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2002 FORD Mondeo Hatchback OEM Service and Repair Workshop Manual

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BECM (battery energy control module) P0CA6:00	Hybrid/EV Battery Charging Current High: No Sub Type Information	This DTC (diagnostic trouble code) sets if the BECM (battery energy control module) detects the charging current excceded a maximum value.

Possible Sources

- Charging system fault

O1 RETRIEVE ALL SOBDM (SECONDARY ON-BOARD DIAGNOSTIC CONTROL MODULE A) DTCS

- Ignition ON.
- Using a diagnostic scan tool, perform SOBDM (secondary on-board diagnostic control module A) self-test.
- If eqiupped, Using a diagnostic scan tool, perform GFM2 (generic function module 2) self-test.

Are any SOBDM (secondary on-board diagnostic control module A) or GFM2 (generic function module 2) DTCs present?

Yes	REFER to the SOBDM (secondary on-board diagnostic control module A) and GFM2 (generic function module 2) DTC (diagnostic trouble code) chart and diagnose all other Diagnostic Trouble Codes (DTCs) first. REFER to: High Voltage Battery Charging System - Electric (414-03B High Voltage Battery Charging System, Diagnosis and Testing).

No	CLEAR the DTC (diagnostic trouble code) . The concern may be related to an intermittent fault condition or faulty EVSE (Electric Vehicle Supply Equipment) being connected to the vehicle charge port.

PINPOINT TEST P : P1A0F:68

Refer to Wiring Diagrams Cell 13for schematic and connector information.
Normal Operation and Fault Conditions The high voltage battery incorporates hardwired interlock staples for the high voltage battery cable connections. The BECM (battery energy control module) is notified if an external interlock circuit fault occurs other than at the high voltage battery. If the interlock circuit fault occurs at the SOBDMC (secondary on-board diagnostic control module C) also known as the Inverter System Controller (ISC) the BECM (battery energy control module) sets P1A0F:68 DTC (diagnostic trouble code) and results in power limiting. This fault illuminates the stop safely hazard (red triangle) warning indicator and prevents the vehicle from starting. **DTC Fault Trigger Conditions**

BECM (battery energy control module) P0AA1:00	Hybrid/EV Battery Positive Contactor 'A' Stuck Closed: No Sub Type Information	Sets if BECM (battery energy control module) detects the contactor is stuck closed for 60 seconds.
BECM (battery energy control module) P0AA2:00	Hybrid/EV Battery Positive Contactor 'A' Stuck Open: No Sub Type Information	Sets if BECM (battery energy control module) detects the contactor is stuck open for 2.4 seconds.

Possible Sources

- Wiring, terminals or connectors
- High voltage battery junction box
- BECM (battery energy control module)

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 450 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.

NOTE

If SOBDMC DTC P1A10:00 is present the ignition must be turned OFF for a minimum for 5 minutes after clearing all continuous DTC's to reset it prior to performing the next pinpoint test step.

Q1 CHECK FOR STUCK CLOSED POSITIVE AND STUCK CLOSED NEGATIVE CONTACTOR DTCS

- Ignition ON.

- Disconnect all the BECM (battery energy control module) connectors in sequence.
  REFER to: Battery Energy Control Module (BECM) - Electric(414-03A High Voltage Battery, Mounting and Cables, Removal and Installation).
- CHECK the High Voltage Battery Junction Box C4815F for being fully seated.

Was the connector fully seated?

Yes	INSTALL a new high voltage battery junction box. REFER to: High Voltage Battery Junction Box - Electric (414-03A High Voltage Battery, Mounting and Cables, Removal and Installation). Re-install the high voltage battery cover and the high voltage battery into the vehicle. Repower the high voltage system. REFER to: High Voltage System De-energizing - Electric (414-03A High Voltage Battery, Mounting and Cables, General Procedures). GO to Q4

No	Reseat the connector. Re-install the high voltage battery cover and the high voltage battery into the vehicle. Repower the high voltage system. REFER to: High Voltage System De-energizing - Electric (414-03A High Voltage Battery, Mounting and Cables, General Procedures). Operate the system to check for normal vehicle operation.

Q4 CLEAR ALL BECM (BATTERY ENERGY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES

- Ignition ON.
- Using a diagnostic scan tool, CLEAR all BECM (battery energy control module) Diagnostic Trouble Codes (DTCs).
- Ignition OFF for a minimum of 1 minute.
- Using a diagnostic scan tool, perform BECM (battery energy control module) self-test.

Is DTC (diagnostic trouble code) P0563:00, P0AA1:00 and/or P0AA2:00 present?

Yes	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 BECM (battery energy control module) . REFER to: Battery Energy Control Module (BECM) - Electric (414-03A High Voltage Battery, Mounting and Cables, Removal and Installation).

If SOBDMC DTC P1A10:00 is present the ignition must be turned OFF for a minimum for 5 minutes after clearing all continuous DTC's to reset it prior to performing the next pinpoint test step.

R1 CHECK FOR STUCK CLOSED POSITIVE AND STUCK CLOSED NEGATIVE CONTACTOR DTCS

- Ignition ON.
- Using a diagnostic scan tool, review the BECM (battery energy control module) Diagnostic Trouble Codes (DTCs)
- Record all the BECM (battery energy control module) Diagnostic Trouble Codes (DTCs).

Are the following Diagnostic Trouble Codes (DTCs) present: P0563:00/P0AA1:00 (Main Positive Contactor Stuck Closed) P0AA4:00 (Main Negative Contactor Stuck Closed)
AND

Yes	**If BOTH main positive contactor AND main negative contactor stuck closed DTCs are present INSTALL a new high voltage battery (Do not open the high voltage battery).** REFER to: High Voltage Battery - Electric (414-03A High Voltage Battery, Mounting and Cables, Removal and Installation).
No	GO to R2

R2 REVIEW ALL BECM (BATTERY ENERGY CONTROL MODULE) DTCS

- Review all the BECM (battery energy control module) Diagnostic Trouble Codes (DTCs).

Are Diagnostic Trouble Codes (DTCs) P0ADD:00, P0ADF:00, P0AE0:00, and/or U3012:00 present?

Yes	REFER to the BECM (battery energy control module) DTC (diagnostic trouble code) chart and diagnose the Diagnostic Trouble Codes (DTCs) first.
No	GO to R3

R3 CHECK THE CONTACTOR VOLTAGE SENSE CIRCUIT CONNECTOR FOR BEING FULLY SEATED

- Ignition OFF.
- Depower the high voltage system.

Yes	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 BECM (battery energy control module) . REFER to: Battery Energy Control Module (BECM) - Electric (414-03A High Voltage Battery, Mounting and Cables, Removal and Installation).

No	The repair is complete.

PINPOINT TEST S : P0AA6:00

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

Normal Operation and Fault Conditions With the ignition in the ON position, the BECM (battery energy control module) monitors the electrical isolation (leakage resistance) between the high-voltage system and the vehicle chassis. When the contactors are closed and the resistance value is less than 400,000 ohms, a mild electrical isolation fault is set. If the isolation resistance value is less than 100,000 ohms a severe isolation fault is set. This fault illuminates the stop safely hazard (red triangle) warning indicator and the vehicle will not start at the next ignition cycle. **DTC Fault Trigger Conditions**

DTC (diagnostic trouble code)	Description	Fault Trigger Condition
BECM (battery energy control module) P0AA6:00	Hybrid/EV Battery Pack 'A' Voltage System Isolation Fault: No Sub Type Information	Sets if BECM (battery energy control module) detects a high voltage system leakage resistance value of less than 400,000 ohms for 30 seconds.

Possible Sources

- Moisture/water penetration of high-voltage connectors
- High voltage battery cables
- DCACA (Direct Current/Alternating Current Converter Module A)
- GFM3 (generic function module 3) also known as the DCACB (Direct Current/Alternating Current Converter Module B) (if equipped)
- GFM2 (generic function module 2) also known as the secondarya charger (if equipped)
- Direct Current/Direct Current (DC/DC) converter control module

S2 DETERMINE IF THE VEHICLE STARTS

- Attempt to start the vehicle depressing the brake pedal and pressing the start button.

Does the ready to drive indicator illuminate?

Yes	This indicates the leakage fault is mild or there is an intermittent fault condition. GO to S3

No	This indicates a severe leakage fault is currently present, GO to S3

S3 MONITOR THE LEAKAGE RESISTANCE PIDS

- Ignition ON
- Using a diagnostic scan tool, view BECM (battery energy control module) PIDs.
- Select the following BECM (battery energy control module) PIDs:
  - Access the BECM (battery energy control module) and monitor the LEAKRESPOS (Leakage Resistance (Bus +)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAKRESNEG (Leakage Resistance (Bus -)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAK_RES_OVERALL (Leakage Resistance (Overall)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAKRESCON (Leakage Resistance (Battery Contactors Open)) (Ohm) PID (parameter identification)
- **NOTE**

  For a severe leakage fault the Diagnostic Trouble Codes (DTCs) must be cleared or the vehicle may not start.

  Using a diagnostic scan tool, clear the BECM (battery energy control module) Diagnostic Trouble Codes (DTCs).
- **NOTE**

  For a severe leakage fault the ignition must be left OFF for a minimim of 1 minute or the Diagnostic Trouble Codes (DTC) may not repeat and the leakage PID values may not be valid.

  Ignition OFF for a minimum of 1 minute.
- **NOTE**

- Disconnect High Voltage Battery C295 .
- Repower the high voltage system.
  REFER to: High Voltage System De-energizing - Electric(414-03A High Voltage Battery, Mounting and Cables, General Procedures).
- Ignition ON
- Using a diagnostic scan tool, view BECM (battery energy control module) PIDs.
- Select the following BECM (battery energy control module) PIDs:
  - Access the BECM (battery energy control module) and monitor the LEAKRESPOS (Leakage Resistance (Bus +)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAKRESNEG (Leakage Resistance (Bus -)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAK_RES_OVERALL (Leakage Resistance (Overall)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAKRESCON (Leakage Resistance (Battery Contactors Open)) (Ohm) PID (parameter identification)
- **NOTE**

  For a severe leakage fault the Diagnostic Trouble Codes (DTCs) must be cleared or the vehicle may not start.

  Using a diagnostic scan tool, clear the BECM (battery energy control module) Diagnostic Trouble Codes (DTCs).
- **NOTE**

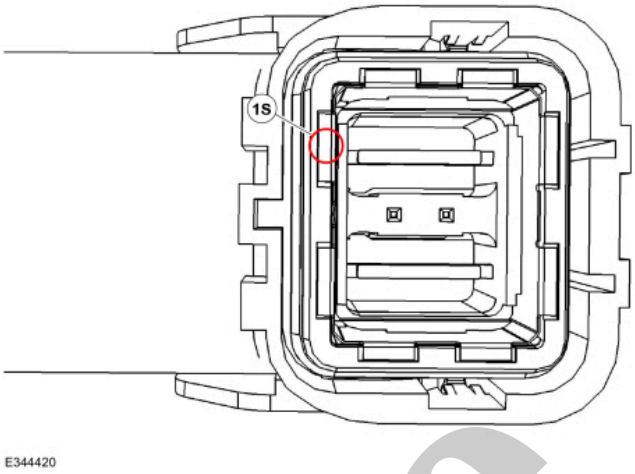
  For a severe leakage fault the ignition must be left OFF for a minimim of 1 minute or the Diagnostic Trouble Codes (DTC) may not repeat and the leakage PID values may not be valid.

  Ignition OFF for a minimum of 1 minute.
- **NOTE**

  Once the ignition is switched to ON the scan tool requires 10 seconds to re-establish the connection. Once the connection is established there will be 10 seconds of viewable data before the contactors open and the PID values default to a normal value of 1.6M ohms making it appear the vehicle fault is no longer present. This does not apply to a mild leakage fault.

  While viewing datalogger, switch the ignition ON and select continue.

Are LEAKRESPOS, LEAKRESNEG and LEAK_RES_OVERALL read greater than 400,000 ohms for at least 10 seconds?

C294-2	Ω	 C294-1S (shield)

Are the resistances greater than 400,000 ohms?

Yes	GO to S6

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). GO to S12

S6 CHECK THE HIGH VOLTAGE BATTERY CABLE TO REAR SOBDMC (SECONDARY ON-BOARD DIAGNOSTIC CONTROL MODULE C) FOR BEING SHORTED

- Disconnect High Voltage Battery C293 .
- Disconnect GFM2 (generic function module 2) C3003C (vehicles equipped with dual chargers ONLY) .
- Disconnect GFM3 (generic function module 3) C4631C (vehicles equipped with duel inverters ONLY) .
- Disconnect DCACA (Direct Current/Alternating Current Converter Module A) C4632C .
- Disconnect ACCMB (Air Conditioning Control Module B) (max trailer tow vehicles ONLY) C1039B .
- Disconnect SOBDMC (secondary on-board diagnostic control module C) C3471B .
- Take measurements while performing a wiggle test of the high-voltage cable assembly.
  High Voltage Battery

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). GO to S12

S7 MONITOR THE LEAKAGE RESISTANCE PIDS WITH THE ACCMB (AIR CONDITIOINING COMPRESSOR CONTROL MODULE B) ISOLATED (MAX TRAILER TOW VEHICLES ONLY)

- Ignition OFF.
- Depower the high voltage system.
  REFER to: High Voltage System De-energizing - Electric(414-03A High Voltage Battery, Mounting and Cables, General Procedures).
- Connect High Voltage Battery C293 .
- Connect GFM2 (generic function module 2) C3003C (vehicles equipped with dual chargers ONLY) .
- Connect GFM3 (generic function module 3) C4631C (vehicles equipped with duel inverters ONLY) .
- Connect DCACA (Direct Current/Alternating Current Converter Module A) C4632C .
- Connect SOBDMC (secondary on-board diagnostic control module C) C3471B .
- Repower the high voltage system.
  REFER to: High Voltage System De-energizing - Electric(414-03A High Voltage Battery, Mounting and Cables, General Procedures).
- Ignition ON
- Using a diagnostic scan tool, view BECM (battery energy control module) PIDs.
- Select the following BECM (battery energy control module) PIDs:
  - Access the BECM (battery energy control module) and monitor the LEAKRESPOS (Leakage Resistance (Bus +)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAKRESNEG (Leakage Resistance (Bus -)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAK_RES_OVERALL (Leakage Resistance (Overall)) (Ohm) PID (parameter identification)
  - Access the BECM (battery energy control module) and monitor the LEAKRESCON (Leakage Resistance (Battery Contactors Open)) (Ohm) PID (parameter identification)
- **NOTE**

  For a severe leakage fault the Diagnostic Trouble Codes (DTCs) must be cleared or the vehicle may not start.

  Using a diagnostic scan tool, clear the BECM (battery energy control module) Diagnostic Trouble Codes (DTCs).