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1994 FORD Mondeo Sedan OEM Service and Repair Workshop Manual

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Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods for information about these practices.

NOTE

The FDRS (Ford Diagnosis and Repair System) SOBDM (secondary on-board diagnostic control module A) and OBCC (Off-Board Charger Controller) self-tests must be performed with Electric Vehicle Supply Equipment (EVSE) disconnected from the vehicle charge port.

Symptom	Possible Sources	Action
• A module does not respond to a diagnostic scan tool	• Refer to the Pinpoint Test	• Go to the appropriate symptom chart. REFER to: Controller Area Network (CAN) Module Communications Network(418-00A Controller Area Network (CAN) Module Communications Network, Diagnosis and Testing).
• A module does not respond to a diagnostic scan tool after attempting to program or configure the module.	• Refer to the Pinpoint Test	• GO to Pinpoint Test BQ
• Charger Service Required cluster message notification	• Refer to the Pinpoint Test	• GO to Pinpoint Test BR
• Vehicle does not appear to charge and EVSE indicators are not illuminated: Amber fault indicator - OFF, Blue status indicator - OFF, Red trouble indicator - OFF	• Refer to the Pinpoint Test	• GO to Pinpoint Test BS
• Vehicle does not appear to charge and EVSE displays the following fault: Amber fault indicator - ON, Blue	• Refer to the Pinpoint Test	• GO to Pinpoint Test BT

(secondary on-board diagnostic control module A)		

DIAGNOSTIC ROUTINE(S)

PINPOINT TEST A : P064F:00, P06B8:00

Refer to Wiring Diagrams Cell 12for schematic and connector information.
Normal Operation and Fault Conditions When powered on, the SOBDM (secondary on-board diagnostic control module A) validates internal software and loads the NVRAM (nonvolatile random-access memory) parameters. If the SOBDM (secondary on-board diagnostic control module A) fails to load NVRAM (nonvolatile random-access memory) parameters or detects the software checksum does not match a DTC (diagnostic trouble code) sets. The CSI (Charge Status Indicator) illuminates to indicates a fault and the vehicle will not charge. **DTC Fault Trigger Conditions**

DTC (diagnostic trouble code)	Description	Fault Trigger Condition
SOBDM (secondary on-board diagnostic control module A) P064F:00	Unauthorized Software/Calibration Detected: No Sub Type Information	Sets if SOBDM (secondary on-board diagnostic control module A) detects unauthorized software.
SOBDM (secondary on-board diagnostic control module A) P06B8:00	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error: No Sub Type Information	Sets if SOBDM (secondary on-board diagnostic control module A) fails to load NVRAM (nonvolatile random-access memory) parameters.

Possible Sources

- SOBDM (secondary on-board diagnostic control module A) software
- SOBDM (secondary on-board diagnostic control module A)

A1 RETRIEVE SOBDM (SECONDARY ON-BOARD DIAGNOSTIC CONTROL MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

- Ignition ON.
- Using a diagnostic scan tool, clear the SOBDM (secondary on-board diagnostic control module A) DTCs.
- Using a diagnostic scan tool, perform SOBDM (secondary on-board diagnostic control module A) self-test.

Possible Sources

- BECM (battery energy control module) fault
- DC (direct current) fast charge EVSE fault

B1 CHECK THE BECM (BATTERY ENERGY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

- Ignition ON.
- Using a diagnostic scan tool, perform BECM (battery energy control module) self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	ADDRESS the BECM (battery energy control module) DTC (diagnostic trouble code) . REFER to: High Voltage Battery, Mounting and Cables - Electric (414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing).

No	CLEAR the SOBDM (secondary on-board diagnostic control module A) DTC (diagnostic trouble code) and test the system for normal operation by connecting a known good EVSE to the vehicle. The concern may be related to a faulty EVSE being used or an intermittent fault condition.

PINPOINT TEST C : P0CF4:29, P0CF4:77, P0CF5:00, P0CF7:00, P0CF7:66, P0D2B:38

Refer to Wiring Diagrams Cell 12for schematic and connector information.

Normal Operation and Fault Conditions The SOBDM (secondary on-board diagnostic control module A) is a component that charges the high voltage battery while the vehicle is plugged into a Electric Vehicle Supply Equipment (EVSE). When plugged into an external power source, the SOBDM (secondary on-board diagnostic control module A) monitors the duty cycle and frequency of the pilot signal which is sent out from the Electric Vehicle Supply Equipment (EVSE). The pilot signal is used to determine when the Electric Vehicle Supply Equipment (EVSE) is ready to supply AC (alternating current) voltage, the type of Electric Vehicle Supply Equipment (EVSE) connected, and the current capacity available. The pilot circuit is hardwired from the vehicle charge port to the OBCC (Off-Board Charger Controller) and from the OBCC (Off-Board Charger Controller) to the SOBDM (secondary on-board diagnostic control module A) . This allows a separate digital communication layer known as Powerline Communication (PLC) to occur between a DC (direct current) fast charge Electric Vehicle Supply Equipment (EVSE) and the OBCC (Off-Board Charger Controller) . The pilot signal and duty cycle passes through the OBCC (Off-Board Charger Controller) to the SOBDM (secondary on-board diagnostic control module A) . If the pilot duty cycle signal or frequency is lost or goes out of range the SOBDM (secondary on-board diagnostic control module A) will stop charging of the High Voltage Battery and set a DTC (diagnostic trouble code) . The Charge Status Indicator (CSI) LED (light emitting diode) s will display a charging fault. **DTC Fault Trigger Conditions**

SOBDM (secondary on-board diagnostic control module A) P0D2B:38	Control Pilot Indicator Control Circuit/Open: Signal Frequency Incorrect	This DTC (diagnostic trouble code) sets when the EVSE control pilot frequency is less than 950Hz or greater than 1050Hz for 5 seconds. This DTC (diagnostic trouble code) is related to a faulty or incompatible EVSE. Consult with customer to determine which EVSE was used when the fault occurred. If fault occurred with a customer owned EVSE ask customer to provide it for testing.

Possible Sources

- EVSE
- Wiring, terminals or connectors
- Vehicle charge port
- OBCC (Off-Board Charger Controller)
- SOBDM (secondary on-board diagnostic control module A)

Visual Inspection and Pre-checks

- Inspect for any visual damage to the EVSE.
- Inspect vehicle charge port for pin damage.
- Inspect SOBDM (secondary on-board diagnostic control module A) connectors for being fully seated.
- Inspect OBCC (Off-Board Charger Controller) connector for being fully seated.

WARNING

To prevent the risk of high-voltage shock, always follow precisely all warnings and service instructions, including instructions to depower the system. The high-voltage system utilizes approximately 300 volts DC, provided through high-voltage cables to its components and modules. The high-voltage cables and wiring are identified by orange harness tape or orange wire covering. All high-voltage components are marked with high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions may result in serious personal injury or death.

NOTICE

Use the correct probe adapter(s) from the Flex Probe Kit when taking measurements. Failure to use the correct probe adapter(s) may damage the connector.

C1 REVIEW THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE SOBDM (SECONDARY ON-BOARD DIAGNOSTIC CONTROL MODULE A)

- Depower the high voltage battery system.
  REFER to: High Voltage System De-energizing - Electric(414-03A High Voltage Battery, Mounting and Cables, General Procedures).
- Disconnect Charge port inline C302 .
- Disconnect OBCC (Off-Board Charger Controller) C1012 .
- Disconnect SOBDM (secondary on-board diagnostic control module A) C1821B .
- Ignition ON.
- Measure:

  Vehicle Harness

Positive Lead	Measurement / Action	Negative Lead
C302-11 (female side)	V⎓	Ground
C302-12 (female side)	V⎓	Ground

  Charge Port

Positive Lead	Measurement / Action	Negative Lead
C302-11 (male side)		Ground
C302-12 (male side)	V⎓	Ground

Is any voltage present?

Yes	For the vehicle harness measurements, REPAIR the circuit. For the charge port measurements INSTALL a new charge port. REFER to: Charge Port - Electric (414-03B High Voltage Battery Charging System, Removal and Installation).

C5 CHECK PILOT CIRCUIT FOR BEING OPEN

- Measure:
  Vehicle Harness

Positive Lead	Measurement / Action	Negative Lead
C302-11 (female side)	Ω	C1012-6
C302-12 (female side)	Ω	C1012-7

Charge Port

Positive Lead	Measurement / Action	Negative Lead
C302-11 (male side)	Ω	C1821B-6
C302-12 (male side)	Ω	C1002-CP

Is the resistance less than 3 ohms?

Yes	GO to C6

No	For the vehicle harness measurements, repair the circuit. For the charge port measurements INSTALL a new charge port. REFER to: Charge Port - Electric (414-03B High Voltage Battery Charging System, Removal and Installation).

C6 CHECK THE INTERNAL OBCC (OFF-BOARD CHARGER CONTROLLER) MODULE RESISTANCE

- Reconnect the SOBDM (secondary on-board diagnostic control module A) C1821B. Make sure it seats and latches correctly.
- Ignition ON.
- CONNECT known good EVSE to the vehicle charge port for 1 minute.
- Using a diagnostic scan tool, clear the SOBDM (secondary on-board diagnostic control module A) DTCs.
- Using a diagnostic scan tool, view SOBDM (secondary on-board diagnostic control module A) PIDs.
    - Access the SOBDM (secondary on-board diagnostic control module A) and monitor the BAT_CHRGR_STAT (Hybrid/EV Battery Charger Status) PID (parameter identification)
    - Access the SOBDM (secondary on-board diagnostic control module A) and monitor the PILOT_DUTYCYCL (Control Pilot Duty Cycle) (%) PID (parameter identification)

Is the Bat_Charger_Stat PID (parameter identification) value "Charge Ready" and Pilot_Dut_Cycl PID (parameter identification) value 10-96%?

Yes	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.

No	CHECK OASIS (Online Automotive Service Information System) for any applicable service articles: TSB (Technical Service Bulletin) , GSB (General Service Bulletin) , SSM (special service message) or FSA (Field Service Action) . If a service article exists for this concern, DISCONTINUE this test and FOLLOW the service article instructions. If no service articles address this concern, INSTALL a new SOBDM (secondary on-board diagnostic control module A) . REFER to: Secondary On-Board Diagnostic Control Module A (SOBDM) - Electric (414-03B High Voltage Battery Charging System, Removal and Installation).

PINPOINT TEST D : P0D21:00, P0D23:00, P0D4C:00, P0D51:00, P0D5C:00, P0D85:00

Refer to Wiring Diagrams Cell 12for schematic and connector information.

Normal Operation and Fault Conditions The SOBDM (secondary on-board diagnostic control module A) measures and monitors the output voltage, current, and the output power performance during power conversion. The SOBDM (secondary on-board diagnostic control module A) incorporates an internal current and voltage output sensors that are monitored for faults. The voltage and current output monitoring are used to ensure correct operation of the SOBDM (secondary on-board diagnostic control module A) while it is charging the high voltage battery. **DTC Fault Trigger Conditions**

DTC (diagnostic trouble code)	Description	Fault Trigger Condition

To prevent the risk of high-voltage shock, always follow precisely all warnings and service instructions, including instructions to depower the system. The high-voltage system utilizes approximately 300 volts DC, provided through high-voltage cables to its components and modules. The high-voltage cables and wiring are identified by orange harness tape or orange wire covering. All high-voltage components are marked with high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions may result in serious personal injury or death.

D1 CHECK BECM (BATTERY ENERGY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

- Ignition ON.
- Using a diagnostic scan tool, perform BECM (battery energy control module) self-test.

Are any BECM (battery energy control module) Diagnostic Trouble Codes (DTCs) present other than P0D5C:00?

Yes	ADDRESS the BECM (battery energy control module) DTC (diagnostic trouble code) . REFER to: High Voltage Battery, Mounting and Cables - Electric (414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing).

No	GO to D2

D2 TEST SYSTEM WITH A KNOWN GOOD EVSE CONNECTED TO THE VEHICLE

- Ignition ON.
- Using a diagnostic scan tool, clear the SOBDM (secondary on-board diagnostic control module A) DTCs.
- CONNECT a known good EVSE to a AC (alternating current) power outlet and the vehicle charge port. For DTC (diagnostic trouble code) P0D5C:00 wait 5 minutes. For DTC (diagnostic trouble code) P0D21:00, P0D23:00, P0D4C:00, P0D51:00, and/or P0D85:00 wait 1 minute.
- Using a diagnostic scan tool, perform SOBDM (secondary on-board diagnostic control module A) self-test.

Is DTC (diagnostic trouble code) P0D21:00, P0D23:00, P0D4C:00, P0D51:00, P0D85:00, and/or P0D5C:00 present?

Yes	GO to D3

D4 CHECK THE HIGH VOLTAGE CABLE AND DCDC (DIRECT CURRENT/DIRECT CURRENT CONVERTER CONTROL MODULE) FOR BEING OPEN

- Connect DCDC (direct current/direct current converter control module) C1457A .
- Measure:

Positive Lead	Measurement / Action	Negative Lead
C1821C-B	Ω	C295-2
C1821C-A	Ω	C295-1

Are the resistances less than 3 ohms?

Yes	GO to D5

No	INSTALL a new high voltage cable. REFER to: High Voltage Battery Cables - Electric (414-03A High Voltage Battery, Mounting and Cables, Removal and Installation).

D5 CHECK FOR CORRECT SOBDM (SECONDARY ON-BOARD DIAGNOSTIC CONTROL MODULE A) OPERATION

- Ignition OFF.
- DISCONNECT and inspect all SOBDM (secondary on-board diagnostic control module A) connectors.
- 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 SOBDM (secondary on-board diagnostic control module A) connectors. Make sure they seat and latch correctly.
- Repower the high voltage system.
  REFER to: High Voltage System De-energizing - Electric(414-03A High Voltage Battery, Mounting and Cables, General Procedures).