CHASSIS CAB PTO GENERAL GUIDELINES

- **Overview note: The PTO models, packaging space, controls and functions are essentially the same as previous years. In other words, you can essentially install and use the same PTO/pump systems from previous years and get the same response. However, there are some enhancements that will be explained in the 2019 PTO documents in this body builder guide. They are identified by the *New For 2019* notes.**
- The Ram 3500/4500/5500 Chassis cab models equipped with gasoline and diesel engines that have the PTO prep option have the capability of mounting and controlling a PTO.
- The PTO prep option codes are: LBN for right hand PTO and LBV for left hand PTO.
- Automatic transmissions 2010 model year and later lock up the transmission torque converter at 1200 RPM to minimize energy loss and heat rejection. However, PTO usage is allowed at speeds as low as 900 RPM, which is the default PTO minimum speed.
- **PTO prep cannot be added to vehicles not factory built with PTO prep.**
- The Aisin AS68RC Automatic transmission can use devices up to 60 HP and 250 ft-lbs torque. For standard right side PTO applications (sales code LBN), Chelsea 270 or 252 series fit this transmission and Muncie CS6 series fit this transmission. There is no difference in how PTOs and pumps mount between 4x2 and 4x4 automatic models on the right side.
- There is an optional alternate left side PTO available on 4x2 automatic transmissions. You cannot get both left and right side PTO capability. This PTO position may provide easier installation and the possibility for driveshaft driven devices.
- New for 2017 the left hand PTO opening is available for 4x4. However, only the PTO and drive system made by Marco Equipment called Ram Drive© is usable at this time.

Pump sizes

- The automatic transmission models have been test fit with 25 GPM rated size single pumps and tandem 13 GPM rated pumps. While these larger pumps have limited clearance to the diesel exhaust system and many people have mentioned this as a concern, it should be noted that the exhaust pipe in the PTO area is a double walled pipe which provides significant heat insulation properties. In fact, in our extreme heat PTO testing in over 100 degree F Fahrenheit temperature we never exceeded 200 degree F on the PTO, pump or hoses.
- The gasoline engine models have a smaller exhaust pipe but the exhaust temperatures are higher. Additional shielding to the PTO/pump system may be required.
- If you have specific PTO and pump fitment questions and can provide the actual PTO and pump combination, we can test fit it and provide pictures and instructions on how to install your specific combination.

Note: Never remove the heat shields provided as original equipment. It is also the responsibility of the final stage manufacturer to install appropriate shielding to any secondary body or equipment installed to the Chassis Cab. **Final Stage Manufacturers assume all responsibility related to modifications performed.**

PTO Limitations

Please read this information carefully and call us with any questions before you order a vehicle so you understand the specific capabilities of our PTO system.

- The Automatic transmission PTO is turbine driven not engine driven. What this means is that the PTO will work only with the stationary mode in park, or in mobile mode with the vehicle moving at approximately 7 mph and above or in neutral. Because of this the PTO system is not a suitable system for vehicles like: snow plows, autoloader wreckers, or dump trucks if they are used to dump and spread at a crawling speed. These vehicles are more effective with an engine driven 'clutch pump' type hydraulic pump.
- The size and package space do not allow for components driven by a driveshaft from a PTO on the automatic transmission right side. Automatic transmission models have exhaust system components in the way that cannot be relocated because it will effect emissions compliance.
- While the optional left side PTO will support a driveshaft driven device (4x4 requires aftermarket Ram Drive© transfer case). Check with the PTO manufacturer to ensure the PTO has the capability to drive the device.
- Diesel engines have the capability to support a split shaft PTO. See the instructions in the titled "Split Shaft PTO" mode to program and run the automatic transmission to allow 'split shaft mode'.
- **Note: Circuit F607, the connection to the PTO hot shift solenoid, cannot withstand an inductive voltage spike of 500V or higher. Damage to the Engine Control Module (ECM) could result.**

PTO Mode Descriptions

Standard Mode

- Standard mode is used to turn on PTO and provide an elevated idle with the vehicle in a stationary position.
- It allows the PTO to be driven at an elevated idle between 900 and 2000 RPM. The speed is either variable by using the cruise control switches, or fixed by programming a single set speed. See the PTO programming menu section for single set speed instructions.
- Typical standard mode applications: Rollback wreckers, mini-tankers, power liftgates, porta-potty/septic tank vacuum trucks, some dump bodies, simple cranes, etc. Essentially any application remains stationary, and only needs one speed.
- Standard mode is enabled by pressing the in cab PTO switch. Pressing the switch raises the RPM and provides a 12V source to activate the PTO.
- ***New for 2019*, the standard mode in-cab PTO switch now has auto resume mode. So you can now use the in cab switch for vehicles like aerials that require remote start stop.**

Note: The Auto Resume function must be enabled though the Commercial Features menu, see the PTO menu section.

Mobile Mode

- Mobile mode is used when the vehicle will be in motion. Typical uses are: auto loader wreckers, salt spreaders, dump trucks.
- Mobile mode is started by pressing the PTO switch with the vehicle in park. This enables the PTO and you can then shift to reverse, neutral, or drive. However, the PTO does not start turning rapidly enough until the vehicle is moving about 7 mph.
- The default setting of maximum vehicle speed in mobile mode is 8 MPH but can be adjusted from 5 to 50 MPH. The vehicle's maximum speed will be limited to the preset number while mobile mode is enabled.
- ***New for 2019*** **is an elevated idle mobile mode called Park-Idle. This allows an elevated idle configurable between 900 and 2000 RPM when in park. When shifted out of park, PTO remains active but RPM control returns to the accelerator pedal.**
    - **Suitable for vehicles like mini-packer refuse trucks or salt spreaders.**
    - **If park brake interlock setting is enabled in mobile mode, elevated idle will only occur when vehicle is in park and the park brake is applied.**

Remote Mode

- Remote mode does not use the in cab switch. It uses an aftermarket switch connected to wires and a connector provided in the upfitter kit.
- Remote mode must be used if the application requires more than one speed. Typical uses are: mechanic trucks, tire service trucks, well service trucks.
- Remote mode renders the in cab PTO switch non-functional.
- ***New for 2019*** **RPM control is now selectable from 1 of 3 options in the Commercial Features menu: VSIM Set Speed, Remote Throttle, or CAN (J1939). See Advanced PTO Features below.**

Split Shaft Mode

- Split shaft mode provides auxiliary power directly from the output shaft of the transmission. This is accomplished by removing a section of the driveshaft and replacing it with a split shaft box. This box has the capability to disconnect and reconnect the power to the rear axle as well as controlling power to an auxiliary device.
- Typical uses are: Fire truck mini-pumpers, large compressor/generators, well drilling, oil field 'power tongs'.
- Split shaft mode is entered by following the correct sequence shown in the split shaft section. This locks the automatic transmission in 4th gear (1 to 1 ratio).
- ***New for 2019*** **Split shaft mode has two available gear choices 4th gear (1 to 1) and 5th gear (0.77 to 1) See PTO menu section.**
- ***New for 2019*** Split shaft mode allows the engine speeds between 1200 and 2400 RPM.
- Split shaft mode is only available on the diesel engine.

PTO Enabling/Disabling Features

- Vehicle must be in park (for mobile mode the PTO must be started in park).
- The PTO switch has been activated.
- Vehicle must be running
- No transmission, engine, accelerator, brake system faults.
- The PTO must be correctly installed using the provided circuits. The PTO hot shift solenoid cannot be connected directly to 12V power.
- On diesel and gasoline engines, in standard and remote modes depressing the brake pedal turns off the PTO.
- On gasoline engines in standard and remote modes, depressing the accelerator pedal turns off the PTO.
- ***New for 2019*** **You can now interlock PTO operation with park brake activation. See the PTO menu section.**
- ***New for 2019*** **You can now change the ramp (response) rate to engine speed change requests in the PTO system. See the PTO menu section. This ramp rate setting applies to all customer requested RPM changes in stationary and remote mode, and well as elevated idle mobile mode.**

Advanced PTO Features

- The following features are unique specialized features of the PTO system that are controlled by the eight pin connector located on transmission bellhousing, left side.
    - **Remote Throttle:** This featured is enabled by connecting a 0-1K, or 0-10K variable resistor as follows. F856 to one side of the resistor, K400 to the other and K128 to the movable leg on the resistor. When K129 is grounded, remote throttle is turned on. **Note: Enabling remote throttle disables the foot accelerator pedal**
        - ***New for 2019*** **Remote throttle must also be selected as the RPM control while in remote mode. See PTO menu section.**
        - ***New for 2019*** The engine (RPM per second) response speed to requested set point is now programmable. See the 'ramp rate' selection in the PTO menu section.
    - **Accelerator Interlock:** Grounding circuit K810 'turns off' the signal from the accelerator pedal. This feature is only available on the diesel engine. **Note: This feature must be enabled by the dealer for 2018MY and previous.**
        - ***New for 2019*** **Accelerator interlock is now enabled through the EVIC in addition to dealer enabled.**
        - **Note: Enabling Accelerator interlock disables the foot and remote throttles.**
    - **Remote PTO:** This circuit F425 is a duplicate of the F425 remote PTO circuit in the cab. Grounding this circuit enables remote PTO.

  - **Switch Return:** This circuit V937, is the preferred 'clean ground' to use for all of the above features.
- **VSIM Set Speed:** Up to 3 RPM set speeds can be configured in the PTO menu while in remote mode and set speed is selected for RPM control. These set speeds can be selected while PTO is active by grounding the appropriate input on the VSIM. See VSIM section for pin selection.
  - If multiple inputs are active on the VSIM, the set point with the lowest numerical value will be given priority. Example, if 1 and 3 are active, 1 RPM will be set to the value defined for point 1.
  - ***New for 2019*** **Set Speed must be selected as the RPM control (not remote throttle or J1939) while in remote mode. See PTO menu section.**
- Cummins J1939 interface
  - Cummins provides this interface to "gate" certain CAN messages for customer use. It is an industry standard three-way connector located underhood, on the driver's side of the engine near the connection to the intake manifold. Messages included are vehicle speed, engine speed, park brake on/off, system voltage – filtered, brake switch status, wait to start lamp status and coolant temp.
  - Available on engine near the intake manifold inlet area
  - This is a separate bus from the VSIM J1939 interface.
- ***New for 2019*** **While not a specific PTO feature, all Ram Chassis Cabs come standard with a commandable idle up circuit even if PTO prep is not selected. This is a circuit on the VSIM that is set through the cluster menu. See separate document on Stationary Engine Idle Up**
- ***New for 2019*** **J1939 RPM control:** RPM can now be controlled over CAN using through the J1939 VSIM interface while PTO is active. This can be done following these steps:
  - PTO must be in remote mode with J1939 selected as the RPM control
  - PTO is still enabled though F425 circuit
  - RPM is commanded through PGN 0, Torque/Speed Control 1 (TSC1)
    - TSC1 message definition follows SAE standard for J1939
    - SPN 695 shall be set to 0x1 when control of RPM is desired, and 0x0 otherwise
    - SPN 898 shall be set to the desired RPM within 900-2000 for AUX drive and 1200-2400 for Split Shaft. Input values are handled as follows
      - 0x0000 - 0x0384 = 900 RPM
      - 0x0384 – 0x0960 = desired RPM from 900-2400
      - 0x0960 – 0xFFFE = 2400 RPM (2000 AUX drive)
      - 0xFFFF = 900 RPM
    - Maximum engine RPM/s response to requested set point is defined by the ramp rate selection in the Commercial Settings. See PTO menu section.
    - All other SPNs that are part of PGN 0 are don't care
  - Vehicle status information such as current engine RPM can be obtained from the J1939 VSIM bus. See VSIM section.

NOTE: On gasoline engine models, for remote throttle to function, PTO mode and accelerator interlock must be activated.

PTO Circuit Definition Chart

Location E :Transmission Bellhousing Drivers Side

The following chart is provided to assist in correctly interfacing the PTO with the vehicle

Circuit Name/ Connector Cavity Number	Type/Gauge/Color	Circuit Funtionality	Descrition	Usage
F856/1	18T-YL/PK	5V engine engine sensor feed: input to 10K resistor	5 volt pwr input to the variable resistor	Remote throttle control
K400/2	18T-BR/VT	5V engine sensor return	output from the varible resistor back to the engine controller	Remote throttle control
K128/3	18T-DB/LG	remote throttle varible input	varible signal from the resistor back to the controller	Remote throttle control
K129/4	18T-DB	Remote throttle switch	On off switch provided by customer to turn on or off the remote throttle. Remote switch closes to ground.	Remote throttle control
K119/5	18T-LG/BK	Maximum operating speed switch	Feature selects a lower maximum vehicle speed when the switch is on. Customer supplied switch closes to ground.	Maximum operating speed switch
K810/6	18T-VT/DG	Accelerator interlock switch	Disabling of the accelerator control by closing (grounding) of the operator controlled switch.	Disabling of the vehicle accelerator pedal
F425/7	18T-PK	remote PTO switch	customer supplied remote PTO on/off switch enables PTO when circuit connected to ground	Remote PTO
V937/8	18T-VT/BR	Ground (return)	Ground connected to engine controller.	Signal return

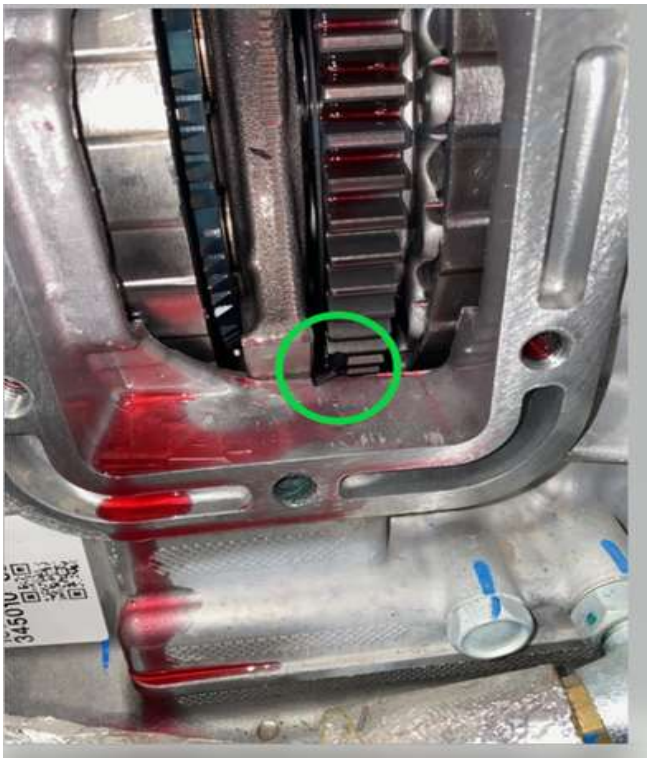
Dealer Settable Functions

These features are available as factory options at the time of ordering, but also can be reset in the field with the dealer service tool (Witech).

- Idle Shutdown Timer: the engine will stop after X minutes of idling. Settable from 5 to 60 minutes in 5 minute increments. Depressing brake, accelerator, opening the door, or PTO mode disables the feature. (chassis cab only)
    - ***New for 2019*** **Idle shut down timer can be disabled (either temporarily or permanently) through a VSIM input. See VSIM section for pin selection.**
- Vehicle Maximum Speed: The engine will limit power above the set speed. Settable from 40 to unlimited (i.e. factory vehicle max speed) in 1 mph increments on diesel. Gasoline engines have 3 selectable speeds: 65,70 and 77mph. (chassis cab only)

Important Note About PTO Mounting

The picture below shows the PTO opening, and specifically the circled area showing the snap ring that holds the PTO gear. Be aware that the picture shows the correct position and orientation of this clip. Upfitters have contacted us with concerns that this clip is bent and could contact the mating PTO gear. However, the normal bent end of the clip cannot contact the mating gear of the PTO.



PTO General Guidelines