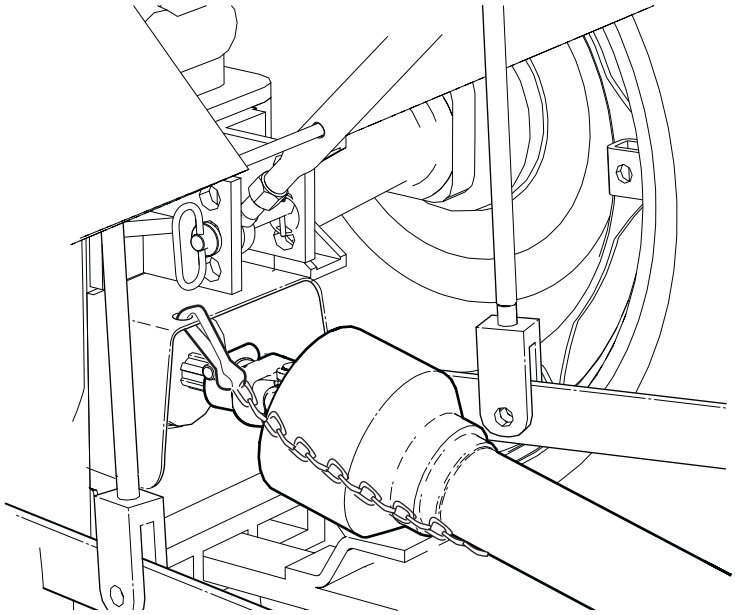
INSTALLATION INSTRUCTIONS

PTO Shaft
for tractor attachments



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WALLENSTEIN

Table of Contents

1. Introduction

⚠ WARNING!

Read the machine operator's manual before you install or use this machine. Carefully read all the safety information and understand all the safety labels that are on the machine. Failure to read and understand the machine information can cause serious personal injury or machine damage.

Illustrations are provided for reference only. It is possible that some details are not shown.

Units of measurement in Wallenstein technical manuals are written as: US Customary (SI metric)

For support or service, contact your local Wallenstein Equipment dealer or distributor.

This manual is subject to change without notice. For the most current information, go to WallensteinEquipment.com.

2. Safety

Read and make sure that you fully understand all the safety information before you operate, service, or maintain a machine.

2.1 Safety Alert Symbol

Look for this safety alert symbol on the machine and in the machine information.

When you see this symbol, it means:

There is a hazard! Be careful!

Your safety is involved!

The safety alert symbol identifies important safety messages that you need to understand. Safety messages show or tell you about hazards that can or will make you ill, cause you serious injury, or kill you. Always obey the instructions in a safety message.

2.2 Why Safety is Important

- **Accidents disable and kill people.**
- **Accidents cost money.**
- **Accidents are preventable.**

You are responsible for the safe operation and maintenance of your Wallenstein Equipment product. You must make sure that you and anyone who uses, maintains, or works around the machine is familiar with the operation and maintenance procedures and related safety information in this manual. Obey the safety best practices in this manual when you operate or maintain your machine.

You are responsible for your own safety and the safety of the people around you. Most accidents can be prevented. **Do not ignore safety instructions and best practices.**

2.3 Signal Words

The signal words **DANGER**, **WARNING,** and **CAUTION** identify the severity of a hazard to anyone who uses the machine. The applicable signal word for each message is selected based on the following guidelines:

DANGER

Identifies a hazardous situation that, if not avoided, **will** result in serious injury or death. This signal word is used to tell anyone who uses the machine about the most hazardous situations and machine components that cannot be guarded against.

WARNING

Identifies a hazardous situation that, if not avoided, **can** result in serious injury or death. This signal word includes hazards that occur when guards are removed and can be used to tell anyone who uses the machine about unsafe practices.

CAUTION

Identifies a hazardous situation that, if not avoided, **can** result in minor or moderate injury. It can also be used to tell anyone who uses the machine about unsafe practices.

IMPORTANT – Identifies a situation that could result in damage to the machine or property, but is not a personal injury hazard.

Provides additional information that is helpful.

3. PTO Shaft Components

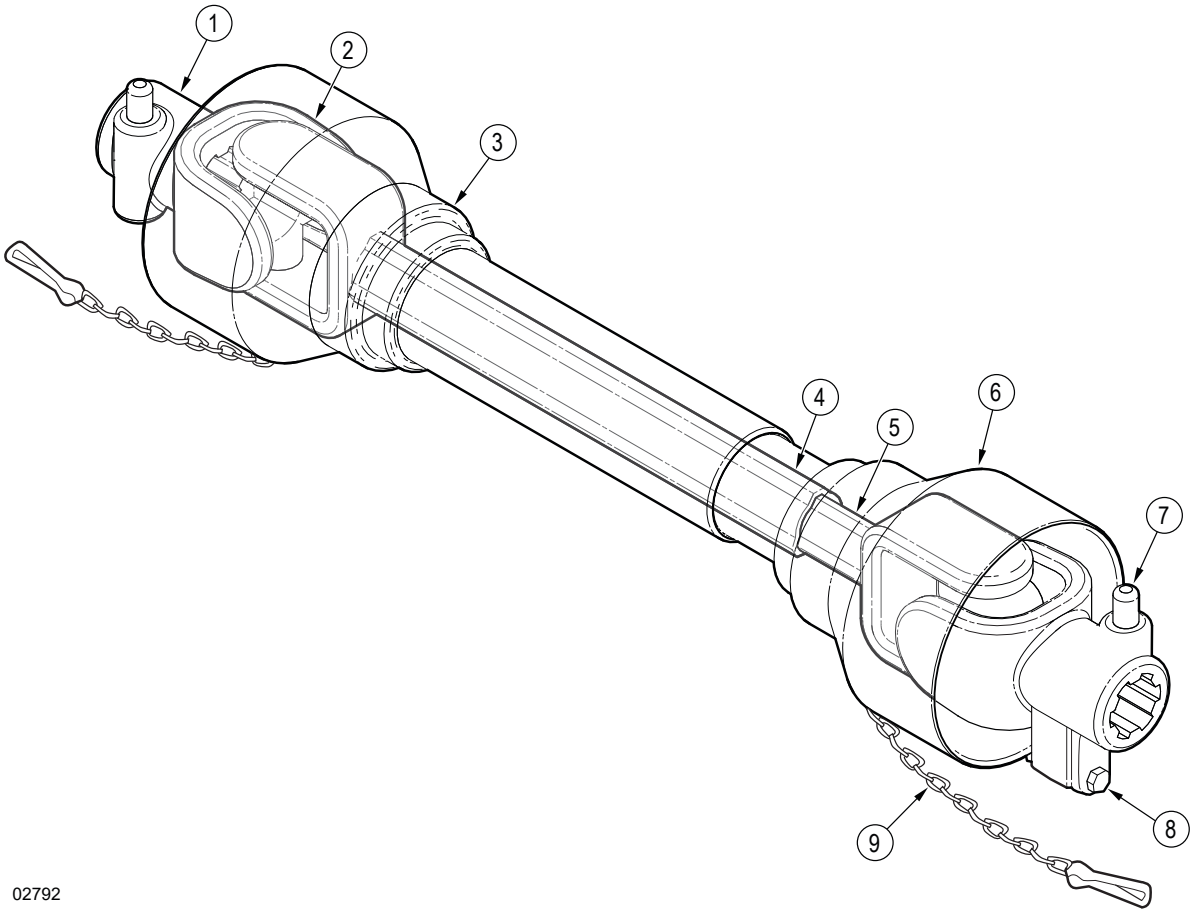


Figure 1– PTO shaft components

1. Tractor or machine connection (1 of 2)
2. Universal-joint yoke (1 of 2)
3. Outer guard
4. Outer shaft
5. Inner shaft
6. Inner guard
7. Quick-connect release pin (1 of 2)
8. Shear bolt
9. Safety chain (1 of 2)

4. Cut a PTO Shaft to the Correct Length

⚠ WARNING!

Read and obey all the installation and setup instructions. Install the equipment correctly and, if necessary, cut the equipment to the correct length. If the equipment is the incorrect length or is installed incorrectly, it can cause serious injury or death and damage the machine.

⚠ WARNING!

Wear the personal protective equipment (PPE) that is necessary to do the work safely.

This includes, but is not limited to protective eyewear or a face shield, and heavy gloves.

⚠ WARNING!

The PTO shaft must be the correct length.

If the inner shaft and guard do not have sufficient space to retract, the interference will put too much force on the machine and tractor PTO drive bearings and cause them to fail. This failure can result in serious injury or machine damage.

The telescopic parts of the PTO shaft must overlap by a minimum of 1/3 the length of the full PTO shaft in the fully retracted position. If the PTO shaft is too short, the two halves can disconnect from each other when you lift or lower the machine. The disconnected halves of the PTO shaft will turn fast without control and can cause serious injury or death, and machine damage.

IMPORTANT! Always use the PTO shaft that was supplied with your machine. If you use a different PTO shaft it is possible that the universal-joint yokes will not be aligned with each other (this is also called out of phase). The yokes must be aligned with each other to prevent an unbalance. An unbalance can cause wear and after some time the PTO shaft can fail. If it is necessary to replace the PTO shaft, contact your local Wallenstein Equipment dealer or distributor.

IMPORTANT! Make sure that the PTO shaft is the correct length for your tractor. Tractor hitch connections are different lengths. As a result, the PTO shaft that you receive with the machine can be too long for your tractor.

IMPORTANT! If you use a quick hitch on your tractor, cut the PTO shaft to the correct length with the quick hitch attached.

The PTO shaft has telescopic parts (the secondary shaft and guard retract into the primary shaft and guard). The telescopic parts must move freely through the full range of motion and they must overlap each other in the fully lifted and fully lowered positions.

A PTO shaft is the correct length when it is in the fully retracted position and:

- The full length of the PTO shaft is 2” (5 cm) less than the shortest distance between the tractor output shaft and the machine input shaft and,
- The two shafts overlap by a minimum of 1/3 the full length of the PTO shaft.

There are two methods that you can use to cut the PTO shaft parts. Select the method that is easiest for you.

4.1 Method 1

Use measurements to calculate and mark the four cut locations.

4.1.1 Measurement Definitions

Variable	Measurement
A	The distance between the PTO shaft yoke locks. See *Figure 2*.
B	The distance between the groove on the tractor output shaft and the groove on the tractor input shaft when the two shafts are level with each other. See *Figure 3*.
C	2” (5 cm)
D	The difference between B and C (B - C = D)
E	The difference between A and D (A - D = E)

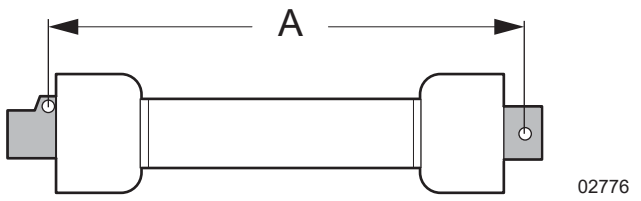


Figure 2–Measurement A

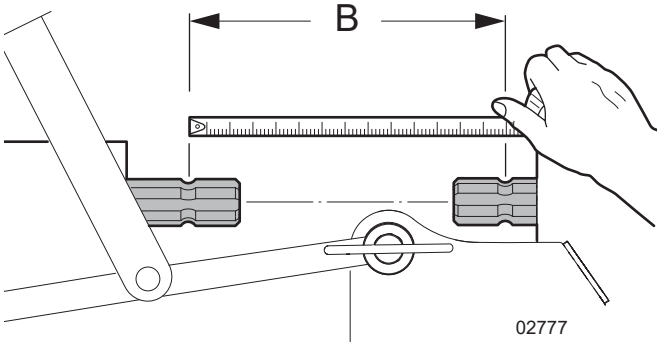


Figure 3–Measurement B

4.1.2 Procedure

1. Measure the PTO shaft:
   - **a.** Disconnect the PTO shaft from the machine.
   - **b.** Set the PTO shaft on a flat surface.
   - **c.** Fully retract the PTO shaft.
     Push the ends together to make the PTO shaft as short as possible.
   - **d.** Measure the distance between the two PTO shaft yoke locks. This measurment is **A**. See *Figure 2*.
2. Connect the machine to your tractor.
   For instructions, see the Operator’s Manual for your machine.
3. Align the machine input shaft with the tractor output shaft:
   - **a.** Start the tractor.
   - **b.** Lift the machine until the machine input shaft aligns with the tractor output shaft (the two shafts are level with each other).
     This is the shortest distance between the input and output shafts.
   - **c.** Apply the tractor parking brake.
   - **d.** Put the tractor PTO drive in neutral.
   - **e.** Stop the tractor PTO drive and apply the brake.
   - **f.** Stop the tractor engine.
   - **g.** Remove the key from the ignition switch and keep it with you.
4. Measure the distance from the groove on the tractor output shaft to the groove on the machine input shaft. This measurement is **B**. See *Figure 3*.
5. Subtract **C** (2” [5 cm]) from B. This measurement is **D** (B - C = D).
6. Subtract D from A. The difference is **E** (A - D = E).
7. Do one of the following:
   - If measurement **D** is more than measurement **A**, it is possible that the PTO shaft is too short. The procedure is complete.
     For more information, contact your local dealer or distributor.
   - If measurement **D** is equal to measurement **A**, it is not necessary to cut the PTO shaft. The procedure is complete.
   - If measurement **D** is less than measurement **A**, it is necessary to cut the two shafts and two guards. Continue with step 8.
8. Divide the PTO shaft into two halves.
   Pull the telescopic guards and shafts apart.
9. You can remove the guards from the shafts; however, this is optional.

10. Cut the two guards to decrease their length by **E**.
See *Figure 4*.
Do the following for each guard:

- **a.** From the open end of the guard, measure the length of **E**.
- **b.** Mark the cut location on the guard.
- **c.** You can wrap a strip of tape around the guard at the marked location to help you make a straight cut; however, this is optional.
- **d.** Use an appropriate tool (for example, a sawsall) to cut the guard on the mark. Cut perpendicular to the guard for a flat end.
  If the guard is attached to the shaft, make sure that you do not cut the shaft. **The shaft must be longer than the guard**.

11. Cut the two shafts to decrease their length by **E**.
See *Figure 5*.
Do the following for each shaft:

- **a.** Put the shaft in a vice to prevent it from moving.
- **b.** From the end of the shaft, measure the length of **E**.
- **c.** Mark the cut location on the shaft.
- **d.** Use an appropriate tool (for example, a sawsall) to cut the shaft on the mark. Cut perpendicular to the shaft for a flat end.
  Make sure that the shaft is longer than the guard or it will not be easy to put the two halves together.
- **e.** Remove all the rough or sharp edges from the end of the shaft.

12. If you removed the guards in step 10, install the guards.

13. Verify that the PTO shaft length is correct:

- **a.** Put the two PTO shaft halves together.
  Insert the inner shaft and guard into the outer shaft and guard. Push the ends together to make the PTO shaft as short as possible.
- **b.** Measure the distance between the two PTO shaft yoke locks.
  For more information, see step 1.
- **c.** Do one of the following:
  - If the PTO shaft length is equal to measurment **D**, the length is correct. Continue with step 14.
  - If the PTO shaft is longer than measurement **D**, the length is incorrect. Start at step 2 and do this procedure again.
  - If the PTO shaft is shorter than measurement **D**, the length is incorrect. It is possible that the PTO shaft is too short.
    For more information, contact your local dealer or distributor.

14. Do step 8 again.

15. Apply grease to the inner shaft. See *Figure 6*.

16. Put the two PTO shaft halves together.
Insert the inner shaft and guard into the outer shaft and guard.

17. Make sure that the telescopic parts move freely over the full range of motion.
If the parts do not move freely, examine the ends of the two shafts for rough or sharp edges.

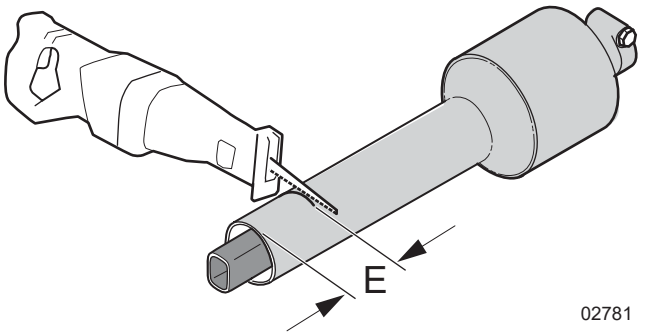


Figure 4– Cut a guard

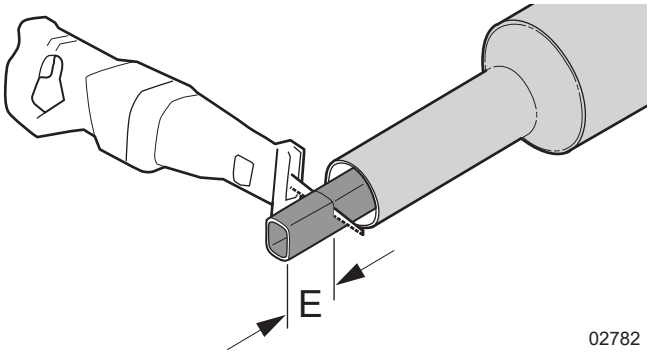


Figure 5– Cut a shaft

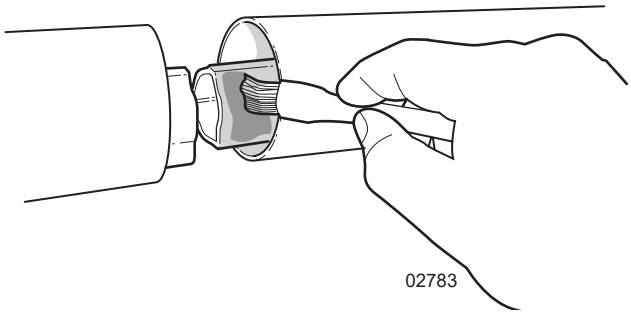
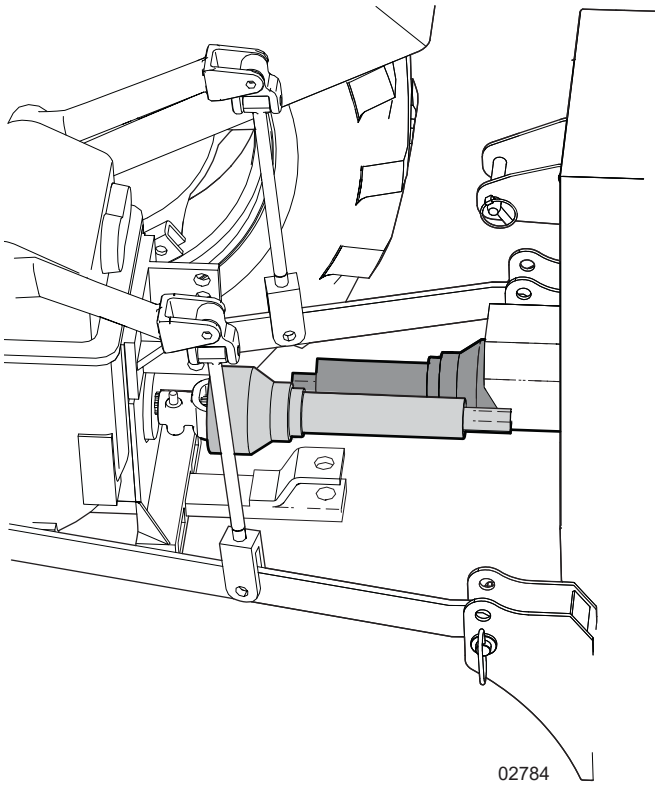


Figure 6– Apply grease to the inner shaft

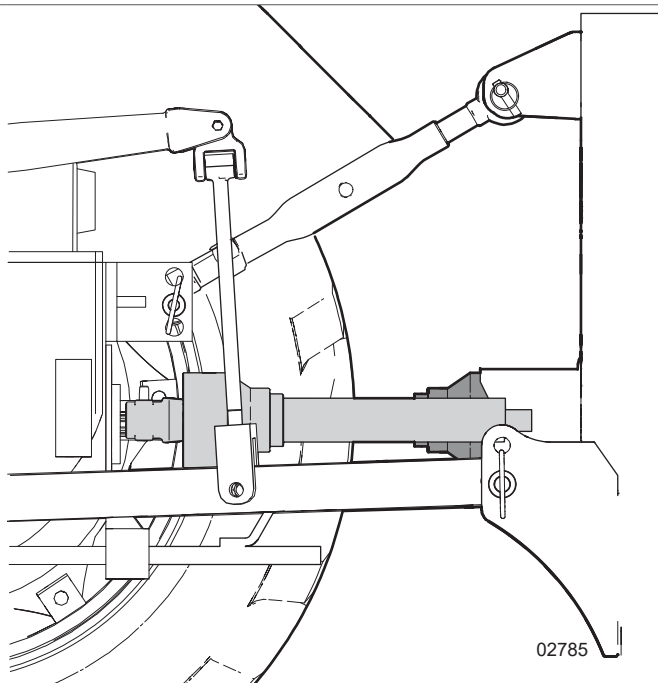
4.2 Method 2

Use the PTO shaft parts to mark the four cut locations.

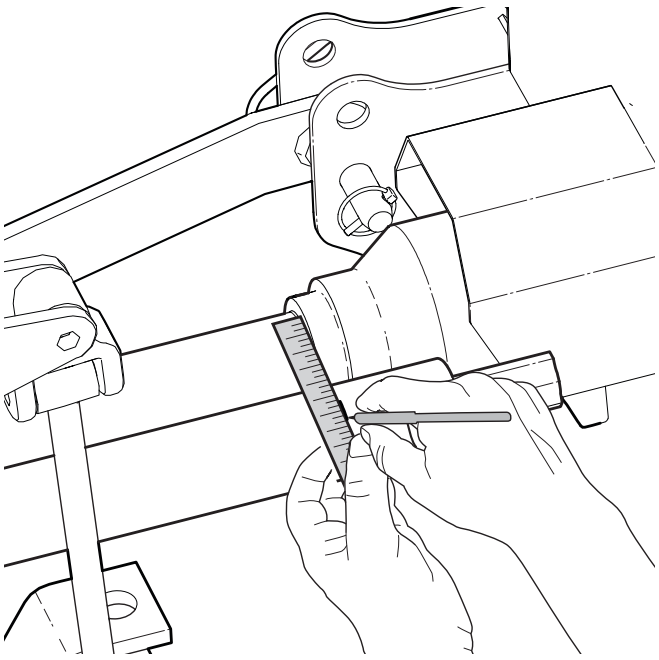
1. Disconnect the PTO shaft from the machine.
2. Connect the machine to your tractor.
   For instructions, see the Operator's Manual for your machine.
3. Align the machine input shaft with the tractor output shaft:
   a. Start the tractor.
   b. Lift the machine until the machine input shaft aligns with the tractor output shaft (the two shafts are level with each other).
   This is the shortest distance between the input and output shafts.
   c. Apply the tractor parking brake.
   d. Put the tractor PTO drive in neutral.
   e. Stop the tractor PTO drive and apply the brake.
   f. Stop the tractor engine.
   g. Remove the key from the ignition switch and keep it with you.
4. Divide the PTO shaft into two halves.
   Pull the telescopic guards and shafts apart.
5. Connect the correct half of the PTO shaft to the machine input shaft.
6. Connect the correct half of the PTO shaft to the tractor output shaft.



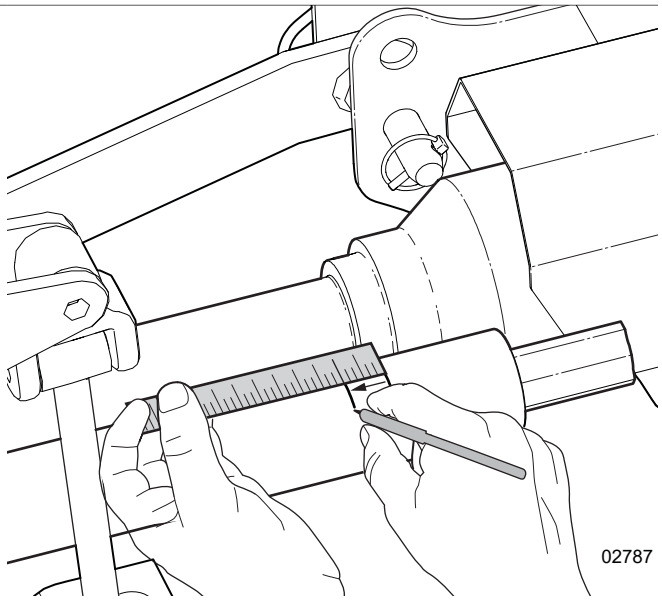
7. Manually lift the free end of each shaft until the two halves are parallel to each other.
8. Do one of the following:
   - If the shafts are too long or there is not sufficient space to make the two halves parallel, use *Method 1 on page 7*.
   - If you can make the shafts parallel, support them with blocks or tie them together to keep them in position.



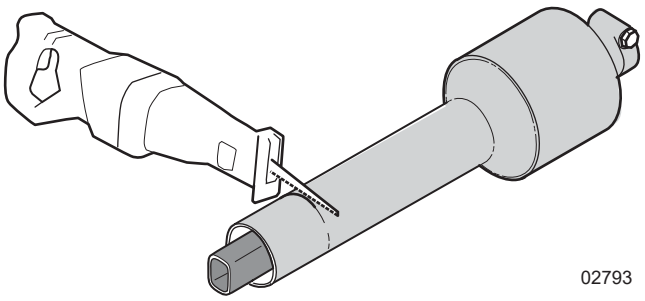
9. Put a straight edge perpendicular across the top of the two halves with the side of the straight edge flat against the face where one of the guards expands to cover the yoke.
10. Mark the other guard where the straight edge goes across it.



11. Measure 2” (5 cm) from the mark you made in step 10 to make the guard shorter.
12. Mark the guard. This is the guard cut location.

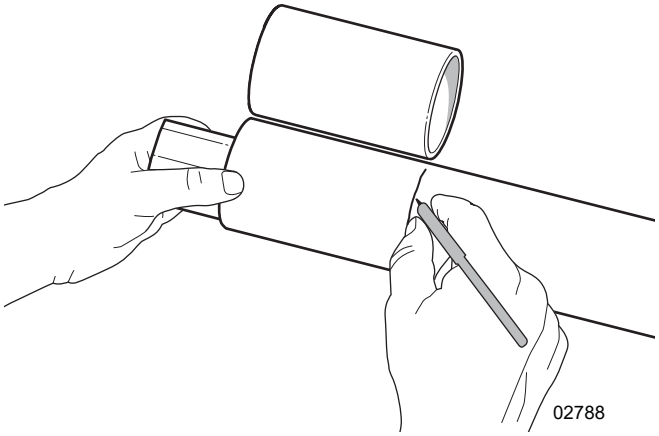


13. Remove the two halves of the PTO shaft from the tractor and the machine.
14. You can remove the guards from the shafts; however, this is optional.
15. You can wrap a strip of tape around the guard at the marked location to help you make a straight cut; however, this is optional.
16. Use an appropriate tool (for example, a sawsall) to cut the guard on the mark. Cut perpendicular to the guard for a flat end.
    If the guard is attached to the shaft, make sure that you do not cut the shaft. **The shaft must be longer than the guard**.



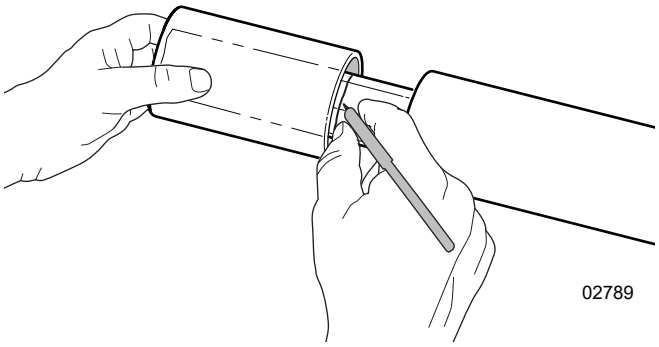
17. Use the piece of guard that you cut off to mark the cut location on the second guard.

18. Do steps 15 and 16 again for the second guard.



19. Put one of the shafts in a vice to prevent it from moving.

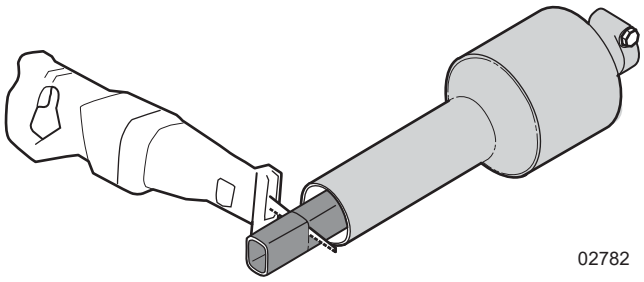
20. Align the the piece of guard you cut off with the end of the shaft, and then mark the cut location.
The shaft must be longer than its guard.



21. Use an appropriate tool (for example, a sawsall) to cut the shaft on the mark. Cut perpendicular to the shaft for a flat end.

22. Remove all the rough or sharp edges from the end of the shaft.

23. Do steps 19 to 22 again for the second shaft.



24. Verify that the PTO shaft length is correct:

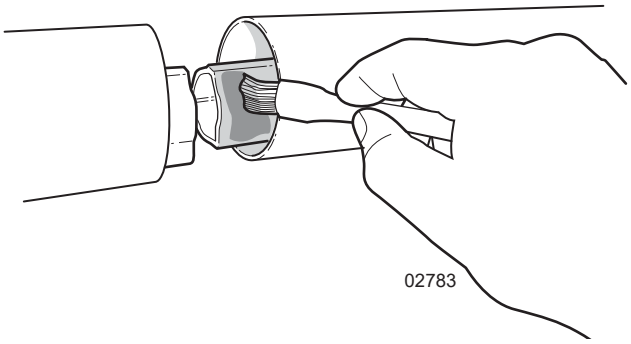
- **a.** If you removed the guards in step 14, install them on the PTO shaft.
- **b.** Put the two PTO shaft halves together.
  Insert the inner shaft and guard into the outer shaft and guard. Push the ends together to make the PTO shaft as short as possible.
- **c.** Connect the PTO shaft to the tractor and the machine.
- **d.** Do one of the following:
  - If the PTO shaft length is correct. Continue with step 25.
  - If the PTO shaft length is too long. Start at step 4 and do this procedure again.
  - If the PTO shaft length is too short, contact your local Wallenstein Equipment dealer or distributor for more information.

25. Do step 4 again.

26. Apply grease to the inner shaft.

27. Put the two PTO shaft halves together.
Insert the inner shaft and guard into the outer shaft and guard.

28. Make sure that the telescopic parts move freely over the full range of motion.
If the parts do not move freely, examine the ends of the shafts for rough or sharp edges.



5. Install a PTO Shaft

⚠ WARNING!

Read and obey all the installation and setup instructions. Install the equipment correctly and, if necessary, cut the equipment to the correct length. If the equipment is the incorrect length or is installed incorrectly, it can cause serious injury or death and damage the machine.

⚠ WARNING!

Wear the personal protective equipment (PPE) that is necessary to do the work safely.

This includes, but is not limited to protective eyewear or a face shield, and heavy gloves.

IMPORTANT! The PTO shaft safety chains must not wind around the PTO shaft guard during operation. Also, the safety chains must not limit the PTO shaft movement.

IMPORTANT! During operation, the PTO shaft angle must not be greater than 15° between the tractor and the machine. If the angle is incorrect, it can cause wear and after some time the PTO shaft can fail.

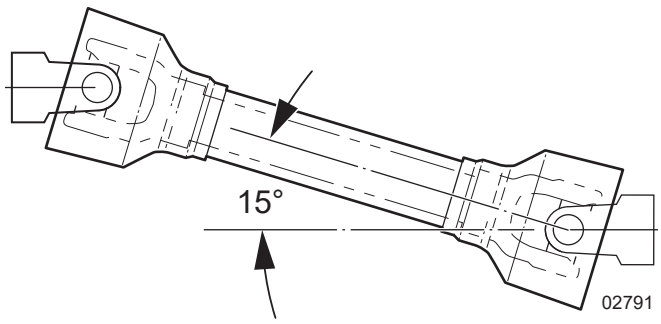


Figure 7–PTO shaft maximum angle

1. Connect the correct end of the PTO shaft to the machine input shaft.
2. Pull on the PTO shaft to make sure that it is connected.
3. Connect the PTO shaft safety chain to the machine.
   If necessary, correct the safety chain length. The PTO shaft safety chain must not wind around the guard during operation. Also, the safety chain must not limit the PTO shaft movement.
4. Connect the machine to your tractor.
   For instructions, see the Operator's Manual for your machine.
5. Fully lower the machine.
6. Put the tractor PTO drive in the neutral position.
7. Stop the tractor:
   a. Apply the tractor parking brake.
   b. Put the tractor PTO drive in neutral.
   c. Stop the tractor PTO drive and apply the brake..
   d. Stop the tractor engine.
   e. Remove the key from the ignition switch and keep it with you.
8. If the machine is not on the ground, support the machine with blocks to prevent movement.
9. Extend the PTO shaft to the tractor output shaft.
10. Connect the PTO shaft to the tractor.
11. Do step 2 again.
12. Connect the PTO shaft safety chain to the tractor output shaft guard.
    If necessary, correct the safety chain length.
13. If you used blocks to support the machine in step 8, remove the blocks.

6. Test the PTO Shaft

1. Install the PTO shaft.
   For instructions, see *Install a PTO Shaft on page 13.*
2. Lift or lower the machine until the PTO shaft is level with the ground.
3. Stop the tractor:
   a. Apply the tractor parking brake.
   b. Put the tractor PTO drive in neutral.
   c. Stop the tractor PTO drive and apply the brake.
   d. Stop the tractor engine.
   e. Remove the key from the ignition switch and keep it with you.
4. Examine the PTO shaft to make sure that it is not fully retracted.
   There is a minimum of 2” (5 cm) between the ends of the telescopic parts and the yokes.
5. Lift the machine to the highest position.
6. Do step 3 again.
7. Examine the PTO shaft to make sure that:
   - The PTO shaft is not fully retracted.
   - The telescopic parts overlap each other.
   - The PTO shaft angle is not more than 15° from the tractor connection. See *Figure 7 on page 13*.
8. Lower the machine to the lowest position.
9. Do steps 3 and 7 again.

7. Specifications

These specifications are provided for reference and are subject to change without notice.

7.1 Bolt Torque

IMPORTANT! If you replace hardware, use fasteners of the same grade.

IMPORTANT! The torque specifications in these tables are for non-greased or non-oiled threads. Do not grease or oil fastener threads unless otherwise indicated. When you use a thread lock, increase the specified torque 5%.

☞ Bolt grades are identified by the marks on top of the bolt head.

These bolt torque specification tables provide the correct torque settings for common bolts and capscrews. Tighten all bolts to the torque that is specified in the table, unless otherwise indicated. Check the bolt tightness periodically.

Imperial Bolt Torque Specifications

Bolt Diameter	Torque					
	SAE Gr. 2		SAE Gr. 5		SAE Gr. 8	
	lbf•ft	N•m	lbf•ft	N•m	lbf•ft	N•m
1/4 inch	6	8	9	12	12	17
5/16 inch	10	13	19	25	27	36
3/8 inch	20	27	33	45	45	63
7/16 inch	30	41	53	72	75	100
1/2 inch	45	61	80	110	115	155
9/16 inch	60	95	115	155	165	220
5/8 inch	95	128	160	215	220	305
3/4 inch	165	225	290	390	400	540
7/8 inch	170	230	420	570	650	880

SAE Gr. 2 SAE Gr. 5 SAE Gr. 8

Metric Bolt Torque Specifications

Bolt Diameter	Torque			
	Gr. 8.8		Gr. 10.9	
	lbf•ft	N•m	lbf•ft	N•m
M3	0.4	0.5	1.3	1.8
M4	2.2	3	3.3	4.5
M6	7	10	11	15
M8	18	25	26	35
M10	37	50	52	70
M12	66	90	92	125
M14	83	112	116	158
M16	166	225	229	310
M20	321	435	450	610
M30	1,103	1,495	1,550	2,100

WALLENSTEIN

MAKING WORK FEEL MORE LIKE PLAY™

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