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1. Engine Retarder (General Overview)

The engine retarder feature is designed to help decelerate the vehicle by providing additional vehicle or engine load. This will reduce brake wear in vehicles which require frequent braking.

Programmable parameters within the engine control module (ECM) provide engine retarder related options that can be adjusted to suit the customer’s needs. Choosing whether the engine retarder is activated by pressing the service brake pedal or by releasing the accelerator pedal is an example.

The document will address unique engine retarder functionality for International® MaxxForce™ 11 and 13 engines.

WARNING! Do not use the engine or exhaust brake on slippery road surfaces. Doing so may cause wheel slippage and/or loss of vehicle control, which could result in property damage, personal injury or death.

CAUTION: To prevent engine damage when driving downhill, do not operate the engine above high idle. Prevent an engine over speed condition when going down long and steep grades. Use service brakes and select the appropriate gear, as required, to keep the engine rpm within operating limits.

NOTE: The engine retarder should never be considered a substitute for the vehicle service brakes. The service brakes should always be viewed as the primary vehicle braking system. The engine retarder cannot bring the vehicle to a complete stop. Only the service brakes can bring the vehicle to a complete stop.

Peak braking horsepower occurs when the engine retarder switch is in position 3, and the engine is at approximately 2250 rpm.

In order to warn the operator of an engine over speed condition, the yellow engine caution light will illuminate at 2250 rpm, an audible warning will be heard at 2350 rpm, and the red engine warning light will illuminate at 2450 rpm. Engine operation up to 2450 rpm is acceptable, but an engine over speed fault will be logged at 2450 rpm and the engine fan will disengage.

It is the operator’s responsibility to prevent mechanical damage to the truck. Under these conditions, use service brakes and select the appropriate gear, as required, to keep the engine rpm within operating limits.

To set up the engine retarder feature it is recommended that you use one of the example settings, referenced in the “Parameter Setup” section, and then modify only the specific parameters that will help meet your vehicle application.

This feature document assumes that the vehicle is equipped with a factory installed engine retarder system; otherwise there may be engine components, additional switches, harnesses, and software modifications which may also be required.

1.1. Feature Codes

Specifically, this document will address the operation and programming of the engine retarder for the following feature:

- **0007SCT** – ENGINE RETARDER 11L & 13L. NOTE: This feature is for available for all International® MaxxForce™ 11 and 13 engines. It includes an On/Off Switch and a three level selector switch.

2. Definitions/Acronyms

The following terms are referenced in this document:

- **APS** – Accelerator Pedal Sensor
- **ECM** – Engine Control Module
- **PTO** – Power Take Off

3. Description and Operation

3.1. Operation

The driver control of the engine retarder feature consists of two switches:

- 1 engine retarder enable (ON/OFF) switch which allows the driver to enable or disable the system.
- 1 engine retarder level selection switch which allows the operator to select from the following engine retarder levels:
 - “1” = Low
 - “2” = Medium
 - “3” = High

Any of the following visual indications may occur when the enable switch is placed in the ON position:

- The engine retarder ON/OFF switch LED indicator turns ON.
- The yellow “ENGINE BRAKE” indicator in the lower right (4-pack) of the gauge cluster turns ON.

The following interlocks must be satisfied for the engine retarder to operate:

- Cab mounted engine retarder On/Off switch must be set to ON.
- “Engine Retarder Mode (7000)” programmable parameter must not be disabled (0.)
- Clutch pedal must be released.

- Accelerator pedal must be fully released.
- There must be no active vehicle speed sensor (VSS) faults.
- Must be in gear.
- Vehicle speed must be greater than the value of the “Engine Retarder Minimum Vehicle Speed (7002)” programmable parameter.

Under normal operating conditions if the above conditions are met, the engine retarder will engage automatically when the accelerator pedal is fully released, and will be disengaged when the accelerator pedal is pressed. However, the “Engine Retarder Mode (7000)” programmable parameter allows the customer to select one of two optional modes of service brake pedal engine retarder activation.

3.1.1. Service Brake Option

An optional feature allows the engine retarder to be activated by means of the service brake pedal.

With this feature enabled, normal operation of the engine retarder is modified in that the driver must first release the accelerator pedal and then press the service brake pedal before the engine retarder will activate, provided all other applicable interlocks conditions are met.

Note 1: The level of engine retarder application depends on the position of the engine retarder level selection switch.

This feature is enabled by setting the “Engine Retarder Mode (7000)” programmable parameter to one of two possible settings:

- Mode 5: “Enabled – Active while Service Brake is Applied”.

Note 2: To deactivate the engine retarder in “Mode 5”, the driver is required to fully release the service brake pedal.

- Mode 8: “Enabled – Remains On after Service Brake Released”.

Note 3: Releasing the service brake pedal in “Mode 8” will not de-activate the Engine Retarder. You must either move the accelerator or clutch pedal.

3.1.2. Cruise Control Option

An optional feature allows the engine retarder to activate automatically during cruise control operation to help maintain the desired set speed.

This feature is enabled by the “Cruise Control Engine Retarder Enable (7006)” programmable parameter. There are additional parameters detailed later in this document to further customize cruise control engine Retarder operation.

Refer to the [Engine Retarder Example](#) section and the [Programmable Parameters](#) section for more information.

NOTE: Cruise activated engine Retarder only occurs when the engine retarder mode is enabled, the enable switch is turned ON, and cruise control is set.

3.2. Feature Interaction

The engine retarder feature interacts with the following engine features:

- Cruise Control – The engine retarder feature works differently while operating in cruise control. Refer to the “Cruise Control” feature document for more information.
- Road Speed Limiting – Road Speed Limiting has similar behavior as Cruise Control Engine Retarder functionality. Refer to the [Engine Retarder Example](#) section for more information.
- Power Take Off (PTO) – If in “PTO mode”, the engine retarder will not function. Refer to the “PTO” feature document for more information.
- Eaton UltraShift Transmission – Has specific parameter setup requirements. Refer to the appropriate Eaton documentation for more information.

4. Programmable Parameters

The following programmable parameters are required for the engine retarder feature. These parameters should be programmed to the engine retarder 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.

Parameter Name	Description	Possible Values	Customer Programmable?	Recommended Setting
Engine Retarder Mode (7000)	<p>This parameter determines the conditions that the engine retarder feature will be functional.</p> <ul style="list-style-type: none"> • If set to (0) – The engine retarder functionality is disabled. • If set to (4) – The engine retarder is active 2 seconds after the accelerator pedal is released (See Note 1). • If set to (5) – The engine retarder is active after the service brake pedal has been pressed and remains pressed (See Note 2). Also, the accelerator pedal must not be pressed. • If set to (8) – The engine retarder is active while the service brake is pressed. It remains active after the brake has been released until the clutch or accelerator is pressed. 	<p>0: Disabled – Engine Retarder</p> <p>4: Enabled – Normal Engine Retarder</p> <p>5: Enabled – Active while Service Brake is Applied.</p> <p>8: Enabled – Remains On after Service Brake Released.</p> <p>Note 1: The time is programmable by parameter (7008).</p> <p>Note 2: The time is programmable by parameter (7001).</p>	YES	Customer Chosen

Engine Retarder

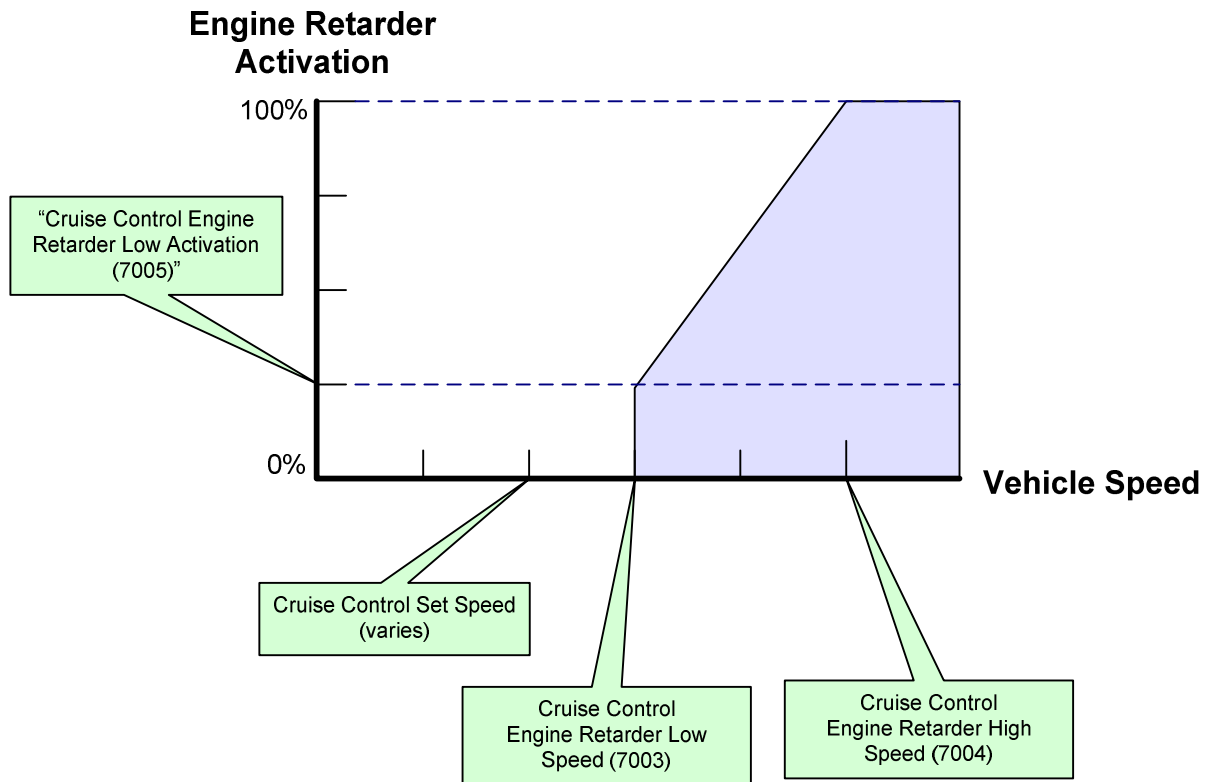
Engine Retarder – Brake Pedal Delay (7001)	This parameter sets the delay time for the (optional) service brake pedal activated engine retarder. NOTE: The engine retarder mode must be set to 5: “Enabled – Active while Service Brake is Applied” for this parameter to be recognized by the feature.	0 to 300 (seconds)	YES	0 seconds
Engine Retarder – Accelerator Pedal Delay (7008)	This parameter sets the delay time for the (optional) accelerator pedal activated Engine Retarder. NOTE: The engine retarder mode must be set to 4: “Enabled – Normal Engine Retarder” for this parameter to be recognized by the feature.	0 to 300 (seconds)	YES	2 seconds
Engine Retarder Minimum Vehicle Speed (7002)	This parameter sets the minimum vehicle speed limit that the engine retarder can be activated. NOTE: If a minimum vehicle speed for engine retarder engagement is NOT desired, this parameter should be set to ZERO.	2 to 127.5 (mph)	YES	10 mph
Cruise Control Engine Retarder Enable (7006)	(Optional Feature) This parameter enables the cruise control related engine retarder functionality.	0: Disabled 1: Enabled	YES	Customer Chosen
Cruise Control Engine Retarder Low Speed (7003)	(Optional Feature) This parameter sets the vehicle speed above the cruise set speed at which the engine retarder will activate at the programmed “Cruise Control Engine Retarder Low Activation (7005)” parameter setting.	1 to 20 (mph)	YES	Note: This should be set higher than the Cruise Over Speed (7605) parameter value.
Cruise Control Engine Retarder High Speed (7004)	(Optional Feature) This parameter sets the programmed speed (above the cruise set speed) at which the engine retarder will activate at 100%.	(7003) to 20 (mph).	YES	6 mph
Cruise Control Engine Retarder Low Activation (7005)	(Optional Feature) This parameter sets the activation percent (%) that the engine retarder feature starts at the “Cruise Control Engine Retarder Low Speed (7003)” parameter setting.	10 – 100%	YES	10 %

5. Parameter Setup

5.1. Engine Retarder Example

The following graph illustrates the vehicle speed (mph) and the corresponding engine retarder activation percentage (%) (in blue) during cruise activated engine retarder.

Cruise Control Engine Retarder Graph (Example A):



"Example A" Discussion (observe the graph)

The following programmable parameters are customer adjustable:

- "Cruise Control Engine Retarder Low Speed (7003)" (default = 10%).
- "Cruise Control Engine Retarder Low Speed (7003)" (default = 4 mph).
- "Cruise Control Engine Retarder High Speed (7004)" (default = 6 mph).

In this example discussion, we'll assume that these parameters are left at their default settings.

The shaded (blue) portion of the graph indicates the area where cruise control activated engine retarder is occurring.

For example, if the cruise set speed is 55 mph and the vehicle speed reaches 59 mph (set speed + 4 mph), the feature will activate 10% Engine Retarder. When the vehicle speed reaches 61 mph (set speed + 6 mph), the feature will activate 100% Engine Retarder.

Notice how the percent (%) engine retarder application increases as the vehicle speed increases above the cruise set speed. This only occurs between the “cruise control engine retarder low speed (7003)” parameter and the “cruise control engine retarder high speed (7004)” parameter settings.

5.2. Possible Engine Retarder Applications

This section describes one application of the engine retarder feature and how the programmable parameters can be effectively configured for this application. This is not a comprehensive list, and does not include all possible applications that an owner/operator might encounter.

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

(Example A)

Programmable Parameter Setup for Example A:		
Parameter	Value	Units
Engine Retarder Mode (7000) =	4	
Engine Retarder Brake Pedal Delay (7001) =	0	Sec
Engine Retarder Accelerator Pedal Delay (7008) =	2	Sec
Engine Retarder Minimum Vehicle Speed (7002) =	10	mph
Cruise Control Engine Retarder Low Speed (7003) =	4	mph
Cruise Control Engine Retarder High Speed (7004) =	6	mph
Cruise Control Engine Retarder Low Activation (7005) =	10	%
Cruise Control Engine Retarder Enable (7006) =	ON	On/Off

6. Frequently Asked Questions

Q: Will the engine retarder activate with Cruise Control engaged?

A: Yes, if the “Cruise Control Engine Retarder Enable (7006)” programmable parameter is enabled and the related parameters are set correctly, the engine retarder will activate automatically to help maintain the desired cruise control set speed.

Q: Can I install an engine retarder if my truck is not originally equipped with one?

A: Yes, but it may be expensive as some internal engine components may need to be swapped out.

Q: I have driven other trucks with Engine Retarders. This one does not seem to slow the truck as much, why?

A: This engine retarder is quiet so you do not have the noise as an indication that the retarder is working. This engine retarder feature is also designed to be used on all routes including low noise routes so while there is a decrease in overall braking HP you can use the retarder all the time.

Q: What would be appropriate programmable parameter settings for an over the road application of the engine retarder feature?

A: Set the following values: "Engine Retarder Mode (7000)" parameter to "Enabled – Active while Service Brake is Applied", the "Cruise Control Engine Retarder Enable (7006)" parameter to "Enabled". Leave all other parameters at their default settings.