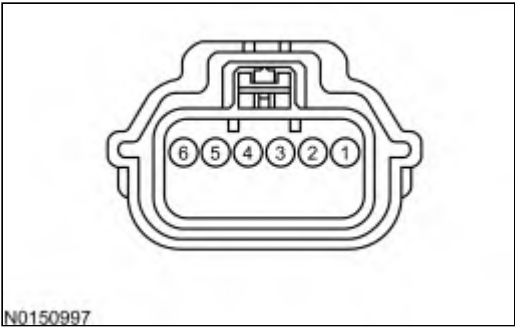
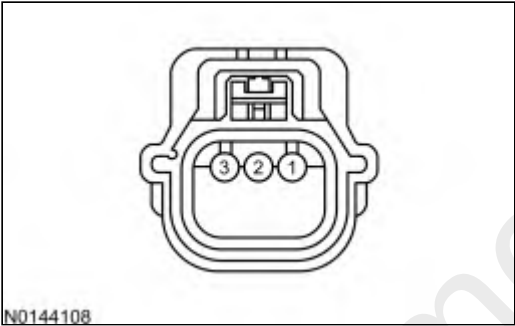




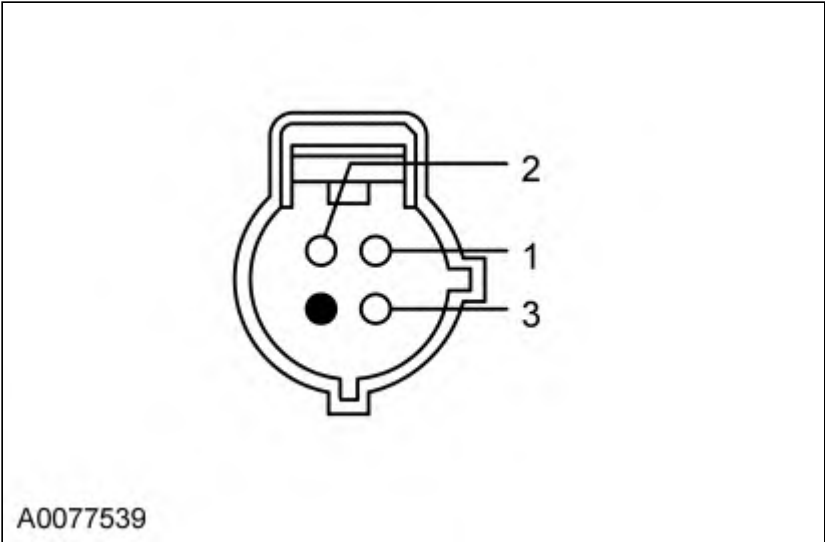
Pin	Circuit
4	APPRTN2 (Accelerator Pedal Position Return 2)
6	APPVREF2 (Accelerator Pedal Position Reference Voltage 2)
3	APPRTN1 (Accelerator Pedal Position Return 1)
1	APPVREF1 (Accelerator Pedal Position Reference Voltage 1)

Air Conditioning Pressure (ACP) Sensor Connector

A



B



Vehicle	Connector	Pin	Circuit
Expedition, Explorer, Navigator	A	1 2	SIGRTN VREF
Ranger 2.5L	B	1 2	SIGRTN VREF
All other vehicles	A	1 3	SIGRTN VREF

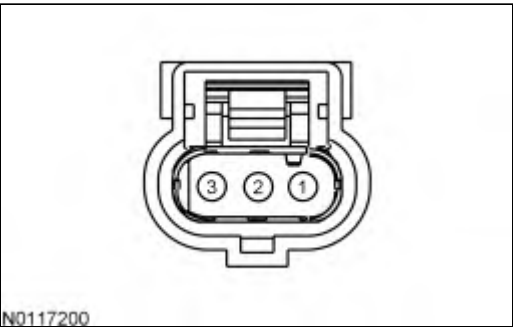
Brake Vacuum Sensor Connector



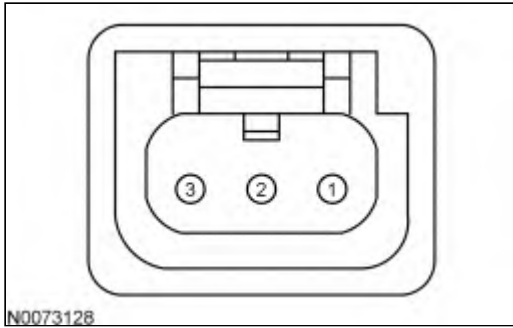
Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Camshaft Position Bank 1 Sensor 1 (CMP11) Sensor Connector

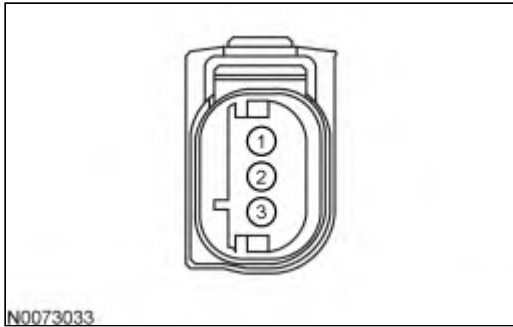
A



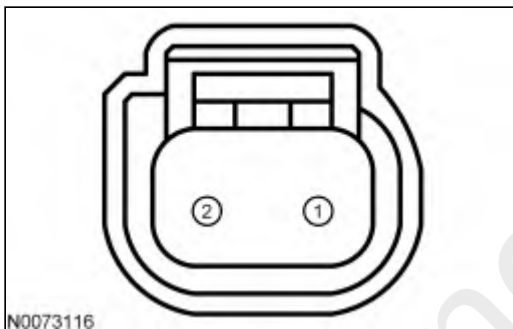
B



C



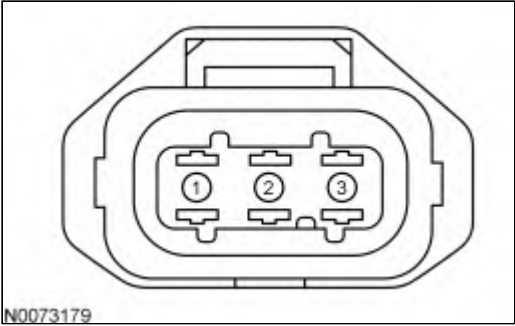
D



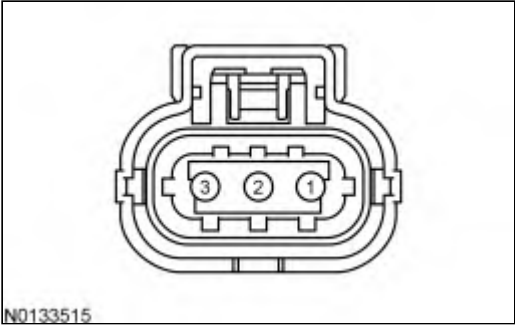
E



F



G

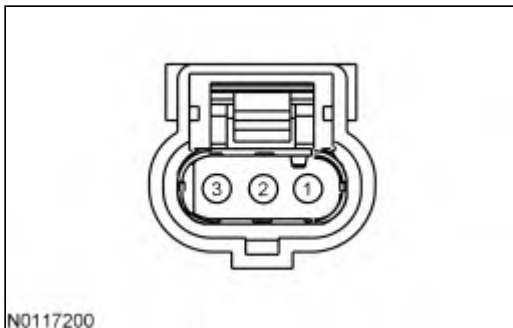


Vehicle	Connector	Pin	Circuit
Continental 2.7L, Continental 3.0L, Continental 3.7L, Flex GTDI 3.5L, Ford GT, Fusion 2.7L, MKZ 3.0L	A	2	SIGRTN
Continental 2.0L, EcoSport 2.0L, Fusion 2.0L, MKZ 2.0L, Mustang 2.3L, Transit Connect 2.0L	B	2 1	SIGRTN VREF

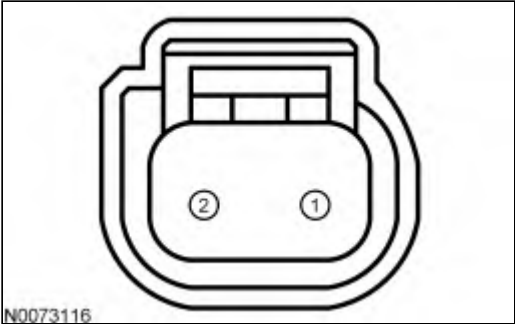
Vehicle	Connector	Pin	Circuit
Corsair 2.0L, Corsair 2.3L, EcoSport 1.5L, Edge 2.0L, Escape/Kuga 1.5L, Escape/Kuga 2.0L, Explorer 2.3L, F-150 5.0L, F-Series Super Duty 6.2L, Mustang 5.0L, Nautilus 2.0L, Ranger 2.3L, Transit Connect 1.0L	A	2 1	SIGRTN VREF
E-Series	C	2	SIGRTN
EcoSport 1.0L, Ranger 2.5L	A	3 1	SIGRTN VREF
F-650 / F-750, Flex TiVCT 3.5L	D	1	SIGRTN
Fusion 2.5L, Transit Connect 2.5L	E	3	SIGRTN
Fusion 1.5L	F	1 3	SIGRTN VREF
KA	G	2 1	SIGRTN VREF
All other vehicles	A	2 3	SIGRTN VREF

Camshaft Position Bank 1 Sensor 2 (CMP12) Sensor Connector

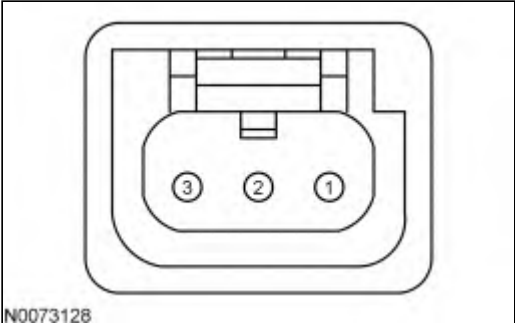
A



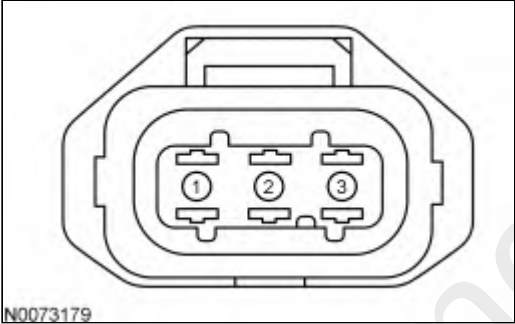
B



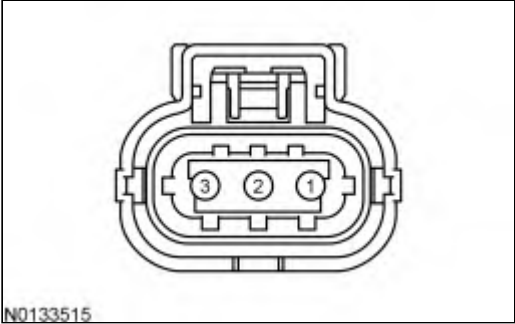
C



D



E

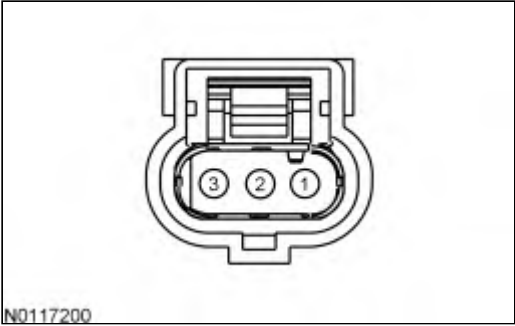


Vehicle	Connector	Pin	Circuit

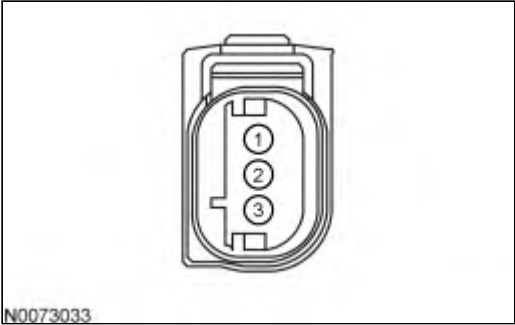
Vehicle	Connector	Pin	Circuit
Continental 2.7L, Continental 3.0L, Ford GT, Fusion 2.7L, MKZ 3.0L	A	2	SIGRTN
Continental 3.7L, Flex	B	1	SIGRTN
Continental 2.0L, EcoSport 2.0L, Fusion 2.0L, MKZ 2.0L, Mustang 2.3L, Transit Connect 2.0L	C	1 2	VREF SIGRTN
Corsair, EcoSport 1.5L, Edge 2.0L, Escape/Kuga, Explorer 2.3L, F-150 5.0L, Mustang 5.0L, Nautilus 2.0L, Ranger, Transit Connect 1.0L	A	1 2	VREF SIGRTN
EcoSport 1.0L	A	1 3	VREF SIGRTN
Fusion 1.5L	D	3 1	VREF SIGRTN
KA	E	1 2	VREF SIGRTN
All other vehicles	A	3 2	VREF SIGRTN

Camshaft Position Bank 2 Sensor 1 (CMP21) Sensor Connector

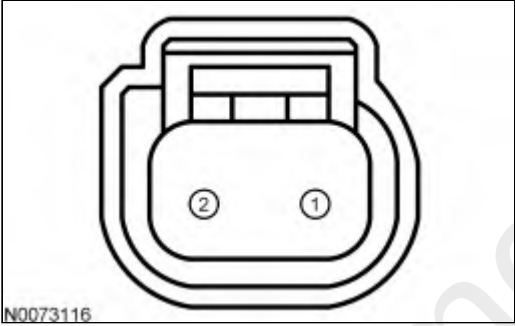
A



B



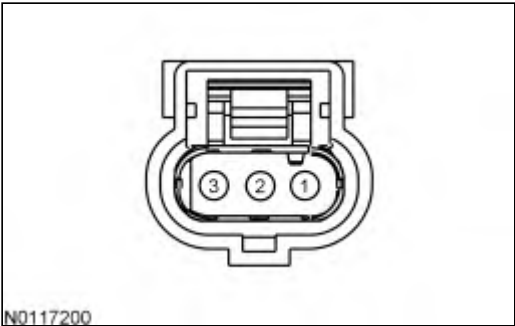
C



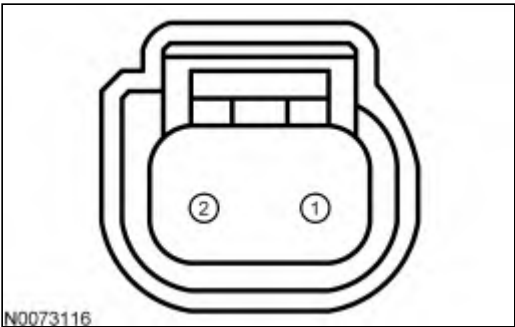
Vehicle	Connector	Pin	Circuit
Continental, Flex GTDI 3.5L, Ford GT, Fusion, MKZ	A	2	SIGRTN
E-Series	B	2	SIGRTN
F-150 5.0L, F-Series Super Duty	A	2 1	SIGRTN VREF
Flex TiVCT 3.5L	C	1	SIGRTN
Mustang 5.0L	B	2 1	SIGRTN VREF
All other vehicles	A	2 3	SIGRTN VREF

Camshaft Position Bank 2 Sensor 2 (CMP22) Sensor Connector

A



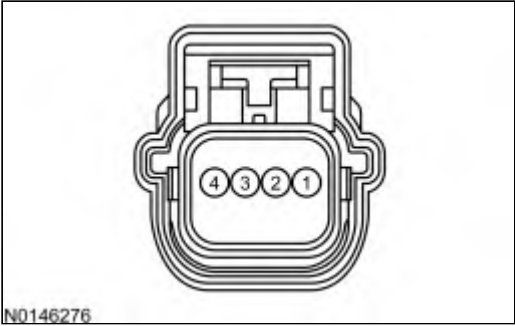
B



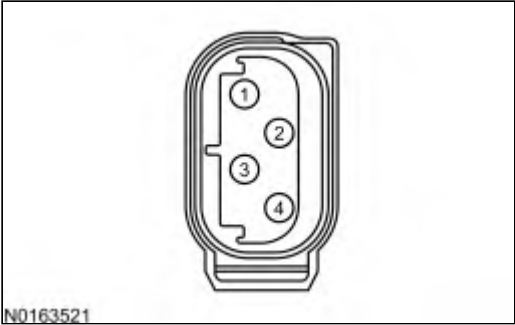
Vehicle	Connector	Pin	Circuit
Continental 3.0L, Continental 2.7L, Ford GT, Fusion, MKZ	A	2	SIGRTN
Continental 3.7L, Flex	B	1	SIGRTN
F-150 5.0L, Mustang 5.0L	A	2 1	SIGRTN VREF
All other vehicles	A	2 3	SIGRTN VREF

Clutch Pedal Position (CPP) Sensor Connector

A

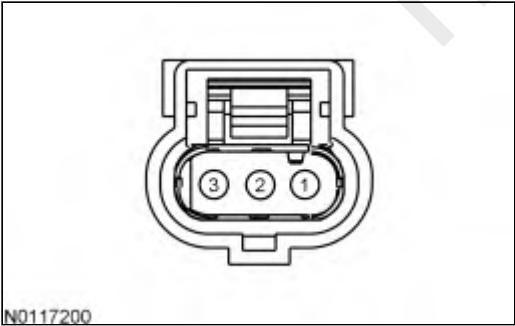


B



Vehicle	Connector	Pin	Circuit
Mustang 5.0L	A	4 2	SIGRTN VREF
Transit Connect	B	4 2	SIGRTN VREF

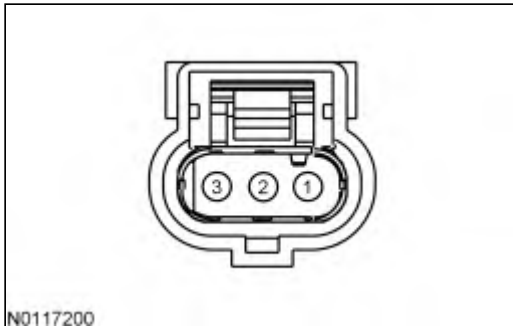
Crankcase Pressure Sensor Connector



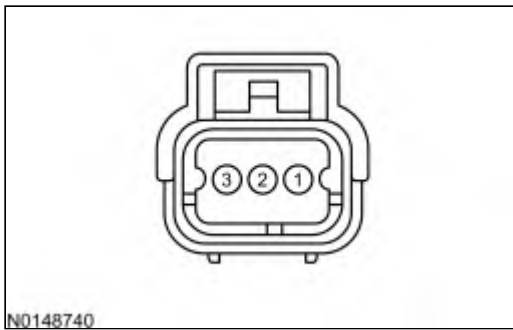
Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Crankshaft Position (CKP) Sensor Connector

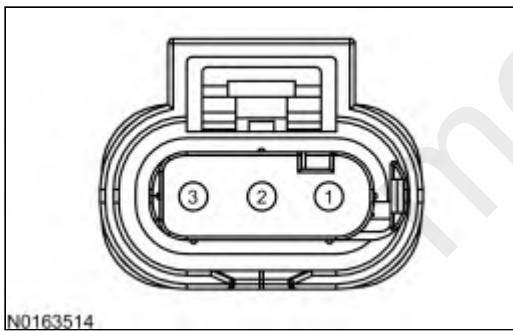
A



B



C

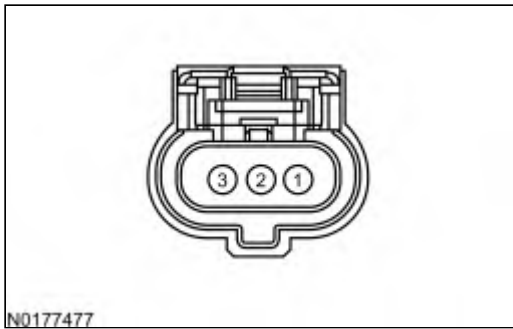


D



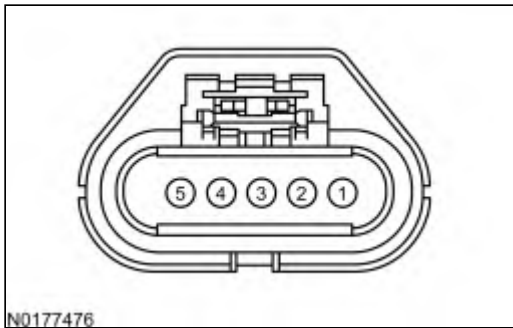
Vehicle	Connector	Pin	Circuit
Aviator, Continental 2.7L, Continental 3.0L, Edge 2.7L, Explorer 3.0L, F-150 2.7L, F-150 5.0L, Fusion 2.7L, MKZ 3.0L, Mustang 5.0L, Nautilus 2.7L	A	1 3	SIGRTN VREF
EcoSport 1.0L, KA 1.0L, Transit Connect 1.0L	B	2 1	SIGRTN VREF
EcoSport 1.5L, Escape/Kuga 1.5L, F-Series Super Duty, KA 1.2L, KA 1.5L, Motorhome / Stripped Chassis / Step Van	A	2 1	SIGRTN VREF
Expedition, Explorer 3.3L, F-150 3.3L, F-150 3.5L, Flex, Ford GT, Navigator, Transit	A	2 3	SIGRTN VREF
Fusion 1.5L	C	2 1	SIGRTN VREF
Mustang 2.3L	D	3 1	SIGRTN VREF
Mustang 5.2L	A	1 2	SIGRTN VREF
All other vehicles	A	3 1	SIGRTN VREF

Differential Pressure Feedback EGR Sensor Connector



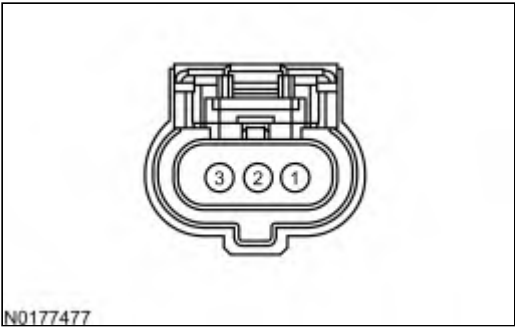
Pin	Circuit
3	VREF (Reference Voltage)
2	SIGRTN (Signal Return)

Electric Exhaust Gas Recirculation (EEGR) Assembly Connector



Vehicle	Connector	Pin	Circuit
Corsair 2.5L, Escape/Kuga 2.5L, F-150 2.7L	A	3 1	VREF SIGRTN
Explorer 3.3L, F-150 3.3L, Transit	A	3 5	VREF SIGRTN
All other vehicles	A	4 2	VREF SIGRTN

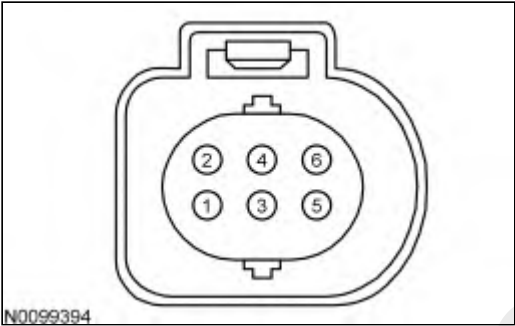
Exhaust Pressure (EP) Sensor Connector



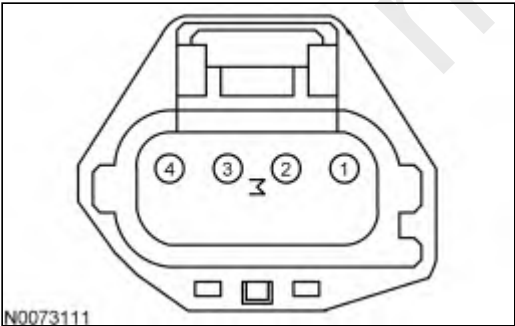
Pin	Circuit
2	SIGRTN (Signal Return)
1	VREF (Reference Voltage)

Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector

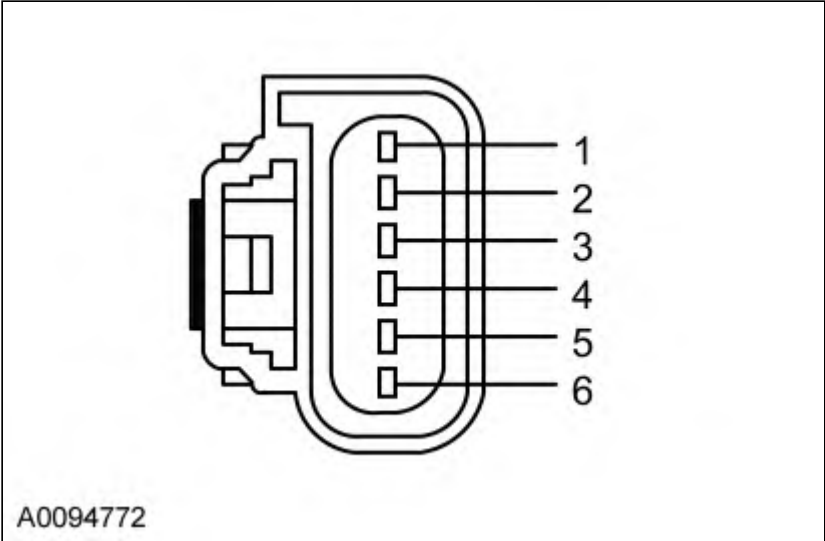
A



B

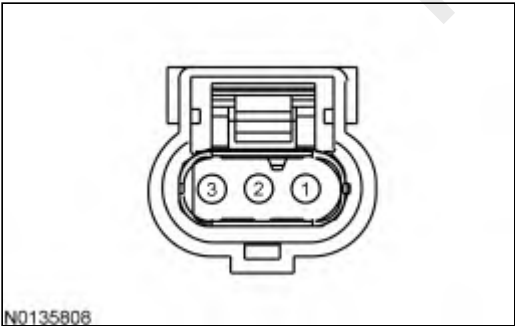


C



Vehicle	Connector	Pin	Circuit
EcoSport 1.5L, EcoSport 1.0L, Escape/Kuga 1.5L, Fusion 1.5L, KA, Transit Connect 1.0L	A	3 1	ETCRTN ETCREF
F-650 / F-750, Flex GTDI 3.5L	B	3 2	ETCRTN ETCREF
All other vehicles	C	4 5	ETCRTN ETCREF

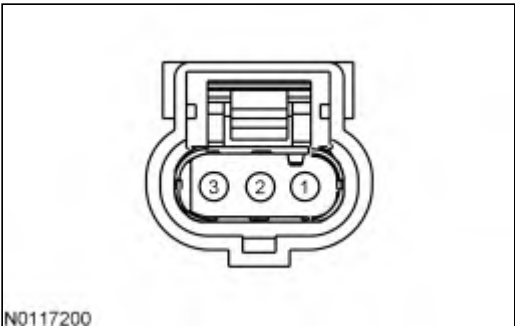
Fuel Pressure Sensor Connector



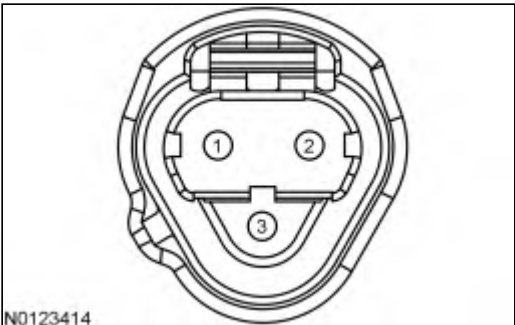
Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fuel Rail Pressure (FRP) Sensor Connector

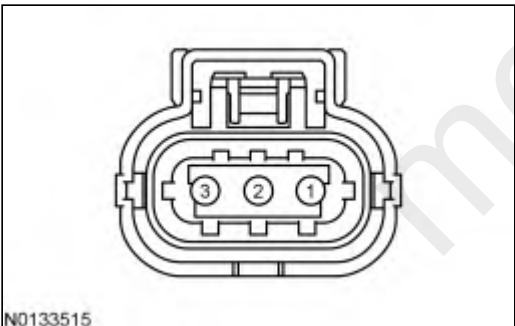
A



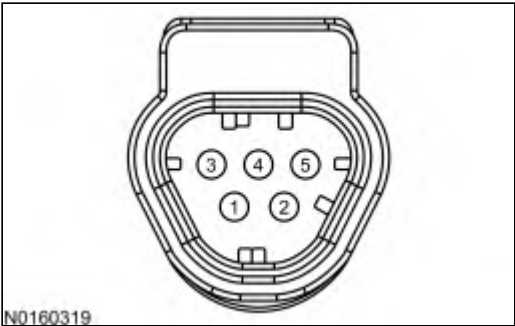
B



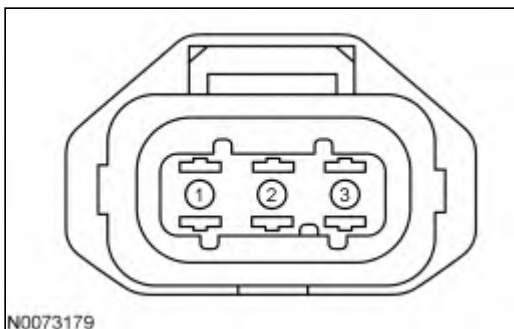
C



D



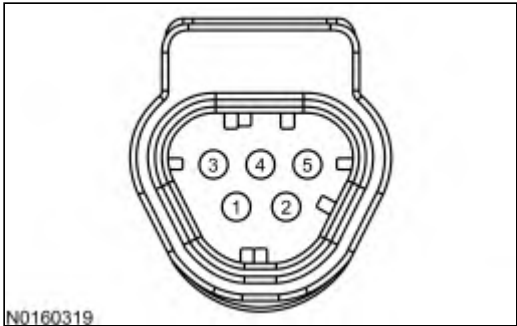
E



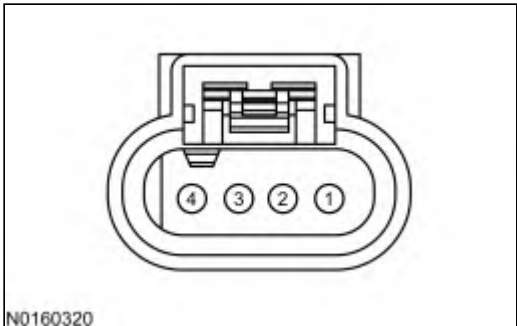
Vehicle	Connector	Pin	Circuit
Aviator, Explorer 3.0L	A	2 1	SIGRTN VREF
Continental 3.0L, Continental 2.7L, EcoSport 2.0L, Edge 2.7L, Fusion 2.7L, MKZ 3.0L, Nautilus 2.7L, Transit	B	3 1	SIGRTN VREF
Corsair, Escape/Kuga	C	1 3	SIGRTN VREF
EcoSport 1.0L	C	3 1	SIGRTN VREF
Expedition, Navigator	D	3 4	SIGRTN VREF
Explorer 2.3L	A	1 3	SIGRTN VREF
F-150 2.7L, F-150 5.0L, Mustang 5.0L, Ranger	C	2 1	SIGRTN VREF
Flex, Fusion 2.0L, MKZ 2.0L	E	1 3	SIGRTN VREF
Fusion 1.5L	E	2 1	SIGRTN VREF
Transit Connect 1.0L	A	2 3	SIGRTN VREF
All other vehicles	D	3 5	SIGRTN VREF

Fuel Rail Pressure Temperature (FRPT) Sensor Connector

A



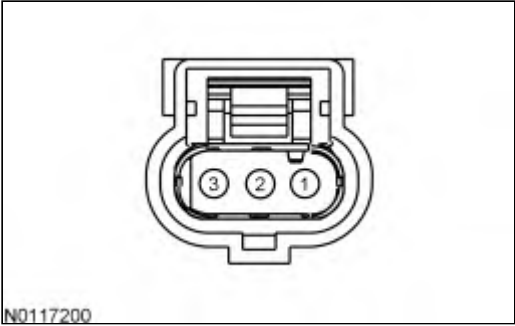
B



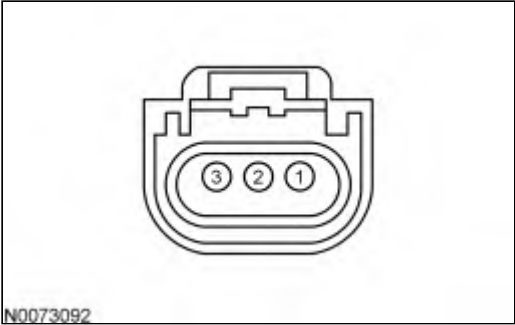
Vehicle	Connector	Pin	Circuit
Expedition, Navigator	A	4 2	SIGRTN VREF
F-150 2.7L, F-150 3.5L, Ford GT, Mustang TiVCT 5.2L	A	4 3	SIGRTN VREF
All other vehicles	B	2 1	SIGRTN VREF

Fuel Tank Pressure (FTP) Sensor Connector

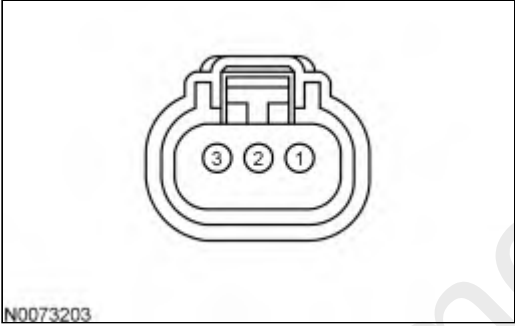
A



B

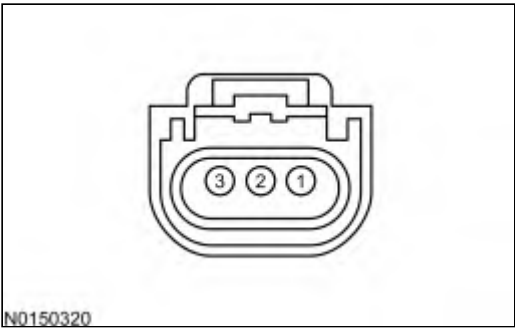


C



Vehicle	Connector	Pin	Circuit
Corsair, Escape/Kuga 2.5L, Ford GT	A	3 2	VREF SIGRTN
E-Series, F-650 / F-750, F-Series Super Duty, Motorhome / Stripped Chassis / Step Van, Ranger, Transit GTDI 3.5L	B	3 2	VREF SIGRTN
All other vehicles	C	3 2	VREF SIGRTN

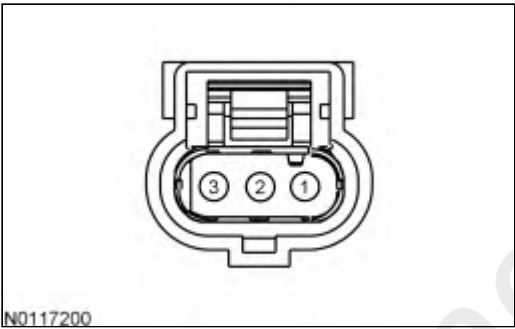
Generator Current Sensor Connector



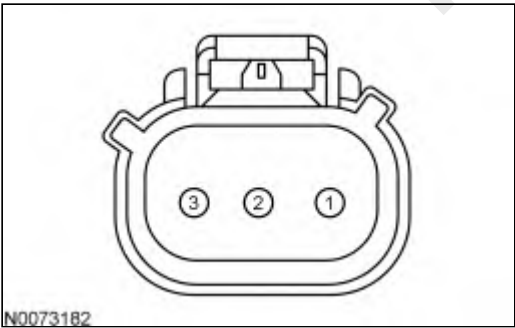
Pin	Circuit
2	SIGRTN (Signal Return)
1	VREF (Reference Voltage)

Intake Manifold Runner Control Bank 1 (IMRC1) Sensor Connector

A



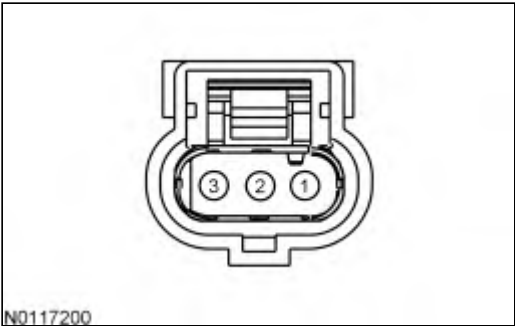
B



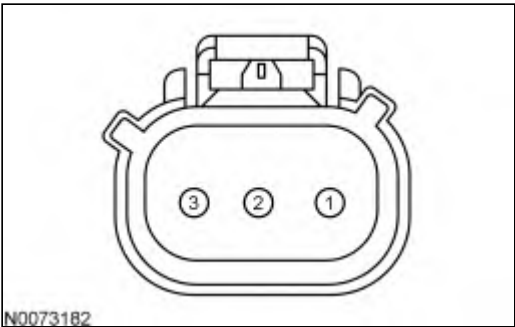
Vehicle	Connector	Pin	Circuit
F-150	A	1 3	SIGRTN VREF
F-Series Super Duty, Mustang	B	3 2	SIGRTN VREF

Intake Manifold Runner Control Bank 2 (IMRC2) Sensor Connector

A



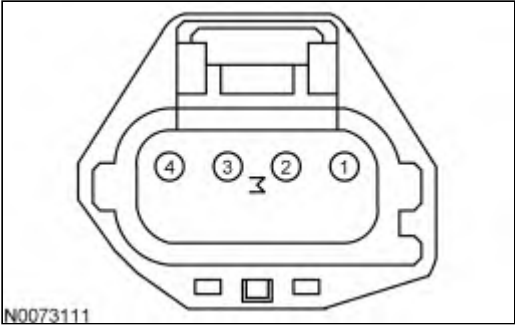
B



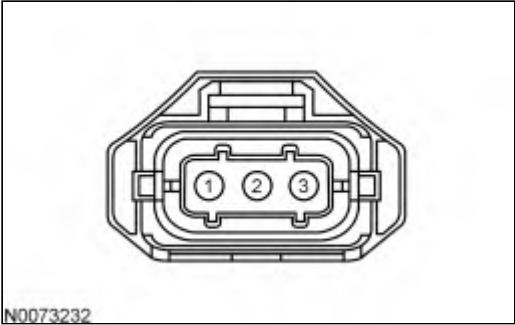
Vehicle	Connector	Pin	Circuit
F-150	A	1 3	SIGRTN VREF
F-Series Super Duty, Mustang	B	3 2	SIGRTN VREF

Manifold Absolute Pressure (MAP) Sensor Connector

A



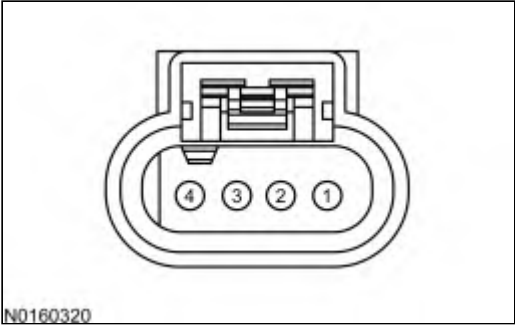
B



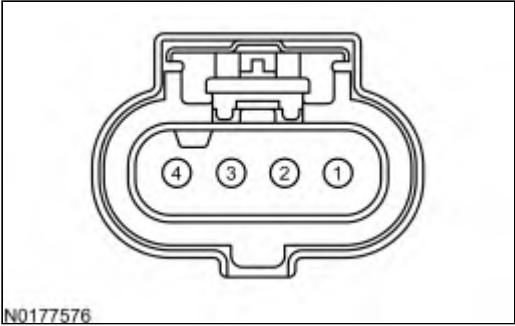
Vehicle	Connector	Pin	Circuit
Fusion 2.5L, Transit Connect	A	4 2	SIGRTN VREF
All other vehicles	B	2 1	SIGRTN VREF

Manifold Absolute Pressure Temperature (MAPT) Sensor Connector

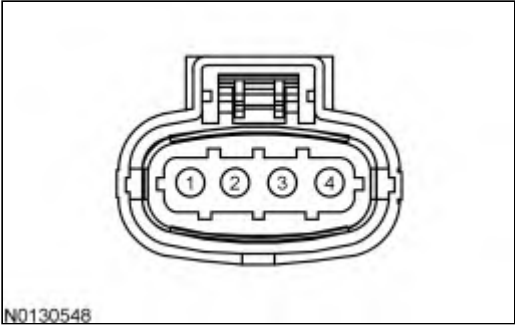
A



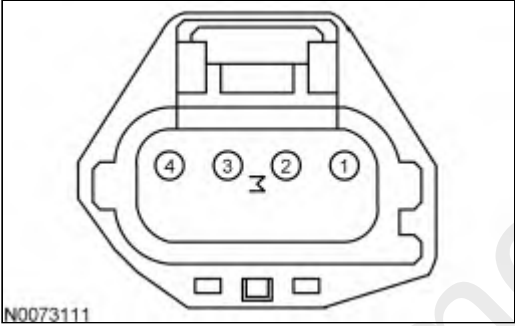
B



C



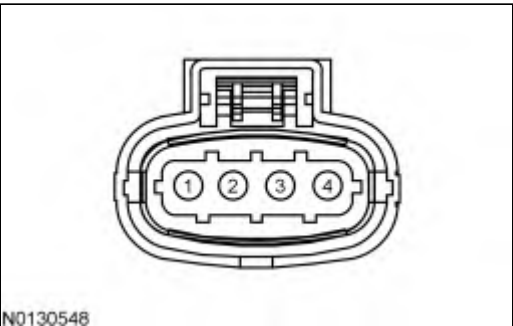
D



Vehicle	Connector	Pin	Circuit
Continental, EcoSport 1.5L, Edge, Explorer 3.3L, F-150 3.3L, Flex 3.5L, KA, Nautilus, Transit TiVCT 3.5L, Transit Connect 1.0L	A	4 2	SIGRTN VREF
Corsair 2.5L, Escape/Kuga 2.5L, F-Series Super Duty 6.2L	B	4 2	SIGRTN VREF

Vehicle	Connector	Pin	Circuit
F-150 5.0L	C	1	SIGRTN
		3	VREF
Ranger 2.5L	D	4	SIGRTN
		2	VREF

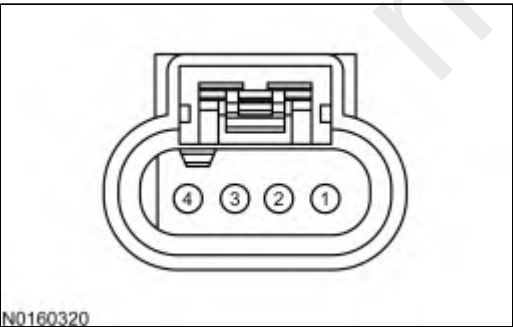
Manifold Absolute Pressure/Charge Air Cooler Temperature (MAP/CACT) Sensor Connector



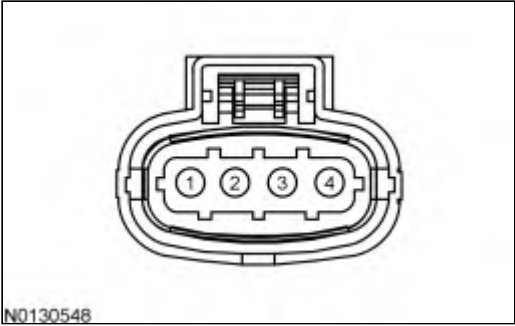
Pin	Circuit
1	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Manifold Absolute Pressure/Intake Air Temperature 2 (MAP/IAT2) Sensor Connector

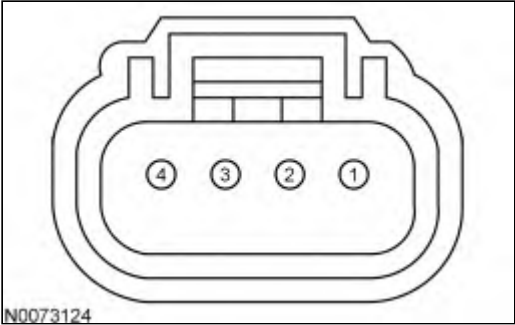
A



B

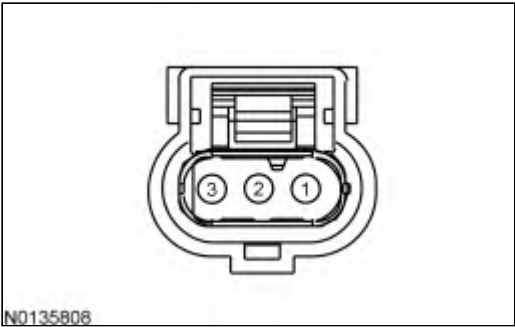


C



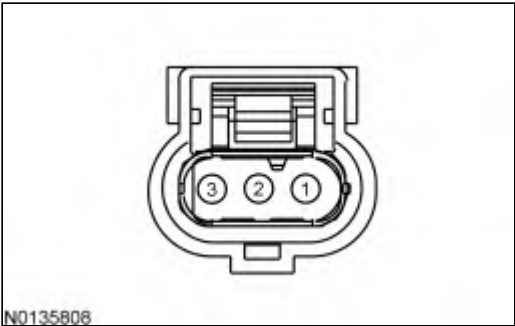
Vehicle	Connector	Pin	Circuit
Aviator, Corsair, Escape/Kuga, Explorer, Ranger	A	4 2	SIGRTN VREF
Continental 2.0L, EcoSport, Mustang 2.3L	B	1 3	SIGRTN VREF
Edge 2.7L, F-150 2.7L, Flex, Nautilus 2.7L, Transit	C	4 2	SIGRTN VREF
Mustang 5.2L	A	3 2	SIGRTN VREF
All other vehicles	B	4 2	SIGRTN VREF

Particulate Filter Pressure Bank 1, Sensor 1 Connector



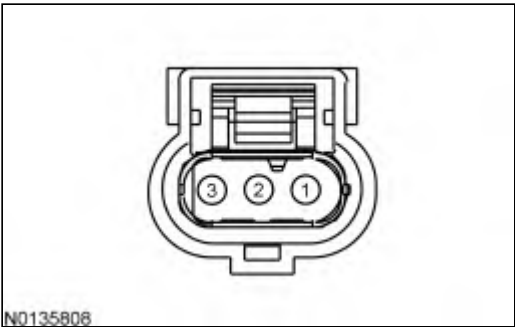
Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Particulate Filter Pressure Bank 1, Sensor 2 Connector



Pin	Circuit
3	VREF (Reference Voltage)
2	SIGRTN (Signal Return)

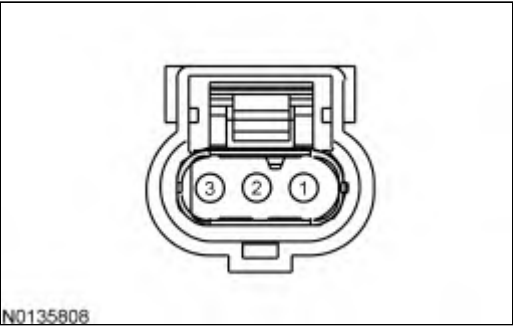
Particulate Filter Pressure Bank 2, Sensor 1 Connector



Pin	Circuit
-----	---------

Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

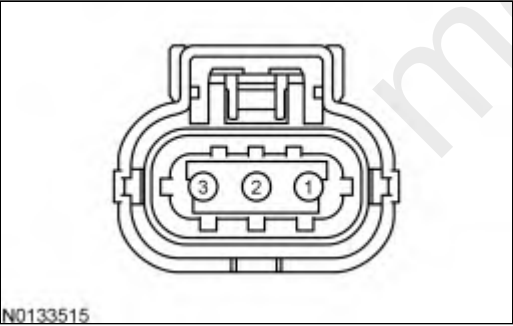
Particulate Filter Pressure Bank 2, Sensor 2 Connector



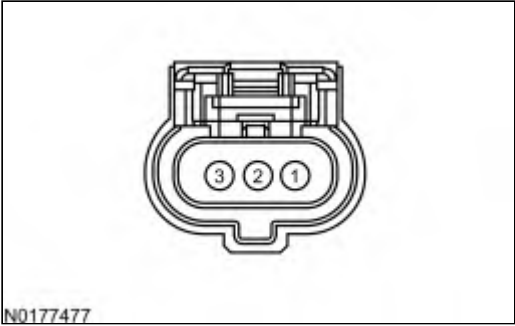
Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Turbocharger Boost Pressure (TCBP) Sensor Connector

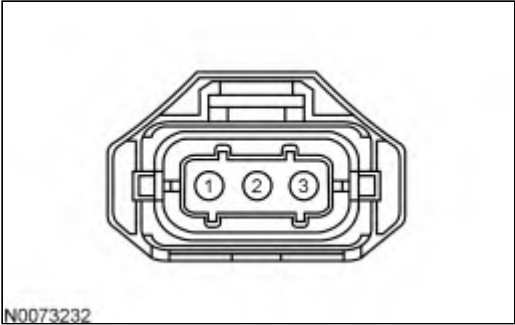
A



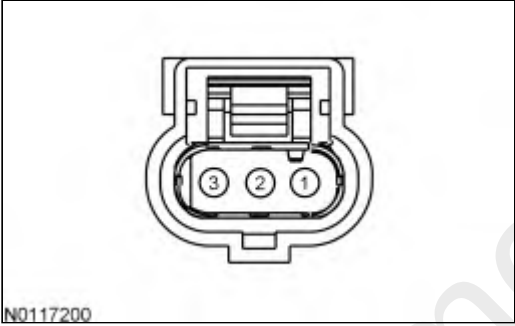
B



C



D

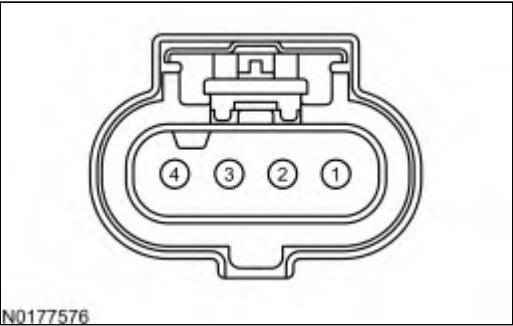


Vehicle	Connector	Pin	Circuit
Continental 2.0L, EcoSport, Mustang, Transit Connect	A	2 3	SIGRTN VREF
Corsair, Escape/Kuga 2.0L, Ranger 2.3L	B	2 3	SIGRTN VREF
Edge 2.0L, Nautilus 2.0L	C	2 1	SIGRTN VREF
Escape/Kuga 1.5L	B	3 2	SIGRTN VREF
Explorer 2.3L	D	2 3	SIGRTN VREF

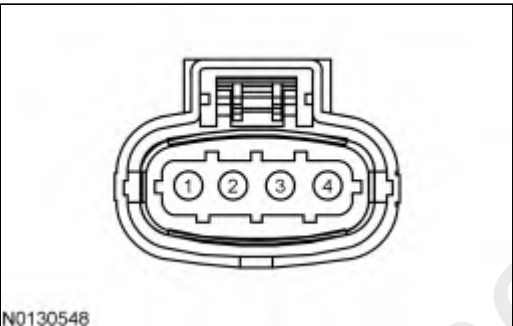
Vehicle	Connector	Pin	Circuit
Fusion 1.5L	A	2	SIGRTN
		1	VREF

Turbocharger Boost Pressure/Charge Air Cooler Temperature (TCBP/CACT) Sensor Connector

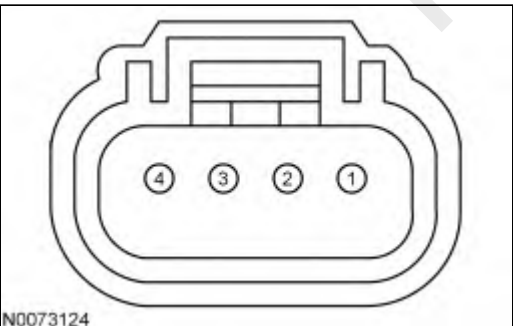
A



B



C

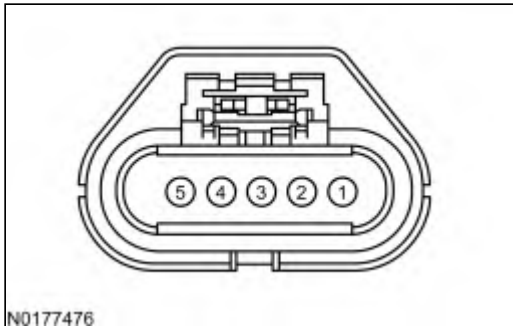


Vehicle	Connector	Pin	Circuit
Aviator, Explorer	A	4	SIGRTN
		2	VREF
Fusion 2.0L, MKZ 2.0L	B	1	SIGRTN
		3	VREF

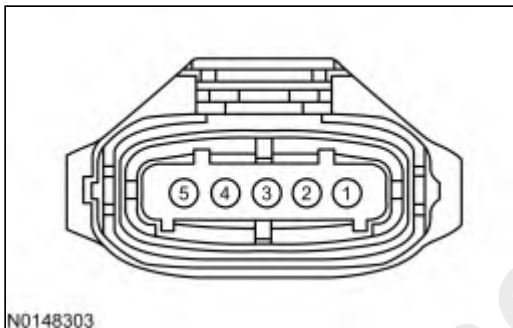
Vehicle	Connector	Pin	Circuit
All other vehicles	C	4 2	SIGRTN VREF

Turbocharger Wastegate Motor Bank 1 Connector

A

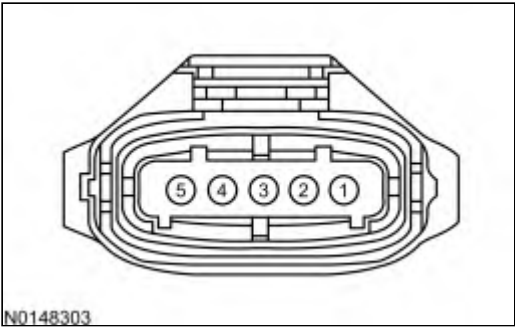


B



Vehicle	Connector	Pin	Circuit
Corsair, Escape/Kuga 2.0L, Explorer 2.3L, Ranger 2.3L	A	5 3	SIGRTN VREF
Edge, Nautilus 2.0L	B	5 3	SIGRTN VREF
Expedition, F-150, Navigator	B	3 4	SIGRTN VREF

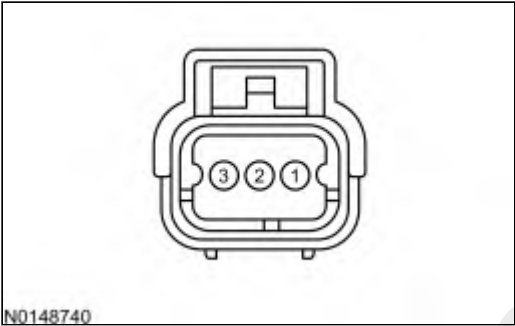
Turbocharger Wastegate Motor Bank 2 Connector



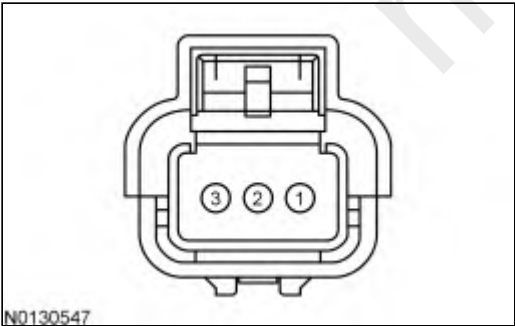
Pin	Circuit
3	SIGRTN (Signal Return)
4	VREF (Voltage Reference)

Wastegate Vacuum Sensor Connector

A



B



Vehicle	Connector	Pin	Circuit
Aviator, Explorer	A	2 1	SIGRTN VREF
All other vehicles	B	2 1	SIGRTN VREF

Powertrain Control Module (PCM) Connector

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

Vehicle	Connector	Pin	Circuit
Aviator, Explorer 3.0L	306 PIN	B1, B16, B2 B26, B28, B43, E113, E13, E47, E5, E9, E91 B72 B87 E114 B67, B70, B81, B82, E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Continental 2.7L, Continental 3.0L	198 PIN	B101, B102, B103 B16, B18, B37, B38, E20, E53 B35 B36 E31 B11, B13, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Continental 3.7L	198 PIN	B97, B99 B51, B71, B90, E29, E40, E49, E51, E54 B59 B35 E23 E34 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Corsair 2.0L, Corsair 2.3L, Escape/Kuga 2.0L	198 PIN	B100, B101, B102 B18, B19, B26, B36, B4, B55, E13, E14, E15, E16, E41, E57 B19 B18 E16 B13, B14, B15, B37, B38, E10, E13, E14, E15, E19, E25, E30, E56, E9 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
Corsair 2.5L, Escape/Kuga 2.5L	198 PIN	B97, B99 B13, B18, B30, B35, B51, B53, B54, B59, E12, E15, E22, E23, E40, E44, E47, E59 B59 B35 E23 B17, B29, B36, B40, B45, E11, E34, E52, E7, E73, E8 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
E-Series	198 PIN	B97, B99 B30, B51, B54, B71, B90, E49 B59 B35 E23 B29, B52 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
EcoSport 1.0L Automatic Transmission	198 PIN	B101, B102, B103 B16, B18, B19, B38, B9, E19, E20, E22, E53, E54 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
EcoSport 1.0L Manual Transmission	198 PIN	B101, B102, B103 B17, B19, B34, E10, E19, E20, E54 B35 B36 E18 B11, E3, E7 B10 B12 E5	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
EcoSport 1.5L Automatic Transmission	198 PIN	B97, B99 B13, B15, B33, B51, B53, E12, E29, E35, E53 B35 B59 E23 B52, E11, E28, E34 B36 B40 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
EcoSport 1.5L Manual Transmission	112 PIN	B55, B56 B19, B8, B9, E1, E2, E23, E3, E38, E4, E44, E5 B12 B3 E6 E1, E10, E11, E7, E9 B11 B2 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
EcoSport 2.0L	198 PIN	B101, B102, B103 B16, B18, B38, B9, E20, E35, E53, E56, E7 B35 B36 E31 B11, B13, E5, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Edge 2.0L	198 PIN	B100, B101, B102 B16, B18, B19, B36, B38, B4, B7, E13, E14, E20, E41, E53, E57 B19 B18 E16 B13, B14, B15, B16, E19, E25, E30, E32, E9 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Edge 2.7L	306 PIN	B1, B16, B2 B16, B18, B19, B26, B37, B38, B58, B7, E113, E13, E20, E47, E53, E91 B72 B87 E114 B70, B81, B82, E115, E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
Escape/Kuga 1.5L	198 PIN	B100, B101, B102 B18, B19, B26, B36, B4, B55, E13, E14, E16, E41, E57, E86 B19 B18 E16 B13, B14, B15, B37, B38, E10, E13, E14, E15, E19, E25, E30, E56, E9 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Expedition	198 PIN	B101, B102, B103 B16, B17, B18, B30, B34, B37, B38, B75, B94, E10, E20, E29, E32, E53 B15 B19 E35 B11, B13, B5, E2, E3, E5, E6, E8 B14 B18 E4	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Explorer 2.3L	198 PIN	B100, B101, B102 B26, B28, B36, B4, B55, E13, E14, E41, E57 B19 B18 E16 B13, B15, E19, E25, E30, E9 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Explorer 3.3L	306 PIN	B1, B16, B2 B26, B28, B43, E113, E13, E47, E5, E9, E91 B72 B87 E114 B67, B70, B81, B82, E115, E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
F-150 2.7L	306 PIN	B1, B16, B2 B17, B18, B34, B37, B38, B43, E113, E121, E13, E47, E5, E91, E92, E99, T84, T85 B72 B87 E114 E115, E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-150 3.3L	306 PIN	B1, B16, B2 B43, E113, E13, E47, E5, E91, E99, T84, T85 B72 B87 E114 E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-150 5.0L	306 PIN	B1, B16, B2 B43, E113, E13, E47, E5, E91, E99, T84, T85 B72 B87 E114 E115, E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-150 3.5L High Output	198 PIN	B101, B102, B103 B16, B17, B18, B30, B34, B37, B38, B7, B75, B94, E10, E20, E29, E32, E53 B15 B19 E35 B11, B13, B5, E2, E3, E5, E6, E8 B14 B18 E4	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-150 3.5L	306 PIN	B26, B43, E113, E121, E13, E47, E5, E91, E99, T84, T85 B72 B87 E114 B70, B82, E115, E116, E118, E120 B71 B86 E117	SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
F-650 / F-750	198 PIN	B97, B99 B54, B71, E49, E54 B59 B35 E23 B52, B66 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-Series Super Duty 6.2L	306 PIN	B1, B16, B2 B26, B28, B29, B43, B58, B72, B73, B87, E113, E114, E47, E5, E72, E74, E79, E9, E99 B72 B87 E114 B70, B71, B82, B86, E117, E118, E120, E69, E95 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-Series Super Duty 7.3L, Motorhome / Stripped Chassis / Step Van	306 PIN	B1, B16, B2 B26, B28, B43, B58, B72, B87, E113, E114, E47, E5, E91, E99, T80, T84, T85 B72 B87 E114 B70, B71, B82, B86, E117, E118, E120, T81 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Flex GTDI 3.5L	198 PIN	B101, B102, B103 B16, B18, B37, B38, E20, E41, E53 B35 B36 E31 B11, B13, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
Flex TiVCT 3.5L	198 PIN	B97, B99 B51, B56, B71, B90, E29, E40, E41, E49, E54 B59 B35 E23 B52, B66, E34 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Ford GT	198 PIN	B101, B102, B103 B18, B37, B38, B9, E20, E32, E53, E56 B35 B36 E31 B11, E5, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Fusion 2.5L	198 PIN	B97, B99 B33, B54, B56, B71, E35, T41 B35 B59 E23 B66, E34 B36 B40 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Fusion 2.7L, MKZ 3.0L	198 PIN	B101, B102, B103 B16, B18, B19, B37, B38, B7, E20, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
KA 1.0L	128 PIN	B36, E24 E14, E15, E7, E8, T17, T20, T21, T22 B33 B32 T19 B26, E2, T26, T28, T30 B46 B44 T27	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
KA 1.2L, KA 1.5L Manual Transmission	112 PIN	B55, B56 B8, E1, E2, E38, E4, E44 B12 B3 E6 E11, E7, E9 B11 B2 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
KA 1.5L Automatic Transmission	198 PIN	B97, B99 B15, B51, B53, E12, E29, E35 B35 B59 E23 E11, E28, E34 B36 B40 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Mustang 2.3L	198 PIN	B100, B101, B102 B17, B18, B19, B36, B37, B38, B55, E13, E14, E20, E32, E41, E5, E53, E57 B19 B18 E16 B11, B13, B16, E19, E30, E5, E6, E8 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Mustang 5.0L	306 PIN	B1, B16, B2 B26, B43, B51, B54, B56, B58, E113, E13, E22, E32, E40, E47, E49, E5, E54, E91, E99, T57, T71, T84, T85 B72 B87 E114 B52, B66, B81, E115, E118, E120, E34, T81 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
Mustang 5.2L Supercharged	306 PIN	B1, B16, B2 B30, B35, B51, B54, B59, B71, E113, E114, E13, E28, E47, E5, E72, E79, E9, E91, E92, E99 B72 B87 E114 B71, B81, B82, E115, E116, E117, E118, E78 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Mustang TiVCT 5.2L	198 PIN	B1, B16, B2 B51, B54, B71, B90, E40, E49, E54 B59 B35 E23 B29, B52, E34 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Nautilus 2.0L	198 PIN	B100, B101, B102 B16, B18, B19, B36, B38, B4, E13, E14, E20, E41, E53, E57 B19 B18 E16 B13, B14, B15, B16, E19, E25, E30, E32, E9 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Nautilus 2.7L	306 PIN	B1, B16, B2 B16, B18, B2, B26, B37, B38, B58, E113, E13, E20, E26, E47, E53, E91 B72 B87 E114 B70, B81, B82, B83, E115, E116, E118, E120 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
Navigator	198 PIN	B101, B102, B103 B16, B17, B18, B30, B34, B37, B38, B75, B94, E10, E20, E29, E32, E53 B15 B19 E35 B11, B13, B5, E2, E5, E6, E8 B14 B18 E4	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Ranger 2.3L	198 PIN	B100, B101, B102 B18, B19, B26, B36, E13, E14, E41, E57 B19 B18 E16 B13, B14, B15, E19, E25, E30, E9 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Ranger 2.5L	128 PIN	B11, B12 B33, B38, B40, E3, E6, E9, T29 B41 B42 E4 B14, B16, T18 B17 B18 E28	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Transit GTDI 3.5L	306 PIN	B101, B102, B103 B43, E113, E13, E47, E5, E91, E99, T84, T85 B72 B87 E114 B70, B81, B82, E116, E118, E120, T81, T82 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Transit TiVCT 3.5L	306 PIN	B1, B16, B2 B43, E113, E13, E47, E5, E91, E99, T84, T85 B72 B87 E114 B70, B81, B82, E116, E118, E120, T81, T82 B71 B86 E117	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Vehicle	Connector	Pin	Circuit
Transit Connect 1.0L	198 PIN	B100, B101, B102 B36, B4, E13, E14, E41, E57 B19 B18 E16 B13, B15, B16, B26, E19, E25, E30 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Transit Connect 2.0L	198 PIN	B100, B101, B102 B36, E13, E14, E5, E57 B19 B18 E16 E19, E25, E30 B38 B37 E10	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Transit Connect 2.5L	198 PIN	B97, B99 B33, B35, B54, B56, B71, E35 B35 B59 E23 E34 B36 B40 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
All other vehicles	198 PIN	B101, B102, B103 B16, B18, B19, B38, E20, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

C1 CHECK THE REFERENCE VOLTAGE TO SIGNAL RETURN

Note: Diagnostic trouble codes (DTCs) P0642, P0643, P06A6, P06A7 and P06A8 are set due to VREF circuit concerns only. When diagnosing DTC P0642, P0643, P06A6, P06A7 or P06A8, follow the path for VREF concerns. The DTCs P0652 and P0653 are set due to ETCREF circuit concerns only. When diagnosing DTC P0652 or P0653, follow the path for ETCREF concerns.

- Ignition OFF.
- Suspect Sensor connector disconnected.
- Ignition ON, engine OFF.
- For ETCREF concerns.

- Measure the voltage between:

(+) ETBTPS Connector, Harness Side
ETCREF

(-) ETBTPS Connector, Harness Side

ETCRTN

- For APPVREF concerns.
- Measure the voltage between:

(+) APP Sensor Connector, Harness Side
APPVREF1 - Pin 1
APPVREF2 - Pin 6

(-) APP Sensor Connector, Harness Side

APPRTN1 - Pin 3

APPRTN2 - Pin 4

- For VREF concerns.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side
VREF

(-) Suspect Sensor Connector, Harness Side

SIGRTN

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C41 .
-----	-----------------------------

No	GO to C2 .
----	----------------------------

C2 CHECK THE REFERENCE VOLTAGE TO GROUND

- For ETCREF concerns.
- Measure the voltage between:

(+) ETBTPS Connector, Harness Side
ETCREF

(-)

Ground

- For APPVREF concerns.
- Measure the voltage between:

(+) APP Sensor Connector, Harness Side
APPVREF1 - Pin 1
APPVREF2 - Pin 6

(-)

Ground

Ground

- For VREF concerns.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side
VREF

(-)

Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C40 .
No	GO to C3 .

C3 CHECK THE REFERENCE VOLTAGE WITH ALL SENSORS DISCONNECTED

Note: Refer to the Sensors Connected To Reference Voltage Chart at the beginning of this pinpoint test and the Wiring Diagrams Manual Electronic Engine Controls Cell to identify the sensors connected to VREF, ETCREF and APPVREF.

- Ignition OFF.
- Disconnect all of the sensors connected to the reference voltage circuits.
- Ignition ON, engine OFF.
- Measure the voltage at the sensor disconnected in C1.
- For ETCREF concerns.
- Measure the voltage between:

ETCREF	(+) ETBTPS Connector, Harness Side	(-)
		Ground

- For APPVREF concerns.
- Measure the voltage between:

APPVREF1 - Pin 1 APPVREF2 - Pin 6	(+) APP Sensor Connector, Harness Side	(-)
		Ground
		Ground

- For VREF concerns.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C8 .
No	GO to C4 .

C4 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

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

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

(+) ETBTPS Connector, Harness Side
ETCREF

(-) PCM Connector, Harness Side
ETCREF

- For APPVREF concerns.
- Measure the resistance between:

(+) APP Sensor Connector, Harness Side
APPVREF1 - Pin 1
APPVREF2 - Pin 6

(-) PCM Connector, Harness Side
APPVREF1
APPVREF2

- For VREF concerns.
- Measure the resistance between:

(+) Suspect Sensor Connector, Harness Side
VREF

(-) PCM Connector, Harness Side
VREF

Is the resistance less than 5 ohms?

Yes GO to [C5](#).

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

C5 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

- For APPVREF or ETCREF concerns.
- Measure the resistance between:

(+) PCM Connector, Harness Side
ETCREF
APPVREF1
APPVREF2
APPVREF1
APPVREF2

(-) PCM Connector, Harness Side

ETCRTN
APPRTN1
APPRTN2
APPRTN2
APPRTN1

- Measure the resistance between:

(+) PCM Connector, Harness Side
ETCREF
APPVREF1
APPVREF2

(-)
Ground
Ground
Ground

- For VREF concerns.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
VREF	SIGRTN

- Measure the resistance between:

(+) PCM Connector, Harness Side	(-)
VREF	Ground

Are the resistances greater than 10K ohms?

Yes	GO to C6 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

C6 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VPWR

- For ETCREF concerns.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
ETCREF	VPWR

- For APPVREF concerns.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
APPVREF1	VPWR
APPVREF2	VPWR

- For VREF concerns.
- Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
VREF	VPWR

Is the resistance greater than 10K ohms?

Yes	GO to C7 .
No	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

C7 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

- Ignition ON, engine OFF.
- For ETCREF concerns.

- Measure the voltage between:

(+) PCM Connector, Harness Side
ETCREF

(-)
Ground

- For APPVREF concerns.
- Measure the voltage between:

(+) PCM Connector, Harness Side
APPVREF1
APPVREF2

(-)
Ground
Ground

- For VREF concerns.
- Measure the voltage between:

(+) PCM Connector, Harness Side
VREF

(-)
Ground

Is any voltage present?

Yes REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.
No GO to [C42](#).

C8 CHECK THE REFERENCE VOLTAGE WITH THE ETBTPS CONNECTED

Note: If this sensor was used for the measurement in C3, GO to [C9](#).

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

(+) APP Sensor Connector, Harness Side
APPVREF1 - Pin 1
APPVREF2 - Pin 6

(-)
Ground
Ground

Are the voltages between 4.5 - 5.5 V?

Yes GO to [C9](#).
No INSTALL a new ETBTPS. REFER to the Workshop Manual Section 303-04, Fuel Charging and Controls or Section 303-14, Electronic Engine Controls.
Clear the PCM DTCs. REPEAT the self-test.

C9 CHECK THE REFERENCE VOLTAGE WITH THE APP SENSOR CONNECTED

Note: If this sensor was used for the measurement in C3, GO to [C10](#).

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

ETCREF	(+) ETBTPS Connector, Harness Side
--------	--------------------------------------

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes GO to [C10](#).

No INSTALL a new APP sensor. REFER to the Workshop Manual Section 310-02, Acceleration Control.
Clear the PCM DTCs. REPEAT the self-test.

C10 CHECK THE REFERENCE VOLTAGE WITH THE MAP SENSOR CONNECTED

Note: If the vehicle is not equipped with a MAP sensor or if this sensor was used for the VREF measurement in C3, GO to [C11](#).

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

VREF	(+) Suspect Sensor Connector, Harness Side
------	--

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes GO to [C11](#).

No INSTALL a new MAP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.
Clear the PCM DTCs. REPEAT the self-test.

C11 CHECK THE REFERENCE VOLTAGE WITH THE TCBP/CACT SENSOR CONNECTED

Note: If the vehicle is not equipped with a TCBP/CACT sensor or if this sensor was used for the VREF measurement in C3, GO to [C12](#).

- Ignition OFF.
- TCBP/CACT Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side
------	--

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C12 .
No	INSTALL a new TCBP/CACT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C12 CHECK THE REFERENCE VOLTAGE WITH THE TURBOCHARGER WASTEGATE MOTOR BANK 1 CONNECTED

Note: If the vehicle is not equipped with a turbocharger wastegate motor bank 1 sensor or if this sensor was used for the VREF measurement in C3, GO to [C13](#).

- Ignition OFF.
- Turbocharger Wastegate Motor Bank 1 connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C13 .
No	INSTALL a new Turbocharger Wastegate Motor Bank 2. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C13 CHECK THE REFERENCE VOLTAGE WITH THE TURBOCHARGER WASTEGATE MOTOR BANK 2 CONNECTED

Note: If the vehicle is not equipped with a turbocharger wastegate motor bank 2 sensor or if this sensor was used for the VREF measurement in C3, GO to [C14](#).

- Ignition OFF.
- Turbocharger Wastegate Motor Bank 2 connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C14 .
No	INSTALL a new Turbocharger Wastegate Motor Bank 2. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C14 CHECK THE REFERENCE VOLTAGE WITH THE MAP/IAT2 SENSOR CONNECTED

Note: If the vehicle is not equipped with a MAP/IAT2 sensor or if this sensor was used for the VREF measurement in C3, GO to [C15](#).

- Ignition OFF.
- MAP/IAT2 Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C15 .
No	INSTALL a new MAP/IAT2 sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C15 CHECK THE REFERENCE VOLTAGE WITH THE FRP SENSOR CONNECTED

Note: If the vehicle is not equipped with a FRP sensor or if this sensor was used for the VREF measurement in C3, GO to [C16](#).

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

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C16 .
No	INSTALL a new FRP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C16 CHECK THE REFERENCE VOLTAGE WITH THE CRANKCASE PRESSURE SENSOR CONNECTED

Note: If the vehicle is not equipped with a crankcase pressure sensor or if this sensor was used for the VREF measurement in C3, GO to [C17](#).

- Ignition OFF.
- Crankcase Pressure Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C17 .
No	INSTALL a new Crankcase Pressure sensor. REFER to the Workshop Manual Section 303-08, Engine Emission Control. Clear the PCM DTCs. REPEAT the self-test.

C17 CHECK THE REFERENCE VOLTAGE WITH THE IMRC1 SENSOR CONNECTED

Note: If the vehicle is not equipped with an IMRC1 sensor or if this sensor was used for the VREF measurement in C3, GO to [C18](#).

- Ignition OFF.
- IMRC1 Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C18 .
No	INSTALL a new IMRC1 sensor. REFER to the Workshop Manual Section 303-01, Engine. Clear the PCM DTCs. REPEAT the self-test.

C18 CHECK THE REFERENCE VOLTAGE WITH THE IMRC2 SENSOR CONNECTED

Note: If the vehicle is not equipped with an IMRC2 sensor or if this sensor was used for the VREF measurement in C3, GO to [C19](#).

- Ignition OFF.
- IMRC2 Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C19 .
No	INSTALL a new IMRC2 sensor. REFER to the Workshop Manual Section 303-01, Engine. Clear the PCM DTCs. REPEAT the self-test.

C19 CHECK THE REFERENCE VOLTAGE WITH THE CPP SENSOR CONNECTED

Note: If the vehicle is not equipped with a CPP sensor or if this sensor was used for the VREF measurement in C3, GO to [C20](#).

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

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C20 .
No	INSTALL a new CPP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C20 CHECK THE REFERENCE VOLTAGE WITH THE ACP SENSOR CONNECTED

Note: If the vehicle is not equipped with an ACP sensor or if this sensor was used for the VREF measurement in C3, GO to [C21](#).

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

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C21 .
No	INSTALL a new ACP sensor. Clear the PCM DTCs. REPEAT the self-test.

C21 CHECK THE REFERENCE VOLTAGE WITH THE FUEL PRESSURE SENSOR CONNECTED

Note: If the vehicle is not equipped with a fuel pressure sensor or if this sensor was used for the VREF measurement in C3, GO to [C22](#).

- Ignition OFF.
- Fuel Pressure Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C22 .
No	INSTALL a new Fuel Pressure Sensor. REFER to the Workshop Manual Section 310-01, Fuel Tank and Lines. Clear the PCM DTCs. REPEAT the self-test.

C22 CHECK THE REFERENCE VOLTAGE WITH THE CKP SENSOR CONNECTED

Note: If the vehicle is not equipped with a CKP sensor or if this sensor was used for the VREF measurement in C3, GO to [C23](#).

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

VREF

(+) Suspect Sensor Connector, Harness Side

(-)

Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C23 .
No	INSTALL a new CKP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C23 CHECK THE REFERENCE VOLTAGE WITH THE CMP SENSOR CONNECTED

Note: If the vehicle is not equipped with a CMP sensor or if this sensor was used for the VREF measurement in C3, GO to [C24](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

VREF

(+) Suspect Sensor Connector, Harness Side

(-)

Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C24 .
No	INSTALL a new CMP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C24 CHECK THE REFERENCE VOLTAGE WITH THE WASTEGATE VACUUM SENSOR CONNECTED

Note: If the vehicle is not equipped with a wastegate vacuum sensor or if this sensor was used for the VREF measurement in C3, GO to [C25](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Wastegate Vacuum Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C25 .
No	INSTALL a new Wastegate Vacuum Sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C25 CHECK THE REFERENCE VOLTAGE WITH THE MAPT SENSOR CONNECTED

Note: If the vehicle is not equipped with a MAPT sensor or if this sensor was used for the VREF measurement in C3, GO to [C26](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C26 .
No	INSTALL a new MAPT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C26 CHECK THE REFERENCE VOLTAGE WITH THE GENERATOR CURRENT SENSOR CONNECTED

Note: If the vehicle is not equipped with a generator current sensor or if this sensor was used for the VREF measurement in C3, GO to [C27](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Generator Current Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C27 .
No	INSTALL a new Generator Current sensor. REFER to the Workshop Manual Section 414-01, Battery, Mounting and Cables. Clear the PCM DTCs. REPEAT the self-test.

C27 CHECK THE REFERENCE VOLTAGE WITH THE MAP/CACT SENSOR CONNECTED

Note: If the vehicle is not equipped with a MAP/CACT sensor or if this sensor was used for the VREF measurement in C3, GO to [C28](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- MAP/CACT Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C28 .
No	INSTALL a new MAP/CACT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C28 CHECK THE REFERENCE VOLTAGE WITH THE TCBP SENSOR CONNECTED

Note: If the vehicle is not equipped with a TCBP sensor or if this sensor was used for the VREF measurement in C3, GO to [C29](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C29 .
No	INSTALL a new TCBP sensor. Clear the PCM DTCs. REPEAT the self-test.

C29 CHECK THE REFERENCE VOLTAGE WITH THE FRPT SENSOR CONNECTED

Note: If the vehicle is not equipped with a FRPT sensor or if this sensor was used for the VREF measurement in C3, GO to [C30](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C30 .
No	INSTALL a new FRPT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C30 CHECK THE REFERENCE VOLTAGE WITH THE BRAKE VACUUM SENSOR CONNECTED

Note: If the vehicle is not equipped with a brake vacuum sensor or if this sensor was used for the VREF measurement in C3, GO to [C31](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Brake Vacuum Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C31 .
No	INSTALL a new Brake Vacuum sensor. Clear the PCM DTCs. REPEAT the self-test.

C31 CHECK THE REFERENCE VOLTAGE WITH THE PARTICULATE FILTER PRESSURE BANK 1, SENSOR 1 CONNECTED

Note: If the vehicle is not equipped with a particulate filter pressure bank 1, sensor 1 or if this sensor was used for the VREF measurement in C3, GO to [C32](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Particulate Filter Pressure Bank 1, Sensor 1 connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)

Ground

Is the voltage between 4.5 - 5.5 V?**Yes** GO to [C32](#).

No INSTALL a new Particulate Filter Pressure Bank 1, Sensor 1. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls.
Clear the PCM DTCs. REPEAT the self-test.

C32 CHECK THE REFERENCE VOLTAGE WITH THE PARTICULATE FILTER PRESSURE BANK 1, SENSOR 2 CONNECTED

Note: If the vehicle is not equipped with a particulate filter pressure bank 1, sensor 2 or if this sensor was used for the VREF measurement in C3, GO to [C33](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Particulate Filter Pressure Bank 1, Sensor 2 connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)

Ground

Is the voltage between 4.5 - 5.5 V?**Yes** GO to [C33](#).

No INSTALL a new Particulate Filter Pressure Bank 1, Sensor 2. Clear the PCM DTCs. REPEAT the self-test.

C33 CHECK THE REFERENCE VOLTAGE WITH THE PARTICULATE FILTER PRESSURE BANK 2, SENSOR 1 CONNECTED

Note: If the vehicle is not equipped with a particulate filter pressure bank 2, sensor 1 or if this sensor was used for the VREF measurement in C3, GO to [C34](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Particulate Filter Pressure Bank 2, Sensor 1 connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)

Ground

Is the voltage between 4.5 - 5.5 V?**Yes** GO to [C34](#).

No	INSTALL a new Particulate Filter Pressure Bank 2, Sensor 1. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.
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C34 CHECK THE REFERENCE VOLTAGE WITH THE PARTICULATE FILTER PRESSURE BANK 2, SENSOR 2 CONNECTED

Note: If the vehicle is not equipped with a particulate filter pressure bank 2, sensor 2 or if this sensor was used for the VREF measurement in C3, GO to [C35](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Particulate Filter Pressure Bank 2, Sensor 2 connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C35 .
No	INSTALL a new Particulate Filter Pressure Bank 2, Sensor 1. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C35 CHECK THE REFERENCE VOLTAGE WITH THE TCIPT SENSOR CONNECTED

Note: If the vehicle is not equipped with a TCIPT sensor or if this sensor was used for the VREF measurement in C3, GO to [C36](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

VREF (+) Suspect Sensor Connector, Harness Side

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C36 .
No	INSTALL a new TCIPT sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C36 CHECK THE REFERENCE VOLTAGE WITH THE EP SENSOR CONNECTED

Note: If the vehicle is not equipped with an EP sensor or if this sensor was used for the VREF measurement in C3, GO to [C37](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C37 .
No	INSTALL a new EP sensor. REFER to the Workshop Manual Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C37 CHECK THE REFERENCE VOLTAGE WITH THE EGR VALVE CONNECTED

Note: If the vehicle is not equipped with an EGR valve or if this valve was used for the VREF measurement in C3, GO to [C38](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

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

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

Yes	GO to C38 .
No	INSTALL a new EEGR assembly. Clear the PCM DTCs. REPEAT the self-test.

C38 CHECK THE REFERENCE VOLTAGE WITH THE DIFFERENTIAL PRESSURE FEEDBACK EXHAUST GAS RECIRCULATION (DPFEGR) SENSOR CONNECTED

Note: If the vehicle is not equipped with a DPFEGR sensor or if this sensor was used for the VREF measurement in C3, GO to [C39](#).

Note: Only measure the circuits that apply to the vehicle being diagnosed.

- Ignition OFF.
- Differential Pressure Feedback EGR Sensor connector connected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side

VREF

(-)
Ground

Is the voltage between 4.5 - 5.5 V?

- Yes

GO to [C39](#).
- No

INSTALL a new DPFEGR sensor. Clear the PCM DTCs. REPEAT the self-test.

C39 CHECK THE REFERENCE VOLTAGE WITH THE FTP SENSOR CONNECTED

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

VREF	(+) Suspect Sensor Connector, Harness Side	(-)
		Ground

Is the voltage between 4.5 - 5.5 V?

- Yes

The concern is intermittent.
GO to Pinpoint Test [Z](#).
- No

INSTALL a new FTP sensor. REFER to the Workshop Manual Section 303-13, Evaporative Emissions.
Clear the PCM DTCs. REPEAT the self-test.

C40 CHECK THE SIGRTN OR ETCRTN CIRCUITS FOR AN OPEN

- Ignition OFF.
- Disconnect the PCM.
- For ETCRTN concerns.
- Measure the resistance between:

(+) ETBTPS Connector, Harness Side	(-) PCM Connector, Harness Side
ETCRTN	ETCRTN

- For APPRTN concerns.
- Measure the resistance between:

(+) APP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
APPRTN1 - Pin 3	APPRTN1
APPRTN2 - Pin 4	APPRTN2

- For SIGRTN concerns.
- Measure the resistance between:

(+) Suspect Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
SIGRTN	SIGRTN

Is the resistance less than 5 ohms?

- | | |
|------------|--|
| Yes | GO to C42 . |
| No | REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test. |

C41 CHECK THE SUSPECT SENSOR FOR AN INTERNAL SHORT

- Clear the KOEO, KOER, and continuous DTCs.
- Ignition OFF.
- Connect the suspect sensor.
- Ignition ON, engine OFF.
- Carry out the PCM self-test.

Is the concern still present?

- | | |
|------------|---|
| Yes | INSTALL a new sensor for the sensor in question.
Clear the PCM DTCs. REPEAT the self-test. |
| No | The concern is intermittent.
GO to Pinpoint Test Z . |

C42 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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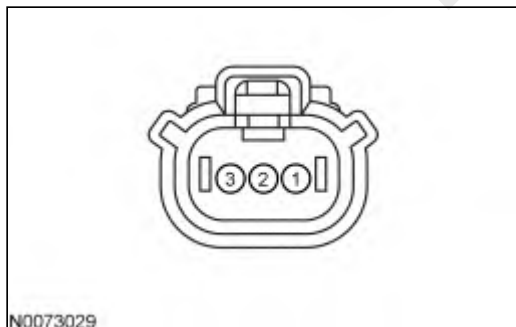
JB: Secondary Ignition (COP)

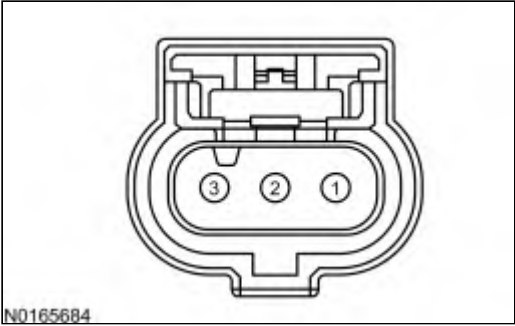
NOTICE: A damaged ignition system may cause high catalyst temperatures. Check the components next to the catalyst and muffler for heat damage.

This pinpoint test is intended to diagnose the following:

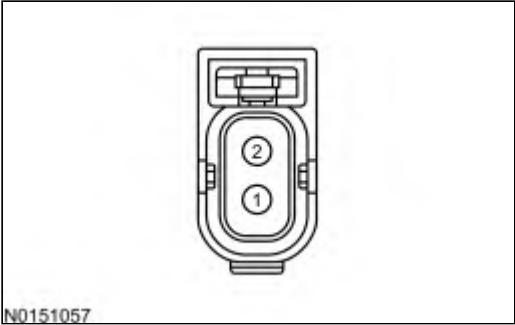
- spark plugs (12405)
- secondary side of the coil
- exhaust spark plug wire (12286) (6.2L engine only)

Vehicle	Firing Order for Coil On Plug Applications
Fusion 1.5L	1 2 4 3
E-Series, F-150 5.0L, F-Series Super Duty 6.2L, F-Series Super Duty 7.3L, Motorhome / Stripped Chassis / Step Van, Mustang 5.0L	1 5 4 8 6 3 7 2
Mustang 5.2L	1 5 4 8 3 7 2 6
3-cylinder applications	1 2 3
4-cylinder applications	1 3 4 2
6-cylinder applications	1 4 2 5 3 6
8-cylinder applications	1 3 7 2 6 5 4 8

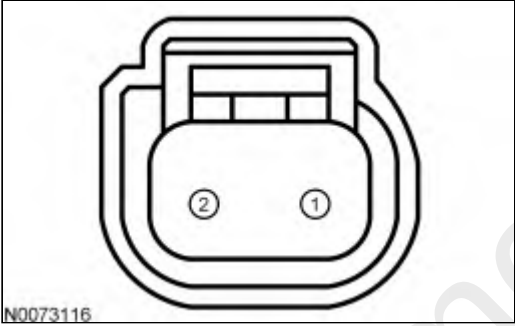
Coil On Plug (COP) Connector**A****B**



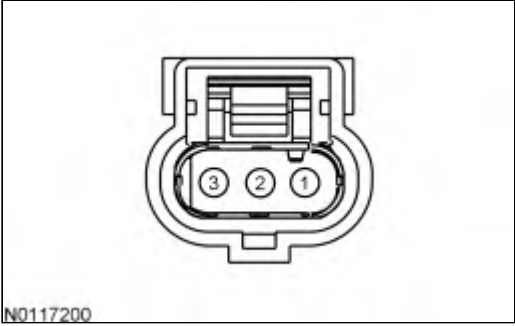
C



D



E



Vehicle	Connector	Pin	Circuit
Continental 3.7L, Flex, Transit GTDI 3.5L	A	3	VPWR