

# International® T14 (2023)

Overview: *Predictive Cruise  
Control (PCC) Parameters*

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## General Overview: Predictive Cruise Control

This feature provides programming for Predictive Cruise Control (PCC) support.

Predictive Cruise Control is functionality mainly active during cruise control. It utilizes the knowledge of upcoming geographical features, mainly topography but also curvature. RADAR and camera information is used for some input. This information is often referred to as the horizon.

This document will address the PCC functionality for the T14 transmission.

## Description and Operation

*NOTE: Refer to the vehicle operation and maintenance manual, as well as the T14 transmission operation and maintenance manual, for additional information on operation and indications.*

**Speed Decrease** – This was the first function designed in Active Prediction. The algorithm is designed to reduce energy losses from braking and functions in such a way that it reduces the vehicle speed before a downhill slope where the driver would need to activate the brakes to avoid over speeding. However, due to drivability issues the vehicle speed cannot be reduced to the extent that it disturbs the surrounding vehicles too much or causes driver annoyance.

**Super Decrease (Additional Droop)** – A problem with traditional speed decreases, in heavy hills, when the vehicle loses a lot of vehicle speed going uphill, once the vehicle goes over the crest it accelerates up to the interval (minimum speed) for a normal Speed Decrease to be valid where motoring would occur. In the case the following downhill slope is long, and brake activation would be needed, it would expend a lot of unnecessary fuel to accelerate in the downhill slope. If the vehicle needs to accelerate back up to the DHSC set speed (braking speed) with motoring using gravity, in short enough time, decreasing the speed (motoring) is allowed even below the interval (minimum speed).

**Speed Increase** – Function which increases the vehicle speed, before an uphill slope, where the vehicle will not be able to keep the cruising speed. The main purpose of this feature is to regain some lost momentum from speed decreases. It also allows the vehicle to enter an uphill slope at full engine torque improving drivability. This also allows the vehicle to stay longer in the direct drive, which has higher efficiency than other gears. It should be noted that increasing the speed also increases driving and air resistance.

**Eco-Roll (Eco Coast)** - This is the function that opens the clutch (not actually putting the gearbox in neutral as the name suggests) and keeps the powertrain disengaged while the engine is idling. Losses in the driveline efficiency will be lower due to less friction and pumping losses, in the engine, and also less friction in the transmission. However, while Eco-Roll is active it is necessary to use fuel to keep the engine speed at idle, thus it is necessary to make sure coasting with an open clutch does not lead to any unnecessary braking or accelerations. The principle is that if there isn't unnecessary energy in the vehicle, Eco-Roll will save fuel. If there is excess of energy in the vehicle, the vehicle should be motoring, i.e., transmission stays in gear with a closed clutch. Eco-Roll in this situation will waste fuel since it is going to be necessary to brake the vehicle anyway. Eco-Roll is highly dependent on engine efficiency at idling and driver interaction, otherwise this feature may not save any fuel.

**Pulse and Glide (PNG)** - Pulse and Glide is an extension of the standard Eco-Roll allowing the vehicle to increase speed slightly to open up the possibility for Eco-Roll. On flat roads where the road grade and vehicle weight cannot sustain the vehicle speed, while coasting in neutral, it can still increase fuel efficiency by coasting in neutral. To do so, the vehicle speed must be increased before going into neutral and allowed to undershoot slightly at the end of the glide (coasting) phase. The idea here is to trade energy in the increase phase and return phase into better efficiency during the coasting phase. The combustion engine will work at a better spot in the fuel map during the speed increases and at a better spot during the idling time.

**Down Hill Speed Control Momentum Gain (Hill Roll Out)**- This feature minimizes the brake losses by letting go of the auxiliary brakes early when the vehicle is about to leave a downhill slope. This will allow the vehicle to for a brief time increase the speed above the DHSC set speed or assumed braking speed. Once the top speed has been reached in the Down Hill Speed Control Momentum Gain, typically Eco-Roll is engaged. This prolongs the time before it is necessary to start injecting fuel in the engine to keep the vehicle speed.

**Controlled Retardation into Slope** - The Engine Brake has limited performance at heavy weights and can be used predictively (with map data) to make full use of its capabilities. As an extension to the Downhill Speed Control (DHSC), this function identifies if there is additional braking needed for the coming downhill slope, and if so, the brake controller is allowed to apply the brakes, much earlier, (at a significantly lower speed than the DHSC set speed.

**Cruise at Low Engine RPM**- also known as "Part Load Gear Selection" uses map data to identify the highest possible gear, with low engine speeds, that is still efficient to use in terms of engine and gearbox efficiencies.

**Predictive Shift Scheduling** - Active Prediction is fully integrated with the Gear Shifting Strategy, i.e., during speed increases, motoring, braking etc.

**Predictive Torque Management** – Predictive Torque Management is a smart torque feature that utilizes horizon data to limit engine torque, when the full torque and power of the engine is not necessary to maintain vehicle speed within the normal operating speed range defined by the PCC logic. If the predictive logic determines that vehicle speed will not drop below the negative offset and the vehicle will regain speed again to reach the cruise control set point, the invert boost feature will actively reduce maximum allowed engine torque. This will ensure the engine is allowed operate more efficiently.

The PCC feature provides TCM programming allowing the owner/operator to select the customer programmable parameters for the desired vehicle configuration.

### **Programmable Parameters**

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

Parameter Name	Description	Possible Values	Customer Prgm?	Recommended Setting
PCC Down Hill Speed Control Momentum Gain Offset (CCCAPSO) (D073 000)	Allowed momentum gain (hill roll out) offset from DHSC-speed. This is the maximum allowed vehicle velocity increase on top of the set DHSC speed the system can affect, to save fuel at the end of downhill slopes.	0 -10 MPH	YES	Customer Chosen
PCC Positive Speed Offset Item 0 (PSO) (D082 000)	Allowed positive PCC speed offset for performance mode, item 0.	0 -10 MPH	YES	Customer Chosen
PCC Positive Maximum Speed Offset Item 1 (MSO) (D082 001)	Maximum Positive PCC speed offset for economy mode, item 1.	0 -10 MPH	YES	Customer Chosen
PCC Positive Maximum Speed Offset Item 2 (MSO) (D082 002)	Maximum Positive PCC speed offset for performance plus mode, item 2.	0 -10 MPH	YES	Customer Chosen

Parameter Name	Description	Possible Values	Customer Prgm?	Recommended Setting
PCC Positive Maximum Speed Offset Item 3 (MSO) (D082 003)	Maximum Positive PCC speed offset for offroad mode, item 3.	0 -10 MPH	YES	Customer Chosen
PCC Minimum Speed Offset Item 0 (NSO) (D083 000)	Allowed negative PCC speed offset for performance mode, item 0.	0 -10 MPH	YES	Customer Chosen
PCC Minimum Speed Offset Item 1 (MSO) (D083 001)	Minimum Positive PCC speed offset for economy mode, item 1.	0 -10 MPH	YES	Customer Chosen
PCC Minimum Speed Offset Item 2 (MSO) (D083 002)	Minimum Positive PCC speed offset for performance plus mode, item 2.	0 -10 MPH	YES	Customer Chosen
PCC Minimum Speed Offset Item 3 (MSO) (D083 003)	Minimum Positive PCC speed offset for offroad mode, item 3.	0 -10 MPH	YES	Customer Chosen
Eco Roll Enable (ERE) (D017 000)	Enable Eco-Roll also known as Eco Coast. Manual Eco-Roll with Accelerator pedal (that does not require map data) is activated by quickly tapping the accelerator pedal while motoring	1 - Disable 2 - Enabled with CC (with Map data) 3 - Enabled with CC (with Map data) and Accelerator Pedal (with Map data and manual activation)	NO	3 - Enabled
Pulse and Glide Mode (PAGM) (D034 000)	The "Pulse and glide" feature will only be allowed in the performance modes defined by this parameter.	1, Disabled 2, Standard and Economy 3, Economy only	Dealer	2
Cruise at Low Engine RPM (D060 000)	Enables the predictive part load shift schedule strategy which allows the vehicle to be driven at low engine speeds when engine torque need is low.	1 - Off 2 - Reduced Fuel Efficiency (limit noise) 3 - Max Fuel Efficiency	Fleet	Customer Chosen
Controlled Retardation into Slope (D04F 000)	Activate Controlled Retardation into Slope which will make use of horizon data and vehicle information to activate engine brake early if predicted that the engine brake is not going to be strong enough to maintain the downhill speed controller set speed.	1 - Disable 2 - Enable	Fleet	Customer Chosen

Parameter Name	Description	Possible Values	Customer Prgm?	Recommended Setting
Predictive Torque Management (D08E 000)	Selects performance modes which allows predictive torque management feature.	1 - Disabled 2 - Economy mode only 3 - Economy and Performance 4. - Economy, Performance, and Offroad 5. All performance modes	Fleet	Customer Chosen

### Frequently Asked Questions

NA

### Definitions/Acronyms

Acronym	Definition
TCM	Transmission Control Module
PIM	Powertrain Interface Module
AMT	Automated Manual Transmission
PCC	Predictive Cruise Control
DHSC	Down Hill Speed Control
CCAP	Cruise Control with Active Prediction.