Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002C0Z1
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (COOLING): COOLING FAN SYSTEM (for PHEV Model): Cooling Fan Circuit; 2023 - 2024 MY Prius Prime [03/2023 -]		

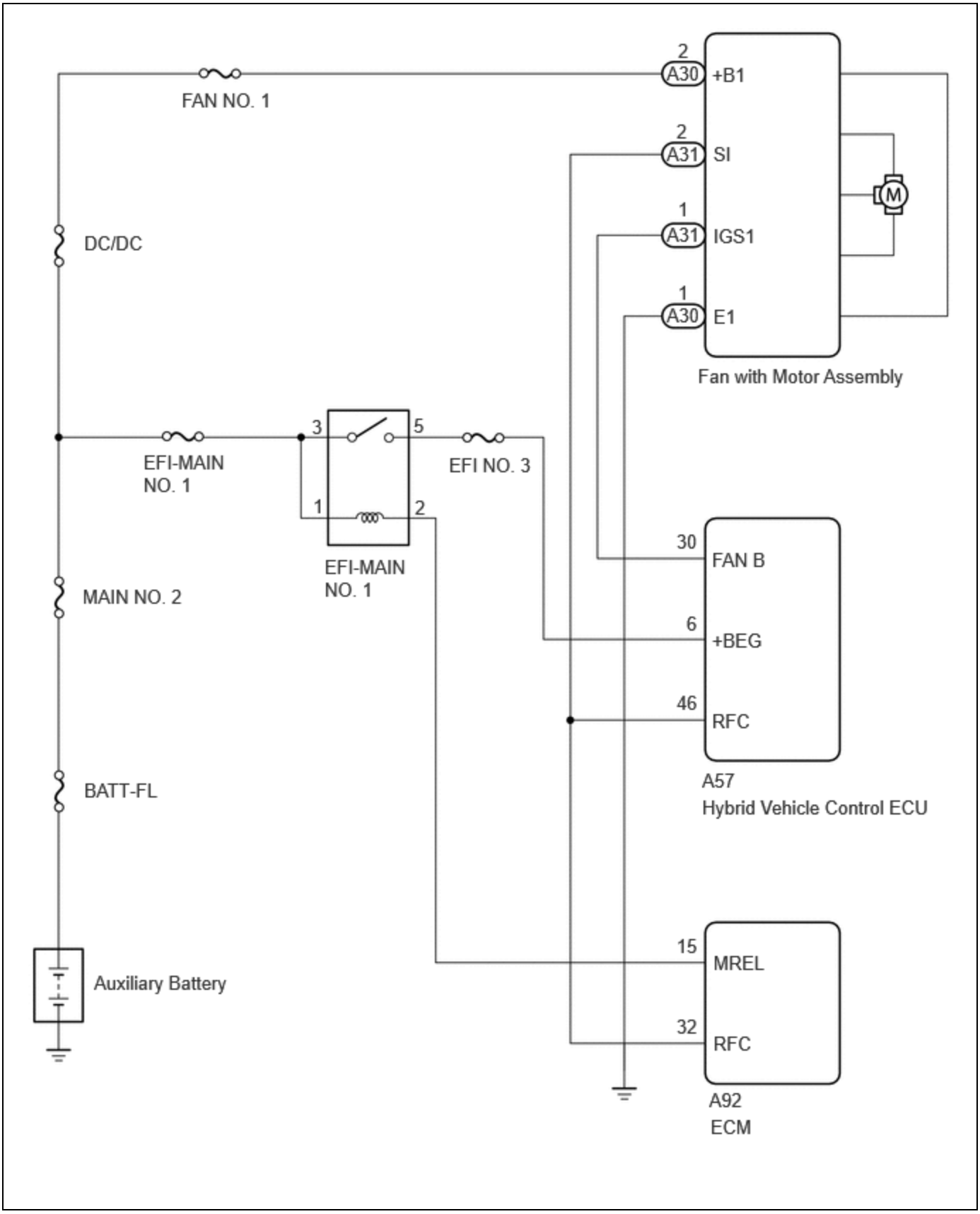
Cooling Fan Circuit

DESCRIPTION

The ECM calculates an appropriate cooling fan speed based on the engine coolant temperature, air conditioning switch status, refrigerant pressure, hybrid coolant temperature, engine speed and vehicle speed, and sends a signal to the cooling fan ECU (fan with motor assembly). The cooling fan ECU (fan with motor assembly) steplessly controls the speed of the cooling fan based on the duty cycle signal sent from the ECM. By sending signals to the cooling fan ECU (fan with motor assembly) in accordance with the driving conditions and by controlling the cooling fan speed optimally with the ECM, both high cooling performance and quietness are ensured.

If there is a pre-air conditioning request from the air conditioning system while the ignition switch is off and the HV battery temperature is high during plug-in charging, control the cleaning fan ECU (fan with motor assembly) with the hybrid vehicle control ECU.

WIRING DIAGRAM



CAUTION / NOTICE / HINT

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following procedure.

- Make sure to perform the necessary procedures (adjustment, calibration, initialization, or registration) after parts related to the cooling fan system have been removed/installed or replaced.

Click here INFO

PROCEDURE

1.	**PERFORM ACTIVE TEST USING GTS (CONTROL THE ENGINE COOLING FAN DUTY RATIO)**

(a) Check the operation of the cooling fan while operating it using the GTS.

Powertrain > Engine > Active Test

TESTER DISPLAY
Control the Engine Cooling Fan Duty Ratio

OK:

GTS OPERATION	FAN OPERATION
30 - 100%	Cooling fan operates
0%	Cooling fan stops

RESULT	PROCEED TO
OK	A
Cooling fan does not operate	B
Cooling fan does not stop	C

A ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

C ▶ **GO TO STEP 9**

B ▼

2.	**CHECK HARNESS AND CONNECTOR (FAN WITH MOTOR ASSEMBLY - BODY GROUND)**

(a) Disconnect the A30 fan with motor assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(A30)
Click Connector(A30)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A30-1 (E1) - Body ground	Always	Below 1 Ω

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

3.	**CHECK HARNESS AND CONNECTOR (FAN WITH MOTOR ASSEMBLY POWER SOURCE)**

(a) Disconnect the A30 fan with motor assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

EWD INFO

Click Location & Routing(A30)
Click Connector(A30)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A30-2 (+B1) - A30-1 (E1)	Always	11 to 14 V

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (FAN WITH MOTOR ASSEMBLY - AUXILIARY BATTERY)**

OK ▼

4.	**CHECK HARNESS AND CONNECTOR (FAN WITH MOTOR ASSEMBLY POWER SOURCE)**

(a) Disconnect the A31 fan with motor assembly connector.

(b) Turn the ignition switch to ON.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

EWD INFO

Click Location & Routing(A31)
Click Connector(A31)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A31-1 (IGS1) - Body ground	Ignition switch ON	11 to 14 V

NG ▶ **GO TO STEP 7**

OK ▼

5.	**CHECK HARNESS AND CONNECTOR (FAN WITH MOTOR ASSEMBLY - ECM - HYBRID VEHICLE CONTROL ECU)**

(a) Disconnect the A31 fan with motor assembly connector.

(b) Disconnect the A92 ECM connector.

(c) Disconnect the A57 hybrid vehicle control ECU connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(A31,A92,A57)
Click Connector(A31)
Click Connector(A92)
Click Connector(A57)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A31-2 (SI) - A92-32 (RFC)	Always	Below 1 Ω
A31-2 (SI) - A57-46 (RFC)	Always	Below 1 Ω
A31-2 (SI) or A92-32 (RFC) - Body ground	Always	10 kΩ or higher
A31-2 (SI) or A57-46(RFC) - Body ground	Always	10 kΩ or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

6.	**INSPECT ECM (RFC TERMINAL)**

(a) Disconnect the A31 fan with motor assembly connector.

(b) Disconnect the A57 hybrid vehicle control ECU connector.

(c) Operate the cooling fan motor (fan with motor assembly) using the Active Test function and measure the resistance according to the value(s) in the table below.

Powertrain > Engine > Active Test

TESTER DISPLAY
Control the Engine Cooling Fan Duty Ratio

Standard Resistance:

EWD INFO

Click Location & Routing(A31)
Click Connector(A31)

TESTER CONNECTION	GTS OPERATION	SPECIFIED CONDITION
A31-2 (SI) - Body ground	Before Active Test (0%) → During Active Test (100%)	Before Active Test (0%): Resistance is stable → During Active Test (100%): Resistance fluctuates*

HINT:

*: Using the Active Test, duty control of the transistors in the ECM will be performed. Due to the duty control, resistance of the RFC terminal will be unstable during the Active Test. If the resistance is stable before the Active Test and fluctuates while performing the Active Test, it can be determined that the transistor is operating. If the transistor does not operate during the Active Test, the ECM may be malfunctioning.

OK ▶ **REPLACE FAN WITH MOTOR ASSEMBLY**

NG ▶ **REPLACE ECM**

7.	**CHECK HARNESS AND CONNECTOR (FAN WITH MOTOR ASSEMBLY - HYBRID VEHICLE CONTROL ECU)**

(a) Disconnect the A31 fan with motor assembly connector.

(b) Disconnect the A26 hybrid vehicle control ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(A31,A57)

Click Connector(A31)
Click Connector(A57)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A31-1 (IGS1) - A57-30 (FANB)	Always	Below 1 Ω
A31-1 (IGS1) or A57-30 (FANB) - Body ground	Always	10 kΩ or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

8.	**CHECK HARNESS AND CONNECTOR (HYBRID VEHICLE CONTROL ECU POWER SOURCE)**

(a) Disconnect the A57 hybrid vehicle control ECU connector.

(b) Turn the ignition switch to ON.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

EWD INFO

Click Location & Routing(A57)
Click Connector(A57)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A57-6 (+BEG) - Body ground	Ignition switch ON	11 to 14 V

NOTICE:

Make sure to check for and clear DTCs after performing this inspection.

OK ▶ **REPLACE HYBRID VEHICLE CONTROL ECU**

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

9.	**CHECK HARNESS AND CONNECTOR (FAN WITH MOTOR ASSEMBLY - ECM - HYBRID VEHICLE CONTROL ECU)**

(a) Disconnect the A31 fan with motor assembly connector.

(b) Disconnect the A92 ECM connector.

(c) Disconnect the A57 hybrid vehicle control ECU connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

EWD INFO

Click Location & Routing(A31,A92,A57)
Click Connector(A31)
Click Connector(A92)
Click Connector(A57)

TESTER CONNECTION	CONDITION	SPECIFIED CONDITION
A31-2 (SI) - A92-32 (RFC)	Always	Below 1 Ω
A31-2 (SI) - A57-46 (RFC)	Always	Below 1 Ω
A31-2 (SI) or A92-32 (RFC) - Body ground	Always	10 kΩ or higher
A31-2 (SI) or A57-46(RFC) - Body ground	Always	10 kΩ or higher

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

OK ▼

10.	**INSPECT ECM (RFC TERMINAL)**

(a) Disconnect the A31 fan with motor assembly connector.

(b) Disconnect the A57 hybrid vehicle control ECU connector.

(c) Operate the cooling fan motor (fan with motor assembly) using the Active Test function and measure the resistance according to the value(s) in the table below.

Powertrain > Engine > Active Test

TESTER DISPLAY
Control the Engine Cooling Fan Duty Ratio

Standard Resistance:

EWD INFO

Click Location & Routing(A31)
Click Connector(A31)

TESTER CONNECTION	GTS OPERATION	SPECIFIED CONDITION
A31-2 (SI) - Body ground	Before Active Test (0%) → During Active Test (100%)	Before Active Test (0%): Resistance is stable → During Active Test (100%): Resistance fluctuates*

HINT:

*: Using the Active Test, duty control of the transistors in the ECM will be performed. Due to the duty control, resistance of the RFC terminal will be unstable during the Active Test. If the resistance is stable before the Active Test and fluctuates while performing the Active Test, it can be determined that the transistor is operating. If the transistor does not operate during the Active Test, the ECM may be malfunctioning.

OK ▶ **REPLACE HYBRID VEHICLE CONTROL ECU**

NG ▶ **REPLACE ECM**