



DirectDrive PLUS LLC

137 Westbrook Drive

Honey Brook, PA 19344

(610) 273-2071

2019+ INSTALLATION

and

OWNER'S MANUAL

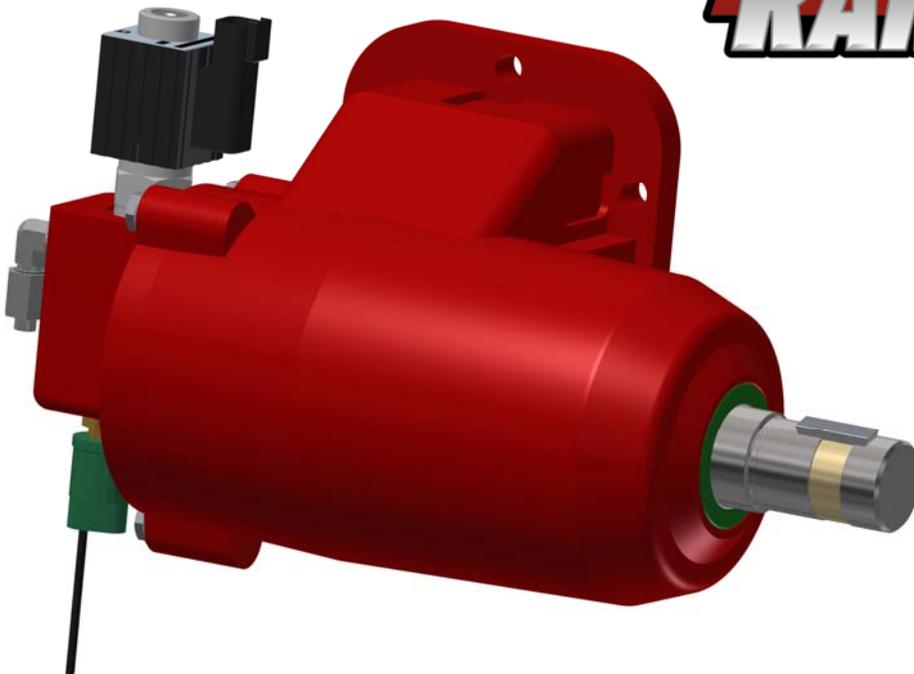


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1. SAFETY INFORMATION

General Safety Practices:

To prevent injury to yourself and/or damage to the equipment:

- Read carefully all owner's manuals, service manuals, and/or other instructions. If you find a section to be vague or unclear, call DirectDrive PLUS at (610) 273-2071 for clarification.
- Always follow proper procedures and use proper tools and safety equipment.
- Be sure to receive proper training.
- Never work alone while under a vehicle or while repairing or maintaining equipment.
- Always use proper components in applications for which they are approved.
- Be sure to assemble components correctly.
- Never use worn-out or damaged components.
- Always block any raised or moving device that may injure a person working on or under a vehicle.
- Never operate the controls of the Power Take-Off or other driven equipment from any position that could result in getting caught in the moving machinery.

Proper Choice of PTO Model:

WARNING: A Power Take-Off must be properly matched to the vehicle transmission and to the auxiliary equipment being powered. An improperly matched Power Take-Off could cause severe damage to the vehicle transmission, the auxiliary driveshaft, and/or to the auxiliary equipment being powered. Damaged components or equipment could malfunction causing serious personal injury to the vehicle operator or to others nearby.

To prevent injury to yourself and/or damage to the equipment:

- Always refer to catalogs, literature, and owner's manuals and follow recommendations when selecting, installing, repairing, or operating a Power Take-Off.
- Never attempt to use a Power Take-Off not specifically recommended for the vehicle transmission.
- Always match the Power Take-Off's specified output capabilities to the requirements of the equipment to be powered.
- Never use a Power Take-Off whose range of speed could exceed the maximum rated speed.

Cold Weather Operation of PTO:

WARNING: During extreme cold weather operation [32°F (0°C) and lower], a disengaged Power Take-Off can momentarily transmit high torque that will cause unexpected output shaft rotation. This is caused by the high viscosity of the transmission oil when it is extremely cold. As slippage occurs between the Power Take-Off clutch plates, the oil will rapidly heat up and the viscous drag will quickly decrease.

The Power Take-Off output shaft rotation could cause unexpected movement of the driven equipment resulting in serious personal injury, death, or equipment damage.

To prevent injury to yourself and/or damage to the equipment:

- Driven equipment must have separate controls.
- The driven equipment must be left in the disengaged position when not in operation.
- Do not operate the driven equipment until the vehicle is allowed to warm up.

SAFETY INFORMATION

WARNING: Rotating Auxiliary Shafts:

To prevent injury to yourself and/or damage to the equipment:

- Rotating auxiliary driveshafts are dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death.
- Do not go under the vehicle when the engine is running.
- Do not work on or near an exposed shaft when the engine is running.
- Turn off the engine and store the ignition keys in a safe location before working on the Power Take-Off or driven equipment. Exposed rotating driveshafts must be guarded.

If an auxiliary driveshaft is used and remains exposed after installation, it is the responsibility of the vehicle designer and P.T.O. installer to install a guard.

WARNING: Using Set Screws:

WARNING: Auxiliary driveshafts may be installed with either recessed or protruding set screws. If you choose a square head set screw, you should be aware that it will protrude above the hub of the yoke and may be a point where clothes, skin, hair, hands, etc. could be snagged. A socket head set screw, which may not protrude above the hub of the yoke, does not permit the same amount of torqueing as does a square head set screw. Also, a square head set screw, if used with a lock wire, will prevent loosening of the screw caused by vibration. Regardless of the choice made with respect to a set screw, an exposed rotating auxiliary driveshaft must be guarded.

WARNING: Mobile PTO Operation:

Some Power Take-Offs may be operated when the vehicle is in motion. To do so, the P.T.O. must have been properly selected to operate at highway speeds and correctly matched to the vehicle transmission and the requirements of the driven equipment.

If in doubt about the P.T.O. specifications and capabilities, avoid operating the P.T.O. when the vehicle is in motion. Improper application and/or operation can cause serious personal injury or premature failure of the vehicle, the driven equipment, and/or the P.T.O.

Always remember to disengage the P.T.O. when the driven equipment is not in operation.

2. GENERAL INFORMATION

This booklet will provide you with information on correct installation of DirectDrive PLUS Power Take-Offs (P.T.O.'s). Proper installation and setup procedures will help you get additional and more profitable miles from your truck equipment and components.

It is important that you be sure that you are getting the right transmission/P.T.O. combination when you order a new truck. An inadequate transmission will overwork any P.T.O. in a short period of time. In addition, a mismatched transmission and P.T.O. combination can result in unsatisfactory performance of your auxiliary power system from the start.

If you have questions regarding correct P.T.O. and transmission combination, please contact DirectDrive PLUS at (610) 273-2071 or your local DirectDrive PLUS supplier. They can help you select the properly matched components to ensure correct and efficient applications.

Auxiliary Power Shafts:

An auxiliary power shaft transmits torque from the power source (PTO) to the driven accessory. The shaft must be capable of transmitting the maximum torque and R.P.M. required of the accessory, plus any shock loads that develop.

An auxiliary power shaft operates through constantly relative angles between the power source and the driven accessory, therefore, the length of the auxiliary power shaft must be capable of changing while transmitting torque. This length change, commonly called "slip movement", is caused by movement of the power train due to torque reactions and chassis deflections.

Joint operating angles are very important in an auxiliary power joint application. In many cases, the longevity of a joint is dependent on the operating angles. For more information on selecting and designing an acceptable auxiliary power shaft, see the following technical manual provided by Dana / Spicer: <http://www2.dana.com/pdf/J3311-1-DSSP.pdf>

3. APPLICATION GUIDELINES (RD200-1 and RD200-2)

The Ram 3500/4500/5500 Chassis cab models equipped with gas and diesel engines that have the PTO prep option "LBV" have the capability of mounting and controlling a PTO on the left side. The Aisin AS69RC automatic transmission can power devices up to 60HP and 250 ft. lbs. torque.

RD200-1 Specifications and Ratings:

- PTO Port: Left (Driver's Side / Order Code LBV)
- Maximum HP Load: 60 (See note under "PTO Limitations")
- Output Speed: 126% of engine RPM
- Maximum Output Speed: 2550 RPM
- Output Type: 1.25" round shaft, 5/16 Woodruff key
- Rotation: Engine (Counter-clockwise viewed from Driver's Seat)
- Minimum RPM: 1150 Engine RPM for Full Load (Torque Converter Lock)

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 as opposed to engine driven. The torque converter will lock at approximately 1150 engine RPM. What this means is that the PTO will function in stationary mode with the transmission in Park, or in mobile mode with the vehicle moving at approximately 7 mph and above (this speed varies depending on rear axle ratio) or in neutral. Because of this, the RD200 PTO system is not a suitable system for vehicle applications such as: 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.

HP is electronically limited by engine ECM. Actual output may be reduced by 10-15% due to parasitic loads (alternator, a/c compressor, cooling fan, etc.) on engine. In our testing, we have seen consistent HP output of 53 HP and 160 FT LB with Cummins diesel engine.

4. OPERATION MODES

PTO Operation:

The customer will have the ability to operate the PTO in either a “stationary” or “mobile” mode. Under normal operation the vehicle will go to 900 rpm when PTO is engaged. By utilizing the cruise switches the idle speed can then be adjusted to between 900 and 2000 rpm’s.

NOTE: Due to emission requirements the gasoline engine PTO may have delay in engagement. It may require up to ten seconds for the PTO to engage.

Stationary Mode:

This feature interacts with the transmission to utilize an auxiliary PTO to drive equipment. Activated by a switch inside the cab, this feature operates only when the vehicle is stationary.

Once active, the engine speed may be increased by holding the RES ACCEL button on the steering wheel or decreased by holding the COAST button. On the gasoline engine vehicle you must turn on the cruise control switch to enter this variable speed mode. This is the factory programmed setting.

If you need a single set speed, you will now be able to program it (and disable the cruise switches) via the Electronic Vehicle Information Center (EVIC) screen in the center of the cluster.

Stationary PTO is available only when the vehicle is stationary. When the truck is equipped with an automatic transmission, it must be in Park and the service brake must be released and functional. To operate the PTO in this mode the vehicle must meet the following conditions:

- Transmission in “park” position
- PTO switch has been activated
- Vehicle must be running
- No transmission, engine, accelerator, brake or clutch switch faults present
- PTO must be correctly installed using the RAM provided circuits

To operate the PTO via a remote switch, the customer must make sure the above conditions are met. It is vital for proper operation that the PTO and remote have been installed correctly, paying special attention to ensure the vehicle provided wiring has been connected properly. This is the responsibility of the installer of the PTO and switches/remote system.

Mobile Mode:

Mobile mode allows for use of the PTO when the vehicle is in motion. This feature, when activated by the menu available on the Electronic Vehicle Information Center (EVIC) screen in the center of the cluster, will allow you to enter mobile PTO mode when you press the PTO switch on the dash. When this feature is selected stationary PTO and Remote PTO features are not available. To activate the PTO in this mode the vehicle must meet the following conditions:

- PTO switch has been activated
- Vehicle must be in “park” position
- Parking brake must not be applied
- No transmission, engine, accelerator, brake or clutch switch faults present
- Vehicle must be running
- PTO must be correctly installed using the vehicle provided circuits

The operator may choose to use the PTO while the vehicle is moving. To do so, the PTO function must be activated prior to taking the vehicle out of “park”. This is accomplished by activating the PTO on/off switch. At this point the customer may place the vehicle in a forward or reverse gear and have PTO operation.

The PTO will also function in park and neutral but without an increase in idle speed. However, the accelerator pedal can be used to increase PTO speed. Mobile mode does not provide the exact same capability as a ‘live drive’ i.e. you cannot have PTO capability at zero vehicle speed in drive. However, some customers have had success with shifting the vehicle into neutral and allowing the vehicle to coast.

To disengage PTO operation and return to “standard vehicle operation”, simply turn the PTO on/off switch to the off position.

Remote Mode Features

Remote mode allows the use of an aftermarket auxiliary switch to actuate the PTO, or some automated/relay driven method to turn on the PTO. Presumably this will be from a location other than the cab of the truck.

Remote PTO can be calibrated for one to three selectable engine speeds.

Remote mode is the only method that accommodates multiple PTO speeds. Up to three different PTO speeds can be programmed. These speeds are programmed via the Electronic Vehicle Information Center (EVIC) screen in the center of the cluster (see page 2). The circuits that enable these multiple speeds are contained in the Vehicle System Interface Module (VSIM). The VSIM module is located under the dash on the driver’s side. The connecting wires are contained in the upfitter wiring kit and VSIM wiring kit.

Remote PTO feature has a higher priority than “Idle Up”. If the Remote PTO feature is active the, “Idle Up” switches are ineffective. The Idle Up or Stationary PTO feature cannot be activated until the Remote PTO relinquishes control.

To operate the PTO in this mode, the vehicle must meet the following conditions:

- transmission in “park” position
- Upfitter provider (on/off) switch has been activated
- Vehicle must be running
- No transmission, engine, accelerator, brake or clutch switch faults present
- PTO must be correctly installed using the vehicle provided circuits

Remote Throttle and Remote Throttle Switch (Cummins Only)

This feature allows the use of a 0-10K or 0-100K potentiometer to function as a remote throttle. By connecting the circuits K400, F856, and K128 to the each end and the movable center leg respectively, the potentiometer will function as a remote throttle. These circuits are located on a connector on the driver’s side of the transmission bellhousing area.

The wiring and for this and two functions below as well as schematics are contained in the upfitters wiring kit delivered with every vehicle. Circuit K129 must be connected to circuit V937 to turn on this feature.

Note: Remote throttle automatically disables the accelerator.

Note: These features must be enabled by the dealer on 2013 and early 2014 trucks.

Accelerator interlock (Cummins Only)

This allows the accelerator to be locked out when activated. This feature is often used in conjunction with remote PTO or remote throttle. While active, it disables the vehicles accelerator pedal typically for safety reasons. This feature is activated by connecting circuit K 810 to V937. Diesel only.

Switch Return

Electrical return/ground for switch circuits.

J1939 Interface (Cummins Only)

Cummins provides this interface to “gate” certain CAN messages for customer use. It is an industry standard three way connector located under-hood, 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, clutch switch engaged, wait to start lamp status and coolant temp.

More Information

More information on programing and wiring your PTO can be found on the RAM Body Builder Website at

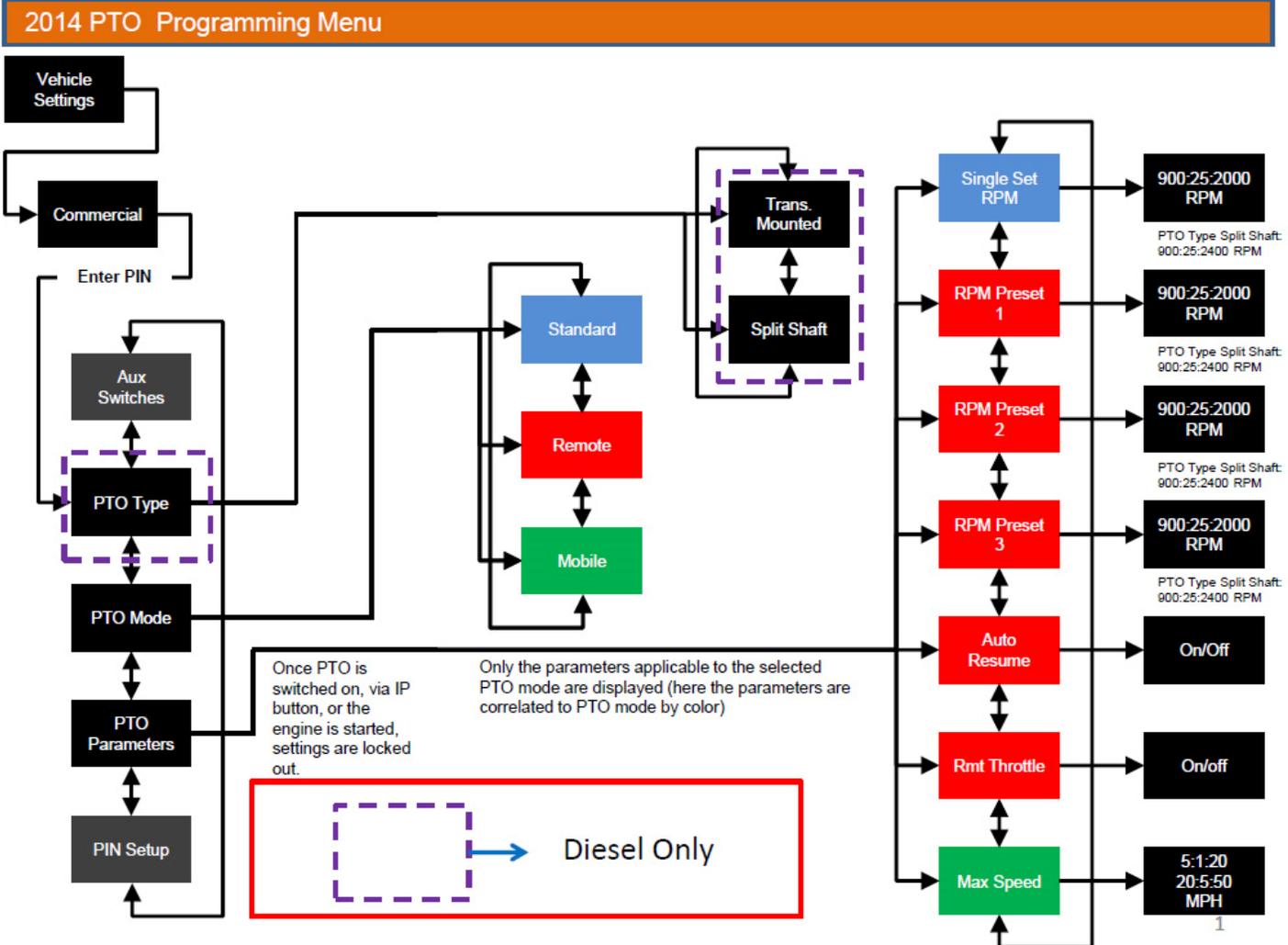
<http://www.ramtrucks.com/en/bodybuildersguide/>

5. INSTALLATION, PTO ACTIVATION PROGRAMMING

Illustrated below is the PTO programming menu contained within the Electronic Vehicle Information Center (EVIC). The EVIC is located between the Speedometer and Tachometer.

To access the PTO Programming menu, the key fob must be placed in the ignition and turned to the run position, but with the engine off. The PTO Programming menu can be accessed by navigating through the Vehicle Settings menu using the controls found on the steering wheel.

After selecting the Commercial Settings menu, a PIN will be required to enter the PTO Programming menu. The factory (default) PIN is 0000.



If you require a single set speed in standard mode, scroll through the PTO/Standard menu to Single Set RPM and set your speed.

If you require this speed or other settings to be 'locked' so that only approved people can reset the settings. Change the 4 digit PIN code by entering the PIN setup menu. Now only people who have the PIN code can change the settings.

Once you have the correct modes programmed, you can proceed to the quick start menu on the next page.

Settings must be made with the key in the run position but with the engine off

You must use remote mode with an aftermarket switch when using Hard Wired Remote Start/Stop

NOTE: The programming buttons may require multiple presses to actuate. Continue to press the button if the programming does not function on the first or second press.

SAFETY FIRST

These directions are for mechanics with experience in removing and installing drivetrain components.

Mechanics should be familiar with basic safety procedures in the use of jacks, tools and vehicle components.

The same Mechanic should see the project through from beginning to end.

SAFTEY FIRST



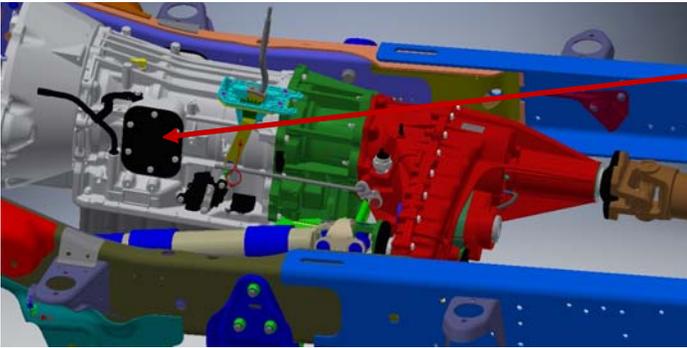
Securely Chock the wheels



Firmly Set Parking Brakes



Place the Keys/Fob in a secure location



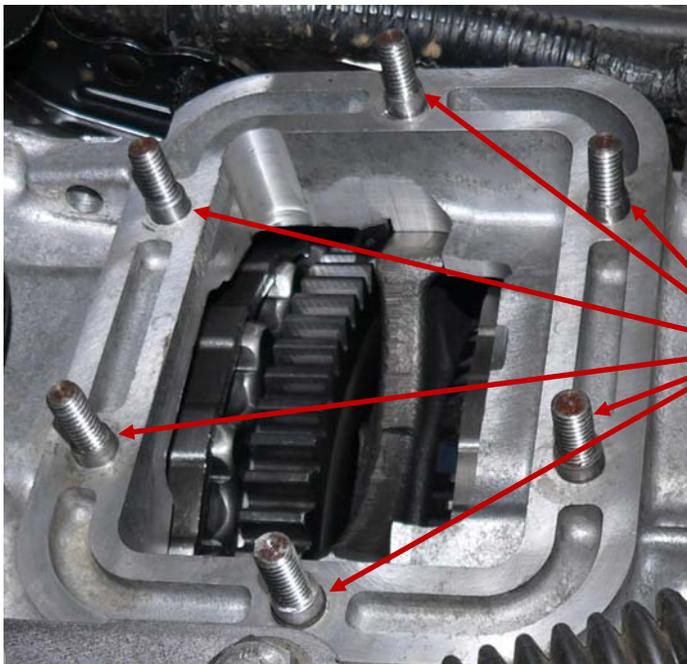
Remove bolts, cover plate and gasket from PTO port on left (driver's) side of transmission and discard.



Apply blue Loctite 242 to the large diameter of each mounting stud part # MAR-2041



(2) Jam nuts are provided in the installation kit for installing the studs into transmission. Thread two nuts onto one stud and lock together with 2 wrenches.



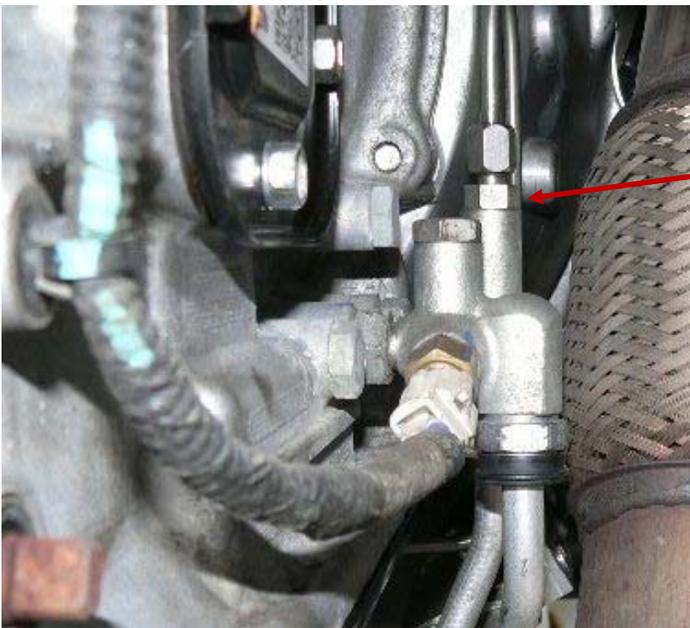
Turn the outer nut to install the stud in the transmission. Tighten firmly. Unlock jam nuts and move to next stud.

Install the six Mounting Studs as shown.

Discard jam nuts when completed.



Remove the two shift cable retaining bolts and move the cable out of the way.



On the right side of the transmission remove the plug on the front oil cooler line.

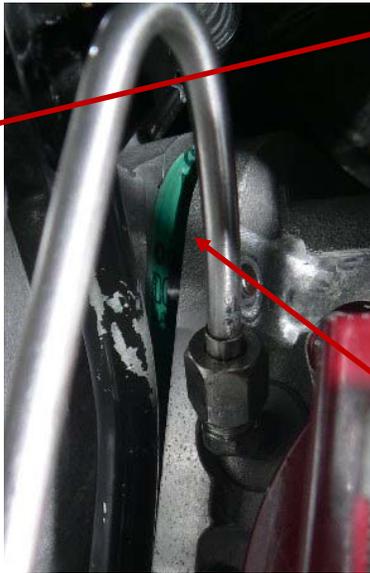
Install the straight fitting provided with the PTO.



Slip gasket part # MAR-2043 over the studs.



Place the PTO over the studs. Seat the PTO against the transmission, and thread a flange nut onto the bottom stud.



Pull the PTO away at the top.



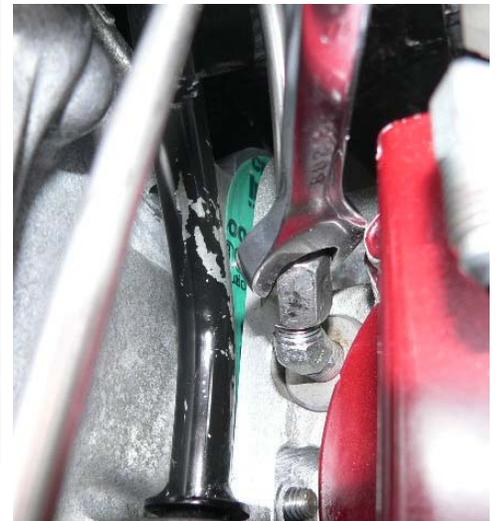
Right Side of Transmission

Do NOT install the oil line clamp at this time.



Remove the left front oil pan bolt and discard

Install the Oil Lubricating line as illustrated. You may need to re-shape the line to align properly. Tighten the line securely.





Seat the PTO against the transmission and install the remaining nuts on the studs.

Tighten to 30 Ft. Lbs. (40 Nm)

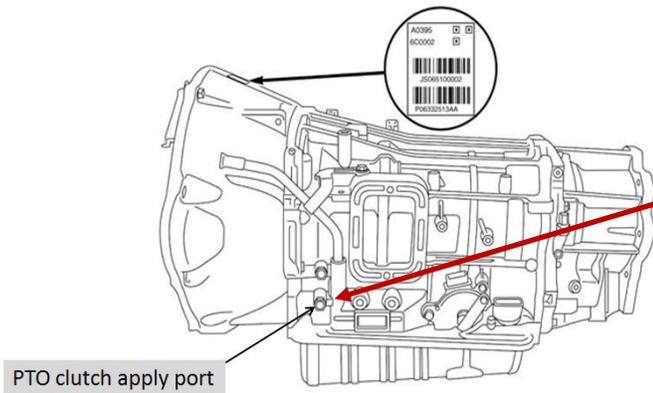


Install the oil line clamp as shown.

Use the bolt provided and adjust as necessary.

Aisin AS69RC PTO Clutch Apply Port

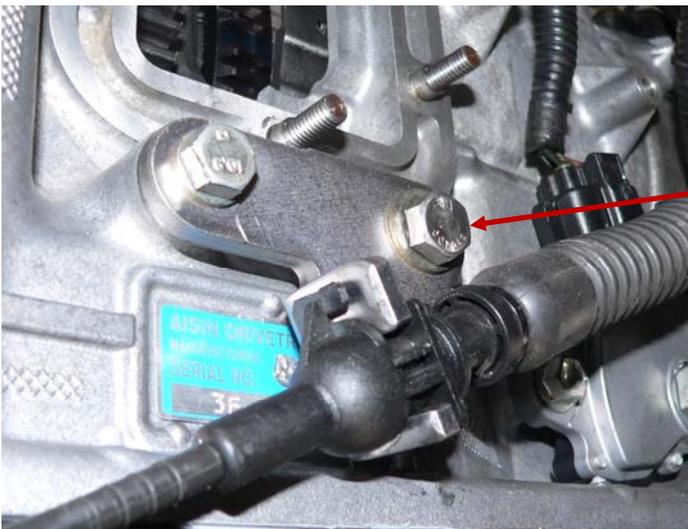
- Aisin AS69RC PTO Clutch Apply Port



Remove this plug from the left side of the transmission case .



Install the second straight fitting into the port and tighten .



Reinstall the Shift cable bracket.

Use 242 Loctite on bolts

Torque bolts to 9 Ft. Lbs. (12.5 NM)



Install the main pressure line.

Thread the top nut first, and the bottom nut second.

Tighten firmly using a 9/16 wrench



Not required for 2019 -2020 MY



Control wiring is composed of two harnesses.

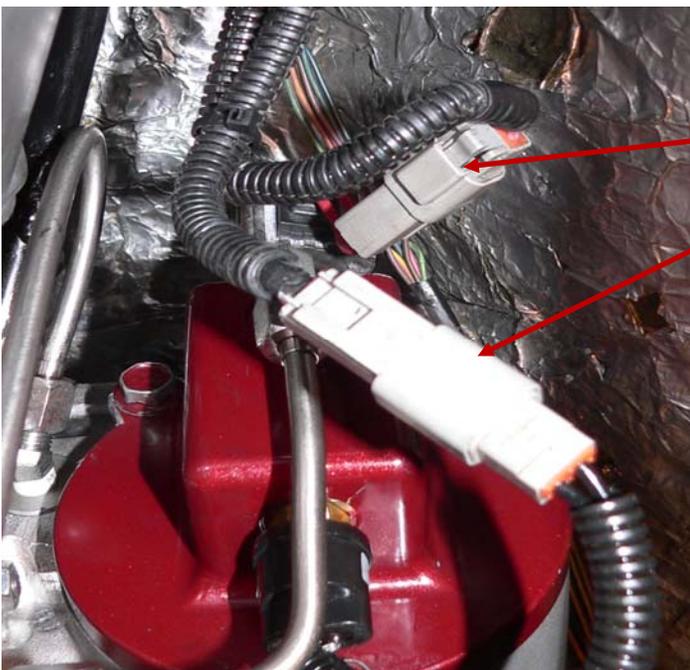
An under-dash harness and an under-hood harness.

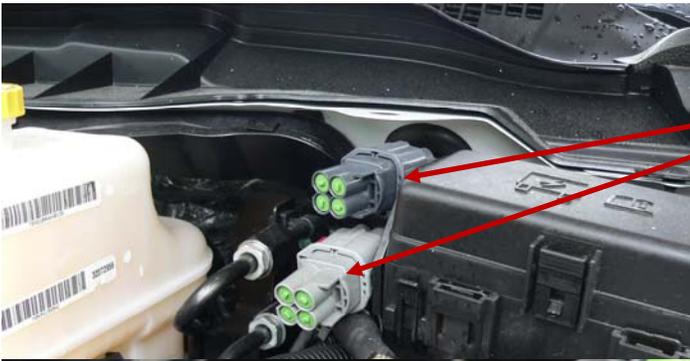
Install the Under-hood harness first.

Connect the two Deutsch connectors at the PTO.

Route the harness along the Transmission dipstick tube and secure with zip ties.

Be sure the harness is not chaffing on sharp edges or corners. Confirm that the harness is not in a position where it could be pinched by engine movement.





At the firewall next to the brake booster are two capped connectors.



On the light grey connector slide back the red lock, press the release and remove the connector cap.

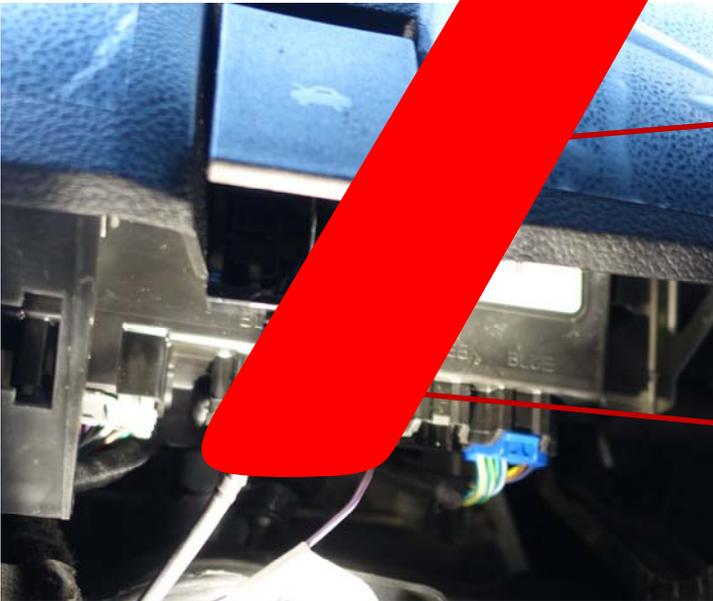


Insert the light grey connector of the underhood harness into the light grey firewall connector. Slide the red lock front.



Under the hood, locate the emergency brake mechanism and the 6 position connector.

Insert the 6 position connector of the under dash harness into the 6 position connector. An audible click can be heard when the connector is properly seated.



Insert the SIM behind the drivers knee panel.

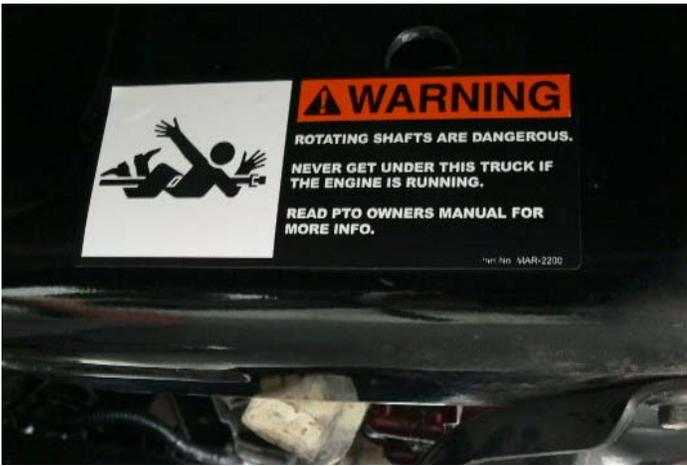
Insert the 6 position connector of the under dash harness into the 6 position connector position marked "DOWN".

Not required for 2019 –2020 MY

This completes the Control Wiring



IT IS VERY IMPORTANT THAT
WARNING LABELS
 ARE PLACED AT STRATEGIC LOCATIONS
 TO PREVENT PERSONS FROM BEING IN-
 JURED.



Place two (2) 2-3/4" x 6-3/4" warning labels, part number MAR-2200 on the vehicle frame rails (one (1) on each side), in a position that would be HIGHLY visible to anyone that may attempt to go under the truck near the rotating shaft.



Place one (1) 5/16" x 7" PTO installed label, part number MAR-2203, directly above the upfitter switches.



Place one (1) 4-1/2" x 8" safe operation label, part number MAR-2201, on the driver's visor.

Spare warning labels may be included with your shipment. If you require additional or replacement labels, please order at no charge from your local DirectDrive PLUS supplier or send request to: DirectDrive PLUS LLC, 137 Westbrook

Drive, Honey Brook PA 19344 or call

Customer Service at (610) 273-2071

Start the engine and check for oil leaks.

DO NOT GET UNDER THE TRUCK WHILE ENGINE IS RUNNING!!!!!!

Place the Owners Manual in the Truck

Check List

- Test Run and Checked for Oil Leaks (**DO NOT GET UNDER VEHICLE WHEN RUNNING!**)
- P.T.O. Mounting Bolts are Have Been Tighten
- Wiring Harness Properly Secured
- Warning Labels Installed on Frame
- Operations Label Installed in Cab
- Owners Manual Placed in Truck

6. PTO MAINTENANCE

Due to the normal and sometime severe torsional vibrations that Power Take-Off units experience, operators should follow a set maintenance schedule for inspections. Failure to service loose bolts or Power Take-Off leaks could result in potential auxiliary Power Take-Off or transmission damage. Periodic P.T.O. MAINTENANCE is required by the owner/operator to ensure proper, safe and trouble free operation.

Daily:

- Check all air, hydraulic and working mechanisms before operating P.T.O.
- Perform maintenance and repairs as required.

Monthly:

- Inspect for possible leaks and tighten all air, hydraulic and mounting hardware, if necessary.
- Torque all bolts, nuts, etc. to DirectDrive PLUS specifications.
- Perform maintenance and repairs as required.

Failure to comply entirely with the provisions set forth in the Owner's Manual will result in voiding of ALL warranty consideration.

**DIRECTDRIVE PLUS**

137 Westbrook Drive

Honey Brook PA 19344

(610) 273-9937

info@directdriveplus.com

Warranty Statement

APPLICABLE PRODUCTS: RAMDRIVE PLUS 4X2 PTO

EXPRESS WARRANTY: DirectDrive PLUS, LLC, ("DirectDrive") hereby warrants to the original and subsequent buyer(s) that above mentioned products manufactured by DirectDrive are free of defects in material and workmanship for a period of one (1) year from the date of shipment by DirectDrive or 15,000 miles, whichever occurs first. Within this warranty period, DirectDrive will cover parts and labor.

LIMITATIONS: DirectDrive's obligation is expressly conditioned on the Product being:

Subjected to normal use and service.

Properly installed and maintained in accordance with DirectDrive's Instruction Manual and Industry Standards as to recommended service and procedures.

Not damaged due to abuse, misuse, negligence or accidental causes.

Not altered, modified, serviced (non-routine) or repaired other than by an Authorized Service facility.

THE ABOVE EXPRESS LIMITED WARRANTY IS EXCLUSIVE. NO OTHER EXPRESS WARRANTIES ARE MADE. SPECIFICALLY EXCLUDED ARE ANY IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATIONS, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE; COURSE OF DEALING; OR USAGE OF TRADE.

EXCLUSIVE REMEDIES: If Buyer promptly notifies DirectDrive upon discovery of any such defect (within the Warranty Period), the following terms shall apply:

- Any notice to DirectDrive must be in writing, identifying the Product (or component) claimed defective and circumstances surrounding its failure.
- DirectDrive reserves the right to physically inspect the Product and require Buyer to return same to DirectDrive's plant or Authorized Service Facility.
- In such event, Buyer must notify DirectDrive for a Return Goods Authorization number and Buyer must return the Product F.O.B. within (30) days thereof.
- If determined defective, DirectDrive shall at its option, repair or replace the Product or refund the purchase price.

Absent proper notice within the Warranty Period, DirectDrive shall have no further liability or obligation to Buyer.

THE REMEDIES PROVIDED ARE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE. IN NO EVENT SHALL DirectDrive BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING, WITHOUT LIMITATION, LOSS OF LIFE; PERSONAL INJURY; DAMAGE TO REAL OR PERSONAL PROPERTY DUE TO WATER OR FIRE; TRADE OR OTHER COMMERCIAL LOSSES ARISING, DIRECTLY OR INDIRECTLY OUT OF PRODUCT FAILURE.