higher

TYPICAL MALFUNCTION THRESHOLDS

"Camshaft position actuator error" from motor drive VVT system control module	Received
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CONFIRMATION DRIVING PATTERN

HINT:

- After repair has been completed, clear the DTC and then check that the vehicle has returned to normal by performing the following All Readiness check procedure.

[Click here](#) INFO

- When clearing the permanent DTCs, refer to the "CLEAR PERMANENT DTC" procedure.

[Click here](#) INFO

- Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
- Turn the ignition switch off and wait for at least 30 seconds.
- Put the engine in Inspection Mode (Maintenance Mode).

[Click here](#) INFO

- Start the engine and warm it up (until the engine coolant temperature reaches 75°C (167°F) or higher) with all the accessories switched off [A].
- Idle the engine for 10 seconds or more [B].
- Enter the following menus: Powertrain / Engine / Trouble Codes [C].
- Read the pending DTCs.

HINT:

- If a pending DTC is output, the system is malfunctioning.
- If a pending DTC is not output, perform the following procedure.

- Enter the following menus: Powertrain / Engine / Utility / All Readiness.
- Input the DTC: P001001.
- Check the DTC judgment result.

HINT:

- If the judgment result is NORMAL, the system is normal.
- If the judgment result is ABNORMAL, the system has a malfunction.
- If the judgment result is INCOMPLETE, perform steps [A] through [C] again.
- [A] to [C]: Normal judgment procedure.

The normal judgment procedure is used to complete DTC judgment and also used when clearing permanent DTCs.

- When clearing the permanent DTCs, do not disconnect the cable from the auxiliary battery terminal or attempt to clear the DTCs during this procedure, as doing so will clear the universal trip and normal judgment histories.

CAUTION / NOTICE / HINT

NOTICE:

- Vehicle Control History may be stored in the hybrid vehicle control ECU if the engine is malfunctioning. Certain vehicle condition information is recorded when Vehicle Control History is stored. Reading the vehicle conditions recorded in both the freeze frame data and Vehicle Control History can be useful for troubleshooting.

for HEV Model: Click here [INFO](#)

for PHEV Model: Click here [INFO](#)

(Select Powertrain in Health Check and then check the time stamp data.)

- If any "Engine Malfunction" Vehicle Control History item has been stored in the hybrid vehicle control ECU, make sure to clear it. However, as all Vehicle Control History items are cleared simultaneously, if any Vehicle Control History items other than "Engine Malfunction" are stored, make sure to perform any troubleshooting for them before clearing Vehicle Control History.

for HEV Model: Click here [INFO](#)

for PHEV Model: Click here [INFO](#)

PROCEDURE

1.	INSPECT CAMSHAFT TIMING GEAR ASSEMBLY
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Pre-procedure1

(a) Remove the cam timing control motor with EDU assembly.

HINT:

Click here [INFO](#)

Procedure1

(b) Check if the eccentric shaft of the camshaft timing gear assembly rotates smoothly.

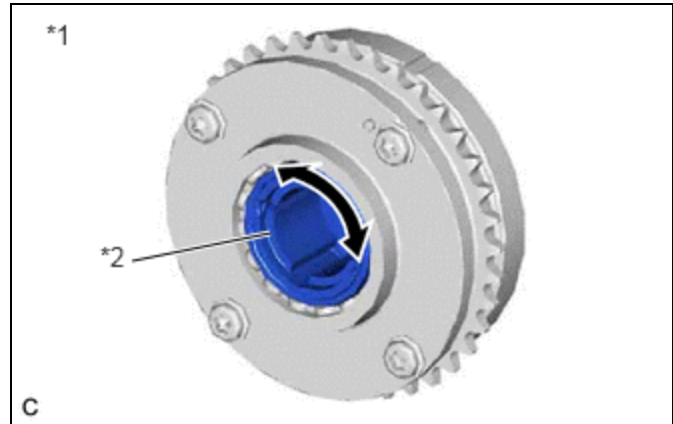
NOTICE:

If the camshaft is at a position where a valve is about to open, the eccentric shaft may become difficult to rotate.

OK:

Rotates smoothly.

Result:



*1	Camshaft Timing Gear Assembly
*2	Eccentric Shaft

PROCEED TO
OK
NG

Post-procedure1

(c) Perform "Inspection After Repair" after removing the cam timing control motor with EDU assembly.

HINT:

[Click here](#) **INFO**

OK ► REPLACE CAM TIMING CONTROL MOTOR WITH EDU ASSEMBLY

NG ► REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

