



TYPE 2 HYDRAULIC PTO

INSTALLATION AND MAINTENANCE MANUAL



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1.0 INTRODUCTION

- 1.1 The WPT Power Transmission PTO
- 1.2 Product Identification Numbers
- 1.3 Using this Manual

2.0 SPECIFICATIONS

- 2.1 Flywheel and Flywheel Housing Dimensions (Table 1)
- 2.2 Maximum RPM (Table 2)
- 2.3 Suggested Hydraulic Schematic (Table 3)
- 2.4 Bolt Tightening Torques (Table 4)

3.0 INSTALLATION

- 3.1 Flywheel and Flywheel Housing Alignment Inspection
- 3.2 Lubrication Prior To Installment
- 3.3 Mounting The PTO On Engine (Table 5)
- 3.4 Hydraulic Connection

4.0 MOUNTING THE SHEAVE

5.0 OPERATION

- 5.1 Hydraulic Hose / Pipe Sizes
- 5.2 High Inertia Loads
- 5.3 Engine RPM

6.0 LUBRICATION

- 6.1 Grease Specification
- 6.2 Grease Specification Cold Conditions
- 6.3 Grease Lubrication Intervals
- 6.4 Oil Specification
- 6.5 Oil Lubrication Intervals
- 6.6 Clutch
- 6.7 Rotary Union
- 6.8 Bearing Operating Temperatures

7.0 MAINTENANCE

- 7.1 Disassembly
- 7.2 Preparing Shaft for Assembly
- 7.3 Assembly

8.0 TYPICAL DRAWING AND PARTS LIST

9.0 TYPICAL DRAWING AND PARTS LIST – COMPACT

10.0 TROUBLESHOOTING GUIDE

1.0 INTRODUCTION


- 1.1 The WPT Power Transmission PTO is the most rugged PTO available on the market today. Follow the procedures detailed in this Installation Maintenance Manual for years of service.
- 1.2 When ordering parts, use the part number from the Bill of Materials supplied with this unit. Also, please include the part number and the serial number from the unit itself. These will be found on a metal tag riveted to the bell housing. Your WPT Distributor can provide a copy of the Bill of Materials if the one provided should become lost.
- 1.3 When performing installation and maintenance functions, refer to the drawing at the back of this manual. The references on the drawing in this manual DO NOT correspond to the references on the assembly drawing and Bill of Materials. Do not use the item numbers from the drawing in this manual for ordering parts.

DANGER:

To avoid damage or personal injury, insure that adequate lifting devices and hand tools are available.

DANGER:

Read these instructions thoroughly and review until you fully understand all warning and hazards before proceeding with the work described in this manual. Failure to follow these instructions in this manual can result in unreasonable exposure to hazardous conditions and/or personal injury and/or death.

Throughout there are a number of HAZARD WARNINGS that must be read and adhered to in order to prevent possible loss of equipment and/or personal injury and /or loss of life. The three warning words are “DANGER”, “WARNING” and “CAUTION”. They are used to indicate the severity of the hazard and are preceded by a safety alert symbol. 

“**DANGER**” – Denotes the most serious injury hazard and is used when serious injury or death **WILL** result from misuse or failure to follow the specific instructions set forth in this manual.

“**WARNING**” – Denotes when serious injury or death **MAY** result from misuse or failure to follow the specific instructions set forth in this manual.

“**CAUTION**” – Denotes when injury, product or equipment damage may result from the misuse or failure to follow the specific instructions set forth in this manual.

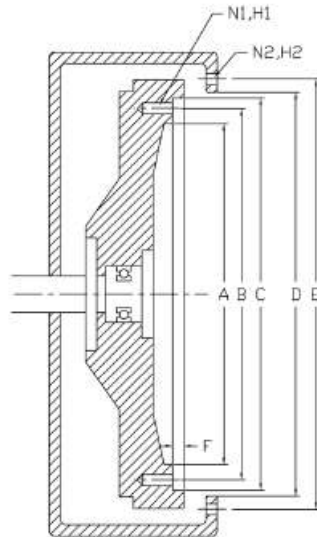
It is the responsibility of the personnel involved in the installation, operation and maintenance of this equipment, on which this PTO is mounted, that they must fully understand the warnings and dangers that are listed in this manual and are aware of what the correct procedures must be to safely install, operate and maintain this equipment.

2.0 SPECIFICATIONS

2.1 Flywheel and Flywheel Housing Dimensions

| TABLE 1 in (mm) | | | | | | | | | | | |
|------------------------|------------------|--------------------|--------------------|----|--------------|--------------|--------------------|--------------------|----|---------------|---------------|
| CLUTCH SIZE | "A" | "B" | "C" | N1 | H1 | SAE HSG SIZE | "D" | "E" | N2 | H2 | F |
| 18"/14" | 19.62 (498.3) | 21.375 (542.93) | 22.500 (571.50) | 6 | 5/8-11 NC | "O" | 25.500 (647.70) | 26.750 (679.45) | 16 | 1/2-13 NC | 0.25 (6.4) |
| 14" | 16.12 (409.4) | 17.250 (438.15) | 18.375 (466.73) | 8 | 1/2-13 NC | "1" | 20.125 (511.17) | 20.875 (530.22) | 12 | 7/16-14 NC | 0.25 (6.4) |
| 11" | 12.38 (314.5) | 13.125 (333.38) | 13.875 (352.43) | 8 | 3/8-16 NC | "2" | 17.625 (447.68) | 18.375 (466.72) | 12 | 3/8-16 NC | 0.25 (6.4) |
| 11" | 12.38 (314.5) | 13.125 (333.38) | 13.875 (352.43) | 8 | 3/8-16 NC | "3" | 16.125 (409.58) | 16.875 (428.62) | 12 | 3/8-16 NC | 0.25 (6.4) |

Dimensions listed here-in-above are standard. However, the assembly specific drawing overrides this table.



2.2 Maximum RPM

| TABLE 2 | | | |
|--------------------|-------------|-------------|-------------|
| CLUTCH SIZE | 11" | 14" | 18" |
| RPM | 2500 | 2300 | 2100 |

Do not exceed maximum ratings without consulting WPT Engineering.

2.3 Suggested Hydraulic Schematic

NOTE: Recommended operating hydraulic pressure is 500 P.S.I. ± 50.

TABLE 3

HYDRAULIC ACTUATION

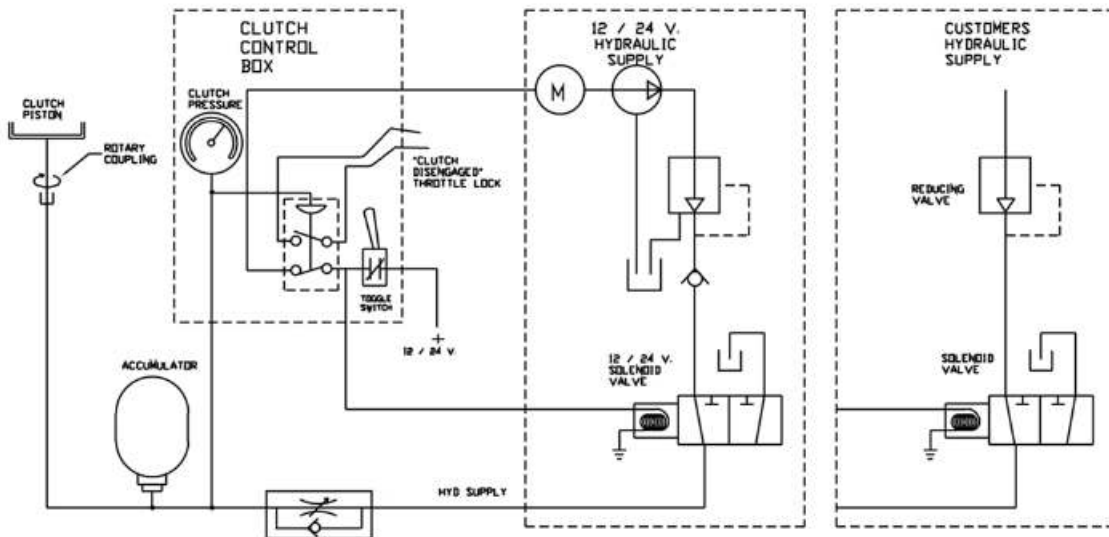


TABLE 4

| TORQUE VALUES FOR SOCKET HEAD AND HEX HEAD CAPSCREWS | | | | | | |
|---|--------------------|----------------|-----------|---------------------|----------------|-----------|
| SOCKET HEAD CAP SCREWS | | | | | | |
| BOLT SIZE IN INCHES | As Received | | | Lubricated** | | |
| | LB - FT | LB - IN | Nm | LB - FT | LB - IN | Nm |
| 1/4 | 13 | 150 | 17 | 10 | 120 | 13 |
| 5/16 | 23 | 305 | 34 | 18 | 244 | 27 |
| 3/8 | 45 | 545 | 62 | 36 | 436 | 49 |
| 7/16 | 70 | 840 | 95 | 56 | 672 | 76 |
| 1/2 | 108 | 1300 | 147 | 86 | 1040 | 117 |
| 9/16 | 155 | 1860 | 210 | 124 | 1488 | 168 |
| 5/8 | 211 | 2530 | 286 | 168 | 2024 | 228 |
| 3/4 | 367 | 4400 | 497 | 293 | 3520 | 397 |
| 7/8 | 583 | 7000 | 791 | 466 | 5600 | 632 |
| 1 | 867 | 10400 | 1175 | 693 | 8320 | 940 |
| 1 1/8 | 1242 | 14900 | 1684 | 993 | 11920 | 1347 |
| 1 1/4 | 1750 | 21000 | 2374 | 1400 | 16800 | 1899 |
| 1 3/8 | 2317 | 27800 | 3142 | 1853 | 22240 | 2513 |
| 1 1/2 | 3042 | 36500 | 4125 | 2433 | 29200 | 3300 |
| 1 3/4 | 4950 | 59400 | 6714 | 3960 | 47520 | 5371 |
| 2 | 7492 | 89900 | 10161 | 5993 | 71920 | 8128 |
| HEX HEAD CAP SCREWS - Grade 8 | | | | | | |
| BOLT SIZE IN INCHES | As Received | | | Lubricated** | | |
| | LB - FT | LB - IN | Nm | LB - FT | LB - IN | Nm |
| 1/4 | 8 | 100 | 11 | 6 | 80 | 9 |
| 5/16 | 17 | 200 | 23 | 13 | 160 | 18 |
| 3/8 | 30 | 360 | 41 | 24 | 288 | 32 |
| 7/16 | 48 | 570 | 64 | 38 | 456 | 51 |
| 1/2 | 83 | 990 | 112 | 66 | 792 | 89 |
| 9/16 | 107 | 1285 | 145 | 85 | 1028 | 116 |
| 5/8 | 143 | 1714 | 194 | 114 | 1371 | 155 |
| 3/4 | 256 | 3070 | 347 | 204 | 2456 | 277 |
| 7/8 | 417 | 5000 | 565 | 333 | 4000 | 452 |
| 1 | 625 | 7500 | 848 | 500 | 6000 | 678 |
| HEX HEAD CAP SCREWS - Grade 5 | | | | | | |
| BOLT SIZE IN INCHES | As Received | | | Lubricated** | | |
| | LB - FT | LB - IN | Nm | LB - FT | LB - IN | Nm |
| 1/4 | 6 | 71 | 8 | 5 | 56 | 6 |
| 5/16 | 12 | 142 | 16 | 9 | 113 | 12 |
| 3/8 | 22 | 260 | 29 | 17 | 208 | 23 |
| 7/16 | 34 | 410 | 46 | 27 | 328 | 36 |
| 1/2 | 53 | 636 | 72 | 42 | 508 | 57 |
| 9/16 | 74 | 890 | 101 | 59 | 712 | 80 |
| 5/8 | 104 | 1250 | 141 | 83 | 1000 | 112 |
| 3/4 | 183 | 2200 | 249 | 146 | 1760 | 199 |
| 7/8 | 298 | 3570 | 403 | 238 | 2856 | 322 |
| 1 | 440 | 5280 | 597 | 352 | 4224 | 477 |
| 1 1/8 | 553 | 6640 | 750 | 442 | 5312 | 600 |
| 1 1/4 | 775 | 9300 | 1051 | 620 | 7440 | 840 |
| 1 3/8 | 1012 | 12140 | 1372 | 809 | 9712 | 1097 |
| 1 1/2 | 1350 | 16200 | 1831 | 1080 | 12960 | 1464 |

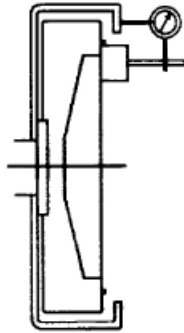
NOTE: Torque specifications listed above are recommended unless the assembly specific drawing lists otherwise.

3.0 INSTALLATION

3.1 Flywheel and flywheel housing alignment inspection.

It is strongly recommended that dial indicator checks be made (as shown) prior to installation of the PTO, especially on new engines or when a previous PTO failure might indicate an alignment problem.

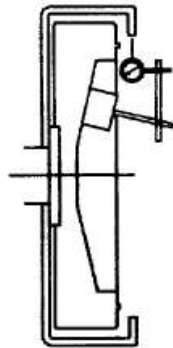
3.1.1 Check flywheel to housing face run out.



Mount the indicator base on the face of the flywheel and position the dial indicator tip perpendicular to the flywheel housing mounting face. Rotate the flywheel 360 degrees while holding pressure against the crankshaft thrust bearing. The total indicator reading should not exceed:

| | |
|-----------------|------------------------|
| SAE #3 Housing: | 0.008 inches (0.20 mm) |
| SAE #2 Housing: | 0.009 inches (0.23 mm) |
| SAE #1 Housing: | 0.012 inches (0.30 mm) |
| SAE #0 Housing: | 0.016 inches (0.41 mm) |

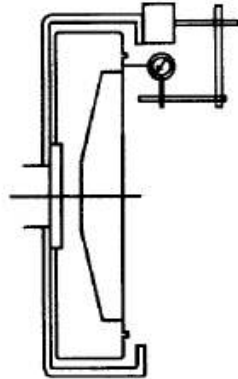
3.1.2 Check flywheel housing bore run out.



Mount the indicator base on the face of the flywheel and position the dial indicator tip so its movement is perpendicular to the pilot bore of the flywheel housing. Rotate the flywheel 360 degrees. The total indicator reading should not exceed:

| | |
|-----------------|------------------------|
| SAE #3 Housing: | 0.008 inches (0.20 mm) |
| SAE #2 Housing: | 0.009 inches (0.23 mm) |
| SAE #1 Housing: | 0.012 inches (0.30 mm) |
| SAE #0 Housing: | 0.016 inches (0.41 mm) |

3.1.3 Check flywheel face run out.



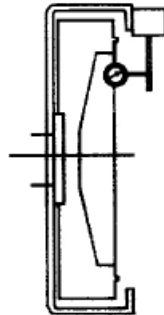
Mount the indicator base on the flywheel housing and position the dial indicator tip so its movement is perpendicular to the face of the flywheel. Position the indicator tip near the drive ring mounting bolt circle diameter. Rotate the flywheel 360 degrees while holding pressure against the crankshaft thrust bearing. The total indicator reading should not exceed:

11" Clutch: 0.007 inches (0.18 mm)

14" Clutch: 0.009 inches (0.23 mm)

18" Clutch: 0.011 inches (0.28 mm)

3.1.4 Check flywheel pilot bore run out.



Mount the indicator base on the flywheel housing and position the dial indicator tip so its movement is perpendicular to the face of the pilot ring inner diameter on the flywheel. Rotate the flywheel 360 degrees. The total indicator reading should not exceed:

All Flywheel Sizes: 0.005 inches (0.13 mm)

3.2 Lubrication Prior To Installation

3.2.1 PTO's with Grease Lubrication: The WPT PTO is lubricated at the factory with Lubriplate® 1200-2 lithium based grease. Lubrication should be topped off prior to being placed in service. See **Section 6** for specific lubrication instructions.

3.2.2 PTO's with Oil Lubrication: Use only Mobil – Exxon SHC 85w-140 synthetic oil or equivalent.

NOTE: If utilizing Python Hydraulic Clutch Control refer to HCC manual.



WARNING:

PTO is shipped without oil and must be filled with oil prior to being placed in service.

3.2.3 See **Section 6** for specific lubricating instructions.

3.3 Mounting PTO On Engine



DANGER:

The PTO is heavy; use approved lifting equipment and procedures to prevent accident or injury.

3.3.1 Use a long handled screwdriver or other tool to align the friction disc teeth with the teeth of the drive ring.



WARNING:

Use caution when installing the PTO to avoid damaging the teeth of the friction discs.

3.3.2 Install the **drive ring** on the engine flywheel making sure that the ring is seated in the locating bore. Use SAE Grade 5 bolts (or equivalent) with lock washers and torque to the specifications in **Table 4** or to the engine manufacturer's torque recommendation. Use the engine manufacturer's torque if different from that in **Table 4**.

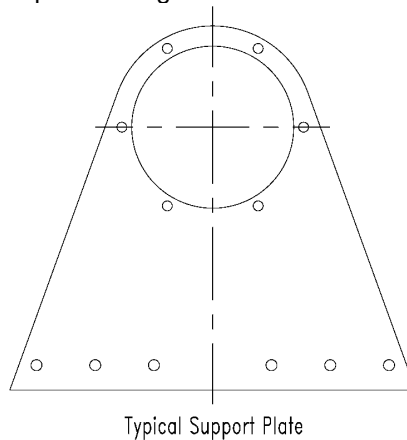
3.3.3 Slowly draw the PTO toward the engine, this can be done by installing 3 or 4 equally spaced lengths of all-thread with nuts into the flywheel housing and tightening these while supporting the weight of the PTO with a hoist or cribbing.

3.3.4 When the PTO is fully in place, remove the studs, if used, and replace with SAE Grade 5 bolts (or equivalent) with lock washers and torque to the value in **Table 4**. Use the engine manufacturer's torque recommendation if different from that in **Table 4**.

3.3.5 Install customer supplied support plate per Table 5 below.

| TABLE 5 - SUPPORT PLATES | | | |
|---------------------------------|------------------------------|------------------------------|--------------------------------|
| CLUTCH SIZE | SIDE LOAD APPLICATION | IN - LINE APPLICATION | SUPPORT PLATE THICKNESS |
| 211 and smaller | Recommended | Recommended | .250" - .375" Thick |
| 311 thru 314 | Required | Recommended | .375" - .500" Thick |
| 318 | Required | Required | .500" - .750" Thick |

3.3.6 Typical support plate configuration.



3.3.7 MOUNTING THE SHEAVE, see **section 4.0** below.

3.4 Hydraulic Connection

3.4.1 Mount **rotary union** to shaft only after the PTO is mounted to the engine and sheave and belts have been installed.

3.4.2 A flexible hose must be used for the hydraulic connection to the rotary coupling. Assemble rotary coupling to fittings and hose, before mounting to the shaft

WARNING:

Ensure that there is no side load placed on the rotary coupling. The rotary coupling is delicate and extremely sensitive to damage by side load.

4.0 MOUNTING THE SHEAVE

If the key is not in the shaft, install it now. Be sure it seats in the bottom of the slot. Measure the distance from the top of the key to the opposite side of the shaft. Compare this measurement to the mating dimension in the sheave or bushing and adjust key height if necessary.

Install sheave, belts and adjust belt tension.

WARNING:

Do not exceed belt tension shown on WPT assembly drawing. Re-check and adjust belt tension after several hours of operation.

5.0 OPERATION

5.1 Recommended operating hydraulic pressure is 500 P.S.I.± 50.

5.2 Ensure that hose or pipe sizes are adequate to supply the fluid to the clutch. Hose or pipe size of 1/4 inch should be a minimum for short runs. Use 3/8 inch size if runs are longer than 15 feet.

5.3 Where high inertia loads must be started, engaging the clutch at idle speed may stall the engine. High inertia loads may be brought up to speed by engaging the clutch for short periods (1 second) at intervals long enough to prevent excessive heat buildup in the friction

discs. With extremely high loads, the engine may have to be operated at higher speeds while engaging the clutch.

- 5.4 Once the load is turning with the clutch fully engaged, the engine RPM may be increased.

Special hydraulic circuitry may be used to regulate clutch engagement. Consult WPT for recommended equipment.

 **WARNING:**

UNDER NO CIRCUMSTANCES should the clutch be slipped for more than 1-3 seconds depending on the application, without either fully engaging the clutch or completely disengaging the clutch to allow it to cool.

 **WARNING:**

Any excessive vibration in the PTO should be cause for investigation. All rotating parts of the WPT PTO are balanced at the factory.

6.0 LUBRICATION

6.1 Grease Specification

The WPT PTO is lubricated at the factory. The lubricant type is specified on a tag affixed to the PTO. Grease specified on tag will serve under normal ambient conditions up to 2300 RPM at a maximum bearing temperature of 225° F (93.3° C).

6.2 Grease Specification for Cold Conditions

For any PTO with a lube label naming 1200-2, use Lubriplate® MAG-1 below -25° F (-32° C),. If 1200-2 Lubriplate® is not called out on label contact WPT for substitute.

 **WARNING:**

Do not mix sodium or calcium based greases with lithium based grease.

6.3 Grease Lubrication Intervals

There are only two places on the WPT PTO that require lubrication. Each is connected to the bearing cavity with the excess grease being forced out of a relief valve on the bottom of the unit. The small amount of grease expelled is an indication that enough grease is being provided.

When the PTO runs, additional grease will be expelled out of the relief valve due to pressure caused from the bearings heating up. This is normal and the amount of grease expelled will vary, depending on the amount of grease in the cavity.

Every 75 hours of operation, add enough grease to expel a small amount from the relief valves.

Every 300 hours of operation, flush the bearing with approximately 7.5 oz. (1/2 tube).

These lubrication intervals are suggested. The operator is responsible for establishing lubrication intervals according to the duty cycle and operating conditions in which the equipment is used.

6.4 Oil Specification

Use only Mobil – Exxon SHC 85w-140 synthetic oil or equivalent.

NOTE: If utilizing Python Hydraulic Clutch Control refer to HCC manual.



WARNING:

WPT PTO is shipped without oil and must be filled with oil prior to being placed in service.

6.5 Oil lubrication intervals

These lubrication intervals are suggested. The operator is responsible for establishing lubrication intervals according to the duty cycle and operating conditions in which the equipment is used.

Check oil levels periodically. Add oil to bottom edge of sight plug, Do Not overfill.

Drain and refill every 1,000 hours of operation.

6.6 Clutch

No lubrication is required.

6.7 Rotary Union

Normally no lubrication is required. If equipped with grease fittings or oil cups, any good bearing oil or grease can be used, but care should be taken not to over lubricate.

6.8 Bearing Operating Temperature

Operating temperature range is normally between 170° F and 225° F (76.7° C and 93.3° C). Higher ambient temperatures will cause the bearings to run at higher temperatures. More frequent lubrication intervals and/or lubricant designed for higher operating temperatures will be required if the unit is to be used in this environment. Consult the factory for lubricant recommendations where ambient temperatures are consistently above 100° F (38° C).



CAUTION:

Do not rely on checking bearing temperature with the hand. Acceptable bearing temperatures are normally higher than the hand can stand for more than a second. An infrared or contact type thermometer should be used to take accurate temperature measurements.

7.0 MAINTENANCE

This WPT PTO uses a clutch which does not need adjustment and does not require periodic inspection of friction material and wear plates between clutch rebuilds. When the clutch begins to slip when engaged it is necessary to rebuild the clutch replacing the **floating plate, center plates, friction discs, seals, O-rings** and **rotary union**. A clutch that is suspected of slipping should be removed from service for examination or repair.



WARNING:

Slippage generates heat and when excessive, will shorten the life of **friction discs** and **seals**.

Most damage to WPT clutches is a result of misalignment or low operation pressure. Misalignment will cause premature wear of teeth (**friction disc, center plates, floating plate, hub** and **drive**

ring, and if extreme, may cause breakage of these parts. Low operating pressure may cause the clutch to slip. Low operating pressure or insufficient delivery may cause the clutch to engage slowly.

7.1 Disassembly

(Refer to PTO illustrations at the back of this manual)

WARNING:

Use care when removing the PTO from the engine to avoid damage to grease fittings, friction disc teeth and other components.

7.1.1 Disengage clutch, remove power from the engine and make sure the appropriate engine operation controls are locked and tagged before beginning.

7.1.2 Use a hoist or other suitable lifting equipment to support the weight of the PTO. Attach lifting devices at several places or use cribbing to support the PTO in a horizontal position during removal.

DANGER:

The PTO can weigh in excess of 500 lbs. (227 Kg). Use approved lifting equipment and procedures to prevent accident or injury.

7.1.3 Remove hoses, rotary union and other connections connected to the PTO

7.1.4 Remove the mounting bolts between the PTO and flywheel housing, removing those located near the top last. The PTO should separate from the flywheel housing. If the PTO doesn't separate, insert two of the bolts into the two threaded holes in the bellhousing until the housing is removed from the engine flywheel housing pilot diameter.

7.1.5 Remove the PTO from the engine.
Use care when removing the PTO from the engine to avoid damage to **grease fitting**, **friction disc** teeth and other components.

7.1.6 Before removing six cylinder **bolts (SHCS piston)**, see **CAUTION** below.

CAUTION:

Use caution when removing **bolts (SHCS piston)**. **Springs** within the clutch store energy and could cause the clutch to fly apart. The best removal practice will be to remove 3 of the 6 **bolts**, replace them with 12" long all-thread segments. Place a large outer diameter washer on each of the all thread bolts, followed by a nut. Run the nut down the all-thread segment until it holds the **piston** in place. Remove the remaining 3 **bolts**. Loosen the three nuts on the all-thread bolt, evenly, until all stored energy is removed.

7.1.7 Remove the **piston** and **cylinder** assembly from the shaft.

7.1.8 Separate the **piston** and **cylinder** assembly and discard the Polypak **seals** and **O-Rings**.

7.1.9 Remove the **floating plate** from the **Hub**. Remove the 4 **roll pins** from the **floating plate** and retain for reassembly.

7.1.10 Remove the **friction discs** and **center plates** from the **hub**.

7.1.11 Check **hub** and **drive ring** teeth for wear. Lay a straight edge along the side of the teeth. Any groove worn .015" (.38mm) indicates part replacement.

- 7.1.12 Position the shaft with the clutch at the top and resting on the **bellhousing/bearing carrier**.
 - 7.1.13 Bend the tab out of the slot on the bearing lock nut (6) and remove the **locknut** and **lock washer** or remove **snap ring** on compact version.
 - 7.1.14 Use a puller in the threaded holes in the **hub** to pull the **hub** and **backplate**.
 - 7.1.15 Remove the **set screw** in the **clutch spacer** if equipped.
 - 7.1.16 Remove the **clutch spacer** if required.
 - 7.1.17 Turn unit over, clutch end down.
 - 7.1.18 Remove the sheave if still on the shaft.
 - 7.1.19 Remove the bolts from the **outer endcap** and remove it.
 - 7.1.20 The **shaft assembly** may now be drawn out of the **bearing carrier**.
 - 7.1.21 Remove the bolts from the **inner endcap** and remove it.
 - 7.1.22 Remove the **oil seal spacers, bearings** and **bearing spacer** from the **shaft**.
- 7.2 Preparing the shaft for assembly
- 7.2.1 Clean the **shaft**. Remove all dirt or corrosion.
 - 7.2.2 Check the **shaft** to see that it is free of burrs.
 - 7.2.3 Inspect **threads** to see that there is no damage.
 - 7.2.4 **Keyways** should not be worn. **Key** should be a snug fit in the **keyway**.
- 7.3 Assembly
- 7.3.1 Assemble **shaft assembly** and place into **bearing carrier/bellhousing** by reversing items **7.1.13** through **7.1.22**.
 - 7.3.2 Place new **friction discs** and **center plates** on the **hub** as shown in the illustration in the back of this manual.
 - 7.3.3 Place new **friction discs** and **center plates** on the **hub** as shown in the illustration in the back of this manual.
 - 7.3.4 Fit the **roll pins** into the new **floating plate** and place on the **hub**.
- NOTE: **Roll pin** side of **floating plate** should face away from **friction discs**.
- IMPORTANT:**
Floating plate to **hub** alignment is critical. Align two of the **roll pins** 180 deg. apart with two bolt holes in **hub**. The other two **roll pins** will be half way between two bolt holes. Mark location of one **roll pin** that is in line with **hub** bolt hole, using a permanent marker. Place mark between the **roll pin** and the O.D. of the **floating plate**. Mark will be used to align the **piston/cylinder** assembly with the **floating plate**.
- 7.3.5 Inspect the actuator parts (**piston & cylinder**) for burrs and sharp edges. Use a fine file or emery cloth to smooth any sharp edges.

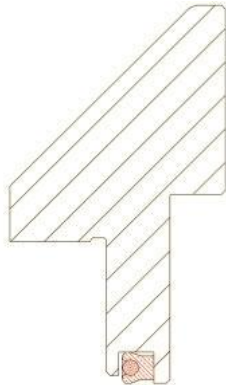


WARNING:

Surfaces on which the seals ride are 16 (.4) Ra finish. Do not damage these surfaces when removing burrs and sharp edges. Any damage to the seal surfaces could result in a hydraulic leak.

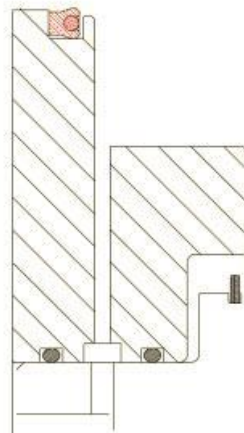
- 7.3.6 Lubricate the new **seal** with clean hydraulic fluid and insert into the **cylinder**.

NOTE: Ensure that the open face of the **seal** is facing the flywheel side of the clutch as shown below.



- 7.3.7 Lubricate new **seal** and new **O-rings** with clean hydraulic oil. Insert the new **seal** and the new **O-rings** into the **piston**.

NOTE: Ensure that the open face of the **seal** is facing the sheave side of the clutch as shown below.



- 7.3.8 Liberally lubricate all seals and seal surfaces with clean hydraulic oil prior to assembly. Insert the **piston** into the **cylinder** while taking care not to damage the seals.

IMPORTANT:

Piston to cylinder alignment is critical. Align two of the roll pin holes 180 deg. apart in the **cylinder** with two bolt holes in **piston**. The other two roll pin holes will be half way between two bolt holes. Mark location of one roll pin hole, that is in line with **hub** bolt hole, using a permanent marker. Place mark on the O.D. of the large angle surface of **cylinder**. Mark will be used to align the piston/cylinder assembly with the **floating plate**.

 **WARNING:**

Use of sharp objects to force seal into grooves will result in seal damage. Take care to not roll the edge of either seal back when assembling the piston into the cylinder.

NOTE: A ring style compressor may be required to install the piston **seal** into the **cylinder**.

7.3.9 Fit the **piston** and **cylinder** assembly onto the 4 **roll pins** located in the **floating plate** making sure to align the permanent marker marks and bolt holes.

7.3.10 Install three 12" long all-thread segments equally spaced thru the **piston** and into the **hub**. Place a large outer diameter washer on each of the all thread bolts, followed by a nut. Tighten the nuts evenly on the all-threads, squeezing the springs, until the floating plate contacts the hub.

 **WARNING:**

Ensure that the **floating plate** teeth are aligned with the **hub** teeth to prevent damage during installation.

7.3.11 Continue tightening the nuts until the **floating plate** is against the **friction disc** and **piston** is in place against **hub**.

7.3.12 Install and hand tighten three **socket head bolts (piston)**, using thread locking compound, in holes between the all-threads.

7.3.13 Remove the three nuts, washers and all-threads and install the remaining three **socket head bolts (piston)** using thread locking compound.

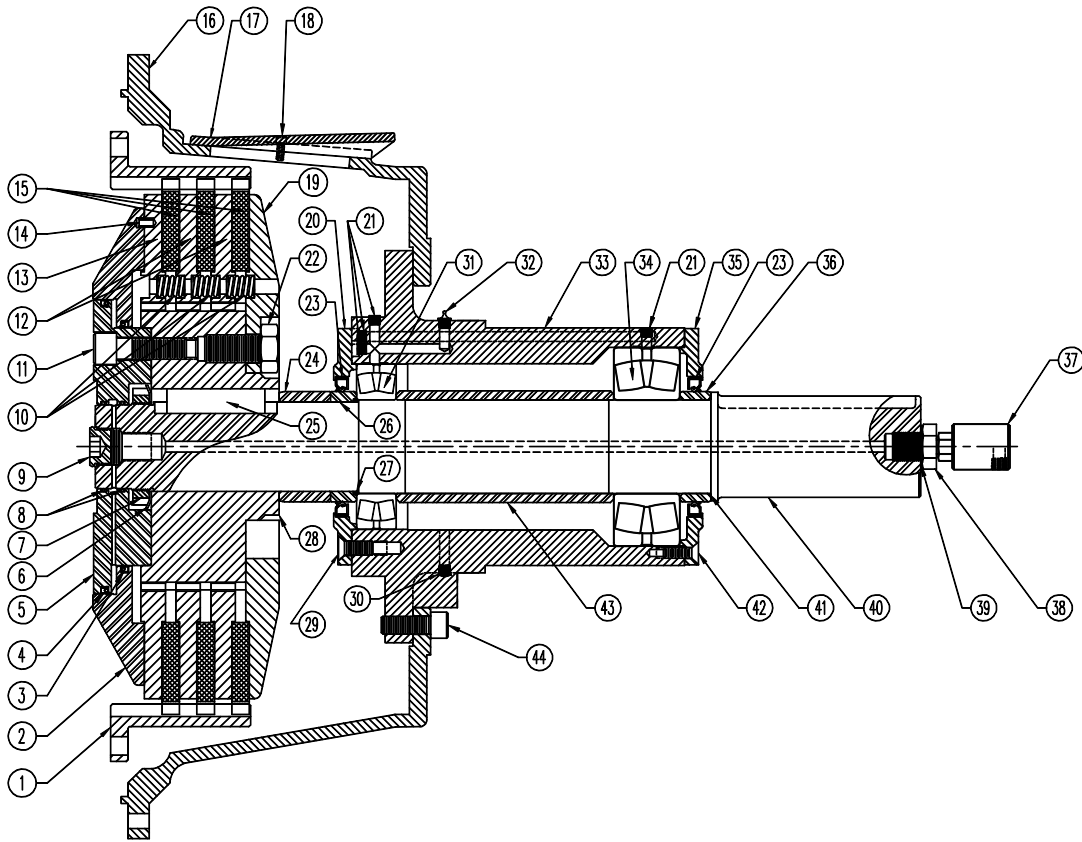
7.3.14 Torque the 6 **bolts** evenly to the torque specified in **Table 4**.

7.3.15 Pressure test the unit. Connect the PTO to a hydraulic oil supply connected through the **Rotary Union** at the sheave end of shaft. Apply a maximum of 35 bar (500 psi) to the unit. Hold pressure for approximately one hour.

7.3.16 Check for any visible leaks around the **Piston** and **Cylinder** assembly.

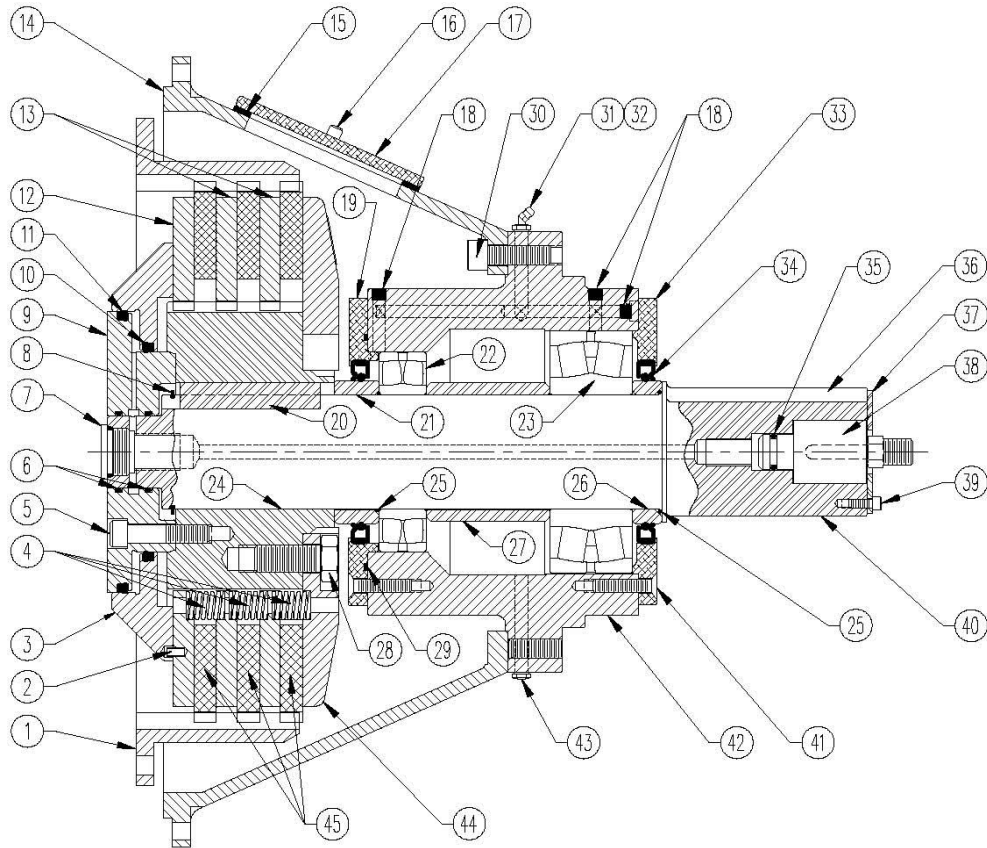
7.3.17 If it passes pressure test, mount PTO unit onto engine. See section **3.0 Installation**, for specific instructions.

8.0 TYPICAL DRAWING AND PARTS LIST



| Item | Description | Qty | Item | Description | Qty |
|--|----------------------|--------|------|-------------------------|-----|
| 1 | Driving Ring | 1 | 23 | Oil Seal | 2 |
| 2 | Cylinder | 1 | 24 | Spacer, Clutch | 1 |
| 3 | Seal, Polypak, Inner | 1 | 25 | Key, Clutch | 1 |
| 4 | Seal, Polypak, Outer | 1 | 26 | Spacer, Oil Seal, Inner | 1 |
| 5 | Piston | 1 | 27 | O-Ring, Spacer | 1 |
| 6 | Washer, Lock | 1 | 28 | Hub | 1 |
| 7 | Locknut | 1 | 29 | FHSCS | 6 |
| 8 | O-Ring | 2 | 30 | Relief Valve | 1 |
| 9 | Plug | 1 | 31 | Bearing, Small | 1 |
| 10 | Spring | varies | 32 | Zerk, Grease | 2 |
| 11 | SHCS, Piston | 6 | 33 | Bearing Carrier | 1 |
| 12 | Center Plate | 2 | 34 | Bearing, Large | 1 |
| 13 | Floating Plate | 1 | 35 | Endcap, Outer | 1 |
| 14 | Pin, Roll | 4 | 36 | Spacer, Oil Seal, Outer | 1 |
| 15 | Friction Disc | 3 | 37 | Rotary Union | 1 |
| 16 | Bellhousing | 1 | 38 | Adapter, Rotary Union | 1 |
| 17 | Cover, Hand Hole | 2 | 39 | Gasket | 1 |
| 18 | SHCS, Cover | 1 | 40 | Shaft | 1 |
| 19 | Backplate | 1 | 41 | O-Ring, Spacer | 1 |
| 20 | Endcap, Inner | 2 | 42 | FHSCS | 6 |
| 21 | Pipe Plug | 5 | 43 | Spacer, Bearing | 1 |
| 22 | HHCS | 4 | 44 | SHCS, Bellhousing | 12 |
| | | | | | |
| NOTE: For actual drawing and parts list, contact WPT. Use assembly no./serial no. to identify your unit. | | | | | |

9.0 TYPICAL DRAWING AND PARTS LIST – COMPACT



| Item | Description | Qty | Item | Description | Qty |
|------|-------------------------|-----|------|-------------------------|-----|
| 1 | Driving Ring | 1 | 24 | Hub | 1 |
| 2 | Pin, Roll | 4 | 25 | O-Ring, Spacer | 2 |
| 3 | Cylinder | 1 | 26 | Spacer, Oil Seal, Outer | 1 |
| 4 | Spring | 24 | 27 | Spacer, Bearing | 1 |
| 5 | SHCS, Piston | 6 | 28 | HHCS | 4 |
| 6 | O-Ring | 2 | 29 | O-Ring | 1 |
| 7 | Plug | 1 | 30 | SHCS, Bellhousing | 12 |
| 8 | Snap Ring | 1 | 31 | Zerk, Grease | 2 |
| 9 | Piston | 1 | 32 | Cap, Grease | 2 |
| 10 | Seal, Polypak, Inner | 1 | 33 | Endcap, Outer | 1 |
| 11 | Seal, Polypak, Outer | 1 | 34 | Oil Seal | 2 |
| 12 | Floating Plate | 1 | 35 | O-Ring | 1 |
| 13 | Center Plate | 2 | 36 | Key | 1 |
| 14 | Bellhousing | 1 | 37 | Endcap, Shaft | 1 |
| 15 | Gasket | 1 | 38 | Rotary Union | 1 |
| 16 | SHCS, Cover | 2 | 39 | SHCS, Endcap | 4 |
| 17 | Cover, Hand Hole | 1 | 40 | Shaft | 1 |
| 18 | Pipe Plug | 4 | 41 | FHSCS | 12 |
| 19 | Endcap, Inner | 1 | 42 | Bearing Carrier | 1 |
| 20 | Key, Clutch | 1 | 43 | Relief Valve | 1 |
| 21 | Spacer, Oil Seal, Inner | 1 | 44 | Backplate | 1 |
| 22 | Bearing, Small | 1 | 45 | Friction Disc | 3 |
| 23 | Bearing, Large | 1 | | | |

NOTE: For actual drawing and parts list, contact WPT. Use assembly no./serial no. to identify your unit.

10.0 TROUBLESHOOTING GUIDE

| Problem | Possible Cause | Remedy |
|--|---|--|
| PTO Will Not Engage/Disengage | Improper engagement pressure | Check engagement pressure and adjust as necessary |
| | Worn or damaged friction discs | Inspect friction discs and replace as needed |
| | Debris in clutch pack | Inspect clutch pack and remove debris |
| Ringing or Knocking Sound While Disengaged | Normal operational sound | Engage PTO |
| Grinding/Scraping Sounds While Engaged or Disengaged | Worn PTO main bearings | Inspect main bearings and replace as needed |
| Clutch Slips, Burnt Smell, and/or Smoke from PTO | Improper engagement pressure | Check engagement pressure and adjust as necessary |
| | Worn or damaged friction discs | Inspect friction discs and replace as needed |
| | Sliding sleeve assembly contacting clutch shaft | Check for axial loading on operating shaft |
| Excessive Vibrations | Worn engine bearings | Inspect endplay and runout on engine flywheel, replace as needed |
| | Worn PTO main bearings | Inspect main bearings and replace as needed |
| | Improper alignment | Check alignment, adjust as needed |
| Split Friction Disc or Broken Teeth | Worn drive ring | Inspect drive ring teeth and replace as needed |
| | Engagement speed is too high | Reduce to 1100 r/min or below |
| | Improper alignment | Check alignment, adjust as needed |
| | No support outboard support plate | Check if unit requires outboard support, install if needed |
| | High inertia or shock load starts | Contact WPT Power Applications Engineering for support |
| PTO Self Engages | Improper engagement torque | Check engagement torque and adjust as necessary |
| | Worn or damaged friction discs | Inspect friction discs and replace as needed |
| Frequent Adjustments Needed to Engagement Pressure | Engagement speed is too high | Reduce engagement speed to below 1100 r/min |
| Bearing Carrier Hot | Too much or too little grease | Remove/Add Grease |
| | Improper belt tension | Adjust belt tension according to belt manufactures recommendations |
| | Worn PTO main bearings | Inspect main bearings and replace as needed |
| Excessive Grease Leaking | Over greased | Run at idle speed until grease outflow stops |