UI Bulletin 120

Subject: Power Take Off (PTO) Subsystem Operating Description and Application Guide

Models Affected: All New C/K 3500HD CC

Chevrolet Silverado / GMC Sierra.

Model Years: 2015 and Beyond

Date: August 26, 2014

Revision Date:

ADVISORY:

This bulletin provides a complete description of the PTO option on the 2015 Heavy Duty Chassis Cab Chevrolet Silverado and GMC Sierra 3500HD Cab Chassis Models with the Duramax diesel engine and Allison MW7 transmission. The PTO subsystem is factory ready for engine idle up control and is ready for transmission mounted gear and external electrical components to be attached.

This Bulletin is the complete Operating Description and Application Guide
Table of Contents

1. Quick Start Reference - Power Take-Off (PTO)
2. Factory PTO Settings
3. Primary PTO Operating Modes
4. Preset PTO
5. Variable PTO
6. Mobile PTO
7. PTO System Disengage Conditions
8. Prolonged or Extended PTO Operation
9. PTO Operational Speed Control
10. Factory Preset Parameters
11. Driver Information Center (DIC) Warning Messages
12. Duramax Diesel Supplement
13. Appendix
[1] Quick Start Reference - Power Take-Off (PTO)

The PTO is an upfitter integrated system that allows the user to create an auxiliary power source for running add-on equipment, such as salt spreaders, dump beds, lifts, winches, and lift buckets etc. The PTO system controls engine speed to values higher than normal base idle, PTO load relay engagement, and remote starting and shutdown of the engine.

PTO Components

The OEM PTO components consist of:

- The transmission [internal] PTO gear – rotates with the torque converter
- The in-cab PTO switch and cruise control SET and RES switches
- The PTO telltale indicator
- The Driver Information Center (DIC)
- The Radio and Navigation Screen (HMI)
- The power take off module (PTOM)
- The remote PTO upfitter connector [X191]

Note: The interface connector [X191] is located at the rear of the cab near the RH frame rail and comes with a cap which is the mating half to the truck harness connector. This is the connector the upfitter will use to wire in external electrical components such as a control relay, oil solenoid [these two are basic to all systems] and possibly external switches to control the PTO from outside the cab.
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## Front of Instrument Panel Components

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Trailer Brake Control Switch</td>
<td>9</td>
<td>Accessory Power Receptacle – 110V AC (KI4)</td>
</tr>
<tr>
<td>2</td>
<td>Speaker – Left Instrument Panel (UQ3)</td>
<td>10</td>
<td>Accessory Power Receptacle – Instrument Panel 2</td>
</tr>
<tr>
<td>3</td>
<td>Instrument Cluster</td>
<td>11</td>
<td>Accessory Power Receptacle – Instrument Panel 1</td>
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<tr>
<td>4</td>
<td>Ambient Light/Sunload Sensor</td>
<td>12</td>
<td>USB Receptacle</td>
</tr>
<tr>
<td>5</td>
<td>Info Display Module</td>
<td>13</td>
<td>Seat Heating and Cooling Switch – Driver</td>
</tr>
<tr>
<td>6</td>
<td>Seat Heating and Cooling Switch – Passenger</td>
<td>14</td>
<td>Data Link Connector</td>
</tr>
<tr>
<td>7</td>
<td>Speaker – Right Instrument Panel (UQ3)</td>
<td>15</td>
<td>Headlamp Switch</td>
</tr>
<tr>
<td>8</td>
<td><strong>Switches – PTO switch location</strong></td>
<td>16</td>
<td>Transfer Case Shift Control Switch</td>
</tr>
</tbody>
</table>

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(On/Off): Press to turn the system on or off. The indicator light is white when cruise control is on and turns off when cruise control is off.

+RES (Resume/Accelerate): If there is a set speed in memory, press briefly to resume to that speed or press and hold to accelerate. If cruise control is already active, use to increase vehicle speed.

SET (Set/Coast): Press briefly to set the speed and activate cruise control. If cruise control is already active, use to decrease vehicle speed.

(Cancel): Press to disengage cruise control without erasing the set speed from memory.
**X191 Engine Harness to Power Take-Off Jumper Harness**

**Connector Part Information [truck side]**
- Harness Type: Engine
- OEM Connector: 15326863
- Service Connector: 19180282
- Description: 16-Way F 150 GT Series, Sealed (BK)

**Connector Part Information [upfitter Cap]**
- Harness Type: Power Take-Off Jumper
- OEM Connector: 15326868
- Service Connector: 15306364
- Description: 16-Way M 150 Series, Sealed (BK)

**Terminal Information**

<table>
<thead>
<tr>
<th>Terminated Lead</th>
<th>Service Terminal</th>
<th>Tray</th>
<th>Core Crimp</th>
<th>Insulation Crimp</th>
</tr>
</thead>
<tbody>
<tr>
<td>13575412</td>
<td>12191819</td>
<td>8</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>13575298</td>
<td>12191819</td>
<td>8</td>
<td>E</td>
<td>1</td>
</tr>
<tr>
<td>13576363</td>
<td>15326269</td>
<td>19</td>
<td>E</td>
<td>4</td>
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</tbody>
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** Bulletin 120**

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### Pin Color Circuit Terminal Type ID Function

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Circuit</th>
<th>Type ID</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BN/WH</td>
<td>6085</td>
<td>I</td>
<td><strong>Power Take Off Remote Engine Start Switch Signal</strong></td>
</tr>
</tbody>
</table>
| B   | BN       | 6381    | I       | **Power Take Off Relay Engage Signal**
|     |          |         |         | Relay Coil High Side pin [86]                                            |
| C   | -        | -       | -       | Not Occupied                                                             |
| D   | BK       | 550     | I       | **Ground**
|     |          |         |         | solenoid coil ground
|     |          |         |         | [high side to relay NO contact pin 87]                                   |
| E-F | -        | -       | -       | Not Occupied                                                             |
| G   | YE       | 2522    | I       | Power Take Off Status Signal                                             |
| H   | VT/D-BU  | 2562    | II      | **Power Take Off Relay Coil Control**
|     |          |         |         | Relay Coil low side pin [85]                                            |
| J   | WH/L-GN  | 6142    | II      | Power Take Off Engine Shutdown Signal                                    |
| K   | RD/VT    | 2640    | I       | Battery Positive Voltage                                                 |
| L-M | -        | -       | -       | Not Occupied                                                             |
| N   | D-BU/GY  | 6089    | II      | Power Take Off Remote Switch Set Signal (1)                               |
| R   | VT/WH    | 239     | II      | **Run/Crank Ignition 1 Voltage**
|     |          |         |         | Power for Relay common contact pin [30]                                  |

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**UI Bulletin**

120

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The PTO system is *programmed in the plant for a basic 3 speed idle up [Stationary Preset] mode* with the relay control circuit enabled and ready to close a control relay. [The relay is not included and must be added by the upfitter.] For most customers the only electrical connections that are required are a control relay and an oil solenoid. The system is ready to go. [Older systems did not have the relay driver turned on so they would not engage the PTO until reprogrammed at a dealer. That has been corrected.]

The 3 factory speeds are:

1. 900 RPM – occurs with press and release of the PTO switch
2. 1200 RPM – occurs with press and release of the Cruise SET switch [if PTO is ON]
3. 1900 RPM – occurs with press and release of the Cruise Resume Switch [if PTO is ON]

See schematic below. The components in the grey shaded box are what must be connected to X191 for basic in cab operation [Stationary Preset].

Note: **On a new unit before anything is connected, start the truck in park with the park brake set and turn the PTO Switch ON. You should be able to achieve the 3 speed operation described above. If not, have the dealer fix it before you proceed! When proper idle up operation is confirmed THEN connect your components.**
Schematic for basic PTO operation [control relay and oil solenoid]

Figure 2: Provisional Connector Basic Hookup – in cab operation

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Switch schematic for outside –remote– PTO operation

2015 Sierra, Silverado Service Manual | Transmission | Power Take-Off | Schematic and Routing Diagrams |
Figure 2: Provisional Connector Remote Switches – Outside Operation

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[3] Primary PTO Operating Modes

PTO modes of operation include the following:

- **Preset** *(Stationary)*
  In-cab control standard. Remote control available.

- **Variable** *(Stationary)*
  In-cab control standard. Remote control available.

- **Mobile**
  In-cab control only

Note:

1. Factory default programming enables in-cab controls. A GM Service Tool can reprogram the system to allow for remote control [disables in-cab controls].
2. All PTO modes provide for engine rpm control and PTO load relay control [engage/disengage].
3. All PTO modes provide for safety interlocks for PTO load disengagement.
4. Remote PTO modes provide for remote engine starting, and shutdown.
5. Remote PTO modes provide for engine shutdown due to critical engine conditions, as well as a timed engine shutdown feature.
Preset PTO

[Preset] Enable Conditions - In-cab Operation [factory default programming]

To Enable PTO the following conditions must be satisfied:

1. Engine must be running.
2. The vehicle cannot be moving.
3. The parking brake must be set.
4. The shift lever must be in PARK [P].
5. The brake pedal must not be depressed.
6. Cruise Control must be OFF.
7. Press and release the PTO In-cab switch, located below the center console. The PTO telltale will blink rapidly until the PTO load relay becomes engaged (Ref. Note 3 below). The telltale will then be steady. The engine will advance to the PTO Standby speed.
8. After PTO Standby speed is achieved the Cruise Control SET- and RES+ switches can be used to accomplish the Set 1 or Set 2 PTO engine speeds. Note: The accelerator pedal is disabled, and cannot be used to override the PTO present speeds below.

<table>
<thead>
<tr>
<th>Factory default PTO engine speeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby</td>
</tr>
<tr>
<td>Set 1 (SET-)</td>
</tr>
<tr>
<td>Set 2 (RES+)</td>
</tr>
</tbody>
</table>

Note:

On a new vehicle the PTO function [3 speed idle up] should be confirmed before any wiring modifications are done. See your GM dealer if the default presets are not functioning properly.

1. The PTO Control setting [as viewed by a Service Tool] is default programmed to “Interior Mode PTO Switch”.
2. Since a PTO load relay is not yet wired in the system, the PTO Telltale does not initially truly reflect the status of the PTO load. The PTO load relay output is enabled as a factory default. Note: When the PTO Telltale is either blinking or on solid, the PTO Relay output will be activated.
[Preset] Enable Conditions - Remote Operation [requires programming with GM Service tool and installation of an appropriate remote switch panel] The panel must be provided by the Upfitter. Please refer to the schematics above which show how Upfitter supplied equipment is to be wired.

1. Cruise Control must be OFF (confirm this is OFF before powering down the vehicle with the Ignition key).
2. The engine must be stopped [Ignition key can be removed and vehicle locked if desired]
3. The hood must be closed.
4. The park brake must be set.
5. The shift lever must be in PARK [P].
6. From the Remote Switch Panel close and open the PTO Remote Arm Switch.
7. Within 5 seconds open and close the PTO Remote Engine Start/Shutdown switch
8. The vehicle horn will chirp 3 times, and then engine starting will automatically be initiated. The PTO system will then elevate engine rpm to PTO standby speed and engage the PTO load relay.
9. The PTO Remote Set switch can now be used to accomplish the PTO Set 1 and Set 2 Engine speeds.

Note: The accelerator pedal is disabled when remote PTO operation is selected.

Note:

1. The PTO load relay engages immediately when the PTO operation is initiated by the switch input. This produces a soft engagement because the transmission torque converter is unlocked. The torque converter will lock upon reaching stable PTO Standby Speed [default = 900 rpm] so maximum power is available.
2. The first elevated engine speed – PTO Standby Speed is not intended as a working speed but as a verification that the system is active and ready to go to a working speed. This speed can be modified to a ‘working speed’ with a GM Service Tool. The upper limit for PTO Standby Speed is 1500 rpm.
3. The remote switches and relay connections are made at the PTO Upfitter Connector located on the chassis frame behind the cab.
4. The PTO Control setting on the Service Tool must be programed to “Remote PTO Mode Switch” before the remote switches can be used.
5. The PTO relay is programed to be enabled in the factory default settings.
[5] Variable PTO

[Variable] Enable Conditions - in-cab operation [requires programming with GM Service tool]
1. Engine must be running.
2. The vehicle cannot be moving.
3. The parking brake must be set.
4. The shift lever must be in PARK [P].
5. The brake pedal must not be depressed.
6. Press and release the PTO In-cab switch, located below the center console. The PTO telltale will blink rapidly until the PTO load becomes engaged. The telltale will then be steady. The engine will advance to the PTO Standby speed.
7. After PTO Standby speed is achieved, the Cruise Control Set - and Res + switches can be used to tap up and tap down the engine speed. [Factory setting for the tap step is 100 rpm and the setting for the ramp rate is 150 rpm/sec. The GM Service Tool can enable the capability to change the default value for tap step via the Radio Customization menu. The default values for both tap step and for ramp rate can be changed with a GM Service Tool.] Note: The accelerator pedal is disabled, and cannot be used to control PTO engine speed.

[Variable] Enable Conditions - Remote Operation [requires programming with GM Service tool and appropriate remote switch panel provided by Upfitter]
1. Cruise Control must be OFF (confirm this is OFF before powering down the vehicle with the Ignition key).
2. The engine must be stopped [key can be removed and vehicle locked if desired].
3. The vehicle cannot be moving.
4. The hood must be closed.
5. The park brake must be set.
6. The shift lever must be in PARK [P].
7. From the Remote Switch Panel close and open the PTO Remote Arm Switch.
8. Within 5 seconds open and close the PTO Remote Engine Start/Shutdown switch.
9. The vehicle horn will chirp 3 times, and then engine starting will automatically be initiated. The PTO system will then elevate engine rpm to PTO Standby speed and engage the PTO load relay.
10. The desired engine operating speed can now be accomplished. Two versions of engine rpm control are available, switches or potentiometer [according to which one was installed].
   [A] Switches – the PTO Remote Tap Up and Tap Down switches can be used to achieve the desired engine speed.
   [B] Potentiometer – a PTO Remote Throttle Potentiometer can be used as a continuous variable throttle control to dial in the desired engine speed.
Note:

1. The PTO load relay engages immediately when the PTO operation is initiated by the switch input. This produces a soft engagement because the transmission torque converter is unlocked. The torque converter will lock upon reaching stable PTO Standby Speed [default = 900 rpm] so maximum power is available.
2. The first elevated engine speed – PTO Standby Speed is not intended as a working speed but as a verification that the system is active and ready to go to a working speed.
3. The remote switches, the remote throttle [if used] and relay connections are made at the PTO Upfitter Connector located on the chassis frame behind the cab.
4. The engine speeds can be adjusted between the low of PTO Standby Speed and the high of PTO Max Engine speed limits. Both values can be modified from the factory default settings with a GM Service Tool.
5. Factory setting for the tap step is 100 rpm and the setting for ramp rate is 150 rpm/sec. The default value for tap step can be modified via the Radio Customization menu. The default values for both tap step and for ramp rate can be changed with a GM Service Tool.
6. The PTO Control setting must be programmed to “Remote PTO Mode Switch” with Service Tool.
7. The potentiometer option for controlling PTO engine speed is selected with the Service Tool by setting the Remote PTO Switch.
8. The PTO Load Relay is “enabled” as the factory default programmed setting.


[Mobile] Enable Conditions - in-cab operation only [requires programming with GM Service tool]

1. Engine must be running.
2. Cruise Control must be OFF.
3. Engine rpm must be less than 1500 rpm [Maximum PTO Engage Speed]
4. Transmission Shift Lever must be in manual shift selection M1, M2 or M3.
5. The brake must be tapped at least once and then remain released.
6. Press and release the PTO In-cab switch, located below the center console. The PTO telltale will blink rapidly until the PTO load becomes engaged. The telltale will then be steady. The engine speed will remain at the current throttle setting or advance to PTO Standby Speed, which ever value is greater. If the engine rpm is above 1500 rpm the PTO relay will not engage until the engine rpm drops below 1500.
7. Once engaged if additional engine speed is desired two control methods are available – Cruise switches or accelerator pedal.
   a. Cruise Res + switch can be used to tap up [or if continuously held to ramp up (see Table in Section 11 for factory preset parameters)] to the desired operating speed. The Cruise Set - switch can be used to tap down [or coast down if continuously held] to the desired engine speed. [Top limit is PTO Max Engine Speed – default 2100 rpm and programmable to 3100 rpm. Lower limit is PTO Standby Speed – default 900 rpm with program range from base idle to 900 rpm.]
   b. Accelerator pedal – can be used to achieve the desired speed. When the desired speed is accomplished the Cruise Set - switch would be used to capture and maintain that speed. Normal tap up and tap down can then be used to fine tune the setting.

Note:
In mobile PTO mode the vehicle speed achieved is the result of the current engine speed requested and the transmission gear range selected. When vehicle is placed in M2 or M3, the vehicle will upshift according to engine RPM set point, and vehicle speed will increase. To prevent upshifts and maintain lower vehicle speeds, place vehicle in M1.

[7] PTO System Disengage Conditions

Stationary Modes [preset or variable] - in-cab control

To disengage PTO perform one of the following actions:

1. Depress the brake pedal. The engine returns to base idle, but the PTO load relay remains engaged. The PTO Telltale will blink slowly indicating that a PTO Set Speed is still stored in memory. Upon releasing the brake, the factory default programming is for the engine speed to remain at curb idle. Pressing and releasing the Cruise Res + Switch will restore engine rpm to the last PTO Set speed. The PTO system can also be programmed to return engine rpm to the PTO Standby Speed setting.

2. Depress the Cruise Cancel switch. The engine returns to base idle, but the PTO load relay remains engaged. The PTO Telltale will blink slowly indicating that a PTO Set Speed is still stored in memory. Activating the Cruise Res + switch, will restore engine rpm to the last PTO Set speed.

3. Press and release the PTO in-cab switch. The PTO Load Relay disengages and engine returns to base idle. The PTO Telltale will turn OFF indicating the PTO Load Relay is disengaged and the stored set speed has been cleared from memory.

4. Release Park Brake.

Stationary Modes [preset or variable] - remote control

To disengage PTO:
1. Open the PTO Remote Engine Start/Shutdown switch. Load Relay disengages and engine will stop.
2. Assert the PTO Emergency Stop Switch. Load Relay disengages and engine will stop.

Stationary Modes will also disengage if:
1. Vehicle movement is detected.
2. Park Brake is released.
3. Transmission is shifted out of PARK [P].
4. Ignition Key is cycled from “Run/Crank” to “Off” position.
5. PTO feedback signal is lost [load disengaged] if used. See full system schematic.
6. Cruise becomes ENABLED (Cruise ON/OFF switch pressed)
7. Timed auto-engine shutdown: The timed auto-engine shutdown feature provides the means to shut down the engine automatically after a predefined time. PTO must be operational for this function to be active.
8. Engine shutdown based on critical engine or PTO system fault conditions: The engine will be shut down when PTO is operating if a critical engine condition is detected by the vehicle system (i.e., low oil, low oil pressure, hot engine, hot transmission, low fuel, Diesel Particulate Filter (DPF) regeneration). If PTO operation is continued when critical engine conditions are present, a horn chirp warning will occur. The engine will shutdown 2 minutes after the horn warning. The operator can re-start the engine with the ignition key or with the PTO remote engine start controls. The above horn warning and engine shutdown will again occur if the critical engine condition is still present.

Notes:
[A] Resume memory speed is cleared for the above actions.

[B] When PTO remote engine starting has been initialed with the ignition key in the “Run” position, the Shift Lever will remain locked if the brake pedal is pressed and shift from Park is attempted while the engine is running and PTO is active (stand-by mode). At this point, a shift to Park will not be allowed until one of the following actions is taken by the vehicle operator:
1. Press the PTO Remote Engine Start/Shutdown, or
2. Press Cruise Cancel or toggle the Cruise Control switch to ON, or
3. Release Park Brake
Mobile Mode

To Disengage PTO:

1. Depress the brake pedal. The PTO system releases control of engine speed, but the PTO load relay remains engaged. Engine will return to base idle unless the accelerator pedal is depressed. The PTO load relay remains engaged. The PTO Telltale will blink slowly indicating that a PTO Set Speed is still stored in memory. Upon releasing the brake the factory default programming is for the engine speed to remain at curb idle awaiting an input from the Cruise Res + Switch to restore engine rpm to the last PTO Set speed. The system can also be programmed to return engine rpm to the PTO Standby Speed setting.

2. Press and release the Cruise Cancel switch. The engine returns to base idle; but the PTO load relay remains engaged. The PTO Telltale will blink slowly indicating that a PTO Set Speed is still stored in memory. Pressing and releasing the Cruise Res + switch, will restore engine rpm to the last PTO Set speed.

3. Press and release the PTO in-cab switch. Load Relay disengages and engine returns to base idle. The PTO Telltale will go OFF indicating the PTO Load Relay is disengaged and the stored set speed has been cleared from memory.

Mobile Mode will also disengage if:

1. PTO feedback input is lost [load disengaged] if used.
2. Vehicle Speed exceeds Max Vehicle Speed. Factory default setting = 58 MPH
3. Engine Speed exceeds Max Engine Speed for greater than 15 seconds. Factory default setting = 2100 rpm.
4. The Cruise Control On/Off switch is toggled to ON.
5. The Park Brake is applied.
6. The Transmission Shift Lever is moved out of manual shift selection [M1, M2, M3].

Note:

1. Resume memory speed is cleared for the above actions.
2. Although the PTO system attempts to limit accelerator and PTO switch inputs to comply with maximum speed and/or rpm parameters, some vehicle operating conditions such as downhill acceleration can cause the vehicle speed or engine rpm to exceed these limits and in those cases the PTO system may disengage.
[8] Prolonged or Extended PTO Operation

While operating your vehicle in stationary PTO mode, the Diesel Particulate Filter (DPF) will continue to filter the exhaust and accumulate soot. The engine control system, depending on the speed and load being applied by the PTO, may not be able to generate enough energy or adequate heat needed to clean or regenerate the DPF. Continued operation under conditions that do not allow effective regeneration or cleaning will eventually plug the DPF and result in reduced power. The ENGINE POWER IS REDUCED Driver Information Center (DIC) message and Malfunction Indicator Lamp will be displayed, and dealer/retailer service will be required to return your vehicle to normal, full power operation. To prevent this from occurring, frequently monitor your vehicle during PTO operation, paying particular attention to the CLEAN EXHAUST FILTER SEE OWNER MANUAL NOW DIC warning message. If the DIC message is displayed during PTO operation, see OWNER MANUAL Diesel Particulate Filter for information on how to clean or regenerate the DPF.

[9] PTO Operational Speed Control

[Variable] PTO operational speed control provides the following functions:

Cruise Set - Switch (In-cab) or Remote PTO Tap Down switch

- **SET**: [in cab operation] - press and hold the accelerator to obtain the desired engine speed, then press and release the Set - position on the Cruise Switch. The current engine speed will be maintained. This action can be repeated as desired to a higher rpm value. The PTO set speed cannot exceed 3100 rpm (Mobile PTO only).
- **TAP-DOWN**: Press and release the Set - switch position on the Cruise Switch to reduce the engine speed by increments of 100 rpm. The TAP-DOWN Engine Speed increments can be adjusted by GM Service Tool. The Service Tool can enable the option for adjustment of TAP-DOWN Engine Speed increments via Radio Customization menu.
- **COAST**: Press and hold the Set - switch position on the Cruise Switch to reduce the rpm at 150 RPM per second until the desired engine speed is reached or until the initial PTO standby speed is reached.

In-cab Cruise Res + Switch (or Remote PTO Tap Up switch)

- **RESUME**: After a PTO set speed has been achieved during PTO operation, a “RESUME SPEED” is retained after an application of the brake pedal. Engine speed will reduce to basic idle speed. The PTO Telltale will blink slowly indicating the previous PTO set speed has been retained in memory. Press and release the Res + switch position on the Cruise Switch to resume the previous PTO set speed.
- **TAP-UP**: Press and release the Res + position on the Cruise Switch to increase the engine speed by increments of 100 rpm (factory present value). The TAP-UP Engine Speed increments can be adjusted by the GM Service Tool. The Service Tool can enable the option for adjustment of TAP-UP Engine Speed increments via Radio Customization menu.
ACCEL: Press and hold the Res + position on the Cruise Switch to increase the rpm by 150 rpm per second until the desired engine speed is reached or until the maximum allowable PTO set speed is reached. Alternatively, the engine speed acceleration can be adjusted via the Radio Customization menu.

[10] Factory Preset Parameters

The following table lists the factory preset parameters. These may be altered by a GM Service tool to configure the various PTO features.

<table>
<thead>
<tr>
<th>Programmable Parameters</th>
<th>Factory Setting</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTO Option Configuration</td>
<td>VEHICLE SATIONARY, PRESET SPEED</td>
<td>VEHICLE SATIONARY, PRESET SPEED</td>
<td>VEHICLE SATIONARY, VARIABLE SPEED</td>
</tr>
<tr>
<td>PTO Control (Switch Type)</td>
<td>Interior PTO Mode Switch</td>
<td>Interior Mode PTO Switch</td>
<td>Remote PTO Mode Switch</td>
</tr>
<tr>
<td>Type of Set Switch Operation</td>
<td>MOMENTARY</td>
<td>MOMENTARY</td>
<td>LATCHING</td>
</tr>
<tr>
<td>Default Engine Speed After PTO On</td>
<td>DISABLED</td>
<td>DISABLED</td>
<td>ENABLED</td>
</tr>
<tr>
<td>PTO Load Feedback</td>
<td>DISABLED</td>
<td>DISABLED</td>
<td>ENABLED</td>
</tr>
<tr>
<td>PTO Relay</td>
<td>ENABLED</td>
<td>DISABLED</td>
<td>ENABLED</td>
</tr>
<tr>
<td>Keep PTO relay engaged During Braking</td>
<td>ENABLED</td>
<td>DISABLED</td>
<td>ENABLED</td>
</tr>
<tr>
<td>Action after brake is released</td>
<td>RETURN TO BASE IDLE RPM</td>
<td>RETURN TO BASE IDLE RPM</td>
<td>RETURN TO STANDBY RPM</td>
</tr>
</tbody>
</table>
## UI Bulletin 120

<table>
<thead>
<tr>
<th></th>
<th>15%</th>
<th>0%</th>
<th>25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Low Fuel level for Engine Shutdown</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine Run Time While PTO is Active Timer</td>
<td>420 min</td>
<td>0 min</td>
<td>3480 min</td>
</tr>
<tr>
<td>PTO Max. Engine Speed</td>
<td>2100 RPM</td>
<td>500 RPM</td>
<td>3100 RPM</td>
</tr>
<tr>
<td>Max. Engine Speed for PTO Engagement</td>
<td>1500 RPM</td>
<td>1000 RPM</td>
<td>1800 RPM</td>
</tr>
<tr>
<td>PTO Standby Speed</td>
<td>900 RPM</td>
<td></td>
<td>1500 RPM</td>
</tr>
<tr>
<td>PTO Set 1 Speed</td>
<td>1200 RPM</td>
<td></td>
<td>3100 RPM</td>
</tr>
<tr>
<td>PTO Set 2 Speed</td>
<td>1900 RPM</td>
<td></td>
<td>3100 RPM</td>
</tr>
<tr>
<td>Engine Speed Tap step</td>
<td>100 RPM</td>
<td>4 RPM</td>
<td>500 RPM</td>
</tr>
<tr>
<td>Engine Speed Ramp rate</td>
<td>150 RPM</td>
<td>4 RPM</td>
<td>150 RPM</td>
</tr>
<tr>
<td>Maximum Vehicle Speed</td>
<td>94 km/h</td>
<td>30 km/h</td>
<td>94 km/h</td>
</tr>
<tr>
<td>Minimum Remote</td>
<td>2 %</td>
<td>0 %</td>
<td>50 %</td>
</tr>
</tbody>
</table>

## Disclaimer
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<table>
<thead>
<tr>
<th>Potentiometer Threshold</th>
<th>95 %</th>
<th>50 %</th>
<th>100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Remote Potentiometer Threshold</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Set Switch Transition to Low Voltage</td>
<td>SET_SPEED 1</td>
<td>STANDBY SPEED, SET SPEED_1 or SET SPEED_2</td>
<td></td>
</tr>
<tr>
<td>(&lt;33% of Ignition Voltage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Set Switch Transition to Open State</td>
<td>PTO_STANDBY</td>
<td>STANDBY SPEED, SET SPEED_1 or SET SPEED_2</td>
<td></td>
</tr>
<tr>
<td>(&gt;33% of Ignition, and &lt;67% of Ignition Voltage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Set Switch Transition to High Voltage</td>
<td>SET_SPEED 2</td>
<td>STANDBY SPEED, SET SPEED_1 or SET SPEED_2</td>
<td></td>
</tr>
<tr>
<td>(&gt;67% of Ignition Voltage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horn Chirps during a Remote Start Event</td>
<td>ENABLED</td>
<td>DISABLED</td>
<td>ENABLED</td>
</tr>
</tbody>
</table>

If the PTO factory preset parameters do not match the settings described above, then they may have already been altered in order to satisfy the requirements of the installed PTO system and body equipment.
The following PTO Settings are also offered via the vehicle customization screens, which can be enabled by your service technician. These include the following parameters:

- PTO Standby RPM
- PTO Set•1 Speed
- PTO Set•2 Speed
- Tap Step Speed
- PTO Engine Run Timer


If the PTO telltale does not remain on (i.e. goes out after one second), this indicates that not all PTO enabling conditions have been satisfied. In the case, one or more of the following Driver Information Center (DIC) messages may appear on the instrument panel cluster if the PTO will not engage. The operator must take the action indicated, then again attempt to re-enable PTO.

- PTO: SHIFT TO PARK (P) (Stationary only)
- PTO: SET PARK BRAKE (Stationary only)
- PTO: PRESS & RELEASE BRAKE (Mobile only)
- PTO: RELEASE BRAKE
- PTO: REDUCE VEHICLE SPEED
- PTO: REDUCE ENGINE SPEED
- PTO: DISENGAGE CRUISE CONTROL

In addition to these messages, the PTO telltale will indicate when all conditions required to engage PTO have not been met. When enabling PTO, the PTO telltale will turn on, then turn off after one second. Under normal operating conditions, the PTO telltale will remain on throughout the PTO operating cycle.

Additional in-vehicle PTO module information can be accessed by the service technician to aid in troubleshooting. Also see service manual for more information.

The GM service technician can access service tool information which will contain reasons why PTO may not engage and reasons why PTO may unexpectedly disengage due to a system conditions.
[12] Duramax Diesel Supplement

The following images are copied from your glove box literature - Chevrolet/GMC Duramax Diesel Supplement

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**Vehicle Personalization**

**Vehicle Personalization (Van Models)**

Your Duramax Diesel vehicle may have additional customizable features for Power Take-Off (PTO). See **Power Take-Off (PTO) on page 9-41.** These features may need to be enabled by your dealer.

**Entering the Feature Settings Menu**

1. Turn the ignition to ON/RUN without the engine running and place the vehicle in P (Park). To avoid excessive drain on the battery, it is recommended that the headlamps are turned off.

2. Press the customization button to scroll through the available customizable options.

---

**Feature Settings Menu Items**

**PTO STANDBY SPEED**

This feature allows you to select the PTO standby speed.

Press the customization button until the PTO STANDBY SPEED screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- 800 RPM
- 900 RPM
- 1000 RPM
- 1100 RPM
- 1200 RPM
- 1300 RPM
- 1400 RPM
- 1500 RPM
- NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

**PTO SET 1 SPEED**

This feature, available if the vehicle is configured for Stationary Preset PTO, allows you to select the PTO 1 set speed.

Press the customization button until the PTO SET 1 SPEED screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

- 1000 RPM
- 1200 RPM
- 1400 RPM
- 1600 RPM
- 1800 RPM
- 2000 RPM
- 2200 RPM
- 2400 RPM
- NO CHANGE

---

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Instruments and Controls

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

PTO SET 2 SPEED
This feature, available if the vehicle is configured for Stationary Preset PTO, allows you to select the PTO 2 set speed.

Press the customization button until the PTO SET 2 SPEED screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

• 1800 RPM
• 2000 RPM
• 2200 RPM
• 2400 RPM
• 2600 RPM
• 2800 RPM
• 3000 RPM
• 3200 RPM
• NO CHANGE

PTO TAP STEP
This feature, available if the vehicle is configured for Stationary Variable or Mobile PTO, allows you to select the PTO tap step.

Press the customization button until the PTO TAP STEP screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

• 25 RPM
• 75 RPM
• 100 RPM
• 150 RPM
• 200 RPM
• 250 RPM
• 350 RPM
• NO CHANGE

To select a setting, press the set/reset button while the desired setting is displayed on the DIC.

PTO SHUTDOWN TIME
This feature, available if the vehicle is configured for Stationary Preset or Stationary Variable PTO, allows you to select the PTO shutdown time.

Press the customization button until the PTO SHUTDOWN TIME screen appears on the DIC display. Press the set/reset button once to access the settings for this feature. Then press the customization button to scroll through the following choices:

• OFF
• 20 MINUTES
• 35 MINUTES
• 50 MINUTES
• 65 MINUTES
• 80 MINUTES
• 95 MINUTES
• 110 MINUTES
### Appendix: Safety Recommendations

<table>
<thead>
<tr>
<th>No.</th>
<th>Safety Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PTO Feature has several characteristics that can be changed by configuration. Check all configuration selections carefully to avoid inadvertently deactivating safety mechanisms or impacting performance.</td>
</tr>
<tr>
<td>2</td>
<td>Upfitter's choice of components may affect performance. Even when system safety is available the overall performance of the system may be adversely affected by use of an improperly selected component or not following the recommended mechanization. The PTO System's safety mechanisms are designed to interrupt PTO operation in the event of a detected fault in related components or wiring.</td>
</tr>
<tr>
<td>3</td>
<td>The PTO safety mechanisms designed and built into the vehicle have been created by GM to cover PTO System operation only, which can include automatic engine shutdown in some situations. Safety and function of any and all equipment added by the upfitter to the vehicle is the responsibility of the upfitter. Upfitter is responsible for any applicable occupational, industrial safety or regulatory requirements.</td>
</tr>
<tr>
<td>4</td>
<td>Stationary Remote mode is not intended to operate with the vehicle’s hood open. PTO system operation is terminated if the hood is opened during stationary operation.</td>
</tr>
<tr>
<td>5</td>
<td>Stationary Remote Mode is not intended to be operated with the ignition key in place.</td>
</tr>
<tr>
<td>6</td>
<td>Reference Best Practices Manual available through the GM Upfitter website. Reference incomplete vehicle document (IVD) for any additional regulatory requirements.</td>
</tr>
</tbody>
</table>
UI Bulletin 120

General Motors Upfitter Integration

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## UI Bulletin 120

### General Motors Upfitter Integration

http://www.gmupfitter.com • 1-800-875-4742 (Upfitter Hotline)

**Bulletin 120**

July 22, 2014

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<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>A manual fuse must be always be replaced by one of the same capacity. Larger capacity fuses must never be substituted for smaller capacity fuses or circuit overvoltage will occur, potentially resulting in overloading, damage to components, or possibly fire. Smaller capacity fuses substituted in place of larger capacity fuses will blow too frequently.</td>
</tr>
<tr>
<td>B.</td>
<td>Fuse following too often results in improper / customer annoyance.</td>
</tr>
<tr>
<td>C.</td>
<td>Failure of the device may result in inability to set or change speed, or in speeding / hard-starting resulting in operator / customer annoyance.</td>
</tr>
</tbody>
</table>

### Starting System

- **Power Supply (Switched Battery via Igniter Switch):**
  - Power Supply (Unseated terminals)
  - Relay Switch Open

- **N.O. Main Battery Center-Off (Accessory):**
  - Remote Set Switch
  - 3-port Position Latching (Accessory 1)
  - Remote Variable Speed Control
  - Polarity Meter (Accessory 1)

- **PTO (Remote Mode, PFI/ST):**
  - D: PTO Engage Relay High
  - H: PTO Engage Relay Low
  - G: PTO Load Feedback

- **Power Train (PT):**
  - All Models (Configuration)

- **General Ground:**
  - Power Return

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K. V_BATT</td>
<td>Fuse will open to protect internal and external circuits in the event of excessive current draw. Current limited, protected by 30A Fuse.</td>
</tr>
<tr>
<td>N.</td>
<td>PTO System controls and implements the speed change request. Long control engine speed by throttle range (High/Normal) or Speed Limit (High/Normal).</td>
</tr>
</tbody>
</table>

### PTO Load Feedback

- **PTO Load Feedback:**
  - Provides confirmation that the PTO Relay has closed when requested, and that it remains when commanded to stay closed.

### PTO Engage Relay

- **PTO Engage Relay:**
  - N.O. Contact

### PTO Load Feedback

- **PTO Load Feedback:**
  - Provides confirmation that the load is in the state commanded, whether engaged or disengaged.

### General Ground

- **General Ground:**
  - Power Return

Reference for all signals monitored for faults that would lead to a safety issue. Measurements made at various points within the system are taken with respect to a normal ground or the harness or to the frame of the upfitted equipment. If the “normal” ground is not at the same voltage level as the rest of the vehicle ground potential can happen if there is a high resistance in the ground circuit. These measurements will not be consistent. Safety mechanisms require that they must be.

1. The specific response that occurs in this situation is configurable; behind here is the factory programmed default. See Section 13, Factory Reset Parameters.