



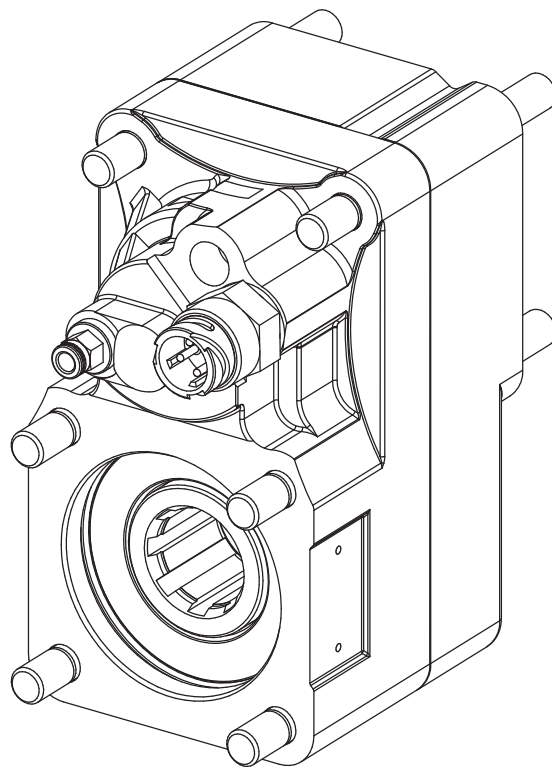
**Muncie[®]
Power
Products**

KEEP IN VEHICLE
READ OPERATING INSTRUCTIONS
INSIDE BEFORE OPERATING PTO

P84Z*-1*X SERIES P81Z*-1*X SERIES REAR MOUNTED PTO

**INSTALLATION INSTRUCTIONS
AND OPERATOR'S MANUAL**

For Eaton Endurant LV



⚠ WARNING!

ALWAYS READ AND UNDERSTAND THE ENTIRE MANUAL COMPLETELY BEFORE INSTALLATION OR OPERATION OF PTO AND DRIVEN EQUIPMENT INCLUDING THESE WARNINGS AND OPERATOR'S INSTRUCTIONS IN SECTION 3.

- ALWAYS DISENGAGE THE PTO WHEN THE DRIVEN EQUIPMENT IS NOT IN OPERATION.
- DO NOT ATTEMPT TO INSTALL OR SERVICE ANY POWER TAKE-OFF WITH THE TRUCK ENGINE RUNNING. PUT IGNITION KEYS IN YOUR POCKET BEFORE GETTING UNDER TRUCK.
- DO NOT ALLOW TRUCK ENGINE TO BE STARTED WHILE WORKERS ARE UNDER TRUCK.
- BEFORE WORKING ON A VEHICLE PLACE TRANSMISSION IN NEUTRAL OR PARK, SET BRAKES, AND IMMOBILIZE TRUCK WHEELS WITH SUITABLE CHOCKS.
- BE SURE TO BLOCK ANY RAISED BODY OR MECHANISM BEFORE WORKING ON OR UNDER EQUIPMENT.
- INSTALLED POWER TAKE-OFFS MUST NEVER BE SHIFTED IN OR OUT OF GEAR BY ANY MEANS EXCEPT BY THE CONTROLS IN THE CAB OF THE TRUCK.
- STAY CLEAR OF SPINNING DRIVESHAFTS TO AVOID BECOMING ENTANGLED AND INJURED.
- IT SHALL BE THE RESPONSIBILITY OF THE INSTALLER OF A MUNCIE POWER TAKE-OFF TO DECIDE WHETHER TO INSTALL GUARDS IN THE PTO AND/OR DRIVELINE AREA BECAUSE OF POTENTIAL EXPOSURE TO DANGER. THIS IS BECAUSE MOST MUNCIE PTOS ARE INSTALLED BY EQUIPMENT DISTRIBUTORS OR MANUFACTURERS AND THEREFORE, THE RESPONSIBILITY OF THE INSTALLATION IS BEYOND THE CONTROL OF MUNCIE POWER PRODUCTS.
- OBTAIN PROPER TRAINING BEFORE OPERATING THIS MACHINERY.
- DO NOT INSTALL OR OPERATE EQUIPMENT WHICH HAS NOT BEEN PROPERLY SPECIFIED FOR YOUR VEHICLE.
- INSTALLERS ARE TO INSURE THAT PTO COMPONENTS DO NOT INTERFERE WITH ANY CHASSIS COMPONENTS, INCLUDING BUT NOT LIMITED TO VEHICLE CROSSMEMBERS, FRAME RAILS, DRIVESHAFTS, EXHAUSTS, CONVERTERS, FUEL LINES, ETC. WHILE VEHICLE IS STATIONARY OR MOBILE.
- ALLOW THE VEHICLE, PTO AND DRIVEN EQUIPMENT TO WARM UP WHEN OPERATING IN WEATHER WHERE TEMPERATURES ARE NEAR OR BELOW FREEZING 32° F (0° C).
- INSTALL SEPARATE CONTROLS FOR PTO AND DRIVEN EQUIPMENT.
- ALWAYS INSTALL THE SAFETY LABELS PROVIDED AND PLACE THE OPERATOR'S MANUAL IN THE VEHICLE GLOVE COMPARTMENT.

The PTO is supplied with a packet containing warning labels. If you did not receive any, or if you need extra, you may order them, no charge, by phone, email or mail. They are available through your nearest Muncie® distributor or at the number and address below:

1-800-FOR-PTOS (1-800-367-7867)
Muncie Power Products, Inc.
201 East Jackson St.
Muncie, IN 47305
info@munciepower.com
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⚠ This symbol indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Note: Muncie is not liable for damages, and consequential damages, related to lack of compliance with previous suggestions and guidelines.



**P84Z*-*1*X SERIES AND P81Z*-*1*X SERIES
REAR MOUNTED PTO INSTALLATION
INSTRUCTIONS AND OPERATOR’S MANUAL
FOR EATON ENDURANT LV**

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SECTION - 1

INSTALLATION INSTRUCTIONS

ALL INSTALLERS MUST READ THE FOLLOWING

PTO AND ACTIVATION KIT INSTALLATION INSTRUCTIONS

Always wear safety glasses. Read entire manual before starting installation.

IMPORTANT: Disconnect vehicle battery prior to installing electrical and electric/hydraulic activation kits.

- A. Vehicle manufacturers may have specific locations for accessing electrical power and activating hydraulics. The body builder manual or company representative for the vehicle chassis should be consulted prior to installing electrical or hydraulic systems.
- B. Route wires and activation lines away from rotating and high temperature components. Use appropriate looms and bulk head pass-thru's wherever possible to avoid rubbing through insulation or tubing and causing an electrical short or oil leak.
- C. Follow all Federal Motor Vehicle Safety Standards (FMVSS) for your vehicle.
- D. Where electrical grounds are indicated, be sure that they are good ground connections, with straight paths to the vehicle battery ground. (Many vehicle cabs are insulated from the vehicle frame and a weak ground is a very common cause for malfunctions).
- E. When installing hydraulic components, be certain to follow common installation and testing procedures. If you are not familiar with acceptable installation procedures request instructions and guidance from the hydraulic equipment supplier.
- F. Caution should be taken by installer with any PTO installation to insure components do not interfere with any chassis component during installation or when vehicle is operated.
- G. Cold weather start conditions require that the transmission be started and warmed prior to engaging PTO and using equipment. Hydraulic pumps should be run at idle and under no load conditions to allow oil to warm before activating hydraulic system.

INSTALLATION INSTRUCTIONS Continued

▲ Danger! Read entire manual before starting installation. Always wear safety glasses.

1. There is a packet with the PTO which contains four (4) warning labels. Before adhering the labels, make sure the surfaces are free of dirt and grease. Place the labels supplied with the PTO as follows:

TRUCK FRAME LABELS

The two (2) Truck Frame Labels, which measure approximately 4" x 8", are to be placed on the outside of the vehicle frame rail. These labels are to be easily seen by anyone who might go under the truck or near to the PTO. One label is to be placed on each side of the vehicle. See Figure 1.

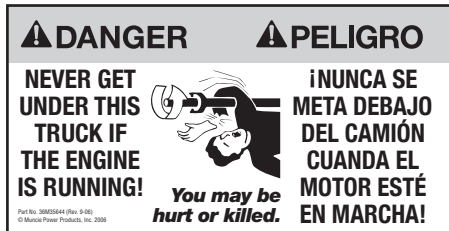


Figure 1

Note: Should the vehicle body installed on the chassis cover the frame rail, place the label on the body in a position easily visible by anyone who might go under the vehicle or near the PTO.

DO NOT PAINT OVER THE LABELS.

Visor and Dash Labels

The PTO Equipped Caution Label, which measures approximately 2" x 3", is to be placed within the cab of the vehicle and in easy view of the vehicle operator. It should be located near the PTO control, when the control is installed in the vehicle dash (see Figure 2). This label directs the operator to read the PTO operating instructions on the Visor Label. The Visor Label, which measures approximately 4" x 6 1/2", is to be placed **ON** the visor on the operator's side of the vehicle.

See Figure 2.

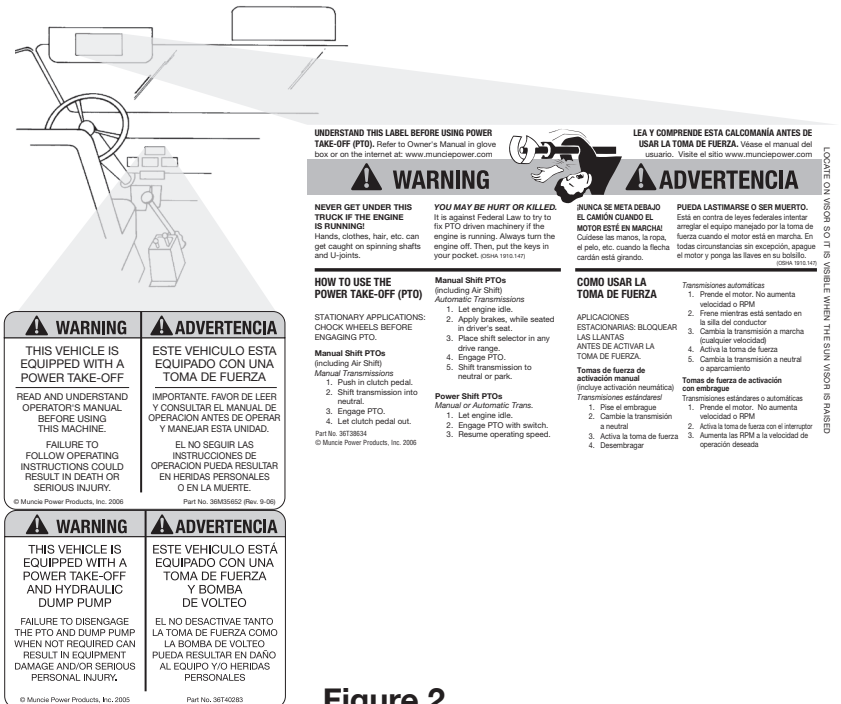
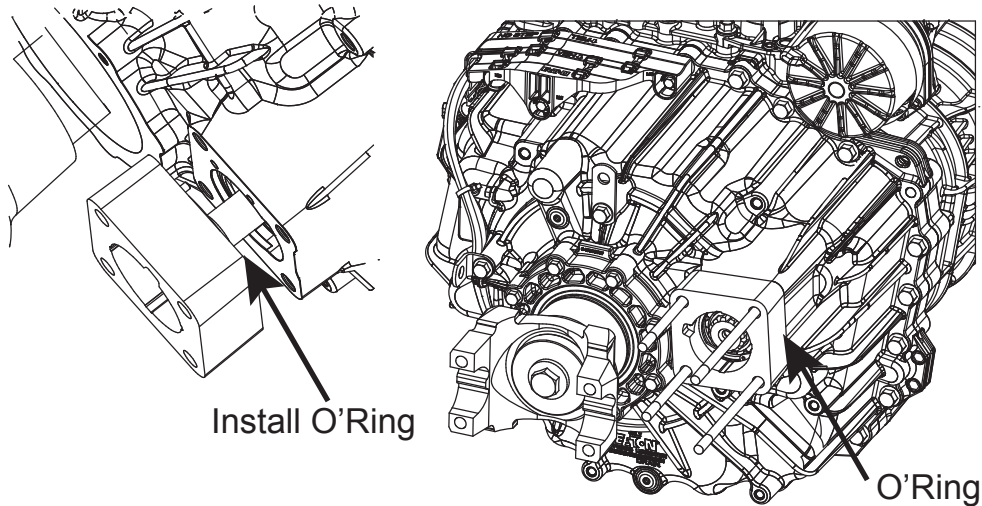


Figure 2

INSTALLATION INSTRUCTIONS Continued

Always wear safety glasses. Read entire manual before starting installation.

2. Because the location is above the oil level, the transmission does not need to be drained. Remove the cover on the rear PTO opening. Caution, some oil may be present and drip from opening.
3. Insert 2 long studs and 2 short studs in the transmission pad in the orientation shown. Slide PDF over the mounting studs. Make sure the O-Ring provided is in its groove in the adapter housing.
4. Mount the PTO adapter shaft over the studs and onto the rear opening and align the PTO shaft with the internal transmission drive shaft while aligning the alignment pin in the adapter to the hole in the transmission.



The following chart shows the output yoke number and the available PTO which will clear this output.

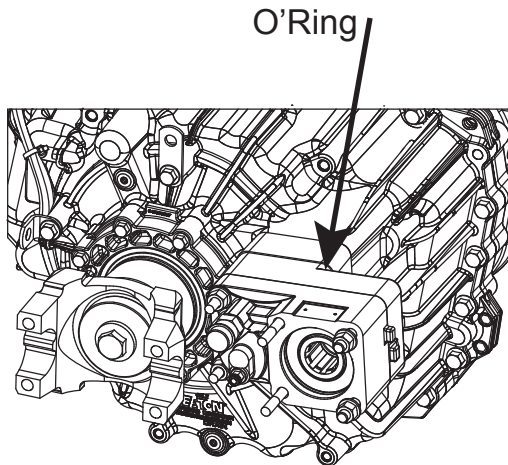
Eaton Yoke Number	Muncie P81 (1:1) ratio	Muncie P84 (1:0.9) ratio
5505543	OK	OK
5505544	XXXXXX	OK
5505545 (1750 series)	XXXXXX	OK
5505546	XXXXXX	OK
5505547 (1810 series)	XXXXXX	XXXXXX
5505548 (1810 series)	XXXXXX	OK
5505553 (RPL 25 series)	XXXXXX	OK
5505571	OK	OK
5505572	OK	OK
5505607	OK	OK
5505632 (SPL 350 series)	OK	XXXXXX
5505635	OK	OK

OK — Clearance deemed acceptable
XXXXXX — deemed unacceptable

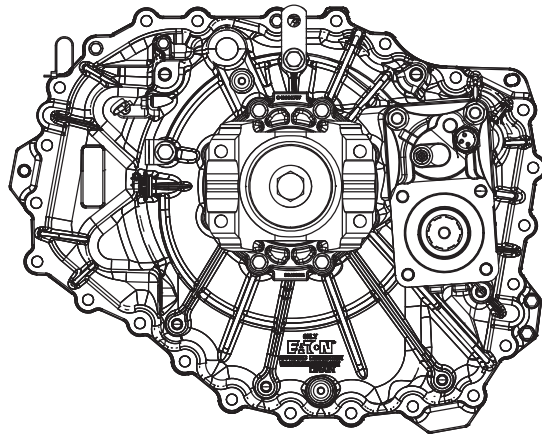
INSTALLATION INSTRUCTIONS Continued

Always wear safety glasses. Read entire manual before starting installation.

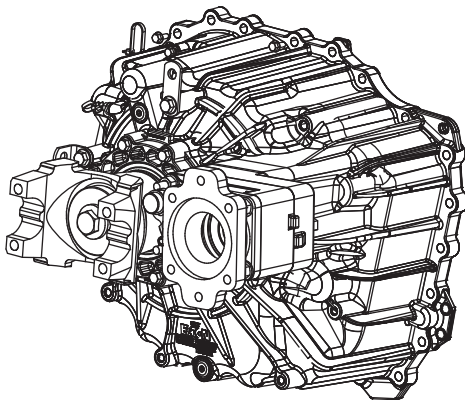
5. Using the provided O-Ring, mount the PTO to the transmission on to the adapter shaft with the output arranged outwards as shown below. Check for clearance to transmission output yoke.
6. Using washers and nuts, mount the PTO. Torque nuts to 35 lb.ft.
7. The PTO show has the DIN pump mount. Install the washer and cap screw after mounting the pump.
8. For SAE pumps, an additional output adapter will be required. Check for flange clearance to vehicle driveline.



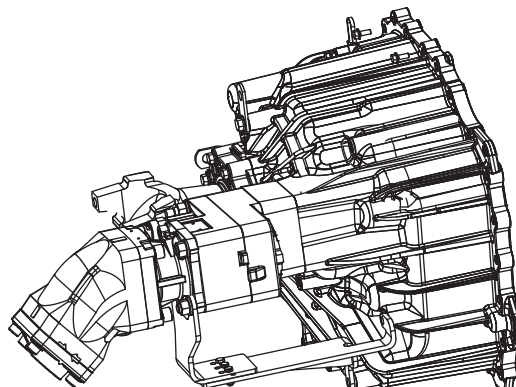
PTO may be mounted vertically if transmission output shaft permits. Check to make sure components clear rotating components.



9. PTO with SAE-B output is shown below. The pump orientation must be away from frame rail to insure clearance.
10. Whenever a direct mount hydraulic pump is used, it is required to use a support bracket attached to the two transmission locations. It is the responsibility of the installer to provide this support bracket.
 - The maximum total mass allowed on this PTO opening is 90 lbs. (41 Kg.) including the PTO and pump.



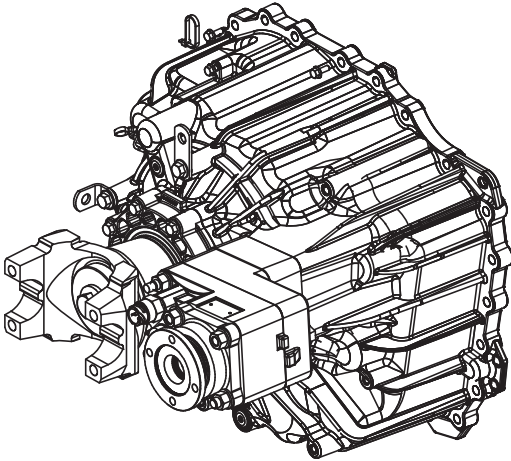
Support bracket attached to PTO at pump mount.



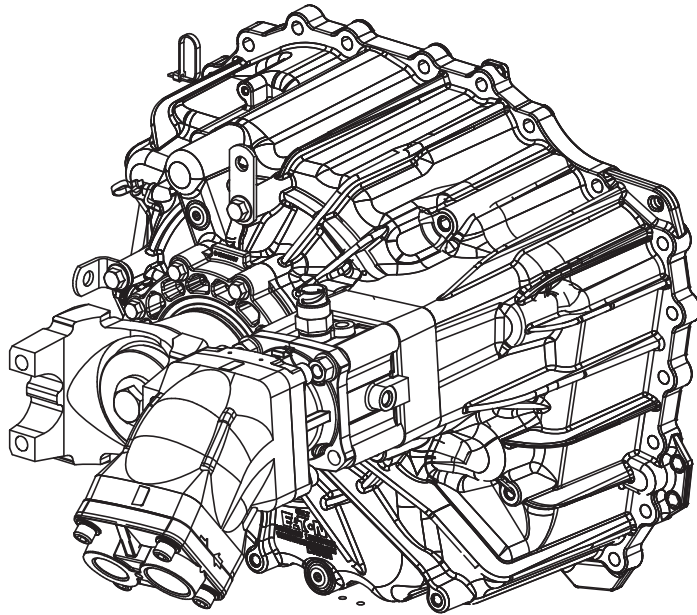
INSTALLATION INSTRUCTIONS Continued

Always wear safety glasses. Read entire manual before starting installation.

The P81 PTO is available with a companion flange output for connection to 1310 series type driveshaft. Check for frame rail and cross member clearance before ordering this option.



The Muncie P81Z2 Series PTO is available for the Eaton Endurant. This PTO places the hydraulic pump directly out from the PTO mounting pad. This air shift PTO is available with a DIN mount or 1310 Series companion flange for driveshaft applications. This PTO does not need additional support when coupled to the Q-Series or T-Series DIN Muncie pump.

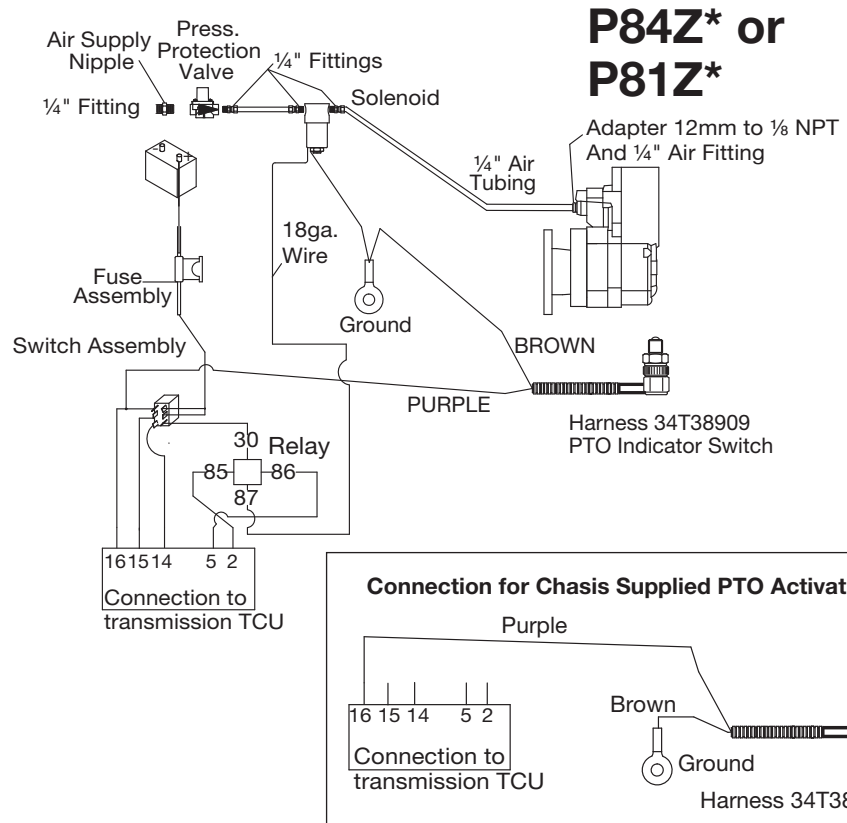


SECTION - 2

WIRE HARNESSES, SCHEMATICS AND AUXILIARY INSTRUCTIONS

OPTIONAL ELECTRIC/AIR ACTIVATION KIT 48TK6434 + 34T38909

11. For applications without the chassis installed PTO switch use the kit below. The transmission may still need to be programmed for PTO use. Check with dealer before proceeding. Mount the rocker switch bracket in a convenient location in the cab or mount the switch into the vehicle dash.
12. The PTO output can be either direct mounted hydraulic pump or drive shaft output. For the drive shaft version follow the proper procedure for connection to driven equipment.

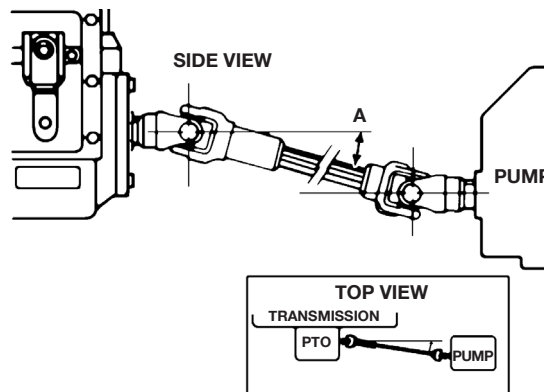


PTO WITH DRIVELINE SYSTEM

If your system utilizes a driveline between the PTO and another device and if you have noise in your system that was not there before, the angularity or phasing of your driveline may be the cause.

Check driveline angularity and reduce total angularity per recommendation on chart and be sure the PTO shaft is parallel within 1.5° to the pump shaft (or driven unit). Drivelines must be in phase, that is, the yoke ears on the PTO and pump shafts must be in alignment, as illustrated below. PTO with Direct Couple Hydraulic Pump Installation.

Max Speed (RPM)	Max TJA "A"
3,500 *	5°
3,000 *	5°
2,500	7°
2,000	8°
1,500	11°
1,000	12°

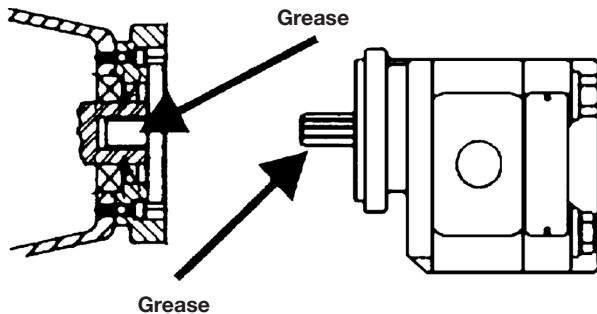


NOTE: For installations with angles in the top and side views, use the following formula to compute the true joint angles (TJA) $TJA = \sqrt{A^2 + B^2}$

NOTE: * For speeds over 2,500 RPM, contact Muncie Power for approval.

WIRE HARNESSES, SCHEMATICS AND AUXILIARY INSTRUCTIONS Continued

PTO WITH DIRECT COUPLE HYDRAULIC PUMP

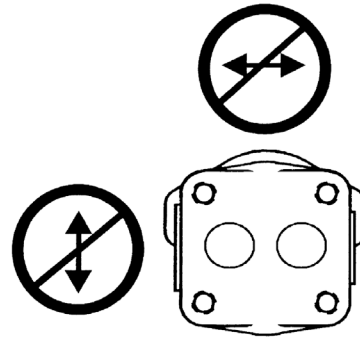


Before bolting the pump to the PTO, place non-seizing compound or grease on the PTO shaft and pump shaft. All Muncie Power direct mount PTOs are supplied with the appropriate grease. Reusing an existing pump will require inspection of the pump splines. Clean any old grease from pump prior to installation.

Muncie Power does NOT provide a bracket for the PTO which is mounted to the rear of the transmission. A bracket should be designed to support single section pumps up to 60 pounds*. It should be attached to the pump and to the transmission to support the pump and to inhibit movement in all directions. For multiple section pumps and pumps over 60 pounds, this PTO is not recommended.

*Weight includes fittings, oil and unsupported hose sections.

This requirement does not take into account the system duty cycles, vehicle vibrations, application, terrain, and other external influences. We recommend that direct mounted components of any size or weight be supported when these conditions are extreme or unknown.



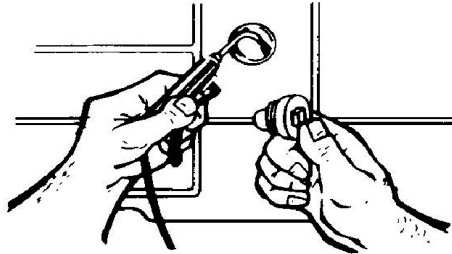
This recommendation is based upon our experiences to date. Bracket design illustrations and pump recommendations is to be used as a GUIDELINE ONLY. Bracket design shown is representative and is not to be duplicated for all applications. Any failure as a result of damage caused by unsupported weight attached to the PTO will affect any warranty considerations.

A bracket attached to two or more transmission bolts and two pump bolts is required. The bracket design should assure that there is no stress or force exerted on the pump or PTO shaft. If the vertical supports are greater than 20° off of perpendicular with the transmission main shaft then a reinforced bracket must be used. Reinforce horizontal members to prohibit flexing at bend or weld. Attach the bracket at the pump bolt closest to the center of gravity of the pump.

The Muncie direct mount flanges offer multiple mounting bolt holes which allow the flange to be rotated to multiple locations on the PTO for improved port location or clearance. Be sure to torque the cap screw to 25 ft.lb. It is advisable to use a thread locker to secure the cap screws (Loctite 241 or Nyloc or equivalent).

WIRE HARNESSES, SCHEMATICS AND AUXILIARY INSTRUCTIONS Continued

13. Refill transmission with manufacturer's approved fluid and run engine for 5-10 minutes to check for leaks, always staying clear of rotating components
14. Complete installation by placing warning labels as indicated on borders of the decals. Placement examples are illustrated on page 5.



After complete installation, installers need to check for leaks and proper mounting-torque of fasteners. Operate the equipment for an appropriate amount of time to establish for proper operation or per the equipment manufacturer's recommendation. After shutting down equipment and engine, check for leaks. Allow unit to sit for 60 minutes, then check again for any leaks. Fix all leaks per manufacturer's recommendation.

SECTION - 3 TEST PROCEDURE

Start engine and with engine at idle or output shaft speed under 1,200 RPM, engage PTO. If PTO fails to operate or will not develop enough torque to operate your equipment, check pressures as follows:

- a. **Stop engine.**
- b. Install 400 PSI pressure gauge at the pressure inlet of PTO and a 400 PSI gauge at the pressure switch port.
- c. Start engine. **Stay clear of rotating components.** Check gauge at inlet to PTO. If gauge registers less than 150 PSI, check for obstructions in the hoses and verify that activation hose is connect to the correct port on the transmission. Recheck the transmission information for the main pressure tap location on your model transmission. If plumbing is correct then transmission should be inspected at an authorized Allison/ Caterpillar service center or dealer.
- d. Place PTO switch in engage position. **Stay clear of rotating components.** If either gauge registers less than 150 PSI or if there is more than 50 PSI difference in the readings, then **turn off engine** and remove the solenoid valve and check the solenoid orifices, fittings and hoses for contamination.
- e. If these suggestions do not improve the operation of the PTO then a catastrophic failure may have occurred and the PTO should be inspected at a Muncie Power service center.

SECTION - 4

OWNER'S/OPERATOR'S POWER TAKE-OFF SHIFTING PROCEDURES & PRECAUTIONS

⚠ WARNING

Power Take-off Operation – Vehicle Stationary

WARNING – parking brake must always be set

WARNING – vehicle's wheels must always be chocked

WARNING – transmission must always be in neutral or park

WARNING – an operator must always be in the driver's seat whenever the engine is running and the transmission is in gear, in order to prevent or stop any unexpected movement of the vehicle which may cause injuries to the operator or others in the vicinity

- Read all operator's manuals and instructions for the equipment that you are operating on this vehicle.
- Obtain instructions and training for all operations of the equipment on this vehicle including those not covered by this instruction booklet.
- Never work alone when repairing or going under a vehicle for repair or maintenance.
- Always block any raised or movable components or devices when working on or around the vehicle as specified by the equipment manufacturer.
- Warning: PTOs may drive driven equipment with an exposed drive shaft which may cause severe injury or death if contacted.
- Care must be taken when using a PTO for any specific application that the PTO has been properly specified to match the transmission and auxiliary equipment. Improper specification and installation can cause severe damage to the vehicle transmission and the auxiliary components including driveshafts a driven equipment. Damaged components, equipment resulting in failure can cause serious personal injury to operators and persons in the vicinity.
- Always follow recommended procedures for selecting, installing, operating, or repairing a power take-off as found in Muncie operator's manuals, service parts lists and service manuals catalogs and application guides
- Never use a Muncie PTO above the recommended operation speed of the unit or the specified driven unit.
- Never use a power take-off that has not been specified for the output capabilities for the equipment being driven.

Rotating PTO drive shafts

It is recommended that direct couple hydraulic pumps be used whenever possible, but if your application requires the use of an exposed drive shaft it is the responsibility of the installer and purchaser to determine the best installation of a guard.

- Rotating shaft can snag clothing, skin, hands, hair, etc. and will cause serious injury or death.
- Do not go under the vehicle when the engine is running.
- Do not work near an exposed drive shaft with engine running.
- Auxiliary shaft can be installed with recessed or protruding set screws. If raised and square head set screws are chosen, then be aware that this is a catch point for clothes, skin, hair, hands, etc. and serious injury or death may result.

The output shaft of a PTO with internal clutch packs may rotate in cold temperatures with the PTO disengaged. PTO shaft rotation can cause sudden movement of the output shaft and attached drive shaft leading to personal injury or death. Allow transmission to operate for a few minutes before engaging PTO. Allow PTO to operate for a few minutes before actuating application controls.

Some O.E.M. chassis manufacturers have integrated electronic controls which require certain conditions to be met before engaging a PTO. These include, but are not limited to setting parking brake, foot off service brake, engine at idle, foot off accelerator pedal, and/or transmission selector in park or neutral.

⚠ THIS SYMBOL WARNS OF PERSONAL INJURY OR DEATH

PTO MAINTENANCE

The Power Take-off, being an integral part of the transmission, should be serviced at the same intervals as the transmission. Transmission fluid changes should follow the interval recommended by the vehicle manufacturer for severe service. Transmission oil level is important. Checking for PTO leaks and checking the transmission oil level should be done on a regular basis.

Check for leaks upon delivery of the vehicle and after initial operation of your equipment. Loss of any oil can significantly affect or damage a transmission or PTO. Muncie Power Products, Inc. is not responsible for damage resulting from improper fastener installation, mounting torque or maintenance of the PTO.

The Power take-off is also part of a system. The PTO system may include the activation control parts, a driveshaft, or hydraulic pump. This PTO system requires periodic checks and service. Typically the interval for maintenance checks of the PTO system depends on the application of the system. Every time the chassis is lubricated or a mechanic is under the vehicle the PTO system should be checked and serviced. For severe duty PTO system applications, it is recommended that the system be checked for service every 100 hours of use (this guideline can be adjusted based on past service history once you have it established). Service should include checking and lubricating direct mount pump shaft connections. PTO gears can be checked for wear by removing the inspection or shifter cover. If pitting, galling, cracking, or deformation of the gears or splines has occurred, then the PTO needs to be rebuilt or replaced.

Within the first week of use, recheck the installation of the PTO. Check for leaks and loose mounting hardware (studs, cap screws, nuts). Recheck the cable or lever connections for proper adjustment and tighten any loose connections. At regular maintenance intervals, check adjustments and lubricate moving parts, tighten and repair the connections, mounting hardware, cable or lever linkages.

It is recommended that the operator/owner do a visual inspection for leaks under and around the vehicle and equipment on at least a weekly basis. Any leaks found should be corrected immediately.

Pumps that are mounted directly to the PTO output require the application of an anti-seize or a high-temperature, high-pressure grease. The purpose of this grease is to help make the PTO easier to service and to reduce the effects of fretting corrosion on the mating PTO and pump shafts. PTO applications under severe duty cycles and/or high torque requirements may require servicing this shaft connection by periodically re-greasing the shafts. Vehicles with low speed diesel engines are also severe applications due to the vibrations inherent in these vehicles. Fretting corrosion cannot be stopped by applying grease; the grease is only a deterrent.

POWER TAKE-OFF WARRANTY

THE MUNCIE POWER TAKE-OFF IS WARRANTED TO BE FREE OF DEFECTS IN MATERIAL OR WORKMANSHIP AND TO MEET MUNCIE'S STANDARD WRITTEN SPECIFICATIONS AT THE TIME OF SALE. MUNCIE'S OBLIGATION AND LIABILITY UNDER THIS WARRANTY IS EXPRESSLY LIMITED TO REPAIRING OR REPLACING, AT MUNCIE'S OPTION, WITHIN ONE YEAR AFTER DATE OF ORIGINAL INSTALLATION ANY DEFECTIVE PART OR PARTS OR ANY PRODUCT NOT MEETING THE SPECIFICATIONS.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. MUNCIE MAKES NO WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR ANY PARTICULAR PURPOSE. MUNCIE'S OBLIGATION UNDER THIS WARRANTY SHALL NOT INCLUDE ANY TRANSPORTATION CHARGES OR COSTS OF INSTALLATION OR ANY LIABILITY FOR DIRECT, INDIRECT SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OR DELAY. THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE, AND MUNCIE'S LIABILITY WITH RESPECT TO ANY CONTRACT OR SALE OR ANYTHING DONE IN CONNECTION THEREWITH, WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY, OR OTHERWISE, SHALL NOT, EXCEPT AS EXPRESSLY PROVIDED HEREIN, EXCEED THE PRICE OF THE PRODUCT OR PART ON WHICH SUCH LIABILITY IS BASED.

IF REQUESTED BY MUNCIE, PRODUCTS OR PARTS FOR WHICH A WARRANTY CLAIM IS MADE ARE TO BE RETURNED TRANSPORTATION PREPAID TO A MUNCIE SERVICE CENTER. ANY INSTALLATION OR USE NOT IN ACCORDANCE WITH CATALOGUE OR PACKAGE INSTRUCTIONS, OTHER IMPROPER USE, OPERATION BEYOND CAPACITY, SUBSTITUTION OF PARTS NOT APPROVED BY MUNCIE, USE WITH EQUIPMENT OTHER THAN THE EQUIPMENT ON WHICH THE POWER TAKE-OFF IS FIRST INSTALLED, OR ALTERATION OR REPAIR MADE TO THE POWER TAKE-OFF OTHER THAN AT A MUNCIE SERVICE CENTER SHALL VOID THIS WARRANTY. NO EMPLOYEE OR REPRESENTATIVE OF MUNCIE IS AUTHORIZED TO CHANGE THIS WARRANTY IN ANY WAY OR TO GRANT ANY OTHER WARRANTY.

NOTES



**Muncie®
Power
Products**

A Member of the Interpump Group

19-02 (Rev. 04-25)

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