Your Ultimate Source for OEM Repair Manuals

FactoryManuals.net is a great resource for anyone who wants to save money on repairs by doing their own work. The manuals provide detailed instructions and diagrams that make it easy to understand how to fix a vehicle.

2018 Ford Transit Connect Service and Repair Manual

Go to manual page

Intake Air Flow

303-12A Intake Air Distribution and Filtering - 2.7L EcoBoost (238kW/324PS)	***2022 F-150***
Diagnosis and Testing	***Procedure revision date: 10/30/2020***

Intake Air Flow

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods

(100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC (diagnostic trouble code)	Description	Action
PCM (powertrain control module)	P0111:00	Intake Air Temperature Sensor 1 Circuit Range/Performance (Bank 1): No Sub Type Information	GO to Pinpoint Test DA
PCM (powertrain control module)	P0112:00	Intake Air Temperature Sensor 1 Circuit Low (Bank 1): No Sub Type Information	GO to Pinpoint Test DA
PCM (powertrain control module)	P0113:00	Intake Air Temperature Sensor 1 Circuit High (Bank 1): No Sub Type Information	GO to Pinpoint Test DA

Start/Run/Move > Starting > Slow Crank/Battery > Always	GO to Pinpoint Test HU
Start/Run/Move > Starting > Hard Start/Long Crank > Always	GO to Pinpoint Test HU
Start/Run/Move > Starting > Ready to Drive (hyb/EV) > Inoperative	GO to Pinpoint Test HU
Start/Run/Move > Starting > Auto Start/Stop > Inoperative	GO to Pinpoint Test HU
Driving Performance > Runs Rough > All Running Modes > Always	GO to Pinpoint Test DA
Driving Performance > Idle Quality > Fast > Always	GO to Pinpoint Test HU
Driving Performance > Idle Quality > Slow > Always	GO to Pinpoint Test HU
Driving Performance > Idle Quality > Slow Return > Always	GO to Pinpoint Test HU
Driving Performance > Idle Quality > Rough > Always	GO to Pinpoint Test DA
Driving Performance > Stalls/Quits > Deceleration > Always	GO to Pinpoint Test HU
Driving Performance > Lack/Loss of Power > Acceleration > Always	GO to Pinpoint Test HU
Driving Performance > Lack/Loss of Power > Cruise/ Steady Speed > Always	GO to Pinpoint Test HU
Driving Performance > Hesitates/Stumble > Acceleration > Always	GO to Pinpoint Test DA
Driving Performance > Engine Surge > At Idle > Always	GO to Pinpoint Test DA
Driving Performance > Engine Surge > Cruise/ Steady Speed > Always	GO to Pinpoint Test HU

Pinpoint Tests

PINPOINT TEST DA : INTAKE AIR TEMPERATURE (IAT) SENSOR

Normal Operation and Fault Conditions

module) P0112:00	(Bank 1): No Sub Type Information	(parameter identification) reading less than the self-test minimum with ignition ON engine OFF or during any engine operating mode indicates a concern is present.
PCM (powertrain control module) P0113:00	Intake Air Temperature Sensor 1 Circuit High (Bank 1): No Sub Type Information	Sets when the PCM (powertrain control module) detects the IAT (intake air temperature) sensor signal is greater than the self-test maximum. An IAT (intake air temperature) sensor PID (parameter identification) reading greater than self-test maximum with the ignition ON engine OFF or during any engine operating mode indicates a concern is present.

Possible Sources

- IAT (intake air temperature) sensor circuitry concern
- IAT (intake air temperature) sensor (12A697)
- PCM (powertrain control module) (12A650)

Pinpoint Test Steps available in the on-line Workshop Manual.

PINPOINT TEST HU : INTAKE AIR SYSTEMS

Normal Operation and Fault Conditions

Refer to the DTC (diagnostic trouble code) Fault Trigger Conditions.

The IMRC (intake manifold runner control) sensor values should change when the IMRC (intake manifold runner control) is commanded open or closed.

DTC Fault Trigger Conditions

DTC (diagnostic trouble code)	Description	Fault Trigger Condition
PCM (powertrain control module) P0505:00	Idle Control System: No Sub Type Information	Sets when the PCM (powertrain control module) detects the desired RPM (revolutions per minute) could not be reached or controlled during the KOER (key on, engine running) self-test. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose other Diagnostic Trouble Codes (DTCs) first. If no other Diagnostic Trouble Codes (DTCs) are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are

control module) P050B:00	Performance 'A': No Sub Type Information	threshold. Disregard the freeze frame data. Freeze frame data does not apply to the cold start monitor. This DTC (diagnostic trouble code) is informational only and may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose other Diagnostic Trouble Codes (DTCs) first. If no other Diagnostic Trouble Codes (DTCs) are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the Diagnostic Trouble Codes (DTCs) and verify the engine coolant temperature is below 37.8°C (100°F). Allow the vehicle to soak for 2 to 3 hours if necessary for the engine coolant temperature to fall below 37.8°C (100°F). Start the engine without touching the accelerator pedal and allow the engine to idle for 6 minutes in park. If no Diagnostic Trouble Codes (DTCs) are present and the MIL (malfunction indicator lamp) is not illuminated after idling for 6 minutes, carry out the KOER (key on, engine running) , self-test to confirm that no Diagnostic Trouble Codes (DTCs) are present and the repair is complete.
PCM (powertrain control module) P050E:00	Cold Start Engine Exhaust Temperature Too Low: No Sub Type Information	Sets when the PCM (powertrain control module) detects the catalyst temperature ratio exceeds the calibrated value and the MIL (malfunction indicator lamp) illuminates. The PCM (powertrain control module) calculates the actual catalyst warm up temperature during a cold start. The PCM (powertrain control module) then compares the actual catalyst temperature to the expected catalyst temperature model. The difference between the actual and expected temperatures is a ratio. This DTC sets when this ratio exceeds the calibrated value and the malfunction indicator lamp (MIL) illuminates. Disregard the freeze frame data. Freeze frame data does not apply to the cold start monitor. This DTC (diagnostic trouble code) is informational only and may be accompanied by other Diagnostic Trouble Codes (DTCs). Diagnose other Diagnostic Trouble Codes (DTCs) first. If no other Diagnostic Trouble Codes (DTCs) are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the Diagnostic Trouble Codes (DTCs) and verify the engine coolant temperature is below 37.8°C (100°F). Allow the vehicle to soak for 2 to 3 hours if necessary for the engine coolant temperature to fall below 37.8°C (100°F). Start the engine without touching the accelerator pedal and allow the engine to idle for 6 minutes in park. If no Diagnostic Trouble Codes (DTCs) are present and the MIL (malfunction indicator lamp) is not illuminated after idling for 6 minutes, carry out the KOER (key on, engine running) , self-test to confirm that no Diagnostic Trouble Codes (DTCs) are present and the repair is complete.

Intake Air Pressure and Temperature

303-12A Intake Air Distribution and Filtering - 2.7L EcoBoost (238kW/324PS)	***2022 F-150***
Diagnosis and Testing	***Procedure revision date: 11/3/2020***

Intake Air Pressure and Temperature

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods

(100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC (diagnostic trouble code)	Description	Action
PCM (powertrain control module)	P007A:00	Charge Air Cooler Temperature Sensor Circuit (Bank 1): No Sub Type Information	GO to Pinpoint Test DN
PCM (powertrain control module)	P007B:00	Charge Air Cooler Temperature Sensor Circuit Range/Performance (Bank 1): No Sub Type Information	GO to Pinpoint Test DN
PCM (powertrain control module)	P0096:00	Intake Air Temperature Sensor 2 Circuit Range/Performance (Bank 1): No Sub Type Information	GO to Pinpoint Test DN

PCM (powertrain control module)	P2229:00	Barometric Pressure Sensor A Circuit High: No Sub Type Information	GO to Pinpoint Test DO
PCM (powertrain control module)	U060B:00	Lost Communication With Turbocharger/Supercharger Boost Sensor A: No Sub Type Information	GO to Pinpoint Test DM
PCM (powertrain control module)	U066D:00	Lost Communication With Charge Air Cooler Temperature Sensor Bank 1: No Sub Type Information	GO to Pinpoint Test DN

Global Customer Symptom Code (GCSC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods

(100-00 General Information, Description and Operation).

Global Customer Symptom Code Chart

Customer Symptom	Action
Driving Performance > Runs Rough > Acceleration > Always	GO to Pinpoint Test DM
Driving Performance > Runs Rough > Cruise/ Steady Speed > Always	GO to Pinpoint Test DM
Driving Performance > Runs Rough > Deceleration > Always	GO to Pinpoint Test DM
Driving Performance > Runs Rough > All Running Modes > Always	GO to Pinpoint Test DM
Driving Performance > Idle Quality > Fast > Always	GO to Pinpoint Test DM
Driving Performance > Idle Quality > Rolling > Always	GO to Pinpoint Test DM
Driving Performance > Idle Quality > Slow > Always	GO to Pinpoint Test DM
Driving Performance > Idle Quality > Slow Return > Always	GO to Pinpoint Test DM
Driving Performance > Idle Quality > Rough > Always	GO to Pinpoint Test DM
Driving Performance > Stalls/Quits > At Idle > Always	GO to Pinpoint Test DM

control module) P0107:00	Sensor Circuit Low: No Sub Type Information	sensor operating voltage is below the minimum calibrated parameter of 0.024 volt.
PCM (powertrain control module) P0108:00	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit High: No Sub Type Information	Sets when the PCM (powertrain control module) detects the MAP (manifold absolute pressure) sensor operating voltage is greater than the maximum allowable calibrated parameter of 4.96 volts.
PCM (powertrain control module) P0109:00	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit Intermittent: No Sub Type Information	Sets when the PCM (powertrain control module) detects the MAP (manifold absolute pressure) sensor signal is intermittent.
PCM (powertrain control module) P0235:00	Turbocharger/Supercharger Boost Sensor 'A' Circuit: No Sub Type Information	Sets when the PCM (powertrain control module) detects the Turbocharger Boost Pressure (TCBP) sensor circuit value is not within the expected range.
PCM (powertrain control module) P0236:00	Turbocharger/Supercharger Boost Sensor 'A' Circuit Range/Performance: No Sub Type Information	Sets when the PCM (powertrain control module) detects the Turbocharger Boost Pressure (TCBP) PID (parameter identification) does not correlate with the BARO or the MAP PID (parameter identification) . This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Check for other Diagnostic Trouble Codes (DTCs) and diagnose those first. Check the intake air system for leaks and restrictions.
PCM (powertrain control module) U060B:00	Lost Communication With Turbocharger/Supercharger Boost Sensor 'A': No Sub Type Information	Sets when the PCM (powertrain control module) no longer receives a signal from the Turbocharger Boost Pressure (TCBP) sensor.

Possible Sources

- MAP (manifold absolute pressure) / IAT2 (intake air temperature 2) sensor circuitry concern

		CAC (charge air cooler) , remove debris if necessary. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Check for other Diagnostic Trouble Codes (DTCs) and diagnose those first.
PCM (powertrain control module) P0096:00	Intake Air Temperature Sensor 2 Circuit Range/Performance (Bank 1): No Sub Type Information	Sets when the PCM (powertrain control module) detects the IAT2 (intake air temperature 2) sensor value does not correlate with the CAC (charge air cooler) temperature sensor value or the IAT (intake air temperature) sensor value at ignition ON after a calibrated soak period (typically 6 to 8 hours). This DTC (diagnostic trouble code) also sets if the IAT2 (intake air temperature 2) sensor value exceeds the maximum calibrated temperature threshold while driving. Aftermarket heaters that are attached to the engine, transmission or battery may cause DTC (diagnostic trouble code) P0096 to set in cold weather climates after a 6 hour soak period. This DTC (diagnostic trouble code) may be accompanied by other Diagnostic Trouble Codes (DTCs). Check for other Diagnostic Trouble Codes (DTCs) and diagnose those first.
PCM (powertrain control module) P0097:00	Intake Air Temperature Sensor 2 Circuit Low (Bank 1): No Sub Type Information	Sets when the PCM (powertrain control module) detects the IAT2 (intake air temperature 2) sensor signal is less than the self-test minimum. The IAT2 (intake air temperature 2) sensor minimum is 0.2 volt. Monitor the IAT2 PID (parameter identification) value. A typical IAT2 (intake air temperature 2) sensor temperature should be greater than the IAT (intake air temperature) sensor temperature.
PCM (powertrain control module) P0098:00	Intake Air Temperature Sensor 2 Circuit High (Bank 1): No Sub Type Information	Sets when the PCM (powertrain control module) detects the IAT2 (intake air temperature 2) sensor signal is greater than the self-test maximum. The IAT2 (intake air temperature 2) sensor maximum is 4.6 volts. Monitor the IAT2 PID (parameter identification) value. A typical IAT2 (intake air temperature 2) sensor temperature should be greater than the IAT (intake air temperature) sensor temperature.

BARO SENSOR TRANSFER FUNCTION

Volts	Pressure in kPa	Pressure in psi	Pressure in in-Hg
0.3	7.6	1.1	2.2
0.5	12.7	1.84	3.8
2.64	60	8.7	17.7
4.54	115	16.68	34
4.75	120.3	17.45	35.5
4.8	121.6	17.66	35.9

E327548

Refer to the DTC (diagnostic trouble code) Fault Trigger Conditions.

DTC Fault Trigger Conditions

DTC (diagnostic trouble code)	Description	Fault Trigger Condition
PCM (powertrain control module) P2227:00	Barometric Pressure Sensor 'A' Circuit Range/Performance: No Sub Type Information	Sets when the PCM (powertrain control module) detects either of the following conditions are present: • When the BARO PID (parameter identification) does not correlate with the TCBP and the MAP (manifold absolute pressure) PIDs at ignition ON, engine OFF. • When the MAP (manifold absolute pressure) and TCBP PIDs correlate with the engine running, but the TCBP PID (parameter identification) does not correlate with the BARO PID (parameter identification) at idle. This DTC (diagnostic trouble code) is only operational between 1,000 feet below sea level to 15,000 feet above sea level, it should be disregarded if set outside the operational range.
PCM (powertrain control module) P2228:00	Barometric Pressure Sensor 'A' Circuit Low: No Sub Type Information	Sets when the PCM (powertrain control module) detects the BARO (barometric pressure) reading is abnormally low indicating an extreme high altitude. When the BARO (barometric pressure) signal is less than the calibrated threshold for greater than 100 ms, a concern is indicated.