Sports Turf Renovating Machines

Designed for School Districts, Municipalities, Universities,
Golf Courses, and Sports Teams

Tractor Powered, 3-Point, Category 1&2
540 RPM

PTO-60 Sports Turf Machine

Aerate • Vertical Mow • Dethatch
Resurface Field • Lip Removal

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PTO-60 Cutting Reel

Owner's Manual

Preface:

The original Hardie renovator (push lawn mower size) has been manufactured since 1946. Decades of professional turf renovating experience has made our machinery some of the finest and most reliable ever built. Our machines are nearly indestructible and will last a lifetime when given just minimal maintenance. Our PTO-60 turf renovator was developed primarily for use by school districts and municipalities. This machine weighs in at slightly over 1100 pounds, and is sure to make quick work of the exhausting task of turf maintenance.

Warranty

All turf renovators are covered by a one-year factory warranty on materials and workmanship. Consumable items like blades and retainer bolts are not warranty items.

Delivery Conditions

Your renovator comes completely assembled, adjusted, serviced and in field operational condition at time of delivery. The drive shaft (shown) to connect the tractor to the PTO-60 is included.

SPECIFICATIONS:

Turf renovators are designed for Category 1 or 2, 540 RPM PTOs with Standard 3 Point Hitches. Category 2 bushings are included with every renovator.

Our renovators require a minimum 30 HP at the PTO. Extra horsepower cannot damage the unit. The mechanical parts are protected by a safety clutch torque limiter as part of the driveline.

Model Number	Recommended Minimum HP	Cutting Width	Number of Blades	Weight (lbs.)
PTO-60	**30**	**60"**	**100**	**1110**

GENERAL INFORMATION:

Before attaching unit to tractor:

1. Always check the oil level in gearbox.
2. Check PTO shaft, grease all fittings.
3. Check for proper chain tension and wear.
4. Check for sprocket wear.
5. Make sure cutting reel is in full up position using the ratchet jack.

MAINTENANCE & LUBRICATION

Lubricate grease fittings and check gear oil level weekly.

Grease fitting locations:

1. Rear roller (one fitting on each end).
2. PTO shaft (one fitting on each end).
3. Reel bearing blocks (one fitting on each block).
4. Sprocket drive shaft (one fitting near sprockets).
5. Ratchet jack depth Adjuster(two fittings).

Change gear oil according to manufacturer's recommendations. After a one-week break in period of operation, drain and fill the gearbox with new standard 80-90 weight gear oil. Thereafter, changing oil once a year is recommended. The oil can be changed at the same time you replace the blades. Maintain tire air pressure at 20 PSI.

NOISE AND VIBRATION

Never operate a machine which is making unusual noises. Abnormal noise is an indication of a developing problem. Stop the machine immediately and check for problems.

Figure #1 and #2 FRONT WHEELS

Figure #3 and #4 DEPTH ADJUSTMENT INDICATOR

FRAME ASSEMBLY

FRAME

The PTO-60 frame is a fully-welded, rugged, heavy duty, reinforced unit constructed of 1", 1/2", 1/4" and 3/16"plate steel and tubing.

FRONT WHEELS & TIRES

The front tires are 18" diameter 8.50" x 8" tubeless tires. We use standard golf cart tires and rims, 4-bolt, mounted on standard spindles and hub assemblies. They are designed to be fully adjustable up and down.

The machine is designed to use the blades to their maximum potential by allowing the front of the machine to be lowered as the blades get shorter. The machine can be lowered in 1/2" increments by using either the top or bottom hole on the wheel supports.

DEPTH ADJUSTMENT INDICATOR

The depth of cut is controlled by a ratchet jack at the rear. A depth of cut indicator extends approximately three times the actual depth of the cut. Example, if the indicator extends up 1", the actual cut depth is about 1/3" deep. The depth of cut changes as blades wear down and front wheels are adjusted.

FRAME ASSEMBLY

FLOATING TOP LINK CONNECTION

Figure #5 FLOATING TOP LINK CONNECTION

The design of this machine requires a floating top link connection so that the roller will stay on the ground when traveling over uneven or hilly turf. A five position fully adjustable telescoping top link hook up is also incorporated to fit to a tractor top link. When the top link is hooked up to the tractor in normal operating condition, it works best to leave the top link connection slightly loose (about a 45 degree angle) to allow the machine to float over high and low spots when the tractor front wheels drop into ruts, etc.

REAR GROUND ROLLER

Figure #6 REAR GROUND ROLLER

The rear roller is nearly the same width as the cut. It is 6" in diameter and is designed to give a uniform depth of cut that will not allow the machine to fall into small holes and scalp turf unexpectedly. It is supported by two standard 1-3/8" pillow block bearings mounted on a rectangular roller support mechanism.

A scraper is incorporated into the roller support assembly to keep debris from sticking to the roller. The scraper is fully adjustable with two 3/8" bolts. The rear roller can also be used to compact soil and infield mix on baseball/softball fields. Pull the pins on the rear wheels, and raise them off the ground; the roller will then be on the ground. The blades will soften the dirt, while the roller leaves a nice finish behind the machine.

REAR WHEELS & TIRES

Figure #7 REAR WHEEL

The rear tires are 18" diameter 8.50" x 8" tubeless tires. We use standard golf cart tires and rims, 4-bolt, mounted on standard spindles and hub assemblies. They are designed to be fully adjustable up and down in 1/2" increments. They can be entirely removed if you desire full pressure on the ground roller to flatten things out, or to get closer to a fence or wall. They can be adjusted down to allow the ground roller to ride inches above the ground.

If you are planning on picking up the debris created, the ground roller should not touch the ground. If you let the ground roller touch the ground, the debris will be more difficult to pick up with a turf vacuum, etc.

POWER DRIVE LINE

PTO SHAFT AND SAFETY CLUTCH

The PTO shaft and safety clutch are two separate assemblies. Both ends of the clutch assembly are fitted with standard 1-3/8" six spline connectors. The clutch is mounted to the gearbox with two retaining bolts. The heavy duty clutch is adjusted to slip if the blades are stopped by hitting an obstruction. This clutch protects the entire driveline from damage if a mishap occurs. The drive shaft is rated at 65 HP and comes with standard 6 spline 1-3/8" quick disconnect fittings.

GEARBOX

Our premium quality gearboxes are manufactured by Curtis Machine, rated well above actual torque requirements and safety clutch limiters. With minimal maintenance and normal gear oil changes, the gearbox will never require replacement. All gearboxes are manufactured with 1-3/8" input and output shafts.

Figure #8, #9 and #10 PTO SHAFT & SAFETY CLUTCH

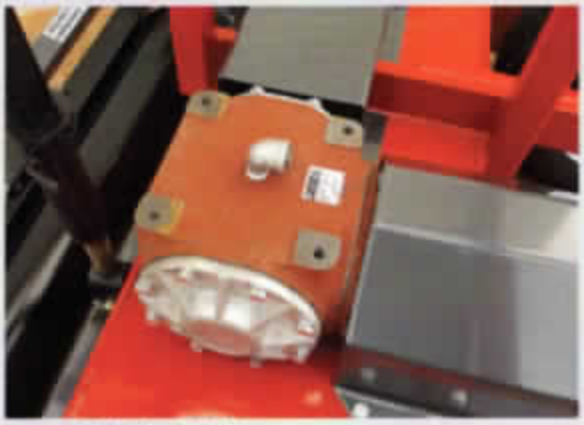


Figure #11 GEARBOX

POWER DRIVE LINE

CHAIN AND SPROCKETS



Figure #12, #13 & #14 CHAIN & SPROCKETS

A **'single double sprocket'** is one solid piece with two rows of teeth.

We use a single double sprocket on both the drive shaft and the reel shaft.

Our heavy-duty **'X-Ring Motorcycle' Drag Racing Chains** are a matched set with no master links, considerably stronger (10,000 lb. tensile strength) than standard chain (7,200 lb.). It will last significantly longer than standard chain because it is permanently lubricated.

Due to the harsh environment chains and sprockets are exposed to, the teeth on sprockets will become worn and distorted as the chains stretch and wear. Therefore, we recommend replacing both sprockets and chains at the same time. Replacing only the chain will result in premature sprocket or chain wear.

Figure #15 CHAINS & SPROCKETS

Figure #16 SPROCKETS WITH NO CHAINS

CHAIN AND SPROCKET REMOVAL AND INSTALLATION

To remove the chains and sprockets, remove the long top guard and the chain guard using a 1/2" socket. There are a total of ten (10) bolts to remove.

We use a bolt and jam nut for our chain adjuster. Loosen the chain adjuster using two 3/4" wrenches; remove the two bolts using a 1/2" socket. Remove the chain adjuster and loosen the reel bearing using two 3/4" wrenches. Using your tractor or forklift, lower the machine to the ground which will move the adjustable bearing block to the highest position.

The chains should be loose enough to remove at this point. Next using a 5/32" allen wrench, loosen both set screws on both sprockets and remove them.

POWER DRIVE LINE

CHAIN AND SPROCKET REMOVAL AND INSTALLATION

Be sure to use anti-seize when installing both sprockets and always use thread locker on the sprocket set screws. To install the chain and sprockets, install the lower sprocket first making sure the hub touches the bearing locking collar.

Then, using a square, align the upper sprocket with the lower sprocket, and tighten the set screws. After both sprockets are installed, it is time to install the new chains. To give you some flex, it works best to put the chain over the top sprocket until it is on the driveshaft. Work the chain onto the lower sprocket, then the uppper. The second chain will go on from the outside in the same manner. A rubber mallet will aid in getting the chains onto the sprockets.

Figure #17 DRIVESHAFT & REEL END WITH SPROCKETS REMOVED

Figure #18 & #19 SPROCKET ALIGNMENT USING A SQUARE

Figure #20 CHAIN INSTALLED, READY FOR SECOND CHAIN

Figure #21 BOTH CHAINS INSTALLED AND TENSIONED

ADJUSTING THE CHAINS

Using two 3/4" wrenches, slightly loosen the bolts that attach the reel bearing to the frame. Using your forklift or tractor, raise the machine frame off the ground so the reel lowers to where the chain is tight. Using the chain adjuster and two 3/4" wrenches, tighten the chains until snug. Be sure not to overtighten. Tighten the bolts retaining the reel bearing and install guards.

GUARDS

The guards protect people from injury; **never operate this machinery without all three guards in place.**

Figure #22 TOP GUARD & CHAIN GUARD

Figure #23 CLUTCH GUARD

The chain guard is a heavy-duty protective device. If the chains are loose, you may hear noise coming from the chain guard; stop operation of machine and adjust chain tension to correct tightness. Chain should be tight enough that they will not hit the guard and loose enough to deflect about 1/2".

Figure #24 DRIVE SHAFT BEARING

SHAFT COUPLER, DRIVE SHAFT & BEARING

We use a standard 1 3/8" shaft coupler to connect the driveshaft to the gearbox. There are two 5/16" keys in the coupler. The bearing and bearing block support are held in place by two 1/2" grade 5 bolts. To replace the bearing you must remove the drive shaft. Loosen all set screws and keys, slide the drive shaft out of the coupler. Installation is the reverse of removal. Be sure to use antiseize on the shaft coupler, and thread locker on all set screws.

Figure #25 GEAR BOX WITH SHAFT COUPLER INSTALLED

Figure #26 BEARING, DRIVE SHAFT, LOCKS AND KEYWAY INSTALLED

Figure #27 DRIVE SHAFT AND BEARING COMPLETELY INSTALLED

Figure #28 DRIVESHAFT AND KEY

CUTTING REEL ASSEMBLY

Figure #29 CUTTING REEL ASSEMBLY CONSISTS OF THE REEL (MACHINED FROM 3" SOLID STEEL BAR) THE BLADES AND BLADE RETAINER BOLT ASSEMBLIES

Figure #30 LIFTING TOOL

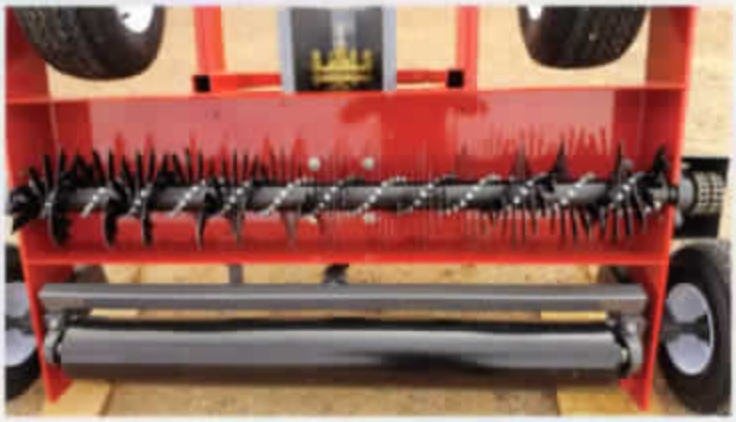


Figure #31 THE MACHINE STANDING UP AFTER USING THE LIFTING TOOL

Figure #32 BLADES AND RETAINER BOLTS (INSTALLED)

CUTTING REEL REMOVAL AND REPLACEMENT

First, it is easiest to stand the machine up using the lifting tool, which was included with your machine. When removing the cutting reel assembly from the renovator it is first necessary to remove the chain guard assembly from the frame using a 1/2" socket.

Next you must loosen and remove the chain adjuster and drive chains using two 3/4" wrenches, allowing the reel to turn freely. Remove the four bearing block retaining bolts from the bearing blocks. Once these are removed, the reel is free from the frame.

Bearing blocks are fastened to the frame using grade 8, 1/2" x 2" bolts. Due to the limited clearance between blades and retainer bolts, they are installed from the inside of the machine going outwards. A standard flat washer and grade 8 nylon lock nut are installed on the outside.

Figure #33 BEARINGS

CUTTING REEL ASSEMBLY

BEARINGS

Grease bearings every time you change the cutting blades. Inspect bearings occasionally. Replace noisy bearings immediately. Replace reel bearings as preventative maintenance after every three blade changes. These bearings are subject to flying debris, dust, dirt, fertilizer, moisture, etc and require replacement to keep the machine in a safe operating condition.

BEARING REPLACEMENT

The reel does not have to be removed from the machine before performing bearing replacement services. We use heavy duty flange style bearings that are 1-3/8" (207-22) industry standard. The flange block on the sprocket end has an adjustable slotted attachment hole on one end, allowing the chain to be adjusted when necessary. The replacement bearings are easily exchanged by turning the bearings sideways to the bearing block and removing.

Figure #34 BEARING (WITH REEL IN PLACE)

REEL BEARING BLOCK ASSEMBLIES

Bearing blocks are constructed of durable cast iron. They are standard bearing units readily available at most bearing distributors. Housings that have one end slotted are used on the sprocket end for adjusting chain tension.

Bearing replacement is periodically necessary due to the extreme duty they are exposed to but should last quite some time if serviced regularly.

Bearing blocks are attached with 1/2" x 2" Grade 8 bolts. Bolts are first installed through frame side from the inside out. This is done because of the close clearance between bolt heads and turning blades.

Figure #35 SLOTTED REEL BEARING BLOCK ASSEMBLY

Figure #36 FIXED REEL BEARING BLOCK ASSEMBLY

Figure #37 SLOTTED REEL BEARING BLOCK, CHAINS AND SPROCKETS (INSTALLED)

BLADES & SLOTTED ASSEMBLIES

Figure #38 & #39 CUTTING BLADES

CUTTING BLADES

Blades are manufactured from special tempered flexible knife steel that is tough and durable and never needs sharpening.

A locking centering notch is milled into each blade. This notch centers and locks each blade independently in the reel by using a separate blade retainer bolt

Figure #40 BLADE RETAINER BOLT

Figure #41 CUTTING BLADE AND RETAINER BOLT ASSEMBLY

Over the life of the blades, normal use will cause them to shorten as they wear. Occasional blade replacement will be required. Blade life depends on depth of cut, hardness of soil, wetness of turf, etc.

Figure #42 PICKUP TOOL

BLADE REPLACEMENT WITH REEL IN MACHINE

a. Disconnect machine from the tractor. It is much easier to leave the reel fully attached to the machine when replacing the blades.

b. Attach the pickup tool (Figure #42) to the two front pins on the machine where the tractor is attached.

c. Adjust the ratchet jack so that the ground roller is completely down and the depth indicator no longer sticks up.

d. Move the ratchet jack handle to one side all the way (either side). Moving handle will make sure that the handle is not bent when the machine is tilted backwards.

Figure #43 MACHINE SHOWN WITH PICKUP TOOL INSTALLED

BLADE REPLACEMENT WITH REEL IN MACHINE (continued)

e. Pick up the front of the machine using a chain from a suitable lifting device. This may be your skiploader, forklift or other lifting mechanism. Pick it up just high enough to allow the rear of the machine to remain on the ground. Once the machine is in this position, it can be tipped over so that it will rest on the frame and the upper ratchet jack support. Be sure the ratchet jack handle is out of the way.

f. The easiest method of removal is by using an electric impact gun with a 9/16" six point deep socket. Never use a 1/2" air impact wrench for installation as it is too powerful and bolts will be damaged. Replace any worn out or broken blades. Never use a slotted bolt that is broken. The bolts are designed as a weak link to avoid damage to a reel or other expensive part.

g. When you are tightening the new blades into position, don't over tighten them. Good and snug is good enough. A 1/4" drive electric impact gun will do the job great. Use of any air tool larger than 3/8" can easily over-torque and break slotted bolt assemblies. The blades are directional. Make sure the tip of the blades are touching the ground first, they spin the same direction as the tires roll.

IDENTIFICATION PLATE

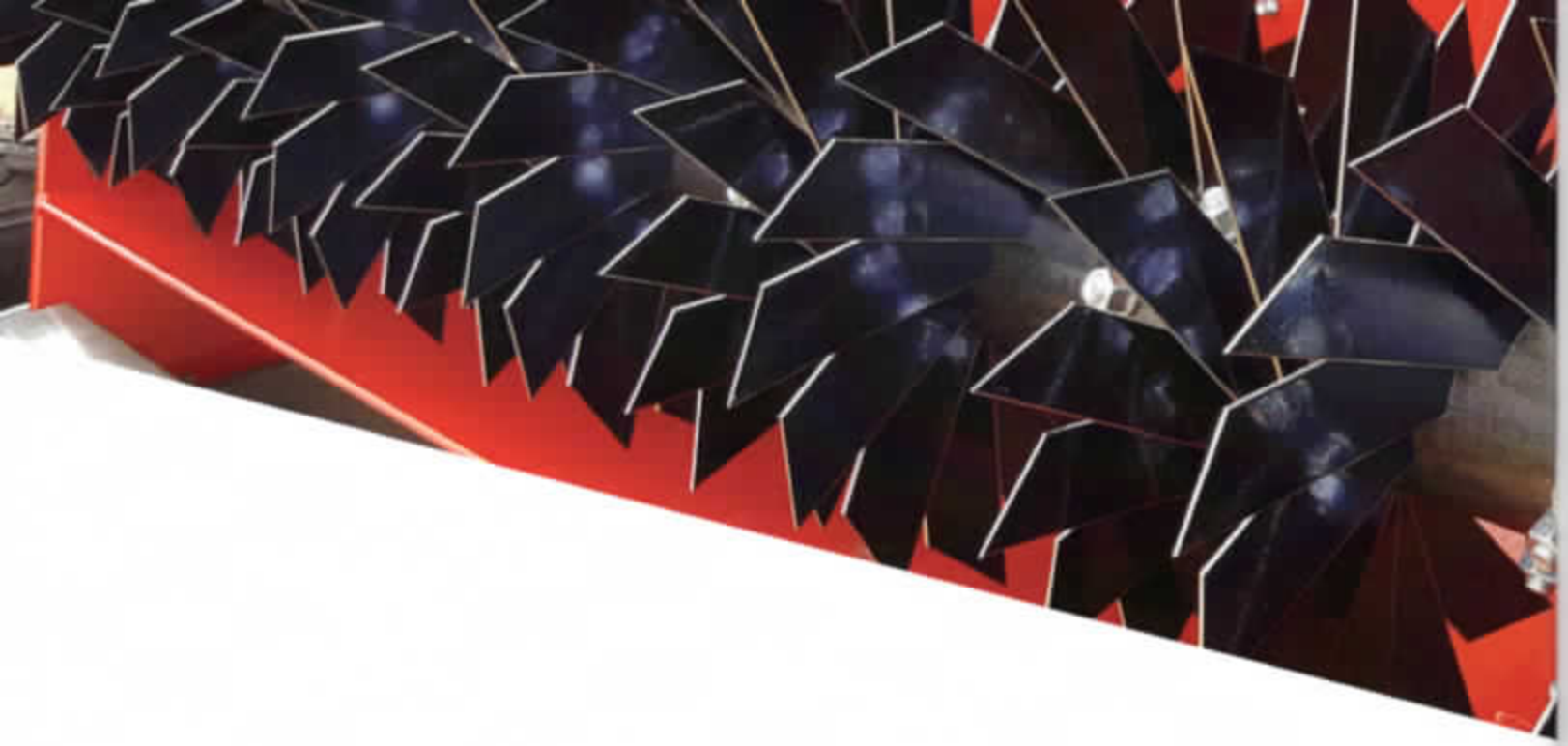
One identification plate is installed on the deck of each machine before they leave the factory. This plate includes model number, serial number as well as our factory name and phone number.

Figure #44 MACHINE IN POSITION FOR BLADE CHANGE

Figure #45 NEW CUTTING BLADES INSTALLED (NOTE DIRECTION OF BLADES)

RENOVATING, AERATING, DETHATCHING AND LIP REMOVAL SUGGESTIONS

1. Locate and mark all obstructions before starting to renovate.
2. If area to be renovated is extremely dry and dusty, the dust can be kept to a minimum by sprinkling slightly. If your field is too wet or muddy, it needs to dry out before using the machine. Renovators were designed to work on slightly damp turf and infield mix.
3. The depth of cut is easily adjusted. A mechanical ratchet jack controls the height of the roller and the rear wheels.
4. Due to the fixed blade design, as opposed to a flail blade, one pass over the area to be renovated with the turf renovator will bring most thatch to the surface where it can easily be picked up with a rake, vacuum or sweeper. If you see the need for a second pass over the area being renovated, it is best to go at a 90 degree angle across the previous renovation.
5. Generally, turf should be renovated when it is actively growing as it will recover quicker. Usually one or two renovations per year will keep turf healthy. Some specialty turf grasses or those irrigated with reclaimed water can grow so fast that they may require renovation more than once a year.
6. When you are ready to renovate, make sure the reel is clear from any obstructions. Adjust the depth indicator to measure about an inch deep. Raise the machine off of the ground and engage the PTO. Bring the PTO speed to 540 RPM as it needs to be top speed for the machine to work efficiently. Make a short test pass across the turf for a few feet to determine the actual cutting depth. It may take several test passes to adjust the cutting depth to your requirement. Once you have determined your adjustment for your particular application, you are ready to renovate. Start out the tractor transmission in a low gear. Progressively change to a faster gear to determine the most efficient pace for renovation. Ordinarily the two slowest forward gears are the most efficient. If you try to move the tractor too fast, the machine will tend to hop and the finished surface will not be as smooth. To stop, raise the machine off the ground to remove the blades from the turf.
7. Infield lip removal is simple with this machine. Once the machine is running, position the tractor to straddle the lip where the outfield meets the infield. You want to be half on the infield, half on the grass. Lower the machine until you start to see the lip being removed behind it. Depending on the severity of the build-up, it may take more than one pass to remove. Caution: limit this to two passes at a time in order to let the turf recover properly. Although turf can vary, generally it takes about two weeks for it to recover.



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