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2019 Ford SSV Plug-in Hybrid Service and Repair Manual

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- Using a diagnostic scan tool, perform a IPMA (image processing module A) module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Lane Keeping System(419-07 Lane Keeping System, Diagnosis and Testing).

No	GO to O4

O4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

- Using a diagnostic scan tool, retrieve the GWM (gateway module A) Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Controller Area Network (CAN) Module Communications Network(418-00A Controller Area Network (CAN) Module Communications Network, Diagnosis and Testing).

No	GO to O5

O5 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

- Using a diagnostic scan tool, perform the PCM (powertrain control module) self-test.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to PCM DTC Chart in this section.

No	GO to O6

O6 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

NOTE
If new modules were installed prior to the DTC (diagnostic trouble code) being set, the module configuration may be incorrectly set during the PMI (programmable module installation) , or the PMI

> **NOTE**
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> If new modules were installed prior to the DTC (diagnostic trouble code) being set, the module configuration can be incorrectly set during the PMI (programmable module installation) or the PMI (programmable module installation) may not have been carried out.

- CHECK the vehicle service history for recent service actions related to the IPMA (image processing module A) , GWM (gateway module A) or PCM (powertrain control module) . If recent service history is found:
    - verify correct replacement module was installed
        - HVBOM may be used to verify correct part fitment
    - verify the configuration of replacement module was correct
        - re-configure module using as-built data if prior configuration is suspect
    - verify the module was not obtained from a like vehicle and installed into customer vehicle
        - return the swapped module to source vehicle and obtain new replacement module
- Operate the system and determine if the observable symptom is still present.

Is the observable symptom still present?

Yes	GO to O8

No	The system is operating correctly at this time. The concern may have been due to incorrect parts replacement procedures or incorrect module configuration.

O8 CHECK FOR CORRECT IPMA (IMAGE PROCESSING MODULE A) OPERATION

- Ignition OFF.
- Disconnect and inspect the IPMA (image processing module A) connector(s).
- Repair:
    - corrosion (install new connector or terminals – clean module pins)
    - damaged or bent pins – install new terminals/pins
    - pushed-out pins – install new pins as necessary
- Reconnect the IPMA (image processing module A) connector(s). Make sure they seat and latch correctly.
- Operate the system and determine if the concern is still present.

Is the concern still present?

		network data from the ABS (anti-lock brake system) module.
PCM (powertrain control module) U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	The PCM (powertrain control module) sets this DTC (diagnostic trouble code) when the PCM (powertrain control module) receives invalid network data from the BCM (body control module) .
PCM (powertrain control module) U0423:00	Invalid Data Received from Instrument Panel Cluster Control Module: No Sub Type Information	The PCM (powertrain control module) sets this DTC (diagnostic trouble code) when the PCM (powertrain control module) receives invalid network data from the IPC (instrument panel cluster) control module.
PCM (powertrain control module) U1011:00	Invalid Internal Control Module Monitoring Data Received from ECM/PCM: No Sub Type Information	The PCM (powertrain control module) sets this DTC (diagnostic trouble code) when the PCM (powertrain control module) receives invalid network data from the PCM (powertrain control module) .
PCM (powertrain control module) U1012:00	Invalid Internal Control Module Monitoring Data Received from Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	The PCM (powertrain control module) sets this DTC (diagnostic trouble code) when the PCM (powertrain control module) receives invalid network data from the ABS (anti-lock brake system) module.
PCM (powertrain control module) U1022:00	Invalid Internal Control Module Monitoring Data Received from Body Control Module: No Sub Type Information	The PCM (powertrain control module) sets this DTC (diagnostic trouble code) when the PCM (powertrain control module) receives invalid network data from the BCM (body control module) .

Possible Sources

- Suspect Module

P1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE MODULE SENDING INVALID DATA

- Using a diagnostic scan tool, carry out the self-test for the module in question sending the invalid data.

Are any Diagnostic Trouble Codes (DTCs) present from the module sending the invalid data?

No	The system is operating correctly at this time. The DTC (diagnostic trouble code) may have been set due to a previous low battery voltage condition. CLEAR the DTC (diagnostic trouble code) .

Q2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

- Using a diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	DIAGNOSE the charging system concern. REFER to: Charging System - 2.7L EcoBoost (238kW/324PS)/3.5L EcoBoost (BM) (414-00 Charging System - General Information, Diagnosis and Testing).
No	GO to Q3

Q3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

- Check the battery condition and verify the battery is fully charged.
  REFER to: Battery(414-01 Battery, Mounting and Cables, Diagnosis and Testing).

Is the battery OK and fully charged?

Yes	GO to Q4
No	If the battery is discharged, DIAGNOSE the cause of the low battery condition. REFER to: Charging System - 2.7L EcoBoost (238kW/324PS)/3.5L EcoBoost (BM) (414-00 Charging System - General Information, Diagnosis and Testing). If the battery condition fails, INSTALL a new battery. REFER to: Battery (414-01 Battery, Mounting and Cables, Removal and Installation).

Q4 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) BATT_V_INF (V) PID (PARAMETER IDENTIFICATION) WITH THE ACTUAL BATTERY VOLTAGE

- Start the engine.
- Turn on accessories (climate control blower on high speed, exterior lights).

Positive Lead	Measurement / Action	Negative Lead
C1551B-2	$\overline{\overline{V}}$	Ground
C1551B-16	$\overline{\overline{V}}$	Ground
C1551B-17	$\overline{\overline{V}}$	Ground

Are the voltages within 0.2 volt of the recorded battery voltage?

Yes	GO to Q6

No	REPAIR the circuit in question for high resistance.

Q6 CHECK THE PCM (POWERTRAIN CONTROL MODULE) GROUNDS

- Ignition OFF.
- Removed the fused jumper.
- Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-46	Ω	Ground
C1551B-47	Ω	Ground
C1551B-61	Ω	Ground

	Guided Routine available in the on-line Workshop Manual.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TEST R : P0521, P0524, P06DD, P06DE

Normal Operation and Fault Conditions

Refer to the DTC (diagnostic trouble code) Fault Trigger Conditions.

DTC Fault Trigger Conditions

DTC (diagnostic trouble code)	Description	Fault Trigger Condition
PCM (powertrain control module) P0521:00	Engine Oil Pressure Sensor/Switch 'A' Circuit Range/Performance: No Sub Type Information	This DTC (diagnostic trouble code) sets when the PCM (powertrain control module) detects signal variation outside of the module parameters on the hardwired input from the engine oil pressure sensor.
PCM (powertrain control module) P0524:00	Engine Oil Pressure Too Low: No Sub Type Information	This DTC (diagnostic trouble code) sets when the PCM (powertrain control module) detects low engine oil pressure.
PCM (powertrain control module) P06DD:00	Engine Oil Pressure Control Circuit Performance/Stuck Off: No Sub Type Information	This DTC (diagnostic trouble code) sets when the PCM (powertrain control module) detects the engine oil pressure control solenoid valve is stuck off.
PCM (powertrain control module) P06DE:00	Engine Oil Pressure Control Circuit Stuck On: No Sub Type Information	This DTC (diagnostic trouble code) sets when the PCM (powertrain control module) detects the engine oil pressure control solenoid valve is stuck on.

Possible Sources

- Communications network concern
- Wiring, terminals or connectors

- Ignition OFF.
  - Wait at least 60 seconds.
- KOEO (key on, engine off)
- Using the diagnostic scan tool, view PCM (powertrain control module) Parameter Identifications (PIDs).
- Access the PCM (powertrain control module) and monitor the EOP_PRESS (Engine Oil Pressure) (kPa) PID (parameter identification)
- Wait approximately 30 seconds.

Does the engine oil pressure read approximately 0.0 psi (kPa) - 4.4 psi (30 kPa)?

Yes	GO to R4

No	VISUALLY CHECK the wiring harness and electrical connector for signs of damage. REPAIR as necessary. If there on no signs of damage, INSTALL a new engine oil pressure sensor. REFER to: Engine Oil Pressure (EOP) Sensor (303-14B Electronic Engine Controls - 3.3L Duratec-V6, Removal and Installation).

R4 CHECK THE ENGINE OIL PRESSURE AT IDLE

R6 COMMAND THE ENGINE OIL PRESSURE DUTY CYCLE PID (PARAMETER IDENTIFICATION)

- Access the PCM (powertrain control module) and control the RPM_DSD (Desired Idle Speed (RPM)) (Rpm) PID (parameter identification)
- Set the desired engine speed to 1800 RPM (revolutions per minute) .
- Access the PCM (powertrain control module) and control the EOPDC_CMD (Engine Oil Pressure Control Duty Cycle - Commanded) (% Duty Cycle) PID (parameter identification)
- Set the PID (parameter identification) to 0% and wait 10 seconds.
- Access the PCM (powertrain control module) and monitor the EOP_PRESS (Engine Oil Pressure) (kPa) PID (parameter identification)

Is the EOP (engine oil pressure) greater than 30.5 psi (210 kPa)?

Yes	GO to R8

No	GO to R7

R7 CARRY OUT THE VARIABLE OIL PRESSURE ACTUATOR UNBLOCK SEQUENCE AND RECHECK THE OIL PRESSURE

- Access the PCM (powertrain control module) and control the RPM_DSD (Desired Idle Speed (RPM)) (Rpm) PID (parameter identification)
- Set the desired engine speed to 1800 RPM (revolutions per minute) .
- Access the PCM (powertrain control module) and control the EOPDC_CMD (Engine Oil Pressure Control Duty Cycle - Commanded) (% Duty Cycle) PID (parameter identification)
- Command the PID (parameter identification) from MIN to MAX. Wait 15 seconds. Repeat this step 3 times waiting waiting 15 seconds between between steps.
- Access the PCM (powertrain control module) and monitor the EOP_PRESS (Engine Oil Pressure) (kPa) PID (parameter identification)

Is the EOP_PRESS PID (parameter identification) display equal or greater than 8.7 psi (60 kPa)?

Yes	GO to R8

No	CHECK the oil pressure using a mechanical gauge. REFER to: Engine - Flex Fuel – Ethanol/Full Hybrid Electric Vehicle (FHEV)/Gasoline (303-00 Engine System - General Information, Diagnosis and Testing).

PCM (powertrain control module) P06DC:00	Engine Oil Pressure Control Circuit High: No Sub Type Information	This DTC (diagnostic trouble code) sets when the PCM (powertrain control module) detects a short to voltage on the engine oil pressure control solenoid valve circuit.

Possible Sources

- Communications network concern
- Wiring, terminals or connectors
- Engine oil pressure control solenoid valve
- PCM (powertrain control module)

S1 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

- Using a diagnostic scan tool, retrieve all PCM (powertrain control module) diagnostic trouble codes (DTCs)

Are any PCM (powertrain control module) diagnostic trouble codes (DTCs) present?

Yes	GO to S2

No	The system is operating correctly at this time. The DTC (diagnostic trouble code) may have been set due to high network traffic or an intermittent fault condition.

S2 CLEAR AND CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

- Using a diagnostic scan tool, clear all PCM (powertrain control module) diagnostic trouble codes (DTCs)
- Using a diagnostic scan tool, retrieve all PCM (powertrain control module) diagnostic trouble codes (DTCs)

Are any PCM (powertrain control module) diagnostic trouble codes (DTCs) present?

Yes	GO to S3