

# MaxxForce<sup>®</sup> 7 (2010)

## Overview: *In Cab Engine Speed Control*

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## General Overview: In-Cab Engine Speed Control

The In-Cab Engine Speed Control feature allows the operator to set and maintain a constant engine speed without using the accelerator pedal. The operator is allowed to select preset engine speeds or to adjust the engine speed manually via In-Cab switches.

The document will address unique In-Cab Engine Speed Control functionality for MaxxForce® 7.

## Description and Operation

The In Cab Engine Speed control provides the operator engine speed control to any installed auxiliary devices from inside the cab. This engine speed control is accomplished by utilizing the steering wheel cruise control switches.

### Operation

The operational control of the in-cab engine speed control feature consists of three cruise control switches located on the steering wheel:

- **“Cruise On/Cruise Off”** switch allows the driver to enable or disable the in cab engine speed control preset functionality. The Cruise On switch also has an indicator light.
- **“Resume”** switch allows the operator to ramp up the engine or cycle through the presets.
- **“Set”** switch allows the operator to ramp down the engine or cycle through the presets.

The in-cab engine speed control will only operate if the PTO enable switch is ON, the vehicle speed is less than a programmable limit, the PTO input switches are not faulted, and other “interlock” conditions are met (i.e., vehicle speed, engine speed, etc.) are met.

### Stationary Variable

#### Stationary Variable Speed PTO Control

Stationary variable engine speed control allows the operator to select any engine speed within the PTO boundaries. This is done by increasing or decreasing the engine speed to the desired set point by using the Cruise Control Set switch and the Resume switch. The vehicle must not be moving to activate PTO when programmed to Stationary Variable Mode.

#### Stationary Variable Speed PTO Setup

In addition to the main setup parameters (i.e. PTO Mode Selection, etc.) there is a specific stationary variable speed related PTO Engine Speed Throttle Ramp Rate parameter.

## Stationary Variable Speed PTO Driver Interaction

In addition to the normal interlock conditions for all PTO operation, perform the following steps for stationary variable PTO operation:

1. Press the Cruise ON switch.
2. Press the "Set" switch to activate PTO. The current engine speed will be the PTO engine speed set point.
3. Press and hold the "Resume" switch to increase the engine speed set point. The engine speed will increase by the programmed PTO Engine Speed Throttle Ramp Rate. When the switch is released the current engine speed will become the set speed.
4. Press and hold the "Set" switch to decrease the PTO speed set point. The engine speed will decrease by the programmed PTO Engine Speed Throttle Ramp Rate. When the switch is released the current engine speed will become the set speed.
5. Press and release the "Resume" switch or the "Set" switch to increase or decrease the PTO engine speed set point by a fixed value of 25 RPM.
6. Using the accelerator to increase engine speed and momentarily pressing the "Set" switch will set the current engine speed as the PTO engine speed set point.
7. If the PTO operation is interrupted (i.e. brake or clutch pressed, or a press of the "Resume" switch) will return the engine to the previous PTO engine speed set point.

*The clutch, brake, or vehicle speed interruption described above is dependent on the programming of the PTO Interlock Disable with Vehicle Speed, PTO Disable with Clutch, and the PTO Disable with Service Brake parameters.*

## Stationary Preset

Stationary preset engine speed control allows the operator to select up to 6 preset engine speeds while the vehicle is stationary. The preset speeds are selected using the "Set" switch or the "Resume" switch as described in the Stationary Preset Driver Interaction section.

## Stationary Preset Setup

There are up to 6 specific preset engine speed parameters that can be programmed. The preset engine speed parameters are typically programmed in an increasing preset order.

## Stationary Preset Driver Interaction

In addition to the normal interlock conditions for all PTO operation, perform the following steps for stationary preset PTO operation:

1. Press the cruise ON switch.
2. Press either the "Set" switch or the "Resume" switch to activate PTO.
3. Pressing the "Resume" switch will select PTO Preset Speed 2.
4. Pressing the "Set" switch will select PTO Preset Speed 1.
5. Interrupting PTO operation (i.e. clutch, brake, or vehicle speed) will return the engine to idle (PTO standby). If the "Set" switch is pressed, then the engine will go to preset 1. If the "Resume" switch is pressed, then the engine will go to preset 2.

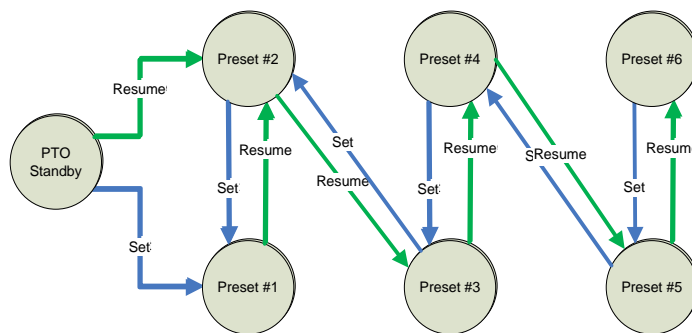
*The clutch, brake, or vehicle speed interruption described above is dependent on the programming of the PTO Interlock Disable with Vehicle Speed, PTO Disable with Clutch, and the PTO Disable with Service Brake parameters.*

Refer to the Stationary Preset Diagram for a general visual representation of how the operator interacts with the switches during stationary preset PTO operation.

### Stationary Preset Notes

- PTO Preset Engine Speed 1 (In Cab Set/Coast) [RPM] – This is the engine speed set point that will be selected when the "Set" button is pressed. This is the first PTO Preset Speed.
- PTO PRESET Engine Speed 2 (In Cab Resume) [RPM] – This is the engine speed set point that will be selected when the "Resume" button is pressed. This is the second PTO Preset Speed.
- Pressing and holding either the "Set" switch or the "Resume" switch will not result in cycling through the preset speeds.

### Stationary and Mobile Variable Preset Diagram



## Mobile Variable

### Mobile Variable Speed PTO Control

Mobile variable speed control permits a desired variable engine speed to be selected. The vehicle can be moving or stationary during PTO operation.

### Mobile Variable Speed PTO Setup

There are two specific mobile variable speed related PTO parameters; PTO Vehicle Speed Kick Out, and PTO Vehicle Speed Limit.

### Mobile Variable Speed PTO Driver Interaction

Functionality and setup is identical to Stationary Variable Speed PTO with the exception that a stationary vehicle is no longer required.

### Feature Interaction

The In-Cab Engine Speed Control feature interacts with these engine features:

- Cruise Control. There is no interaction with cruise control; however, PTO uses the same switches (Cruise On/Off, Resume & Set) as the cruise control feature.
- Idle Shutdown Timer (IST)
- Vehicle Speed Governor (VSG)

## Programmable Parameters

The following programmable parameters are required for engine speed control and power take off operation. These parameters should be programmed to the engine speed control operation, which will best suit the vehicle conditions expected.

To meet the customer's needs, programmable parameters can be reset from the production plant settings. If the parameter is indicated as not programmable, the setting is preset from the factory and can't be changed without dealer authorization.

*There are multiple available PTO configurations. Please see the Parameter Setup section for a few examples and specific setup instructions.*

Parameter Value	Description	Possible Values	Cust Pgrm	Recommended Settings
Aux Throttle Control Mode (7500)	<p>This parameter determines the conditions that the Engine Speed Control (PTO) feature will be functional. Set this parameter to enable PTO operation and to choose which inputs are used for control.</p> <ul style="list-style-type: none"> <li>• <b>If set to (0)</b> - The P TO functionality is disabled.</li> <li>• <b>If set to (2)</b> - Only the in-cab inputs will be able to control PTO.</li> <li>• <b>If set to (3)</b> - Both remote and in-cab inputs will be able to control PTO (See Note 1 &amp; 2).</li> <li>• <b>If set to (1)</b> - Only the remote PTO inputs will be able to control PTO (See Note 2).</li> </ul> <p><b>Note 1:</b> The last input received will take priority when Mode 3 is selected.</p> <p><b>Note 2:</b> Mode 1 and the remote portion of Mode 3 are discussed in the Remote Engine Speed Control document.</p>	<p>0: Disable</p> <p>1: Remote Operation Only</p> <p>2: In Cab Operation Only</p> <p>3: Remote and In Cab Operation</p>	YES	Customer Chosen
Aux Throttle Control - In Cab Mode (7502)	<p>Set this parameter after selecting In-Cab Or Remote and In-Cab Operation to determine which PTO mode is active.</p> <ul style="list-style-type: none"> <li>• <b>If set to (0)</b> - The switches will not be used. Refer to the Remote Engine Speed Control document.</li> <li>• <b>If set to (1)</b> - The switches will be used to select up to 6 preset engine speeds. Refer to the Stationary Preset section for more information.</li> <li>• <b>If set to (2)</b> - The switches will be used to adjust the engine speed variably. Refer to the Stationary Variable section for more information.</li> <li>• <b>If set to (3)</b> - The switches will be used to adjust the engine speed to a desired set point to allow for vehicle movement. Refer to the Mobile Variable section for more information.</li> </ul>	<p>0: None</p> <p>1: Stationary Preset</p> <p>2: Stationary Variable</p> <p>3: Mobile Variable</p>	YES	Customer Chosen
Aux Throttle Control - Maximum Engine Speed (7508)	<p>The maximum engine speed that can be reached using any PTO controls.</p> <p><b>Note 1:</b> This parameter must be set properly to protect PTO related equipment.</p>	650 to 3000 RPM	YES	Customer Chosen (See Note 1)
Aux Throttle Control - In Cab Operator Interface (7503)	<p>Select this parameter when accelerator, brake or clutch is desired to be ignored during engine speed control operation.</p> <ul style="list-style-type: none"> <li>• <b>If set to (0)</b> - The accelerator, brake, and clutch are inputs used for PTO operation.</li> <li>• <b>If set to (1)</b> - The accelerator, brake, and clutch will be ignored during PTO operation.</li> </ul> <p><b>Note:</b> Use parameters (7510), (7511) and (7513) to provide the specific input options.</p>	<p>0: Enable</p> <p>1: Disable</p>	YES	Customer Chosen
Aux Throttle Control - Ramp Rate (7507)	<p>This parameter sets the speed at which the engine will attempt to increase the engine speed.</p> <p><b>Note 1:</b> The engine only attempts to increase the engine speed at this rate because actual engine changes are influenced by other factors such as engine load and available engine power.</p> <p><b>Note 2:</b> This parameter should be set to provide a smooth transition to the desired engine speed to accommodate applicable PTO equipment.</p>	1 - 1500 RPM	YES	100 RPM

## Parameters for Preset Engine Speed PTO Configurations.

Parameter Value	Description	Possible Values	Cust Pgrm	Recommended Settings
Aux Throttle Control – Preset Engine Speed 1 (SET) (7505)	This parameter sets the running engine speed set point that will be maintained when the first PTO preset speed is selected OR when SET is pressed. <b>Note 1:</b> Presets speeds that will not be used can be set to 0 rpm.	650 to 3000 RPM	YES	Customer Chosen <b>(See Note 1)</b>
Aux Throttle Control – Preset Engine Speed 2 (RESUME) (7506)	This parameter sets the running engine speed set point that will be maintained when the second PTO preset speed is selected OR when RESUME is pressed. <b>Note 1:</b> Presets speeds that will not be used can be set to 0 rpm.	650 to 3000 RPM	YES	Customer Chosen <b>(See Note 1)</b>
Aux Throttle Control – Preset Engine Speed 3 (7509)	This parameter sets the running engine speed set point that will be maintained when the third PTO preset speed is selected OR when SET is pressed twice. <b>Note 1:</b> Presets speeds that will not be used can be set to 0 rpm.	650 to 3000 RPM	YES	Customer Chosen <b>(See Note 1)</b>
Aux Throttle Control – Preset Engine Speed 4 (7510)	This parameter sets the running engine speed set point that will be maintained when the fourth PTO preset speed is selected OR when RESUME is pressed twice. <b>Note 1:</b> Presets speeds that will not be used can be set to 0 rpm.	650 to 3000 RPM	YES	Customer Chosen <b>(See Note 1)</b>
Aux Throttle Control – Preset Engine Speed 5 (7511)	This parameter sets the running engine speed set point that will be maintained when the fifth PTO preset speed is selected OR when SET is pressed three times. <b>Note 1:</b> Presets speeds that will not be used can be set to 0 rpm.	650 to 3000 RPM	YES	Customer Chosen <b>(See Note 1)</b>
Aux Throttle Control – Preset Engine Speed 6 (7512)	This parameter sets the running engine speed set point that will be maintained when the sixth PTO preset speed is selected OR when RESUME is pressed three times. <b>Note 1:</b> Presets speeds that will not be used can be set to 0 rpm.	650 to 3000 RPM	YES	Customer Chosen <b>(See Note 1)</b>
Aux Throttle Control – Maximum Vehicle Speed (7501)	This parameter is the maximum vehicle speed that the PTO will be allowed to operate. <b>Note 1:</b> Set this parameter to the maximum vehicle speed that the PTO is typically used.	0 – 20 MPH	YES	Customer Chosen <b>(See Note 1)</b>



## Parameters for PTO Override Configurations.

Parameter Value	Description	Possible Values	Cust Pgrm	Recommended Settings
Aux Throttle Control – SPDT Enable (7519)	This programmable parameter allows the operator to use a single switch to activate PTO PRESET 1 or 2.	<b>0:</b> Disable the ability to activate the PTO enable signal (CC/PTO On, RPRE, RVAR) at the same time as the PTO incrementing signal (Set, Resume) <b>1:</b> Enable the ability to activate the PTO enable signal (CC/PTO On, RPRE, RVAR) at the same time as the PTO incrementing signal (Set, Resume)	YES	Customer Chosen
Aux Throttle Control – Enable ATC Overrides (7526)	This parameter allows the operator to enable or disable In Cab PTO overrides.	0: Disable 1: Enable	YES	Customer Chosen
Aux Throttle Control – Disable ATC with Service Brake (7514)	This parameter allows operator to set the Service Brake to disable the In Cab PTO.	0: Service Brake Disables PTO 1: Service Brake Does Not Disable PTO	YES	Customer Chosen
Aux Throttle Control – Disable ATC with Parking Brake Released (7515)	This parameter allows the use of PTO without requiring the parking brake set. <b>Note:</b> Depending on the calibration, some calibrations have the Parking Brake interactions with PTO disabled permanently.	0: Parking Brake Disables PTO 1: Parking Brake Does Not Disable PTO	YES	Customer Chosen
Aux Throttle Control – Disable ATC with Driveline Status (7516)	This parameter allows the use of PTO without requiring the Driveline Status indicate ‘driveline disengaged’ <b>Note:</b> For Automatic transmissions, ‘Driveline Status’ refers to the gear selector; moving the gear selector from the Park/ Neutral position will cancel the current PTO mode. For Manual transmissions, ‘Driveline Status’ refers to the clutch switch or gear selector status; pressing the clutch or moving the gear selector from ‘Neutral’ will cancel the current PTO mode.	0: Driveline Status Disables PTO 1: Driveline Status Does Not Change PTO	YES	Customer Chosen
Aux Throttle Control – Disable ATC with In- Cab Controls (7517)	This parameter allows operator to disable the ATC with In Cab Controls.	0: In- Cab Controls Disable PTO 1: In- Cab Controls Do Not Change PTO	YES	Customer Chosen
Aux Throttle Control – Disable ATC with Vehicle Speed (7518)	This parameter allows In Cab PTO to be disabled with vehicle speed.	0: Vehicle Speed Limit Disables PTO 1: Vehicle Speed Limit Does Not Change PTO	YES	Customer Chosen

## Parameter Setup

### Possible In-Cab PTO Applications

The In-Cab PTO feature is application specific. This section briefly describes one example of In-Cab PTO configuration and operation. This configuration will likely need to be modified to meet the needs of the actual application that the owner/operator requires.

Please review the description and operation section and the programmable parameters for a better understanding of how the various engine speed control parameters and the engine speed control mode might be best configured for your vehicle.

### EXAMPLE A - Typical In-Cab PTO Scenario

In this example, the operator requires two preset engine speeds while the vehicle is stationary. The presets are activated via the cruise control switches.

Adjust parameters as follows:

Parameter Name	Action Required
Aux Throttle Control Mode (7500)	Select 2: In Cab Operation Only
Aux Throttle Control - In Cab Mode (7502)	Select 1: Stationary Preset
Aux Throttle Control - Preset Engine Speed 1 (SET) (7505)	Set this to 900 rpm
Aux Throttle Control - Preset Engine Speed 2 (RESUME) (7506)	Set this to 1100 rpm

#### Operation:

1. Activate the PTO by pressing the Cruise ON switch on the steering wheel.
2. Activate the 1st preset engine speed (900 rpm) by pressing the Set switch.
3. Activate the 2nd preset engine speed (1100 rpm) by pressing the Resume switch.

### EXAMPLE B - In-Cab PTO with Variable Speed Control Scenario

In this example, the operator requires the engine speed to be able to ramp up and down within a range of engine speeds while the vehicle is stationary. The engine speed is controlled through the cruise control switches.

Adjust parameters as follows:

Parameter Name	Action Required
Aux Throttle Control Mode (7500)	Select 2: In Cab Operation Only
Aux Throttle Control - In Cab Mode (7502)	Select 1: Stationary Preset

**Operation:**

1. Activate the PTO by pressing the Cruise ON switch on the steering wheel.
2. Increase the current engine speed by pressing and holding the Resume switch. Release the switch when the desired engine speed is reached.
3. Decrease the current engine speed by pressing and holding the Set switch. Release the switch when the desired engine speed is reached.

**Frequently Asked Questions**

**How many presets can I configure in the In-Cab PTO feature?**

Six preset engine speeds can be programmed if Stationary Preset mode is selected. Refer to the stationary preset section for more information.

**My application requires a ramp in rather than step increments for engine speed control. Can I do this with In Cab PTO?**

Yes, refer to Example B in the parameter setup section for details.

**My application uses external PTO controls (located outside the cab). How do I set these up?**

An example of this application is described in the remote engine speed control document.

**Definitions/Acronyms**

The following terms are referenced in this document:

Acronym	Definition
ATC	Auxiliary Throttle Control
CC	Cruise Control
ECM	Engine Control Module
IST	Idle Shutdown Timer
PTO	Power Take Off
VSG	Vehicle Speed Governor
VSS	Vehicle Speed Sensor