PTO Troubleshooting

This document should help you diagnose issues with your PTO not functioning correctly on your Ram Truck.

Overview

Here is how the PTO works.

When you push the PTO button (either the factory in dash switch or the upfitter added remote switch) a ground signal is sent to the engine controller. This ground, when received, tells the engine to enter PTO mode. The controller checks to make sure that there are no active faults and that all prerequisites are met. The engine controller then raises the engine RPM to the 900 RPM default or whatever preset speed is used. However, mobile mode does not raise the rpm above normal vehicle idle. At the same time, the engine controller sends a bus message to the transmission controller to confirm that both modules have no active faults. The transmission control module does similar housekeeping checks as the engine controller and then responds by grounding a circuit which is connected to the PTO relay. The PTO relay then outputs 12V to power the PTO hot shift solenoid provided by the PTO manufacturer.

Troubleshooting

These are the things to check when your PTO is not functioning correctly.

<u>Nothing happens when you turn on the PTO button.</u>

- Make sure you do not have any active faults/a visible check engine or transmission light. These will disable PTO.
- It is possible there is a wiring issue connecting the switch to the engine. You can change modes between standard and remote to partially check wiring. K425 is the circuit that connects from the in cab switch to the ECM. F425 is an entirely different circuit to the ECM.
- If the vehicle is returning from the dealer for service to the engine or transmission it is possible the PTO feature was inadvertently turned off. The Witech is required to re-enable it.

The PTO menu does not show up when I try to program in the cluster

- The key or button must be in the run position, but the engine must not be running.
- The vehicle may not have PTO prep (LBN or LBV)

My PTO only runs for 30 seconds and then shuts off (with the PTO LED flashing) 2018 and older

- This issue is essentially caused because a circuit W708 (Orange wire with a brown stripe) is not grounded. This circuit is frequently connected to the pressure switch on the PTO manufacturer's hydraulic lines. So if there is any problem with that switch or connecting wires it will cause this issue. Accordingly, it is recommended that this wire be permanently grounded. The location of this circuit is on the brown connector of the vehicle system interface module (VSIM). More information about the VSIM module is available in the VSIM section under "Electrical Wiring Information".
- It is possible that the brown connector which contains the W708 wire could be inserted in the wrong slot. It should be in the middle slot.
- You can confirm that this circuit is connected and working correctly by checking to see if it has 12V (with a DVM) when the PTO is turned on. If you do not see 12V either the connection or the VSIM is bad.
- On 2013-2015 trucks the VSIM can lock up which will cause the same 30 second drop out. You can test and confirm that you have this issue by unplugging all 5 connectors from the VSIM and waiting for 1 minute before reconnecting. If this resets the VSIM, you could possibly be OK for weeks to months before the next lock up. However, the permanent fix it to take the vehicle to the dealer for TSB 08-108-15.
- Occasionally, people will mistake circuit W500 on the brown VSIM connector for W708. This is because W500 is brown with an orange tracer instead of orange with a brown tracer. This error is easily found because W500 when grounded will cause the headlamps to flash in 'wigwag' fashion.

My PTO only runs for 30 seconds and then shuts off (with the PTO LED flashing) 2019 only

- Starting in 2019 the circuit W708 is eliminated. There is no wire that has to be grounded. We built the feedback circuit into the vehicle system.
- However, Ram chassis cabs built before August 6, 2019 have a condition where a circuit (F790) monitoring the PTO hot shift solenoid power (F607) is vulnerable to a voltage spike. This voltage spike causes damage to the ECM that is not repairable.

- Most if not all vehicles have been equipped with a diode added to the circuit to protect the ECM. However, if a truck has never been to the dealer there is a slight possibility that this has not occurred. The result would be the 30 second drop out. If this is the case and you are confident the diode has never been installed, take the vehicle to the dealer and request they review STAR online 1918000009.
- There have been a few issues where the F790 circuit has disconnected from the bottom of the aux. fuse box behind the driver's side battery. The fuse box is attached by two 10mm bolts. If you remove this box and find a broken wire that is dark blue with a pink tracer that is your root cause.

My PTO shuts off in 5 seconds

- There is an issue where a recall T79 if not completed to the last step will cause this problem. If the vehicle is just returned from the dealer this is probable. Ask the dealer to review STAR online S1608000300
- If it is not the above issue, the dealer will need to diagnose using the Witech dealer service tool.

My PTO does not turn on but the RPM increases

- This means the vehicle recognizes PTO mode but you may not be getting power to your hot shift solenoid. Work your way through the PTO wiring starting by checking the PTO fuse and relay and finishing at the PTO hot shift solenoid.
- If the solenoid is functioning correctly, there could be hydraulic or mechanical issues with the PTO.

My PTO turns on but there is no RPM increase.

- One simple reason is that the truck is in Mobile PTO mode. Check the cluster to ensure the truck is in the correct mode for the application. Especially after any service.
- If the vehicle is in Remote mode, the engine speed will be 900 RPMs until one of the VSIM remote set speed wires is grounded.
- Occasionally, vehicle upfitters will turn on the PTO with their own power, separate from the OEM PTO power circuit. If that is determined, treat the vehicle as if nothing happens when the PTO button is pressed.

Additional Reference Materials

- The PTO Schematics, located in Technical Information/PTO operation and Installation Guide section, provide a good overview of the PTO wiring and connectors.
- The VSIM, located in electrical wiring information, shows the location and wiring layout for this module.

On YouTube there are several videos found by searching Ram Trucks/Ram engineering videos. Look for: PTO 101 and PTO 201 which explain the PTO connections, plus several other videos on the VSIM and some lighting information.