

# TS51 Drum Mower Quick Start Guide

## Contents

Scope and Purpose .....	1
Theory of Operation.....	2
Suspension Spring.....	3
Transport Position.....	4
Mow Position .....	5
Floating .....	5
Setting the Three Point Hitch Height.....	6
Setting the Lower Limit .....	6
Drum Unit Pivoting.....	7
Minor Adjustments for Optimal Mowing.....	7
Tilting the Mower .....	7
Raising the Back Curtain .....	8
Mowing Strategy.....	8
Parking .....	9
Blades.....	9
Conditioning Tines.....	9
Lubrication .....	10
Changing the Oil .....	11
Figure 1 - drum unit on the TS51 drum mower .....	2
Figure 2 - suspension spring .....	3
Figure 3 – stretch the spring by turning the nut at the end of the all-thread.....	4
Figure 4 - setting the transport latch for transport position .....	5
Figure 5 - three point hitch height is optimal when handle is about 60% up the slot.....	6
Figure 6 - low limit chain shown installed.....	6
Figure 7 - Position control low limit shown before and after setting low limit.....	7
Figure 8 - curtain strapped up with tie wraps .....	8
Figure 9 - jack stand shown up for mowing and transport and down to park.....	9
Figure 12 - oil level is 4-5/8" down from the top of the gear box .....	10
Figure 13 - 90° gearbox plug locations.....	10

## Scope and Purpose

This guide is limited to the TS51 Drum Mower sold by Tractor Tools Direct. This guide is limited to setup and operation of the mower. Please consult the owner’s manual for operation and safety related information. The intent of this guide is to explain the setup and operation of the mower so you get off to a good safe start.

## Theory of Operation

The drum mower is a rotary mower for the cutting of forage crops that will be baled or gathered for silage. The lower drum unit is in constant contact with the ground and thus maintains a uniform cutting height for the blades. The drum cutter unit is held at the top on a center pivot that allows the 2 drums to follow the contour of the ground to maintain a constant cut height even on irregular ground contour. The lower drum unit is mounted on a pair of bearings and turns freely to minimize the friction with the ground. The upper drum unit with blades and the column that the conditioner plates are mounted turn at high rpm. The upper drums have 3 raised bars welded to the top surface to better spread the crop for better dry down. The 12 conditioners serve to crimp the stems of the crop to cause it to not lay flat on the ground in a flat narrow windrow and have better air penetration for faster dry down.

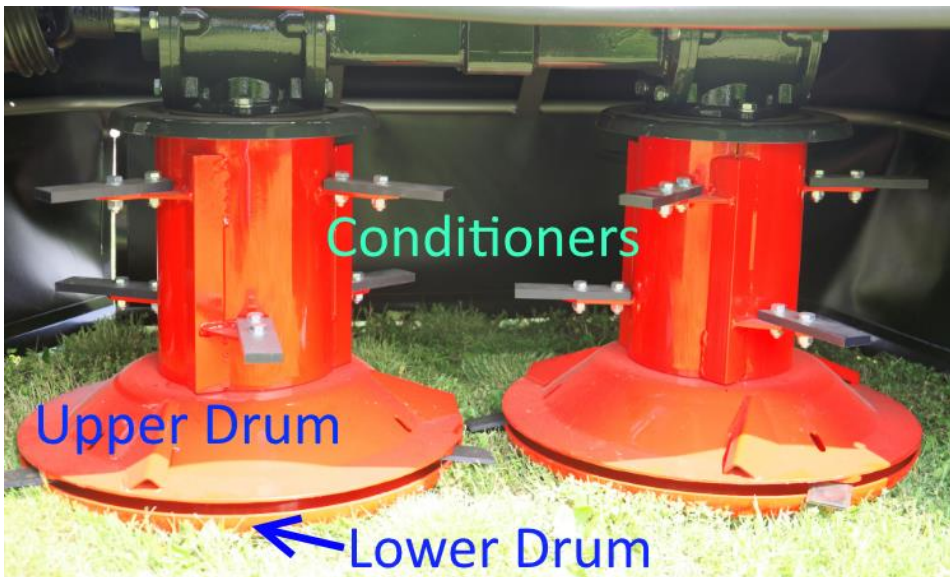


Figure 1 - drum unit on the TS51 drum mower

The mower is operated so that the lower drums are always on the ground. Raising the mower while in operation will cause unintended and unpredictable operation and is not recommended. The mower was not designed to be suspended in the air except when in the transport position.

The blades are mounted on a pin and held in place with a leaf spring. This allows the blade to rotate all the way around to clear an obstacle like a stone or root until the obstacle has passed. The blade is held out into the cutting position by the centrifugal force generated by the speed of rotation. This allows enough force to cut the crop but will give way when hitting an obstacle. The blades are reversible having a cutting edge on both sides that typically lasts from 10 to 20 acres per edge. The blade change tool quickly pushes down the leaf spring to change the blade.

The two drums are counter rotating where the blades come together at the front center of the mower. Only the bottom of the crop is cut. Most of the crop is drawn between the two columns by the action of the conditioners and is crimped by the flailing action and also spread out by this action.

The suspension spring works to reduce the sliding friction by lifting up at the center pivot point and thus taking some of the weight off the lower drum skid plates and transferring it to the tractor. The reduced weight on the ground makes the sliding action along the ground smoother for a better ride on the tractor and allows a faster ground speed.

## Setting the Mower to the Extended or Compact Position

The mower is designed to be used with both larger and smaller tractors. There are two positions in which the mower can be configured to work optimally with different sized tractors - a “compact” and an “extended” position. The compact position is for tractors with a rear wheel width of up to 54”, while the extended position is used with tractors with wheels that are more than 54” in width.

To change the mower from the compact to the extended setting, remove the two bolts shown below. Remove the threaded handle that is installed in plate with the slot. Release and hold up the lock pin and, at the same time, pull the drum unit out. The lock pin will snap into the next hole when the arm has reached the extended position. Reinstall the two side bolts. Reinstall the threaded handle into the extended position hole. The result will be as shown in Figure 2 below. To change a mower from extended to compact position, perform these steps in reverse.

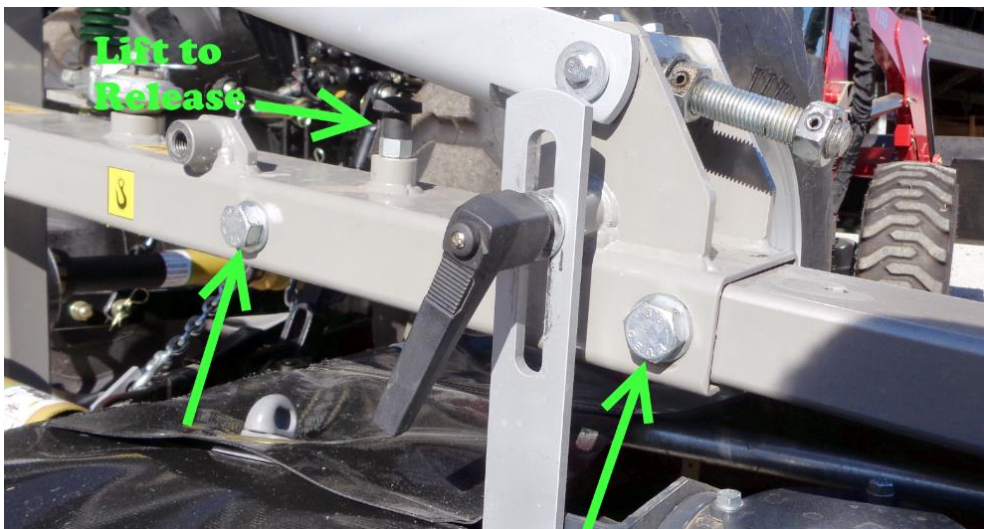


Figure 2 - bolts and lock pin to change between compact and extended positions

## Suspension Spring

The large spring on the upper lift arm controls the amount of weight that is transferred from the drum unit to the tractor.



Figure 3 - suspension spring

The more tension on the spring, the easier the drums glide across the ground. When mowing, the spring should be extended to the point where about 2-3” of threaded rod shows between the nut on the spring and the end of the stop tube as shown in Figure 4. Turn the large nut at the end of the threaded rod clockwise to stretch the spring.

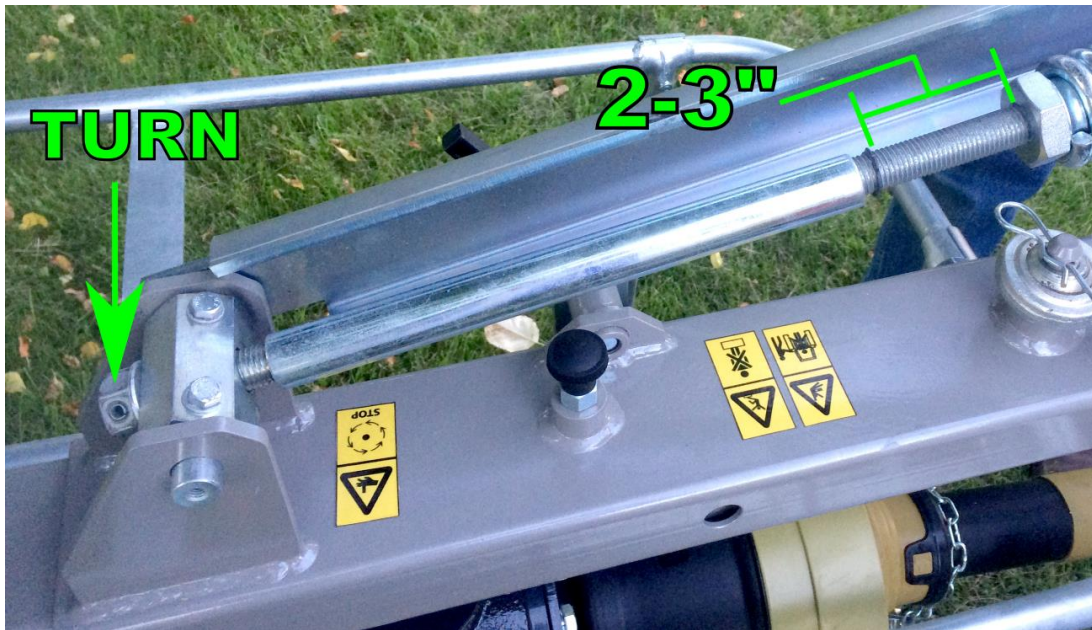


Figure 4 – stretch the spring by turning the nut at the end of the threaded rod until the space indicated above is 2-3”

Do not over-stretch the spring as it will be stress-damaged and will not be as effective. Add WD-40 or a similar lubricant to the inside of the washer that is being compressed by the large nut to ease the ratcheting motion.

## Breakaway Bar

The safety release bar, or “breakaway bar” is designed to hold the cutting drums in position during regular use, and to release them back if an obstruction is hit. The sensitivity of the bar is determined by how tightly the bar’s spring is compressed. In the optimal condition, the length of the spring is **3 ¼” tall** in the dimension shown in Figure 5 below.

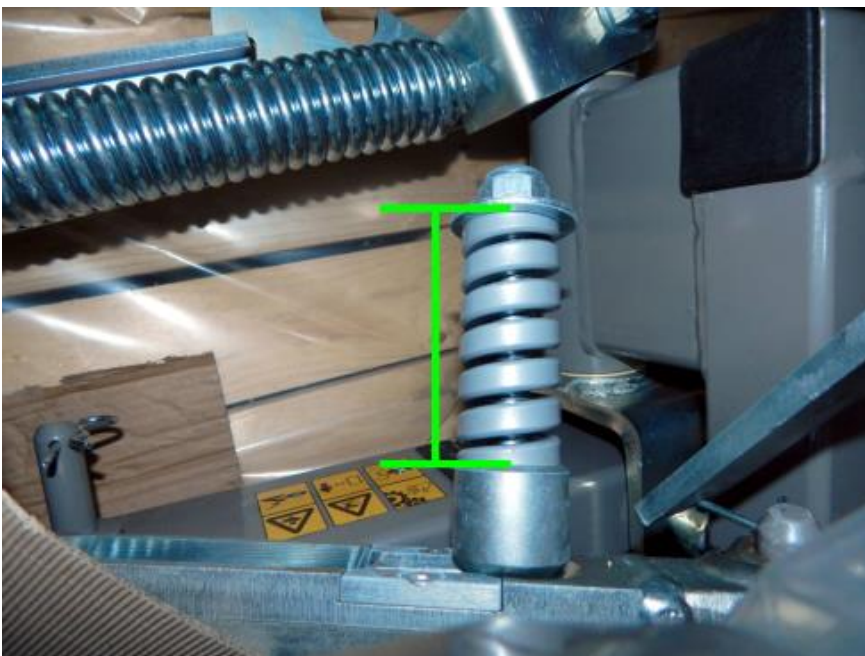


Figure 5 - breakaway bar spring height

You may need to tighten the locking nut to achieve the optimal spring height of 3 ¼". Try using the machine at this setting and only compress the spring if needed. Compress the spring in half-turn increments until it stops releasing during normal use.

**Important Note: Do not over-tighten the breakaway bar spring as it will prevent the safety release mechanism from doing its job to protect the machine from damage.**

## Transport Position

Whenever the mower is not mowing and needs to be moved, it should be rotated into transport position. Follow these steps to switch from mow position into transport position:

1. Detach the breakaway bar by releasing the R-clips and removing it from both pins.
2. Rotate the mower to the rear. Raise the three point hitch until enough weight is lifted that you can push the drum unit to the rear by hand.
3. Re-install the breakaway bar between the two pins that align with its receiving holes.
4. Set the transport latch, near the top of the large counter balance spring, by pivoting it toward the top of the arm as shown in Figure 6. This may require raising or lowering the three point hitch to allow the latch to fully lock in position. Setting this latch keeps the mower from bobbing up and down while you are driving.
5. Tighten the black pivot restrictor handle shown in Figure 7 to keep the mower from pivoting during transport.

**Important Note: Never engage the PTO when in transport position; the driveline is in a 90° angle and cannot turn.**



Figure 6 - setting the transport latch for transport position

## Mow Position

The mower is swung out to the side of the tractor by releasing the breakaway bar and rotating the mower 90°. Keep yourself out to the far end of the mower so you do not find yourself pinned between the tractor tire and the front guard frame. Keep the mower just high enough to swing by sliding on the ground without it getting away from you. Release the transport latch before mowing. Also ensure that the jack stand is raised into the upper position and locked.

## Floating

The mower is designed so that the three point hitch stays at a fixed position and the drum unit is allowed to float up and down while following ground contours. This section will provide some tips on how to ensure that the mower is set up to float optimally.

### Setting the Three Point Hitch Height

This is the most important part of getting smooth operation from the mower. For the drums to remain in contact with the ground and also for the counter balance to work, the height of the three point hitch is critical. First loosen the handle shown in Figure 7 two turns so it does not bind with the slotted pivot restrictor plate. The mower's hitch is at its optimal height when this handle is just above the center of the pivot restrictor plate as shown in Figure 7 below.



Figure 7 - three point hitch height is optimal when handle is about 60% up the slot

### Setting the Lower Limit

The included low limit chain can be used to maintain a fixed hitch height. The chain has two clevises and a steel plate with two holes. The chain is installed on one end where the top link connects to the tractor using the clevis. The steel plate with two holes is installed on the inside pin of the mower's hitch, where the lift arm connects.



Figure 8 - low limit chain shown installed

Raise the hitch until it is at optimal height (see previous section). Raise the lift arms a little bit higher and attach the chain with an appropriate length so that there is a little bit of slack. When the three point hitch is lowered, it should stop at the position where the black pivot restrictor handle (Figure 7) is just above the middle of the slot. If not, raise the lift arms again and adjust the chain length one link shorter. Gather up any chain that could possibly become entangled and secure it for safety.

Some tractors come equipped with position control, which automatically keeps the height of the lift arms constant during working. Position control can be used to fix the position of the hitch ONLY with draft control off or disabled. Consult the operator manual that came with your tractor as they vary widely in design and operation. To confirm the draft control is off, disengaged, or floating, you should be able to lift the lift arms by hand upward freely and easily when no implement is attached.

If your tractor is equipped with position control, you can set the low limit lock to maintain the height to this position. We would still strongly recommend using the low limit chain as a backup to prevent damage to the machine if the position control fails.



Figure 9 - Position control low limit shown before and after setting low limit

### Drum Unit Pivoting

The pivot restrictor plate with the slot, shown in Figure 7 is attached to the mower drum unit and will move up and down with the drum unit as it follows the contour of the ground. This is normal. The black plastic restrictor handle will travel along the slot and acts as a pivot indicator. Having the handle pivot in the upper half of the slot is preferable than for it to run in the lower half and bottom out in the slot.

When the handle hits bottom, the weight of the three point hitch and, potentially, some of the weight of the tractor, is placed on the drum unit and the suspension spring is no longer removing weight from the drums. This will place significant force on the drums and is likely to cause the safety release to trigger. In rough conditions or with extreme force, it could cause damage to the machine.

## Minor Adjustments for Optimal Mowing

### Tilting the Mower

The top link on most tractors is adjustable in length. The adjusted length of the top link determines the angle of the lower drums in relation to the ground. The default position of the mower is for it to be level with the ground, with the bottom discs gliding along the grass. This is desirable if you have a flat, smooth field with no debris. If your field has bumps, mole hills, gopher mounds, or rocks, it is desirable to have the mower tipped back a little bit to allow for better clearance. Do not tip the mower back too far as it will cause the drums to scalp the ground, causing excess friction. 2-3 degrees of tilt should be sufficient.

*The angle adjustment must be done after the height is set to the correct position. Changing the height of the three point hitch will change the angle. If you adjust the height of the mower, you will need to reset the angle.*

## Raising the Back Curtain

In heavy hay conditions, or where you want maximum fluffing and spreading, the rear flap of the curtain may be raised up and secured in place from above. This prevents the curtain from stopping the crop's path of travel when it is being flung to the rear.

**Warning: the curtain is in place to prevent damage or injury resulting from debris being thrown out by the drums. Raising the curtain could increase the risk of damage to nearby objects or injury. Do this at your own risk, and ensure that there are no people within 100 yards or more from the machine.**



Figure 10 - curtain strapped up with tie wraps

Failure to secure the curtain could result in it coming in contact with the conditioner plates and becoming ripped.

## Mowing Strategy

The drum mower is not designed to be lifted or backed up while in operation. The safety release system will not work in reverse, so keep the mower moving forward only.

The PTO RPM needs to be kept at or near the recommended 540 RPM for the mower cut well. Note that engine RPM is different from PTO RPM. Consult your tractor's manual to learn where to set the throttle to achieve 540 PTO RPM. If the mower gets bogged down in heavy hay, slow down the tractor's forward speed to keep engine RPM to that which produces 540 RPM on your PTO.

Before cutting hay, we recommend mowing around the field edges and around any obstacles in the field with a flail mower or brush hog. It is easier to get close to the fence with a flail mower or brush hog than a drum mower due to visibility limitations. Go through the field and remove any fallen limbs around trees or other obstructions from the field before you cut.

The best way to mow is to go around the field making **all right turns**, in a **clockwise** rotation. Since significant weight is carried in the drums, **trying to turn left may cause the safety release system to trip**. If you do not flail mow or brush hog the outer edge of your field and want to harvest hay near the field edge, the first couple of times around the field you will have to go counter-clockwise. You should be able to do this successfully without tripping the safety release if you do not try to turn too sharply to the left.

Once you have cut enough hay to clear the fence, switch to a clockwise rotation. Running clockwise places the tractor on the hay that has already been cut. When approaching a corner, turn a bit early and as tight as possible. This may result in a small missed strip in the shape of a crescent moon. This is easily dealt with at the end of



cutting by making 4 trips out to the corners and back from the center, assuming you have a square field. It's important to cut any missed hay as it can tangle in the pickup of the baler later. The drum mower will not clog in hay that has already cut, so it is safe to cut down any missed strips without trying to lift the mower.

## Parking

To release the mower from the tractor either in transport or the mow position, first lower the jack stand as shown below.



Figure 11 - jack stand shown up for mowing and transport and down to park

Make sure the transport latch is set as shown in Figure 6 on page 5. Moving the three point hitch up and down will help set the latch.

## Blades

Always keep a spare change of blades on hand before you mow. If you hit a large stone or some other obstacle the blades on that drum may become damaged. They are easily replaced with the blade tool, but only if you have them on hand. You can order them from our website here: <http://tractortoolsdirect.com/showroom/drum-mower-blades/>

Always replace the blades in a set. The blades are spinning very fast and differences in weight will cause vibration and can wear the mower prematurely. Always run the mower with all the blades in place, and in matched sets for good balance. Do not mix old and new blades.

## Conditioning Tines

The conditioning tines are made from High Density Polyethylene material. If you want to reduce the conditioning intensity and reduce the horsepower required to operate the mower, they may be removed three at a time, leaving either the lower or upper row in place, or remove all six from each drum. The metal attachment tines will still provide a significant spreading action even without the plastic tines attached.

If one or more of the tines becomes worn or damaged, remove all three from that level on the mower for balance, until you can replace the damaged one. We have replacement tines and hardware in stock. If you need them, contact us.

## Lubrication

The gearboxes are filled with oil to the correct level at the factory. You should always verify the correct level of oil in the three gearboxes before operation as a safety measure.

The oil reservoir for the two drum unit gearboxes is accessed from above. Remove the caps on top of each gearbox by first removing the four screws securing them. Carefully remove the cap and its paper seal so as not to damage the seal. The optimum oil level is 4 5/8" from the top. Alternatively, you can leave the cap on, remove the fill plug, and use a dip stick (a straw, for example). Place the stick down into the reservoir, mark the stick where it meets fill hole, and measure the length of stick between that mark and the top of the oil.



Figure 12 - oil level is 4-5/8" down from the top of the gear box

The 90° gearbox between the tractor and the drum unit has a fill level plug located half way up on the side. Oil is added from the plug on top of the gearbox until it runs out the fill level plug. The side plate has a plug near the bottom to drain the oil.



Figure 13 - 90° gearbox plug locations

The prescribed oil type is 90w EP Gear Lube. A multi viscosity type that is close to 90 weight, e.g., 85W140, can also be used.

## Changing the Oil

The oil in the gearboxes should be replaced regularly according to the operator's manual from the manufacturer. The 90° gearbox is drained using the plug on the bottom of the side cover plate, as shown in Figure 13. The two gearboxes on the drum unit are drained with a suction pump. These can be obtained at an auto parts store or online. Remove the gearbox caps carefully as they have a paper seal which can tear easily.

Vented gearboxes breathe and moisture will enter the gearbox over time. It is important to change the oil on an annual basis due to the possibility of water accumulating in the oil, causing corrosion to internal parts. We recommend changing the oil right after the machine is run after the last cutting of the year. The oil will still be hot or warm, and any water present will be entrained in the oil and easily removed at that time. Having the mower still hitched to the tractor makes it easier to gain access to the inner gearbox when the mower is lifted, giving some headroom over the cover plate. Blow away any loose debris before opening the gearbox to ensure it does not enter the chamber.