



DirectDrive PLUS LLC

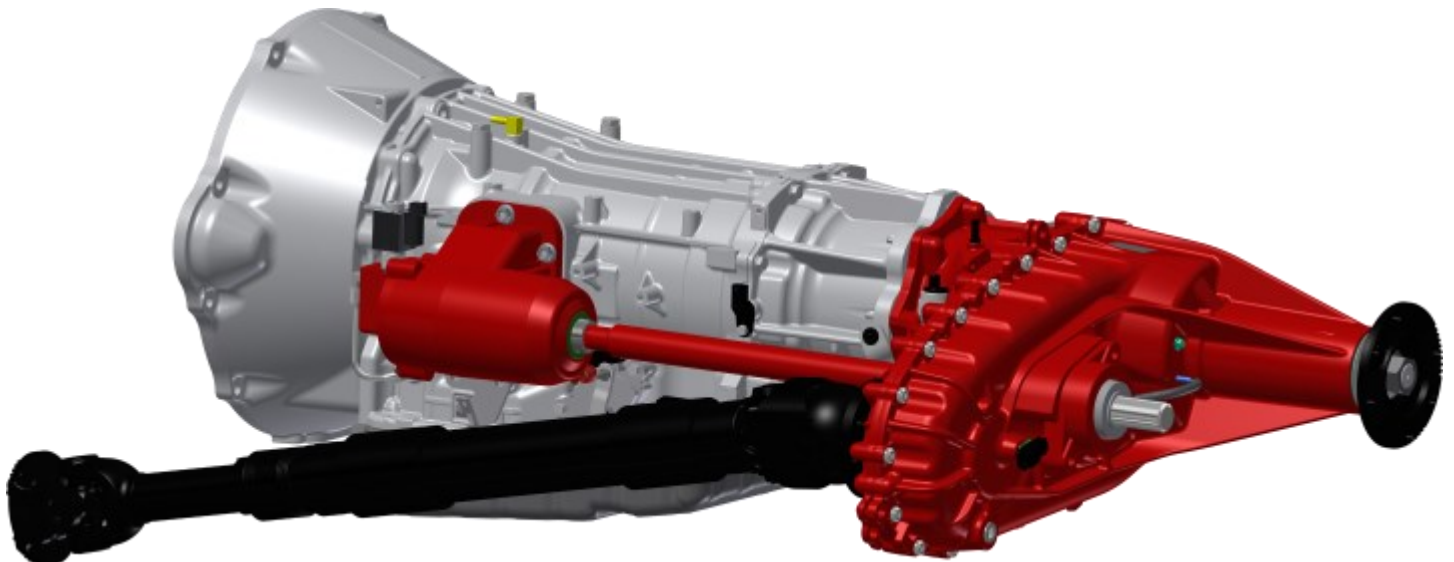
137 Westbrook Drive

Honey Brook, PA 19344

2022+ INSTALLATION

and

OWNER'S MANUAL



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.
- Driven equipment must be left in the disengaged position when not in operation.
- Driven equipment must not be operated 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 must be in “park” position
- PTO switch must be activated
- Vehicle must be running
- No transmission, engine, accelerator, brake or clutch switch faults may be 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 must be activated
- Vehicle must be in “park” position
- Parking brake must not be applied
- No transmission, engine, accelerator, brake or clutch switch faults may be 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 must be in “park” position
- Upfitter provider (on/off) switch must be activated
- Vehicle must be running
- No transmission, engine, accelerator, brake or clutch switch faults may be 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

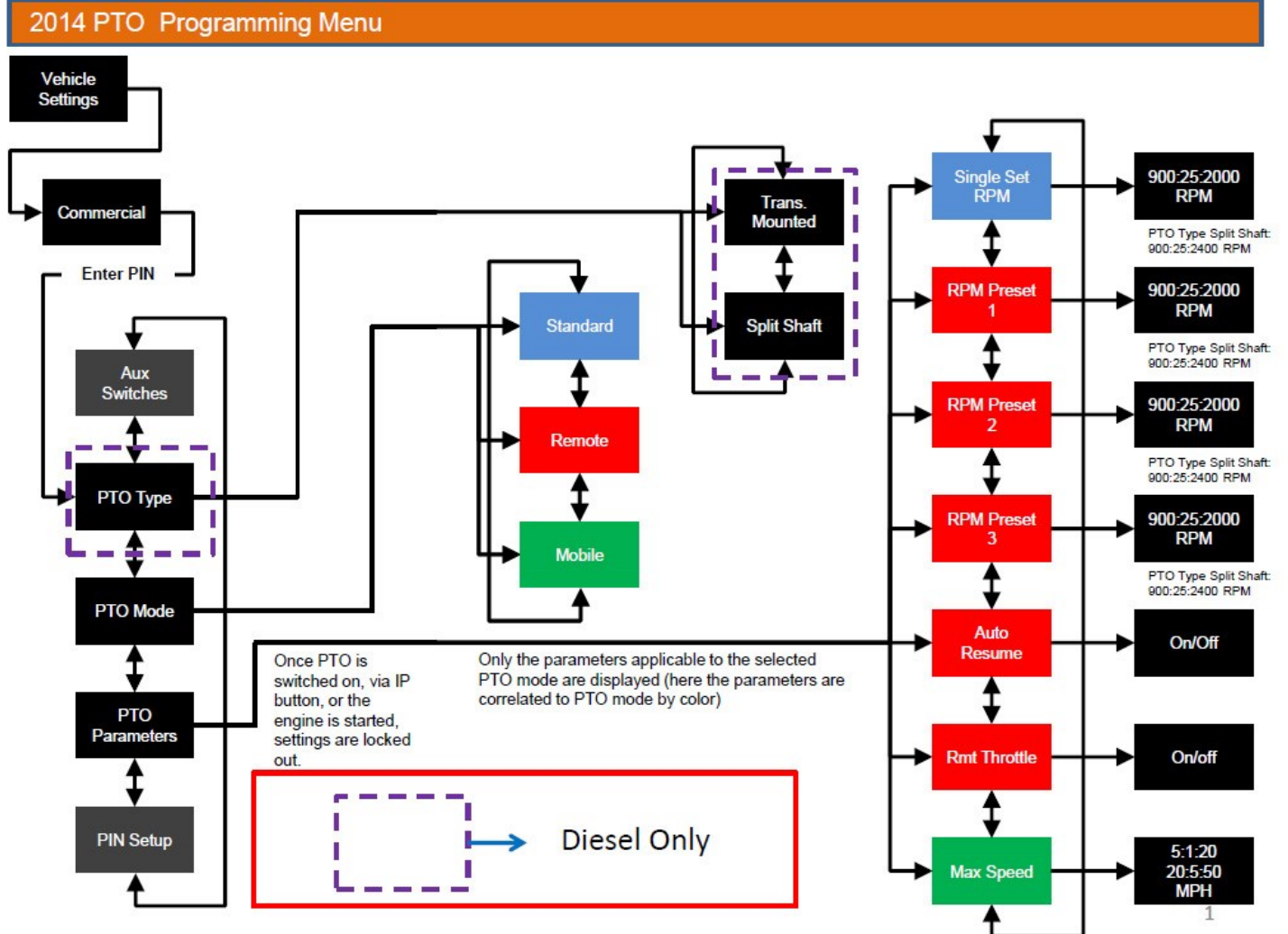
<http://www.ramtrucks.com/en/bodybuildersguide/>

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.



2014-2021 PTO Programming Menu

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.

2022+ PTO Programming Menu



CHASSIS CAB PTO PROGRAMMING MENU

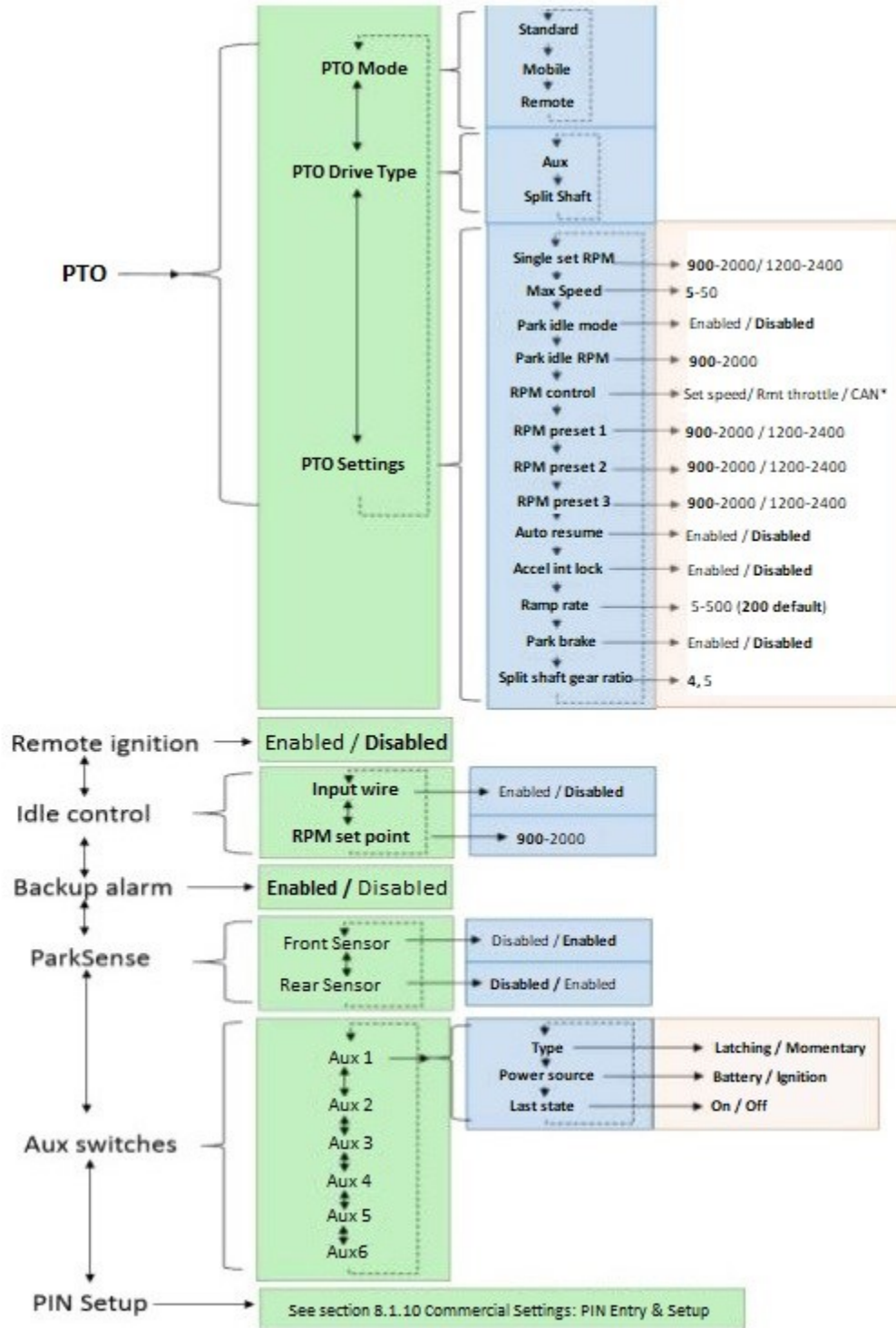
Below is the new PTO programming menu contained within the Electronic Vehicle Information Center (EVIC). The EVIC is located between the Speedometer and Tachometer. It is controlled using the buttons on the left hand side of the steering wheel. You will be able to access the PTO functions by scrolling to **Vehicle Settings** on low line vehicles and **Commercial Settings** on high line vehicles. The next screen is the PIN number entry screen. The factory set PIN is 0000. The vehicle will be factory set to stationary single mode with driver adjustable PTO speed. If this is the mode that is needed no change in settings is required.

- For Remote or Mobile Mode, change to the required mode. Note that each mode has its own set of **PTO Parameters**
- If you require a single set speed in **Standard mode**, scroll through the PTO/Standard menu/PTO Parameters to Single Set RPM and set your speed.
- If you require a single set speed in **Remote mode**, scroll through the PTO/Remote menu/PTO Parameters to RPM Preset 1 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 in the next section to show the correct wires to connect.
- **Note: These settings must be made with the vehicle in the run position but with the engine off.**
- **Note: Ensure that the settings are saved on the menu screen after entry. You can double check by exiting and re-entering the menu to confirm.**



Ram Chassis Cab PTO Programming Menu

STELLANTIS N.A. - Body Builder Instruction



Ram Chassis Cab PTO Programming Menu

STELLANTIS N.A. - Body Builder Instruction

PTO	PTO Mode	Standard		
		Mobile		
		Remote		
	PTO Drive Type	AUX		
		Splitshaft		
	PTO Settings	Single Set RPM	900-2000/1200-2400	★
		Max Speed	5-50	★
		Park Idle Mode	enabled/disabled	
		Park Idle RPM	900-2000	★
		RPM Control	Set Speed/Rmt Throttle/J1939	
		RPM Preset 1	900-2000/1200-2400	★
		RPM Preset 2	900-2000/1200-2400	★
		RPM Preset 3	900-2000/1200-2400	★
		Auto Resume	enabled/disabled	
		Accel Int Lock	enabled/disabled	
Ramp Rate		50-500 (200 default)	★	
Park Brake		enabled/disabled		
Gear Ratio	4,5			

Color Coding For PTO Menu
6.7L Cummins Diesel Only
Available only when in standard mode
Available only when in mobile mode
Available only when in remote mode
Available only when in standard or remote mode
Available whenever ignition is in run, engine is off
Available only in split shaft mode
Available only in AUX drive
Available in standard or remote mode on 6.7 Cummins Only
Bolded values are defaults
RPM range 900-2000 AUX drive, 1200-2400 Split Shaft

Numerical values' details

RPM: 900 to 2000 in steps of 25; 1200 to 2400 in steps of 25
 E.g. 900, 925, 950, ... etc.

Speed: 5 to 20 in steps of 1 (e.g. 5, 6, 7,...etc.) and 25, 30, 35, 40, 45 and 50.

Ramp Rate: 50 to 500 in steps of 50 (e.g. 50, 100, 150, ... etc.)

Ram Chassis Cab PTO Programming Menu

STELLANTIS N.A. - Body Builder Instruction

Installation Outline

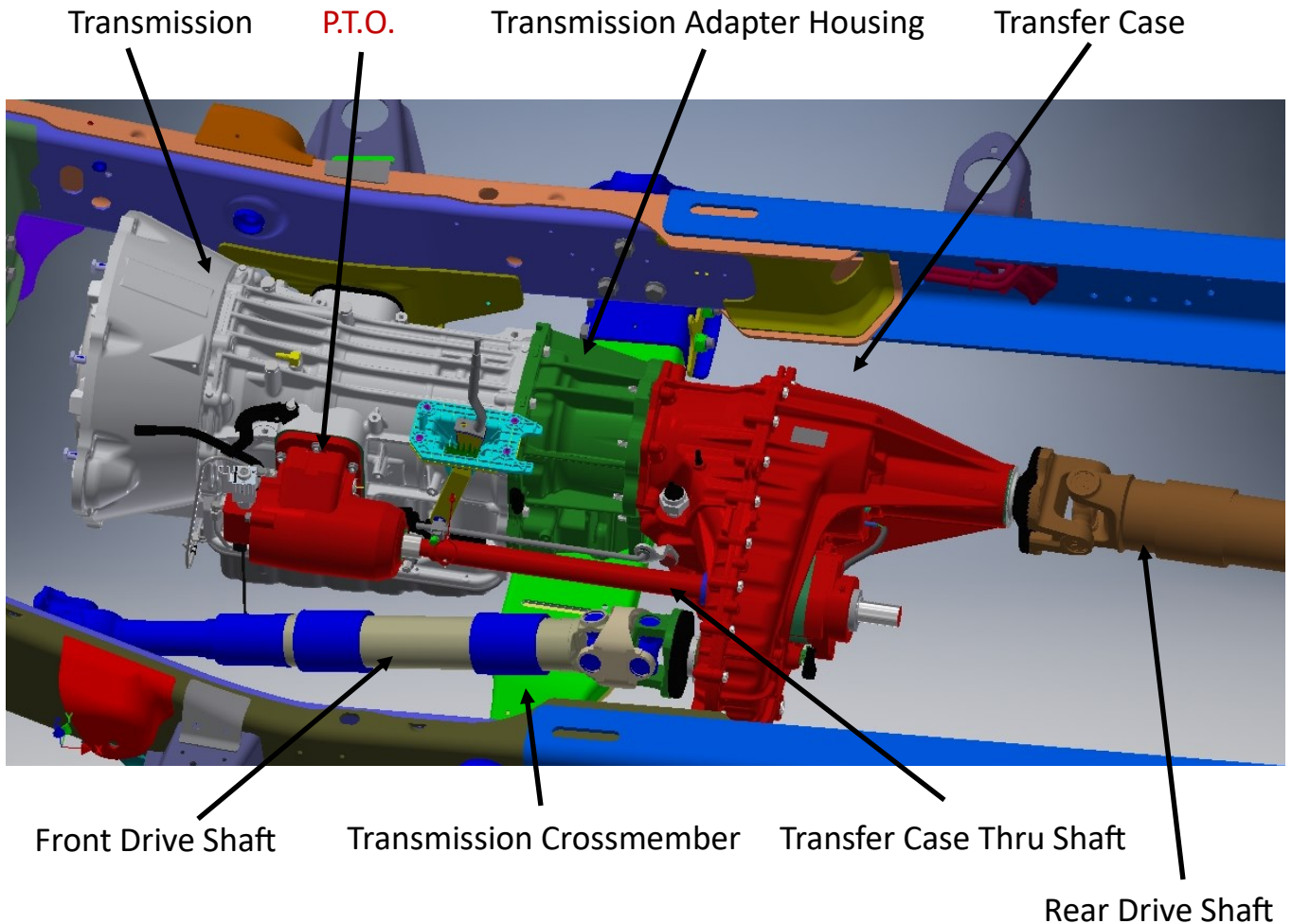
1. Overview of Installation	Page 9
2. Component Identification	Page 10
3. Safety First	Page 9
4. Remove Original Transfer Case	Page 12
5. Install Modified Transfer Case	Page 17
6. Install PTO	Page 20
7. Install Front Driveshaft	Page 32
8. Install Warning Labels	Page 33
9. Check List	Page 34
10. PTO Maintenance	Page 35

1. OVERVIEW

These directions explain how to remove the original equipment manufactures transfer case and install a modified transfer case and PTO system.

1. The original Transfer Case is removed
2. The modified Transfer Case is installed with the exception of a few components.
3. The PTO is installed and wired
4. The Transfer Case installation is completed.

2. COMPONENT IDENTIFICATION



3. 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.

SAFETY FIRST



Securely Chock the wheels



Firmly Set Parking Brakes



Place the Keys / Fob in a secure location

4. REMOVE THE ORIGINAL TRANSFER CASE



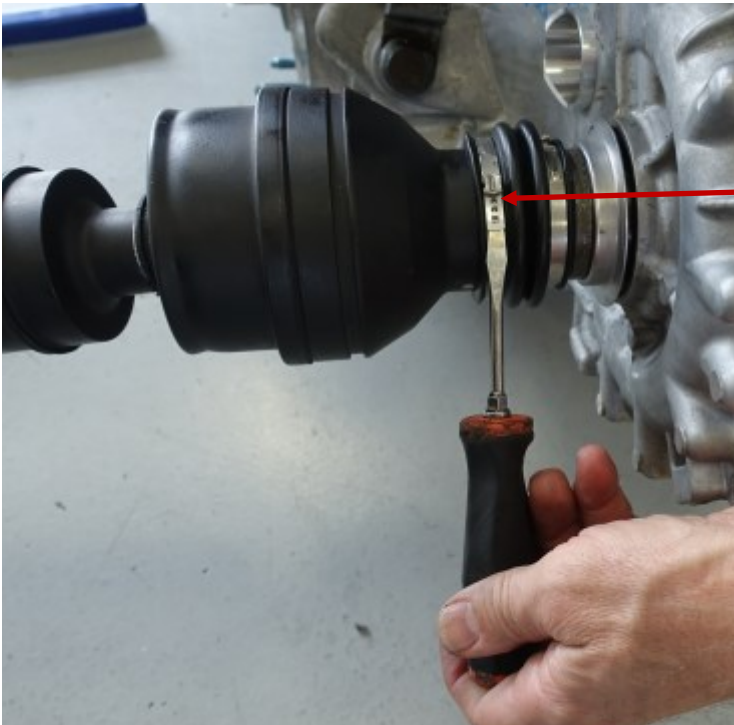
Remove the four bolts securing the Rear Driveshaft.



Move the Driveshaft up and to the side and secure it.



If equipped, remove the Skid Plate.



Remove the Front Driveshaft:

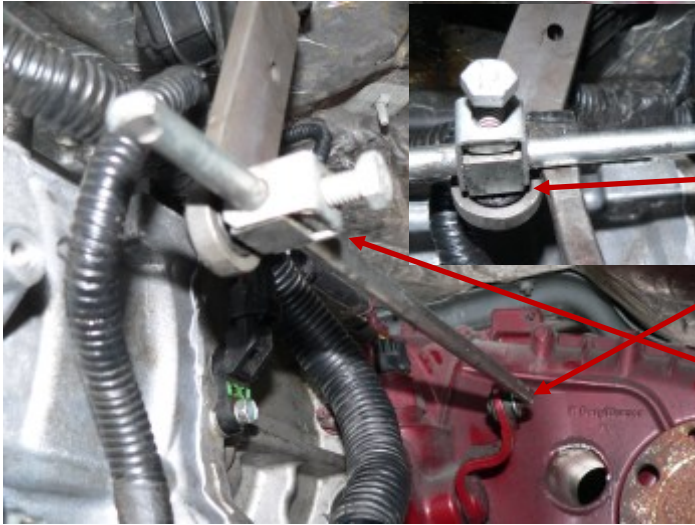
Release the **FORWARD** boot band by prying loose the latch tab. Remove and discard the band.



Roll the rubber boot back over itself to reveal the retaining clip access. Pry the retaining clip ears apart while pulling on the driveshaft.

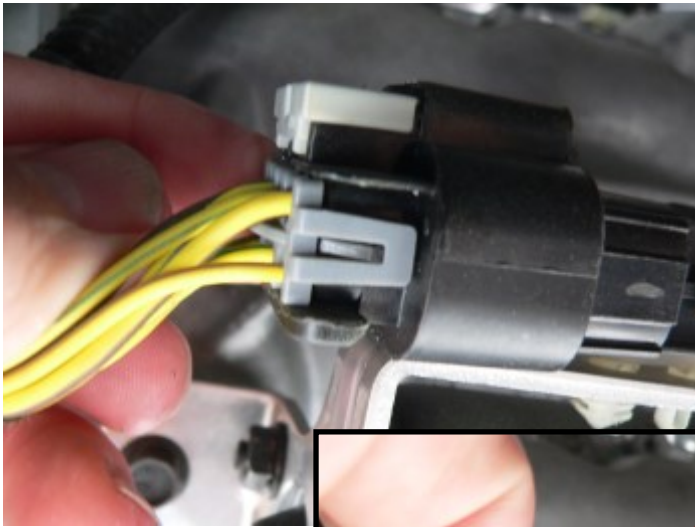
Lisle 44900 Lock Ring Plier or equivalent is recommended to spread the retaining ring.

Unroll boot back over itself to prevent it from becoming deformed.

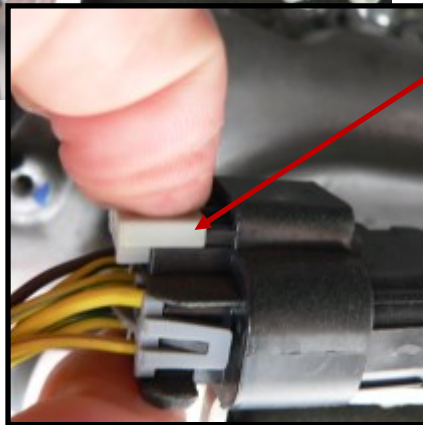


On Manual Transfer Case, remove the shift linkage by prying between the lever and the linkage.

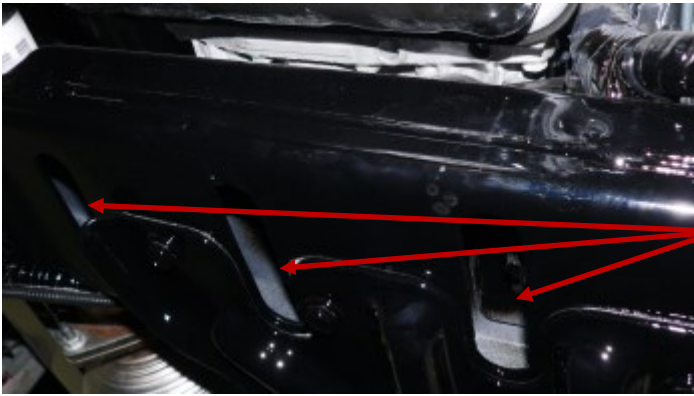
Do not loosen the set bolt!!!



On Electric Shift Transfer Cases, separate the electrical connection to the shift motor.



Slide back the lock and depress the tab.



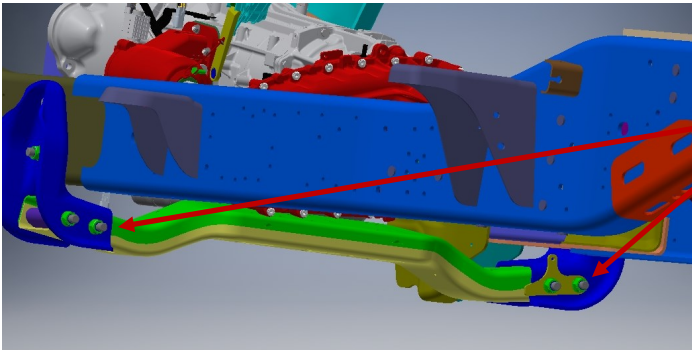
Remove the three 13mm nuts that secure the transmission mount to the transmission crossmember. These three nuts are accessed by the three slots in the underside of the crossmember.



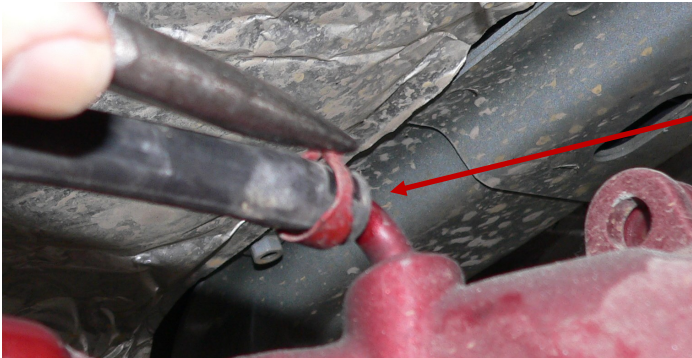
With a jack, support the transmission and lift slightly.



Place a piece of tape on the transmission crossmember marking the orientation.



With the transmission supported, remove the 4 bolts that retain the rear crossmember.



Lower the transmission 3 or 4 inches.

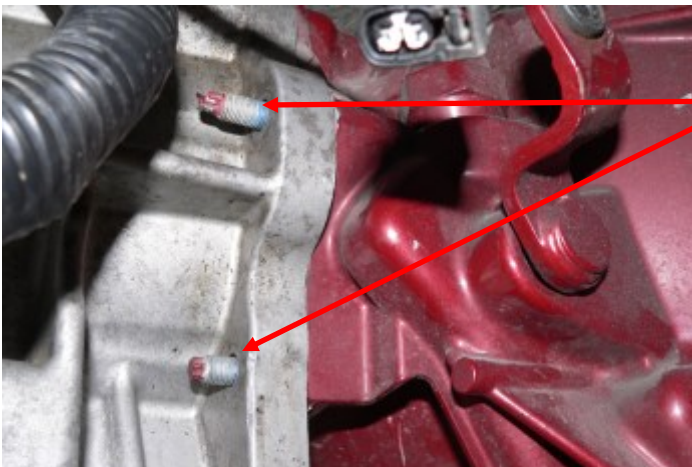
Using a needle nose pliers, squeeze the clamp on the vent line and remove the vent line.



On manual shift Transfer Case, disconnect the electrical connector near the shift lever.



Place a transmission jack under the transfer case and secure the transfer case to the jack following the jack manufacturer's recommendations.



Using a 9/16 wrench, remove the eight retaining nuts that attach the transfer case to the transmission adapter housing.

Slide Transfer Case back and lower jack.

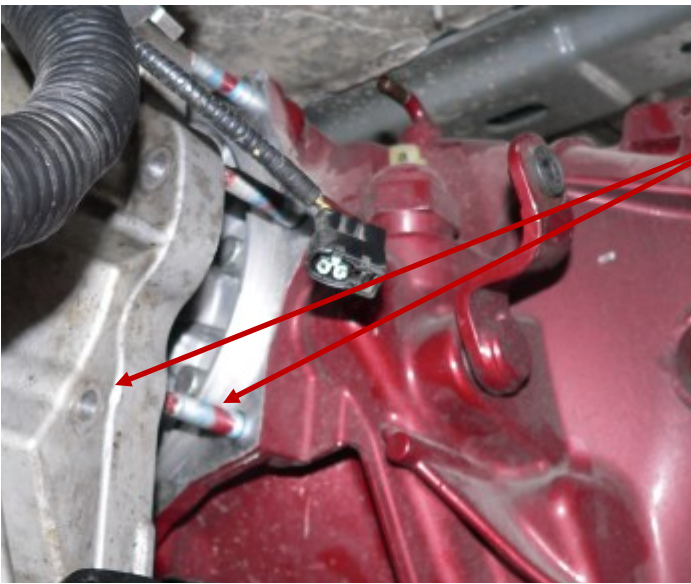
Set Transfer Case aside for return to DDP.

5. INSTALL MODIFIED TRANSFER CASE



Step 1

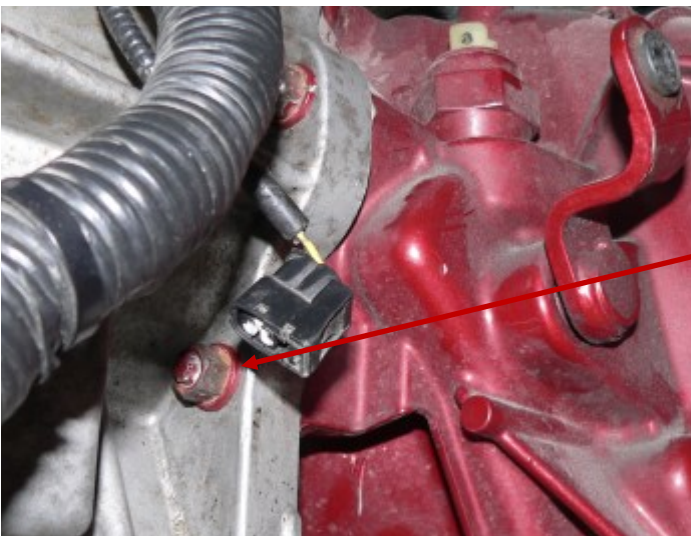
Properly secure the modified Transfer Case to a Transmission Jack following the jack manufacturer's directions.



Step 2

Align the Transfer Case mounting stud with the mounting holes in the transmission adapter housing.

It may be necessary to rotate the rear driveshaft flange to align the shaft splines as the Transfer Case is installed.



Step 3

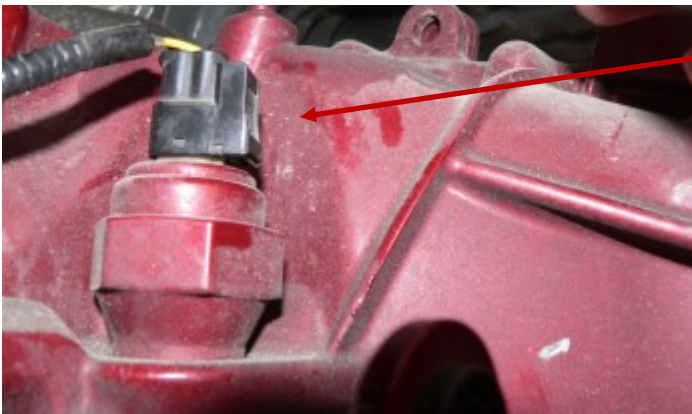
Install the eight mounting nuts to secure the Transfer Case to the Transmission Adapter Housing.

Torque Nuts to 30 Ft. Lbs. (40Nm)



Step 4

Reinstall the Vent Hose.



Step 5

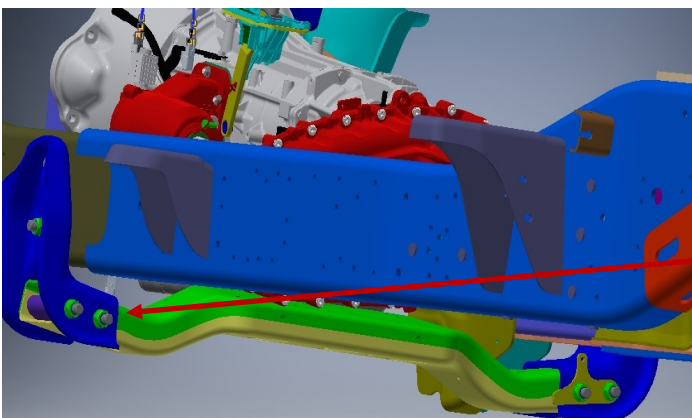
Remove the Jack supporting the Transfer Case.

On manual shift Transfer Case, reconnect the electrical connector near the shift lever.



Step 6

Using the Jack raise the Transmission to its original position.



Step 7

Reinstall the Transmission Crossmember taking into consideration the orientation.

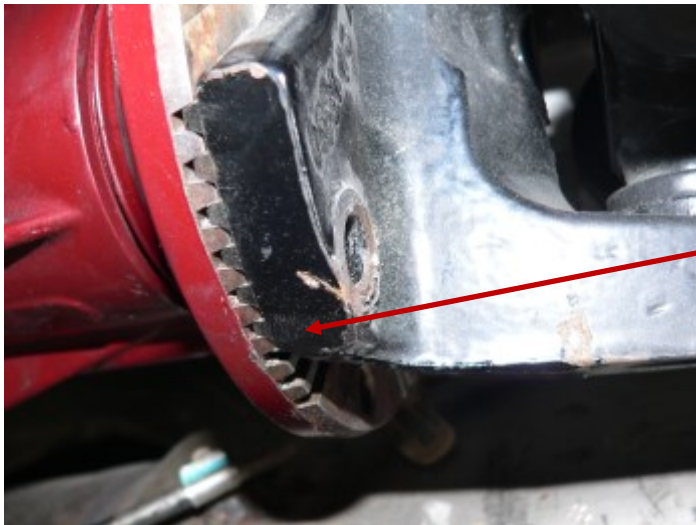
Torque the four mounting bolts to 94 Ft. Lbs. (127Nm).



Step 8

Install the three Transmission Mounting Nuts through the slots in the Transmission Crossmember.

Torque Nuts to 45 Ft. Lbs. (61Nm)



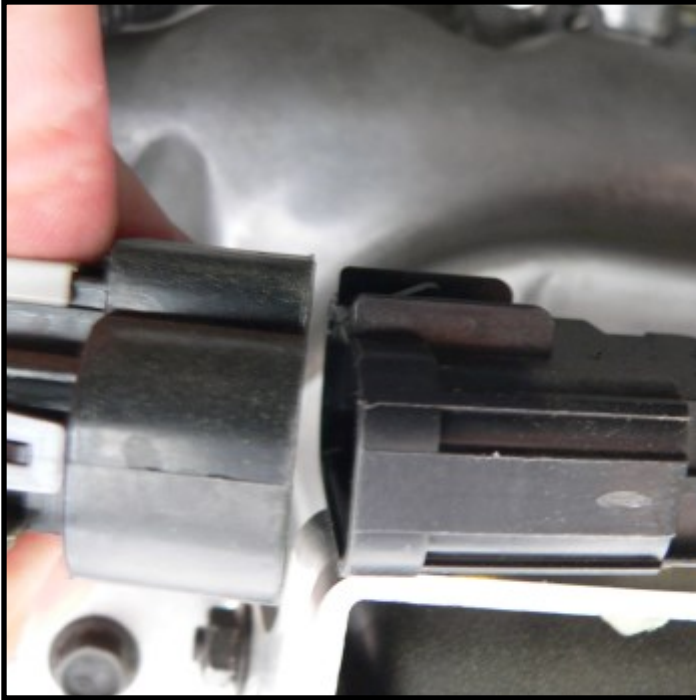
Step 9

Reinstall the Rear Driveshaft . Be careful to align the locating teeth on both flanges.



Coat Bolts with Blue Loctite Compound (242 or 243) and install.

Torque the bolts to 65 Ft. Lbs. (88Nm)

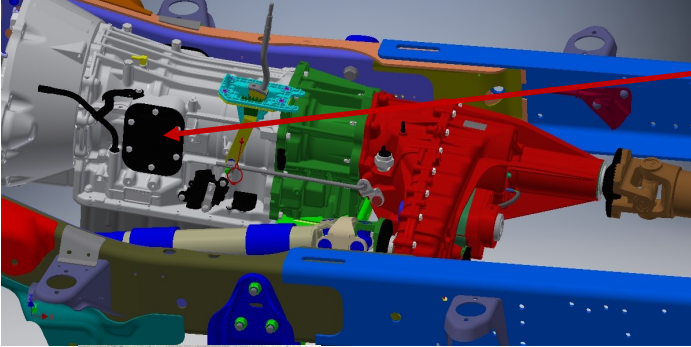


On electric shift Transfer Cases, reconnect the electrical connection to the shift motor.

!! CHECK OIL LEVEL IN THE TRANSFER CASE !!
USE MERCON LV

It is recommended to first install the PTO and PTO Shaft before installing the front drive shaft, shift linkage and skid plate.

6. PTO INSTALLATION



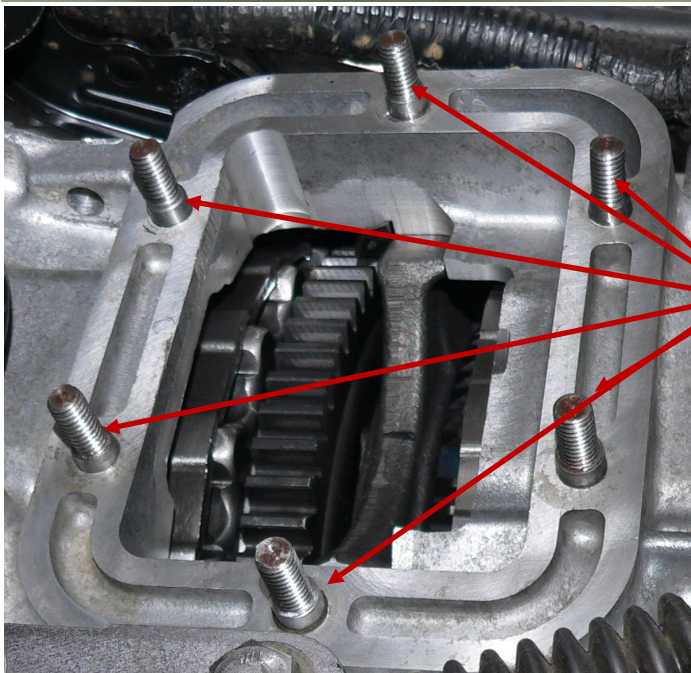
Remove bolts, cover plate and gasket from PTO port on left (driver's) side of transmission and discard.



Apply blue Loctite 243 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.



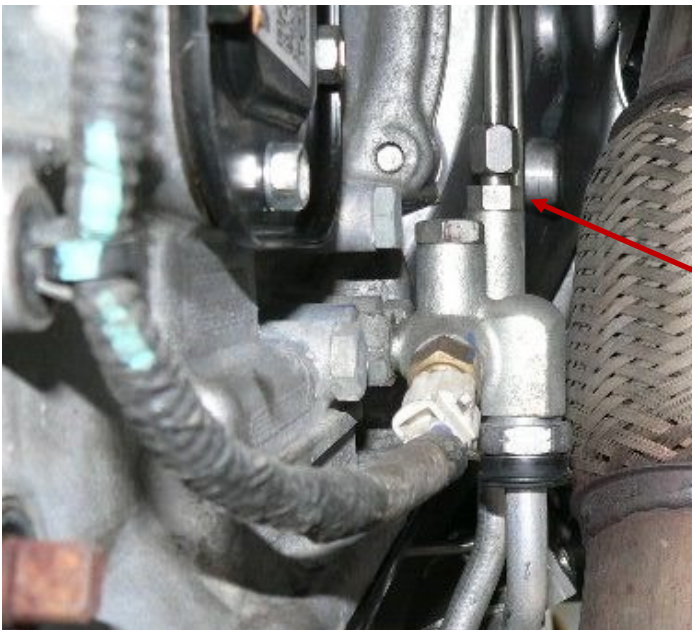
Turn the outer nut to install the stud into the transmission. Tighten firmly. Unlock jam nuts and move to the next stud.

Install the six Mounting Studs as shown.

Discard jam nuts when finished.



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

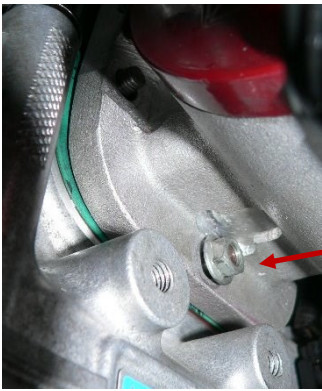


On the right side of the transmission remove the plug on the front oil cooler line.

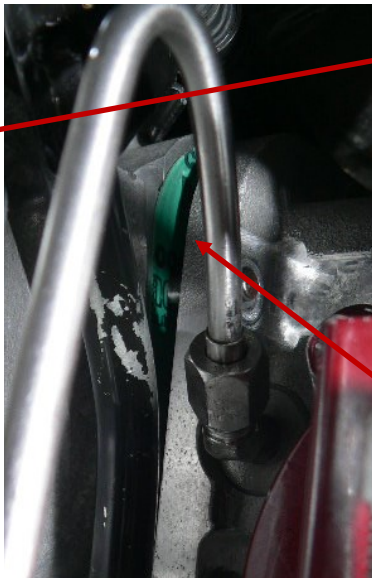
Install the straight fitting provided with the PTO.



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.

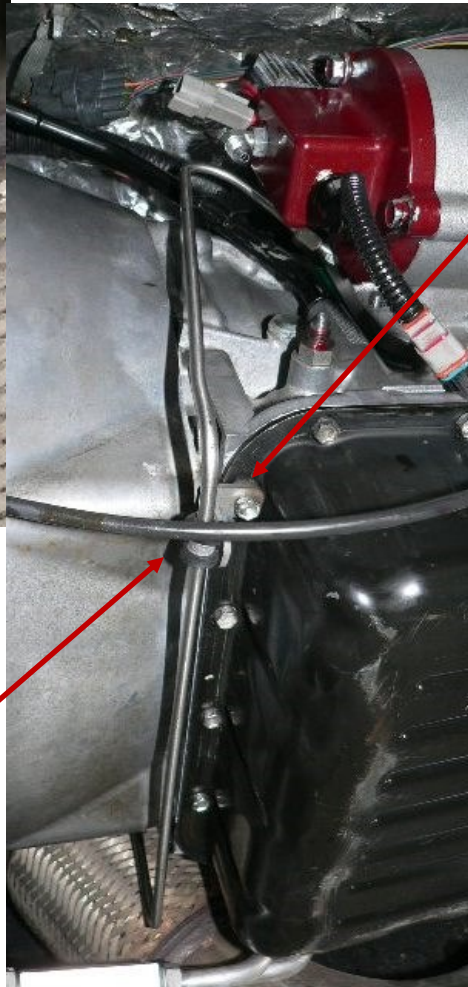


Pull the PTO away at the top.



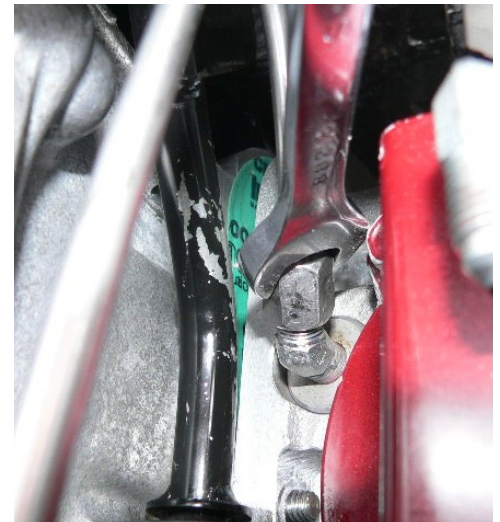
Right Side of Transmission

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)

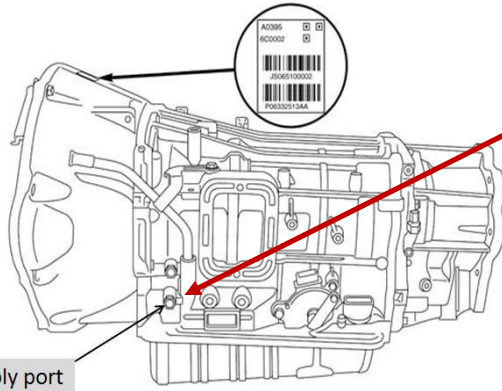


Install the oil line clamp as shown.

Use the bolt provided and adjust as necessary.

Aisin AS69RC PTO Clutch Apply Port

- Aisin AS69RC PTO Clutch Apply Port

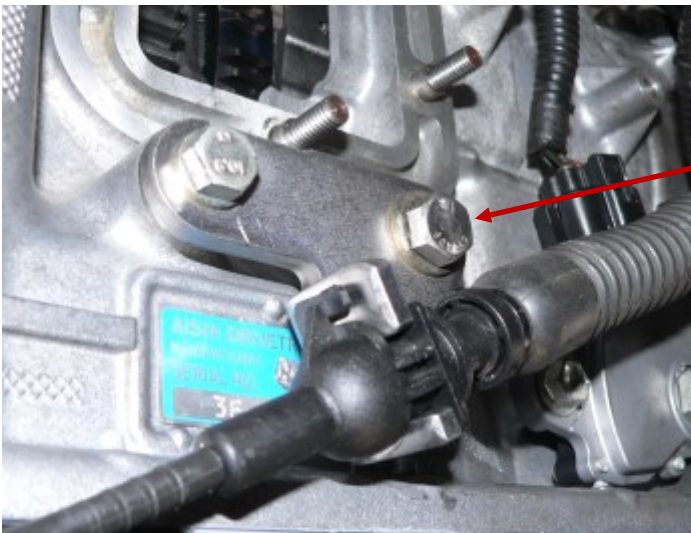


Remove this plug from the left side of the transmission case .

PTO clutch apply port



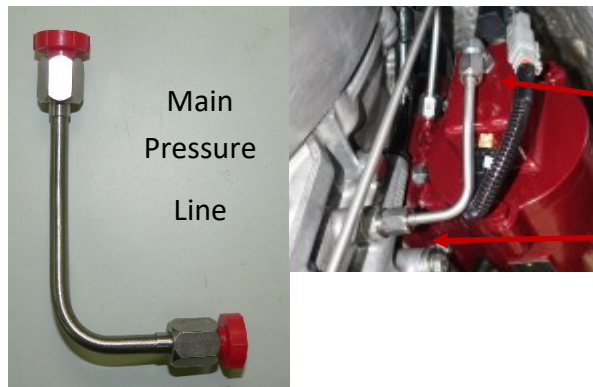
Install the second straight fitting into the port and tighten .



Reinstall the shift cable bracket.

Use 243 Loctite on the bolts.

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



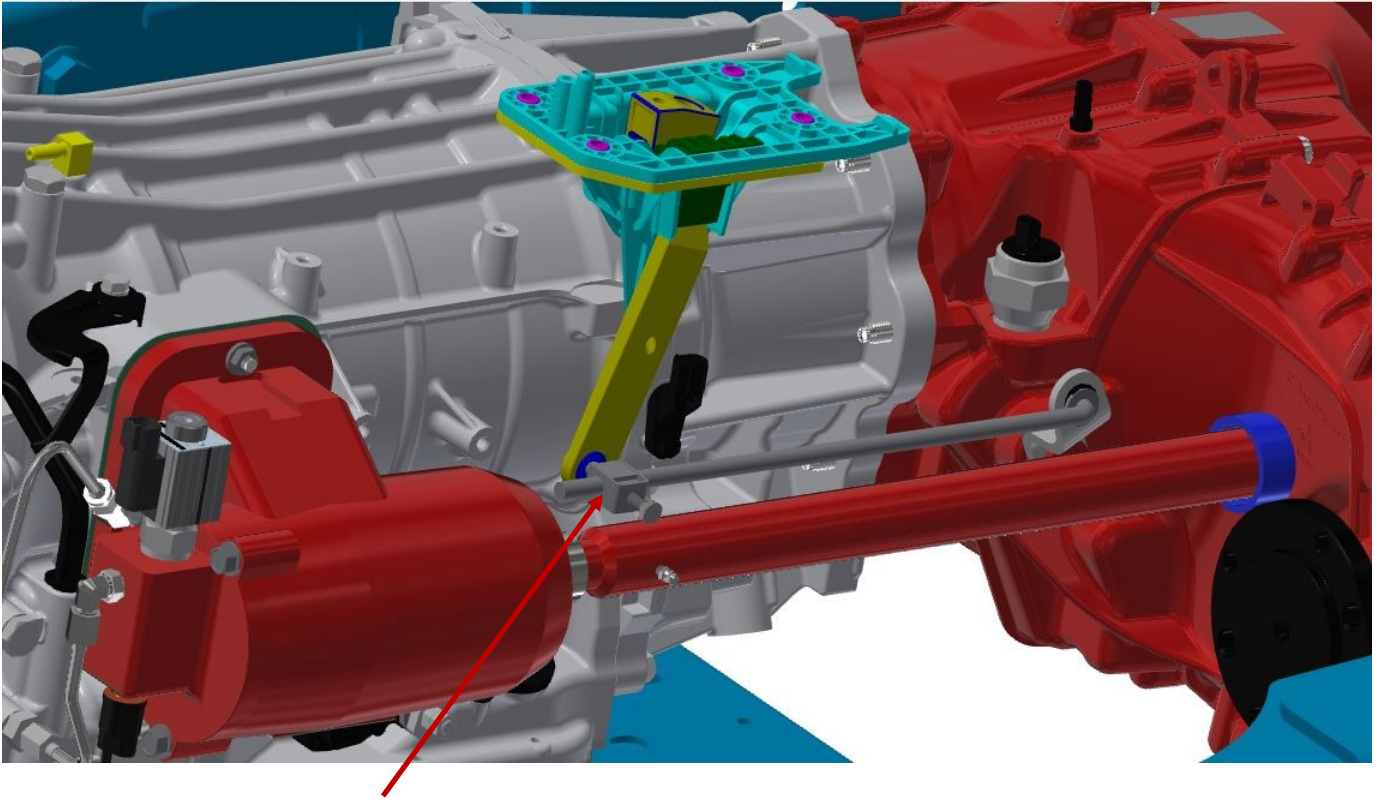
Install the main pressure line.

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

Tighten firmly using a 9/16 wrench.

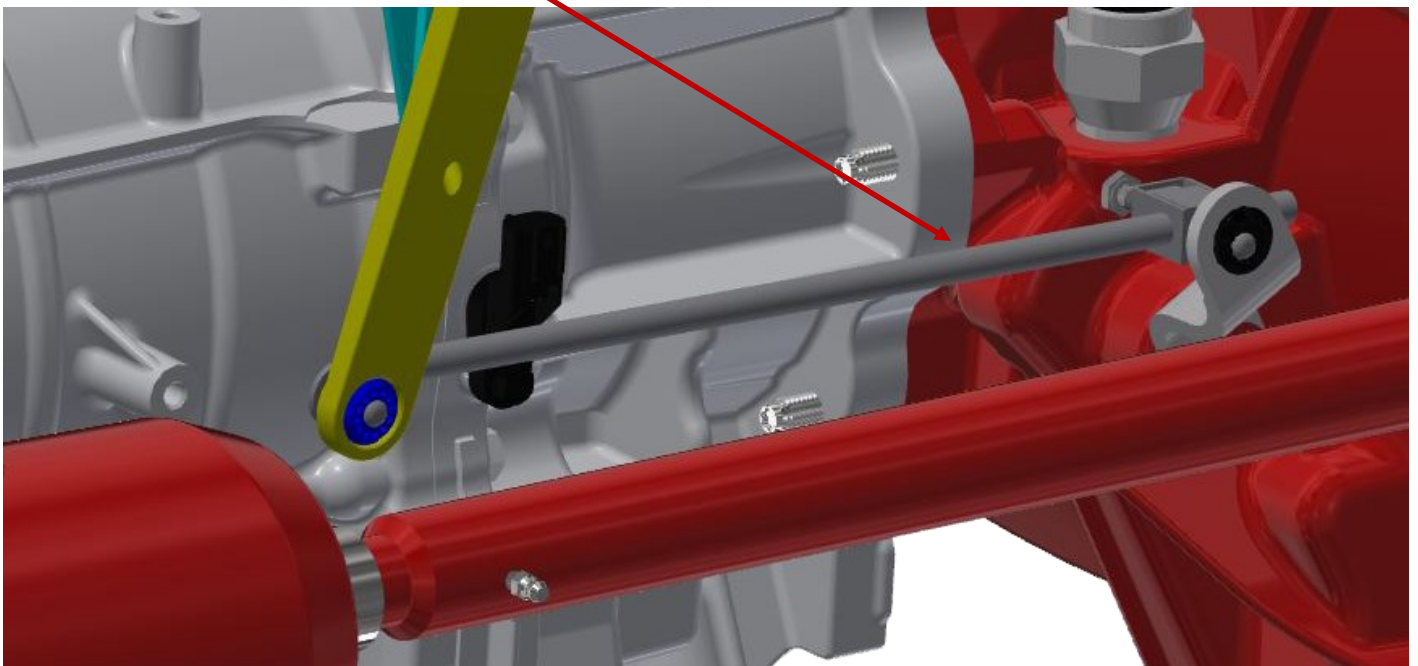


Install Shift Linkage (Manual Transfer Case)

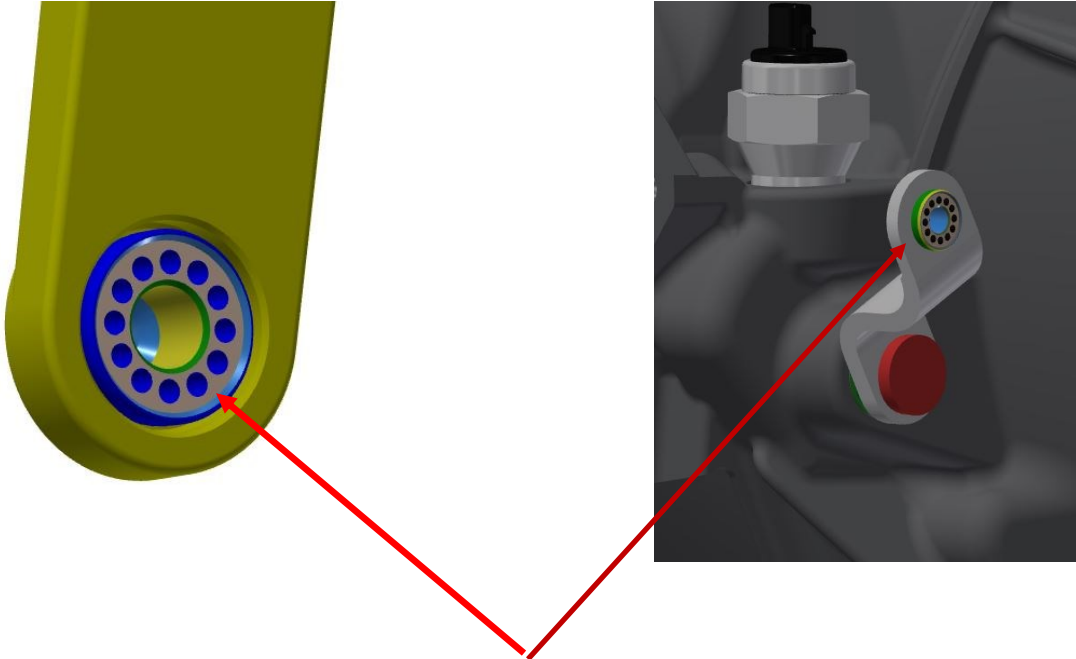


Picture depicts the factory orientation of the shift rod.

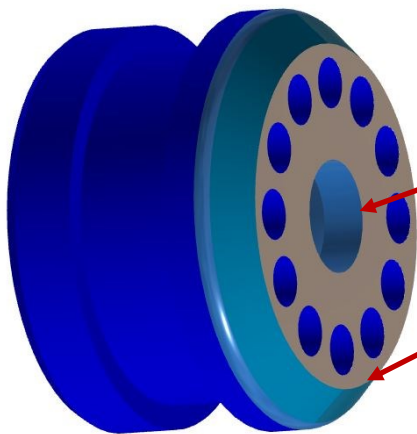
For the RamDrive system, the rod will be flipped end over end and inserted from the opposite side.



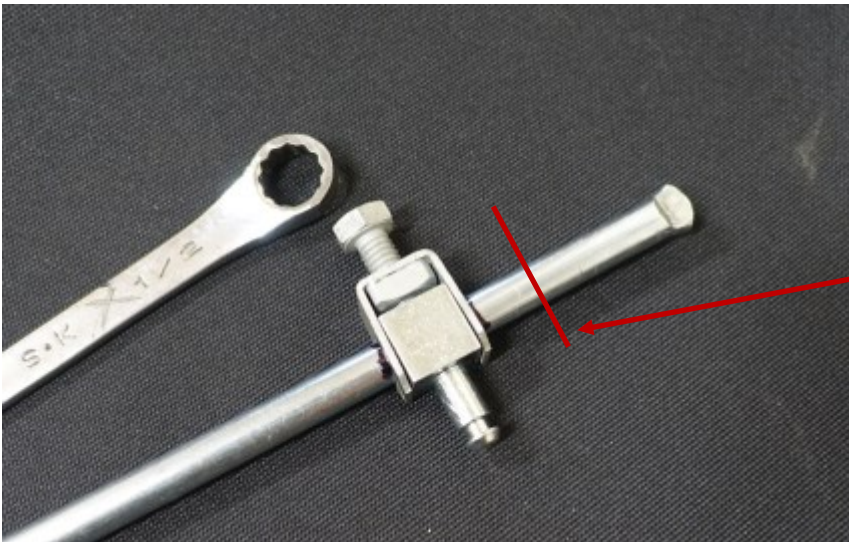
Before the rod can be installed the following modifications need to be made.



Using a blunt screwdriver, remove the rubber grommets from the shifter and the transfer case by pushing them through their mounting holes.



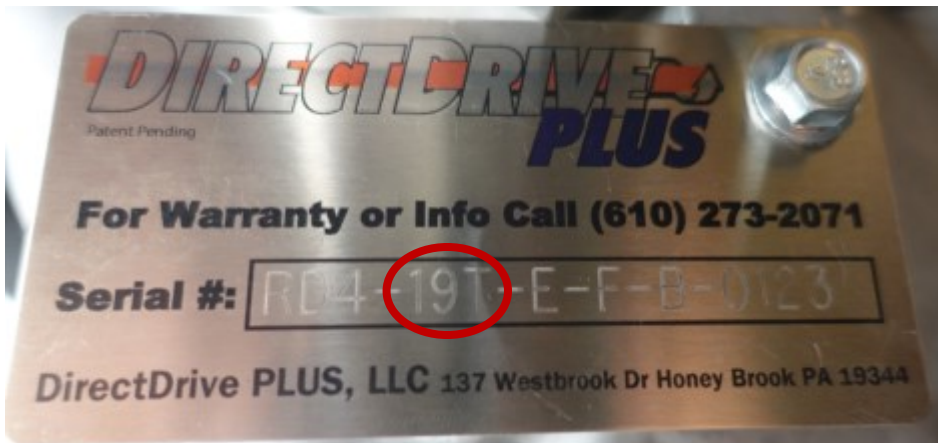
Reinstall the rubber grommet with the small hole and chamfered side towards the left outside of the vehicle.



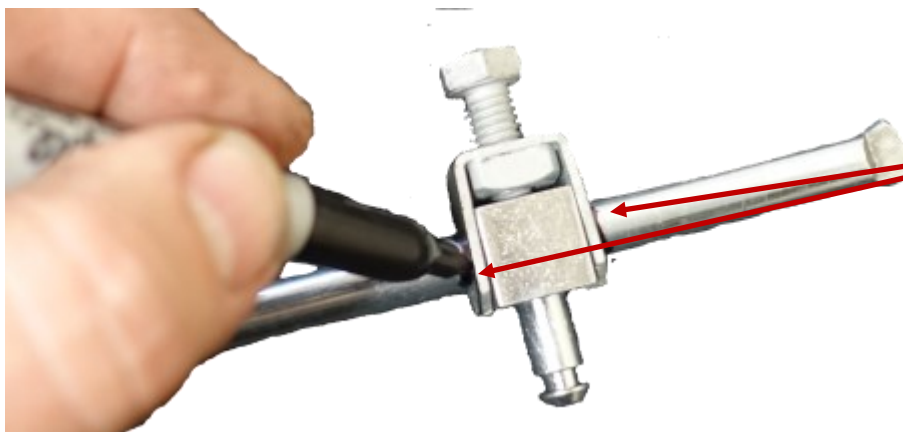
Cut the Shift Rod 1/2" from the Clamp.

TRANSFER CASE with a "19T" in the Model

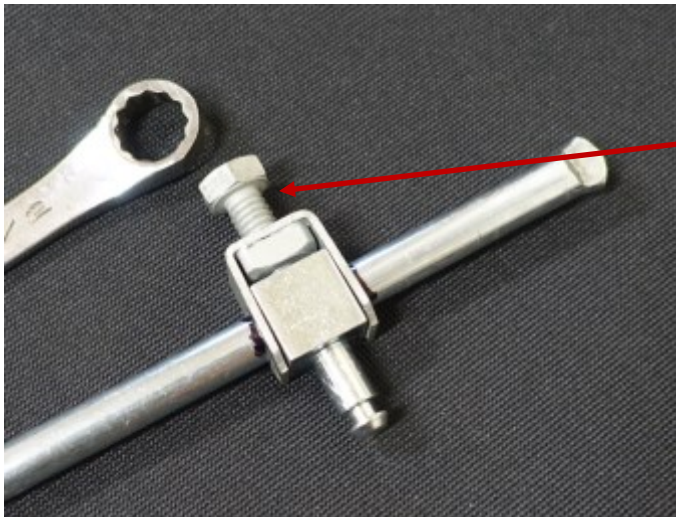
Additional modifications to the shift rod



On "19T" model transfer cases, the shift rod clamp bolt needs to be replaced with a set screw.



Mark the rod on both sides of the clamp



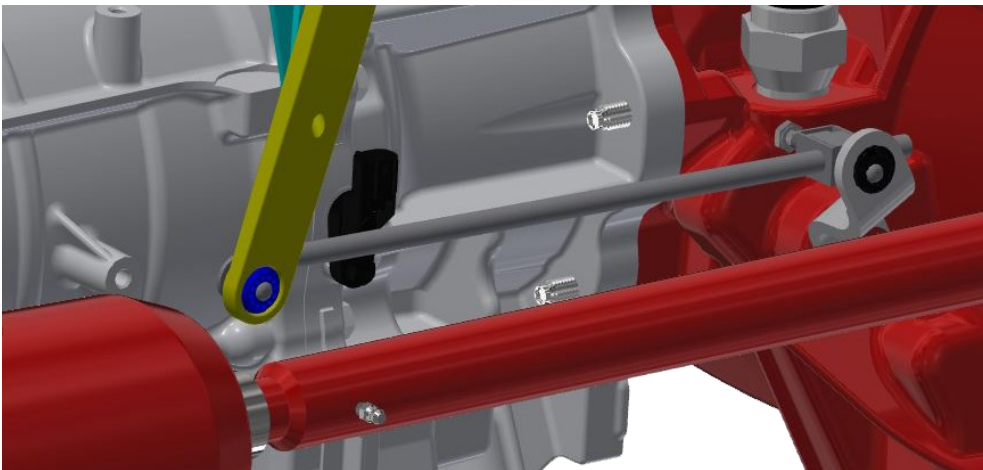
Using a 1/2" wrench, remove the bolt.



Replace the bolt with the set screw provided.



Verify the clamp is within the markings and properly oriented.



Install the shift linkage as illustrated.

1 1/4" Output Shaft (skip to p.37 for SAE Pump Mount)



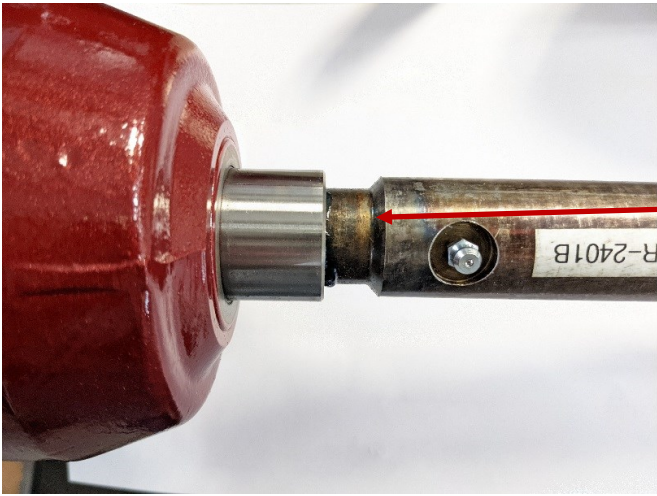
Insert the splined end of the Transfer Case Shaft through the rear opening of the Transfer Case.



Install the bearing assembly over the Transfer Case Shaft and over the threaded studs.



Install the two flange nuts and torque to 65 Ft. Lbs. (88Nm)



Adjust how far the Transfer Case Shaft is inserted into the PTO Output Shaft.

There should be approximately 1/2" between the nose of the PTO and the shoulder of the shaft.



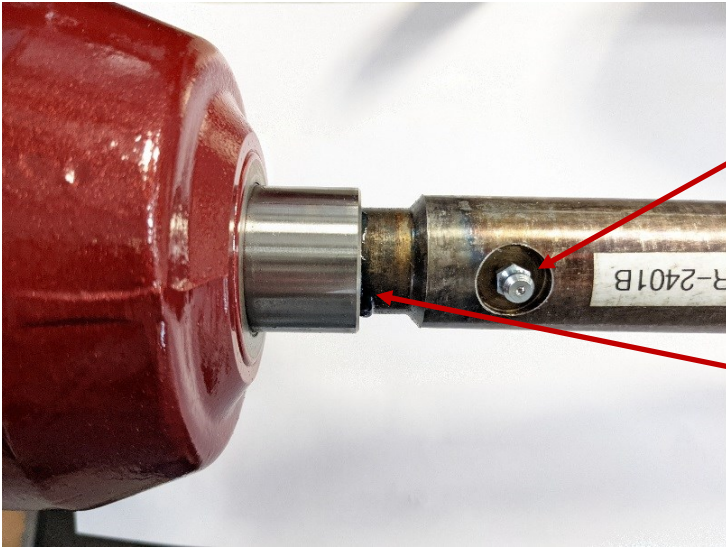
Install the collar onto the Bearing Assembly.



Using a #30 Torx driver, torque the set screw to 100 In. Lbs. (11Nm).



Double check the insertion of the Transfer Case Shaft into the PTO Output Shaft.



Install the grease zerk into the Transfer Case Shaft.

Grease with chassis grease until grease seeps from around the PTO output shaft.

SAE or MK Output



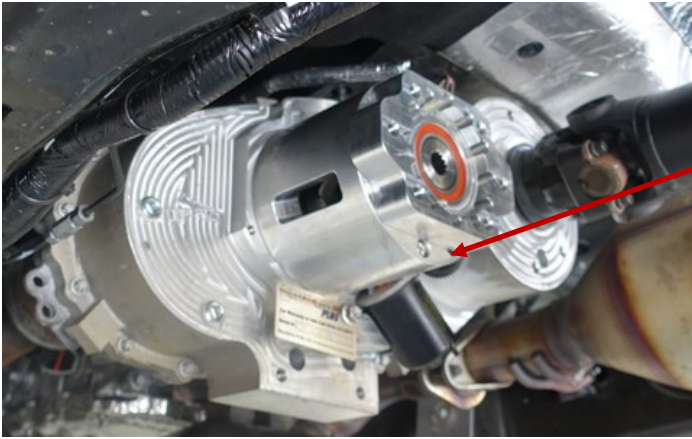
The Transfer Case shaft must be fastened into the SAE Flange U-joint before installing in the transfer case. Coat the setscrew with 243 Loctite and fasten firmly.



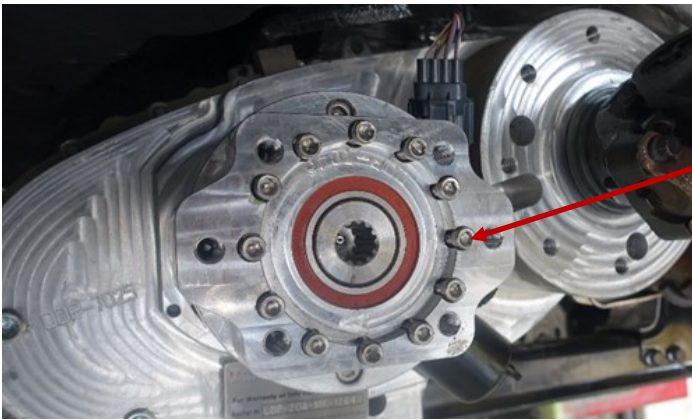
Install the shaft, spline first, through the rear of the transfer case.



Install the shaft spline into the PTO



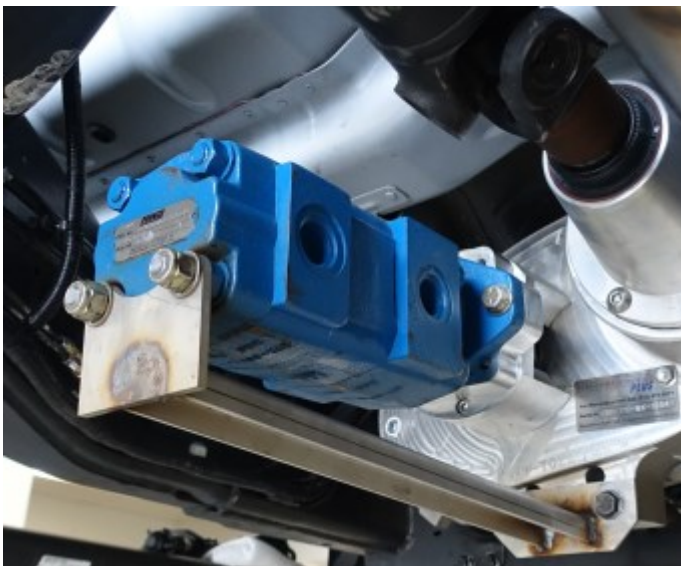
Using a soft mallet install the SAE flange into the mounting block, until the flange contacts the block.

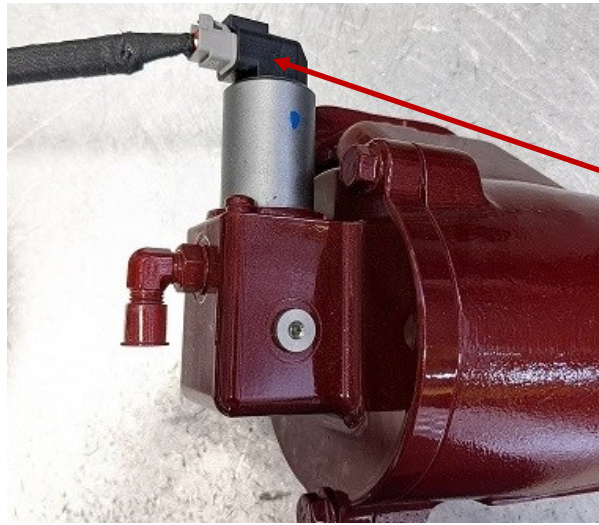


Align the flange mounting holes and install the provided fasteners. Torque fasteners to 25 Ft-Lb.

Applications with large hydraulic pumps need a supporting bracket fabricated and installed to support the pump.

(See Illustration below)





Install the Under-hood harness. →

Connect the Deutsch connector at the PTO.

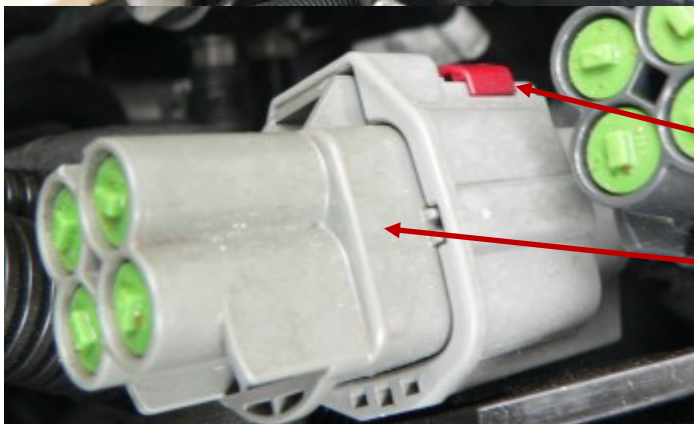
Route the harness along the Transmission dipstick tube and secure with zip ties.



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 under-hood harness into the light grey firewall connector. Slide the red lock front.

7. INSTALL FRONT DRIVESHAFT



Slip the front driveshaft over the transfer case stub shaft until the retaining ring locks. Verify that the retaining ring is locked by prying lightly between the transfer case and front driveshaft.



Use the supplied tool to crimp boot band.

Place tool nose over the raised portion of the band. Squeeze handles until clamp is snug.



Re-install the Skid Plate if equipped.

8. WARNING LABELS

IT IS VERY IMPORTANT THAT

WARNING LABELS

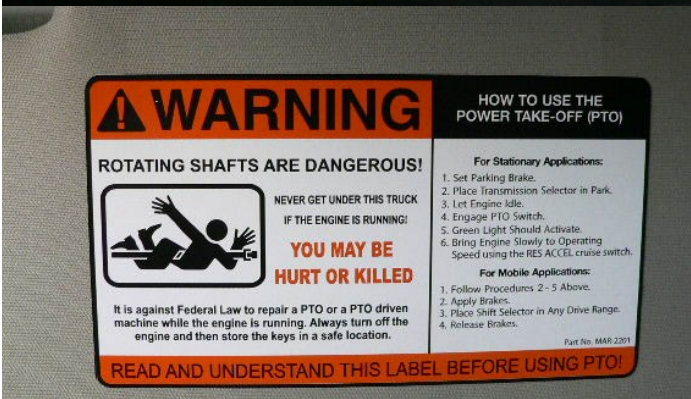
ARE PLACED AT STRATEGIC LOCATIONS TO PREVENT PERSONS FROM BEING INJURED.



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

9. CHECK LIST

Start the engine and check for oil leaks.

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

Place the Owner's Manual in the Truck

- Test Run and Check for Oil Leaks (**DO NOT GET UNDER VEHICLE WHEN RUNNING!**)
- P.T.O. Mounting Bolts are Tight
- Transfer Case Mounting Bolts are Properly Torqued
- Transmission Crossmember Bolts are Properly Torqued
- Transmission Mounting Nuts are Properly Torqued
- Rear Support Bearing is Properly Torqued
- Bearing Shaft Collar is Properly Torqued
- Wiring Harness for Transfer Case is Properly Installed
- Front and Rear Drive Shaft Bolts are Properly Torqued
- Skid Plate is Reinstalled (if applicable)
- Transfer Case Oil Level is Checked
- Wiring Harness is Properly Secured
- Warning Labels are Installed on Frame Rails
- Operations Label is Installed in Cab
- Owners Manual is Placed in Cab

10. 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) 273-2071

info@directdriveplus.com

www.DirectDriveplus.com

Warranty Statement

APPLICABLE PRODUCTS: RAMDRIVE PLUS 4X4 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.

**DIRECTDRIVE PLUS**

137 Westbrook Drive
Honey Brook PA 19344

(610) 273-2071

info@directdriveplus.com

www.DirectDriveplus.com

Warranty Statement

APPLICABLE PRODUCTS: RAMDRIVE PLUS 4X4 Transfer Case (RD4-)

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 five (5) years from the date of shipment by DirectDrive or 100,000 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.



DirectDrive PLUS LLC

137 Westbrook Drive

Honey Brook, PA 19344

(610) 273-2071

Instruction Manual

EVAP Relocation

2017—RAM

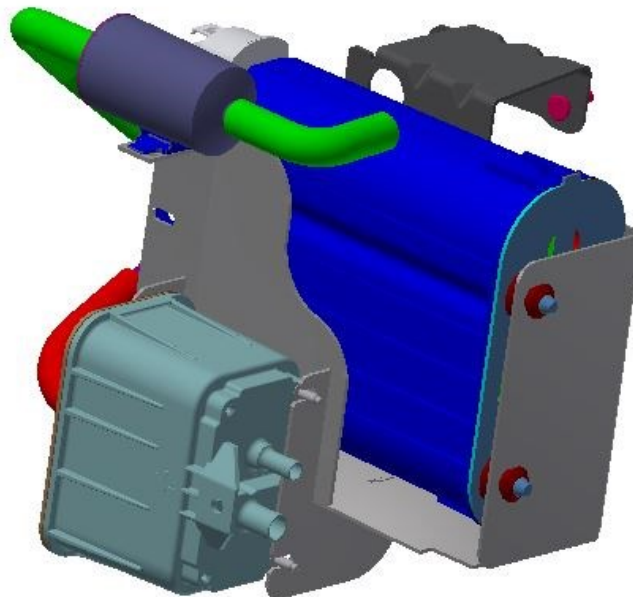


TABLE OF CONTENTS

1. SAFETY INFORMATION	Page 3
2. GENERAL INFORMATION	Page 4
3. APPLICATION GUIDELINES	Page 4
4. SCOPE of RELOCATION	Page 4
5. INSTALLATION INSTRUCTIONS	Page 5
6. WARRANTY	Page 16

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.

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: EVAP system canisters and lines may contain gasoline or gasoline vapors

Do not smoke, carry lighted tobacco or have an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

2. GENERAL INFORMATION

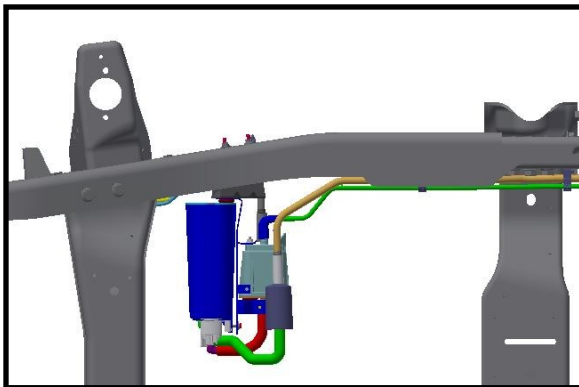
This booklet will provide you with information on correct installation of DirectDrive PLUS EVAP relocation. Proper installation and setup procedures will help you get additional and more profitable miles from your truck equipment and components.

3. APPLICATION GUIDELINES

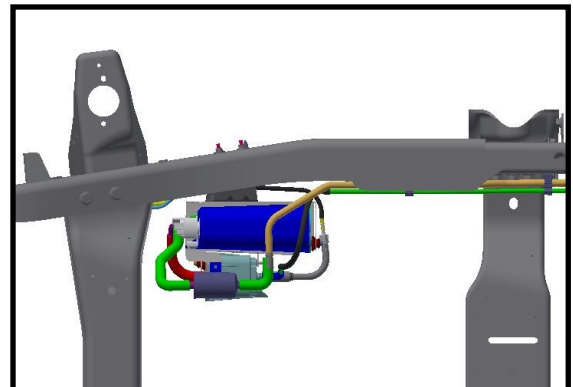
This EVAP relocation kit is intended to be used only with 2017 and newer RAM cab and chassis trucks with a gasoline engine and no midship fuel tank

4. SCOPE of RELOCATION

The purpose of this relocation kit is turn the EVAP canisters 90 degrees to allow for a PTO shaft pass from the rear of the transfer case to the driven appliance.



OEM Location



New Location

5. INSTALLATION INSTRUCTIONS

**Read this Manual Through Before
Beginning Project!**

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.

SAFETY FIRST

Securely Chock the wheels



Firmly Set Parking Brakes

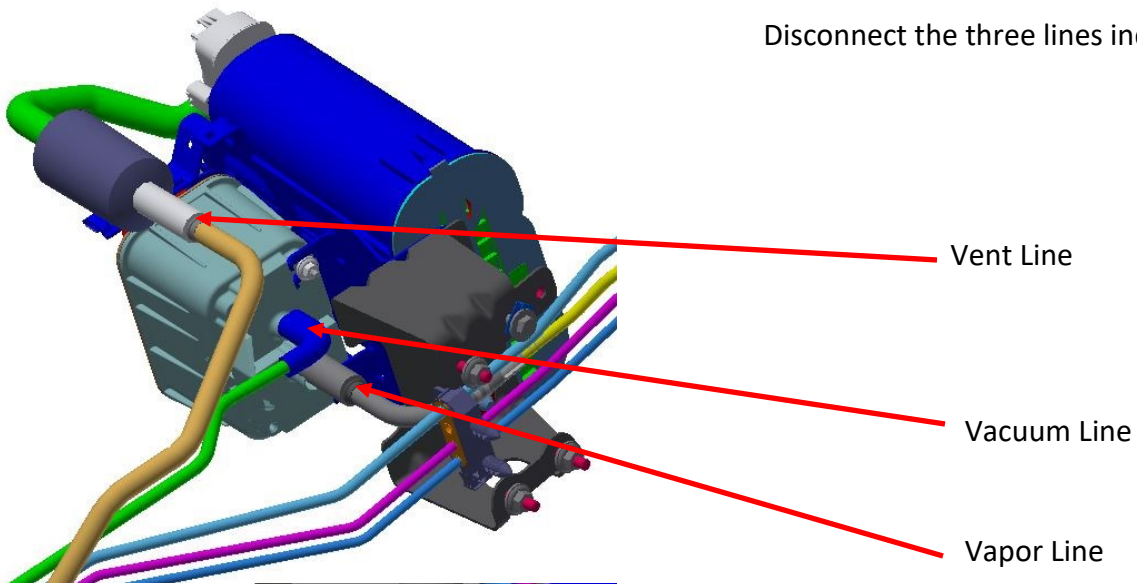


Place the Keys/Fob in a secure location

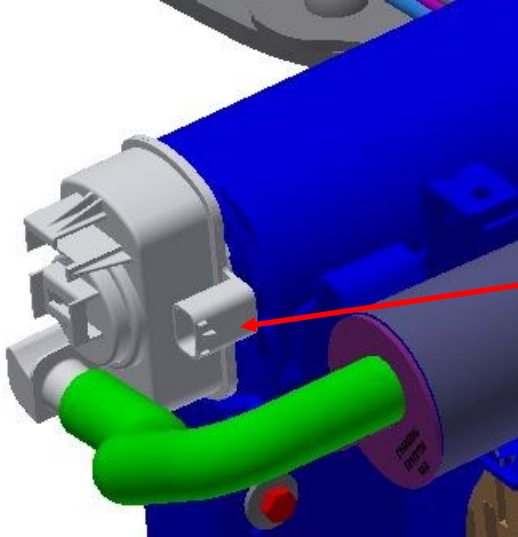


REMOVE ORIGINAL EVAP

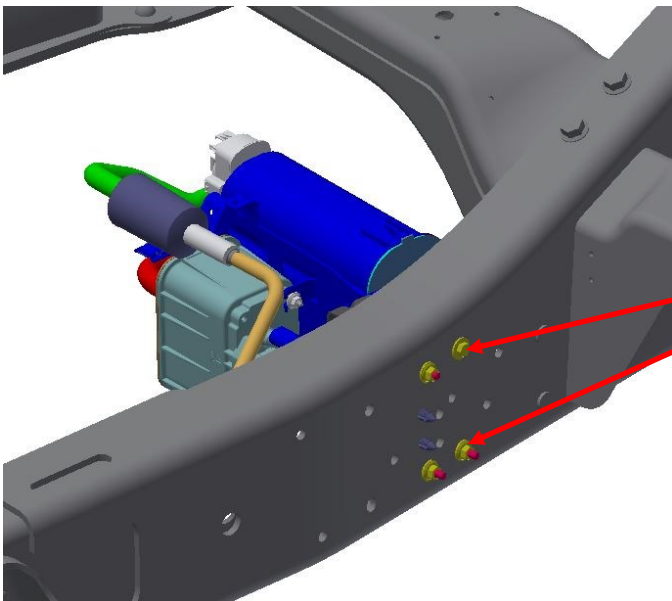
Disconnect the three lines indicated.



Disconnect electrical connector at
pressure switch



Remove the four fasteners
On the outside of the left frame rail
that retain the EVAP mounting bracket.

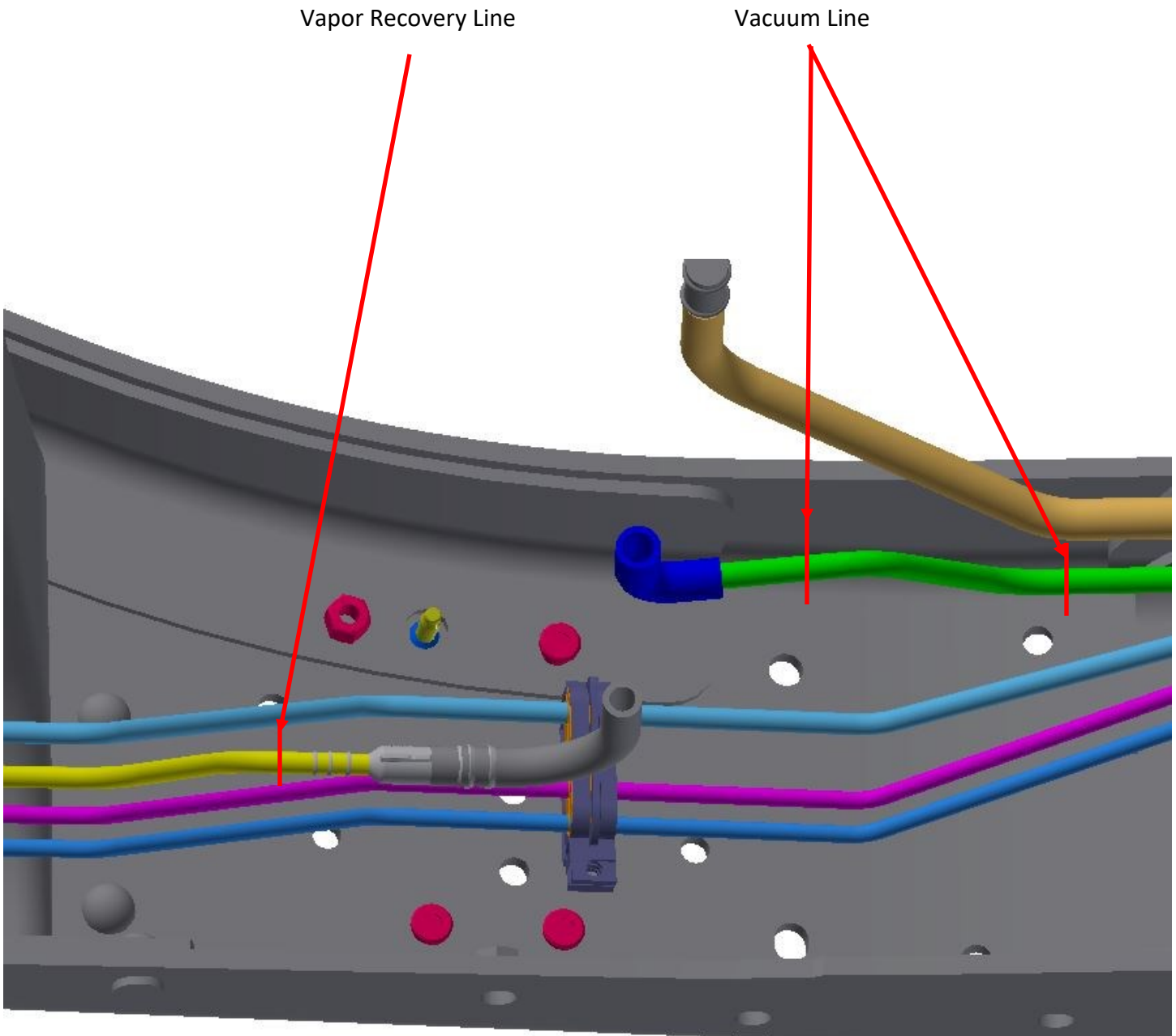


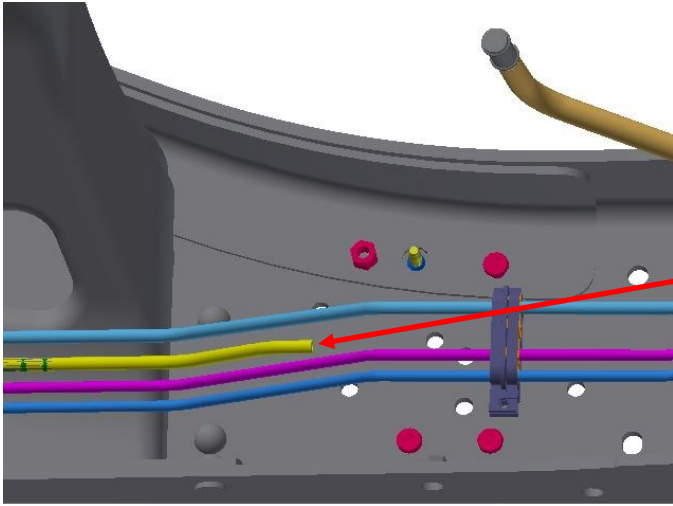
Remove the EVAP assembly.

LINE MODIFICATION

Using a Hose Cutter, cut the plastic lines at the places indicated.

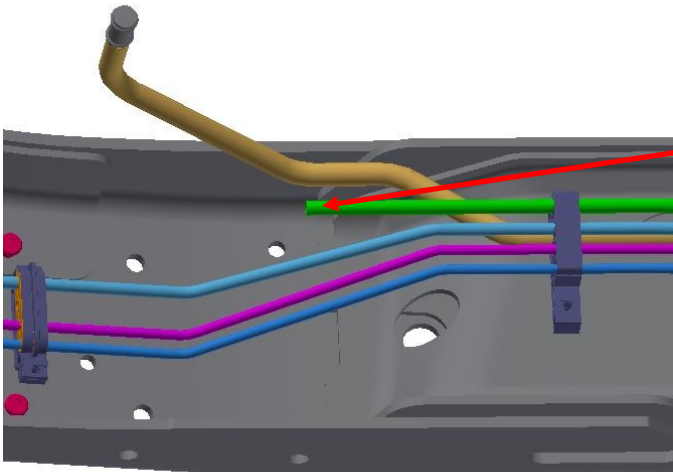
Do not discard the ends





Slip the 5/16" Fuel line provided in the kit over the modified Vapor Recovery line.

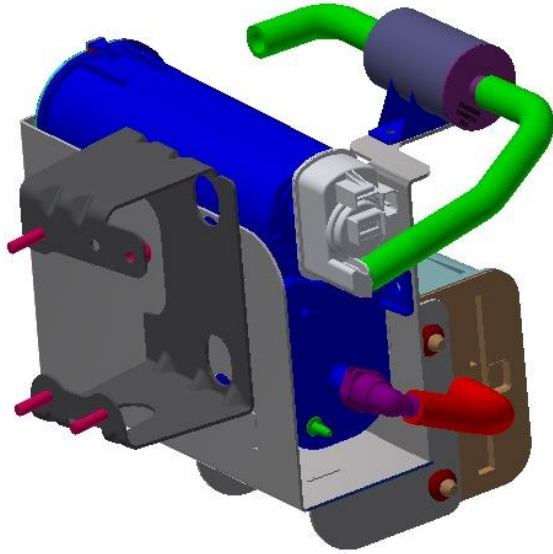
Hose should overlap Vapor Recovery line at least 1"



Slip the 3/8" Fuel line provided in the kit over the modified Vacuum line

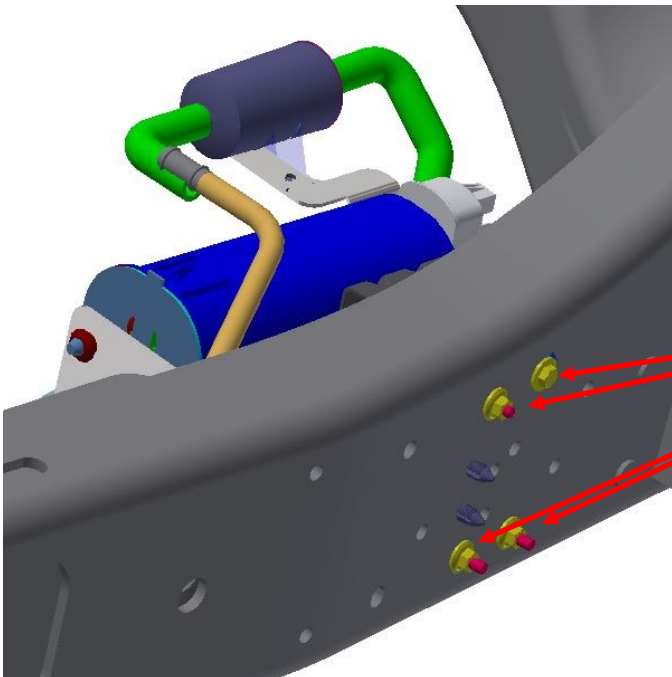
Hose should overlap Vacuum line at least 1"

INSTALLATION OF MODIFIED EVAP ASSEMBLY



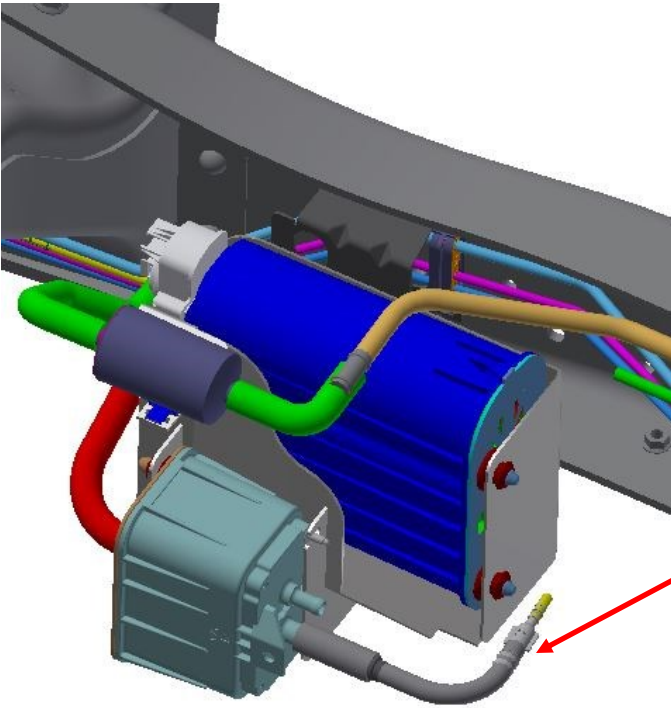
Install the modified EVAP assembly utilizing the original mounting holes

Be sure not to pinch wires or lines between mounting bracket and frame rail



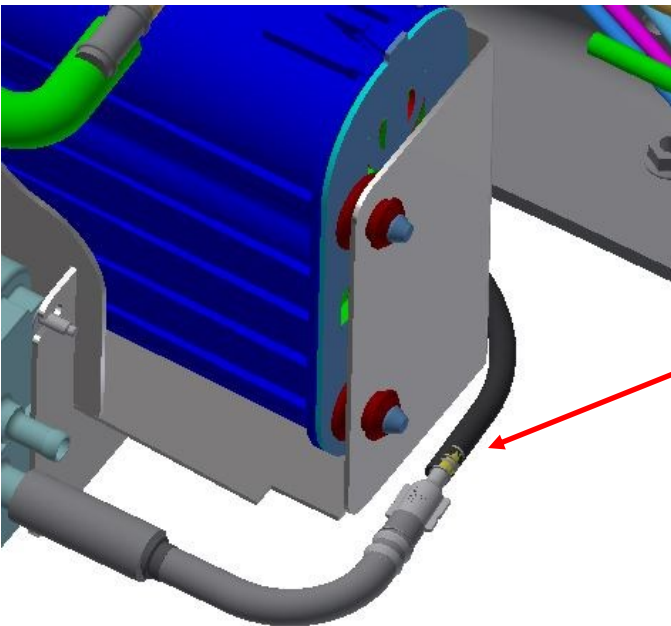
Install the four fasteners removed from the original assembly.

Tighten fasteners to 25 Ft/Lb.



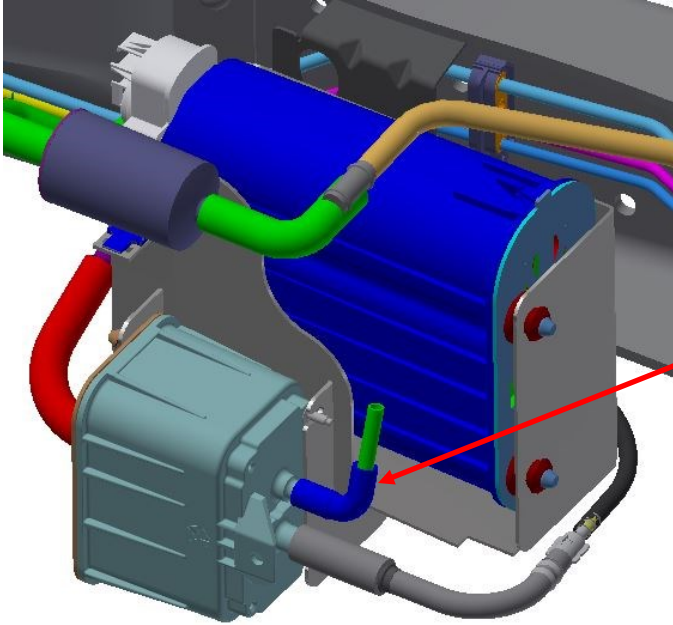
Install the Vapor Recovery Elbow
previously removed onto the Small

Canister

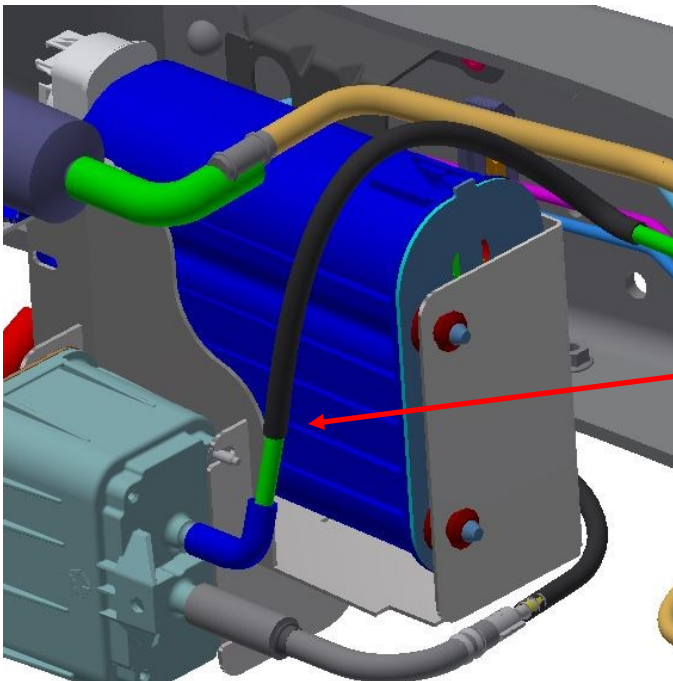


Cut the 5/16" Fuel line to the correct
length and slip over the Vapor Recovery
Elbow

Hose should overlap Vapor Recovery
elbow at least 1"

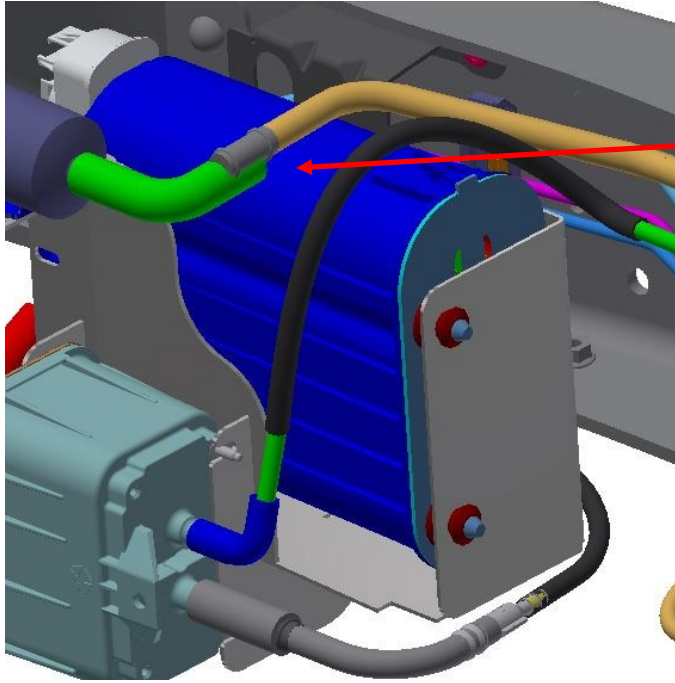


Install the Vacuum Line elbow previously removed

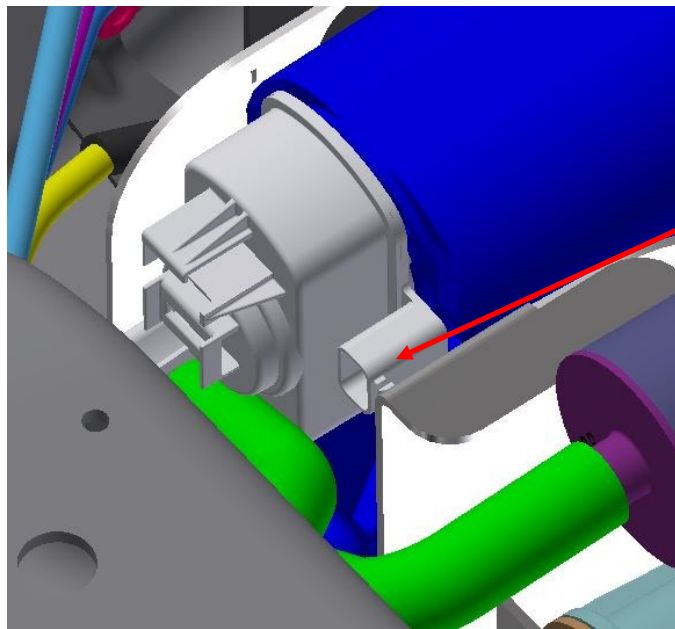


Cut the 3/8" Fuel line hose to the correct length and slip over the Vacuum Line Elbow

Hose should overlap Vacuum line Elbow at least 1"



Reconnect the Vent Line



Properly secure wire harness and
reconnect pressure switch

The OEM Assembly Removed
Needs to be Returned to
DIRECTDRIVE PLUS
For Core Credit

Place the Owners Manual in the Truck

CHECK LIST

- Are the Mounting Fasteners Properly Torqued?
- Are the Hoses Properly Routed and Without Kinks?
- Are the Hoses or Wire Harness Chaffing on Sharp Edges?
- Are the Hose and Wire Harness Properly Secured?
- Start the Truck, is the Check Engine Light Illuminated?
- Installation Manual Placed in Truck?

**DIRECTDRIVE PLUS**

137 Westbrook Drive

Honey Brook PA 19344

(610) 273-9937

info@directdriveplus.com

Warranty Statement

APPLICABLE PRODUCTS: **EVAP Relocation Kit**

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.