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

FORM NUMBER - 769-01415

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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 declutches 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 TM 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).

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.

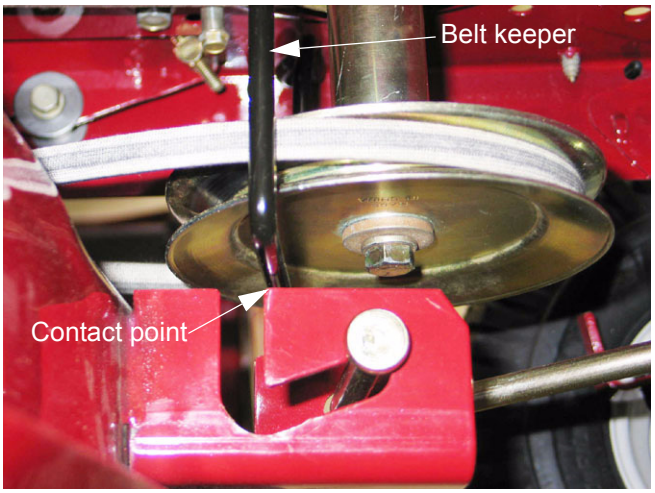


Figure 2.3

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.

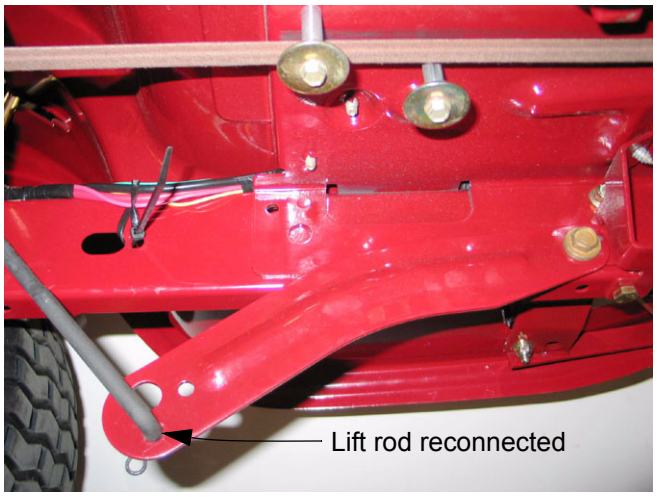


Figure 2.5

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.

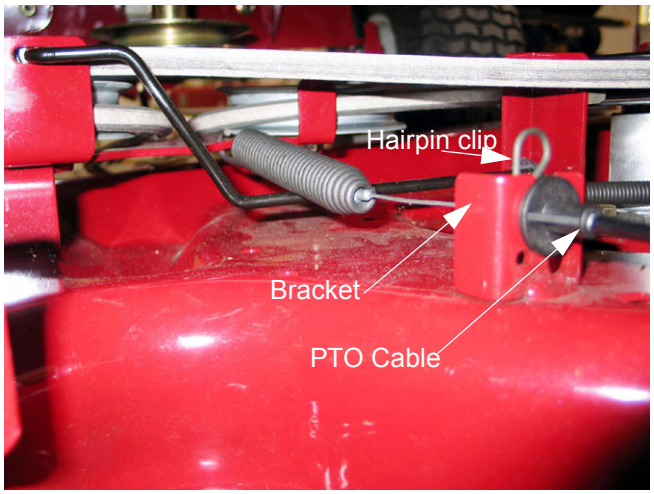


Figure 2.6

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.

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.

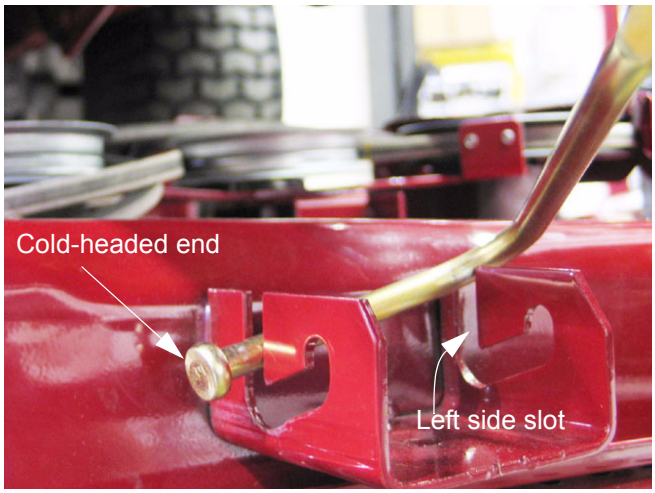


Figure 2.9

- 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 it's 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.

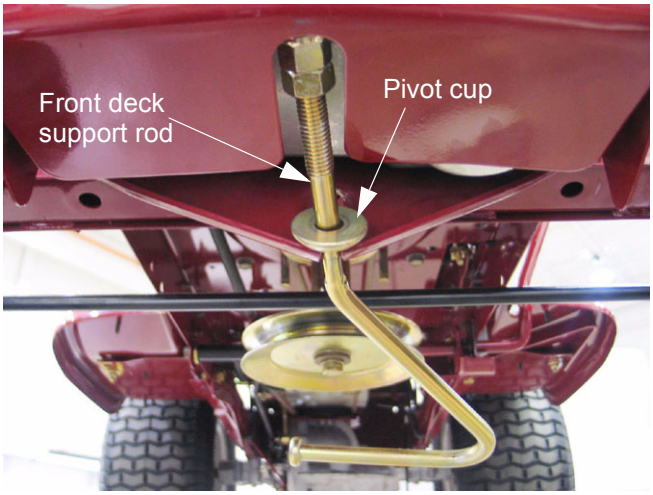


Figure 3.1

- 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.

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.

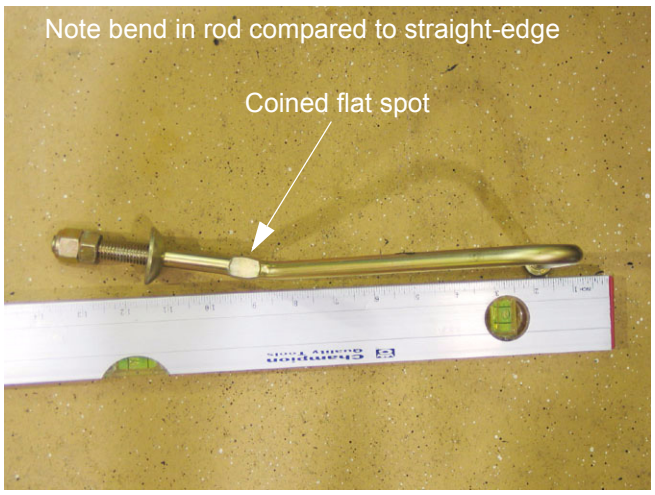


Figure 3.2

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

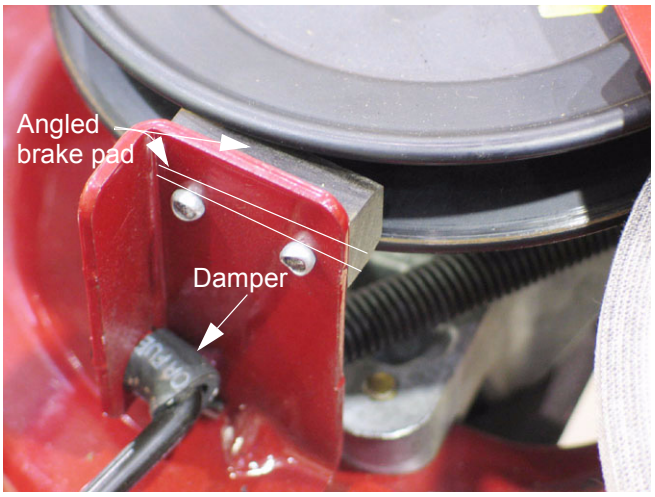


Figure 3.3

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.

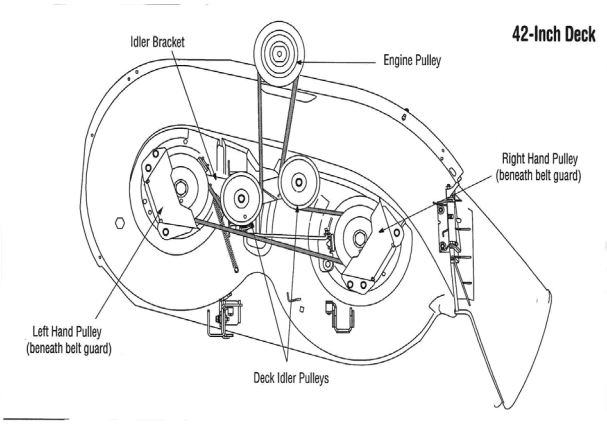


Figure 3.5

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

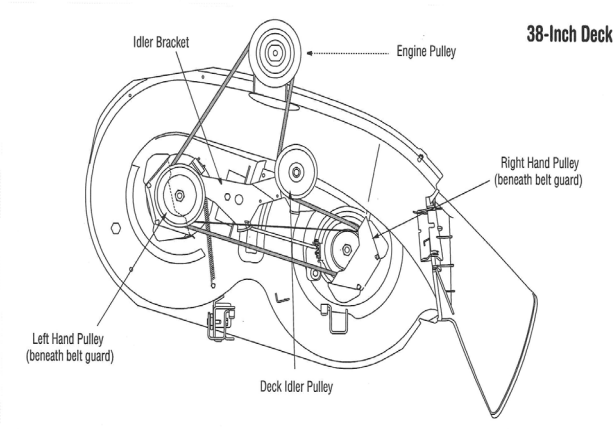


Figure 3.6

4. PTO CABLE

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

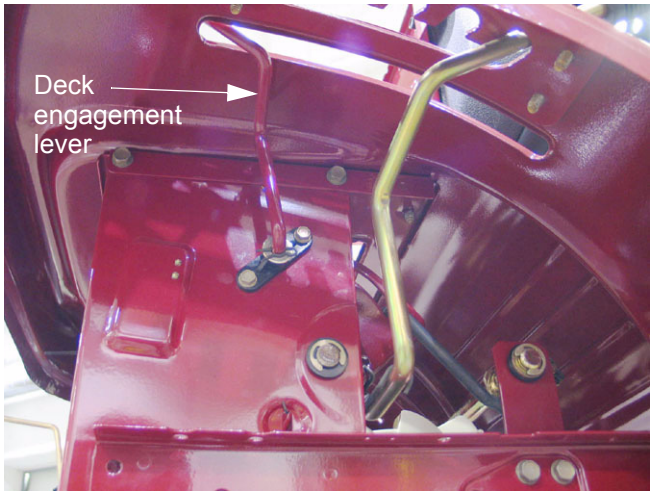


Figure 4.1

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.

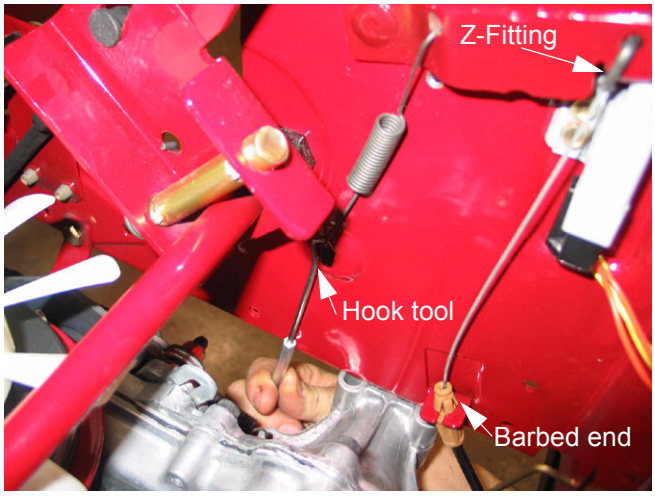


Figure 4.3

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

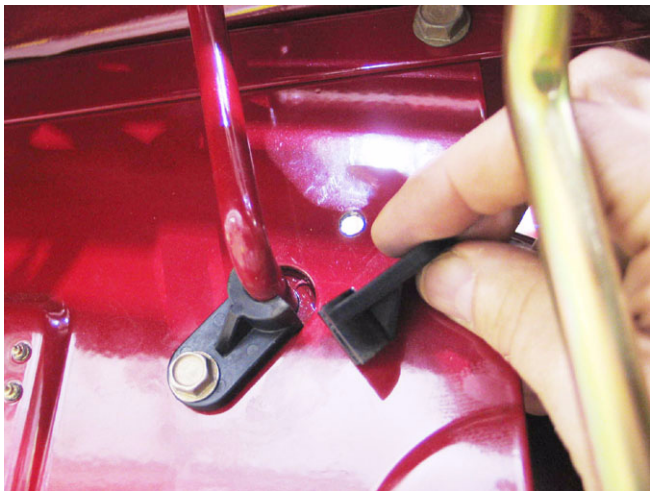


Figure 4.4

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.

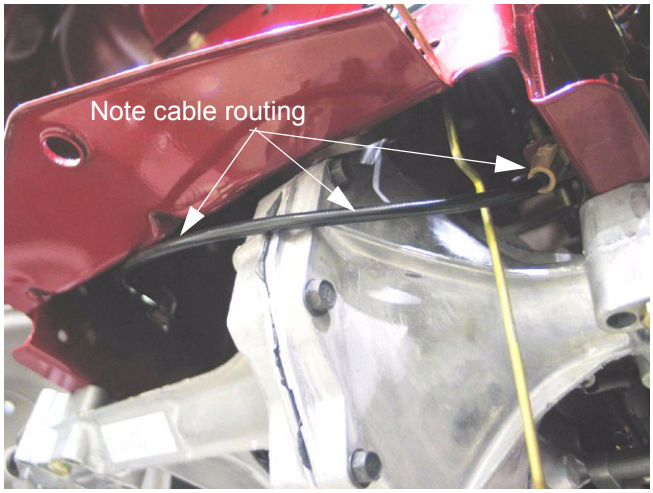


Figure 4.5

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.

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.

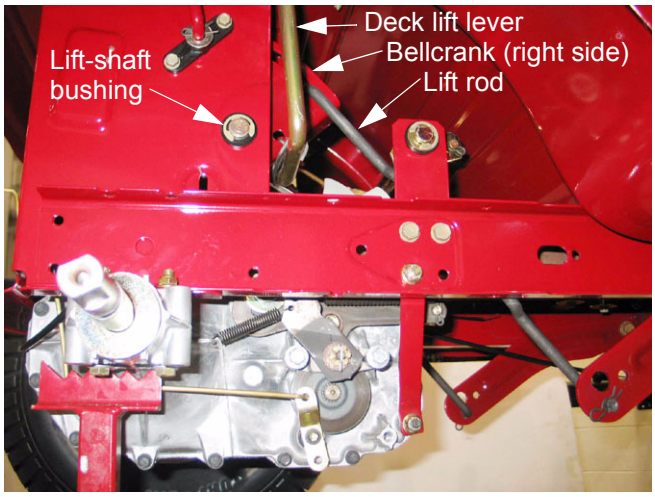


Figure 5.2

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.

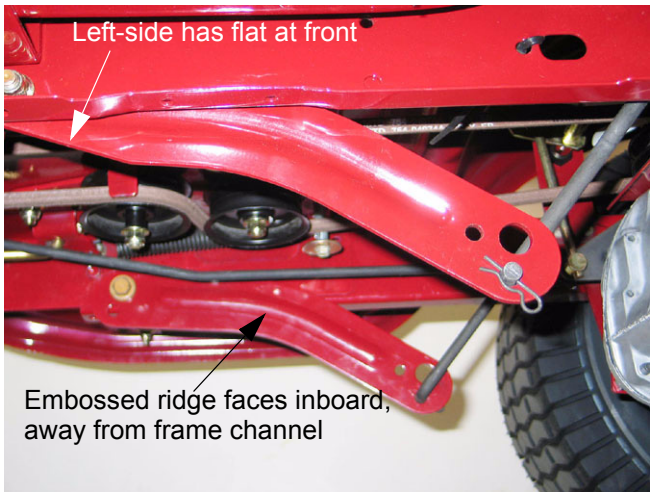


Figure 5.3

NOTE: Lift link position and orientation.

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

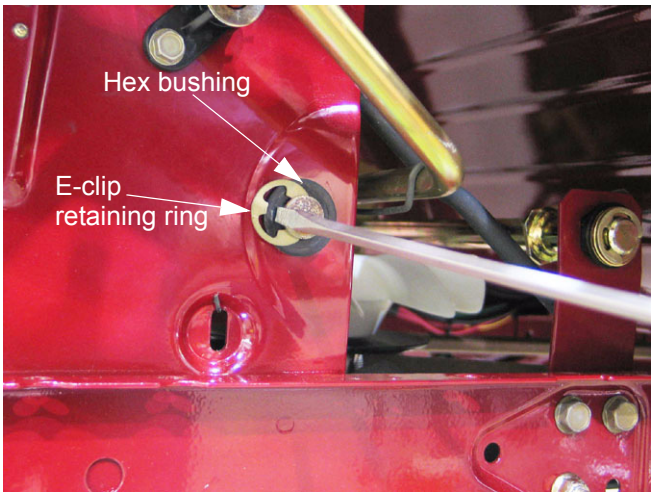


Figure 5.4

- 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.

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.

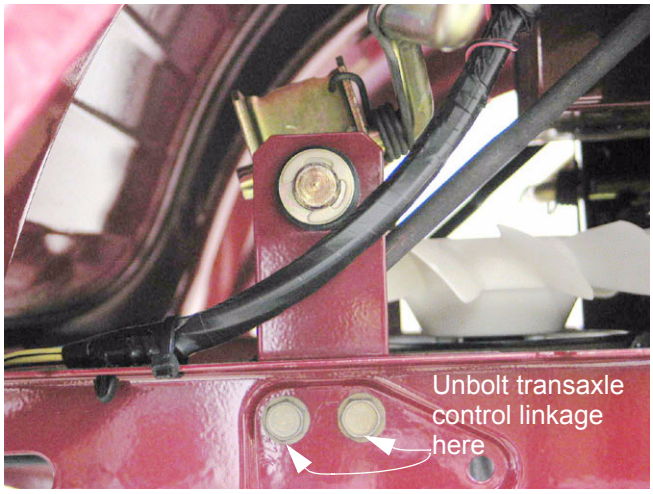


Figure 5.7

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.

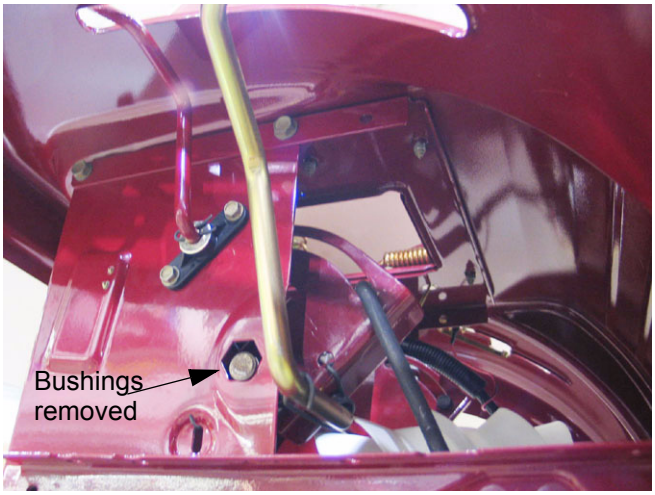


Figure 5.9

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.

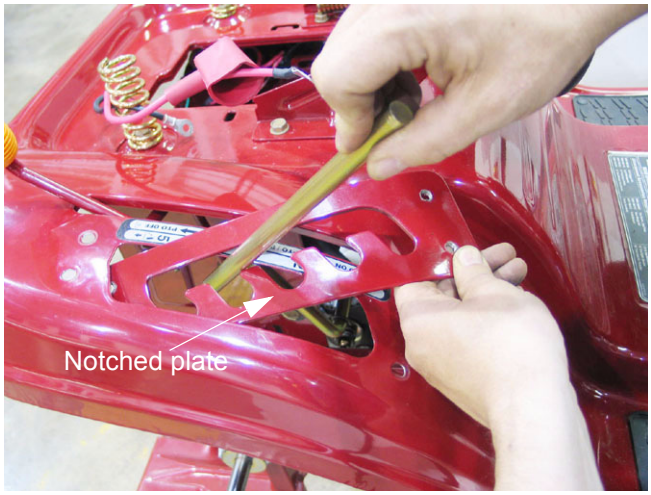


Figure 5.10

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.

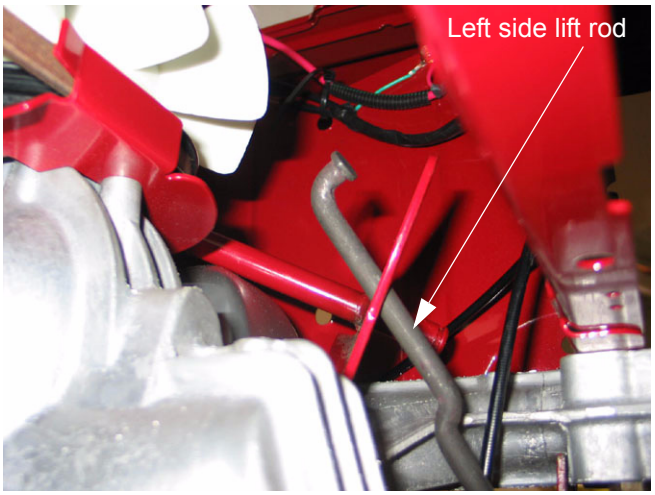


Figure 5.12

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

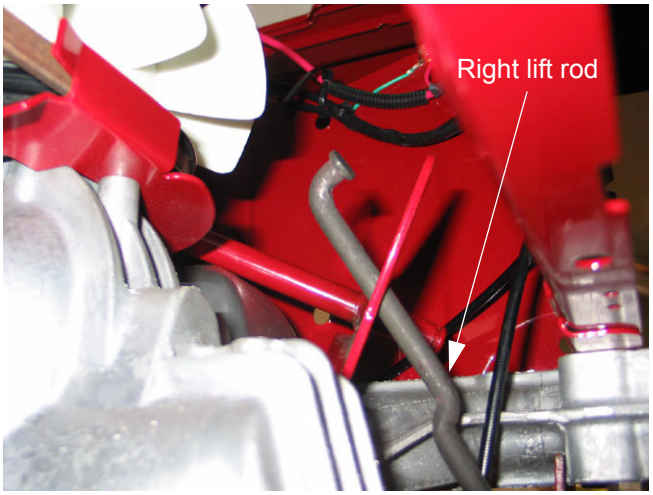


Figure 5.13

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.

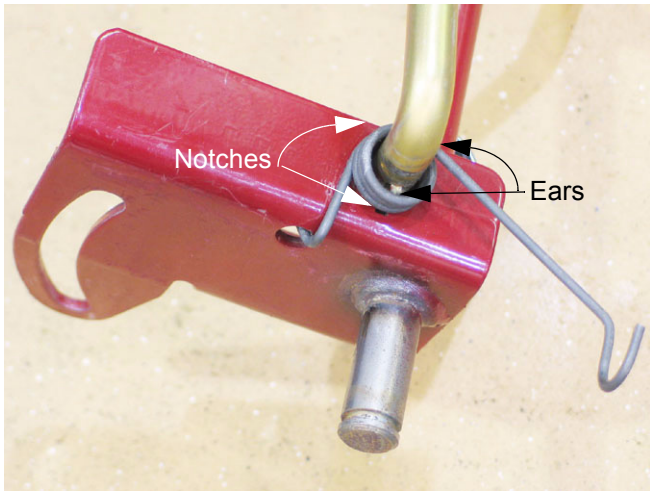


Figure 5.15

5.16. Installation notes: See Figure 5.16.

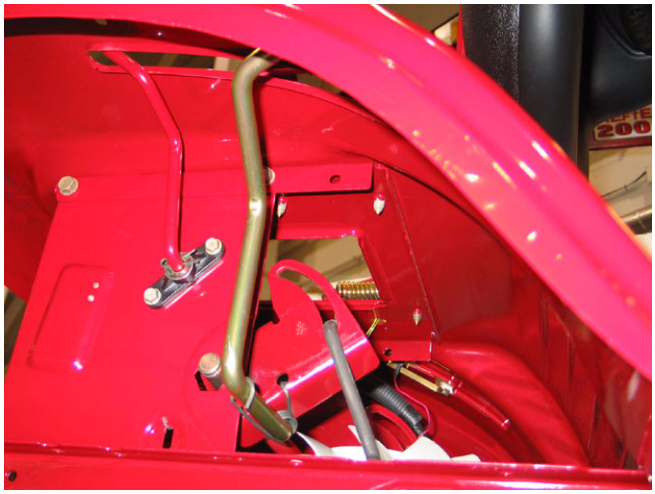


Figure 5.16

- 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.

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.

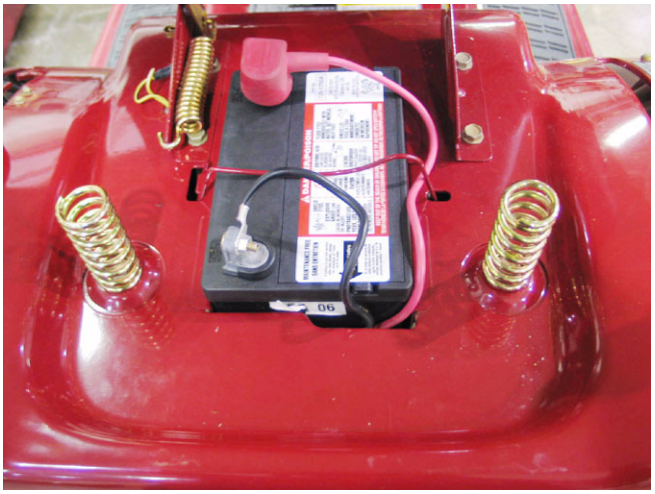


Figure 6.5

- 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.

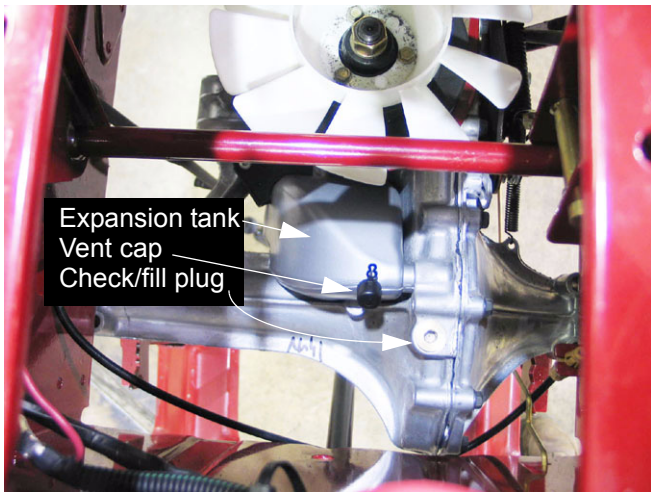


Figure 6.6

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.

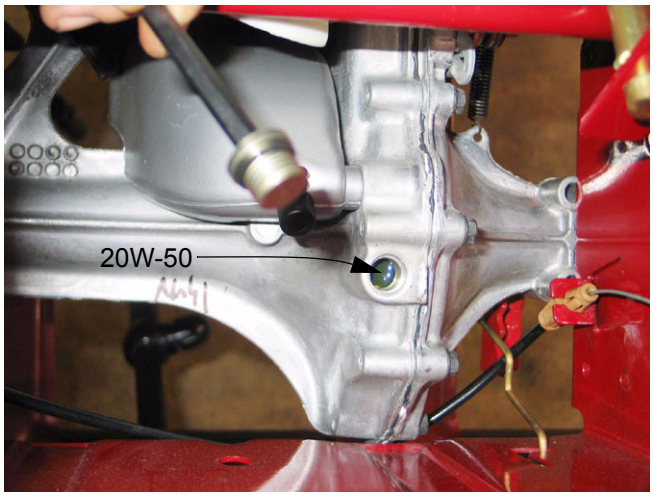


Figure 6.7

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.

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

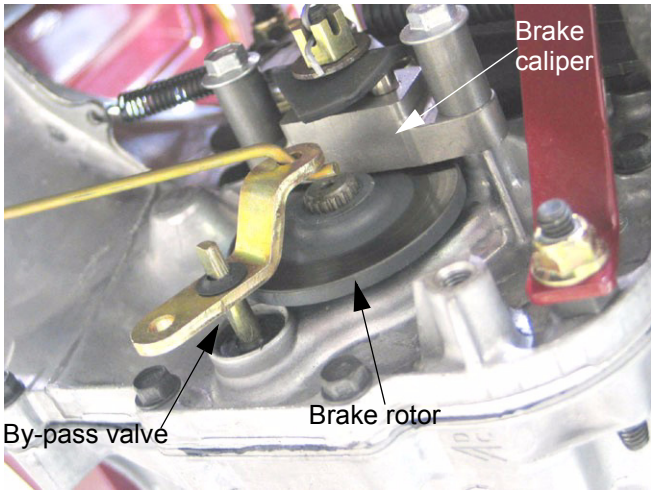


Figure 6.12

- 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.

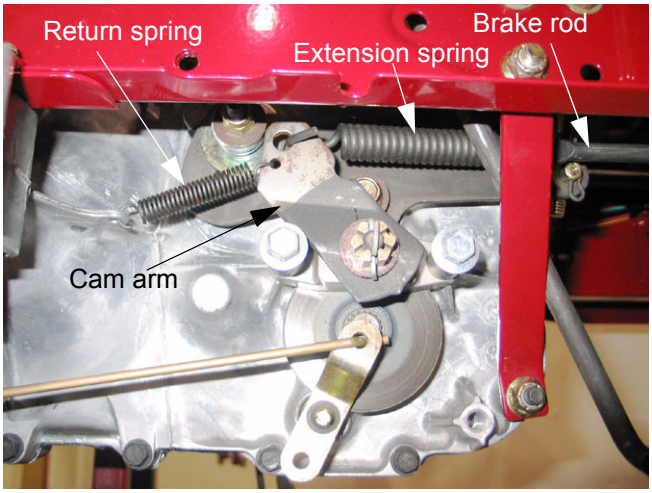


Figure 6.14

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.

- 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.

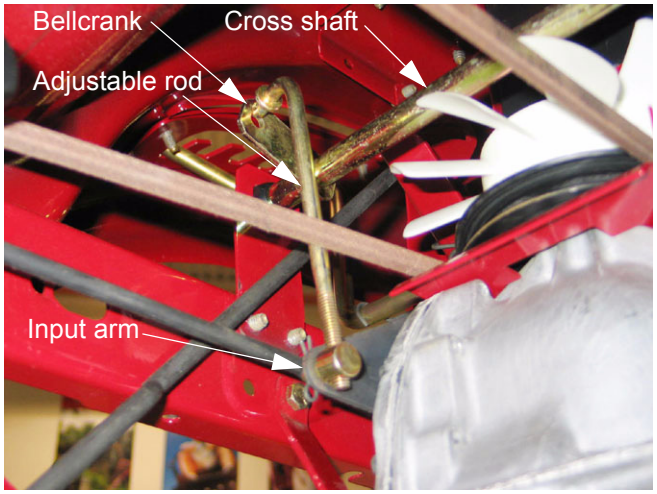


Figure 7.2

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.

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.

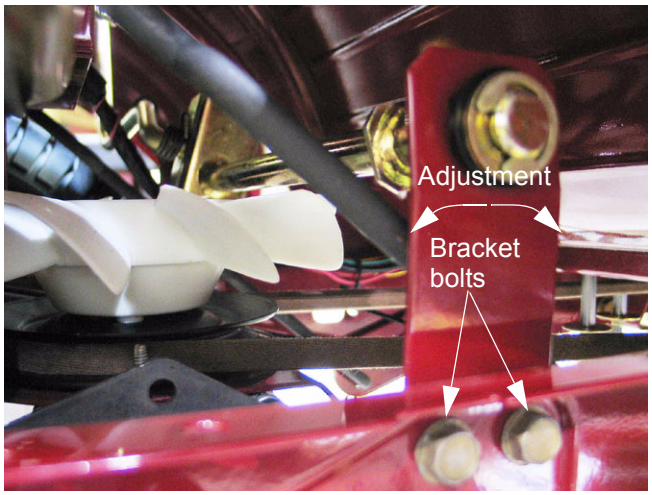


Figure 7.4

- 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.

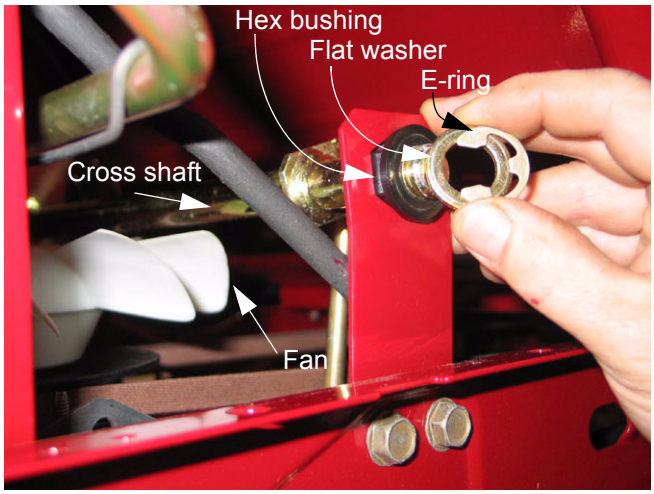


Figure 7.5

- 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.

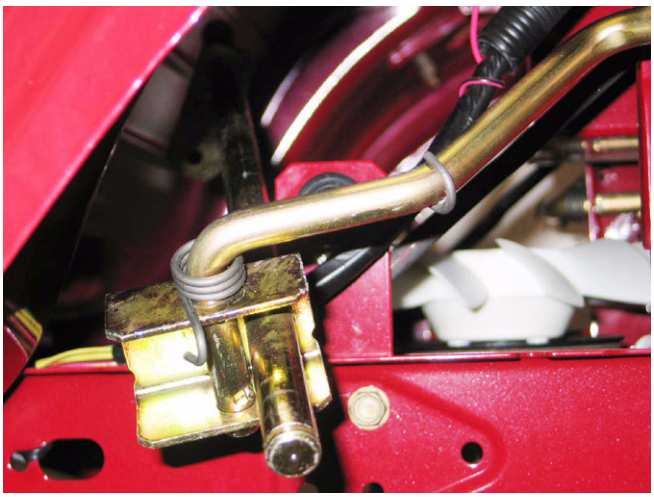


Figure 7.7

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

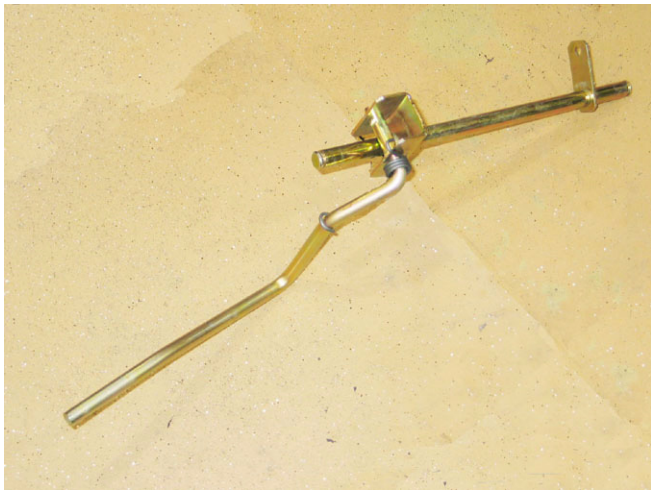


Figure 7.8

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.

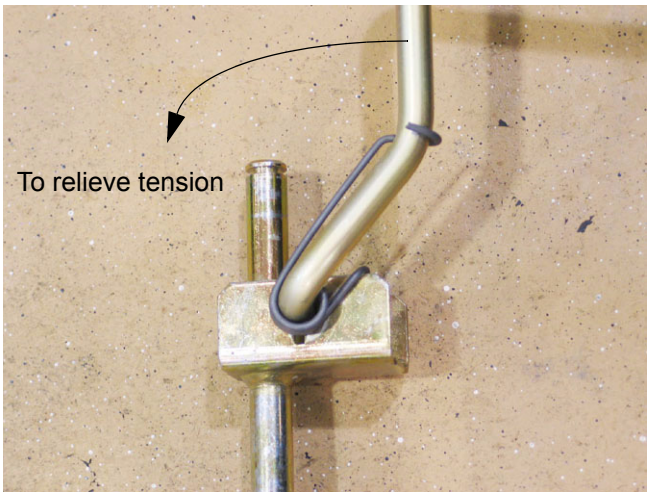


Figure 7.9

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.

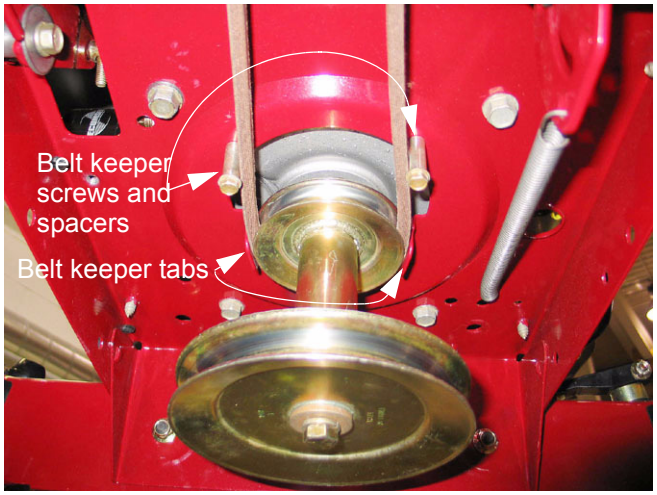


Figure 8.3

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.

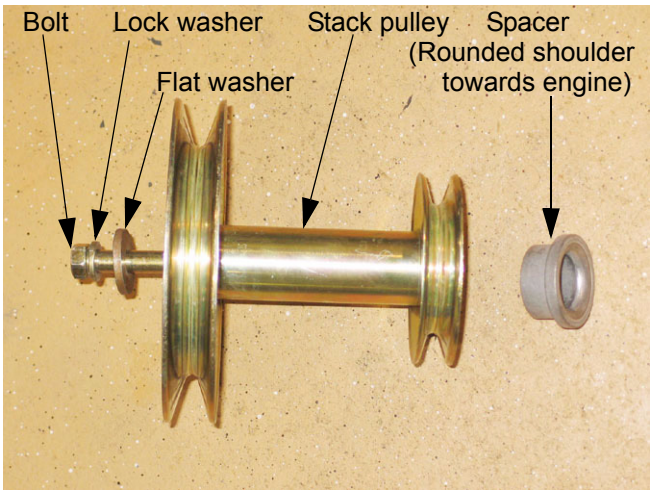


Figure 8.4

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.

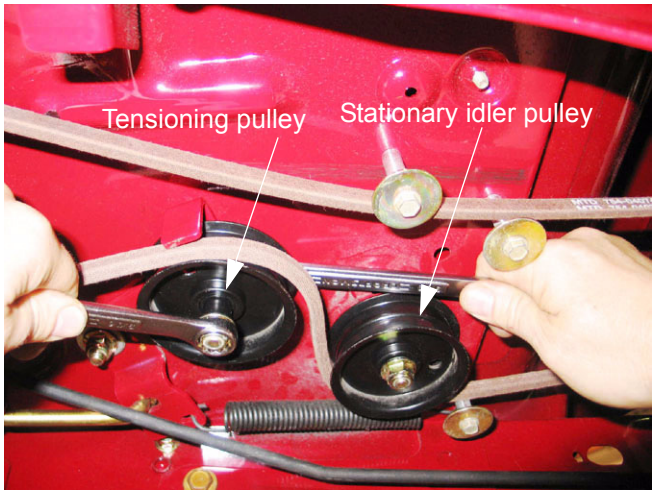


Figure 8.6

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.

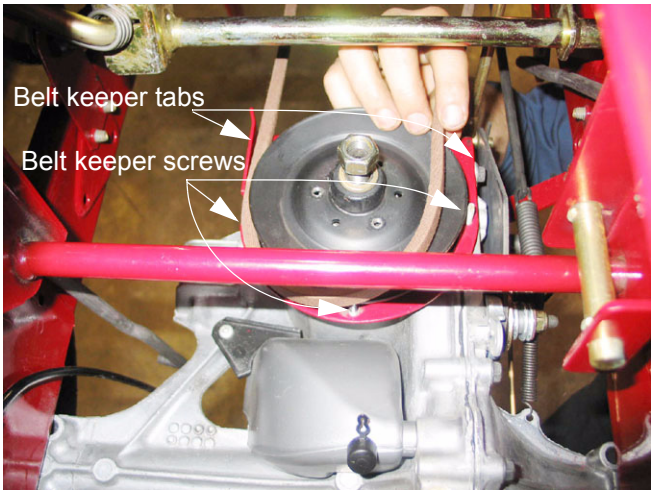


Figure 8.11

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.

9. CLUTCH/BRAKE LINKAGE : HYDROSTATIC

9.1. Application of the clutch / brake pulls on the rod that actuates the cam arm on the brake caliper, and pivots the tension pulley bracket away from the belt, creating slack. See Figure 9.1.

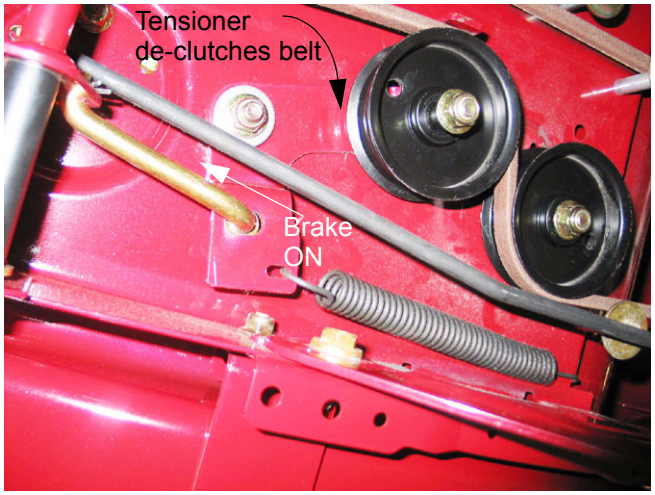


Figure 9.1

9.2. One spring, reaching rearward from the bracket, works against the pedal. This spring tensions the belt when the pedal is released.

- Failure of this extension spring will cause a loss of drive and reduced belt life.
- A bracket that does not pivot because of damage, binding, or corrosion will cause loss of drive and reduced belt life.

9.3. A lighter extension spring, reaching forward from the arm on the pedal shaft maintains slight pedal pressure until the rear spring comes into play. See Figure 9.3.

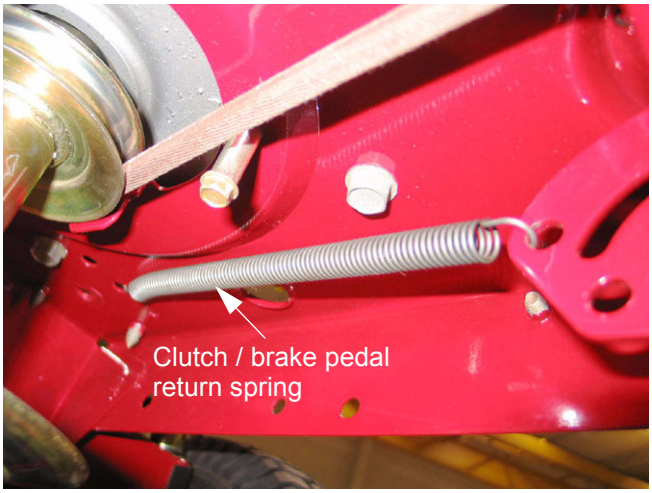


Figure 9.3

9.4. If it is necessary **to remove the brake pedal assembly** (cross shaft), the process is very simple and the parts are easy to reach.
See Figure 9.4.

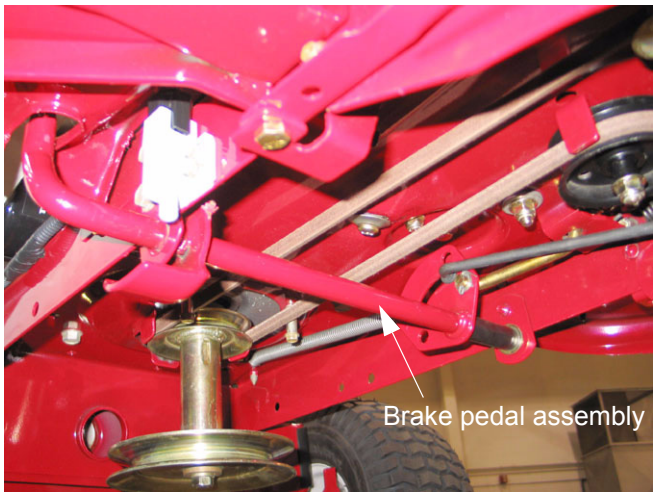


Figure 9.4

NOTE: This procedure may be necessary if the pedal assembly cross-shaft or the pedal support brackets exhibit wear after extended use.

- Remove the cutting deck to gain access to the linkage.
- Mark or make note of the linkage connections and orientations relative to the brake pedal assembly.
- Disconnect the extension spring that reaches forward from the brake pedal assembly
- Remove and discard the cotter pins that secure the brake rod and the tensioner pulley control rod to the brake pedal assembly. Disconnect the rods.
- Remove the pedal support brackets from the frame using a 1/2” wrench, and lower the pedal assembly out of the tractor.

9.5. Brake pedal assembly installation can be accomplished by reversing the removal process.

NOTE: Use new cotter pins on reassembly.

NOTE: Confirm correct operation of the brake / clutch pedal mechanism before returning the mower to service.

9.6. If it is necessary **to remove the brake rod from the tractor**, the easiest method is as follows: See Figure 9.6.

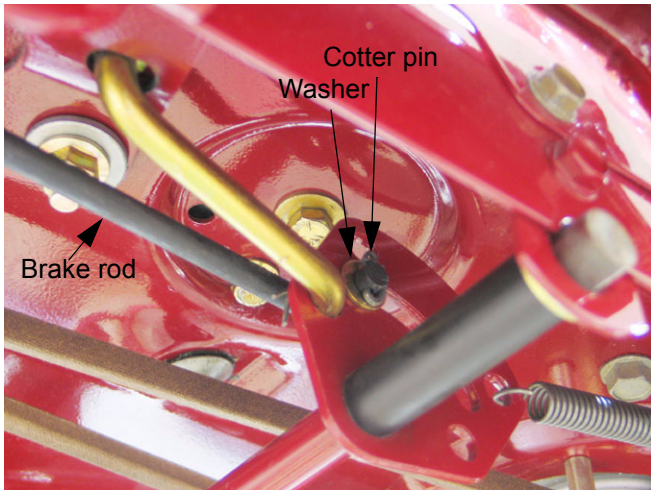


Figure 9.6

- Remove the cutting deck.
- Disconnect the front of the brake rod from the brake pedal assembly by removing and discarding the cotter pin, removing the washer, and pulling the rod out of the hole in the bellcrank on the brake cross shaft assembly.
- Pivot the spring that connects the brake rod to the caliper up and outward to unhook it.

9.7. Brake rod and spring installation can be accomplished by reversing the removal process. See Figure 9.7.

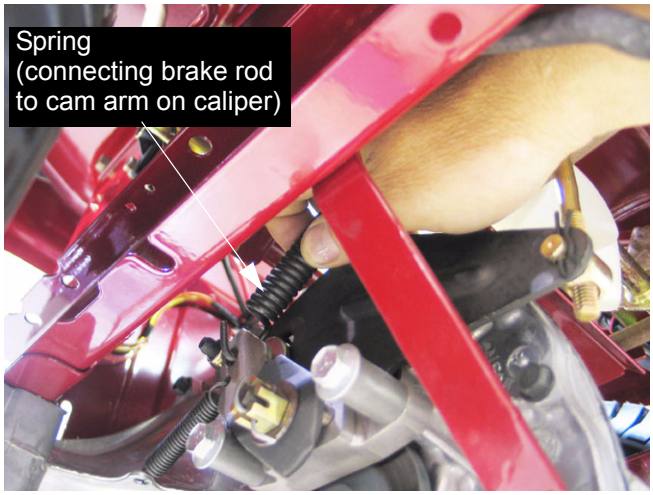


Figure 9.7

NOTE: Confirm correct operation of the brake / clutch pedal mechanism and all tractor safety features before returning the tractor to service.

10. PARKING BRAKE : HYDROSTATIC DRIVE

10.1. The parking brake is operated by small lever on the left side of the dash panel. The label describes one end of the lever's travel as "ON", and the other end as "RUN".

10.2. Moving the lever up to the "RUN" position allows the brake pedal to come up, releasing the brake and engaging the drive belt.

10.3. Depressing the clutch / brake pedal and moving the lever back to "ON" locks the pedal down. See Figure 10.3.

Figure 10.3

10.4. The lever moves an adjustable rod that moves the latch assembly. See Figure 10.4.

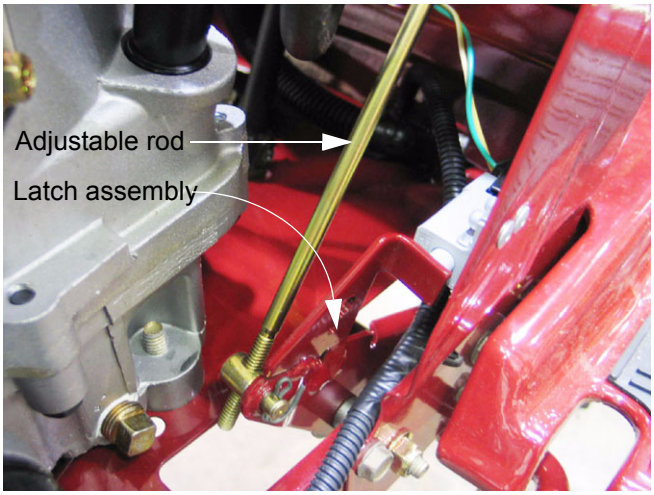


Figure 10.4

10.5. The latch assembly should be adjusted so that it depresses the plunger on the park brake switch, and locks the pedal down.

10.6. Adjust the rod length so that the tab on the latch just bottoms-out in the notch on the brake pedal assembly when the pedal is depressed and the park brake is moved to “ON”. See Figure 10.6.

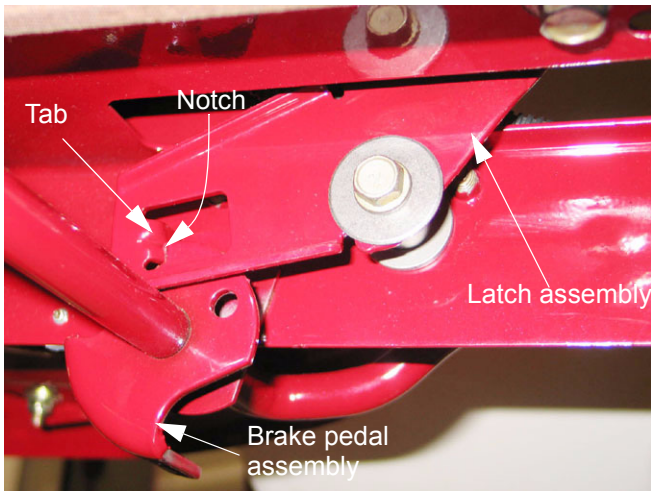


Figure 10.6

NOTE: The latch may be adjusted by removing the cotter pin that secures the ferrule on the adjustable rod to the latch. Thread the ferrule up or down the length of the rod to adjust its effective length. Secure the ferrule with a new cotter pin upon completion of the adjustment.

10.7. At that point, the plunger on the switch should be pressed-in far enough to securely close the contacts in the switch.

- If the plunger is not pressed far enough: check that the switch is securely fastened to the dash.
- The tab on the latch that contacts the plunger may be adjusted slightly by bending.

10.8. If the latch is not working correctly and adjustment fails to solve the problem, examine the latch for binding or interference:

- Some of the clearances between the latch and the frame are fairly close.
- Component wear, with years of use, may allow the latch to bind.
- Interference / binding will likely be evidenced by wear marks in the metal and paint at the point of contact.
- Replace any visibly worn components, and adjust the linkage.

10.9. Confirm the correct operation of the tractor’s safety features before returning it to service.

11. BELT REPLACEMENT: VARIABLE SPEED BELT DRIVE

NOTE: This section does not apply to tractors equipped with hydrostatic transaxles.

11.1. Because there is inter-play between the two drive belts in the variable-speed pulley system, it is good practice to replace both drive belts at the same time.

11.2. Set the parking brake.

11.3. Remove the battery. See Figure 11.3.

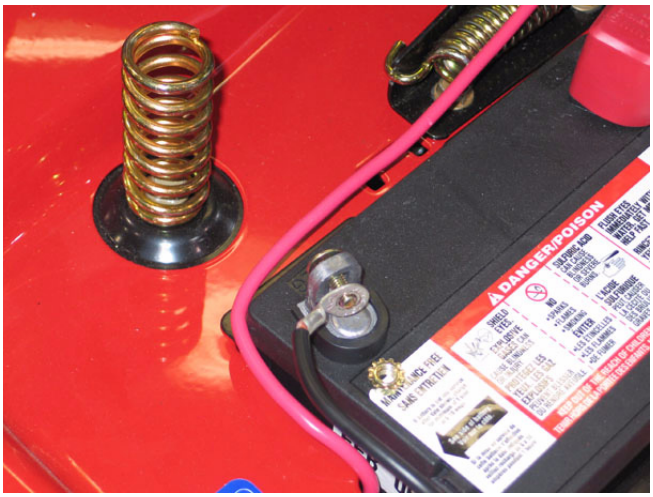


Figure 11.3

NOTE: When disconnecting the battery disconnect the negative cable first.

11.4. Remove the battery tray.

11.5. Loosen the large nut holding the transaxle pulley on using a 7/16” socket. See Figure 11.5.

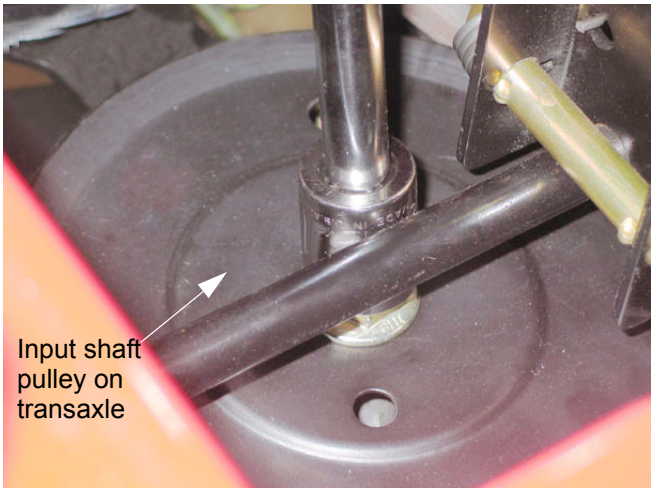


Figure 11.5

11.6. Disconnect the spring from the anchor bolt on the left side of the tractor using a spring puller or a small piece of rope. See Figure 11.6.

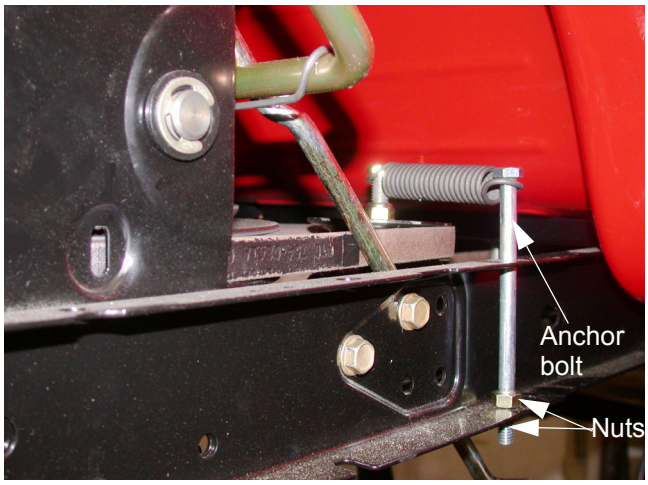


Figure 11.6

11.7. Maneuver the upper (rear) belt from under the transaxle pulley, and remove it. See Figure 11.7.

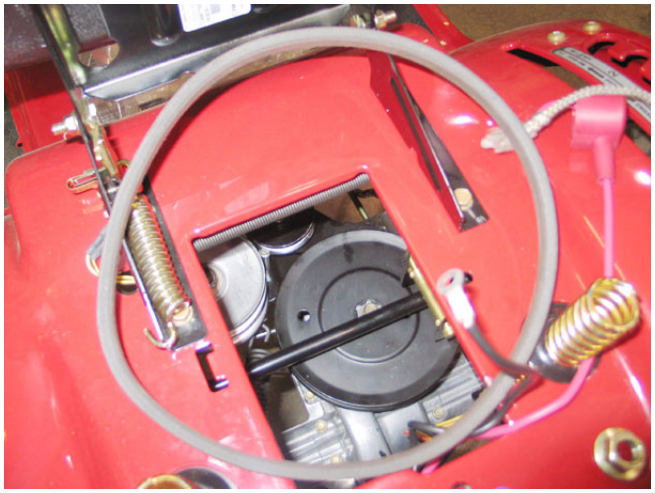


Figure 11.7

11.8. Remove the belt guide from the variable speed pulley bracket using a 1/4”socket. See Figure 11.8.

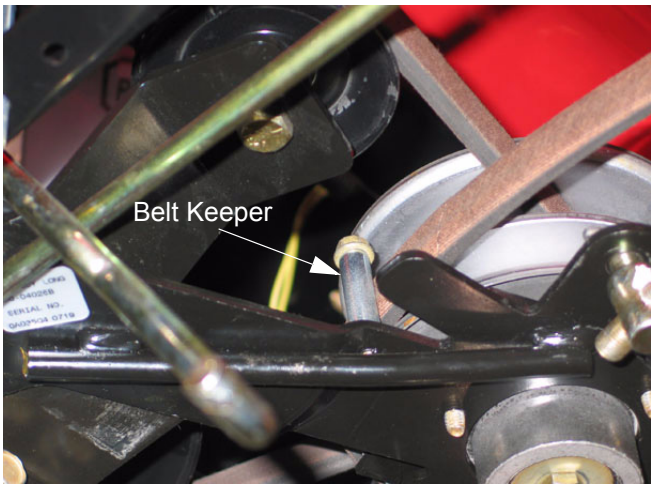


Figure 11.8

NOTE: Easiest access is through the battery compartment.

11.9. Lift the middle sheave slightly so the belt will clear the belt guide, and slip the belt off of the variable speed pulley.

11.10. Remove the beltkeeper surrounding the engine pulley, using a 1/2” wrench. See Figure 11.10.

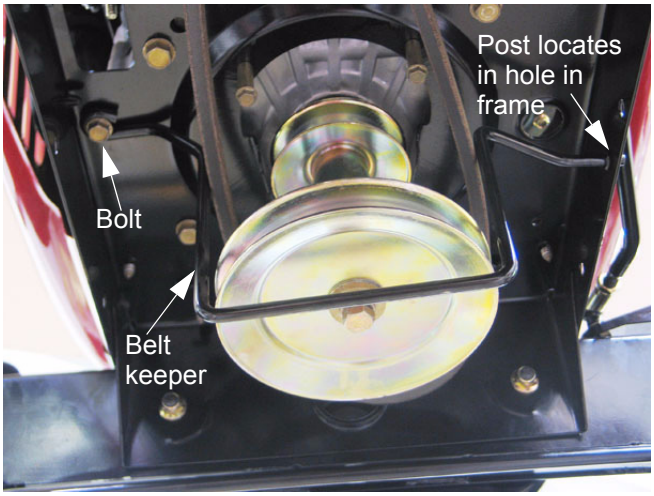


Figure 11.10

11.11. Remove the crankshaft pulley using a 5/8" wrench. See Figure 11.11.

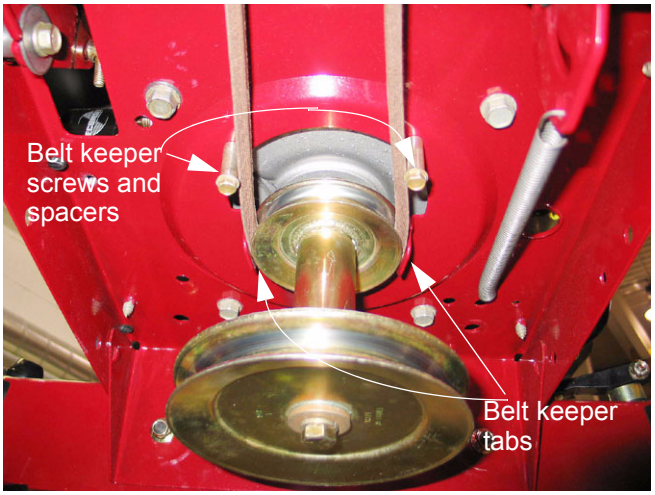


Figure 11.11

11.12. 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 11.12.

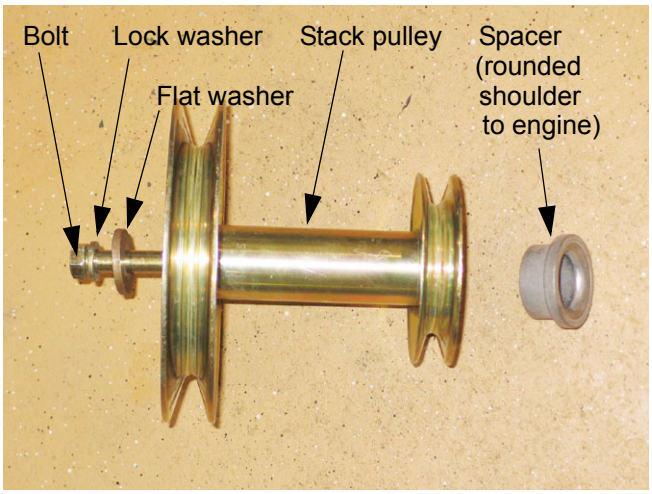


Figure 11.12

11.13. 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 10-15 ft.-lb. (13.6-20.3 Nm).
- Confirm proper operation of the brake/clutch linkage before installing the cutting deck.
- Adjust the speed control linkage if necessary.
- Confirm proper operation of tractor safety features before returning the tractor to service.

12. SPEED CONTROL LINKAGE ADJUSTMENT: VARIABLE SPEED BELT DRIVE

12.1. Because of the change of tensions with new belts it is always advisable to check all drive adjustments after changing the drive belts. See Figure 12.1.

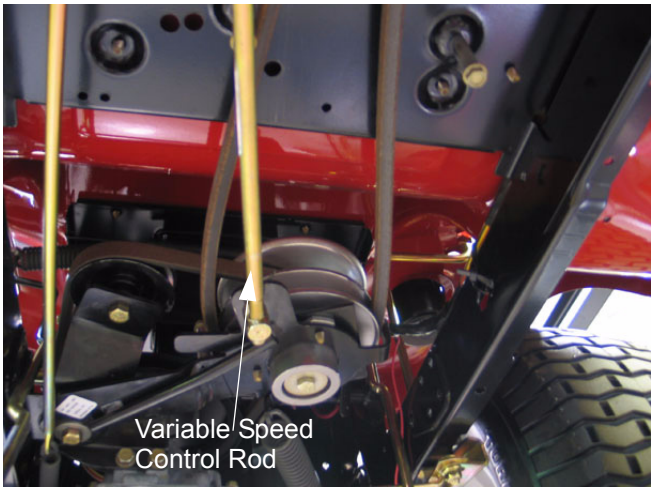


Figure 12.1

12.2. Engage the parking brake taking the tension off the Variable speed control rod.

12.3. Remove the cotter pin from the ferrule on the top side of the variable speed pulley bracket. See Figure 12.3.

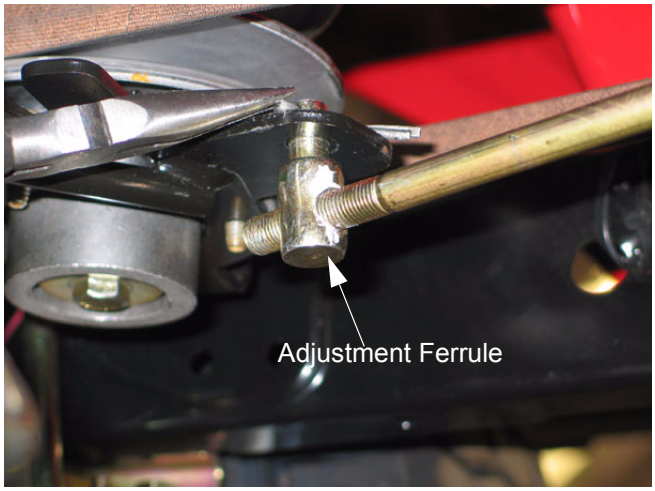


Figure 12.3

12.4. Disconnect the ferrule from the bracket. See Figure 12.4.

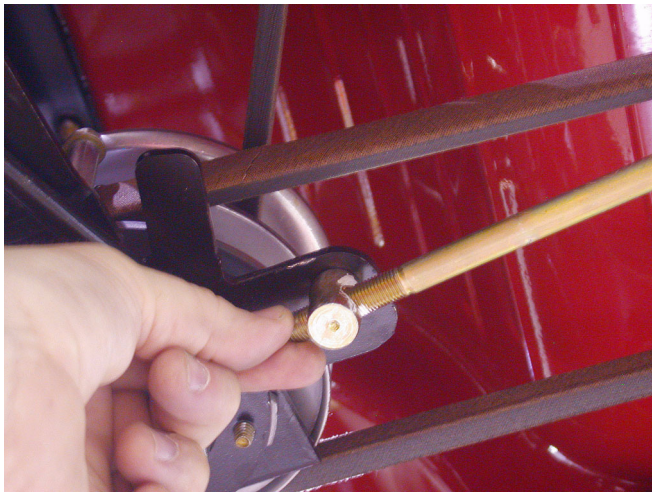


Figure 12.4

NOTE: If adjustment is needed there will be tension on the linkage, and the resulting friction will create resistance when sliding the ferrule out.

12.5. If there is a slight resistance when you pull the ferrule out, thread the ferrule up or down the rod so that the post fits into the hole without interference from the bracket.

13. CRUISE CONTROL/PARKING BRAKE ADJUSTMENT: VARIABLE SPEED BELT DRIVE

13.1. Set the parking brake to expose the adjustment ferrule and cotter pin. See Figure 13.1.

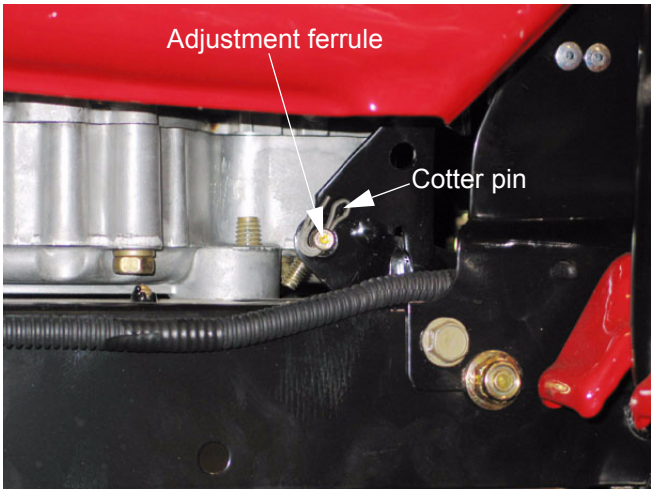


Figure 13.1

13.2. Remove and discard the cotter pin that secures the ferrule in the latch assembly, then disconnect the linkage from the latch assembly.

13.3. Thread the ferrule up or down the rod so that the post of the ferrule fits into the hole without resistance.

13.4. Secure the ferrule to the linkage using a new cotter pin, and test the operation of the linkage and related safety features before returning the tractor to service. See Figure 13.4.

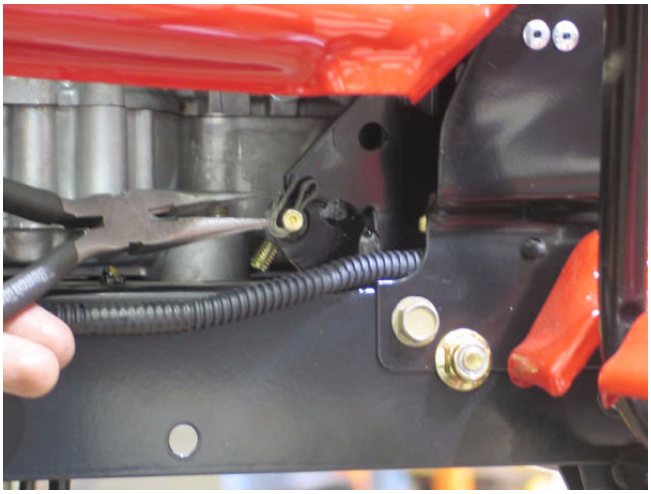


Figure 13.4

14. STEERING

14.1. The toe angle is not adjustable. The front wheels are kept pointed in the same direction (except for the Ackerman effect) by a tie-rod with fixed ends. There is an adjustable end on the drag link that connects the steering gear to the steering arm on the right front axle. See Figure 14.1.

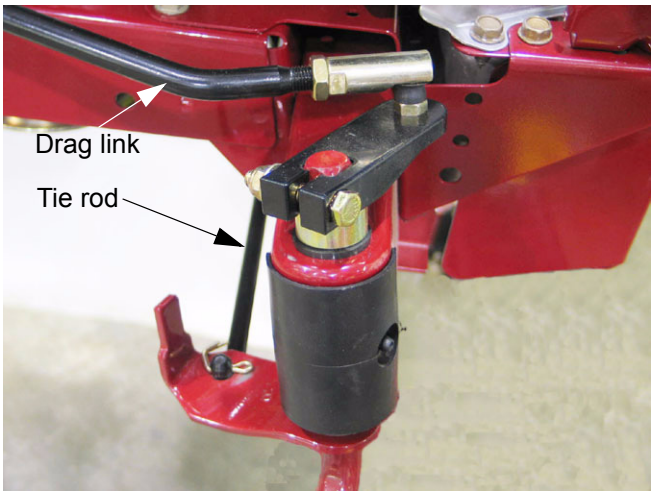


Figure 14.1

NOTE: The front wheels should exhibit 1/16” to 5/16” (1.6mm - 7.9mm) toe-in.

14.2. If the tie-rod is visibly bent, its effective length is shortened, and toe-out will result. Very minor bends may be straightened. Substantial bends should be repaired by replacing the tie-rod.

14.3. A toe-angle problem may also be caused by worn axle bushings or worn wheel bearings: inspect the wheel bearings and axle bushings. See Figure 14.3.

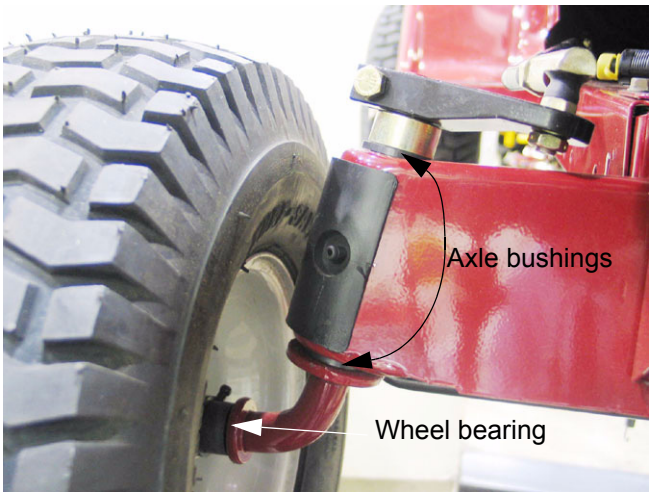


Figure 14.3

14.4. The wheel bearings may be easily examined for play:

- Safely lift and support the end of the pivot bar that the wheel is attached to.
- Attempt to wiggle the wheel on a horizontal axis.
- Excessive play indicates worn wheel bearings. Rocking play (as distinguished from just slipping in and out on the axle) that exceeds the range of acceptable toe angle adjustment (5/16” - 1/16” = 1/4”) is considered excessive.

14.5. The wheel bearings are accessible by prying-off the hub-cap, then removing the cotter pin and flat washer that retain the front tires. See Figure 14.5.

Figure 14.5

14.6. With the front of the tractor safely lifted and supported, the wheel can be removed, and the bearings driven-out and replaced. See Figure 14.6.

Figure 14.6

14.7. On installation, using a new cotter pin, the pin must be bent tightly enough around the axle that it does not interfere with hub-cap installation. See Figure 14.7.

Figure 14.7

14.8. Before removing an axle, the tie-rod must be disconnected from the axle.

NOTE: Only tractors equipped with fabricated (not cast iron) pivot bars have removable axle bushings.

14.9. The left side axle bushing can be reached by prying-off the push-on cap. Discard the cap, and replace it with a new one on reassembly. See Figure 14.9.

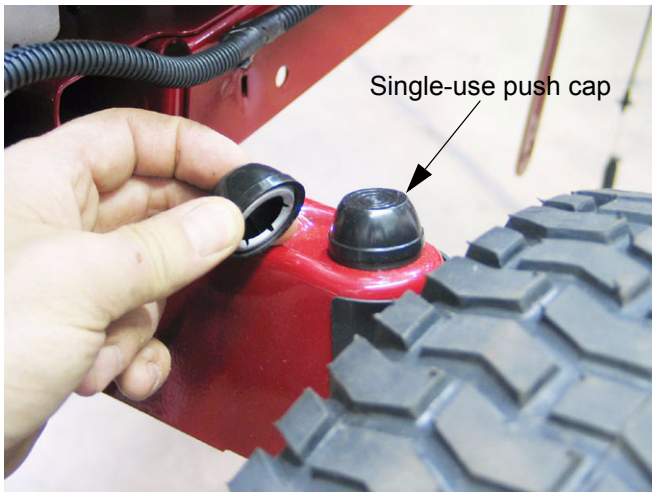


Figure 14.9

14.10. The right side axle can be removed from the pivot bar by loosening the clamp bolt that secures the steering arm to the square-section at the top of the axle using a pair of 1/2" wrenches, and lifting the arm off. See Figure 14.10.

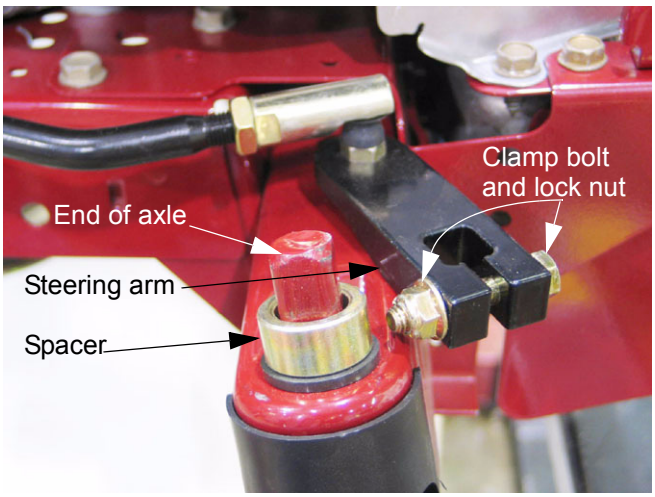


Figure 14.10

14.11. The bushings can be easily pried out of the pivot bar. See Figure 14.11.

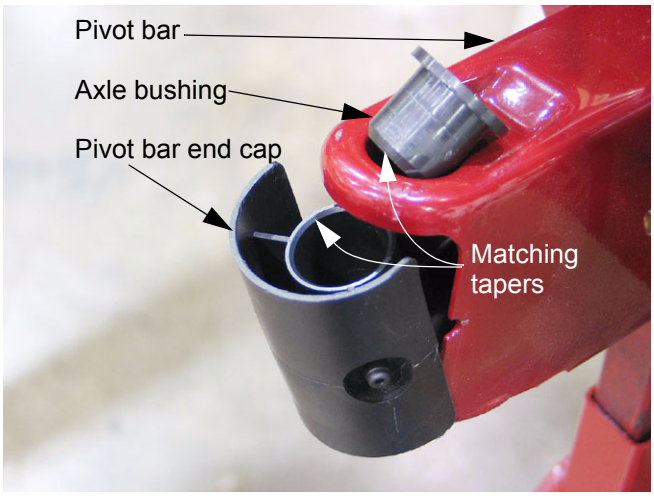


Figure 14.11

NOTE: The ends of the axle bushings are tapered to seat into the matching taper in the bore of the pivot bar end-cap.

14.12. The end caps cannot be removed until the bushings are removed.

NOTE: Continued operation with worn bushings will cause rapid tire wear. If the bushing wears through completely, the pivot bar will be damaged.

14.13. Replace any single-use fasteners (push-on caps and cotter pins) with new ones on reassembly.

14.14. Lubricate all friction surfaces with grease such as MTD P/N 737-0300A upon reassembly.

14.15. Tighten the steering arm clamp bolt to a torque of 200-260 in-lb. (22.6 Nm-29.4 Nm). Replace the nylon ring lock nut if it has lost its retaining capabilities.

14.16. The drag link should be adjusted so that when the steering wheel is positioned straight-ahead, the front wheels also point straight ahead, and the steering gear is centered.

NOTE: It is possible to remove the steering wheel from the steering shaft, shift it one or two splines over to align it with the front wheels, and reinstall it. This may leave the steering gear off-center, giving the tractor a turning radius that is biased in one direction.

14.17. To **center the steering gear**: See Figure 14.17.

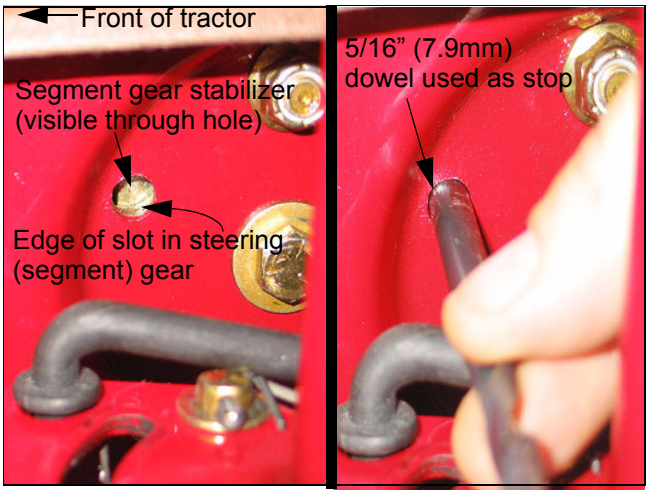


Figure 14.17

- Locate the 5/16” (7.9mm) hole in the frame, beneath the gear, toward the front of the circular embossment that supports the steering gear.
- Turn the steering wheel to position the end of the curved slot in the steering gear in alignments with the hole, so that a dowel pin passed through the hole passes through the slot, but rests against the end of the slot.
- viewing the steering gear from above: 12 teeth of the steering gear should be on each side of the pinion gear tooth that most deeply engages the steering gear.

14.18. To **adjust the drag link**, it is necessary to loosen the jam nut that locks the ball joint in position. Hold the ball joint using a 1/2” wrench, and loosen the nut using an 11/16” wrench. See Figure 14.18.

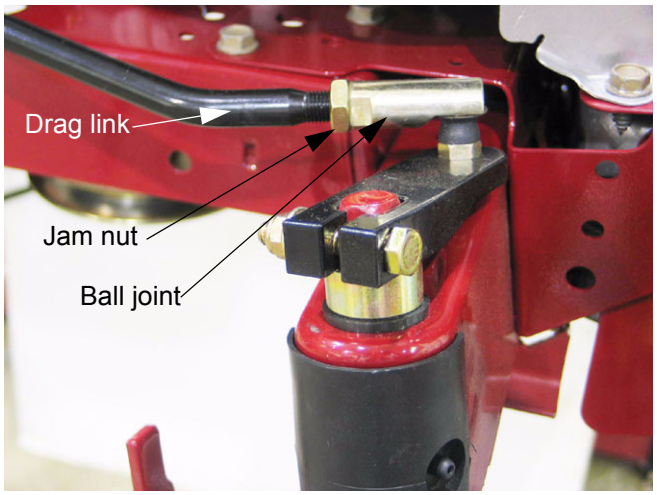


Figure 14.18

14.19. After the jam nut is loosened, remove the steering arm from the axle as described in the axle bushing replacement procedure.

NOTE: This is preferable to separating the ball joint from the steering arm because the center-locking nut that secures the ball joint to the steering arm distorts the threads on installation.

14.20. Rotate the steering arm and ball joint to thread them up or down the drag link threads as necessary to align the steering wheel.

14.21. Test-fit the steering arm to confirm alignment.

14.22. Once positioned:

- Tighten the steering arm clamp bolt to a torque of 200-260 in-lb. (22.6 Nm-29.4 Nm). Replace the nylon ring lock nut if it has lost its retaining capabilities.
- Center the ball joint in its travel, so it does not bind, and tighten the jam nut that secures it.
- Thoroughly test the operation of the steering gear before returning the tractor to service.

15. STEERING GEAR

15.1. It is good practice to check the steering gear whenever a tractor is in for repair: See Figure 15.1.

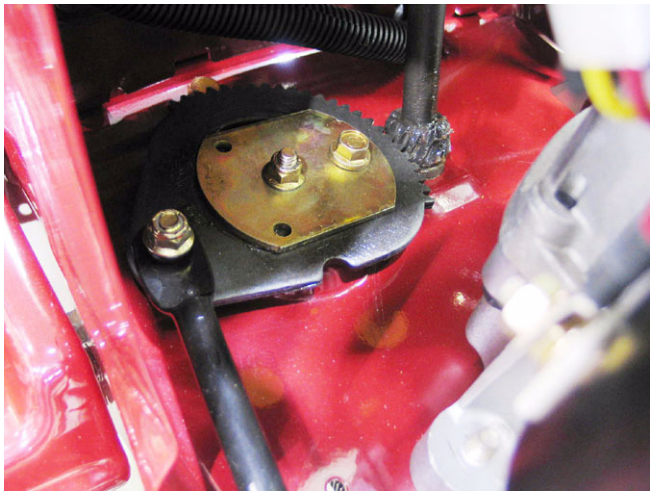


Figure 15.1

- Check the alignment in the straight-ahead position.
- Turn the wheel to full lock in both directions with enough force to confirm that the pinion gear is not slipping.
- Make a visual inspection of the steering gear and pinion gear, paying particular attention to the condition of the teeth. If either are worn or damaged, replace both gears and any suspect bushings and hardware.

15.2. The bolt that secures the steering wheel is concealed under the center cap. See Figure 15.2.

Figure 15.2

15.3. To remove the steering wheel, remove the bolt and belleville washer using a 1/2” wrench.

15.4. Match-mark the steering wheel to the shaft, and lift the steering wheel off of the splined end of the steering shaft.

NOTE: The steering wheel need not be removed to remove the steering shaft / pinion gear, but the steering shaft support must be.

15.5. To remove the steering shaft support, take out the three screws that fasten it to the dash panel using a 3/8” wrench. See Figure 15.5.

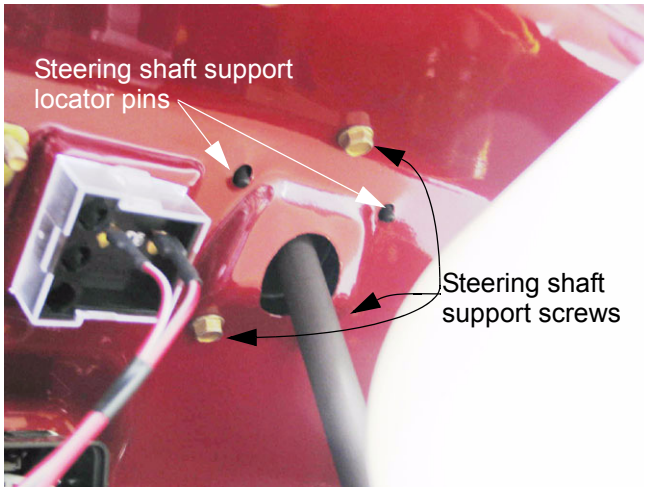


Figure 15.5

NOTE: The screws are easier to reach if the cable tie that secures the gas tank is released, allowing the gas tank to be moved.

15.6. If the steering shaft is to be removed, the screw and cap that secure it can be removed using a #4 phillips driver. See Figure 15.6.

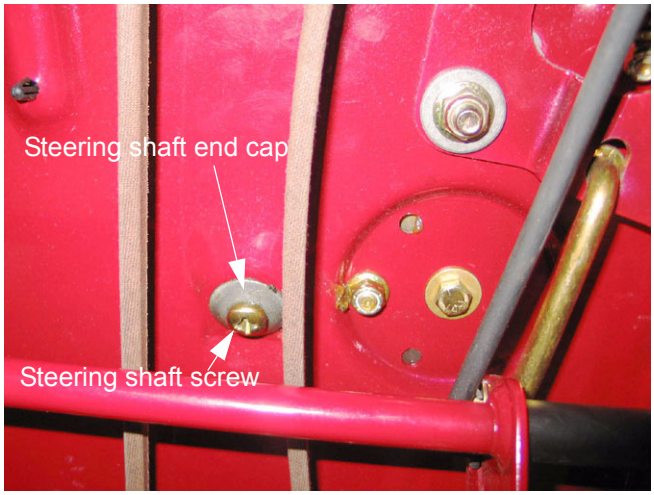


Figure 15.6

15.7. From this point, the steering shaft may be lifted slightly to remove the hex bushing that locates it. See Figure 15.7.

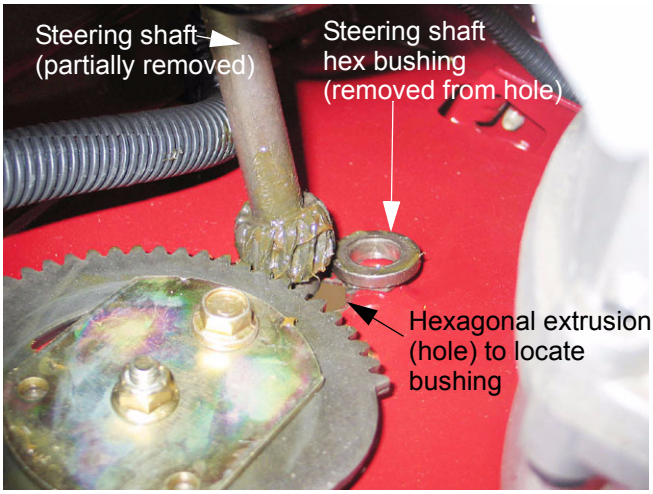


Figure 15.7

15.8. If the steering shaft support is removed, the steering shaft may be removed completely. See Figure 15.8.

Figure 15.8

15.9. It is also feasible to leave the steering shaft in place, and remove the steering gear independently.

15.10. Depending on the nature of the repair that is to be done, and the engine that the tractor is equipped with, it may be easier to remove the steering arm and drag link along with the steering gear. See Figure 15.10.

Figure 15.10

15.11. To remove the drag link prior to removal of the steering gear, it is necessary to block the gear from turning as the nut is loosened. This may be accomplished by holding the steering shaft or by inserting a pin through the gear and the frame.

15.12. To remove the steering gear, loosen and remove both bolts that hold it in place using a pair of 1/2" wrenches. See Figure 15.12.

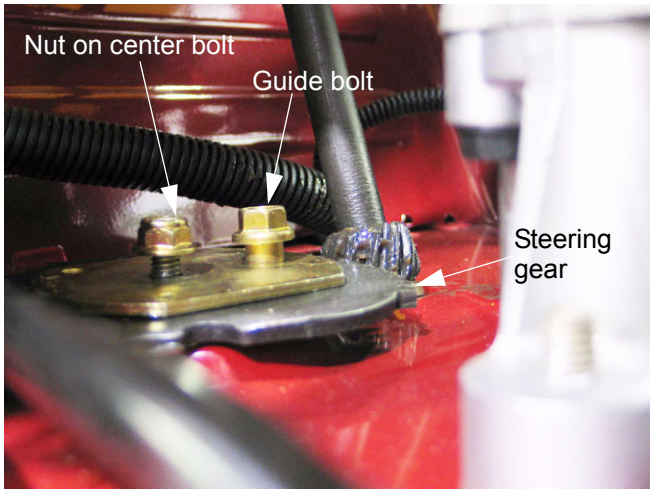


Figure 15.12

NOTE: The bolt near the center of the steering gear comes-up from the bottom, with the nut on top. The bolt that passes through the curved slot (guide bolt) goes down from the top.

15.13. Lift away the steering gear stabilizer plate. See Figure 15.13.

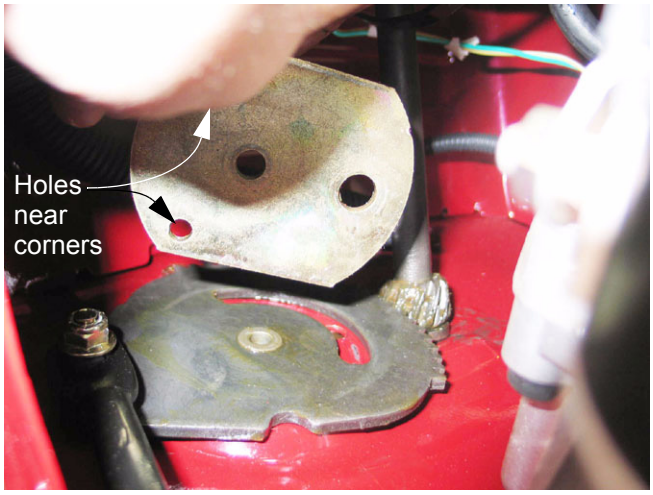


Figure 15.13

NOTE: The two holes near the corners of the stabilizer plate should be oriented away from the steering shaft.

15.14. With the stabilizer plate removed, the steering gear, spacer, and drag link can be removed. See Figure 15.14.

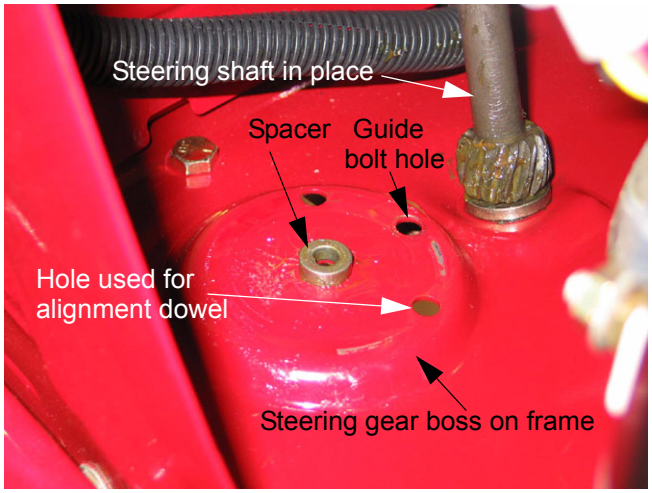


Figure 15.14

15.15. After removal, the steering gear can be held in a bench vise to remove the drag link using a 1/2" wrench. See Figure 15.15.

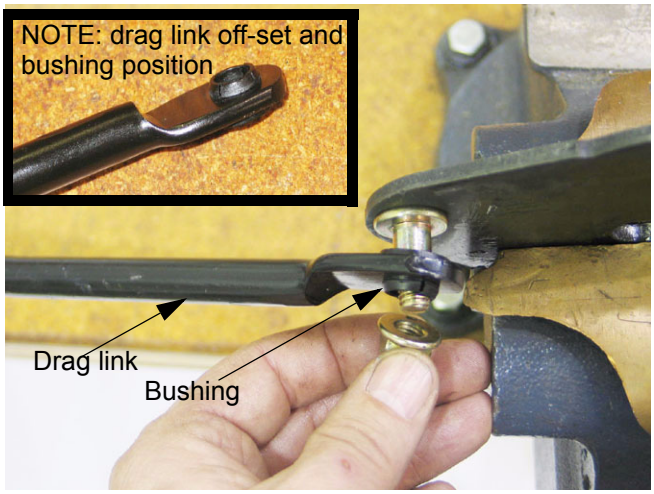


Figure 15.15

15.16. The end of the drag link is off-set and coined flat. The side of the off-set end that is stepped-down faces away from the steering gear. Otherwise the drag link will interfere with the frame when connected to the steering arm and axle.

15.17. There is a removable bushing between the stud on the steering gear and the drag link. One side of the bushing is a flat shoulder, the other side is tapered and barbed. The flat shoulder faces the gear when installed correctly.

15.18. Assembly notes:

- Replace any locking fasteners that show signs of wear or reduced locking function. In some cases, the parts may be thoroughly cleaned and locked with re leasable thread locking compound such as Loctite 242 (blue).
- Replace the hex bushing that locates the steering shaft, the spacer at the center of the steering gear, and the bushing on the end of the drag link to tighten-up sloppy steering, in addition to confirming that the gears, wheel bearings, and axle bushings are in good condition.
- Apply grease such as MTD P/N 737-0300A (Benelene), or anti-seize compound, to the friction surfaces and teeth of the steering gear on assembly.
- Make a visual inspection of the steering gear and pinion gear, paying particular attention to the condition of the teeth. If either are worn or damaged, replace both gears and any suspect bushings and hardware.

- Apply anti-seize compound to the bearing surface at the base of the steering shaft.
- The screw that secures the bottom of the steering shaft should be thoroughly cleaned and locked with re leasable thread locking compound such as Loctite 242 (blue). Tighten it to a torque of 17-20 ft.-lbs (23-27 Nm).
- The screw that secures steering wheel to the steering shaft should be thoroughly cleaned. Re leasable thread locking compound such as Loctite 242 (blue) should be applied to the threads. Tighten it to a torque of 17-20 ft.-lbs (23-27 Nm).
- Tighten the steering gear shoulder bolt (passes through the curved slot in the steering gear) before tightening the steering gear pivot bolt (passes through the spacer at the center of the steering gear).
- The steering gear shoulder bolt should be tightened to a torque of 200-260 in-lb. (22.6-29.4 Nm).
- The steering gear pivot bolt should be tightened to a torque of 200-260 in-lb. (22.6-29.4 Nm).
- The ball joint nuts should be tightened to a torque of 150-250 in-lb. (17-28 Nm) after removal or adjustment.

15.19. Thoroughly test the steering before returning the tractor to service:

- Test for ease and freedom of movement.
- Check for loose operation or hardware.
- Turn to full-lock in both directions to check linkage travel and steering gear.

16. PIVOT BAR

16.1. Pivot bars are not normally replaced in the service life of a tractor. The most common reasons for replacing a pivot bar are:

- Damage caused by dropping the tractor (e.g.. while loading it into a truck), or tow-motor collision
- Damage caused by continued use after the axle bushings have deteriorated.

16.2. Although it is not strictly necessary, pivot bar removal may be easier if the hood, side panels, and front grill assembly are removed prior to servicing the pivot bar.

16.3. On Troy-Bilt models, the side panels are secured with 2 self tapping screws and 1 screw and nut. See Figure 16.3.

Figure 16.3

16.4. A spacer is fits between the dash and the side panel, around the lower rear bolt that fastens the side panel to the dash. See Figure 16.4.

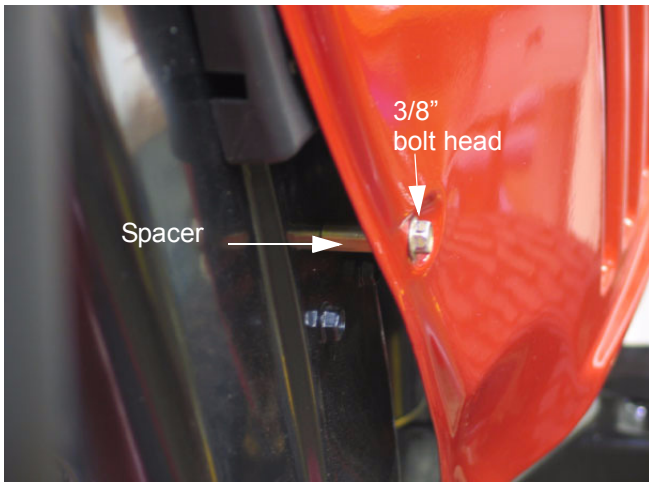


Figure 16.4

NOTE: A 3/8” wrench fits the lower rear bolt, but there is a nut inside the dash panel that must be held with a 7/16” wrench.

16.5. Remove the front screws securing the grille with two 1/2” wrenches. See Figure 16.5.

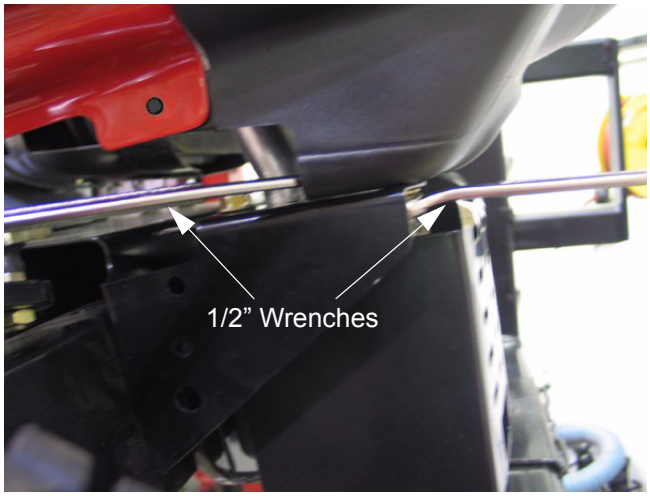


Figure 16.5

16.6. Lift the grill, side panels, and hood off of the front on the lawn tractor.

16.7. Raise and secure the front of the frame to allow removal of the front wheels.

NOTE: Do not use the pivot bar as a means to suspend the front of the lawn tractor.

16.8. Remove the front wheels.

16.9. Remove the cotter pins that secure the tie rod to the axle.

NOTE: Discard the cotter pins and replace with new hardware.

16.10. Remove the muffler heat shield and the muffler as one unit. See Figure 16.10.

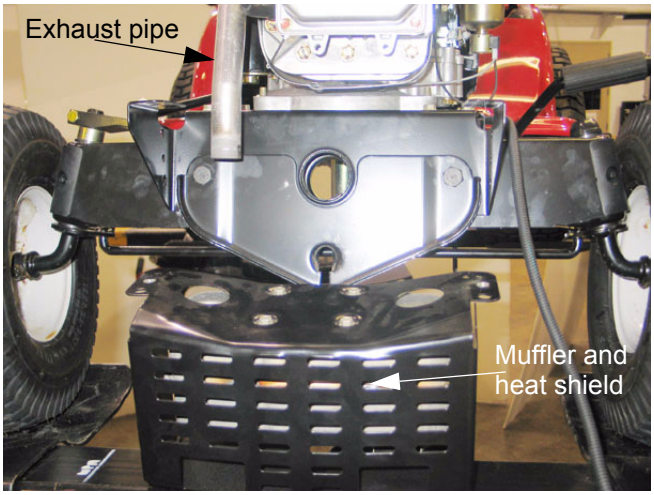


Figure 16.10

16.11. Disassemble axles from the pivot bar.

16.12. Remove the shoulder bolts that pass through the front hanger bracket, front pivot bracket, pivot bar, and frame. See Figure 16.12.

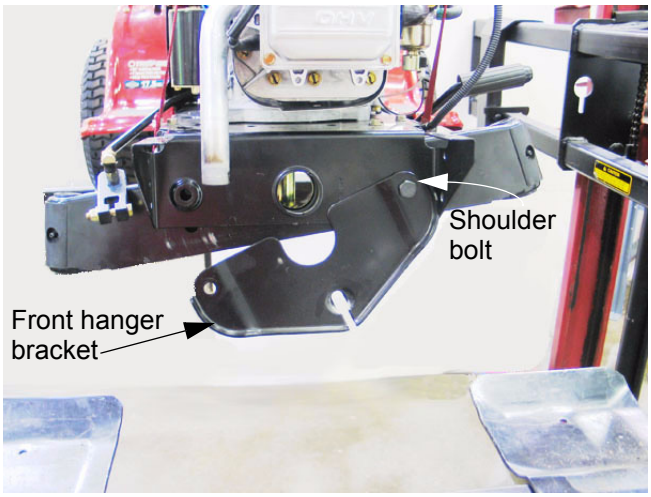


Figure 16.12

16.13. Remove the self-tapping screws on the left side of the tractor that secure the front pivot bracket. See Figure 16.13.

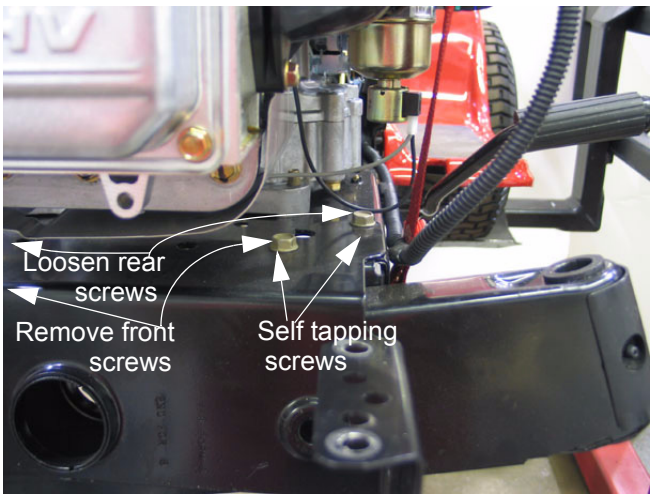


Figure 16.13

16.14. Remove the front screws only. Loosen the rear screws. this will allow the bracket to pivot forward, freeing the pivot bar from the frame. See Figure 16.14.

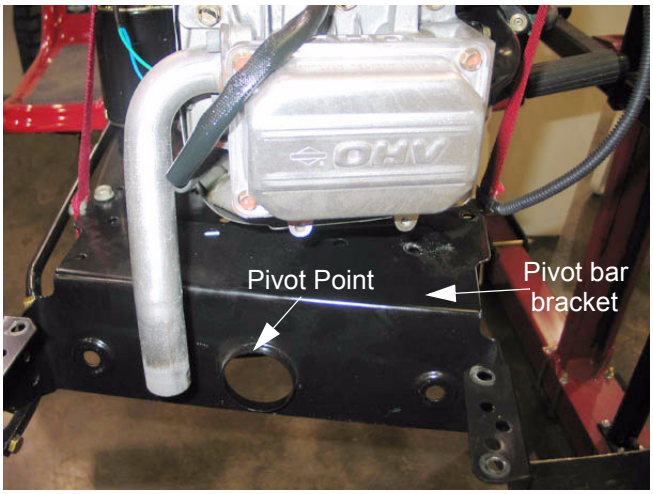


Figure 16.14

16.15. Installation notes:

- Apply anti-seize compound liberally to all of the friction surfaces of the pivot bar, particularly the round boss that serves as the central pivot point.
- Replacing all of the plastic bushings while the pivot bar is disassembled makes economic and mechanical sense.
- Grease all moving parts on reassembly, using MTD P/N 737-0300A (Benelene), or similar grease.

17. ELECTRICAL SYSTEM

17.1. **Introduction:** The electrical system was designed with the RMC module that was introduced for the ‘05 season as an integral component.

- The **RMC module contains electronic logic circuits**. When diagnosing anything that is connected to the RMC module, high impedance test light or a high impedance digital volt-ohm meter (DVOM) should be used. The amperage draw of a standard incandescent test light may over-burden some internal electronic circuits, burning-out the module.

  NOTE: These tools are not outrageously expensive or exotic. High impedance test lights (Thexton model 125 is typical) can be purchased locally from stores like NAPA for under $30.00. Appropriate multi meters can be purchased for under $100.00, and are an invaluable tool for any competent technician.

- It is typical when industries **shift from electro-mechanical to electronic controls** that diagnosis shifts from tracing through a number of independent circuits to checking the in-puts to and out-puts from a central processor. This is similar to, but much less complex than the transition that the auto industry made with the conversion to fuel injection in the 1980s.
- The **starter safety circuit** has no connection to the RMC module.
- The **safety circuits that are capable of turning-off the engine** work through the RMC module.
- It is still important to be familiar with the workings of the individual components of the electrical system, but **some** of them **can now be checked from a central point on the tractor**. This makes life easier on the technician, frequently making it unnecessary to connect to difficult to reach switches in the preliminary stages of diagnosis.
- The function of individual safety switches can be seen as providing information “inputs” to the RMC module.
- The next part of this section gives a **detailed description of the electrical components** on this tractor, their function in the system, and their physical location on the tractor. Armed with this information and the proper tools, a technician should be able to efficiently diagnose most electrical problems.

Electrical Diagnostic Over-view

17.1-17.9	Key Switch and Module
17.3	Key Switch OFF
17.4	Key Switch START
17.5	Key Switch RUN
17.6	Key Switch REVERES CAUTION
17.9	Module Function
17.1O-17.24	Single-point Diagnosis
17.11-17.23	RMC Plug Test
17.14-17.17	Pigtail Plug Test
17.16	Pigtail Plug Test: seat safety
17.17	Pigtail Plug Test: PTO safety
17.19	RMC Plug Test: reverse safety
17.2O	RMC Plug Test: ground
17.21	RMC Plug Test: power
17.22	RMC Plug Test: park-brake
17.23	RMC Plug Test: module arm signal
17.25-17.31	Direct testing of switches
17.25	Direct test: PTO safety switch
17.26	Direct test: Brake safety switch
17.27	Direct test: park brake safety switch
17.28	Direct test: reverse safety switch
17.29	Direct test: seat safety switch
17.3O	Direct test: starter solenoid
17.31	Lighting circuit
17.32	Fuse and Ammeter
17.33	Engine harness connector: White
17.34	Engine harness connector: Troy-Bilt
17.35	Voltage drop test

17.2. The **Key Switch** is similar to those used in a variety of MTD applications since 1999. The difference in this case is that it is incorporated in the same housing as the RMC module; the two items are not available separately.
See Figure 17.2.

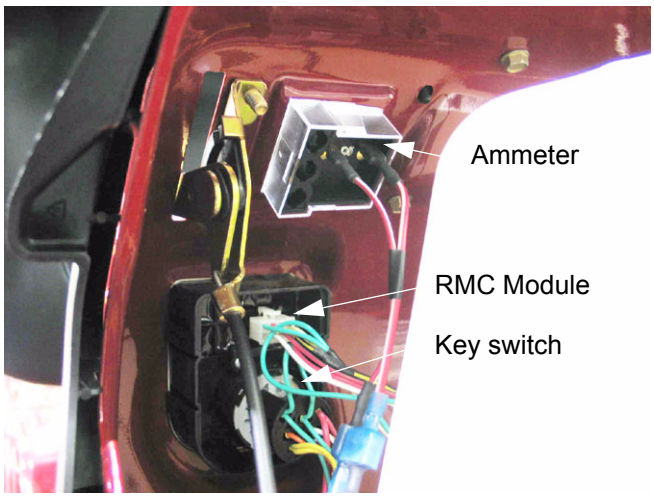


Figure 17.2

17.3. In the **OFF** position, continuity can be found between the M, G, and A1 terminals.
See Figure 17.3.

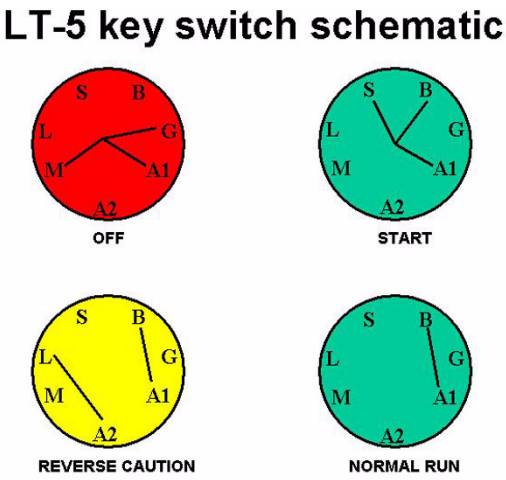


Figure 17.3

- M is connected to the magneto by a yellow wire, G is connected to ground by a green wire, and A1 is connected to the after fire solenoid and alternator.
- In the **OFF** position, the magneto primary windings are grounded, disabling the ignition system. The alternator output that normally keeps the after fire solenoid powered-up is given a more direct path to ground, depriving the after fire solenoid of power. This turns-off the fuel supply.
- **Symptom**-engine runs with key in OFF position: The key switch is not completing the path to ground either because of an internal fault or a bad ground connection elsewhere in the harness. Check continuity between M, G, and A1 terminals with key switch in OFF position. Check green wire continuity to ground.
- **Symptom**-loud “BANG” when key is turned to the OFF position: The after fire solenoid is not closing, either because it is physically damaged or the alternator output is not getting grounded. Check continuity between G and A1 terminals. Check continuity from red wire to afterlife solenoid.
- **Symptom**-Engine runs 3-5 seconds after key is turned to OFF position: The after-fire solenoid is turning-off the fuel supply, but the ignition is continuing to operate. Check continuity between the M and G terminals in the OFF position. Check continuity from yellow wire connection all the way to the spade terminal on the magneto.

17.4. In the **START** position, continuity can be found between B, S, and A1 terminals.

- Battery power from the B terminal is directed to the start circuit through the S terminal and to the afterlife solenoid through A1. There is no alternator output to A1 until the engine is running.
- **Symptom**-No crank and no starter solenoid click: Power is not getting to the trigger spade on the starter solenoid. Assuming good battery, check for power where the fused red wire with white trace connects to the B terminal.
  Check for continuity between B and S terminals in START position. If power is getting to the S terminal in the START position, the problem lies down-stream in the starter circuit;
  Check continuity from the orange wire on the S terminal to the orange wire with white trace on the trigger spade on the starter solenoid. If it is broken, trace through the brake and PTO switches.
- **Symptom**-No crank, solenoid click: The problem lies in the heavy-gauge side of the starter circuit; battery cables, starter cable, solenoid, or ground issue.
- **Symptom**-Crank, spark, but not fuel: Power is not reaching the afterlife solenoid.
  Check continuity from B to A1 in the START position. If power is reaching the red wire that connects to the A1 terminal in the start position, the problem lies down-stream of the key switch.
  A handy quick-check is to apply power to the red wires where they connect to the S terminal (whole circuit) or directly to the afterlife solenoid to listen for the audible “click” that it makes when functioning.
- **Symptom**-Crank, but no spark: This is a highly unlikely scenario. If it occurs after a key switch has been changed independently of the RMC module, this would arouse suspicion that the wrong key switch was installed. Otherwise, the problem lies elsewhere in the safety circuits or engine. Do not over-look the possibility of a bad magneto or chafed ground lead within the engine harness.

17.5. In the **NORMAL RUN** position (green zone), the B and A1 terminals should have continuity. Once the engine is running, the alternator produces current that tracks-back from the A1 circuit to charge the battery, via the red wire with white trace connected to the B terminal.
The plain red wire carrying alternator current to the A1 terminal doubles-back, with the second plain red wire on that terminal supplying power directly to the after-fire solenoid.

- **Symptom**-Battery does not charge: If the switch has continuity between B and A1 in the RUN position, follow the engine manufacturer’s recommendations for testing alternator output.
  If alternator output is getting to and through the key switch, but not reaching the battery, the fuse may have blown after start-up. A blown fuse will disable the starter circuit.
  A simple quick-test for the presence of alternator output at the battery is to check across the battery posts for DC voltage.
- **Symptom**-After-fire solenoid does not work: engine starts and dies: The after-fire solenoid is powered directly by the red wire carrying alternator output, and should operate independently of anything else on the tractor once the engine is running. If the alternator fails *and* battery power is not reaching the afterlife solenoid through the key switch, it will not work. This is an unusual set of circumstances.

17.6. In the **REVERSE CAUTION MODE** (yellow zone), the same characteristics are true as for the normal run position, but *in addition* the L terminal will have continuity with the A2 terminal. The A2 terminal is connected to the RMC module by a white wire. The L terminal (formerly used for the lighting circuit) connects directly to the ground circuit of green wires.
When the key is in the REVERSE CAUTION MODE position, the white wire carries a ground signal to the RMC module. When the parking brake is not set, this ground signal tells arms (enables), *but does not turn-on* the RMC module.

- **Symptom**-RMC module will not turn-on: Check for continuity between A2 and L terminals on the key switch when it is in the REVERSE CAUTION MODE position. Confirm that the green wire has continuity to ground. If the switch is capable of establishing a ground signal to the RMC module, the problem is likely to lie elsewhere in the system.

- **Symptom**-RMC module will not turn-on: confirm that the ground path (continuity to ground) to the white wire is broken when the key switch is in any position other than REVERSE CAUTION MODE. The RMC module is disarmed (disabled) when the parking brake is set. To re-arm the module, the key is moved to another position, breaking the ground signal, then returned to the REVERSE CAUTION MODE, re-establishing the ground signal. It works something like a latched relay. If it is not possible to break the ground-path, it is not possible to freshly establish it either, and the RMC module will not be armable.
  Causes for such a condition might include a shorted or incorrect key switch, or a chafed white wire shorting to ground between the key switch and the RMC module.

17.7. The RMC Module is in the same housing as the key switch, and is not available separately. For the purpose of diagnosis it is treated separately. Diagnosis in unit with the key switch introduces too many over-lapping variables.
See Figure 17.7.

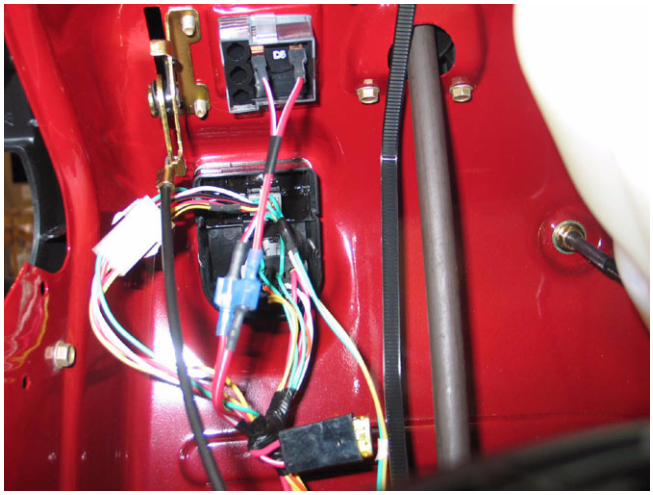


Figure 17.7

17.8. **Principle**: To diagnose the module, the simplest approach is to check all of the inputs (safety circuits) that are connected to it. If the inputs work properly, but the RMC module does not work properly (outputs), then the module can be determined to be faulty. A specific procedure is covered, following the description of the correct operation of the RMC module.

17.9. **Working properly**: The module cannot be diagnosed if its function is not understood. It is designed to work as follows: See Figure 17.9.

Figure 17.9

- When the **RMC module is disarmed**, the tractor will operate as MTD tractors have historical operated:
  If reverse is engaged when the manual PTO is ON, the engine will turn-off.
  If the operator leaves the seat with the bad running, the engine will turn-off.
  If the operator leaves the seat with the PTO in the OFF position, the engine will turn-off unless the brake is applied, whether by the presence of a foot on the pedal or the setting of the parking brake.
  Be aware that there are separate switches for the brake and the parking brake latch.
  Bear in mind that there represented no electric PTO versions of the 700 series lawn tractor.
- When the **RMC module is armed**, the tractor will operate identically to when the module is disarmed.
- When the **RMC module is armed and turned-on**: The tractor will operate identically to when the module is disarmed, except that the operator will be able to put the transmission in reverse with the PTO engaged and the engine and cutting deck will continue to run.
  The operator may put the tractor into and out of reverse as many times as they wish without having to re-arm or turn-on the module again.
- **To arm the RMC module**: the operator must turn the key switch to the REVERSE CAUTION MODE (yellow zone), with the parking brake released.

- **To turn the RMC module ON**: The module must first be armed, then the orange triangular button is depressed, illuminating the red LED indicator to indicate that it is ON. It is important that the operator must take two actions to turn the RMC module ON so that they do not do so inadvertently.
- **The RMC module will turn-OFF and disarm if**: The operator moves the key to any position other than REVERSE CAUTION MODE.
  The operator sets the parking brake.
  If the operator leaves the seat without setting the parking brake, the engine will turn-off. The key movement necessary to re-start the engine will make it necessary to re-arm and turn-on the RMC module if the operator wishes to continue with the ability put the tractor in reverse while the PTO is running.
- **To re-arm and turn the module ON**: If the key is in REVERSE CAUTION MODE position, it must be turned to another position (Normal Run), then returned to REVERSE CAUTION MODE. Once re-armed, the module can be turned-on by pressing orange triangular button. It will be confirmed that the module is ON by the illumination of the red LED on the module.

17.10. **To identify a faulty RMC module**: If the RMC module does not function as described, the **RMC plug test** should be the first step in diagnosis.

- If the RMC plug test confirms that the safety circuits (inputs) work as designed, yet the RMC module does not work properly, the RMC module is faulty.
- The RMC plug test will give an indication of what the problem is if it is not a faulty RMC module. If the problem is identified in a particular circuit, check the safety switch that is associated with the circuit. If the switch is good, then the problem lies within the wiring harness.

  NOTE: Like the electronic components found on most cars, the RMC module requires a fully charged battery to work properly. If the system voltage falls below 12 V. an accurate diagnosis of the RMC module is impossible because the module will be temporarily disabled by low voltage.

17.11. Disconnect the molded 8-pin plug from the RMC module. See Figure 17.11.

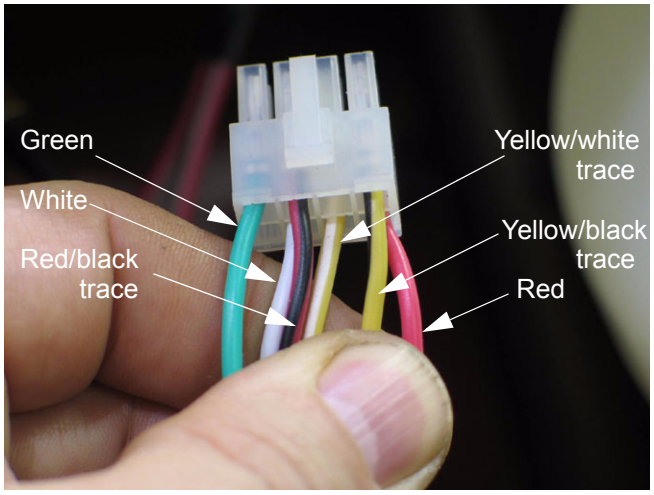


Figure 17.11

NOTE: It may be necessary to unfasten the fuel tank and move it aside for easier access to the plug.

17.12. Looking at the plug head-on, it will be configured as shown in the diagram: There will be 8 female pin terminals. When probed they should yield the results described in the following sections. See Figure 17.12.

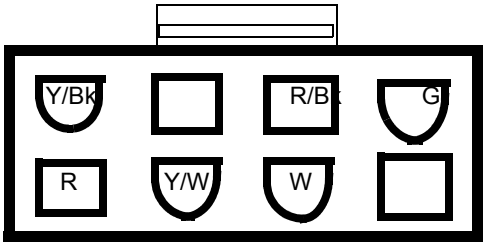


Figure 17.12

17.13. Top left, D-shape: Yellow wire with Black trace:

- **Behavior**: Should have continuity to ground when seat is empty *or* the PTO is ON *and* the brake is released.
- **Circuitry**: The black wire with yellow trace splits into two yellow wires with black traces, and enters a second 8-pin connector (pigtail) within 6” of the 8-pin connector at the module.

17.14. From the other side of the 8-pin pigtail connector, it emerges as one yellow wire with a black trace, and a second yellow wire with a white trace. See Figure 17.14.

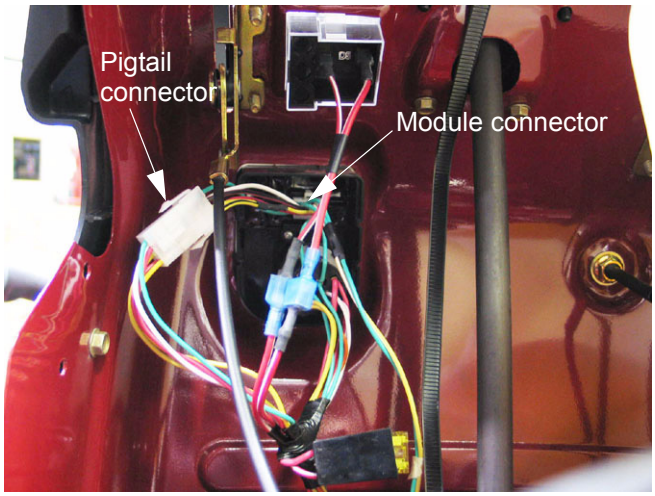


Figure 17.14

17.15. Check the PTO and seat safety circuits with the 8-pin pigtail connector unplugged, then reconnect it and continue with the RMC plug test.

17.16. Yellow wire with white trace from 8-pin pigtail connector: See Figure 17.16.

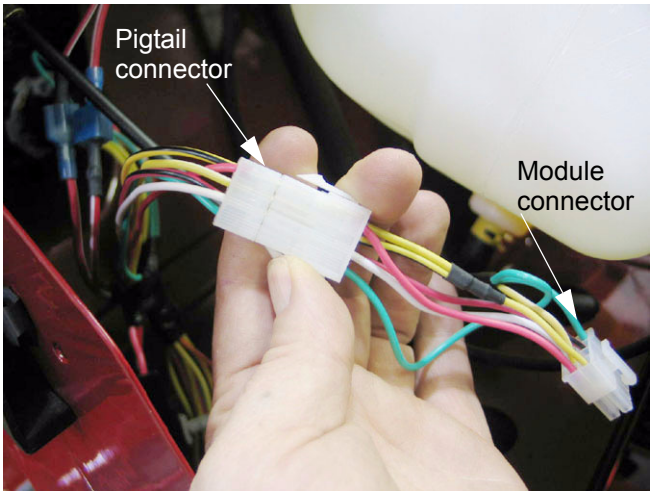


Figure 17.16

- **Behavior**: When the female pin terminal leading into the main harness is probed, there should be continuity to ground *only* when the seat is empty.
- **Circuitry**: The yellow wire with white trace leads to the forward terminal on the seat safety switch, where it finds a path to ground when the seat is empty.
- **Interpretation**: If behavior is correct, the seat safety circuit is good.
  If there is continuity to ground when the seat is occupied, the switch may be inoperative, or there may be a short to ground in the wire leading to it. If there is not continuity to ground when the seat is empty, the switch may be inoperative or there may be an open condition in the wire leading to it.

17.17. Yellow wire with black trace from the 8-pin pigtail connector provides input to the module from the **PTO switch**: See Figure 17.17.

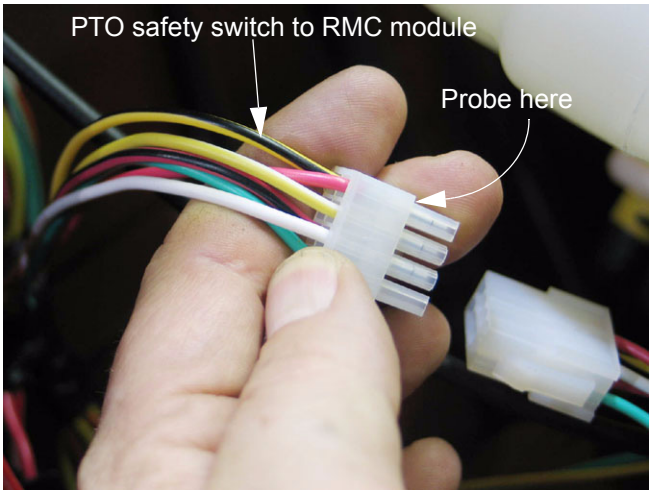


Figure 17.17

- **Behavior**: When the female (metal) pin terminal leading into the main harness is probed, there should be continuity to ground only when the PTO is ON, regardless of whether the brake is applied or the seat is occupied.
- **Circuitry**: The yellow wire with black trace leads to the PTO switch, where it finds a path to ground when the PTO is ON.
- **Interpretation**: If behavior is correct, the N.C. side of the PTO switch /circuit is functioning properly.
  If there is continuity to ground when the PTO is OFF, the switch may be inoperative or there may be a short to ground in the wire leading to it.
  If there is not continuity to ground when the PTO switch is ON, the PTO switch may be inoperative, or there may be an open condition in the wire that leads to it.

17.18. Reconnecting the pigtail, and returning to the RMC Plug: there is a blank space next to the yellow wire with black trace.

17.19. There is a red wire with black trace next to the blank space in the RMC connector. This wire provides the module with input from the **reverse switch.**

- **Behavior**: When the tractor is in reverse, this terminal should have continuity to ground.
- **Circuitry**: This wire runs directly to the reverse safety switch under the right fender. This is a simple metal tang switch that grounds-out against the transmission control lever.
- **Interpretation**: Continuity to ground when the tractor is not in reverse would indicate a short to ground in the circuit. This could take the form of a chafed wire contacting ground, a bent reverse safety switch that is always in contact with another metal part, or a broken plastic insulator that separates the switch from the fender.
  Lack of continuity to ground would indicate a broken or disconnected wire leading to the reverse safety switch, or a switch that is not closing because of physical damage or corrosion.

17.20. At the opposite end of the top row from the yellow wire with black trace is a green wire.

- **Behavior**: The green wire should always have continuity to **ground**.
- **Circuitry**: The green wire leads to ground.
- **Interpretation**: If this ground path is not good, there will probably be other ground-related issues with the tractor: slow starter motor, slow battery charge, dim lights. All ground connections should be mechanically secure and corrosion free.

17.21. The red wire immediately below the Yellow wire with black trace on the OCR plug carries **battery voltage**.

- **Behavior**: D.C. battery voltage should show-up on a volt meter when the red probe is touched to this terminal and the black probe is grounded, regardless of the key switch position.
- **Circuitry**: This wire draws power directly from the B terminal on the key switch.
- **Interpretation**: If there is not battery voltage at this terminal, the tractor is probably not functional at all. Look for a blown fuse, disconnected battery, disconnected ammeter or some other major fault.

17.22. The yellow wire with white trace that is adjacent to the red wire in the bottom row goes to the **parking brake switch** that is riveted to the inside of the left front edge of the dash panel.

- **Behavior**: There should be continuity to ground from this terminal *only* when the parking brake lever is in the ON position.
- **Circuitry**: The yellow and white wire leads directly to the parking brake switch. When the parking brake is ON, the plunger on the switch is down, closing the contacts. When the contacts close, a circuit is completed to the green ground wire.

- **Interpretation**: The wires that lead to this switch are readily visible and traceable.
  If there is no continuity to ground when the parking brake is ON, look for broken wires, a loose connector, or mechanical damage that prevents the linkage from depressing the plunger on the switch.
  If there is continuity to ground when the parking brake is in the RUN position, look for a chafed wire contacting metal or physical damage that prevents the plunger on the switch from extending when the linkage moves.

17.23. The white wire that is adjacent to the yellow wire with white trace provides a **ground signal** to the RMC module when the key switch is placed in the **REVERSE CAUTION MODE.**

- **Behavior**: There should be continuity to ground at this terminal when the key switch is in the REVERSE CAUTION MODE position.
- **Circuitry**: When the key switch is in the REVERSE CAUTION MODE position, a ground path is established by connecting terminal A2 to terminal L within the key switch. The white wire from the RMC module connects to A2, and a green ground wire connects to L.
- **Interpretation**: If the white wire fails to reach a ground path when the key switch is in the REVERSE CAUTION MODE position, the RMC module will not arm or operate. Check the key switch for continuity between A2 and L in the REVERSE CAUTION MODE position, confirm that the green wire connecting to the L terminal does have good continuity to ground, and check for any loss of continuity in the white wire that extends from the key switch to the RMC module, including the molded connector between the two components.

17.24. If the RMC plug test or the pigtail plug test indicates fault with any of the safety switches, the next step is to test the suspect switch. The operation of those switches is described in the following sections.

17.25. The **PTO Switch** is located just to the rear of the mounting point for the PTO lever.
See Figure 17.25.

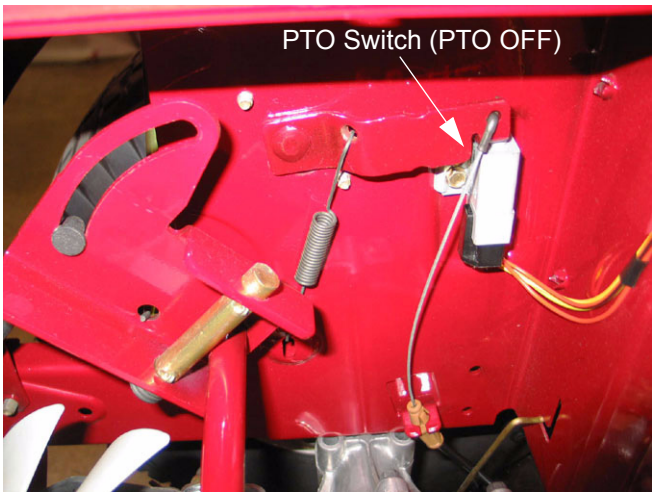


Figure 17.25

- The plunger on the switch is depressed when the PTO lever is drawn rearward into the OFF position. The switch contains two sets of contacts.
- A normally open (NO) set of contacts is in the starter inhibit circuit. When the PTO is OFF, and the contacts are closed, power coming from the brake switch (key switch in START, brakes ON) through the orange wire with black trace is passed on to the trigger terminal on the starter solenoid through the orange wire with white trace.
- A normally closed (NC) set of contacts is in the safety shut-down circuit. A circuit is completed from the M terminal on the key switch through the yellow wire to the Magneto terminal on the RMC module through the yellow wire with black trace when the contacts are closed. This gives the RMC module the ability to turn-off the engine when the PTO is ON.

17.26. The **Brake Switch** is mounted to the left frame channel, just beneath the running board and immediately behind the clutch / brake pedal. See Figure 17.26.

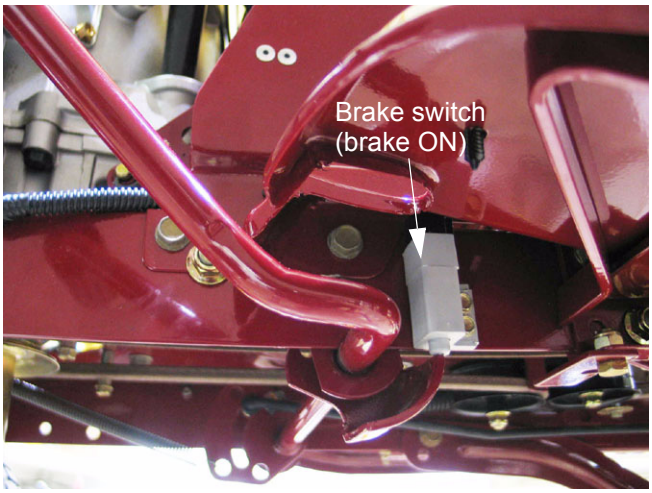


Figure 17.26

- The plunger on the switch is depressed when the clutch / brake pedal is pressed-down, de-clutching the drive belt and applying the brakes. The switch contains two sets of contacts.
- A normally open (NO) set of contacts is in the starter inhibit circuit. When the clutch / brake pedal is depressed, the contacts are closed, power coming from the key switch (key switch in START) through the orange wire is passed on to the PTO switch through the orange wire with black trace.
- A normally closed (NC) set of contacts is in the safety shut-down circuit. A circuit is completed from the M terminal on the key switch, and directly from the magneto primary windings through the pair of yellow wires to the clutch / brake switch through to the yellow wire with black trace when the contacts are closed.
- The yellow wire with black trace leads to one element of the seat switch. If the seat is vacant *and* the pedal is up, the engine will turn-off.

17.27. The **Park Brake Switch** is riveted inside the left front edge of the dash panel. See Figure 17.27.

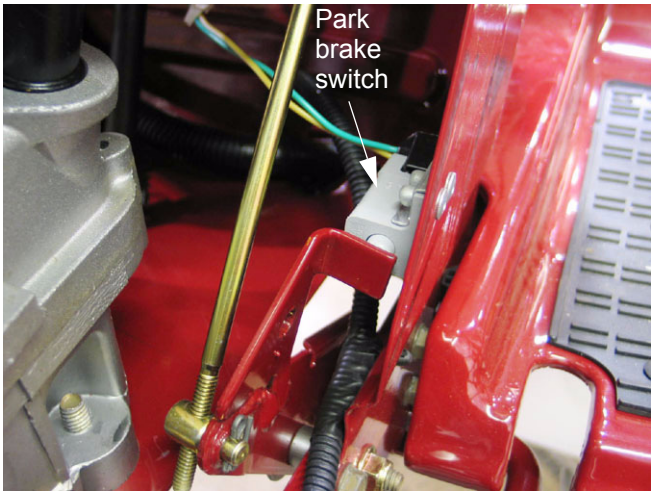


Figure 17.27

- The switch contains two sets of contacts, one set normally open (NO), and one set normally closed (NC). Only the normally open set is used in this application.
- The switch plunger is extended (contacts open) when the parking brake is released: “RUN” position on the label.
- The plunger is depressed (contacts closed) when the parking brake is applied: “ON” position on the label.
- To insure that the correct spade terminals on the switch are tested, it may be best to identify the yellow wire with white trace and the green wire that connect to the switch where they enter the connector for the RMC module, and test from that point.
- When the park brake is set, this switch sends a ground signal to the RMC module. The module responds by turning-off and disarming itself.

  NOTE: Once the operator has set the parking brake, they may leave the seat of the tractor while the engine continues to run. Because the tractor cannot tell if the same operator has returned to the seat when operation resumes, the module must be re-set (armed) and turned-on by the operator who is currently in the seat.

  NOTE: The electric PTO clutch system found on some 600 and 800 series tractors does not use a park brake switch. The electric PTO version disarms whenever the seat becomes vacant.

17.28. The **Reverse Safety Switch** is a simple metal contact tang. The gear selector touches it when placed in the reverse position, providing a ground path through the gear selector lever itself. See Figure 17.28.

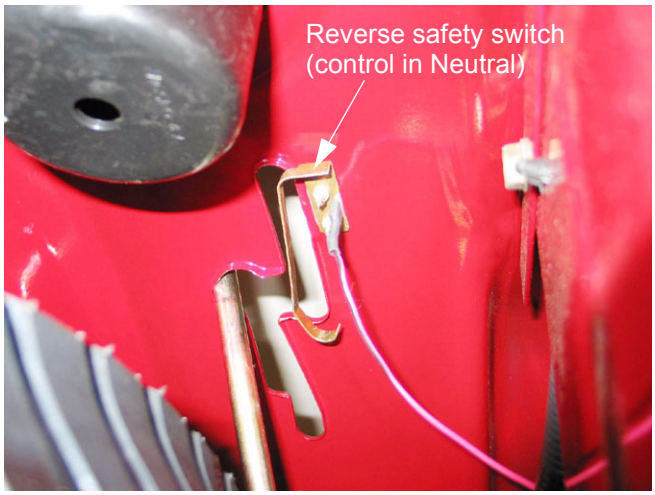


Figure 17.28

- The red wire with black trace leads directly back to the RMC module.
- When the RMC module is turned-on, the rest of the system effectively does not “see” the reverse safety switch.
- This wire can be identified at the RMC module connection, and tested for continuity to ground in REVERSE position.
- The most common problems are likely to be caused by physical damage: a broken insulator between the switch and the fender, an unplugged wire, or a bent tang.

17.29. The **Seat Safety Switch** consists of a pair of simple metal contact tangs attached to the seat mounting bracket. See Figure 17.29.

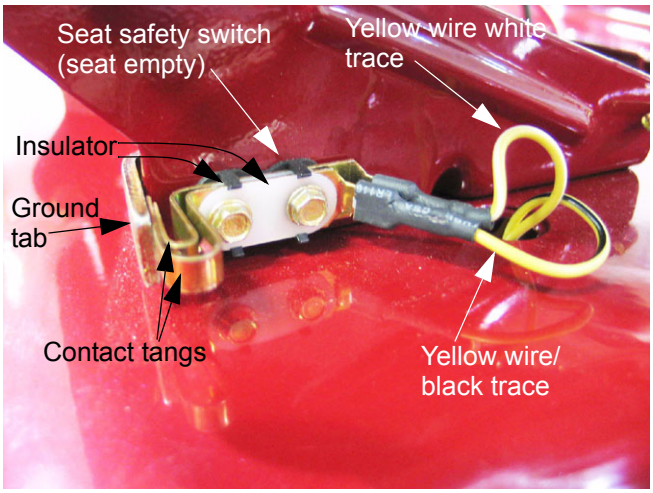


Figure 17.29

- The yellow wire with white trace is connected to the front spade terminal on the seat safety switch. When the seat is vacant, the tab on the seat bracket closes a ground path in series with the PTO switch. If the PTO is ON and the seat is empty, the circuit is completed, shorting-out the primary windings of the magneto, turning-off the engine.
- The yellow wire with black trace is connected to the rear spade terminal on the seat safety switch. When the seat is vacant, the tab on the seat bracket closes a ground path in series with the brake switch. If the brake is not applied, and the seat is empty, the circuit is completed, shorting-out the primary windings of the magneto, turning-off the engine.
- The most common problems are likely to be caused by physical damage: a broken insulator between the switch and the seat bracket, an unplugged wire, or a bent tang.

17.30. The **starter solenoid** is mounted at the left rear corner of the frame. The mounting bracket is visible beneath the left fender, and the solenoid itself is accessibly by removing the battery. See Figure 17.30.

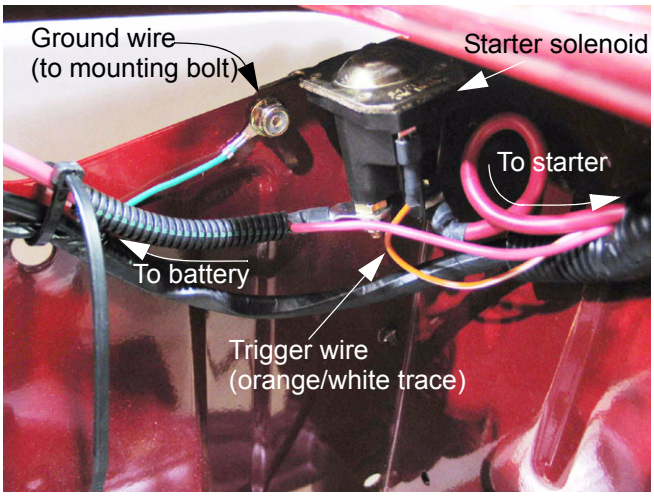


Figure 17.30

- When the proper safety conditions are met, (brake applied, PTO OFF) the orange wire with white trace energizes the windings that magnetize an iron core, pulling the contacts closed between the two heavy posts, connecting battery power to the starter motor.

17.31. The **lighting circuit** is hot whenever the engine is running. It does not draw from the battery, but runs directly off its own circuit on the alternator. See Figure 17.31.

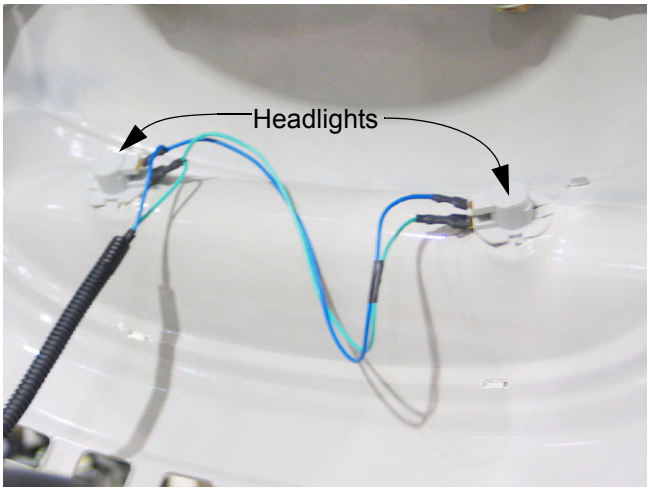


Figure 17.31

- The blue wire carries alternator current, the green wire is a ground.

17.32. The 20A fuse and ammeter are both located near the RMC module / key switch assembly, under the dash panel. See Figure 17.32.

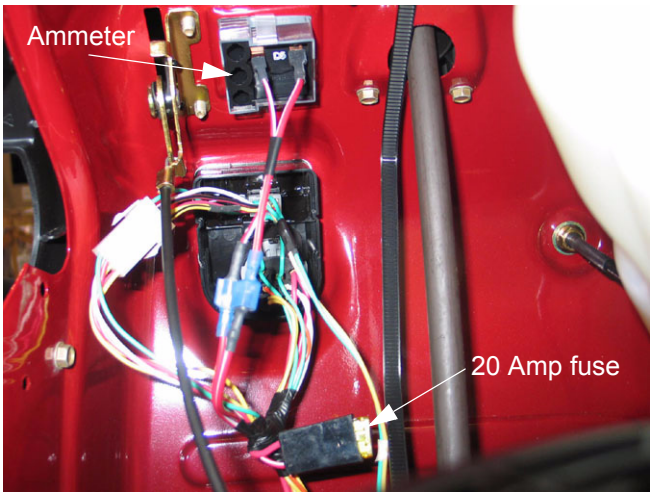


Figure 17.32

- The solid red wire feeds the fuse with power picked-up from the battery cable connection to the “hot” post of the starter solenoid.
- The red wire with white trace carries fused power to the ammeter, and from there to the B terminal on the key switch.
- The ammeter leads both have female spade connectors at the ammeter, but are male / female where they connect to the rest of the harness to maintain correct polarity. The female spade connector that comes off the fuse holder could be plugged directly to the inboard terminal on the ammeter, maintaining correct polarity.
- Incorrect polarity will have no ill effects other than a backward reading on the ammeter.
- A failed fuse, internally failed ammeter, or disconnected ammeter will disable most of the tractor’s electrical system.
- Remember that a failed fuse has done it’s job of protecting the rest of the circuit from an overload. If a fuse blows, figure-out why and correct the core problem before returning the tractor to service.

17.33. The engine harness connector on the White tractor has alternator and safety circuit components. See Figure 17.33.

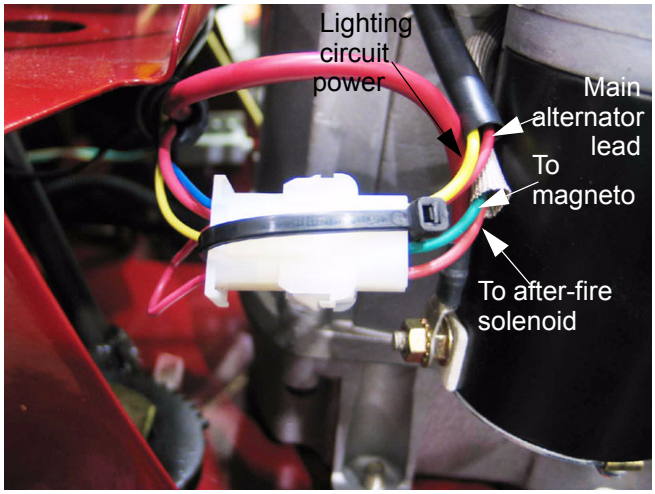


Figure 17.33

- The red wire in the thermally insulated conduit near the starter motor leads to the after-fire solenoid. It receives power from the battery and the alternator through red jumper wire.
- The green wire in the thermally insulated conduit near the starter motor leads to the magneto primary winding connection. On the tractor side of the connection is the yellow wire that provides engine shut-down capability through a variety of possible ground paths.
- The yellow wire in the PVC conduit that emerges from under the engine shroud connects to the blue wire in the tractor harness, providing dedicated power for the lights.
- The red wire in the PVC conduit that emerges from under the engine shroud connects to paired red wires in the tractor harness. One feeds power to the B terminal on the key switch, while the other provides power to the after-fire solenoid when the engine is running.
- Refer to the engine manufacturer's specifications to test starting and charging systems.

17.34. The engine harness connector on the Briggs and Stratton powered Troy-Bilt tractor also contains alternator and safety circuit components. See Figure 17.34.

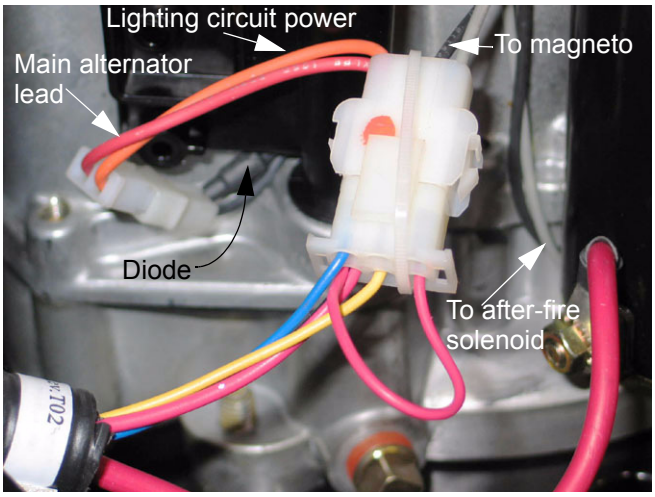


Figure 17.34

- The gray wire in the engine harness leads to the after-fire solenoid. It receives power from the battery and the alternator through red jumper wire.
- The black wire in the engine harness leads to the magneto primary winding connection. On the tractor side of the connection is the yellow wire that provides engine shut-down capability through a variety of possible ground paths.
- The red wire in the engine harness contains a diode. It provides D.C. power to paired red wires in the tractor harness. One feeds power to the B terminal on the key switch, while the other provides power to the after-fire solenoid when the engine is running.
- The orange wire carries unregulated, non-rectified alternator output to the blue wire in the tractor harness, providing dedicated power for the lights.
- Refer to the engine manufacturer's specifications to test starting and charging systems.

17.35. **Ground issues**: It is relatively easy to track where power is on the positive side of the system. The negative side is frequently neglected, though it may account for just as many electrical problems as the positive side.

17.36. Most technicians' first instinct when testing ground paths is to set the multimeter to the Ohms scale (Ω) and look for continuity using resistance as a measurement. This method does give a rough idea if the circuit is complete or not.

17.37. Resistance is not the most definitive scale for identifying circuits that are complete, but have reduced current carrying capacity because of bad connections, physical damage, or corrosion.

17.38. As a point of illustration, a short length of 12 or 14 gauge stranded wire can be stripped at the ends to facilitate an Ohm reading. See Figure 17.38.

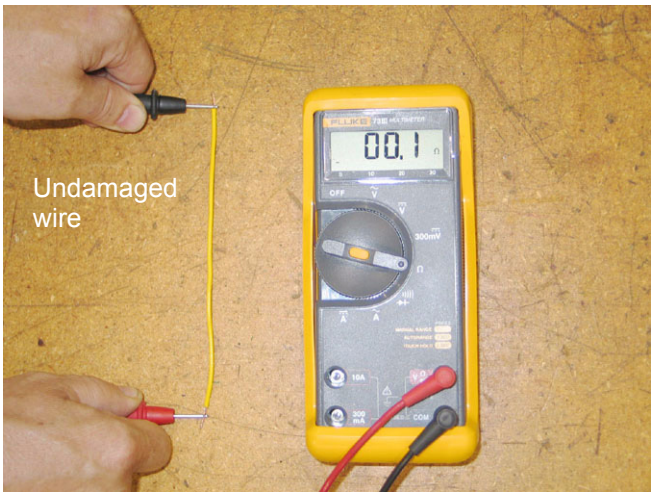


Figure 17.38

17.39. For comparison, strip away insulation at the middle of the wire, and snip strands until only a few remain. Repeat the Ohm reading. There will not be a substantial change. See Figure 17.39.

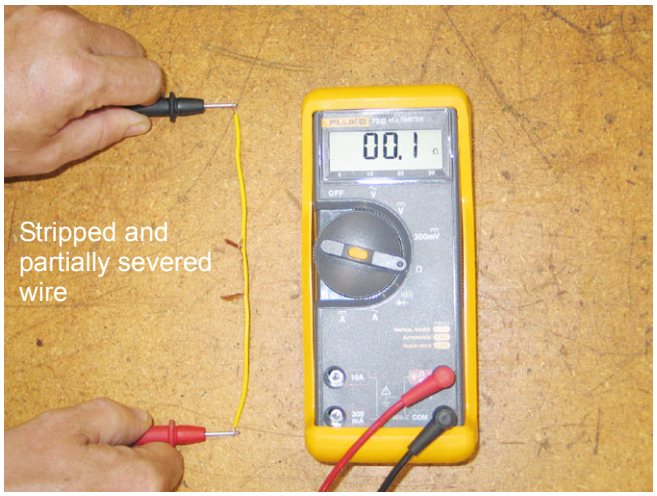


Figure 17.39

- While the actual resistance did not change, the ability of the whittled-down length of wire to carry current is vastly reduced.
- Similar effects occur when a terminal is not firmly crimped, a connection is loose, insulated by paint or corrosion, or the wire is chafed, cut, or corroded.

17.40. A more effective way to identify this reduced current carrying capacity is to look for "voltage drop".

17.41. Voltage drop tests are useful on both the positive or the negative side of the system. We will concentrate on the negative side to begin with. See Figure 17.41.

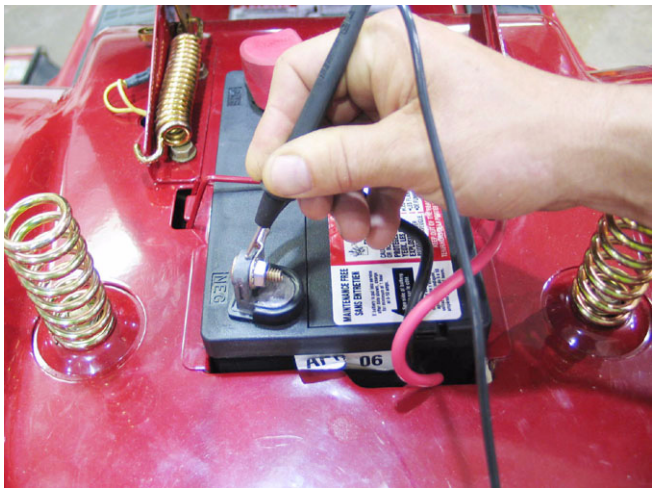


Figure 17.41

- Ultimately, any negative current should find its way back to the negative post of the battery.
- To check ground-side voltage drop: set-up a multimeter to measure 12V DC.
- Make a good electrical connection between the black (-) probe and the negative post on the battery.
- Make a good electrical connection between the red (+) probe and the suspect point of ground.
- Power-up the circuit in question.
- The voltage that shows-up on the meter is the power that is not following the intended path back to the negative battery post.
- Voltage drop on a good circuit should be less than 0.1 volts. A voltage drop reading on the meter of greater than 0.2 volts indicates a fairly substantial problem that demands attention.

17.42. As an example, if the starter solenoid does not engage properly, check for voltage drop between the ground point for the starter solenoid and the negative post on the battery. See Figure 17.42.

Figure 17.42

17.43. With the starter engaged, this machine exhibited a voltage-drop reading beyond 0.30 volts, indicating a poor ground connection.

17.44. A similar ground-side test on a tractor with a slow-cranking starter motor can be conducted between the engine block and the negative battery post. See Figure 17.44.

Figure 17.44

17.45. With the starter engaged, this machine exhibited a voltage-drop reading beyond 0.30 volts, indicating a poor ground connection.

17.46. Individually, these readings should lead a technician to inspect the connection between the solenoid and the ground path (e.g. mounting hardware, green wire with eyelet beneath head of solenoid mounting bolt), or the engine and the frame (e.g. loose or rusty engine mounting bolts).

17.47. If both of these readings were found on the same tractor, a common point in the system would be the primary suspect (e.g. poor connection between negative battery cable and frame).

17.48. Applying this principle to the positive side of the system: See Figure 17.48.

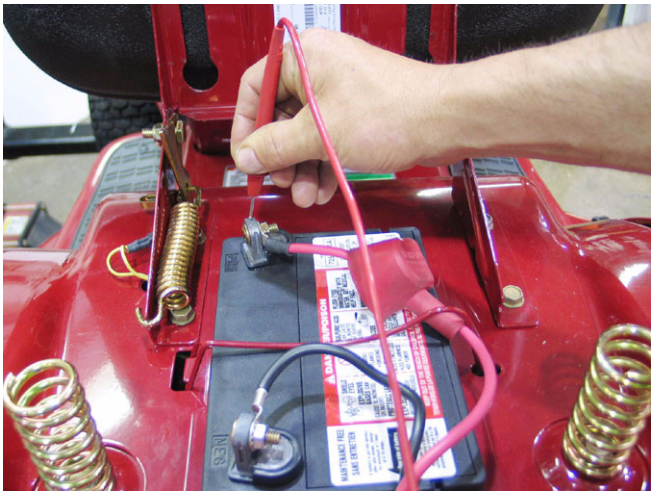


Figure 17.48

- Ultimately, any positive current should find its way from the positive post of the battery to its destination through the wiring harness.
- To check hot-side voltage drop: set-up a multimeter to measure 12V DC.
- Make a good electrical connection between the red (+) probe and the positive post on the battery.
- Make a good electrical connection between the black (-) probe and the suspect point of the circuit.
- Power-up the circuit in question.
- The voltage that shows-up on the meter is the power that is not following the intended path back to the negative battery post.
- Voltage drop on a good circuit should be less than 0.1 volts. A voltage drop reading on the meter of greater than 0.2 volts indicates a fairly substantial problem that demands attention.

17.49. As an example, if the tractor had a slow-turning starter, the ground-side voltage drop measured below 0.1 volts, and there was not a parasitic load on the engine (e.g. PTO clutch that is not fully disengaged), it would be logical for the technician to check voltage drop to the starter. See Figure 17.49.

Figure 17.49

17.50. With the starter motor engaged, the voltage drop reading here is nearly 0.6 volts, indicating a serious problem in the heavy-gauge circuit between the starter and the battery.

17.51. Checking voltage-drop at various points along the circuit can help pin-point the problem.

- Check voltage-drop at the output lug on the starter solenoid:
  If there is a significant difference, the problem lies between the lug on the solenoid and the lug on the starter.
  If there is little change, the problem lies further up-stream.
- Check voltage drop at the input lug on the solenoid:
  If there is significant difference between the reading there and the reading at the output lug (greater than 0.10 volt), then the contacts inside the solenoid may be burned.
  If there is little change, the problem lies further up-stream, between the battery and the solenoid.
- Results may be cross-checked by testing voltage drop across the two posts of the starter solenoid while cranking the starter motor.

17.52. This test may also be applied to the light gauge circuits on the tractor.

17.53. Switches may be bench tested using an Ohm meter. Generally speaking, safety switches will have less than 0.2 Ω through the contacts.

17.54. On MTD switches:

- Normally Closed contacts are identified by the letters “NC” stamped on the spades that connect to those contacts.
- Paired spades (going to the same set of contacts) are next to each-other flat-to-flat (not edge to edge).
- It is good to test switch contacts in both modes: open and closed, confirming that each set of contacts is neither shorted nor faulted.

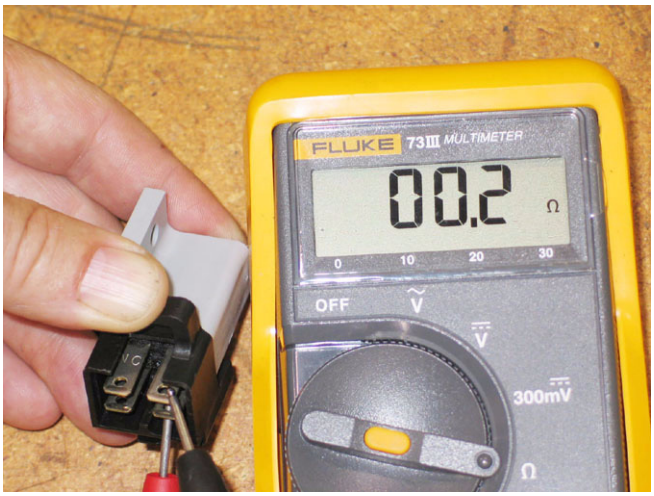
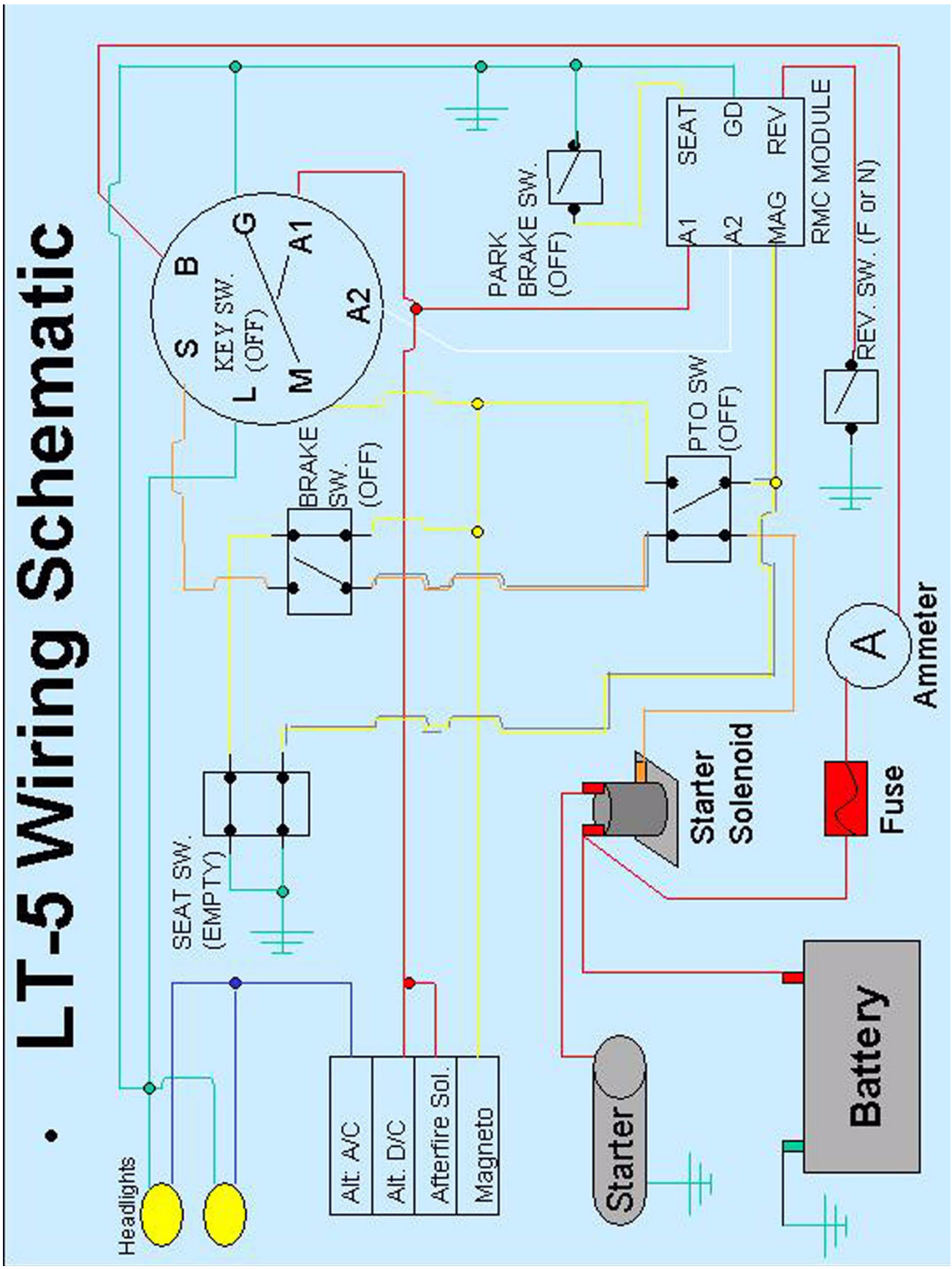


Figure 17.54


LT-5 Wiring Schematic
KEY SW.
(OFF)
S
B
G
L
M
A1
A2
PARK
BRAKE SW.
(OFF)
SEAT
GD
REV
A1
A2
MAG
RMC MODULE
REV. SW. (F or N)
BRAKE
SW.
(OFF)
PTO SW
(OFF)
SEAT SW.
(EMPTY)
A
Ammeter
Starter
Solenoid
Fuse
Battery
Starter
Alt. A/C
Alt. D/C
Afterfire Sol.
Magneto
Headlights

18. FASTENER INSTALLATION SPEC.S

Torque Settings	
Engine Pulley Bolt	450-600 in-lbs / 51-67 Nm
Segment Stop Bolt	200-260 in-lbs / 23-29 Nm
Segment Pivot Bolt	200-260 in-lbs / 23-29 Nm
Steering Block Bolts	200-260 in-lbs / 23-29 Nm
Lower Steering Shaft Screw *	17-20 ft-lbs / 23-27 Nm
Blade Nuts	70-90 ft-lbs / 95-122 Nm
Steering Wheel Screw *	17-20 ft-lbs / 23-27 Nm
Chute Mounting Screws	50-100 in-lbs /6-11 Nm
Idler Pulley	40-50 Ft-lbs /55-68 Nm
Idler Bracket Pivot Blot	40-50 Ft-lbs /55-68 Nm
Spindle screws	200-300 in-lbs /23-34 Nm
Engine Bolts	200-450 in-lbs / 23-51Nm
Trans Axle (single speed)	
Transmission Pulley Nut	10-15 ft-lbs / 14-21 Nm
V-Speed Bracket **	260-350 in-lbs / 29-40 Nm
Tension Pulley **	260-350 in-lbs / 29-40 Nm
Perimeter Bolts	90-120 in-lbs / 11-14 Nm
* Loctite	
** Nut w/nylon insert	
Note:	
Apply never seez to the crank shaft prior to re-installing	
the Engine pulley	