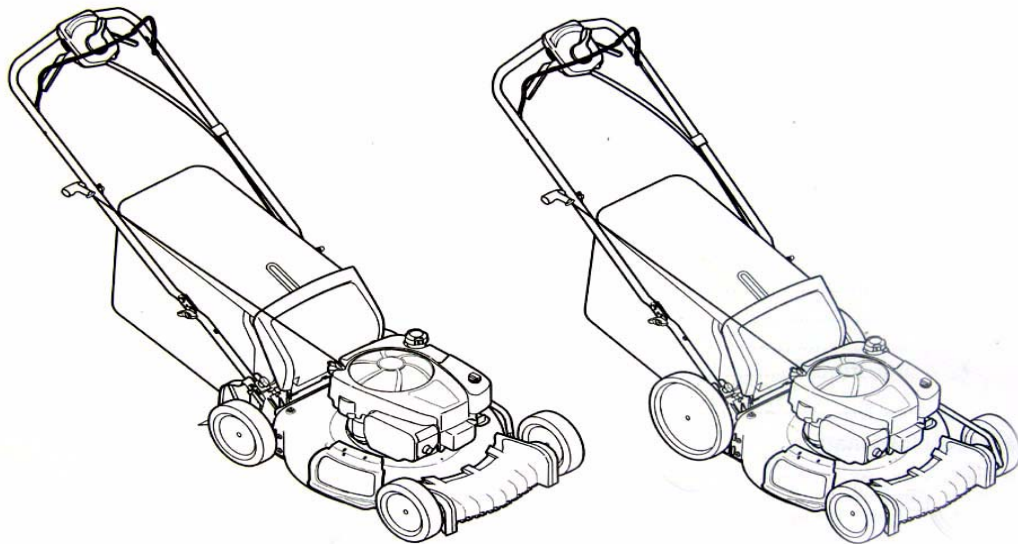




Professional Shop Manual



“C” and “D” Series Mowers

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.

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CHAPTER 1: INTRODUCTION

Professional Service Manual Intent: This manual is intended to provide service dealers with repair and overhaul procedures for the “C” and “D” series mowers.

Disclaimer: The information contained in this manual is correct at the time of writing. Both the product and the information about the product are subject to change without notice.

About the text format

Certain flags and key words are used to indicate the nature of the text that accompanies them. They are as follows:



Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.



Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

NOTE: “NOTE” is used to point-out helpful information that may not fit as a step in a procedure.

1. Numbered steps indicate specific things that should be done, and the order in which they should be done.
 - 1a. Sub steps will be lettered and nested within steps. Two or more sub steps may be combined to describe the actions required to complete a step.
 - **Bullet points:** Indicate sub-steps or points of interest, without implying order or relative importance.

Disclaimer: This manual is intended for use by trained, professional technicians.

- Common sense in operation and safety is assumed.
- In no event shall MTD be liable for poor text interpretation, or poor execution of the procedures described in the text.
- If the person using this manual is uncomfortable with any procedures they encounter, they should seek the help of a qualified technician.

C and D series mowers

Safety

This Service Manual is meant to be used along with the Operator's Manual. Read the Operator's Manual and familiarize yourself with the safety and operational instructions for the equipment being worked on. Keep a copy of the Operator's Manual for quick reference. Operator's manuals may be viewed for free at the brand support website. It will be necessary to have the complete model and serial number for the equipment.



- Be prepared in case of emergency:
 - Keep a fire extinguisher nearby
 - Keep a first aid kit nearby
 - Keep emergency contact numbers handy
- Replace any missing or damaged safety labels on shop equipment.
- Replace any missing or damaged safety labels on equipment being serviced.



- Grooming and attire:
 - Do not wear loose fitting clothing that may become entangled in equipment.
 - Long hair should be secured to prevent entanglement in equipment.
 - Jewelry is best removed.
- Protective gear: includes, but is not limited to
 - Clear eye protection _____ while working around any machinery
 - Protective gloves _____ where necessary
 - Armored footwear _____ when working around any machinery
 - Hearing protection _____ when working in noisy environments
 - Chemically resistant gloves _____ when working with chemicals or solvents
 - Respirator _____ when working with chemical or solvents
 - Appropriate tinted eye protection ____ when cutting or welding



- Remember that some hazards have a cumulative effect. A single exposure may cause little or no harm, but continual or repeated exposure may cause very serious harm.
- Clean spills and fix obviously dangerous conditions as soon as they are noticed.
- Lift and support heavy objects safely and securely.
- Be aware of your surroundings and potential hazards that are inherent to all power equipment. All the labels in the world cannot protect a technician from an instant of carelessness.



Exhaust fumes from running engines contain carbon monoxide (CO). Carbon monoxide is a colorless odorless gas that is fatal if inhaled in sufficient quantity. Only run engines in well ventilated areas. If running engines indoors, use an exhaust evacuation system with adequate make-up air ventilated into the shop.

Fasteners

- The fasteners used on the equipment described in this manual, and the engine that powers it are a combination of metric and fractional inch. For this reason, wrench sizes are frequently identified in the text, and measurements are given in U.S. and metric scales.
- If a fastener has a locking feature that has worn, replace the fastener or apply a small amount of releasable thread locking compound such as Loctite® 242 (blue).
- Some fasteners like cotter pins are single-use items that are not to be reused. Other fasteners such as lock washers, retaining rings, and internal cotter pins (hairpin clips) may be reused if they do not show signs of wear or damage. This manual leaves that decision to the judgement of the technician.

Assembly Instructions

- **Torque specifications** may be noted in the part of the text that covers assembly. They may be summarized in tables along with special instructions regarding locking or lubrication. Whichever method is more appropriate will be used. In many cases, both will be used so that the manual is handy as a quick-reference guide as well as a step-by-step procedure guide that does not require the user to hunt for information.
- **Lubricant** quantity and specification may be noted in the part of the text that covers maintenance, and again in the section that covers assembly. They may also be summarized in tables along with special instructions. Whichever method is more appropriate will be used. In many cases, the information will be found in several places in the manual so that the manual is handy as a quick-reference guide as well as a step-by-step procedure guide that does not require the user to hunt for information.
- The level of assembly instructions provided will be determined by the complexity of reassembly, and by the potential for damage or unsafe conditions to arise from mistakes made in assembly.
- Some instructions may refer to other parts of the manual for subsidiary procedures. This avoids repeating the same procedure two or three times in the manual.

C and D series mowers

The “C” Series Mower

The “C” series mower is a 21” (53cm) platform introduced for the 2011 season. “C” series refers to the 5th character in the model number. See Figure 1.1.

- Rear wheel drive with variable speed transmission.
- Drive control for the Troy-Bilt version is by a unique two-lever clutch control with a 4-position speed selector.
- The deck is designed to be used as a rear discharge, side discharge, or mulching mower, easily reconfigured by the customer.
- Like the A and B series mowers, the wheels and drive system of the C and D series mowers are carried by plastic housings that mount to the front and rear of the deck.
- A single lever sets mowing height.
- 8” (20cm) front wheels and rear wheels



Figure 1.1

The “D” Series Mower

The “D” series mower is a high wheel version of the “C” series mower. See Figure 1.2.

- Rear wheel drive with variable speed transmission.
- Drive control for the Troy-Bilt version is by a unique two-lever clutch control with a 4-position speed selector.
- The deck is designed to be used as a rear discharge, side discharge, or mulching mower, easily reconfigured by the customer.
- Like the A and B series mowers, the wheels and drive system of the C and D series mowers are carried by plastic housings that mount to the front and rear of the deck.
- A single lever sets mowing height.
- 8” (20cm) front wheels and 11” (28cm) rear wheels



Figure 1.2

The C and D series mowers used in this manual are branded “Troy-Bilt TB330XP” and “Troy-Bilt TB350XP”. The decks are grey with red controls and labels. They are powered by Briggs&Stratton 175cc OHV engines. These mowers may be built in a variety of brands powered by a variety of engines. When ordering parts, identify the mower by the 11-digit model number and 11-digit serial number.

NOTE: Use only the correct OEM parts when making repairs to the mower or its engine.

Understanding Model and Serial Numbers



Figure 1.3

A sample model number of an “C” series mower is 12AKC39B011. See Figure 1.3.

The break down of what the model number means is as follows:

- 12 indicates that this is a self propelled mower
- . . .A indicates the sales revision
- K indicates 4-speed variable drive with recoil start
- C indicates rear-wheel drive and wheel size
- 3 indicates single lever height adjustment and grass discharge modes.
- 9B indicates the engine
- 011 indicates the brand or retailer

The serial number is 1L210K30336. The serial number reads as follows:

- 1 engineering level
- . L month of production (A= Jan. B= Feb. C= Mar. D= April...J = Dec.)
- . . 21 day of the month
- 0 last digit of the year, repeats every decade
- K plant it was built in (K = Tupelo MS)
- 3 assembly line number
- 0336 sequence number

Technical and service information is available to our company authorized service center personnel through our company corporate offices, regional parts distributors and regional service center field support personnel. Please contact the Central Service Distributor in your area or our contact our corporate offices directly for further service information.

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C and D series mowers

Maintenance chart

Maintenance item	Each use	Each 25 hrs. use	Each 50 hrs. use
Check engine oil	*		
Check air filter	*		
Check for loose/bent blade	*		
Check & gap spark plug		Replace if worn	*
Check cooling fins		After prolonged storage	
Check/clean spark arrestor		*	
Change oil		* and before prolonged storage	
Change air filter		*	
Note on air filter	Air filter and pre-filter life vary dramatically with operating conditions		
Drain or preserve fuel		Before prolonged storage	
Fog or lube cylinder		Before prolonged storage	
Rotate engine to TDC		Before prolonged storage	

NOTE: Refer to the engine manufacturer's manual #769-03354A for complete engine service information.

Fastener Tightening Torques

Description	U.S. Measurement	Metric
Blade Bolt	450-600 in-lb.	50-70 Nm
Wheel nuts	130-170 in-lb.	12-18 Nm
Height adjuster link shoulder screws	45-50 in-lb.	6-7 Nm
Front axle retainers	40-50 in-lb.	3.5-4.5 Nm
Front axle cover	30-40 in-lb.	3.5-4.5 Nm
Rear baffle	30-40 in-lb.	3.5-4.5 Nm
Rear axle lower bracket	30-40 in-lb.	3.5-4.5 Nm
Transmission input pulley nut	100-160 in-lb.	12-18 Nm
Engine mount bolts	20-25 ft-lb.	28-34 Nm
Transmission cover bolts	15-20 in-lb	1-2 Nm
Lower belt cover bolts	45-50 in-lb.	6-7 Nm
Deckwash bolt	45-50 in-lb.	6-7 Nm

CHAPTER 2: BLADE AND BELT

Blades

The condition of the blades will greatly effect the quality of the cut.

The blades should be sharpened and balanced after every 10 hours of cutting, or when a change in cut quality or performance is noticable. Inspect the blade every couple hours of use. Blade sharpening needs vary with local conditions. A dull blade tears the grass instead of cutting it. Torn grass blades leaves a rough look and makes the grass vulnerable to diseases.

Blades need to be examined for damage before sharpening. Blades must be balanced after sharpening to reduce the vibrations felt from the deck.

Bent blades are a sign of a blade impact. The blades must be replaced and the engine inspected for a bent crankshaft if a bent blade is found. A bent blade or a bent crankshaft will cause other damage to the mower. A typical customer complaint would be that parts are vibrating and falling-off the mower. In extreme cases, when the mower is run with a bent blade or crankshaft, the engine can tear loose from the deck.



Running a mower with a bent blade will cause damage to the mower and can create a thrown object hazard. As soon as damage or vibration is noted, the mower should be taken out of service until the problem is repaired.

Do not attempt to straighten a bent blade or crankshaft. The bent part must be replaced. In the case of the crankshaft, solutions include, replacing the crankshaft, replacing the short block, replacing the complete engine, or replacing the mower.



Straightening a bent blade or crankshaft increases the damage to the metal. This can create a thrown object hazard.

Bent blades and bent crankshafts are seldom warrantable damage.

Blades come in a variety of styles; side discharge, mulching, bagging, combination, there are even de-thatching blades on the market. The C and D Series mowers come equipped with a 3-in-1 blade from the factory. The outer part of the leading edge cuts the grass. A wing on the back edge lifts the grass for the next blade and propels clippings toward the bag or side discharge chute if the path to either is open. A stepped-up cutting edge just in-board of the outer cutting edge mulches clippings as they fall, if the side and/or rear discharge chute(s) are closed and the mulch plug is in place.

The air flow in the cutting deck is generated by the spinning blade. If the blade is mounted upside down, the air flow will be reversed pushing the grass down instead of standing up.

NOTE: Blades that are mounted upside down increase the risk of impact damage.



An incorrect or improperly mounted blade can create a thrown object hazard.

C and D series mowers

Blade Removal

To remove the cutting blade:



Before tipping the mower to work on it, make sure it will not start unexpectedly, spill fuel, or create a burn hazard. The engine should be cool, the fuel tank should be empty or nearly empty, and the ignition system should be fully disabled.

1. Make the mower safe to tip-up.
 - 1a. Allow the engine to cool if it has been run recently.
 - 1b. Drain the fuel tank to a level that will prevent spillage.
 - 1c. Disconnect and ground the spark plug wire.
2. Tip the mower with the muffler side down, or tilt the mower back on a lift or workbench. Secure the mower safely so that it will not fall. See Figure 2.1.



Figure 2.1

3. Block the blade from rotating using a block of wood or a blade holder tool.

NOTE: MTD blade holding tool, part number 490-850-0005, can be used block the blade. See Figure 2.2.
4. Remove the blade bolt and diamond-shaped Belleville blade spring using a 5/8" wrench.



Use care around the blade while removing or tightening the bolt. The blade can spin and cause injury.

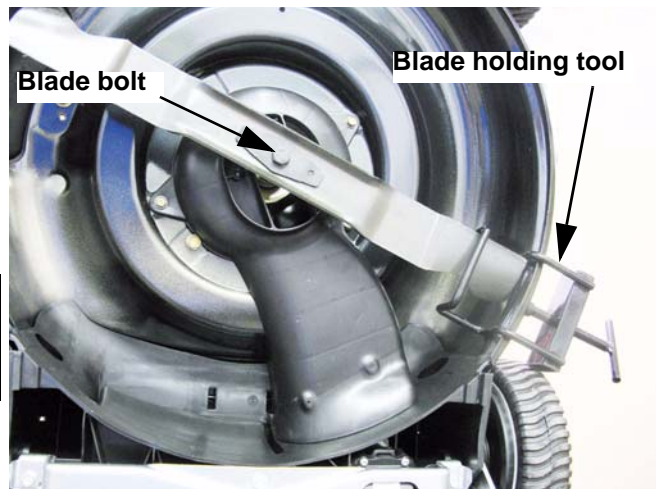


Figure 2.2

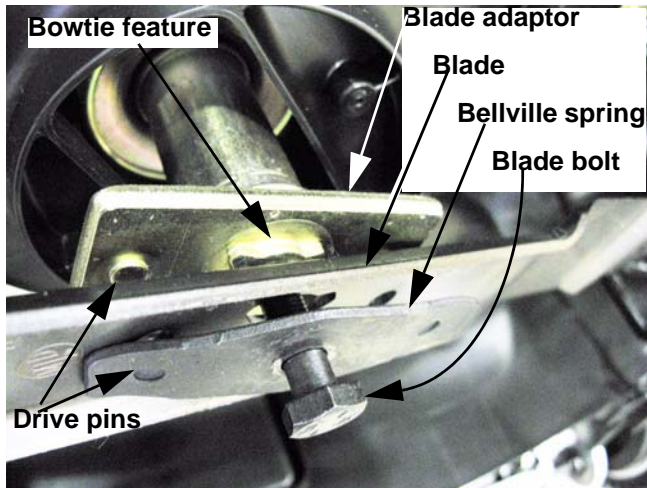


Figure 2.3

5. Lift away the blade.
6. Inspect the blade. If it is bent or worn beyond proper sharpening, replace it with a new blade.
7. Sharpen and balance the blade if it is not badly worn.

NOTE: If the customer complains of vibration or parts falling off, or if the mower is showing signs of vibration fatigue damage, there is reason to suspect a bent blade and/or bent crankshaft.

8. Check the blade adapter, crankshaft and hardware for damage: See Figure 2.3.
 - The end of the crankshaft should not wobble or orbit when the crankshaft is rotated.
 - The key in the blade adaptor and the keyway in the crankshaft should engage firmly. The blade adaptor should not spin on the crankshaft.
 - The bowtie-shaped boss and embossed pins on the blade adaptor should not be deformed. Corresponding holes in the blade should match the blade adaptor and fit securely over the bosses (drive features) on the blade adaptor.
 - The blade bolt should not be damaged, and the bellville spring that fits between the bolt head and the blade should still have tension.



Figure 2.4

9. Install the blade with the blade adapter and Belleville spring washer properly positioned: See Figure 2.4.
 - The part number and the word "BOTTOM" should face the ground when the mower is in its normal operating position.
 - The wings at the ends of the blade should point up, into the deck shell.
 - The lips on the center span of the blade should curve down, away from the blade adaptor

NOTE: Aftermarket blades in non MTD brands or Arnold brand may not have the correct shape drive feature, and may not meet safety requirements for thrown objects.

10. Tighten the blade bolt to a torque of 450-600 in.-lb. (50-70 Nm).
11. Put the mower back in its normal operating position, and insure that it is safe to operate.
12. Test-run the mower in a safe place. Do not put an unsafe mower back into service.

C and D series mowers

Blade Sharpening



Use proper safety equipment when sharpening blades: wear eye protection and keep all guards in place on the grinder used for sharpening.

1. Determine if the blade is too worn to sharpen:
 - The minimum width of the blade at its narrowest point should be no less than 1-5/8" (4.1275cm).
 - There should be no bending, metal separation, or obvious physical damage.
 - The wings should still have a square trailing edge that is 50% of the thickness of the original blank (blade stock).
 - There should be no damage to the drive feature.
2. To sharpen the cutting blades: See Figure 2.5.
 - Dress the original bevel of the cutting edge.
 - Do not sharpen the bottom edge of the blade, and do not extend the bevel beyond the length of the original cutting edge.
 - Remove equal amounts of metal from both ends of the blade, maintaining the original 29° to 32° angle.
3. Balance the blade after sharpening: dress the edge of whichever end of the blade is heavier until the blade stays level on the balancer. See Figure 2.6.



A poorly balanced blade will cause excessive vibration and may cause damage to the mower and result in personal injury.

NOTE: MTD blade balancer AR-SBB-102 or the blade balancing kit, AR-BSK-1 can be used to balance the blade.



Figure 2.5

Blade balancing:

NOTE: the blade is positioned upside-down for better fit on the balancer



Figure 2.6

Belt Removal

The traction drive clutch and ground speed are controlled by two cables on the C & D series mowers. The clutch cable tilts the transmission back, tightening the drive belt. When the belt is tightened, it drives the input pulley on the transmission. The second cable moves a cam that closes the sheaves of the pulley, changing the effective circumference of the pulley, and changing the drive ratio.

NOTE: Use only the correct OEM part number belt.

- A belt that is too long may not engage fully and may not provide the full range of speeds, losing top speed.
- A belt that is too short may not disengage fully, and may drive the transmission even when the clutch lever is released.
- A belt that does not have the same profile or wrapping may not perform as intended.
- The belts used on the C & D series mowers come from various belt manufacturers, but are made to MTD specifications. These specifications are tailored to the mower design, and seldom work-out to standard belt lengths. If MTD went to the trouble and expense of designing a belt for the application, there is a reason they did so.

NOTE: If the belt has broken prematurely, identify and correct the cause of the failure before returning the mower to service.

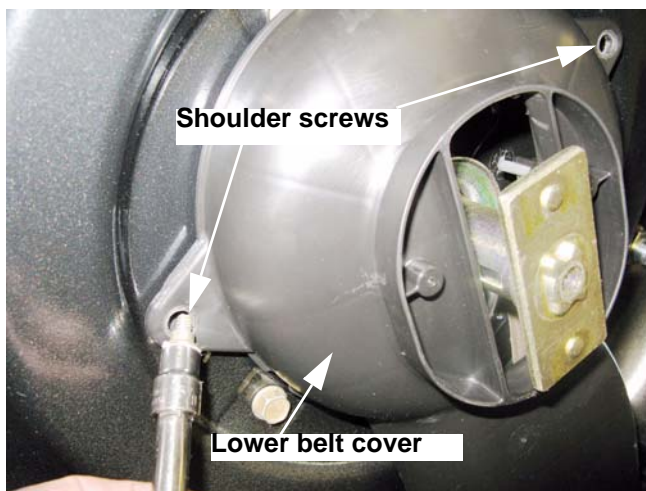


Figure 2.7

1. Confirm that the mower is set to its lowest ground speed position, indicated by a 1 at the speed control on the handlebar.
2. Remove the blade by following the steps described in the blade section of this chapter.
3. Rotate the crankshaft to align the blade adaptor to the opening in the lower belt cover.
4. Remove the two shoulder screws that hold the lower belt cover to the deck. See Figure 2.7.
5. Remove the lower belt cover.

C and D series mowers

- Slide the blade adaptor / drive pulley off of the crankshaft. The belt will come off with it. See Figure 2.8.

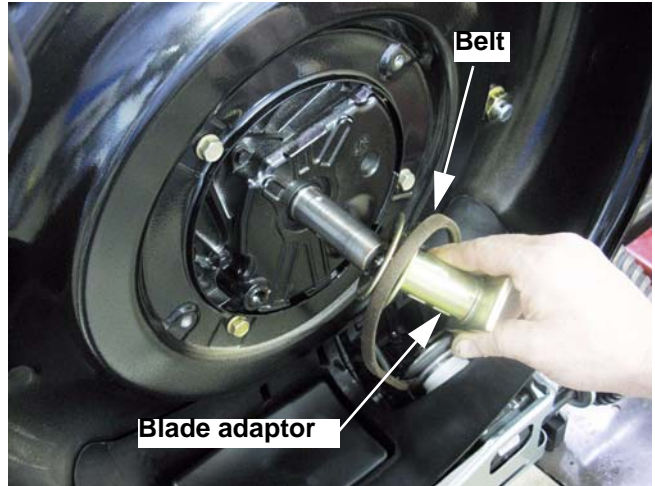


Figure 2.8

- At the back of the mower, lift the rear grass door to reveal the upper belt cover. Secure the grass door with a prop or a strap.
- Remove the screw that secures the upper belt cover. Tilt the back of the cover up, and draw the cover back to release the tabs that locate the front edge of the cover.
- Lift the transmission cover off of the mower. See Figure 2.9.



Figure 2.9

- Unhook the loop in the drive clutch cable from the post that the upper belt cover screw goes into.
- Unhook the clutch release spring from the brackets that hold it, and remove it from the mower. See Figure 2.10.

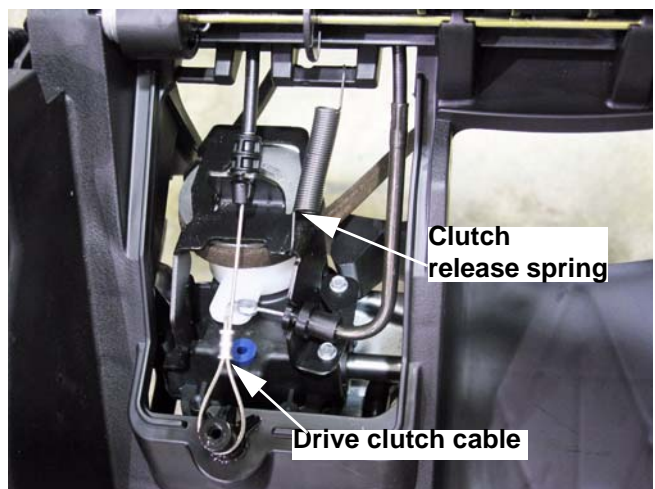


Figure 2.10

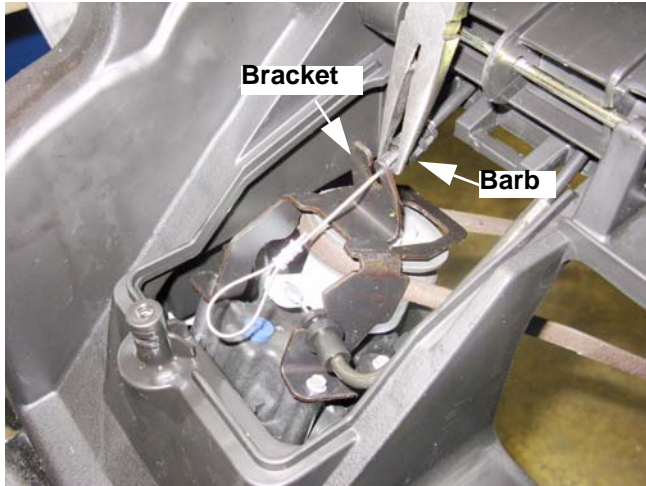


Figure 2.11

NOTE: It is not strictly necessary to disconnect the cables, but doing so will make alignment and installation of the belt keeper / bracket easier during reassembly.

12. Squeeze the barb on the bottom end of the drive clutch cable to release it from its bracket. See Figure 2.11.



Figure 2.12

13. Pry the curved end of the speed control cable housing out of its bracket, and unhook the Z-fitting from the arm on the speed control cam. See Figure 2.12.

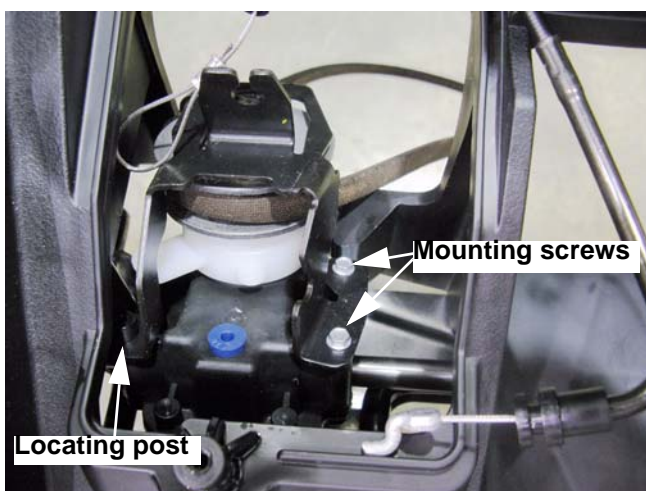


Figure 2.13

14. Remove the two screws that hold the combination belt keeper / cable bracket to the transmission using a 1/4" wrench. See Figure 2.13.

NOTE: There is a locating post on the side of the bracket that is opposite the two screws.

C and D series mowers

15. Work the belt off of the transmission pulley and remove it from the mower. See Figure 2.14.
16. Check the belt, pulleys, and cables for any problems that might cause premature belt failure:
 - Work the drive clutch control and check the cable for full travel and smooth operation.
 - Work the speed control, and check the cable for full travel and smooth operation.
 - Check the pulley sheaves for signs of belt slippage like polished contact surfaces or belt debris / dust.
 - Look for signs that foreign objects may have damaged the belt.
17. Work the speed control cam through its full range of travel to confirm that it move freely. See Figure 2.15.
18. Repair any problems that will damage the new belt.



Figure 2.14

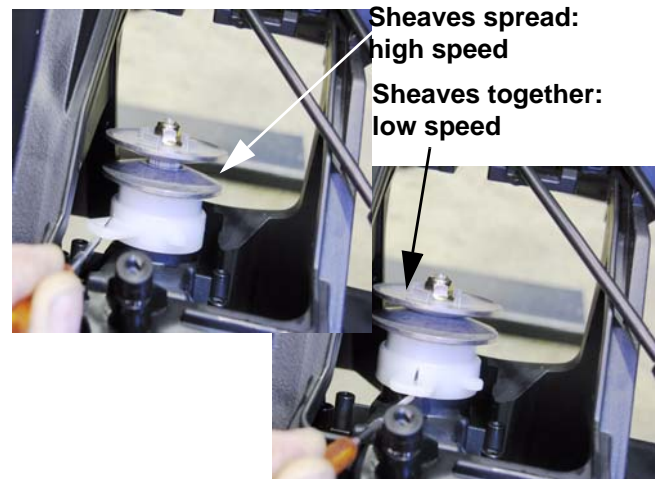


Figure 2.15

Belt Replacement

1. Put the new belt onto the transmission pulley, extending the belt toward the crankshaft.
2. Slip the belt into the pulley on the blade adaptor, then slide the blade adaptor onto the crankshaft. See Figure 2.16.
3. Install the blade adaptor/pulley onto the crankshaft.



Figure 2.16

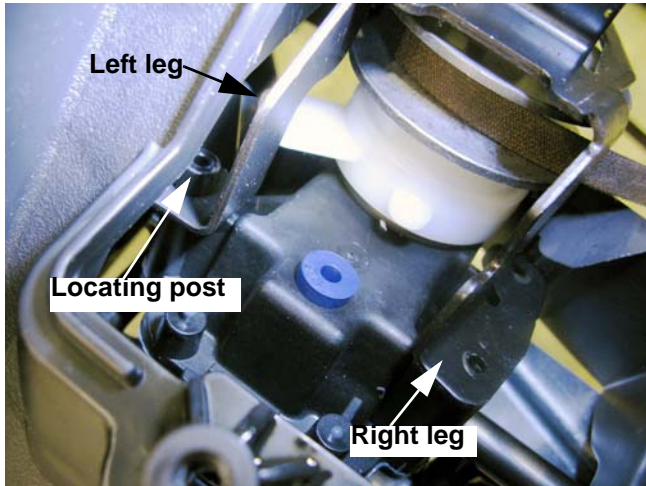


Figure 2.17

4. Position and attach the belt keeper / bracket to the transmission. See Figure 2.17.
 - The left leg of the bracket locates over a post on the transmission housing.
 - The right leg of the bracket is secured with two screws that go into the plastic transmission housing.
 - Do not over tighten the screws.

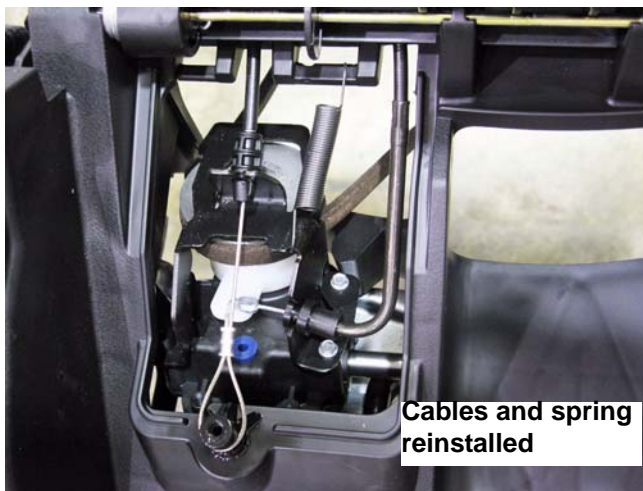


Figure 2.18

5. Reinstall the clutch control cable, the ground speed control cable, and the clutch release spring. See Figure 2.18.
6. Rock the transmission back, or squeeze the clutch lever to tighten the belt.

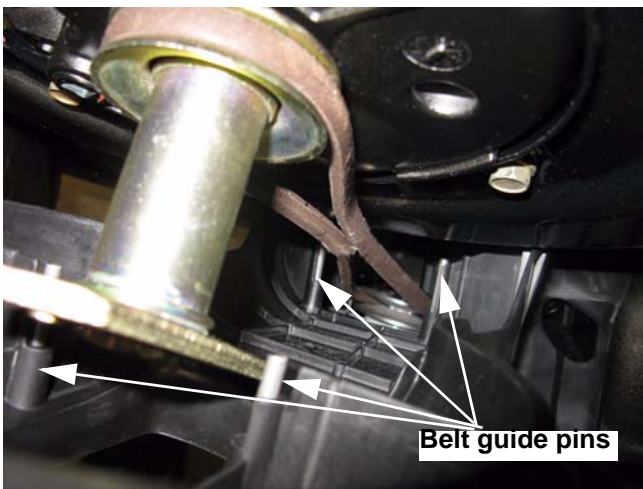


Figure 2.19

7. Install the lower belt cover, being careful to route the belt inside of all four metal belt guide pins that are molded into the cover. See Figure 2.19.

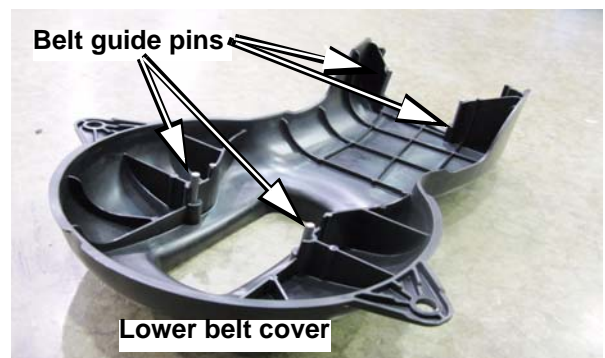


Figure 2.20

C and D series mowers

8. Install the blade, and tighten the blade bolt to a torque of 450-600 in.-lb. (50-70 N-m)
9. Check the operation of the new belt:
See Figure 2.21.

- 9a. With the spark plug still disconnected, support the rear of the mower so that the wheels are off the ground, while the front wheels rest on the ground.
- 9b. Operate the drive clutch to confirm that the transmission rocks back to engage the drive belt, then rocks forward to de-clutch the drive belt when the clutch control is released.
- 9c. Use your left hand to hold the safety bail and drive clutch lever. Pull the recoil rope with your right hand, and move the speed control lever through its full range of travel using your left thumb. The speed cam should open and close the sheave on the transmission pulley in response to the speed control input.



Figure 2.21

NOTE: The sheave will open when the transmission pulley is stationary, moving from a speed drive ratio to a power drive ratio (from 1 to 4 on the speed selector). The belt and transmission pulley must be rotating for the sheave to close without placing undue stress on the speed control cam.

10. Install the transmission cover and test run the mower in a safe area. See Figure 2.22.
 - 10a. Test all operational and safety features before returning the mower to service.
 - 10b. Adjust the thumb roller on the bottom side of the speed control assembly to set the correct belt tension.



Figure 2.22

- Rolling the adjuster toward the front of the mower will increase belt tension. There is an embossed arrow pointing in this direction, adjacent to the roller.
- Rolling the adjuster toward the rear of the mower will decrease belt tension.
- **Too Tight:** If the speed control lever jumps from Speed #4 to Speed #3, or from Speed #3 to Speed #2, when the drive clutch lever is engaged with the engine running, the belt tension is too high.
- **Too Tight:** If the mower wants to “creep” when the speed control lever is in Speed #4 and the drive clutch lever is not squeezed, the belt tension is too tight. If rolling the adjuster toward the rear of the mower does not stop the creeping, further investigation is required.
- **Too Loose:** If the mower does not have sufficient drive force to spin its wheels on smooth concrete (not a broomed or florette surface) with the drive clutch engaged, and the speed control lever set for Speed #1, the belt tension is too low, and the adjuster should be rolled toward the front of the mower to tighten the belt.

CHAPTER 3: CONTROLS AND CABLES

Engine Control Cable

The engine control cable operates the engine brake. When the bail is pulled against the handle bar, the engine control cable pulls the engine brake pad away from the flywheel releasing the brake.

The engine brake has an ignition switch built into it. When the brake is engaged, the ignition switch shorts the ignition module to ground. This turns off the ignition, stopping the engine.



Figure 3.1



Figure 3.2

To check the operation of the engine control Cable:

1. Start the engine, and confirm that it operates at the correct engine RPM to keep the blade tip speed as near as possible to 19,000 ft./minute (5,790 meters/minute) without going over. See Figure 3.1.

NOTE: For 21" (53.3cm.) mowers, that limit is 3,458 RPM. Staying safely below that limit, MTD specs the engines on the C and D series mowers to run at $3,200 \pm 100$ RPM.

2. If the engine speed is substantially under 3,200 or at all over 3,200 RPM, adjust the engine speed according to the engine manufacturer's instructions.
3. Release the safety bail, and check the amount of time it takes for the blade to stop rotating.

NOTE: The CSPC Code of Federal Regulations #16, part 1205 dictates that the blade should stop rotating within 3 seconds of releasing the safety bail.

4. If the blade does not stop within 3 seconds, check the operation of the cable. See Figure 3.2.
 - If the cable moves freely throughout its full range of travel, the problem lies in the engine. Repair the engine stop-switch or brake according to the engine manufacturer's instructions.
 - If the cable does not move freely throughout its full range of travel, disconnect the cable from the bail to confirm where the source of the bind is. The cable is more vulnerable than the bail.
5. Isolate the bail from the cable following the instructions for removing the bail and cable from the mower.

C and D series mowers

To Remove / Replace the Engine Control Cable:

1. Make sure the engine is off and cool enough to safely work around.
2. Squeeze the side of the bail that the cable attaches to inward.
3. When the end of the bail clears the hole in the handlebar that it pivots in, move the bail away from the hole and release the pressure. See Figure 3.3.
4. Unhook the Z-fitting from the safety bail.

NOTE: The opposite side of the bail has a 180° bend in it, so that it hooks into the handlebar.

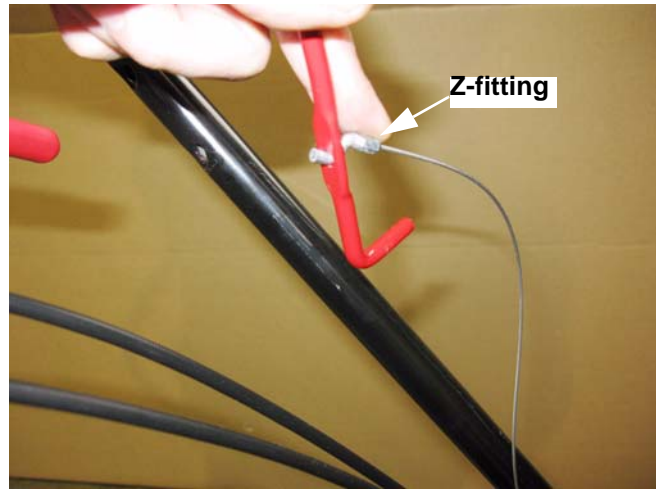


Figure 3.3

5. If the safety bail is to be removed: After the z-fitting is unhooked, pivot the bail upwards to release the hooked end from the right side of the handlebar. See Figure 3.4.



Figure 3.4

6. Pry the cable clip off of the handlebar. See Figure 3.5.

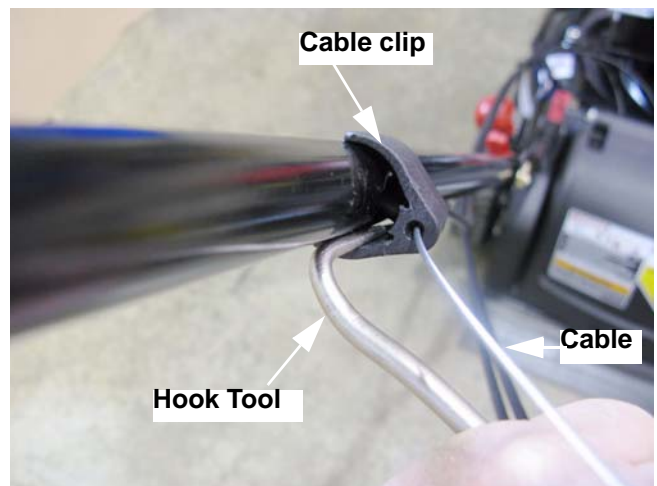


Figure 3.5

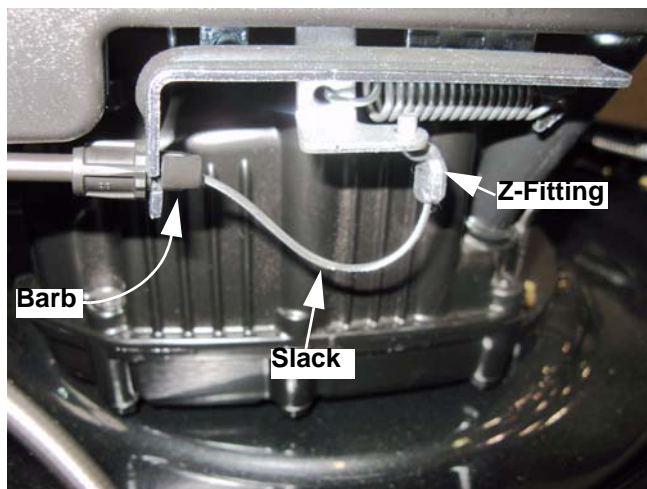


Figure 3.6

7. Use the slack created in the cable to release the Z-fitting from the engine stop control on the engine. See Figure 3.6.
8. Use a pair of needle nose pliers to squeeze the barb at the engine end of the cable housing, releasing it from the the bracket on the engine.
9. To install the new cable, reverse the steps used to remove the old one.
10. Test run the mower in a safe place, and check all of the mower's safety features before returning it to service. Do not return an unsafe mower to service.

Drive Control Housing Assembly

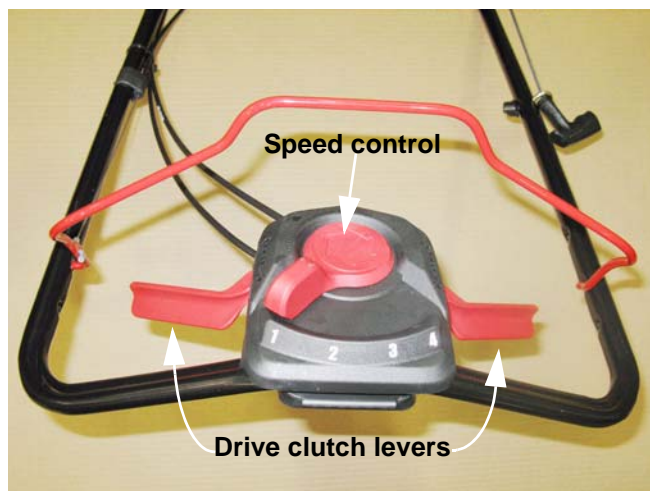


Figure 3.7

Description: The drive control housing on the C and D Series mowers is unique in that it has two drive clutch levers and a 4-position speed control lever. The two clutch levers allow operation with either hand. See Figure 3.7.

The operational description will be broken by function:

- Clutch Engagement
- Speed control

The operational descriptions are followed by detailed disassembly/reassembly instructions.

C and D series mowers

Clutch engagement:

- Within the housing, the two levers cross one another. See Figure 3.8.
- A secondary lever pivots on the same fulcrum as the right-hand side control lever.
- A post on the secondary lever extends into the travel path of both control levers, so that the movement of either control lever will move the secondary lever.
- Clutch cable travel is controlled by the thumb knob at the top end of the clutch control cable housing.
- The clutch operates by tipping the transmission back so that the pulley is drawn into the belt.
- See Figure 3.9.
- The variable speed mechanism works by spreading or closing the sheaves of the input pulley on the transmission. This changes the effective circumference of the pulley, but also changes the length of the belt's path of travel.
- This change in the path of travel changes the amount of tension on the belt.
- To compensate for variations in belt clutching tension across the range of ground speed selections, the bracket that holds the top of the clutch cable moves in coordination with the speed control lever.

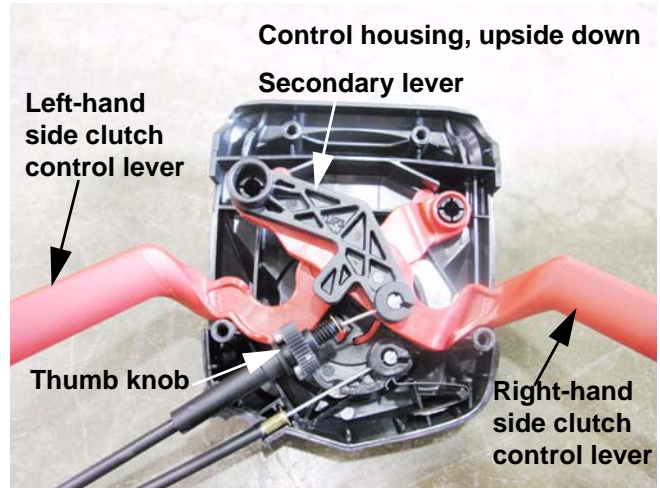


Figure 3.8

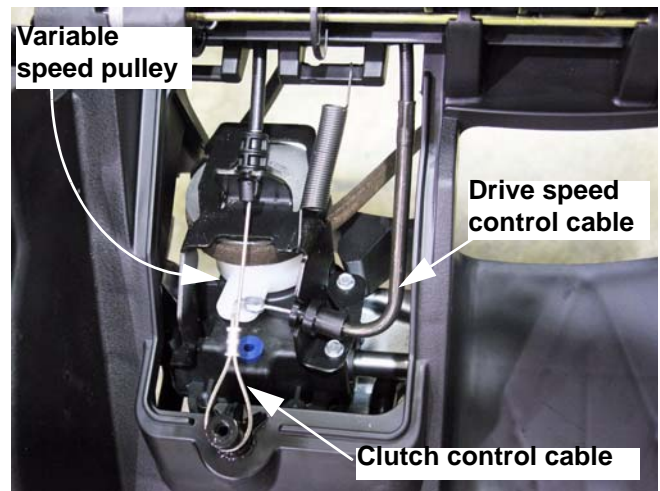


Figure 3.9

Drive Control Housing Removal and Disassembly

1. Remove the large wing nuts on the carriage bolts that fasten the upper handlebars to the lower handlebars. See Figure 3.10.
2. Fold the handlebars forward to provide access to the bottom of the drive control housing.
3. Position the mower so that the length of the cables will allow the control housing to be placed on a suitable work surface.



Figure 3.10

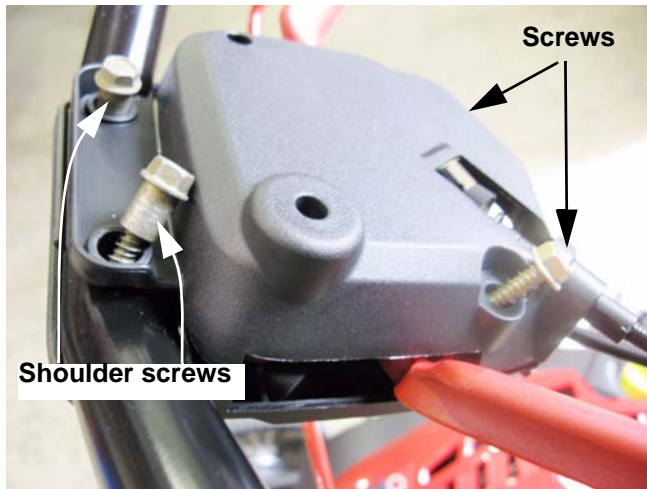


Figure 3.11

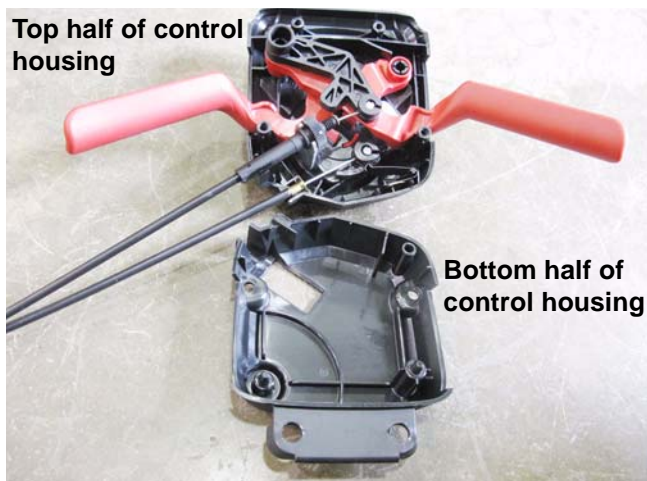


Figure 3.12

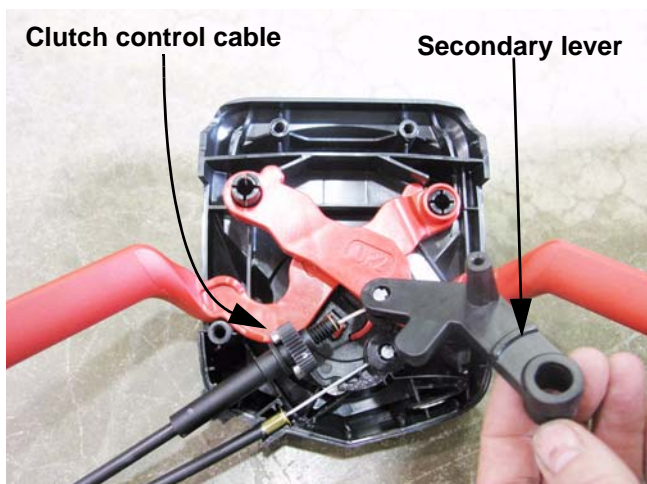


Figure 3.13

4. The control housing is held together and fastened to the upper handlebar by four screws.
5. Remove all four screws using a 3/8" wrench. The shoulder screws go through the handlebar. See Figure 3.11.
6. Carefully separate the two halves of the control housing just enough to allow the housing to be removed from the handlebar.

7. Move the control housing to the workbench, and carefully separate the bottom half of the housing from the top half of the housing. See Figure 3.12.

8. Lift the secondary lever off of the fulcrum post that it shares with the left-hand side control lever. See Figure 3.13.
9. Slip the cable-end barrel out of the hole in the secondary lever.

NOTE: The levers are embossed with indications of their position and order of assembly into the control box. The first parts removed would be the last parts installed.

- The ribbed side of the secondary lever is embossed "UP3".
- The next visible surface after the secondary lever is removed is the top of the left hand side control lever, embossed "UP2".
- The right hand side control lever is embossed "UP1".

C and D series mowers

10. Lift the right-hand side “UP2” control lever off of the tall fulcrum post and out of the control housing. See Figure 3.14.



Figure 3.14

11. Lift the right-hand side “UP1” control lever off of the short fulcrum post and out of the control housing. See Figure 3.15.



Figure 3.15

12. Use a pair of needle nose pliers to compress and remove the detent spring from the speed control actuator. See Figure 3.16.

NOTE: DO NOT over compress the spring. Squeeze it only as tight as is necessary to remove it.

NOTE: Some early production 2011 mowers may have a small flat washer tucked between the flat end of the detent spring and the edge of the control housing. This is intentional.

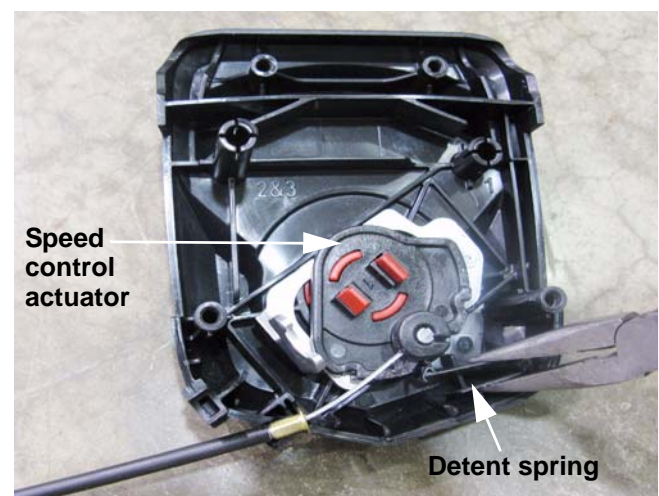


Figure 3.16

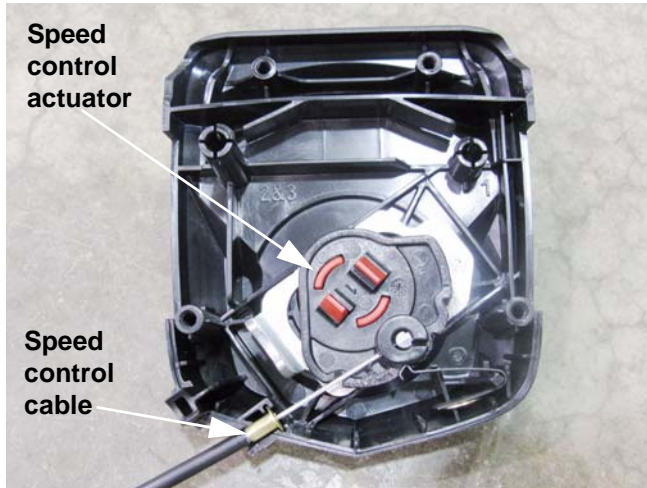


Figure 3.17

13. Lift the flanged end of the speed control cable out of its pocket in the control housing. See Figure 3.17.
14. Pivot the cable to align with the slot in the speed control actuator, and separate the cable-end barrel from the actuator.

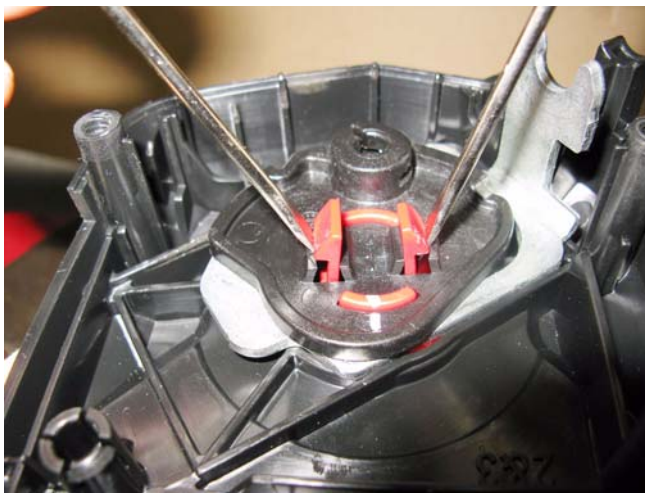


Figure 3.18

15. Use two small straight-blade screwdrivers to release the speed control actuator from the speed control lever. See Figure 3.18.

NOTE: This is most easily done with the speed control lever fixed in a bench vise. Use padding to prevent damage to the lever.

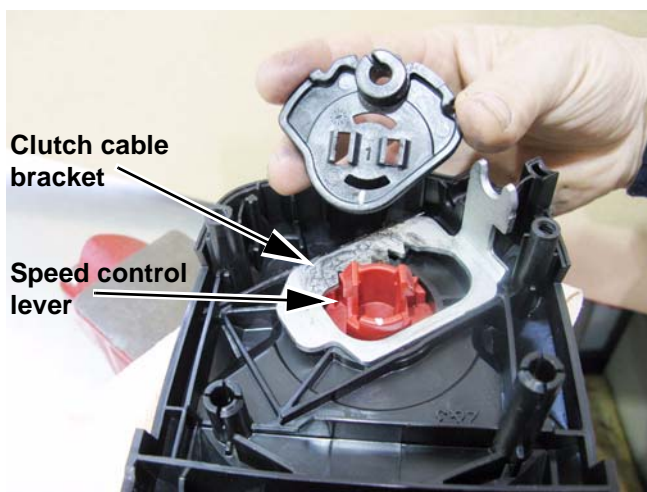


Figure 3.19

16. Lift the speed control actuator out of the drive control housing. See Figure 3.19.

NOTE: The two slots that the lock tabs pass through to fasten the actuator to the lever are different lengths. This makes it impossible to attach the actuator to the lever in the wrong direction.

17. At this point, the clutch cable bracket and the speed control lever can be separated from the drive control housing.

C and D series mowers

Reassembly notes:

18. The pinion gear on the speed control lever must be centered in the rack that moves the clutch cable bracket. See Figure 3.20.
 - As the speed control lever pivots the actuator in one direction, the clutch cable bracket moves in the opposite direction.
 - The actuator draws the speed control cable in, closing the sheave on the transmission pulley.

- AND -

- The clutch bracket eases the clutch cable tension to counter-act the tightening of the belt that results from the growth of the circumference of the pulley.
19. Reassemble the drive control housing by reversing the process of disassembling it.
 20. Carefully slip the housing back over the handlebars, and secure it with the four screws.
 21. Test run the mower in a safe place before returning it to service.
 - 21a. Check all safety features.
 - 21b. Test the speed control mechanism while the engine is running, to make sure the full range of speeds is available.
 - 21c. Adjust the thumb roller on the bottom side of the speed control assembly to set the correct belt tension.

- Rolling the adjuster toward the front of the mower will increase belt tension. There is an embossed arrow pointing in this direction, adjacent to the roller.
- Rolling the adjuster toward the rear of the mower will decrease belt tension.
- **Too Tight:** If the speed control lever jumps from Speed #4 to Speed #3, or from Speed #3 to Speed #2, when the drive clutch lever is engaged with the engine running, the belt tension is too high.
- **Too Tight:** If the mower wants to “creep” when the speed control lever is in Speed #4 and the drive clutch lever is not squeezed, the belt tension is too tight. If rolling the adjuster toward the rear of the mower does not stop the creeping, further investigation is required.
- **Too Loose:** If the mower does not have sufficient drive force to spin its wheels on smooth concrete (not a broomed or florette surface) with the drive clutch engaged, and the speed control lever set for Speed #1, the belt tension is too low, and the adjuster should be rolled toward the front of the mower to tighten the belt.

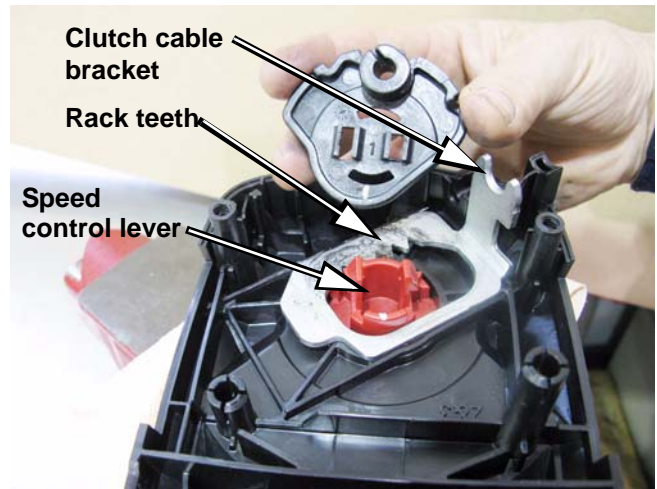


Figure 3.20



Figure 3.21

Drive Clutch Control Cable Removal and Replacement:



Figure 3.22

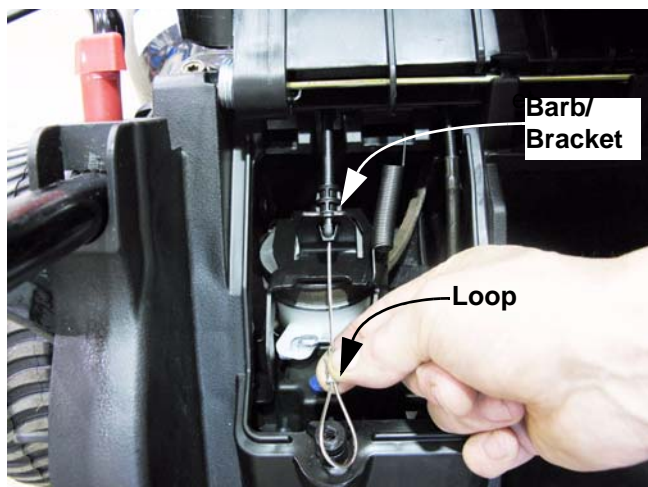


Figure 3.23

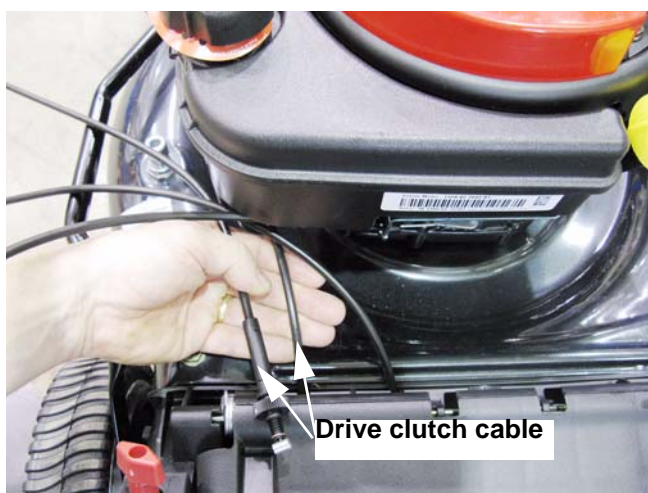


Figure 3.24

1. Disconnect the top (adjustable) end of the clutch control cable. Use the instructions in the Drive Control Housing section of this chapter.
2. With the grass collector bag removed, lift the grass door at the back of the mower, and secure it with a prop or a strap.
3. Remove the transmission cover using a 3/8" wrench. See Figure 3.22.
4. Unhook the loop at the lower end of the cable from the post that the belt cover screw goes into. See Figure 3.23.
5. Squeeze the barb on the end of the cable housing to release it from the belt keeper/bracket above the transmission.
6. Lower the grass door.
7. Draw the lower end of the clutch control cable out of the opening between the grass door and the rear edge of the deck. See Figure 3.24.

NOTE: The outboard cable is the clutch cable.

8. Install the new cable by reversing the steps used to remove the cable.
9. Run and test the mower in a safe place before returning it to service.
 - 9a. Check all safety features.
 - 9b. Test the speed control mechanism while the engine is running, to make sure the full range of speeds is available.
 - 9c. Adjust the thumb roller on the bottom side of the speed control assembly as described in the drive control housing assembly section of this chapter.

C and D series mowers

Drive Speed Control Cable Removal and Replacement:

1. Disconnect the top (adjustable) end of the clutch control cable. Use the instructions in the Drive Control Housing section of this chapter.
2. With the grass collector bag removed, lift the grass door at the back of the mower, and secure it with a prop or a strap.
3. Remove the transmission cover using a 3/8" wrench. See Figure 3.25.



Figure 3.25

4. Carefully pry the L-shaped speed control cable housing out of the belt keeper / bracket at the back of the transmission. See Figure 3.26.
5. Maneuver the cable to release the Z-fitting that connects the cable to the speed control cam that moves the lower sheave of the variable speed pulley.
6. Lower the grass door.
7. Draw the lower end of the clutch control cable out of the opening between the grass door and the rear edge of the deck. See Figure 3.27.

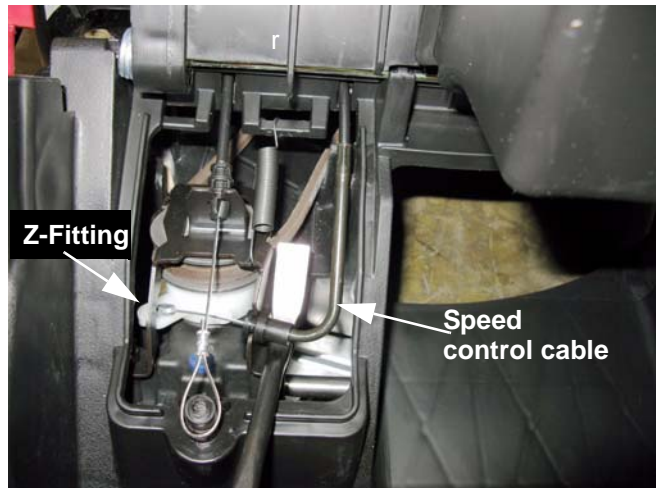


Figure 3.26

NOTE: The inboard cable is the speed control cable.

8. Install the new cable by reversing the steps used to remove the cable.
9. Set the speed control for position #4, leaving maximum slack in the cable.
10. Run and test the mower in a safe place before returning it to service.
 - 10a. Check all safety features.
 - 10b. Test the speed control mechanism while the engine is running, to make sure the full range of speeds is available.
 - 10c. Adjust the thumb roller on the bottom side of the speed control assembly as described in the drive control housing assembly section of this chapter.

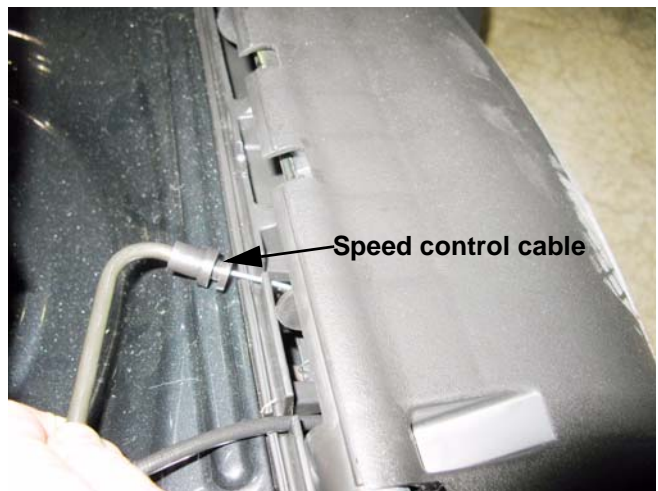


Figure 3.27

CHAPTER 4: DECK AND TRANSMISSION

Trail Shield



Never operate a mower without the trail shield. It is a safety device that is required by law.

The trail shield is designed to drag on the ground behind the mower. This helps keep the operator from getting their feet under the mowing deck.



Figure 4.1

To remove and replace a trail shield:

1. Disconnect and ground the spark plug wire to prevent accidental starting of the engine.
2. Lift and safely support the back of the mower. It should be far enough up to allow convenient reach under the rear of the mower deck.
3. Fold-back the outer edges of the trail shield, so that it can be pivoted forward. See Figure 4.1.

NOTE: The trail shield mounts to the rear baffle. The Term “rear baffle” on this mower refers to the rear structure that carries the wheels, transmission, handle-bars, trail shield, and rear grass door.

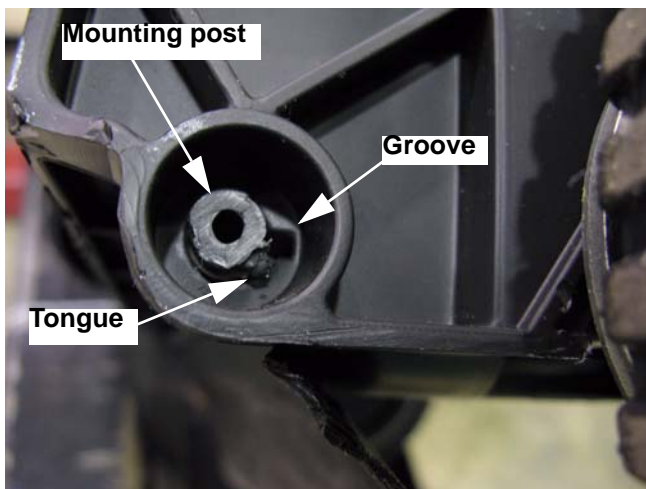


Figure 4.2

4. Align the tongues on the mounting posts at each end of the trail shield with the grooves in the trail shield mounting recess on the rear baffle. See Figure 4.2.
5. Pull down on the trial shield, bowing it until the mounting posts can be withdrawn from the mounting recesses in the rear baffle.
6. Install the trail shield by reversing the steps used to remove it.
7. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

C and D series mowers

Side Discharge Door / Mulch Plug



Never operate a mower without the side discharge door properly in-place. It is a safety device that is required by law.

The side discharge door is designed to contain grass clippings and light yard debris. In mulching mode, it keeps clippings under the deck. In side discharge mode it locks the side discharge chute securely in place.

1. The combination side discharge door and mulch plug is spring loaded so that it stays firmly in place.
2. Repair it if: See Figure 4.3.
 - The safety label has become illegible.
 - The discharge door is damaged so that it does not contain clippings and light yard debris to the underside of the deck.
 - The discharge door, its spring, or hinge mechanism do not cause it to properly close or secure the side discharge chute.

NOTE: The side discharge doors that are sold as service parts will include the bracket, hinge pin, and torsion spring. The bracket, pin, and spring are available separately, but the **door will typically be replaced as an assembly.**

3. Disconnect and ground the spark plug wire to prevent accidental starting of the engine.
4. To remove the side discharge door assembly from the deck, remove the single screw that fastens the hinge from beneath the deck using a 3/8" wrench. See Figure 4.4.



Figure 4.3

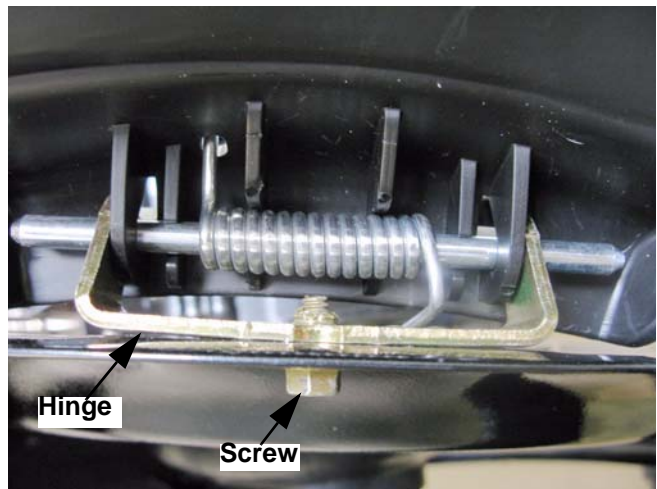


Figure 4.4

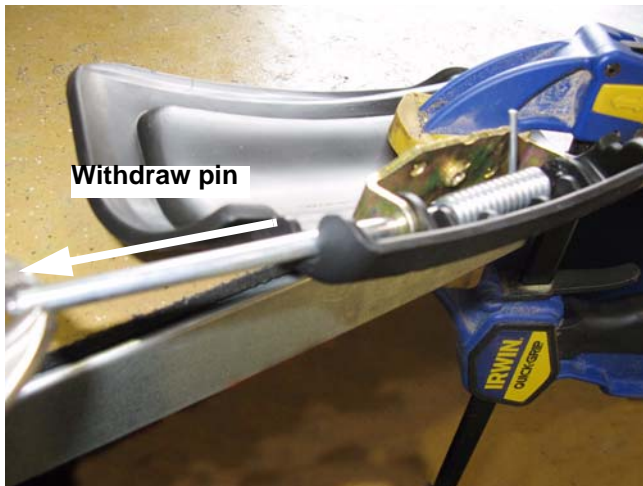


Figure 4.5

NOTE: The side discharge door will **typically be serviced as an assembly**, and there is little need to separate the parts of the assembly in the field. **Disassembly is not recommended**, but if it is necessary for any reason, the following procedure can be used.

5. To separate the door from the hinge: See Figure 4.5.
 - 5a. Clamp the discharge door and hinge to a workbench so that the hinge is easily accessible.
 - 5b. Grasp the rear edge of the hinge pin with a pair of locking pliers and withdraw the pin.

NOTE: There is a notch on the rear edge of the side discharge door to provide clearance for removing the hinge pin.

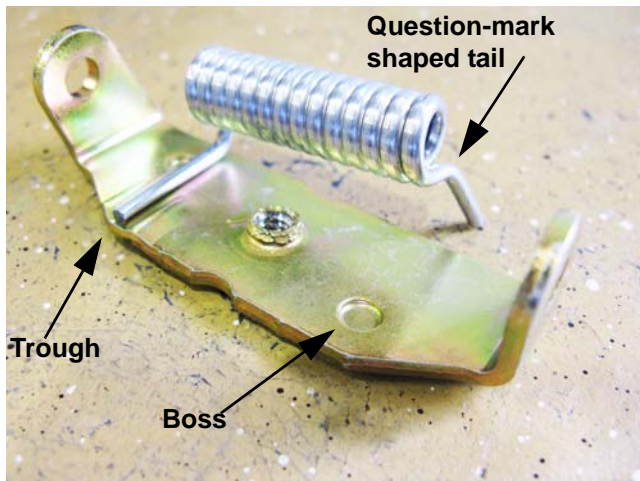


Figure 4.6

NOTE: There are two extruded bosses on the bottom of the hinge. They seat into holes in the mower deck to align the hinge.

NOTE: There is a trough formed near the front leg of the hinge. The L-shaped tail of the closure spring fits into this trough on assembly. See Figure 4.6.



Figure 4.7

6. For assembly: Clamp the side discharge door to a workbench top. See Figure 4.7.
7. Insert the question mark-shaped tail of the spring through the small hole in the side discharge door.
8. Position the hinge with the L-shaped spring tail in the trough.
9. Roll the hinge into position, and secure it by inserting the hinge pin. Stake the hinge pin with a punch once it is installed, so that it does not back out.

C and D series mowers

10. To Install the side discharge door on the mower deck: See Figure 4.8.
- 10.1. Position the hinge so that the alignment bosses fit into the alignment holes in the deck.
- 10.2. Install the screw that fastens the hinge to the deck, and tighten it to a torque of 45-50 in-lbs (6-7 Nm).
11. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

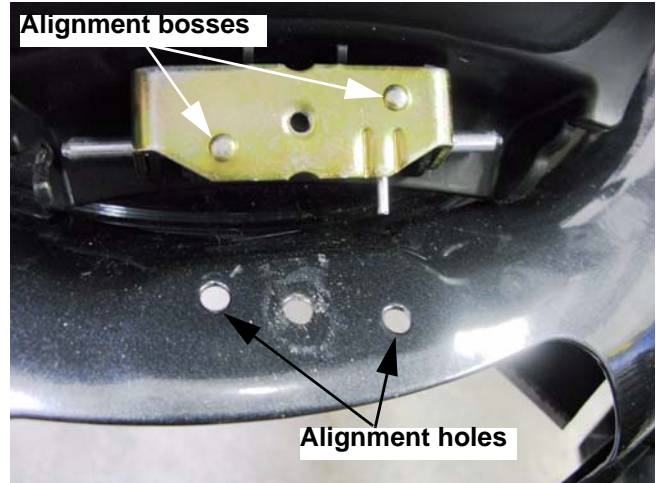


Figure 4.8

Deckwash Fitting

1. The C and D Series mowers are available with deckwash fittings. These fittings resemble fittings that MTD has used on previous equipment, but the mounting is different.
2. Removing the quick-connect hose coupling reveals the new plastic fitting. See Figure 4.9.



Figure 4.9

3. Remove the shoulder screw that holds the fitting to the deck using a 3/8" wrench. See Figure 4.10.
4. Tilt the fitting away from the screw to remove it from the port in the deck.
5. When installing a deckwash fitting, tighten the screw to a torque of 45-50 in-lb. (6-7 Nm).

NOTE: Do not install a deckwash fitting on a mower deck that did not originally have a hole for one.



Figure 4.10

Rear Grass Door



Never operate a mower without the rear grass door properly in-place. It is a safety device that is required by law.

The rear grass door is designed to contain grass clippings and light yard debris. In mulching mode, it keeps clippings under the deck. With the rear grass collector in place, it locks the grass bag securely in place and prevents

Repair the rear grass door if:

- The safety labels have become illegible.
- The rear grass door is damaged so that it does not contain clippings and light yard debris to the underside of the deck.
- The rear grass door, its spring, or hinge mechanism do not cause it to properly close or secure the grass collector.

NOTE: The rear grass door is included with the rear sub-frame assembly. The springs are available separately. This procedure covers door removal for the purpose of replacing the torsion springs.

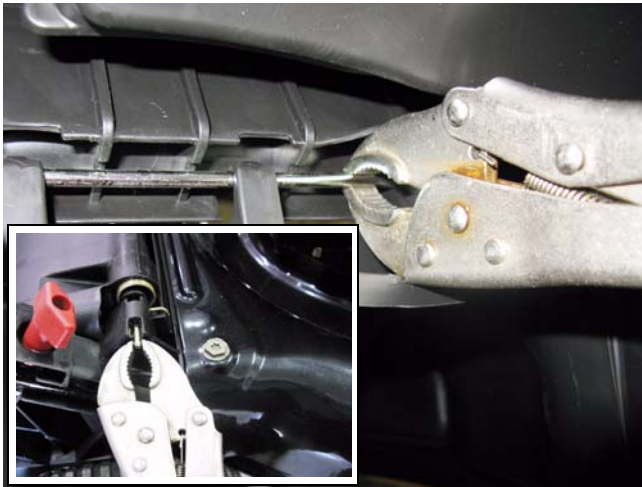


Figure 4.11

To remove and replace the rear grass door:

1. Disconnect and ground the spark plug wire to prevent accidental starting of the engine.
2. Lift the rear grass door and secure it in the raised position with a block or a cord.
3. Grasp the grass door hinge pin with a pair of locking pliers, and slide it toward the right side of the mower. See Figure 4.11.
4. Withdraw the hinge pin (inset).

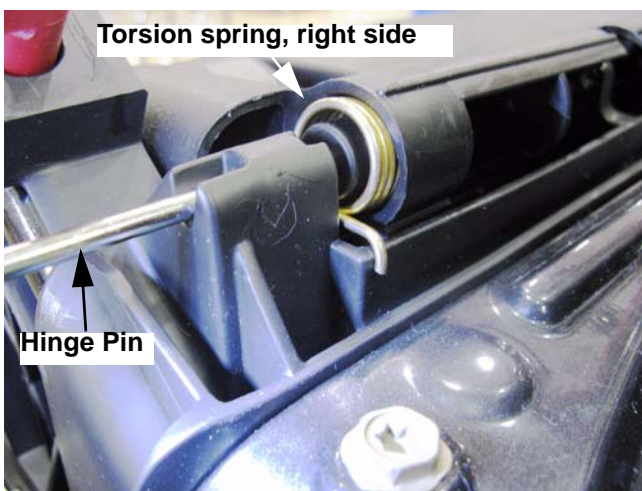


Figure 4.12

5. Lift the grass door off of the mower, keeping track of the torsion springs that keep it closed. See Figure 4.12.

C and D series mowers

NOTE: The grass door torsion springs are mirror image of each other. There is a left spring and a right spring.

- The inner tail of each spring hooks through the L-shaped hole in the grass door. See Figure 4.13.
- The body of the spring fits into a recess in the outboard edge of the grass door.
- The outer (L-shaped) tail of the spring hooks over the top lip of the rear baffle when it is correctly installed. See Figure 4.14.

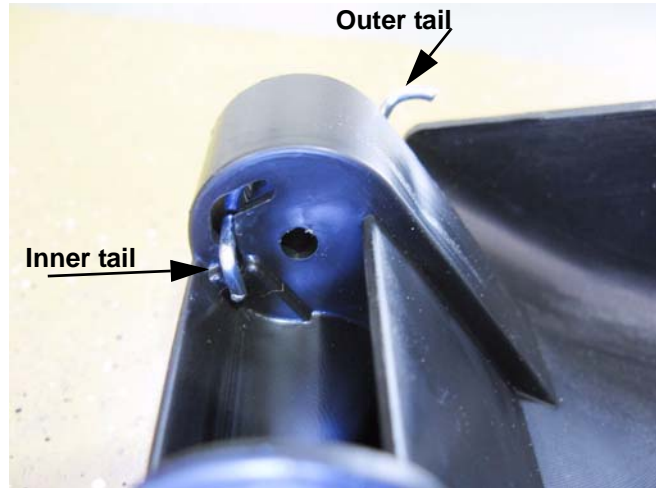


Figure 4.13

6. Position the rear grass door on the rear sub-frame.
7. Hook the ends of the left torsion springs over the lip near the front edge of the rear sub-frame.
8. Press the door down to load the torsion springs.

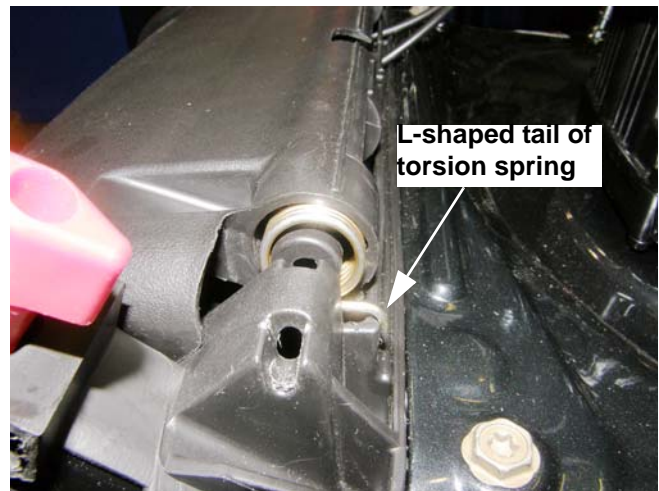


Figure 4.14

9. Insert the hinge pin from the right-hand side. See Figure 4.15.
 - It should take roughly 15 lbs. (6 kg.) of force to push the pin. If it is significantly looser, consider replacing the complete rear subframe and grass door assembly. See Figure 4.15.
 - Push the hinge pin in far enough to expose the small gap in the rear baffle.

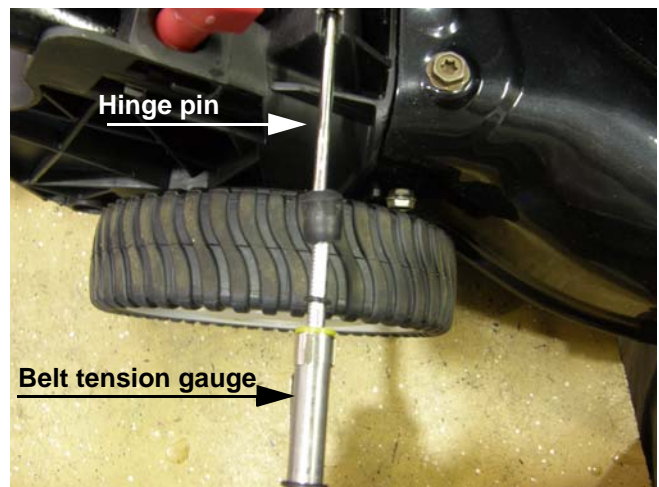


Figure 4.15

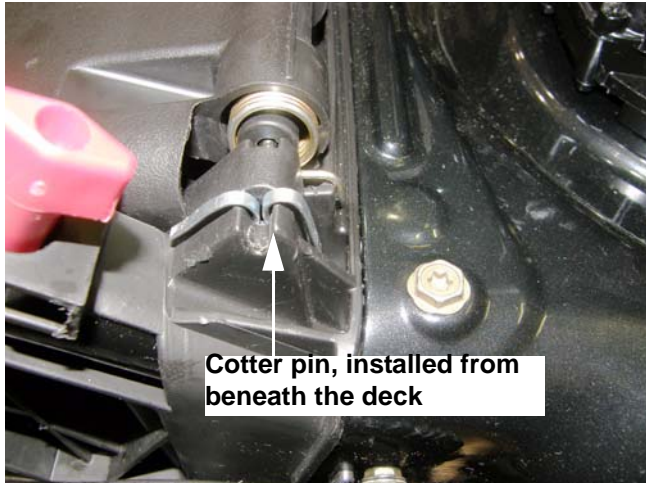


Figure 4.16

10. Push a 5/32" x 1-1/2" (4mm x 40mm) cotter pin through the gap, coming up from the bottom. Bend both ends of the cotter pin down around the hinge loop. See Figure 4.16.
11. Confirm that the grass door pivots freely, fits properly against the grass bag, and closes fully.
12. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

Front Wheels



Figure 4.17

All of the wheels (drive and non drive) are held on with nylock nuts.

To remove/replace a wheel:

1. Loosen the nut that secures each wheel that is to be removed, using a 9/16" wrench.
2. Lift and safely support the mower so that the wheel or wheels to be removed are off the ground.
3. Remove the wheel nut. See Figure 4.17.
4. Slide the wheel off of the axle. Capture the washers on the front wheels, if they are present.
5. The front wheels may have special double-beveled washers between the wheel and the nut. See Figure 4.18.

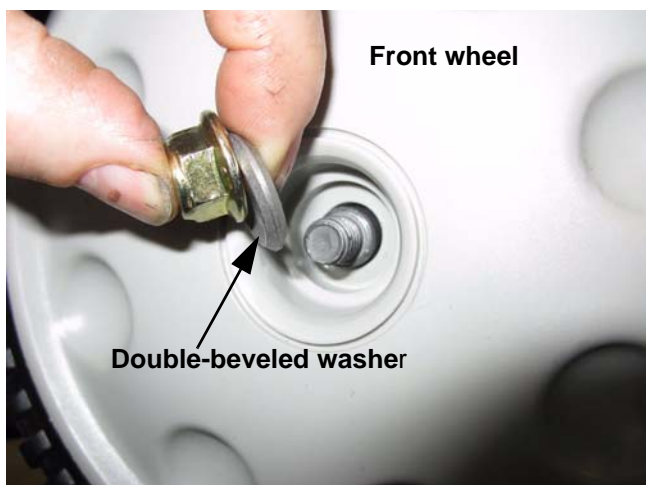


Figure 4.18

6. Install the wheel by following the previous steps in reverse order.

NOTE: Service wheels may not need the washer. Check the fit of the wheel on the axle to see if the washer is needed.

NOTE: Apply a small amount of a dry lubricant such as graphite or PTFE (Teflon) to the axle shaft before sliding the wheel on.

NOTE: Apply a small amount of releasable thread locking compound such as Loctite® 242 (blue) to the lock nut or replace it with a new one.

NOTE: Tighten the wheel nuts to a torque of 80-100 in lbs (9-11 Nm)

C and D series mowers

8" (20cm) rear wheels

7. Rear wheel removal is similar to the process for removing the front wheels, but they lack the double-beveled washer, and they contain a drive gear. See Figure 4.19.

NOTE: The drive gear is not available as a separate service part, though it can be removed by taking out 3 screws. Use a 5/16" wrench to remove the screws.

NOTE: If the drive gear is worn, it is likely that the pinion gear that turns it will be worn as well. The wheel and pinion gear should be replaced as a pair.



Figure 4.19

11" (28cm) rear wheels

8. Removal of the 11" rear wheels is similar to removal of the 8" rear wheels, except that there is a wheel cover. See Figure 4.20.
9. The wheel cover fastens near the hub. Pry-out the edge of the wheel cover to reach the fastening point, but removal force should be applied as close as possible to the center of the wheel cover.
10. Remove the nut from the axle using a 9/16" wrench.

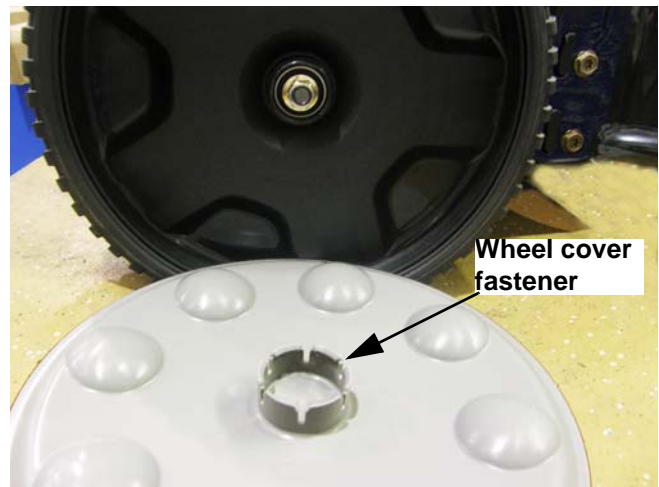


Figure 4.20

11. Slide the wheel off of the axle. See Figure 4.21.

NOTE: The drive gear is not available as a separate service part, though it can be removed by taking out 3 screws. Use a 5/16" wrench to remove the screws.

NOTE: If the drive gear is worn, it is likely that the pinion gear that turns it will be worn as well.

- The wheel and pinion gear should be replaced as a pair.
- The bearings used in the 11" rear wheels are not available separately from MTD. Replace the wheel if the bearings have failed.

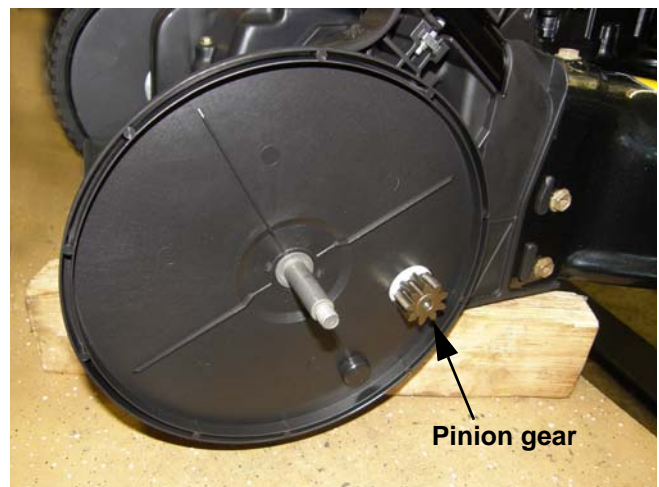


Figure 4.21



Figure 4.22

12. The pinion gear slides off of the transmission drive shaft. See Figure 4.22.

NOTE: Apply a small amount of anti-seize compound to the splines when installing the pinion gear, but do not use a grease lubricant on the teeth of the gears. Grease will attract dust, becoming an abrasive paste rather than a lubricant.

NOTE: The 42-tooth ring gear inside the 8" wheel is driven by a 10-tooth pinion gear. The 52-tooth ring gear inside the 11" wheel is driven by a 9-tooth pinion gear. The transmissions are identical. The 9-tooth pinion gear will fit into the 8" wheel, but it will not mesh with the ring gear. The 10-tooth pinion is taller than the 9-tooth pinion, and it will not allow the 11" wheel to seat fully on its axle.



Figure 4.23

13. The dust covers of the 8" wheel and the 11" wheels slip off easily once the wheels are removed. See Figure 4.23.

14. Assembly notes:

15. Reinstall the dust covers and pinion gear if removed.

NOTE: Apply a small amount of a dry lubricant such as graphite or PTFE (Teflon®) to the axle shaft before sliding the wheel on.

NOTE: Apply a small amount of releasable thread locking compound such as Loctite® 242 (blue) to the lock nut or replace it with a new one.

16. Tighten the wheel nuts to a torque of 80-100 in lbs (9-11 Nm)
17. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

C and D series mowers

Front Axle

To remove and replace the axle:

1. Remove the wheels by following the procedure described in the previous section of this chapter.
2. Set the height adjuster to the highest mowing position. See Figure 4.24.

NOTE: There is a lift assist spring on the front axle. Raising the deck relieves most of the tension from the spring. It also brings the height adjuster link to rest against the stop on the front axle.

NOTE: The 8" (20cm) and 11" (28cm) rear wheels use different height adjuster links. Because of this, the front axle geometry differs between the C and D series mowers. Service procedures are similar.

3. The height adjuster link connects to the left side of the axle. The wheel bracket on the right side of the axle is a mirror image of the wheel bracket on the left side of the axle, including the bolt hole for the height adjuster link.
4. A simple lever tool can be made using some flat stock and a roll pin or bolt.
5. Use the tool to relieve any remaining tension on the lift assist spring, taking shear load off of the threads of the shoulder bolt. See Figure 4.25.
6. Remove the the shoulder bolt and wave washer that connect the height adjuster link to the front axle using a 3/8" wrench.

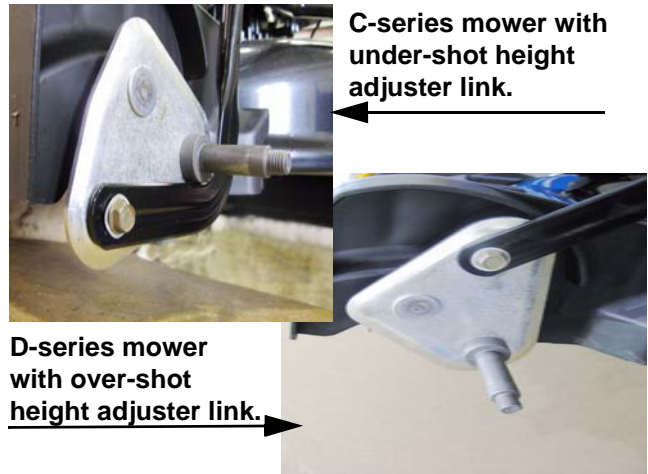


Figure 4.24

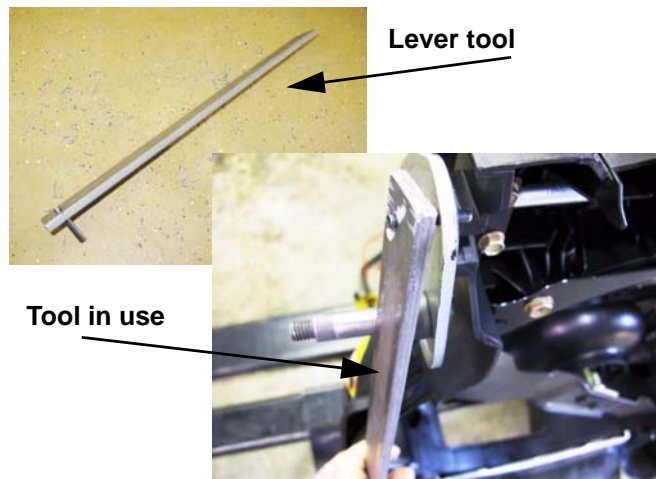


Figure 4.25

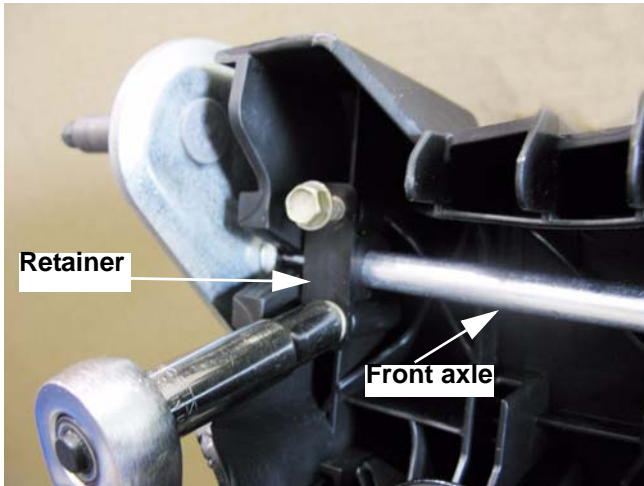


Figure 4.26

7. Ease the front axle back into a position that completely relaxes the lift assist spring.
8. Remove the front axle retainers using a 3/8" wrench. See Figure 4.26.



Figure 4.27

9. With the retainers off, the axle will still be held in place by two spring tabs on each end of the axle. See Figure 4.27.



Figure 4.28

10. Press a socket or similar round tool into the gap between each pair of tabs, gently spreading them to release the axle. See Figure 4.28.

C and D series mowers

11. The spring is captive on the front axle weldment. See Figure 4.29.



Figure 4.29

12. To install the front axle, position the tail fo the spring into the locator slot.
 - The hook end of the spring should be between the elbow in the front axle weldment and the plastic front axle cover.
 - The elbow bend in the front axle should be oriented to the rear.
 - Torsion force from the spring should cause the axle to pivot, pushing the stub axle toward the ground, applying lifting force to the deck. See Figure 4.30.
13. Push the axle assembly past the plastic spring tabs, into the pocket that locates it in the front axle cover.



Figure 4.30

14. When the axle is in position, secure it with the axle retainers. See Figure 4.31.

NOTE: The axle retainers are off-set. When installed correctly, the outboard edge of the retainers fits flush against the inside edge of the front axle cover.

NOTE: Tighten the screws that hold the axle retainers to a new front axle cover to 30-40 in-lbs (3.5-4.5 Nm).

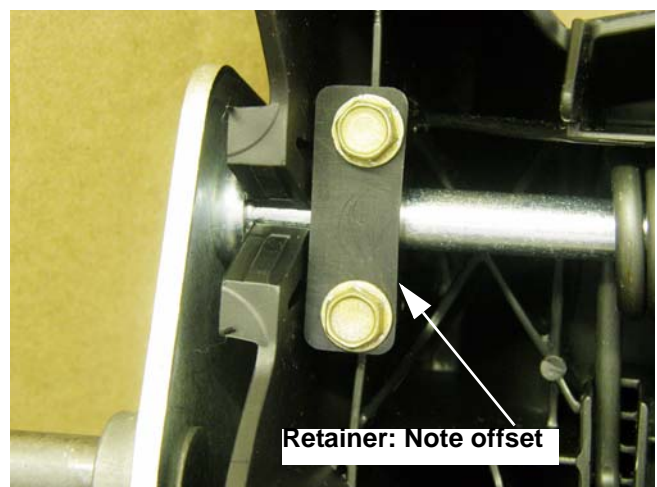


Figure 4.31

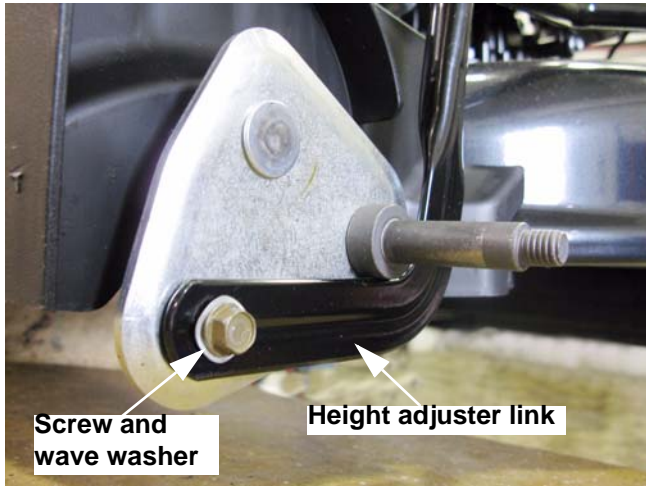


Figure 4.32

Front Axle Cover

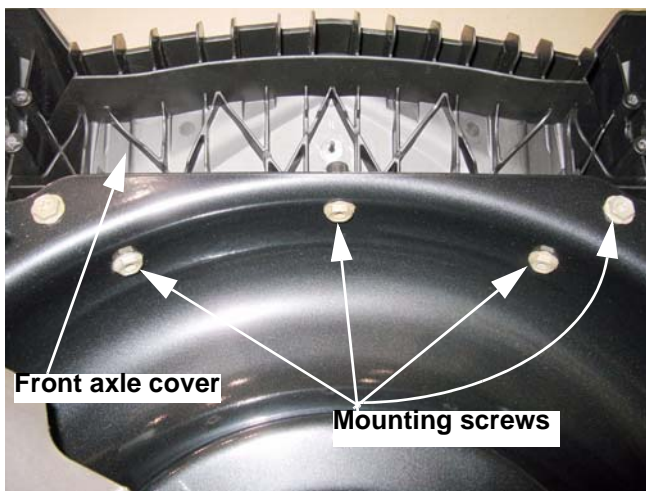


Figure 4.33

15. Reconnect the height adjuster link. Tighten the screw to a torque of 45-50 in-lbs. (4-5 Nm). See Figure 4.32.

16. Reinstall the wheels.

NOTE: Apply a small amount of a dry lubricant such as graphite or PTFE (Teflon®) to the axle shaft before sliding the wheel on.

NOTE: Apply a small amount of releasable thread locking compound such as Loctite® 242 (blue) to the lock nut or replace it with a new one.

17. Tighten the wheel nuts to a torque of 80-100 in-lbs. (9-11 Nm).

18. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

NOTE: The front axle cover is the plastic structure attached to the front of the mower deck. The front axle mounts to it.

1. Remove the front wheels and axle as described previously in this chapter.

2. Remove the 5 screws that hold the front axle cover to the mower deck using a 1/2" wrench or a T-40 Torx driver. See Figure 4.33.

3. Install the replacement front axle cover by reversing the steps used to remove it.

NOTE: Tighten the screws that hold the front axle cover to the mower deck to 30-40 in-lbs (3.5-4.5 Nm).

4. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

C and D series mowers

Handlebars

NOTE: Most service procedures that would involve removal of the handlebars will also involve removal of the rear baffle. We have written the procedures around this assumption, disconnecting the handlebars and removing them completely from the mower.

1. Disconnect and ground the spark plug wire to prevent accidental starting of the mower.
2. Hold the safety bail against the handlebar and pull the starter rope about 6" (15cm). Tie a slip-knot in the starter rope near the recoil housing. Release the rope from the eye bolt on the handlebar. See Figure 4.34.



Figure 4.34

3. It is easier to disconnect the drive control cables at the bottom end than at the top. Disconnect the speed control and clutch cables as described in Chapter 3 of this manual. See Figure 4.35.
4. Disconnect the engine control cable, as described in Chapter 3.

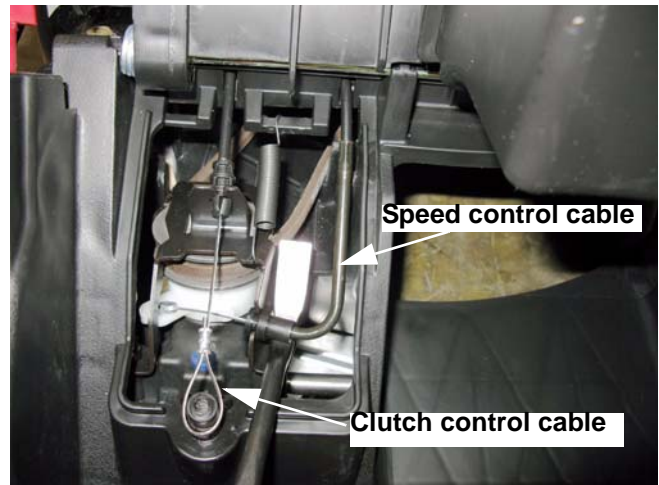


Figure 4.35

5. Remove both of the wing screws that hold the lower handlebar to the rear baffle. See Figure 4.36.
6. Withdraw the handlebar from the baffle, and put it aside.
7. After the handlebar is removed, reinstall the wing screws, so that the captive nuts do not fall out of the rear baffle.
8. Reinstall the handlebar by reversing the steps used to remove it.
9. Test run the mower in a safe area and check all of the safety features before returning it to service. Do not put an unsafe mower into service.

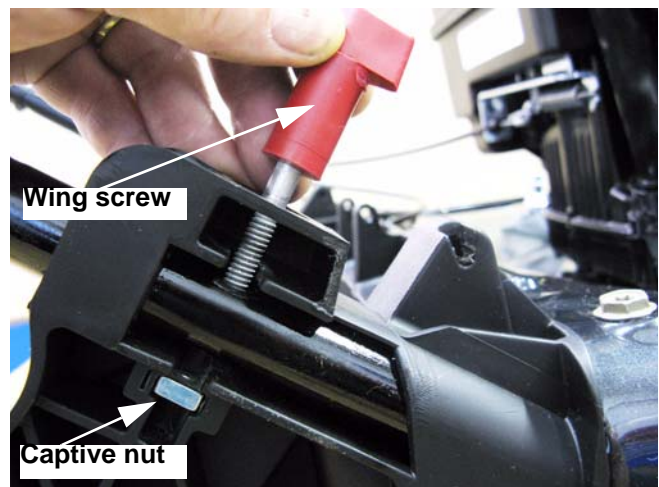


Figure 4.36

Transmission and Rear Axle Inspection



Figure 4.37

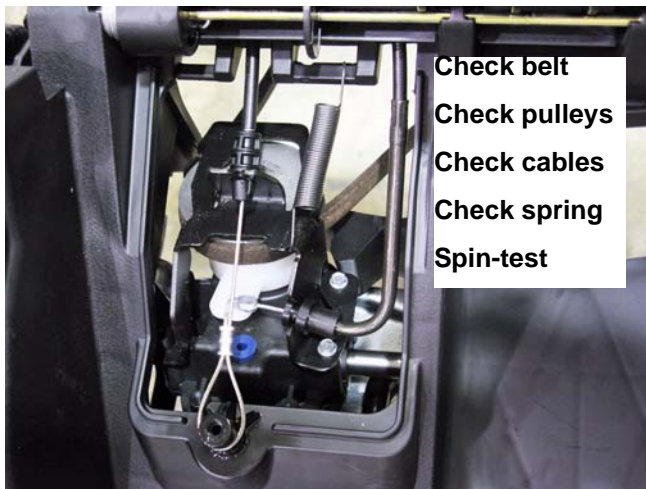


Figure 4.38

Checking the transmission:

1. To avoid replacing a transmission that does not have any mechanical problems, it is important to understand what it does when it is working properly. Check the transmission before removing it.
2. Disconnect and ground the spark plug wire to avoid starting the engine accidentally.
3. Remove the rear wheels, as described previously in this chapter. See Figure 4.37.
 - Make a visual inspection of the pinion gear and spur gear that drive the wheel.
 - Confirm that the splines that drive the pinion gears are not stripped.
4. Lift and secure the rear grass door, and remove the upper belt cover as described in Chapter 2 of this manual.
5. Inspect the belt, sheave, cables, and tensioning mechanism. See Figure 4.38.
 - The belt should not be significantly worn or damaged.
 - Confirm that the correct MTD part number belt is on the mower.
 - Check the operation of the clutch cable and the engagement of the belt, as described in chapter 3.
 - Check the operation of the speed control cable, as described in chapter 3.
6. The transmission should behave as follows:
 - Rotating either output shaft in either direction should be possible without significant drag, and without causing the input shaft or the other output shaft to move. If an output shaft will not turn in one direction, rotate it slightly in the opposite direction, or turn the input shaft counter-clockwise to disengage the drive pawl. This is normal operation.
 - Rotating the input shaft counter-clockwise should be possible without significant drag, and without causing either of the output shafts to move.
 - Rotating the input shaft clockwise should cause the output shafts to rotate in the direction that will cause forward drive at the wheels.
 - While being driven, the output shafts should be able to exceed the speed that they are driven at. This allows differential action while the mower is being turned left or right with the self-propel mechanism engaged. It also allows the operator to push the mower faster than the drive mechanism is moving it.
7. If the conditions listed above are all true for the transmission in question, the problem is likely to be external. Look harder at the belt, sheaves, the drive pinions inside the wheels, and the control mechanism to find the drive system problem.
8. If the conditions listed above are not all true for the transmission in question, the problem is likely to be internal to the transmission. Replace the transmission to fix the drive problem.

C and D series mowers

Transmission and Rear Axle Removal

The transmission and rear axle assembly are removed from the mower together:

1. After checking the transmission, the mower will be in the following condition:
 - The spark plug wire will be disconnected and grounded.
 - The back of the mower will be safely supported, and the rear wheels will be removed.
 - The rear grass door will be propped or strapped in the open position.
 - The upper belt cover will be removed.
2. Remove the left front wheel from the mower, as described previously in this chapter.
3. Slide the pinion gears off of both transmission output shafts.
4. Remove the dust covers from both wheel brackets. See Figure 4.39.

NOTE: The lift assist spring that acts on the front axle will keep tension on the height control link. To disconnect the height control link from the wheel bracket on the rear axle, isolate the spring tension. This will take shear load off of the shoulder bolt that connects the height control link to the rear wheel bracket.

5. Block the height adjuster link at the front axle. See Figure 4.40.
 - A linkage block tool can be made from a 2x4 or similar dimensional lumber.
 - Drill a hole of at least 7/8" (2.22cm) in the 2x4, and trim the end to fit between the axle shoulder and the inside elbow of the height adjuster link.
 - Place the wood block onto the left front axle so that it limits the travel of the height adjuster mechanism; fixing the distance between the axle and the height adjuster link.



Figure 4.39

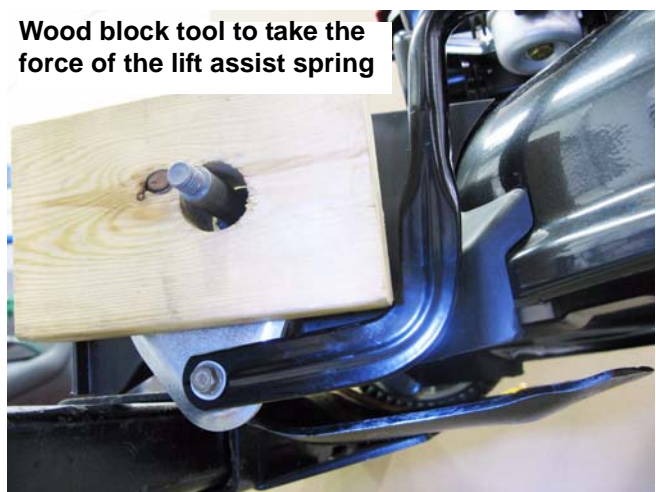


Figure 4.40

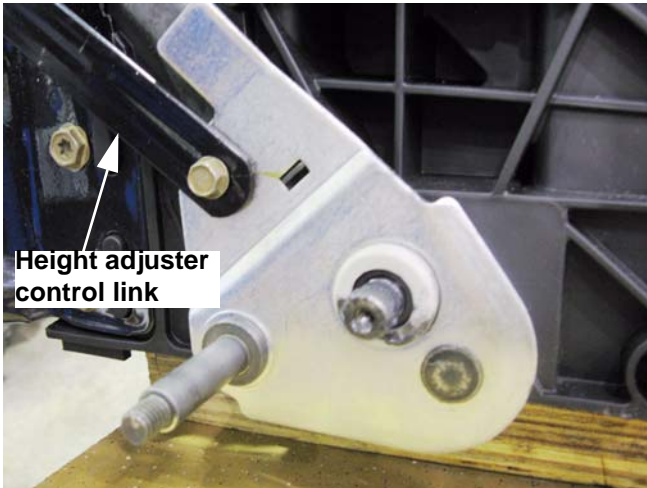


Figure 4.41

6. Remove the shoulder screw that connects the height control link to the left rear wheel bracket using a 3/8" wrench. See Figure 4.41.
7. Pivot the height control link forward, out of the way, or remove it completely.



Figure 4.42

8. Disconnect the clutch and speed control cables from the transmission, as described in Chapter 3.
9. Remove the drive belt from the transmission input pulley, as described in Chapter 2. See Figure 4.42.

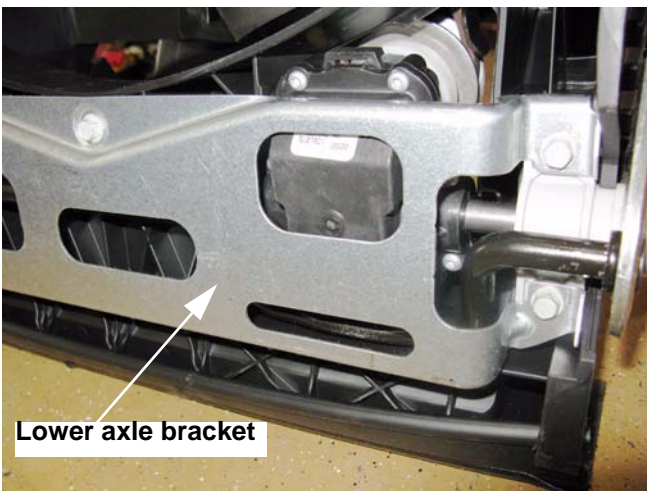


Figure 4.43

10. Position the mower for easy access to the screws that hold the lower axle bracket to the rear baffle. See Figure 4.43.
 11. Remove the 5 screws that hold the lower transmission bracket to the rear baffle using a 3/8" wrench.
- NOTE:** The two screws at each end of the lower axle bracket secure spherical axle bearings to the rear baffle.

C and D series mowers

12. Slip the spherical bearings out of the pockets that locate them in the rear baffle, and remove the transmission and axle assembly together. See Figure 4.44.

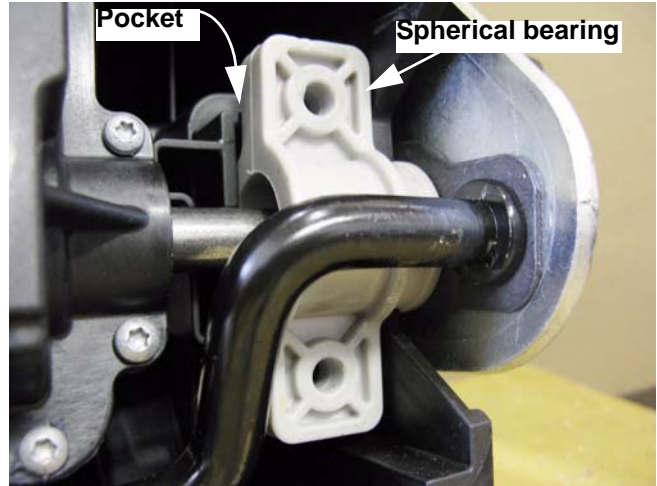


Figure 4.44

13. With the transmission and axle assembly removed, the transmission can be separated from the axle:
 - Push the spherical bearings inward, to release them from the wheel brackets.
 - With both bearings slid toward the transmission housing, there will be enough range of movement to slide the transmission housing toward the right wheel bracket (the one without the height adjuster lever).
 - When the short drive shaft is clear of the left side wheel bracket, angle the transmission out of the bracket, and withdraw the long drive shaft from the right side wheel bracket. See Figure 4.46.



Figure 4.45

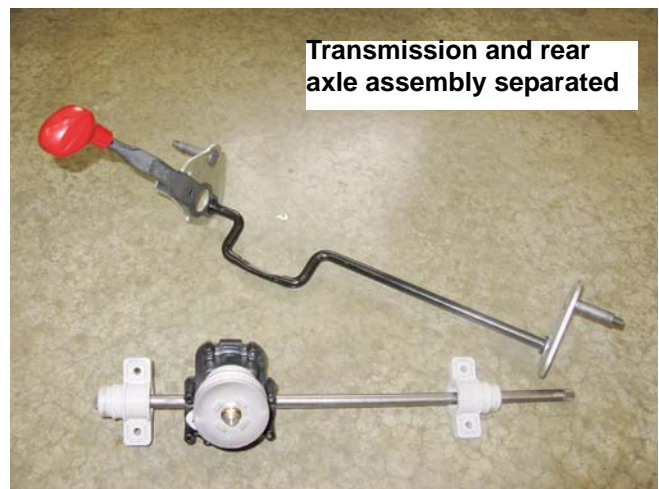


Figure 4.46

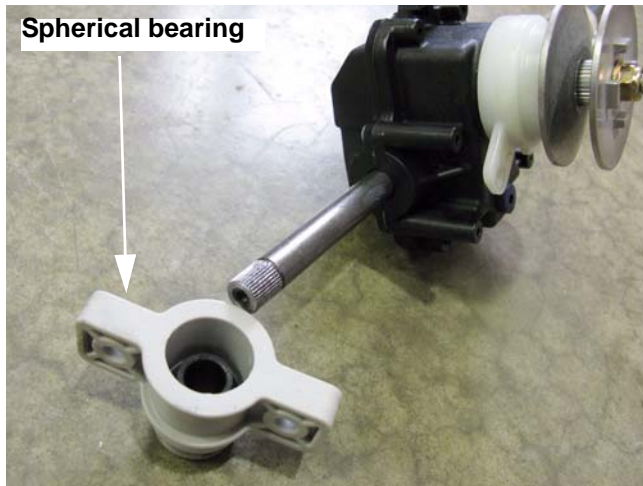


Figure 4.47

14. Examine the spherical bearings. If they show signs of significant wear, replace them with new ones. See Figure 4.47.
 - It is false economy to save a few dollars on the bearings only to disassemble the mower a few months later to replace the bearings.
 - The drive shafts rotate in the bearings.
 - The transmission also pivots on the bearings to tension and de-tension the belt (clutch and de-clutch).
 15. Install the transmission by reversing the previous steps used to remove it.
-
16. Assembly notes:
 - Do not lubricate the spherical bushings with an oil or grease based product. It will attract dust and become an abrasive paste rather than a lubricant. A small amount of dry lubricant such as graphite or PTFE (Teflon®) can be used.
 - Tighten the screws that hold the lower axle bracket to the rear baffle to 30-40 in-lbs (3.5-4.5 Nm).
 - Tighten the shoulder screw to a torque of 45-50 in-lbs (6-7 Nm).
 17. Test run the mower in a safe area. Check all of the safety features, and check the full range of drive speeds before returning it to service. Do not put an unsafe mower into service.

Transmission and variable speed pulley

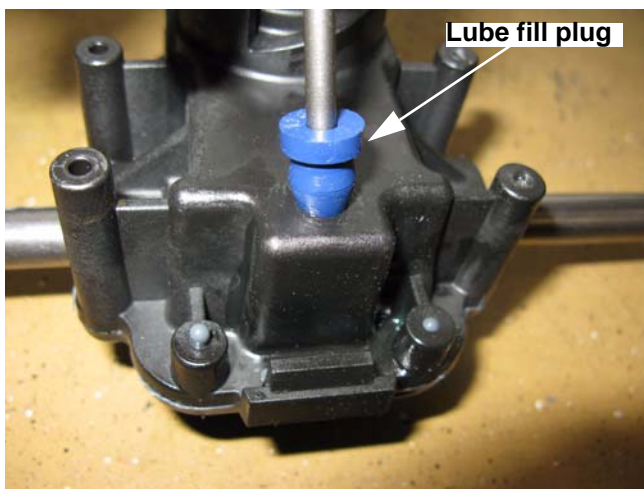


Figure 4.48

1. Lubricant: In the course of normal service, it should not be necessary to replace the gear lube. See Figure 4.48.
 - If there is reason to believe that the transmission lubricant is contaminated, it can be drained and replaced through the blue plug on the top of the transmission housing.
 - The transmission contains 1.0 fl.oz. (29.6ml.) of 85-W140 gear lube (P/N: 737-3065, qt.).
2. Use a 5/32" (4mm) flat-nosed punch, or a similar size pin to reinstall the blue plug.

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3. The variable speed pulley operates by spreading or closing the gap between the sheaves.
- When the gap is wider, the circumference of the belt contact patch on the pulley is smaller. This means that each revolution of the crankshaft pulley will result in a relatively greater number of revolutions of the input pulley of the transmission. This will drive the wheels with more torque, but less speed than when the sheaves are close together. See Figure 4.49.

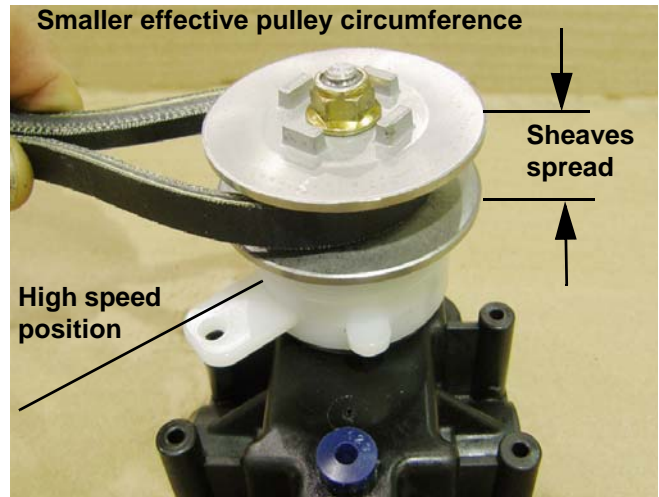


Figure 4.49

- Then the sheaves are close together the circumference of the belt contact patch on the pulley is greater. This means that each revolution of the crankshaft pulley will result in a relatively fewer number of revolutions of the input pulley of the transmission. This will drive the wheels with less torque, but more ground speed than when the sheaves are spread. See Figure 4.50.
- The top sheave is fixed on the input shaft. The bottom sheave slides up and down the input shaft in response to the ramp on the white plastic speed control cam.

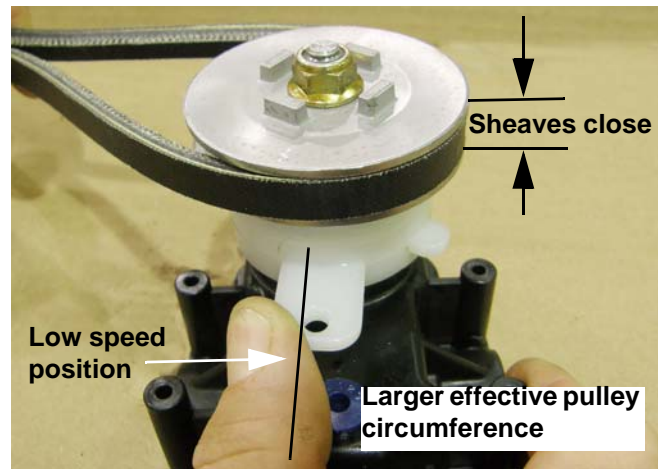


Figure 4.50

NOTE: This procedure can be done without removing the transmission from the mower. It is illustrated on the bench for the sake of visibility.

NOTE: Speed control cam and transmission input pulley parts are not available through MTD. The procedures illustrated here may be useful if the assembly is taken apart for cleaning or lubrication.

4. To disassemble the variable speed pulley, hold the upper sheave with a 1-1/4" wrench, or fix it in a bench vise. Rotate the nut using a 1/2" wrench. See Figure 4.51.



Figure 4.51



Figure 4.52

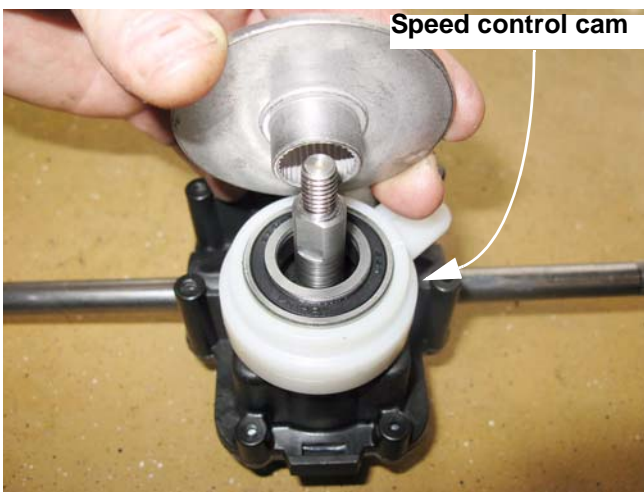


Figure 4.53



Figure 4.54

5. Once the nut is removed, the top sheave will slide off of the double-D shaped shaft. See Figure 4.52.
6. The lower sheave mates to the upper pulley with splines.

7. The lower sheave should lift out of the bearing that supports it on the speed control cam. See Figure 4.53.
 8. Shims adjust the range of movement of the sheaves. See Figure 4.54.
- If there is not an issue with the available speed range, do not change the size or number of shims.
 - Correct shimming will result in the arm on the speed control cam being very nearly aligned with the blue rubber oil plug in the top of the transmission housing when the sheaves are fully closed.

- The hole in the arm of the speed control cam will over-lap about half-way with the recess in the top of the blue rubber plug when the sheaves are fully closed.
- If there is not enough shimming, the mower may not have the full low-end of the speed range, and the speed control cam may over-rotate, getting jammed against the back edge of the ramp that raises it.
- If there are too many shims, the sheaves will not spread far enough apart. The mower will lose the top end of the drive speed range, and the operator may over-stress the speed control cable in trying to move the speed control selector to the 4th speed detent.

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9. The speed control cam and bearing assembly will lift off of the input shaft. See Figure 4.55.



Figure 4.55

10. On reassembly, orient the speed control cam and bearing so that the small ear on the cam is just past the blue oil fill plug with the cam in the relaxed position (sheaves spread). See Figure 4.56.
11. Clean all of the contact surfaces:
 - Insure that the cam moves freely.
 - Insure that the lower sheave slides freely on the splines.
 - Lubricate **very sparingly** using a dry graphite or PTFE (Teflon®) based lubricant.
 - Do not get lubricant where it is likely to get onto the belt or sheaves.
 - Tighten the lock nut to a torque of 100-160 in-lbs (12-18Nm).

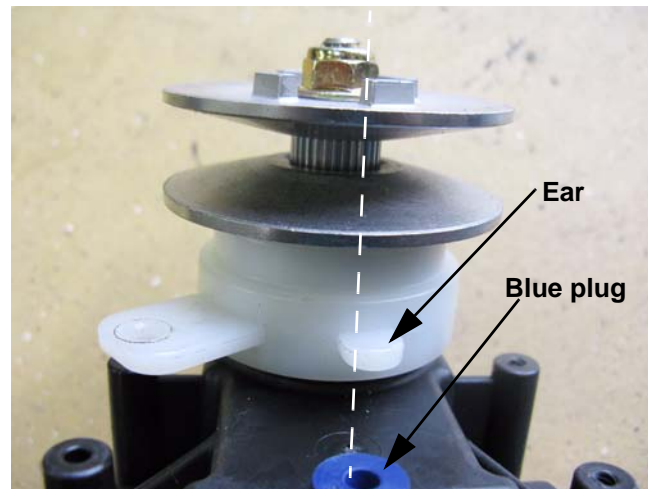


Figure 4.56

Rear baffle removal

NOTE: The rear baffle comes complete with the rear grass door.

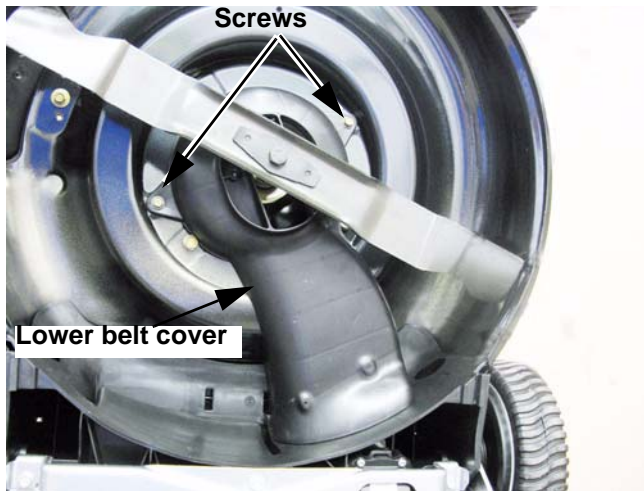


Figure 4.57

1. Allow the engine to cool, then disconnect and ground the spark plug wire.
2. Confirm the fuel level is low enough that there is no risk of spillage.
3. Tip the mower back on its handlebars, or on its side with the air filter up, so that the lower belt cover can be reached.
4. Remove the screws that fasten the lower belt cover to the mower deck using a 3/8" wrench. The belt cover can remain in place. See Figure 4.57.

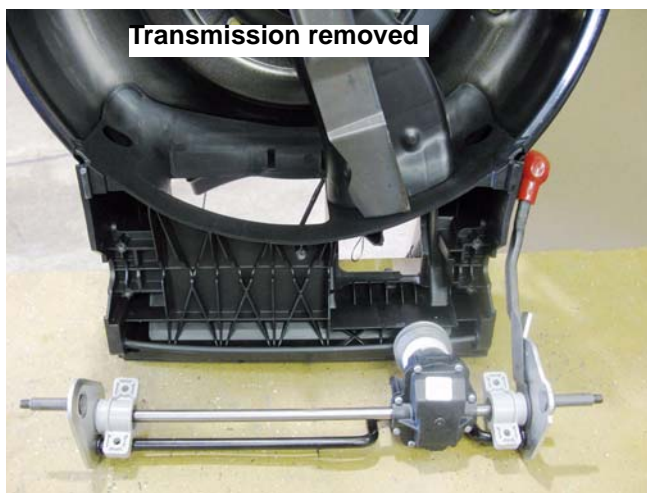


Figure 4.58

5. Remove the transmission as described previously in this chapter. See Figure 4.58.
6. Carefully tip the mower down so that it is resting with the bottom of the deck on the workbench.



Figure 4.59

7. Remove the handlebars as described in a previous section of this chapter. See Figure 4.59.

C and D series mowers

- Remove the 6 screws that hold the rear baffle to the mower deck using a T-40 driver or a 9/16" wrench. See Figure 4.60.

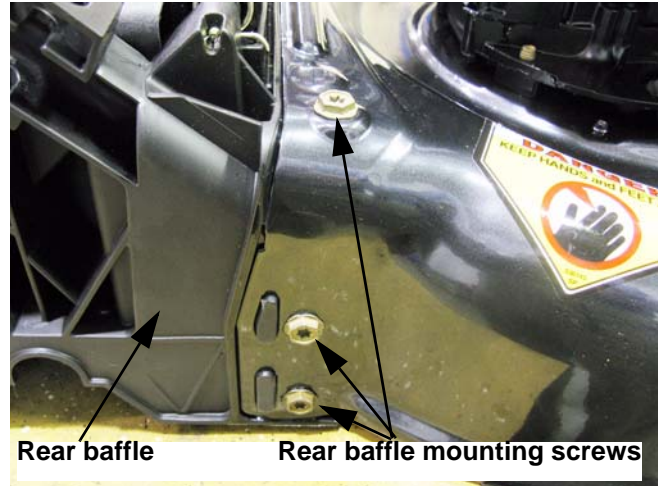
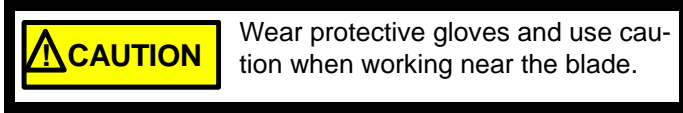


Figure 4.60

- Separate the rear baffle assembly from the mower deck. See Figure 4.61.



Figure 4.61

- On installation, confirm that the belt and lower belt cover are properly positioned as the new rear baffle goes in. See Figure 4.62.
 - The belt must fit inside of all four guide pins in the lower belt cover.

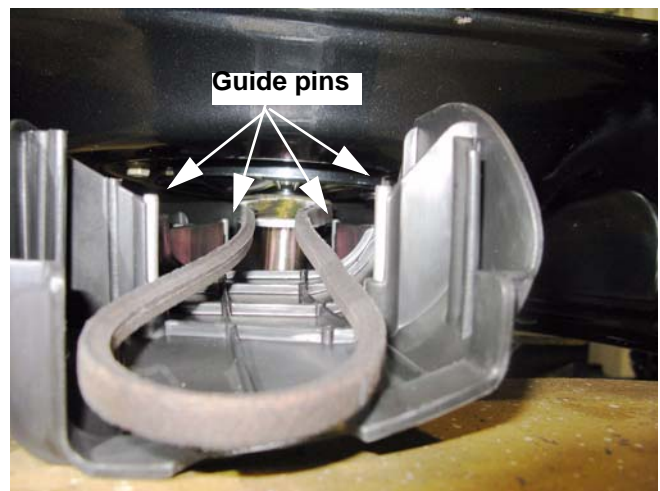


Figure 4.62

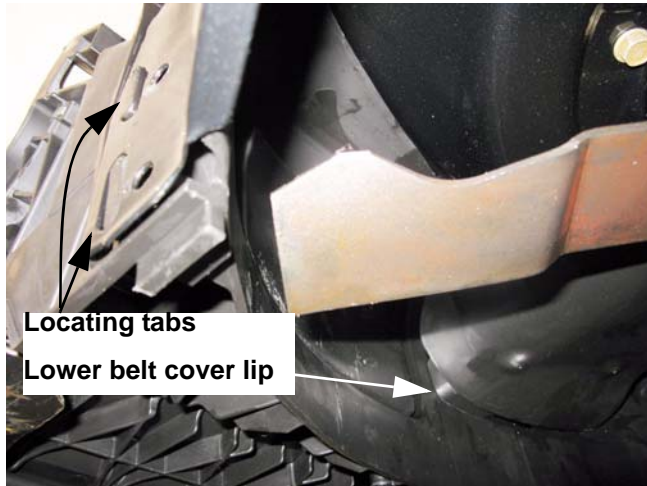


Figure 4.63

11. The two locating tabs on each side of the rear baffle must be seated in the slots behind the rear baffle mounting screws before the screws are tightened. See Figure 4.63.
12. The lip on the rear edge of the lower belt cover needs to fit into the opening in the rear baffle.
13. Once properly located, install all six screws that secure the rear baffle, and tighten them to a torque of 30-40 in-lbs. (3.5-4.5 Nm).
14. Tighten the lower belt cover screws to a torque of 45-50 in-lbs. (6-7 Nm).

15. Assemble the remainder of the drive and control systems by reversing the removal processes covered in the section of this chapter that applies to them.
 - Install the transmission
 - Install the handlebars and controls
 - Connect the control cables
 - Connect the drive belt
 - Install the wheels
16. Test run the mower in a safe area. Check all of the safety features, and check the full range of drive speeds before returning it to service. Do not put an unsafe mower into service.



Never operate a mower without the rear grass door properly in-place. It is a safety device that is required by law.

The rear grass door is designed to contain grass clippings and light yard debris. In mulching mode, it keeps clippings under the deck. With the rear grass collector in place, it locks the grass bag securely in place and prevents

C and D series mowers

Transmission Internal Workings

NOTE: There are no internal parts for this transmission available through MTD. If the transmission in a C or D series mower fails, replace it as a complete assembly. This section explains the internal operation of the transmission so that technicians have a better understanding of how it works. If a technician actually sees any of the parts shown in this section of the manual, they have probably made a mistake.

1. The input shaft drives a worm gear within the trans-
2. The worm gear turns a helical gear that drives the axles.
3. The helical gear and axles are supported by a pair of axle bearings. Blue-colored thrust washers control axle end-play. See Figure 4.64.
4. The retainer for the bearing that supports the worm gear also has two spring arms that drag against the shoulders of the helical gear assembly. See Figure 4.65.

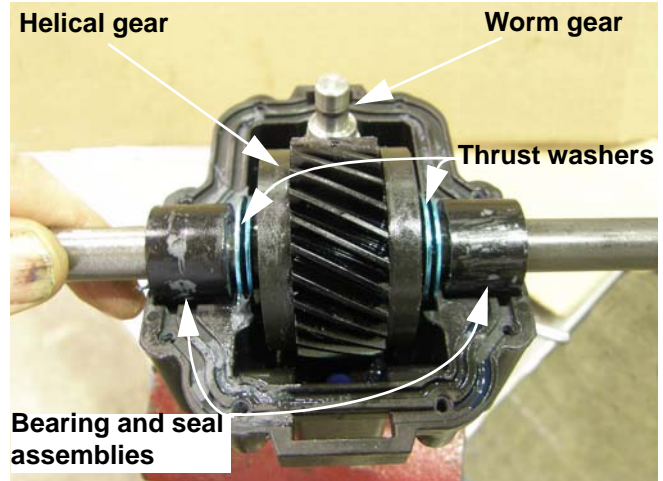


Figure 4.64

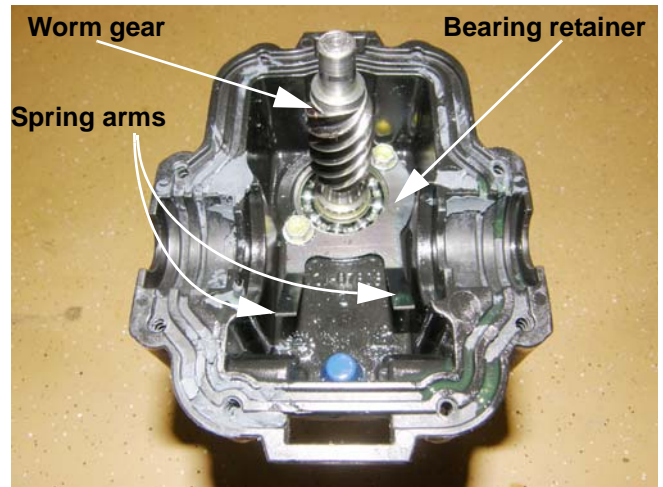


Figure 4.65

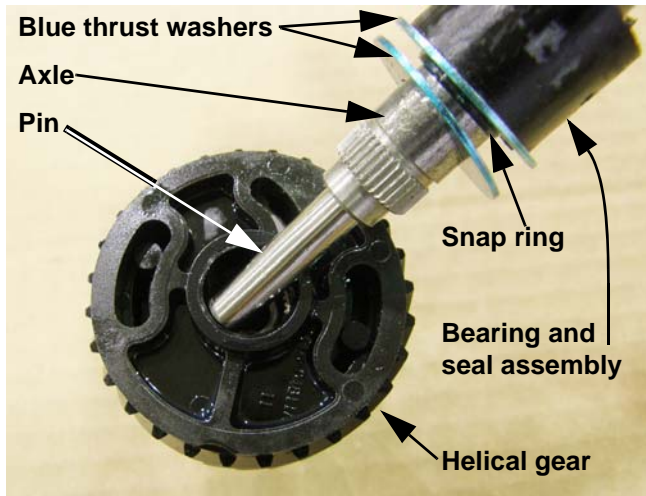


Figure 4.66

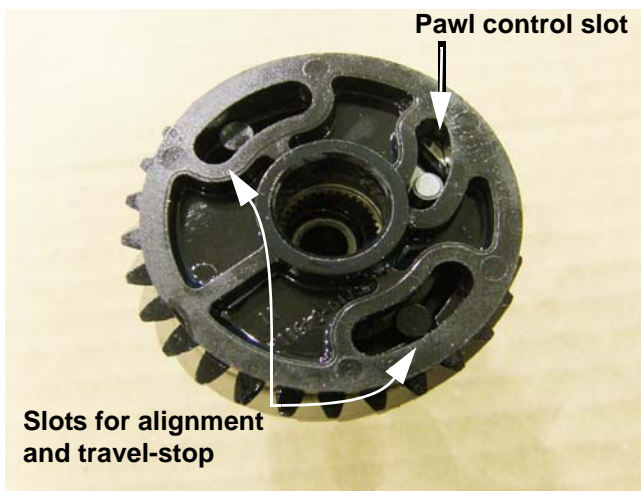


Figure 4.67

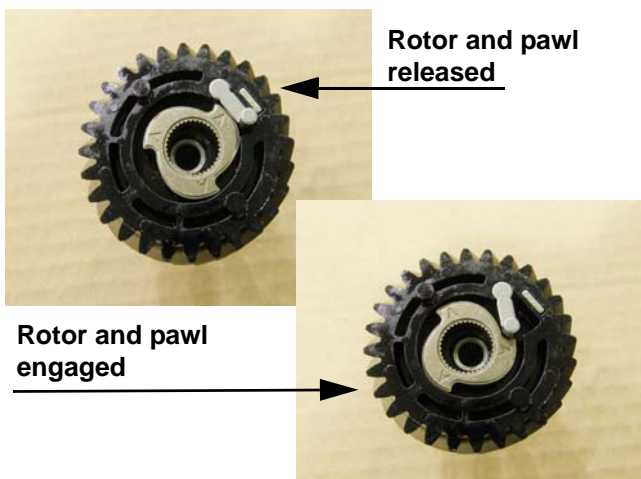


Figure 4.68

5. The helical gear assembly drives the axles through a splined connection. See Figure 4.66.
6. There is one blue thrust washer separating the bearing and seal assembly from a circlip on the axle.
7. There is a second blue thrust washer between the circlip and the outside of the pinion assembly.
8. A pin fits into the inboard end of both axles. It provides alignment between the axles.

9. A drag plate with a set of slots rides against the other side of the helical gear: See Figure 4.67.

- There are two slots that follow the curve of the outer edge of the plate. They are for travel stop and alignment.
- A third curved slot acts as a cam to control the pawl.
- When the gear turns faster than the axle, the drag plate lags relative to the axle, moving the pawl control pin inward, engaging drive to the axle.
- When the axle is turning faster than the gear, the curved slot forces the pawl control pin out, disengaging drive to the axle.
- The drag plate rotates on a shoulder on the axle.
- This non-A rotor connects to the short axle.

10. Taking the drag plate off reveals the pawl and the rotor. See Figure 4.68.

- The bore of the rotor is splined, providing a drive connection to the axle.
- Normally, the pawl is held outward, assisted by a small magnet in the pinion gear.
- When the pawl is forced in by the cam slot, it engages one of three notches in the rotor.
- The rotor has "A" stamped in on one side. It is reversible.

C and D series mowers

11. When assembled correctly, the sweep of the single cam slot should match the sweep of the lobes on the rotor, guiding the pawl to seat in the hook at the trailing edge of each lobe in the rotor. See Figure 4.69.



Figure 4.69

12. The A-side drag plate contains four cam slots.
- The A-side drag plate has a notch in it that will catch on the spring arm on the bearing retainer.
 - When the A-side drag plate lags relative to the axle, the cam slot pulls the pawl control pin inward, engaging drive to the A-side rotor and the long axle.

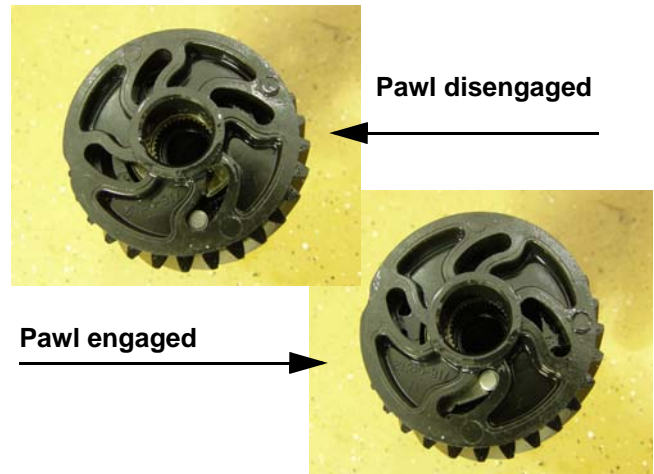


Figure 4.70

13. The A-side pawl is held outward by a small magnet that fits in the pinion gear. See Figure 4.71.

NOTE: In this picture, the “B”s are visible on the rotor because we are looking at the outward facing side of the rotor. It is correctly positioned in the A side of the helical gear. Most production rotors are only marked on the A side.

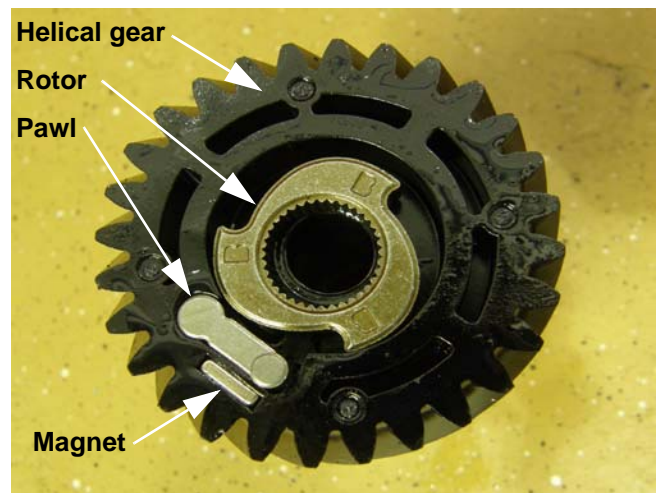


Figure 4.71