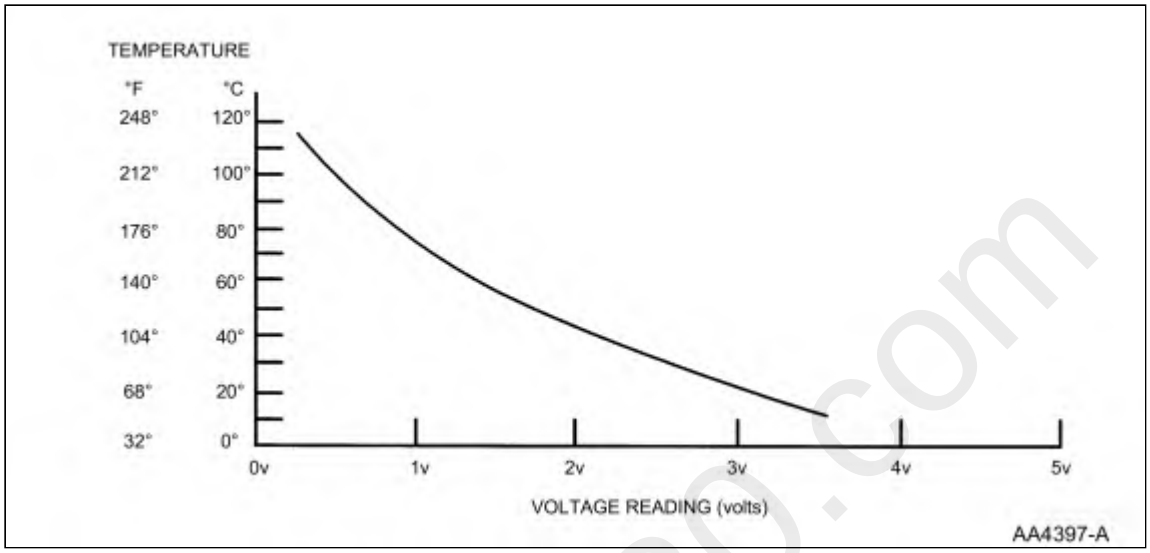
KP: Charge Air Cooler (CAC)

This pinpoint test is intended to diagnose the following:

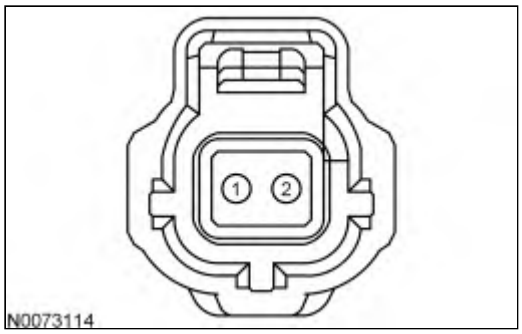
- CAC coolant temperature sensor (12A648)
- CAC pump (8501)
- harness circuits: CAC, CACCTS, SIGRTN, PUMPPWR and GND



TEMPERATURE SENSOR VOLTAGE AND RESISTANCE SPECIFICATIONS

Temperature		Temperature Sensor Values
°C	**°F**	**Resistance (K ohms)**
120	248	1.18
110	230	1.55
100	212	2.07
90	194	2.80
80	176	3.84
70	158	5.37
60	140	7.70
50	122	10.97
40	104	16.15
30	86	24.27
20	68	37.30
10	50	58.75
0	32	95.85
-10	14	160.31

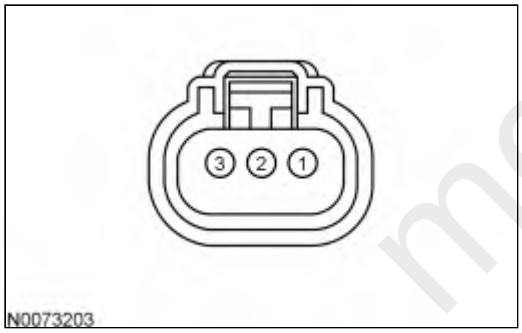
Charge Air Cooler (CAC) Coolant Temperature Sensor Connector



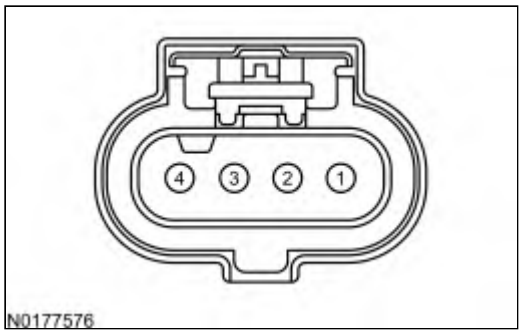
Vehicle	Connector	Pin	Circuit
Fusion	A	2 1	SIGRTN CACCTS
Mustang	A	1 2	SIGRTN CACCTS

Charge Air Cooler (CAC) Pump Connector

A



B



Vehicle	Connector	Pin	Circuit

Vehicle	Connector	Pin	Circuit
Fusion	A	3 1 2	CAC GND PUMPPWR
Mustang	B	3 1 4	CAC GND PUMPPWR

Powertrain Control Module (PCM) Connector

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

Vehicle	Connector	Pin	Circuit
Fusion	198 PIN	E13 B19 E23	CAC SIGRTN CACCTS
Mustang	306 PIN	E60 E5 E98	CAC SIGRTN CACCTS

KP1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)
Are DTCs P00DF, P00E0, P00E1, P00E2, P0127, P023A, P023B, P023C or P026A present?

Yes	For DTC P00DF, P00E0, P00E1, P00E2, P0127, GO to KP2. For all others, GO to KP9.
No	For symptoms without DTCs, GO to KP2. For all others, RETURN to Section 3, Symptom Charts for further direction.

KP2 CHECK THE CAC COOLING SYSTEM

WARNING: To avoid personal injury do not unscrew the coolant pressure relief cap while the engine is operating or hot. The cooling system is under pressure. Steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in personal injury.

Note: *Verify cooling fan operation before proceeding with this test.*

- Check the CAC cooling system for any loss of coolant or overheating concerns.

Is the CAC cooling system OK?

Yes	GO to KP3.
No	REFER to the Workshop Manual Section 303-03, Charge Air Cooling, to continue CAC cooling system diagnosis.

KP3 CHECK THE RESISTANCE OF THE CAC COOLANT TEMPERATURE SENSOR

Note: *Refer to the Temperature Sensor Voltage And Resistance Specifications chart for the resistance specifications.*

- Ignition OFF.
- Charge Air Cooler (CAC) Coolant Temperature Sensor connector disconnected.
- Measure the resistance between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Component Side	(-) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Component Side
CACCTS	SIGRTN

Is the resistance within specification?

Yes	GO to KP4.
No	INSTALL a new Charge Air Cooler (CAC) Coolant Temperature sensor. REFER to the Workshop Manual 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to Section 2, Resetting The Keep Alive Memory (KAM). Clear the PCM DTCs. REPEAT the self-test.

KP4 CHECK THE CAC COOLANT TEMPERATURE SENSOR CIRCUITS FOR AN OPEN

- PCM connector disconnected.
- Measure the resistance between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
CACCTS	CACCTS
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	GO to KP5.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP5 CHECK THE CAC COOLANT TEMPERATURE SENSOR CIRCUITS FOR A SHORT TO GROUND

- Measure the resistance between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Harness Side	(-)
CACCTS	Ground
SIGRTN	Ground

Are the resistances greater than 10K ohms?

Yes	GO to KP6.
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KP6 CHECK THE CAC COOLANT TEMPERATURE SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

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

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Harness Side	(-)
CACCTS	Ground
SIGRTN	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to KP7.

KP7 CAC COOLANT TEMPERATURE SENSOR INTERMITTENT CHECK

- Charge Air Cooler (CAC) Coolant Temperature Sensor connector connected.
- PCM connector connected.
- Ignition ON, engine OFF.
- Access the PCM and monitor the CACCT_V (VOLT) PID.
- While observing the PID, wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM.
- Lightly tap on the CAC coolant temperature sensor and wiggle the harness and connector to simulate road shock.

Does the PID reading change?

Yes	REPAIR as necessary or INSTALL a new CAC coolant temperature sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to Section 2, Resetting The Keep Alive Memory (KAM).
No	GO to KP8.

KP8 CHECK THE CHARGE AIR COOLER COOLANT TEMPERATURE AND THE ENGINE COOLANT TEMPERATURE CORRELATION

Note: *Check temperature values while engine is at ambient temperature, cold soak the engine for a minimum of 6 hours if necessary. Make sure the vehicle has not been in direct sun light.*

Note: *All PIDs may not be available on all vehicles.*

- Access the PCM and monitor the CACCT (TEMP), ECT (TEMP) and ECT1 (TEMP) PIDs.

Are the temperature readings within 16.6° C (30°F) of each other?

Yes	GO to Pinpoint Test Z.
No	INSTALL a new Charge Air Cooler (CAC) Coolant Temperature sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. RESET the keep alive memory (KAM). REFER to Section 2, Resetting The Keep Alive Memory (KAM). Clear the PCM DTCs. REPEAT the self-test.

KP9 CHECK THE PUMPPWR CIRCUIT FOR AN OPEN

- Ignition OFF.
- Charge Air Cooler (CAC) Pump connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
PUMPPWR	Ground

Is the voltage greater than 10.5 V?

Yes	GO to KP10.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP10 CHECK THE GND CIRCUIT FOR AN OPEN

- Ignition OFF.
- Measure the resistance between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
GND	Ground

Is the resistance less than 5 ohms?

Yes	GO to KP11.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP11 CHECK THE CAC CIRCUIT FOR AN OPEN

- PCM connector disconnected.
- Measure the resistance between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-) PCM Connector, Harness Side
CAC	CAC

Is the resistance less than 5 ohms?

Yes	GO to KP12.
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP12 CHECK THE CAC CIRCUIT FOR A SHORT TO GROUND

- Measure the resistance between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
CAC	Ground

Is the resistance greater than 10K ohms?

Yes	GO to KP13.

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

KP13 CHECK THE CAC CIRCUIT FOR A SHORT TO VOLTAGE

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

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
CAC	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	INSTALL a new Charge Air Cooler (CAC) Pump. REFER to the Workshop Manual Section 303-03, Charge Air Cooling. Clear the PCM DTCs. REPEAT the self-test.