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2020 Ford Transit-350 Service and Repair Manual

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Drive Cycle Preparation	**NOTE** To bypass the EVAP (evaporative emission) soak timer (normally 6 hours), the PCM (powertrain control module) must remain powered after clearing the continuous DTC (diagnostic trouble code) s and resetting the emission monitors information in the PCM (powertrain control module) . 1. Install the scan tool. Turn the ignition ON with the engine OFF. Cycle the ignition OFF, then ON. If needed, select the appropriate vehicle and engine qualifier. Clear the continuous DTC (diagnostic trouble code) s and reset the emission monitors information in the PCM (powertrain control module) .	Bypasses the engine soak timer. Resets the OBD (on-board diagnostic) monitor status.
	2. Begin to monitor the following PID (parameter identification) s (if available): AAT, ECT, EVAPDC, FLI, IAT and TP MODE. Start the vehicle without returning the ignition to the OFF position.	
	3. Idle the vehicle for 15 seconds. Drive at 77 to 104 km/h (48 to 65 mph) until the engine coolant temperature is at least 76.7°C (170°F).	
Prep for Monitor Entry	4. Is the ambient air temperature between 4.4 and 37.8°C (40 and 100°F)? If AAT is not available, IAT is used. If not, complete the following steps, but note that step 16 is required to bypass the EVAP (evaporative emission) monitor and complete the OBD (on-board diagnostic) drive cycle.	Engine warm-up and provides ambient air temperature input to the PCM (powertrain control module) . If AAT is not available, IAT is used.
HO2S (heated oxygen sensor)	5. Cruise at 77 to 104 km/h (48 to 65 mph) for greater than 5 minutes.	Executes the HO2S (heated oxygen sensor) monitor.
EVAP (evaporative emission)	6. Cruise at 77 to 104 km/h (48 to 65 mph) for 10 minutes (avoid sharp turns and hills). NOTE: To initiate the monitor, the throttle should be at part throttle, EVAPDC must be greater than 75%, and FLI must be	Executes the EVAP (evaporative emission) purge flow monitor if the ambient air temperature

	except the EVAP (evaporative emission) monitor have completed. If not, go to step 15.	
EVAP (evaporative emission)	13. Turn the ignition OFF for 1 hour to allow the engine off 0.508 mm (0.020 inch) leak check to run.	Executes the 0.508 mm (0.020 inch) EVAP (evaporative emission) monitor.
Readiness Check	14. Turn the ignition ON. Access the On-Board System Readiness (OBD (on-board diagnostic) II monitor status) function on the scan tool. Determine whether all non-continuous monitors including the EVAP (evaporative emission) monitor have completed. If not, go to step 15.	Determine if any monitor has not completed.
Pending Code Check And EVAP (evaporative emission) Monitor Bypass Check	15. With the scan tool, check for pending codes. Conduct the normal repair procedures for any pending code concern. Otherwise, repeat any incomplete monitor. If the EVAP (evaporative emission) monitor is not complete and the ambient air temperature was out of the 4.4 to 37.8°C (40 to 100°F) temperature range in step 4, or the altitude is over 2438 m (8000 ft.), the EVAP (evaporative emission) bypass procedure must be followed. Go to Step 16.	Determines if a pending code is preventing the completion of the OBD (on-board diagnostic) drive cycle.
EVAP (evaporative emission) Monitor Bypass	16. Park the vehicle for a minimum of 8 hours. Repeat steps 2 through 14. Do not repeat step 1.	Allows the bypass counter to increment to 2.

On Board Diagnostics (OBD) Monitors

The California Air Resources Board (CARB) began regulating OBD (on-board diagnostic) systems for vehicles sold in California beginning with the 1988 model year. The initial requirements, known as OBD (on-board diagnostic) I, required identifying the likely area of concern with regard to the fuel metering system, EGR (exhaust gas recirculation) system, emission related components and the PCM (powertrain control module) . A MIL (malfunction indicator lamp) was required to illuminate and alert the driver of the concern and the need to repair the emission control system. A DTC (diagnostic trouble code) was required to assist in identifying the system or component associated with the concern.

Starting with the 1994 model year, both CARB and the Environmental Protection Agency (EPA) mandated enhanced OBD (on-board diagnostic) systems, commonly known as OBD (on-board diagnostic) II. The

carry out an OBD (on-board diagnostic) check in order to renew a vehicle registration. The I/M readiness indicators must show that all monitors have been completed prior to the OBD (on-board diagnostic) check.

Starting in the 1996 model year, OBD (on-board diagnostic) II was required on all California and California State gasoline engine vehicles up to 14,000 lbs. GVWR. Starting in the 1997 model year, diesel engine vehicles up to 14,000 lbs. GVWR required OBD II.

California states are ones that have adopted California emission regulations, starting in the 1998 model year. For example, Delaware, Connecticut, Maine, Massachusetts, New Mexico, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Washington have adopted California's emission regulations. These states receive California certified vehicles for passenger cars, light trucks, and medium duty vehicles up to 14,000 lbs GVWR.

Starting in the 1996 model year, OBD (on-board diagnostic) II was also required on all Federal gasoline engine vehicles up to 8,500 lbs. GVWR. Starting in the 1997 model year, diesel engine vehicles up to 8,500 lbs. GVWR required OBD (on-board diagnostic) II.

Starting in the 2004 model year, Federal vehicles over 8,500 lbs. are required to phase in OBD (on-board diagnostic) II. Starting in the 2004 model year, gasoline fueled medium duty passenger vehicles (MDPVs) are required to have OBD (on-board diagnostic) II. By the 2006 model year, all Federal vehicles from 8,500 to 14,000 lbs. GVWR will have been phased into OBD (on-board diagnostic) II.

Permanent Diagnostic Trouble Code (DTC)

The software stores a permanent DTC (diagnostic trouble code) in non volatile random access memory (NVRAM) whenever a DTC (diagnostic trouble code) is set and the MIL (malfunction indicator lamp) has been illuminated. Permanent DTCs can only be cleared by the module strategy itself. After a permanent DTC (diagnostic trouble code) is stored, 3 consecutive test passed monitoring cycles must complete before the permanent DTC (diagnostic trouble code) can be erased. At that time, both the permanent DTC (diagnostic trouble code) is erased and the MIL (malfunction indicator lamp) is extinguished. The PCM (powertrain control module) clears permanent DTCs after one monitoring cycle if a request to clear DTCs is sent by the scan tool, and the test subsequently runs and passes (test must continue to pass for the entire driving cycle for continuous monitors) and a Permanent DTC (diagnostic trouble code) Driving Cycle has been completed. A Permanent DTC (diagnostic trouble code) Driving Cycle requires a total of 10 minutes of engine run time, consisting of 5 minutes of vehicle operation above 40 km/h (25 MPH) and 30 continuous seconds of vehicle operation at idle. After clearing DTCs, running the OBD (on-board diagnostic) Drive Cycle ensures that all monitors complete, the Permanent DTC (diagnostic trouble code) Driving Cycle completes, inspection/maintenance (I/M) readiness codes are set to a ready status and any permanent DTCs are erased. A permanent DTC (diagnostic trouble code) cannot be erased by clearing the KAM (keep alive memory) . The intended use of the permanent DTC (diagnostic trouble code) is to prevent vehicles from passing an in use inspection simply by disconnecting the battery or clearing the DTCs with a scan tool prior to the inspection. The presence of permanent DTCs at an inspection without the MIL (malfunction indicator lamp) illuminated is an indication that a correct repair was not verified by the on board monitoring system.

Vehicle Reference Voltage (VREF)

The VREF is a consistent positive voltage (5 volts plus or minus 0.5 volt) provided by the PCM (powertrain control module) . The VREF is typically used by 3 wire sensors and some digital input signals.

Variable Camshaft Timing (VCT) Monitor

The VCT (variable camshaft timing) output driver in the PCM (powertrain control module) is checked electrically for opens or shorts. The VCT (variable camshaft timing) system is checked functionally by monitoring the closed loop camshaft position error correction. If the correct camshaft position cannot be maintained and the system has an advance or retard error greater than the calibrated threshold, a VCT (variable camshaft timing) control concern is indicated.

Variable Camshaft Timing (VCT) System

The VCT (variable camshaft timing) system enables rotation of the camshaft relative to the crankshaft rotation as a function of engine operating conditions.

The VCT (variable camshaft timing) system has 4 operational modes: idle, part throttle, wide open throttle (WOT), and default mode. At idle and low engine speeds with closed throttle, the PCM (powertrain control module) determines the phase angle based on airflow, engine oil temperature and engine coolant temperature. At part and wide open throttle the PCM (powertrain control module) determines the phase angle based on engine RPM (revolutions per minute) , load, and throttle position. The VCT (variable camshaft timing) system provides reduced emissions and enhanced engine power, fuel economy and idle quality. In addition, some VCT (variable camshaft timing) system applications can eliminate the need for an external EGR (exhaust gas recirculation) system. The elimination of the EGR (exhaust gas recirculation) system is accomplished by controlling the overlap time between the intake valve opening and exhaust valve closing.

Vehicle Speed Limiter

The PCM (powertrain control module) disables some or all of the fuel injectors whenever a vehicle over speed condition is detected. The purpose of the vehicle speed limiter is to prevent damage to the powertrain. Once the driver reduces the excessive vehicle speed, the engine returns to the normal operating mode. No repair is required. However, the technician should clear the DTCs and inform the customer of the reason for the DTC (diagnostic trouble code) .

Either excessive wheel slippage caused by sand, gravel, rain, mud, snow, ice or excessive RPM (revolutions per minute) increase in neutral may cause the vehicle speed limiter to activate even though the vehicle has not exceeded the maximum speed limit.

Component Description

Camshaft Position (CMP) Sensor

The CMP (camshaft position) sensor detects the position of the camshaft. The CMP (camshaft position) sensor identifies when piston number 1 is on its compression stroke. A signal is then sent to the PCM (powertrain control module) and used for synchronizing the sequential firing of the fuel injectors. Coil on plug

Crankshaft Position System

303-14E Electronic Engine Controls - 3.5L V6 PowerBoost (CN)	***2022 F-150***
Diagnosis and Testing	***Procedure revision date: 11/20/2020***

Crankshaft Position System

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)	P0315:00	Crankshaft Position System Variation Not Learned: No Sub Type Information	GO to Pinpoint Test JD
PCM (powertrain control module)	P0335:00	Crankshaft Position Sensor A Circuit: No Sub Type Information	GO to Pinpoint Test JD
PCM (powertrain control module)	P0339:00	Crankshaft Position Sensor A Circuit Intermittent: No Sub Type Information	GO to Pinpoint Test JD
PCM (powertrain control module)	P033F:00	Crankshaft/Camshaft Loss Of Synchronization: No Sub Type Information	GO to Pinpoint Test JD

		identification) while cranking the engine. A value of 0 RPM (revolutions per minute) indicates a CKP (crankshaft position) concern.
PCM (powertrain control module) P0339:00	Crankshaft Position Sensor 'A' Circuit Intermittent: No Sub Type Information	Sets when the PCM (powertrain control module) detects several erratic PIP (profile ignition pick-up) pulses have occurred in the CKP (crankshaft position) sensor signal within a calibrated time period when the camshaft speed exceeds the equivalent speed of engine idle or the starter motor is engaged.
PCM (powertrain control module) P033F:00	Crankshaft/Camshaft Loss Of Synchronization: No Sub Type Information	Sets when the PCM (powertrain control module) detects the input signal from the CKP (crankshaft position) sensor or the CMP (camshaft position) sensor is erratic.

Possible Sources

- CKP (crankshaft position) sensor circuitry concern
- Crankshaft pulse wheel
- CKP (crankshaft position) sensor (6C315)
- PCM (powertrain control module) (12A650)

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

PCM (powertrain control module)	P0605:00	Internal Control Module Read Only Memory (ROM) Error: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	P0607:00	Control Module Performance: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	P0630:00	VIN Not Programmed Or Incompatible - ECM/PCM: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	P064F:00	Unauthorized Software/Calibration Detected: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	P06DA:00	Engine Oil Pressure Control Circuit/Open: No Sub Type Information	GO to Pinpoint Test W
PCM (powertrain control module)	P06DB:00	Engine Oil Pressure Control Circuit Low: No Sub Type Information	GO to Pinpoint Test W
PCM (powertrain control module)	P06DC:00	Engine Oil Pressure Control Circuit High: No Sub Type Information	GO to Pinpoint Test W
PCM (powertrain control module)	P06DD:00	Engine Oil Pressure Control Circuit Performance/Stuck Off: No Sub Type Information	GO to Pinpoint Test V
PCM (powertrain control module)	P06DE:00	Engine Oil Pressure Control Circuit Stuck On: No Sub Type Information	GO to Pinpoint Test V
PCM (powertrain control module)	P1001:00	KOER Not Able to Complete, KOER Aborted: No Sub Type Information	GO to Pinpoint Test X
PCM (powertrain control module)	P1060:00	Excessive Engine Component Deterioration: No Sub Type Information	GO to Pinpoint Test Y

PCM (powertrain control module)	U0137:00	Lost Communication With Trailer Brake Control Module: No Sub Type Information	GO to Pinpoint Test G
PCM (powertrain control module)	U0138:00	Lost Communication with All Terrain Control Module: No Sub Type Information	GO to Pinpoint Test H
PCM (powertrain control module)	U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test I
PCM (powertrain control module)	U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test J
PCM (powertrain control module)	U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test K
PCM (powertrain control module)	U0164:00	Lost Communication With HVAC Control Module: No Sub Type Information	GO to Pinpoint Test L
PCM (powertrain control module)	U0199:00	Lost Communication With "Door Control Module A": No Sub Type Information	GO to Pinpoint Test M
PCM (powertrain control module)	U0200:00	Lost Communication With "Door Control Module B": No Sub Type Information	GO to Pinpoint Test N
PCM (powertrain control module)	U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	GO to Pinpoint Test D
PCM (powertrain control module)	U023A:00	Lost Communication With Image Processing Module A: No Sub Type Information	GO to Pinpoint Test O
PCM (powertrain control module)	U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test P

PCM (powertrain control module)	U0554:00	Invalid Data Received From Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test T
PCM (powertrain control module)	U0594:00	Invalid Data Received From Hybrid/EV Powertrain Control Module: No Sub Type Information	GO to Pinpoint Test T
PCM (powertrain control module)	U1010:00	Invalid Internal Control Module Monitoring Data Received from Hybrid Powertrain Control Module: No Sub Type Information	GO to Pinpoint Test T
PCM (powertrain control module)	U1011:00	Invalid Internal Control Module Monitoring Data Received from ECM/PCM: No Sub Type Information	GO to Pinpoint Test T
PCM (powertrain control module)	U1012:00	Invalid Internal Control Module Monitoring Data Received from Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test T
PCM (powertrain control module)	U1022:00	Invalid Internal Control Module Monitoring Data Received from Body Control Module: No Sub Type Information	GO to Pinpoint Test T
PCM (powertrain control module)	U2100:00	Initial Configuration Not Complete: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	U2101:00	Control Module Configuration Incompatible: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	U2200:00	Control Module Configuration Memory Corrupt: No Sub Type Information	GO to Pinpoint Test QA
PCM (powertrain control module)	U3003:00	Battery Voltage: No Sub Type Information	GO to Pinpoint Test U

Pinpoint Tests

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