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1. Vehicle Speed Limiter (General Overview)

The vehicle speed limiter (VSL) feature limits the maximum speed that the vehicle can travel on a level road. The customer can set up this feature for performance or to provide better overall fuel economy. The customer can also choose a blend of fuel economy or performance.

The following additional features are available with VSL:

- **Adjustable VSL** – This feature temporarily reduces the maximum vehicle speed provided by VSL and provides a secondary vehicle speed limit to accommodate local speed limits.
- **VSL Override** – This feature momentarily enables the operator to achieve a higher vehicle speed limit than the limit provided by the VSL feature, useful during passing situations.
- **VSL Anti-Tampering** – This feature offers additional vehicle security measures, where the vehicle speed signal (VSS) input is monitored for tampering.

These options can be enabled by programmable parameters within the engine control module (ECM).

The document will address unique VSL functionality for MaxxForce® 11 and 13 engines.

1.1. Feature Codes

N/A

2. Definitions/Acronyms

The following terms are referenced in this document:

- **ECM** – Engine Control Module
- **GDP** – Gear Down Protection
- **VSL** – Vehicle Speed Limiter
- **VSS** – Vehicle Speed Sensor

3. Description and Operation

3.1. Operation

3.1.1. Vehicle Speed Limiter

This feature limits the maximum vehicle speed controlled by the accelerator pedal. If your engine reaches a certain speed and feels like it should have more power to travel faster, you are probably traveling at the governed maximum speed limit. Verify the “Accelerator Vehicle Speed Limit” (7902) parameter setting.

NOTE: The driver controls for this feature work through the accelerator pedal only.

The following interlocks must be satisfied for Vehicle Speed Limiter to be active:

- As long as there are no active vehicle speed sensor (VSS) faults, then the feature will be active.

NOTE: If the vehicle speed sensor (VSS) is faulted, the engine speed will be limited to the programmable “Engine Speed Limit with VSS Fault” (7901) parameter setting.

3.1.2. Adjustable VSL

This feature is designed to temporarily reduce the maximum vehicle speed provided by VSL and provide a secondary vehicle speed limit to accommodate local speed limits. This might be useful for spreader applications and construction, etc. An additional operator switch is required.

The driver control of the feature consists of the following:

- The accelerator pedal.
- The “AVSL” operator switch.
- The related programmable parameters.

The feature is activated by the “AVSL” operator switch. Once the switch has been turned ON, a new customer programmable vehicle speed limit or is accepted as the maximum vehicle speed limit.

In addition, the customer can program whether they want the current vehicle speed or a programmable vehicle speed to be the active vehicle speed limit once the “AVSL” switch is turned ON.

NOTE: Cruise control will be deactivated if it was active when the “AVSL” switch is turned ON.

The new maximum vehicle speed limit can be adjusted in increments by “bumping” the cruise control SET and RESUME switches until the “AVSL” switch is turned OFF.

Once the “AVSL” switch is turned OFF, the maximum vehicle speed limit is selected from the normal vehicle speed limit provided by the VSL feature.

3.1.3. VSL Override

This feature raises the vehicle speed limit provided by the VSL feature to a customer programmable speed when the driver identifies a "passing situation."

The driver control of the feature consists of the following:

- The accelerator pedal.
- The related programmable parameters.

The following visual indications may be used by the feature:

NOTE: These appear in the form of text messages in the gauge cluster digital display.

- "VSL Override"
 - "Active" – Indication which informs the operator that the accelerator vehicle speed limit is actively increased.
 - "Expiring" – Indication which informs the operator that the vehicle speed override is about to expire.

To activate the VSL Override feature:

Activate the VSL Override feature by double-pumping the accelerator foot pedal. This is done by starting at the full throttle position. Next, release the accelerator pedal completely and then return it back to full throttle, release it again and then return back to full throttle once again.

If successful, VSL Override is enabled. The message "Active" will appear. The double-pumping of the accelerator foot pedal should be started when the vehicle speed has reached the normal accelerator vehicle speed limit.

VSL Override may work while cruise is enabled, but VSL Override operation does not depend on cruise control.

After the vehicle speed is currently being maintained above the normal accelerator vehicle speed limit, if the vehicle speed drops below the normal accelerator vehicle speed limit, VSL Override is automatically deactivated. The operator must repeat the double-pump action to reactivate the feature.

The operator may be warned by the "Expiring" message any time that the vehicle speed limit increase is about to expire.

Additional Information:

Activating VSL Override does not deactivate cruise control if it is on when the passing event begins. Once the vehicle has passed the other vehicles and VSL Override has deactivated, cruise control takes over again automatically.

The customer can program the duration of allowed vehicle speed limit increase. In addition, the customer can choose whether the duration is based on real time (if equipped with a real time clock) or based on engine hours.

The customer may decide to allow the operator to enable this feature for 30 minutes over 8 hours time interval based on engine hours. For example, the operator could use 30 seconds worth of increase, then 10 minutes worth, etc. up to a total of 30 minutes over 8 engine hours. After that the operator would be required to wait for the new interval to begin to start using VSL Override again.

Refer to the [Programmable Parameters](#) section for more information.

3.1.4. VSL Anti-Tampering

This feature monitors the vehicle speed signal (VSS) input to the engine control module (ECM) to determine whether it is valid or if it has been tampered with.

The following conditions must be met before the feature will be active:

- Manual transmissions: Clutch pedal must be released
- Automatic Transmissions: Torque Converter must be locked.
- All Transmissions: PTO must be disengaged.

The engine will take measures (i.e. reduce engine power, limit engine speed, etc.) if it determines that the VSS input has been subjected to tampering. The maximum engine speed with a VSS fault is customer programmable.

3.2. Feature Interaction

Global VSL is the maximum vehicle speed. No features can increase this limit.

- Cruise Control Maximum VSL – This can be increased/decreased using driver reward/penalty.
- Accelerator VSL – Can be influenced using driver reward, VSL override, and the AVSL switch.
- In gears lower than top gear, GDP or Progressive Shift will likely limit the vehicle speed less than the Global VSL setting.

There is interaction within the vehicle speed limiter (VSL) feature:

The vehicle speed limit in effect will depend on which feature described in this document is active. For example, if the customer programs the VSL feature to 65mph, but Adjustable VSL is programmed to 60mph, then the vehicle speed will be limited to 60mph while the “AVSL” switch is turned on.

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Similarly, if the VSL override is programmed to 70mph, and VSL override is activated by double-pumping the accelerator, then the vehicle speed will be limited to 70mph rather than the 65mph programmed by the VSL feature.

If VSL Override is Active:

Calculated Vehicle Speed Limit = Accelerator Vehicle Speed Limit (7902) + VSLO SPEED INCREMENT (7912)

If Driver Reward and VSL Override are both Active:

Calculated Vehicle Speed Limit = Accelerator Vehicle Speed Limit (7902) + VSLO SPEED INCREMENT (7912) (Driver Reward Speed Limit is ignored)

4. Programmable Parameters

The following programmable parameters are required for VSL operation. These parameters should be programmed to the operation which will best suit the vehicle conditions expected.

Parameters indicated as “Customer Programmable” can be adjusted differently than the production assembly plant setting to meet the customer’s needs. If the parameter is indicated as non-customer programmable, the parameter setting is preset from the factory and can’t be changed without authorization.

VSL Parameters:

Parameter Name	Description	Possible Values	Customer Programmable?	Recommended Setting
Global Vehicle Speed Limit (7937)	This parameter sets the vehicle speed to which all features will be limited. Cruise control, VSL Override, Driver Reward, and the “Accelerator Vehicle Speed Limit” (7902) will not be allowed to raise the vehicle speed limit above this value.	1 – 127 (mph)	YES	Customer Chosen

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<p>Accelerator Vehicle Speed Limit (7902)</p>	<p>This parameter sets the maximum accelerator controlled vehicle speed. The engine will not power the vehicle faster than this value.</p> <p>This parameter can be used to encourage driver behavior.</p> <ul style="list-style-type: none"> For fuel economy, it is recommended to set parameter (7902) less than both “Maximum Cruise Control Speed” (7604, 7909) parameters. For passing opportunities, it is recommended to set parameter (7902) higher than the “Maximum Cruise Control Speed” (7909) parameter. <p>The limits should be programmed as follows:</p> <p>(7928 + 7902) > (7902 + 7912)</p> <p>NOTE: (7928) is part of driver reward. Ignore this from the calculation if driver reward is not in the vehicle configuration.</p>	<p>1 – 127 (mph)</p>	<p>YES</p>	<p>Customer Chosen</p> <p>NOTE: Must be set to a value less than the “Global Vehicle Speed Limit” (7937) parameter setting.</p>
<p>Vehicle Speed Under Speed Limit (7904)</p>	<p>This parameter sets the amount of vehicle speed allowed below the programmed vehicle speed limit, useful during uphill grades.</p> <p>Adjusting this parameter adjusts how tightly the engine tries to maintain the vehicle speed limit based on accelerator pedal demand. This parameter setting effects performance and fuel economy.</p> <ul style="list-style-type: none"> Setting this value lower will more aggressively track the “Global Vehicle Speed Limit” (7937) parameter setting. This increases performance and decreases fuel economy. Setting this value higher will allow the vehicle speed to drop below the “Global Vehicle Speed Limit” (7937) parameter setting. This reduces the time that the engine spends at maximum fueling and therefore improves fuel economy. 	<p>1 to 4 (mph)</p>	<p>YES</p>	<p>Customer Chosen</p> <p>Set between 1 & 4 (mph)</p> <p>1 = best performance 4 = best fuel economy</p>

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<p>Vehicle Speed Over Speed Limit (7903)</p>	<p>This parameter sets the amount of vehicle speed allowed above the programmed vehicle speed limit, useful during downhill grades.</p> <p>Adjusting this parameter adjusts how tightly the engine tries to maintain the vehicle speed limit based on accelerator pedal demand. This parameter setting effects performance and fuel economy.</p> <ul style="list-style-type: none"> Setting this value lower will more aggressively track the "Global Vehicle Speed Limit" (7937) parameter setting. This increases performance and decreases fuel economy. Setting this value higher will allow the vehicle to go above the "Global Vehicle Speed Limit" (7937) parameter setting. This increases the benefits of momentum and therefore improves fuel economy. 	<p>1 to 4 (mph)</p>	<p>YES</p>	<p>Customer Chosen</p> <p>Set between 1 & 4 (mph)</p> <p>1 = best performance 4 = best fuel economy</p>
<p>Vehicle Speed Limiter Parameter #1 (7900)</p>	<p>This parameter is required to be set to 1.</p>	<p>N/A</p>	<p>YES</p>	<p>Must be set to 1</p>

Adjustable VSL Parameters:

Parameter Name	Description	Possible Values	Customer Programmable?	Recommended Setting
<p>Adjustable VSL Enable (7931)</p>	<p>This parameter enables or disables the Adjustable Road Speed Limiter feature in the engine.</p>	<p>0: Disabled 1: Enabled</p>	<p>YES</p>	<p>Customer Choice</p>

Vehicle Speed Limiter

Adjustable VSL Selection Mode (7932)	<p>This parameter sets the maximum vehicle speed limit for Adjustable Road Speed Limiter feature.</p> <p>If set to 0: Accelerate the vehicle to the desired vehicle speed limit and press the “AVSL” switch. The vehicle will now be limited to this new speed.</p> <p>If set to 1: The (7933) parameter setting will be the vehicle speed limit. This setting is useful for spreader applications, alternative limit for construction zones, etc.</p>	<p>0: Current Vehicle Speed</p> <p>1: Programmed Vehicle Speed Limit</p>	YES	Customer Choice
Adjustable Road Speed Limiter VSL (7933)	This parameter sets the maximum vehicle speed limit for Adjustable Road Speed Limiter feature.	30 – 100 mph	YES	<p>Customer Choice</p> <p>Should be programmed lower than the “Accelerator Vehicle Speed Limit” (7902) parameter setting</p>

VSL Override Parameters:

Parameter Name	Description	Possible Values	Customer Programmable?	Recommended Setting
VEHICLE SPEED LIMIT OVERRIDE (7911)	Set this parameter to “Enabled” to activate the Vehicle speed Limiter (VSL) Override Feature.	<p>0: Disabled</p> <p>1: Enabled</p>	YES	Customer Choice
VSLO SPEED INCREMENT (7912)	<p>This parameter selects the amount of vehicle speed that is allowed above the Accelerator Vehicle Speed Limit (7902) when this feature is enabled.</p> <p>The limits should be programmed as follows:</p> <p>(7928 + 7902) > (7902 + 7912)</p> <p>NOTE: (7928) is part of driver reward. Ignore this from the calculation if driver reward is not in the vehicle configuration.</p>	0 – 10 mph	YES	5 mph

Vehicle Speed Limiter

VSL Override Duration (7913)	This parameter selects the amount of time the operator can use the additional vehicle speed allowed above the normal accelerator vehicle speed limit within the interval.	0– 240 minutes	YES	<ul style="list-style-type: none"> If the “VSL Override Time Duration Mode Select” is set to engine hours: Set to 30 minutes (every 8 hours). If the “VSL Override Time Duration Mode Select” is set to real time clock, customer choice.
VSLO TIME DURATION SOURCE (7934)	<p>This parameter selects whether the “VSL Override Duration” (7913) parameters is reset based on engine hours or real time clock time.</p> <p>Parameter (8911) must also be set to (1) and the vehicle must have a real time clock installed.</p>	<p>0: Engine Hours</p> <p>1: Real Time Clock</p>	YES	<p>Customer Choice</p> <p>Setting this parameter to (0) “Engine Hours” will work for most applications.</p> <p>However; if you are frequently rotating drivers in your fleet, it is recommended that you set this parameter to (1) “Real Time Clock” as the clock will run even when the engine is turned off.</p>
VSLO MAXIMUM ACTIVATION TIME (7914)	This parameter selects the maximum amount of time that VSLO feature can be used by the driver during the interval set by parameter (7915).	0 – 1000 minutes	YES	30 minutes
TIME INTERVAL TO RESET VSLO (7915)	<p>This parameter selects the vehicle time interval after which the “VSL Override Duration” (7913) parameter is automatically reset and the feature is deactivated.</p> <p>NOTE: The time can be based on engine hours or real time clock hours.</p>	0 – 24 hours	YES	8 hours

VSL Anti-Tampering Parameters:

Parameter Name	Description	Possible Values	Customer Programmable?	Recommended Setting
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Engine Speed Limit with VSS Fault (7901)	This parameter sets the maximum engine speed allowed when an active vehicle speed sensor (VSS) fault exits and PTO engine speed control is not active. This parameter might be useful in preventing the operator from exceeding the “Accelerator Vehicle Speed Limit” (7902) parameter setting by tampering with the vehicle speed sensor.	1200 to 2100 (rpm)	YES	This parameter should be set to match the “Accelerator Vehicle Speed Limit” (7902) parameter setting
Vehicle Speed Anti-Tampering Enable (7905)	Set this parameter to “Enable” to activate vehicle speed limiter (VSL) anti-tampering.	0: Disabled 1: Enabled	YES	Customer Choice

5. Parameter Setup

5.1. Possible VSL Applications

This section briefly describes one example of Vehicle Speed Limiter (VSL) 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 VSL parameters might be best configured for your vehicle.

(Example A) VSL Configuration, w/Adjustable VSL, VSL Override, and VSL Anti-Tampering

In this example, the customer requires vehicle speed limiter operation with a blend of fuel economy and performance. In addition, this particular customer requires adjustable VSL at 35mph, VSL Override increase of 5mph, and Anti-Tampering functionality.

Adjust parameters as follows:

Parameter Name	Action Required
Global Vehicle Speed Limit (7937)	Set to “70” mph
Accelerator Vehicle Speed Limit (7902)	Set to “65” mph
Vehicle Speed Under Speed Limit (7904)	Set to “4” mph
Vehicle Speed Over Speed Limit (7903)	Set to “4” mph
Vehicle Speed Limiter Parameter #1 (7900)	Set to “1”
Adjustable VSL Enable (7931)	Set to “1”

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Adjustable VSL Selection Mode (7932)	Set to "1"
Adjustable Road Speed Limiter VSL (7933)	Set to "35" mph
VEHICLE SPEED LIMIT OVERRIDE (7911)	Set to "1"
VSLO SPEED INCREMENT (7912)	Set to "5" mph
VSL Override Duration (7913)	Set to "30" minutes
VSLO MAXIMUM ACTIVATION TIME (7914)	Set to "30" minutes
VSLO TIME DURATION SOURCE (7934)	Set to "0"
TIME INTERVAL TO RESET VSLO (7915)	Set to "8" hours
Engine Speed Limit with VSS Fault (7901)	Set to "65" mph
Vehicle Speed Anti-Tampering Enable (7905)	Set to "1"

6. Frequently Asked Questions

Q: Can the Vehicle Speed Limiter feature be configured to help the vehicle perform better during an uphill grade?

A: Yes, depending on whether fuel economy or performance is desired during uphill grades, the "Vehicle Speed Under Speed Limit" (7904) parameter can be set to meet the customer's needs.

- Setting this parameter to a lower value will more aggressively track the programmed "Accelerator Vehicle Speed Limit" (7902) parameter setting. This increases performance and decreases fuel economy.
- Setting this parameter to a higher value will allow the vehicle speed to drop below the programmed "Accelerator Vehicle Speed Limit" (7902) parameter setting. This reduces the time that the engine spends at maximum fueling and therefore improves fuel economy.