



SVE BULLETIN

SPECIAL VEHICLE ENGINEERING – BODY BUILDERS ADVISORY SERVICE

E-Mail via website: www.fleet.ford.com/truckbbas (click "Contact Us")

Toll-free: (877) 840-4338

QVM Bulletin: Q-256

Date: 30 August, 2016

2017 and later F-250-550 Stationary Elevated Idle Control

Models Affected

2017 and later Model Year (MY) F-250/350/450/550 vehicles with 6.7L Diesel, 6.2L, and 6.8L Gasoline Engines

Purpose

To explain changes and functions of the stationary elevated engine idle control (SEIC) for power take-off (PTO) and battery charge protect (BCP) applications.

Important Update for 2017 MY and later F Super Duty 6.2L and 6.8L Gasoline equipped vehicles

The F-Super Duty 6.2L and 6.8L gasoline engine equipped vehicles have had changes made to the SEIC/PTO system, including Circuit color and circuit locations, the addition of and SEIC connector pigtail, Mobile PTO mode and Battery Charge Protect. Please review the following information carefully to ensure proper set up and operation of the SEIC / PTO System.

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1. Overview

Stationary Elevated Idle Control (SEIC)

- A power train control module (PCM) strategy that provides elevated engine speed to drive auxiliary commercial equipment such as hydraulic pumps, generators, air compressors; or maintain vehicle battery charge under extreme electrical demands.
- SEIC is standard in all PCM's for F-Super Duty trucks.
- 6.7L diesel only - Split shaft mode engages the transmission output shaft.

Customer Access Wires for SEIC and VSO/CTO/PARK Signals

- Located in cabin, tagged and bundled behind the passenger side kick panel. Pass-thru wires are in the same location.
- The final stage manufacturer or up-fitter is required to supply the customer interface equipment.
- Additional information in the "Circuit Descriptions" section.

Transmission Power Take off (PTO) Gear and Port

- Available on F-250/350/450/550.
- Available for TorqShift™ 6-speed automatic transmission by ordering “Transmission Power Take-Off Provision”. The PTO gear is direct-splined to the torque converter impeller.
- NEVER use any sealer, especially silicone-based, on the PTO port gasket.
- TorqShift™ Automatic Transmission: The PTO gear delivers up to 250ft-lbs of torque to the aftermarket PTO. The powertrain cooling system can manage the heat of 40 HP during continuous operation. Higher horsepower can be delivered, but for shorter durations depending on the amount of power required.
- Some aftermarket PTO's may not be capable of using the full available torque. Consult with the aftermarket PTO supplier to ensure the appropriate PTO selected for the application.

Customer Access Circuit / SEIC Wire Locations

SEIC circuits, Customer Access Signal Circuits, Pass-Thru Wires.

F250/350/450/550

Cabin /Passenger Kick Panel

- Blunt-cut access wires for SEIC, "Customer Access" signal circuits for CTO, VS_OUT, TRO_P, TRO_N, and 4 pass-thru wires, are bundled together at this location behind the passenger side kick panel.



F250/350/450/550

Under hood /passenger side

- The 4 blunt-cut pass-thru wires terminate at the passenger kick panel and under hood near the passenger side firewall grommet



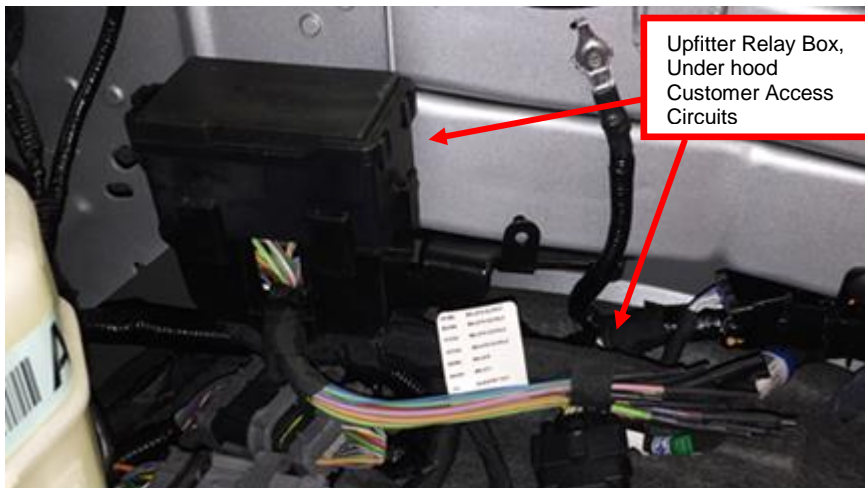
Customer Access Circuit / SEIC Wire Locations (Cont.)

SEIC circuits, Customer Access Signal Circuits, Pass-Thru Wires

F250/350/450/550

Under hood /Driver side

- Upfitter Relay box and upfitter switch outputs (if equipped) are located on the driver's side of the engine compartment.



Customer Access Circuit Descriptions

(Refer to page 5 for SEIC/ PTO interface connector pin out)

F-250/350/450/550 6.2L Gasoline, 6.8L Gasoline and 6.7L Diesel					
CUSTOMER ACCESS SIGNAL CIRCUITS - Found: Blunt-cut & taped, behind passenger side kick panel					
Conn. Pin #	Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
14	Gray / Brown	TRANS TRO-P	CET22	OUTPUT PARK-Only	6.7L Diesel - PCM Pin C1232T-20 6.2L / 6.8L Gas - PCM Pin C175E-19
					- An output from the PCM that indicates when the Transmission Range Sensor is indicating that the Transmission is in the Park Position. The Low Side driver (160mA max.) in the PCM will pull this output to ground when active (Transmission is in the PARK Position). To properly reference this output, the customer supplied external controller/device needs to pull this output up to VPWR with a 10K Ohm resistor. Thus when the output is active, the voltage at this output will be 0 volts. When this output is not active, the output will be pulled up to VPWR by the 10K Ohm pull up resistor.
13	Green / White	TRANS TRO-N	CET21	OUTPUT NEUTRAL-Only	6.7L Diesel - TCM Pin C1232T-24 6.2L / 6.8L Gas - PCM Pin C175E-59
					- An output from the PCM that indicates when the Transmission Range Sensor is indicating that the Transmission is in the Neutral Position. The Low Side driver (160mA max.) in the PCM will pull this output to ground when active (Transmission is in the Neutral Position). To properly reference this output, the customer supplied external controller/device needs to pull this output up to VPWR with a 10K Ohm resistor. Thus when the output is active, the voltage at this output will be 0 volts. When this output is not active, the output will be pulled up to VPWR by the 10K Ohm pull up resistor
12	Violet / Orange	VS OUT	VMC05	OUTPUT Vehicle Speed	6.7L Diesel - PCM Pin C1232B-5 6.2L / 6.8L Gas - PCM Pin C175B-78
					- An output from the PCM that provides 8000 pulses per mile signal with a 50% duty cycle. The low side driver in the PCM will switch the output off and on (off will allow the output to be pulled up close to VPWR), (on will put the output to 0 volts). To properly reference this output, the customer supplied external controller/device needs to pull this output down to ground with a 10K Ohm resistor.
5	Blue	CTO	CE913	OUTPUT Engine Speed	6.7L Diesel - PCM Pin C1232B-10 6.2L / 6.8L Gas - PCM Pin C175B-77
					- An output from the PCM that indicates a Clean Tachometer Output to provide an indication of engine RPM. The low side driver in the PCM will switch the output off and on (off will allow the output to be pulled up close to VPWR), (on will put the output to 0 volts), at a Frequency = (Engine RPM's * Number of cylinders) / 120), with a duty cycle of 50%. To properly reference this output, the customer supplied external controller/device needs to pull this output down to ground with a 10K Ohm resistor.

Customer Access Circuit Descriptions (cont.)

(Refer to page 5 for SEIC/ PTO interface connector pin out)

F-250/350/450/550 6.2L Gasoline, 6.8L Gasoline and 6.7L Diesel					
CUSTOMER ACCESS SIGNAL CIRCUITS - Found: Blunt-cut & taped, behind passenger side kick panel					
15	White / Violet	PARK BRAKE SW	CMC25	OUTPUT Park Brake	6.7L Diesel, 6.2L / 6.8L Gas – BCM Pin C2280E-47
					- Ground Output Signal wire - NOTE: The Body Control Module (BCM) park brake input also uses this signal. The BCM park brake input cannot source any current. The body builder must provide a high impedance circuit (such as a Field Effect Transistor) with a 20 kilo-ohm or larger resistor to prevent faulting the Body Control Module. See schematic in the Body Builder Layout Book.
1	Violet	CBP04	CBP04	Service Brake signal output	6.7L Diesel, 6.2L / 6.8L Gas – BCM Pin C2280G-7
					Intended for aftermarket Trailer Brake controller. BCM fuse F4, 5 Amp
N/A	Blue / Green	PTO RLY CTL	CE924	CONTROL Upfitter PTO Relay	6.7L Diesel, 6.2L / 6.8L Gas – Upfitter Relay Box
					Control (ground) side of relay coil – commanded by an upfitter installed switched ground signal - Can be combined with circuit CE326 for PTO upfit.
N/A	Green / White	PTO OUTPUT	CB112	OUTPUT Upfitter PTO Relay	6.7L Diesel, 6.2L / 6.8L Gas – Upfitter Relay Box
					25A fused output (F5-Upfitter Relay Box) – Can be used for PTO upfit.

Pass-thru Circuits

F-250/350/450/550 6.2L Gasoline, 6.8L Gasoline and 6.7L Diesel				
Pass-Thru circuits - Found: Blunt-cut & taped, behind passenger side kick panel				
Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
Brown / White	None	CAC09	PASS-THRU	- Pass thru wire, terminating at the passenger kick panel and under hood near the passenger side firewall grommet.
White	None	CAC10	PASS-THRU	- Pass thru wire, terminating at the passenger kick panel and under hood near the passenger side firewall grommet.
White / Orange	None	CAC11	PASS-THRU	- Pass thru wire, terminating at the passenger kick panel and under hood near the passenger side firewall grommet.
Gray / Orange	None	CAC12	PASS-THRU	- Pass thru wire, terminating at the passenger kick panel and under hood near the passenger side firewall grommet.

In-Cab Voltage Source (VPWR)

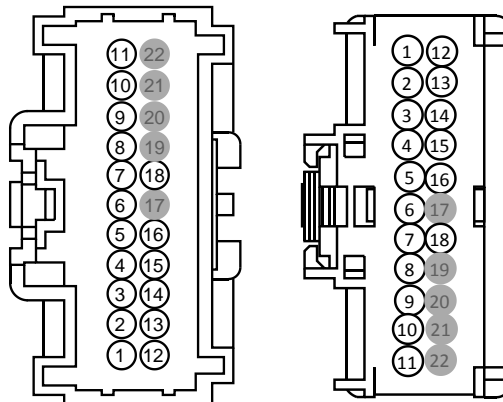
F-250/350/450/550 6.2L Gasoline, 6.8L Gasoline and 6.7L Diesel					
CUSTOMER ACCESS SIGNAL CIRCUIT - Found: Blunt-cut & taped, behind passenger side kick panel					
Conn. Pin #	Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
2	Green / Orange	CBP22	CBP22	OUTPUT Run / Start Feed	6.7L Diesel - BCM Pin C2280C-23 6.2L / 6.8L Gas – BCM Pin C2280C-23
					- 12V, 5A fused feed intend for SEIC / PTO use.

Under-hood Voltage Sources (VPWR)

F-250/350/450/550 6.2L Gasoline, 6.8L Gasoline and 6.7L Diesel				
CUSTOMER ACCESS SIGNAL CIRCUITS - Found: (if equipped) located on the driver's side of the engine compartment.				
Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
Brown	RUN/STRT OUT	CB111	OUTPUT RUN / START	- Ignition Hot-in Run / Start - 20-amp fused (F3 in upfitter auxiliary relay box) circuit, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Brown / Red	20A B+	SB106	OUTPUT Battery Hot	- 20-amp fused (F6 in upfitter auxiliary relay box) circuit, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Brown / Green	RELAY1	CB117	OUTPUT Upfitter Switch 1	- 25-amp fused output (16awg), Ignition Hot only, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Violet / Orange	RELAY2 OUTPUT	CB114	OUTPUT Upfitter Switch 2	- 25-amp fused output (16awg), Ignition Hot only, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Blue / Green	RELAY3 OUTPUT	CB116	OUTPUT Upfitter Switch 3	- 25-amp fused output (16awg), Ignition Hot only, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Gray / Brown	RELAY4 OUTPUT	CB113	OUTPUT Upfitter Switch 4	- 25-amp fused output (16awg), Ignition Hot only, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Brown / Blue	RELAY5	CB115	OUTPUT Upfitter Switch 5	- 40-amp fused output (10awg), customer configurable to either Ignition Hot or Hot at all times, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.
Gray / Orange	RELAY6 OUTPUT	CB118	OUTPUT Upfitter Switch 6	- 40-amp fused output (10awg), customer configurable to either Ignition Hot or Hot at all times, found on the driver's side of the engine compartment, taped on a harness near the upfitter auxiliary relay box.

SEIC / PTO Interface Connector

2017 MY Super Duty SEIC now includes an interface connector and pigtail. This pigtail is included on all F-Series Super Duty vehicles. Replacements may be ordered through Ford Parts. The Ford service part number is: **HC3Z-14A303-C**



C213 - SEIC/PTO Interface Connector View

Left: Male, Right: Female

2. PTO Mode Descriptions

PTO Mode Specifications

Engine	Mode	Max. Load at Transmission PTO Gear	Minimum Engine RPM	Maximum Engine RPM
6.7L Diesel	Stationary	250ft-lbs	900	3000
	Mobile	150ft-lbs	750	3000
	Split-shaft	N/A	700	3000
6.8L Gasoline	Stationary	250ft-lbs	800	2400
	Mobile	125ft-lbs	750	2400
6.2L Gasoline	Stationary	250ft-lbs	800	2400
	Mobile	125ft-lbs	750	2400

Operating Modes

Stationary Elevated Idle Control mode

-Operates in Park at elevated engine speed. The maximum load at the transmission PTO gear are shown in the table below:

Engine	Max. Load at Transmission PTO Gear, Stationary
6.7L Diesel	250ft-lbs
6.8L Gasoline	250ft-lbs
6.2L Gasoline	250ft-lbs

- Intended to be commanded ONLY by applying battery voltage to certain customer-access blunt-cut wire circuits, and adding a target-speed resistor, and is only available when the vehicle road speed signal is zero.
- Includes a circuit which changes from open-circuit to ground when enablers are met that may be used to turn on an indicator lamp while providing battery power to an aftermarket PTO clutch or solenoid.
- Ramp rates are fixed and cannot be altered by the customer.
- Refer to page 12 for example wiring diagrams.

Typical SEIC Engagement Sequence for TorqShift™ PTO

1. 12V is applied to PTO 1 circuit.
2. PCM looks for the following enabling conditions:
 - Parking brake applied.
 - Foot off of service brake
 - Vehicle in PARK (or NEUTRAL)
 - Foot off of accelerator pedal
 - Vehicle speed is 0 mph (stationary)
 - Engine at a stable base idle speed
 - Transmission Oil Temp above 20° F
 - 6.7L only - Engine Coolant Temperature (ECT) 20° F minimum
 - 6.2L / 6.8L only - Engine Coolant Temperature (ECT) 40° F minimum.
 (See page 15 for complete list of Enable / Disable conditions.)
3. Command is sent to boost the transmission hydraulic line pressure to a minimum of 150 psi, which is used by the aftermarket PTO supplier to hold their PTO Clutch. Command is sent to increase engine speed to 900 rpm
4. The PTO RLY circuit changes from open-circuit to ground. If the up-fitter uses the circuit wiring offered in this bulletin then this will provide battery voltage to the aftermarket PTO solenoid to engage the PTO.
5. Engine RPM ramps to target speed determined by the resistor selection.

Mobile Mode

-Operates in all gears and all vehicle speeds. The engine idle speed is elevated to 750 RPM when the Mobile Mode is initiated. Engine RPM is controlled by the driver through the throttle pedal but peak engine speed is not limited beyond normal operating ranges. There is no built in provision to limit engine speed to a pre-set RPM. To prevent over speed damage to attached pumps and equipment an additional aftermarket rpm limiter will be required. The maximum load allowable for mobile mode are shown in the table below.

Engine	Max. Load at Transmission PTO Gear, Mobile
6.7L Diesel	150ft-lbs
6.8L Gasoline	125ft-lbs
6.2L Gasoline	125ft-lbs

- If the PTO feature is used for extended periods of time without vehicle movement it is recommended to switch to Stationary Mode.
- Refer to page 13 for example wiring diagrams.

Typical Mobile Mode Engagement Sequence

1. 12V applied to PTO 2 circuit
2. PCM looks for the following enabling conditions:
 - Transmission Oil Temp above 20° F
 - 6.7L only - Engine Coolant Temperature (ECT) 20° F minimum
 - 6.2L / 6.8L only - Engine Coolant Temperature (ECT) 40° F minimum(See page 15 for complete list of Enable / Disable conditions.)
3. PCM looks for voltage on PTO RPM circuit
4. Command is sent to boost transmission hydraulic line pressure to a minimum of 150 psi, which is used by the aftermarket PTO supplier to hold their PTO Clutch
5. The PTO RLY circuit changes from open-circuit to ground. If the up-fitter uses the circuit wiring offered in this bulletin then this will provide battery voltage to the aftermarket PTO solenoid to engage the PTO.
6. Engine idle increases to 750 RPM.

Split Shaft Mode (Diesel Only)

- To install Split-Shaft mode, wire according to the diagram shown on page 14. Select elevated idle speed by installing a resistor (which provides voltage to PTO RPM input) as indicated in the wiring diagram. Split-Shaft mode requires that supply voltage (nominal 12vdc) be applied to both the **PTO 1** and **PTO 2** circuits.

- Refer to page 14 for example wiring diagrams.

Split Shaft Engagement procedure:

(See page 15 for complete list of Enable / Disable conditions.)

1. Ensure the following engine is running and the engine coolant temp is above 20° F.
2. Apply park brake.
3. Disconnect vehicle drive train (transmission in NEUTRAL, 4x4 DISENGAGED) and engage PTO load.
4. With foot off both the service brake and accelerator pedals, turn Split-Shaft PTO on.
5. While pressing the service brake, shift transmission into drive.
6. The system will shift the transmission into 4th gear, lock the converter and then ramp up to the target idle speed in a controlled manner. Release the service brake*.

*If vehicle unexpectedly lurches or moves upon releasing service brake, immediately depress brake pedal and shift transmission into PARK or NEUTRAL to secure vehicle. Contact Upfitter immediately

Battery Charge Protect (BCP):

-Available on vehicles equipped with the 6R140 transmission.

-When 12V is applied to the BCP SW circuit, the engine speed goes immediately to 600. From this state, the PCM uses battery voltage as well as ambient air temp., engine oil temperature information to raise engine speed higher

to maintain battery charge. Maximum engine speed in BCP mode is 1200 rpm. Loss of an operating condition after BCP is engaged will require the BCP switch to be cycled before BCP will re-engage.

- BCP CANNOT BE ACTIVE WHEN SEIC OR PTO MODES ARE ACTIVE
- A Resistor must be installed between DIESEL PTO REF (GAS PTO VREF for 6.8L) and PTO RPM for both Diesel and Gasoline engines.
- Auto Entry (6.7L Diesel only): The BCP and Mobile operation modes allow PTO to engage automatically once the engine started provided the input switch is left in the on position prior to starting the engine. However, loss of an operating condition after PTO is initially engaged will require the switch to be cycled before PTO will re-engage.
- Refer to page 12 for example wiring diagram

Typical Battery Charge Protect Mode Engagement Sequence:

1. 12V applied to BCP SW circuit
2. PCM looks for the following enabling conditions:
 - Parking brake applied.
 - Foot off of service brake
 - Vehicle in PARK (or NEURTRAL)
 - Foot off of accelerator pedal
 - Vehicle speed is 0 mph (stationary)
 - Engine at a stable base idle speed
 - Transmission Oil Temp above 20° F
 - 6.7L only - Engine Coolant Temperature (ECT) 20° F minimum
 - 6.2L & 6.8L only - Engine Coolant Temperature (ECT) 40° F minimum.
3. PCM looks for a valid voltage between 0.2 to 4.7 Volts on the PTO RPM circuit
4. Vehicle idle fluctuates slightly as PCM enters BCP mode.
5. The BCP LP circuit changes from open-circuit to ground. This is intended to provide a ground path for a BCP indicator lamp.

NOTE: BCP is a smart system. Engine idle will not increase unless the vehicle senses an increase in electrical demand. Under periods of low electrical demand, the operator may not notice any change in engine RPM. It is recommend that the modifier install an indicator lamp to alert the operator that BCP is properly engaged.

Additional notes:

Adaptive Cooling

This PCM strategy automatically restricts engine power when it senses an over-temperature condition, and may interrupt the SEIC-PTO operation. Typically, the over-temperature condition it reacts to will also show up on the temperature gage on the instrument panel. Elevated engine speed, typical of SEIC operation, may help avoid Adaptive Cooling occurrence due to the resultant additional engine and transmission coolant flow. However, depending on the auxiliary PTO power being demanded, 900 rpm may not be enough to prevent the power train from entering Adaptive Cooling mode, but 1500 rpm may.

Input Resistor

ALL modes (SEIC, PTO) require usage of an input resistor. The resistor value may be obtained in Tables A & B.

Table A- 6.7L Diesel SEIC Resistor Charts

6.7L Diesel Engine					
Stationary Mode			Split Shaft Mode		
Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)	Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)
900	54050	0.400	700	54050	0.400
1000	35098	0.590	800	36247	0.574
1200	19491	0.971	1000	20795	0.922
1400	12677	1.352	1200	13810	1.270
1600	8858	1.733	1400	9830	1.617
1800	6415	2.114	1600	7258	1.965
2000	4718	2.495	1800	5460	2.313
2200	3471	2.876	2000	4132	2.661
2400	2515	3.257	2200	3111	3.009
2600	1759	3.638	2400	2301	3.357
2800	1147	4.019	2600	1644	3.704
3000	641	4.400	2800	1099	4.052
			3000	641	4.400
Mobile Mode					
Engine Target Speed (RPM)	Resistor (Ohms)		Voltage (volts)		
Minimum 750 (Commanded by throttle)	360		4.644269		
** Voltages are exact to achieve RPM shown. Resistors are standard 5% values (1 watt) and yield RPM values +/- 32rpm					

Table B: 6.2L, 6.8L SEIC Resistor Chart

6.2L Gasoline, 6.8L Gasoline Engine Stationary Mode					
Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)	Engine Target Speed (RPM)	Resistor (Ohms)	Voltage (volts)
800	54050	0.40	1700	4168	2.65
900	31454	0.65	1800	3403	2.90
1000	21411	0.90	1900	2760	3.15
1100	15735	1.15	2000	2212	3.40
1200	12086	1.40	2100	1738	3.65
1300	9542	1.65	2200	1326	3.90
1400	7668	1.90	2300	963	4.15
1500	6230	2.15	2400	641	4.40
1600	5092	2.40			
Mobile Mode					
Engine Target Speed (RPM)	Resistor (Ohms)		Voltage (volts)		
Minimum 750 (Commanded by throttle)	360		4.644269		
** Voltages are exact to achieve RPM shown. Resistors are standard 5% values (1 watt) and yield RPM values +/- 32rpm					

Circuit Descriptions for PTO Modes

(Refer to page 5 for SEIC/ PTO interface connector pin out)

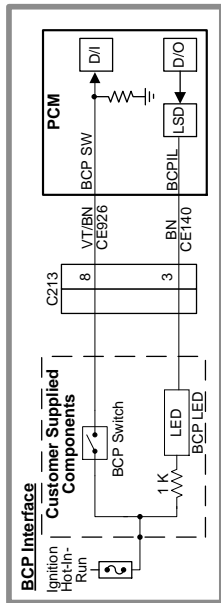
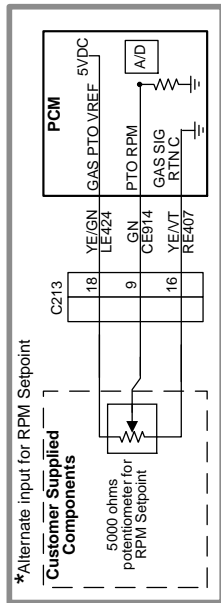
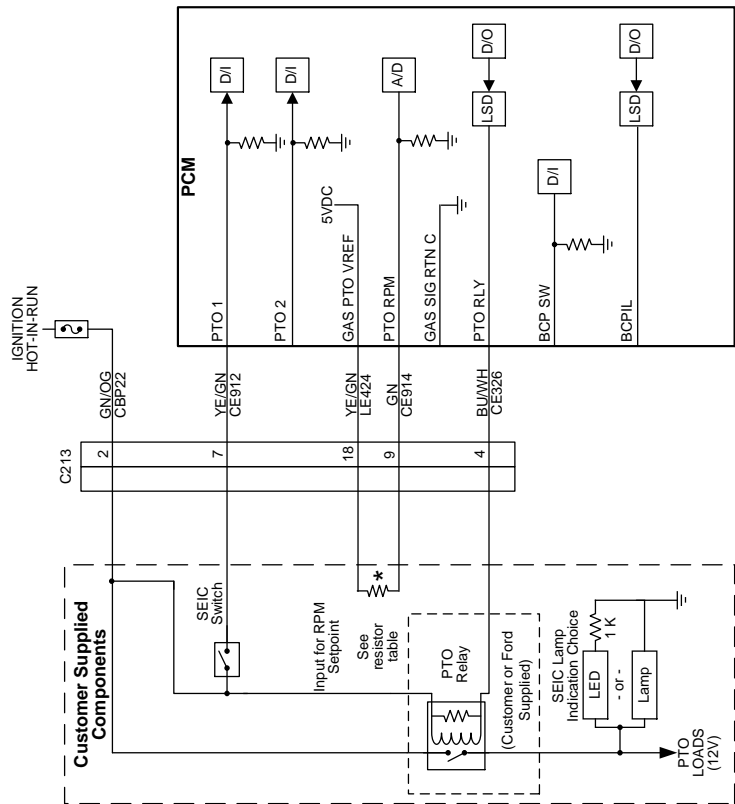
F-250/350/450/550 – 6.7L Diesel					
Conn. Pin #	Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
7	Yellow / Green	PTO 1	CE912	INPUT (VPWR)	6.7L Diesel - PCM Pin C1232B-6 <ul style="list-style-type: none"> Applying vehicle battery voltage to this wire initiates SEIC Stationary Mode process. <ul style="list-style-type: none"> Signals TorqShift™ transmission to enter SEIC Stationary Mode strategy. Verifies safety enablers. Turns off OBD and other emission-related monitoring. Elevates engine speed to target found at PTO RPM circuit. Invokes the PTO relay circuit when safety enablers are met. Looks for the target engine speed requested at the PTO RPM circuit using a resistor or POT.
					6.7L Diesel - PCM Pin C1232B-4 <ul style="list-style-type: none"> Applying vehicle battery voltage to this wire initiates Mobile PTO Mode. <ul style="list-style-type: none"> Signals TorqShift™ transmission to enter Mobile Mode strategy. Verifies safety enablers. Turns off OBD and other emission-related monitoring. Invokes the PTO relay circuit when safety enablers are met. Requires valid resistance on PTO RPM input for system to function
4	Blue / White	PTO RLY	CE326	OUTPUT	6.7L Diesel - PCM Pin C1232B-11 <ul style="list-style-type: none"> A low-side driver, changing from "open-circuit" to "ground" indicating that the engine is ready for the PTO operation to begin and that a PTO load may be applied. Intended for powering a PTO indicator lamp, or turn on a relay coil (not to exceed 1 amp). LED lights require adding a resistor in series.
					6.7L Diesel - PCM Pin C1232B-8 <ul style="list-style-type: none"> Requires the addition of a resistor or potentiometer for any SEIC / PTO mode. Resistor / potentiometer selection determines the fixed or variable engine target speed. Combine in circuit with DIESEL PTO REF and DIESEL PTO GND. Speed range available: 900 rpm to 3000 rpm (700 min RPM for split shaft operation).
11	Blue / Orange	PTO 2	CE933	INPUT (VPWR)	6.7L Diesel - PCM Pin C1232B-55 <ul style="list-style-type: none"> A 5-volt reference, buffered against shorts to ground or power, used to complete the resistor circuit for engine speed selection.
					6.7L Diesel - PCM Pin C1232B-22 <ul style="list-style-type: none"> A ground reference, buffered, used to complete the resistor circuit for engine speed selection.
9	Green	PTO RPM	CE914	INPUT (resistor)	6.7L Diesel - PCM Pin C1232B-21 <ul style="list-style-type: none"> Applying vehicle battery voltage to this wire begins BCP. BCP regulates engine speed between 600 to 1200 rpm to maintain required charge system voltage
					6.7L Diesel - PCM Pin C1232B-20 <ul style="list-style-type: none"> A low-side driver, changing from "open-circuit" to "ground" indicating that BCP is in effect. Intended for powering an indicator lamp.
10	White / Brown	DIESEL PTO REF	LE434	Reference Voltage	6.7L Diesel - PCM Pin C1232B-23 <ul style="list-style-type: none"> - 12V, 5A fused feed intend for SEIC / PTO use.
6	Gray / Violet	DIESEL PTO RTN	RE327	PCM Ground	
8	Violet / Brown	BCP SW	CE926	INPUT (VPWR)	
3	Brown	BCPIL	CE140	OUTPUT	
2	Green / Orange	CBP22	CBP22	OUTPUT Run / Start Feed	

Circuit Descriptions for PTO Modes (Cont.)

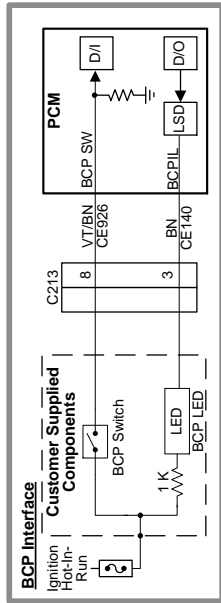
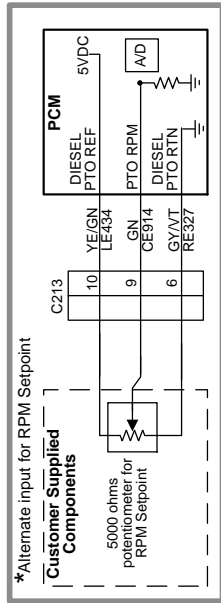
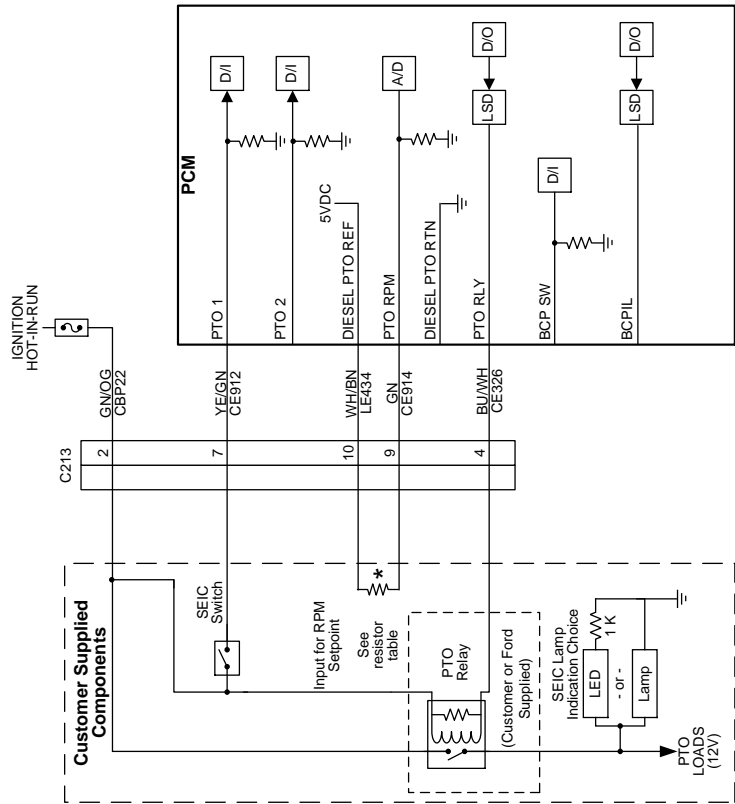
(Refer to page 5 for SEIC/ PTO interface connector pin out)

F-250/350/450/550 – 6.2L Gasoline, 6.8L Gasoline Engine PCM					
Conn. Pin #	Wire Color	Wire Tag	Circuit No.	Circuit Intent	Description
7	Yellow /Green	PTO 1	CE912	INPUT (VPWR)	6.2L / 6.8L Gas – PCM Pin C175B-84
					<ul style="list-style-type: none"> Applying vehicle battery voltage to this wire initiates SEIC Stationary Mode process. <ul style="list-style-type: none"> Signals TorqShift™ transmission to enter SEIC Stationary Mode strategy. Verifies safety enablers. Turns off OBD and other emission-related monitoring. Elevates engine speed to target found at PTO RPM circuit. Invokes the PTO relay circuit when safety enablers are met. Looks for the target engine speed requested at the PTO RPM circuit using a resistor or POT
11	Blue / Orange	PTO 2	CE933	INPUT (VPWR)	6.2L / 6.8L Gas – PCM Pin C175B-88
					<ul style="list-style-type: none"> Applying vehicle battery voltage to this wire initiates Mobile PTO Mode. <ul style="list-style-type: none"> Signals TorqShift™ transmission to enter Mobile mode strategy. Verifies safety enablers. Turns off OBD and other emission-related monitoring. Invokes the PTO relay circuit when safety enablers are met. Requires valid resistance on PTO RPM input for system to function
4	Blue / White	PTO RLY	CE326	OUTPUT	6.2L / 6.8L Gas – PCM Pin C175B-98
					<ul style="list-style-type: none"> A low-side driver, changing from "open-circuit" to "ground" indicating that the engine is ready for PTO operation to begin and that a PTO load may be applied. Intended for powering a PTO indicator lamp, or turn on a relay coil (not to exceed 1 amp). LED lights require adding a resistor in series.
9	Green	PTO RPM	CE914	INPUT (resistor)	6.2L / 6.8L Gas – PCM Pin C175B-85
					<ul style="list-style-type: none"> Requires the addition of a resistor or potentiometer for any SEIC / PTO mode. Resistor / potentiometer selection determines the fixed or variable engine target speed. Combine in circuit with GAS PTO VREF and GAS SIG RTN C. Speed range available: 910 rpm to 2400 rpm
18	Yellow / Green	GAS PTO VREF	LE424	Reference Voltage	6.2L / 6.8L Gas – PCM Pin C175B-52
					<ul style="list-style-type: none"> A +5-volt reference, buffered against shorts to ground or power, used to complete the resistor circuit for engine speed selection.
16	Yellow / Violet	GAS SIG RTN C	RE407	PCM Ground	6.2L / 6.8L Gas – PCM Pin C175B-51
					<ul style="list-style-type: none"> A ground reference, buffered, used to complete the resistor circuit for engine speed selection.
8	Violet / Brown	BCP SW	CE926	INPUT (VPWR)	6.2L / 6.8L Gas – PCM Pin C175B-82
					<ul style="list-style-type: none"> Applying vehicle battery voltage to this wire begins BCP. BCP regulates engine speed between 600 to 1200 rpm to maintain required charge system voltage
3	Brown	BCPIL	CE140	OUTPUT	6.2L / 6.8L Gas – PCM Pin C175B-17
					<ul style="list-style-type: none"> A low-side driver, changing from "open-circuit" to "ground" indicating that BCP is in effect. Intended for powering an LED lamp (40mA max.).
2	Green / Orange	CBP22	CBP22	OUTPUT Run / Start Feed	6.2L / 6.8L Gas – BCM Pin C2280C-23
					<ul style="list-style-type: none"> - 12V, 5A fused feed intend for SEIC / PTO use.

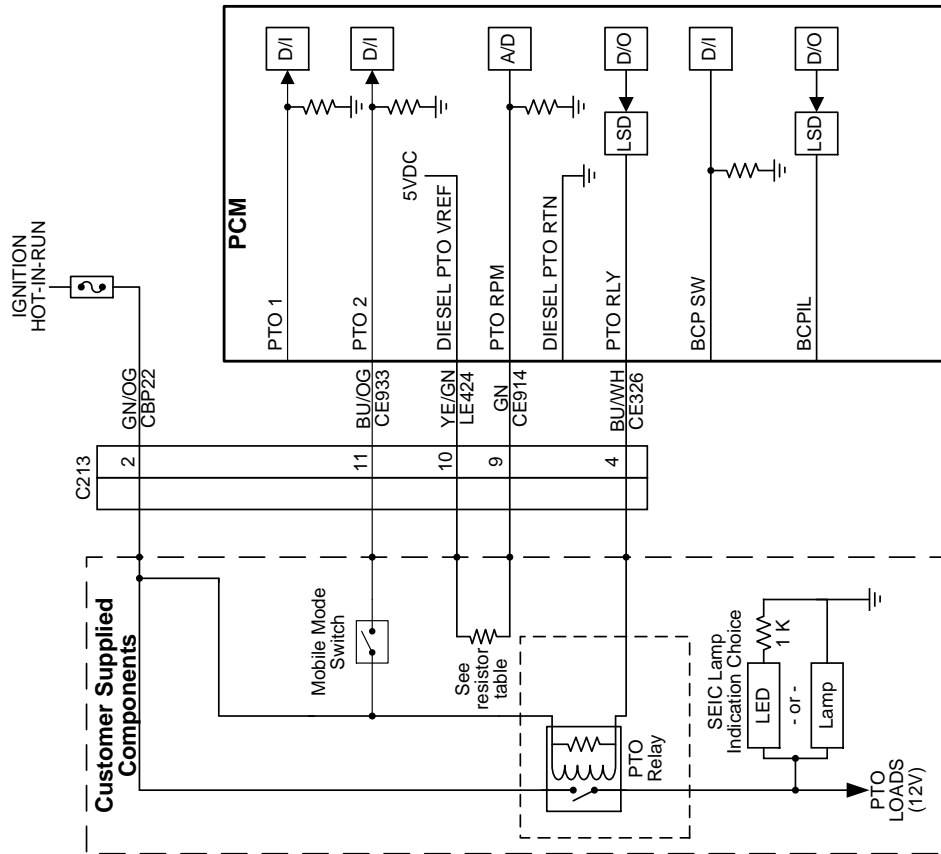
SEIC and BCP Interface 2017 F-250-550 6.2L & 6.8L Gasoline



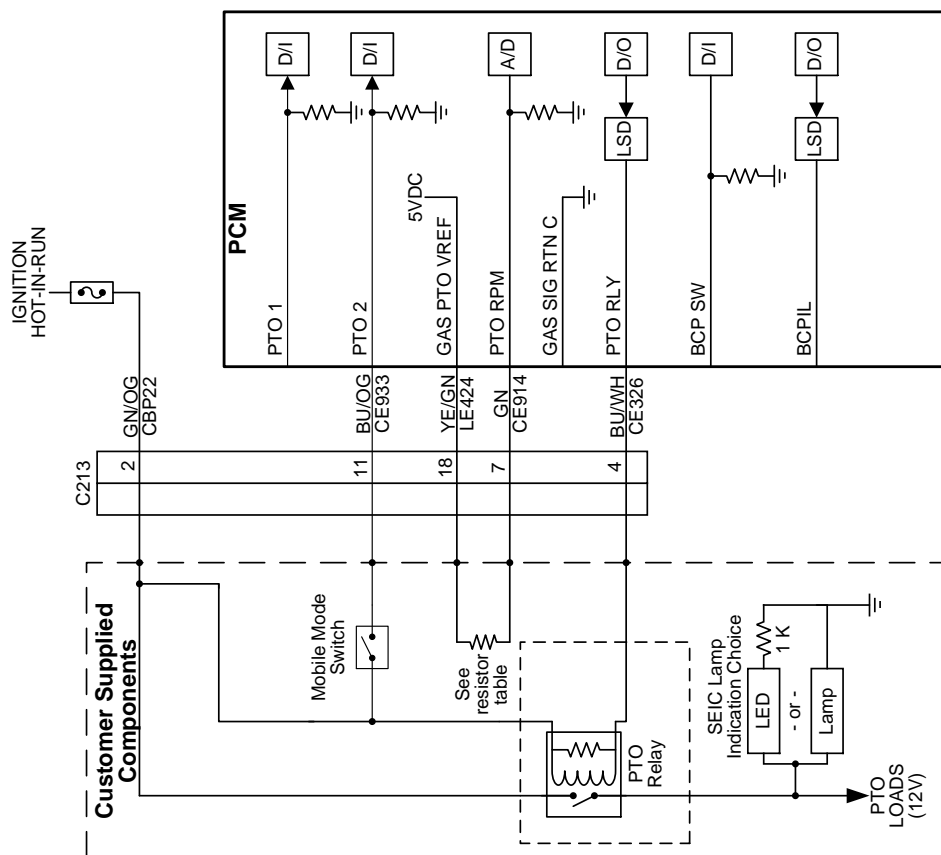
SEIC and BCP Interface 2017 F-250-550 6.7L



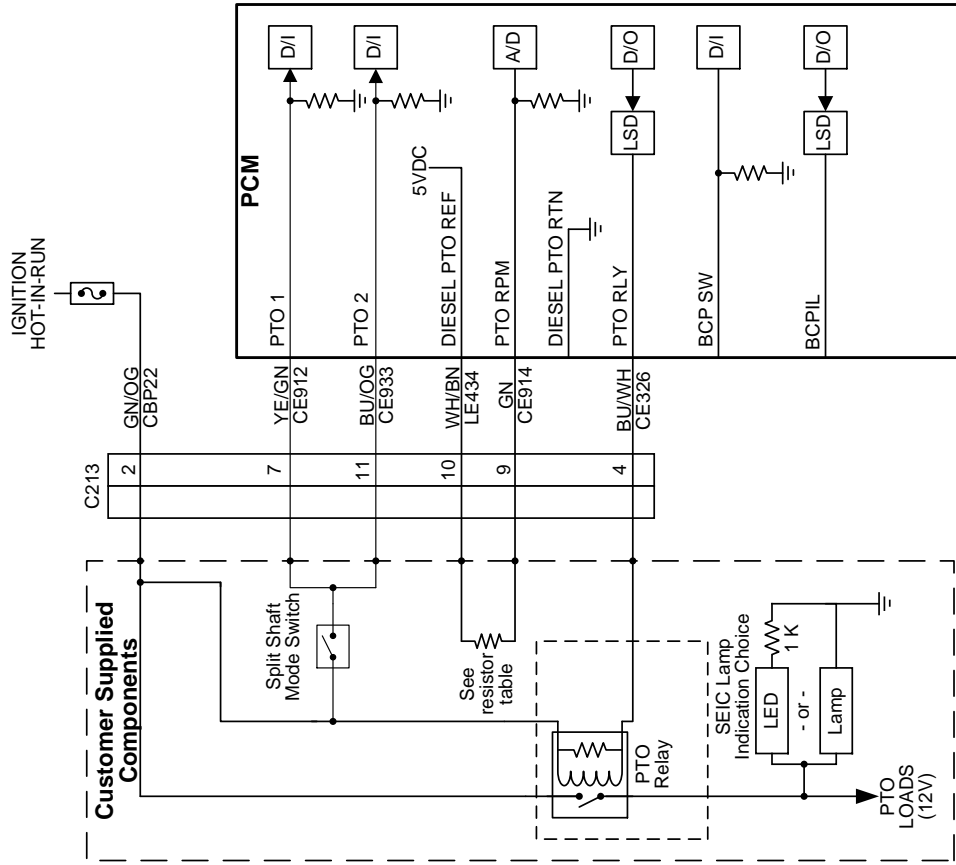
**SEIC Interface
2017 F-250-550 6.7L Diesel
Mobile Mode**



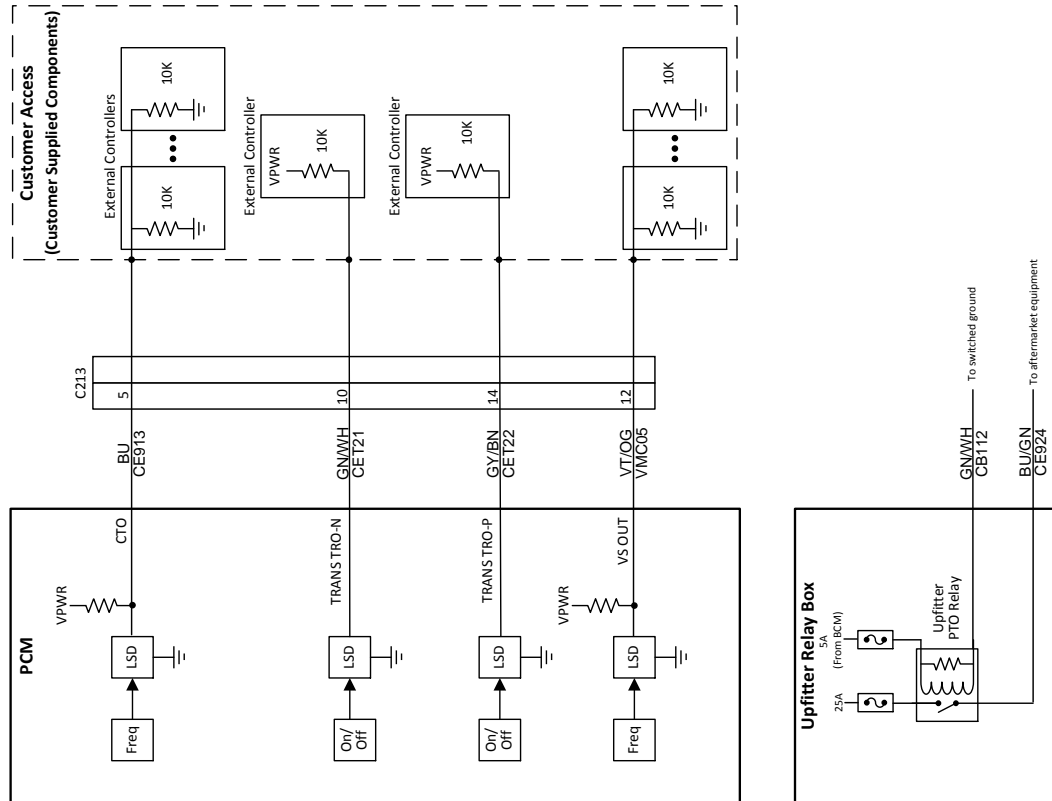
**SEIC Interface
2017 F-250-550 6.2L & 6.8L Gasoline
Mobile Mode**



SEIC Interface 2017 F-250-550 6.7L Diesel Split Shaft Mode



Customer Access 2017 F-250-550 6.7L Diesel / 6.2L & 6.8L Gasoline



6.7L Diesel, 6.2L Gasoline and 6.8L Gasoline SEIC / BCP Enable/Disable Conditions

Vehicle Conditions to Enable SEIC (all are required)	Vehicle Conditions that Disable SEIC (any one required - See Note-1)	SEIC	Split Shaft (Diesel only)	Mobile Mode
Parking brake applied.	Parking brake disengaged.	Yes	Yes	No
Foot off of service brake	Depressing service brake	Yes	See note-2	No
Vehicle in PARK (or NEUTRAL)	Vehicle taken out of PARK (or NEUTRAL)	Yes	See note-2	No
Foot off of accelerator pedal	Accelerator pedal depressed	Yes	Yes	No
Vehicle speed is 0 mph (stationary)	Vehicle speed is not 0 mph (stationary)	Yes	Yes	No
Engine at a stable base idle speed		Yes	Yes	No
Transmission Oil Temp above 20° F	Transmission Oil Temperature (TOT) exceeds 240° F.	Yes	Yes	Yes
Engine Coolant Temperature (ECT) 20° F minimum (6.7L)	Engine Coolant Temperature (ECT) exceeds 234° F	Yes	Yes	Yes
Engine Coolant Temperature (ECT) 40 degree F minimum. (6.2L, 6.8L)	Engine Coolant Temperature Limit (ECT)	Yes	N/A	Yes
	Catalyst Temperature Limit	Yes	Yes	Yes

Note 1: A “change-of-state” at the “PTO 1” and/or “PTO 2” circuit(s) is required to re-invoke SEIC.

When a disabler is seen by the PCM the "PTOIL" circuit changes from "ground-source" to “open-circuit”, SEIC drops out, and the engine speed returns to base idle. To re-initiate SEIC the operator must turn off the aftermarket PTO switch (removing command voltage to the “PTO 1 / PTO 2” circuit) and turn it back on again.

Note 2: See Split Shaft Mode description under Operating Modes.

4. SEIC / PTO – General System Behavior

- To guarantee full advertised torque capability at the automatic transmission PTO gear and through the aftermarket PTO clutch, the hydraulic line pressure serving the aftermarket PTO clutch must be elevated. Applying battery voltage to the PTO circuit is the signal to the transmission to enter SEIC strategy and these important functions. This applies to both stationary and mobile PTO operations.

- **If an SEIC disabler occurs in any mode:**
 - **ALL engines will require a "change-of-state", meaning the operator is required to turn off voltage to the “PTO 1” and/or “PTO 2” circuit(s), and back on again to re-invoke SEIC and PTO operation.**
- If the Transmission Oil Temperature (TOT) sensor reaches 240°F, the PTO system may disengage, preventing torque from being delivered to the aftermarket transmission PTO.
- SEIC/PTO strategy function in the PCM is not affected by the loss of vehicle battery electrical power.
- SEIC Ramp Rate (fixed, not programmable):
 - When first applying battery voltage to the PTO circuit the PCM directs the engine to ramp to the initial target that it sees at the RPM circuit at a rate of 200 rpm/sec
 - The SEIC system offers buffered PCM voltage and ground circuits to complete the resistor circuits for engine speed.
 - If there is a high electrical demand on the chassis battery, such as from aftermarket inverters or generators, etc., the actual elevated idle engine speed may vary with that demand for any given resistance in the SEIC circuit.

SEIC / PTO – General System Behavior (cont.)

- **Correlation between engine speed and resistor values:**
 - Both the 6.7L Diesel and 6.2L/6.8L Gasoline applications uses a 5 volt reference signal and ground for the PTO_RPM input circuit.
 - Normal base engine calibration allows approximately +/-50 rpm fluctuation. If any factory vehicle accessories are used during SEIC, e.g. a/c, defroster, etc., then that fluctuation may increase to approximately +/-100 rpm or more.
 - The sudden loss of aftermarket PTO hydraulic pressure during SEIC/PTO operation, like a ruptured hose, may send SEIC engine speed to near 3000 rpm. It is recommended that a hydraulic pressure switch linked to SEIC/PTO be added to disable SEIC/PTO when a hose ruptures.
 - Because of a service brake circuit characteristic at engine-start, invoking SEIC may cause the diagnostic error code FFG_BOO to get flagged (recorded in the PCM). To avoid this, simply tap the service brake pedal sometime after engine-start and prior to invoking SEIC. Once the code is set, SEIC may not be available until it is erased.

5. APPENDIX

Vocabulary / Definitions

PTO Applications: Includes all forms of mechanical power, using the vehicle powertrain as the source, including transmission side-mounted PTO, split-shaft PTO, crankshaft PTO, and FEAD-mounted clutch-pumps, air compressors, and generators.

Clutch-Pump: A type of PTO that is driven by the vehicle engine crankshaft through the FEAD pulley system.

PCM: Powertrain Control Module

FEAD: Front End Accessory Drive (belt and pulley drive system)

SEIC: Stationary Elevated Idle Control

VSO, VSOUT: Vehicle Speed Out – see Customer Accessible Signal Description

TPO: Throttle Position Out. Direct customer access not provided.

ETC: Engine Coolant Temperature

CTO: Clean Tach Out - Customer Accessible Signal Description

VPWR: Vehicle Power Battery Voltage.

BCP_IL / BCP_SW: Battery Charge Protection Illumination Lamp / Battery Charge Protection Switch

Intermittent Duty Usage: 5 minutes out of a 15 minute period or less of continuous operation.

Continuous Duty Usage: Greater than 5 minutes out of a 15 minute period of continuous operation.

Change-of-State: Part of the SEIC strategy. If any condition is met that disables SEIC, the operator is required to turn the PTO switch OFF and back ON again before SEIC will allow elevated idle to return.

TRO_N, TRO_P: Transmission Range Output, indicating NEUTRAL ONLY, or PARK-ONLY

BCM: Body Control Module, located at lower passenger-side of instrument panel