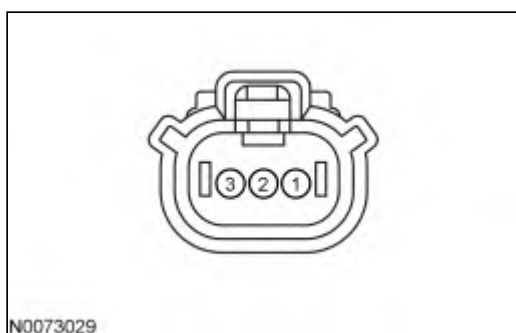
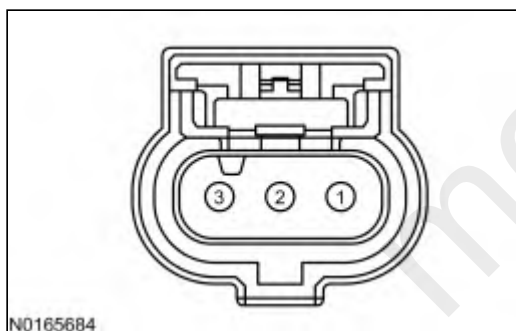
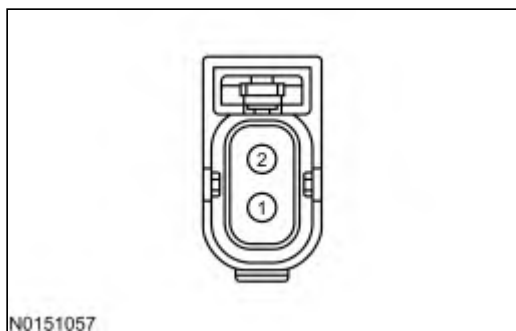
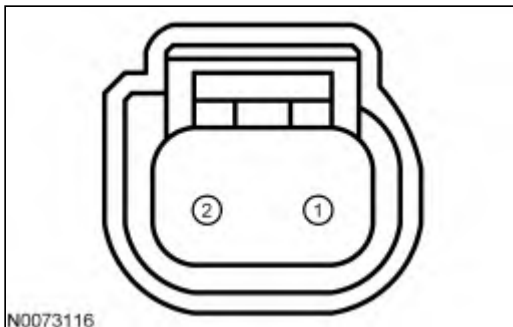
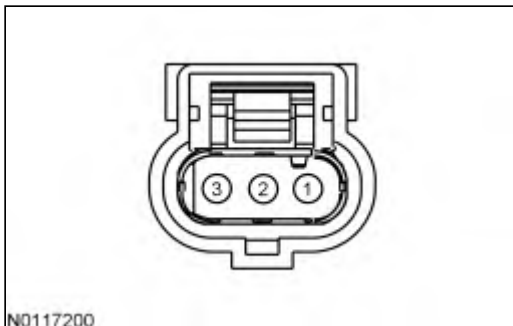


JF: Integrated Ignition Coil On Plug Coils A Through J Failure

This pinpoint test is intended to diagnose the following:

- ignition coils (12029)
- ignition coil harness
- PCM (12A650)

Coil On Plug (COP) Connector**A****B****C****D**

**E**

Vehicle	Connector	Pin	Circuit
Continental 3.7L, Flex TiVCT 3.5L	A	1 3	COP VPWR
Corsair 2.5L, Escape/Kuga 2.5L, Explorer 3.3L, F-150 3.3L, Mustang 5.0L, Transit TiVCT 3.5L	B	1 3	COP VPWR
E-Series	A	3 1	COP VPWR
EcoSport 1.5L, KA	C	1 2	COP VPWR
F-150 5.0L, Mustang 5.2L	B	1 1 (Cylinder 3), 3 (All Others)	COP VPWR
F-650 / F-750	D	2 1	COP VPWR
F-Series Super Duty, Motorhome / Stripped Chassis / Step Van	B	3 1	COP VPWR
Flex GTDI 3.5L, Transit GTDI 3.5L	A	2 1 3	COP GND VPWR
Fusion 2.5L, Ranger 2.5L, Transit Connect 2.5L	D	1 2	COP VPWR

Vehicle	Connector	Pin	Circuit
All other vehicles	E	1 2 3	COP GND VPWR

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to Section 6, Reference Values.

Vehicle	Connector	Pin	Circuit
Continental 2.0L, EcoSport 2.0L, Fusion 1.5L, Fusion 2.0L, MKZ 2.0L	198 PIN	E43 E72 E57 E42	COP4 COP3 COP2 COP1
Continental 2.7L, Continental 3.0L, Flex GTDI 3.5L, Ford GT, Fusion 2.7L, MKZ 3.0L	198 PIN	E73 E58 E43 E72 E57 E42	COP6 COP5 COP4 COP3 COP2 COP1
Continental 3.7L, Flex TiVCT 3.5L	198 PIN	E94 E90 E89 E88 E92 E93	COP6 COP5 COP4 COP3 COP2 COP1
Corsair 2.0L, Corsair 2.3L, Edge 2.0L, Escape/Kuga 2.0L, Explorer 2.3L, Mustang 2.3L, Nautilus 2.0L, Ranger 2.3L, Transit Connect 2.0L	198 PIN	E58 E59 E45 E60	COP4 COP3 COP2 COP1
Corsair 2.5L, Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	198 PIN	E89 E84 E94 E79	COP4 COP3 COP2 COP1

Vehicle	Connector	Pin	Circuit
E-Series	198 PIN	E90 E87 E88 E89 E92 E94 E95 E93	COP8 COP7 COP6 COP5 COP4 COP3 COP2 COP1
EcoSport 1.0L Automatic Transmission	198 PIN	E72 E57 E42	COP3 COP2 COP1
EcoSport 1.0L Manual Transmission	198 PIN	E52 E51 E50	COP3 COP2 COP1
EcoSport 1.5L Automatic Transmission, KA 1.5L Automatic Transmission	198 PIN	E89 E84 E79	COP3 COP2 COP1
EcoSport 1.5L Manual Transmission, KA 1.2L, KA 1.5L Manual Transmission	112 PIN	E54 E52 E53	COP3 COP2 COP1
Escape/Kuga 1.5L, Transit Connect 1.0L	198 PIN	E58 E59 E60	COP3 COP2 COP1
Expedition, F-150 3.5L High Output, Navigator	198 PIN	E57 E56 E71 E70 E55 E41	COP6 COP5 COP4 COP3 COP2 COP1
F-150 5.0L	306 PIN	E126 E84 E42 E63 E83 E62 E105 E21	COP8 COP7 COP6 COP5 COP4 COP3 COP2 COP1

Vehicle	Connector	Pin	Circuit
F-650 / F-750	198 PIN	E92 E95 E94 E80 E89 E85 E87 E88 E90 E93	COP10 COP9 COP8 COP7 COP6 COP5 COP4 COP3 COP2 COP1
F-Series Super Duty, Motorhome / Stripped Chassis / Step Van, Mustang 5.0L, Mustang 5.2L Supercharged	306 PIN	E105 E83 E42 E62 E84 E63 E126 E21	COP8 COP7 COP6 COP5 COP4 COP3 COP2 COP1
KA 1.0L	128 PIN	T8 T24 T16	COP3 COP2 COP1
Mustang TiVCT 5.2L	198 PIN	E90 E94 E95 E89 E92 E88 E87 E93	COP8 COP7 COP6 COP5 COP4 COP3 COP2 COP1
Ranger 2.5L	128 PIN	T8 T24 T7 T16	COP4 COP3 COP2 COP1
All other vehicles	306 PIN	E63 E105 E62 E42 E84 E21	COP6 COP5 COP4 COP3 COP2 COP1

JF1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Note: Electronic ignition engine timing is entirely controlled by the PCM. Electronic ignition timing is not adjustable. Do not attempt to check base timing. You will receive false readings.

Note: Pull on the suspect coil connector to determine if it is correctly seated before proceeding with the current diagnostic path. If the suspect coil connector is not seated correctly, reconnect the suspect connector until an audible click can be

heard.

Note: Coil letter A through H corresponds with cylinder number 1 through 8.

Are DTCs P0351, P0352, P0353, P0354, P0355, P0356, P0357, P0358, P2300, P2301, P2303, P2304, P2306, P2307, P2309, P2310, P2312, P2313, P2315 OR P2316 present?

Yes	For Aviator, Continental 2.0L, Continental 2.7L, Continental 3.0L, Corsair 2.0L, Corsair 2.3L, EcoSport 1.0L, EcoSport 2.0L, Edge, Escape/Kuga 1.5L, Escape/Kuga 2.0L, Expedition, Explorer 2.3L, Explorer 3.0L, F-150 2.7L, F-150 3.5L, Flex 3.5L GTDI, Ford GT, Fusion 1.5L, Fusion 2.0L, Fusion 2.7L, MKZ, Mustang 2.3L, Nautilus, Navigator, Ranger 2.3L, Transit 3.5L GTDI, Transit Connect 1.0L, and Transit Connect 2.0L, GO to JF4 . For all others, GO to JF2 .
No	For symptoms without DTCs, GO to JF4 . For all others, RETURN to Section 3, Symptom Charts for further direction.

JF2 CHECK THE FUNCTIONALITY OF THE SUSPECT COIL DRIVER CIRCUIT

NOTICE: Do not disconnect any COP while the engine is running, damage to the COP or PCM may occur.

- Ignition OFF.
- Suspect Coil Assembly connector disconnected.
- Remove the fuel pump fuse to disable the fuel pump.
- Connect the Deluxe Noid Lite and Signal Test Light Set AST7898 or equivalent between the COP and VPWR circuits in the suspect coil harness side connector.
- Monitor the noid light.
- Crank the engine.

Does the noid light blink consistently?

Yes	GO to JF3 .
No	GO to JF4 .

JF3 CHECK THE FUNCTIONALITY OF THE SUSPECT COIL

Note: A correctly operating ignition system only requires a spark when the spark gap is set to the 25-28 kV range.

- Ignition OFF.
- Carry out a visual inspection. Closely inspect the coil case and boot for carbon tracking, cracks and torn or incorrectly installed boots.
- Remove the suspect COP from the spark plug.
- Connect the Adjustable Ignition Spark Tester THX458 or equivalent.
- Suspect Coil Assembly connector connected.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 40 kV.
- Crank the engine 3 times.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 25-28 kV.
- Monitor the spark tester.
- Crank the engine.

Is a spark present when the spark gap is set to 25-28 kV while cranking the engine?

Yes	GO to Pinpoint Test Z .
No	INSTALL a new coil. If necessary, INSTALL a new spark plug. REFER to the Workshop Manual Section 303-07, Engine Ignition. Clear the PCM DTCs. REPEAT the self-test. If the concern or DTC is still present, GO to JF10 .

JF4 CHECK THE VPWR TO THE SUSPECT COIL

NOTICE: Do not disconnect any COP while the engine is running, damage to the COP or PCM may occur.

- Ignition OFF.
- Suspect Coil Assembly connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) COP Connector, Harness Side	(-) Vehicle Battery
VPWR	Negative terminal

Is the voltage greater than 10.5 V?

Yes	For Aviator, Continental 2.0L, Continental 2.7L, Continental 3.0L, Corsair 2.0L, Corsair 2.3L, EcoSport 1.0L, EcoSport 2.0L, Edge, Escape/Kuga 1.5L,
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Escape/Kuga 2.0L,
Expedition,
Explorer 2.3L,
Explorer 3.0L,
F-150 2.7L,
F-150 3.5L,
Flex 3.5L GTDI,
Ford GT,
Fusion 1.5L,
Fusion 2.0L,
Fusion 2.7L,
MKZ,
Mustang 2.3L,
Nautilus,
Navigator,
Ranger 2.3L,
Transit 3.5L GTDI,
Transit Connect 1.0L, and
Transit Connect 2.0L, GO to [JF5](#).
For all others, GO to [JF6](#).

No REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

JF5 CHECK THE SUSPECT COIL GROUND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Measure the resistance between:

(+) COP Connector, Harness Side	(-)
GND	Ground

Is the resistance less than 5 ohms?

Yes	GO to JF6 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

JF6 CHECK THE SUSPECT COIL DRIVER CIRCUIT FOR AN OPEN

- Ignition OFF.
- PCM connector disconnected.
- Suspect Coil Assembly connector disconnected.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) COP Connector, Harness Side
COP	COP

Is the resistance less than 5 ohms?

Yes	GO to JF7 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

JF7 CHECK THE SUSPECT COIL DRIVER CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition ON, engine OFF.
- Measure the voltage between:

(+) COP Connector, Harness Side	(-) Vehicle Battery
COP	Negative terminal

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to JF8 .

JF8 CHECK THE SUSPECT COIL DRIVER CIRCUIT FOR A SHORT TO GROUND

- Ignition OFF.
- Measure the resistance between:

(+) COP Connector, Harness Side	(-) Vehicle Battery
COP	Negative terminal

Is the resistance greater than 10K ohms?

Yes	For Aviator, Continental 2.0L, Continental 2.7L, Continental 3.0L, Corsair 2.0L, Corsair 2.3L, EcoSport 1.0L, EcoSport 2.0L, Edge, Escape/Kuga 1.5L, Escape/Kuga 2.0L, Expedition, Explorer 2.3L, Explorer 3.0L, F-150 2.7L, F-150 3.5L, Flex 3.5L GTDI, Ford GT, Fusion 1.5L, Fusion 2.0L, Fusion 2.7L,
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	MKZ, Mustang 2.3L, Nautilus, Navigator, Ranger 2.3L, Transit 3.5L GTDI, Transit Connect 1.0L, and Transit Connect 2.0L, GO to JF9 . For all others, GO to JF10 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test. If the concern or DTC is still present, GO to JF9 .

JF9 CHECK THE SUSPECT COIL FOR DAMAGE

Note: A correctly operating ignition system only requires a spark when the spark gap is set to the 25-28 kV range.

- PCM connector connected.
- Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the suspect coil.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 40 kV.
- Crank the engine 3 times.
- Set the gap on the Adjustable Ignition Spark Tester THX458 or equivalent to 25-28 kV.
- Monitor the spark tester.
- Crank the engine.

Is a spark present when the spark gap is set to 25-28 kV while cranking the engine?

Yes	If necessary, INSTALL a new spark plug. REFER to the Workshop Manual Section 303-07, Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.
No	INSTALL a new coil. REFER to the Workshop Manual Section 303-07, Engine Ignition. Clear the PCM DTCs. REPEAT the self-test. If the concern or DTC is still present, GO to JF10 .

JF10 CHECK FOR CORRECT PCM OPERATION

- Disconnect all the PCM connectors.
- Visually inspect for:
 - pushed out pins
 - corrosion
- Connect all the PCM connectors and make sure they seat correctly.
- Carry out the PCM self-test.
- Verify the concern is still present.

Is the concern still present?

Yes	INSTALL a new PCM. REFER to Section 2, Flash Electrically Erasable Programmable Read Only Memory (EEPROM) , Programming the VID Block for a Replacement PCM.
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

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