



Service Manual



LT-5 - 700 Series Rider

NOTE: These materials are for use by trained technicians who are experienced in the service and repair of outdoor power equipment of the kind described in this publication, and are not intended for use by untrained or inexperienced individuals. These materials are intended to provide supplemental information to assist the trained technician. Untrained or inexperienced individuals should seek the assistance of an experienced and trained professional. Read, understand, and follow all instructions and use common sense when working on power equipment. This includes the contents of the product's Operators Manual, supplied with the equipment. No liability can be accepted for any inaccuracies or omission in this publication, although care has been taken to make it as complete and accurate as possible at the time of publication. However, due to the variety of outdoor power equipment and continuing product changes that occur over time, updates will be made to these instructions from time to time. Therefore, it may be necessary to obtain the latest materials before servicing or repairing a product. The company reserves the right to make changes at any time to this publication without prior notice and without incurring an obligation to make such changes to previously published versions. Instructions, photographs and illustrations used in this publication are for reference use only and may not depict actual model and component parts.

MTD Products Inc - Product Training and Education Department

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700 SERIES LAWN TRACTORS

1. INTRODUCTION

- 1.1. **Disclaimer:** This service manual was intended for the use, by trained technicians. The information contained in this manual is current and accurate at the time of writing, but is subject to change without notice.
- 1.2. **Description:** A new step-through rider platform was introduced for the '05 mowing season. It is designated as the 700 series rider. This series replaces the 660 through 690 series box frame riders. The mower depicted in most of this manual is branded "White", and designated by factory #13A2791G790. The mower depicted in the portion of this manual that covers the variable speed drive system is branded "Troy-Bilt", and designated by factory # 13AN779G766. It is representative of the series. See Figure 1.2.



Figure 1.2

- 1.3. **Variations: Drive Systems** The 700 series is available with a HydroGear hydrostatic transmission or a variable-speed pulley system driving a simple Forward-Neutral-Reverse transmission manufactured by MTD. The Hydrostatic versions will have model numbers in the 790 range. Non-hydro versions have model numbers in the 770 range.
- 1.4. **Variations: Cutting Decks** Two decks will be available on the 700 series platform: 38" (97cm) designated by an F in the eighth position of the model number, and 42" (107cm), designated by a G in the eighth position of the model number.
- 1.5. **Variations: Other** The 700 series platform will accommodate a variety of single and twin cylinder engines, and a range of styles and brands will be applied to it. The steel dash panel is common to all 700 series, and plastic inserts will be used to match the different hoods used.
- 1.6. **Spotter's Guide:** The 700 series is visibly similar to the existing step-through platform 600 and 610 series lawn tractors, but there are substantial differences.
- **Drive System: Hydro** The 790 series de-clutches the traction drive belt when the clutch/brake pedal is depressed, without moving the fender-mounted transmission control lever. In contrast, the 610 series hydro is controlled by a foot-operated rocker pedal. The operator of the 610 series must remove their foot from the rocker pedal to apply the brake. The rocker pedal is spring-loaded to return to neutral.
 - **Drive System: Non-hydro** The 770 and 600 series transmission are both operated by a gear selector lever on the right fender. Ground speed is controlled by a clutch/brake pedal on the left side of the 770. Ground speed is controlled by an automotive style drive pedal and a separate brake pedal on the right side of the tractor on the 610 series. The variable speed pulley principal is the same, but pedal operation is reversed.
 - **Deck Engagement:** The PTO belt is engaged on the 700 series using a lever on the right fender. The 600 series uses a dash-mounted lever or an electric PTO clutch.
 - **Decks:** While the 700 series accepts only an F or G deck, the 600 series will accept a variety of decks that include 46" (H deck), 50" (P deck). Both series have Fast-Attach™ decks, but the 600 series has "J" pins to connect the rear of the deck, while the 700 series decks are secured directly to the lift rods and lift links by locking internal cotter pins ("hairpin clips" that resemble a bow-tie in configuration).

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2. DECK REMOVAL

- 2.1. The engine should be turned off long enough for the exhaust system to cool before starting work.
- 2.2. The controls should be in the following positions:
PTO lever: OFF Deck height: lowest position
- 2.3. Remove the crankshaft pulley belt keeper using a 1/2" wrench. See Figure 2.3.

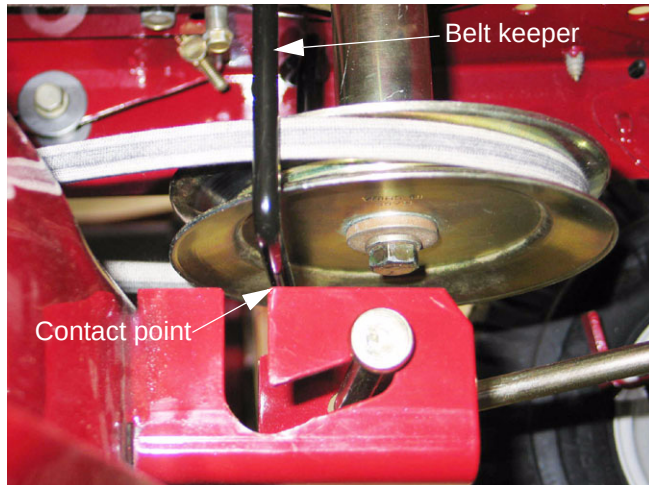


Figure 2.3

NOTE: The belt keeper doubles as the deck up-stop.

NOTE: The correct place for the pin-end of the belt keeper is the small hole in the right frame channel, roughly in-line with the crankshaft.

- 2.4. Remove the hairpin clips that secure the deck lift rods to the cutting deck and the deck lift links. See Figure 2.4.



Figure 2.4

- 2.5. With the deck on the ground, the lift rods can be reconnected to the lift links. This will enable the rods and links to be moved out of the way by lifting the deck height lever. See Figure 2.5.

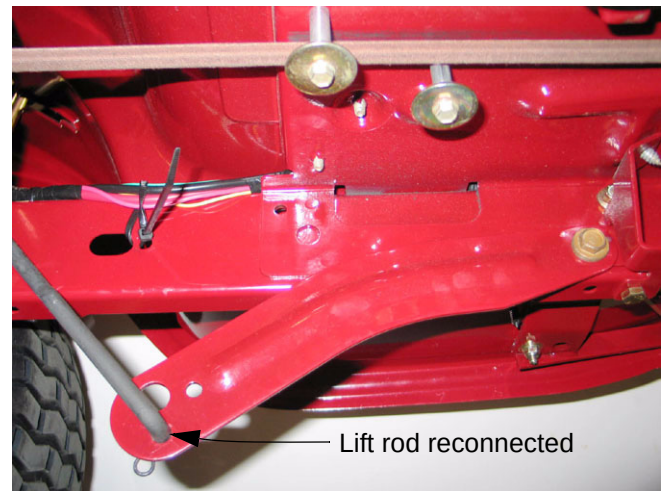


Figure 2.5

- 2.6. Working from the right side of the tractor, remove the hairpin clip that secures the PTO cable housing to the bracket on the deck. Separate the cable from the bracket. See Figure 2.6.

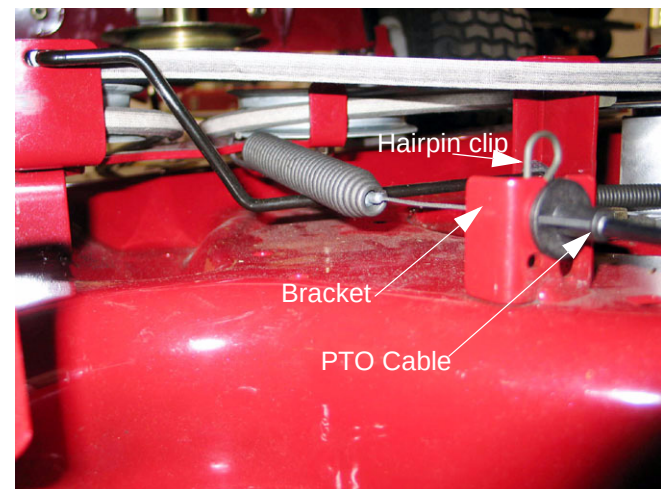


Figure 2.6

NOTE: There is a small plastic spacer that fits between the hairpin clip and the bracket

- 2.7. Unhook the PTO cable spring from the idler pulley bracket, and move the cable out of the way.

NOTE: Some early production units were equipped with a brake rod that passed above the PTO cable spring. On these models it is necessary to disconnect the brake rod before removing the spring.

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- 2.8. Slide the deck forward slightly, and slip the PTO belt off of the crankshaft pulley.
- 2.9. Because of angular interference between the inside angle of the front deck support rod and the hooks on the front of the deck, the following manipulations will ease deck removal:
See Figure 2.9.

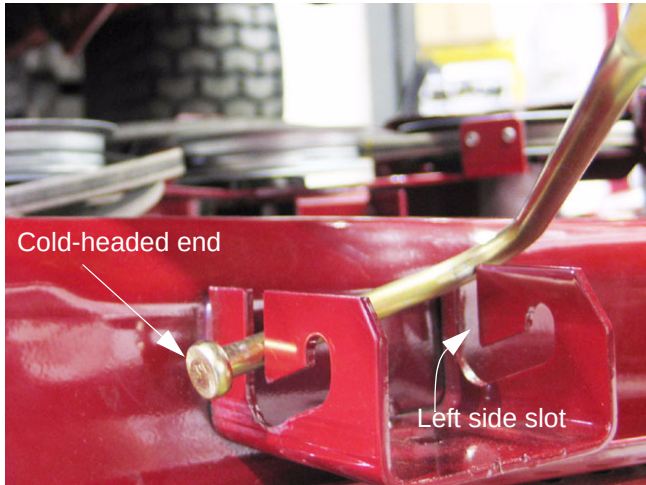


Figure 2.9

- Align the rod with the slot in the left side of the bracket on the deck.
 - Pivot the rod up on the left side to clear the slot.
 - Move the deck forward slightly so that the right side (cold-headed end) of the rod may be lifted out of the right side bracket on the deck.
- 2.10. Reverse the removal process to install the deck. Test the operation of the mower and its safety features before returning it to service.

NOTE: Using a length of 2X4 dimensional lumber, or similar object to support the front edge of the deck will make it easier to connect the deck lift rods and deck lift links.

3. DECK DETAILS AND UPDATES FOR 2005

- 3.1. The front deck support rod is easily removed by slipping it forward until the coined spot slips through the opening in the bracket that supports it. See Figure 3.1.

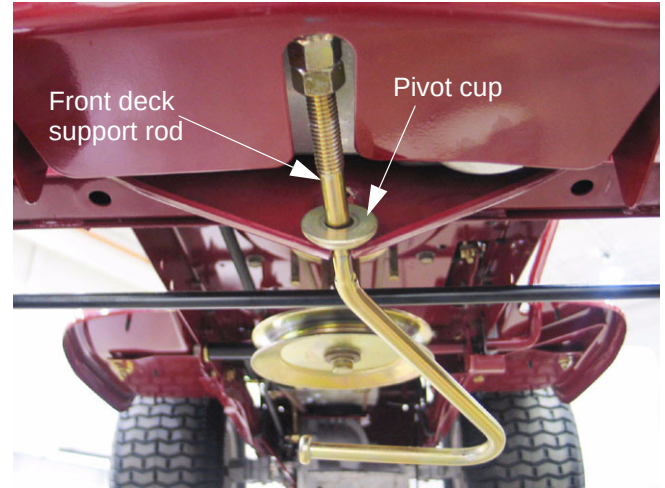


Figure 3.1

- The nut and jam nut are used to make and secure fore / aft deck level adjustment using a pair of 3/4" wrenches.
- The deck should be set slightly nose-down: 1/4" (1.27cm) to 3/8" (1.9cm) to maintain vacuum beneath the deck, improving cutting performance.
- Measurement is made from blade-tip to ground, with the blades oriented front-to-back.
- Slots are provided in the muffler cover for easy removal of the rod.
- The hemispherical pivot cup nestles in a recess in the front of the bracket.
- Side-to-side leveling is accomplished using a pinion gear and clamp screw on the left-rear deck hanger bracket. The deck should be set level from side-to-side, as measured from the blade tip to the ground with the blades oriented end-to-end. Adjustment is made using a 1/2" wrench and a 1 1/4" wrench.

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- 3.2. The hooked side of the front deck support rod belongs on the left. This is important because there is a slight bend in the rod. The rod needs to angle down to clear the steering tie-rod before extending back to meet the deck. See Figure 3.2.

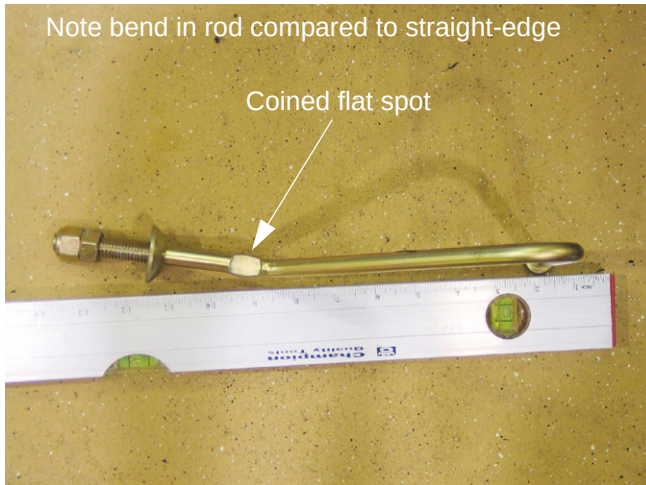


Figure 3.2

- 3.3. The re-configured brake rod now uses a short bit of 5/16" fuel line as a damper. See Figure 3.3.



Figure 3.3

- 3.4. The blade brake pads are attached at a slight angle to prevent chatter on PTO disengagement.

- 3.5. The 42" deck has a fixed idler pulley to provide better wrap on the left spindle pulley, and a tensioner pulley to tighten the belt. See Figure 3.5.

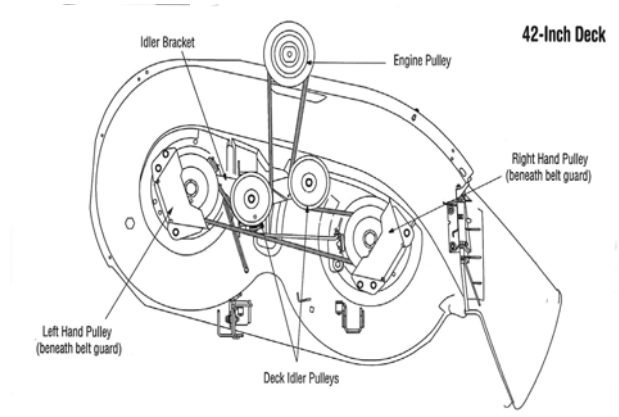


Figure 3.5

- 3.6. The 38" deck has a shorter belt, and a single tensioner pulley to tighten the belt. See Figure 3.6.

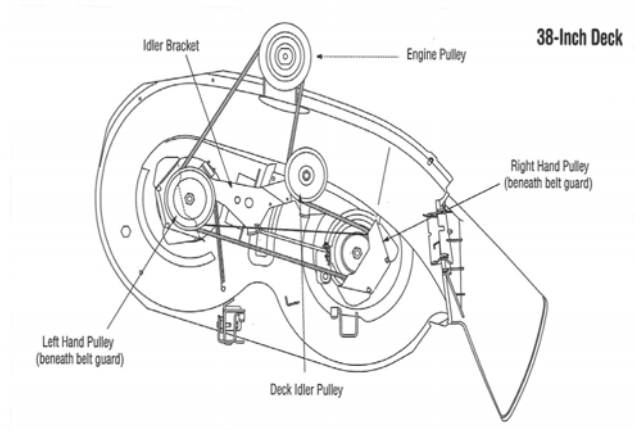


Figure 3.6

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4. PTO CABLE

- 4.1. The deck engagement lever is supported by a two-piece bushing under the right fender. See Figure 4.1.

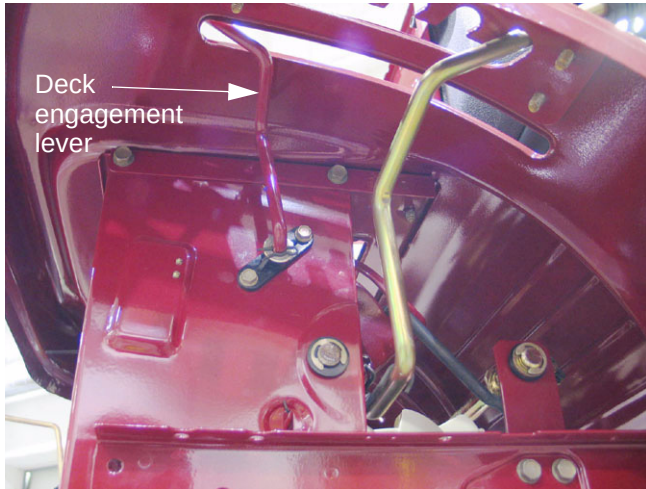


Figure 4.1

- 4.2. The return spring can be removed from the inside of the lever using a hooked tool, with the PTO lever in the OFF position.
- 4.3. The PTO cable can be removed from its bracket by squeezing the barbs to release it. Once released, there will be enough slack in the cable to unhook the Z-fitting from the PTO lever. See Figure 4.3.

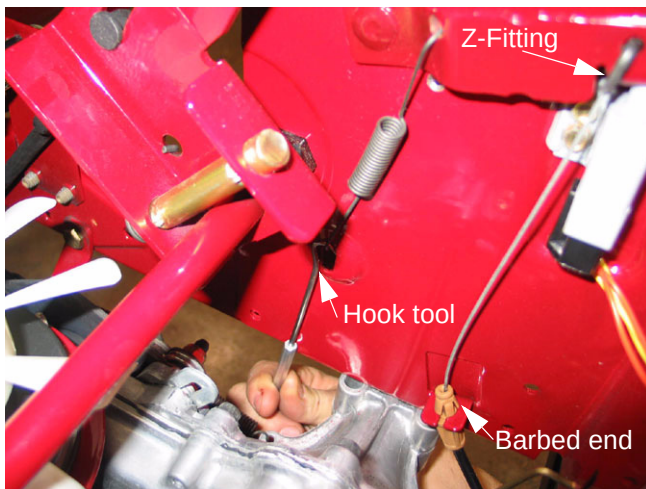


Figure 4.3

- 4.4. The bushing is easily replaced by simply unbolting the two halves using a 3/8" wrench. See Figure 4.4.



Figure 4.4

NOTE: The washer and hairpin clip have been removed here for the sake of visibility.

NOTE: The lever itself is difficult to replace without removing the fender.

- 4.5. The cable is properly routed behind the transmission to reach the left side frame channel, where it is secured by a clip. See Figure 4.5.

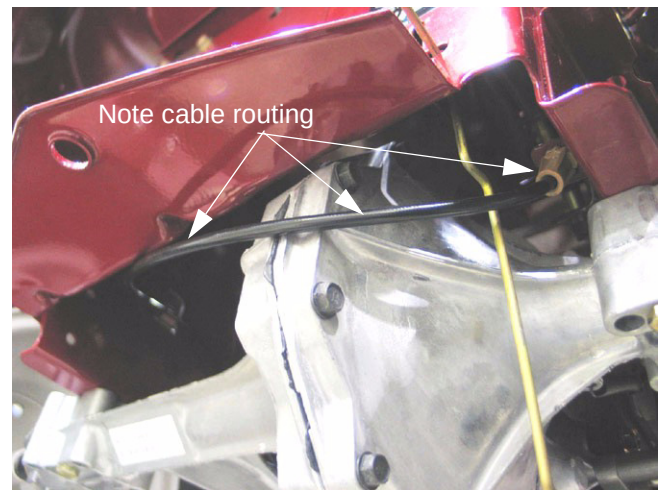


Figure 4.5

- 4.6. From there, the cable reaches forward, secured beneath the foot-pad on the fender by a hairpin clip and bracket similar to the deck-end mounting.

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5. DECK LIFT

- 5.1. In an advancement over the box-frame design, the deck height and engagement functions are isolated from one-another.
- 5.2. The deck lift control, located on the right fender, rotates a cross-shaft and two slotted bell-cranks (lift shaft assembly) that draw up and back on the deck lift rods. See Figure 5.2.

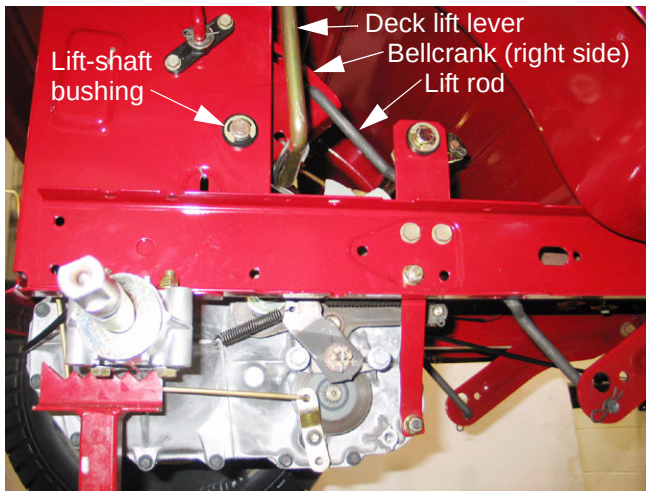


Figure 5.2

NOTE: The slotted configuration of the bell-crank arms suspends the deck, yet allows it to float upward as the anti-scalp wheels encounter bumps.

- 5.3. The the deck lift links are distinct from left to right: there are two different part numbers. See Figure 5.3.

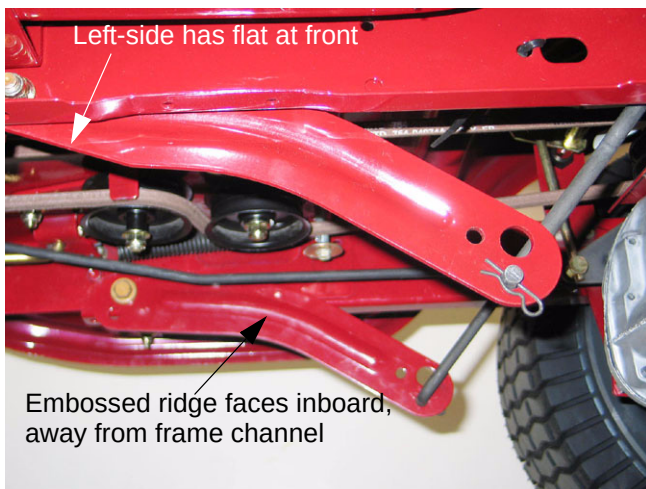


Figure 5.3

NOTE: Lift link position and orientation.

- 5.4. The bushings that support the lift shaft assembly are easily replaced. See Figure 5.4.

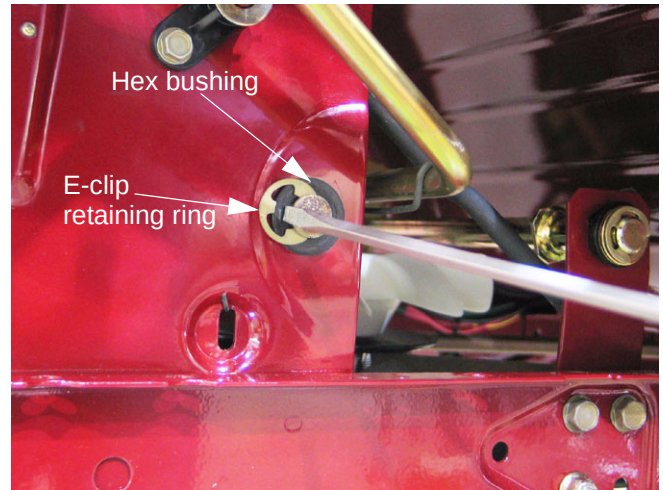


Figure 5.4

- Remove the cutting deck, or support it using 2"X4" dimensional lumber or similar, to relieve the weight from the linkages.
 - Lift and safely support the back of the tractor.
 - Remove the rear wheels using a 1/2" wrench (not absolutely necessary, but eases access).
 - Remove the "E" clips from the shaft, and replace the bushings one at a time.
 - Reverse the removal process to install deck lift shaft assembly bushings.
- 5.5. If it is necessary to remove the lift shaft assembly, the job can be done without removing the fenders.

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5.6. Preliminary steps: See Figure 5.6.



Figure 5.6

- Remove the cutting deck.
 - Disconnect and remove the battery.
 - Remove the handle from the deck lift lever.
- 5.7. Remove the transaxle control linkage, complete with the brackets that support it, as described in the “TRANSAXLE CONTROL LINKAGE” section of this manual. See Figure 5.7.

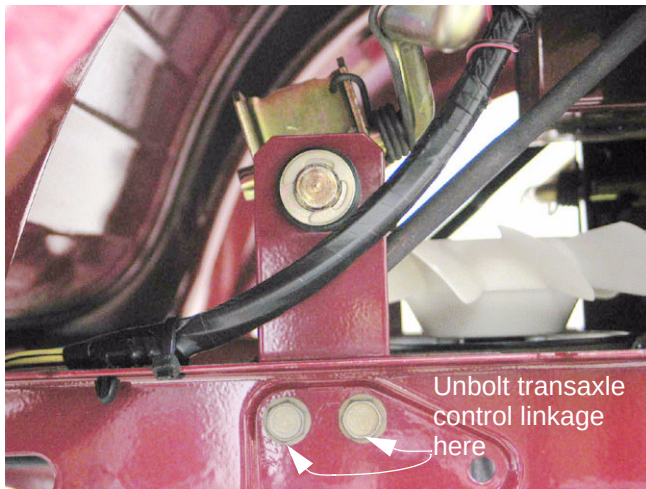


Figure 5.7

- 5.8. If the deck lift rods have been re-connected to the deck lift links to provide clearance for sliding the cutting deck out from under the tractor, disconnect them.

NOTE: The deck lift rods are interchangeable left-to-right, but it is important to maintain the correct orientation.

NOTE: The stepped “bow” in the middle goes outboard, riding against the transaxle control brackets.

- 5.9. Remove the bushings that support the lift shaft assembly. See Figure 5.9.

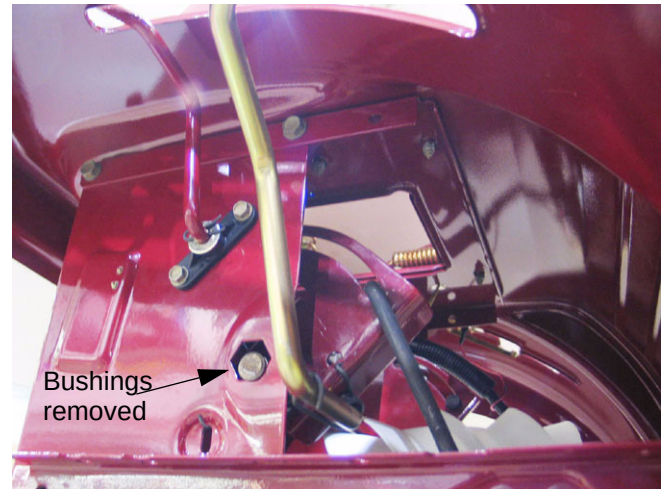


Figure 5.9

NOTE: Use care not to damage the cooling fan when removing the lift shaft assembly. The shaft is in close proximity to the fan, and worn bushings may reduce the fan/lift shaft clearance to a negative figure.

- 5.10. Remove the notched plate that surrounds the lift lever using a T-40 Tor-X driver. See Figure 5.10.



Figure 5.10

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- 5.11. Slide the lift shaft to the right, so that the left end clears the opening in the frame that the hexagonal bushing fits in.
- 5.12. Maneuver the left side lift rod out of the curved slot in the lift-shaft arm, and up through the battery opening. See Figure 5.12.

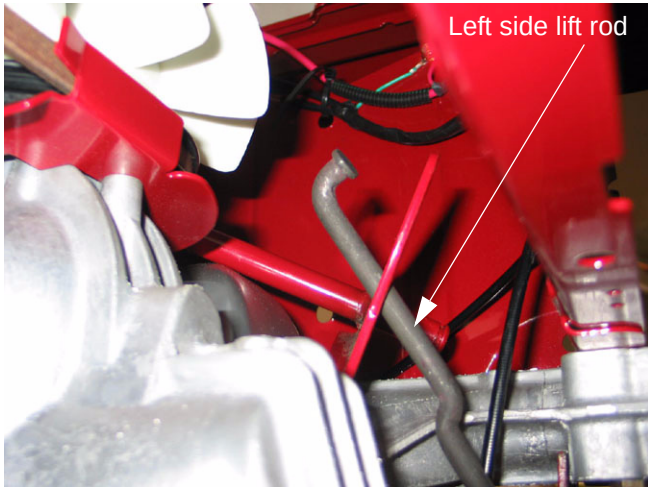


Figure 5.12

- 5.13. Rotate the lift shaft arms up and back so that the right side lift rod can be removed. See Figure 5.13.

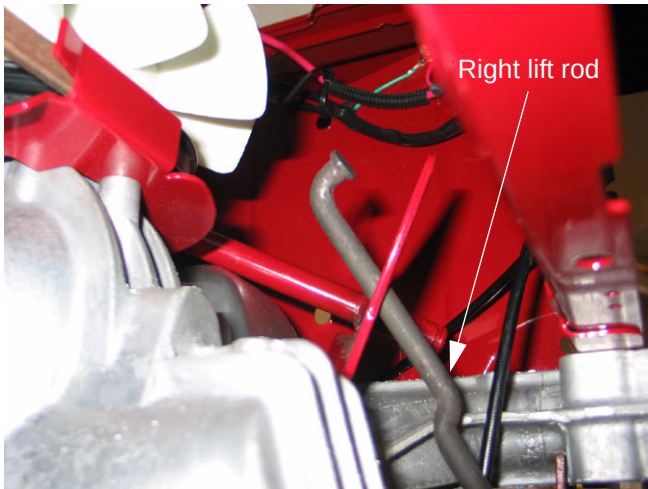


Figure 5.13

- 5.14. Once the lift rods are removed, the lift shaft can be withdrawn, complete with the lift lever, out the opening beneath the left fender. See Figure 5.14.



Figure 5.14

- 5.15. On the bench, the lift lever can be rotated in its mounting hole in the lift shaft assembly to relieve the torsion spring tension and align the coined "ears" on the lever with the notches in the bracket, so that it may be removed. See Figure 5.15.

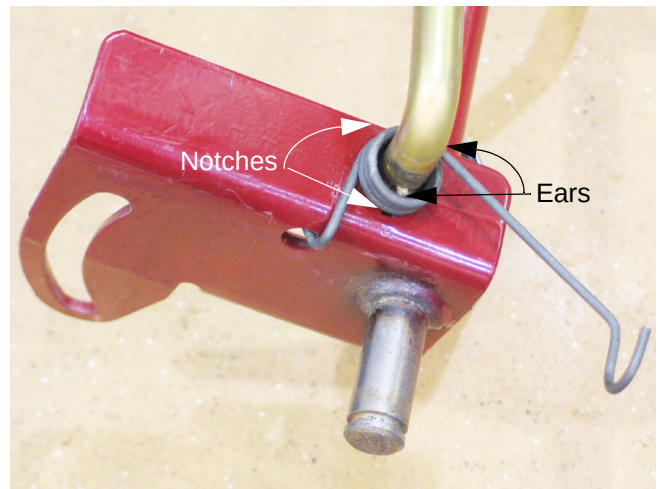


Figure 5.15

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5.16. Installation notes: See Figure 5.16.

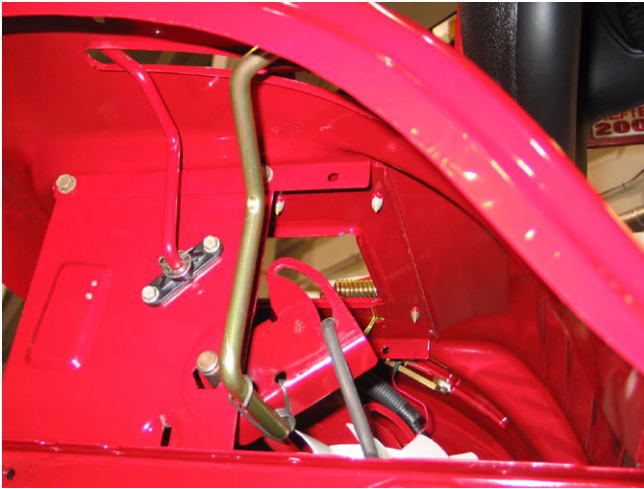


Figure 5.16

- Slide the lift shaft assembly into the frame through the opening in front of the wheel.
- Position the lift lever through the opening in the right fender.
- Install the lift rods onto the arms on the lift shaft, from the inside-out.
- Confirm that the right side lift rod passes above and in front of the lever and the end of the lift shaft.
- Insert each end of the lift shaft assembly through the hexagonal openings in the frame.
- The remainder of the assembly is simply matter of reversing the removal process.
- Check deck for side-to-side levelness and correct fore-aft adjustment of 1/4"-5/16" (6.35-8.00 mm) lower at the front, as measured at the blade tips.
- Confirm correct operation of the blades and all tractor safety features before returning the tractor to service.

6. HYDROSTATIC TRANSAXLE

6.1. A Hydro-Gear model 348-0510 transaxle drives the hydrostatic transmission equipped 790 series. See Figure 6.1.



Figure 6.1

- 6.2. If a **warrantable problem** occurs in the first two years of service, the transaxle will be replaced as a unit by an authorized White dealer, returning the transaxle to MTD for vendor recovery. It may also be repaired by a Hydro-Gear authorized MTD dealer under the Hydro-Gear warranty.
- 6.3. If any **non-warranty** hydrostatic transaxle service is required, it can be performed by a White or Hydro-Gear authorized MTD dealer. These transmissions are feasible to repair, and the repair / replace decision is left to the judgement of the shop and the customer.
- 6.4. These transaxles frequently last the life of the tractor with no need for service. To help increase the life of the transaxle:
 - Clean off accumulated mud or debris to aid cooling.
 - Avoid using a pressure washer, as it may force water past the seals, contaminating the fluid.
 - Remove the rear wheels annually, clean the axles, and apply a fresh coating of anti-seize compound.
 - Keep linkages and brakes properly adjusted.
 - Replace the cooling fan promptly if it gets damaged.
 - In normal service, do not attempt to drain and fill the transaxle. There is no drain plug.

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- 6.5. Access to the fill plug can be gained by removing the battery and the tray that supports the battery. See Figure 6.5.

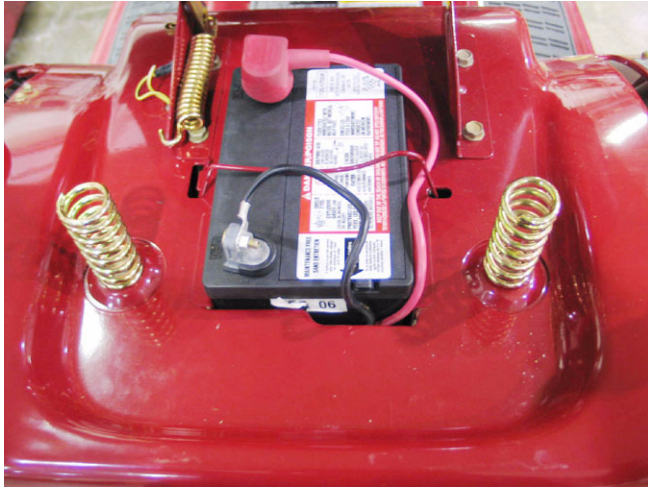


Figure 6.5

- Disconnect the negative (black) cable first, and reconnect it last when the battery is reinstalled.
 - After both cables are removed using a pair of 7/16" wrenches, remove the battery hold-down.
 - Carefully lift-out the battery.
 - Remove the battery tray.
- 6.6. Customers and unfamiliar technicians may attempt to add or check the fluid level at the vent cap on the plastic over-flow reservoir. See Figure 6.6.

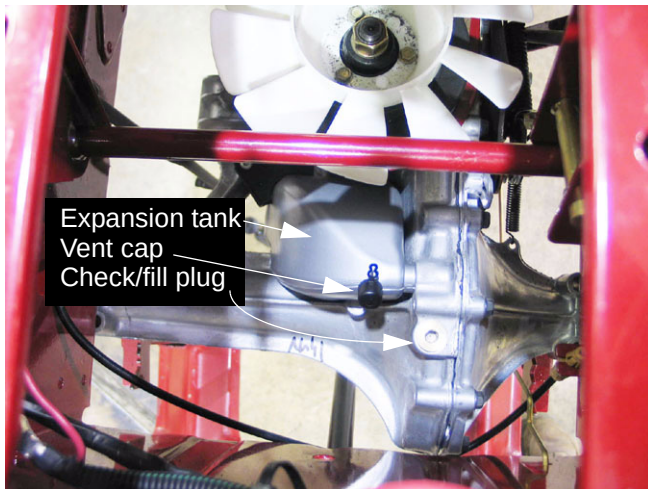


Figure 6.6

- 6.7. After a thorough cleaning, to prevent contamination of the fluid, the fill plug can be removed using a 1/4" allen wrench. See Figure 6.7.

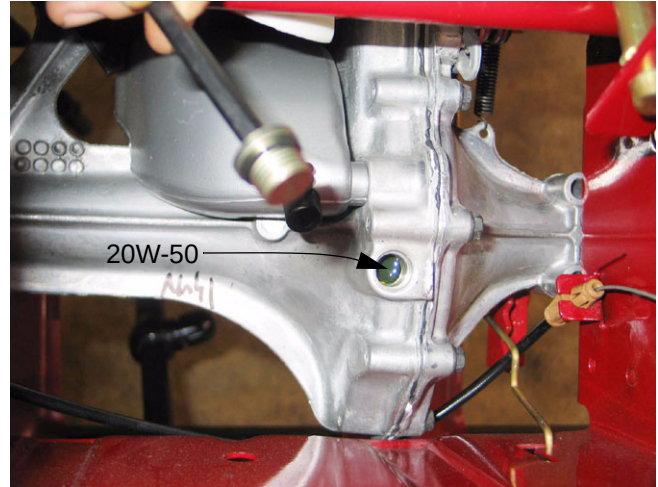


Figure 6.7

- 6.8. Between 5 deg. - 100 deg. f (10 deg. - 38 deg. c), the fluid level should be 1" - 1.25" (2.54cm - 3.18cm) from the top of the housing. Total capacity is .600 - .632 gal. (2271ml - 2391ml) of 20W-50 motor oil having an API classification of SH/CD.
- 6.9. The transaxle must be removed and inverted to drain the fluid out.
- 6.10. After a fluid change, purge the system and top-up the fluid to the correct level:
- With the engine at idle speed, and the by-pass valve open, slowly cycle the control lever from full forward to full reverse positions 5 or 6 times.
 - Check fluid level, close the by-pass valve, and repeat the previous step. When the transaxle operates normally, without excessive noise, the purge process is complete; all the air is out of the system.
 - Air in the system will cause a "growling" noise, and sluggish performance.
- 6.11. In normal service, fluid replacement should not be necessary, but in the event of fluid contamination or degradation, it can be done.

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6.12. The by-pass valve and brake are visible beneath the right side frame channel. See Figure 6.12.

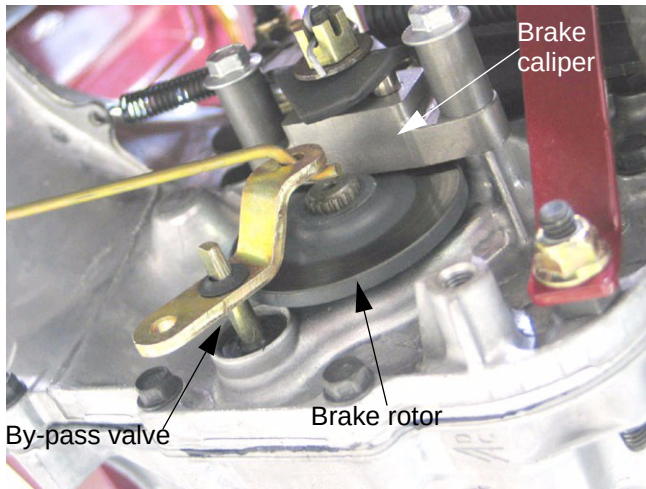


Figure 6.12

- The **by-pass valve** is open when the by-pass rod and lever are back. It is closed for normal operation when the rod and lever are at the forward end of their travel.
- An open by-pass valve will disable the transaxle.
- Open the by-pass to push the tractor.
- The **brake is properly adjusted** when a .015" (.381 mm) feeler gauge will slip between the pad and the rotor.
- Brake adjustment is made by removing the cotter pin from the castle-nut and rotating the nut to tighten or loosen the clearance between the pads and the rotor. There is no linkage adjustment.
- **Replace the cotter pin** with a new one after making any brake adjustment.
- A **tight or stuck brake** can cause symptoms similar to low fluid: noisy operation and sluggish performance. In addition to these symptoms, the brake will become extremely hot, and the rotor will become discolored.

6.13. The brake rod pulls on a spring that is hooked to the cam-arm on the brake caliper. The cam-arm forces two pins inward against a backing plate and brake pad. The pad forces the floating rotor against a second pad located behind the rotor. The pinching action creates the friction necessary to stop or hold the tractor.

6.14. A return spring pulls the cam arm back to relieve the friction when the brake pedal is released. See Figure 6.14.

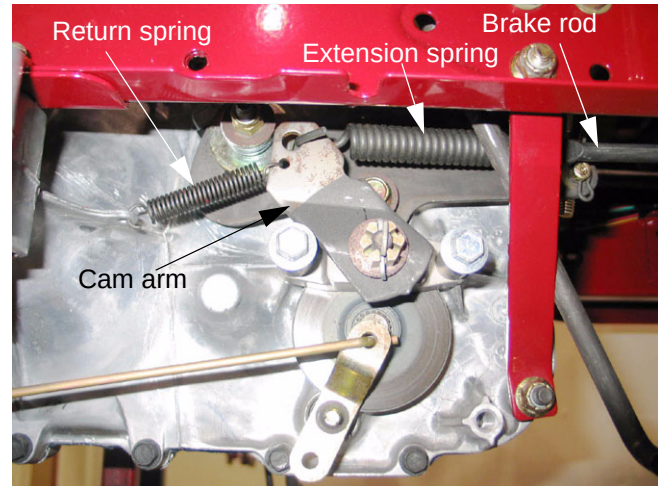


Figure 6.14

6.15. Slightly above and behind the brake assembly is the **friction pack**. The friction pack maintains a set amount of resistance in the control linkage: See Figure 6.15.



Figure 6.15

- Too much resistance may raise control effort to an unacceptable level. This would be caused by an over-tightened nut on the friction pack.

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- Too little resistance may allow the linkage to drift back to neutral, particularly when ascending a grade conforming to the 15 degree description in the Operators Manual. This condition may indicate that it is necessary to tighten the friction pack nut slightly.
- 6.16. The factory setting on the friction pack is to torque the nut to 100 in-lbs (11.3 n-m), then back the nut off one full turn (360 deg.).
- 6.17. This setting should result in about 5 lbs (2.67 kg.) of resistance in the lever, measured as near the end of the lever as possible. See Figure 6.17.



Figure 6.17

NOTE: A belt tension checker such as that manufactured by Browning is useful for checking control resistance.

7. TRANSAXLE CONTROL LINKAGE

- 7.1. The lever that controls the ground speed and direction of travel is located on the right rear fender.
- 7.2. The lever rotates a cross-shaft and bellcrank. An adjustable rod connects the bellcrank to the input arm on the left side of the transaxle. See Figure 7.2.

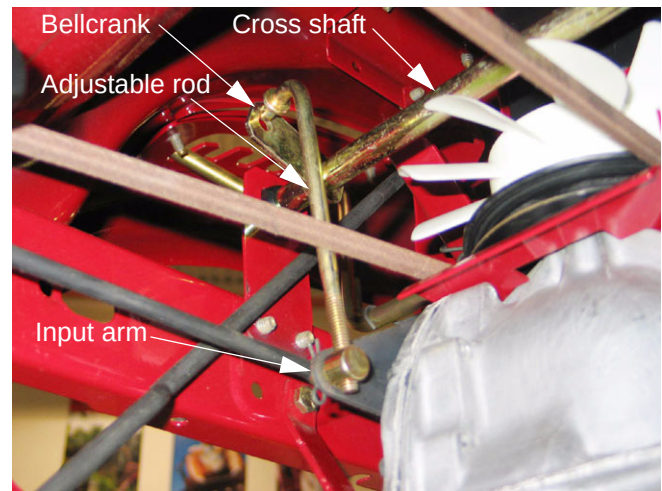


Figure 7.2

- 7.3. The input arm on the transaxle will return to neutral when the rod is disconnected. The rod length should be adjusted so that the neutral position of the control lever on the fender corresponds with neutral position of the input arm.
- If mis-adjusted, the tractor will “creep” in neutral, or lurch as soon as the brake is released, even though the control lever is in neutral.
 - If one end of the rod is disconnected, with the control lever in neutral, the centering action of the input arm should not draw the end of the rod a way from the hole it connects to.
 - Lengthen or shorten the rod as necessary to adjust, by threading it into or out of the ferrule.
 - Reconnect the rod and test the operation of the linkage and the tractor’s safety features before returning the tractor to service.

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- 7.4. The pitch on the threads of the rod is 16 threads per inch. If an adjustment of less than $1/16$ " is needed, the bolts that secure the mounting bracket to the frame can be loosened slightly for adjustment. See Figure 7.4.

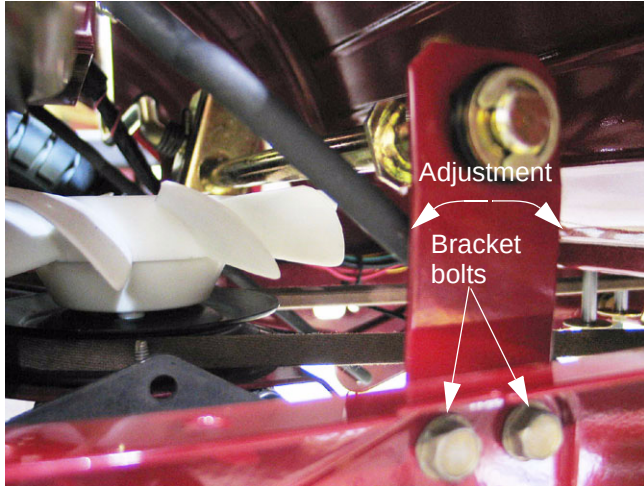


Figure 7.4

- The bracket can be budged one way or the other, within the amount of travel allowed by the bolt holes in the frame, to effect an adjustment.
 - Once adjustment has been made, tighten the bracket bolts.
- 7.5. If the control lever develops enough play that it becomes imprecise, the plastic hex bushings that support the cross shaft are easily replaced. See Figure 7.5.

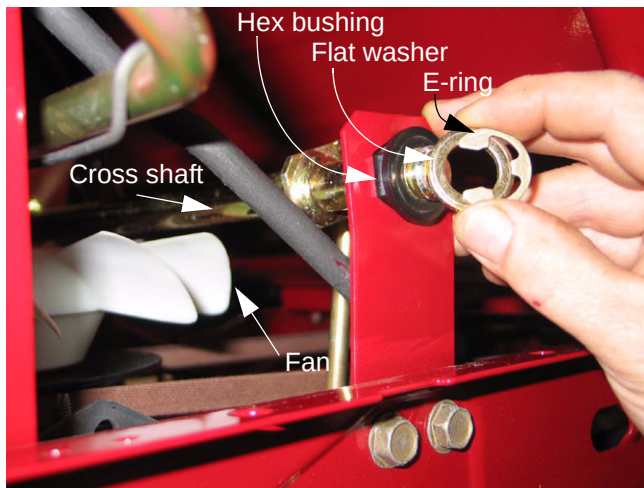


Figure 7.5

- Remove the "E" clip and flat washer from the shaft.
- Remove and replace the bushing.

- 7.6. If it is necessary to remove the cross-shaft and control lever: See Figure 7.6.



Figure 7.6

- Remove the handle from the lever using a blow-gun.
 - Lift and safely support the back of the tractor.
 - Remove the rear wheels using a $1/2$ " wrench.
 - Disconnect the rod from the bellcrank to the input arm.
 - Remove the bushings - or - unbolt the brackets from the frame.
- 7.7. The control lever and cross shaft assembly can then be maneuvered out from under the fender. See Figure 7.7.

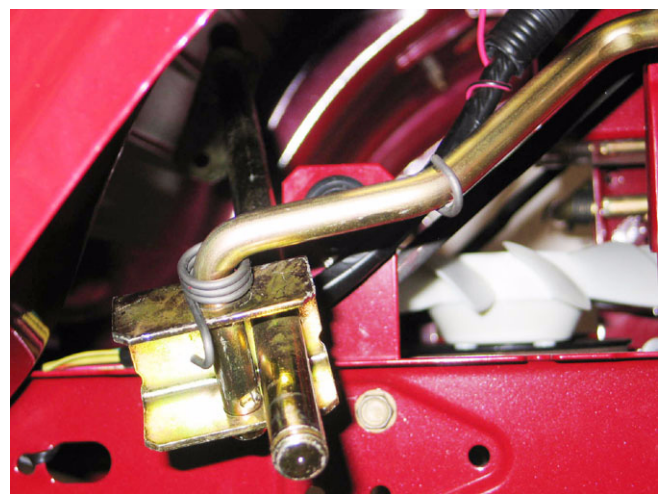


Figure 7.7

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- 7.8. The cross shaft, control lever, and torsion spring can be disassembled on the bench. See Figure 7.8.

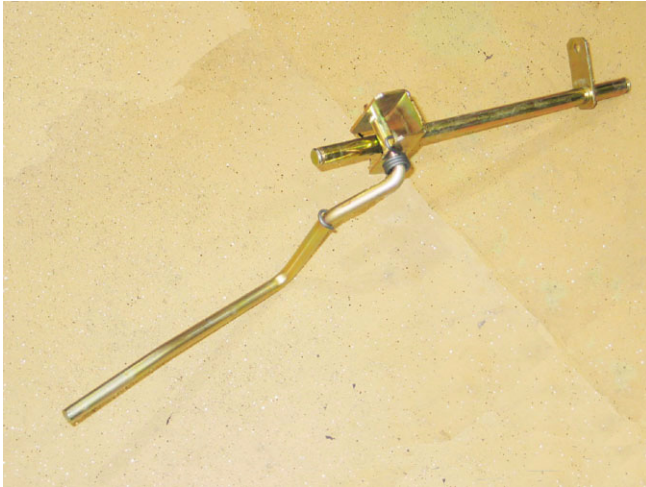


Figure 7.8

- 7.9. Rotate the lever to relieve tension from the torsion spring, and align the coined "ears" on the lever with the slots that they pass through in the cross shaft assembly. See Figure 7.9.

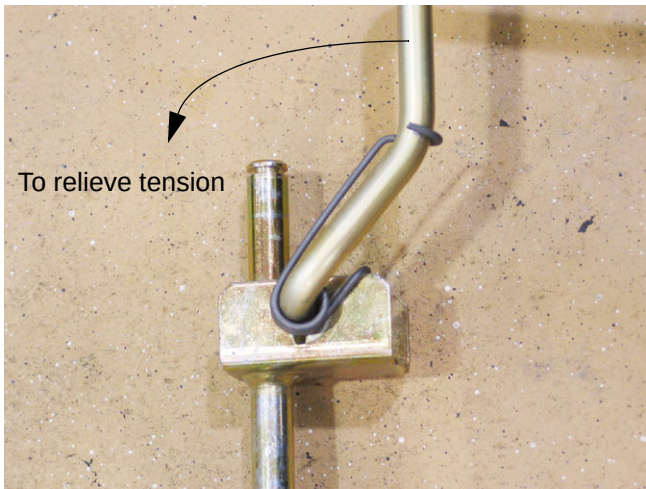


Figure 7.9

- 7.10. Install by reversing the removal procedure. Replace any worn parts and test-run the mower to confirm proper function before returning it to service.

8. DRIVE BELT: HYDROSTATIC DRIVE

- 8.1. To remove the transaxle drive belt, begin by removing the cutting deck and the front deck stabilizer link. The procedure in the operator's manual or the procedure described in the "DECK REMOVAL" section of this manual will provide some guidance, if necessary.
- 8.2. Set the Parking Brake.
- 8.3. Remove the crankshaft pulley using a 5/8" wrench. See Figure 8.3.

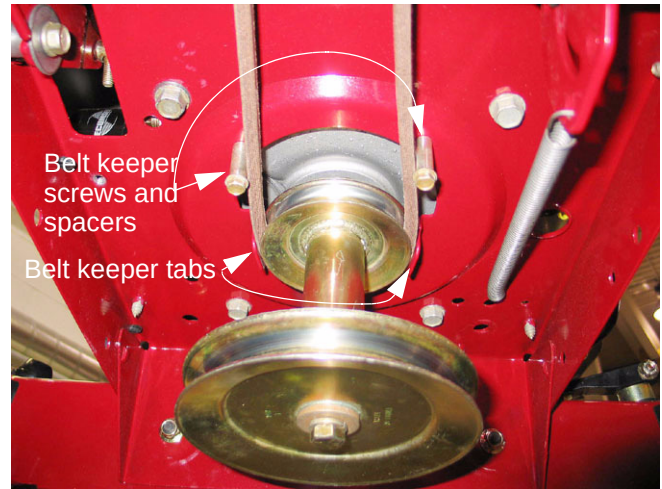


Figure 8.3

- 8.4. Pulley Hardware: The pulley is secured by a bolt, lock washer, and a heavy flat washer. A spacer is positioned above it on the crankshaft, with the top edge radius matching the step in the crankshaft. The key is integral with the stack pulley. See Figure 8.4.

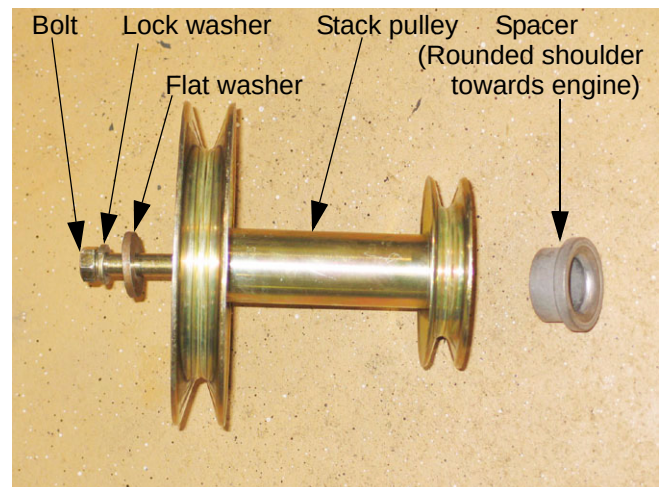


Figure 8.4

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- 8.5. Release the parking brake.
- 8.6. Loosen, but do not remove the nut that secures the drive belt tensioning pulley to the tensioner bracket using two 9/16" wrenches. See Figure 8.6.

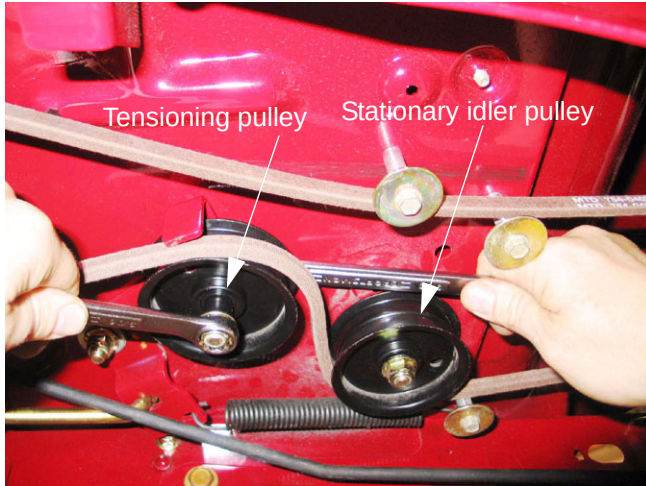


Figure 8.6

- 8.7. With the pulley loosened slightly, the belt will slip off between the lip of the pulley and the belt keeper.
- 8.8. Disconnect the battery, and remove it from the tractor.
- 8.9. Remove the tray that supports the battery. This will reveal the cooling fan and pulley on top of the hydrostatic transaxle. See Figure 8.9.



Figure 8.9

- 8.10. Remove the three screws that secure the fan to pulley using a 5/16" driver.

- 8.11. Loosen the pulley using a 3/4" wrench, and lift the pulley far enough to slip the belt by the belt keeper tabs and screws. See Figure 8.11.

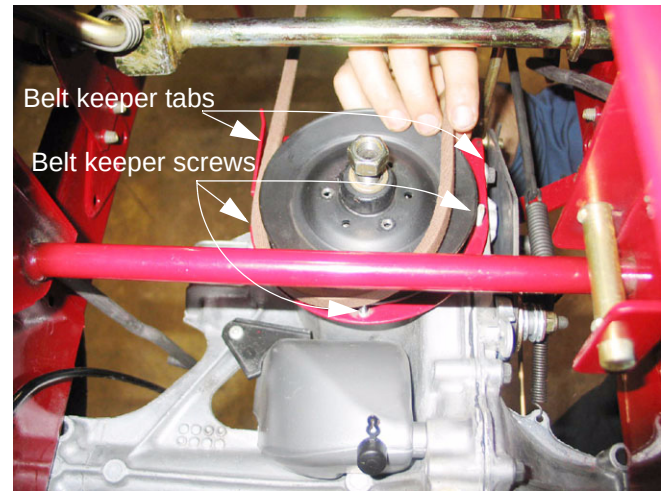


Figure 8.11

- 8.12. Belt installation is basically the reversal of the removal process. On installation:
- Confirm correct belt routing inside of all the keepers and through all of the guide pins.
 - Apply a small quantity of anti-seize compound to the engine crankshaft before installing the crankshaft pulley.
 - Tighten the crankshaft pulley bolt to a torque of 37.5-50 ft-lb (51-68 Nm).
 - Tighten the transaxle pulley nut to a torque of 30-43 ft-lb (41-59 Nm).
 - Confirm proper operation of the brake/clutch linkage before installing the cutting deck.