

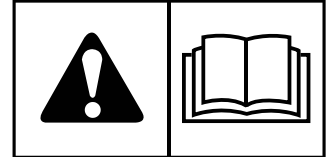


DEALER SERVICE MANUAL

400S Series

Zero-Turn Riding Mower

S/N: 4000175395 & Above



Model	Description
5901706	400SB2348CE, Zero-Turn Rider with 48" Mower Deck
5901990	400SB2348CE, Zero-Turn Rider with 48" Mower Deck



5107604
Revision C

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Thank you for purchasing this quality-built Ferris Zero-Turn Riding Mower. We're pleased that you've placed your confidence in the Ferris brand. When operated and maintained according to the manuals, your Ferris product will provide many years of dependable service.

The manuals contain safety information to make you aware of the hazards and risks associated with the unit and how to avoid them. This Zero-Turn Riding Mower was designed to be used as described in this operator's manual and operated by trained professionals for finish cutting of established lawns and is not intended for any other purpose. It is important that you read and understand the instructions thoroughly before attempting to start or operate this equipment. Save these original instructions for future reference.

Products Covered by This Manual

The following products are covered by this manual:
5901706 & 5901990

The images in this document are representative, and are meant to complement the instructional copy they accompany. Your unit may vary from the images displayed. *LEFT* and *RIGHT* are as seen from the operator's position.

Ferris is a registered trademark of Briggs & Stratton.

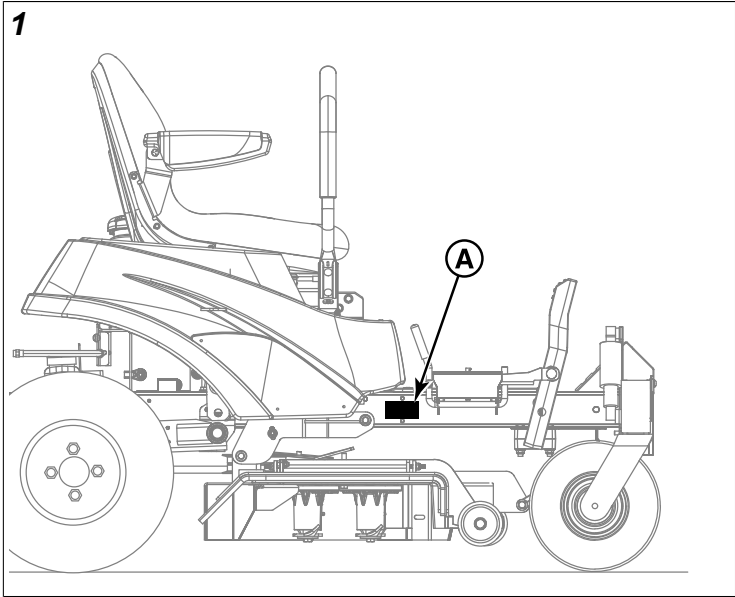
The Illustrated Parts Lists for this machine can be downloaded from ferrismowers.com. Please provide model and serial number when ordering replacement parts.

Declaration of Conformity Statement

This product complies with all relevant regulations and directives; for details, please see the product specific Declaration of Conformity (DOC) sheet that is part of the instructions which are accompanying the unit.

Product Identification Tag

The product identification tag (A, Figure 1) can be found in the location shown.



Your unit may feature a serial tag that looks like either one of the following two options:

BRIGGS & STRATTON MILWAUKEE, WI 53201, USA ASSEMBLED IN THE USA	
PART NO. XXXXXXX	SERIAL NO. XXXXXXXXXX

 BRIGGS & STRATTON, LLC MILWAUKEE, WI 53201 ASSEMBLED IN THE USA	
MODEL NO. XXXXXX	SERIAL NO. XXXXXXXXXX
	

Record your model number, serial number, and engine model and serial numbers in the space provided for easy access.

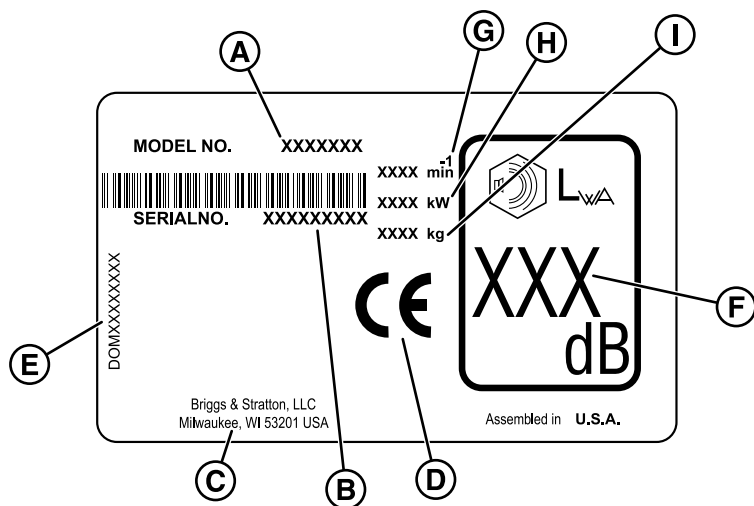
PRODUCT REFERENCE DATA	
Unit Model Number:	
Unit Serial Number:	
Mower Deck Model Number (if applicable):	
Mower Deck Serial Number (if applicable):	
Dealer Name:	
Date Purchased:	
ENGINE REFERENCE DATA	
Engine Make:	
Engine Model:	
Engine Type / Specification:	
Engine Code / Serial Number:	

When contacting your authorized service dealer for replacement parts, service, or information you **MUST** have these numbers.

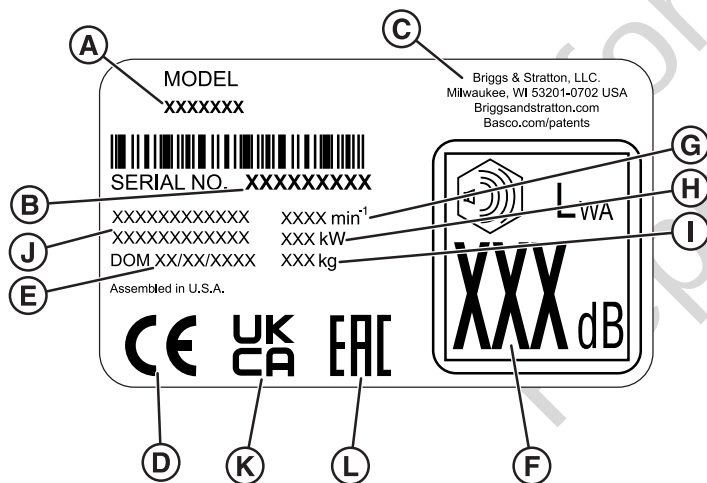
Note: For the location of the engine identification numbers, refer to engine owner's manual.

CE Identification Tag Markings

Serial number range: 4002237197 and below:



Serial number range: 4002237198 and above:



- A. Manufacturer's Identification Number
- B. Serial Number
- C. Manufacturer's Address
- D. CE Compliance Logo
- E. Year of Manufacture
- F. Sound Power in Decibels
- G. Maximum Engine Speed in Rotations per Minute
- H. Power Ratings in Kilowatts
- I. Mass of Unit in Kilograms
- J. Manufacturer's Product Description
- K. UKCA Compliance Logo
- L. EAC Compliance Logo

Operator Safety

Operating Safely

Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of unit, severe personal injury or death to you, or bystanders, or damage to property or equipment. **This mowing deck is capable of amputating hands and feet and throwing objects.**

The safety alert triangle (⚠) in text signifies important cautions or warnings which must be followed.

Safety Alert Symbol and Signal Words

The safety alert symbol ⚠ identifies safety information about hazards that can result in personal injury. A signal word (**DANGER**, **WARNING**, or **CAUTION**) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard.

⚠ DANGER indicates a hazard which, if not avoided, **will** result in death or serious injury.

⚠ WARNING indicates a hazard which, if not avoided, **could** result in death or serious injury.

⚠ CAUTION indicates a hazard which, if not avoided, **could** result in minor or moderate injury.

NOTICE indicates information considered important but not hazard-related.

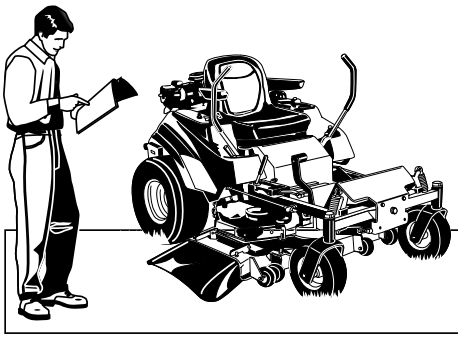
Operating Safety



Power equipment is only as safe as the operator. If it is misused, or not properly maintained, it can be dangerous! Remember, you are responsible for your safety and that of those around you.

Use common sense, and think through what you are doing. If you are not sure that the task you are about to perform can be safely done with the equipment you have chosen, ask a professional: contact your local authorized dealer.

Read the Manual

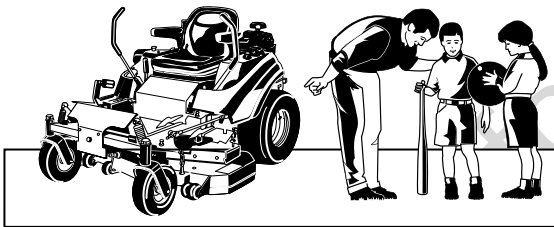


The operator's manual contains important safety information you need to be aware of **BEFORE** you operate your unit as well as **DURING** operation.

Safe operating techniques, an explanation of the product's features and controls, and maintenance information is included to help you get the most out of your equipment investment.

Be sure to completely read the Safety Rules and Information found on the following pages. Also completely read the Operation section.

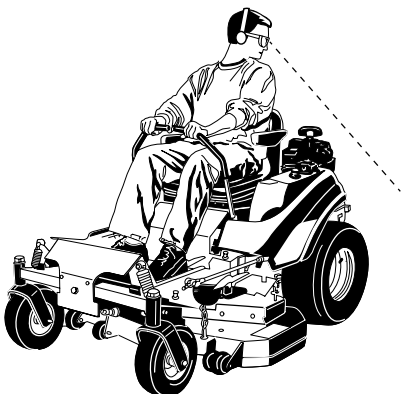
Children



Tragic accidents can occur with children. Do not allow them anywhere near the area of operation. Children are often attracted to the unit and mowing activity. Never assume that children will remain where you last saw them. If there is a risk that children may enter the area where you are mowing, have another responsible adult watch them.

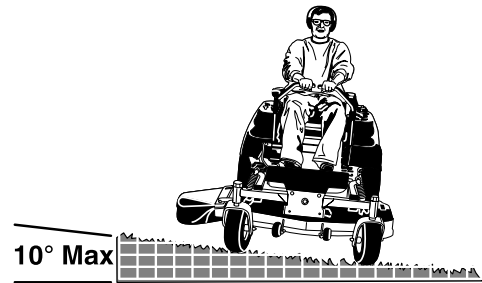
DO NOT GIVE CHILDREN RIDES ON THIS UNIT! This encourages them to come near the unit in the future while it is running, and they could be seriously hurt. They may then approach the unit for a ride when you are not expecting it, and you may run over them.

Reverse



Do not mow in reverse unless absolutely necessary. Always look down and behind before and while traveling in reverse even with the mower blades disengaged.

Slope Operation



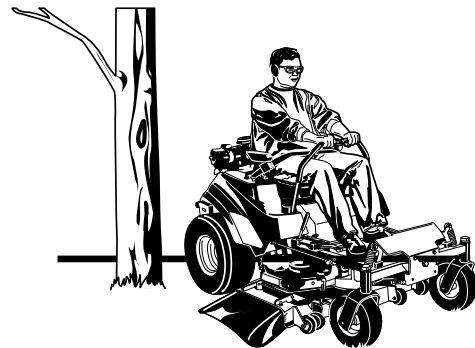
You could be seriously injured or even killed if you use this unit on too steep an incline. Using the unit on a slope that is too steep or where you don't have adequate traction can cause you to lose control or roll over. Refer to the **Slope Identification Guide** to measure the slope of a lawn surface.

A good rule of thumb is to not operate on any slope you cannot back up. You should not operate on inclines with a slope greater than 10 degrees, a 3.5 ft (1,1 m) rise over a 20.0 ft (6,0 m) length. Avoid turning down slopes; if possible turn up slopes.

Also note that the surface you are driving on can greatly impact stability and control. Wet grass or icy pavement can seriously affect your ability to control the unit.

If you feel unsure about operating the unit on an incline, don't do it. It's not worth the risk.

Moving Parts

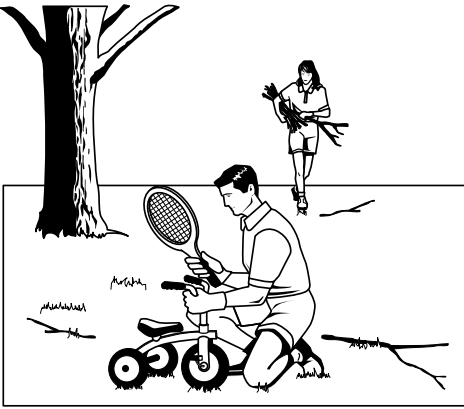


This equipment has many moving parts that can injure you or someone else. However, if you are seated in the seat properly, and follow all the rules in this book, the unit is safe to operate.

The mower deck has spinning mower blades that can amputate hands and feet. Do not allow anyone near the equipment while it is running!

To help you, the operator, use this equipment safely, it is equipped with an operator present safety system. Do NOT attempt to alter or bypass the system. See your dealer immediately if the system does not pass all the safety interlock system tests found in this manual.

Thrown Objects

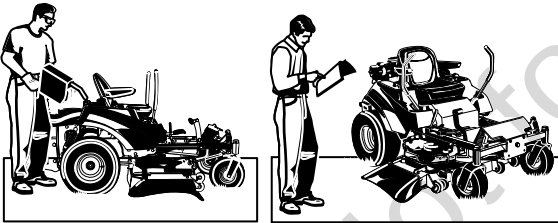


This unit has spinning mower blades. These blades can pick up and throw debris that could seriously injure a bystander. Be sure to clean up the area to be mowed **BEFORE** you start mowing.

Do not operate this unit without the entire grass catcher or discharge guard (deflector) in place.

Also, do not allow anyone in the area while the unit is running! If someone does enter the area, shut the unit off immediately until they leave.

Fuel and Maintenance



Always disengage all drives, shutoff the engine, and remove the key before doing any cleaning, refueling, or servicing.

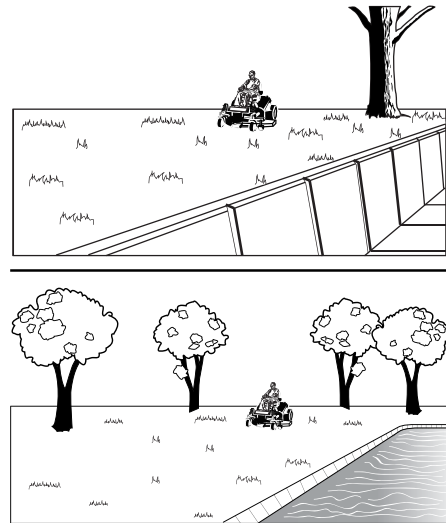
Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

Do not add fuel indoors, in an enclosed trailer, garage, or any other enclosed area that is not well ventilated. Gasoline spills should be cleaned up promptly and before operation begins.

Gasoline should be stored only in sealed containers approved for fuel.

Proper maintenance is critical to the safety and performance of your unit. Keep the unit free of grass, leaves, and excess oil. Be sure to perform the maintenance procedures listed in this manual, especially periodically testing the safety system.

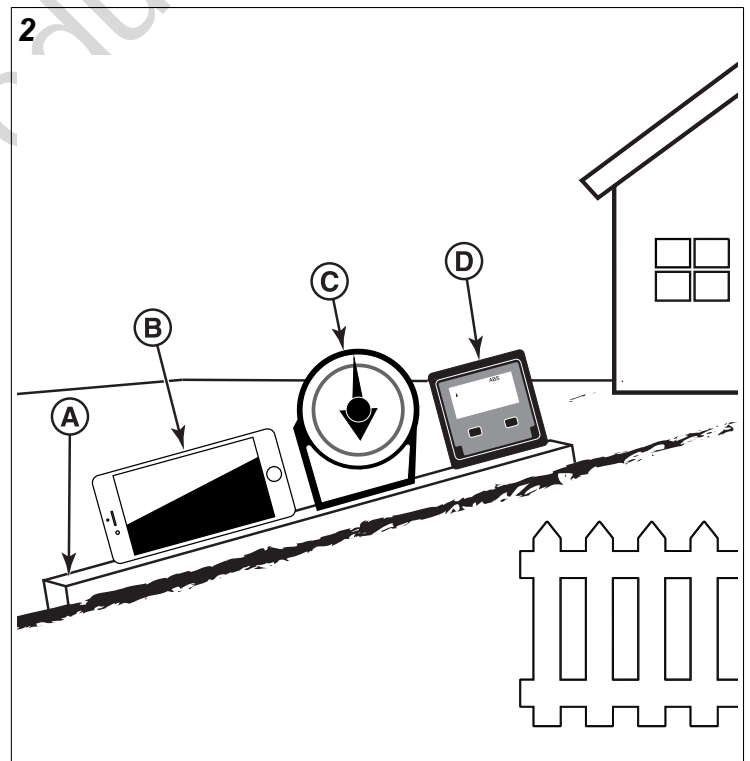
Retaining Walls, Drop-Offs, and Water



Retaining walls and drop-offs around steps and water are a common hazard. Do **NOT** operate down slope towards or near water, retaining walls, or drop-offs.

Give yourself a minimum of two mower widths of clearance around these hazards and hand-trim with a walk behind mower or string trimmer. Wheels dropping over retaining walls, edges, ditches, embankments, or into water can cause rollovers, which may result in serious injury, death, or drowning.

Slope Identification Guide



How to measure the slope of a lawn surface with a smartphone or an angle finder tool:



WARNING

Do not operate on slopes greater than 10 degrees.

1. Use a straight edge at least two (2) feet long (A, Figure 2). A 2x4 or a straight piece of metal works well.
2. Angle finder tools.
 - a. **Use your smartphone:** Many smartphones (B, Figure 2) have an inclinometer (angle finder) located under the compass application (app). Or, search an app store for an Inclinometer app.
 - b. **Use angle finder tools:** Angle finder tools (C and D, Figure 2) are available at local hardware stores or online (also called inclinometer, protractor, angle meter, or angle gauge). Dial type (C) or digital type (D) work, others may not. Read and obey the user instructions supplied with the angle finder tool.
3. Put the two (2) feet long straight edge along the steepest part of the lawn slope. Put the board up and down the slope.
4. Lay the smartphone or angle finder tool on the straight edge and read the angle in degrees. This is the slope of your lawn.

Note: A paper gauge slope identification guide is included in your product literature packet and is also available to download from the manufacturer's website.

Safety Rules and Information

General Operation

1. Read, understand, and follow all instructions in the manual and on the unit before starting.
2. Do not put hands or feet near rotating parts or under the machine. Keep clear of the discharge opening at all times.
3. Only allow responsible adults, who are familiar with the instructions, to operate the unit (local regulations can restrict operator age).
4. Clear the area of objects such as rocks, toys, wire, etc., which could be picked up and thrown by the blade(s).
5. Be sure the area is clear of other people before mowing. Stop the unit if anyone enters the area.
6. Never carry passengers.
7. Do not mow in reverse unless absolutely necessary. Always look down, behind, and to the side before changing directions.
8. Never direct discharge material toward anyone. Avoid discharging material against a wall or obstruction. Material may ricochet back toward the operator. Stop the blade(s) when crossing gravel surfaces.
9. Do not operate the machine without the entire grass catcher, discharge guard (deflector), or other safety devices in place.
10. Slow down before turning.

11. Never leave a running unit unattended. Always disengage the PTO, set parking brake, stop engine, and remove keys before dismounting.
12. Disengage blades (PTO) when not mowing. Shut off engine and wait for all parts to come to a complete stop before cleaning the machine, removing the grass catcher, or unclogging the discharge guard.
13. Operate the machine only in daylight or good artificial light.
14. Do not operate the unit while under the influence of alcohol or drugs.
15. Watch for traffic when operating near or crossing roadways.
16. Use extra care when loading or unloading the unit into a trailer or truck.
17. Always wear eye protection when operating this unit.
18. Data indicates that operators, age 60 years and above, are involved in a large percentage of power equipment-related injuries. These operators should evaluate their ability to operate the equipment safely enough to protect themselves and others from injury.
19. Follow the manufacturer's recommendations for wheel weights or counterweights.
20. Keep in mind the operator is responsible for accidents occurring to other people or property.
21. All drivers should seek and obtain professional and practical instruction.
22. Always wear substantial footwear and trousers. Never operate when barefoot or wearing sandals.
23. Before using, always visually check that the blades and blade hardware are present, intact, and secure. Replace worn or damaged parts.
24. Disengage attachments before: refueling, removing an attachment, making adjustments (unless the adjustment can be made from the operator's position).
25. When the machine is parked, stored, or left unattended, lower the cutting means unless a positive mechanical lock is used.
26. Before leaving the operator's position for any reason, disengage the PTO, engage the parking brake (if equipped), stop the engine, and remove the key.
27. To reduce fire hazard, keep the unit free of grass, leaves, & excess oil. Do not stop or park over dry leaves, grass, or combustible materials.
28. It is a violation of California Public Resource Code Section 4442 to use or operate the engine on or near any forest-covered, brush-covered, or grass-covered land unless the exhaust system is equipped with a spark arrester meeting any applicable local or state laws. Other states or federal areas may have similar laws.

Transporting And Storage

1. When transporting the unit on an open trailer, make sure it is facing forward, in the direction of travel. If the unit is facing backwards, wind lift could damage the unit.

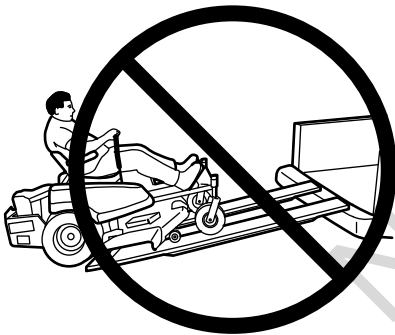
2. Always observe safe refueling and fuel handling practices when refueling the unit after transportation or storage.
3. Never store the unit (with fuel) in an enclosed poorly ventilated structure. Fuel vapors can travel to an ignition source (such as a furnace, water heater, etc.) and cause an explosion. Fuel vapor is also toxic to humans and animals.
4. Always follow the engine manual instructions for storage preparations before storing the unit for both short and long term periods.
5. Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
6. Never store the unit or fuel container inside where there is an open flame or pilot light, such as in a water heater. Allow unit to cool before storing.



WARNING

Unsafe Operation Hazard

Do not load this zero-turn rider on a trailer or truck using two separate ramps. Only use a single ramp that is at least one foot wider than the width of the rear wheels of this rider. This rider has a zero turning radius and the rear wheels could fall off the ramps, or the rider could tip over injuring the operator or bystanders.



Slope Operation

Slopes are a major factor related to loss-of-control and tip over accidents, which can result in severe injury or death. Operation on all slopes requires extra caution. If you feel uneasy on a slope, do not operate on it.

Control of a zero-turn riding mower sliding on a slope will not be regained by the application of the brake. The main reasons for loss of control are: insufficient tire grip on the ground, speed too fast, inadequate braking, the type of machine is unsuitable for its task, lack of awareness of the ground conditions, incorrect hitching and load distribution.

1. Avoid turning down slopes; if possible turn up slopes.
2. Watch for holes, ruts, or bumps. Uneven terrain could overturn the unit. Tall grass can hide obstacles.
3. Choose a slow speed so that you will not have to stop or change speeds while on the slope.
4. Do not mow on wet grass. Tires may lose traction.

5. Do NOT operate down slope towards or near water, retaining walls, or drop-offs.
6. Avoid starting, stopping, or turning on a slope. If machine stops forward motion on a slope, stop the blades and drive slowly off the slope.
7. Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction, which could cause the machine to rollover.
8. Use extra care while operating machines with grass catchers or other attachments; they can affect the stability of the unit. Do not use on steep slopes.
9. Do not try to stabilize the machine by putting your foot on the ground (ride-on units).
10. Do not mow near drop-offs, ditches, or embankments. The mower could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in. Give yourself a minimum of two mower widths of clearance around these hazards.
11. Do not use grass catchers on steep slopes.
12. Do not mow slopes you cannot back up.
13. Remove obstacles such as rocks, tree limbs, etc.
14. Use slow speed. Tires may lose traction on slopes even through the brakes are functioning properly.
15. Do not turn on slopes unless necessary, and then, turn slowly and gradually up slopes, if possible.



WARNING

Unsafe Operation Hazard

Never operate on slopes greater than 10 degrees, a rise of 3-1/2 feet (106 cm) vertically in a 20 feet (607 cm) length.

Select slow ground speed before driving onto slope. In addition to front weights, use extra caution when operating on slopes with rear-mounted grass catchers.

Avoid turning down slopes; if possible turn up slopes. Use caution when changing directions and **DO NOT START OR STOP ON A SLOPE.**

Towed Equipment (Ride-On Units)

1. Tow only with a machine that has a hitch designed for towing. Do not attach towed equipment except at the hitch point.
2. Follow the manufacturer's recommendations for weight limit for towed equipment and towing on slopes.
3. Never allow children or others in or on towed equipment.
4. On slopes, the weight of the towed equipment may cause loss of traction and loss of control.
5. Travel slowly and allow extra distance to stop.
6. Do not shift to neutral and coast down hill.

Children

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the unit

and the mowing activity. Never assume that children will remain where you last saw them.

1. Keep children out of the mowing area and under the watchful care of another responsible adult.
2. Be alert and turn unit off if children enter the area.
3. Before and during reverse operation, look behind and down for small children.
4. Never carry children, even with the blade(s) off. They may fall off and be seriously injured or interfere with safe unit operation. Children who have been given rides in the past may suddenly appear in the mowing area for another ride and be run over or backed over by the machine.
5. Never allow children to operate the unit.
6. Use extra care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

Emissions

1. Engine exhaust from this product contains chemicals known, in certain quantities, to cause cancer, birth defects, or other reproductive harm.
2. Look for the relevant Emissions Durability Period and Air Index information on the engine emissions label.

Service and Maintenance

Safe Handling of Gasoline

1. Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
2. Use only approved gasoline containers.
3. Never remove the gas cap or add fuel with the engine running. Allow the engine to cool before refueling.
4. Never fuel the machine indoors.
5. Never store the machine or fuel container where there is an open flame, spark, or pilot light such as near a water heater or other appliance.
6. Never fill containers inside a vehicle or on a truck bed with a plastic bed liner. Always place containers on the ground away from your vehicle before filling.
7. Remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.
8. Keep nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete. Do not use a nozzle lock-open device.
9. If fuel is spilled on clothing, change clothing immediately.
10. Never over-fill the fuel tank. Replace gas cap and tighten securely.
11. Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.
12. If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have dissipated.

13. Replace all fuel tank caps and fuel container caps securely.

Service & Maintenance

1. Never run the unit in an enclosed area where carbon monoxide fumes may collect.
2. Keep nuts and bolts, especially blade attachment bolts, tight and keep equipment in good condition.
3. Never tamper with safety devices. Check their proper operation regularly and make necessary repairs if they are not functioning properly.
4. Keep unit free of grass, leaves, or other debris buildup. Clean up oil or fuel spillage and remove any fuel-soaked debris. Allow machine to cool before storage.
5. If you strike an object, stop and inspect the machine. Repair, if necessary, before restarting.
6. Never make adjustments or repairs with the engine running.
7. Check grass catcher components and the discharge guard frequently and replace with manufacturer's recommended parts, when necessary.
8. Mower blades are sharp. Wrap the blade or wear gloves, and use extra caution when servicing them.
9. Check brake operation frequently. Adjust and service as required.
10. Maintain or replace safety and instructions labels, as necessary.
11. Do not remove the fuel filter when the engine is hot as spilled gasoline may ignite. Do not spread fuel line clamps further than necessary. Ensure clamps grip hoses firmly over the filter after installation.
12. Do not use gasoline containing METHANOL, gasohol containing more than 10% ETHANOL, gasoline additives, or white gas because engine/fuel system damage could result.
13. If the fuel tank must be drained, it should be drained outdoors.
14. Replace faulty silencers/mufflers.
15. Use only factory authorized replacement parts when making repairs.
16. Always comply with factory specifications on all settings and adjustments.
17. Only authorized service locations should be utilized for major service and repair requirements.
18. Never attempt to make major repairs on this unit unless you have been properly trained. Improper service procedures can result in hazardous operation, equipment damage and voiding of manufacturer's warranty.
19. On multiple blade mowers, take care as rotating one blade can cause other blades to rotate.
20. Do not change engine governor settings or over-speed the engine. Operating the engine at excessive speed can increase the hazard of personal injury.

21. Disengage drive attachments, stop the engine, remove the key, and disconnect the spark plug wire(s) before: clearing attachment blockages and chutes, performing service work, striking an object, or if the unit vibrates abnormally. After striking an object, inspect the machine for damage and make repairs before restarting and operating the equipment.
22. Never place hands near the moving parts, such as a hydro pump cooling fan, when the tractor is running. (Hydro pump cooling fans are typically located on top of the transaxle).
23. Units with hydraulic pumps, hoses, or motors: **WARNING:** Hydraulic fluid escaping under pressure may have sufficient force to penetrate skin and cause serious injury. If foreign fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result. Keep body and hands away from pin holes or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, and not hands, to search for leaks. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. If leaks occur, have the unit serviced immediately by your authorized dealer.
24. **WARNING:** Stored energy device. Improper release of springs can result in serious personal injury. Springs should be removed by an authorized technician.
25. Models equipped with an engine radiator: **WARNING:** Stored energy device. To prevent serious bodily injury from hot coolant or steam blow-out, never attempt to remove the radiator cap while the engine is running. Stop the engine and wait until it is cool. Even then, use extreme care when removing the cap.

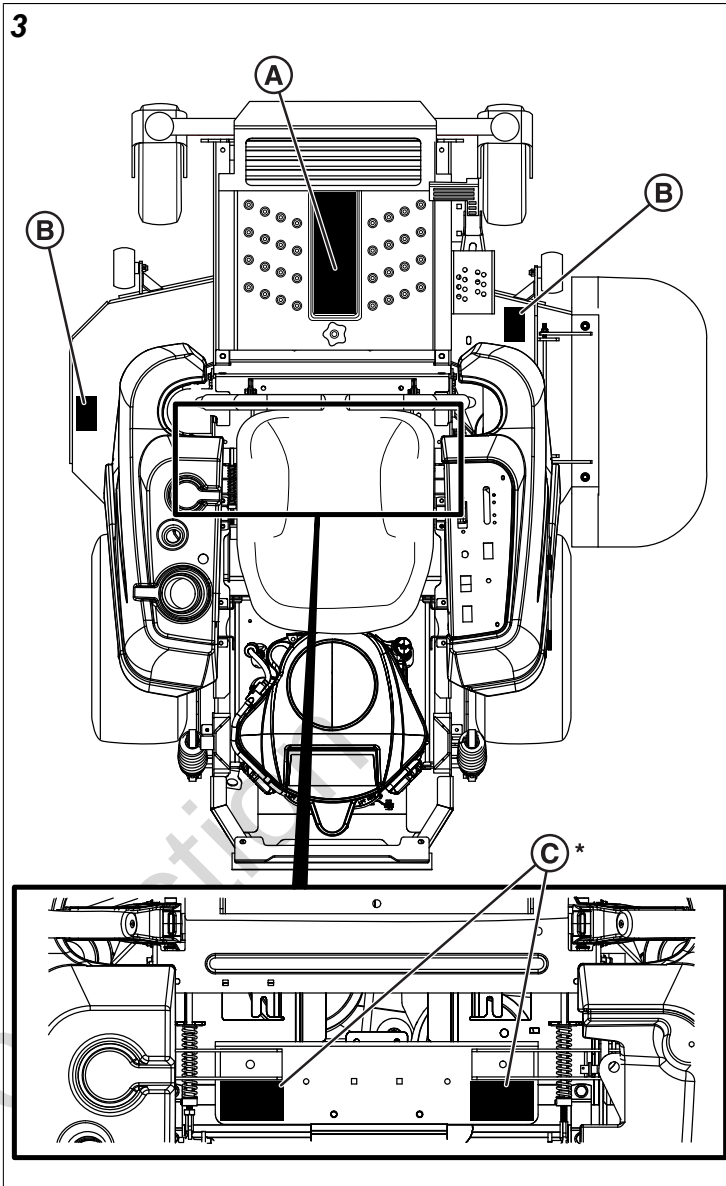
Safety Decals and Icons

Read the safety decals before operating your unit. The cautions and warnings are for your safety. Understand and follow all safety decals to avoid a personal injury or damage to the unit.



WARNING

If any safety decals become worn or damaged and cannot be read, order replacement decals from your local dealer.



* Located under seat plate on cross rail.

- A. **Part Number: 5106566 - Decal, Main Safety**
- B. **Part Number: 7106109 - Decal, Danger, Discharge**
- C. **Part Number: 5061042 - Decal, Warning, Hand in Belt**

5106566 - Decal, Main Safety



	WARNING: Read and understand the Operator's Manual before using this machine. Know the location and function of all controls. Do not operate this machine unless you are trained.
	DANGER - AMPUTATION AND DISMEMBERMENT HAZARD: To avoid injury from rotating blades and moving parts, keep safety devices (guards, shields and switches) in place and working.
	DANGER - THROWN OBJECTS AND AMPUTATION HAZARD: To avoid injury, keep bystanders and children away. Remove objects that can be thrown by the blades. Do not mow without discharge chute or entire grass catcher in place.

	DANGER - LOSS OF CONTROL AND ROLL OVER HAZARD: Operating on slopes can be hazardous and cause a loss of control and roll-overs. Do not operate on slopes over 10* degrees. Avoid sudden turns or rapid speed changes. Reduce speed and use extreme caution on slopes. Avoid turning down slopes; if possible, turn up slopes. Do not operate down slopes towards or near water, retaining walls, or drop-offs. Give yourself a minimum of two mower widths of clearance around these hazards.
	DANGER - AMPUTATION HAZARD: Never carry riders, especially children, even with the blades off. Do not mow in reverse unless absolutely necessary. Look down and behind - before and while backing.
	DANGER: LOSS OF TRACTION, SLIDING, STEERING, AND CONTROL ON SLOPES HAZARD: If machine stops forward motion on a slope, stop the blades. and drive slowly off the slope.
	DANGER: Engage parking brake, remove key, and consult technical literature before performing service or maintenance.
	DANGER - FIRE HAZARD: Remove key and wait three (3) minutes before refueling.

*This limit was determined per International Standard ISO 5395-3:2013, Section 4.6 and is based on the ISO 5395-3 Stability Test procedure described in Annex A. The 10 degree "limit of stability" is equal to 60% of the angle at which machine lift-off occurred in static tests. Actual dynamic stability may vary depending on operating conditions.

7106109 - Decal, Danger, Discharge

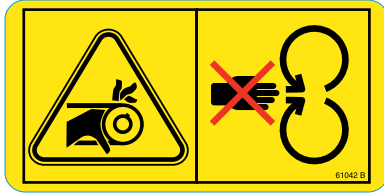


	Danger - Thrown Objects Hazard: Do not mow without discharge chute or entire grass catcher in place.
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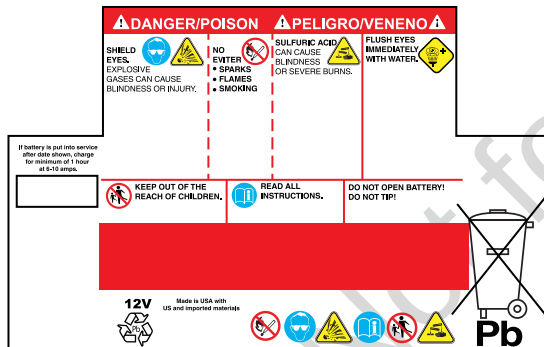
Danger - Amputation and Thrown Objects Hazard: To avoid injury from rotating blades, stay clear of deck edge and keep others away.

5061042 - Decal, Danger



Danger: Dismemberment: This machine can crush and cut. Keep hands away from belts and pulleys.

Battery Safety Decal



Warning: Fire Hazard - Keep children, open flames and sparks away from the battery, which could ignite explosive gases.



Warning: Sulfuric acid can cause blindness or severe burns - Always wear safety goggles or a face shield when working on or near a battery.



Warning: Batteries produce explosive gases - Read and understand the Operator's Manual before using this machine.



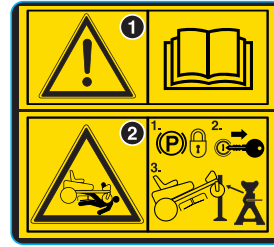
Important: Do not discard a battery in the trash - Contact local authorities for disposal and/or recycling of batteries.



Flush eyes immediately with water. Get medical help fast.

Safety Icons for Optional Jack Kit Accessory

An optional jack kit is available as an accessory through your normal parts source. Please see the explanations below for the safety icons displayed on the jack kit.



Part Number: 5105632 - Decal, Warnings, Svc Jack

1.) Warning - Read the Operator's Manual.

2.) Crushing Hazard, Mower: (1.) Park machine on flat level ground and engage the parking brake; (2.) Stop the engine and remove the ignition key; (3.) Properly jack the machine and secure with jack stands before working under the machine.

Safety Interlock System Checks



WARNING

DO NOT operate machine if any safety interlock or safety device is not in place and functioning properly. Contact your dealer immediately for assistance. DO NOT attempt to defeat, modify, or remove any safety device.

TEST 1 - Engine must not crank if:

- PTO switch is engaged, OR;
- Parking brake is not engaged, OR;
- Ground speed control levers are not locked in their NEUTRAL positions.

TEST 2 - Engine should crank if:

- PTO switch is not engaged, AND;
- Parking brake is engaged, AND;
- Ground speed control levers are locked in their NEUTRAL positions.

TEST 3 - Engine must shut off if:

- Operator rises off seat with PTO engaged, OR
- Operator rises off seat with parking brake disengaged.
- Operator moves ground speed control levers out of their neutral positions before disengaging parking brake.

TEST 4 - Check mower blade stopping time:

Mower blades and mower drive belt should come to a complete stop within seven (7) seconds after electric PTO switch is turned off (or operator rises off seat). If mower drive belt does not stop within seven (7) seconds, see your dealer.

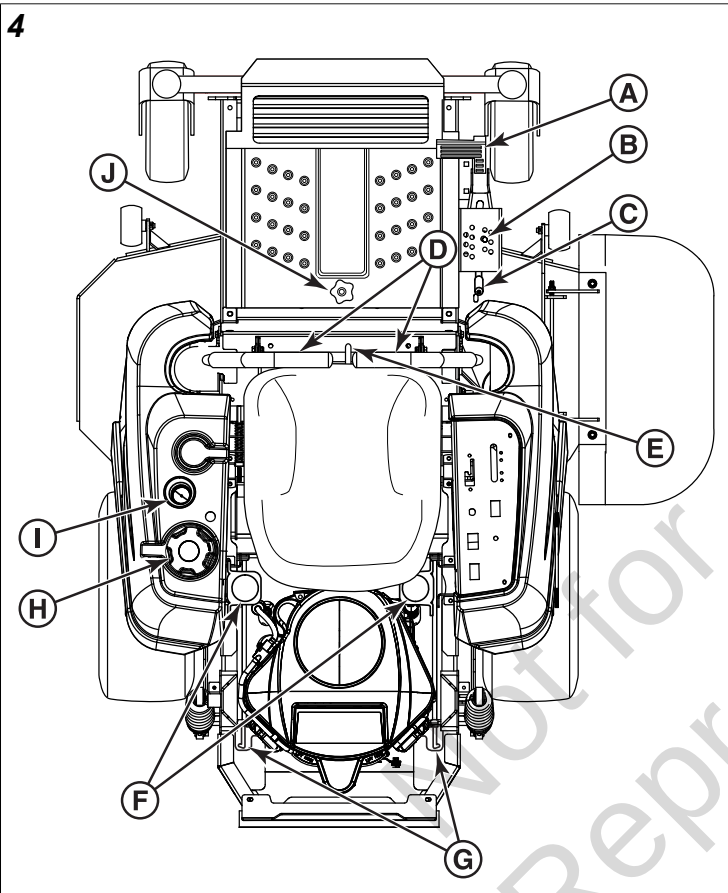
Note: Once the engine has stopped, PTO switch must be turned off, parking brake must be engaged, and the ground speed control levers must be locked in the NEUTRAL position after the operator returns to the seat in order to start the engine.

Features and Controls

Control Functions and Locations

The information below briefly describes the function of individual controls. Starting, stopping, driving, and mowing require the combined use of several controls applied in specific sequences. To learn what combination and sequence of controls to use for various tasks see the *Operation* section.

Zero-Turn Rider Controls

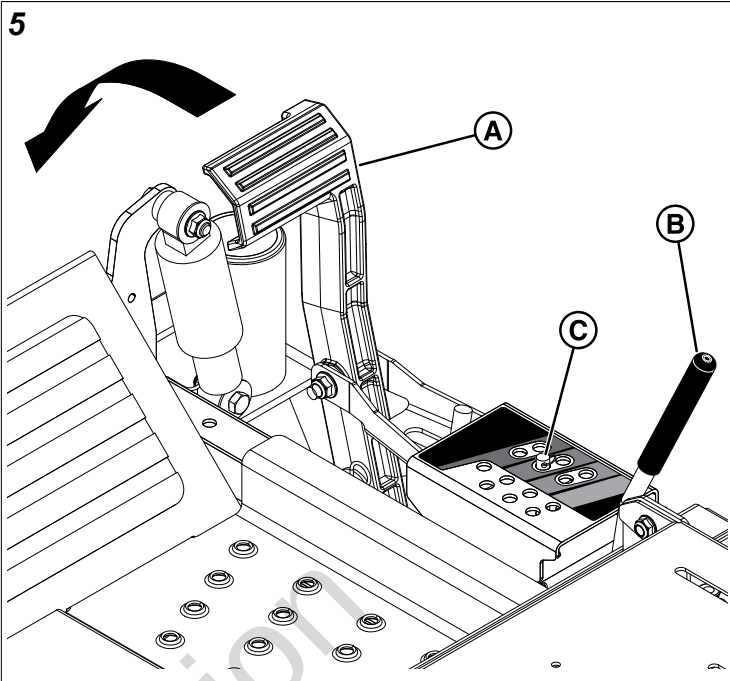


- A. Deck Lift Pedal
- B. Cutting Height Adjustment Pin
- C. Deck Lift Lock Lever
- D. Ground Speed Control Lever
- E. Seat Adjustment Levers
- F. Transmission Oil Fill / Tanks
- G. Transmission Release Levers
- H. Fuel Tank Cap
- I. Fuel Level Gauge
- J. Removable Floor Plate

Deck Lift Pedal, Cutting Height Adjustment Pin, and Deck Lift Lock Lever: These controls are used to adjust the cutting height of the mower deck.

Depress the deck lift pedal (A, Figure 5) until the deck lift lock lever (B) locks the mower deck into the 4-1/2" (11,43 cm) TRANSPORT position. Place the cutting height adjustment

pin (C) into the hole for the desired cutting height. Depress the deck lift pedal, move the deck lift lock lever outwards, and slowly release the deck lift pedal until it rests against the cutting height adjustment pin.

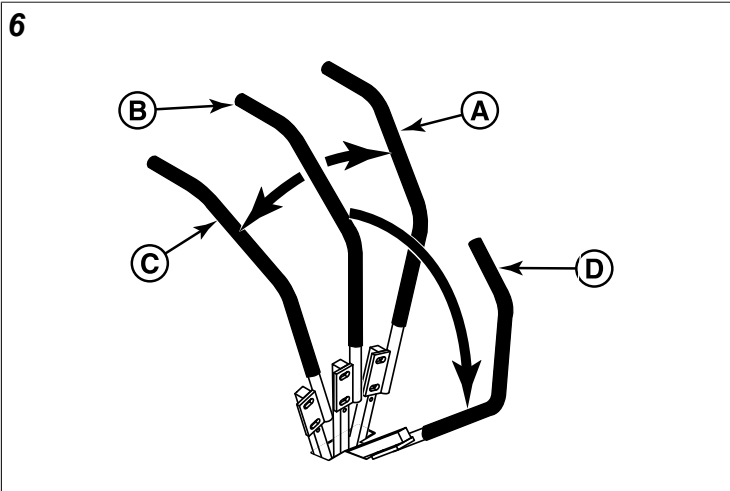


Cutting Height Adjustment Pin



Deck Lift Lock Lever

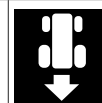
Ground Speed Control Levers: These levers control the ground speed and direction of the zero-turn riding mower. The left lever controls the left rear drive wheel and the right lever controls the right rear drive wheel.



Forward



Neutral



Reverse

Moving a lever forward (A, Figure 6) from the NEUTRAL position (B) increases the FORWARD speed of the associated wheel, and pulling back (C) on a lever increases the REVERSE speed.

Moving a levers outwards (D) from the NEUTRAL position locks the levers in the NEUTRAL position.

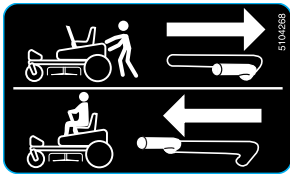
Note: The further a lever is moved away from the neutral position, the faster the drive wheel will turn.

See the *Zero-Turn Riding Mower Driving Practice* section for steering instructions.

Seat Adjustment Lever: The seat can be adjusted forward and back. Move the lever towards the left, position the seat as desired, and release the lever to lock the seat in position.

Transmission Oil Fill: Transmission oil is added through the hydraulic oil tanks. It also serves as extra holding capacity for oil as the transmissions heat up and the hydraulic oil expands. See *Check / Fill Transmission Oil* for oil level check and fill procedures.

Transmission Release Levers:

Icon	Control Name
	Transmission Release Levers

This unit is equipped with two transmission release levers. The transmission release levers deactivate the transaxle so that the unit can be pushed by hand. Both transmission release levers must be in the same position whether you are driving the unit or pushing it by hand. See *Pushing the Unit by Hand* for operational information.

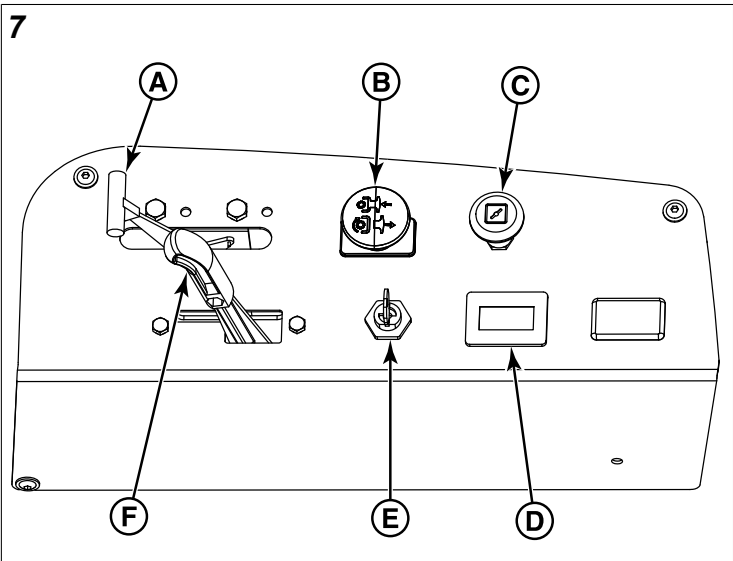
Fuel Tank Cap: To remove the cap, turn **counter-clockwise**.



Fuel Level Gauge: Displays the fuel level in the tank.

Removable Floor Plate: The floor plate can be removed for easy access to the mower deck. To remove the plate, remove the retainer hardware and tilt the floor pan up and then remove from the unit. Reverse the process for re-installation.

Instrument Control Panel



- A. Throttle Control
- B. PTO (Power Take Off) Switch
- C. Choke
- D. Hour Meter
- E. Ignition Switch
- F. Parking Brake

Throttle Control: The throttle controls engine speed. Move the throttle forward to increase engine speed and back to decrease engine speed. Always operate at FULL throttle when mowing.

	
Fast throttle speed.	Slow throttle speed.

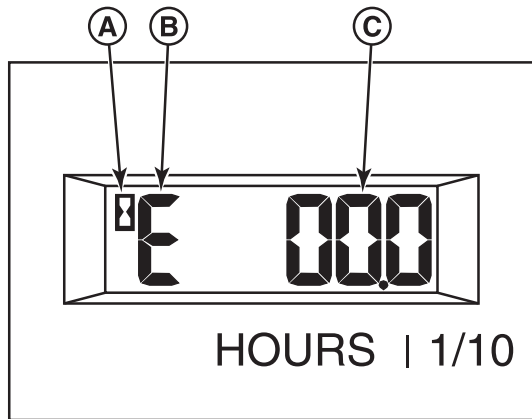


PTO (Power Take Off) Switch: The PTO switch engages and disengages the mower blades. Pull UP on the switch to engage, and push DOWN to disengage.



Choke: Close the choke for cold starting. Open the choke once the engine starts. A warm engine may not require choking. Pull the knob UP to close the choke. Push the knob DOWN to open the choke.

Hour Meter: This unit is equipped with a dual function hour meter that records the number of hours that the engine has run and the number of hours that the PTO switch has been engaged.



"A" - Hour Glass Icon - The hour glass icon flashes when the hour meter is recording the passage of time.

"B" - Mode Icon - The mode icon will display an "E" when displaying engine hours, and a "P" when displaying PTO hours.

"C" - Time Display - This is the number of hours that are recorded.

The default display of the hour meter is engine hours. The mode icon will display a "E" and the hour glass icon will not flash.

To begin recording engine hours, start the unit's engine and release the parking brake. The hour glass icon will flash.

To begin recording PTO hours, pull the PTO switch up to engage the PTO clutch. The unit's engine must be running. The mode icon will display a "P" and the hour glass icon will flash.

While recording PTO hours, the hour meter also records engine hours; however, the hour meter only displays PTO hours when recording PTO hours.

To stop recording PTO hours, push the PTO switch down to disengage the PTO clutch.

To stop recording engine hours, engage the parking brake.

The hour meter has a self contained power source so that the recorded hours are always visible even when the engine is OFF.

Ignition Switch: The ignition switch starts and stops the engine, it has three positions:

	OFF: Stops the engine and shuts off the electrical system.
	RUN: Allows the engine to run and powers the electrical system.
	START: Cranks the engine for starting.

Note: Never leave the ignition switch in the RUN position with the engine stopped—this drains the battery.



Parking Brake: Pull the parking brake lever back, in towards the operator and allow it to travel forward to engage the parking brake. Pull the parking brake lever back, out away from the operator, and allow it to travel forward to disengage the parking brake.

Note: To start the unit the parking brake must be engaged.



DISENGAGE: Releases the parking brake.



ENGAGE: Locks the parking brake.

Operation

Before First Time Operation

- Be sure to read all information in the Safety and Operation sections before attempting to operate this zero-turn rider and mower deck.
- Become familiar with all of the controls and how to stop the machine.
- Drive in an open area without mowing to become accustomed to the unit.



WARNING



- Never operate on slopes greater than 10 degrees.
- Select slow ground speed before driving onto a slope. Use extra caution when operating on slopes with a rear-mounted grass catcher.
- Avoid turning down slopes; if possible turn up slopes. Use caution when changing direction on slopes and **do NOT start or stop on a slope.**



WARNING

- Never allow passengers to ride on the unit.
- Before leaving the operator's position for any reason, engage the parking brake, disengage the PTO, turn the ignition switch to OFF and remove the ignition key.
- To reduce fire hazard, keep the engine, rider and mower free of grass, leaves and excess grease. Do NOT stop or park rider over dry leaves, grass or combustible materials.
- Fuel is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do NOT allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

WARNING

Do NOT load this zero-turn rider on a trailer or truck using two separate ramps. Only use a single ramp that is at least one foot wider than the width of the rear wheels of this rider. This rider has a zero turning radius and the rear wheels could fall off the ramps, or the rider could tip over injuring the operator or bystanders.



Checks Before Starting

- Check that the crankcase is filled to the full mark on the crankcase oil fill and dipstick. If necessary, add oil through the engine oil fill. See the engine operator's manual for instructions, engine oil dipstick location, and oil recommendations.
- Make sure all nuts, bolts, screws, and pins are in place and tight.
- Adjust the seat position and make certain you can reach all the controls from operator's position.
- Fill the fuel tank with fresh fuel. Refer to engine operator's manual for fuel recommendations.
- Check the hydraulic oil level.

Starting the Engine

WARNING

- If you do not understand how a specific control functions, or have not yet thoroughly read the FEATURES AND CONTROLS section, do so now.
 - Do NOT attempt to operate the unit without first becoming familiar with the location and function of all controls.
1. While sitting in the operator's seat, engage the parking brake, make sure the PTO switch is disengaged, and the ground speed control levers are locked in the neutral position.
 2. **A warm engine may not require choking.** Set the engine throttle control to FAST throttle position. Then fully close the choke by pulling the knob OUT fully.
 3. Insert the key into the ignition switch and turn it to START.
 4. After the engine starts, gradually open the choke (push knob down fully). Reduce to half throttle speed and allow engine to warm. *Warm up the engine by running it for at least a minute before engaging the PTO switch or driving the unit.*

5. After warming the engine always operate the unit at FULL throttle when mowing.

In the event of an emergency the engine can be stopped by simply turning the ignition switch to OFF. Use this method only in emergency situations. For normal engine shut down follow the procedure given in *Stopping the Zero-Turn Riding Mower*.

Stopping the Zero-Turn Riding Mower

1. Returning the ground speed control levers to the middle position will stop the unit's movement. Pivot the levers outward and lock them in NEUTRAL.
2. Disengage the PTO by pushing down on the PTO switch.
3. Engage the parking brake by pulling the parking brake lever back, in towards the operator, and then allowing it to travel forward to the lock position.
4. Move the throttle control to mid-throttle position and turn the ignition key to OFF. Remove the key.

Zero-Turn Driving Practice

The lever controls of the Zero Turn rider are responsive, and learning to gain a smooth and efficient control of the rider's forward, reverse, and turning movements will take some practice.

Spending some time going through the maneuvers shown and becoming familiar with how the unit accelerates, travels, and steers — before you begin mowing — is absolutely essential to getting the most out of the Zero Turn rider.

Locate a smooth, flat area of your lawn — one with plenty of room to maneuver. (Clear the area of objects, people and animals before you begin.) Operate the unit at mid-throttle during this practice session (ALWAYS operate at full throttle when mowing), and turn slowly to prevent tire slippage and damage to your lawn.

We suggest you begin with the Smooth Travel procedure to the right, and then advance through the forward, reverse, and turning maneuvers.

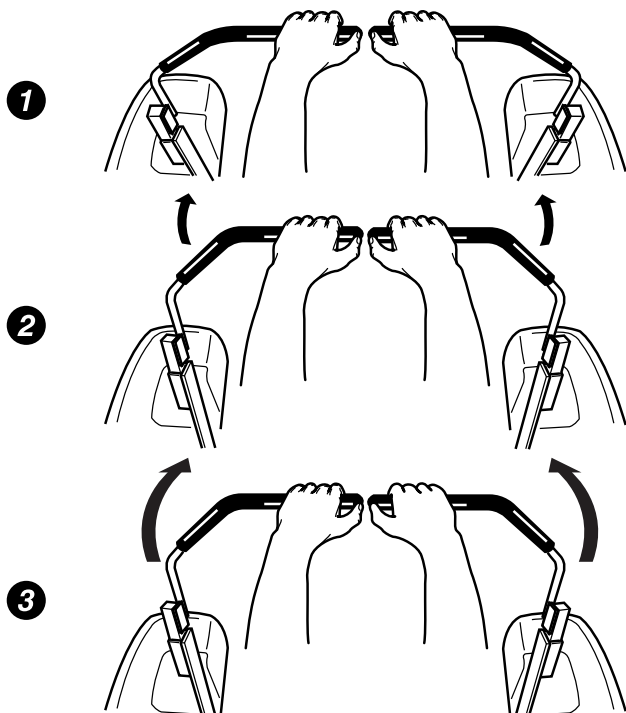
You must release the parking brake prior to moving the control levers inward.

Smooth Travel

The lever controls of the Zero Turn rider are responsive.

The BEST method of handling the ground speed control levers is in three steps — as shown in Figure 8.

8



FIRST place your hands onto the levers as shown.

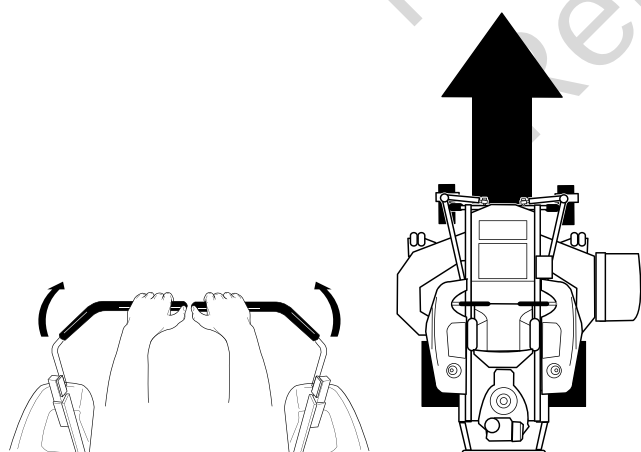
SECOND, to go forward gradually push the levers forward with your palms.

THIRD, to speed up move the levers farther forward. To slow down smoothly, slowly move the levers toward neutral.

Basic Driving

Forward Travel Practice

9

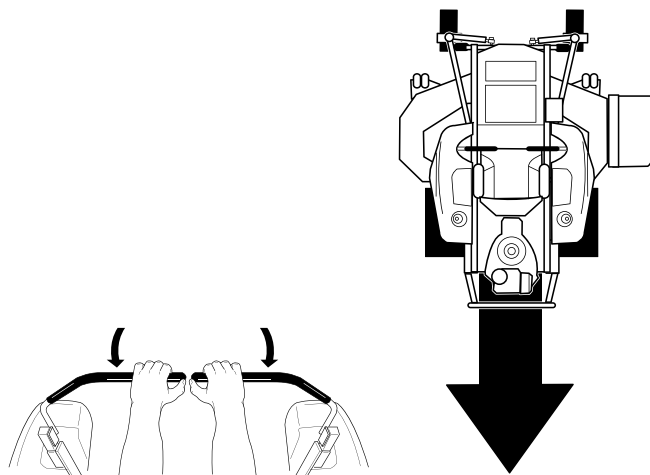


Gradually move both ground speed control levers — evenly **FORWARD** from neutral. Slow down and repeat.

NOTE: Straight forward travel takes practice. If necessary, top speed can be balance-adjusted — see the Speed Balancing Adjustment in the Adjustments section near the back of this manual.

Reverse Travel Practice

10

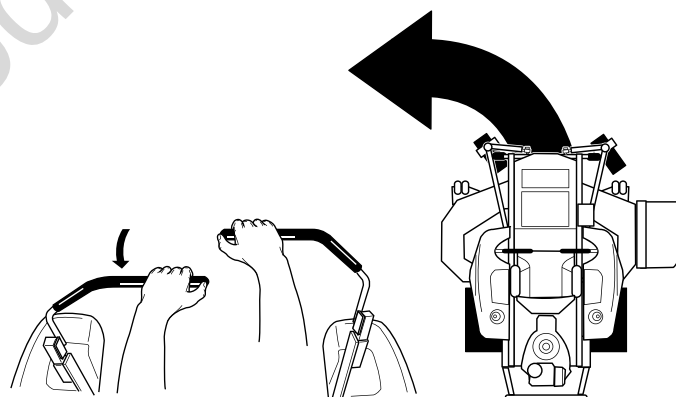


LOOK DOWN & BEHIND, then gradually move both ground speed control levers evenly **BACK** from neutral. Slow down and repeat.

NOTE: Practice backing up for several minutes before attempting to do so near objects. The rider turns sharply in reverse as well as forward, and backing up straight takes practice.

Practice Turning Around A Corner

11

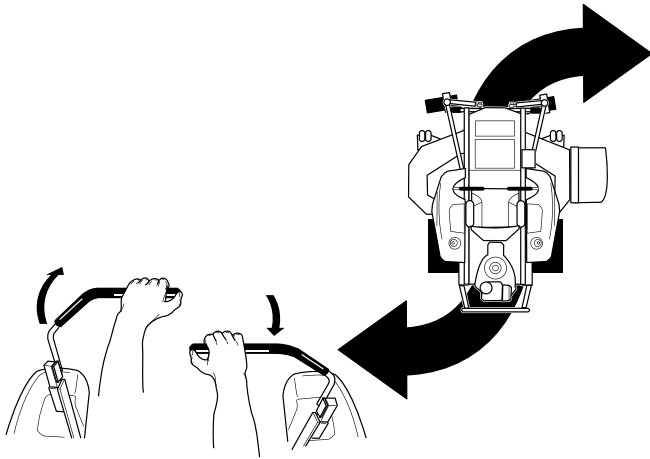


While traveling forward allow one handle to gradually return back toward neutral. Repeat several times.

NOTE: To prevent pivoting directly on the tire tread, it is best to keep both wheels going at least slightly forward.

Practice Turning in Place

12



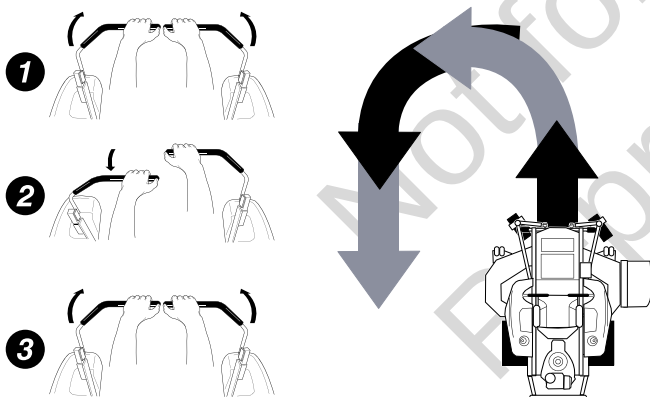
To turn in place, “Zero Turn,” gradually move one ground speed control lever forward from neutral and one lever back from neutral simultaneously. Repeat several times.

NOTE: Changing the amount each lever is pulled—forward or back, changes the “pivot point” you turn on.

Advanced Driving

Executing an End-Of-Row Zero Turn

13



Your Zero Turn Rider’s unique ability to turn in place allows you to turn around at the end of a cutting row rather than having to stop and Y-turn before starting a new row.

For example, to execute a left end-of row zero turn:

1. Slow down at the end of the row.
2. Move the RIGHT ground speed control lever forward slightly while moving the LEFT ground speed control lever back to center and then slightly back from center.
3. Begin mowing forward again.

This technique turns the rider LEFT and slightly overlaps the row just cut —eliminating the need to back up and re-cut missed grass.

As you become more familiar and experienced with operating the Zero Turn rider, you will learn more maneuvers that will make your mowing time easier and more enjoyable.

Remember, the more you practice, the better your control of the Zero Turn will be!

Mowing

1. Engage the parking brake. Make sure that the PTO switch is disengaged, the ground speed control levers are locked in the NEUTRAL position and the operator is in the seat.
2. Start the engine. See *Starting the Engine*.
3. Set the mower cutting height. See *Cutting Height Adjustment*.
4. Set the throttle to the 1/2 throttle position.

Note: It is best practice to engage the PTO with the throttle set at the minimum throttle position necessary to engage the deck drive system without stalling the engine.

5. Engage the PTO by pulling up on the PTO switch.
6. Move the throttle to the "FAST" position and begin mowing.
7. When finished, reduce throttle speed so that the engine idles and push the PTO switch down to shut off the PTO.
8. Stop the engine. See *Stopping the Zero-Turn Riding Mower*.

Mowing Recommendations

Several factors can affect how well your unit cuts grass. Following proper mowing recommendations can improve the performance and life of your unit.

Height of Grass

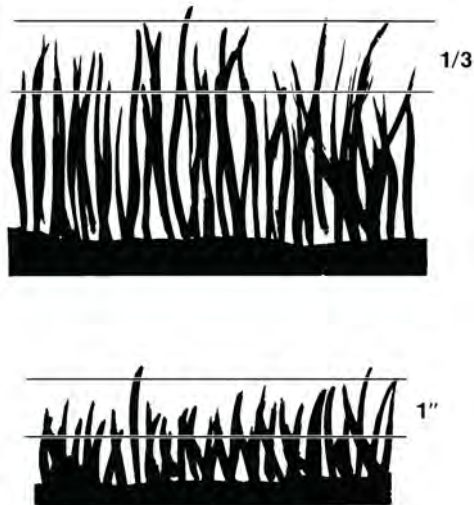
Often cutting height is a matter of personal preference. Typically, you should mow the grass when it is between three and five inches high. The proper cutting height range for a specific lawn will depend upon several factors, including the type of grass, the amount of rainfall, the prevailing temperature, and the lawn’s overall condition.

Cutting the grass too short causes weak, thin grass plants, which are easily damaged by dry periods and pests. Cutting too short is often more damaging than allowing the grass to be slightly higher.

Letting grass grow a bit longer—especially when it is hot and dry—reduces heat build-up, preserves needed moisture and protects the grass from heat damage and other problems. However, allowing grass to grow too high can cause thin turf and additional problems.

Cutting off too much at one time shocks the plant’s growth system and weakens the grass plants. **A good rule of thumb is the 1/3 rule: to cut no more than one third of the grass height, and never more than 1 inch at a time.**

14

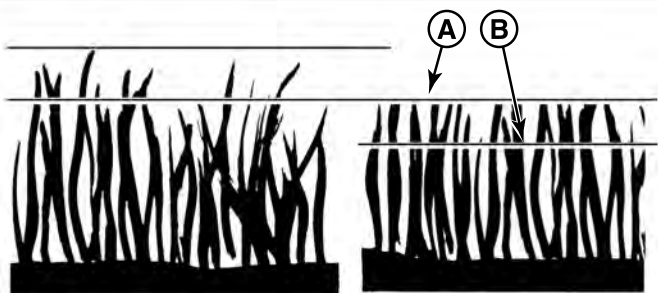


The amount of grass you are able to cut in one pass is also effected by the type of mowing system you are using (for example, broadcasting with side discharge decks can process a much larger volume of grass than mulching does).

Tall grass requires incremental cutting. For extremely tall grass, set the cutting height at maximum for the first pass (A, Figure 15), and then reset it to the desired height and mow a second (B) or third time.

Don't cover the grass surface with a heavy layer of clippings. Consider using a grass collection system and starting a compost pile.

15



When and How Often to Mow

The time of day and condition of the grass greatly affect the results you'll get when mowing. For the best results, follow these guidelines:

- Mow when the grass is between three and five inches high.
- Mow with sharp blades. Short clippings of grass one inch or shorter decompose more quickly than longer blades. Sharp mower blades cut grass cleanly and efficiently, preventing frayed edges which harm the grass.
- Mow at time of day when the grass is cool and dry. Late afternoon or early evening often provide these ideal mowing conditions.

- Avoid mowing after rain or even heavy dew, and never mulch when the grass is wet (moist grass does not mulch well, and clumps beneath the mower deck).

Mowing Patterns

Always start mowing on a smooth, level area.

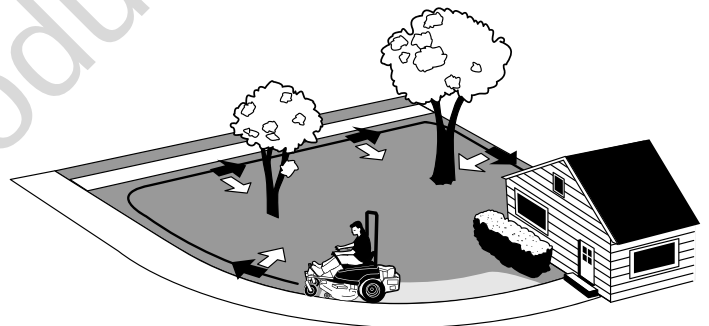
The size and type of area to be mowed will determine the best mowing pattern to use. Obstructions such as trees, fences and buildings, and conditions such as slopes and grades must also be considered.

- Cut long straight strips overlapping slightly.
- Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.
- For a truly professional cut, mow across the lawn in one direction, then re-cut the lawn by mowing perpendicular to the previous cut.

Note: Always operate the engine at FULL THROTTLE when mowing.

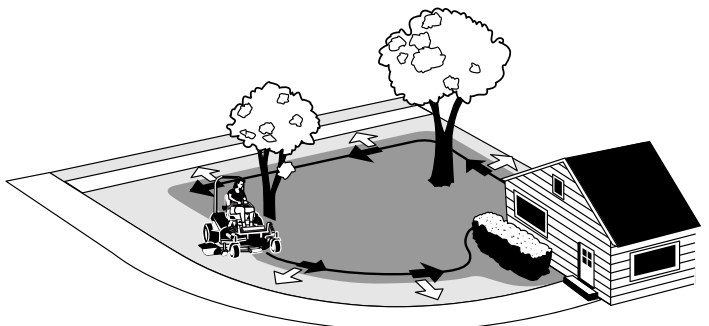
If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems. Use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual gear models). If you hear the engine slowing down you are mowing too fast, use a slower ground speed.

16



Where possible, make one or two passes around the outside of the area discharging the grass INTO the lawn to keep the cut grass off fences and walks.

17



The remainder of the mowing should be done in the opposite direction so that the clippings are dispersed OUT onto the area of lawn previously cut.

Mowing Methods

Broadcast Mowing

Broadcasting, or side-discharging, disperses fine clippings evenly over the entire lawn. Many golf courses use this method. Your mower has a deep dish deck to allow freer circulation of clippings so they are broadcast evenly over the lawn.

Engine Speed & Ground Speed for Broadcasting:

Always operate the engine at full throttle when mowing. If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems.

ALWAYS use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual gear models). If you hear the engine slowing down you are mowing too fast, use a slower ground speed.

How Much Grass to Cut Off When Broadcasting:

Mow when the grass is 3-5 inches long. Do not cut the grass shorter than 2 to 2-1/2 inches. Do not cut off more than 1 inch of grass in a single pass.

Mulching

Mulching consists of a mower deck which cuts and re-cuts clippings into tiny particles and which then blows them down INTO the lawn. These tiny particles decompose rapidly into by-products your lawn can use. UNDER PROPER CONDITIONS, your mulching mower will virtually eliminate noticeable clippings on the lawn surface.

Note: When mulching under heavy cutting conditions, a rumbling sound may be present and is normal.

Mulching Requires EXCELLENT Mowing Conditions:

Mulching mowers cannot function properly if the grass is wet, or if the grass is simply too high to cut. Even more than normal mowing, mulching requires that the grass be dry and the appropriate amount is cut.

Do not use the mower as a mulching mower during the first two or three mowings in the spring. The long grass blades, quick growth, and often wetter conditions are more suitable for broadcasting (side-discharging) or grass bagging operation.

Engine Speed & Ground Speed for Mulching:

Use full engine throttle matched with a slow ground speed so that clippings will be finely cut. Ground speed while mulching should be HALF of the speed that would be used when broadcasting (side discharging) under similar conditions. Since mulching requires more horsepower than broadcasting, using a slower ground speed is vitally important for proper mulching operation.

How Much Grass to Mulch:

The best mulching action typically results from cutting only the top 1/2 inch to 3/4 inch of grass blade. This provides short clippings which decompose properly (much more quickly than longer clippings). The ideal cutting height will vary with climate, time of year, and quality of your lawn. We recommend that you experiment with both the cutting height and ground speed until you achieve the best cut. Start with a high cutting height and using progressively lower settings until you find a cutting height that is matched to your mowing conditions and preferences.

Pushing the Rider by Hand



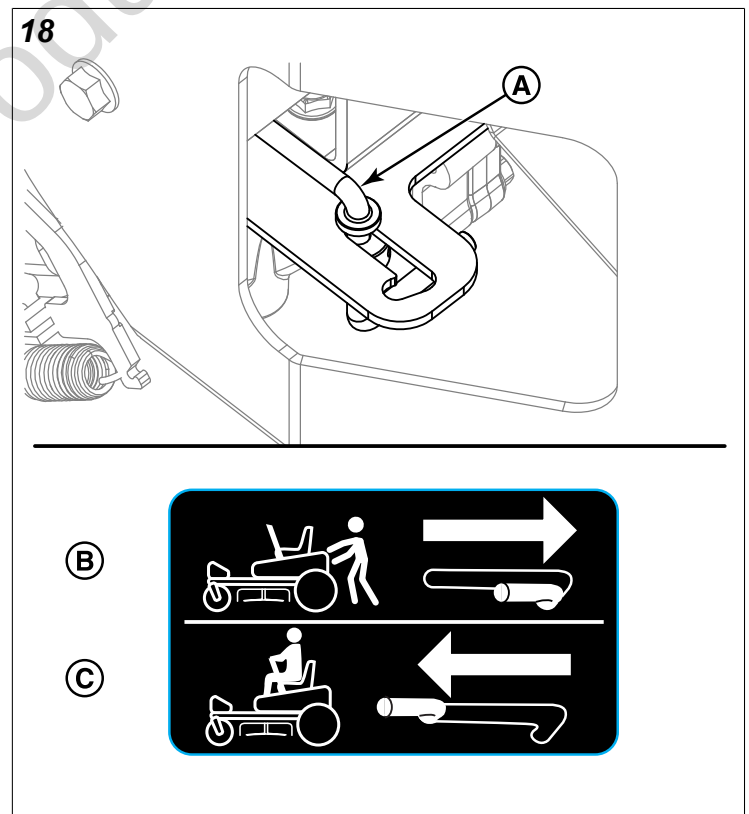
WARNING

Unsafe Operation Hazard.

DO NOT disengage the transmissions and coast down slopes. DO NOT use the transaxle release levers to disengage the transmissions unless machine motion can be controlled and engine is off.

NOTICE Do not tow rider. Towing the rider will cause transmission damage. Do not use another vehicle to push or pull this rider.

1. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
2. Locate the transmission release levers (A, Figure 18) on the rear of the rider beneath the bumper. There is one transmission release lever on each transmission. The transmission release levers open and close the transmission bypass valves.



3. To open the transmission bypass valve (bypass position) (B), pull the transmission release lever out towards the

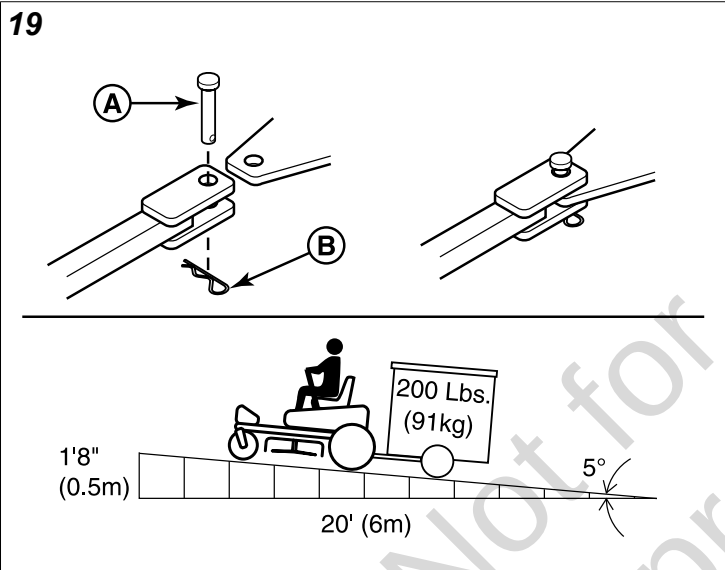
rear of the rider and push it towards the rear tire. Repeat this process for the other side of the rider.

4. Disengage the parking brake. The rider can now be pushed by hand.
5. After moving the rider, close the bypass valve (run position) (C) by pushing the transmission release lever towards the center of the machine and then pushing it towards the front of the rider. Repeat this process for the other side of the rider.

Note: Both transmission release levers must be in the same position.

Attaching a Trailer

The maximum weight of a towed trailer should be less than 200 lbs (91 kg). Secure the trailer with an appropriately sized clevis pin (A, Figure 19) and clip (B).



Excessive towed loads can cause loss of traction and loss of control on slopes. Reduce towed weight when operating on slopes. The surface being driven on greatly impacts traction and stability. Wet or slippery surfaces can greatly reduce traction and the ability to stop or turn. Carefully evaluate the surface conditions before operating the unit and trailer, and never operate on slopes greater than 5°. See *Slope Operation and Towed Equipment (Ride-On Units)* in the safety section of this manual for additional safety information.

Storage

Temporary Storage (30 Days or Less)

Remember, the fuel tank will still contain some fuel, so never store the unit indoors or in any other area where fuel vapor could travel to any ignition source. Fuel vapor is also toxic if inhaled, so never store the unit in any structure used for human or animal habitation.



WARNING

Never store the unit, with fuel in the engine or fuel tank, in a heated shelter or in an enclosed, poorly ventilated enclosures. Fuel fumes may reach an open flame, spark or pilot light (such as a furnace, water heater, clothes dryer, etc.) and cause an explosion.

Handle fuel carefully. It is highly flammable and careless use could result in serious fire damage to your person or property.

Drain fuel into an approved container outdoors away from open flame or sparks.

Here is a checklist of things to do when storing your unit temporarily or in between uses:

- Park the unit on a flat level surface. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
- Keep the unit in an area away from where children may come into contact with it. If there's any chance of unauthorized use, remove the spark plug(s) and put in a safe place. Be sure the spark plug openings are protected from foreign objects with a suitable cover.
- If the unit can't be stored on a reasonably level surface, chock the wheels.
- Clean all grass and dirt from the mower.

Long Term Storage (Longer Than 30 Days)

Before you store your unit for the off-season, read the *Fuel and Maintenance* instructions in the OPERATOR SAFETY section, then perform the following steps:

1. Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when unit is used again.
2. Prepare the mower deck for storage as follows:
 - A. Clean the underside of the mower deck.
 - B. Coat all bare metal surfaces with paint or a light coat of oil to prevent rusting.
3. Clean external surfaces and engine.
4. Prepare the engine for storage. See the engine operator's manual.
5. Clean any dirt or grass from cylinder head cooling fins, engine housing, and air cleaner element.
6. Cover the air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt, and insects.
7. Completely grease and oil unit as outlined in the *Lubrication* section.
8. Clean up the unit and apply paint or rust preventative to any areas where paint is chipped or damaged.
9. Make sure that the battery is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. If battery is left in unit, disconnect the negative cable.
10. Drain fuel system completely or add a fuel stabilizer to the fuel system. If you have chosen to use a fuel stabilizer

and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of gasoline fumes. Remember, fuel fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

Note: Fuel, if permitted to stand unused for extended periods (30 days or more), may develop gummy deposits which can adversely affect the engine carburetor and cause engine malfunction. To avoid this condition, add a fuel stabilizer to the fuel tank and run the engine a few minutes, or drain all fuel from the unit before placing it in storage.

Starting After Long Term Storage

Before starting the unit after it has been stored for a long period of time, perform the following steps.

1. Remove any blocks from under the unit.
2. Install the battery if it was removed.
3. Unplug the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh fuel. See engine operator's manual for recommendations.
5. See engine operator's manual and follow all instructions for preparing engine after storage.
6. Check crankcase oil level and add proper oil if necessary. If any condensation has developed during storage, drain crankcase oil and refill.
7. Inflate tires to proper pressure. Check fluid levels.
8. Start the engine and let it run slowly. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

Maintenance Schedule

The following schedule should be followed for normal care of your unit. You will need to keep a record of your operating time. Determining operating time is easily accomplished by observing the hour meter.

If your unit is equipped with a dual function hour meter that displays both engine hours and PTO hours, the maintenance intervals are based on the engine hours as displayed by the hour meter.

ZERO-TURN RIDER AND MOWER MAINTENANCE	
Before each use	
Check the safety interlock system.	
Check the rider's brakes.	
Check rider and mower for loose hardware.	
Clean visible debris from rider and mower deck.*	
Check hydraulic oil level.	
Every 25 Hours	
Clean deck and Check / Replace mower blades.*	
Lubricate rider and mower deck.*	
Check tire pressures.	
Every 100 Hours	
Check mower blade stopping time.	
Clean battery and cables.	

ZERO-TURN RIDER AND MOWER MAINTENANCE

See dealer for initial change of hydraulic oil.

Every 400 Hours or Yearly

See dealer for hydraulic oil and filter change.

ENGINE MAINTENANCE

Before each use

Check engine oil level.

Clean visible debris from engine compartment*

Every 50 Hours

Inspect / Clean spark arrester.**

Refer to engine owner's manual

Service air filter.

Change engine oil and filter.

Check / Replace spark plugs.

Check / Replace fuel filter.

*More often in hot (over 85° F; 30° C) weather or dusty operating conditions.

**If equipped. Replace if damaged.

Maintenance Procedures

Service and Maintenance Safety



WARNING

Amputation and crushing hazard

Specific steps must be taken in order to perform service and maintenance procedures safely.

Read and follow all the applicable safety and instructional messages in this manual.

Always disengage the mower blades, set the parking brake, turn the engine OFF, remove the ignition key, and wait for all movement to stop prior to performing service and maintenance procedures.

Always disconnect the spark plug wire(s) and fasten it away from the plug before beginning any maintenance or service procedures on order to prevent accidental ignition.

Adding Fuel



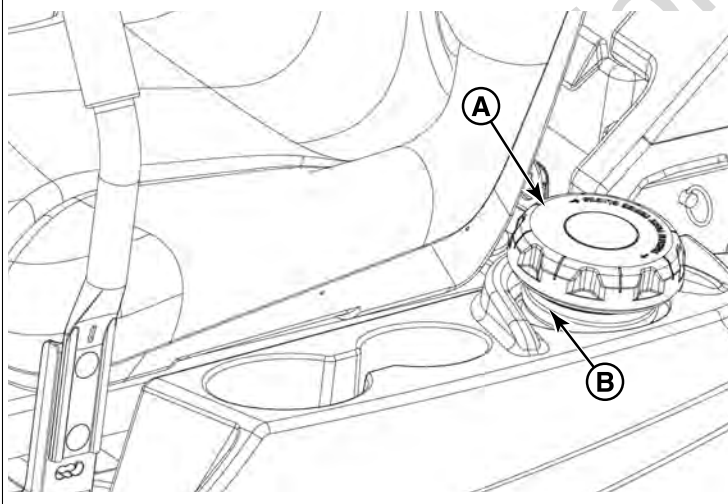
Fuel and its vapors are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

When Adding Fuel

- Turn engine off and let engine cool at least 3 minutes before removing the fuel cap.
 - Fill fuel tank outdoors or in well-ventilated area.
 - Do not overfill fuel tank. To allow for expansion of the fuel, do not fill above the bottom of the fuel tank neck.
 - Keep fuel away from sparks, open flames, pilot lights, heat, cigarettes, and other ignition sources.
 - Check fuel lines, tank, cap, and fittings frequently for cracks or leaks. Replace if necessary.
 - If fuel spills, wait until it evaporates before starting engine.
1. Clean the fuel cap area of dirt and debris. Remove the fuel cap (A, Figure 20).
 2. Fill the fuel tank with fuel. To allow for expansion of the fuel, do not fill above the bottom of the fuel tank neck (B).
 3. Reinstall the fuel cap.

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Replacing the Fuel Filter



Fuel and its vapors are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

Do NOT remove the fuel filter when the engine is hot, as spilled gasoline may ignite. Do NOT spread hose clamps further than necessary. Ensure clamps grip hoses firmly over filter after installation.

Carbureated Models: The fuel filter is located in the fuel line between fuel tank and carburetor, near the fuel pump.

Fuel Injected Models: The fuel filter is located in the fuel line between the fuel tank and fuel pump.

If filter is dirty or clogged, replace as follows:

1. Disconnect the negative battery cable.
2. Place a container below the filter to catch spilled fuel.
3. Using a pliers, open and slide hose clamps from fuel filter.
4. Remove hoses from filter.
5. Install new filter in proper flow direction in fuel line.
6. Secure with hose clamps.
7. Reconnect the negative battery cable when finished.

Check Engine Oil Level

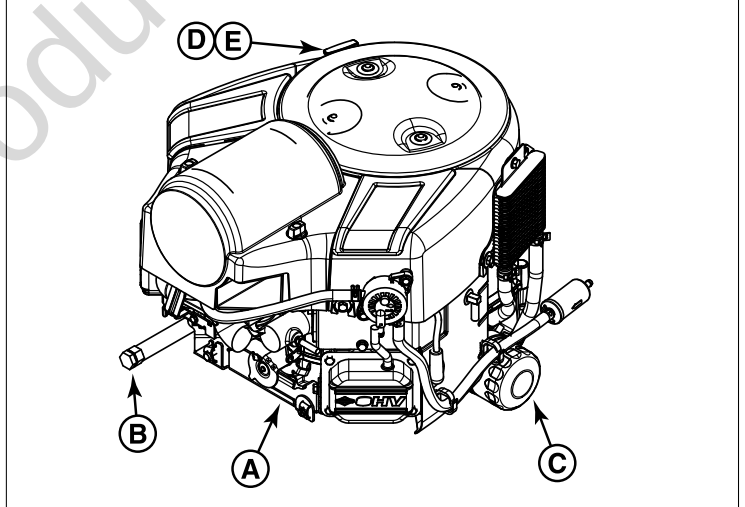
Interval: Before Each Use

Refer to the engine operator's manual for dipstick and oil fill locations and specific engine oil check and fill procedures.

Changing the Engine Oil and Filter

This series of mower is equipped with a Briggs & Stratton Commercial Turf (A, Figure 21) series engine. Reference figure 21 for the location of the components listed for this procedure.

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1. Warm the engine by running it for a few minutes. (Refer to the engine operator's manual for oil and filter replacement instructions.)
2. Remove the oil drain hose (B) from its storage position and route the hose so that when the oil drain cap is removed the oil can be drained into a small pan.
3. Place a small pan under the oil drain hose to catch the oil. Using the appropriate tools, remove the oil drain cap from the oil drain hose and drain the engine oil.
4. After draining, replace the cap and wipe up any spilled oil. Reinstall the oil drain hose to its storage position so it is retained during normal operation.

- Place an absorbent shop cloth under the engine oil filter (C). Remove the engine oil filter and replace with a new one.
- Add engine oil (refer to engine operator's manual) in the fill tube (D) and check the amount of oil in the engine using the engine oil dipstick (E).
- Remove the shop cloth and wipe up any spilled oil.

Engine Maintenance

For engine maintenance schedules and procedures, please refer to the engine operator's manual.

Inspect Muffler and Spark Arrester

Inspect the muffler for cracks, corrosion, or other damage. Remove the spark arrestor, if equipped, and inspect for damage or carbon blockage. If replacement parts are required, make sure to use only original equipment replacement parts.



WARNING

Replacement parts must be the same and installed in the same position as the original parts or fire could result.

Fuse Location and Identification

The electrical system for this unit is equipped with two replaceable fuses. See the chart below for the circuit, amperage, and approximate location of the fuses.

Circuit	Amperage	Approximate Location
Main	20 amp	Center of the machine and in front of the battery.
PTO Clutch	15 amp	Left hand side hydraulic tank mount.

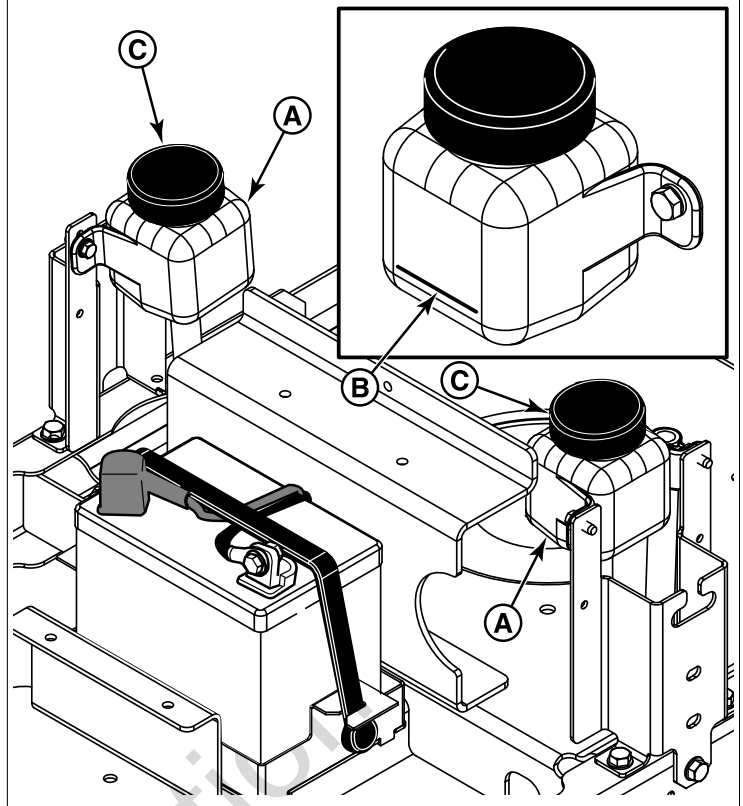
Check / Fill Transmission Oil Level

This unit is equipped with two transmission oil tanks. One transmission oil tank only supplies oil to one transmission. The level of oil in both transmission oil tanks must be checked, and if necessary, filled.

Oil Type: 20W-50 conventional detergent motor oil.

- Locate the transmission oil tanks (A, Figure 22).

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- Check the oil level when the unit is cold. The oil should be up to the "FULL COLD" mark (B). If the oil is below this level, proceed to step #3.
- Before removing the tank caps (C), make sure the area around the tank cap and fill neck of the tank is free of dust, dirt, or other debris. Remove the tank cap.
- Add oil up to the "FULL COLD" mark.
- Reinstall the tank caps.
- After adding oil to the tanks, it may be necessary to purge air from the hydraulic system. See *Purging the Air from the Hydraulic System* procedure. If the unit is not driving properly, see your authorized Ferris servicing dealer.

Transmission Oil Filter Change

Change Interval: Every 400 Hours or Yearly (Initial hydraulic oil and filter change after first 100 hours of operation).

It is recommended that the procedure for changing the hydraulic oil and transmission filter be performed by an authorized Ferris servicing dealer.

Lubrication

Lubricate the unit at the locations shown in Figures 23, 24, 25, and 26 as well as the following lubrication points.

Grease:

- Mower deck spindles (A, Figure 23).
- Rear transmission cradle pivots (A, Figure 24).
- Front caster wheel axles (A, Figure 26).

Use grease fitting when present. Disassemble parts to apply grease to moving parts when grease fittings are not installed.

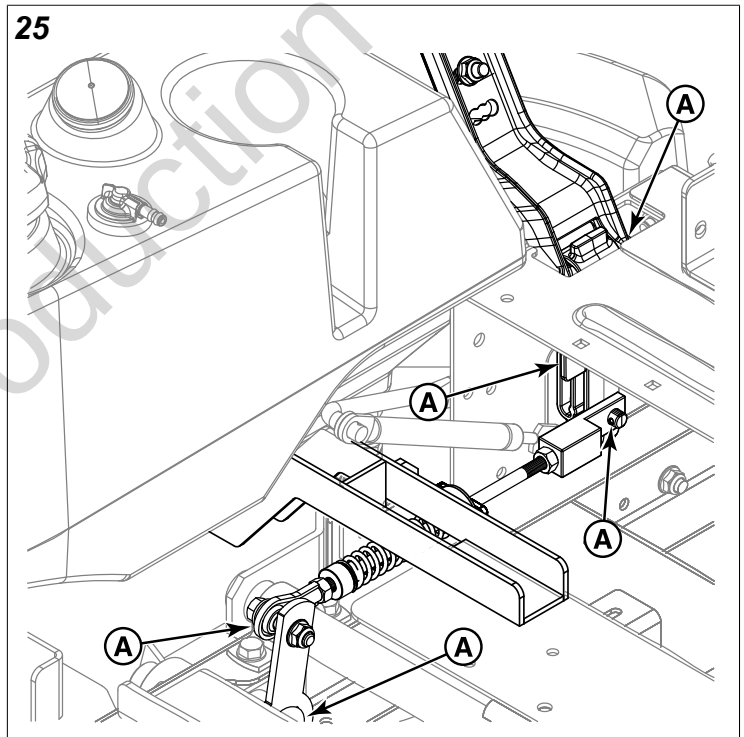
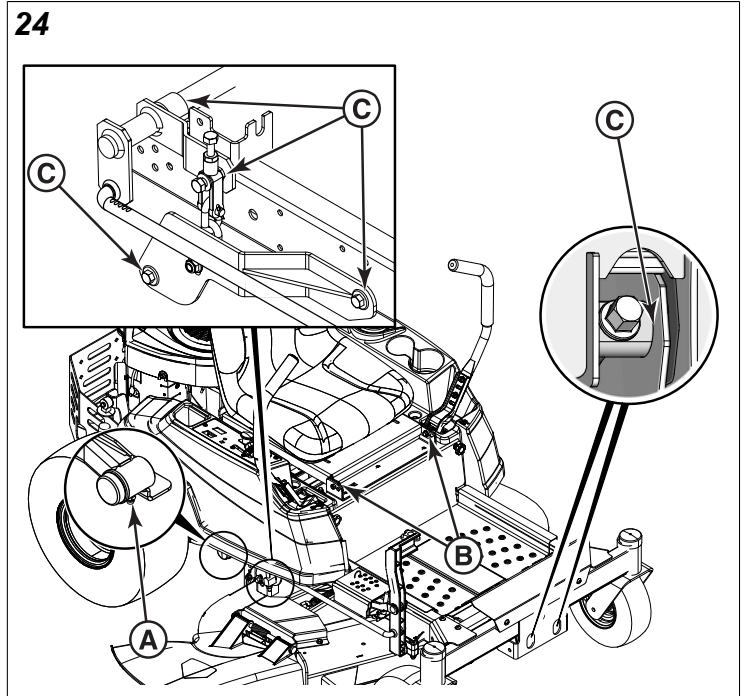
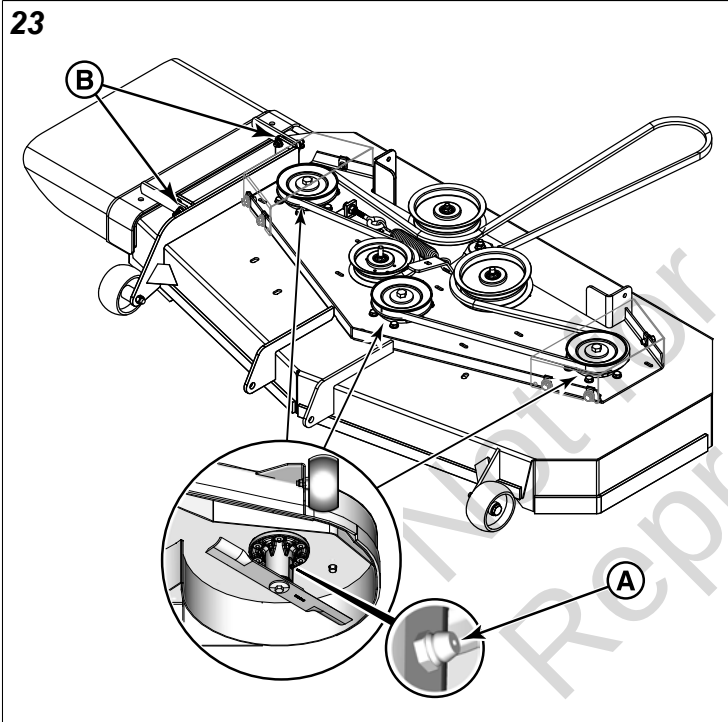
Not all greases are compatible. Red grease (p/n 5022285) is recommended, automotive-type high-temperature, lithium grease may be used when this is not available.

Oil:

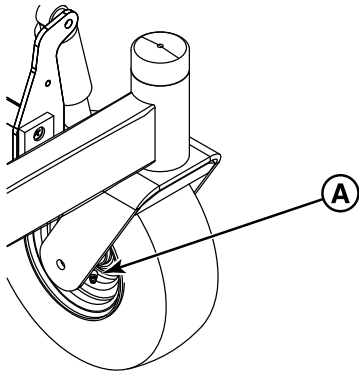
- Discharge chute pivots (B, Figure 23).
- Ground speed control lever and neutral linkage rod pivots (A, Figure 25).
- Seat plate pivots (B, Figure 24).
- Deck lift linkage pivots (C, Figure 24).

Generally, all moving metal parts should be oil where contact is made with other parts.

Keep oil and grease off of belts and pulleys. Remember to wipe grease fittings and surfaces clean both before and after lubrication.



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Servicing the Mower Blades

Removing the Mower Blades



CAUTION

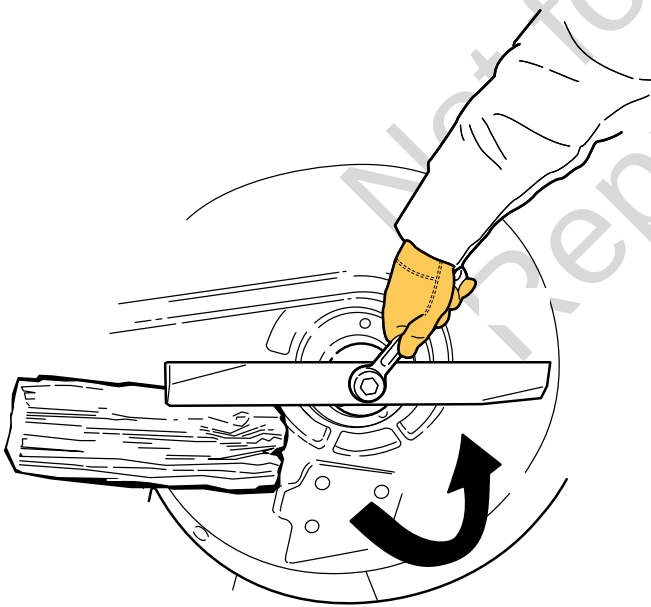
Laceration hazard

Mower blades are sharp.

Always wear gloves when handling, or working near, mower blades.

1. Use a block of wood to prevent the mower blade from turning as shown in Figure 27.

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2. Using a wrench, remove the bolt securing the blade to the spindle.

Inspecting the Mower Blades



DANGER

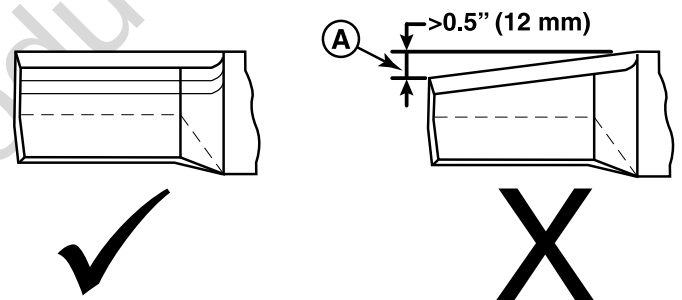
Thrown objects hazard

Avoid injury: a worn or damaged mower blade can break and a piece of the blade could be thrown into the operator's area or bystander's area resulting in serious personal injury or death.

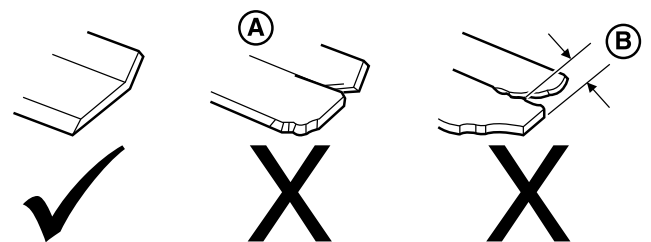
- Inspect the mower blade every 25 hours or at least once per year.
- If the mower blade hits a solid object, stop the engine immediately and inspect the mower blades.
- Never weld or straighten bent mower blades.

1. Remove the mower blade from the unit. See *Removing the Mower Blades*.
2. Inspect the mower blade (Figures 28 and 29). Discard the mower blade if it has any of the following conditions:
 - More than .5" (12,7 mm) of the mower blade metal has been removed from previous sharpening or wear (A, Figure 28)
 - The air lifts are excessively eroded (A, Figure 29) and the notch (B) is .25" (6,35 mm) deep or greater.
 - The mower blade is broken or bent.

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29



3. If the cutting edges are not sharp or have nicks, sharpen the blades. See *Sharpening the Mower Blades*.

Sharpening the Mower Blades



WARNING

Thrown objects and fire hazard

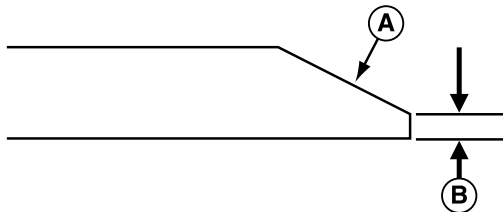
Grinding mower blades throws sparks and fine metal particles that are capable of igniting gasoline and gasoline vapors, and that can injure unprotected eyes.

Be sure all flammable materials are cleared from the area where grinding will occur.

Always wear safety glasses or goggles when grinding mower blades.

1. Sharpen mower blades with a grinder, hand file, or electric blade sharpener.
2. Sharpen the blade by removing an equal amount of material from the cutting edge of each end of the blade.
3. Keep the original bevel (A, Figure 30) when grinding. DO NOT change the mower blade bevel.

30



4. The mower blade should have a maximum of 1/64" (0,40 mm) cutting edge (B) or less.

Balancing the Mower Blades



CAUTION

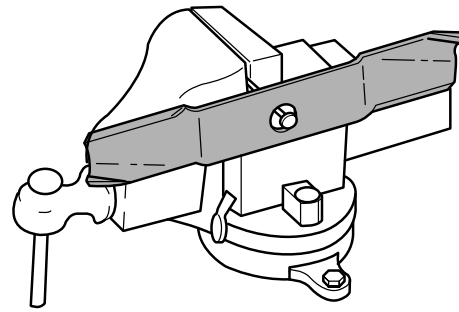
Thrown objects hazard

An unbalanced mower blade can create excessive vibration and damage the unit, or cause mower blade failure resulting in thrown debris.

Be sure blade is balanced before installing.

1. Clean the blade to remove any dried grass or other debris.
2. Clamp a nail in a bench vise, hang the blade on the nail, and position the blade in a level horizontal position as shown in Figure 31.

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3. Check the balance of the blade. If either end of the blade moves downward the end that moves downward is heavier than the other. Sharpen the heavy end until balance is achieved. See *Sharpening the Mower Blades* for sharpening instructions.
4. Repeat the process until the mower blade remains in the horizontal, level position.

Installing Mower Blades



CAUTION

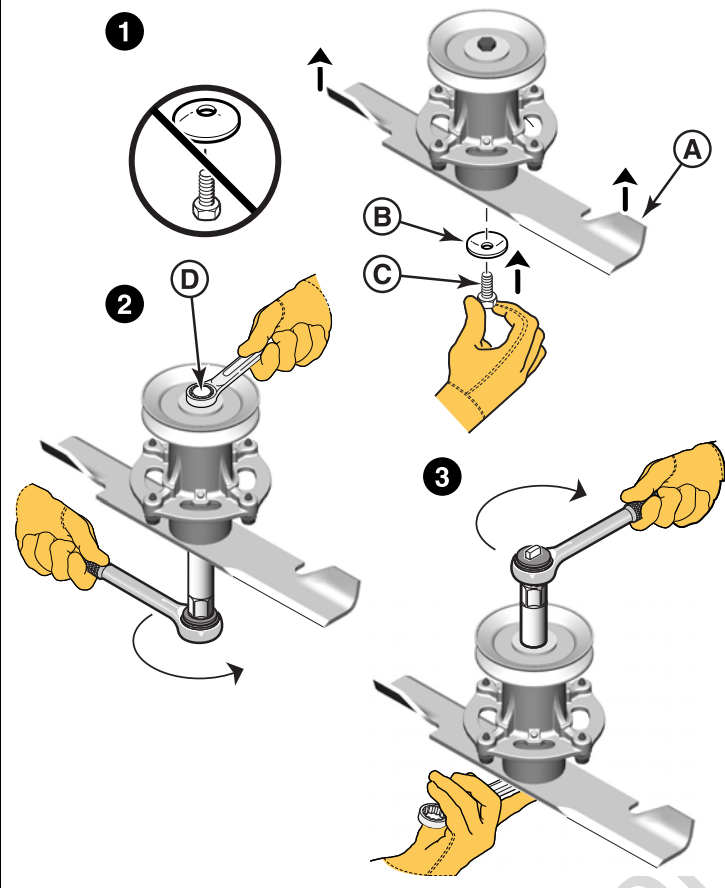
Laceration hazard

Mower blades are sharp.

Always wear gloves when handling, or working near, mower blades.

1. Install each blade with the airlifts (A, Figure 32) pointing up towards the mower deck as shown. Install the concave side of the washer (B) towards the blade. Install the blade mounting bolt (C) hand tight to hold the washer and blade onto the shaft (make sure the blade is fully seated onto the shaft).

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2. Tighten the blade mounting bolt to 50 - 60 ft. lbs. (68 - 81 Nm) of torque while holding onto the pulley bolt (D) with a wrench.
3. Tighten the pulley bolt to 50 - 60 ft. lbs. (68 - 81 Nm) of torque while holding onto the blade mounting bolt with a wrench.

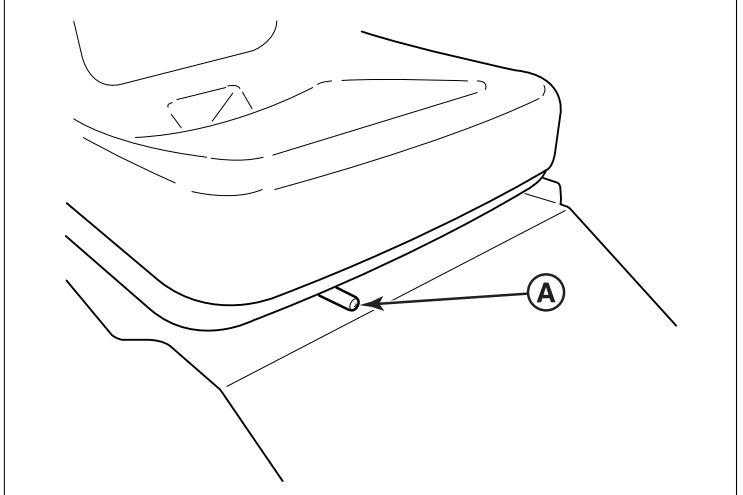
Seat And Ground Speed Control Lever Adjustments

The seat and ground speed control levers should be adjusted so that the ground speed control levers can be moved through their full range of motion without contacting the operator's legs.

Seat Adjustment

The seat can be adjusted forward and back. Move the lever (A, Figure 33) towards the left, position the seat as desired, and release the lever to lock the seat into position.

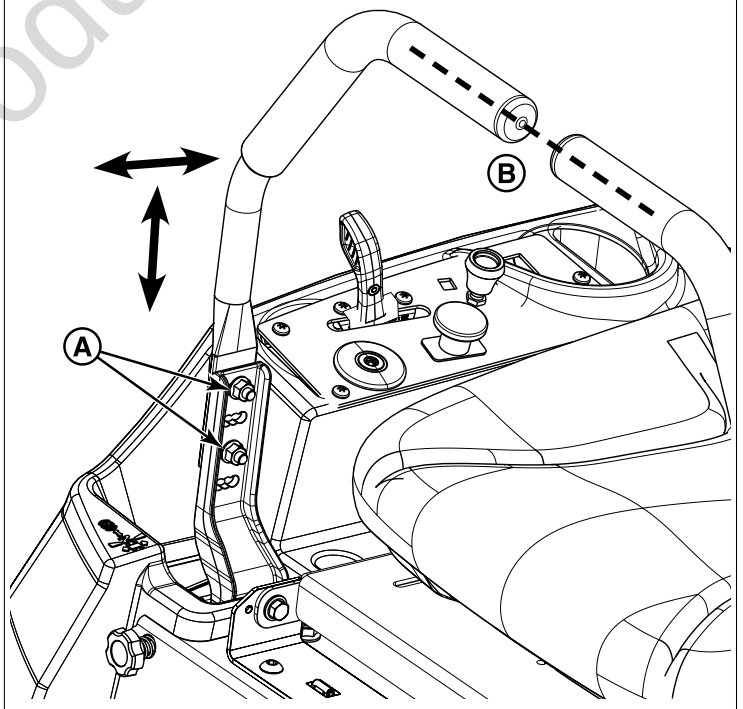
33



Ground Speed Control Lever Adjustment

1. Loosen the ground speed control lever mounting hardware (A, Figure 34) to adjust the levers forward and backward.
2. Remove the hardware to raise or lower the levers.
3. Always be sure to adjust both levers so that they are aligned (B, Figure 34).
4. After adjustment is complete, tighten the hardware to 13 lb-ft (18 Nm).

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Speed Balancing (Tracking) Adjustment

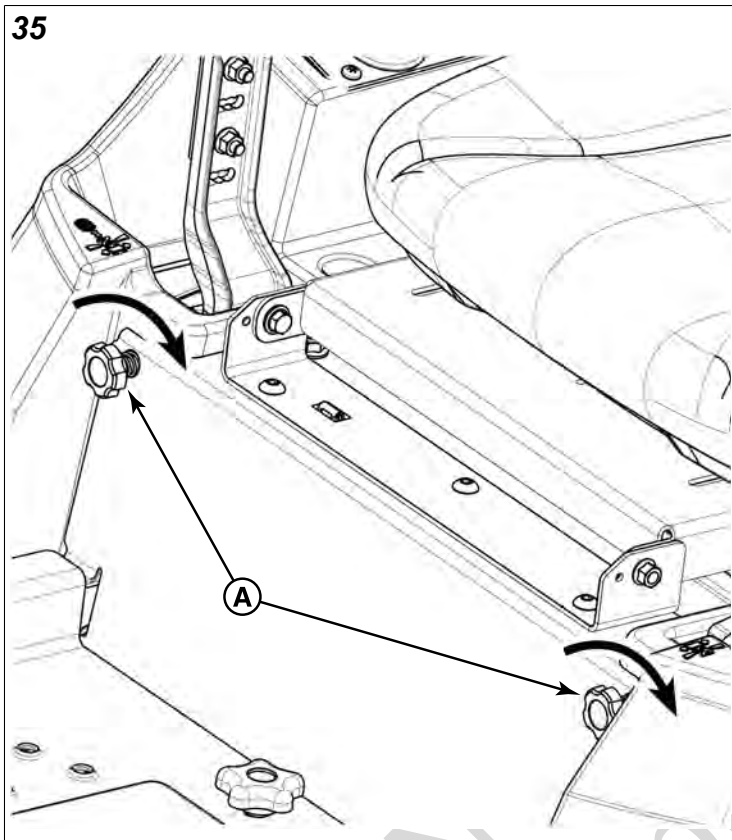
If the unit drifts to the right or left when the ground speed control levers are in the maximum forward position, the top speed of each of these control levers can be balanced. Only adjust the speed of the wheel that is traveling faster.

1. Tighten the knob (A, Figure 35) of the faster wheel by 1/2-turn (clockwise) increments until the unit travels (tracks) straight.



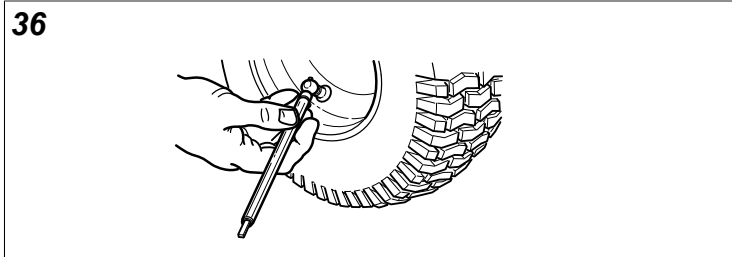
WARNING

DO NOT adjust the unit for a faster overall speed forward or reverse than it was designed.



Checking Tire Pressures

Tire pressure should be checked periodically (see Figure 36), and maintained at the levels shown in the *Specifications* chart. Note that these pressures may differ slightly from the "Max Inflation" stamped on the side-wall of the tires. The pressures shown provide proper traction and extend tire life.

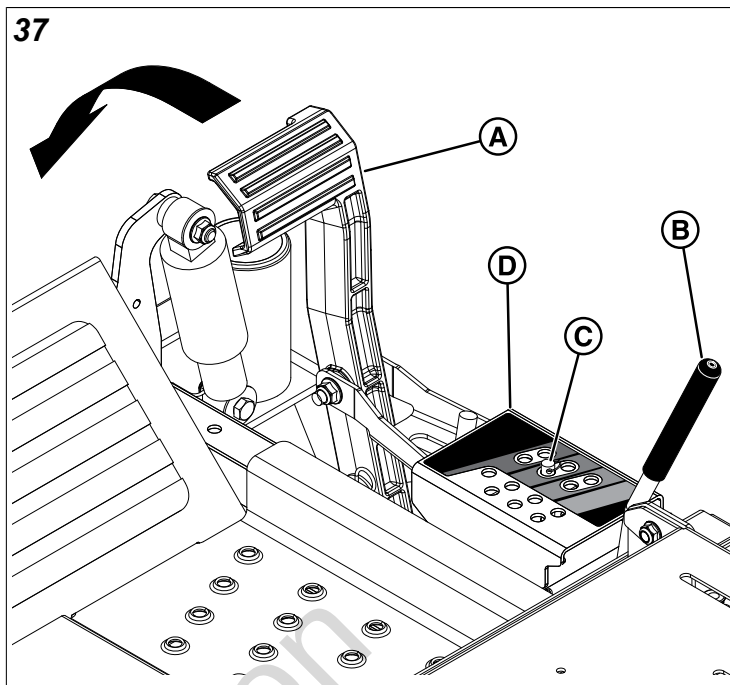


Cutting Height Adjustment

The deck lift pedal adjusts the mower cutting height. The cutting height is adjustable between 1-1/2" (3,8 cm) and 4-1/2" (11,4 cm) in 1/4" (0,64 cm) increments.

To adjust cutting height:

1. Fully depress the deck lift pedal (A, Figure 37) until the deck lift lock lever (B) locks the deck into the highest position (transport position).



2. Place the cutting height adjustment pin (C) into the hole for the desired cutting height.

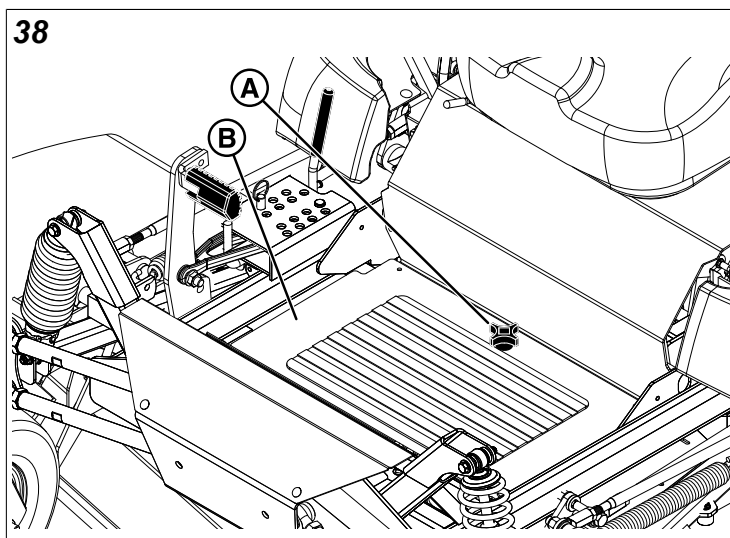
Note: Make sure the pin is inserted into the holes in both upper and lower plates of the adjustment bracket (D).

3. Depress the deck lift foot pedal and then push the deck lift lock lever towards the right to release the lock.
4. Slowly release the deck lift pedal until it comes to rest against the cutting height adjustment pin.

Floor Pan Removal & Installation

This unit is equipped with a removable floor pan which can be removed to provide better access to the mower deck.

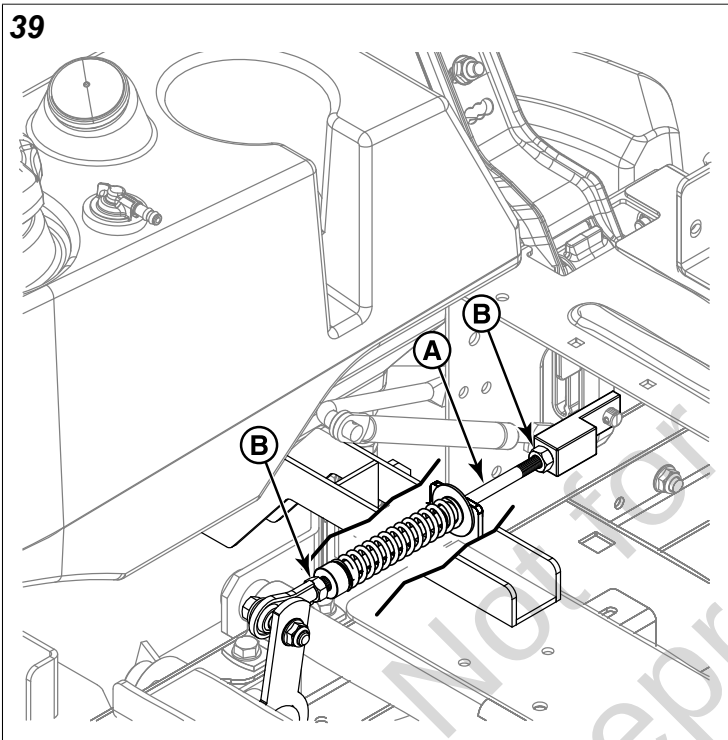
1. Loosen and remove the retaining hardware (A, Figure 38) that secures the floor pan to the frame of the unit.



2. Tilt the back end of the floor pan up and then remove it from the unit.
3. To re-install the floor pan: Reverse the removal procedure.

Neutral Adjustment

Each ground speed control lever on this machine is connected to a transmission by two linkage rods and a pivoting arm. The lower rod that connects the transmission to the pivoting arm is set at the factory and should not be changed for neutral adjustment purposes. The neutral adjustment is achieved by changing the length of the upper linkage rod (A, Figure 39) that connects the ground speed control lever to the pivoting arm.



Determining if adjustment is necessary:

Lock the ground speed control levers in the NEUTRAL position. If either of the zero-turn rider's tires turns; then the upper linkage rod associated with that side of the machine will need to be adjusted.

Note: Perform this adjustment on a hard, level surface such as a concrete floor.

1. Disengage the PTO, engage the parking brake, and turn off the engine.
2. There are two nuts (B) on the upper linkage rod. Loosen the nuts and turn the upper linkage rod to adjust.
 - If the machine creeps forward, turn the upper linkage rod **clockwise** (while standing at the rear of the machine, facing forward);
 - If the machine creeps backward, turn the upper linkage rod **counter-clockwise** (while standing at the rear of the machine, facing forward).
3. Lock the jam nuts when neutral is achieved.

Note: This adjustment should not be performed while the machine is running. It may take several attempts to achieve neutral, depending on how much the machine creeps.

Return-to Neutral Adjustment

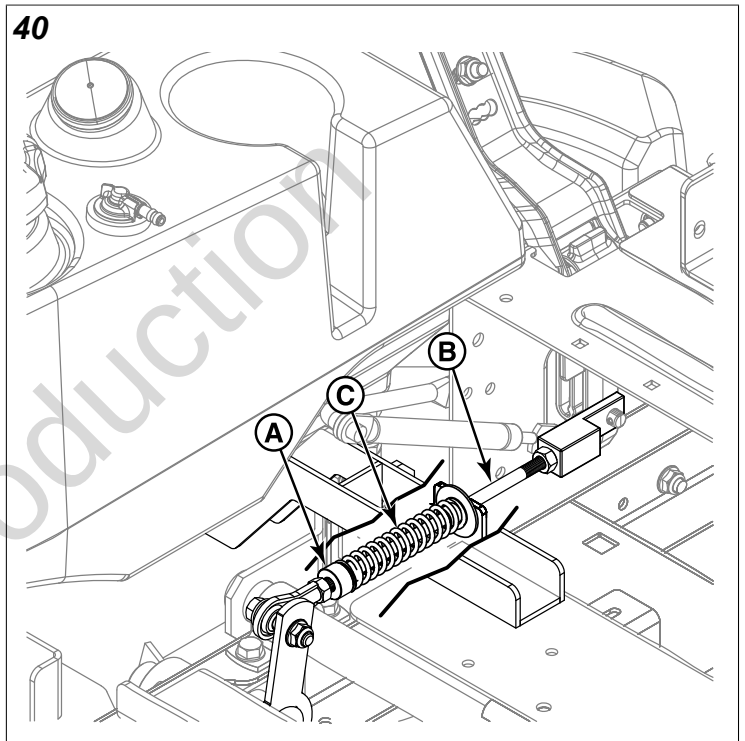
Prior to performing this procedure the **Neutral Adjustment** procedure must be completed.



WARNING

To avoid serious injury, perform adjustments only with engine stopped, key removed, and rider parked on level ground.

1. Position the ground speed control levers into the NEUTRAL position.
2. Loosen the set collar (A, Figure 40) on the upper linkage rod (B).



3. Position the set collar along the upper linkage rod until it contacts and very lightly compresses the neutral return spring (C).
4. Move the ground speed control levers into the operating position, pull rearward, and release.
5. Move the ground speed control levers out towards the NEUTRAL position.
 - if the ground speed control lever aligns with the notch in the neutral lock plate, adjustment is complete;
 - if the ground speed control lever stops its return motion past the notch (while standing at the rear of the machine), re-position the set collar so the neutral return spring is less compressed.
 - if the ground speed control lever stops its return motion before the notch (while standing at the rear of the machine), re-position the set collar so that the neutral return spring is more compressed.

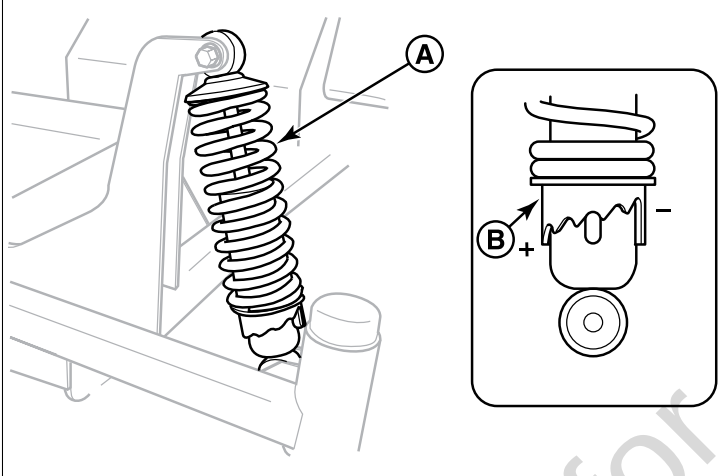
- Repeat the process as necessary until the ground speed control lever aligns with the notch in the neutral lock plate.

Note: It is important to note that after every adjustment of the neutral linkage rod, the ground speed control lever must be pulled rearward and released to properly check the return-to-neutral adjustment.

Suspension Adjustment

The shock assemblies (A, Figure 41 - front shown, rear similar) can be adjusted to vary the amount of pre-load applied to the springs. This allows the operator to customize the ride according to operator's weight and operating conditions.

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Less Pre-Load:

- Light operator weight
- Softer, more cushioned ride
- Best for relatively flat terrain

More Pre-Load:

- Heavy operator weight
- Stiffer, more rigid ride
- Better handling and greater stability on hilly terrain

To Adjust the Spring Pre-Load:

- Park machine on a flat, level surface. Disengage the PTO, pivot the ground speed control levers out to the NEUTRAL position, and stop the engine.
- To adjust the front shocks:** Turn the pre-load adjustment collar (B, Figure 41) with your hand to a higher notch (-) to decrease the pre-load, or to a lower notch (+) to increase the pre-load.



WARNING

Use two hands when adjusting the shock springs. This will prevent the wrench from slipping while pressure is applied.

- To adjust the rear shocks:** Using the supplied spanner wrench (p/n 5022853), insert the tip of the wrench into the notch in the pre-load adjustment collar. While holding the wrench in place with one hand, turn the pre-load adjustment collar to a higher notch (-) to decrease the pre-load, or to a lower notch (+) to increase the pre-load.

Make sure all four shocks are set to the same amount of pre-load.

Note: The spanner wrench was included in the literature packet for the machine.

Parking Brake Adjustment

The parking brake is not adjustable. If the parking brake does not function properly, do not use the zero-turn riding mower! See your authorized Ferris servicing dealer to have the parking brake serviced.

Deck Leveling Adjustment

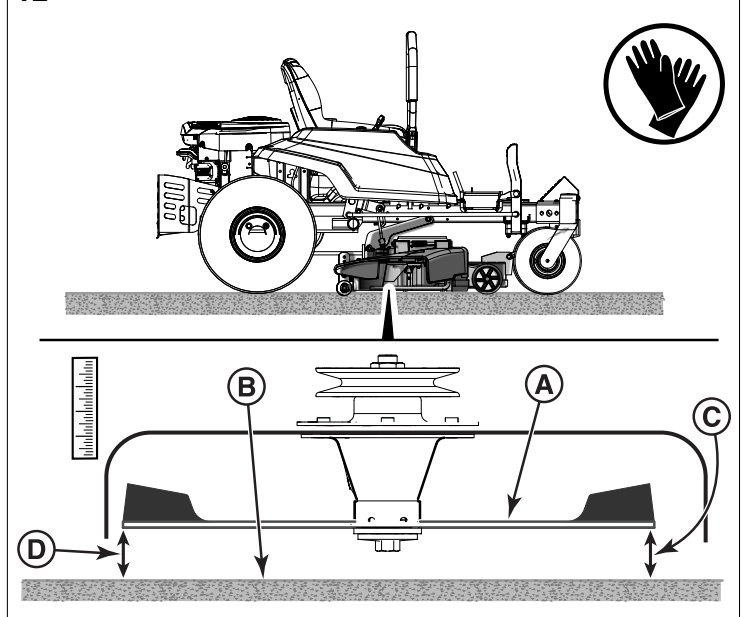


WARNING

Wear heavy gloves when handling or working around cutting blades. Blades are extremely sharp and can cause severe injury.

- Park the machine on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn the ignition switch to OFF, and remove the ignition key.
- Set the mower deck to the 3" (7,6 cm) cutting height.
- Turn the front caster wheels so that they are facing front-to-back.
- Verify that the tires pressures are correct.
- Verify that the mower blades are flat, and not bent or broken. A bent or broken blade must be replaced.
- Position the two outside mower blades so that they are facing front-to-back.
- Measure the distance between the outside tips of the blades (A, Figure 42) and the ground (B).

42

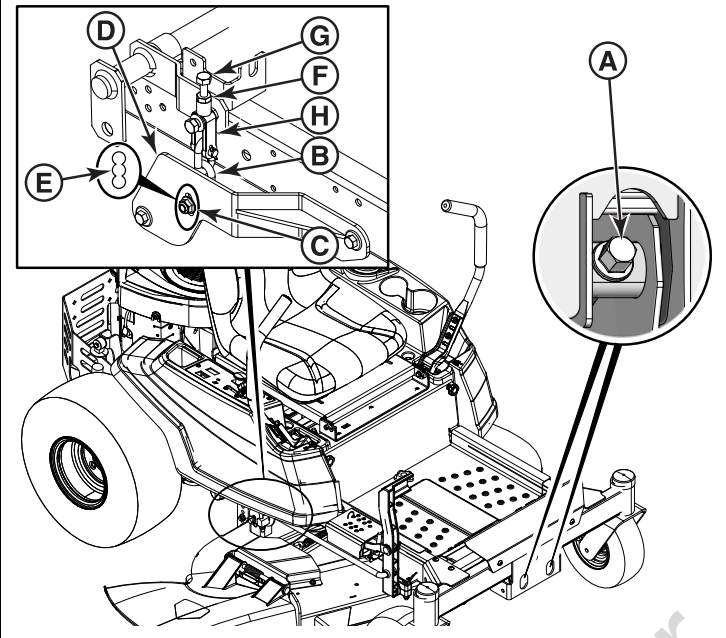


- The front measurements (C) should equal 3" (7,6 cm).

- The rear measurements (D) should equal 3-1/4" (8,3 cm).

8. If the front measurements were incorrect, turn the adjustment nuts (A, Figure 43) until the measurements are correct. Turning the nut **clockwise** will raise the deck, **counter-clockwise** will lower the deck.

43



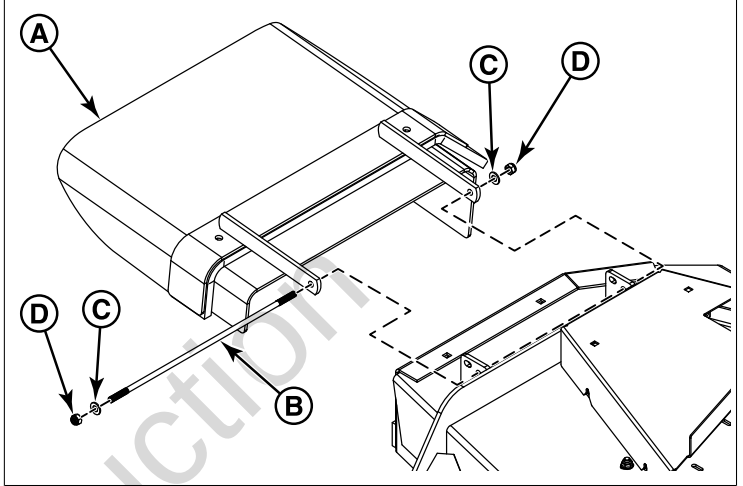
9. If the rear measurements were incorrect the rear hanger chains (B) will need to be adjusted.
 - If the difference between the measurement and 3-1/4" (8,3 cm) is equal to or greater than 3/8" (0,95 cm), the placement of the hanger chains needs to be changed.
 - If the difference between the measurement and 3-1/4" (8,3 cm) is less than 3/8" (0,95 cm), skip to step #13.
10. Place blocking underneath all four corners of the mower deck until all tension is relieved from the deck hangers.
11. Remove the hardware (C) that secures the hanger chains to the lift arms (D).
 - If the measurement was less than 3-1/4" (8,3 cm) move the hardware to the next upper hole (E).
 - If the measurement was more than 3-1/4" (8,3 cm) move the hardware to the next lower hole (E).
12. Remove the blocking from underneath the mower deck.
13. Loosen the jam nuts (F) and turn the fine adjustment bolts (G) to adjust the deck height until the measurement is achieved. Tighten the jam nuts against the clevises (H).
14. Verify that all four measurements are correct.

Configuring the Mower Deck for Side Discharge

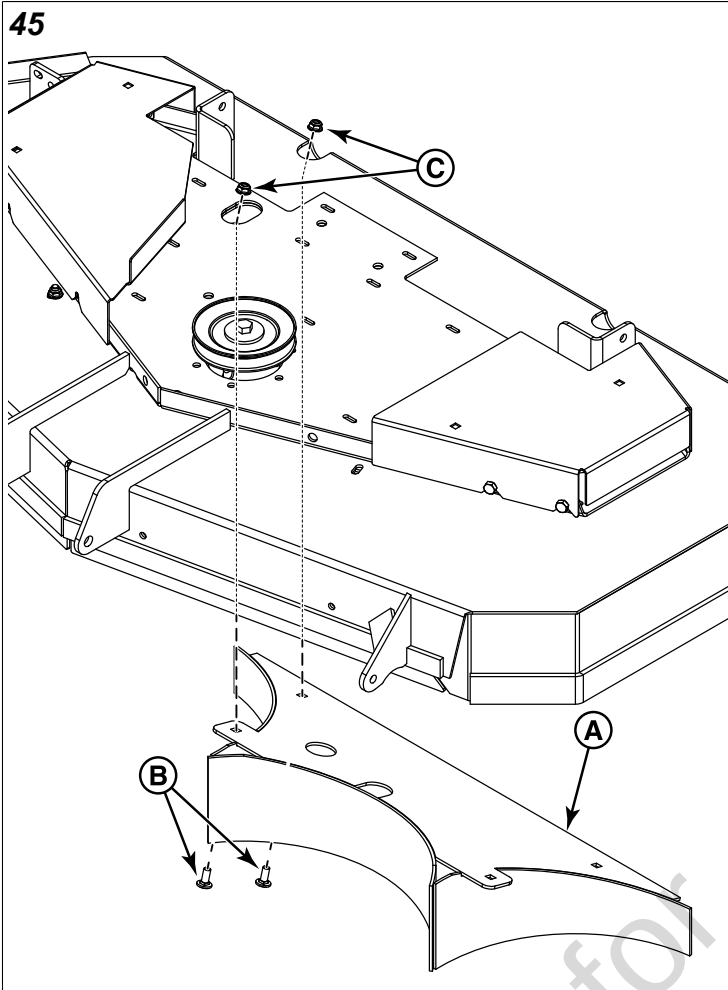
This procedure details the steps for configuring the mower deck for side discharge.

1. Park the machine on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn the ignition switch to OFF, and remove the ignition key.
2. Removing the mower deck from underneath the zero-turn rider will make the process of configuring the mower deck easier, so it is recommended that you remove the mower deck from underneath the zero-turn rider to perform this procedure.
3. Attach the discharge chute (A, Figure 44) to the mower deck using the chute rod (B), two (2) 5/16 washers (C), and two (2) 5/16-24 nylon nuts (D).

44



4. Attach the tall rear baffle (A, Figure 45) to the mower deck using the four (4) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).

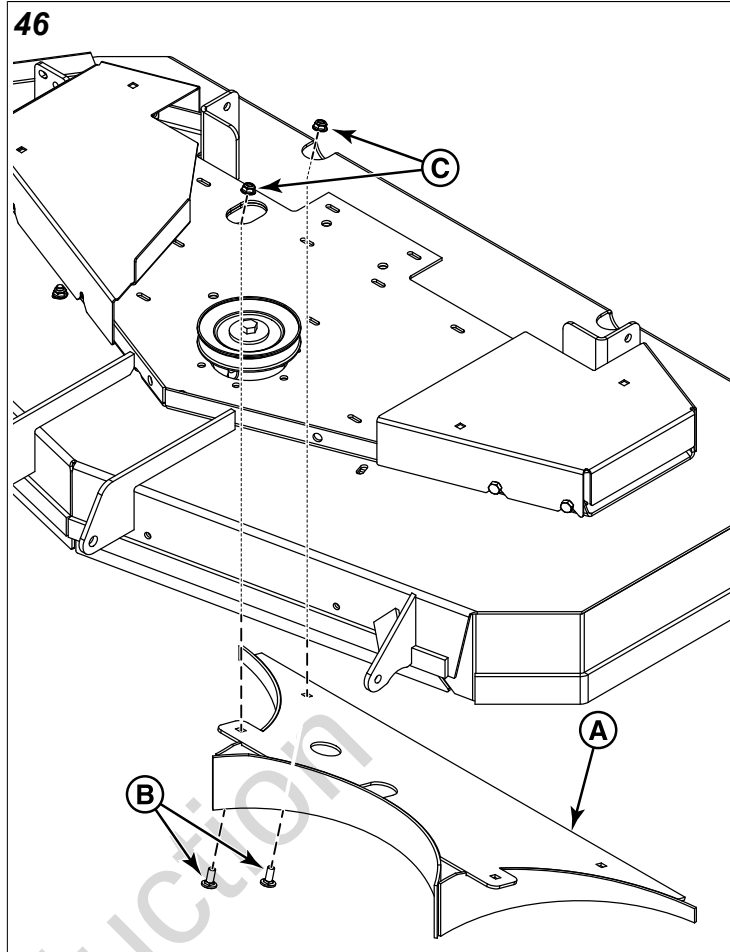


5. If you removed the mower deck from underneath the zero-turn rider for this procedure, re-install it now.

Configuring the Mower Deck for Rear Discharge

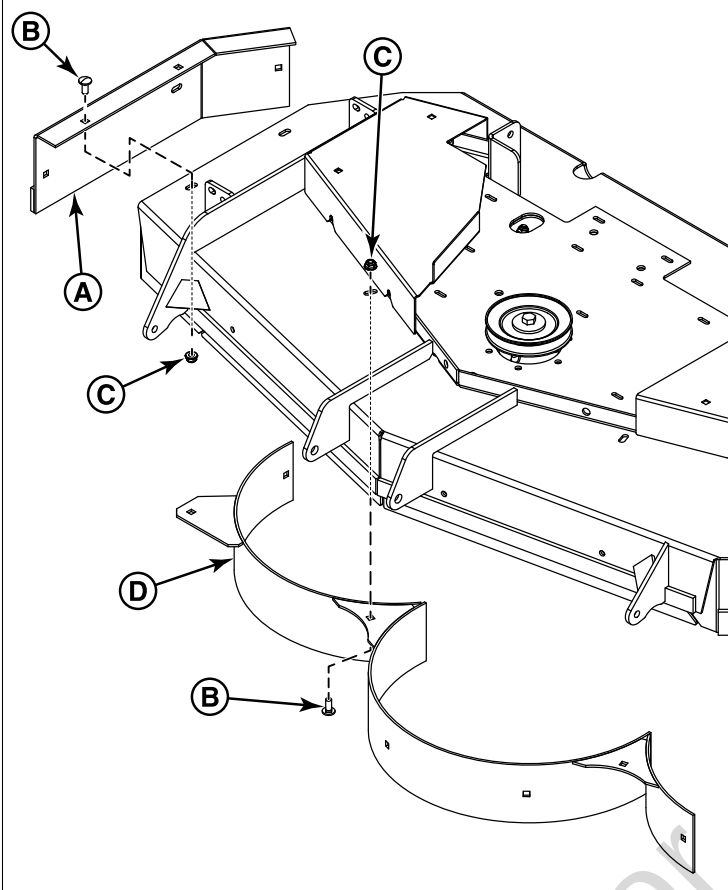
This procedure details the steps for configuring the mower deck for rear discharge.

1. Park the machine on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn the ignition switch to OFF, and remove the ignition key.
2. Removing the mower deck from underneath the zero-turn rider will make the process of configuring the mower deck easier, so it is recommended that you remove the mower deck from underneath the zero-turn rider to perform this procedure.
3. Attach the short rear baffle (A, Figure 46) to the mower deck using four (4) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).



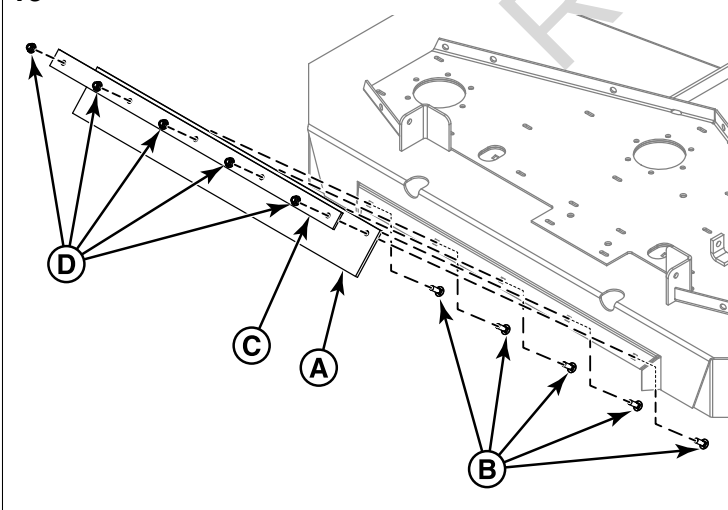
4. Attach the block off plate (A, Figure 47) to the mower deck using the three (3) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).

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5. Attach the front baffle (D) to the mower deck using the five (5) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).
6. Attach the rear deflector (A, Figure 48) to the mower deck. Put the five (5) 5/16 carriage bolts (B) up through the mower deck, the rear deflector, the retainer plate (C), and secure using the 5/16 hex nylock flange nuts (D).

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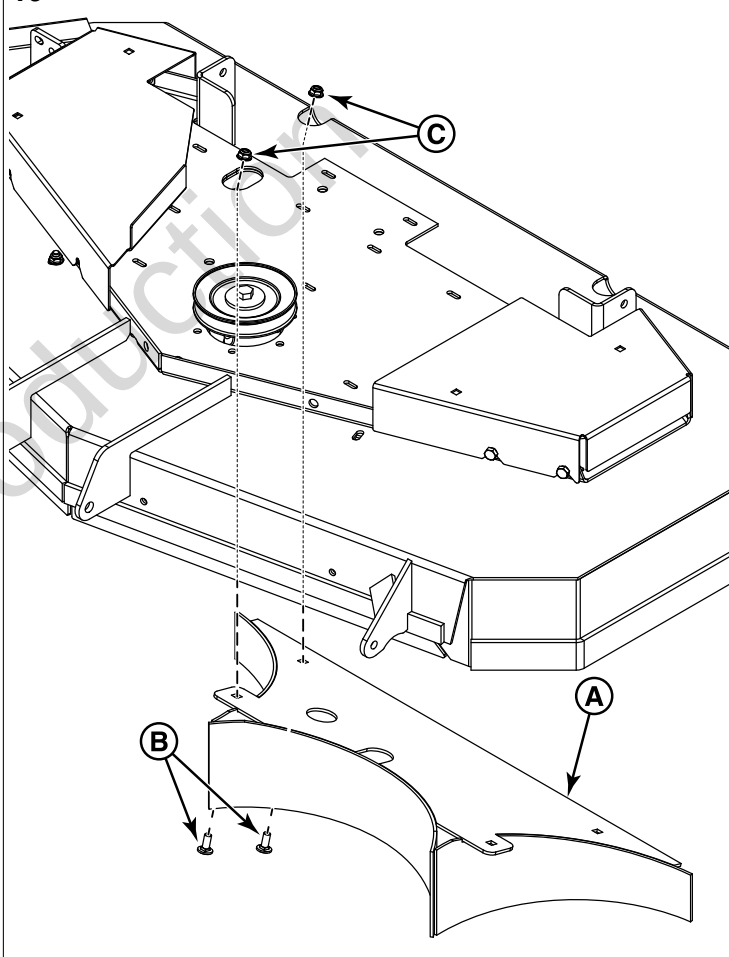
7. If you removed the mower deck from underneath the zero-turn rider for this procedure, re-install it now.

Configuring the Mower Deck for Mulching

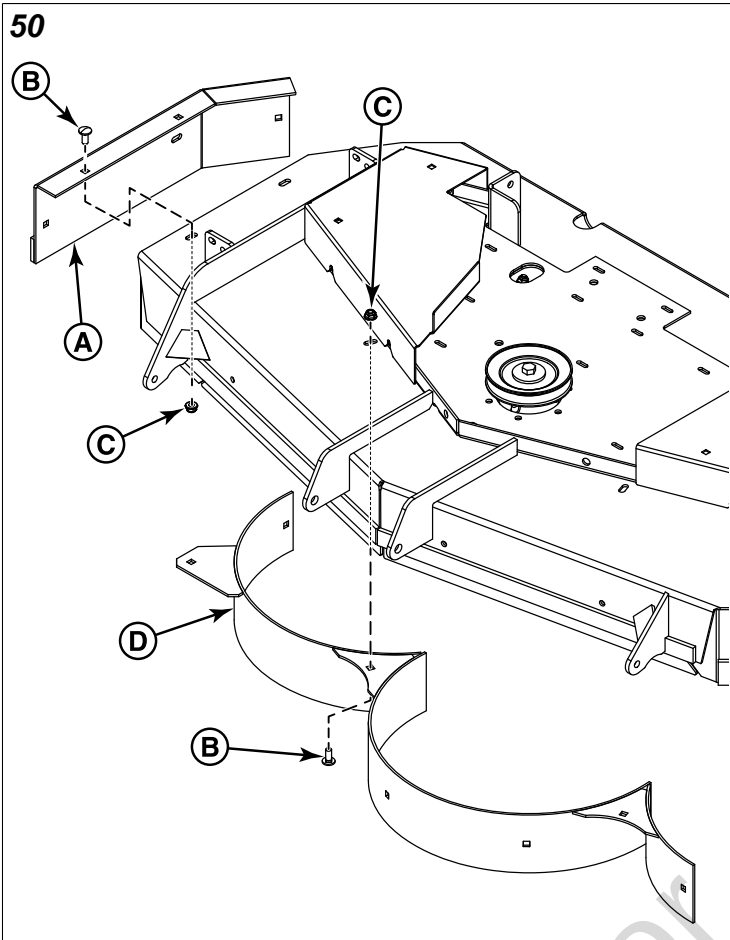
This procedure details the steps for configuring the mower deck for mulching.

1. Park the machine on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn the ignition switch to OFF, and remove the ignition key.
2. Removing the mower deck from underneath the zero-turn rider will make the process of configuring the mower deck easier, so it is recommended that you remove the mower deck from underneath the zero-turn rider to perform this procedure.
3. Attach the tall rear baffle (A, Figure 49) to the mower deck using four (4) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).

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4. Attach the block off plate (A, Figure 50) to the mower deck using the three (3) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).

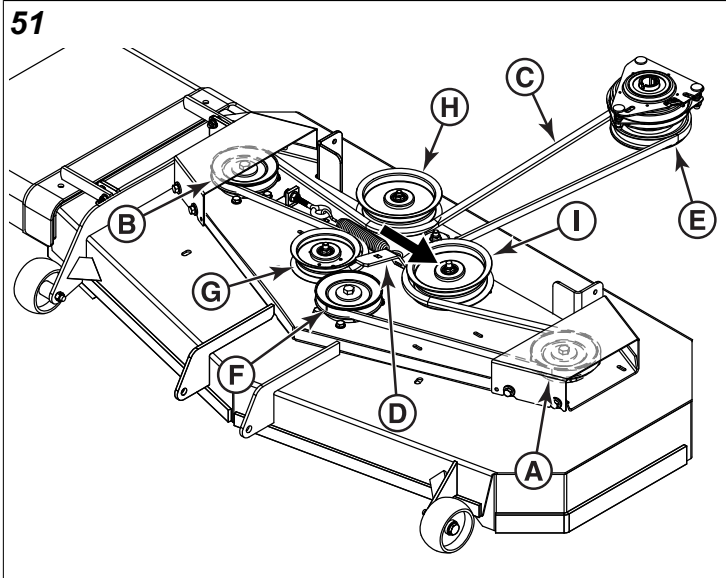


5. Attach the front baffle (D) to the mower deck using the five (5) 5/16 carriage bolts (B) and 5/16 hex nylock flange nuts (C).
6. If you removed the mower deck from underneath the zero-turn rider for this procedure, re-install it now.

Mower Deck Drive Belt Replacement

NOTICE To avoid damaging belt, **do not pry over pulleys.**

1. Park the machine on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn the ignition switch to OFF, and remove the ignition key.
2. Lower the mower deck to the lowest cutting position and remove the floor pan from the machine.
3. Remove the left and right hand spindle covers (A, & B Figure 51, respectively) from the mower deck to gain access to the mower deck drive belt (C).

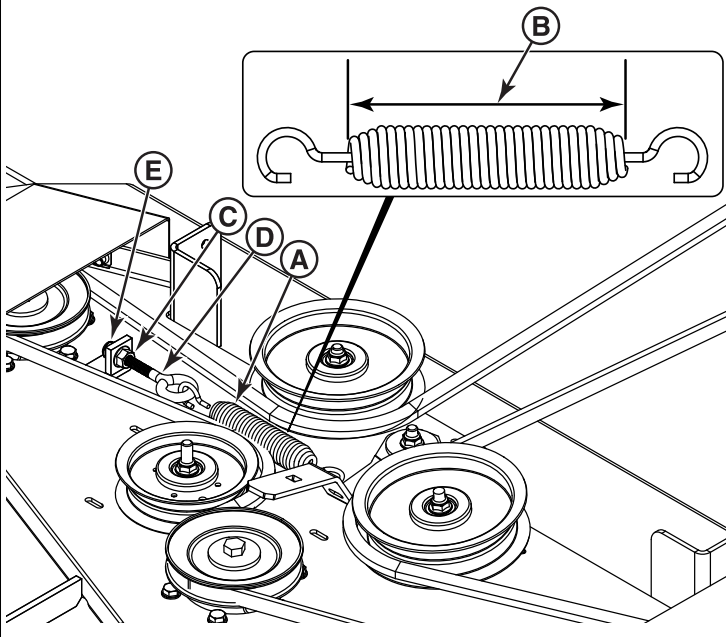


WARNING

Use extreme caution when rotating the idler arm due to the increased tension in the spring as the idler arm is being rotated. Injury may result if the idler arm is prematurely released while the spring is under tension.

4. Rotate the idler arm (D) **counter-clockwise**, which will relieve the tension on the belt exerted from the idler arm. Remove the belt from the left hand spindle pulley (A – exposed when the left hand spindle cover was removed). Carefully release the tension on the idler arm.
5. Remove the old belt from the remaining pulleys and replace with a new belt.
6. Install the new belt. Make sure that the V-side of the belt runs in the pulley grooves of the PTO clutch pulley (E), the right hand spindle pulley (B – exposed when the right hand spindle cover was removed), and the center spindle pulley (F). Make sure that the back side of the belt contacts the faces of the front stationary idler pulley (G), the rear stationary idler pulley (H) and the adjustable idler pulley (I).
7. Rotate the idler arm (D) **counter-clockwise** and install the belt on the left hand spindle pulley.
8. Set the mower deck to the 3" (7,6 cm) cutting position.
9. Measure the coil-to-coil length of the belt tensioning spring (A, Figure 52). The coil-to-coil measurement (B) should equal 6" (15,2 cm). If the measurement is not correct, the spring will need to be adjusted. If the measurement is correct, skip to step #13.

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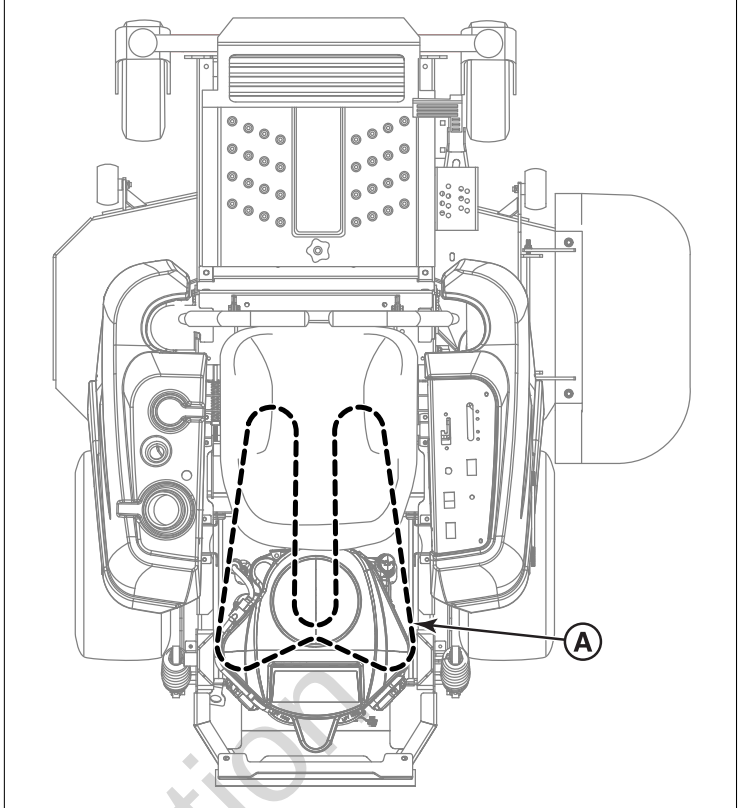


10. Loosen the jam nut (C) on the spring anchor eye bolt (D).
11. Turn the adjustment nut (E) until the measurement of 6" (15,2 cm) is achieved.
12. Tighten the jam nut.
13. Re-install the spindle covers and the floor pan.
14. Run the mower deck under no-load condition for about five (5) minutes to break in the new belt.

Transmission Drive Belt Replacement

This zero-turn riding mower is equipped with a transmission drive belt (A, Figure 53) that is located under the engine deck of the unit.

53



Inspect the Condition of the Transmission Drive Belt

Service Interval: Every 400 hours or annually.

1. Park the unit on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn the ignition switch to OFF, and remove the ignition key. Wait for all moving parts to stop.
2. Visually inspect the belt (A, Figure 53) for cracks, frayed edges, burn marks or any other damage. If the belt is damaged it must be replaced.
3. To replace the transmission drive belt the PTO clutch must be removed from the engine's crankshaft so it is recommended that the procedure for replacing the transmission drive belt be an authorized Ferris servicing dealer only service procedure.

Cleaning the Battery and Cables

This unit is equipped with a maintenance-free BCIU1 battery.

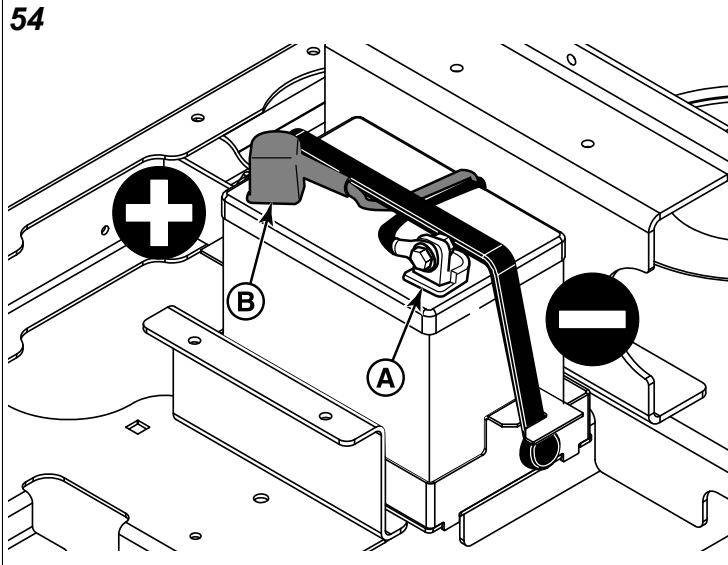


Keep open flames and sparks away from the battery.

- Be careful when handling the battery.
- Avoid spilling electrolyte.
- Keep flames and sparks away from the battery.
- When removing or installing battery cables, disconnect the negative cable FIRST and reconnect it LAST. If not done in this order, the positive terminal can be shorted to the frame by a tool.

Cleaning the Battery and Cables

1. Disconnect the cables from the battery, negative [-] cable first (A, Figure 54).



2. Clean the battery terminals and cable ends with a wire brush until shiny.
3. Reinstall the battery and reattach the battery cables, positive [+] cable first (B).
4. Coat the cable ends and the battery terminals with petroleum jelly or non-conducting grease.

Battery Service



WARNING

Keep open flames and sparks away from the battery; the gasses coming from it are highly explosive. Ventilate the battery well during charging.

Checking Battery Voltage

A voltmeter can be used to determine condition of the battery. When the engine is off, the voltmeter shows battery voltage, which should be 12 volts. When the engine is running, the voltmeter shows voltage of charging circuit which normally is 13 to 14 volts.

A dead battery, or one too weak to start the engine, may not mean the battery needs to be replaced. For example, it may mean that the alternator is not charging the battery properly. If there is any doubt about the cause of the problem, see your authorized Ferris servicing dealer. If you need to replace the battery, follow the steps under *Cleaning the Battery and Cables*.

Charging a Completely Discharged Battery



WARNING

- Do NOT charge battery with key switch ON.
- Never use a quick battery charger to start engine.
- Always disconnect negative (-) battery cable before charging battery,

1. Be aware of all the safety precautions you should observe during the charging operation. If you are unfamiliar with the use of a battery charger and hydrometer, have the battery serviced by your dealer.
2. Add distilled water sufficient to cover the plate (fill to the proper level near the end of the charge). If the battery is extremely cold, allow it to warm before adding water because the water level will rise as it warms. Also, an extremely cold battery will not accept a normal charge until it becomes warm.
3. Always unplug or turn the charger off before attaching or removing the clamp connections.
4. Carefully attach the clamps to the battery in proper polarity (usually red to [+] positive and black to [-] negative).
5. While charging, periodically measure the temperature of the electrolyte. If the temperature exceeds 125° F (51.6° C), or if violent gassing or spewing of electrolyte occurs, the charging rate must be reduced or temporarily halted to prevent battery damage.
6. Charge the battery until fully charged (until the specific gravity of the electrolyte is 1.250 or higher and the electrolyte temperature is at least 60° F). The best method of making certain a battery is fully charged, but not over charged, is to measure the specific gravity of a cell once per hour. The battery is fully charged when the cells are gassing freely at low charging rate and less than 0.003 change in specific gravity occurs over a three hour period.

Jump Starting With Auxiliary (Booster) Battery

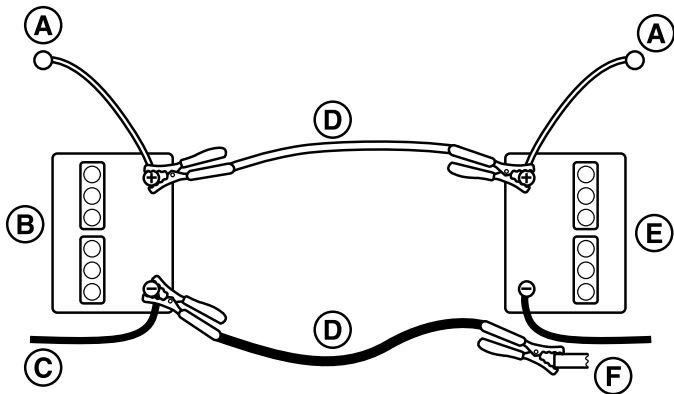
Jump starting is not recommended. However, if it must be done, follow these directions. Both booster and dis-charged batteries should be treated carefully when using jumper cables. Follow the steps below EXACTLY, being careful not to cause sparks. Refer to Figure 55.



WARNING

For your personal safety, use extreme care when jump starting. Never expose battery to open flame or electric spark – battery action generates hydrogen gas which is flammable and explosive. Do not allow battery acid to contact skin, eyes, fabrics, or painted surfaces. Batteries contain a sulfuric acid solution which can cause serious personal injury or property damage.

To avoid engine damage, do not disconnect battery while engine is running. Be sure terminal connections are tight before starting.



This hook-up is for negative grounded vehicles.

Callout	Description
A	To Starter Switch
B	Starting Vehicle Battery
C	To Ground
D	Jumper Cable
E	Discharged Vehicle Battery
F	Engine Block
Make sure vehicles do not touch.	

- Both batteries must be of the same voltage.
- Position the vehicle with the booster battery adjacent to the vehicle with the discharged battery so that booster cables can be connected easily to the batteries in both vehicles. Make certain vehicles do not touch each other.
- Wear safety glasses and shield eyes and face from batteries at all times. Be sure vent caps are tight. Place damp cloth over vent caps on both batteries.
- Connect positive (+) cable to positive post of discharged battery (wired to starter or solenoid).
- Connect the other end of same cable to same post marked positive (+) on booster battery.
- Connect the second cable negative (-) to other post of booster battery.
- Make final connection on engine block of stalled vehicle away from battery. Do not lean over batteries.
- Start the engine of the vehicle with the booster battery. Wait a few minutes, then attempt to start the engine of the vehicle with the discharged battery.
- If the vehicle does not start after cranking for ten (10) seconds, STOP PROCEDURE. More than ten (10) seconds seldom starts the engine unless some mechanical adjustment is made. Allow a sixty (60) second cool down period between starting attempts. Failure to follow these guidelines can burn out starter motor.
- After starting, allow the engine to return to idle speed. Remove the cable connection at the engine or frame. Then remove the other end of the same cable from the booster battery.

- Remove the other cable by disconnecting at the discharged battery first and then disconnect the opposite end from the booster battery.
- Discard the damp cloths that were placed over the battery vent caps.



WARNING



Any procedure other than the preceding could result in:

- personal injury caused by electrolyte squirting out the battery vents,
- personal injury or property damage due to battery explosion,
- damage to the charging system of the booster vehicle or of the immobilized vehicle.

Do not attempt to jump start a vehicle having a frozen battery because the battery may rupture or explode. If a frozen battery is suspected, examine all fill vents on the battery. If ice can be seen or if the electrolyte fluid cannot be seen, do not attempt to start with jumper cables as long as the battery remains frozen.

Troubleshooting

While normal care and regular maintenance will extend the life of your equipment, prolonged or constant use may eventually require that service be performed to allow it to continue to operating properly.

This troubleshooting guide lists the most common problems, their causes and remedies.

Refer to **Maintenance Procedures** for instructions on how to perform most of these minor adjustments and service repairs yourself. If you prefer, all of these procedures can be performed for you by your local authorized dealer.



WARNING



Remove ignition key prior to performing maintenance on the unit.

To avoid serious injury, perform maintenance on the unit or mower deck only when the engine is stopped and the parking brake is engaged.

Always remove the ignition key, disconnect the spark plug wire(s) and fasten it away from the plug(s) before beginning the maintenance, to prevent accidental starting of the engine.

Troubleshooting Charts

Troubleshooting the Rider

Problem: Engine will not turn over or start.	
Cause	Remedy
Parking brake not engaged.	Engage parking brake.
PTO (electric clutch) switch in ON position.	Place in OFF position.

Problem: Engine will not turn over or start.	
Ground speed control levers not in "NEUTRAL" position.	Move ground speed control levers to the "NEUTRAL" position.
Out of fuel.	If engine is hot, allow it to cool, then refill the fuel tank.
Engine flooded.	Move choke control to the closed position.
Fuse blown.	Replace fuse.
Battery terminals require cleaning.	Clean the battery terminals.
Battery discharged or dead.	Recharge or replace.
Wiring loose or broken.	Visually check wiring and replace broken or frayed wires. Tighten loose connections.
Solenoid or starter motor faulty.	Repair or replace. See authorized dealer.
Safety interlock switch faulty.	Replace as needed. See authorized dealer.
Spark plug(s) faulty, fouled, or incorrectly gapped.	Clean and gap, or replace. See engine operator's manual.
Water in fuel.	Drain fuel and replace with fresh fuel.
Gas is old or stale.	Drain fuel and replace with fresh fuel.

Problem: Engine starts hard or runs poorly.	
Cause	Remedy
Fuel mixture too rich.	Clean air filter. Check choke adjustment.
Spark plug(s) faulty, fouled, or incorrectly gapped.	Clean and gap, or replace. See engine operator's manual.

Problem: Engine knocks.	
Cause	Remedy
Low oil level.	Check and add oil as required.
Using wrong grade oil.	See engine operator's manual.

Problem: Excessive oil consumption.	
Cause	Remedy
Engine running too hot.	Clean engine fins, blower screen, and air cleaner.
Using wrong weight oil.	See engine operator's manual.
Too much oil in crankcase.	Drain excess oil.

Engine exhaust is black.	
Cause	Remedy
Dirty air filter.	Replace air filter. See engine operator's manual.
Engine choke is in closed position.	Open choke control.

Problem: Engine runs, but rider will not drive.	
Cause	Remedy
Transmission release lever(s) in "bypass" position	Move transmission release lever(s) to the "drive" position.
Belt is broken.	See authorized dealer to have drive belt replaced.
Drive belt slips.	See problem and cause below.
Parking Brake is not fully released.	See authorized dealer.

Problem: Rider drive belt slips.	
Cause	Remedy

Problem: Rider drive belt slips.	
Pulleys or belt is greasy or oily.	Clean as required.
Tension too loose.	See authorized dealer.
Belt stretched or worn.	See authorized dealer to have drive belt replaced.

Problem: Brake will not hold.	
Cause	Remedy
Placement of parking brake cable is not correct.	See authorized dealer.
Braking components in transmission worn.	See authorized dealer.

Problem: Rider steers or handles poorly.	
Cause	Remedy
Steering lever linkages are loose.	Check and tighten any loose connections.
Improper tire inflation.	See Checking Tire Pressures

Troubleshooting the Mower Deck

Problem: Mower will not raise.	
Cause	Remedy
Lift linkage not properly attached or damaged.	See authorized dealer.

Problem: Engine stalls easily with mower engaged.	
Cause	Remedy
Engine speed too slow.	Set to full throttle.
Ground speed too fast.	Decrease ground speed.
Cutting height set too low.	Cut tall grass at maximum cutting height during first pass.
Discharge chute jamming with cut grass.	Cut grass with discharge pointing towards previously cut area.

Problem: Excessive mower vibration.	
Cause	Remedy
Blade mounting bolts are loose.	Tighten to 50-60 ft lbs (68-81 Nm).
Mower blades, spindles, or pulleys are bent.	Check and replace as necessary.
Mower blades are not balanced.	Remove, sharpen, and balance blades. See Servicing the Mower Blades.
Belt installed incorrectly.	Reinstall the belt correctly.

Problem: Excessive belt wear or breakage.	
Cause	Remedy
Bent or rough pulleys.	Replace damaged pulleys.
Using incorrect belt.	Replace with correct belt.

Problem: Mower drive belt slips, or fails to drive.	
Cause	Remedy
Idler pulley spring broken, or not properly attached.	Repair or replace as needed.
Mower drive belt broken.	Replace mower drive belt.

Problem: Mower does not engage.	
Cause	Remedy
Electrical wiring damage.	Locate and repair damaged wire.

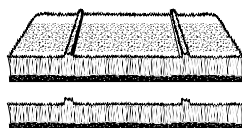
Problem: Mower does not engage.

Battery voltage too low.	Recharge battery and check alternator. See Battery Maintenance.
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Troubleshooting Common Cutting Problems

Problem: Streaking

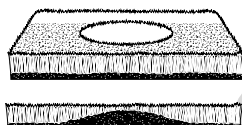
Streaking is when thin strips of uncut grass are left behind the mower. Streaking is usually caused by operator error or poor blade maintenance.



Cause	Remedy
Blades are not sharp.	Sharpen your blades.
Blades are worn down too far.	Replace your blades.
Engine speed is too slow.	Always mow at full throttle.
Ground speed is too fast.	Slow down.
Deck is plugged with grass.	Clean out the mower.
Not overlapping cutting rows enough.	Overlap your cutting rows
Not overlapping enough when turning.	When turning your effective cutting width decreases—overlap more when turning.

Problem: Scalping

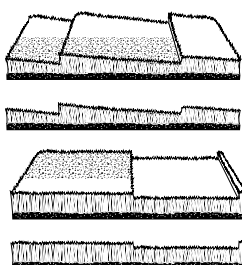
Scalping is when the mower deck comes close to or hits the ground. Scalping can be caused by the mower deck misadjustment, unevenness in the lawn, or by mower deck bouncing because the ground speed is too fast.



Cause	Remedy
Lawn is uneven or bumpy.	Roll or level the lawn.
Mower deck cutting height is set too low.	Raise the cutting height.
Ground speed is too fast.	Slow down.
Deck is not leveled correctly.	Correctly level the deck.
Tire pressure is low or uneven.	Check and inflate the tires.

Problem: Stepped Cutting

Stepped cutting is sharp ridges or uneven levels left in the lawn surface. Stepped cutting is usually caused by mower deck damage or misadjustment, or damage to the mower blades.



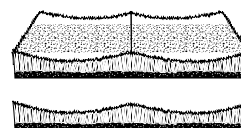
Cause	Remedy
Deck is not leveled correctly.	Level the deck correctly.
Tires are not properly inflated.	Check and inflate the tires.

Problem: Stepped Cutting

Blades are damaged.	Replace the blades.
Deck shell is damaged.	Repair or replace the deck.
Mower spindle is bent or loose.	Repair or replace the spindle.
Blades are installed incorrectly.	Reinstall the blades correctly.

Problem: Uneven Cutting

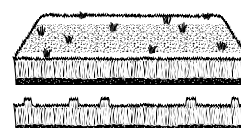
Uneven cutting is waviness or smooth troughs in the lawn surface. Uneven cutting is usually caused by mower deck damage or misadjustment.



Cause	Remedy
Deck is not leveled correctly.	Level the deck correctly.
Blades are dull or worn.	Sharpen or replace the blades.
Blades are damaged.	Replace the blades.
Deck is clogged with grass clippings.	Clean out the deck.
Deck shell is damaged.	Repair or replace the deck.
Mower spindle is bent or loose.	Repair or replace the spindle.
Blades are installed incorrectly.	Reinstall the blades correctly.
Tires are not properly inflated.	Check and inflate the tires.

Problem: Stringers

Stringers are sparse patches of uncut grass left behind the mower. Stringers are usually caused by operator error or poor blade maintenance.



Cause	Remedy
Blades are not sharp or nicked.	Sharpen your blades.
Blades are worn down too far.	Replace your blades.
Engine speed is too slow.	Always mow at full throttle.
Ground speed is too fast.	Slow down.
Deck is plugged with grass.	Clean out the mower.

Specifications

Specifications are correct at time of printing and are subject to change without notice.

ENGINE

For complete engine specifications see the engine manufacturer's operator's manual included with your unit.

Fits models: 5901076 & 5901990

Briggs & Stratton 44C777

Make	Briggs & Stratton
Model	44C777-0005-G1
Electrical System	12 volt, 9 amp alternator; Battery: 230 cca

CHASSIS

Fuel Tank Capacity	5.5 gallons (20,8 L) total
Rear Wheels	
Tire Size	20 X 10 - 10
Inflation Pressure	12 psi (0,83 bar)
Front Wheels	
Tire Size (Serial Number 4000771923 and below)	11 X 4 - 5
Tire Size (Serial Number 4000771924 and above)	11 X 6 - 5
Inflation Pressure	22 psi (1,52 bar)

TRANSMISSIONS

Model 5901729 Only:

LH	ZH-JPBB-3F7B-2XLX (1759446)
RH	ZH-MPBB-3F7C-3LX (1759445)
Type	ZT-2800 Transaxles
Hydraulic Fluid	SAE 20W-50 motor oil
Speeds @ 3400 rpm	Forward: 0-7.5 mph (0-12 km/h) Reverse: 0-4 mph (0-6,4 km/h)

All Other Models:

Serial Number 4001547047 and below	
LH	ZJ-HPEE-3F7B-29LX (5106102)
RH	ZJ-LPEE-3F7C-39LX (5105601)
Serial Number 4001547048 and above	
LH	ZJ-HPEE-SF7B-29LX (5109249)
RH	ZJ-LPEE-SF7C-39LX (5109250)
Type	ZT-3100 Transaxles
Hydraulic Fluid	SAE 20W-50 motor oil
Speeds @ 3400 rpm	Forward: 0-7.5 mph (0-12 km/h) Reverse: 0-4 mph (0-6,4 km/h)

DIMENSIONS

Overall Length	69-7/8" (177,5 cm)
Overall Width (with deflector up)	53" (134,6 cm)
Overall Width (with deflector down)	58-1/2" (148,9 cm)
Height	46-1/2" (118 cm)
Weight (approximate)	753 lbs (341,5 kg)

Warranty

If your unit is equipped with a dual function hour meter that displays both engine hours and PTO hours, the warranty is based on the engine hours as displayed by the hour meter.

Warranty Statement

BRIGGS & STRATTON WARRANTY POLICY (January 2014)

LIMITED WARRANTY

Briggs & Stratton warrants that, during the warranty period specified below, it will repair or replace, free of charge, any part that is defective in material or workmanship or both.

Transportation charges on product submitted for repair or replacement under this warranty must be borne by purchaser. This warranty is effective for and is subject to the time periods and conditions stated below. For warranty service, find the nearest Authorized Service Dealer in our dealer locator map at ferrismowers.com. The purchaser must contact the Authorized Service Dealer, and then make the product available to the Authorized Service Dealer for inspection and testing.

There is no other express warranty. Implied warranties, including those of merchantability and fitness for a particular purpose, are limited to the warranty period listed below, or to the extent permitted by law. Liability for incidental or consequential damages are excluded to the extent exclusion is permitted by law. Some states or countries do not allow limitations on how long an implied warranty lasts, and some states or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state or country to country.**

WARRANTY PERIOD		
Covered Parts	Standard Warranty Period	Rental Warranty Period
Riding mowers - except as noted below +	4 years (48 months) or 500 hours, whichever occurs first.	90 days
+Belts, Tires, Brake Pads, Hoses, Battery, Blades	90 days	90 days
+Attachments	1 year	90 days
+Engine*	See Engine Operator's Manual	See Engine Operator's Manual

* Emissions-related components are covered by the Emissions Warranty Statement

** In Australia - Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure. For warranty service, find the nearest Authorized Service Dealer in our dealer locator map at ferrismowers.com (Select region: Australia), or by calling 1300 274 447, or by emailing or writing to salesenquires@briggsandstratton.com.au, Briggs & Stratton Australia Pty Ltd, 1 Moorebank Avenue, NSW, Australia, 2170.

The warranty period begins on the date of purchase by the first retail or commercial customer.

To ensure prompt and complete warranty coverage, register your product at the website shown above or at www.onlineproductregistration.com, or mail the completed registration card (if provided), or call 1-800-743-4115 (in USA).

Save your proof of purchase receipt. If you do not provide proof of the initial purchase date at the time warranty service is requested, the manufacturing date of the product will be used to determine the warranty period. Product registration is not required to obtain warranty service on Briggs & Stratton products.

ABOUT YOUR WARRANTY

Warranty service is available only through *Ferris* Authorized Service Dealers. This warranty only covers defects in materials or workmanship. It does not cover damage caused by improper use or abuse, improper maintenance or repair, normal wear and tear, or stale or unapproved fuel.

Improper Use and Abuse - The proper, intended use of this product is described in the Operator's Manual. Using the product in a way not described in the Operator's Manual or using the product after it has been damaged will not be covered under this warranty. Warranty coverage will also not be provided if the serial number on the product has been removed or the product has been altered or modified in any way, or if the product has evidence of abuse such as impact damage, or water/chemical corrosion damage.

Improper Maintenance or Repair - This product must be maintained according to the procedures and schedules provided in the Operator's Manual, and serviced or repaired using genuine Briggs & Stratton parts or equivalent. Damage caused by lack of maintenance or use of non-original or non-equivalent parts is not covered by warranty.

Normal Wear and Tear - Like all mechanical devices, the unit is subject to wear even when properly maintained. This warranty does not cover replacement or repairs when normal use has exhausted the life of a part or the equipment. Except as noted in the warranty period, maintenance and wear items such as filters, belts, cutting blades, and brake pads (except engine brake pads) are not covered by warranty due to wear characteristics alone, unless the cause is due to defects in material or workmanship.

Stale or Unapproved Fuel - In order to function correctly, this product requires fresh fuel that conforms to the criteria specified in the Operator's Manual. Engine or equipment damage caused by stale fuel or the use of unapproved fuels (such as E15 or E85 ethanol blends) is not covered by warranty.

Other Exclusions - This warranty excludes damage due to accident, abuse, modifications, alterations, improper servicing, freezing or chemical deterioration. Attachments or accessories that were not originally packaged with the product are also excluded. This warranty does not include used, reconditioned, second-hand, or demonstration equipment or engines. This warranty also excludes failures due to acts of God and other force majeure events beyond the manufacturer's control.

Notes

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