

HV: Electric Cooling Fan Clutch

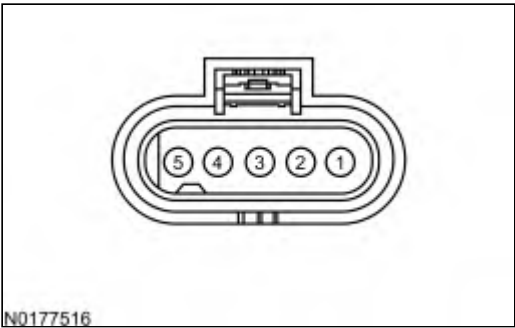
⚠️ WARNING: To avoid the possibility of personal injury or damage to the vehicle, do not operate the engine until the fan blade has been first examined for possible cracks and separation. Failure to follow these instructions may result in personal injury or death.

This pinpoint test is intended to diagnose the following:

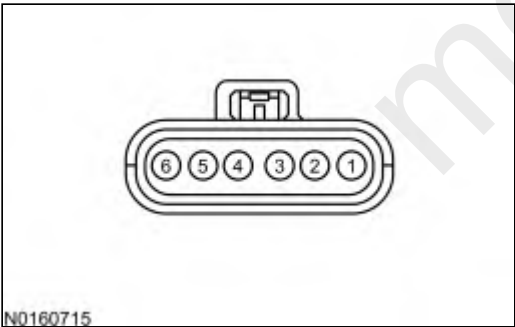
- cooling fan clutch
- harness circuits: fan speed sensor (FSS), FSS PWRGND, FSS VPWR, fan control variable (FCV), and FCV VPWR
- powertrain control module (PCM) (12A650)

Cooling Fan Clutch Connector

A



B



Vehicle	Connector	Pin	Circuit
E-Series	A	3	FSS
		2	PWRGND
		1	VREF
		4	FCV
		5	VPWR

Vehicle	Connector	Pin	Circuit
Ranger	B	5 4 1 2 3	FSS PWRGND VREF FCV VPWR
All other vehicles	B	4 5 3 6 1	FSS SIGRTN VREF FCV VPWR

Powertrain Control Module (PCM) Connector

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

Vehicle	Pin	Circuit
Aviator, Explorer 3.0L	B46, B47, B61, B62, B76, B77 B1, B16, B2 B67, B70, B81, B82, E116, E118, E120	PWRGND VPWR VREF
Continental 2.0L, EcoSport 1.0L Automatic Transmission, Fusion 1.5L	B96, B97, B98, B99 B101, B102, B103 B11, B13, E6, E8	PWRGND VPWR VREF
Continental 2.7L, Continental 3.0L, Flex GTDI 3.5L	B96, B97, B98, B99 E22 B101, B102, B103 B11, B13, E8	PWRGND VBPWR VPWR VREF
Continental 3.7L	B100, B102, B103, B5 E17 B97, B99 E34	PWRGND VBPWR VPWR VREF
Corsair 2.5L, Escape/Kuga 2.5L	B100, B102, B103, B5 B97, B99 B17, B29, B36, B40, B45, E11, E34, E52, E7, E73, E8	PWRGND VPWR VREF
E-Series	B100, B102, B103, B5 B3, E17 B97, B99 B2 B29, B52 E86	PWRGND VBPWR VPWR FSS VREF FCV
EcoSport 1.0L Manual Transmission	B96, B97, B98, B99 B101, B102, B103 B11, E3, E7	PWRGND VPWR VREF

Vehicle	Pin	Circuit
EcoSport 1.5L Automatic Transmission	B100, B102, B103, B5 E17 B97, B99 B52, E11, E28, E34	PWRGND VBPWR VPWR VREF
EcoSport 1.5L Manual Transmission	B49, B50, B51 B55, B56 E1, E10, E11, E7, E9	PWRGND VPWR VREF
EcoSport 2.0L	B96, B97, B98, B99 E17, E22 B101, B102, B103 B11, B13, E5, E6, E8	PWRGND VBPWR VPWR VREF
Edge 2.0L, Nautilus 2.0L	B96, B97, B98, B99 B100, B101, B102 B13, B14, B15, B16, E19, E25, E30, E32, E9	PWRGND VPWR VREF
Edge 2.7L	B96, B97, B98, B99 E36, T3 B1, B16, B2 B70, B81, B82, E115, E116, E118, E120	PWRGND VBPWR VPWR VREF
Expedition, F-150 3.5L High Output	B96, B97, B98, B99 E3, E36, T3 B101, B102, B103 B11, B13, B5, E2, E3, E5, E6, E8	PWRGND VBPWR VPWR VREF
Explorer 2.3L	B96, B97, B98, B99 B100, B101, B102 B13, B15, E19, E25, E30, E9	PWRGND VPWR VREF
Explorer 3.3L	B46, B47, B61, B62, B76, B77 B1, B16, B2 B67, B70, B81, B82, E115, E116, E118, E120	PWRGND VPWR VREF
F-150 2.7L, F-150 5.0L	B46, B47, B61, B62, B76, B77 E36, T3 B1, B16, B2 E115, E116, E118, E120	PWRGND VBPWR VPWR VREF
F-150 3.3L	B46, B47, B61, B62, B76, B77 B1, B16, B2 E116, E118, E120	PWRGND VPWR VREF
F-150 3.5L	B70, B82, E115, E116, E118, E120	VREF
F-650 / F-750	B100, B102, B103, B5 B97, B99 B86 B52, B66	PWRGND VPWR FSS VREF

Vehicle	Pin	Circuit
F-Series Super Duty 6.2L	B46, B47, B61, B62, B76, B77 B1, E17, E36, T3, T82 B1, B16, B2 T52 T80 B70, B71, B82, B86, E117, E118, E120, E69, E95 B4	PWRGND VBPWR VPWR FSS SIGRTN VREF FCV
F-Series Super Duty 7.3L, Motorhome / Stripped Chassis / Step Van	B46, B47, B61, B62, B76, B77 T3, T82 B1, B16, B2 T52 T80 B70, B71, B82, B86, E117, E118, E120, T81 B4	PWRGND VBPWR VPWR FSS SIGRTN VREF FCV
Flex TIVCT 3.5L	B100, B102, B103, B5 E17, T1 B97, B99 B52, B66, E34	PWRGND VBPWR VPWR VREF
Ford GT	B96, B97, B98, B99 E22 B83 B101, B102, B103 B11, E5, E6, E8	PWRGND VBPWR FCV VPWR VREF
Fusion 2.0L, MKZ 2.0L	B96, B97, B98, B99 B77 B101, B102, B103 B11, B13, E6, E8	PWRGND VBPWR VPWR VREF
Fusion 2.5L	B50, B69, B70 E17, E36 B97, B99 B66, E34	PWRGND VBPWR VPWR VREF
Fusion 2.7L	B96, B97, B98, B99 E36, T3 B101, B102, B103 B11, B13, E6, E8	PWRGND VBPWR VPWR VREF
KA 1.0L	B48, E12, T23, T31, T32 B36, E24 B26, E2, T26, T28, T30	PWRGND VPWR VREF
KA 1.2L, KA 1.5L Manual Transmission	B49, B50, B51 B55, B56 E11, E7, E9	PWRGND VPWR VREF
KA 1.5L Automatic Transmission	B100, B102, B103, B5 B97, B99 E11, E28, E34	PWRGND VPWR VREF

Vehicle	Pin	Circuit
MKZ 3.0L	B96, B97, B98, B99 E22, E36, T3 B101, B102, B103 B11, B13, E6, E8	PWRGND VBPWR VPWR VREF
Mustang 2.3L	B96, B97, B98, B99 E22 B100, B101, B102 B11, B13, B16, E19, E30, E5, E6, E8	PWRGND VBPWR VPWR VREF
Mustang 5.0L	B46, B47, B61, B62, B76, B77 E17, E50 B1, B16, B2 B52, B66, B81, E115, E118, E120, E34, T81	PWRGND VBPWR VPWR VREF
Mustang 5.2L Supercharged	B46, B47, B61, B62, B76, B77 B1, B16, B2 B71, B81, B82, E115, E116, E117, E118, E78	PWRGND VPWR VREF
Mustang TiVCT 5.2L	B100, B102, B103, B5 E17 B1, B16, B2 B29, B52, E34	PWRGND VBPWR VPWR VREF
Nautilus 2.7L	B96, B97, B98, B99 B1, B16, B2 B70, B81, B82, B83, E115, E116, E118, E120	PWRGND VPWR VREF
Navigator	B96, B97, B98, B99 E3, E36, T3 B101, B102, B103 B11, B13, B5, E2, E5, E6, E8	PWRGND VBPWR VPWR VREF
Ranger 2.3L	B96, B97, B98, B99 B100, B101, B102 B44 B13, B14, B15, E19, E25, E30, E9 B43	PWRGND VPWR FSS VREF FCV
Ranger 2.5L	B35, B36, B47, B48 B11, B12 B14, B16, T18	PWRGND VPWR VREF
Transit GTDI 3.5L	B46, B47, B61, B62, B76, B77 B101, B102, B103 B70, B81, B82, E116, E118, E120, T81, T82	PWRGND VPWR VREF
Transit TiVCT 3.5L	B46, B47, B61, B62, B76, B77 B1, B16, B2 B70, B81, B82, E116, E118, E120, T81, T82	PWRGND VPWR VREF
Transit Connect 1.0L	B96, B97, B98, B99 B43 B100, B101, B102 B13, B15, B16, B26, E19, E25, E30	PWRGND FCV VPWR VREF

Vehicle	Pin	Circuit
Transit Connect 2.0L	B96, B97, B98, B99 B43 B100, B101, B102 E19, E25, E30	PWRGND FCV VPWR VREF
Transit Connect 2.5L	B100, B102, B103, B5 E17, E36, T1 B66 B97, B99 E34	PWRGND VBPWR FCV VPWR VREF
All other vehicles	B96, B97, B98, B99 B100, B101, B102 B13, B14, B15, B37, B38, E10, E13, E14, E15, E19, E25, E30, E56, E9	PWRGND VPWR VREF

HV1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) Are DTCs P0480 or P0528 present?

Yes	For DTC P0480. GO to HV2 . For all others, GO to HV8 .
No	For fan always on and fan does not operate, GO to HV8 . For all others, RETURN to Section 3, Symptom Charts for further direction.

HV2 CHECK THE VPWR VOLTAGE TO THE ELECTRIC COOLING FAN ACTUATOR VALVE SOLENOID

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

(+) Cooling Fan Clutch Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	GO to HV3 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HV3 CHECK THE FCV CIRCUIT FOR AN OPEN CIRCUIT

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

(+) Cooling Fan Clutch Connector, Harness Side	(-) PCM Connector, Harness Side
FCV	FCV

Is the resistance less than 5 ohms?

Yes	GO to HV4 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HV4 CHECK THE FCV CIRCUIT FOR A SHORT TO GROUND

- Measure the resistance between:

(+) Cooling Fan Clutch Connector, Harness Side	(-)
FCV	Ground

Is the resistance greater than 10K ohms?

Yes	GO to HV5 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HV5 CHECK THE FCV CIRCUIT FOR A SHORT TO VOLTAGE

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

(+) Cooling Fan Clutch Connector, Harness Side	(-)
FCV	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to HV6 .

HV6 CHECK THE ELECTRIC COOLING FAN ACTUATOR VALVE SOLENOID RESISTANCE

Note: If necessary, install pin adapters on the component side pins to carry out the resistance measurement.

- Ignition OFF.
- Cooling Fan Clutch connector disconnected.
- Measure the resistance between:

(+) Cooling Fan Clutch Connector, Component Side	(-) Cooling Fan Clutch Connector, Component Side
FCV	VPWR

Is the resistance between 9 - 14 ohms?

Yes	GO to HV7 .
No	INSTALL a new Cooling Fan Clutch. REFER to the Workshop Manual Section 303-03, Engine Cooling. Clear the PCM DTCs. REPEAT the self-test.

HV7 CHECK THE ELECTRIC COOLING FAN ACTUATOR VALVE SOLENOID FOR A SHORT

- Measure the resistance between:

(+) Cooling Fan Clutch Connector, Component Side	(-)
FCV	Ground

Is the resistance greater than 10K ohms?

Yes	GO to Pinpoint Test Z .
No	INSTALL a new Cooling Fan Clutch. REFER to the Workshop Manual Section 303-03, Engine Cooling. Clear the PCM DTCs. REPEAT the self-test.

HV8 CHECK THE CIRCUITS TO THE FSS

- Cooling Fan Clutch connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Cooling Fan Clutch Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	GO to HV11 .
No	GO to HV9 .

HV9 CHECK THE VOLTAGE CIRCUIT TO THE FSS FOR AN OPEN

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

(+) Cooling Fan Clutch Connector, Harness Side	(-) PCM Connector, Harness Side
VREF	VREF

Is the resistance less than 5 ohms?

Yes	GO to HV10 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HV10 CHECK THE GROUND AND SIGRTN CIRCUITS TO THE FSS FOR AN OPEN

- Ignition OFF.
- PCM connector disconnected.
- For Ranger and F-Series Super Duty,

- Measure the resistance between:

(+) Cooling Fan Clutch Connector, Harness Side	(-) PCM Connector, Harness Side
SIGRTN	SIGRTN

- For all others,
- Measure the resistance between:

(+) Cooling Fan Clutch Connector, Harness Side	(-)
PWRGND	Ground

Is the resistance less than 5 ohms?

Yes	GO to HV14 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HV11 CHECK THE FSS CIRCUIT FOR AN OPEN CIRCUIT

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

(+) Cooling Fan Clutch Connector, Harness Side	(-) PCM Connector, Harness Side
FSS	FSS

Is the resistance less than 5 ohms?

Yes	GO to HV12 .
No	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HV12 CHECK THE FSS CIRCUIT FOR A SHORT TO GROUND

- Measure the resistance between:

(+) Cooling Fan Clutch Connector, Harness Side	(-)
FSS	Ground

Is the resistance greater than 10K ohms?

Yes	GO to HV13 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HV13 CHECK THE FSS CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition ON, engine OFF.

- Measure the voltage between:

(+) Cooling Fan Clutch Connector, Harness Side	(-)
FSS	Ground

Is any voltage present?

Yes	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No	GO to HV14 .

HV14 CHECK THE ELECTRIC COOLING FAN OPERATION

- Ignition ON, engine running.
- Set the heater controls to OFF.
- Access the PCM and monitor the FANSS (RPM) PID.
- Access the PCM and monitor the FAN_DSD (PER) PID.

Does the FANSS PID indicate any RPM?

Yes	For fan always on, GO to HV15 . For all others, GO to Pinpoint Test Z .
No	GO to HV16 .

HV15 CHECK THE COOLING FAN FOR OPERATION

- Ignition OFF.
- Cooling Fan Clutch connector disconnected.
- Ignition ON, engine running.
- Engine at normal operating temperature.
- Increase and maintain the engine speed to 3,500 RPM.
- Listen for cooling fan to disengage.

Does the fan speed stabilize at less than 600 RPM within two minutes?

Yes	GO to Pinpoint Test Z .
No	INSTALL a new Cooling Fan. REFER to the Workshop Manual Section 303-03, Engine Cooling. Clear the PCM DTCs. REPEAT the self-test.

HV16 CHECK THE FUNCTIONALITY OF THE FSS CIRCUIT

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

(+) Cooling Fan Clutch Connector, Harness Side	(-)
FSS	Ground

Is the voltage greater than 10.5 V?

Yes	For intermittent concerns, GO to Pinpoint Test Z .
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	For all others, INSTALL a new Cooling Fan. REFER to the Workshop Manual Section 303-03, Engine Cooling. Clear the PCM DTCs. REPEAT the self-test.
No	GO to HV17 .

HV17 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.