



TECH TIP

CUMMINS POWER TAKE OFF (PTO)
INSTALLATION TECH TIP

GROUP: 0-GENERAL
TECH TIP NO: TT-21-007
DATE: 10-12-2021

SUBJECT VEHICLES:

2022-2023MY Hino Trucks equipped with a Cummins engine.

OVERVIEW

The information contained below outlines scenarios that may not account for all configurations and should be utilized as a general guideline to assist in the integration of interfaces to Hino vehicles prior to assembly and is not intended to be utilized for diagnosis of an installed system or for repair information.

Disclaimer: Hino Motor Sales U.S.A Inc. is an incomplete vehicle manufacturer. It is the responsibility of the final stage manufacturer that the complete vehicle complies with local, state, and federal requirements. Additionally, the final stage manufacturer is responsible to understand all systems and controls to power and operate equipment that interface with Hino vehicles. This should include but is not limited to the design, utility, application, safe operation, performance, durability, controls, installation, and parts availability.



Recommended special tools: Below is a list of special tools that may be required for the installation and configuration of the PTO to the transmission.

Cummins Insite software – Required to change Engine Control Module (ECU) parameters.

Allison DOC software – Required to modify Allison Transmission programming or access to a Allison distributor/repair facility with programming capability.

Appropriate Torque Wrench – different PTO manufacturers use different fasteners and have their own clearance constraints. A special torque wrench may be necessary for the installation.

Recommended Vehicle Electrical Interface: The two major PTO suppliers Muncie and Chelsea offer direct plug & play interface harness for simple scenarios like a single preset RPM level.

Recommended supporting literature: Below is a list of recommended supporting literature to review prior to design and installation of a PTO. This is not a complete list due to many of the documents reference other documents based on application. The below list is a high level overview of fundamental information that needs to be considered when designing and installing a PTO system on a Hino vehicle with an Allison Transmission. The body builder guide can be found at hino.com. The Allison Transmission reference documents can be found on the Allison Transmission Extranet. If you do not have access to the Extranet, contact your Allison Transmission representative. For information related to the PTO, driven component, and/or related system manufacturers, contact the respective manufacturer for supporting documents.



- Cummins Customer Engineering Bulletin (C.E.B) 00597 or other C.E.B's pertaining to auxiliary equipment installation
- Allison Transmission Technical data – PTO Provision
- Allison Transmission Technical data – Transmission Control Systems
- Respective PTO manufacturer technical information
- Respective driven component technical information
- Technical information for any related equipment attached or impacted by a power take off system

Power take off (PTO): A PTO is a piece of equipment attached to the drive train used to power auxiliary equipment.

Transmission PTO Power flow: Allison Transmissions installed in current Hino Conventional Models are equipped with a 2000 or 3000 series transmission. It is important to understand the transmission PTO power flow. A brief summary of these are outlined below, but are covered in greater detail in the recommended supporting literature above. If the PTO is used in gear, the PTO will be affected each time there is a shift.

2000 series: The PTO drive gear is turbine driven and if the transmission is not in lockup mode (1:1) the PTO drive gear is less than engine speed.

3000 series: The PTO drive gear is a large drive gear driven by the engine and is turning whenever the engine is running.

Types of power take off's: There are many different types of power take off's and a PTO is one part of a larger system that requires a thorough understanding of electrical, mechanical, and hydraulic SYSTEMS at a minimum. Failure to understand the entire system can lead to a system that may not function to unsafe operation and/or major component failure.



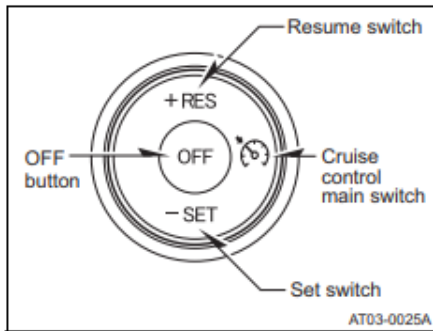
Controls: PTO Interface allows for certain operational controls to be established based on application requirements. There are numerous ways to control and operate a PTO system. This needs to be considered when the mission of the completed vehicle is defined. For transmission mounted clutch type PTO's controls, often times these require raised transmission pressures for proper operation and how to accomplish this is covered in the reference documents listed above. Auxiliary truck interface requirements such as engine shutdown or other auxiliary inputs or controls, can also be found at the reference material listed above. Hino trucks are equipped with 5th generation Allison 3000 series transmission and are equipped with vocational package 223. The 2000 series is equipped with vocational package 354. If a different package or function is required other than what is standard, please contact the final stage manufacturer or your local Allison representative for assistance. The programming may have to be altered and wires may need to be added from the transmission control unit to obtain the desired functionality. What TCM drop outs are available on a Hino truck are limited and vary based on configuration. Drop outs can be added if needed. This information is covered in the recommended supporting literature.

In Cab Preset Multiplex Cruise Switch Stationary PTO Engine RPM Controls: The following is an example of a general guide to operate auxiliary equipment from inside the cabin of the vehicle at a pre-set RPM level.



Example 1: A Hino Conventional model has a requirement by the body company for an in cab preset engine RPM setting and for the accelerator to be disabled in PTO mode.

Note: Depressing the cruise control main switch for greater than .5 seconds will enable PTO governor mode. Depressing the cruise switch set speed will raise the engine RPM to 1500 RPM.



Configuration and RPM Control:

Utilizing the Cummins Insite software, access the features and parameters customization tab for the ECM and make the changes to the parameters as outlined immediately below. After enabling the PTO governor mode by depressing the cruise main switch for <.5 seconds, the set cruise switch can now be utilized to engine RPM to the defined level.

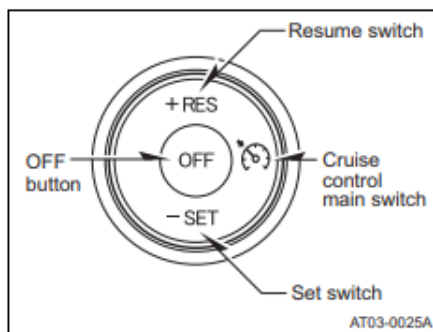
	Enable
 PTO	
Additional Switch Speed	950 RPM
Maximum Engine Load	800 ft*lb
 Maximum Speed	1500 RPM
Maximum Vehicle Speed	12 mph
 Minimum Speed	1500 RPM
Ramp Rate	100 rpm/s
Resume Switch Speed	750 RPM
 Set Switch Speed	1500 RPM
PTO Speed 1 Device	DUMMY
PTO Speed 2 Device	DUMMY
PTO Speed 3 Device	DUMMY
PTO Speed 4 Device	DUMMY
PTO Speed 5 Device	DUMMY
PTO Speed 6 Device	DUMMY
PTO Speed 7 Device	DUMMY
PTO Speed 8 Device	DUMMY
 Accelerator Pedal or Lever Override	Disable

In Cab Variable Multiplex Cruise Switch Stationary PTO

Engine RPM Controls: The following is a general guide to operate auxiliary equipment from inside the cabin of the vehicle at a variable RPM level.

Example 2: A Hino Conventional Model has a requirement by the body company for in cab variable engine speed control not to exceed 1500 RPM, the park brake set to allow RPM control and the accelerator pedal is disabled in PTO mode.

Note: Depressing the cruise control main switch for greater than .5 seconds will enable PTO governor mode. Depressing the cruise switch set speed will raise the engine RPM to 1500 RPM.



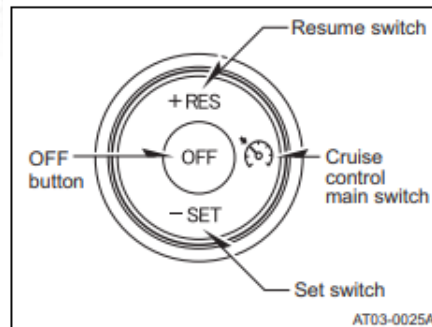
Utilizing the Cummins Insite software access the features and parameters customization tab for the ECM and make the changes to the parameters as outlined immediately below. After enabling the PTO governor mode by depressing the cruise main switch for <.5 seconds, the set/resume cruise switch can now be utilized to increase and decrease the engine RPM's between the minimum and maximum defined RPM levels.

☒ PTO	Enable
\ Additional Switch Speed	950 RPM
\ Maximum Engine Load	800 ft/lb
\ Maximum Speed	1500 RPM
\ Maximum Vehicle Speed	12 mph
\ Minimum Speed	700 RPM
\ Ramp Rate	100 rpm/s
\ Resume Switch Speed	750 RPM
\ Set Switch Speed	750 RPM
\ PTO Speed 1 Device	DUMMY
\ PTO Speed 2 Device	DUMMY
\ PTO Speed 3 Device	DUMMY
\ PTO Speed 4 Device	DUMMY
\ PTO Speed 5 Device	DUMMY
\ PTO Speed 6 Device	DUMMY
\ PTO Speed 7 Device	DUMMY
\ PTO Speed 8 Device	DUMMY
☒ Accelerator Pedal or Lever Override	Disable
☒ Alternate Operation	Disable
☒ Cab PTO	Enable
☒ Clutch Override	Disable
☒ Ignore Vehicle Speed Source in PTO	Disable
☒ Parking Brake Interlock Type	All



In Cab Preset Multiplex Cruise Switch Stationary PTO Engine RPM Controls: The following is an example of a general guide to operate auxiliary equipment at two different pre-set RPM levels.

Example 3: A Hino Conventional Model has a requirement by the body manufacturer to operate at two different RPM levels and should only be able to be operated when the park brake is applied.



Configuration and RPM Control: Utilizing the Cummins Insite software, access the features and parameters customization tab for the ECM and make the changes to the parameters as outlined immediately below. After enabling the PTO governor mode by depressing the cruise main switch for <.5 seconds, the set cruise switch will now increase the engine RPM to 1100 and the resume switch will increase the RPM to 1500.

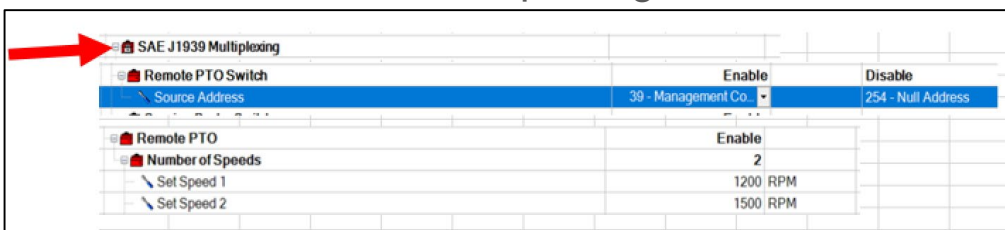
	Enable
PTO	
\ Additional Switch Speed	950 RPM
\ Maximum Engine Load	800 ft*lb
\ Maximum Speed	1500 RPM
\ Maximum Vehicle Speed	12 mph
\ Minimum Speed	1100 RPM
\ Ramp Rate	100 rpm/s
\ Resume Switch Speed	1500 RPM
\ Set Switch Speed	1100 RPM
\ PTO Speed 1 Device	DUMMY
\ PTO Speed 2 Device	DUMMY
\ PTO Speed 3 Device	DUMMY
\ PTO Speed 4 Device	DUMMY
\ PTO Speed 5 Device	DUMMY
\ PTO Speed 6 Device	DUMMY
\ PTO Speed 7 Device	DUMMY
\ PTO Speed 8 Device	DUMMY
Accelerator Pedal or Lever Override	Enable
Alternate Operation	Disable
Cab PTO	Enable
Clutch Override	Disable
Ignore Vehicle Speed Source in PTO	Disable
Parking Brake Interlock Type	All

In Cab Preset Switched Stationary Remote PTO RPM Control. Two Different RPM Levels. The Added Switch Provides 12V to The Vehicle Controller and The Vehicle Controller Sends Multiplexed Message to Enable RPM Control: The following is a general guide to operate auxiliary equipment at two different RPM levels.

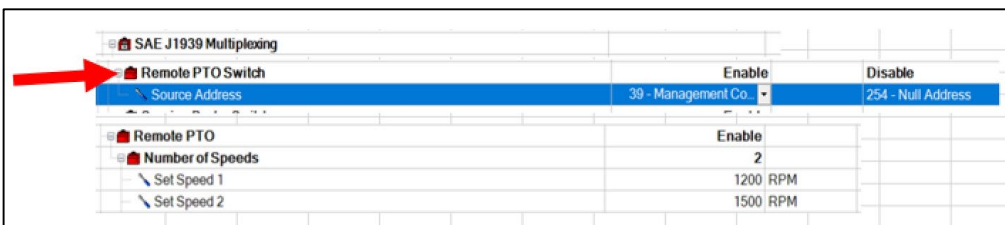
Example 5: A Hino Conventional model has a requirement by the body manufacturer to operate at two different RPM levels.

Configuration and RPM Control: Utilizing the Cummins Insite software, access the customization tab for the ECM and make the changes to the parameters as outlined below. After the programming change, the first preset RPM level can be achieved by supplying a 12V constant signal to the A6N wire (see body builder book for additional information). The second preset level can be achieved by toggling the 12V signal in less than .5 second and toggling again will go to the lower speed. Removing 12V will return the engine to idle speed.

- Select SAE J1930 Multiplexing



- Select remote PTO switch and turn on



- Select 39 Management Computer #1

SAE J1939 Multiplexing			
Remote PTO Switch		Enable	Disable
Source Address		39 - Management Co...	254 - Null Address
Remote PTO		Enable	
Number of Speeds		2	
Set Speed 1		1200 RPM	
Set Speed 2		1500 RPM	

- Select PTO and remote PTO

SAE J1939 Multiplexing			
Remote PTO Switch		Enable	Disable
Source Address		39 - Management Co...	254 - Null Address
Remote PTO		Enable	
Number of Speeds		2	
Set Speed 1		1200 RPM	
Set Speed 2		1500 RPM	

- Choose the number of speeds

SAE J1939 Multiplexing			
Remote PTO Switch		Enable	Disable
Source Address		39 - Management Co...	254 - Null Address
Remote PTO		Enable	
Number of Speeds		2	
Set Speed 1		1200 RPM	
Set Speed 2		1500 RPM	

Note: If the details provided in this Tech Tip did not address your concern or additional assistance is needed, please email product planning at hinoproductplanning@hino.com