

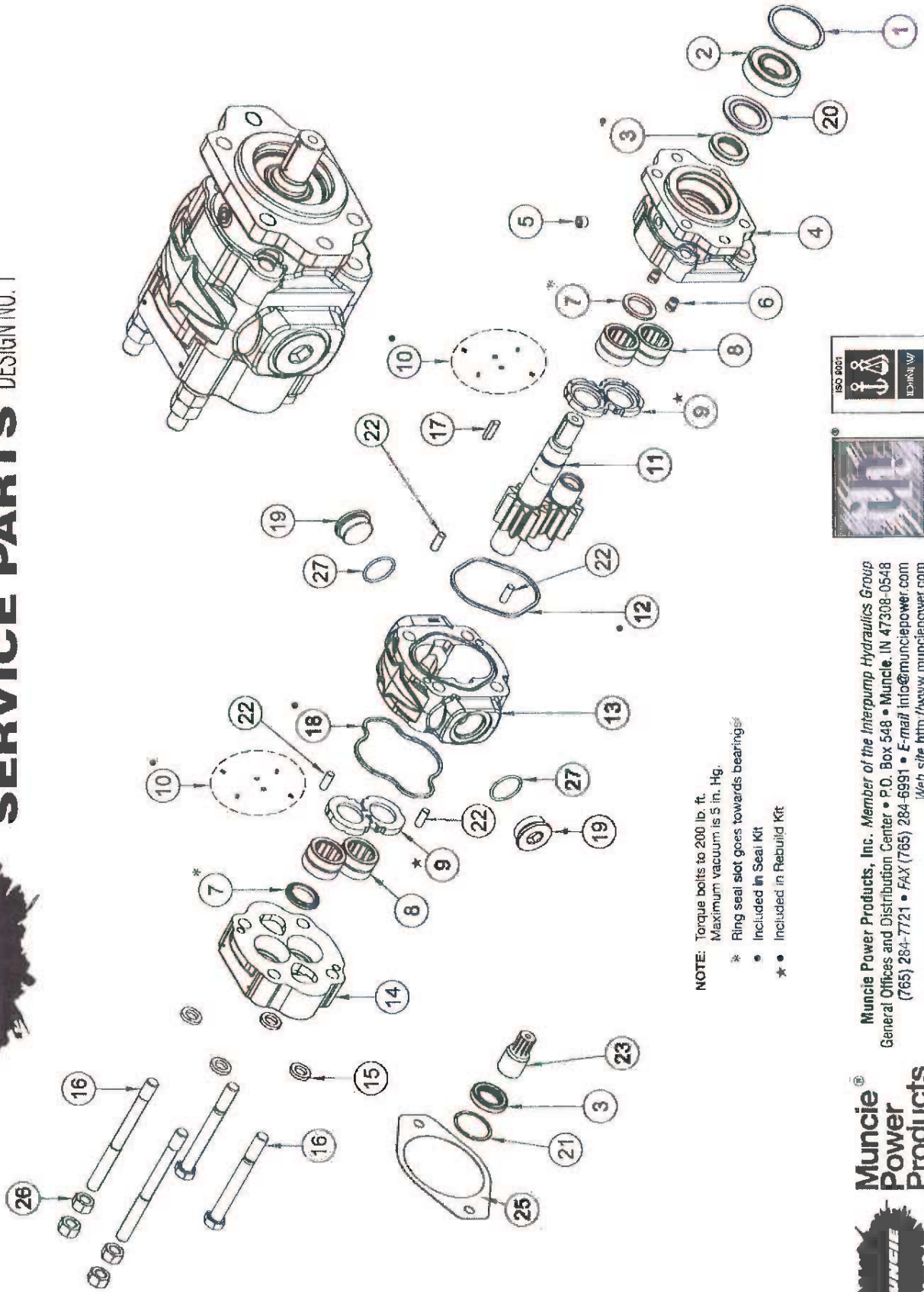
PUMP/PTO/HYD.

SECTION 3



L SERIES PUMP

SERVICE PARTS DESIGN NO. 1



- NOTE:** Torque bolts to 200 lb. ft.
Maximum vacuum is 5 in. Hg.
- * Ring seal slot goes towards bearing[®]
 - Included in Seal Kit
 - ★ Included in Rebuild Kit



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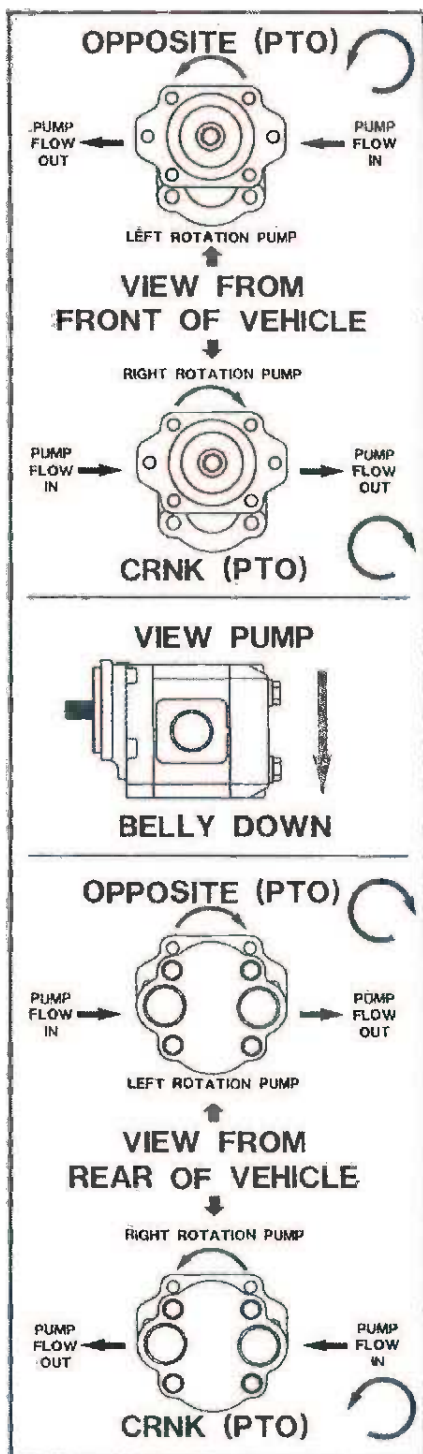
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L SERIES SERVICE PARTS

ITEM	DESCRIPTION	QTY.	MUNCIE PART NO.	ITEM	DESCRIPTION	QTY.	MUNCIE PART NO.
1	O.B. Snap Ring	1	PL1-1001	19GPM	-20SAE x -20SAE	1	PL1-1125-19-SGT
2	O.B. Bearing	1	PL1-1002	23GPM	-20SAE x -20SAE	1	PL1-1125-23-SGT
3	Retainer/Spacer	1	PE1-1002-D	25GPM	-24SAE x -24SAE	1	PL1-1125-25-SHE
	Shaft Seal Low Pressure (BUN)	1	PL1-1005M	27GPM	-24SAE x -24SAE	1	PL1-1125-27-SHE
	High Pressure (GFN)	1	PL1-1005	30GPM	-24SAE x -24SAE	1	PL1-1125-30-SHE
4	Front Cover SAE B 6 Bolt Short	1	PL1-1107-DSPAB	27GPM	-32SFA -16SAE	1	PL1-1125-27-CFS
	SAE B 6 Bolt Long	1	PL1-1107-DLPAB		Rear Cover No Ports	1	PL1-1126-XXX
	SAE B 4 Bolt Long	1	PL1-1107-KLPAB	-20NPT x -20NPT	1	PL1-1126-PCR	
	SAE C Round Shaft Long	1	PL1-1107-CLXXX	-24NPT x -24NPT	1	PL1-1126-PDB	
	Remote Mount	1	PL1-1107-RLPAB	-20SAE x -20SAE	1	PL1-1126-SGT	
	Remote Mount, Del Rnd Shaft	1	PL1-1107-TSXXX	-24NPT Inlet x -12SAE outlet	1	PL1-1126-CZM	
5	Pipe Plug -4 NPTF	1	HHP-4Z	Machined for RV, NPT	1	PL1-1126-PCRHV	
6	Check Valve Assembly	2	PS1-1010	Machined for RV, SAE	1	PL1-1126-SORRV	
7	Ring Seal	2 or 3	PL1-1008	Versatile SAE B 2 bolt	1	PL1-1126-TVH	
8	Bearings	4	PL1-1013		4	PE1-1230	
9	Wear Plate	2	PL1-1014	5/8 Washer	4	PE1-1230	
10	Pocket Seals (12 Pieces)	1	PS1-1009EK	Capscrew 14GPM (5/8-11UNC x 5-1/4)	2 or 4	PL1-1028-14	
11	Gear Set	1	PL1-1016-S02-14-2	16GPM (VPL-27) (5/8-11UNC x 5-1/2)	2 or 4	PL1-1028-16	
		1	PL1-1016-S02-16-2	18GPM (VPL-27) (5/8-11UNC x 5-3/4)	2 or 4	PL1-1028-18	
		1	PL1-1016-S02-19-2	23GPM (5/8-11UNC x 6)	2 or 4	PL1-1028-23	
		1	PL1-1016-S02-23-2	25GPM (5/8-11UNC x 6-1/4)	2 or 4	PL1-1028-25	
		1	PL1-1016-S02-25-2	27GPM (5/8-11UNC x 6-1/2)	2 or 4	PL1-1028-27	
		1	PL1-1016-S02-27-2	30GPM (5/8-11UNC x 6-3/4)	2 or 4	PL1-1028-30	
		1	PL1-1016-S02-30-2	14GPM Versatile (5/8-11UNC x 4-1/2)	4	PL1-1028-294	
	1 inch Round Shaft	1	PL1-1016-K01-16-2	16GPM Versatile (5/8-11UNC x 4-3/4)	4	PL1-1028-341	
		1	PL1-1016-K01-19-2	19GPM Versatile (5/8-11UNC x 5)	4	PL1-1028-295	
		1	PL1-1016-K01-23-2	23GPM Versatile (5/8-11UNC 5-1/4)	4	PL1-1028-14	
		1	PL1-1016-K01-27-2	14GPM (5/8-11UNC x 7)	2	PE1-1028-23S	
		1	PL1-1016-K01-30-2	16GPM (5/8-11UNC x 7-1/4)	2	PL1-1028-16S	
	1 inch 15T Spline	1	PL1-1016-S17-19-2	19GPM (5/8-11UNC x 7-1/2)	2	PE1-1028-27S	
		1	PL1-1016-S17-27-2	23GPM (5/8-11UNC x 7-3/4)	2	PL1-1028-23S	
		1	PL1-1016-S17-30-2	25GPM (5/8-11UNC x 8)	2	PL1-1028-25S	
	1-1/4 inch Round Shaft	1	PL1-1016-K07-23-2	27GPM (5/8-11UNC x 8-1/4)	2	PL1-1028-27S	
		1	PL1-1016-K07-25-2	30GPM (5/8-11UNC x 8-1/2)	2	PL1-1028-30S	
		1	PL1-1016-K07-27-2	Key 1/4 x 3/8 x 1-1/4 Inch	1	PS1-1017	
	Versatile 7/8 - 13T	1	PL1-1016-S02-14-TV2	Rear Cover Body Seal 4.98 x 0.134	1	PL1-1015	
		1	PL1-1016-S02-16-TV2	Port Plug -16 NPTF	2	HHP-16Z	
		1	PL1-1016-S02-18-TV2	-20 NPTF	2	HHP-20Z	
		1	PL1-1016-S02-19-TV2	-24 NPTF	2	HHP-24Z	
		1	PL1-1016-S02-23-TV2	1-5/16-12UN SAE J514	2	HHBP-16Z	
		1	PL1-1016-S17-19-TV2	1-5/8-12UN SAE J514	2	HHBP-20Z	
		1	PL1-1016-S17-23-TV2	1-7/8-12UN SAE J514	2	HHBP-24Z	
		1	PL1-1016-S17-25-TV2	Seal Retainer for Use with O.B. Bearing	1	PL1-1003	
		1	PL1-1016-S17-27-TV2	Seal Snap Ring 2 inch	1 or 2	PL1-1004	
12	Front Cover Body Seal 4.23 x 0.134	1	PL1-1012	Dowel Pin 3/8 x 1 inch	4	PL1-1024	
13	Body	1	PL1-1125-14-PCH	Connection Shaft for Tandem Versatile	1	PL1-1039-TV	
		1	PL1-1125-16-PCH	Connection Shaft for Tandem Short Stack	1	PL1-1039-TS	
		1	PL1-1125-19-PCH	Rear Flange Gasket for TV	1	PL1-1032-TV	
		1	PL1-1125-23-PCH	Nut (5/8-11 UNC)	4	PE1-1020	
		1	PL1-1125-25-PDB	O-Ring 1.18x0.12 for HHBP-16	2	BOR-16	
		1	PL1-1125-27-POB	O-Ring 1.50x0.12 for HHBP-20	2	BOR-20	
		1	PL1-1125-30-PDB	O-Ring 1.72x0.12 for HHBP-24	2	BOR-24	
		1	PL1-1125-16-SGI	Seal Kit	kt	GSK-PL-12	
		1		Rebuild Kit	kt	RBK-PL-12	
		1		Bearing Kit	kt	PL1-1013-K	



PUMP ROTATION & PORT IDENTIFICATION



Use of the phrase "bi-rotational" confuses many people. Usually a single rotation hydraulic pump uses the larger of the two available ports as the inlet port, and the smaller one as the pressure side of the pump. Bi-rotational pumps are constructed so that they have the same size ports, and the single drive shaft may turn either direction.

HOW TO IDENTIFY ROTATION

To determine which port is the inlet port on the bi-rotational pump, just consider that as oil enters the pump, it must travel around the outside of the gears, rather than going through the center. As the gears "squeeze" together, they force the oil out. Determine which way the shaft will turn, and plumb accordingly.

Don't operate the pump without oil. You can destroy it in a very short time, even if it runs less than a minute.

Several features in the Muncie K and L Series hydraulic pump systems provide an array of advantages. Those features include:

- Bi-rotational construction with internal check valves to allow use as right hand (clockwise) or left hand (counter-clockwise) driven pumps without any modifications.
- Four port construction provides the flexibility to use either side or rear ports to facilitate line placement. To enhance performance, critical cold weather applications wisely use the additional inlet port to avoid cold oil starvation and cavitation.
- Direct mount pumps allow both SAE "B" 2-bolt and 4-bolt mounting faces. Some of the K Series Pumps are available with a compact, short flange for direct mounting to a PTO, using the "S" Flange option on the pump and PTO.
- A high pressure seal and front seal case drain is standard on K and L Series pumps, allowing use as high speed hydraulic motors. Maximum back pressure allowed is 150 PSI. If above 150 PSI the case drain port must be connected directly back to the reservoir.



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NEW OR REPLACEMENT PUMP INSTALLATION INSTRUCTIONS

NEW PUMP INSTALLATION?

If you are setting up a new hydraulic system, please read and follow the instructions below.

- 1) Be sure that this pump is of the correct displacement (flow rate) and pressure rating to operate your equipment.
- 2) Thoroughly clean out your hydraulic system. The reservoir should be completely wiped clean. Before installation the hydraulic lines and hoses must be cleaned as well.
- 3) Fill the reservoir with clean new hydraulic oil of the correct viscosity for your operating environment.
- 4) If this is other than a dump pump, find the main relief valve and back it all the way out counter clockwise.
- 5) Install a 0 - 3,000 PSI pressure gauge tee'd into the outlet of the pump.
- 6) Make sure that the reservoir is full of oil and if there is a shut-off valve, insure that it is opened to allow full flow to the pump. Crack the fitting at the pump inlet until the flow of oil reaches the pump and then re-tighten fitting.
- 7) Start the engine and engage the PTO if so equipped. Gradually increase engine speed to the maximum engine RPMs that could be seen during equipment operation. While constantly monitoring the pressure gauge, engage control valve to move a cylinder. The cylinder should not move because the relief valve is completely open. While engaging the control valve, gradually turn relief valve in (clock-wise) while monitoring the pressure gauge until the cylinder moves. Wait until the cylinder reaches end of stroke before further adjustment of the relief valve. Now adjust the relief valve until you reach the correct maximum pressure for your system (see your equipment manufacturer's specifications). Remember, for a pressure relief valve to protect all the components in your system it must be set below the maximum rating of the lowest rated component in your system. Once you have reached the proper setting, lock the relief adjustment.
- 8) Cycle all the cylinders and motors several times to flush all of the lines. Change the filter element. Check the reservoir oil level and add oil if necessary.
- 9) Change the filter again after the first week of service and thereafter according to the indicator gauge on the filter.

NOTE: *Some hydraulic valves contain one or more work sections that have work port reliefs. If you have difficulty in reaching the desired maximum relief valve setting once again back out the relief valve adjustment and engage another valve section that does not have a work port relief.*

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REPLACEMENT PUMP?

If you are replacing a failed pump in an existing system, please read and follow the instructions below.

- 1) Be sure that this replacement pump is of the correct displacement (flow rate) and pressure rating to operate your equipment. Substituting a larger pump for the smaller original pump may only compound your problems and result in early failure. If the replacement pump is smaller the operating speed of your equipment may be affected.
- 2) Be sure to completely clean the hydraulic system. The oil should be drained and the reservoir should be completely wiped clean. The filter should be changed and the hydraulic lines cleaned.
- 3) Fill the reservoir with clean new hydraulic oil of the correct viscosity for your operating environment.
- 4) If this is other than a dump pump, find the main relief valve and back it all the way out counter clockwise.
- 5) Install a 0 - 3,000 PSI pressure gauge tee'd into the outlet of the pump.
- 6) Make sure that the reservoir is full of oil and if there is a shut-off valve, insure that it is opened to allow full flow to the pump. Crack the fitting at the pump inlet until the oil reaches the pump then re-tighten fitting.
- 7) Start the engine and engage the PTO if so equipped. Gradually increase engine speed to the maximum engine RPMs that could be seen during equipment operation. While constantly monitoring the pressure gauge, engage control valve to move a cylinder. The cylinder should not move because the relief valve is completely open. While engaging the control valve, gradually turn relief valve in (clock-wise) while monitoring the pressure gauge until the cylinder moves. Wait until the cylinder reaches end of stroke before further adjustment of the relief valve. Now adjust the relief valve until you reach the correct maximum pressure for your system (see your equipment manufacturer's specifications). Remember, for a pressure relief valve to protect all the components in your system it must be set below the maximum rating of the lowest rated component in your system. Once you have reached the proper setting, lock the relief adjustment.
- 8) Cycle all the cylinders and motors several times to flush all of the lines. Change the filter element again. Check the reservoir oil level and add oil if necessary.
- 9) Change the filter again after the first week of service and thereafter according to the indicator gauge on the filter.

NOTE: Some hydraulic valves contain one or more work sections that have work port reliefs. If you have difficulty in reaching the desired maximum relief valve setting once again back out the relief valve adjustment and engage another valve section that does not have a work port relief.



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Hydraulic Pump

TROUBLESHOOTING GUIDE

Condition	Likely Cause	Correction	
No oil flow from pump.	No oil in reservoir.	Fill reservoir with approved fluid.	
	Closed shut-off valve.	Open valve.	
	Air lock in pump inlet hose.	Use compressed air to pressurize reservoir while running pump or fill inlet hose with oil from the pump end.	
	Pump is wrong rotation for application.	Replace or re-configure pump to correct rotation.	
	Hoses are reversed.	Change inlet and pressure hose locations.	
	PTO not engaged.	See "PTO Troubleshooting"	
	Pump worn or damaged.	Repair or replace pump.	
Pump will not build/hold pressure.	Relief valve improperly set.	Adjust relief valve to manufacturers specification.	
	Relief valve stuck open.	Remove, clean, and re-set to specification.	
	Pump worn or damaged.	Repair or replace pump.	
Pump is noisy.	Aeration (<i>air in system</i>).	See "Oil foaming".	
	Cavitation (<i>Cavitation is caused by excessive vacuum at the pump inlet. Test with a vacuum gauge at the inlet port. Gauge should register under 5 Hg/in. at normal operating speed and temperature.</i>)	Increase inlet hose size. Re-route inlet hose. Check for kinked or collapsed inlet hose. Check for clogged reservoir breather or strainer. Inlet hose should be S.A.E. type 100R4 hose only.	
PUMP LEAKS: At shaft seal.	Dirt under seal.	Replace seal. Examine pump shaft for scoring.	
	Damaged seal or pump body.	Replace seal or body section.	
	Improperly fitted seal.	Replace seal.	
	At body section:	Damaged o'ring or body.	Replace o'ring or body section.
		Improper torquing of bolts.	Torque to specification.
	At pump port. (DO NOT use Teflon tape on pipe thread fittings!)	Loose fitting.	Tighten fitting.
		Damaged fitting.	Replace fitting.
		Damaged pump body.	Replace body section.
	Pump is hot. (Oil temperature should not exceed 140° F (60° C))	Low oil level.	Fill reservoir.
Reservoir too small.		Increase reservoir size.	
Dirty oil.		Replace oil and filter.	
Relief valve stuck open.		Remove, clean, and re-set.	



Hydraulic Pump

TROUBLESHOOTING GUIDE - PAGE 2

Condition	Likely Cause	Correction
Pump is hot <i>(continued)</i>	Relief valve improperly set.	Adjust relief valve to manufacturer's specification.
	Pump too large for application.	Review application. Replace with correct model.
	Undersized system component.	Review application. Replace with correct model.
	Improper weight oil.	Replace with correct oil.
	Low oil level.	Fill reservoir.
Oil foaming	Loose inlet fitting.	Tighten fitting.
	Damaged shaft seal.	Replace seal.
	Leak in inlet hose.	Replace hose.
	Improper tank baffle.	Install baffle or diffuser.



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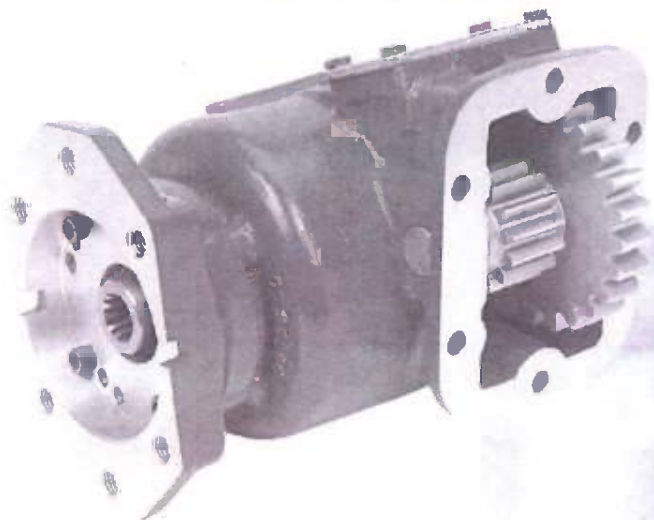
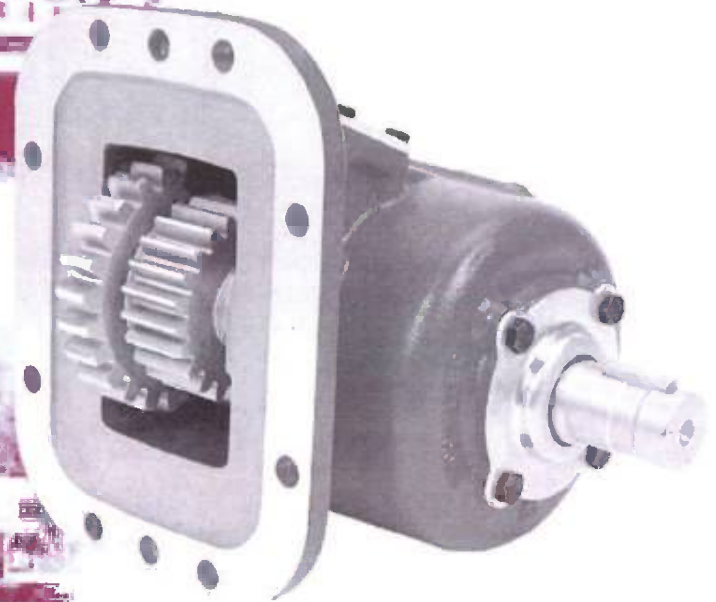
Clutch Shift PTO

Sub-Section 3B



CS6 & CS8 SERIES

CLUTCH SHIFT PTO



CS6 & CS8 Series PTO
U.S. Pat. 5,542,306





CS6 & CS8 SERIES CLUTCH SHIFT PTO

NOW YOU CAN PROVIDE POWERSHIFTED PTO POWER FOR AUTOMATIC AND STANDARD TRANSMISSIONS WITH MUNCIE'S NEW CS6 & CS8 PTO.

The internal wet clutch permits easy engagement and disengagement without the need to stop the PTO drive gear. This prevents gear clash and reduces new operator training time. The enhanced capacity design of the CS6 & CS8 includes many features of the popular Muncie CS10 & CS20 PTOs made for the Allison World Transmissions.



The CS6 & CS8 PTO is specifically designed to fit the older model Allison AT, MT, & HT Series transmissions as well as the Fuller CEEMAT. Using eleven input gear designs and seven internal speed ratios, these new CS Series PTO models also meet requirements for many popular Clark, Fuller, JATCO, Mack and Spicer transmissions often selected for similar chassis. Additionally, the CS8 provides convenient mounting on 8-bolt openings without special adapters.

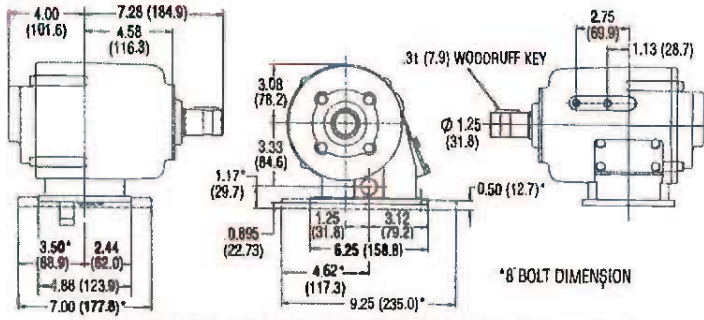


The CS Series is available with standard 1 1/4" round output shaft, or with several direct mount hydraulic flange and shaft options, all with the convenience of rotatable flanges that can be easily repositioned to gain pump mounting clearance or to access hydraulic ports. These flanges interchange with other Muncie PTO series.

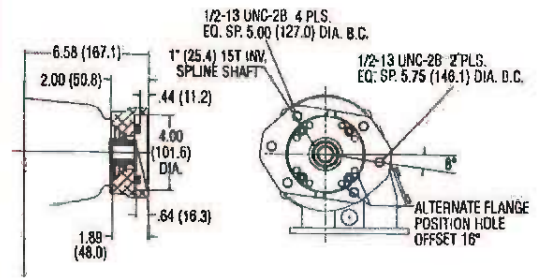
CS6 & CS8 PTO FEATURES INCLUDE:

- **High Strength Ductile Iron Housings**
- **Torque Ratings From 275-350 lb.ft.**
- **Patented Internal Drag Brake Eliminates Unwanted Shaft Rotation...A Must For Product Pump Applications**
- **Three Ways To Shift: Hydraulic, Air, Electric/Air**
- **Allows For Overspeed Protection**

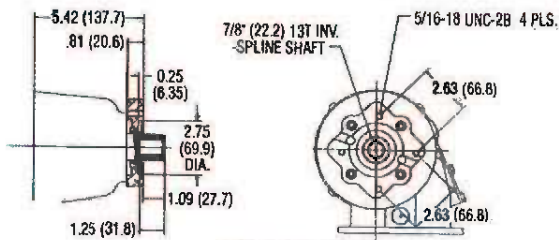
CS6 & CS8 DIMENSIONS IN INCHES (MM)



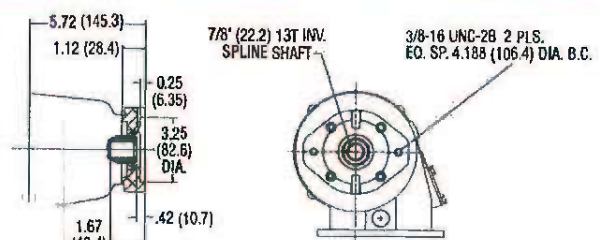
STANDARD 1-1/4 ROUND KEYED SHAFT ("B" OPTION)



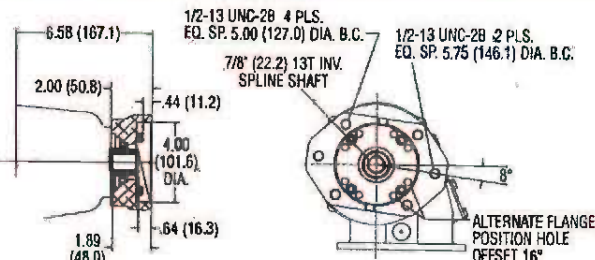
SAE "BB" 2 & 4 BOLT 1"-15 SPLINE ("P" OPTION)



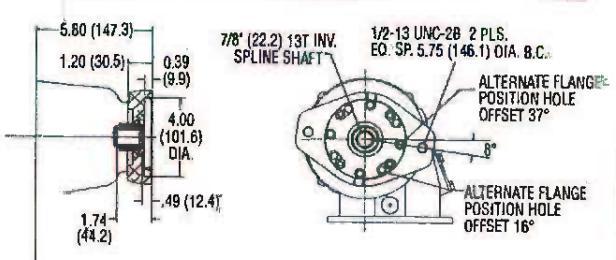
OPTIONAL PUMP BOLT KIT
19MK4717 SOLD SEPARATELY
SPECIAL 7/8"-13 SPLINE ("G" OPTION)



SAE "A" 2 BOLT 7/8"-13 SPLINE ("Q" OPTION)



SAE "B" 2 & 4 BOLT 7/8"-13 SPLINE ("K" OPTION)



SAE "B" 2 BOLT 7/8"-13 SPLINE ("S" OPTION)

MODEL NUMBER CONSTRUCTION

CS 6S — M65 07 — E 1 B X

PTO Type Clutch Shift — CS	CS Gear Data	Special Feature
Mounting SAE 6 Bolt Std. Mtg. — 6S SAE 6 Bolt Non-Std. Mtg. — 6D SAE 6 Bolt Non-Std. Mtg. (Isuzu) — 6N SAE 8 Bolt Std. Mtg. — 8S SAE 8 Bolt Non-Std. Mtg. — 8D	Clark/Fuller 6.1P 25°PA 32° 16' 48" LH — C61 Clark/Fuller 7P 25°PA 30° 46' 48" LH — C70 Fuller 6.35P 20°PA 22° LH — F63 Fuller 8.5P 21°PA Spur — F85 Isuzu (JATCO) 8.46P 20°PA Spur — I85 Mack 6.48P 17.5°PA Spur — M65 Spicer 6P 17.5°PA 26° 10' 37" — S60 Spicer 7P 17.5°PA 28° 4' 23" — S70 Spicer 6P or 6/8P 20°PA Spur — S68 Universal 6P 20°PA Spur — U60 Universal 6P or 6/8P 20°PA Spur — U68	X — None C — Pulse Generator/Pres Lube/EOS-111 D — Pulse Generator/EOS-111 P — Pressure Lube R — Pulse Generator/No Pressure Lube S — Pulse Generator/Pressure Lube
Trans.	Output Type	Assembly Arrangement
Speed Ratio 03 — .33:1 04 — .44:1 05 — .47:1 07 — .70:1 09 — .87:1 12 — 1.15:1 14 — 1.44:1 (8 Bolt-Only)	B — 1-1/4 Round 5/16 KW G — Special K — SAE "B" 2 & 4 Bolt Q — SAE "A" 2 Bolt P — SAE "BB" 2 & 4 Bolt S — SAE "B" 2 Bolt	1 — [Diagram] 3 — [Diagram]
	Shifter Type	
	A — Manual Air E — Elect/Air (12V) F — Elect/Air (24V) H — Elect/Hyd (12V) J — Elect/Hyd (24V)	

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 CATALOG 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.

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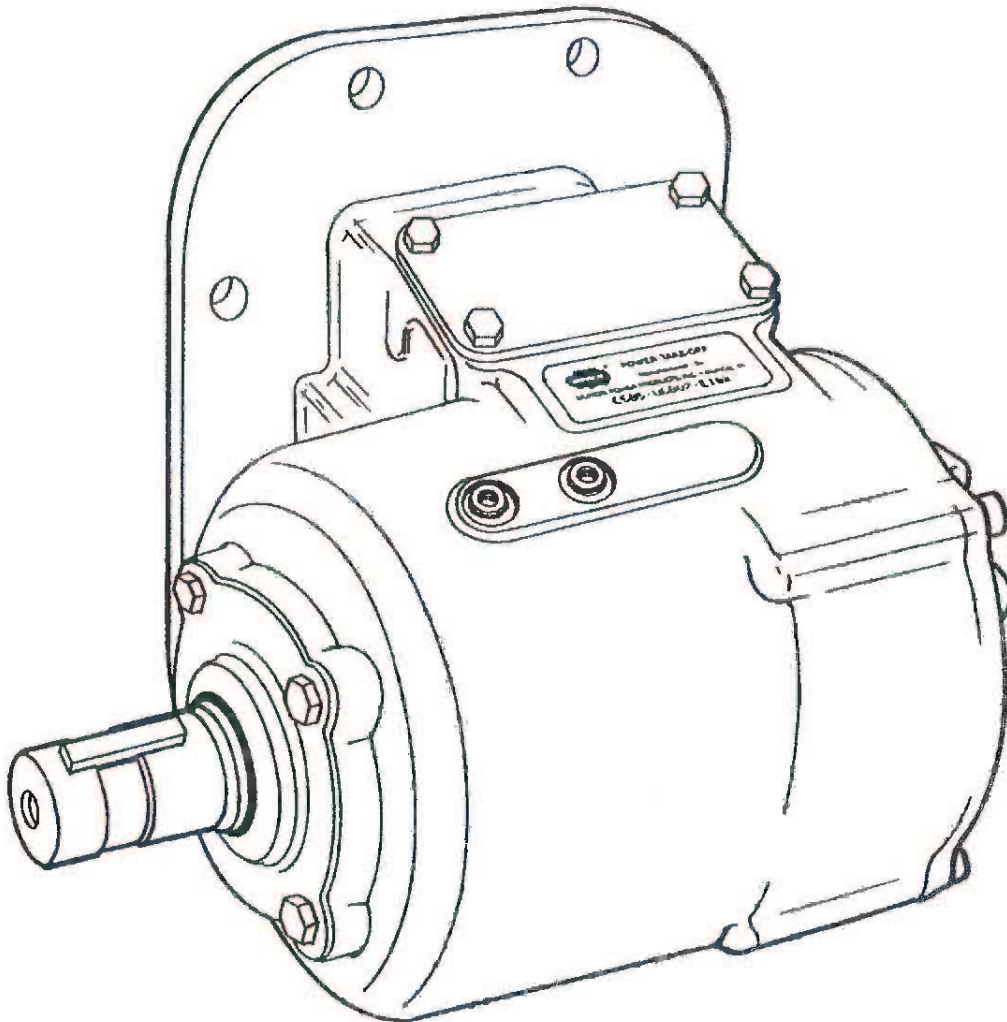
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CS6 & CS8 SERIES CLUTCH SHIFT PTO

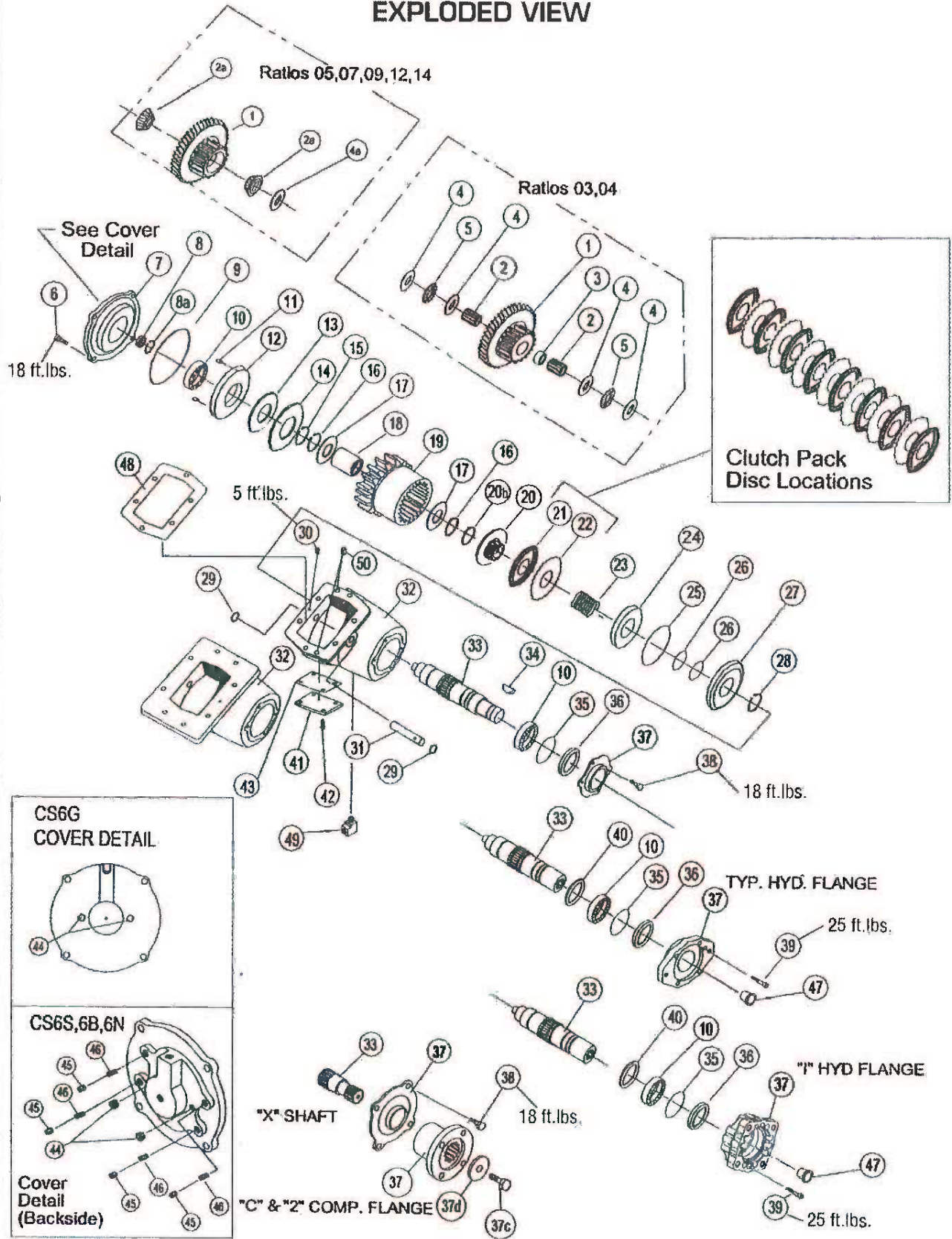
PARTS LIST AND SERVICE MANUAL



U.S. Pat. 5,542,306

Muncie Power Products, Inc.

CS6 & CS8 SERIES PTO EXPLODED VIEW



PARTS LIST AND DESCRIPTION

ITEM	QTY	PART NO.	DESCRIPTION	ITEM	QTY	PART NO.	DESCRIPTION
1	1		<i>See Gear Data Chart Page 4</i>	33	<i>continued</i>	06T37372	"2" "C" "X" Rd. 21-Spline
2	2	10T34006	Input Bearing (03-04)			06T37167	Output Shaft "B" CS6G
2a	2	10T35776	Input Bearing (05-14)			06T37168	Output Shaft "K" "V" CS6G
3	1	18T34622	Spacer (03-04)			06T39526	Output Shaft "I" CS6G
4	4	21T34621	Thrust Race (03-04)			06T36996	Output Shaft "I"
4a	1		<i>See Chart Page 8</i>			06T38908	Output Shaft "Z"
5	2	10T34620	Thrust Bearing (03-04)			06T38767	Output Shaft "B" Only (2 & 4 Assy)
6	4	19T35237	Capscrew			06T39533	Output Shaft "K" Only (2 & 4 Assy)
7	1	15T36717	Bearing Cover, Closed	34	1	26T01627	Woodruff Key
		15T36860	Closed Cover (CS6G)	35	1	12T36751	O Ring
8	1	11T36124	Seal			12T38344	O Ring ("I" & "Z")
8a	1	24T36894	Snap Ring	36	1	11T37790	Seal
9	1	12T34003	O-Ring			11T37795	Seal ("I" & "Z")
10	2	10T21017	Bearing (Only 1 req. for "I" & "Z")	37	1	15T34576	Bearing Cover, Open ("B" "2" "C" "X")
		10T38248	Bearing ("I" & "Z")			14T35537	Hyd Flange ("K" "P" "Z" Only)
11	4	26T36175	Roll Pin			14T39137	Hyd Flange ("G" Only)
12	1	21T36473	Plate			14T38354	Hyd Flange ("I" Only)
13	1	21T36511	Thrust Washer			14T39141	Hyd Flange ("Q" "R" "T" Only)
14	1	21T36512	Plate			14T35464	Hyd Flange ("S" Only)
15	1	24T27240	Snap Ring			14T37779	Hyd Flange ("V" Only)
16	2	24T35480	Snap Ring			14T38343	Hyd Flange ("Z" Only)
17	2	21T29017	Thrust Race			14T37378	"2" Companion Flange
18	1	10T36285	Bearing			14T37357	"C" Companion Flange
19	1		<i>See Output Bell Gear Chart Page 4</i>	37c	1	19T38266	Capscrew ("2" "C" "X")
20	1	02T35454	Clutch Hub	37d	1	21T20092	Flat Washer ("2" "C" "X")
		02T38792	Clutch Hub (184)	38	4	19T33233	Capscrew ("B")
20b	1	24T37951	Snap Ring ("I" & "Z")	39	4	19T34462	Socket Capscrew "K" "P" "V" "Z" Hyd
21	8	49T33564	Friction Disc			19T39257	Socket Capscrew "G" "Q" "S" "T" Hyd
22	7	49T33563	Spacer Disc			19M84478	Socket Capscrew "I"
23	1	27T36112	Spring	40	1	28T36546	Spacer
		27T38791	Spring (184)	40b	1	24T38347	Snap Ring
24	1	49T36560	Piston	41	1	16T33999	Cover
		49T38878	Piston (184)	42	4	19T34028	Capscrew
		49T38387	Piston ("I" & "Z")	43	1	13T34022	Gasket
		49T38758	Piston (2 & 4 Assy)	44	4	25T21684	Pipe Plug
25	1	12T36054	O-Ring	45	4	18T36174	Setcrew
		12T36472	O-Ring (184)	46	4	27T36173	Spring (2 Pcs Only) (U60, A68)
26	2	12T36471	O-Ring	47	1	25T35724	Cap Plug "K" "S" "Q" "G" "Z" (Storage Only)
		12T36053	O-Ring ("I" & "Z")			25T35725	Cap Plug "P" (Storage Only)
27	1	49T36561	Piston Cup			25T37387	Cap Plug "T"
		49T36464	Piston Cup (184)			25T37767	Cap Plug "I"
		49T36115	Piston Cup ("I" & "Z")	48	1	13M13541	Allison Gasket .031 (U60, A68, A69)
		49T38757	Piston Cup (2 & 4 Assy)			13M35091	Gasket .010 6-Bolt
28	1	24T36470	Snap Ring			13M35092	Gasket .020 6-Bolt
29	2	12T35949	O-Ring (03-04)			13M35151	Gasket .010 8-Bolt
		12T35774	O-Ring (05-14)			13M35152	Gasket .020 8-Bolt
30	1	19T35785	Setcrew			13T35198	Gasket .010 (185)
31	1	07T35947	Idler Shaft (03-04)			13T35199	Gasket .020 (185)
		07T37071	Idler Shaft (05-14)	49	1	43T37385	Orifice Fitting (P - Special Op(ion)
32	1	01T36713	6 Bolt Housing (03-04) (1 Arrng)	50	2	26T37992	Dowel Pin (F84 Only)
		01T36706	6 Bolt Housing (03-04) (3 Arrng)	N.S.	1	CS6-GSK	Gasket Kit
		01T37073	6 Bolt Housing (05-14) (1 Arrng)			CS6-GSK-IZ	Includes: (1)8, (1)9, (1)25, (2)26*, (2)29, (1)35*, (1)36*, (1)43, (1)13M35091, (1)13M35092
		01T37072	6 Bolt Housing (05-14) (3 Arrng)			N.S.	Gasket Kit
		01T37107	6 Bolt "N" Housing (05-14) (1 Arrng)			CS8-GSK	Includes: (1)8, (1)9, (1)25, (2)26*, (2)29, (1)35*, (1)36*, (1)43, (1)13M35151, (1)13M35152
		01T37106	6 Bolt "N" Housing (05-14) (3 Arrng)			CS8-GSK-IZ	
		01T37966	6 Bolt "F" Housing "1" (F84 Only)			N.S.	Rebuild Kit (03 & 04)
		01T37965	6 Bolt "F" Housing "3" (F84 Only)			CS6-RBK-03	Rebuild Kit (05 - 14)
		01T38337	6 Bolt Housing (05-14) (3 Arrng) ("I" & "Z")			CS6-RBK-05	Includes: (2)2, (4)4, (2)5, (1)8, (1)8a, (1)9, (2)10*, (1)13, (1)15, (2)16, (2)17, (1)18, (1)20b, (8)21, (7)22, (1)23, (1)25, (2)26, (1)28, (2)29, (1)35*, (1)36*, (1)43, (2)46, (1)13M35091, (1)13M35092
		01T38338	6 Bolt Housing (05-14) (1 Arrng) ("I" & "Z")			CS6-RBK-03-IZ	
		01T39411	6 Bolt Housing Special (39409)			CS6-RBK-05-IZ	
		01T36715	8 Bolt Housing (03-04) (1 Arrng)			N.S.	Rebuild Kit (03 & 04)
		01T36711	8 Bolt Housing (03-04) (3 Arrng)			CS8-RBK-05	Rebuild Kit (05 - 14)
		01T37075	8 Bolt Housing (05-14) (1 Arrng)			CS8-RBK-03-IZ	Includes: (2)2, (4)4, (2)5, (1)8, (1)9, (2)10*, (1)13, (1)15, (2)16, (2)17, (1)18, (1)20b, (8)21, (7)22, (1)23, (1)25, (2)26, (1)28, (2)29, (1)35*, (1)36*, (1)43, (4)46, (1)13M35151, (1)13M35152
		01T37074	8 Bolt Housing (05-14) (3 Arrng)			CS8-RBK-05-IZ	
		01T38350	8 Bolt Housing (05-14) (3 Arrng) ("I" & "Z")			N.S.	Rebuild Kit (03 & 04)
		01T38351	8 Bolt Housing (05-14) (1 Arrng) ("I" & "Z")			CS8-RBK-05	Rebuild Kit (05 - 14)
33	1	06T36892	Output Shaft "B" 1-1/4 Rd			CS8-RBK-03-IZ	Includes: (2)2, (4)4, (2)5, (1)8, (1)9, (2)10*, (1)13, (1)15, (2)16, (2)17, (1)18, (1)20b, (8)21, (7)22, (1)23, (1)25, (2)26, (1)28, (2)29, (1)35*, (1)36*, (1)43, (4)46, (1)13M35151, (1)13M35152
		06T37088	Output Shaft "G" Dana Special			CS8-RBK-05-IZ	
		06T36893	Output Shaft "K" & "V" 7/8 - 13 Spl			N.S.	Rebuild Kit (03 & 04)
		06T37030	Output Shaft "Q" & "S" 7/8-13 Spl			CS8-RBK-05-IZ	Rebuild Kit (05 - 14)
		06T37089	Output Shaft "P" 1-15 Spl				Includes: (2)2, (4)4, (2)5, (1)8, (1)9, (2)10*, (1)13, (1)15, (2)16, (2)17, (1)18, (1)20b, (8)21, (7)22, (1)23, (1)25, (2)26, (1)28, (2)29, (1)35*, (1)36*, (1)43, (4)46, (1)13M35151, (1)13M35152
		06T38964	Output Shaft "R" 5/8-9T Spl				
		06T37336	Output Shaft "T" 3/4-11 Spl				

GEAR DATA

INPUT GEAR - ITEM 1

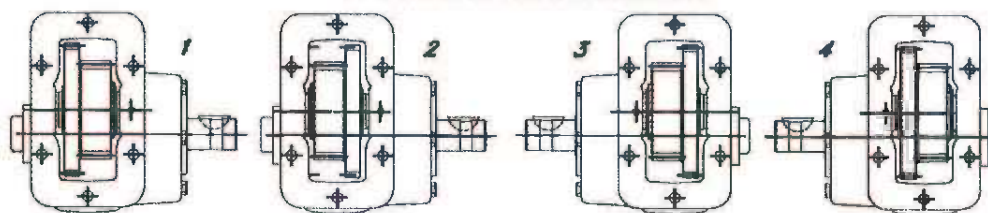
DESIG.	PART NO.	TEETH	GEAR DATA	DESIG.	PART NO.	TEETH	GEAR DATA
A6803	03T37028	26/14	6.86P 20° PA SPUR	I8507	03T37092	38/23	8.46P 20° SPUR
A6804	03T37910	26/17	6.86P 20° PA SPUR	M6504	03T36775	26/17	6.48P 17.65° PA SPUR
A6805	03T37911	26/18	6.86P 20° PA SPUR	M6505	03T37070	26/18	6.48P 17.65° PA SPUR
A6907*	03T37980	30/23	6.86P 20° PA SPUR	M6507	03T37058	26/23	6.48P 17.65° PA SPUR
C6112	03T37067	20/30	6.1P 25° PA 32° 16'48" LH	M6509	03T37059	26/26	6.48P 17.65° PA SPUR
C7009	03T37652	23/26	7P 25° PA 30° 46'48" LH	M6512	03T37060	26/30	6P 17.5° PA SPUR
C7012	03T37068	23/30	7P 25° PA 30° 46'48" LH	M8306	03T38760	30/20	8.38P 19.16° PA 24°58' LH
F1012	03T37984	42/30	10.1P 20° PA SPUR	M8309	03T38762	30/26	8.38P 19.16° PA 24°58' LH
F1107	03T37156	42/23	10.1P 21.5° PA SPUR	S6007	03T37061	21/23	6.48P 17.65° PA 26°10'37" LH
F6107	03T37147	21/23	6.1P 20.5° PA 29° LH	S6807	03T37062	26/23	6/8P 20° SPUR
F6307	03T37086	24/23	6.35P 20° PA 22° LH	S6809	03T37063	26/26	6/8P 20° SPUR
F6309	03T38356	24/26	6.35P 20° PA 22° LH	S6812	03T37064	26/30	6/8P 20° SPUR
F6312	03T37087	24/30	6.35P 20° PA 22° LH	S6814(8-Bt)	03T37110	26/33	6/8P 20° SPUR
F6607	03T38502	24/23	6.65P 20° PA 21.5° LH	S7009	03T37065	24/26	7P 17.5° PA 28° 4'23" LH
F6609	03T38503	24/26	6.65P 20° PA 21.5° LH	S7107	03T37149	29/23	7P 17.5° PA 18° LH
F6612	03T38504	24/30	6.65P 20° PA 21.5° LH	S7109	03T37134	29/26	7P 17.5° PA 18° LH
F7005	03T38195	26/18	7P 23° 26° LH	S7307	03T37919	28/23	7P 22.5° PA 19° LH
F7007	03T38194	26/23	7P 23° PA 26° LH	S7309	03T38171	28/26	7P 22.5° PA 19° LH
F8405	03T37741	28/18	8.38P 18° PA 33.1° LH	S7312	03T38170	28/30	7P 22.5° PA 19° LH
F8407	03T37742	28/23	8.38P 18° PA 33.1° LH	U6003	03T36737	24/14	6P 20° PA SPUR
F8409	03T37743	28/26	8.38P 18° PA 33.1° LH	U6004	03T36738	24/17	6P 20° PA SPUR
F8507	03T37066	34/23	8.55P 21° PA SPUR	U6005	03T37069	24/18	6/8P 20° PA SPUR
F8607	03T39447	28/23	8.38P 18° PA 33.1° RH	U6806	03T38262	24/20	6/8P 20° SPUR
F8609	03T39448	28/26	8.38P 18° PA 33.1° RH	U6807	03T37038	24/23	6/8P 20° SPUR
I8403	03T37329	34/14	8.46P 20° PA SPUR	U6809	03T37039	24/26	6/8P 20° SPUR
I8404	03T37330	34/17	8.46P 20° PA SPUR	U6812	03T37040	24/30	6/8P 20° SPUR
I8405	03T37331	34/18	8.46P 20° PA SPUR	U6814(8-Bt)	03T37042	24/33	6/8P 20° SPUR
I8407	03T37332	34/23	8.46P 20° PA SPUR				
I8505	03T37091	38/18	8.46P 20° SPUR				

*Requires 23M60270 and 20TK4360 (pg 9) to mount, included in PTO.

OUTPUT BELL GEAR - ITEM 19

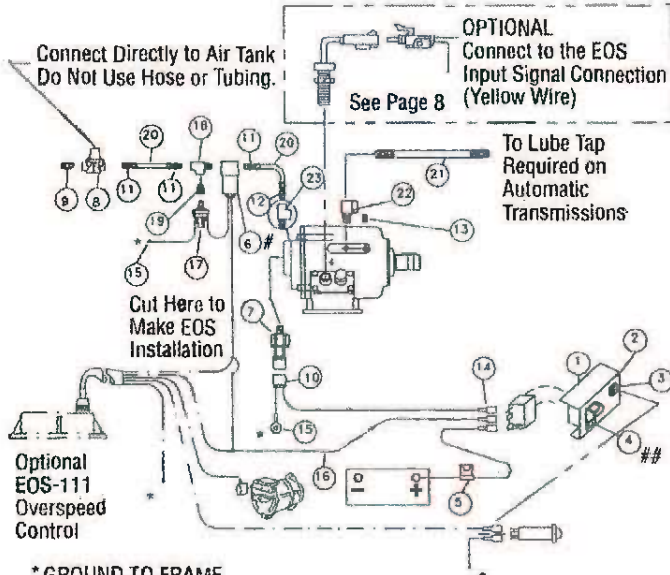
PART NO.	RATIO	TEETH	PART NO.	RATIO	TEETH
02T36744	03	42T	02T38988	03	42T (I & Z Output)
02T36745	04	39T	02T38989	04	39T (I & Z Output)
02T36746	05	38T	02T38990	05	38T (I & Z Output)
02T37913	06	36T	02T38991	06	36T (I & Z Output)
02T36747	07	33T	02T38817	07	33T (I & Z Output)
02T36748	09	30T	02T38992	09	30T (I & Z Output)
02T36749	12	26T	02T38994	12	26T (I & Z Output)
02T36750	14	23T	02T38995	14	23T (I & Z Output)
			02T38764	06	36T (2 & 4 Ass'y)
			02T38766	09	30T (2 & 4 Ass'y)

PTO ASSEMBLY ARRANGEMENTS



CS6 & CS8 INSTALLATION KITS

CLUTCH SHIFT ELECTRIC/AIR SHIFT SYSTEM KIT NO. 48TK3928 12V ELECTRIC AIR SHIFT (For Use When Air Shifting CLUTCH SHIFT)



* GROUND TO FRAME

Solenoid to be mounted in engine compartment out of direct spray of road contaminants.

Green light to turn "ON" when PTO switch is activated.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	30T36270	Switch Assembly 12v (Incl 1,2,3,4)
2	1	36MA1005	Switch Bracket
		36M01006	Face Plate W/Overspeed Light Access
		36T36271	Face Plate W/O Light Access
3	1	32MSR12V	Light Assembly 12v
4	1	30T35687	Rocker Switch 12v
5	1	33T36299	Fuse Assembly
6	1	35M30692	Solenoid Valve 12v
7	1	30T37954	Pressure Switch
8	1	31M15759	Pressure Protection Valve
9	1	44MB2164	Pipe Nipple
10	1	34T36941	Wiring Pigtail
11	2	44MB6844	Male Connector
12	2	44MB6842	Male Connector
13	1	25T21684	Pipe Plug (Use As Req.)
14	3	34M18250	Female Spade Connector
15	2	34M18009	Ring Terminal
16	12	37M18000	Electric Wire 12ft
17	1	31M14732	Pressure Safety Switch (80 PST)
18	1	44MB2254	Street Tee
19	1	44MB0942	Reducer Bushing
N.S.	1	48TA3953	Solenoid Mntg Kit

Parts Included with PTO (Not with Kit No. 48TK3928) "P" Special Option:

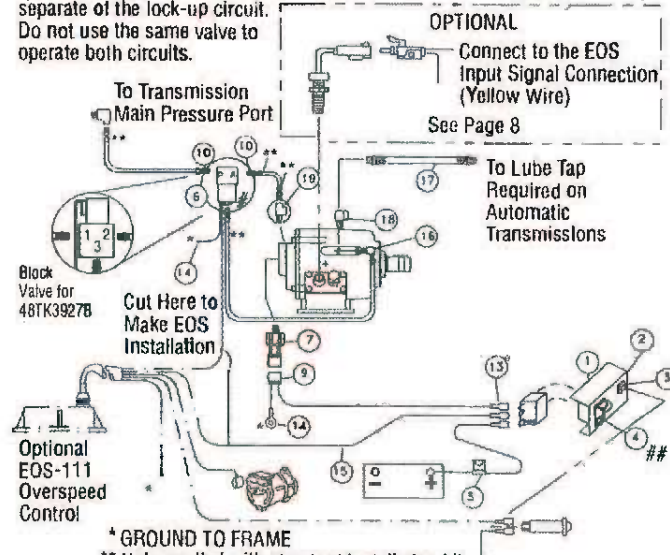
20	1	45M44430	Air Tubing 30ft
21	1	45M4R536	Lube Hose Assembly
22	1	43T37385	Orifice Fitting
23	1	44MB2252	Street Tee
N.S.	1	43M05522	Add. Elbow (F85 Only)
N.S.	2	43T37429	Fitting (I85 Only)

For 24V Electric/Air Kit No. 48TK3931, Substitute:

3	1	30T36453	Switch Assembly 24v (Incl 1,2,3,4)
4	1	32MSR24V	Light Assembly 24v
6	1	30T35712	Rocker Switch 24v
		35M31692	Solenoid Valve 24v

CLUTCH SHIFT ELECTRIC/HYDRAULIC SYSTEM KIT NO. 48TK3927 12V ELECTRIC/HYDRAULIC SHIFT KIT NO. 48TK3927B 12V ELEC/HYD SHIFT (BLOCK VALVE)

On Automatic Transmissions with externally, controlled converter neutral lock-up, install the Clutch Shift activation circuit completely separate of the lock-up circuit. Do not use the same valve to operate both circuits.



* GROUND TO FRAME

** Not supplied with standard installation kit. Order Muncie 131-2-0001 separately.

Solenoid to be mounted in engine compartment out of direct spray of road contaminants.

Green light to turn "ON" when PTO switch is activated.

ITEM	QTY	PART NO.	DESCRIPTION
1	1	30T36270	Switch Assembly 12v (Incl 1,2,3,4)
2	1	36MA1005	Switch Bracket
		36M01006	Face Plate w/Overspeed Light Access
		36T36271	Face Plate w/o Light Access
3	1	32MSR12V	Light Assembly 12v
4	1	30T35687	Rocker Switch 12v
5	1	33T36299	Fuse Assembly
6*	1	35M12340	Solenoid Valve 12v (48TK3927)
		35M12340A	Solenoid Valve 12v (48TK3927B)
7	1	30T37954	Pressure Switch
9	1	34T36941	Wiring Pigtail
10	2	43MX044S	Screen Adapter
13	3	34M18250	Female Spade Connector
14	2	34M18009	Ring Terminal
15	12	37M18000	Electric Wire 12ft
16	1	43T35867	Elbow, Pipe to JIC Incl. w/parts bag
N.S.	1	48TA3953	Solenoid Mntg Kit (48TK3927)
N.S.	2	19T36623	Capscrew (48TK3927B)
N.S.	2	22T35140	Hex Nut (48TK3927B)
N.S.	2	21T37991	Lock Washer (48TK3927B)

Parts Included with PTO (Not with Kit No. 48TK3927) "P" Special Option:

17	1	45M4R536	Lube Hose Assembly
18	1	43T37385	Orifice Fitting

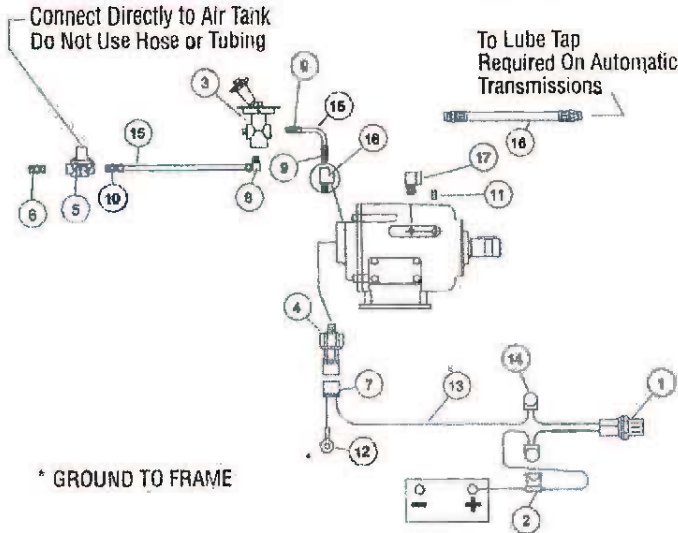
For 24V Electric/Hydraulic Kit No. 48TK3930, Substitute:

19	1	44MB2252	Street Tee
N.S.	1	43M05522	Add. Elbow (F85 Only)
N.S.	2	43T37429	Fitting (I85 Only)
3	1	30T36453	Switch Assembly 24v (Incl 1,2,3,4)
4	1	32MSR24V	Light Assembly 24v
6*	1	30T35712	Rocker Switch 24v
		35M24340	Solenoid Valve 24v (48TK3930)
		35M24340A	Solenoid Valve 24v (48TK3930B)

* Solenoid Valve Block Type is used for new kits with "B" suffix.

CS6 & CS8 INSTALLATION KITS

CLUTCH SHIFT MANUAL AIR SHIFT SYSTEM KIT NO. 48TK4508 MANUAL AIR SHIFT - 12V LIGHT

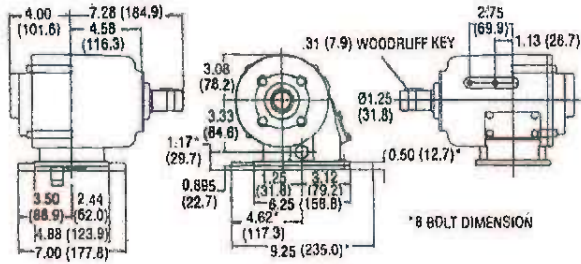


ITEM	QTY	PART NO.	DESCRIPTION
1	1	32M12001	Light Assembly 12v
2	1	33T36299	Fuse Assembly
3	1	35M18653	Air Valve
4	1	30T37954	Pressure Switch
5	1	31M15759	Pressure Protection Valve
6	1	44MB2164	Pipe Nipple
7	1	34T36941	Wiring Pigtail
8	1	44MB6942	Fitting - Elbow
9	2	44MB6842	Male Connector
10	1	44MB6844	Male Connector
11	1	25T21684	Pipe Plug
12	2	34M18009	Ring Terminal
13	12	37M18000	Electric Wire 12ft
14	3	34T36362	Closed End Crimp
N.S.	1	36MA1004	Dash Bracket
N.S.	1	36T38978	Face Plate
N.S.	1	36MK1007	Bolt Kit
Parts Included with PTO (Not with Kit No. 48TK3926) "P" Special Option:			
15	1	45M44430	Air Tubing 30ft
16	1	45M4R536	Lube Hose Assembly
17	1	43T37385	Orifice Fitting
18	1	44MB2252	Street Tee
N.S.	1	43M05522	Elbow
N.S.	2	43T37429	Fitting (185 Only)
For 24V Manual Air Kit No. 48TK4509, Substitute:			
1	1	32M24001	Light Assembly 24v

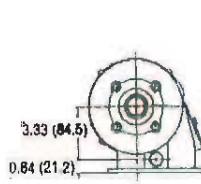
MODEL NUMBER CONSTRUCTION

		CS 6S - M65 07 - E 1 B X				Special Feature
PTO Type	Clutch Shift	CS				X - None
Mounting						C - Pulse Generator/Pres Lube/EOS-111
	SAE 6 Bolt Std. Mtg.	6S				D - Pulse Generator/EOS-111
	SAE 6 Bolt Non-Std. Mtg.	6D				P - Pressure Lube
	SAE 6 Bolt Non-Std. Mtg. (Isuzu)	6N				R - Pulse Generator/No Pressure Lube
	SAE 6 Bolt Std. Mtg., Metric Stud Kit	6B				S - Pulse Generator/Pressure Lube
	SAE 6 Bolt Deep Mtg., Metric Stud Kit	6C				Output Type
	SAE 6 Bolt Std., Less Drag Brake (CS6 Only)	6G				B - 1-1/4 Round 5/16 KW
	SAE/ISO 6 Bolt Std., w/Dowel Holes	6F				C - 1410 Companion Flange
	SAE 8 Bolt Std., Less Drag Brake (CS8 Only)	8G				G - Special
	SAE 8 Bolt Std. Mtg.	8S				I - DIN 5462
	SAE 8 Bolt Deep Mtg.	8D				K - SAE "B" 2 & 4 Bolt
	SAE 8 Bolt Std. Mtg., Metric Stud Kit	8B				P - SAE "BB" 2 & 4 Bolt
	SAE 8 Bolt Deep Mtg., Metric Stud Kit	8C				Q - SAE "A" 7/8" 13 Spl.
Trans.	CS Gear Data					R - SAE "A" 2 Bolt 5/8" 9 Spl.
Aisin	8.46P 20°PA Spur	184				S - SAE "B" 2 Bolt
Allison	6.86P 20°PA Spur	A68, A69				T - SAE "A" 3/4" 11 Spl. 2 Bolt
Clark	6.1P 25°PA 32.28° LH	C61				V - SAE "B" 2 & 4 Bolt
Clark	7P 25°PA 30.78° LH	C70				X - 1.3-21 Spline
Fuller	1.01P 20°PA Spur	F10				2 - DIN Companion Flange
Fuller	1.01P 21.5°PA Spur	F11				Z - SAE "C" 14 Spl. Shaft, SAE "B" Flange
Fuller	6.1P 20.5°PA 29° LH	F61				Assembly Arrangement
Fuller	6.35P 20°PA 22° LH	F63				1 2 3 4
Fuller	6.65P 20°PA 21.5° LH	F66				Shifter Type
Fuller	6.1P 23°PA 26° LH	F70				A - Manual Air (12V)
Fuller	8.38P 18°PA 33.1° LH	F84				E - Elect/Air (12V)
Fuller	8.55P 21°PA Spur	F85				F - Elect/Air (24V)
Fuller	8.38P 18°PA 33.1° RH	F86				H - Elect/Hyd (12V)
Isuzu	8.46P 20°PA Spur	185				K - Manual Air (24V)
Mack	6.48P 17.65°PA Spur	M65				J - Elect/Hyd (24V)
Mercedes	8.38P 19.16°PA 24°58' LH	M83				P - Air, Less Activation Kit
Spicer	6P 17.5°PA 28.7° LH	S60				Speed Ratio
Spicer	6 or 6/8P 20°PA Spur Deep Dish	S68				03 - .33:1 09 - .87:1
Spicer	7P or 17.5°PA 28.07° LH	S70				04 - .44:1 12 - 1.15:1
Spicer	7P 17.5°PA 18° LH	S71				05 - .47:1 14 - 1.44:1 (8-Bolt Only)
Spicer	7P 22.5°PA 19° LH	S73				06 - .55:1
Universal	6P 20°PA Spur	U60				07 - .70:1
Universal	6 or 6/8P 20°PA Spur	U68				

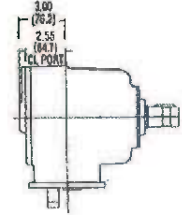
CS6 & CS8 DIMENSIONS IN INCHES (MM)



CS6/8S HOUSING DIMENSION

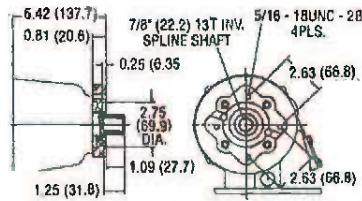


CS6N HOUSING DIMENSION

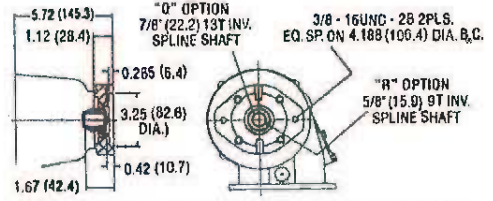


CS6G HOUSING OPTION "B" OR "K" SHAFT ONLY. NO DRAG BRAKE.

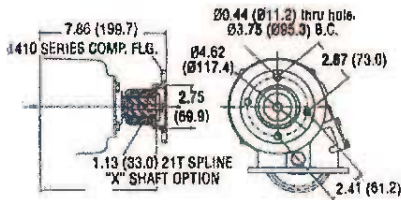
STANDARD 1-1/4" ROUND KEYED SHAFT ("B" OPTION)



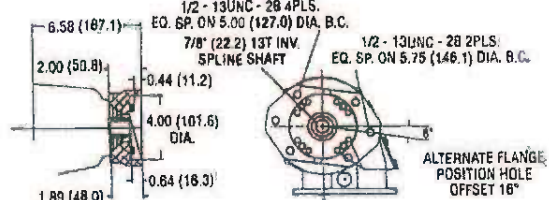
Optional Pump Bolt Kit 19MK4717 Sold Separately.
SPECIAL 7/8" - 13 SPLINE ("G" OPTION)



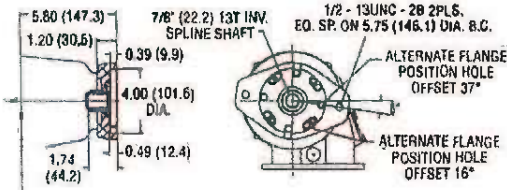
SAE "A" 2-BOLT 7/8" - 13 SPLINE ("O" OPTION)
SAE "A" 2-BOLT 5/8" - 9 SPLINE ("R" OPTION)



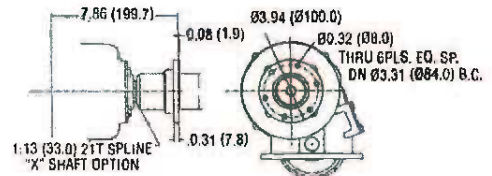
1410 SERIES COMPANION FLANGE ("C" OPTION)



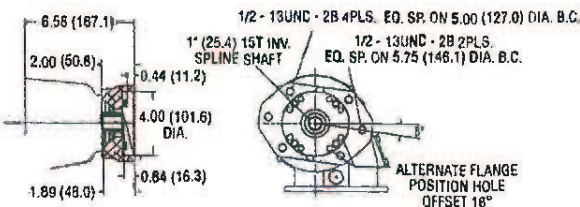
SAE "B" 2 & 4 BOLT 7/8" - 13 SPLINE ("K" OPTION)



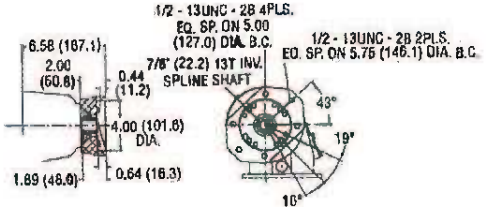
SAE "B" 2-BOLT 7/8" - 13 SPLINE ("S" OPTION)



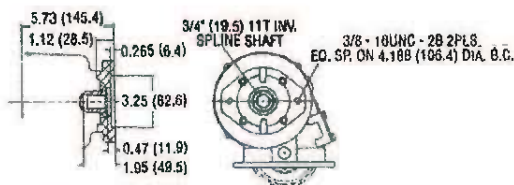
DIN 100 COMPANION FLANGE ("2" OPTION)



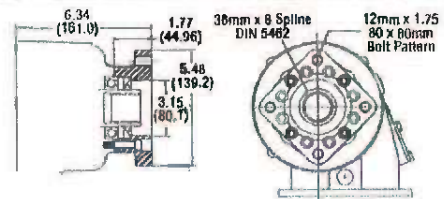
SAE "B-B" 2 & 4 BOLT 1" - 15 SPLINE ("P" OPTION)



SAE "B" 2 & 4 BOLT 7/8" - 13 SPLINE ("V" OPTION)



SAE "A" 2-BOLT 3/4" - 11 SPLINE ("T" OPTION)



DIN 5462 36MM X 8 SPLINE ("I" OPTION)

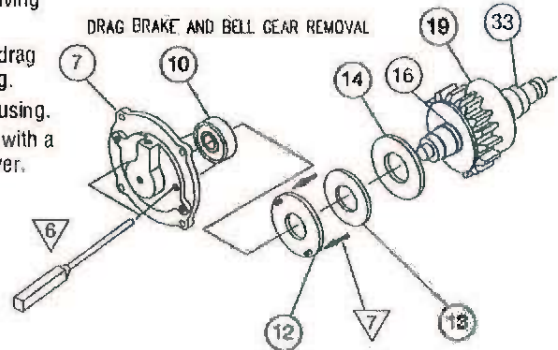
CS6 & CS8 DISASSEMBLY AND REASSEMBLY

(REFERENCE EXPLODED VIEW ON PAGE 2)

DISASSEMBLY PROCEDURE

1. Remove the CS6S input gear, by removing the set screw in the pad and driving the idler shaft from the housing (Items 30, 32).
2. Remove the set screws (Item 45) from bearing cover (Item 7) which hold drag brake springs (Item 46). Position housing so that springs fall from housing.
3. Remove the four (4) capscrews (Item 6) which hold back cover to PTO housing.
4. Position housing against a bench block and hit the end of the output shaft with a soft face hammer to remove entire output shaft assembly with bearing cover.
5. Remove the two (2) pipe plugs (Item 44) from the bearing cover. This exposes the ball bearing assembly within the cover.
6. Using a 1/4" punch and alternating between the two holes, drive the bearing and shaft assembly from the bearing cover.
7. Using a bearing puller remove the rear bearing (Item 10) by grabbing the drag brake plate (Item 12) and removing both pieces. The bronze brake disk (Item 13) can be removed.
8. Using a bearing puller remove the drag brake rotor (Item 14).
9. The piston and clutch pack may be serviced without removal of the drag brake. Using snap ring pliers, remove the snap ring (Item 28) located on the output shaft end while gently pushing on the piston cup (Item 27).
10. Pull the piston cup (Item 27) from the shaft and the piston (Item 24) will go with it.
11. Tap the piston cup on a wood surface to remove the piston.
12. Remove the spring (Item 23). The clutch friction discs (Item 21) and spacer discs (Item 22) and inner clutch hub (Item 20) can be removed by pointing the shaft end down.
13. With the drag brake removed, the snap rings (Item 15 & 16) on this end of the bell gear can be removed with snap ring pliers. This allows the bell gear to be removed towards the closed end. The internal bearing (Item 18) of the bell gear can easily be removed.

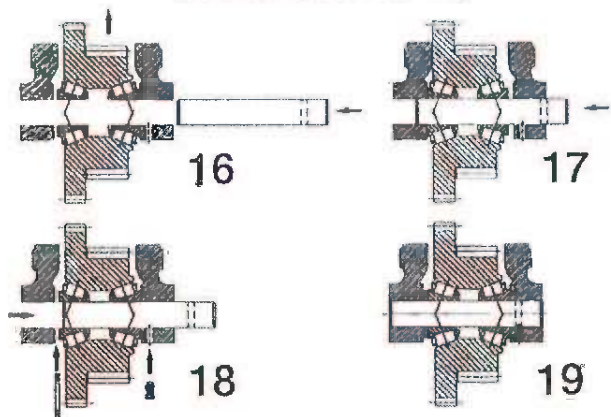
▽ - DENOTES SPECIAL SERVICE PROCEDURES



REASSEMBLY PROCEDURE

14. The reassembly of the unit is made in reverse of the disassembly.
15. Be sure to lubricate the o-rings and all bearings upon installation. Torque capscrews to values shown or to the following values.
5/16" Capscrews - 18 ft.lb.
5/16" Hydraulic Flange Capscrews - 25 ft.lb.
3/8" Capscrews - 36 ft.lb.
1/4" Set screw - 5 ft.lb.
16. Place the input bearing into the input gear and slide this group into the housing to line up the idler shaft.
17. Tap idler shaft into housing and through both bearing races.
18. To seat the bearings, tap the idler shaft in the reverse direction while rotating the gear back and forth. Move the shaft so that it is flush with the bearing in this assembly. Position the PTO so that the idler shaft is pointed down and perpendicular to the table. Insert the thickest shim that can be installed by hand in the gap between the bearing and the housing. Rotate the input gear to ensure it is not excessively tight or loose. Using a feeler gauge, measure the clearance between the shim and the bearing race. Recommended bearing clearance is .002" loose to .006" loose. If measurement is less than .002" then remove the shim and replace with the next thinner shim. If the measurement is greater than .006" then remove shim and replace with the next thicker shim.
19. Tap the idler shaft into position and install the set screw.

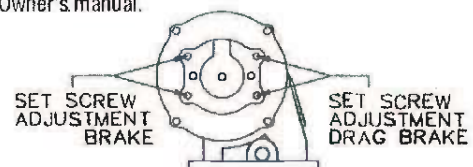
TAPER ROLLER BEARINGS (RATIOS 05 THRU 14)



Item 4a	Dimension	Item 4a	Dimension
18T35783	Shim 0.1150 / 0.1130	18T38728	Shim 0.1325 / 0.1305
18T38725	Shim 0.1175 / 0.1155	18T36229	Shim 0.1350 / 0.1330
18T35782	Shim 0.1200 / 0.1180	18T38729	Shim 0.1375 / 0.1355
18T38726	Shim 0.1225 / 0.1205	18T37151	Shim 0.1400 / 0.1380
18T35781	Shim 0.1250 / 0.1230	18T38730	Shim 0.1425 / 0.1405
18T38727	Shim 0.1275 / 0.1255	18T37152	Shim 0.1450 / 0.1430
18T36230	Shim 0.1300 / 0.1280	18T38731	Shim 0.1475 / 0.1455
		18T37153	Shim 0.1500 / 0.1480

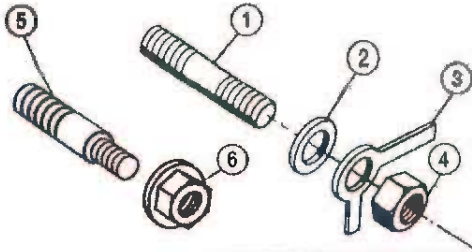
DRAG BRAKE ADJUSTMENT

20. When installing the rear cover be sure to align the roll pins in the drag brake plate with the holes in the rear cover.
21. After the cover has been attached to the housing insert the springs into the holes.
22. Insert the set screw over the spring and turn the screw four (4) full turns.
23. Follow the test and adjustment procedures in the PTO Owner's manual.



MOUNTING KITS

6-BOLT MOUNTING KIT



20TK4418 STD (CS6S, CS6D, CS6N-S71,S73)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	20M38150	Stud
2	4	13M18018	Copper Gasket
3	4	21MX3802	Lock Tab
4	4	22MX3824	Nut
5	2	20T37032	Step-Stud
6	2	22T37605	Lock Nut
N.S.	1	MC00-02	Instruction Card

20TK4359 METRIC (CS6B, CS6C, CS6N-185)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	20M39040	Stud
2	4	13M18018	Copper Gasket
3	4	21MX3802	Lock Tab
4	4	22MX3824	Nut
5	2	20T37952	Step-Stud
6	2	22T37605	Lock Nut
N.S.	1	MC00-02	Instruction Card

20TK4360 METRIC (CS6B-A6907)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	20M39045	Stud
2	4	13M18018	Copper Gasket
3	4	21MX3802	Lock Tab
4	4	22MX3824	Nut
5	2	20T38391	Step-Stud
6	2	22T37605	Lock Nut
N.S.	1	MC00-02	Instruction Card

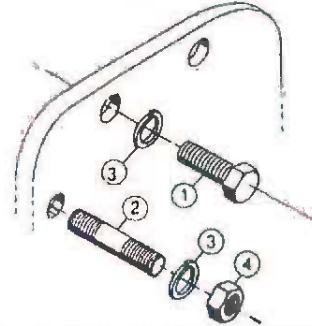
20TK4440 METRIC (CS6B, 184)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	20T38143	Stud (1-1/4")
2	4	13M18018	Copper Gasket
3	4	21MX3802	Lock Tab
4	4	22MX3824	Nut
5	2	20T38582	Step-Stud
6	2	22T37605	Lock Nut
N.S.	1	MC00-02	Instruction Card

20TK4046 METRIC (CS6F-F84)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	4	20M39040	Stud
2	4	13M18018	Copper Gasket
3	4	21MX3802	Lock Tab
4	4	22MX3824	Nut
5	2	20T37952	Step-Stud
6	2	22T37605	Lock Nut
N.S.	1	13M51717	Locktite GSK Elim
N.S.	1	MC99-06	Instruction Card

8-BOLT MOUNTING KIT



20MK8800 STANDARD (CS8S, CS8D)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	6	19M44138	Capscrew
2	2	20M44175	Stud
3	8	21ML4375	Lockwasher
4	2	22MX4420	Nut

20MKM801 METRIC (CS8B, CS8C)

ITEM	QTY	PART NUMBER	DESCRIPTION
2	8	20M47050	Stud
3	8	21ML4375	Lockwasher
4	8	22MX4420	Nut

LUBE HOSE KIT

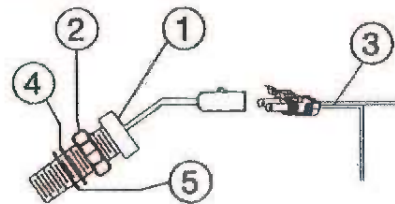


43TK3934 HOSE KIT (STANDARD)

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	45M4R536	Hose Assembly Std.
2	1	43M05522	Elbow

SPEED SENSOR KIT

16TK3833 SPECIAL OPTION "C", "D", "R", & "S"



ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	31T35108	Mag Pickup
2	1	21T35109	Jam Nut
3	1	34MA1415	Wiring Harness
4	1	21T36099	Flat Washer
5	1	12T35774	O-Ring
N.S.	1	16T35523	Cover, Mag Pickup
N.S.	1	25T35565	Plug

The CS6 & CS8 PTOs include mounting kit, special shim/gasket, wiring harness, dash bracket kit, and installation instructions. The installation does not require any special tools. The PTO is available with a pulse generator pick-up for use with the Muncie digital tachometer 38MK2000 (request MP92-04) or the EOS-111 Muncie overspeed switch. The EOS-111 is designed to control the engagement speed and provide overspeed protection of the PTO. Contact your Muncie Application Specialist for assistance with these options.



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Power
Products**

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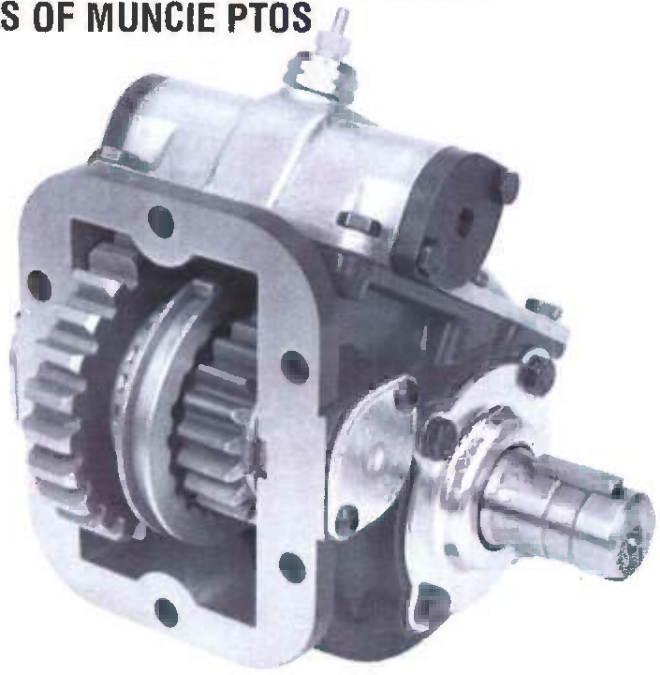
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KEEP IN VEHICLE
READ OPERATING INSTRUCTIONS
INSIDE BEFORE OPERATING PTO

PTO INSTALLATION and OWNER'S MANUAL

FOR ALL 6-BOLT AND 8-BOLT MOUNT
SERIES OF MUNCIE PTOS



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










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WARNING

READ MANUAL COMPLETELY INCLUDING THESE WARNINGS AND OPERATOR'S INSTRUCTIONS IN SECTION 3

-  READ AND UNDERSTAND ENTIRE MANUAL BEFORE INSTALLATION OR OPERATION OF PTO AND DRIVEN EQUIPMENT
 -  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 THE IGNITION KEYS IN YOUR POCKET BEFORE GETTING UNDER THE TRUCK.
 -  DO NOT ALLOW TRUCK ENGINE TO BE STARTED WHILE WORKERS ARE UNDER THE TRUCK.
 -  IMMOBILIZE TRUCK WHEELS WITH SUITABLE CHOCKS BEFORE WORKING UNDER TRUCK.
 -  BE SURE TO BLOCK ANY RAISED BODY OR MECHANISM BEFORE WORKING ON OR UNDER THE 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 EQUIPMENT.
 -  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 OWNER'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 (367-7867)

Muncie Power Products, Inc.
P.O. Box 548
Muncie, IN 47308-0548

info@munciepower.com

 This symbol warns of personal injury.

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PTO OWNER'S MANUAL

FOR ALL 6-BOLT AND 8-BOLT
MOUNT MUNCIE PTOS

TABLE OF CONTENTS

Section 1 PTO Installation

PTO Installation Instructions	1.1
Adapter Plates & Assemblies	1.10
Adapter Gear Installation	1.11
Filler Blocks	1.11

Section 2 Activation Kit Installation

Activation Kit Installation Instructions	2.1
Lever Shift Control	2.1
Cable Shift Instructions	2.2
Indicator Light Switch Continuity Check	2.7
PTO Equipped with Magnetic Pick-Up Sensor	2.7
TG Series Lectra Shift System	2.8
TG Series Wiring Diagram for E-Hydra-Shift	2.9
TG Series Standard Air Shift System	2.10
TG Series Electric/Air Shift System	2.10
82 Series Double Acting Air Shift System	2.11
RG, RL Series Standard Air Shift System	2.11
Automatic Transmission Diagrams	2.12
Clutch Shift and SH Series Electric/Air Shift System	2.18
Clutch Shift and SH Series Standard Air Shift System	2.20
Clutch Shift Electric/Hydraulic Shift System	2.21
Clutch Shift Instructions & Tests	2.22

Section 3 Owner's Manual

Power Take-Off Warranty	3.1
PTO Shifting Procedure & Precautions	3.2
Clutch Shift Operating Notes	3.4
PTO Maintenance	3.4
Indicator Light Check	3.5
PTO Torque & Horsepower Ratings	3.6
PTO Troubleshooting Guide	3.7

SECTION 1 PTO INSTALLATION

PTO INSTALLATION INSTRUCTIONS

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

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

There are two (2) labels which measure approximately 4" x 8" which are to be placed on the outside of the vehicle frame rail, making them easy to be seen by anyone who might go under the truck or near the PTO. One label is to be placed on each side of the vehicle.

Should the 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 labels.**

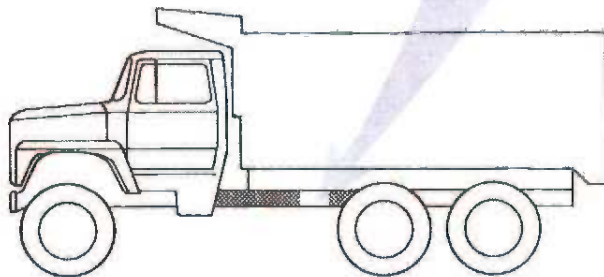


Figure 1.1

There are two (2) 4" X 8" labels supplied and one is to be placed on each side of the vehicle.

2. The 2" x 3" PTO Equipped Caution Label 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 1.2). This label directs the operator to read the PTO operating instructions on the "Visor Label". The Visor Label 4" x 6 1/2" is to be placed on the visor on the operator's side of the vehicle (See Figure 1.2). Do not mount this label on the same side of the visor as the air bag warning label if so equipped. Vehicles with hydraulic dump pumps are supplied with a Warning label to be mounted in clear view of the operator while seated in the driver's seat.

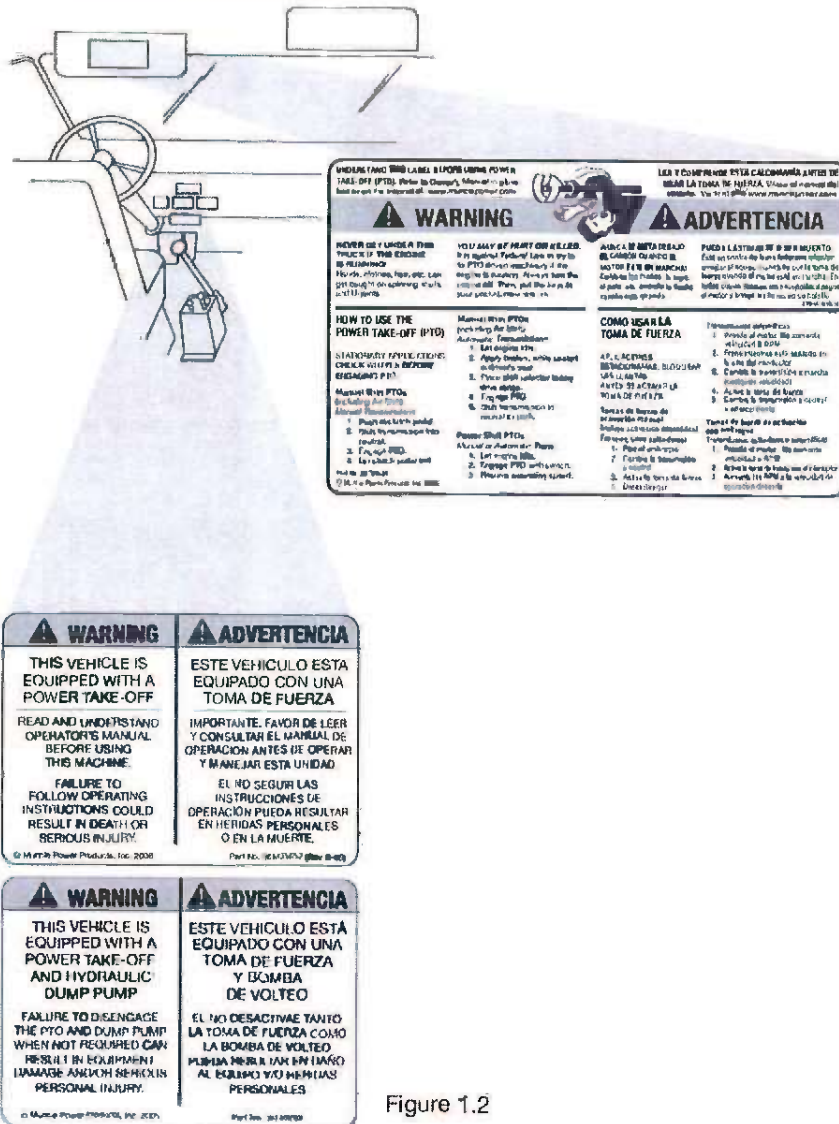


Figure 1.2

3. Manual Transmissions: While driving the truck into the work bay note if a delay is required between depressing the clutch and shifting the main transmission gear selection. If the gear does not come to a complete stop within a few seconds, the clutch linkage on the truck must be adjusted before installing the PTO. Run transmission in neutral. Determine sound of transmission before the PTO is installed. A transmission noise may be more noticeable after PTO is installed.

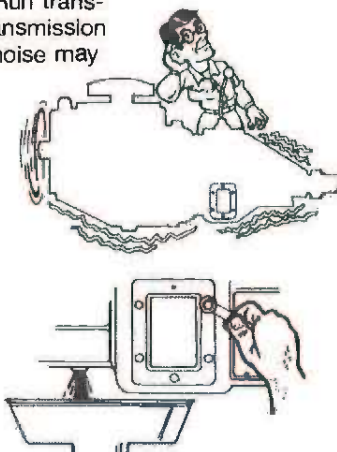
Stop engine.

4. For manual shift transmissions, drain transmission fluid. For Allison automatic transmissions, do **not** drain transmission fluid, but be prepared for a small amount of oil to escape from opening.

Remove cover plate. Place a shop towel in the opening to prevent dirt from getting in the transmission.

Examine cover plate. If there is a magnet attached to the inside, reinstall this cover on the other opening.

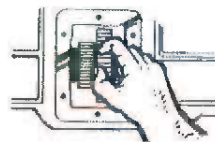
Clean mounting pad. Inspect bolt holes in aperture for thread sealant used on OEM bolts. Clean these internal threads with wire brush to clear the material. **Remove shop towel.**



5. Check transmission for proper PTO driver gear and location. Do not place anything in or near PTO opening while the engine is running.

Stop engine and remove keys before proceeding to next operation.

Check PTO driver gear for condition. A nick or blemish may cause excessive noise when PTO is mounted.

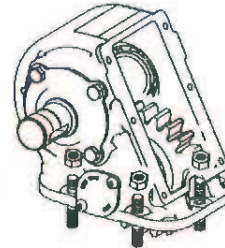
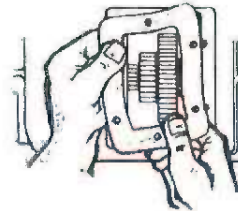


6. Rock transmission gears by hand to get "feel" for gear backlash manufactured into transmission gear set.
7. Open the PTO carton and find the mounting kit (studs and cap screws) enclosed with your PTO. Visual inspection of the PTO will indicate which mounting holes in the PTO will not accept cap screws. Install the enclosed studs in the transmission housing holes that correspond to those PTO holes which will not accept cap screws. Additional instructions may be found on the supplement sheet enclosed with PTO. Install adapter gear at this point if it is required. (Go to page 1.10 if adapter gear is used.) PTOs with mounting option "6F" have two dowel pins which need to be placed in the mounting pad before mounting PTO.
8. Install the studs until the barrel of the stud is even with the transmission pad. This typically requires a torque limit of 30-35 lbs.-ft. (6 bolt pad) or 45-50 lbs.-ft. (8 bolt pad). If more torque is required to install the stud to the barrel or to the depth shown in the below table then remove the lock patch from the stud and the transmission mounting holes and use a liquid loctite in its place (#242).

The studs should be engaged to the minimum depth as shown below.

Stud Dia.	No. Threads	Approx. Depth
3/8"	7 - 8	1/2"
7/16"	8 - 9	5/8"
10mm	9 - 10	1/2"

9. Remove the shifter cover or the inspection cover plate from the PTO by removing the hex head cap screws on the cover plate. With PTOs which do **NOT** have an inspection cover plate, hold the output shaft and rock input gear to get the "feel" of backlash built into the PTO. This "feel" will be helpful when fitting PTO to transmission. (Step 12)
10. Place mounting gasket/shim from your kit over the studs already installed on the transmission. A thin coating of approved transmission oil is recommended on gasket/shims to help seal and to hold them in place during installation. The PTOs for the Eaton Lightning Transmission are designed to be mounted without gasket/shims and require the use of a gasket eliminator which is supplied with the PTO.
- Do not use a permanent sealant on gasket/shims because you may need to change them later. Use approved transmission oil only!
11. Position the PTO on the studs and start the nuts provided onto the studs. Do Not Tighten Yet. Check for gaps between the PTO and transmission and make sure gear teeth are properly meshed and then tighten the top and bottom nuts or cap screws. On some transmission models the TG Series PTO may encounter interference with the idler shaft cap. Special clearance caps may be used and are listed in the application catalog where known interference exists.
12. Check the backlash on the input gear (gear that meshes with transmission gear) by feeling through the inspection hole or shift cover opening previously uncovered in step 9. The amount of rotational movement of the PTO gear should be only .006" to .012". As a reference, the thin gasket/shim in your installation kit is .010" thick. The thin gasket/shim (.010" thick) will change the backlash approx. .006". The amount of movement of the input gear would only be about the same distance as this gasket/shim thickness. At least one gasket/shim **must** be used. Do not stack more than (4) gasket/shims together. On Allison transmissions (Series AT-500, MT-600, HT-700, 1000, 2000, 2400 only) the single .030" gasket/shim (13M13541) should be required and is supplied with PTO. The CS6B/SH6B-A6907 series and TG6B-A69** Series uses the 23M60270 spacer and requires gasket/shims and backlash checks as described below.



Special Instructions for Allison 1000 & 2000 Series Transmission Installations.

Noise can occasionally be emitted from the PTO when installed on the Allison 1000/2000 Series transmissions that may be objectionable to the operator. The following instructions assist in reducing this noise.

Noise emitting when the unit is disengaged and the reduced or extinguished when unit is engaged is common for this installation and is not a signal of advanced failure. Muncie Power Products does not consider this noise to be a warrantable condition.

TG SERIES

When installing the TG series note that the PTO is provided with several gaskets and a steel spacer 23M60270.

Install the PTO using two .020" thick gaskets provided, using one on each side of the spacer.

Check the backlash. Backlash measurement should be in the range .010 to .024".

If the PTO is noisy in the off mode, but quiet when engaged, then remove PTO and re-install with all of the gaskets provided.

CS6 SERIES

CS6B-A68 03 thru 05 ratios: When installing the PTO use one of the two 13M13541 gaskets.

If PTO is noisy in the off mode and quiet when engaged then, remove PTO and re-install using both 13M13541 gaskets provided.

CS6B-A69 07 ratio: Install the PTO using two .020" thick gaskets provided, using one on each side of the 23M60270 spacer provided with PTO.

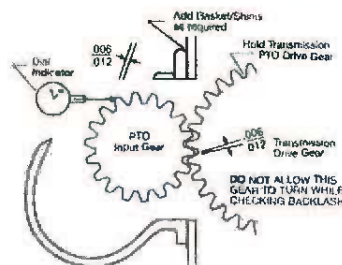
Check the backlash. Backlash measurement should be in the range .010 to .024".

If the PTO is noisy in the off mode, but quiet when engaged, then remove PTO and re-install with all of the gaskets provided.

GM6B/ GA6B SERIES

Install PTO using both 13M13541 gaskets provided. See IN03-01

Notice: For some Warner W80 applications, a maximum of one thin gasket/shim (.010") is required. If backlash is too excessive, remove the gasket/shim and use Loctite Gasket Eliminator™ sealant Muncie #13M51717. A .20 ounce tube has been supplied with the PTO for these applications.



Use of a dial indicator can greatly improve the quality of the installation. Mount the indicator so that the plunger aligns with a tooth on the PTO input gear. Hold the transmission gear with screw driver or bar and rock the PTO gear back and forth with your hand. The

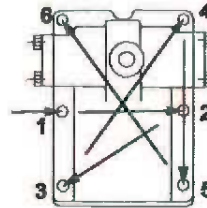
total movement on the dial indicator should be between .006" - .012". Check the backlash at different points around drive gear to find the worst condition. NOTE: Never use silicone type sealant on PTO/transmission mounting surface as proper backlash cannot be attained.

- 13.** Torque all the mounting cap screws or nuts to 40-45 lb-ft (6-bolt pad) or 50-55 lb-ft (8-bolt pad) unless noted in a separate stud kit instruction. Failure to properly tighten capscrews or nuts can lead to leaks. PTO and/or transmission damage can occur. **Improper installation, tightening, or leaks are not the responsibility of Muncie Power Products, Inc.**

Recheck the backlash.

The PTO gear should not move more than .012 or less than .006 when all mounting nuts or bolts have been torqued.

- 14.** Replace shifter cover or inspection cover plate and gasket on the PTO. **Shifter cover gasket can be found in the instruction envelope. It is required to use a gasket under the shift cover.** Torque cap screws to 14-18 lb.-ft. Double check to make sure the shifter fork is in the groove on gear or shift collar before tightening cap screws. On the TG Series shifter cover, the installation and torquing of the capscrew should be in an "X" pattern starting with the center capscrews and crossing the cover during installation. Torque the capscrews using the same pattern.

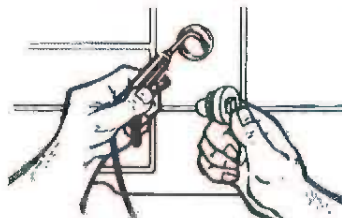


- 15.** Start the truck engine (with transmission and PTO in neutral) for a few seconds and listen for unnatural noises. Stay clear of rotating components. A whine noise indicates the PTO is mounted too tight. Stop engine and add a gasket/shim. A clatter noise indicates a loose mount. Stop engine and remove a gasket/shim. Add sealant (Loctite gasket eliminator™) if no gasket is used.

- A PTO will not always make these noises.
- Do Not adjust backlash by noise alone, always visually check backlash.
- Sometimes filling the transmission with lube is the only way to reduce the noise.
- A tight mounted PTO will cause under cutting of gears and result in premature PTO failure, including gear or housing breakage.
- If OK, repeat test with PTO engaged.

Caution: Keep PTO/transmission running time as short as possible until transmission is refilled with lube. Do not drive the truck without transmission lube.

- 16.** Refill transmission with manufacturer's approved fluid and run engine for 5 to 10 minutes to check for leaks. **Stay clear of rotating components. Stop Engine! Inspect the cap screws, nuts, and studs to make sure they are properly tightened. After completing installation, installers need to check for leaks and proper mounting torque of PTO fasteners. Refer to Step 21.**

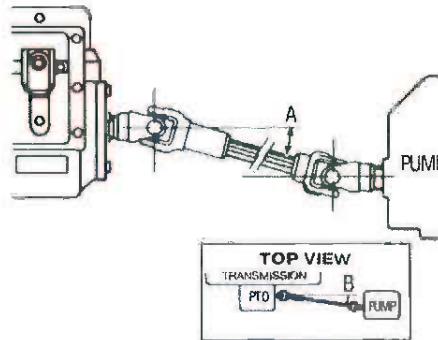


17. Install the appropriate shifter kit components, including the supplied PTO shift indicator light. Refer to page 2.1 for lever shift, page 2.2 thru 2.7 for cable shift, page 2.8 for the Lectra Shift TG series PTO, pages 2.9 thru 2.10 for Air Shift PTOs, and pages 2.11 thru 2.20 for Clutch Shift PTOs.

On air system only, you will not receive any air through the pressure protection valve to the PTO system until your main tank pressure exceeds 65 PSI.

18. 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"
3500*	5°
3000*	5°
2500	7°
2000	8°
1500	11°
1000	12°



* For speeds over 2500 RPM contact Muncie for Approval.

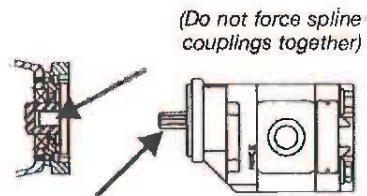
For installations with angles in the top and side views use this formula to compute the true joint angle (TJA):

$$TJA = \sqrt{A^2 + B^2}$$

FOR CABLE OR LEVER SHIFT INSTALLATIONS ONLY.

Before bolting the pump to the PTO, place non-seizing compound or grease on the PTO shaft and pump shaft.

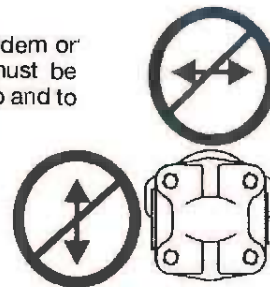
All Muncie direct mount PTOs are supplied with the appropriate grease. Reusing an existing pump will require inspection of the pump splines. Clean any old grease from pump prior to installation.



When mounting hydraulic pumps weighing over 40 lbs., exceeding 12" in length, or for tandem or multiple section pumps, a rigid support bracket must be installed. It should be attached to the rear of the pump and to the transmission to support the pump and to inhibit movement in all directions.

**Weight includes fittings, oil, and unsupported hose sections.*

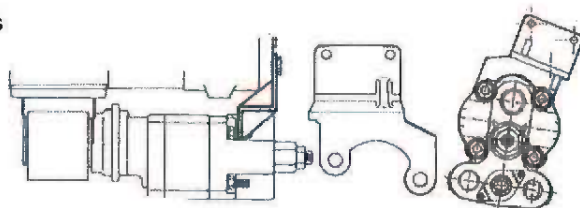
This requirement does not take into account the system duty cycles, vehicle vibrations, application, terrain, and other external influences. We recommend that direct mounted components of any size or weight be supported when these conditions are extreme or unknown.



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.

The drawings below are examples of how the bracket may be constructed. 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 degrees off of perpendicular with the transmission main shaft then a reinforced "Z" 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.



Most 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., and it is advisable to use a thread locker to secure the cap screws (Loctite 241 or NyLoc or equivalent).

- 19.** Greaseable hydraulic output shaft option. PTOs with the "G" special feature option have a grease zerk fitting behind a cover on the closed end cap of the output shaft. Grease needs to be added after the pump has been installed using a grease gun. Use a high temperature, high pressure, EP type grease.



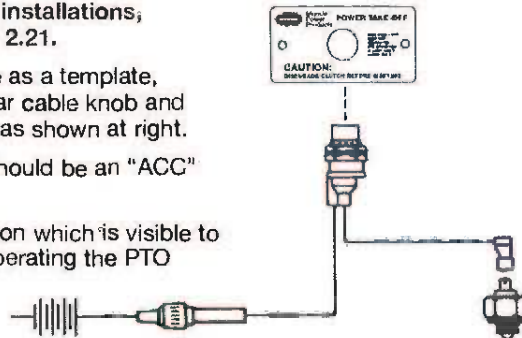
20. FOR CABLE OR LEVER SHIFT INSTALLATIONS ONLY.

For **CLUTCH SHIFT** installations, skip to pages 2.12 - 2.21.

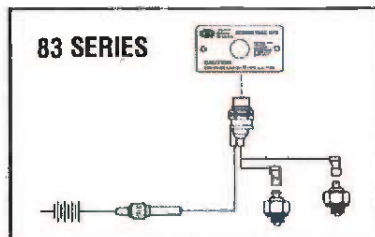
Using the metal plate as a template, drill holes in dash near cable knob and attach indicator light as shown at right.

Battery connection should be an "ACC" tap on fuse panel.

Install light in a position which is visible to the operator when operating the PTO and the vehicle.



The indicator light is to be connected so that when the PTO is engaged the light is "ON" and the light is "OFF" when the PTO is disengaged.



Do not install any other electrical devices to Muncie indicator switches, or to pressure switches. See page 2.12 for wiring indicator switch to the Eaton Fuller CEEMAT transmissions.

- 21.** Complete installation by placing warning labels as indicated on borders of the decals. Placement examples are illustrated on pages 1.1 and 1.2. Turn to Section 3 of Owner's Manual.

After complete installation, installers needs to check for leaks and proper mounting-torque of fasteners. Operate the equipment for an appropriate amount of time established 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 found leaks per manufacturer's recommendation.

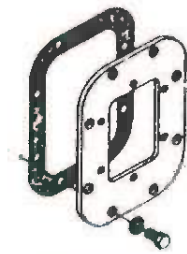
Muncie Power Products, Inc. is not responsible for any damage resulting from installation, mounting torque or maintenance of the PTO.

22. Complete installation by placing warning labels as indicated on borders of the decals. Placement examples are illustrated on pages 1.1 and 1.2. Turn to Section 3 of Owner's Manual.

ADAPTER PLATES & ASSEMBLIES

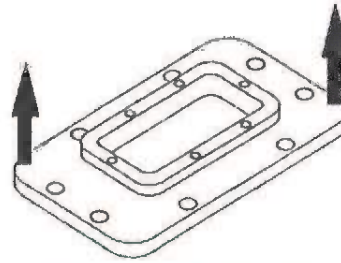
See Muncie Quick Reference Catalog for specifications.

ADAPTER PLATES are used to convert an SAE 8-bolt aperture to an SAE 6-bolt aperture.



Adapter Plate

Adapter plates mount to the transmission pad with included gaskets and capscrews. The 1/4" plate has a raised pad to provide proper thread engagement.



Mount Towards Transmission

This raised pad is to be mounted toward the transmission opening and the PTO is mounted to the flush side of the plate.

ADAPTER GEAR ASSEMBLIES are normally used to reverse the rotation of the PTO output shaft. They are also commonly specified to clear mounting obstructions. Standard adapters will move the PTO outward from the transmission approximately three inches. Adapters often reduce the application horsepower ratings and service life. Contact Muncie for specific information regarding your application.



Solid Body - Single Gear



Angular Cluster Gear



Flanged Body - Single Gear



Vertical Offset Gear

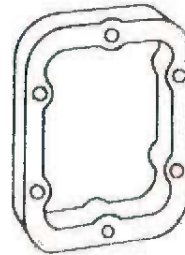
ADAPTER GEAR INSTALLATION

Before installing the adapter gear be sure to read all of the instructions in this booklet for installing a PTO. Follow all the safety instructions listed when installing the adapter as you would for installing the PTO. Make sure that the engine is turned off and wheels are immobilized before starting any installation.

1. Follow steps 1 through 7 on pages 1.1 through 1.3 of this manual.
2. Before attempting to mount adapter to transmission, bench mount the adapter to the PTO using studs or capscrews in at least the top and bottom stud holes.
3. Using gaskets and spacers (if required) adjust the backlash between the adapter and the PTO so that it is between .006" to .012". Some adapters are supplied with gasket eliminator instead of gaskets. Apply a bead evenly around the surface of the mounting pad.
4. After spacing between PTO and adapter is adjusted remove the adapter from the PTO and carefully save the Gasket Pack you have just created. Mount the adapter to the transmission using at least the top and bottom stud holes. Adjust the backlash of the adapter to the transmission so that it is .006" to .012" inches. Refer to steps 8 through 12 on pages 1.3 and 1.4 for additional instructions on backlash.
5. Using the Gasket Packs created from earlier steps, mount the PTO to the adapter using all six studs stud holes and return to the instructions on page 1.3, step 8 and continue the installation until completed.

FILLER BLOCKS/SPACERS

FILLER BLOCKS are often required in transmission applications where it is necessary to use a spacer to adapt the PTO to a particular transmission. Two filler blocks may be used in combination with one or more gaskets between the filler block surfaces. A minimum of one (1) gasket is required between each surface. Refer to notice supplied with the filler block for more information.



SECTION 2

ACTIVATION KIT INSTALLATION

ALL INSTALLERS *MUST* READ THE FOLLOWING

ACTIVATION KIT INSTALLATION INSTRUCTIONS

IMPORTANT: *Disconnect vehicle battery and bleed air tanks with engine stopped prior to installing electrical or air activation kits.*

- A.** Vehicle manufacturers may have specific locations for the accessing of electrical power, activating hydraulics, and air. The body builder manual or company representative for the vehicle chassis should be contacted prior to installing electrical or pneumatic systems.
- B.** Route wires, hydraulic activation lines, and air lines away from rotating and high temperature components. Use appropriate looms and bulkhead pass-thrus wherever possible to avoid rubbing through insulation or tubing and causing an electrical short or air 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 grounds, 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). Check with the vehicle manufacturers for the proper ground location or connect directly to battery.
- 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.** Note that when installing the PTO air systems the installation of a pressure protection valve is required at the air tank. This valve is not a pressure regulator, it is a pressure check valve which does not allow air to the PTO system until the system air pressure exceeds approximately 65 PSI.
- G.** Cold weather start conditions require that the transmission be started and warmed prior to engaging and using equipment. Hydraulic pumps should be run at idle and under no load conditions to allow oil to warm before activating hydraulic system.

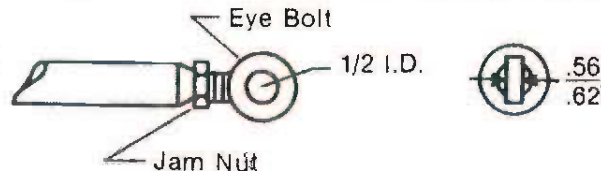
LEVER SHIFT CONTROL

Install indicator light as described on page 1.8, step 19.

Muncie PTOs with lever shift options (available on *RG, RL, 82, 83 Series only) require the customer to provide the linkage and hook-up to the PTO. The PTO is provided with an eye bolt for this purpose.

The PTO is designed with detent ball and spring to locate the engage and disengage positions, but it is *not* designed to lock into these positions. A neutral detent to prevent unintentional or accidental engagement *must* be installed on the external shift linkage. This detent must be included by the installer of the linkage.

Tighten after shifting adjustments have been made.



CABLE SHIFT INSTRUCTIONS

TG SERIES PTO

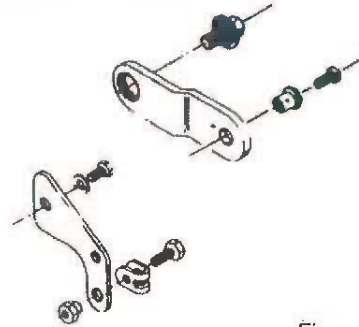
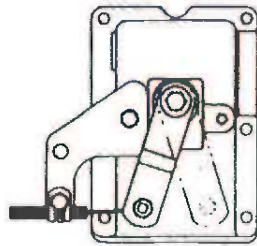


Figure 2.1

SG SERIES PTO

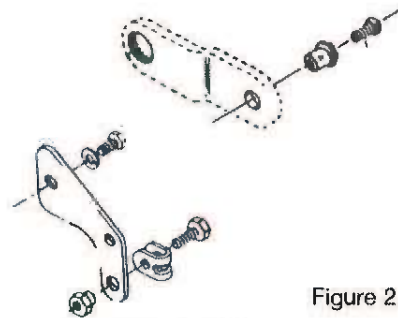
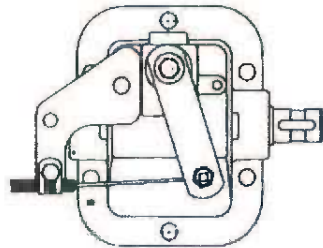


Figure 2.2

RG SERIES PTO

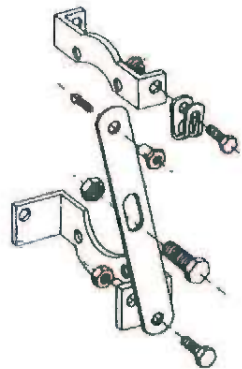
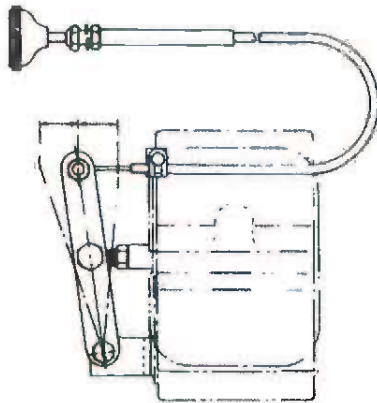
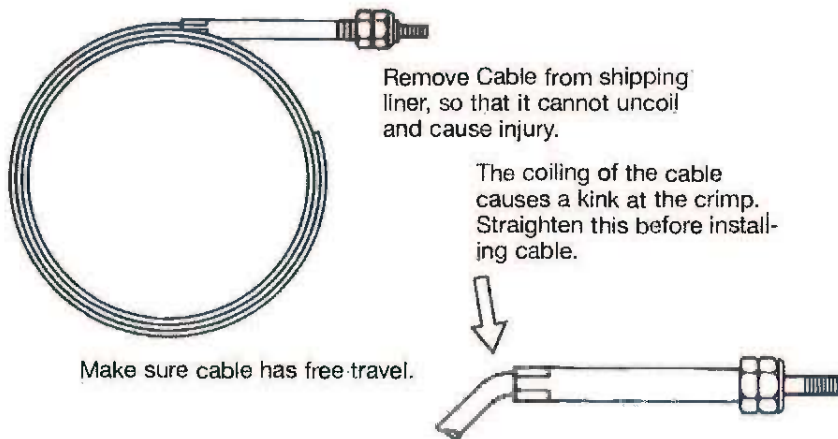


Figure 2.3

WARNING: All cable shift controlled PTOs are designed to be shifted only by wire cable. The unauthorized attachment of lever control linkage to a cable control mechanism may cause damage to shifting components and, subsequently, the transmission. The unauthorized attachment of the lever control linkage to a cable control mechanism may cause the PTO to engage unintentionally due to linkage bounce or flail.

CABLE SHIFT INSTALLATION INSTRUCTIONS

Be sure vehicle is not running when installing or adjusting cable control. After removing the cable from shipping liner (being very careful to hold cable so that it cannot uncoil and cause injury) straighten cable at crimp that has resulted from being coiled. Make sure cable has free travel before installing.



1. Find a suitable location for the control cable and the indicator light. The cable control should be installed so that the operator has easy access to push in and pull out the control without obstruction or interference by other controls or components in the cab.
2. Drill a 1/2" hole in dash or control bracket (not provided).
3. Install the control head through the hole and attach with the lock washer and nuts provided.
4. Knob can be screwed into place, using the jam nut to secure.

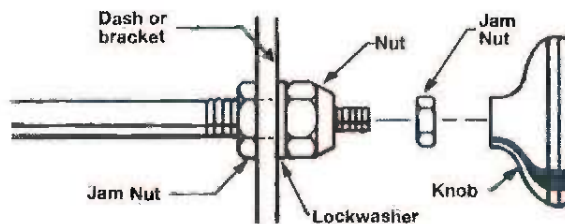
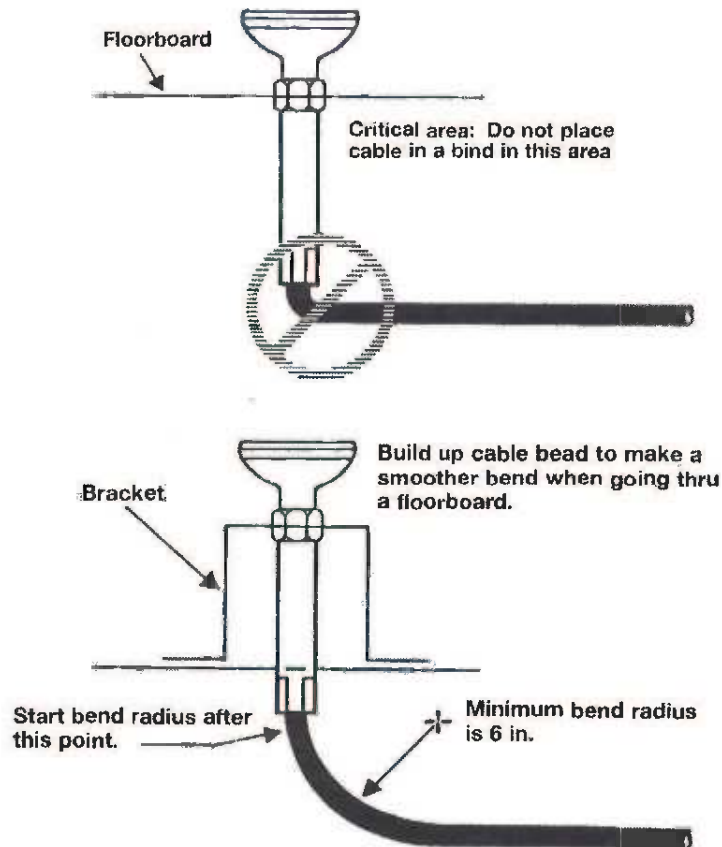


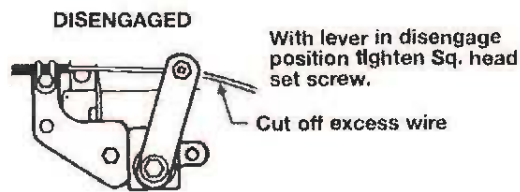
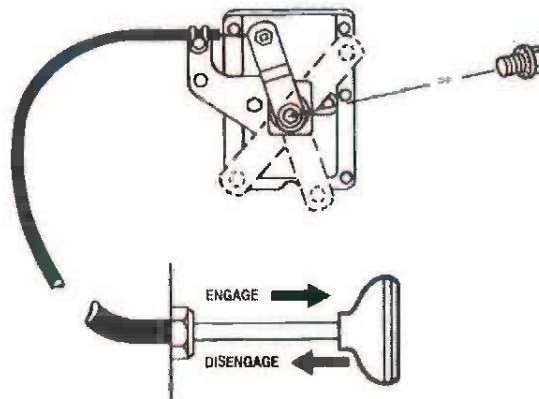
Figure 2.4

5. Route the length of cable through the floorboard or firewall and to the PTO. The cable needs to be routed clear of manifold, exhaust systems, and rotating and moving components. When routing the control cable avoid kinking the cable and do not bend to radius of less than 6"

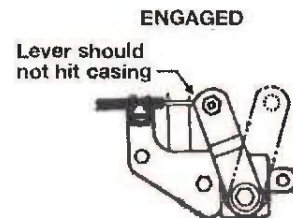


6. The lever on the PTO shifter assembly is designed so that it can be moved to allow the cable approach to be from the front or the back of the PTO. This should be determined by the routing method causing the least amount of bends and the shortest cable length.
7. The lever, also must be positioned so that when you pull on the control knob that the PTO engages. (The RG Series should have a detent position for neutral, instead of pushing all the way in for neutral.)

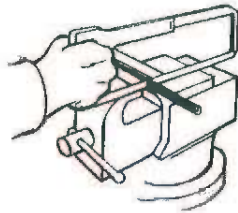
8. To adjust the lever, mark the position of the lever where it's engaged when the cable would pull the lever. **Remove the shift cover from the PTO.** Remove the locking capscrew from the control lever. Lift the lever from the serrated post. Line up the lever with your mark. Line up the serrated hole and post making sure that the poppet and the shift plate are in their respective positions. Replace the locking capscrew and torque to 18 ft.lb. Reinstall shift cover assembly. Double check the installation by referring back to step 7 on the previous page 2.4.



Move lever to its fully disengaged position and the cable knob to its fully disengaged position.



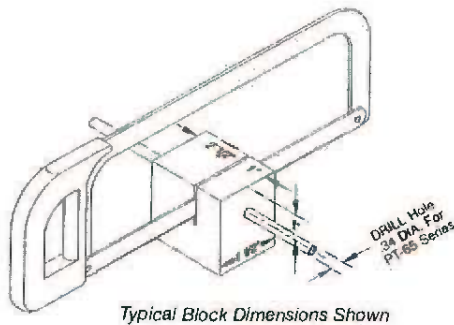
9. Referring to Figs. 2.1, 2.2, 2.3 on page 2.2, install the appropriate brackets, clamps, and hardware.



STANDARD PTO CABLE

If the cable is too long, remove the inner wire and cut casing (only) to length with a hacksaw or large side cutters.

If longer cables are required - they are available from your nearest Muncie Independent Master Warehouse.



DELUXE (PT-65) PTO CABLE

Abrasive power cutting equipment is recommended for shortening this type of control cable. **Do not use a bolt cutter or similar tool.** Described here is a hand method for cutting cables where abrasive power cutting equipment is not available.

Make a holding tool by using a hardwood block of any convenient length as shown in the diagram. The hole should be of a size just large enough for the conduit to easily slip through.

The hacksaw should have a fine tooth blade (no less than 32 teeth per inch). Remove the inner wire before cutting conduit by pulling the control knob end from the control head. Remove the installed cable end by unscrewing it from the cable conduit and saving it for reinstallation.

10. It is recommended that the control cable casing be securely anchored, with cable clamps, approximately every 30", to the frame and/or cab to prevent movement during shifting. Cable mounting clamps can be purchased from your nearest Muncie Independent Master Warehouse. (part no. MT306-4)
11. Install the indicator light and warning labels by referring to steps 19 & 20 on page 1.9 of this instruction booklet. The indicator light is to be "ON" when the PTO is engaged and "OFF" when the PTO is disengaged.

Do not install other electrical devices to the Muncie indicator light switch.

Install cable so that you pull to engage and fully pushed in to disengage.

The PTO indicator light must be installed so that it is visible to the operator of the vehicle while seated in the driver's seat. Additional indicator lights may need to be purchased to comply with this requirement.

INDICATOR LIGHT SWITCH CONTINUITY CHECK



Figure 2.5

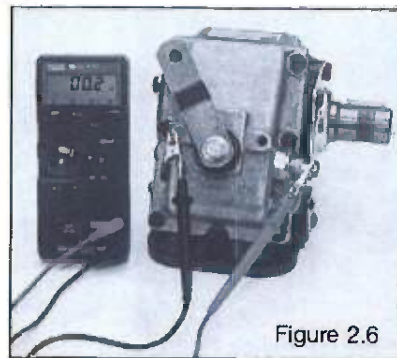


Figure 2.6

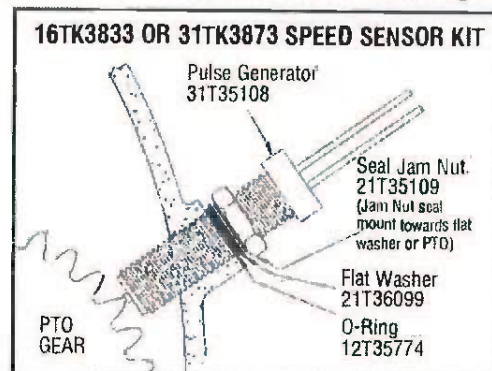
Performing a continuity check on the indicator switch will verify that the indicator switch is functioning and that the PTO is properly assembled.

1. Using a multimeter, connect one lead to the spade terminal on the indicator switch mounted to the PTO.
2. Connect the other lead to a bare metal portion of the PTO or shifter (Figure 2.5).
3. If the PTO is mounted on a vehicle, be sure that the engine is stopped, and the vehicle is safely immobilized to prevent any movement.
4. Engage the PTO. The meter will show continuity (Figure 2.6).
5. Shift PTO to the disengage position. The meter should return to normal (Figure 2.5).

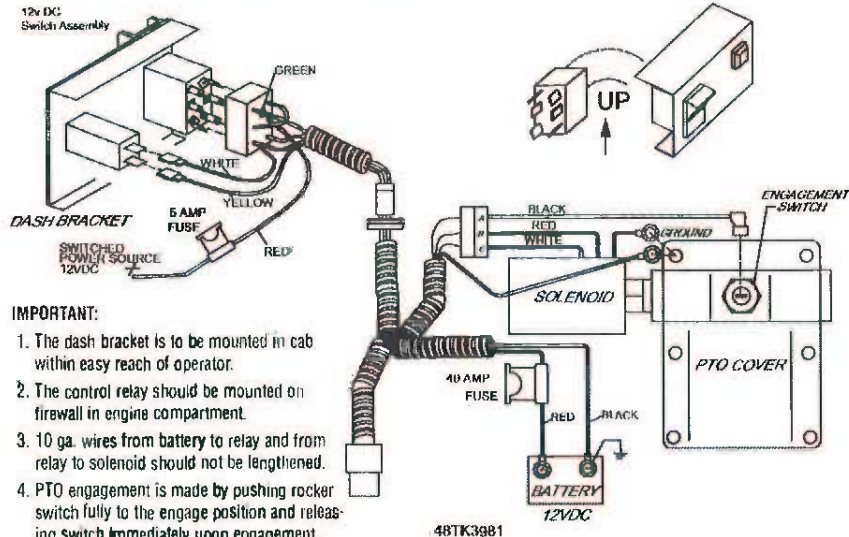
This continuity check may be performed on any Muncie PTO. Only the air shifted models will require an air source to engage the PTO.

PTO EQUIPPED WITH MAGNETIC PICK-UP SENSOR

1. Mount the shift cover to the PTO (as required).
2. Align the internal gear tooth so that tip is centered in the pick-up opening.
3. Install the jam nut with the seal in the nut facing the PTO and back it down the pick up close to the wire end. Place washer then the o'ring on the pick up so that the o'ring will be against the PTO cover. Screw in the pick-up until the tip gently touches the top of the gear tooth.
4. Turn the pick-up backwards 2 turns. Rotate gear to make sure it clears.
5. Hold pick-up and tighten jam nut to hold in place.
6. Re-Check gear for rotation.



TG SERIES LECTRA SHIFT SYSTEM

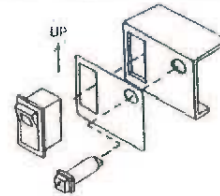


IMPORTANT:

1. The dash bracket is to be mounted in cab within easy reach of operator.
2. The control relay should be mounted on firewall in engine compartment.
3. 10 ga. wires from battery to relay and from relay to solenoid should not be lengthened.
4. PTO engagement is made by pushing rocker switch fully to the engage position and releasing switch immediately upon engagement.
5. Excessive repeated shifting of PTO can overheat solenoid and prevent engagement until allowed to cool down.
6. Drill .825 dia. hole in firewall near where control relay is mounted. Install black plastic grommet (P/N 37T35674) in hole and run the four wire connector through the grommet and plug into cab harness portion of harness. Plug the rocker switch receptacle onto the switch so that the green wire is up (matching the position of the green light on the rocker switch.)

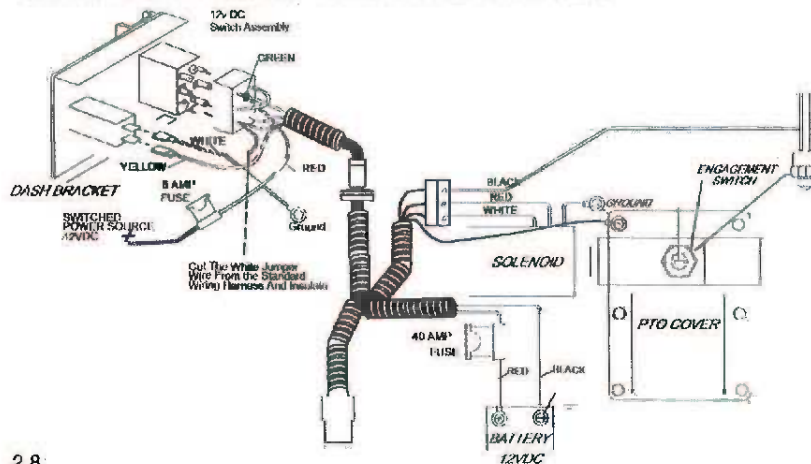
SWITCH AND LIGHT INSTALLATION

1. Remove protective film from faceplate.
2. Lay faceplate on switch bracket and push switch into faceplate and bracket so that the green lens on the rocker is up.
3. Insert the Indicator by aligning the flat with the hole in the faceplate and bracket, then push the light into place.



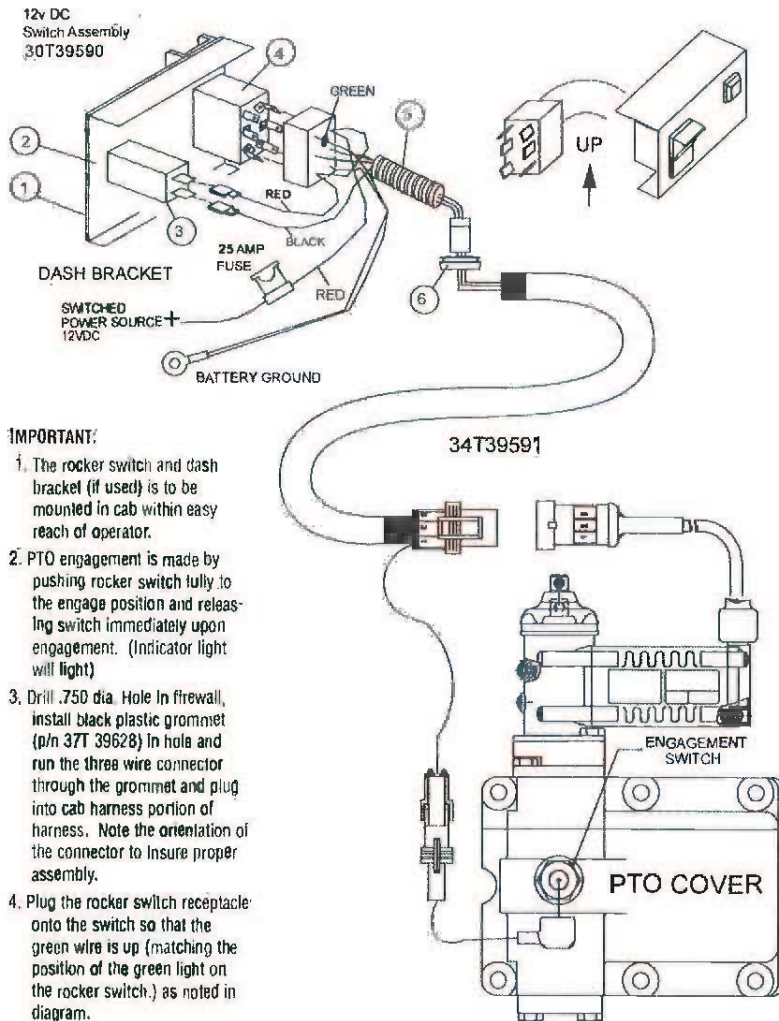
LECTRA SHIFT INSTALLATION WITH EATON FULLER CEMAT

48MK1434-14 (1 or 4 Assembly) • 48MK1434-23 (2 or 3 Assembly)



WIRING DIAGRAM FOR E-HYDRA-SHIFT TG SERIES

Activation Kit: 48TK4686



E-HYDRA SHIFTER

KITS

16TK5024 Standard (1 or 4 Assembly)

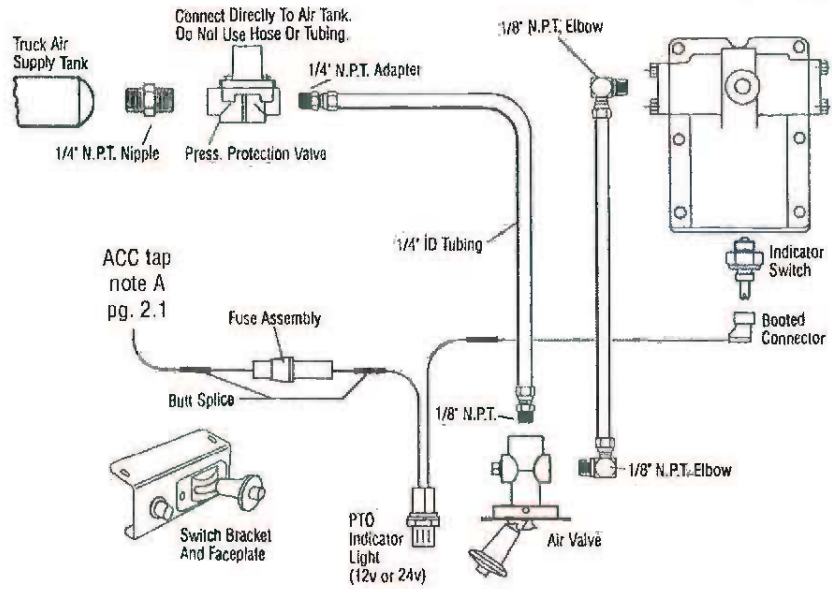
16TK5025 Standard (2 or 4 Assembly)

16TK5026 Allison 1000/2000 (1 or 4 Assembly)

16TK5027 Allison 1000/2000 (2 or 3 Assembly)

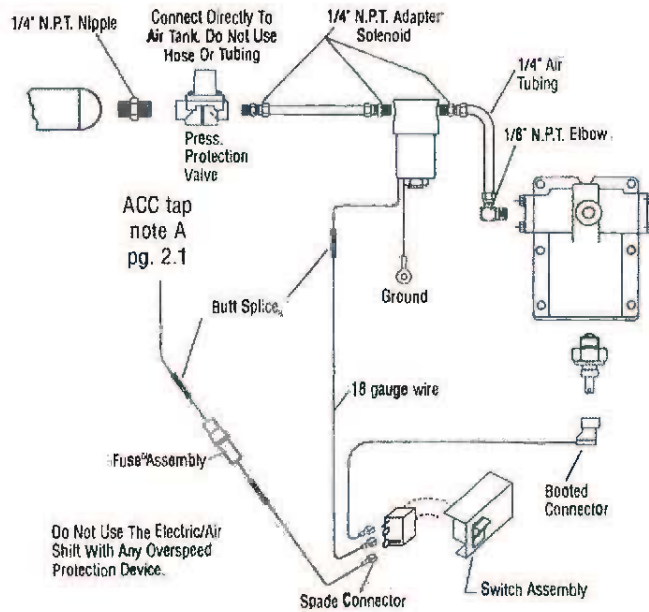
TG SERIES STANDARD AIR SHIFT SYSTEM

48M61250-A (12V Light)
48M62450-A (24V Light)

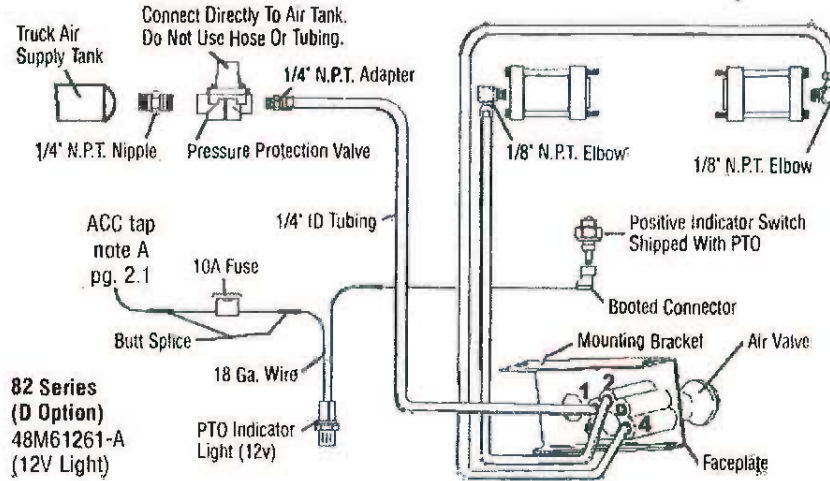


TG SERIES ELECTRIC/AIR SHIFT SYSTEM

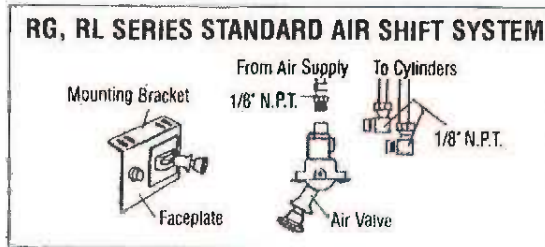
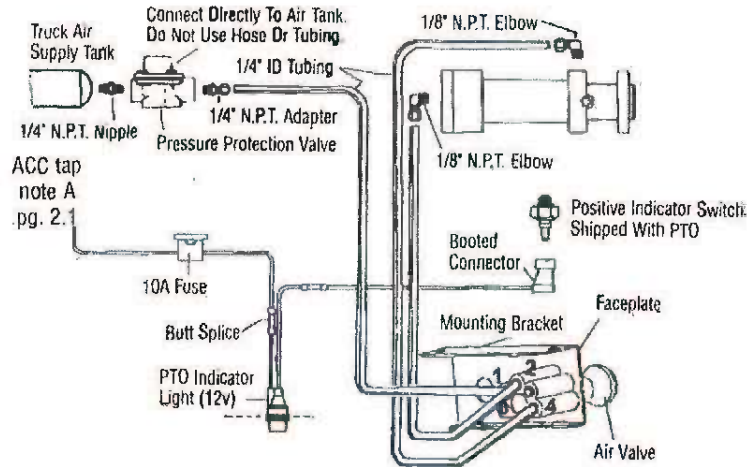
48M61200-A (12V Solenoid & Switch)
48M62400-A (24V Solenoid & Switch)



82 SERIES DOUBLE ACTING AIR SHIFT SYSTEM (D OPTION)



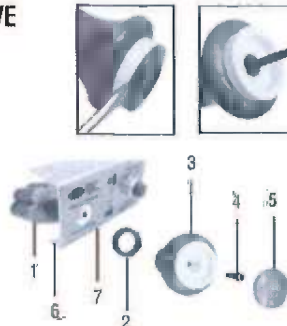
82 SERIES DOUBLE ACTING AIR SHIFT SYSTEM (Q OPTION)



82 Series (Q Option) 48M61261-A (12V Light) RG, RL Series 48M61260-A (12V Light)

INSTRUCTIONS FOR PUSH/PULL MANUAL AIR VALVE

1. Remove the button cover (5) from the end of the air valve.
2. Using 3/32" allen wrench remove screw (4) from knob.
Hold red knob (3) to loosen screw.
3. Pull the red knob (3) from the valve stem.
4. Unscrew the hex nut (2) from the valve (1).
5. Install the valve (1) through the bracket (6) and face plate (7) using hex nut (2) to hold in place.
6. Place knob (3) over the valve stem, aligning the pin in the groove of the knob (3).
7. Insert screw (4) and tighten with 3/32" allen wrench.
8. Push the button cover (5) onto the knob (3).



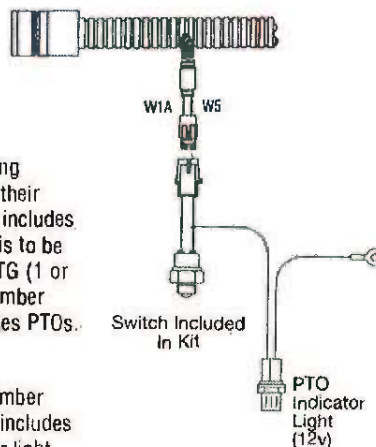
AUTOMATIC TRANSMISSION DIAGRAMS APPLICATION INFORMATION EATON FULLER CEEMAT TRANSMISSIONS

TG, RG, RL, 82 & 83 Series PTOs

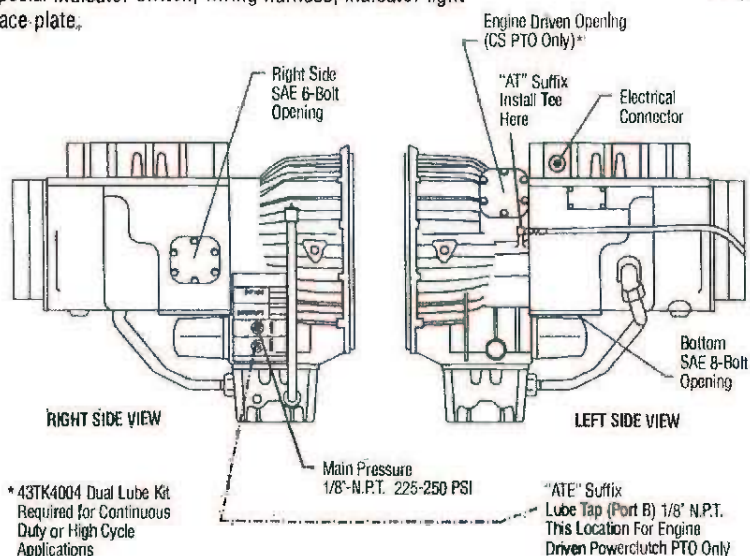
Right Side Or Bottom Mount Openings (Not for Engine Driven PTO Opening). Use in addition to the shift system components

Supplied With The PTO.

Eaton Fuller requires the installation of a special wiring harness for PTO indication used in conjunction with their transmission wiring harness. The Muncie add-on kit includes a special indicator switch and wiring harness which is to be wired as shown. Use kit number 48MK1434-14 For TG (1 or 4 assembly), RL, RG, 82 (all assemblies). Use kit number 48MK1434-23 for TG (2 or 3 assembly), and 83 Series PTOs.



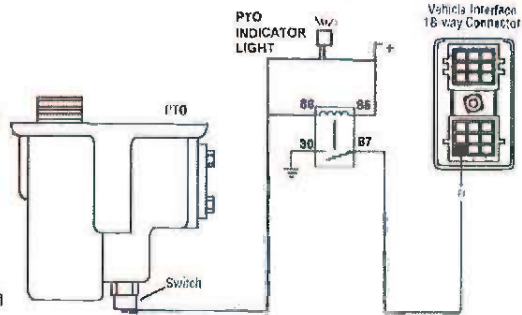
For Electric/Air Shift System PTOs use kit number 48MK1435-14 TG Series (1 or 4 assembly) or kit number 48MK1435-23 TG Series (2 or 3 assembly). This kit includes the special indicator switch, wiring harness, indicator light and face plate.



* 43TK4004 Dual Lube Kit Required for Continuous Duty or High Cycle Applications

EATON FULLER ULTRA SHIFT

There are two different automated manual transmissions provided by Eaton/Fuller. The Medium Duty 6-speed Ultra Shift and the Heavy Duty 10-speed Ultra Shift. Both transmissions require connection to the transmission control module (TCM) as shown in the diagram. To insure that the vehicle is properly specified for PTO use, contact the chassis dealer. Refer to the Eaton installation manual for specific instructions.



WIRING DIAGRAM FOR EATON/FULLER AUTOMATED MANUAL TRANSMISSIONS

1. Locate wire connected to the #F1 on the 18-way connector on the transmission control module (middle position).

Chassis dealer or body builder information should be able to help you find this information.

2. If no wire is present, then obtain the Eaton document TRIG-0082 (6 spd. Version) or TRIG-2500 (10 spd. Version).

Review their instructions for obtaining the Packard (Delphi) terminal described in the PTO section of the Eaton document.

3. Muncie recommends the installation be wired as shown by using a standard, Normally Open, automotive relay.

Follow the recommended wiring shown.

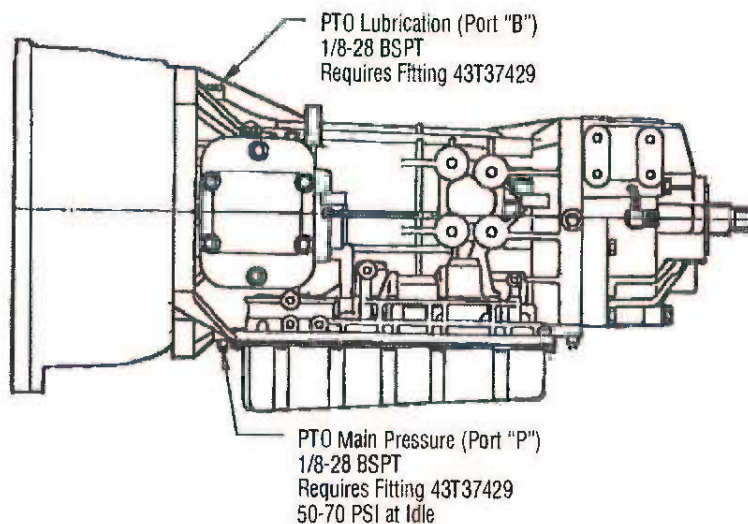
Connector DM3 or AW3 Transmission ECU Connector (Vehicle Interface)

37	29	30	31	33	34	38
23	24	25	26	27	28	
13	14	15	16	17	18	21
35	7	8	9	10	11	12
	1	2	3	4	5	6

Front View - Terminal #18



JATCO AUTOMATIC TRANSMISSION



1/8-28 BSPT Requires Fitting 43T37429 50-70 PSI at Idle