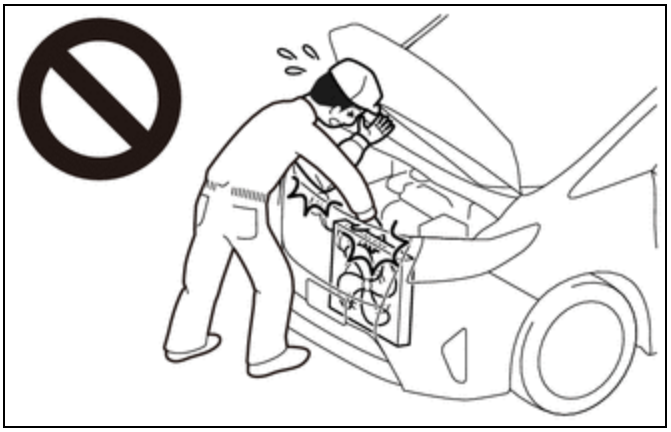
Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM100000002BG8S
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [03/2023 -]
Title: M20A-FXS (ENGINE MECHANICAL): ENGINE: ON-VEHICLE INSPECTION; 2023 - 2024 MY Prius Prius Prime [03/2023 -]		

ON-VEHICLE INSPECTION

CAUTION / NOTICE / HINT

CAUTION:

To prevent injury due to contact with an operating cooling fan, keep your hands and clothing away from the cooling fans when working in the engine compartment with the engine running or the ignition switch ON.



PROCEDURE

1. INSPECT ENGINE COOLANT (for Engine)

HINT:

Click here INFO

2. INSPECT ENGINE OIL

HINT:

Click here INFO

3. INSPECT AUXILIARY BATTERY

HINT:

Click here INFO

4. INSPECT SPARK PLUG

HINT:

Click here INFO

5. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

HINT:

Click here INFO

6. INSPECT VALVE LASH ADJUSTER ASSEMBLY NOISE

(a) Put the engine in Inspection Mode.

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Rev up the engine several times. Check that the engine does not emit unusual noises.

(c) If tappet noise is heard, perform the following procedure.

(1) Idle the engine for at least 10 minutes and then stop the engine.

(2) Remove the fuel (engine room side) pump assembly.

HINT:

Click here INFO

(3) Remove the ignition coil assembly.

HINT:

Click here INFO

(4) Remove the camshaft position sensor (for Intake Side).

HINT:

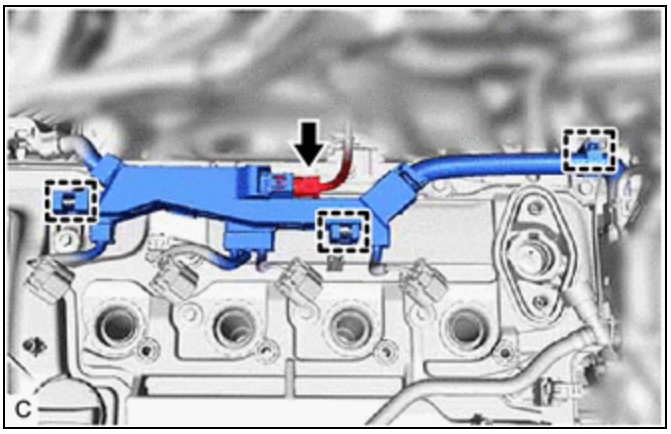
Click here INFO

(5) Remove the camshaft position sensor (for Exhaust Side).

HINT:

Click here INFO

(6) Disconnect the air fuel ratio sensor connector.



(7) Disengage the 3 clamps.

(8) Remove the cylinder head cover sub-assembly.

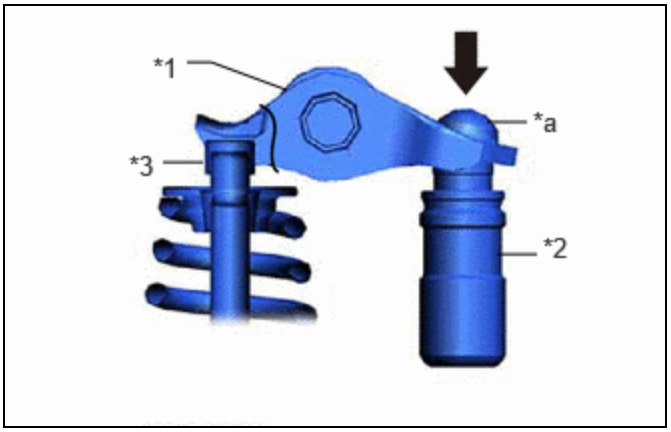
HINT:

- for HEV Model:

  Click here INFO
- for PHEV Model:

  Click here INFO

(9) Push the pivot of the No. 1 valve rocker arm sub-assembly.



*1	No. 1 Valve Rocker Arm Sub-assembly
*2	Valve Lash Adjuster Assembly
*3	Valve Stem Cap
*a	Pivot
➡	Push

OK:

The plunger is very difficult to move.

(10) If the plunger is easy to move, replace the valve lash adjuster assembly.

(11) Install the cylinder head cover sub-assembly.

HINT:

- for HEV Model:

  Click here INFO
- for PHEV Model:

  Click here INFO

(12) Engage the 3 clamps.

(13) Connect the air fuel ratio sensor connector.

(14) Connect the camshaft position sensor (for Exhaust Side) connector.

(15) Connect the camshaft position sensor (for Intake Side) connector.

(16) Install the ignition coil assembly.

HINT:

Click here INFO

(17) Install the fuel (engine room side) pump assembly.

HINT:

Click here INFO

7. INSPECT IGNITION TIMING

NOTICE:

- Check the ignition timing with the cooling fan off.

- Turn off all electrical systems and the A/C.
- When checking the ignition timing, the transaxle should be in park.

Pre-procedure1

(a) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Warm up and stop the engine.

(c) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

Procedure1

(d) Monitor Ignition Timing Cylinder #1 of the Data List.

Powertrain > Engine > Data List

TESTER DISPLAY
Ignition Timing Cylinder #1

Standard Ignition Timing:
-2 to 14° BTDC at idle

Procedure2

(e) Check that the ignition timing advances immediately when the engine speed is increased.

Procedure3

(f) Monitor Ignition Timing Cylinder #1 of the Data List.

Powertrain > Engine > Active Test

ACTIVE TEST DISPLAY
Activate the TC Terminal

DATA LIST DISPLAY
Ignition Timing Cylinder #1

Standard Ignition Timing:

8 to 12° BTDC at idle

Post-procedure1

(g) None

8. INSPECT ENGINE IDLE SPEED

NOTICE:

- Check the engine idle speed with the cooling fan off.
- Turn off all electrical systems and the A/C.
- When checking the engine idle speed, the transaxle should be in park.

Pre-procedure1

(a) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Warm up and stop the engine.

(c) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

Procedure1

(d) Read the value displayed on the GTS.

Powertrain > Engine > Data List

TESTER DISPLAY
Engine Speed

Standard Idle Speed:
950 to 1050 rpm

Post-procedure1

(e) None

9. INSPECT COMPRESSION

NOTICE:

Keep the spark plug holes free of foreign matter when measuring the compression pressure.

Pre-procedure1

(a) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Warm up and stop the engine.

(c) Check for DTCs.

Powertrain > Engine > Trouble Codes

(d) Remove the 4 spark plugs.

NOTICE:

DTCs will be stored if the inspection is performed with the ignition coil assembly connectors disconnected. Make sure that the ignition coil assembly connectors are connected during the inspection.

HINT:

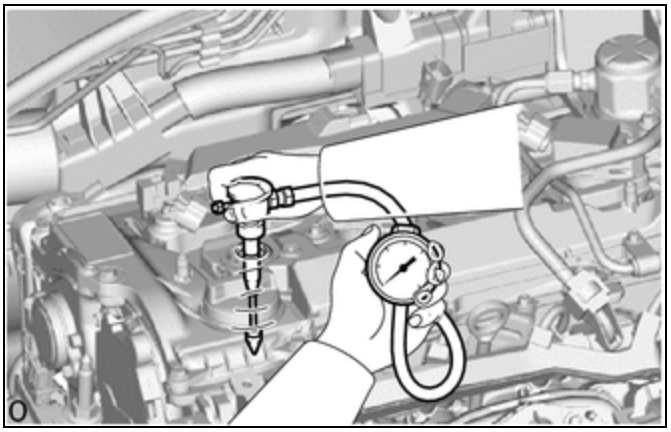
Click here INFO

Procedure1

(e) Check the cylinder compression pressure.

(1) Insert a compression gauge into the spark plug hole.

(2) Depress and hold the brake pedal, and turn the ignition switch to ON (READY). Then check the compression pressure.



Powertrain > Hybrid Control > Active Test

TESTER DISPLAY
Compression Test

Standard Compression Pressure:

ITEM	MINIMUM COMPRESSION PRESSURE	SPECIFIED CONDITION	RESULT
Cylinder 1	800 kPa 8.2 kgf/cm^2 116 psi	1400 kPa 14.3 kgf/cm^2 203 psi	kPa kgf/cm2 psi
Cylinder 2	800 kPa 8.2 kgf/cm^2 116 psi	1400 kPa 14.3 kgf/cm^2 203 psi	kPa kgf/cm2 psi
Cylinder 3	800 kPa	1400 kPa	kPa

ITEM	MINIMUM COMPRESSION PRESSURE	SPECIFIED CONDITION	RESULT
	8.2 kgf/cm^2 116 psi	14.3 kgf/cm^2 203 psi	kgf/cm2 psi
Cylinder 4	800 kPa 8.2 kgf/cm^2 116 psi	1400 kPa 14.3 kgf/cm^2 203 psi	kPa kgf/cm2 psi
Pressure Difference between Each Cylinder	-	200 kPa or less 2.0 kgf/cm^2 or less 29 psi or less	kPa kgf/cm2 psi

NOTICE:

- Noise may be emitted from the hybrid vehicle transaxle assembly. However, this is not a malfunction.
- Inspect all cylinders in the same way.
- Measure the compression pressure as quickly as possible.

(3) If the cylinder compression pressure is low, pour a small amount of engine oil into the cylinder through the spark plug hole and inspect it again.

HINT:

- If adding engine oil increases the compression pressure, the piston rings and/or cylinder bore may be worn or damaged.
- If the compression pressure stays low, a valve may be stuck or seated improperly, or there may be leaks in the cylinder head gasket.

Post-procedure1

(f) Install the 4 spark plugs.

HINT:

Click here INFO

(g) Clear the DTCs.

Powertrain > Engine > Clear DTCs

NOTICE:

After the inspection, clear the DTCs, check for DTCs again and make sure the normal system codes are output.

10. INSPECT CO/HC

HINT:

This check determines whether or not the idle CO/HC complies with regulations.

Pre-procedure1

(a) Put the engine in Inspection Mode (Maintenance Mode).

Powertrain > Hybrid Control > Utility

TESTER DISPLAY
Inspection Mode

(b) Run the engine speed at 2500 rpm for approximately 180 seconds.

(c) Insert a CO/HC meter testing probe at least 40 cm (1.31 ft.) into the tailpipe during idle.

Procedure1

(d) Immediately check the CO/HC concentration at idle and then at an engine speed of 2500 rpm.

HINT:

When performing a 2 mode test (with the engine idling/running at 2500 rpm), the measurement procedures are determined by applicable local regulations.

If the CO/HC concentration does not comply with the regulations, perform troubleshooting in the order given below.

(1) Check for DTCs.

Powertrain > Engine > Trouble Codes

(2) See the following table for possible causes, then inspect the applicable parts and repair them if necessary.

CO	HC	PROBLEM	CAUSE
Normal	High	Rough idle	1. Faulty ignition: ◦ Incorrect valve timing ◦ Fouled, shorted or improperly gapped spark plugs 2. Incorrect valve clearance (valve lash adjuster assembly) 3. Leaks in intake or exhaust valves 4. Leaks in cylinders 5. Faulty EGR
Low	High	Rough idle (Fluctuating HC reading)	1. Vacuum leaks: ◦ PCV hoses ◦ Intake manifold ◦ Throttle body with motor assembly 2. Lean mixture causing misfire 3. Faulty EGR
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air cleaner filter element sub-assembly 2. Plugged PCV valve 3. Faulty SFI systems: ◦ Fuel pressure regulator assembly ◦ Engine coolant temperature sensor ◦ Mass air flow meter

CO	HC	PROBLEM	CAUSE
			◦ ECM ◦ Fuel injector assemblies ◦ Throttle position sensor (built into throttle body with motor assembly) 4. Faulty EGR

Post-procedure1

(e) None