ROUSH CLEANTECH

Ford E-Series and F-Series

Gen 4 Propane, 6.8L Ford V10

Diagnostic Manual

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ALERT MESSAGES

The following alert messages appear from time to time in the appropriate places in this manual. Ensure that all personnel in the immediate area are aware of these reminders. Although propane is nontoxic, nonpoisonous, has the lowest flammability range of any alternative fuel, and dissipates quickly when released into the atmosphere, extreme care must be taken when working with the fuel and fuel system.

IMPORTANT SAFETY INFORMATION

DANGER

Propane Safety

Leaked or vented propane will expand quickly when no longer pressurizing in the fuel system. Liquid propane expands at a ratio of 1:270 going from a liquid to vapor. Propane vapor is heavier than air and seeks the lowest point. When the ratio of propane to air is between 2.2% and 9.6%, propane will burn in the presence of an ignition source at 940°F (504°C) or hotter. Keep away from heat, sparks, flames, static electricity, lighted smoking materials, or other sources of ignition. Failure to heed this danger may result in severe personal injury or death.

DANGER

Fuel Lines

Fuel lines remain pressurized after engine shutdown. Keep away from heat, sparks, flames, static electricity, or other sources of ignition. Do NOT enter storage areas or confined space unless they are adequately ventilated. Failure to heed this danger may result in severe personal injury or death.

DANGER

Propane Vapor

When liquid propane is released from a pressurized vessel, it rapidly evaporates, creating a refrigeration effect that can cause frostbite. Wear non-porous, cold-safe gloves, eye protection, and ear protection during venting and repair operations. Keep moisture away from the valves. Failure to heed this warning can result in personal injury.

DANGER

NFPA 58

Always follow all NFPA 58 guidelines. When working on the propane fuel system or refueling a vehicle, you must be in a well-ventilated area at least 25 ft from any ignition source and 35 ft from any activity that throws sparks. Failure to heed this danger may result in severe personal injury or death.

DANGER

Battery

Disconnect the battery ground at the battery to ensure that the vehicle electrical system has no current. Failure to heed this danger could result in severe personal injury or death.

DANGER

Smoking Around Propane

Do NOT carry lighted smoking materials or smoke while working on fuel system components. Failure to heed this danger could result in severe personal injury or death.

IMPORTANT SAFETY WARNINGS

WARNING

Training

Technicians working with, or around, fuel systems should be properly trained to utilize extreme care and caution at all times. Failure to exercise extreme caution and care may lead to serious accidents which can result in property damage, personal injury, and/or death.

WARNING

Service and System Modification

ROUSH CleanTech does not approve of any additions to or modifications of this fuel system. This fuel system is designed and installed to meet federal standards and engine manufacturer's guidelines. The maintenance provider or modifier assumes all responsibility for the vehicle engine and fuel system if the fuel system is changed or modified. Some states require a special license to perform maintenance or work on propane-powered vehicles. Check with local authorities or your state LP Gas Association for details. All fuel system components must be a minimum of 18 inches from any exhaust system component unless properly shielded. All service, maintenance and repairs performed on LP Gas systems must be done by an authorized LP Gas service technician.

WARNING

Vehicle Filling

For passenger safety, ROUSH CleanTech recommends that all occupants leave the vehicle to a safety zone before fuel filling procedures take place. Failure to heed this warning can result in personal injury.

WARNING

Working on Tank Components

Before removing any components from the fuel tank, it is very important to verify there is not any pressure remaining inside. The technician that is removing a tank component should always be the one to verify it is empty. This should be done right before starting the repair. Failure to do so could result in severe personal injury or death and/or damage to property. Refer to Tank De-pressurization Verification Procedure before removing or working on any tank components

FOREWARD

This manual is intended to provide technicians with the diagnostic procedures required to maintain and service the unique components of the ROUSH CleanTech Liquid Propane Autogas (LPA) system. All diagnostic trouble codes (DTCs) known to be affected by the LPA system are covered in this manual. For all other DTCs, refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual at *www.motorcraft.com.*

ROUSH CLEANTECH CUSTOMER SUCCESS

Call ROUSH CleanTech Customer Success Team at (800) 59-ROUSH (597-6874), Opt. 2 with any questions regarding the ROUSH CleanTech Liquid Propane Autogas system.

SAFETY INFORMATION

The National Fire Protection Association (NFPA) publishes the NFPA 58, which is the industry benchmark standard for he safe storage, handling, transportation, and use of liquefied petroleum gas (LP-Gas or LPG). The NFPA58 is revised as necessary and updated regularly and has been adopted as law in virtually every political subdivision in the United States. Check with your local authorities for regulations applicable to liquid propane.

Installation, Garaging, and Training

Chapter 11 of NFPA 58 applies to engine fuel systems using LP-Gas in internal combustion engines, including containers, container appurtenances, carburetion equipment, piping, hose and fittings and their installation. Additionally, this chapter applies to garaging of vehicles and to the training of personnel.

Paragraph 11.2 specifies that each person engaged in installing, repairing, filling, or otherwise servicing an LP-Gas engine fuel system shall be trained. Contact the Propane Education and Research Council to learn more about their CETP E-Learning computer-based training program.

Purging and Venting (Tanks and Lines)

Venting of LP-Gas to the atmosphere is covered by paragraphs 7.3.1, General, and 7.3.2, Purging of NFPA 58, 2017 edition. Refer to NFPA 58, Local Codes and Proper Training for specific information relating to safe venting of LPG.

SYSTEM AND DIAGNOSTIC TERMINOLOGY

Acronym or Abbreviation	Description
BS	Bleed Solenoid
CAN	Controller Area Network
DTC	Diagnostic Trouble Code
EFPR	Electronic Fuel Pump Relay
EFV	Excess Flow Valve
ERFS	Electronic Returnless Fuel System
EVAP	Evaporative
FCS	Flow Control Solenoid
FLS	Fuel Level Sender
FP	Fuel Pump
FPCM	Fuel Pump Control Module
FRP	Fuel Rail Pressure
FRPCM	Fuel Rail Pressure Control Module
FTS	Fuel Temperature Sensor
GND	Ground
HEGO	Heated Exhaust Gas Oxygen
IPC	Instrument Panel Cluster
IPTS	Injection Pressure Temperature Sensor
KOEO	Key On Engine Off
KOER	Key On Engine Running
LPA	Liquid Propane Autogas
MAF	Mass Air Flow
OEM	Original Equipment Manufacturer
OPD	Overfill Protection Device
PCM	Powertrain Control Module
PID	Parameter Identification
PWR GND	Power Ground
RDT	ROUSH Diagnostic Tool
SIG RTN	Signal Return
SRM	Smart Relay Module
SS	Supply Solenoid
TPTS	Tank Pressure Temperature Sensor
TS	Tank Solenoid
VMV	Vapor Management Valve
VPWR	Voltage Power
VREF	Voltage Reference
WOT	Wide Open Throttle

ROUSH Diagnostic Tool

The Roush Diagnostic Tool (RDT) is a free desktop application available from ROUSH CleanTech for PCM and SRM calibration, performing advanced driveability diagnostics, relaying information directly to the ROUSH CleanTech hotline, DTC reading and clearing, and KOEO/KOER functions on Gen 3 and Gen 4 vehicles.

Required Equipment

Performing electronic diagnostics on a ROUSH CleanTech vehicle using the ROUSH Diagnostic Tool (RDT) requires the use of a capable J2534 Pass-Thru OBD-II device, which is required to communicate between the vehicle and the technicians laptop.

A list of laptop system requirements can be found at http://rdt.roush.com/RoushRdt/.

Downloading and Installing the ROUSH Diagnostic Tool

A laptop with a working USB port and a constant and uninterrupted wifi signal are required to run RDT. RDT is licensed per machine, so the software can only be used on the machine that it has been downloaded to.

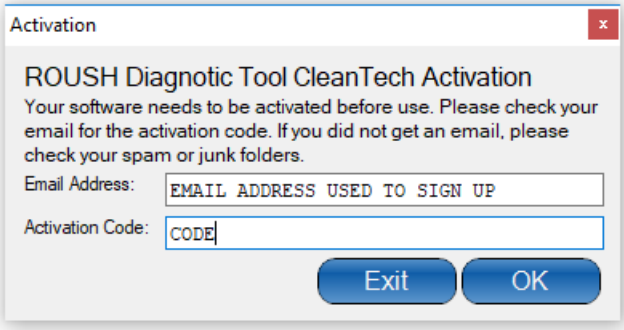
Prior to installing RDT, install all drivers required for the chosen J2534 Pass-Thru device. Consult the installation instructions for the chosen Pass-Thru device to ensure drivers are properly downloaded.

To Download:

1. Access the ROUSH Diagnostic Tool page on the ROUSH CleanTech website to start the download process. The Google Chrome browser works best for downloading RDT.
2. Complete all of the required fields and click "Submit".
3. Click on "ROUSH CleanTech Client" to download RDT for ROUSH CleanTech. The Roush Performance Client will not work with a ROUSH CleanTech Vehicle.

To Install:

1. Locate the file that was downloaded and then run the file.
2. Run the downloaded file to begin installation of the software. Review and agree to the licensing terms and begin the install, which may take several minutes.
3. Locate Roush Diagnostic Tool icon on the desktop and open the program. Read and Accept the warning.
4. Enter email address that was registered and software activation code from above.
5. After installation, select Pass-Though device and close and re-open RDT before first use.

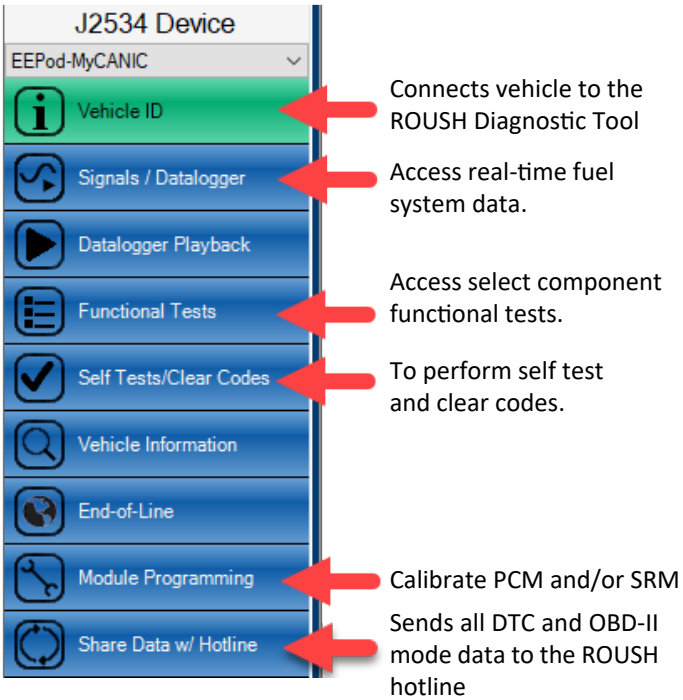


Utilizing the ROUSH Diagnostic Tool

A reliable internet connection is required at all times when working with RDT.

Accessing Functions in RDT

1. Connect J2534 Pass-Thru OBD-II device into the OBD-II port of the vehicle. This port can be found in the steering column. If changing Pass-thru devices, RDT will have to be closed and re-opened each time a new device is to be used.
2. With Key On Engine Off (KOEO), locate the RDT icon on the desktop and open the program. If multiple Pass-Thru devices have been used, select the chosen device via the drop-down menu. Follow any messages from RDT to finish the device selection process.
3. Select Vehicle ID and verify that the VIN and vehicle type are correct.
4. Select the function that is required.
   - To access data on various vehicle functions through the use of RDT PIDs, click on *Signals/Datalogger*.
   - To access Output State Controls, the Fuel Pump Performance test, Fuel Transfer test, or Misfire test, select *Functional Tests*.
   - To Self Tests, KOEO and KOER tests, or remove DTC codes, select *Self Tests/Clear Codes*.
   - To calibrate the PCM or SRM, select *Module Programming* (see https://www.roushcleantech.com/rdt/ for more information on PCM and SRM voucher codes)
   - To share DTC and OBD-II data with the ROUSH CleanTech hotline, select *Share Data w/Hotline*.



For diagnostic procedures that utilize RDT, look for the RDT logo throughout this diagnostic manual.

For Technical Assistance with the ROUSH Diagnostic Tool, please contact RDT-Support@roush.com. For any other questions please contact ROUSH CleanTech Customer Success Team at (800) 59-ROUSH (597-6874), Opt. 2.

ROUSH Diagnostic Tool Datalogger/PID Seelction List

RPR_PT_PRS	RPR_PT_PRS_VOLTS	RPR_PT_TEMP	RPR_PT_TEMP_VOLTS	RPR_FR_PRS
RF_AP_ACTUAL	MUX_RPR_RAIL_PRES	RPR_FR_TEMP	FUL_RAILTEMP	MUX_RPR_RAIL_TEMP
RPR_STATE	RPR_FR_PRS_SAT	RPR_SS1_CMD	RPR_SS2_CMD	RPR_BS_CMD
RPR_FCS_CMD	RPR_FR_PRS_TGT	MUX_RPR_BLEED_STATUS	MUX_RPR_SLV_TANK_PRS	MUX_RPR_REFUL_INPRG
MUX_RPR_SS1_STATUS	MUX_RPR_SS2_STATUS	MUX_RPR_SS3_STATUS	MUX_RPR_FCS_STATUS	MUX_RPR_BS_STATUS
MUX_RPR_SRM_VER	MUX_RPR_PRV_MAX_PRS	MUX_RPR_BLEED_PRS	MUX_RPR_BLEED_TEMP	ACT
ECT	KAMRF[0]	KAMRF[1]	LAMBSE[0]	LAMBSE[1]
FADPT_COL[0][0]	FADPT_COL[0][1]	FADPT_COL[0][2]	FADPT_COL[0][3]	FADPT_COL[0][4]
FADPT_COL[1][0]	FADPT_COL[1][1]	FADPT_COL[1][2]	FADPT_COL[1][3]	FADPT_COL[1][4]
MUX_FUELLVL_ACTV_SIDE	MUX_FUELLVL_PSSV_SIDE	MUX_RPR_SS1_FAULT	MUX_RPR_SS2_FAULT	MUX_RPR_SS3_FAULT
MUX_RPR_BS_FAULT	MUX_RPR_FCS_FAULT	ENGINE_SPEED	LOAD	RF_DC
ESL_CTL_TG	FP_INPUT_VLT	RF_ADAPT[1][1]	RF_ADAPT[1][2]	RF_ADAPT[2][1]
RF_ADAPT[2][2]	AAT1_ENG	IAT11_ENG	IAT12_ENG	MCT
MAP	IMRCM2_VOLTS	IMRCM_VOLTS	IAT11_VOLTS	IAT12_VOLTS
MAP_VOLTS	TPP_FMEM	INJDC_AIRLMT	RF_DP_ACTUAL	RF_DPREF
ETC_FMM_MODE__A	MAP_STATUS	BP	CHT_ENG	INALT_VBATTERY
FLI_ENG1	RPR_FP_V_FLOWRATE	LAM_30MS[0]	LAM_30MS[1]	VBAT
MIS_RATE200	MIS_RATE1000	RPR_FP_DP_INJ_CLIP_FLG	RPR_FP_DP_INJ_MAX	INFAMB_KAM
RPR_SMR_TMR	RPR_FR_TEMP_TGT	SOAK_TIME	FLI_ENG	MUX_RPR_SLV_PUMP_FAULT

RDT PID List for Gen 4 Vehicles

*** Denotes Most Commonly Used**

Name	PCM Parameter
Fuel Tank Pressure (PsiA)*	**Rpr_pt_prs**
Fuel Rail Pressure (PsiA)*	**rpr_fr_prs**
Fuel Rail Target Pressure (PsiA)*	**rpr_fr_prs_tgt**
Fuel Pump Duty Cycle*	**rf_dc**
Fuel Rail Pressure (PsiA)	rf_ap_actual
Fuel Tank Pressure (volts)	rpr_pt_prs_volts
Fuel Tank Temperature (F)	rpr_pt_temp
Fuel Tank Temperature (volts)	rpr_pt_temp_volts
Fuel Rail Pressure (volts)	mux_rpr_rail_pres
Fuel Rail Temperature (F)	rpr_fr_temp
Fuel Rail Temperature (F)	ful_railtemp
Fuel Rail Temperature (volts)	mux_rpr_rail_temp
Propane State (unitless)	rpr_state
Adaptive Vapor Offset (PsiA)	rpr_vpr_prs_offset_flt_m
Adaptive Vapor Maturity Index	rpr_adap_vpr_offset_refuel_m_index
Fuel Rail Saturation Pressure Adapted (PsiA)	rpr_fr_adap_prs_sat_fnl
Fuel Rail Saturation Pressure (PsiA)	rpr_fr_prs_sat
Supply Solenoid 1 Command (Flag)	rpr_ss1_cmd
Supply Solenoid 2 Command (Flag)	rpr_ss2_cmd
Bleed Solenoid Command (Flag)	rpr_bs_cmd
Flow Control Solenoid Command (Flag)	rpr_fcs_cmd
Fuel rail target Pressure (PsiA)	rpr_fr_prs_tgt
Fuel Rail Bleed Status (SRM)	mux_rpr_bleed_status
Slave Tank Pressure (PsiA)	mux_rpr_slv_tank_prs
Slave Tank Transfer in Progress (Flag)	mux_rpr_reful_inprg
Supply Solenoid 1 Status (Bit map)	mux_rpr_ss1_status
Supply Solenoid 2 Status (Bit map)	mux_rpr_ss2_status
Supply Solenoid 3 Status (Bit map)	mux_rpr_ss3_status
Flow Control Solenoid Status (Bit map)	mux_rpr_fcs_status
Bleed Solenoid Status (Bit map)	mux_rpr_bs_status
SRM CALID	mux_rpr_srm_ver
SRM PRV setting (Psi)	mux_rpr_prv_max_prs
Fuel Rail Pressure After Bleed (PsiA)	mux_rpr_bleed_prs
Fuel Rail Temperature After Bleed (F)	mux_rpr_bleed_temp
Master Tank Fuel level (Counts)	MUX_FUELLVL_ACTV_SIDE
Slave Tank Fuel level (Counts)	MUX_FUELLVL_PSSV_SIDE
Supply Solenoid 1 fault bit (Flag)	MUX_RPR_SS1_FAULT
Supply Solenoid 2 fault bit (Flag)	MUX_RPR_SS2_FAULT
Supply Solenoid 3 fault bit (Flag)	MUX_RPR_SS3_FAULT
Bleed Solenoid fault bit (Flag)	MUX_RPR_BS_FAULT
Flow Control Solenoid fault bit (Flag)	MUX_RPR_FCS_FAULT

DIAGNOSTIC TROUBLE CODES

All diagnostic trouble codes (DTCs) known to be affected by the liquid propane autogas (LPA) system are covered in this manual. For all other DTCs, refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual at www.motorcraft.com.

Code	Description
P0005	Fuel Shutoff Valve “A” Control Circuit/Open
P0090	Fuel Pressure Regulator Circuit/Open
P009B	Fuel Pressure Relief Control Circuit/Open
P009E	Fuel Pressure Relief Control Performance/Stuck Off
P009F	Fuel Pressure Relief Control Stuck On
P0148	Fuel Delivery Error
P0171	System Too Lean (Bank 1)
P0172	System Too Rich (Bank 1)
P0174	System Too Lean (Bank 2)
P0175	System Too Rich (Bank 2)
P0181	Fuel Temperature Sensor “A” Circuit Range/ Performance
P0182	Fuel Temperature Sensor “A” Circuit Low
P0183	Fuel Temperature Sensor “A” Circuit High
P019F	Fuel Vapor Pressure Excessive - Low
P0190	Fuel Rail Pressure Sensor Circuit (Bank 1)
P0192	Fuel Rail Pressure Sensor Circuit Low (Bank 1)
P0193	Fuel Rail Pressure Sensor Circuit High (Bank 1)
P01A0	Alternate Fuel Tank “A” Pressure Sensor Circuit Low
P01A1	Alternate Fuel Tank “A” Pressure Sensor Circuit High
P01A2	Alternative Fuel Tank “A” Pressure Sensor Circuit Intermittent/Erratic
P01AC	Alternate Fuel Tank Temperature Sensor Circuit Low
P01AD	Alternate Fuel Tank Temperature Sensor High
P01AE	Alternate Fuel Tank Temperature Sensor Circuit Intermittent/Erratic
P025A	Fuel Pump Module “A” Control Circuit/Open
P025B	Fuel Pump Module “A” Control Circuit Range/ Performance
P027B	Fuel Pump Module “B” Control Circuit Range/ Performance
P03xx	Misfire
P0442	EVAP System Leak Detected (small leak)
P0443	EVAP System Purge Control Valve “A” Circuit
P0446	EVAP System Vent Control Circuit
P0451	EVAP System Pressure Sensor/Switch Range/ Performance
P0452	EVAP System Pressure Sensor/Switch Low
P0453	EVAP System Pressure Sensor/Switch High
P0454	EVAP System Pressure Sensor/Switch Intermittent
P0455	EVAP System Leak Detected (large leak)
P0456	EVAP System Leak Detected (very small leak)
Code	**Description**
P0461	Fuel Level Sender “A” Circuit Range/Performance
P0462	Fuel Level Sender “A” Circuit Low
P0463	Fuel Level Sender “A” Circuit High
P0627	Fuel Pump “A” Control Circuit Open
P064A	Fuel Pump Control Module “A”
P1070	Fuel Vapor Pressure Excessive - High
P116E	Fuel Pressure Relief Valve Actuated
P1453	Fuel Tank Pressure Relief Valve Malfunction
P1456	Fuel Tank Temperature Sensor Circuit Malfunction
P2195	Heated Exhaust Gas Oxygen Sensor Stuck
P2197	Heated Exhaust Gas Oxygen Sensor Stuck
P25B0	Fuel Level Sensor “A” Stuck
P25B1	Fuel Level Sensor “B” Stuck
P2632	Fuel Pump “B” Control Circuit/Open
P2665	Fuel Shutoff Valve “B” Control Circuit/Open
P26B3	Fuel Shutoff Valve “A” Control Circuit Performance/ Stuck Off
P26B5	Fuel Shutoff Valve “B” Control Circuit Performance/ Stuck Off
P26EA	Fuel Pump Control Module “B”
U0108	Lost Communication with Alternative Fuel Control Module
U0109	Lost Communication with Fuel Pump Control Module “A”
U016C	Lost Communication with Fuel Pump Control Module “B”
U210B	Lost Communication Between Fuel Pump Control Module “A” and Restraint Control Module
U210C	Lost Communication Between Fuel Pump Control Module “B” and Restraint Control Module

DIAGNOSTIC TROUBLE CODES EXPLAINED

P0005 — Fuel Shutoff Valve "A" Control Circuit Open	
Description	TS circuit fault. The SRM monitors tank solenoid circuit for open and short circuit faults.
Possible Causes	• Short to voltage • Water in the harness connector • Open power circuit • Open GND circuit • Low battery voltage • Corrosion • Incorrect connections • Damaged TS coil • Blown fuse
Symptom	Vehicle does not start. The pumps run but no pressure builds in the fuel rail.
Diagnostic Aid	Check the FRPCM and SRM electrical connectors for damage, corrosion and water intrusion.
Action	Refer to the Tank Solenoid Electrical Check procedure in Diagnostic Tests and Procedures.

P0090 — Fuel Pressure Regulator Circuit Open	
Description	FCS circuit fault. SRM monitors FCS circuit for open and short circuit faults.
Possible Causes	• Short to voltage • Water in the harness connector • Open power circuit • GND circuit • Low battery voltage • Corrosion • Incorrect connections • Damaged FCS coil • Blown fuse
Symptom	Fuel pressure in the rail does not change when commanded. Extended fuel rail flush time.
Diagnostic Aid	Check the flow control solenoid electrical connector for damage, corrosion and water intrusion.
Action	Refer to the flow control solenoid procedure in Tank Solenoid Electrical Check.

P009B — Fuel Pressure Relief Control Circuit Open	
Description	Bleed solenoid circuit fault. The SRM monitors bleed solenoid circuit for open and short circuit faults.
Possible Causes	• Short to voltage • Water in the harness connector • Open power circuit • Open GND circuit • Low battery voltage • Corrosion • Incorrect connections • Damaged BS coil
Symptom	Fuel rail bleed system does not operate correctly. There is a potential for fuel odor or hard start.
Diagnostic Aid	Check the FRPCM and SRM electrical for damage, corrosion and water intrusion.
Action	Refer to the Fuel Rail Pressure Control Module Electrical Check procedure in Diagnostic Tests and Procedures.

P009E/P26B3 — Fuel Pressure Relief Control Performance Stuck Off/Fuel Shutoff Valve "A" Control Circuit Performance Stuck Off	
Description	Fuel rail failed to bleed. The PCM measures fuel rail pressure on key-up to determine if fuel rail has been properly bled.
Possible Causes	• BS did not open • FRPCM check valve leaked (P26B3) • FRPCM supply solenoid leaked (P26B3) • Bleed port (bleed rate restrictor in outlet to VMV) clogged • EVAP line kinked • Blown fuse
Symptom	Fuel pressure present in the fuel rail after bleed event should have occurred; this may result in hard starts.
Diagnostic Aid	Check that FRPCM bleeds fuel from rail. Leaks to FRPCM can also trigger a fault.
Action	Refer to the Fuel System Fails to Bleed procedure in Diagnostic Tests and Procedures.

P009F — Fuel Pressure Relief Control Circuit Stuck On	
Description	Bleed solenoid stuck open. While the engine is running, the PCM seals the EVAP system and checks for a rise in pressure. If pressure in the EVAP system exceeds the threshold, a fault is set.
Possible Causes	• Bleed Solenoid short to GND (ground) • Armature stuck in post • Solenoid seal compromised
Symptom	There is a potential fuel odor. This is MIL setting fault to aid the technician in diagnosing a possible fuel system fault.
Diagnostic Aid	Evap lines are frosted when solenoid is stuck open.
Action	Refer to the Fuel Rail Pressure Control Module Electrical Check procedure in Diagnostic Tests and Procedures.

P0148 — Fuel Delivery Error	
Description	To maintain target fuel rail pressure increase, the fuel pump voltage has been increased to a maximum adaptive limit and the fuel trims have gone lean.
Possible Causes	• Severely restricted fuel filter • Severely restricted fuel supply line • Damaged or worn fuel pump • Fuel pump wiring or fuse faults • Excess flow valve tripped • Tank supply solenoid or FRPCM supply solenoid closed • Tank manual shutoff valve not completely open
Symptom	Vehicle hesitation or stall condition.
Diagnostic Aid	This is a non-MIL setting DTC to aid the technician in diagnosing a possible fuel system fault. Do not diagnose if no symptoms or other fault codes are present.
Action	If other fault codes are present, diagnose those first. If symptoms are present, refer to diagnostic flow chart for that vehicle symptom.

P0171, P0174 — System Too Lean (Bank 1 and Bank 2 respectively)	
Description	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for more descriptive information.
Possible Causes	• The LPA system was operated in the vapor region • Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	—
Diagnostic Aid	Verify that no LPA system faults are present and then follow the Ford Powertrain Control/Emissions Diagnosis Service Manual procedure.
Action	Refer to the Engine Stumble, Stall, Rough Idle AND Fuel Pressure Drop procedure in Diagnostic Tests and Procedures.

P0172, P0175 — System Too Rich (Bank 1 and Bank 2 respectively)	
Description	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for more descriptive information.
Possible Causes	• The LPA system was operated in the vapor region • Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	—
Diagnostic Aid	Verify that no LPA system faults are present and then follow the Ford Powertrain Control/Emissions Diagnosis Service Manual procedure.
Action	Refer to the Engine Stumble, Stall, Rough Idle AND Fuel Pressure Drop procedure in Diagnostic Tests and Procedures.

P0181 — Fuel Temperature Sensor “A” Circuit Range/Performance	
Description	The SRM reads the IPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between IPTS and SRM • Short in harness • Short in harness • Open circuit • Open or short to voltage in harness • Incorrect harness connection • Damaged IPTS • IPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the fuel rail temperature PID value to determine open or short.
Action	Refer to the Injection Pressure Temperature Sensor Electrical Check procedure in Diagnostic Tests and Procedures.

P0182 — Fuel Temperature Sensor “A” Circuit Low	
Description	The SRM reads the IPTS and passes the voltage reading over the CAN to the PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between IPTS and SRM • Short in harness • VREF open or short • Low ambient temperature operation • Incorrect harness connection • Damaged IPTS (or FTS) • IPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the fuel rail temperature PID value to determine open or short.
Action	Refer to the Injection Pressure Temperature Sensor Electrical Check procedure in Diagnostic Tests and Procedures.

P0183 — Fuel Temperature Sensor “A” Circuit High	
Description	The SRM reads the IPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between IPTS and SRM • Open circuit • Open or short to voltage in harness • Incorrect harness connection • Damaged IPTS (FTS) • IPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the fuel rail temperature PID value to determine open or short.
Action	Refer to the Injection Pressure Temperature Sensor Electrical Check procedure in Diagnostic Tests and Procedures.

P019F— Fuel Vapor Pressure Excessive - Low	
Description	Tank pressure is lower than expected for current temperature.
Possible Causes	• Non HD-5 fuel in tank • Faulty tank pressure temperature sensors (TPTS)
Symptom	Check engine light.
Diagnostic Aid	Resolve any sensor faults prior to diagnosing this code.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P0190 — Fuel Rail Pressure Sensor Circuit	
Description	The SRM reads the IPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between IPTS and SRM • VREF open in harness • VREF open in sensor • Vacuum leaks • IPTS failure • SRM failure
Symptom	—
Diagnostic Aid	VREF should be between 4.5-5.5 volts.
Action	Refer to the Injection Pressure Temperature Sensor Electrical Check procedure in Diagnostic Tests and Procedures.

P0192 — Fuel Rail Pressure Sensor Circuit Low	
Description	The SRM reads the IPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between IPTS and SRM • IPTS FRP signal short to SIG RTN or PWR GND • Damaged IPTS (or FRP) • IPTS failure • SRM failure
Symptom	—
Diagnostic Aid	A FRP PID value during ignition ON, engine OFF, or ignition ON, engine running is less than 0.3 volt. This indicates a concern is present.
Action	Refer to the Injection Pressure Temperature Sensor Electrical Check procedure in Diagnostic Tests and Procedures.

P0193 — Fuel Rail Pressure Sensor Circuit High	
Description	The SRM reads the IPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between IPTS and SRM • IPTS FRP signal short to VREF or VPWR • IPTS (or FRP) open signal • Damaged IPTS (or FRP) • IPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the FRP PID value to determine open or short.
Action	Refer to the Injection Pressure Temperature Sensor Electrical Check procedure in Diagnostic Tests and Procedures.

P01A0 — Alternate Fuel Tank “A” Pressure Sensor Circuit Low	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between TPTS and SRM • VREF open in harness • VREF open in sensor • Vacuum leaks • TPTS failure • SRM failure
Symptom	—
Diagnostic Aid	VREF should be between 4.5-5.5 volts.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P01A1 — Alternate Fuel Tank “A” Pressure Sensor Circuit High	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between TPTS and SRM • TPTS Fuel Pressure signal short to SIG RTN or PWR GND • TPTS (or Fuel Pressure) open signal • Damaged TPTS • TPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the Propane Tank Fuel Pressure PID value to determine open or short.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P01A2 — Alternative Fuel Tank "A" Pressure Sensor Circuit Intermittent/Erratic	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Intermittent wiring fault between TPTS and SRM • TPTS Fuel Pressure intermittent signal short to SIG RTN or PWR GND • TPTS (or Fuel Pressure) intermittent open signal • VREF intermittent open in harness • VREF intermittent open in sensor • Vacuum leaks • Damaged TPTS • TPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the Propane Tank Fuel Pressure PID value to determine open or short.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P01AC — Alternate Fuel Tank Temperature Sensor Circuit Low	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between TPTS and SRM • Short in harness • VREF open or short • Low ambient temperature operation • Incorrect harness connection • Damaged TPTS • TPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the Propane Tank Fuel Pressure PID value to determine open or short.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P01AD — Alternate Fuel Tank Temperature Sensor Circuit High	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Wiring fault between TPTS and SRM • Open circuit • Open or short to voltage in harness • Incorrect harness connection • Damaged TPTS • TPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the Fuel Temperature PID value to determine open or short.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P01AE — Alternative Fuel Tank Temperature Sensor Circuit Intermittent/Erratic	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. The PCM monitors the voltage as if the sensor were plugged into the vehicle.
Possible Causes	• CAN bus fault between the SRM and PCM • Intermittent wiring fault between TPTS and SRM • TPTS Fuel Pressure intermittent signal short to SIG RTN or PWR GND • TPTS (or Fuel Pressure) intermittent open signal • VREF intermittent open in harness • VREF intermittent open in sensor • Vacuum leaks • Damaged TPTS • TPTS failure • SRM failure
Symptom	—
Diagnostic Aid	Verify the Propane Tank Fuel Pressure PID value to determine open or short.
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P025A — Fuel Pump Module “A” Control Circuit/Open	
Description	The Fuel Pump Control Module (FPCM) A receives control commands from the PCM on a Fuel Pump Command (FPC) pin. The FPCM A passes diagnostic information on the CAN bus to the PCM. If the FPCM A does not receive a control command from the PCM on the FPC, it sends a corresponding signal to the PCM on the CAN bus and the fault is set.
Possible Causes	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	Poor starts, rough idle, hesitation/surge.
Diagnostic Aid	—
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

P025B — Fuel Pump Module “A” Control Circuit Range/Performance	
Description	The Fuel Pump Control Module (FPCM) A receives control commands from the PCM on a Fuel Pump Command (FPC) pin. The FPCM A passes diagnostic information on the CAN bus to the PCM. If the FPCM A receives an invalid control command from the PCM on the FPC, it sends a corresponding signal to the PCM on the CAN bus and the fault is set.
Possible Causes	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	—
Diagnostic Aid	
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

P027B — Fuel Pump Module “B” Control Circuit Range/Performance	
Description	The SRM receives the output of the second fuel pump monitor line and repeats the output over the CAN bus to the PCM. The PCM monitors the commanded output versus the monitor’s feedback. If the monitor is out-of-range, a fault is set.
Possible Causes	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	—
Diagnostic Aid	
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

P03xx — Misfire	
Description	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for more descriptive information.
Possible Causes	• The LPA system was operated in the vapor region • Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	—
Diagnostic Aid	Verify no LPA system faults present and follow the Ford Powertrain Control/Emissions Diagnosis Service Manual.
Action	Refer to the Engine Stumble, Stall, Rough Idle AND Fuel Pressure Drop procedure in Diagnostic Tests and Procedures.

P0442 - EVAP System Leak Detected (small leak)	
Description	The Ford PCM has detected a leak in the Evaporative Emissions System (EVAP).
Possible Causes	• Defective vapor management valve • Damaged EVAP canister • Leak in the EVAP system • Defective fuel tank pressure transducer
Symptom	Check engine light.
Diagnostic Aid	The fuel tank pressure transducer has been moved to a bracket near the EVAP canister. The system monitors the lines that go from the FRPCM bleed port to EVAP canister and purge valve. This system is used to de-pressurize the fuel rails after shutdown. The propane tank is sealed and is not part of this system.
Action	Test the EVAP system for leaks or damage.

P0443 - EVAP System Purge Control Valve “A” Circuit	
Description	This DTC sets when the signal moves outside the minimum or maximum limit for the commanded state.
Possible Causes	• VPWR circuit open • EVAPCP circuit open • EVAPCP circuit short to ground • EVAPCP circuit short to voltage • Damaged EVAP purge valve • Damaged PCM
Symptom	Check engine light.
Diagnostic Aid	Purge control valve is located near the rear of the intake manifold. To verify normal function, monitor the EVMV PID or EVAPCP PID and the signal voltage (PCM control side). With the valve closed, the EVMV indicates 0 mA (0% duty cycle for EVAPCP) and voltage approximately equal to battery voltage. When the valve is commanded fully open, EVMV indicates 1,000 mA (100% duty cycle for EVAPCP) and a voltage drop of 3 volts minimum is normal.
Action	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for P0443 diagnostics.

P0446 - EVAP System Vent Control Circuit	
Description	This DTC sets when the signal moves outside the minimum or maximum limit for the commanded state.
Possible Causes	• VPWR circuit open • KAPWR circuit open • CANV circuit open • CANV circuit short to ground • CANV circuit short to voltage • CANV circuit short to KAPWR • Damaged EVAP canister vent valve • Damaged PCM
Symptom	Check engine light.
Diagnostic Aid	Vent control circuit is in the EVAP canister. To verify normal function, monitor the EVAP canister vent valve signal PID EVAPCV and the signal voltage (PCM control side). With the valve open, EVAPCV indicates 0% duty cycle and a voltage approximately equal to battery voltage. When the valve is commanded fully closed, EVAPCV indicates 100% duty cycle, and a minimum voltage drop of 4 volts is normal.
Action	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for P0446 diagnostics.

P0451 - EVAP System Pressure Sensor/Switch Range/Performance	
Description	This DTC sets when a fuel tank pressure (FTP) sensor range (offset) concern is detected. The FTP sensor output is offset by greater than 1.7 inches of water or less than -1.7 inches of water.
Possible Causes	• FTP circuit intermittent open • FTP circuit intermittent short • FTP sensor intermittent open • FTP sensor intermittent short • Contaminated FTP sensor • Damaged FTP sensor • Damaged PCM
Symptom	Check engine light.
Diagnostic Aid	The FTP sensor is located on a bracket near the EVAP canister. With the FTP sensor at atmospheric pressure, the FTP PID normally indicates 0 inches of water. Remove the quick connect hose at the canister that goes to the FTP sensor, wait one minute to allow the pressure to equalize with the ambient air pressure before accessing the PID.
Action	Refer to ROUSH CleanTech wiring schematics.

P0452 - EVAP System Pressure Sensor/Switch Low	
Description	This DTC sets when the fuel tank pressure (FTP) sensor signal average drops below a minimum allowable calibrated parameter.
Possible Causes	• Contamination internal to the FTP sensor connector • FTP circuit open • VREF circuit open • FTP circuit short to ground • FTP circuit short to SIGRTN • Damaged FTP sensor
Symptom	Check engine light.
Diagnostic Aid	The FTP sensor is located on a bracket near the EVAP canister. An FTP voltage PID reading less than 0.22 volt in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.
Action	Refer to ROUSH CleanTech wiring schematics.

P0453 - EVAP System Pressure Sensor/Switch High	
Description	This DTC sets when the fuel tank pressure (FTP) sensor signal average jumps above a maximum allowable calibrated parameter.
Possible Causes	• Contamination internal to the FTP sensor connector • FTP circuit open • VREF circuit open • FTP circuit short to ground • FTP circuit short to SIGRTN • Damaged FTP sensor
Symptom	Check engine light.
Diagnostic Aid	The FTP sensor is located on a bracket near the EVAP canister. An FTP voltage PID reading more than 4.85 volt in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.
Action	Refer to ROUSH CleanTech wiring schematics.

P0454 - EVAP System Pressure Sensor/Switch Intermittent	
Description	This DTC sets when the fuel EVAP system pressure changes greater than 14 inches of water in
	0.1 seconds.
Possible Causes	• Contamination internal to the FTP sensor connector • FTP circuit open • VREF circuit open • FTP circuit short to ground • FTP circuit short to SIGRTN • Damaged FTP sensor
Symptom	Check engine light.
Diagnostic Aid	The FTP sensor is located on a bracket near the EVAP canister. Monitor the FTP PID and note if it changes +/- 15 inches of water multiple times in 1 minute.
Action	Refer to ROUSH CleanTech wiring schematics.

P0455 - EVAP System Leak Detected (large leak)	
Description	The PCM monitors the complete evaporative emission (EVAP) control system for no purge flow, the presence of a large fuel vapor leak, or multiple small fuel vapor leaks. This DTC sets when no purge flow, which is attributed to fuel vapor blockages or restrictions, a large fuel vapor leak, or multiple fuel vapor leaks are detected by the EVAP running loss monitor test with the engine running, but not at idle.
Possible Causes	• Disconnected or cracked fuel EVAP canister tube, EVAP canister purge outlet tube, or EVAP return tube • EVAP purge valve stuck closed • Slow responding EVAP purge valve • Blockages or restrictions in the fuel vapor hoses or tubes • Loose fuel vapor hose or tube connections to the EVAP system components • EVAP canister vent valve stuck open • Damaged fuel tank pressure (FTP) sensor • Damaged EVAP canister
Symptom	Check engine light.
Diagnostic Aid	The fuel tank pressure transducer has been moved to a bracket near the EVAP canister. The system monitors the lines that go from the FRPCM bleed port to EVAP canister and purge valve. This system is used to de-pressurize the fuel rails after shutdown. The propane tank is sealed and is not part of this system.
Action	Check for audible vacuum noise in the engine compartment or near the EVAP canister with engine running.

P0456 - EVAP System Leak Detected (very small leak)	
Description	The Ford PCM has detected a leak in the Evaporative Emissions System (EVAP).
Possible Causes	• Very small holes or breaks in the fuel vapor hoses or tubes • Loose fuel vapor hose or tube connections to the EVAP system components • EVAP system component seals leaking • Damaged wiring to the EVAP purge control valve
Symptom	Check engine light.
Diagnostic Aid	The fuel tank pressure transducer has been moved to a bracket near the EVAP canister. The system monitors the lines that go from the FRPCM bleed port to EVAP canister and purge valve. This system is used to de-pressurize the fuel rails after shutdown. The propane tank is sealed and is not part of this system.
Action	Check for loose or damaged vapor hoses. Visually inspect the EVAP canister inlet port, EVAP canister vent valve filter, and EVAP canister vent hose assembly for contamination or debris.

P0461 — Fuel Level Sender “A” Circuit Range/Performance	
Description	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for more descriptive information.
Possible Causes	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual. Causes are the same except that communication is between the sender and the SRM and not the IPC.
Symptom	—
Diagnostic Aid	The SRM reads fuel level sender input and broadcasts it to the IPC and PCM.
Action	Refer to the Fuel Level Indication System Check procedure in Diagnostic Tests and Procedures.

P0462 — Fuel Level Sender “A” Circuit Low	
Description	This DTC sets when the Fuel Level Gauge signal is electrically less than the minimum allowable sender value.
Possible Causes	• Fuel level sender wiring shorted to ground • Damaged Fuel Level Sender • Smart Relay Module
Symptom	P0462 — Fuel gauge may read empty all the time P2067 — Fuel gauge will only show primary tank
Diagnostic Aid	Smart Relay Module (SRM) reads fuel level sender and broadcasts to the PCM and Instrument Cluster.
Action	Refer to the following tests located later in this manual. • SRM Electrical Test • Fuel Level Indication System Check

P0463 — Fuel Level Sender “A” Circuit High	
Description	This DTC sets when the Fuel Level Gauge signal is electrically less than the minimum allowable sender value.
Possible Causes	• Fuel level sender wiring is disconnected or shorted to above 5 volts • Damaged Fuel Level Sender • Smart Relay Module
Symptom	P0463 — Fuel gauge may read full all the time P2068 — Fuel gauge will only show primary tank
Diagnostic Aid	Smart Relay Module (SRM) reads fuel level sender and broadcasts to the PCM and Instrument Cluster.
Action	Refer to the following tests located later in this manual. • SRM Electrical Test • Fuel Level Indication System Check

P0627 — Fuel Pump "A" Control Circuit Open	
Description	The Fuel Pump Control Module (FPCM) A diagnoses faults of fuel pump A. The FPCM A passes diagnostic information on the CAN bus to the PCM. If the PCM receives a FPCM A signal indicating a fuel pump problem, the fault is set.
Possible Causes	• Wiring fault between FPCM A and fuel pump A • Open circuit • FPCM A fault • CAN fault • Faulty fuel pump
Symptom	—
Diagnostic Aid	
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

P064A — Fuel Pump Control Module "A"	
Description	The Fuel Pump Control Module (FRPCM) A has its own internal diagnostics. The FPCM A passes diagnostic information on the CAN bus to the PCM. If the PCM receives a FPCM A signal indicating an internal problem, the fault is set.
Possible Causes	• FPCM A fault • CAN fault
Symptom	—
Diagnostic Aid	
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

P1070 — Fuel Vapor Pressure Excessive - High	
Description	Tank pressure is higher than expected for current temperature.
Possible Causes	• Non HD-5 fuel in tank • Residual nitogen or air left in tank after fuel purge • Faulty tank pressure temperature sensors (TPTS)
Symptom	• Stumble stall and lack of power in high temperature operation • Slow refueling • Runs rough
Diagnostic Aid	Resolve any sensor faults prior to diagnosing this code.
Action	Refer to the P1070 DTC Pinpoint Test procedure in the Diagnostic Tests and Procedures.

P116E — Fuel Pressure Relief Valve Actuated	
Description	Maximum injection pressure reached. The PCM monitors fuel rail pressure and battery voltage. Based on these measurements, the PCM adjusts fuel pump speed to stay below the maximum operating pressure of the injectors.
Possible Causes	• Operating the vehicle in high ambient conditions • Vehicle operated in a low voltage condition
Symptom	Vehicle hesitation, stall, rough idle, misfire or no start.
Diagnostic Aid	The P116E code is meant as an indication that the fuel system was operated at the limits of the system. The customer may have experienced drive issues although the system is performing as expected.
Action	Refer to the Maximum Pressure Check procedure in Diagnostic Tests and Procedures.

P1453 — Fuel Tank Pressure Relief Valve Malfunction	
Description	The SRM reads the TPTS and passes the voltage reading over the CAN bus to the PCM. If the pressure value of the propane fuel tank approaches the Pressure Relief Valve “pop-off” pressure, a fault is set.
Possible Causes	• High ambient temperature operation • Propane tank fill is contaminated with nitrogen or other constituents • Vehicle is parked over heat source • Tank Pressure Temperature Sensor shorted or reading higher than expected values • Overfill prevention device allowed tank to overfill
Symptom	The driver is alerted with a coolant gauge High setting until the fault condition clears.
Diagnostic Aid	Use mechanical pressure gauge to check tank pressure and an inferred temp gun to check tank temperature. Can also cause a P1285 to set due to failsafe cooling being on, diagnose P1453 first.
Action	Check for other diagnostic fault codes such as Tank Pressure or Temperature P01A1 or P01AD and correct them first. Refer to the Maximum Pressure Check procedure in Diagnostic Tests and Procedures.

P1456 — Fuel Tank Temperature Sensor Circuit Malfunction	
Description	Propane tank sensor when it is inconsistent with the Intake Air Temperature (IAT11_ENG), Rail Temperature (RF_RAILTEMP), and Tank Temperature (RPR_PT_TEMP) rationality check after six hour cold soak.
Possible Causes	Wiring concerns Defective tank pressure temperature sensor
Symptom	Check engine light possible. Possible engine performance issues.
Diagnostic Aid	—
Action	Refer to the Tank Pressure Temperature Sensor Electrical Check procedure in the Diagnostic Tests and Procedures.

P2195, P2197 — Heated Exhaust Gas Oxygen Sensor Stuck	
Description	Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for more descriptive information.
Possible Causes	• The LPA system was operated in the vapor region • Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	—
Diagnostic Aid	Verify that no LPA system faults are present and then follow the Ford Powertrain Control/Emissions Diagnosis Service Manual procedure.
Action	Refer to the Fuel Pressure Drop Check procedure in Diagnostic Tests and Procedures.

P25B0 — Fuel Level Sensor “A” Stuck	
Description	The SRM reads Fuel Level Sender (FLS) input and broadcasts it to the IPC and PCM. If the vehicle is driven a considerable distance and the FLS value doesn’t change, the fault is set.
Possible Causes	• Wire fault between FLS and SRM • Defective fuel level sender or sender Twinsight • SRM fault
Symptom	The driver is unaware of a low fuel condition.
Diagnostic Aid	
Action	Refer to the Fuel Level Indication System Check procedure in Diagnostic Tests and Procedures.

P25B1 — Fuel Level Sensor “B” Stuck	
Description	The SRM monitors the fuel level position on the driver and passenger side fuel tanks while commanding a fuel transfer to occur. If the SRM sees that the fuel level in the driver side tank is not increasing while the passenger side tank fuel level is decreasing, it will stop the transfer, set a P25B1 code and try again. After three failed attempts, the fuel level on the cluster will decrease to its usable amount (driver’s side tank only) to notify the driver there is an issue with the transfer system.
Possible Causes	• Defective fuel level sender or sender Twinsight • Transfer OPD stuck closed • Passenger tank supply valve fault • Weak or defective fuel pump • SRM fault • Wiring concern
Symptom	The driver will notice the fuel gauge on the dash drop to approximately half of its previous amount or the fuel gauge in the IPC only goes to half after the vehicle is filled.
Diagnostic Aid	Smart Relay Module (SRM) reads both fuel level signals and determines when to set the fault based on changes in fuel level.
Action	Refer to the F-650/F-750 Dual Tank Transfer Pin Point Test procedure.

P2632 — Fuel Pump “B” Control Circuit/Open	
Description	The Fuel Pump Control Module (FPCM) B diagnoses faults of fuel pump B. The FPCM passes the information to the SRM on a dedicated circuit. The SRM then sends the diagnostic information to the PCM over the CAN network.
Possible Causes	• Wiring fault between FPCM A and fuel pump A • Open circuit • FPCM A fault • CAN fault • Faulty fuel pump
Symptom	—
Diagnostic Aid	—
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

P26B5 — Fuel Shutoff Valve “B” Control Circuit Performance/Stuck Off	
Description	The SRM monitors fuel rail pressure before and after the start sequence is initiated. If the fuel rail pressure rise is below a threshold, the fault is set.
Possible Causes	• Excess flow valve activated • Fuel pumps weak or inoperable • Manual shutoff valve not fully open • Tank supply solenoid not opening • FRPCM supply solenoid not opening • Restricted supply line filter • Kinked or restricted fuel lines • IPTS or TPTS signal inaccurate • Blown fuse
Symptom	The vehicle will crank no start or start and run poorly. Start sequence will be extended and fuel pumps and supply solenoids will be commanded on and off multiple times, attempting to build rail pressure.
Diagnostic Aid	Check Measuring Fuel Rail and Fuel Tank Pressure procedure.
Action	Refer to the Engine Cranks, No Start procedure in Diagnostic Tests and Procedures.

P2665 — Supply Solenoid Circuit Fault	
Description	FRPCM supply solenoid circuit fault. SRM monitors supply solenoid circuit for open and short circuit faults
Possible Causes	• Short to voltage • Water in the harness connector • Open power circuit • Open GND circuit • Low battery voltage • Corrosion • Incorrect connections • Damaged SS coil • Blown fuse
Symptom	Vehicle does not start. The pumps run but no pressure builds in the fuel rail.
Diagnostic Aid	Check the FRPCM and SRM electrical connectors for damage, corrosion and water intrusion.
Action	Refer to the Fuel Rail Pressure Control Module Electrical Check procedure in Diagnostic Tests and Procedures.

P26EA — Fuel Pump Control Module “B”	
Description	The Fuel Pump Control Module (FPCM) B diagnoses faults of fuel pump B. The FPCM passes the information to the SRM on a dedicated circuit. The SRM then sends the diagnostic information to the PCM over the CAN network.
Possible Causes	• FPCM B fault • CAN fault • Open fuel pump monitor 2 circuit (FPM2)
Symptom	—
Diagnostic Aid	—
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure in Diagnostic Tests and Procedures.

U0108 — Lost Communication with Alternative Fuel Control Module	
Description	Lost communication with SRM. The PCM monitors CAN bus communication for missing messages from the SRM. If the messages are continuously missing, a fault is set.
Possible Causes	• Wiring between the SRM and PCM • SRM lacks power • Blown fuse • SRM loses power or ground
Symptom	Rough idle.
Diagnostic Aid	Check the FRPCM and SRM electrical connectors for damage, corrosion and water intrusion. Check for power at the SRM.
Action	Refer to the Smart Relay Module Electrical Check procedure in Diagnostic Tests and Procedures.

U0109, U016C — Lost Communication with Fuel Pump Control Module A/B	
Description	The SRM repeats the signal from the second EFPR to the PCM over the CAN bus. The PCM monitors this communication. If there is a lack of communication for a long enough period of time, a fault is set.
Possible Causes	• Wire fault between the EFPR and SRM • Wire fault between SRM and PCM • **No** power to the EFPR • SRM fault • CAN bus fault • Faulty EFPR • Blown fuse • Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for a list of other causes.
Symptom	Crank, no start, rough idle or lack of power.
Diagnostic Aid	—
Action	Refer to the Fuel Pump Control Module Electrical Continuity Test procedure and also the Smart Relay Module Electrical Check procedure in Diagnostic Tests and Procedures.

U210B — Lost Communication Between Fuel Pump Control Module “A” and Restraint Control Module	
Description	The FPCM A constantly receives either an OK signal or a disable signal from the RCM on a dedicated “disable” wire. The FPCM A passes diagnostic information on the CAN bus to the PCM. If the FPCM A fails to receive a signal from the RCM, the FPCM A passes a signal, indicating it lost communication with the RCM, to the PCM and the fault is set.
Possible Causes	• Wire fault between EFPR “A” and RCM • Wire fault between SRM and PCM • **No** power to the EFPR “A” • SRM fault • CAN fault • Blown fuse • RCM failure • EFPR “A” failure
Symptom	—
Diagnostic Aid	—
Action	—

U210C — Lost Communication Between Fuel Pump Control Module “B” and Restraint Control Module	
Description	The FPCM B constantly receives either an OK signal or a disable signal from the RCM on a dedicated “disable” wire. The FPCM B passes diagnostic information on the CAN bus to the SRM. The SRM passes that diagnostic information on the CAN bus to the PCM. If the FPCM B fails to receive a signal from the RCM, the FPCM B passes a signal, indicating it lost communication with the RCM, to the SRM. The SRM passes that signal on the CAN bus to the PCM and the fault is set.
Possible Causes	• Wire fault between EFPR “B” and RCM • Wire fault between SRM and PCM • No power to the EFPR “B” • SRM fault • CAN fault • Blown fuse • RCM failure • EFPR “B” failure
Symptom	—
Diagnostic Aid	—
Action	—

DIAGNOSTICS AND PINPOINT TESTS

General Information

Under normal operating conditions, fuel pumps will operate at variable speeds. Fuel pump duty cycle will vary to maintain liquid in the fuel rails under different temperatures and operating conditions.

The fuel pressure controls are designed to keep the rails at a certain pressure over tank pressure, therefore, it is important to measure tank pressure prior to collecting fuel rail pressure data. For example, if the fuel tank is at 150 psi (1034 kPa) and pressure in the rail is measured at 200 psi (1379 kPa), the rail is running at 50 psi (345 kPa) over tank.

Fuel rail pressure should maintain a minimum of 30 psi over tank under normal operating conditions, and will increase based on fuel system demand.

On a tank at ambient temperature conditions, the following pressures can be expected:

Temperature (°F)	Pressure (psi)		
	Min.	Nominal	Max.
0	15	25	35
5	19	29	39
10	23	33	43
15	28	38	48
20	33	43	53
25	38	48	58
30	43	53	63
35	49	59	69
40	55	65	75
45	62	72	82
50	69	79	89
55	77	87	97
60	84	94	104
65	93	103	113
70	102	112	122
75	111	121	131
80	121	131	141
85	131	141	151
90	142	152	162
95	153	163	173
100	165	175	185
105	178	188	198
110	191	201	211
115	205	215	225
120	219	229	239

Note: On vehicles that have been operated for extended periods of time, the tank (fuel) can be much warmer and so higher pressures are to be expected.

Fuel Tank Pressure, Fuel Rail Pressure, Fuel Rail Target Pressure, and Duty Cycle Using the Roush Diagnostic Tool (RDT)

Measuring Fuel Tank Pressure

Method 1: Mechanical

1. Install a 0–500 psi (0–3447 kPa) fuel pressure gauge on the Bleeder Valve at the tank or to the remote Bleeder Valve location.
2. Open the valve to monitor the fuel tank pressure.
3. Record the value and close the valve.

Method 2: Using RDT

1. Follow Steps 1-3 from Accessing Functions in RDT.
2. After the vehicle information has been shown and verified, select the Signals/Datalogger tab.
3. Select the **Rpr_pt_prs** PID from the screen and click on Start and record the value.

Method 3. Ford IDS or generic scan tool in Mode 1 ODB-II data

1. Start vehicle and let run for ten (10) seconds.
2. Key vehicle off and then back to on.
3. Immediately monitor Fuel Rail pressure (FRP).

Measuring Fuel Rail Pressure

Method 1: Mechanical

1. Refer to the Fuel Line Purging Procedure in the appropriate service manual and empty the fuel rails and fuel lines.
2. Disconnect the fuel supply line at the rear of the RH fuel rail.
3. Install the ROUSH service port adapter between the fuel line and the fuel rail.
4. Attach 0–500 psi (0–3447 kPa) fuel pressure gauge to the service port on the adapter and record the value.

Method 2: RDT

1. Follow Steps 1-3 from Accessing Functions in RDT..
2. After the vehicle information has been shown and verified, select the Signals/Datalogger tab.
3. Select the **rpr_fr_prs** PID from the screen and click on Start.
4. Record the value.

Method 3. Ford IDS or generic scan tool in Mode 1 ODB-II data

1. Start vehicle and let run for ten (10) seconds.
2. Immediately monitor Fuel Rail pressure (FRP).

Measuring Fuel Rail Target Pressure

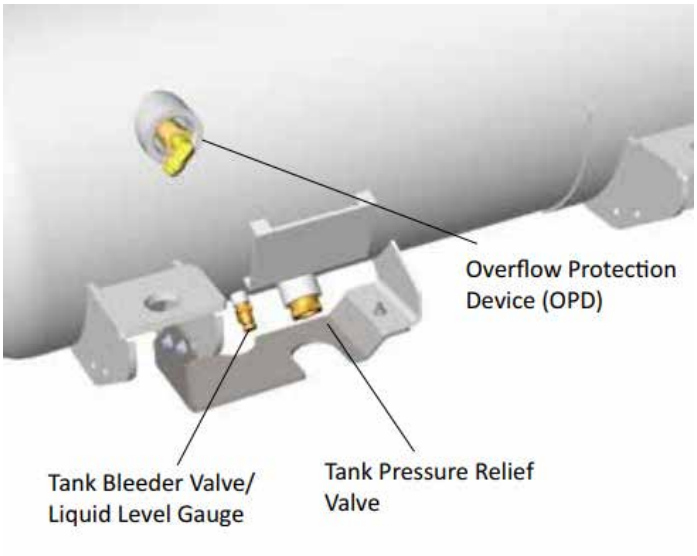
If using a generic scan tool, you won't be able to collect Fuel Rail Target Pressure. If using Ford IDS, Fuel Pump Duty Cycle needs to be multipled by 2.

1. Follow Steps 1-3 from Accessing Functions in RDT..
2. After the vehicle information has been shown and verified, select the Signals/Datalogger tab.
3. Select the **rpr_fr_prs_tgt** PID from the screen and click on Start.
4. Record the value.

Measuring Duty Cycle

1. Follow Steps 1-3 from Accessing Functions in RDT..
2. After the vehicle information has been shown and verified, select the Signals/Datalogger tab.
3. Select the **rf_dc** PID from the screen and click on Start.
4. Record the value.

Pinpoint Test A: No Fill



Step	Procedure	Action
1	**Verify that the vehicle is not full of fuel.** a. Does the fuel cluster show less than 3/4? Does the Sending Unit/Twinsight show less than 3/4 tank?	**Yes** — Go to step 2. **No** — Re-attempt when fuel is less than 3/4.
2	**Check for sufficient fill station pressure.** a. Connect pressure gauge service tool to the vehicle fuel Tank Bleeder Valve and record pressure. b. Locate output pressure gauge on stations. c. Connect and attempt to fill vehicle. d. Ensure turning on station pump before opening nozzle. If not, station Excess Flow Valve (EFV) may be tripped. Is fill station pump pressure at least 25 psi (172 kPa) greater than tank pressure?	**Yes** — Go to Step 3. **No** — Go to Step 8.
3	**Check if Fill Valve O-ring is damaged or missing (threaded ACME Fill Valve only).** Is the O-ring damaged or missing?	**Yes** — Replace damaged or missing O-ring. **No** — Go to step 4.
4	**Open the Bleeder Valve.** Is there a sustained liquid (opaque white mist) for more than ten (10) seconds? **Warning: When liquid propane is released from a pressurized vessel, it rapidly evaporates, creating a refrigeration effect that can cause frostbite. Wear non-porous, cold-safe gloves, eye protection, and ear protection during venting and repair operations. Keep moisture away from the valves. Failure to heed this warning can result in personal injury.**	**Yes** — Refer to Fuel Level Sender Electrical Test. **No** — Go to step 5.
5	**Inspect vehicle to check for kinked or damaged fill lines** Are fill lines kinked installed incorrectly?	**Yes** — Replaced kinked fill lines. **No** — Go to Step 6.
6	**Inspect Fill Filter to ensure correct orientation** Is Fill Filter installed incorrectly?	**Yes** — Install Fill Filter with correct orientation. **No** — Go to step 7.
7	**Inspect OPD for correct orientation. Correct installation of the OPD will find the "Top" mark at the 12 o'clock position.** Is the OPD installed incorrectly?	**Yes** — Refer to OPD Installation Procedure in the appropriate vehicle service manual and install new OPD. **No** — Call ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2.

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8	**Check fuel station differential pressure (the pressure before and after the fuel station pump). The fuel station differential pressure should be below 125 psi.** Is the differential pressure greater than 125 psi?	**Yes** — Contact propane provider to adjust fuel station pump pressure. **No** — Go to step 9.
9	**Check fuel tank temperature and compare against the chart for tank temperature using an infrared temperature gun.** Does the temperature and pressure differ from the chart above?	**Yes** — Call ROUSH CleanTech Customer Success (800) 59-ROUSH (597-6874), Opt. 2. **No** — Allow vehicle to cool and then retest. If still no, contact ROUSH CleanTech Customer Success (800) 59-ROUSH (597-6874), Opt. 2.

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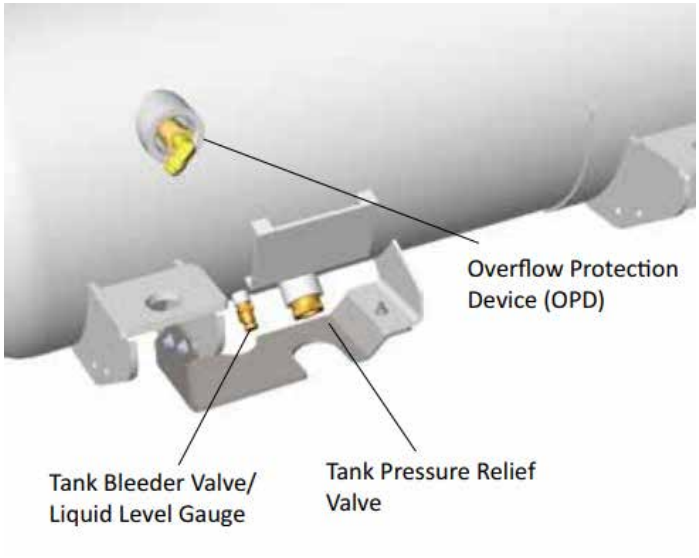
Pinpoint Test B: Slow Fill



Step	Procedure	Action
1	**Determine flow rate at which the vehicle fuel system fills.** a. Time the fill station pump for 10 seconds and record the number of gallons dispensed. b. Multiply the gallons dispensed by six to determine the flow rate in gallons per minute. Is the fill station pump flow rate at least 6 gal (23 L) per minute?	**Yes** — System fill rate is OK; diagnostic is complete. **No** — Fill station is not providing enough pressure to fill vehicle tank. Go to Step 2.
2	**Measure and compare vehicle fuel tank and fill station pressures.** a. Connect a pressure gauge service tool to the fuel Tank Bleeder Valve and record fuel tank pressure. b. Locate output pressure gauge on stations. c. With the dispensing pump on and dispensing nozzle open, measure and record fill station pump pressure. Is fill station pump pressure at least 50 psi (345 kPa) greater than fuel tank pressure?	**Yes** — Go to next step. **No** — Fill station is not providing enough pressure to fill vehicle tank. Go to (path pressure not OK).
3	**Check Fuel Fill Valve; it may not be opening completely.** a. Loosen the fuel fill line connection at the Fill Valve or at the inlet to the fuel filter to relieve any pressure in the fill line. b. Attempt to push open the piston in the Fill Valve to determine if it is opening completely. Piston should travel 1/4 inch. Is the Fill Valve piston opening completely?	**Yes** — Go to next step. **No** — Replace Fill Valve and retest. If persists, move to next step.
4	**Inspect vehicle to check for kinked fill lines.** Are fill lines kinked?	**Yes** — Replaced kinked fill lines. **No** — Go to next step.
5	**Replace the filter in the fuel fill line.** Does the vehicle fuel tank fill at greater than six gal (23 L) per minute?	**Yes** — Diagnostic is complete. **No** — Go to next step.

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6	**Replace the overfill protection device (OPD) valve in the vehicle fuel tank.** **Note: Perform *Fuel Tank Purging* procedure prior to testing. See fiService Manual for vehicle for more information on the *Fuel Tank Purging* procedure.** Does the vehicle fuel tank fill at greater than six gal (23 L) per minute?	**Yes** — Diagnostic is complete. **No** — Call ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2.
7	**Check fuel station differential pressure (the pressure before and after the fuel station pump). The fuel station differential pressure should be below 125 psi.** Is the differential pressure greater than 125 psi?	**Yes** — Contact propane provider to adjust fuel station pump pressure. **No** — Go to next step.
8	**Check fuel tank temperature and compare against the chart for tank temperature. Check fuel tank temperature using an infrared temperature gun.** Does the temperature and pressure differ from the chart on page 23?	**Yes** — Call ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2. **No** — Allow vehicle to cool and then retest. If still no, call ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2.

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Pinpoint Test C: OPD Test

Note: Test must be performed when the vehicle has less than 50% fuel level, as indicated on the cluster.

Step	Procedure
1	Locate the vehicle propane tank data plate and reference the tank volume, often listed as W.C. (water capacity).
2	Calculate 5% of the W.C. This is the number of gallons the vehicle can fuel once liquid is visible at the Bleeder Valve.
3	Park the vehicle at a fill station or near a refueling truck on level ground. Place a level on the frame rail or tank to ensure it is level.
4	Connect the fill nozzle to the vehicle Fill Valve.
5	Open the vehicle Bleeder Valve. You should have clear vapor emitting from the valve.
6	Begin filling per the refueling station manufacturer's procedure.
7	Once liquid (seen as a white mist) is visible at the Bleeder Valve, note the number of gallons filled. Fueling should stop before the calculated 5% volume is reached. If additional 5% is reached, stop fueling as vehicle is over filling and contact ROUSH CleanTech Customer Success (800) 59-ROUSH (597-6874), Opt. 2.
8	Turn off the fuel pump and close the Bleeder Valve.
9	Disconnect the nozzle and replace the fill cap.

Example: A functioning OPD on a tank with a 100 gallon WC will stop before five (5) gallons (100 WC x .05 = 5) have been added after the mist is visible.

Note: OPD might stop before white mist is visible at the Bleeder Valve. This is normal as long as fuel gauge at the instrument cluster reads Full. The tank may have stopped filling before consistent liquid was visible at the bleeder valve. This indicates normal operation.

Note: If PRV is leaking or has been activated, replace PRV.

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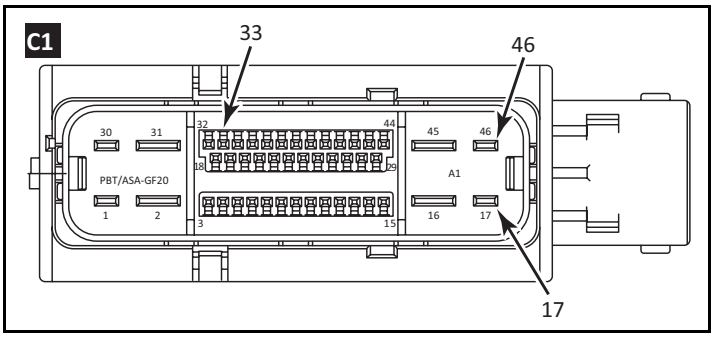
Pinpoint Test D: Engine Does Not Crank



Connector End View

Step	Procedure	Action
1	**Is battery voltage above 10 volts?**	**Yes** — Go to Step 2. **No** — Determine cause of low battery voltage.
2	**Verify that the Smart Relay Module (SRM) has communication. The SRM is located underhood on the driver's side.** Can fuel rail pressure and temperature be read with a scan tool?	**Yes** — Go to Step 3. **No** — Go to the Smart Relay Module Electrical Test procedure.
3	**Refer to the Ford Powertrain Control/Emission Diagnosis Service Manual.** Is the problem corrected?	**Yes** — Diagnostic is complete. **No** — Call ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2.

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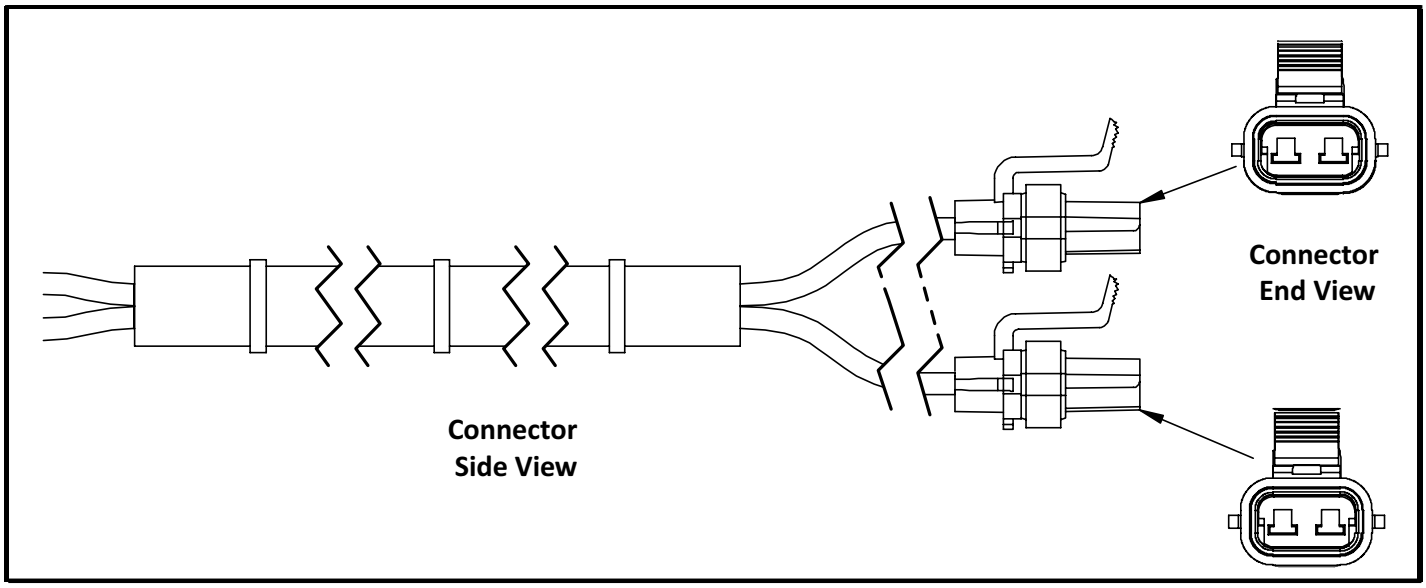
Pinpoint Test E: Engine Cranks, No Start

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.

Note: If vehicle will restart when cold, but won't restart after stall when hot, go to Pinpoint Test F



Step	Procedure	Action
1	**Perform a visual inspection to verify the following:** a. Is there is at least 1/8 tank of fuel or more? (add fuel if necessary). b. Is the tank supply manual shutoff valve fully open? c. Is battery voltage above 12.5 volts? d. Are fuel lines free of kinks or damage? e. Inspect all fuses in both the Ford and ROUSH fuse boxes.	**Yes** — Go to Step 2. **No** — Correct the fault and retry.
2	**Record any Diagnostic Trouble Codes (DTCs).** Are any codes present?	**Yes** — If ROUSH circuit faults are set, refer to the Diagnostic Trouble Code list earlier in this manual. If non-fuel system related faults are set, refer to Ford Powertrain Control/ Emissions Diagnostics Service Manual and correct those condition(s) and retest. If symptom persists, go to step 3. **No** — Go to Step 3.
3	**During start sequence, prior to crank.** **Using the ROUSH Diagnostic Tool (RDT), measure and record Fuel Tank Pressure, Fuel Rail Pressure, Fuel Rail Target Pressure, and Fuel Pump Duty Cycle at during start sequence.** Refer to Measuring and Recording Duty Cycle, Fuel Rail Pressure, Fuel Rail Target Pressure, and Duty Cycle to read these values. **Note: If using a generic scan tool, you won't be able to collect Fuel Rail Target Pressure. If using Ford IDS, Fuel Pump Duty Cycle needs to be multipled by 2.**	**If Fuel Rail Pressure is equal or less than Tank Pressure** — Go to step 6. **If Fuel Rail Pressure is 0-55 psi over Tank Pressure** — Go to step 4. **If Fuel Rail pressure is 55psi over Tank Pressure or greater** — Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual.

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4	**Test Fuel Pump Connectors** a. During starting sequence, measure and record voltage across Pin-A and Pin-B of both Fuel Pump Electrical Connectors, harness side. Is voltage greater than 5V?	**Yes** — Move to the next step. **No** — Go to the Fuel Pump Control Module Electrical Continuity Test.
	b. During starting sequence, load test same connectors with a Circuit Load Tester or 1157 Headlight Test Bulb (or similiar). Does it pass a load test or light a 1157 headlight test bulb (or similiar)?	**Yes** — Move to the next step. **No** — Go to the Fuel Pump Control Module Electrical Continuity Test.
	c. With engine off, measure and record resistance across Pin-A and Pin-B of both Fuel Pump Connectors, tank pass-through side. Is the resistance value OL or greater than 10ohms?	**Yes** — Replace Fuel Pump Assembly and retest. **No** — Move to the next step. If you do not have Roush Diagnostic Tool (RDT), go to step 6.
	d. Please record if possible: During starting sequence, Measure and record amp draw on the fuel pump connectors. Amp draw should be between 2 and 10amps at idle. Amperage should be similar between the two pumps.	
5	**Test rationality between Integrated Injection Pressure Temperature Sensor (IPTS) and Tank Pressure Temperature Sensor (TPTS).** If you have the ROUSH Diagnostic Tool (RDT) or Ford IDS, use the Manual Solenoid Activation Procedure, open tank supply solenoid and FRPCM supply solenoid. Using RDT, read Fuel Tank Pressure (**Rpr_pt_prs**) and Fuel Rail Pressure (**rpr_fr_prs**). Are pressures within 8psi of each other?	**Yes** — Go to next step. **No** — Go to Injection Pressure Temperature Sensor Electrical Check.
6	**Test Tank Supply Solenoid.** During Start Sequence or with tank supply solenoid manually activated, disconnect tank supply solenoid electrical connector and load test connectors with a Circuit Load Tester or 1157 Headlight Test Bulb across Pin-A and Pin-B, frame harness side. Does it pass a load test or light a 1157 headlight test bulb?	**Yes** — Go to next step. **No** — Find and repair wiring fault.
7	**Test FRPCM Supply Solenoid.** During Start Sequence or with FRPCM supply solenoid manually activated, disconnect FRPCM supply solenoid electrical connector, load test connectors with a Circuit Load Tester or 1157 Headlight Test Bulb across Pin-A and Pin-B, frame harness side. Does it pass a load test or light a 1157 headlight test bulb?	**Yes** — Go to next step. **No** — Find and repair wiring fault.
8	**Perform** Excess Flow Valve (EFV) Test Is Excess Flow Valve (EFV) functioning properly?	**Yes** — Refer to Ford Powertrain Control/Emissions Diagnostics Service Manual. **No** — Replace the Supply Valve.

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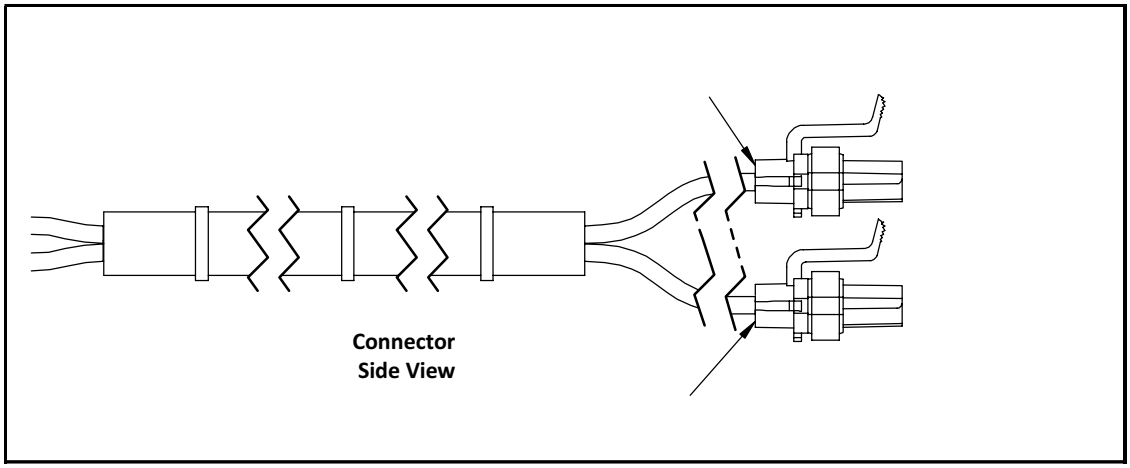
Pinpoint Test F: Engine Stumble, Stall, Rough Idle AND Fuel Pressure Drop

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics**.**



Step	Procedure	Action
1	**Perform a visual inspection to verify the following:** a. Is there is at least 1/8 tank of fuel or more? (add fuel if necessary). b. Is the tank supply manual shutoff valve fully open? c. Is battery voltage above 12.5 volts? d. Are fuel lines free of kinks or damage? e. Inspect all fuses in both the Ford and ROUSH fuse boxes. f. If vehicle has more than 50,000 miles, has Supply Line Filter been replaced within the last 50,000 miles? If not, change Supply Line Filter and retest.	**Yes** — Go to Step 2. **No** — Correct the fault and retry.
2	**Record any Diagnostic Trouble Codes (DTCs).** Are any codes present?	**Yes** — If ROUSH circuit faults are set, refer to the Diagnostic Trouble Code list earlier in this manual. If non-fuel system related faults are set, refer to Ford Powertrain Control/ Emissions Diagnostics Service Manual and correct those condition(s) and retest. If symptom persists, go to step 3. **No** — Go to Step 3.
3	**Start vehicle. Let vehicle idle for at least one (1) minute.**	
4	**Using the ROUSH Diagnostic Tool (RDT), measure and record Fuel Tank Pressure, Fuel Rail Pressure, Rail Target Pressure, and Fuel Pump Duty Cycle at during start sequence.** Refer to Measuring and Recording Duty Cycle, Fuel Rail Pressure, Fuel Rail Target Pressure, and Duty Cycle to read these values. **Note: If using a generic scan tool, you won't be able to collect Fuel Rail Target Pressure.** **If using Ford IDS, Fuel Pump Duty Cycle needs to be multipled by 2.**	**If Fuel Rail Pressure is equal or less than Tank Pressure** — Go to step 9. **If Fuel Rail Pressure is 1-55 psi over Tank Pressure** — Go to step 5. **If Fuel Rail pressure is 55psi over Tank Pressure or greater** — go to step 11.

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5	**Test Fuel Pump Connectors** a. With engine running, measure and record voltage across Pin-A and Pin-B of both Fuel Pump Electrical Connectors, harness side. Is voltage greater than 5V?	**Yes** — Move to the next step. **No** — Go to the Fuel Pump Control Module Electrical Continuity Test.
	b. With engine running, load test same connectors with a Circuit Load Tester or 1157 Headlight Test Bulb (or similiar). Does it pass a load test or light a 1157 headlight test bulb (or similiar)?	**Yes** — Move to the next step. **No** — Go to the Fuel Pump Control Module Electrical Continuity Test.
	c. **Please record if possible**: With engine running, measure and record amp draw on the fuel pump connectors. Amp draw should be between 2 and 10amps at idle. Amperage should be similar between the two pumps.	
	d. Turn off engine. Measure and record resistance across Pin-A and Pin-B of both Fuel Pump Connectors, tank pass-through side. Is the resistance value OL or greater than 10ohms?	**Yes** — Replace Fuel Pump Assembly and retest. **No** — Move to the next step. If you do not have Roush Diagnostic Tool (RDT), go to step 5.
6	**Test Fuel Pump Duty Cycle** At idle is fuel pump duty cycle at 100% (1.0) **AND** fuel rail pressure less than 55psi over tank pressure?	**Yes** — Replace Fuel Pump Assembly. **No** — Move to the next step.
7	**Test rationality between Integrated Injection Pressure Temperature Sensor (IPTS) and Tank Pressure Temperature Sensor (TPTS).** If you have the ROUSH Diagnostic Tool (RDT) or Ford IDS, use the Manual Solenoid Activation Procedure, open tank supply solenoid and FRPCM supply solenoid. Using RDT, read Fuel Tank Pressure (**Rpr_pt_prs**) and Fuel Rail Pressure (**rpr_fr_prs**). Are pressures within 8psi of each other?	**Yes** — Go to next step **No** —Go to Injection Pressure Temperature Sensor Electrical Check.
8	**Test Tank Supply Solenoid.** During Start Sequence or with tank supply solenoid manually activated, disconnect tank supply solenoid electrical connector and load test connectors with a Circuit Load Tester or 1157 Headlight Test Bulb across Pin-A and Pin-B, frame harness side. Does it pass a load test or light a 1157 headlight test bulb?	**Yes** — Go to next step. **No** — Find and repair wiring fault
9	**Test FRPCM Supply Solenoid.** During Start Sequence or with FRPCM supply solenoid manually activated, disconnect FRPCM supply solenoid electrical connector, load test connectors with a Circuit Load Tester or 1157 Headlight Test Bulb across Pin-A and Pin-B, frame harness side. Does it pass a load test or light a 1157 headlight test bulb?	**Yes** — Go to next step. **No** — Find and repair wiring fault
10	**Perform** Excess Flow Valve (EFV) Test Is Excess Flow Valve (EFV) functioning properly?	**Yes** — Refer to Ford Powertrain Control/Emissions Diagnostics Service Manual, correct those condition(s), and retest. **No** — Replace Supply Valve.
11	**Return Line Restriction Test** Are P0148 or P116E codes set AND Fuel Rail Pressure is greater than 80psi over tank AND problem occurs after heavy duty cycle operation?	**Yes —** Replace Return Valve Assembly. **No** — Refer to Ford Powertrain Control/Emissions Diagnostics Service Manual. **Back to DTC List**

Pinpoint Test G: Excess Flow Valve Check

The Excess Flow Valve (EFV) is designed to restrict fuel exiting the tank if the pump is energized while the fuel lines are not connected to the fuel tank. Under normal circumstances, the EFV should not trip. The EFV will reset itself after the fuel pumps have been off for about one minute.

It is common to trip the EFV after the fuel lines have been serviced and contain no pressure. If the EFV trips, turn the vehicle off, wait one minute, and restart. This may take more than one attempt. If the fuel lines have not been serviced recently and the problem persists, there may be a leak in the supply side fuel line. If the problem is only present after the vehicle has been sitting for a length of time, but not present during a short soak, or there is a propane odor when the vehicle is running, refer to the Fuel Line Leak Detection procedure in the service manual for the vehicle in question.

To manually reset the EFV, with the vehicle off, close the manual shutoff valve and wait one minute. Then key the vehicle to start and slowly open the manual shutoff valve. When the EFV resets there will be an audible click.

Step	Procedure	Action
1	**Inspect EFV for checking.** If both fuel pumps and supply valves are operating properly and fuel rails have a near 0psi increase over tank, the EFV may be checking. When the EFV resets there will be an audible click. **Note: Vehicle may cycle pumps multiple times during start up flush sequence if the desired rail pressure increase is not achieved, a P26B5 fault code can be set.** Is EFV continuously checking during normal operation?	**Yes** — Replace the Supply Valve. **No** — No action needed.

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Pinpoint Test H: Maximum Pressure Check

The LPA system operates over a wide range of pressures depending on ambient temperature, driving mode, etc. When the vehicle is subjected to a severe drive cycle in high ambient temperatures, the fuel rail pressure can rise to the limit of the injectors capabilities. This limit is a function of injector voltage and fuel rail pressure. The PCM protects for this condition by reducing the fuel pump speed when the condition is sensed, however, there still may be drive concerns. When the PCM starts reducing fuel pump duty cycle, a P116E code is set. While this condition can occur in a normally functioning vehicle, it can also be exacerbated by several factors. If the fuel tank was not properly bled during the first fill, trapped air in the vapor space can increase tank pressure. In this condition there is often only a faint smell of propane when the Bleeder Valve is opened. The tank should be vented until there is a strong propane odor coming from the Bleeder Valve. The tank pressure should be confirmed against the expected pressure.

Allow the fuel tank to cool to ambient temperature before performing the following procedure.

Step	Procedure	Action
1	**Measure tank pressure and tank surface temperature.** Refer to pressure temp chart on page 23. Is tank pressure more than 15 psi (103 kPa) over expected tank pressure?	**Yes** — Vent the tank until pressure is within the expected range. **No** — Vehicle is working properly; inform and explain operating characteristics to customer.

Temperature (°F)	Pressure (psi)		
	Min.	Nominal	Max.
0	15	25	35
5	19	29	39
10	23	33	43
15	28	38	48
20	33	43	53
25	38	48	58
30	43	53	63
35	49	59	69
40	55	65	75
45	62	72	82
50	69	79	89
55	77	87	97
60	84	94	104
65	93	103	113
70	102	112	122
75	111	121	131
80	121	131	141
85	131	141	151
90	142	152	162
95	153	163	173
100	165	175	185
105	178	188	198
110	191	201	211
115	205	215	225
120	219	229	239

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Pinpoint Test I: Fuel System Fails to Bleed

Step	Procedure	Action
1	**Check for diagnostic trouble codes (DTC).** Are both DTC 26B3 and P009E present?	**Yes** — Go to Step 8. **No** — Go to Step 2.
2	**Check for oil contamination at vapor port/EVAP line.** a. Disconnect EVAP line from vapor port. Is oil present in EVAP line or vapor port?	**Yes** — Replace vapor port and perform Step 3. **No** — Go to Step 3.
3	**Determine if fault condition repeats.** a. START the engine and allow it to run for a few minutes. b. Turn OFF the engine and wait one minute. c. Measure and record the fuel rail pressure, fuel rail temperature and fuel tank pressure with the Key ON Engine OFF (KOEO). d. Energize the bleed solenoid. Refer to the Manual Solenoid Activation Procedure. Verify wiring integrity and voltage to solenoid. e. With the engine OFF, monitor fuel rail pressure for 15 minutes. Does fuel rail pressure drop to below 15psi (103 kPa)?	**Yes** — Potential intermittent fault. Return vehicle to customer and see if problem persists. **No** — Go to Step 4.
4	**Verify vapor port function.** a. Disconnect the EVAP line from the FRPCM port. b. Energize the bleed solenoid. Refer to the Manual Solenoid Activation Procedure. Verify wiring integrity and voltage to solenoid. Is there propane flowing from the port?	**Yes** — Go to Step 7. **No** — Go to Step 5.
5	**Verify bleed solenoid function.** a. Remove the vapor port. b. Energize the bleed solenoid. Refer to the Manual Solenoid Activation Procedure. Verify wiring integrity and voltage to solenoid. Is there propane flowing from the port?	**Yes** — Replace vapor port and repeat Step 3. **No** — Go to Step 6.
6	**Verify that wiring is in good condition and functioning.** a. Perform wiring checks of the FRPCM harness. Is the wiring OK?	**Yes** — Bleed solenoid stuck closed. Replace the FRPCM. **No** — Repair wiring and repeat Step 3.
7	**Check for a kinked EVAP line.** a. Inspect the EVAP line between the FRPCM and EVAP canister. Are there kinks in the line?	**Yes** — Replace the kinked EVAP line and then repeat Step 3. **No** — Go to Step 8.
8	**Check for leaks to the FRPCM.** a. START the engine and allow it to run for a few minutes. b. Turn OFF the engine. c. Measure and record fuel rail pressure. d. Activate bleed solenoid to bleed pressure from fuel rail until fuel pressure drops more than 50 psi (345 kPa). Refer to the Manual Solenoid Activation Procedure. e. De-energize bleed solenoid. f. Disconnect the FRPCM and wait 120 minutes. g. Measure fuel rail pressure and fuel tank pressure. Does fuel rail pressure rise more than 10 psi (69 kPa)?	**Yes** — FRPCM is leaking at either supply solenoid or return check valve. Replace FRPCM. **No** — Potential intermittent fault. Return vehicle to customer and see if problem persists.

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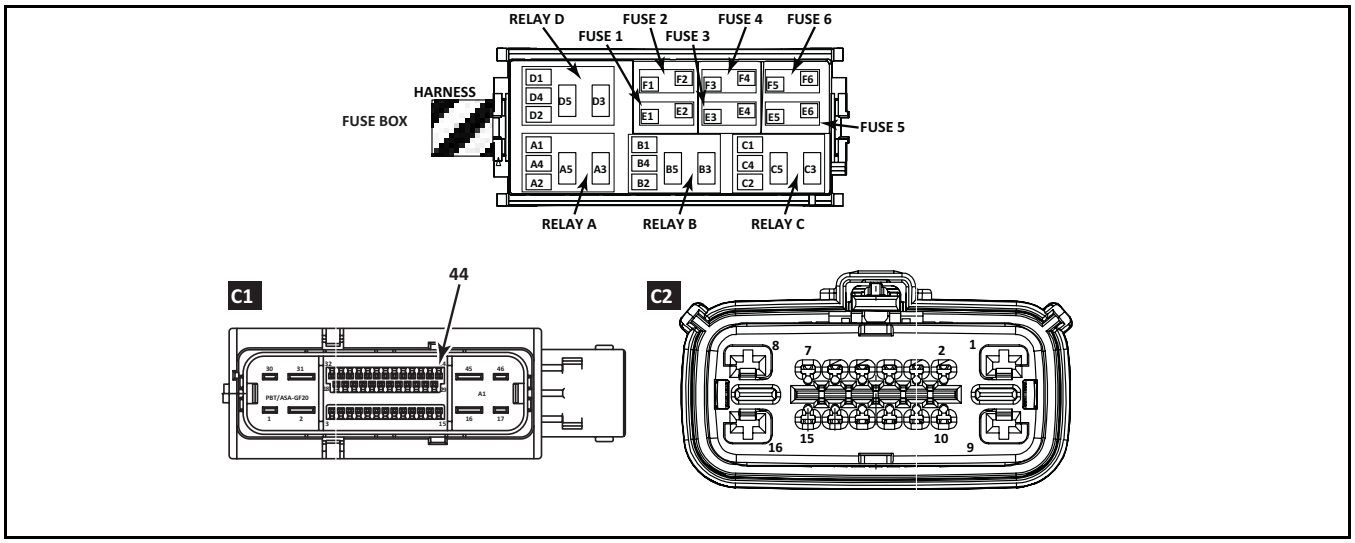
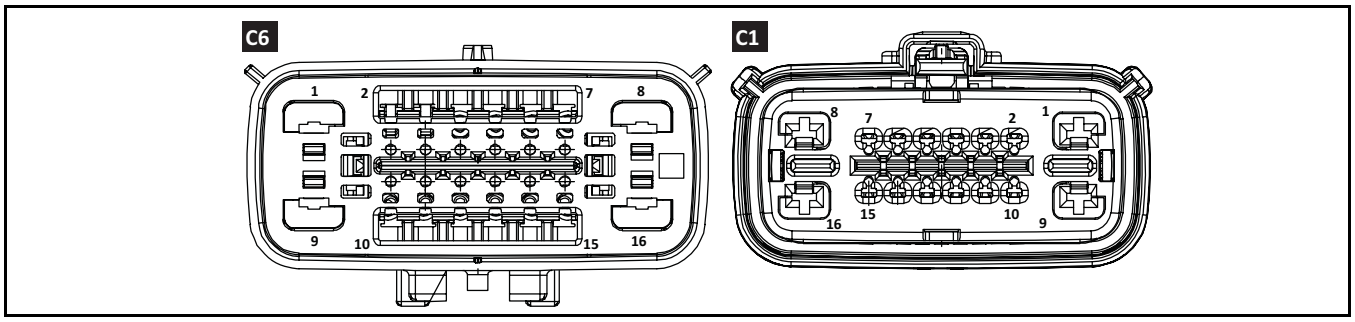
Pinpoint Test J: Tank Solenoid Electrical Check

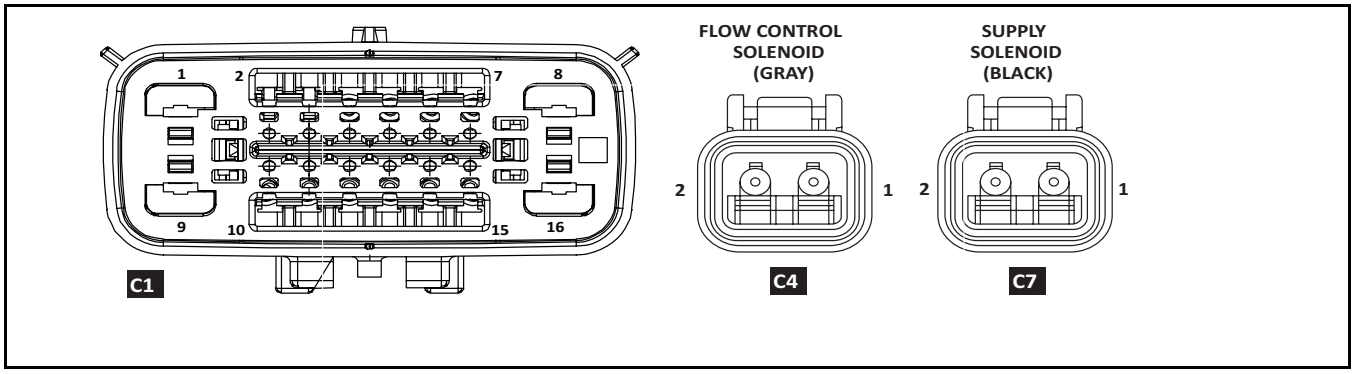
For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.



Underhood Harness Connectors



Rear Frame Harness Connectors



Tank Harness Connectors

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Pinpoint Test J: Tank Solenoid Electrical Check (cont.)

Step	Procedure	Action
1	**Unplug the solenoid harness connector C7 from the tank solenoid. Using a multimeter, measure resistance of the solenoid.** Is the measured resistance within 6-11 ohms?	**Yes** — Go to Step 3. **No** — Replace the tank solenoid.
2	**Using a multimeter, measure voltage at the tank solenoid as follows:** a. With the ignition key ON, check for voltage present at pin-1, connector C7 (tank harness). Use the body as the reference ground. Is battery (B+) voltage present?	**Yes** — Supply circuit OK. Proceed to Step 7. **No** — Go to Step 4.
3	**Check fuse (E3-E4, 20A) in auxiliary fuse box.** Is fuse blown?	**Yes** — Replace fuse and locate the short. **No** — Fuse OK; go to Step 5.
4	**Check Relay A, or primary fuel pump relay.** Is relay functioning properly?	**Yes** — Go to Step 6. **No** — Replace relay.
5	**Check supply circuit continuity from solenoid harness to fuse box.** a. Check continuity between: • Pin-1, connector C7 and pin-10, connector C1 (tank harness) • Pin-1, connector C6 and pin-10, connector C1 (rear frame harness) • Pin-1, connector C2 and cavity A5, fuse box (underhood harness) Is there good continuity in the circuit?	**Yes** — Go to Step 6. **No** — Repair supply circuit wiring.
6	**Check ground circuit continuity from tank harness to Smart Relay Module (SRM) connector.** a. Check continuity between: • Pin-2, connector C7 and pin-7, connector C1 (tank harness) • Pin-7, connector C6 and pin-7, connector C1 (rear frame harness) • Pin-7, connector C2 and pin-1, connector C1 (underhood harness) Is there good continuity in the circuit?	**Yes** — Refer to the Smart Relay Module Electrical Test procedure. **No** — Repair ground circuit wiring.

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Pinpoint Test K: Return Valve Procedure

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.

Step	Procedure	Action
1	**Unplug the solenoid harness connector C4 from the return solenoid. Using a multimeter, measure the resistance of the solenoid.** Is the measured resistance within 6-11 ohms?	**Yes** — Go to Step 3. **No** — Replace the return solenoid.
2	**Using a multimeter, measure the voltage at the tank solenoid as follows:** a. With the ignition key ON, check for voltage present at pin-1, connector C4 (tank harness). Use the body as the reference ground. Is battery (B+) voltage present?	**Yes** — Supply circuit OK. Proceed to step 7. **No** — Go to step 4.
3	**Check fuse (F1-F2, 10A) in auxiliary fuse box.** Is fuse blown?	**Yes** — Replace the fuse. **No** — Fuse OK. Go to Step 5.
4	**Check supply circuit continuity from the solenoid harness to the fuse box.** a. Check continuity between: • Pin 1, connector C4 and Pin 12, connector C1 (tank harness). • Pin 12, connector C6 and Pin 12, connector C1 (rear frame harness). • Pin 12, connector C2 and Cavity F2, fuse box (underhood harness). Is there good continuity in the circuit?	**Yes** — Go to Step 5. **No** — Repair supply circuit wiring.
5	**Check ground circuit continuity from the tank harness to the Smart Relay Module (SRM) connector.** a. Check continuity between: • Pin 2, connector C4 and Pin 11, connector C1 (tank harness). • Pin 11, connector C6 and Pin 11, connector C1 (rear frame harness). • Pin 11, connector C2 and Pin 30, connector C1 (underhood harness). Is there good continuity in the circuit?	**Yes** — Refer to the Smart Relay Module Electrical Test procedure. **No** — Repair ground circuit wiring.

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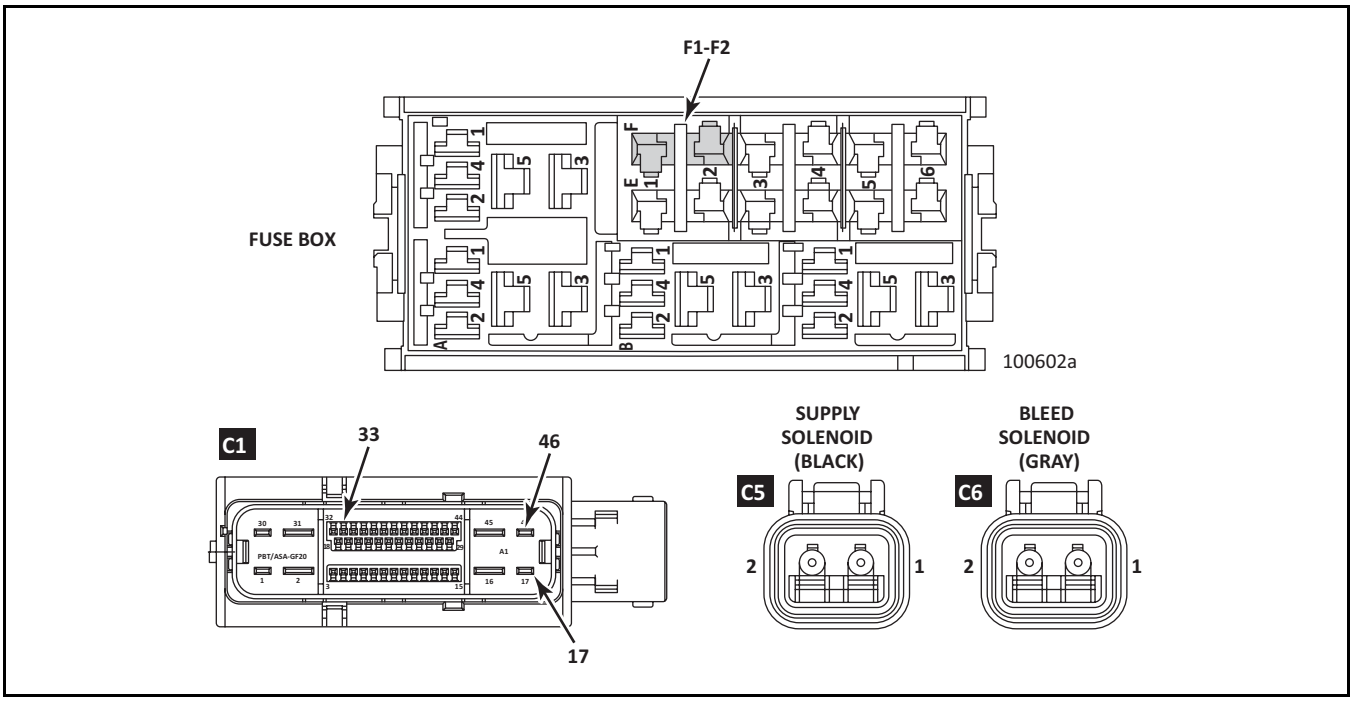
Pinpoint Test L: Fuel Rail Pressure Control Module Electrical Check

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics**.**



For the Supply Solenoid

Step	Procedure	Action
1	**Unplug the supply solenoid connector, C5. Using a multimeter, check the resistance of the solenoid.** Is the measured resistance within 6-11 ohms?	**Yes** — Go to Step 2. **No** — Replace supply solenoid.
2	**Using a multimeter, measure the voltage at the FRPCM supply solenoid as follows:** a. With the ignition key ON, check for voltage present at pin-1, connector C5 to fuse 2. Is voltage present?	**Yes** — Supply circuit OK. Go to next step. **No** — Go to next step.
3	**Check ground circuit continuity from the underhood harness to the Smart Relay Module (SRM) connector.** a. Check continuity between: • Pin 2, connector C5 and Pin 32, connector C1. Is there good continuity between the two pins?	**Yes** — Refer to the Smart Relay Module Electrical Test procedure. **No** — Repair ground circuit wiring.

For the Bleed Solenoid

Step	Procedure	Action
1	**Unplug the bleed solenoid connector, C6. Using a multimeter, check the resistance of the solenoid.** Is the measured resistance within 6-11 ohms?	**Yes —** Go to next step. **No** — Replace Bleed Solenoid
2	**Using a multimeter, measure the voltage at the FRPCM bleed solenoid as follows:** a. With the ignition key ON, check for voltage present at pin-1, connector C6 to fuse 2. Is voltage present?	**Yes** — Supply circuit OK. Go to next step. **No** — Go to next step.
3	**Check ground circuit continuity from the underhood harness to the Smart Relay Module (SRM) connector.** a. Check continuity between: • Pin2, connector C6 and Pin 33, connector C1 Is there good continuity between the two pins?	**Yes** — Refer to the Smart Relay Module Electrical Test procedure. **No** — Repair ground circuit wiring. **Back to DTC List**

Pinpoint Test M: Injection Pressure Temperature Sensor (IPTS) Electrical Check

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.

Step	Procedure	Action
1	**Unplug the connector C3 (underhood harness) to the IPTS. Check resistance of the injection pressure temperature sensor (IPTS).** a. With vehicle at ambient room temperature (20–30°C, 68–86°F) and using a multimeter, measure resistance across the IPTS terminals (between pin-1 and pin-3). Is the resistance value between 8K–12K ohms?	**Yes** — Go to Step 2 **No** — Replace the IPTS.
2	**Check circuit continuity between the IPTS and the Smart Relay Module (SRM).** a. Using a multimeter, check continuity in the underhood harness between: • Pin-1, connector C3 and pin-40, connector C1 • Pin-2, connector C3 and pin-20, connector C1 • Pin-3, connector C3 and pin-18, connector C1 • Pin-4, connector C3 and pin-25, connector C1 Is there good continuity in the circuits?	**Yes** — Refer to the Smart Relay Module Electrical Test procedure. **No** — Repair circuit wiring.

Vout	PSIA
0.5	-0.0
0.6	12.7
0.7	25.5
0.8	38.2
0.9	51.0
1	63.7
1.1	76.5
1.2	89.2
1.3	102.0
1.4	114.7
1.5	127.5
1.6	140.2
1.7	153.0
1.8	165.7
1.9	178.5
2	191.2
2.1	204.0
2.2	216.7
2.3	229.5
2.4	242.2

Rmin	Rmax	degC	degF
301,183	331,179	-40	-40
162,304	175,994	-30	-22
90,938	97,349	-20	-4
52,781	55,836	-10	14
31,290	32,738	0	32
19,346	20,036	10	50
12,315	12,633	20	68
9,900	10,100	25	77
7,977	8,182	30	86
5,282	5,462	40	104
3,585	3,737	50	122
2,474	2,598	60	140
1,744	1,844	70	158
1,250	1,330	80	176
909.6	974.0	90	194
671.3	723.1	100	212
504.0	545.9	110	230
382.6	416.6	120	248
294.6	322.3	130	266
258.6	283.9	135	275

Vout	PSIA
2.5	255.0
2.6	267.7
2.7	280.5
2.8	293.2
2.9	306.0
3	318.7
3.1	331.5
3.2	344.2
3.3	357.0
3.4	369.7

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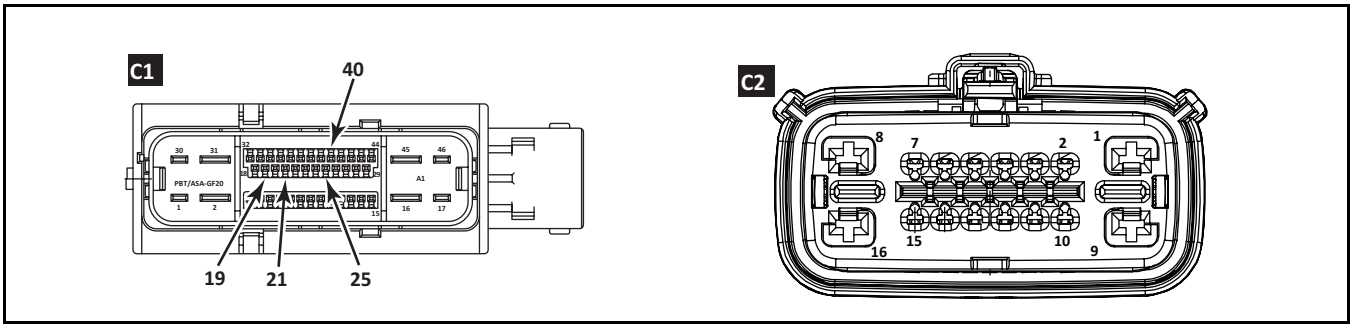
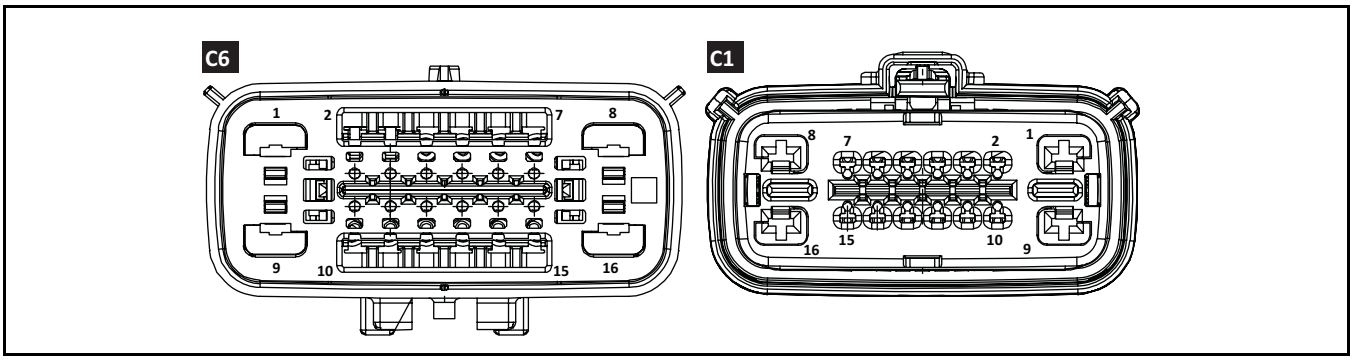
Pinpoint Test N: Tank Pressure Temperature Sensor (TPTS) Electrical Check

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.

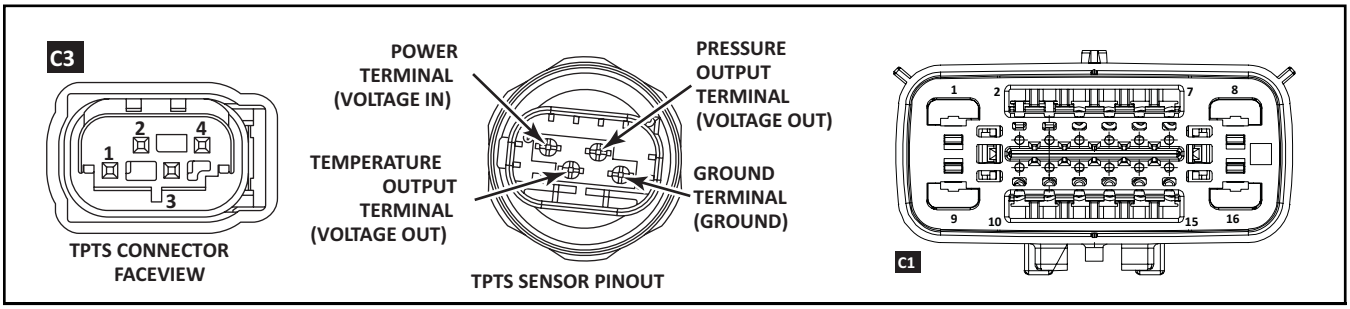
CONNECTORS



Underhood Harness Connectors



Rear Frame Harness Connectors



Fuel Tank Connectors

Step	Procedure	Action
1	**Unplug connector C3 (fuel tank harness) to the TPTS. Check resistance of the fuel pressure temperature sensor (TPTS).** a. With vehicle at ambient room temperature (20–30°C, 68–86°F) and using a multimeter, measure resistance across the FPTS terminals (between pin-1 and pin-3). Is the resistance value between 8K–12K ohms?	**Yes** — Go to Step 3. **No** — Replace the TPTS.
2	**Check circuit continuity between the TPTS and the Smart Relay Module (SRM).** a. Using a multimeter, check continuity in the underhood harness between: • Pin-1, connector C3 and pin-40, connector C1 • Pin-2, connector C3 and pin-21, connector C1 • Pin-3, connector C3 and pin-19, connector C1 • Pin-4, connector C3 and pin-25, connector C1 Is there good continuity in the circuits?	**Yes** — Refer to the Smart Relay Module Electrical Test procedure. **No** — Repair circuit wiring.

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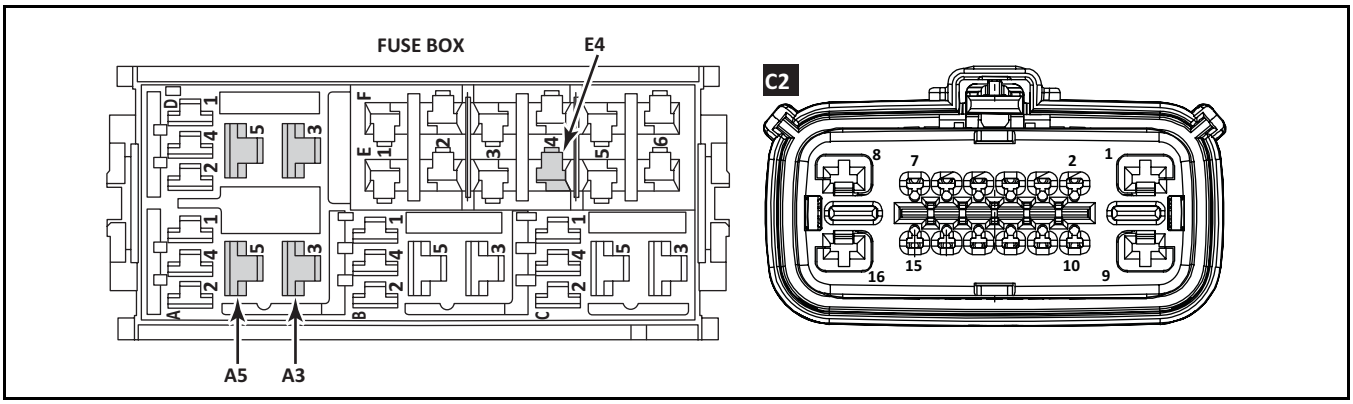
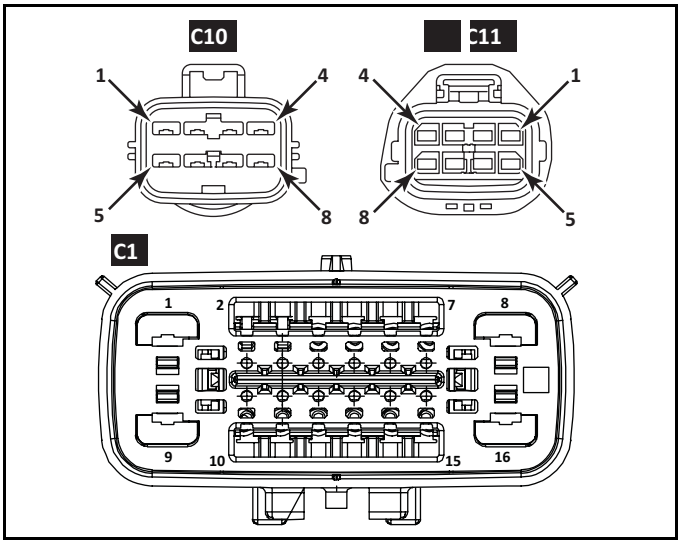
Pinpoint Test O: Fuel Pump Control Module Electrical Continuity Test

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.



Underhood Harness Connectors



Rear Frame Harness Connectors

Step	Procedure	Action
1	**Check Ford FPCM circuit continuity to Ford harness.** a. Disconnect rear frame harness connectors C10 and C11. b. Check for continuity in the rear frame harness across: • Pin-1, connector C10 and pin-1, connector C11 • Pin-3, connector C10 and pin-3, connector C11 • Pin-4, connector C10 and pin-4, connector C11 • Pin-6, connector C10 and pin-6, connector C11 • Pin-7, connector C10 and pin-7, connector C11 Is there good continuity in each circuit?	**Yes** — Go to Step 2. **No** — Repair circuit wiring.
2	**Check FPCM circuit continuity to Ford harness.** a. Disconnect rear frame harness connector C9. b. Check wire VPWR (V+) for continuity across: • Pin-1, connector C9 (rear frame harness) and pin-1, connector C6 (rear frame harness) • Pin-1, connector C2 (underhood harness) and cavity-A5, fuse box (underhood harness) • Cavity-A3, fuse box (underhood harness) and cavity-E4, fuse box (underhood harness) Is there good continuity in each circuit?	**Yes** — Go to Step 3. **No** — Repair circuit wiring.

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3	**Check fuse condition (E3-E4).** Is the fuse blown?	**Yes** — Inspect for shorted wire and replace fuse. **No** — Go to Step 4.
4	**Check ROUSH CleanTech FPCM circuit continuity to Ford harness.** a. Check for continuity in the rear frame harness across: • Pin-1, connector C6 and pin-1, connector C9 • Pin-4, connector C10 and pin-4, connector C9 • Pin-1, connector C1 and pin-5, connector C9 • Pin-6, connector C10 and pin-6, connector C9 • Pin-9, connector C1 and pin-8, connector C9 • Pin-15, connector C6 and pin-7, connector C9 Is there good continuity in each circuit?	**Yes** — Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for functional testing of the FPCM. **No** — Repair circuit wiring.

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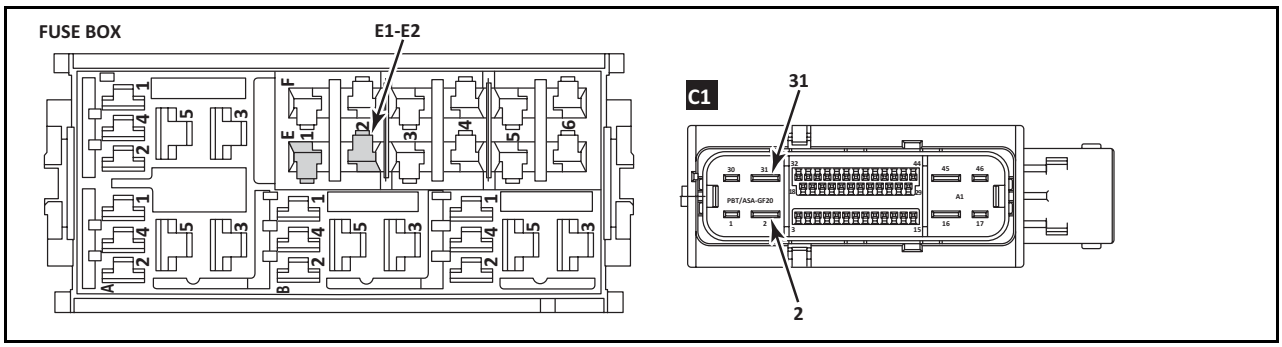
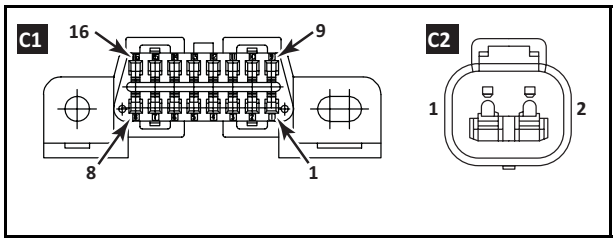
Pinpoint Test P: Smart Relay Module Electrical Test

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.



Underhood Harness Connectors



CAN Harness Connectors

Step	Procedure	Action
1	**Disconnect the Smart Relay Module (SRM) connector C1 (underhood harness).**	
2	**Check for battery voltage (B+) to the SRM.** a. Using a multimeter, check for B+ voltage at pin-2, connector C1. Use a body ground for reference. Is there voltage (B+)?	**Yes** — Go to Step 5. **No** — Go to Step 3.
3	**Check for battery voltage (B+) to the SRM.** a. Check circuit continuity between pin-2, connector C1 and cavity E2, auxiliary fuse box. Is there good continuity in the circuit?	**Yes** — Go to Step 4. **No** — Repair circuit wiring.
4	**Check for battery voltage (B+) to the SRM.** a. Check condition of SRM power fuse (E1-E2, 5A) in the auxiliary fuse box. Is the fuse blown?	**Yes** — Replace fuse. **No** — Go to Step 5.
5	**Check the SRM ground circuit for continuity.** a. Using a multimeter, check ground at pin-31, connector C1 (Underhood harness). Use a body ground for reference. Is there good continuity in the circuit?	**Yes** — Go to Step 6. **No** — Repair circuit wiring.
6	**Check CAN and underhood harness continuity.** a. Check CAN-H(+) continuity across: • Pin-28, SRM connector C1 (Underhood harness) and pin-1, connector 2 (Underhood Harness) • Pin-1, connector C2 (CAN harness) and pin-6, connector C1 (CAN harness) Is there good continuity in the circuits?	**Yes** — Go to Step 7. **No** — Repair circuit wiring.

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7	**Check CAN and underhood harness continuity.** a. Check CAN-H(-) continuity across: • Pin-43, SRM connector C1 (underhood harness) and pin-2, connector 23 (underhood harness) • Pin-2, connector C2 (CAN harness) and pin-14, connector C1 (CAN harness) Is there good continuity in the circuits?	**Yes** — Refer to the Ford Powertrain Control/Emissions Diagnosis Service Manual for functional testing of the CAN bus. **No** — Repair circuit wiring.

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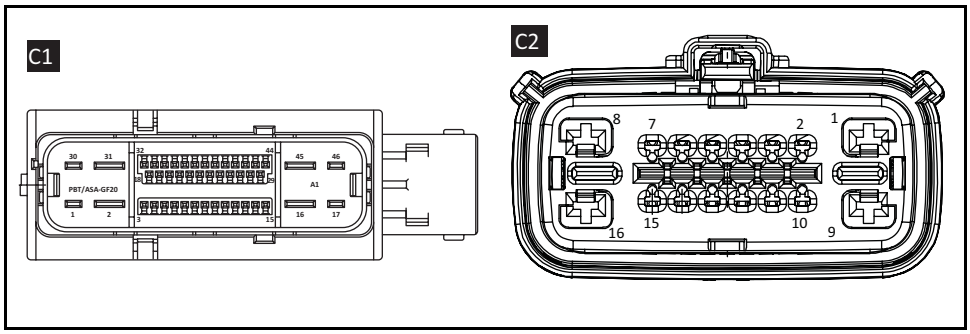
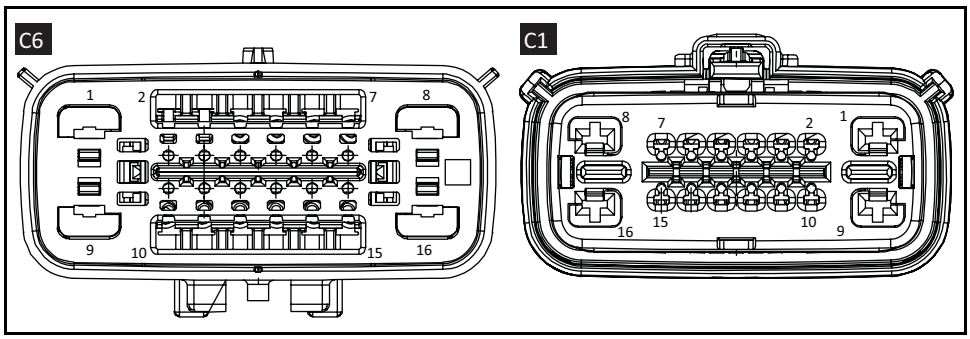
Pinpoint Test Q: Fuel Level Sender Electrical Check

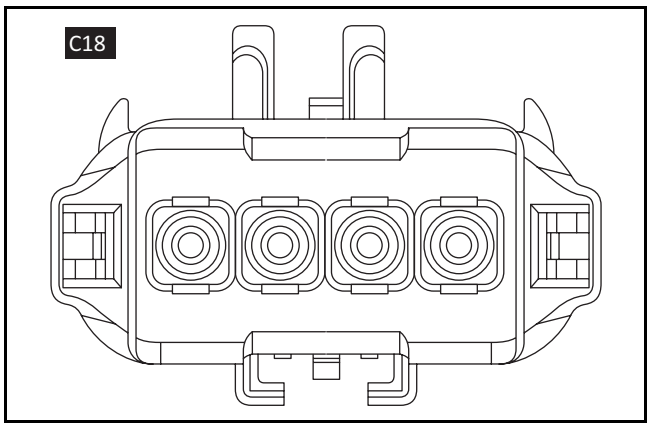
For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.



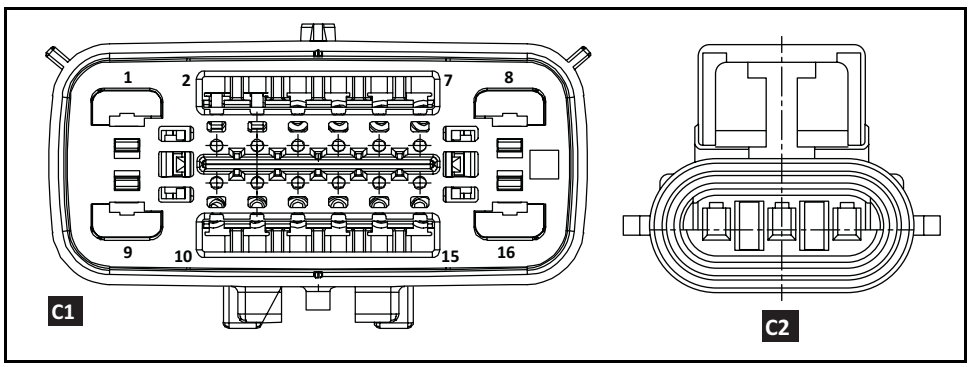
Underhood Harness Connectors



Rear Frame Harness Connectors



Rear Frame Harness Connector



Tank Harness Connectors

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Pinpoint Test Q: Fuel Level Sender Electrical Check (cont.)

Note: The fuel level indication system is calibrated to the voltage output from the fuel level sender. The needle position on the sending unit Twinsight is a raw reading of the sender arm position and is not an accurate representation of the fuel level in the tank. The fuel level gauge on the cluster should display the correct fuel level. All continuity (OHMS) readings should be less than 0.5 OHMS

Step	Procedure	Action
1	**Check for DTCs** If any SRM or TPTS DTCs present go to Pin Point test and resolve those faults prior to diagnosing the Fuel Level Sender fault.	**Yes** — Go to Smart Relay Module Electrical Test or the Tank Pressure Temperature Sensor Electrical Test. **No** — Go to Step 2.
2	**Check reference on Fuel Level Sender** Turn key to on position. Check for 5-volt reference present across pin-A and pin-C harness side of the FLS connector. Is 5v power present?	**Yes** — Go to Step 5. **No** — Go to Step 3.
3	**Check for continuity of harness for 5v vref circuit and ground circuit of Fuel Level Sender.** a. Check for continuity from FLS pin-A frame side harness to pin-25 of SRM connector: Continuity present - **Yes**, go to Step 3b. b. Check for continuity from FLS pin-C frame harness at FLS and pin-40 of SRM connector. Is there good continuity in each circuit?	**Yes** — Go to Step 4. **No** — Locate and repair open circuit or replace harness.
4	**Check for continuity on SRM connectors** a. Check for continuity from SRM connector C1, pin-3 to connector C2, pin-10 (under-hood harness). Continuity present - **Yes**, go to Step 4b. b. Check for continuity from connector C6, pin-10 to connector C18, pin-2 (rear frame harness). Is there good continuity in each circuit?	**Yes** — Go to Step 5. **No** — Repair circuit issues or replace harness.
5	**Perform output voltage check using a universal probe on Pin B and Pin C at FLS connector.** a. With harness fully connected, place the universal probes into pin-B and pin-C of sending unit connector and monitor for voltage. Is voltage present?	**Yes** — Go to Step 6. **No** — Replace electronic portion of sending unit.
6	**Perform sending unit range voltage test.** a. With your probe still on pin-B and pin-C, remove the sending unit electronic portion from the sender body by removing the 2 phillips screws securing it. Leave the wire harness connected. Using a non-magnetic socket or other steel/iron object, move sender from full to empty. Make sure the voltage smoothly changes between 0.1 volts min. to 4.98 volts max. Was there any concern with voltage range output test?	**Yes** — Replace electronic portion of sending unit clear faults and test. **No** — Refer to the Tank Pressure Temperature Sensor Electrical Test procedures within the appropriate Service Manual to replace the in-tank sending unit.

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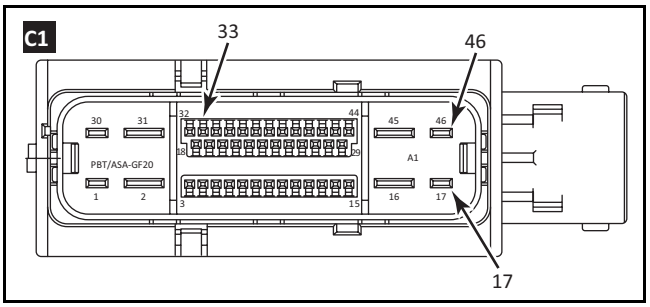
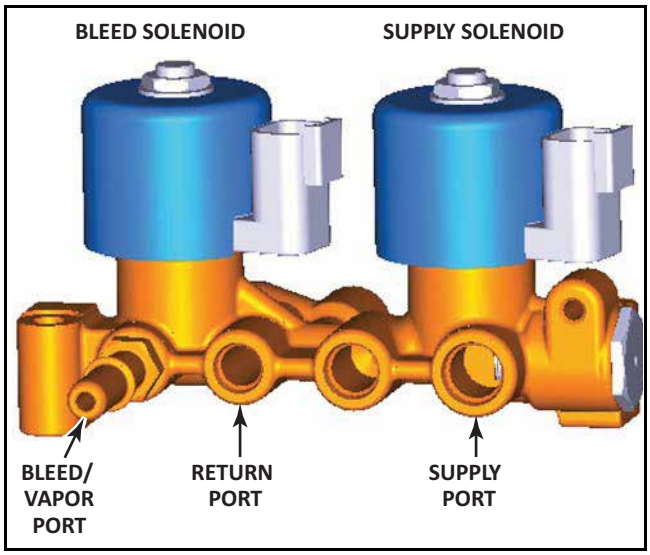
Pinpoint Test R: Manual Solenoid Activation Procedures

For harness and connector layout diagrams and system electrical schematics, refer to Wiring Diagrams and Electrical Schematics.



Connector End View



FRPCM Solenoid Locations

Manual Activation	
Step	**Procedure**
1	Turn ignition to off. Disconnect the Smart Relay Module (SRM) wire harness connector.
2	Energize the individual solenoids by providing a ground to the following pins in the SRM connector **Note: Use caution not to damage SRM connector terminals. Always connect lead to the connector then to ground.** • Pin 33 – Bleed Solenoid • Pin 32 – Supply Solenoid • Pin 30 – Flow Control Solenoid
	Note: The tank supply solenoid cannot be actuated from the SRM. 12v power and ground must be applied to the solenoid connector.

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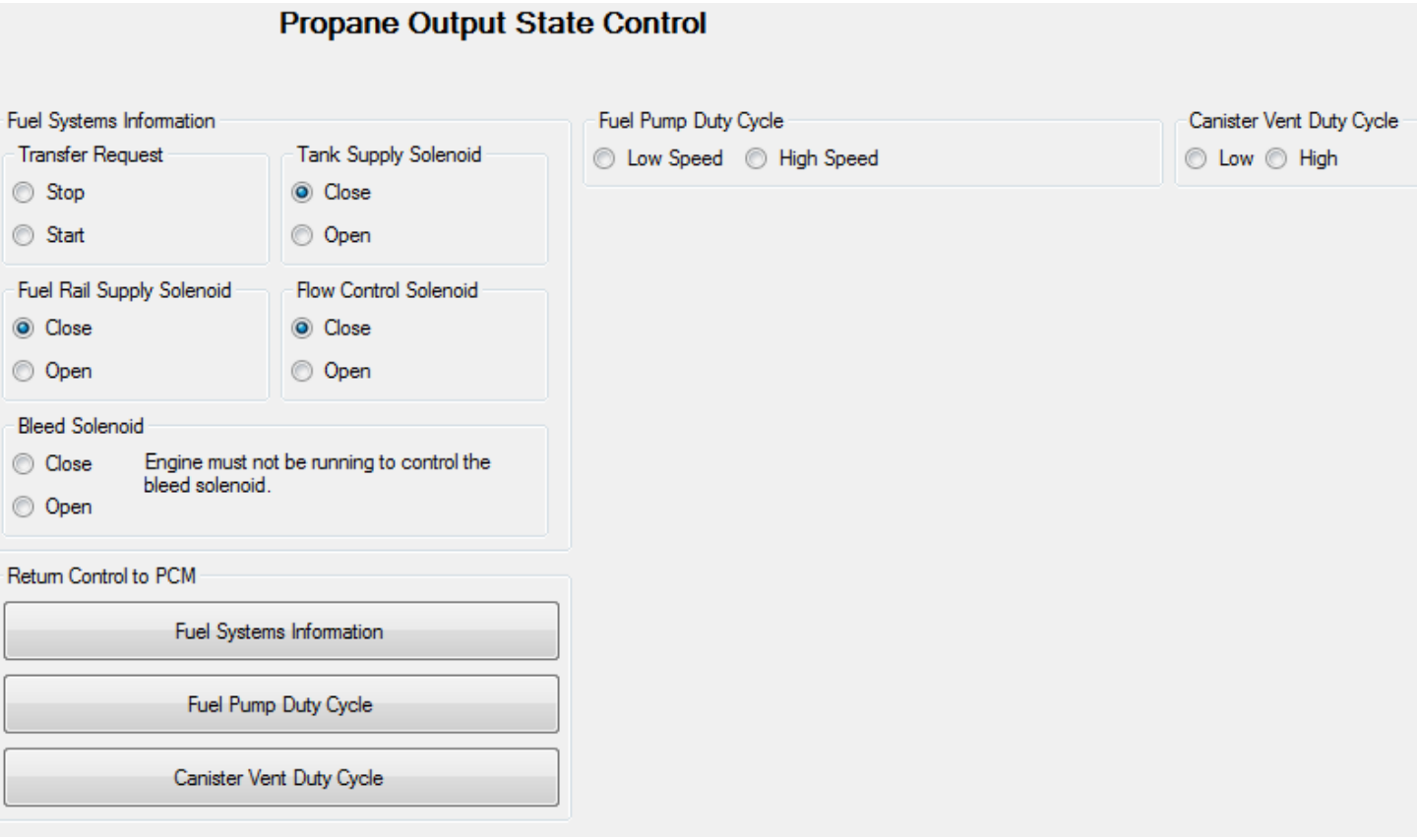
Pinpoint Test R: Manual Solenoid Activation Procedures (cont.)



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Pinpoint Test R: Manual Solenoid Activation Procedures (cont.)

Activation with the Roush Diagnostic Tool (RDT)		
Step	**Procedure**	
1	Refer to the Utilizing the Roush Diagnostic Tool section of the Diagnostic Manual to open RDT and access the vehicle.	
2	Select Functional Tests from the left side menu.	
3	Select the PIDS required to gain solenoid control (see above). The PIDs required are: RPR_PT_PRS, RPR_FR_PRS, RPR_SS1_CMD, RPR_SS2_CMD, RPR_BS_CMD, and RPR_FCS_CMS (see PIDs list for descriptions of each PID).	
4	To open or close selected solenoids, click on the radio button for the chosen solenoid. Results of each test will be available on screen during each test (see below for an example). *The Bleed Solenoid cannot be activated if the vehicle is running.	
5	When solenoid activation and tests have been completed, return the solenoids to their pre-output test state by choosing Close for each solenoid. **Note: Failing to do this will impair future vehicle operation and may potentially damage components.**	
6	After returning the solenoids to the closed position, key the vehicle off and remove the Pass-Thru device. Wait at least one (1) minute before restarting the vehicle to allow the PCM to regain control of the start-up process.	

DMR's

RPR_PT_PRS	88.2461242675781 PSI
RPR_SS1_CMD	0 na
RPR_SS2_CMD	0 na
RPR_BS_CMD	0 na
RPR_FCS_CMD	0 na
RPR_FR_PRS	91.3240203857422 PSI

OSC

Name	Value
Bleed Solenoid	SUCCESS
Flow Control Solenoid	SUCCESS
Tank Supply Solenoid	SUCCESS
Fuel Rail Supply Solenoid	SUCCESS
Transfer Request	not commanded
Fuel Pump Duty Cycle	not commanded
Canister Vent Duty Cycle	not commanded

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Pinpoint Test S: F-650/F-750 Dual Tank Transfer Pinpoint Test (P25B1 DTC)

Step	Procedure	Action
1	**Check for DTCs** Determine if any other DTCs that could contribute to a failure to transfer are stored in the PCM (fuel pump faults, slave tank solenoid fault, fuel level sending unit faults).	**Yes** — Resolve DTCs and retest. **No** — Continue to Step 2.
2	**Visually inspect fuel transfer line** Perform visual inspection of the fuel transfer line which connects the passenger side tank supply valve to the transfer OPD located in-board of the driver's side fuel tank assembly to ensure there are no restrictions or damage to the transfer line assembly. Are any restrictions present?	**Yes** — Repair/replace transfer line and retest. **No** — Continue to step 3.
3	**Visually inspect OPD alignment** The OPD should have a notch or the word TOP stamped into the part on the face of the brass on the OPD and this should be oriented at the 12 o'clock position. Is the transfer OPD located inboard on the driver's side fuel tank assembly oriented properly?	**Yes** — Continue to step 4. **No** — See OPD installation instructions from the service manual to determine if OPD can be reused or replaced.
4	**Perform the sending unit voltage range test** Perform the sending unit voltage test (see Pinpoint Test Q, step 6) on both sending unit dials to ensure they are properly functioning before continuing the pin point test. Are the fuel level senders reading properly? Remove the sending unit Twinsight by removing the 2 small phillips head screws. Leave wire harness connected. Read voltage between pins B and C of the sending unit Twinsight connector. Sender voltages and corresponding fuel levels: Master: [V] 0.413 1.073 1.764 2.391 2.972 3.266 3.650 3.977 4.120 4.255 [%] 0.0 8.0 18.9 33.4 47.2 56.6 70.9 84.9 92.0 100.0 Slave: [V] 0.351 0.641 1.443 1.982 2.613 3.111 3.536 3.868 4.120 4.255 [%] 0.0 1.0 14.6 24.0 37.7 52.1 66.1 80.2 92.0 100.0	**Yes** — If **Yes**: Continue to step 5. **No** — If **No**: Replace fuel gauge and retest.
5	**Attempt fuel transfer** Attempt a fuel transfer by ensuring the driver's side fuel tank level is under 30% and the passenger side tank is above 25% fuel level. Start the vehicle and listen for the transfer to attempt to occur. After the vehicle has started, the system should command the passenger side tank supply solenoid open and fuel pumps to run after approximately 60 seconds of run time. Did the unit attempt to command the transfer? **Note: Determine fuel level in each tank by viewing the parameters in the ROUSH Diagnostic Tool (driver side - MUX_FUELLVL_ACTV_SIDE, passenger side - MUX_FUELLVL_PSSV_SIDE) or performing the voltage test. DO NOT use the needle on the sending units as reference.**	**Yes** — Continue to step 7. **No** — Continue to step 6. **Back to DTC List**

6	**Check voltages at SRM connector** Using the wiring diagrams from the diagnostic manual, ensure the sending unit voltages are present at pins of the SRM connector. The driver side tank sender output is pin 40 of the SRM connector measured to chassis ground, the passenger side tank is pin 40 of the SRM connector measured to chassis ground. Are these voltages the same as listed in step 4?	**Yes** — Continue to step 7. **No** — If no resolution, contact ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2.
7	Is 12 volts present at the passenger side tank supply solenoid when the transfer is commanded?	**Yes** — Continue to step 8. **No** — Repair circuit wiring.
8	Is voltage present to the fuel pumps while the transfer is being commanded? **Note: The fuel pump should have resistance through each motor of less than 1.0 ohm and should draw a minimum of 2 amps when running. If pumps are out of spec, replace fuel pump assembly and retest. Tank supply solenoid should have resistance value of 6-11 ohms. If out of spec, replace tank supply solenoid and retest.**	**Yes** — Continue to step 9. **No** — Repair circuit wiring.
9	De-pressurize the transfer line and drivers side fuel tank using the de-pressurization procedures in the service manual. Replace the OPD and retest the transfer operation. Does vehicle transfer successfully? **Note: Once tank is refilled after repair, it will be necessary to purge the tank of air using the *Fuel Tank Purging* Procedure that is located within the service manual. The fuel levels will need to be set back to the values listed in step 5 above.**	**Yes** — Repair complete. **No** — Contact ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2.

Back to DTC List

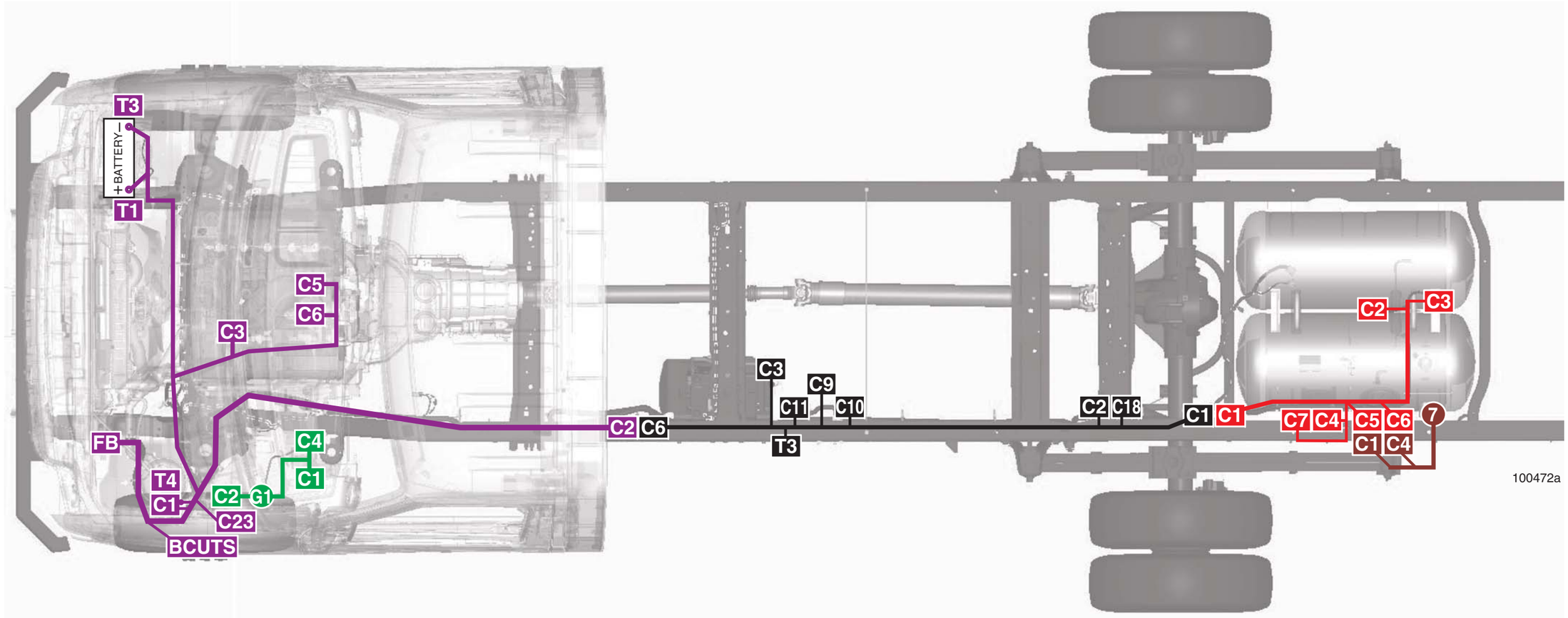
Pinpoint Test T: P1070 DTC Pinpoint Test

Step	Procedure	Action
1	**Test rationality between Integrated Injection Pressure Temperature Sensor (IPTS) and Tank Pressure Temperature Sensor (TPTS).** If you have the ROUSH Diagnostic Tool (RDT) or Ford IDS, use the Manual Solenoid Activation Procedure, open tank supply solenoid and FRPCM supply solenoid. Using RDT, read Fuel Tank Pressure (**Rpr_pt_prs**) and Fuel Rail Pressure (**rpr_fr_prs**). Are pressures within 8psi of each other?	**Yes** — Move to Step 2. **No** — Continue to Step 2.
2	Open bleeder valve for 60 minutes	Once complete, move to Step 3.
3	Close bleeder valve and wait 60 minutes while tank pressure stabilizes	Once complete, move to Step 4.
4	Using RDT, check tank and rail pressure	
5	Re-test rationality between Integrated Injection Pressure Temperature Sensor (IPTS) and Tank Pressure Temperature Sensor (TPTS). If you have the ROUSH Diagnostic Tool (RDT) or Ford IDS, use the Manual Solenoid Activation Procedure, open tank supply solenoid and FRPCM supply solenoid. Using RDT, read Fuel Tank Pressure **Rpr_pt_prs**) and Fuel Rail Pressure (**rpr_fr_prs**). Are pressures within 8psi of each other?	**Yes** — Diagnostics complete. If problem persists, contact ROUSH CleanTech Customer Success at (800) 59-ROUSH (597-6874), Opt. 2. **No** — The vehicle has a volatile fuel mixture. Contact the fuel provider to resolve.

Reference Materials

Wiring Diagram and Electrical Schematics

E-450 GEN4 Wiring Harnesses and Connector Layout



UNDERHOOD HARNESS
CAN HARNESS
REAR FRAME HARNESS
TANK HARNESS
IN-TANK HARNESS

UNDERHOOD HARNESS

BCUTS – BLUNT CUTS FOR CRANK WARNING, FUEL COOLER, AC2 REQ, AND A/C CLUTCH2

- C1 SRM, 46-PIN
- C2 UNDERHOOD / TANK INLINE, 16-PIN
- C3 IPTS, 4-PIN
- C5 SUPPLY SOLENOID, 2-PIN
- C6 BLEED SOLENOID, 2-PIN
- C23 UNDERHOOD / CAN HARNESS INLINE, 2-PIN
- FB FUSE BOX
- T1 BATTERY PWR, RING TERMINAL
- T3 BATTERY GROUND, RING TERMINAL
- T4 SRM CASE GROUND, RING TERMINAL

CAN HARNESS

- C1 OBD FLANGE MOUNT, 16-PIN
- C2 CAN / UNDERHOOD INLINE, 2-PIN
- C4 OBD INLINE TO FORD HARNESS, 16-PIN
- G1 PASS-THRU GROMMET

REAR FRAME HARNESS

- C1 REAR FRAME / TANK HARNESS INLINE, 16-PIN
- C2 FORD FTPT HARNESS INLINE, 3-PIN
- C3 FORD FTPT SENSOR, 3-PIN
- C6 REAR FRAME / UNDERHOOD INLINE, 16-PIN
- C9 RCT EFPR, 8-PIN
- C10 FORD FPCM HARNESS INLINE, 8-PIN
- C11 FORD EFPR, 8-PIN
- C18 FORD FUEL TANK HARNESS INLINE, 4-PIN
- T3 FRAME GROUND, RING TERMINAL

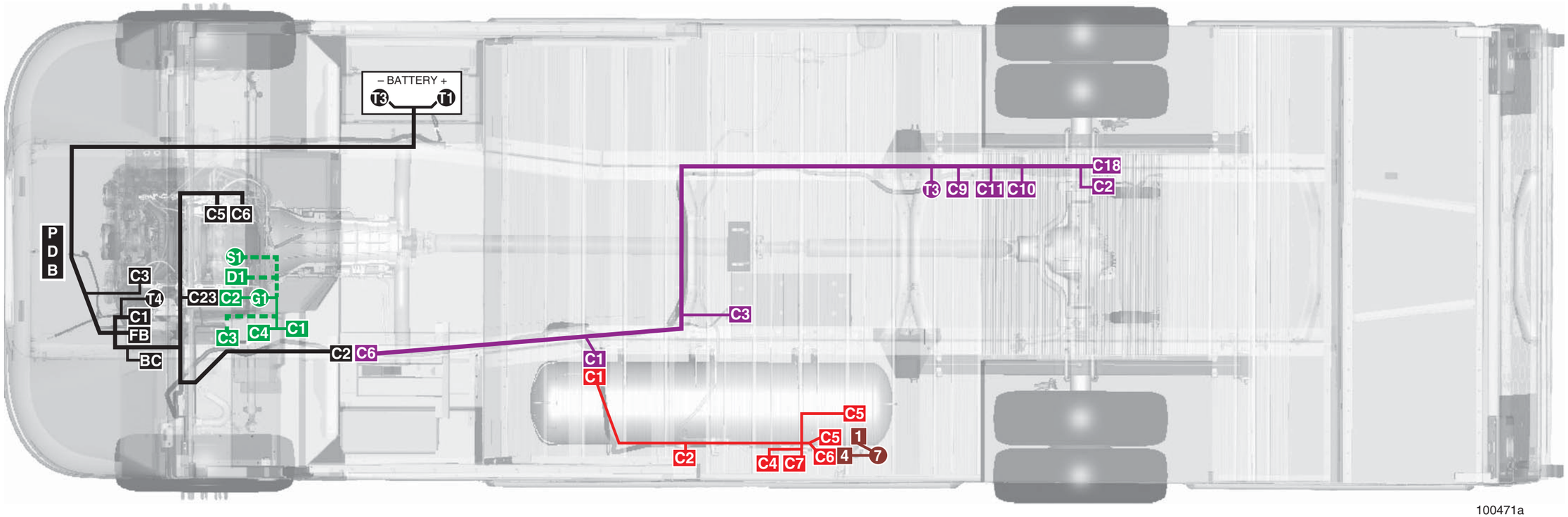
TANK HARNESS

- C1 TANK / REAR FRAME HARNESS INLINE, 16-PIN
- C2 FUEL LEVEL SENDER, 3-PIN
- C3 IPTS #2, 4-PIN
- C4 FLOW CONTROL SOLENOID (GRAY), 2-PIN
- C5 TANK / IN-TANK FP #1 INLINE, 2-PIN
- C6 TANK / IN-TANK FP #2 INLINE, 2-PIN
- C7 SUPPLY SOLENOID (BLACK), 2-PIN

IN-TANK HARNESS

- C1 FUEL PUMP #1 INLINE, 2-PIN
- C4 FUEL PUMP #2 INLINE, 2-PIN
- 7 TANK PASS-THRU GROMMET

F-59 Wiring Harnesses and Connector Layout



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- UNDERHOOD HARNESS
- CAN HARNESS
- REAR FRAME HARNESS
- TANK SOLENOID HARNESS
- IN-TANK HARNESS

UNDERHOOD HARNESS

C1 SRM, 46-PIN
C2 UNDERHOOD / REAR FRAME INLINE CONNECTOR, 16-PIN
C3 IPTS, 4-PIN
C5 SUPPLY SOLENOID, 2-PIN
C6 BLEED SOLENOID, 2-PIN
C23 UNDERHOOD / CAN INLINE CONNECTOR, 4 -PIN
FB AUX FUSE BOX
T1 BATT POWER, RING TERMINAL
T3 BATT GROUND, RING TERMINAL
T4 SRM CASE GROUND, RING TERMINAL
BC BLUNT CUTS FOR CK WRNG, FU CLR, A/C CL2, A/C CL3, AC2 REQ, AC3 REQ

CAN HARNESS

C1 OBD FLANGE MOUNT, 16-PIN
C2 CAN / UNDERHOOD INLINE, 4-PIN
C3 CAN / MORGAN INLINE CONNECTOR, 1-PIN (UPS ONLY)
C4 OBD INLINE CONNECTOR TO FORD HARNESS, 16-PIN
D1 DIODE (UPS ONLY)
G1 GROMMET
S1 SPLICE TO MORGAN OLSON IP HARNESS (UPS ONLY)

REAR FRAME HARNESS

C1 REAR FRAME / TANK INLINE, 16-PIN
C2 FTPT FORD HARNESS INLINE, 3-PIN
C3 FTPT SENSOR, 3-PIN
C6 REAR FRAME / UNDERHOOD INLINE, 16-PIN
C9 RCT EFPR, 8-PIN
C10 FORD FPCM INLINE, 8-PIN
C11 FORD EFPR, 8-PIN
C18 FORD FUEL TANK HARNESS INLINE, 4-PIN
T3 FRAME GROUND (FP SHIELD), RING TERMINAL

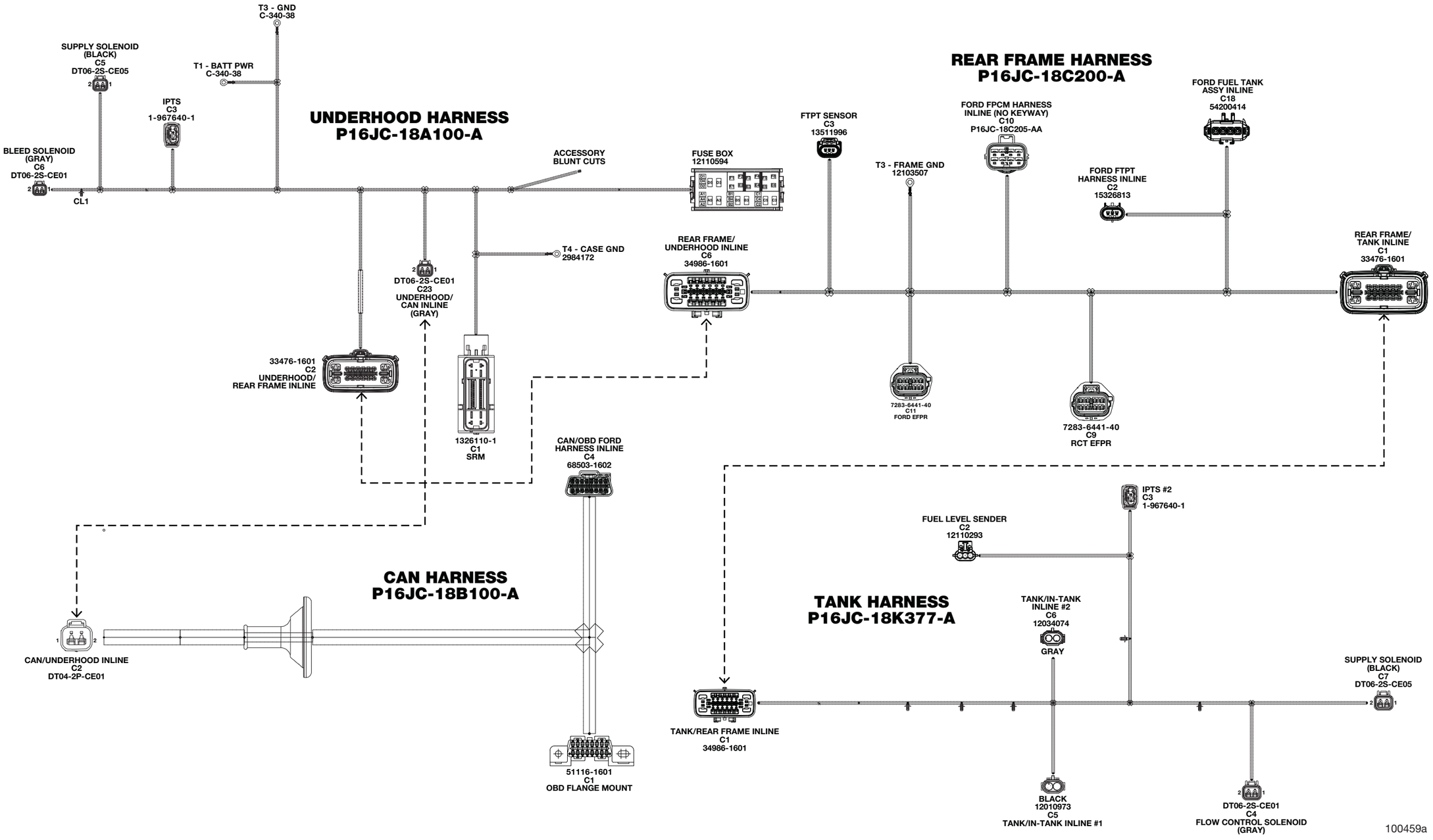
TANK SOLENOID HARNESS

C1 TANK / REAR FRAME INLINE, 16-PIN
C2 FUEL LEVEL SENDER, 3-PIN
C3 IPTS #2, 4-PIN
C4 FLOW CONTROL SOLENOID VALVE, 2-PIN
C5 TANK / FUEL PUMP #1 INLINE, 2-PIN (BLK)
C6 TANK / FUEL PUMP #2 INLINE, 2-PIN (GRAY)
C7 SUPPLY SOLENOID VALVE, 2-PIN

IN-TANK HARNESS

C1 FUEL PUMP #1 INLINE CONNECTOR
C4 FUEL PUMP #2 INLINE CONNECTOR
7 GROMMET

E-450 Roush Wiring Harnesses



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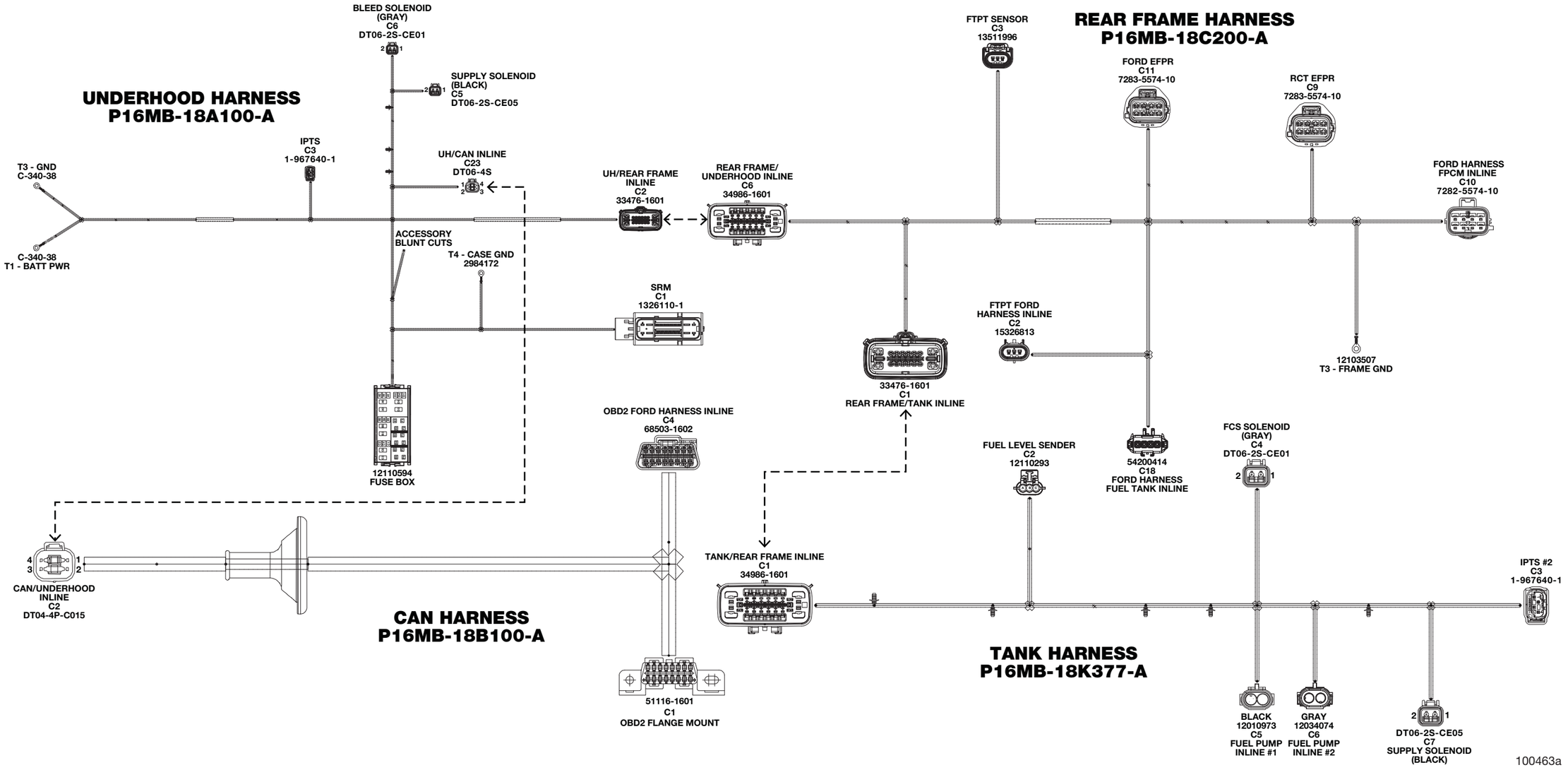
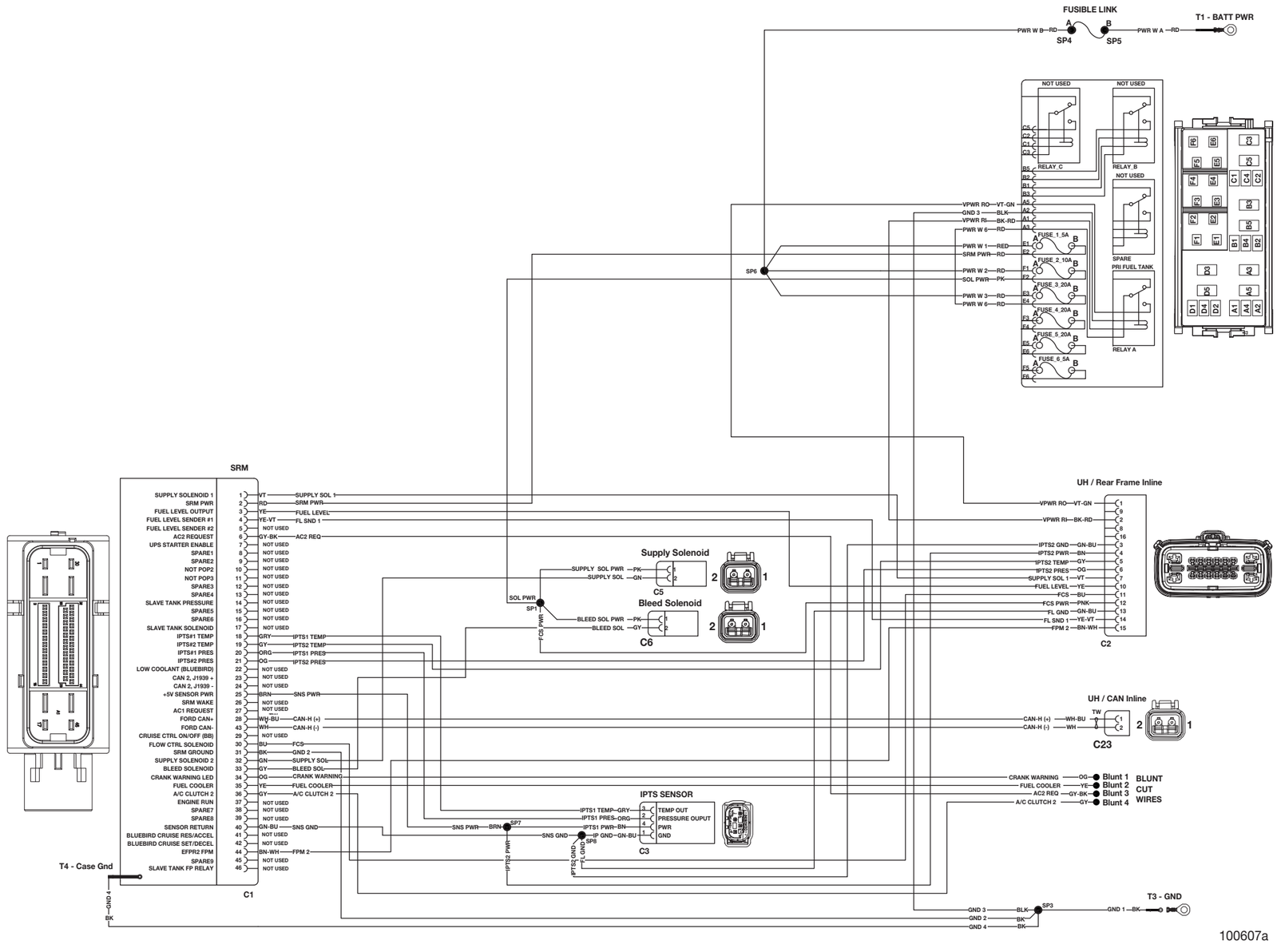
F-59 Roush Wiring Harnesses



E-450 Electrical Schematic — Underhood Harness



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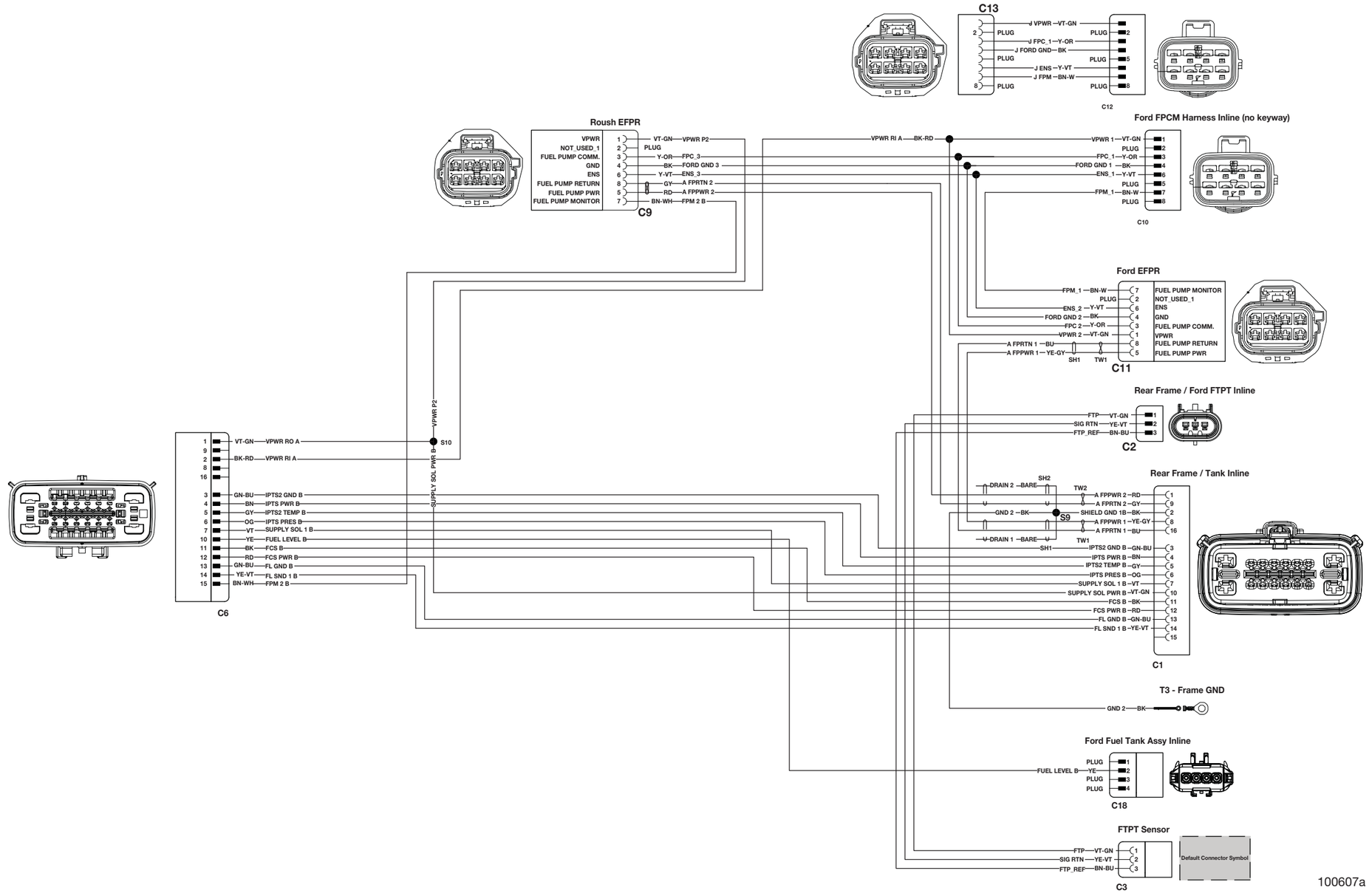
E-450 Electrical Schematic — CAN Bus Harness



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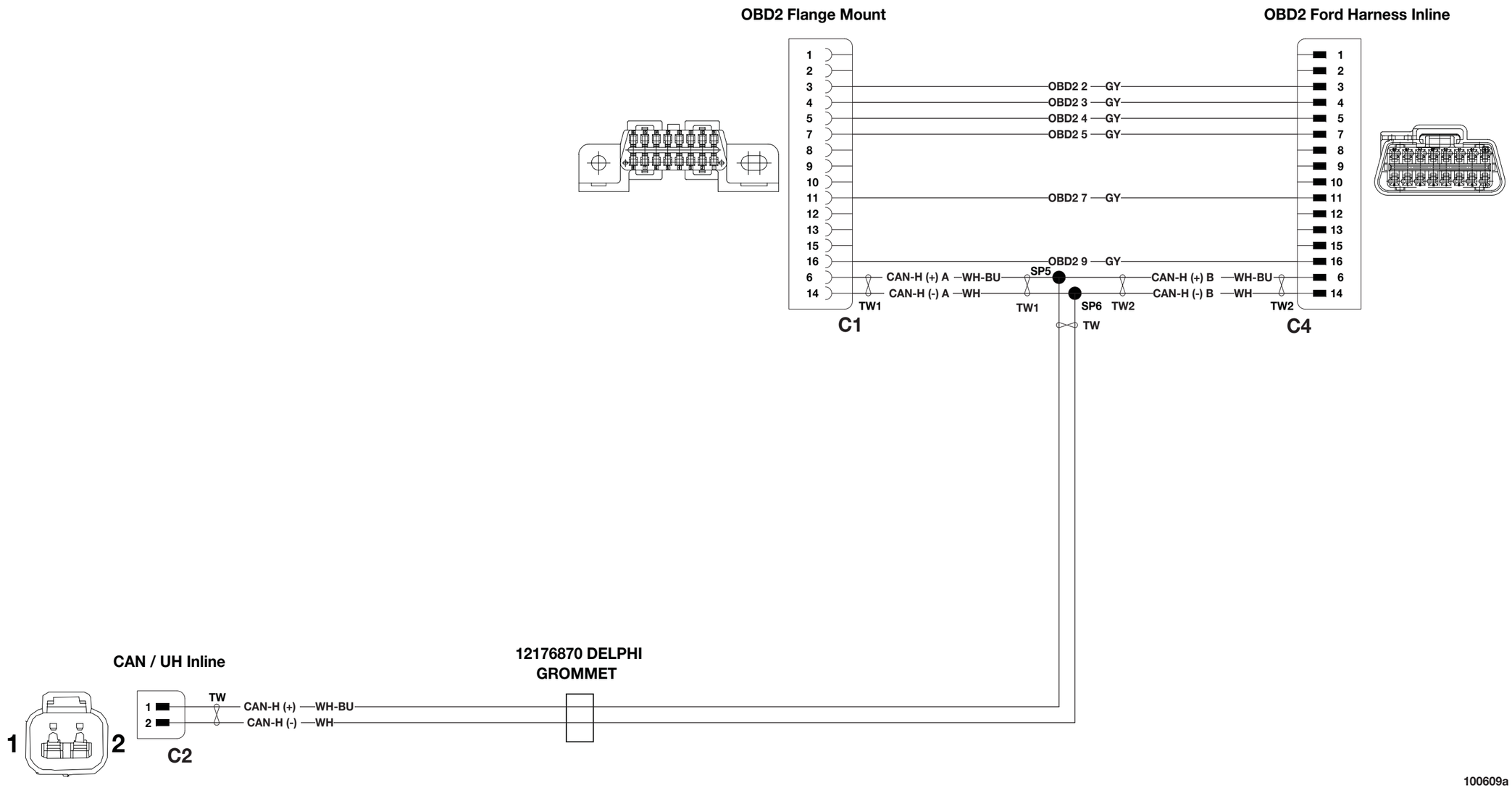
E-450 Electrical Schematic — Rear Frame Harness



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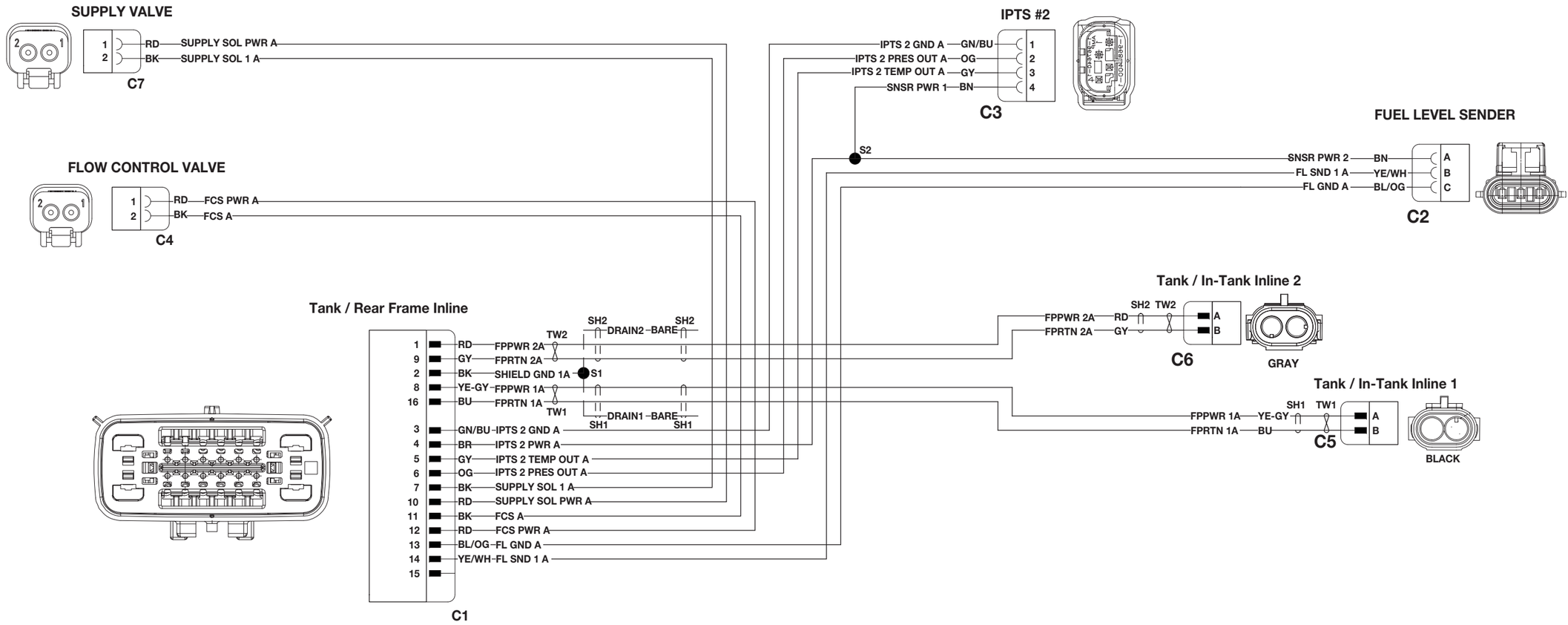
E-450 Electrical Schematic — Tank Harness



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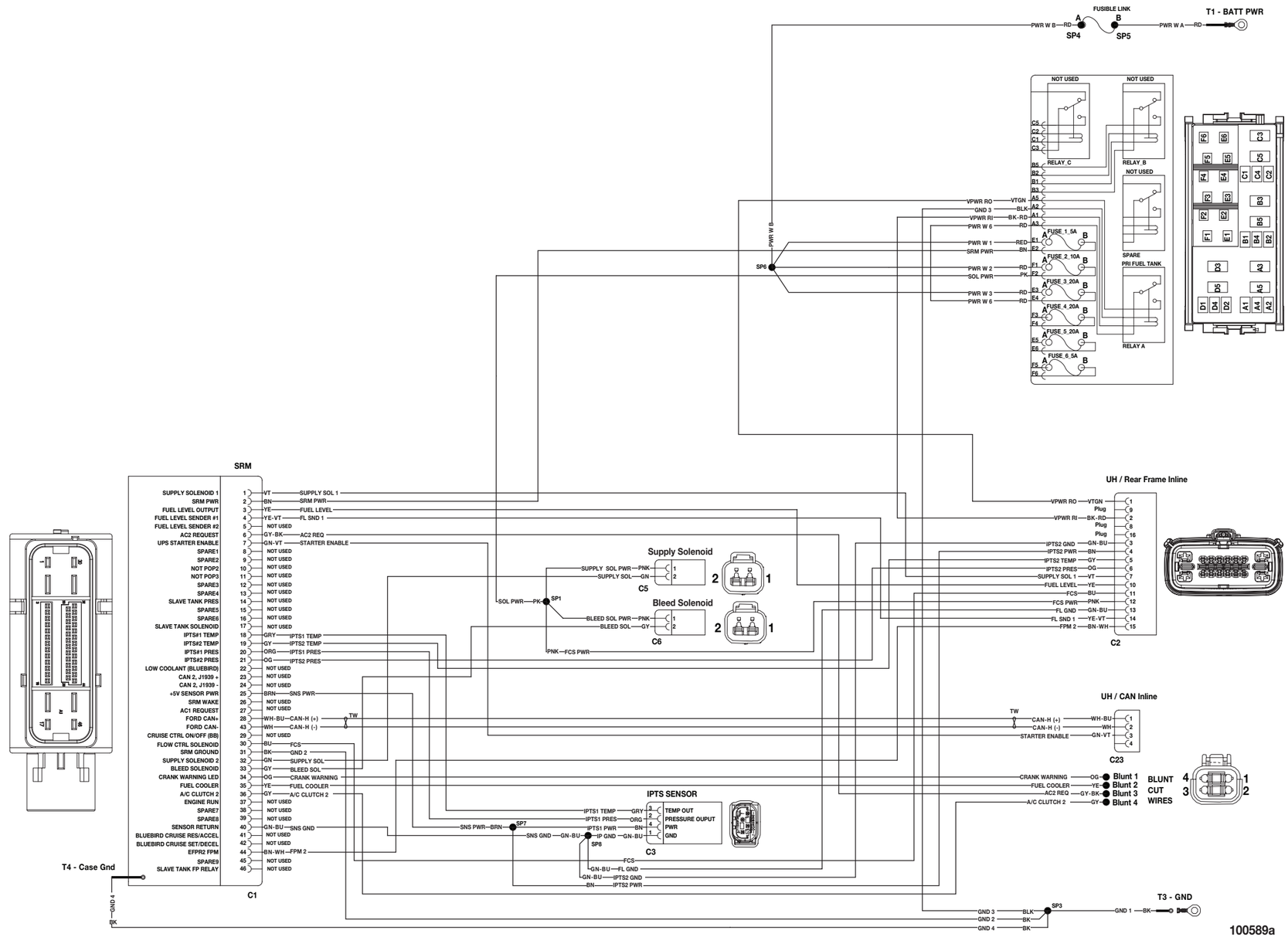
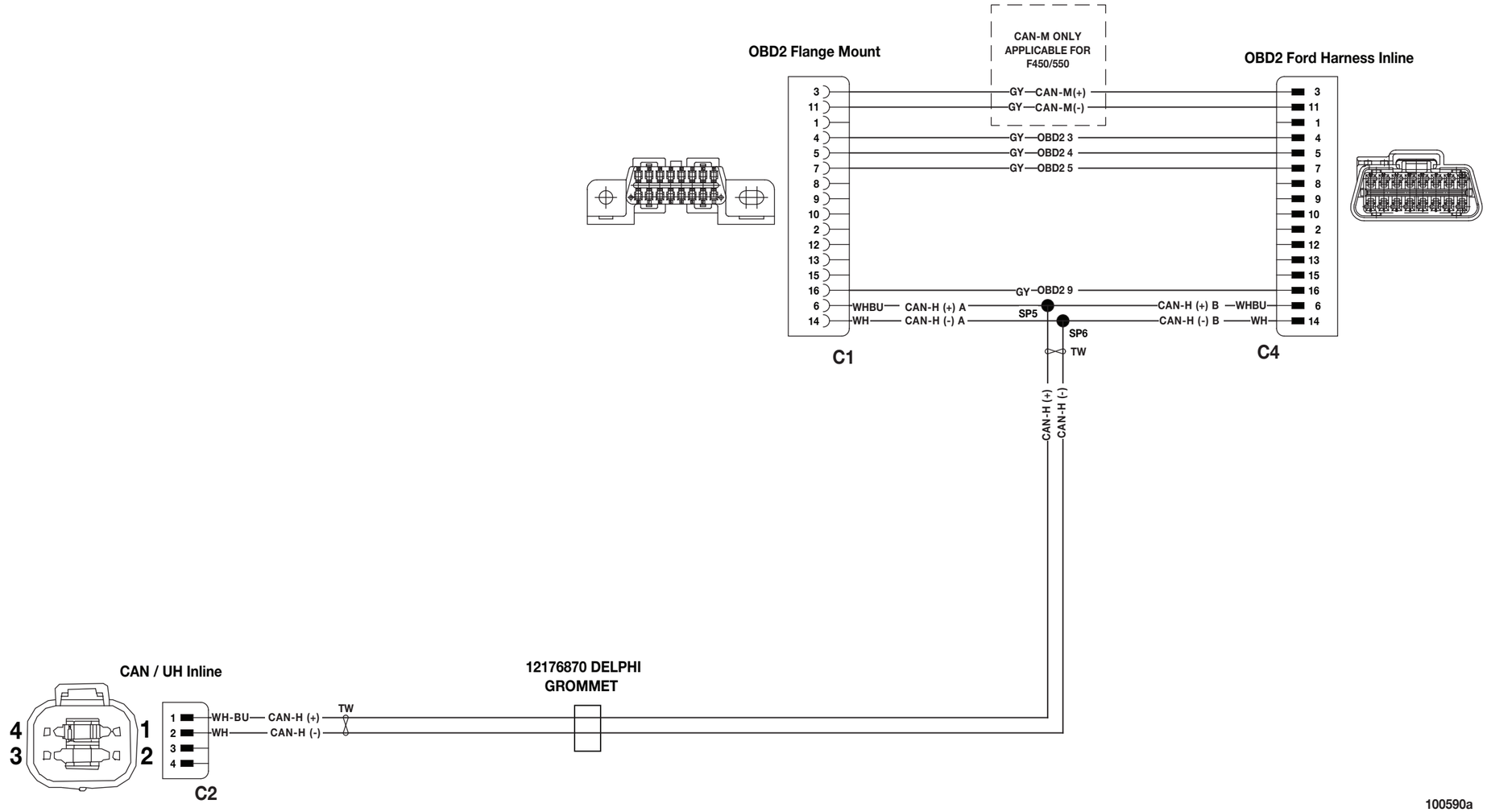
F-59 F-450 F-550 Electrical Schematic — Underhood Harness



F-59 F-450 F-550 Electrical Schematic — CAN Bus Harness



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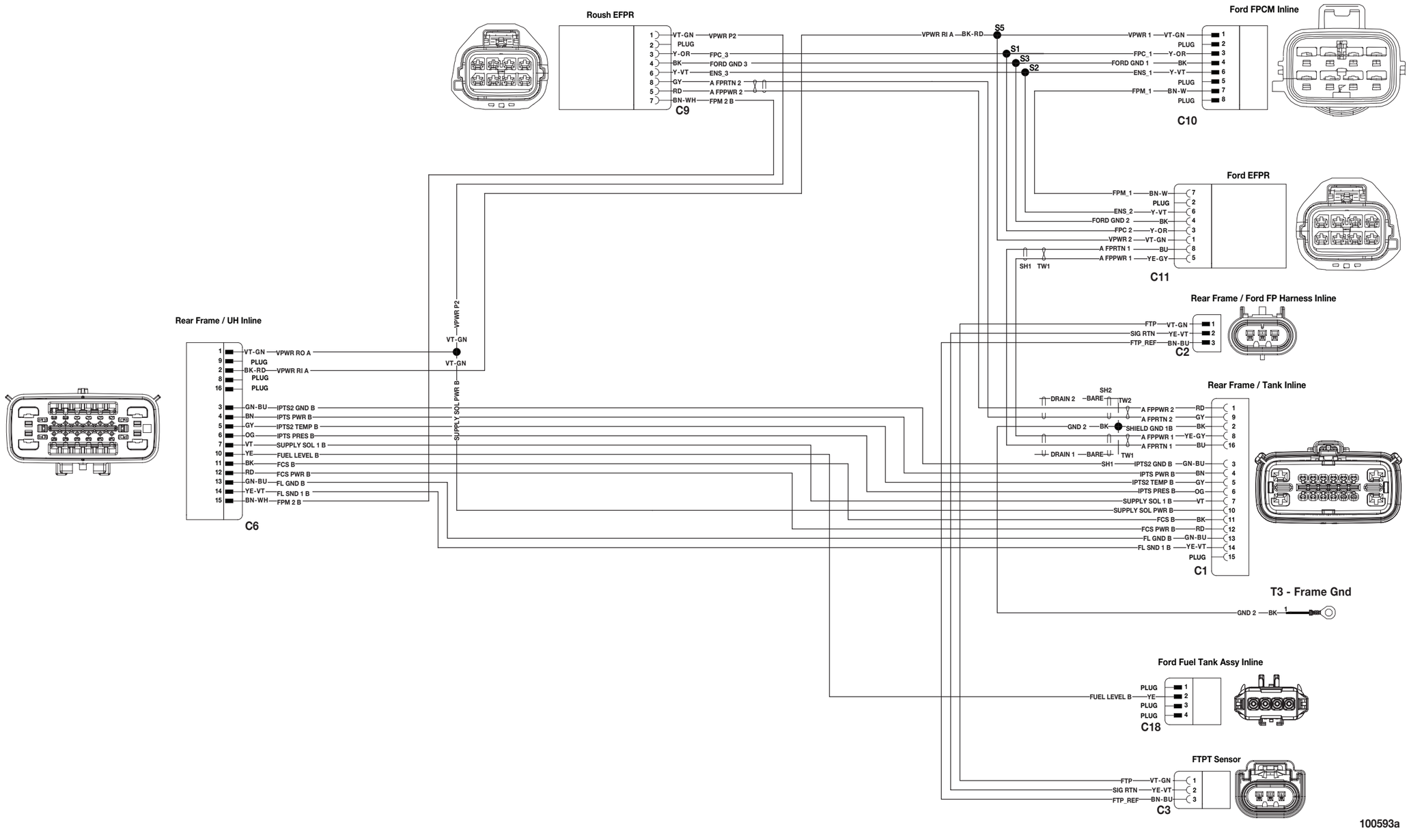
F-59 F-450 F-550 Electrical Schematic — Rear Frame Harness



F-59 F-450 F-550 Electrical Schematic — Tank Harness

WIRE TABLE

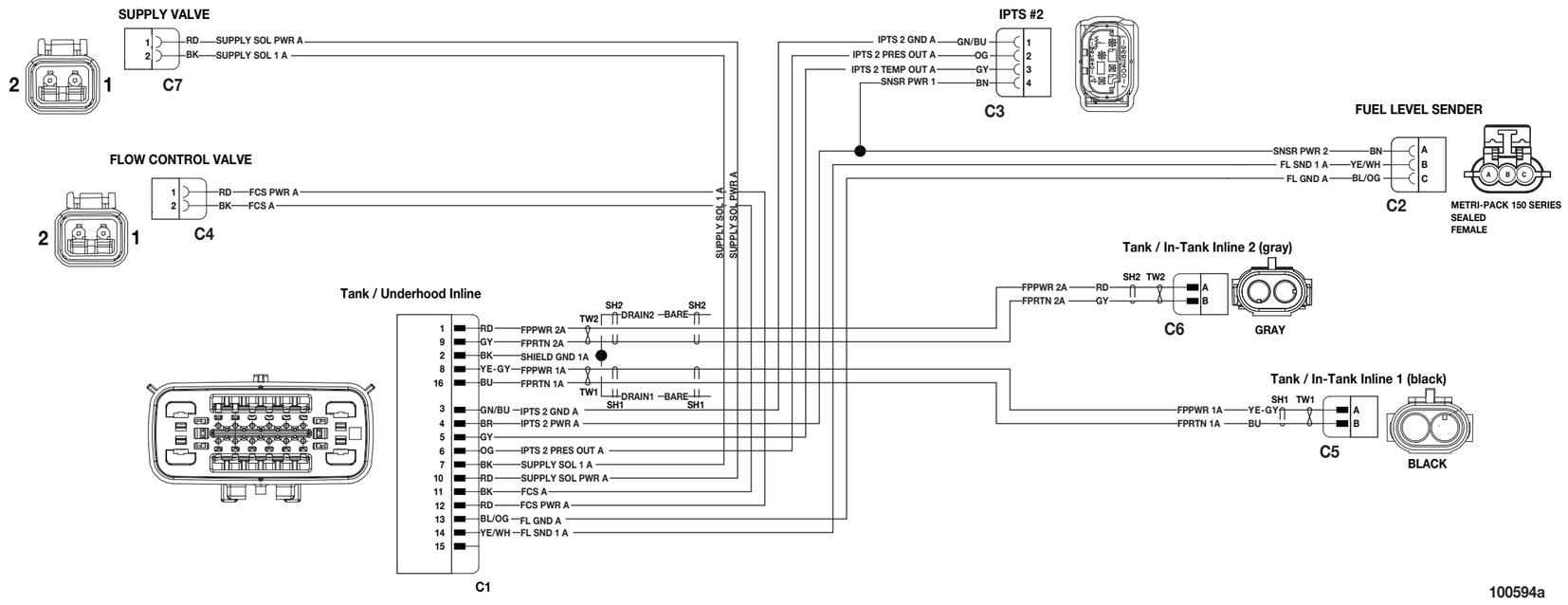
Index	Wire	Color	Spec.	CSA	MAT	From	Connector	Cavity	To	Connector	Cavity	Multicore
1	DRAIN1	BARE	22	0		S1	-	-	-	-	-	SH1
2	DRAIN2	BARE	22	0		S1	-	-	-	-	-	SH2
3	FPPWR 1A	YE-GY	12	3.31	GXL	Tank / In-Tank Inline 1 (black)	C5	A	Tank / Underhood Inline	C1	8	TW1
4	FPRTN 1A	BU	12	3.31	GXL	Tank / In-Tank Inline 1 (black)	C5	B	Tank / Underhood Inline	C1	16	TW1
5	FPPWR 2A	RD	12	3.31	GXL	Tank / Underhood Inline	C1	1	Tank / In-Tank Inline 2 (gray)	C6	A	TW2
6	FPRTN 2A	GY	12	3.31	GXL	Tank / In-Tank Inline 2 (gray)	C6	B	Tank / Underhood Inline	C1	9	TW2
7	FCS A	BK	18	0.82	GXL	FLOW CONTROL VALVE	C4	2	Tank / Underhood Inline	C1	11	
8	FCS PWR A	RD	18	0.82	GXL	FLOW CONTROL VALVE	C4	1	Tank / Underhood Inline	C1	12	
9	FL GND A	BL/OG	18	0.82	GXL	Tank / Underhood Inline	C1	13	FUEL LEVEL SENDER	C2	C	
10	FL SND 1 A	YE/WH	18	0.82	GXL	Tank / Underhood Inline	C1	14	FUEL LEVEL SENDER	C2	B	
11	IPTS 2 GND A	GN/BU	20	0.52	GXL	IPTS #2	C3	1	Tank / Underhood Inline	C1	3	
12	IPTS 2 PRES OUT A	OG	20	0.52	GXL	IPTS #2	C3	2	Tank / Underhood Inline	C1	6	
13	IPTS 2 PWR A	BR	20	0.52	GXL	S2	-	-	Tank / Underhood Inline	C1	4	
14	IPTS 2 TEMP OUT A	GY	20	0.52	GXL	IPTS #2	C3	3	Tank / Underhood Inline	C1	5	
15	SHIELD GND 1A	BK	20	0.52	GXL	Tank / Underhood Inline	C1	2	S1	-	-	
16	SNSR PWR 1	BN	20	0.52	GXL	S2	-	-	IPTS #2	C3	4	
17	SNSR PWR 2	BN	20	0.52	GXL	S2	-	-	FUEL LEVEL SENDER	C2	A	
18	SUPPLY SOL 1 A	BK	18	0.82	GXL	SUPPLY VALVE	C7	2	Tank / Underhood Inline	C1	7	
19	SUPPLY SOL PWR A	RD	18	0.82	GXL	SUPPLY VALVE	C7	1	Tank / Underhood Inline	C1	10	

TWISTED PAIR

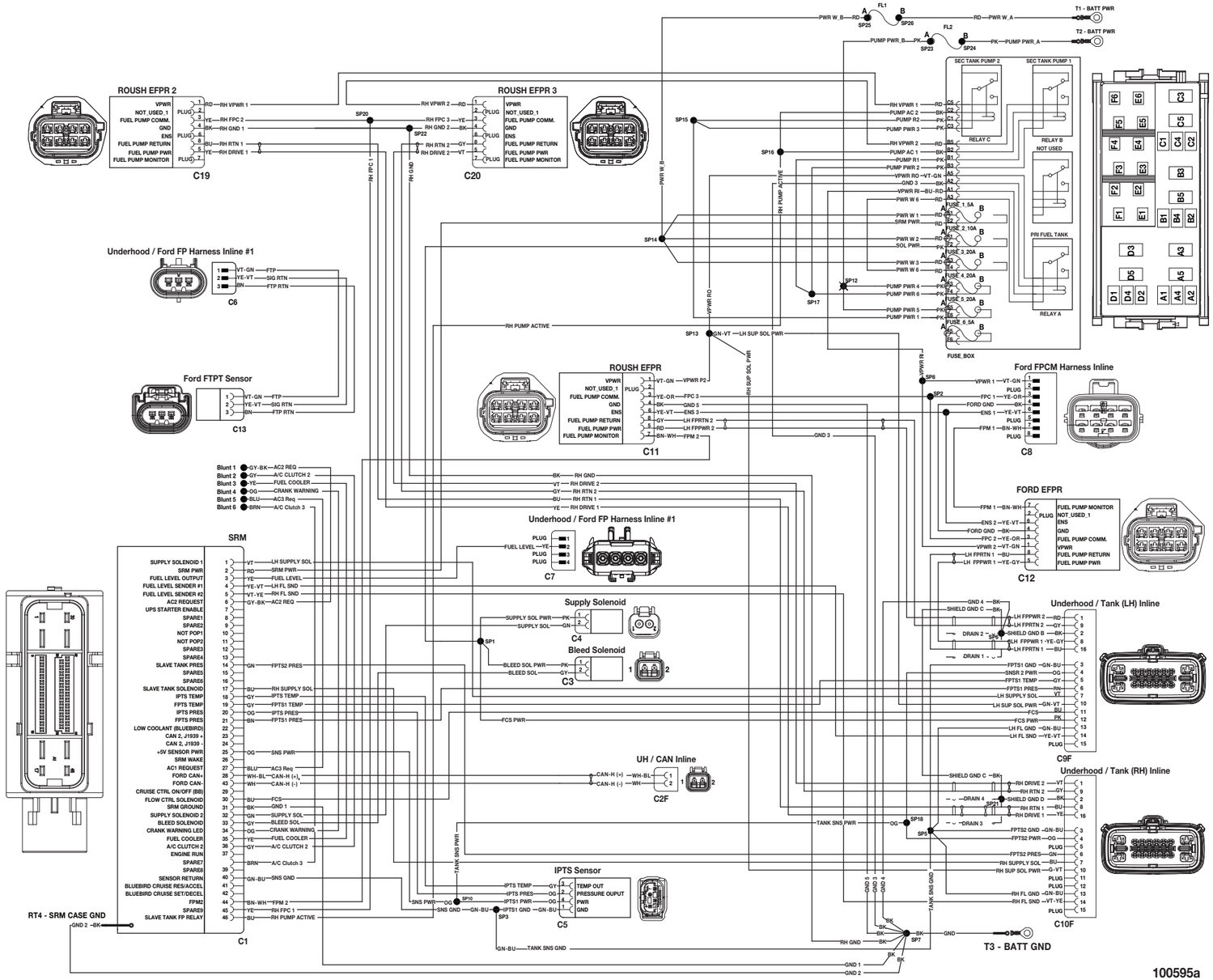
Index	Multicore Name	Contents	Type
1	TW1	FPPWR 1A	Twisted
2	TW1	FPRTN 1A	Twisted
3	TW2	FPPWR 2A	Twisted
4	TW2	FPRTN 2A	Twisted

SHIELD TABLE

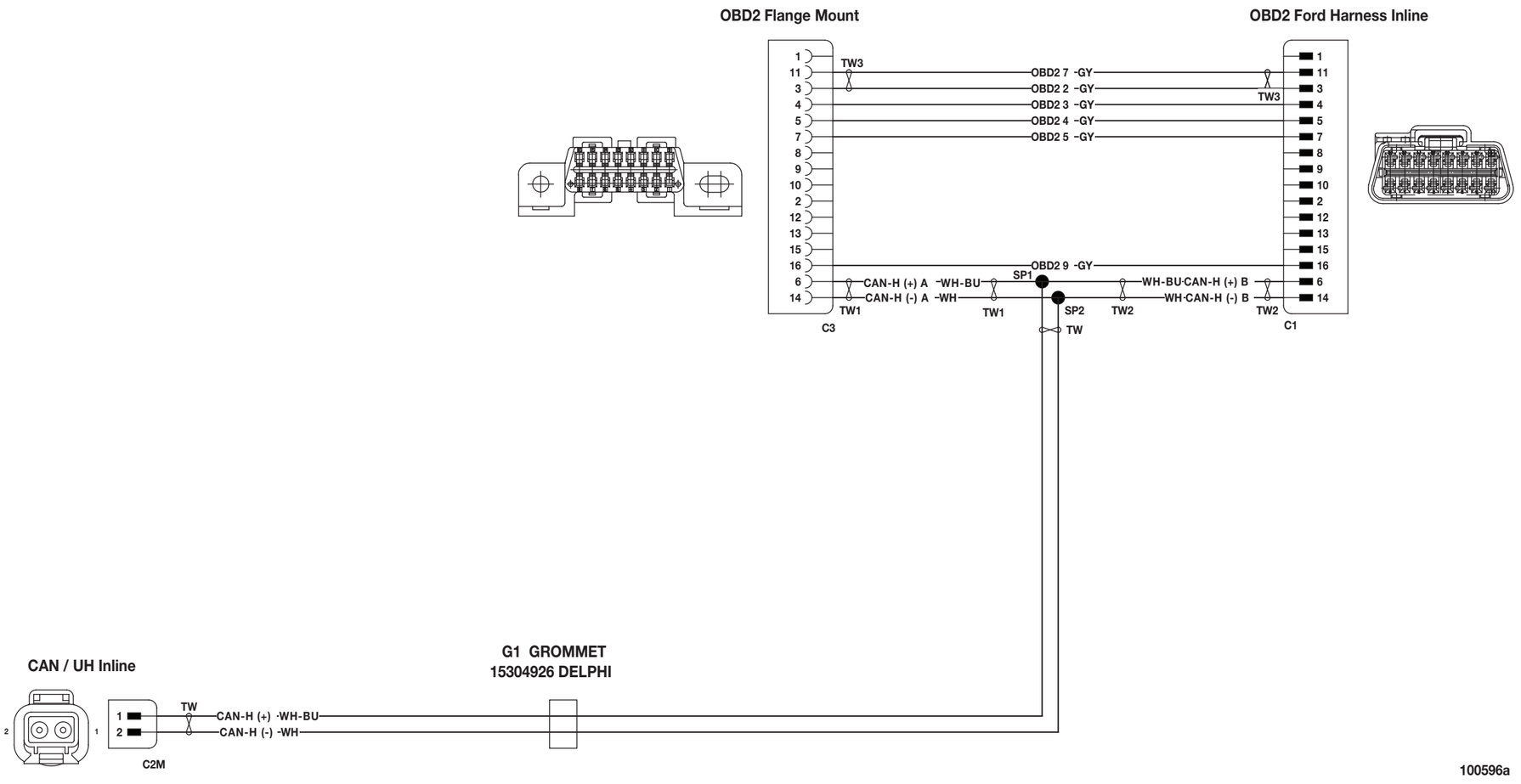
Index	Shield Name	Contents
1	SH1	DRAIN1
2	SH1	TW1
3	SH2	DRAIN2
4	SH2	TW2



F-650 F-750 Electrical Schematic — Underhood Harness



F-650 F-750 Electrical Schematic — CAN Bus Harness



F-650 F-750 Electrical Schematic — Left Tank Harness

WIRE TABLE

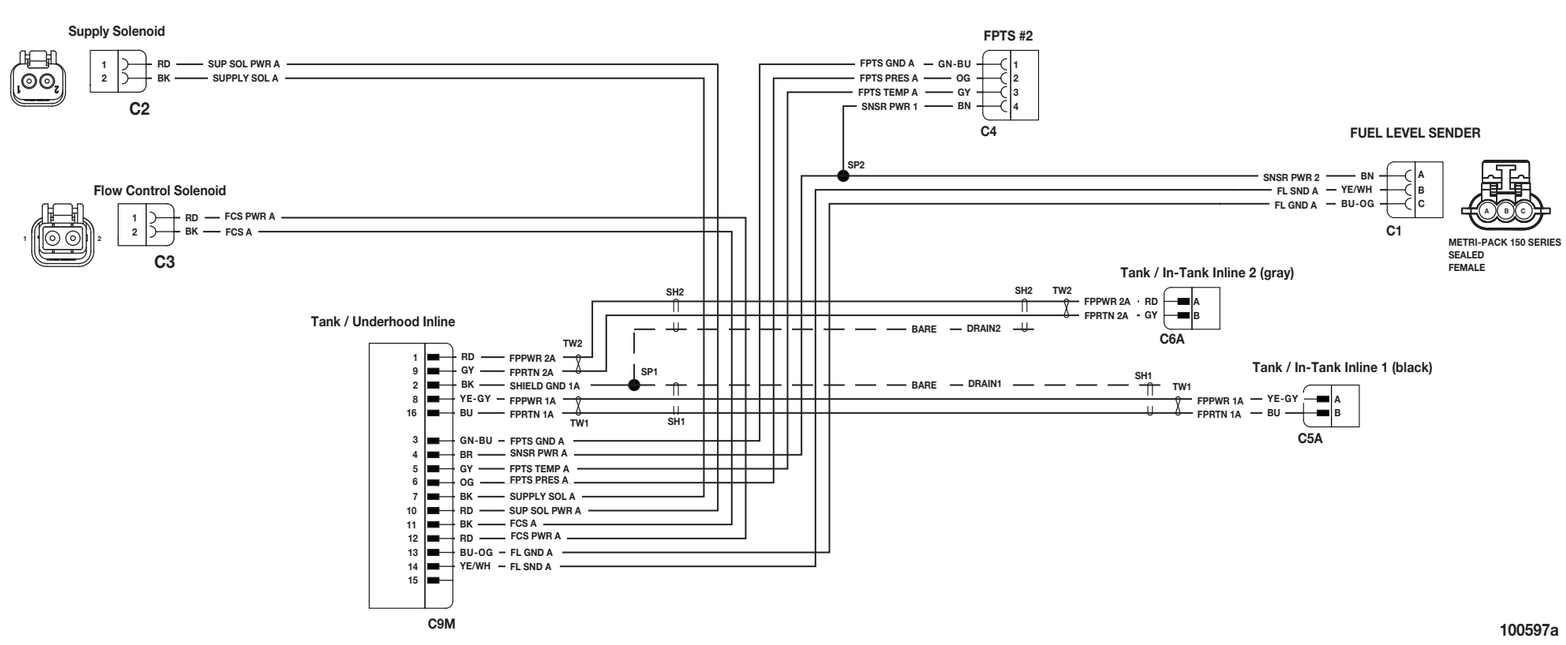
Index	Wire	Color	Spec.	CSA	MAT	From	Connector	Cavity	To	Connector	Cavity	Multicore
1	DRAIN1	BARE	22	0.35	BSTW	SP1	-	-	-	-	-	SH1
2	DRAIN2	BARE	22	0.35	BSTW	SP1	-	-	-	-	-	SH2
3	FPPWR 1A	YE-GY	12	3.31	GXL	Tank / In-Tank Inline 1 (black)	C5A	A	Tank / Underhood Inline	C9M	8	TW1
4	FPRTN 1A	BU	12	3.31	GXL	Tank / In-Tank Inline 1 (black)	C5A	B	Tank / Underhood Inline	C9M	16	TW1
5	FPPWR 2A	RD	12	3.31	GXL	Tank / Underhood Inline	C9M	1	Tank / In-Tank Inline 2 (gray)	C6A	A	TW2
6	FPRTN 2A	GY	12	3.31	GXL	Tank / In-Tank Inline 2 (gray)	C6A	B	Tank / Underhood Inline	C9M	9	TW2
7	FCS A	BK	18	0.82	GXL	Flow Control Solenoid	C3	2	Tank / Underhood Inline	C9M	11	
8	FCS PWR A	RD	18	0.82	GXL	Flow Control Solenoid	C3	1	Tank / Underhood Inline	C9M	12	
9	FL GND A	BU-OG	18	0.82	GXL	Tank / Underhood Inline	C9M	13	FUEL LEVEL SENDER	C1	C	
10	FL SND A	YE/WH	18	0.82	GXL	Tank / Underhood Inline	C9M	14	FUEL LEVEL SENDER	C1	B	
11	FPTS GND A	GN-BU	20	0.52	GXL	FPTS #2	C4	1	Tank / Underhood Inline	C9M	3	
12	FPTS PRES A	OG	20	0.52	GXL	FPTS #2	C4	2	Tank / Underhood Inline	C9M	6	
13	FPTS TEMP A	GY	20	0.52	GXL	FPTS #2	C4	3	Tank / Underhood Inline	C9M	5	
14	SHIELD GND 1A	BK	20	0.52	GXL	Tank / Underhood Inline	C9M	2	SP1	-	-	
15	SNSR PWR 1	BN	20	0.52	GXL	SP2	-	-	FPTS #2	C4	4	
16	SNSR PWR 2	BN	18	0.82	GXL	SP2	-	-	FUEL LEVEL SENDER	C1	A	
17	SNSR PWR A	BR	18	0.82	GXL	SP2	-	-	Tank / Underhood Inline	C9M	4	
18	SUP SOL PWR A	RD	18	0.82	GXL	Supply Solenoid	C2	1	Tank / Underhood Inline	C9M	10	
19	SUPPLY SOL A	BK	18	0.82	GXL	Supply Solenoid	C2	2	Tank / Underhood Inline	C9M	7	

TWISTED PAIR

Index	Multicore Name	Contents	Type
1	TW1	FPPWR 1A	Twisted
2	TW1	FPRTN 1A	Twisted
3	TW2	FPPWR 2A	Twisted
4	TW2	FPRTN 2A	Twisted

SHIELD TABLE

Index	Shield Name	Contents
1	SH1	DRAIN1
2	SH1	TW1
3	SH2	DRAIN2
4	SH2	TW2



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F-650 F-750 Electrical Schematic — Right Tank Harness

WIRE TABLE

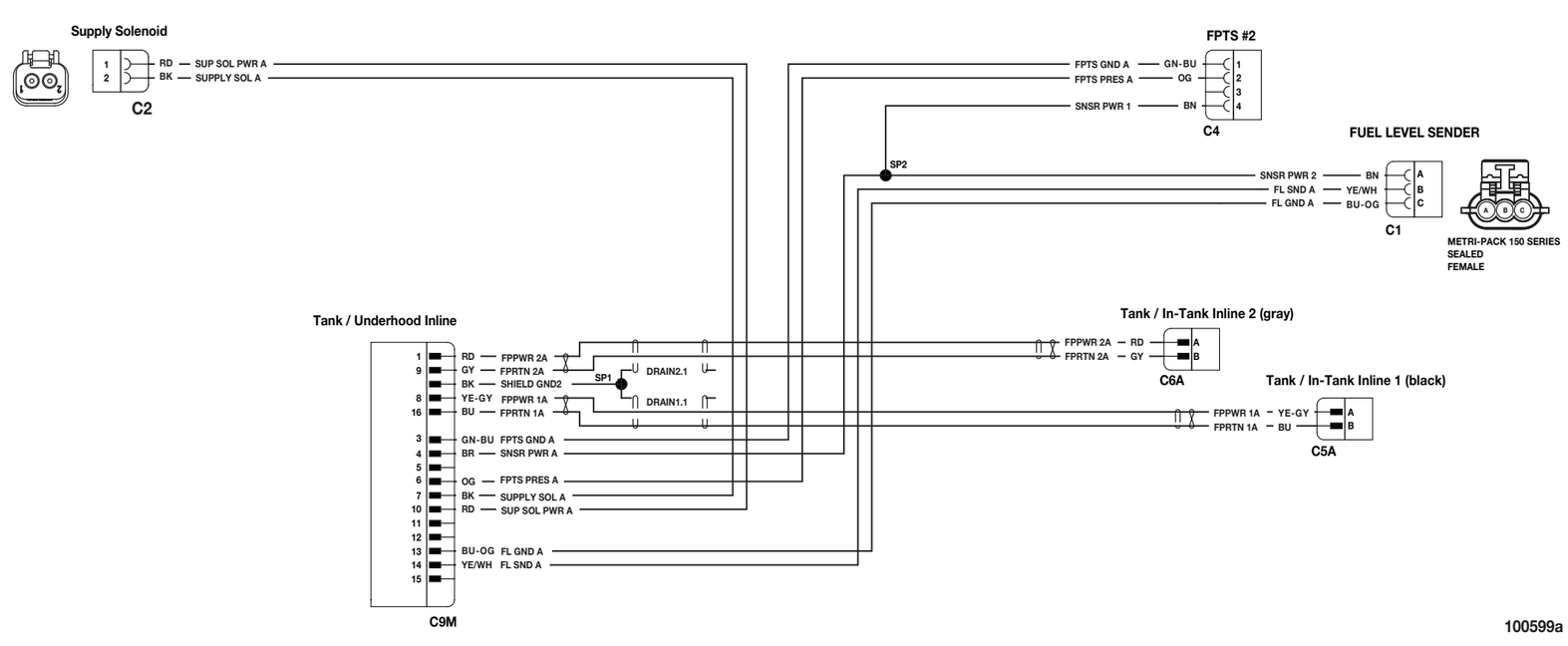
Index	Wire	Color	Spec.	CSA	MAT	From	Connector	Cavity	To	Connector	Cavity	Multicore
1	DRAIN1.1	BARE	22	0.35	BSTW	SP1	-	-	-	-	-	SH1
2	DRAIN2.1			0		SP1	-	-	-	-	-	SH2
3	FPPWR 1A	YE-GY	12	3.31	GXL	Tank / In-Tank Inline 1 (black)	C5A	A	Tank / Underhood Inline	C9M	8	TW1
4	FPRTN 1A	BU	12	3.31	GXL	Tank / In-Tank Inline 1 (black)	C5A	B	Tank / Underhood Inline	C9M	16	TW1
5	FPPWR 2A	RD	12	3.31	GXL	Tank / Underhood Inline	C9M	1	Tank / In-Tank Inline 2 (gray)	C6A	A	TW2
6	FPRTN 2A	GY	12	3.31	GXL	Tank / In-Tank Inline 2 (gray)	C6A	B	Tank / Underhood Inline	C9M	9	TW2
7	FL GND A	BU-OG	18	0.82	GXL	Tank / Underhood Inline	C9M	13	FUEL LEVEL SENDER	C1	C	
8	FL SND A	YE/WH	18	0.82	GXL	Tank / Underhood Inline	C9M	14	FUEL LEVEL SENDER	C1	B	
9	FPTS GND A	GN-BU	20	0.52	GXL	FPTS #2	C4	1	Tank / Underhood Inline	C9M	3	
10	FPTS PRES A	OG	20	0.52	GXL	FPTS #2	C4	2	Tank / Underhood Inline	C9M	6	
11	SHIELD GND2	BK	20	0.52	GXL	SP1	-	-	Tank / Underhood Inline	C9M	2	
12	SNSR PWR 1	BN	20	0.52	GXL	SP2	-	-	FPTS #2	C4	4	
13	SNSR PWR 2	BN	18	0.82	GXL	SP2	-	-	FUEL LEVEL SENDER	C1	A	
14	SNSR PWR A	BR	18	0.82	GXL	SP2	-	-	Tank / Underhood Inline	C9M	4	
15	SUP SOL PWR A	RD	18	0.82	GXL	Supply Solenoid	C2	1	Tank / Underhood Inline	C9M	10	
16	SUPPLY SOL A	BK	18	0.82	GXL	Supply Solenoid	C2	2	Tank / Underhood Inline	C9M	7	

TWISTED PAIR

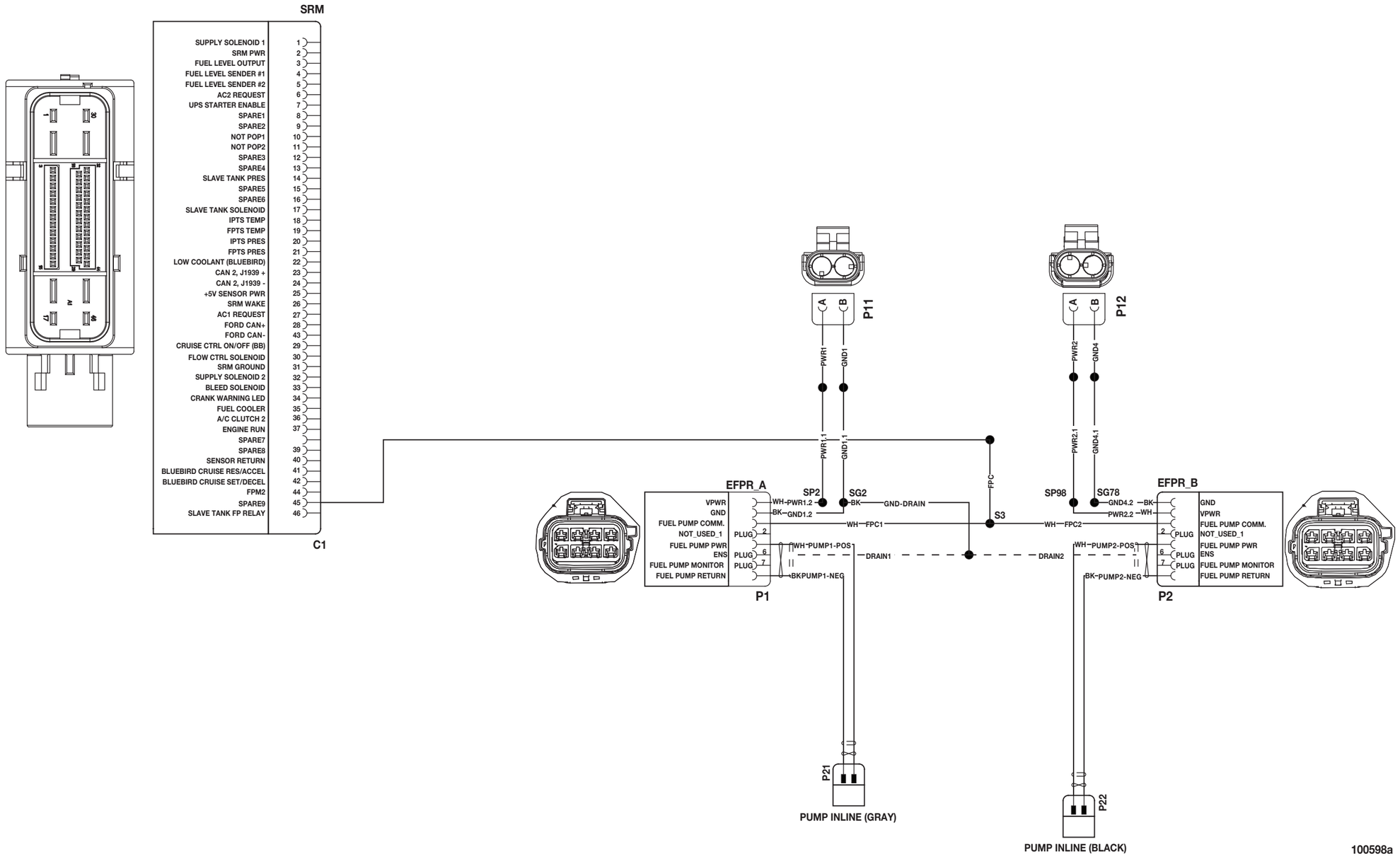
Index	Multicore Name	Contents	Type
1	TW1	FPPWR 1A	Twisted
2	TW1	FPRTN 1A	Twisted
3	TW2	FPPWR 2A	Twisted
4	TW2	FPRTN 2A	Twisted

SHIELD TABLE

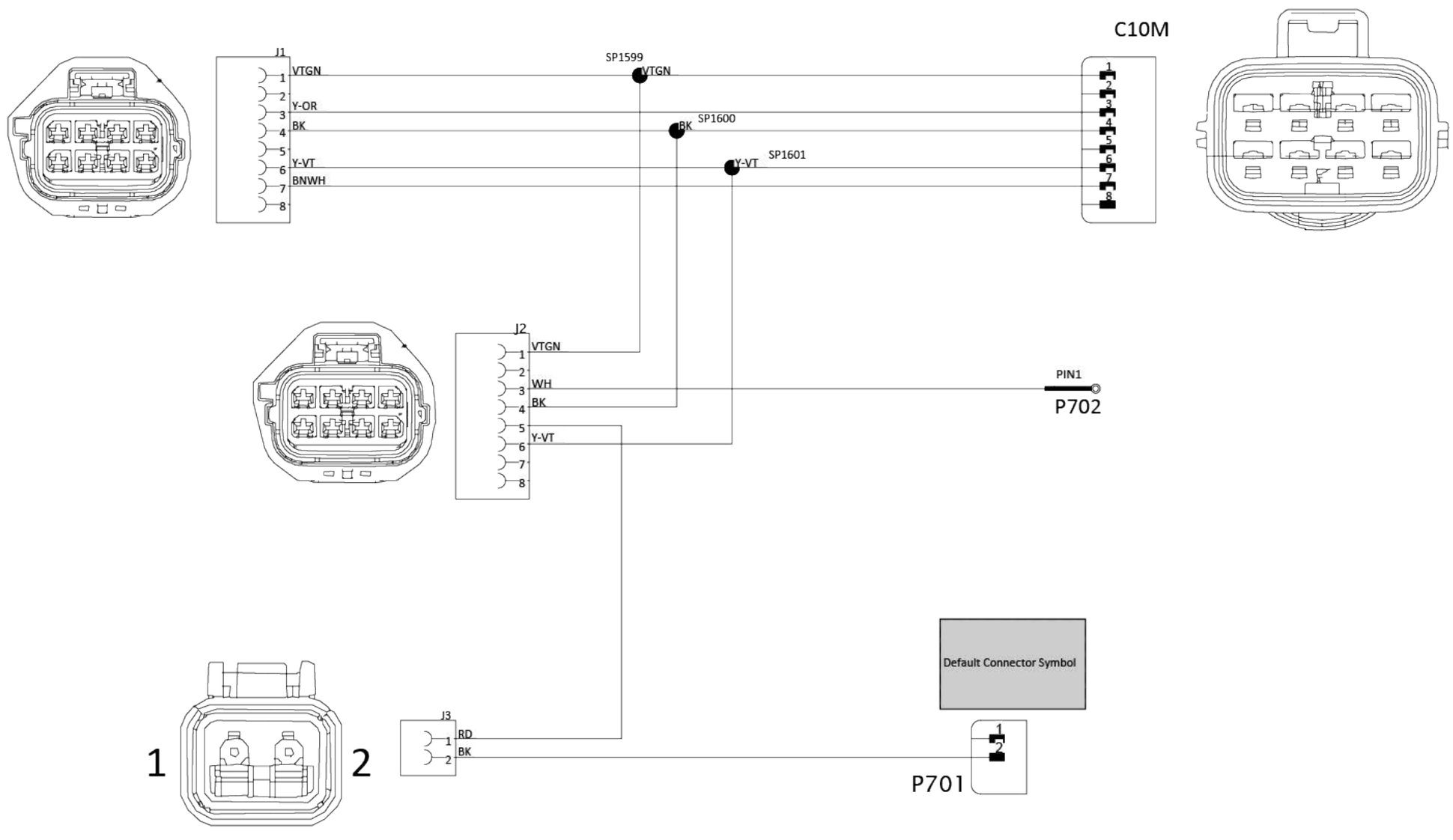
Index	Shield Name	Contents
1	SH1	DRAIN1.1
2	SH1	TW1
3	SH2	DRAIN2.1
4	SH2	TW2



F-650 F-750 Electrical Schematic — Transfer Overlay Harness



2019+ E-350 Wiring Harness Supplement



DTC/MIL Chart

2016-2017 Calibration Release OBD Summary Chart

NOTE: For any DTCs not specific to the ROUSH CleanTech fuel system, please reference the Ford Powertrain Control/Emissions Diagnosis Service Manual.

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
Code	**Description**	**2016/2017**	**2016/2017**	**2016/2017**
c05d7		N/A	N/A	non-MIL
P0005	Fuel Shutoff Valve “A” Control Circuit/Open	non-MIL	non-MIL	non-MIL
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	MIL	MIL	MIL
P0036	HO2S Heater Control Circuit (Bank 1 Sensor 2)	MIL	MIL	MIL
P0040	Oxygen Sensor Signals Swapped Bank 1 Sensor 1 / Bank 2 Sensor 1	non-MIL	non-MIL	non-MIL
P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	MIL	MIL	MIL
P0068	MAP / MAF - Throttle Position Correlation	MIL	MIL	MIL
P0090	Fuel Pressure Regulator Control Circuit/Open	non-MIL	non-MIL	non-MIL
P009B	Fuel Pressure Relief Control Circuit/Open	MIL	MIL	MIL
P009E	Fuel Pressure Relief Control Performance / Stuck Off	MIL	MIL	MIL
P0100	Mass or Volume Air Flow Sensor “A” Circuit	MIL	MIL	MIL
P0102	Mass or Volume Air Flow Sensor “A” Circuit Low	MIL	MIL	MIL
P0103	Mass or Volume Air Flow Sensor “A” Circuit High	MIL	MIL	MIL
P0104	Mass or Volume Air Flow Sensor “A” Circuit Intermittent	MIL	MIL	MIL
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance (Bank 1)	MIL	MIL	MIL
P0112	Intake Air Temperature Sensor 1 Circuit Low (Bank 1)	MIL	MIL	MIL
P0113	Intake Air Temperature Sensor 1 Circuit High (Bank 1)	MIL	MIL	MIL
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	MIL	MIL	MIL
P0122	Throttle/Pedal Position Sensor “A” Circuit Low	MIL	MIL	MIL
P0123	Throttle/Pedal Position Sensor “A” Circuit High	MIL	MIL	MIL
P0125	Insufficient Coolant Temp For Closed Loop Fuel Control	MIL	MIL	MIL
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	MIL	MIL	MIL
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	MIL	MIL	MIL
P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1)	MIL	MIL	MIL
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	MIL	MIL	MIL
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	MIL	MIL	MIL
P0141	O2 Sensor Heater Circuit (Bank 1 Sensor 2)	MIL	MIL	MIL
P0148	Fuel Delivery Error	non-MIL	non-MIL	non-MIL
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	MIL	MIL	MIL
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	MIL	MIL	MIL
P0155	O2 Sensor Heater Circuit (Bank 2 Sensor 1)	MIL	MIL	MIL
P0171	System Too Lean (Bank 1)	MIL	MIL	MIL
P0172	System Too Rich (Bank 1)	MIL	MIL	MIL
P0174	System Too Lean (Bank 2)	MIL	MIL	MIL
P0175	System Too Rich (Bank 2)	MIL	MIL	MIL
P0181	Fuel Temperature Sensor “A” Circuit Range/Performance	non-MIL	non-MIL	non-MIL
P0182	Fuel Temperature Sensor “A” Circuit Low	MIL	MIL	MIL
P0183	Fuel Temperature Sensor “A” Circuit High	MIL	MIL	MIL
P0192	Fuel Rail Pressure Sensor Circuit Low (Bank 1)	MIL	MIL	MIL

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P0193	Fuel Rail Pressure Sensor Circuit High (Bank 1)	MIL	MIL	MIL
P01A0	Alternate Fuel Tank “A” Pressure Sensor Circuit Low	non-MIL	non-MIL	non-MIL
P01A1	Alternate Fuel Tank “A” Pressure Sensor Circuit High	non-MIL	non-MIL	non-MIL
P01A2	Alternative Fuel Tank “A” Pressure Sensor Circuit Intermittent/Erratic	non-MIL	non-MIL	non-MIL
P01AC	Alternate Fuel Tank Temperature Sensor Circuit Low	non-MIL	non-MIL	non-MIL
P01AD	Alternate Fuel Tank Temperature Sensor High	non-MIL	non-MIL	non-MIL
P01AE	Alternate Fuel Tank Temperature Sensor Circuit Intermittent/Erratic	non-MIL	non-MIL	non-MIL
P0201	Cylinder 1 Injector “A” Circuit/Open	MIL	MIL	MIL
P0202	Cylinder 2 Injector “A” Circuit/Open	MIL	MIL	MIL
P0203	Cylinder 3 Injector “A” Circuit/Open	MIL	MIL	MIL
P0204	Cylinder 4 Injector “A” Circuit/Open	MIL	MIL	MIL
P0205	Cylinder 5 Injector “A” Circuit/Open	MIL	MIL	MIL
P0206	Cylinder 6 Injector “A” Circuit/Open	MIL	MIL	MIL
P0207	Cylinder 7 Injector “A” Circuit/Open	MIL	MIL	MIL
P0208	Cylinder 8 Injector “A” Circuit/Open	MIL	MIL	MIL
P0209	Cylinder 9 Injector “A” Circuit/Open	MIL	MIL	MIL
P0210	Cylinder 10 Injector “A” Circuit/Open	MIL	MIL	MIL
P0217	Engine Coolant Over Temperature Condition	non-MIL	non-MIL	non-MIL
P0218	Transmission Fluid Temperature Sensor “A” Over Temperature Condition	non-MIL	non-MIL	non-MIL
P0219	Engine Overspeed Condition	non-MIL	non-MIL	non-MIL
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low	MIL	MIL	MIL
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High	MIL	MIL	MIL
P025A	Fuel Pump Module “A” Control Circuit/Open	non-MIL	non-MIL	non-MIL
P025B	Fuel Pump Module “A” Control Circuit Range/Performance	non-MIL	non-MIL	non-MIL
P027B	Fuel Pump Module “B” Control Circuit Range/Performance	non-MIL	non-MIL	N/A
P0297	Vehicle Overspeed Condition	non-MIL	non-MIL	non-MIL
P0298	Engine Oil Over Temperature Condition	non-MIL	non-MIL	non-MIL
P03xx	Misfire	non-MIL	non-MIL	non-MIL
P0339	Crankshaft Position Sensor “A” Circuit Intermittent	MIL	MIL	MIL
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or single sensor)	MIL	MIL	MIL
P0351	Ignition Coil “A” Primary Control Circuit/Open	MIL	MIL	MIL
P0352	Ignition Coil “B” Primary Control Circuit/Open	MIL	MIL	MIL
P0353	Ignition Coil “C” Primary Control Circuit/Open	MIL	MIL	MIL
P0354	Ignition Coil “D” Primary Control Circuit/Open	MIL	MIL	MIL
P0355	Ignition Coil “E” Primary Control Circuit/Open	MIL	MIL	MIL
P0356	Ignition Coil “F” Primary Control Circuit/Open	MIL	MIL	MIL
P0357	Ignition Coil “G” Primary Control Circuit/Open	MIL	MIL	MIL
P0358	Ignition Coil “H” Primary Control Circuit/Open	MIL	MIL	MIL
P0359	Ignition Coil “I” Primary Control Circuit/Open	MIL	MIL	MIL
P0360	Ignition Coil “J” Primary Control Circuit/Open	MIL	MIL	MIL
P03xx	Misfire	non-MIL	non-MIL	non-MIL

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P0443	EVAP System Purge Control Valve “A” Circuit	MIL	MIL	MIL
P0460	Fuel Level Sensor “A” Circuit	N/A	non-MIL	N/A
P0461	Fuel Level Sensor “A” Circuit Range/Performance	non-MIL	non-MIL	non-MIL
P0462	Fuel Level Sensor “A” Circuit Low	non-MIL	non-MIL	non-MIL
P0463	Fuel Level Sensor “A” Circuit High	non-MIL	non-MIL	non-MIL
P0504	Brake Switch “A”/”B” Correlation	non-MIL	non-MIL	non-MIL
P0505	Idle Control System	non-MIL	non-MIL	non-MIL
P0506	Idle Control System - RPM Lower Than Expected	MIL	MIL	MIL
P0507	Idle Control System - RPM Higher Than Expected	MIL	MIL	MIL
P0532	A/C Refrigerant Pressure Sensor “A” Circuit Low	non-MIL	non-MIL	non-MIL
P0533	A/C Refrigerant Pressure Sensor “A” Circuit High	non-MIL	non-MIL	non-MIL
P0562	System Voltage Low	non-MIL	non-MIL	non-MIL
P0563	System Voltage High	non-MIL	non-MIL	non-MIL
P0572	Brake Switch “A” Circuit Low	non-MIL	non-MIL	non-MIL
P0573	Brake Switch “A” Circuit High	non-MIL	non-MIL	non-MIL
P0579	Cruise Control Multi-Function Input “A” Circuit Range/Performance	non-MIL	N/A	non-MIL
P0581	Cruise Control Multi-Function Input “A” Circuit High	non-MIL	N/A	non-MIL
P0600	Serial Communication Link	MIL	MIL	MIL
P0602	Powertrain Control Module Programming Error	MIL	MIL	MIL
P0604	Internal Control Module Random Access Memory (RAM) Error	MIL	MIL	MIL
P0605	Internal Control Module Read Only Memory (ROM) Error	MIL	MIL	MIL
P0607	Control Module Performance	MIL	MIL	MIL
P060A	Internal Control Module Monitoring Processor Performance	MIL	MIL	MIL
P060B	Internal Control Module A/D Processing Performance	MIL	MIL	MIL
P060C	Internal Control Module Main Processor Performance	MIL	MIL	MIL
P060D	Internal Control Module Accelerator Pedal Position Performance	non-MIL	non-MIL	non-MIL
P0610	Control Module Vehicle Options Error	MIL	MIL	MIL
P061A	Internal Control Module Torque Performance	non-MIL	non-MIL	non-MIL
P061B	Internal Control Module Torque Calculation Performance	MIL	MIL	MIL
P061C	Internal Control Module Engine RPM Performance	MIL	MIL	MIL
P061D	Internal Control Module Engine Air Mass Performance	MIL	MIL	MIL
P0620	Generator Control Circuit	non-MIL	non-MIL	non-MIL
P0625	Generator Field/F Terminal Circuit Low	non-MIL	non-MIL	non-MIL
P0626	Generator Field/F Terminal Circuit High	non-MIL	non-MIL	non-MIL
P0627	Fuel Pump “A” Control Circuit Open	non-MIL	non-MIL	non-MIL
P062F	Internal Control Module EEPROM Error	N/A	non-MIL	N/A
P0630	VIN Not Programmed or Incompatible - ECM/PCM	N/A	MIL	N/A
P0642	Sensor Reference Voltage “A” Circuit Low	MIL	MIL	MIL
P0643	Sensor Reference Voltage “A” Circuit High	MIL	MIL	MIL
P0645	A/C Clutch Relay Control Circuit	non-MIL	non-MIL	non-MIL
P064A	Fuel Pump Control Module “A”	non-MIL	non-MIL	N/A

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P064D	Internal Control Module O2 Sensor Processor Performance (Bank 1)	MIL	MIL	MIL
P064E	Internal Control Module O2 Sensor Processor Performance (Bank 2)	MIL	MIL	MIL
P0657	Actuator Supply Voltage “A” Circuit/Open	MIL	MIL	MIL
P065B	Generator Control Circuit Range/Performance	non-MIL	non-MIL	non-MIL
P06B8	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error	MIL	MIL	MIL
P06E4	Control Module Wake-up Circuit Performance	N/A	non-MIL	N/A
P06E9	Engine Starter Performance	non-MIL	non-MIL	non-MIL
P0701	Transmission Control System Range/Performance	non-MIL	non-MIL	non-MIL
P0702	Transmission Control System Electrical	non-MIL	non-MIL	non-MIL
P0706	Transmission Range Sensor “A” Circuit Range/Performance	MIL	MIL	MIL
P0707	Transmission Range Sensor “A” Circuit Low	MIL	MIL	MIL
P0708	Transmission Range Sensor “A” Circuit High	MIL	MIL	MIL
P0710	Transmission Fluid Temperature Sensor “A” Circuit	non-MIL	non-MIL	non-MIL
P0711	Transmission Fluid Temperature Sensor “A” Circuit Range/Performance	MIL	MIL	MIL
P0712	Transmission Fluid Temperature Sensor “A” Circuit Low	MIL	MIL	MIL
P0713	Transmission Fluid Temperature Sensor “A” Circuit High	MIL	MIL	MIL
P0715	Input/Turbine Shaft Speed Sensor “A” Circuit	MIL	MIL	MIL
P0717	Input/Turbine Shaft Speed Sensor “A” Circuit No Signal	non-MIL	non-MIL	non-MIL
P0718	Input/Turbine Shaft Speed Sensor “A” Circuit Intermittent	MIL	MIL	MIL
P0720	Output Shaft Speed Sensor Circuit	MIL	MIL	MIL
P0722	Output Shaft Speed Sensor Circuit No Signal	non-MIL	non-MIL	non-MIL
P0729	Gear 6 Incorrect Ratio	non-MIL	non-MIL	non-MIL
P0731	Gear 1 Incorrect Ratio	non-MIL	non-MIL	non-MIL
P0732	Gear 2 Incorrect Ratio	non-MIL	non-MIL	non-MIL
P0733	Gear 3 Incorrect Ratio	non-MIL	non-MIL	non-MIL
P0734	Gear 4 Incorrect Ratio	non-MIL	non-MIL	non-MIL
P0735	Gear 5 Incorrect Ratio	non-MIL	non-MIL	non-MIL
P0740	Torque Converter Clutch Solenoid Circuit/Open	MIL	MIL	MIL
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	MIL	MIL	MIL
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	MIL	MIL	MIL
P0743	Torque Converter Clutch Solenoid Circuit Electrical	non-MIL	non-MIL	non-MIL
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	MIL	MIL	MIL
P0748	Pressure Control Solenoid “A” Electrical	non-MIL	non-MIL	non-MIL
P0750	Shift Solenoid “A”	MIL	MIL	MIL
P0751	Shift Solenoid “A” Performance/Stuck Off	MIL	MIL	MIL
P0752	Shift Solenoid “A” Stuck On	MIL	MIL	MIL
P0753	Shift Solenoid “A” Electrical	non-MIL	non-MIL	non-MIL
P0754	Shift Solenoid “A” Intermittent	MIL	MIL	MIL
P0755	Shift Solenoid “B”	MIL	MIL	MIL
P0756	Shift Solenoid “B” Performance/Stuck Off	MIL	MIL	MIL

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P0757	Shift Solenoid “B” Stuck On	MIL	MIL	MIL
P0758	Shift Solenoid “B” Electrical	non-MIL	non-MIL	non-MIL
P0759	Shift Solenoid “B” Intermittent	MIL	MIL	MIL
P0760	Shift Solenoid “C”	MIL	MIL	MIL
P0761	Shift Solenoid “C” Performance/Stuck Off	MIL	MIL	MIL
P0762	Shift Solenoid “C” Stuck On	MIL	MIL	MIL
P0763	Shift Solenoid “C” Electrical	non-MIL	non-MIL	non-MIL
P0764	Shift Solenoid “C” Intermittent	MIL	MIL	MIL
P0765	Shift Solenoid “D”	MIL	MIL	MIL
P0766	Shift Solenoid “D” Performance/Stuck Off	MIL	MIL	MIL
P0767	Shift Solenoid “D” Stuck On	MIL	MIL	MIL
P0768	Shift Solenoid “D” Electrical	non-MIL	non-MIL	non-MIL
P0769	Shift Solenoid “D” Intermittent	MIL	MIL	MIL
P0770	Shift Solenoid “E”	MIL	MIL	MIL
P0771	Shift Solenoid “E” Performance/Stuck Off	MIL	MIL	MIL
P0772	Shift Solenoid “E” Stuck On	MIL	MIL	MIL
P0773	Shift Solenoid “E” Electrical	non-MIL	non-MIL	non-MIL
P0774	Shift Solenoid “E” Intermittent	MIL	MIL	MIL
P0882	TCM Power Input Signal Low	MIL	MIL	MIL
P0883	TCM Power Input Signal High	MIL	MIL	MIL
P0885	TCM Power Relay Control Circuit /Open	non-MIL	non-MIL	non-MIL
P0960	Pressure Control Solenoid “A” Control Circuit/Open	MIL	MIL	MIL
P0961	Pressure Control Solenoid “A” Control Circuit Range/Performance	MIL	MIL	MIL
P0962	Pressure Control Solenoid “A” Control Circuit Low	MIL	MIL	MIL
P0963	Pressure Control Solenoid “A” Control Circuit High	MIL	MIL	MIL
P0973	Shift Solenoid “A” Control Circuit Low	MIL	MIL	MIL
P0974	Shift Solenoid “A” Control Circuit High	MIL	MIL	MIL
P0976	Shift Solenoid “B” Control Circuit Low	MIL	MIL	MIL
P0977	Shift Solenoid “B” Control Circuit High	MIL	MIL	MIL
P0979	Shift Solenoid “C” Control Circuit Low	MIL	MIL	MIL
P0980	Shift Solenoid “C” Control Circuit High	MIL	MIL	MIL
P0982	Shift Solenoid “D” Control Circuit Low	MIL	MIL	MIL
P0983	Shift Solenoid “D” Control Circuit High	MIL	MIL	MIL
P0985	Shift Solenoid “E” Control Circuit Low	MIL	MIL	MIL
P0986	Shift Solenoid “E” Control Circuit High	MIL	MIL	MIL
P1001	KOER Not Able to Complete, KOER Aborted	non-MIL	non-MIL	non-MIL
P1002	KOER Not Able to Complete, KOER Aborted	N/A	non-MIL	N/A
P1101	Mass Air Flow Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1124	Throttle Position Sensor “A” Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1127	Exhaust Temperature Out of Range, O2 Sensor Tests Not Completed	non-MIL	non-MIL	non-MIL
P115E	Throttle Actuator Control Throttle Body Air Flow Trim at Max Limit	non-MIL	non-MIL	non-MIL

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P116E	Fuel Pressure Relief Valve Actuated	non-MIL	non-MIL	non-MIL
P1260	Theft Detected, Vehicle Immobilized	non-MIL	N/A	N/A
P1285	Cylinder Head Over Temperature Condition	non-MIL	non-MIL	non-MIL
P1288	Cylinder Head Temperature Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1289	Cylinder Head Temperature Sensor Circuit High	MIL	MIL	MIL
P1290	Cylinder Head Temperature Sensor Circuit Low	MIL	MIL	MIL
P1336	Crankshaft/Camshaft Sensor Range/Performance	non-MIL	non-MIL	non-MIL
P1397	System Voltage Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1453	Fuel Tank Pressure Relief Valve Malfunction	non-MIL	non-MIL	non-MIL
P1464	A/C Demand Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1501	Vehicle Speed Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1561	Brake Line Pressure Sensor Circuit	non-MIL	N/A	non-MIL
P1575	Pedal Position Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1594	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout	N/A	non-MIL	non-MIL
P1595	Forced Engine Shutdown - Remote Start System Fault, Transmission Range Not In Park Position	N/A	non-MIL	non-MIL
P1602	Immobilizer/ECM Communication Error	non-MIL	N/A	N/A
P160A	Control Module Vehicle Options Reconfiguration Error	N/A	non-MIL	N/A
P161A	Incorrect Response from Immobilizer Control Module	N/A	non-MIL	N/A
P1622	Immobilizer ID Does Not Match	non-MIL	N/A	N/A
P162E	Internal Control Module PTO Control Performance	non-MIL	non-MIL	non-MIL
P162F	Starter Motor Disabled - Engine Crank Time Too Long	non-MIL	non-MIL	non-MIL
P1633	Keep Alive Power Voltage Too Low	non-MIL	N/A	non-MIL
P1635	Tire/Axle Out of Acceptable Range	non-MIL	N/A	non-MIL
P1636	Inductive Signature Chip Communication Error	MIL	MIL	MIL
P1639	Vehicle ID Block Corrupted, Not Programmed	N/A	non-MIL	N/A
P1646	Linear O2 Sensor Control Chip (Bank 1)	MIL	MIL	MIL
P1647	Linear O2 Sensor Control Chip (Bank 2)	MIL	MIL	MIL
P1674	Control Module Software Corrupted	MIL	MIL	MIL
P1702	Transmission Range Sensor Circuit Intermittent	non-MIL	non-MIL	non-MIL
P1703	Brake Switch Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1705	Transmission Range Circuit Not Indicating Park/Neutral During Self Test	non-MIL	non-MIL	non-MIL
P1711	Transmission Fluid Temperature Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL
P1744	Torque Converter Clutch Solenoid Circuit Performance	non-MIL	non-MIL	non-MIL
P177F	Unable To Fully Engage Neutral	non-MIL	non-MIL	non-MIL
P1780	Transmission Control Switch (O/D Cancel) Circuit Out Of Self Test Range	non-MIL	N/A	non-MIL
P1783	Transmission Overtemperature Condition	non-MIL	non-MIL	non-MIL
P1921	Transmission Range Signal	non-MIL	non-MIL	non-MIL
P1934	Vehicle Speed Signal	N/A	MIL	N/A
P193E	A/C Clutch Request Signal	N/A	non-MIL	N/A
P2067	Fuel Level Sensor “B” Circuit Low	N/A	non-MIL	N/A

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P2068	Fuel Level Sensor “B” Circuit High	N/A	non-MIL	N/A
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	MIL	MIL	MIL
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	MIL	MIL	MIL
P2098	Post Catalyst Fuel Trim System Too Lean (Bank 2)	MIL	MIL	MIL
P2099	Post Catalyst Fuel Trim System Too Rich (Bank 2)	MIL	MIL	MIL
P2101	Throttle Actuator “A” Control Motor Circuit Range/Performance	MIL	MIL	MIL
P2107	Throttle Actuator “A” Control Module Processor	MIL	MIL	MIL
P2111	Throttle Actuator “A” Control System - Stuck Open	MIL	MIL	MIL
P2112	Throttle Actuator “A” Control System - Stuck Closed	MIL	MIL	MIL
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low	non-MIL	non-MIL	non-MIL
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High	non-MIL	non-MIL	non-MIL
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low	non-MIL	non-MIL	non-MIL
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High	non-MIL	non-MIL	non-MIL
P2135	Throttle/Pedal Position Sensor/Switch “A”/”B” Voltage Correlation	MIL	MIL	MIL
P2138	Throttle/Pedal Position Sensor/Switch “D”/”E” Voltage Correlation	non-MIL	non-MIL	non-MIL
P2195	Heated Exhaust Gas Oxygen Sensor Stuck	MIL	MIL	MIL
P2196	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)	MIL	MIL	MIL
P2197	Heated Exhaust Gas Oxygen Sensor Stuck	MIL	MIL	MIL
P2198	O2 Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 1)	MIL	MIL	MIL
P219A	Bank 1 Air-Fuel Ratio Imbalance	N/A	MIL	MIL
P219B	Bank 2 Air-Fuel Ratio Imbalance	N/A	MIL	MIL
P2237	O2 Sensor Positive Current Control Circuit/Open (Bank 1 Sensor 1)	MIL	MIL	MIL
P2240	O2 Sensor Positive Current Control Circuit/Open (Bank 2 Sensor 1)	MIL	MIL	MIL
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1 Sensor 1)	MIL	MIL	MIL
P2247	O2 Sensor Reference Voltage Circuit/Open (Bank 2 Sensor 1)	MIL	MIL	MIL
P2251	O2 Sensor Negative Current Control Circuit/Open (Bank 1 Sensor 1)	MIL	MIL	MIL
P2254	O2 Sensor Negative Current Control Circuit/Open (Bank 2 Sensor 1)	MIL	MIL	MIL
P2535	Ignition Switch Run/Start Position Circuit High	non-MIL	non-MIL	non-MIL
P25B0	Fuel Level Sensor “A” Stuck	non-MIL	non-MIL	non-MIL
P25B1	Fuel Level Sensor “B” Stuck	N/A	non-MIL	N/A
P2610	ECM/PCM Engine Off Timer Performance	MIL	MIL	MIL
P2632	Fuel Pump “B” Control Circuit/Open	non-MIL	non-MIL	N/A
P264F	Engine Serial Number Not Programmed or Incompatible	MIL	MIL	MIL
P2665	Fuel Shutoff Valve “B” Control Circuit/Open	non-MIL	non-MIL	non-MIL
P2669	Actuator Supply Voltage “B” Circuit/Open	MIL	MIL	MIL
P26B3	Fuel Shutoff Valve “A” Control Circuit Performance/Stuck Off	non-MIL	non-MIL	non-MIL
P26B5	Fuel Shutoff Valve “B” Control Circuit Performance / Stuck Off	non-MIL	non-MIL	non-MIL
P26EA	Fuel Pump Control Module “B”	non-MIL	non-MIL	N/A
P2700	Transmission Friction Element “A” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL
P2701	Transmission Friction Element “B” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL
P2702	Transmission Friction Element “C” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL

		6.8L 2V LPG E450 Custom Body	6.8L 3V LPG F650 (dual tank)	6.8L 3V LPG F53/F59
		2016/2017	2016/2017	2016/2017
P2703	Transmission Friction Element “D” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL
P2704	Transmission Friction Element “E” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL
P2705	Transmission Friction Element “F” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL
P2758	Torque Converter Clutch Pressure Control Solenoid Stuck On	MIL	MIL	MIL
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	MIL	MIL	MIL
U0108	Lost Communication with Alternative Fuel Control Module	MIL	MIL	MIL
U0109	Loss of Communication on Fuel Pump Control Module “A”	non-MIL	non-MIL	non-MIL
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	non-MIL	non-MIL	non-MIL
U0140	Lost Communication With Body Control Module		non-MIL	
U016C	Loss of Communication on Fuel Pump Control Module “B”	non-MIL	non-MIL	N/A
U0212	Lost Communication With Steering Column Control Module	N/A	non-MIL	N/A
U0300	Internal Control Module Software Incompatibility	MIL	MIL	MIL
U0415	Invalid Data Received from Anti-Lock Brake System (ABS) Control Module	N/A	non-MIL	N/A
U0422	Invalid Data Received from Body Control Module	N/A	non-MIL	N/A
U210B	Lost Communication Between Fuel Pump Control Module “A” and Restraint Control Module	non-MIL	N/A	N/A
U210C	Lost Communication Between Fuel Pump Control Module “B” and Restraint Control Module	non-MIL	N/A	N/A

2018-2019 Diagnostic Codes

N/A and OFF = Code not present
non MIL = DTC – non MIL
MIL = DTC – MIL (two trips)

NOTE: For any DTCs not specific to the ROUSH CleanTech fuel system, please reference the Ford Powertrain Control/Emissions Diagnosis Service Manual.

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
B1342	ECU is Faulted	non-MIL	non-MIL	N/A	OFF	N/A	OFF	OFF
C05D7		N/A	N/A	N/A	non-MIL	N/A	OFF	OFF
P0005	Fuel Shutoff Valve “A” Control Circuit/Open	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0036	HO2S Heater Control Circuit (Bank 1 Sensor 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0040	Oxygen Sensor Signals Swapped Bank 1 Sensor 1/Bank 2 Sensor 1	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0041	Oxygen Sensor Signals Swapped Bank 1 Sensor 2 / Bank 2 Sensor 2	non-MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0056	HO2S Heater Control Circuit (Bank 2 Sensor 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0068	MAP/MAF - Throttle Position Correlation	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0071	Ambient Air Temperature Sensor Circuit “A” Range/Performance	N/A	N/A	MIL	N/A	N/A	N/A	N/A
P0072	Ambient Air Temperature Sensor Circuit “A” Low	N/A	N/A	MIL	N/A	N/A	N/A	N/A
P0073	Ambient Air Temperature Sensor Circuit “A” High	N/A	N/A	MIL	N/A	N/A	N/A	N/A
P0090	Fuel Pressure Regulator Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P009B	Fuel Pressure Relief Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P009E	Fuel Pressure Relief Control Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P009F	Fuel Pressure Relief Control Performance/Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0100	Mass or Volume Air Flow Sensor “A” Circuit	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0102	Mass or Volume Air Flow Sensor “A” Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0103	Mass or Volume Air Flow Sensor “A” Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0104	Mass or Volume Air Flow Sensor “A” Circuit Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0112	Intake Air Temperature Sensor 1 Circuit Low (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0113	Intake Air Temperature Sensor 1 Circuit High (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	non-MIL	non-MIL	MIL	MIL	MIL	MIL	MIL
P0122	Throttle/Pedal Position Sensor “A” Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0123	Throttle/Pedal Position Sensor “A” Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0125	Insufficient Coolant Temp For Closed Loop Fuel Control	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P013C	O2 Sensor Slow Response - Rich to Lean (Bank 2 Sensor 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P013E	O2 Sensor Delayed Response - Rich to Lean (Bank 1 Sensor 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0141	O2 Sensor Heater Circuit (Bank 1 Sensor 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0148	Fuel Delivery Error	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P014A	O2 Sensor Delayed Response - Rich to Lean (Bank 2 Sensor 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0155	O2 Sensor Heater Circuit (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0157	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0158	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0161	O2 Sensor Heater Circuit (Bank 2 Sensor 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0171	System Too Lean (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0172	System Too Rich (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0174	System Too Lean (Bank 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0175	System Too Rich (Bank 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0181	Fuel Temperature Sensor “A” Circuit Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0182	Fuel Temperature Sensor “A” Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0183	Fuel Temperature Sensor “A” Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0192	Fuel Rail Pressure Sensor Circuit Low (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0193	Fuel Rail Pressure Sensor Circuit High (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P019F	Alternative Fuel Tank “A” Pressure Sensor Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P01A0	Alternate Fuel Tank “A” Pressure Sensor Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P01A1	Alternate Fuel Tank “A” Pressure Sensor Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P01A2	Alternative Fuel Tank “A” Pressure Sensor Circuit Intermittent/ Erratic	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P01A9	Alternative Fuel Rail/System Pressure - Too High	MIL	MIL	MIL	MIL	MIL	non-MIL	OFF
P01AC	Alternate Fuel Tank Temperature Sensor Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P01AD	Alternate Fuel Tank Temperature Sensor High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P01AE	Alternate Fuel Tank Temperature Sensor Circuit Intermittent/Erratic	MIL	MIL	MIL	MIL	MIL	MIL	OFF
P0201	Cylinder 1 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0202	Cylinder 2 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0203	Cylinder 3 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0204	Cylinder 4 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0205	Cylinder 5 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0206	Cylinder 6 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0207	Cylinder 7 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0208	Cylinder 8 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0209	Cylinder 9 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0210	Cylinder 10 Injector “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0217	Engine Coolant Over Temperature Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0218	Transmission Fluid Temperature Sensor “A” Over Temperature Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0219	Engine Overspeed Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P025A	Fuel Pump Module “A” Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P025B	Fuel Pump Module “A” Control Circuit Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P027B	Fuel Pump Module “B” Control Circuit Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0297	Vehicle Overspeed Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0298	Engine Oil Over Temperature Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0300	Random Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0301	Cylinder 1 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0302	Cylinder 2 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0303	Cylinder 3 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0304	Cylinder 4 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0305	Cylinder 5 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0306	Cylinder 6 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0307	Cylinder 7 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0308	Cylinder 8 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0309	Cylinder 9 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0310	Cylinder 10 Misfire Detected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0313	Misfire Detected With Low Fuel	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0315	Crankshaft Position System Variation Not Learned	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0316	Misfire Detected On Startup (First 1000 Revolutions)	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0339	Crankshaft Position Sensor “A” Circuit Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or single sensor)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0351	Ignition Coil “A” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0352	Ignition Coil “B” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0353	Ignition Coil “C” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0354	Ignition Coil “D” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0355	Ignition Coil “E” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0356	Ignition Coil “F” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0357	Ignition Coil “G” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0358	Ignition Coil “H” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0359	Ignition Coil “I” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0360	Ignition Coil “J” Primary Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0430	Catalyst System Efficiency Below Threshold (Bank 2)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0442	EVAP System Leak Detected (small leak)	OFF	MIL	MIL	MIL	MIL	MIL	MIL
P0443	EVAP System Purge Control Valve “A” Circuit	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0446	EVAP System Vent Control Circuit	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0451	EVAP System Pressure Sensor/Switch Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0452	EVAP System Pressure Sensor/Switch Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0453	EVAP System Pressure Sensor/Switch High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0454	EVAP System Pressure Sensor/Switch Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0455	EVAP System Leak Detected (large leak)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0456	EVAP System Leak Detected (very small leak)	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0460	Fuel Level Sensor “A” Circuit	N/A	N/A	N/A	N/A	non-MIL	N/A	N/A
P0461	Fuel Level Sensor “A” Circuit Range/Performance	MIL	OFF	OFF	OFF	OFF	OFF	OFF
P0462	Fuel Level Sensor “A” Circuit Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0463	Fuel Level Sensor “A” Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0496	EVAP System High Purge Flow	MIL	N/A	N/A	N/A	N/A	N/A	N/A
P0504	Brake Switch “A”/”B” Correlation	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0505	Idle Control System	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0506	Idle Control System - RPM Lower Than Expected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0507	Idle Control System - RPM Higher Than Expected	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P050A	Cold Start Idle Control System Performance	MIL	MIL	MIL	MIL	MIL	MIL	OFF
P050B	Cold Start Ignition Timing Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P050E	Cold Start Engine Exhaust Temperature Too Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0532	A/C Refrigerant Pressure Sensor “A” Circuit Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0533	A/C Refrigerant Pressure Sensor “A” Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0562	System Voltage Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0563	System Voltage High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0572	Brake Switch “A” Circuit Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0573	Brake Switch “A” Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0579	Cruise Control Multi-Function Input “A” Circuit Range/Performance	non-MIL	non-MIL	N/A	non-MIL	N/A	non-MIL	non-MIL
P0581	Cruise Control Multi-Function Input “A” Circuit High	non-MIL	non-MIL	N/A	non-MIL	N/A	OFF	OFF
P0600	Serial Communication Link	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0602	Powertrain Control Module Programming Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0604	Internal Control Module Random Access Memory (RAM) Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0605	Internal Control Module Read Only Memory (ROM) Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0607	Control Module Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P060A	Internal Control Module Monitoring Processor Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P060B	Internal Control Module A/D Processing Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P060C	Internal Control Module Main Processor Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P060D	Internal Control Module Accelerator Pedal Position Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0610	Control Module Vehicle Options Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P061A	Internal Control Module Torque Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P061B	Internal Control Module Torque Calculation Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P061C	Internal Control Module Engine RPM Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P061D	Internal Control Module Engine Air Mass Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0620	Generator Control Circuit	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	OFF	OFF
P0625	Generator Field/F Terminal Circuit Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0626	Generator Field/F Terminal Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0627	Fuel Pump “A” Control Circuit Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P062C	Internal Control Module Vehicle Speed Performance	OFF	OFF	non-MIL	OFF	OFF	OFF	OFF
P062F	Internal Control Module EEPROM Error	N/A	N/A	non-MIL	N/A	non-MIL	N/A	N/A
P0630	VIN Not Programmed or Incompatible - ECM/ PCM	N/A	N/A	non-MIL	N/A	non-MIL	N/A	N/A
P0642	Sensor Reference Voltage “A” Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0643	Sensor Reference Voltage “A” Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0645	A/C Clutch Relay Control Circuit	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P064A	Fuel Pump Control Module “A”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P064D	Internal Control Module O2 Sensor Processor Performance (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P064E	Internal Control Module O2 Sensor Processor Performance (Bank 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0657	Actuator Supply Voltage “A” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P065B	Generator Control Circuit Range/ Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	OFF	OFF
P068A	ECM/PCM Power Relay De-Energized - Too Early	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P06B8	Internal Control Module Non-Volatile Random Access Memory (NVRAM) Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P06E4	Control Module Wake-up Circuit Performance	OFF	OFF	non-MIL	OFF	non-MIL	OFF	OFF
P06E9	Engine Starter Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0701	Transmission Control System Range/ Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0702	Transmission Control System Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0706	Transmission Range Sensor “A” Circuit Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0707	Transmission Range Sensor “A” Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0708	Transmission Range Sensor “A” Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0710	Transmission Fluid Temperature Sensor “A” Circuit	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0711	Transmission Fluid Temperature Sensor “A” Circuit Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0715	Input/Turbine Shaft Speed Sensor "A" Circuit	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0717	Input/Turbine Shaft Speed Sensor "A" Circuit No Signal	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0718	Input/Turbine Shaft Speed Sensor "A" Circuit Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0720	Output Shaft Speed Sensor Circuit	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0721	Output Shaft Speed Sensor Circuit Range/ Performance	OFF	OFF	MIL	OFF	OFF	OFF	OFF
P0722	Output Shaft Speed Sensor Circuit No Signal	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0729	Gear 6 Incorrect Ratio	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0731	Gear 1 Incorrect Ratio	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0732	Gear 2 Incorrect Ratio	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0733	Gear 3 Incorrect Ratio	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0734	Gear 4 Incorrect Ratio	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0735	Gear 5 Incorrect Ratio	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0740	Torque Converter Clutch Solenoid Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0743	Torque Converter Clutch Solenoid Circuit Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0748	Pressure Control Solenoid "A" Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0750	Shift Solenoid "A"	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0751	Shift Solenoid "A" Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0752	Shift Solenoid "A" Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0753	Shift Solenoid "A" Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0754	Shift Solenoid "A" Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0755	Shift Solenoid “B”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0756	Shift Solenoid “B” Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0757	Shift Solenoid “B” Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0758	Shift Solenoid “B” Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0759	Shift Solenoid “B” Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0760	Shift Solenoid “C”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0761	Shift Solenoid “C” Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0762	Shift Solenoid “C” Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0763	Shift Solenoid “C” Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0764	Shift Solenoid “C” Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0765	Shift Solenoid “D”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0766	Shift Solenoid “D” Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0767	Shift Solenoid “D” Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0768	Shift Solenoid “D” Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0769	Shift Solenoid “D” Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0770	Shift Solenoid “E”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0771	Shift Solenoid “E” Performance/Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0772	Shift Solenoid “E” Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0773	Shift Solenoid “E” Electrical	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0774	Shift Solenoid “E” Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0882	TCM Power Input Signal Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0883	TCM Power Input Signal High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0885	TCM Power Relay Control Circuit /Open	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P0960	Pressure Control Solenoid “A” Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0961	Pressure Control Solenoid “A” Control Circuit Range/Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0962	Pressure Control Solenoid “A” Control Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0963	Pressure Control Solenoid “A” Control Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0973	Shift Solenoid “A” Control Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0974	Shift Solenoid “A” Control Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0976	Shift Solenoid “B” Control Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0977	Shift Solenoid “B” Control Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0979	Shift Solenoid “C” Control Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P0980	Shift Solenoid “C” Control Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0982	Shift Solenoid “D” Control Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0983	Shift Solenoid “D” Control Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0985	Shift Solenoid “E” Control Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P0986	Shift Solenoid “E” Control Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1001	KOER Not Able to Complete, KOER Aborted	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1002	Fuel shutoff valve “C” Control Circuit/Open	OFF	OFF	OFF	OFF	non-MIL	OFF	OFF
P1070		non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1101	Mass Air Flow Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1124	Throttle Position Sensor “A” Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1127	Exhaust Temperature Out of Range, O2 Sensor Tests Not Completed	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P115E	Throttle Actuator Control Throttle Body Air Flow Trim at Max Limit	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P116E	Fuel Pressure Relief Valve Actuated	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1260	Theft Detected, Vehicle Immobilized	non-MIL	non-MIL	N/A	OFF	N/A	OFF	OFF
P1285	Cylinder Head Over Temperature Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1288	Cylinder Head Temperature Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1289	Cylinder Head Temperature Sensor Circuit High	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1290	Cylinder Head Temperature Sensor Circuit Low	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1299	Cylinder Head Over Temperature Protection Active	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1336	Crankshaft/Camshaft Sensor Range/Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1397	System Voltage Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P143D	A/C Clutch Relay Control “B” Circuit	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1450	Unable to Bleed Up Fuel Tank Vacuum	N/A	MIL	MIL	MIL	MIL	MIL	MIL
P1453	Fuel Tank Pressure Relief Valve Malfunction	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1456	Fuel Tank Temperature Sensor Circuit	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1464	A/C Demand Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P1501	Vehicle Speed Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1561	Brake Line Pressure Sensor Circuit	non-MIL	non-MIL	N/A	non-MIL	N/A	non-MIL	non-MIL
P1575	Pedal Position Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1594	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout	OFF	OFF	OFF	OFF	OFF	non-MIL	OFF
P1595	Forced Engine Shutdown - Remote Start System Fault, Transmission Range Not In Park Position	OFF	OFF	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1602	Immobilizer/ECM Communication Error	non-MIL	non-MIL	N/A	OFF	N/A	OFF	OFF
P160A	Control Module Vehicle Options Reconfiguration Error	N/A	N/A	non-MIL	N/A	non-MIL	N/A	N/A
P161A	Incorrect Response from Immobilizer Control Module	N/A	N/A	non-MIL	N/A	non-MIL	N/A	N/A
P1622	Immobilizer ID Does Not Match	non-MIL	non-MIL	N/A	OFF	N/A	OFF	OFF
P162E	Internal Control Module PTO Control Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P162F	Starter Motor Disabled - Engine Crank Time Too Long	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1633	Keep Alive Power Voltage Too Low	non-MIL	non-MIL	OFF	non-MIL	OFF	non-MIL	non-MIL
P1635	Tire/Axle Out of Acceptable Range	non-MIL	non-MIL	N/A	non-MIL	N/A	non-MIL	non-MIL
P1636	Inductive Signature Chip Communication Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1639	Vehicle ID Block Corrupted, Not Programmed	MIL	MIL	non-MIL	MIL	non-MIL	MIL	MIL
P163E	Transmission Control Module Programming Error	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P163F	Transmission ID Block Corrupted, Not Programmed	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1646	Linear O2 Sensor Control Chip (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1647	Linear O2 Sensor Control Chip (Bank 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P166A	Restraints Deployment Communication Circuit	N/A	N/A	non-MIL	N/A	N/A	N/A	N/A
P1674	Control Module Software Corrupted	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P1702	Transmission Range Sensor Circuit Intermittent	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1703	Brake Switch Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P1705	Transmission Range Circuit Not Indicating Park/ Neutral During Self Test	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1711	Transmission Fluid Temperature Sensor Out Of Self Test Range	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1744	Torque Converter Clutch Solenoid Circuit Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P177F	Unable To Fully Engage Neutral	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1780	Transmission Control Switch (O/D Cancel) Circuit Out Of Self Test Range	non-MIL	non-MIL	OFF	non-MIL	OFF	OFF	OFF
P1783	Transmission Overtemperature Condition	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1921	Transmission Range Signal	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P1934	Vehicle Speed Signal	OFF	OFF	MIL	OFF	MIL	OFF	OFF
P193C	Steering Wheel Angle Signal	OFF	OFF	non-MIL	OFF	OFF	OFF	OFF
P193E	A/C Clutch Request Signal	OFF	OFF	non-MIL	OFF	non-MIL	OFF	OFF
P2067	Fuel Level Sensor “B” Circuit Low	OFF	OFF	OFF	OFF	non-MIL	OFF	OFF
P2068	Fuel Level Sensor “B” Circuit High	OFF	OFF	OFF	OFF	non-MIL	OFF	OFF
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2098	Post Catalyst Fuel Trim System Too Lean (Bank 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2099	Post Catalyst Fuel Trim System Too Rich (Bank 2)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2101	Throttle Actuator “A” Control Motor Circuit Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2107	Throttle Actuator “A” Control Module Processor	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2111	Throttle Actuator “A” Control System - Stuck Open	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2112	Throttle Actuator “A” Control System - Stuck Closed	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2119	Throttle Actuator “A” Control Throttle Body Range/ Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2135	Throttle/Pedal Position Sensor/Switch “A”/”B” Voltage Correlation	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2138	Throttle/Pedal Position Sensor/Switch “D”/”E” Voltage Correlation	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2195	Heated Exhaust Gas Oxygen Sensor Stuck	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2196	O2 Sensor Signal Biased/Stuck Rich (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2197	O2 Sensor Signal Biased/Stuck Lean (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2198	O2 Sensor Signal Biased/Stuck Rich (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P219A	Bank 1 Air-Fuel Ratio Imbalance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P219B	Bank 2 Air-Fuel Ratio Imbalance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2237	O2 Sensor Positive Current Control Circuit/Open (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2240	O2 Sensor Positive Current Control Circuit/Open (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2247	O2 Sensor Reference Voltage Circuit/Open (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2251	O2 Sensor Negative Current Control Circuit/Open (Bank 1 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2254	O2 Sensor Negative Current Control Circuit/Open (Bank 2 Sensor 1)	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2535	Ignition Switch Run/Start Position Circuit High	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P25B0	Fuel Level Sensor “A” Stuck	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P25B1	Fuel Level Sensor “B” Stuck	OFF	OFF	OFF	OFF	non-MIL	OFF	OFF
P2610	ECM/PCM Engine Off Timer Performance	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2632	Fuel Pump “B” Control Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P264F	Engine Serial Number Not Programmed or Incompatible	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2665	Fuel Shutoff Valve “B” Control Circuit/Open	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
P2669	Actuator Supply Voltage “B” Circuit/Open	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P26B3	Fuel Shutoff Valve “A” Control Circuit Performance/ Stuck Off	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P26B5	Fuel Shutoff Valve “B” Control Circuit Performance/ Stuck Off	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P26EA	Fuel Pump Control Module “B”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2700	Transmission Friction Element “A” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2701	Transmission Friction Element “B” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2702	Transmission Friction Element “C” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2703	Transmission Friction Element “D” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2704	Transmission Friction Element “E” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2705	Transmission Friction Element “F” Apply Time Range/Performance	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL	non-MIL
P2758	Torque Converter Clutch Pressure Control Solenoid Stuck On	MIL	MIL	MIL	MIL	MIL	MIL	MIL
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	MIL	MIL	MIL	MIL	MIL	MIL	MIL
U0108	Lost Communication with Alternative Fuel Control Module	MIL	MIL	MIL	MIL	MIL	MIL	MIL
U0109	Loss of Communication on Fuel Pump Control Module “A”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	non-MIL	non-MIL	non-MIL	OFF	non-MIL	OFF	OFF
U0126	Lost Communication With Steering Angle Sensor Module	N/A	N/A	non-MIL	N/A	N/A	N/A	N/A
U0140	Lost Communication With Body Control Module	OFF	OFF	non-MIL	OFF	non-MIL	OFF	OFF
U016C	Loss of Communication on Fuel Pump Control Module “B”	MIL	MIL	MIL	MIL	MIL	MIL	MIL
U0212	Lost Communication With Steering Column Control Module	N/A	N/A	non-MIL	N/A	non-MIL	N/A	N/A
U0300	Internal Control Module Software Incompatibility	MIL	MIL	MIL	MIL	MIL	MIL	MIL
U0415	Invalid Data Received from Anti-Lock Brake System (ABS) Control Module	OFF	OFF	non-MIL	OFF	non-MIL	OFF	OFF
U0422	Invalid Data Received from Body Control Module	N/A	N/A	non-MIL	N/A	non-MIL	N/A	N/A
U210B	Lost Communication Between Fuel Pump Control Module “A” and Restraint Control Module	MIL	MIL	OFF	OFF	OFF	OFF	OFF

Code	Description	2018 E-350	2018 E-450	2018 F-450/ F-550	2018 F53/ F59	2018 F-650/ F-750	2018 Blue Bird Vision (Propane)	2019 Blue Bird Vision (Propane)
U1012	Invalid Internal COntrol Module Monitoring Data Received from Anti-Lock Brake System (ABS) Control Module	OFF	OFF	non-MIL	OFF	OFF	OFF	OFF
U210C	Lost Communication Between Fuel Pump Control Module “B” and Restraint Control Module	MIL	MIL	OFF	OFF	OFF	OFF	OFF

Fuel Level Diagnostics

Generation 4 Ford Vehicle

VIN/Body Number: _____ Odometer: _____

Complaint: _____

DTC's: _____

Fuel Gauge readings- (Please indicate the physical location of gauge with an 'x')

Cluster (IPC) E----1/4----1/2----3/4----F

Fuel tank E----1/4----1/2----3/4----F

Passenger Tank (dual tank systems only) E----1/4----1/2----3/4----F

Sender Twinsite voltage check (perform voltage checks with key on)

Measure the voltage on pins A and C at the Twinsite connector (harness side):

Driver _____V Passenger (if dual tank) _____V

Expected Value: ≈5v. If below 5v, perform SRM 5v Reference Output Check

Measure the voltage of Twinsite installed on the fuel tank on pins B and C:

Note: Twinsite must be plugged in

Driver _____V Passenger (if dual tank) _____V

Expected Value Range: ≈0.1v – 4.9v

Sender sweep check

Remove the Twinsite from the tank and measure the voltage sweep of the Twinsite. Use gravity or a piece of non-magnetized ferrous metal, like a socket, to manipulate the gauge through its range of travel.

Voltage sweep from full to empty on pins B and C:

Driver E=_____V F=_____V Passenger (if dual tank) E=_____V F=_____V

Expected Value: ≈0.1v – 4.9v voltage should vary smoothly through range

SRM 5V Reference Output Check (if not 5v Reference at Twinsite)

Reinstall Twinsite to fuel tank and measure voltage at SRM connector C1 on pin 4: ____V

Dual tank system, measure voltage at SRM connector C1 on pin 5: _____V

Expected value: Voltage at SRM should match voltage found at each Twinsite.

Verify continuity from SRM connector C1 pin 3 to Ford Fuel Tank Assy Inline connector C18 pin 2 (E-series/F-450/550/59/53) or C7 (F-650/750). Repair circuit if necessary.

Please contact ROUSH CleanTech for any questions on this diagnostic procedure. Diagnostic Quick Reference Sheets are intended to be used in conjunction with your vehicle service manual available at https://www.roushcleantech.com/service-manuals/. Follow all safety procedures in your vehicle service manual. Technicians working on propane fuel system must complete appropriate training.

Drivability Diagnostics

Generation 4 Propane Powered Vehicles

Vehicle Information

VIN/Body Number: _____ Odometer: _____

Complaint: _____

Vehicle Self-Test

DTC's: _____

Fuel Tank Pressure _____ psi Fuel Rail Pressure _____ psi

Fuel Pump Duty Cycle (RDT parameter "rf_DC") _____ % (Gen 4 only)

Target Rail Pressure (RDT parameter "rpr_fr_prs_tgt") _____ psi (Gen 4 only)

Component Tests

Is the Manual Shutoff Valve Completely Open?
Read voltage across pin A and B of the tank supply solenoid, harness side _____V
Load test connector at the Tank Supply Solenoid. Can it light a test light? Y/N _____
Tank Supply Solenoid Resistance _____Ω
FRPCM Supply Solenoid Resistance _____Ω

<u>Pump 1</u>

With fuel pump connected measure amperage with an amp clamp during fuel system flush

_____ Amps

Voltage across pin A and B of fuel pump connector – harness side

_____ V

Resistance across pin A and B of fuel pump connector – pump side

_____Ω

<u>Pump 2</u>

With fuel pump connected measure amperage with an amp clamp during fuel system flush

_____ Amps

Voltage across pin A and B of fuel pump connector – harness side

_____ V

Resistance across pin A and B of fuel pump connector – pump side

_____ Ω

Please contact ROUSH CleanTech for any questions on this diagnostic procedure. Diagnostic Quick Reference Sheets are intended to be used in conjunction with your vehicle service manual available at roushcleantech.com. Follow all safety procedures in your vehicle service manual. Technicians working on propane fuel system must complete appropriate training.

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