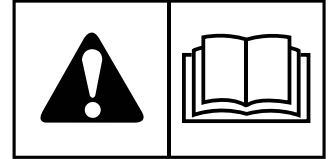




OPERATOR'S MANUAL

500S Series

Zero-Turn Riding Mower



Model	Description
5902051	500S, 48, B25, NA
5902052	500S, 52, B25, NA
5902053	500S, 61, B25, NA
5902056	500S, 61, K24, NA
5902101	500S, 48, B25, NA
5902102	500S, 52, B25, NA
5902103	500S, 61, B25, NA
5902182	500S, 48, B25, AUS
5902183	500S, 52, B25, AUS

This manual is available in Spanish. For a copy, contact your Ferris® dealer or www.ferrismowers.com.
Este manual está disponible en Español. Para obtener una copia, póngase en contacto con su distribuidor Ferris o www.ferrismowers.com.

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General Information

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.

This Operator's Manual contains safety information to make you aware of the hazards and risks associated with the unit and how to avoid them. This product was designed to be used as described in the Operator's Manual and is not intended for any other purpose. It is important that you read and thoroughly understand the instructions in the manual before attempting to start, operate, or service the product.

Save these original instructions for future reference.

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.

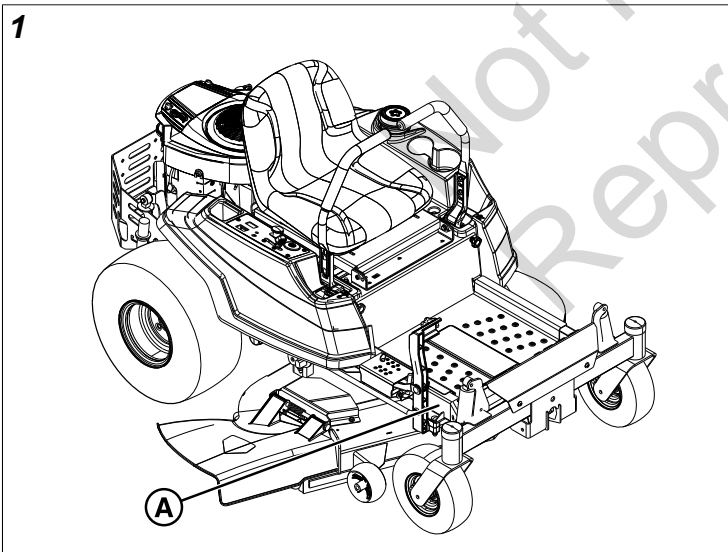
Ferris® is a registered trademark of Briggs & Stratton.

Identifying Your Unit

The following products are covered by this manual:

5902051, 5902052, 5902053, 5902056, 5902101, 5902102, 5902103, 5902182 & 5902183

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:



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

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 the engine operator's manual.

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:	

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

Operator Safety

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.

California Proposition 65

! **WARNING**

This product can expose you to chemicals including gasoline engine exhaust, which is known to the State of California to cause cancer and carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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.

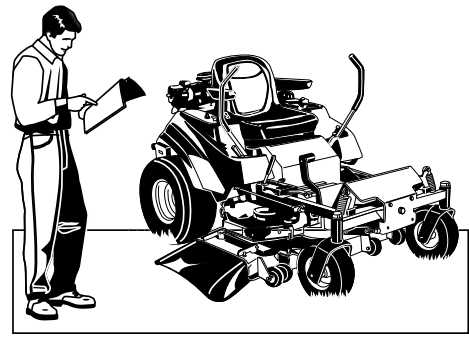
Operating Safety



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

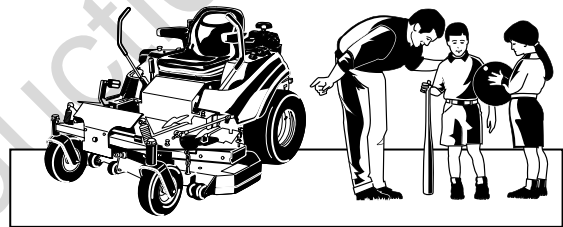


The operator's manual contains important safety information you need to be aware of **BEFORE** you operate your unit as well as **DURING** operation.

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.

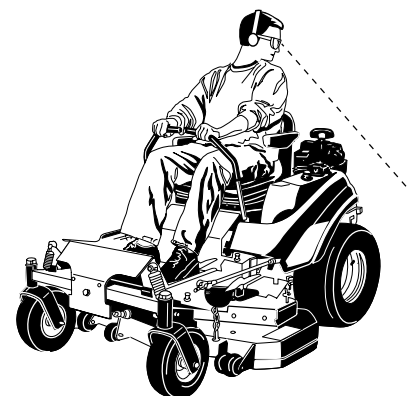
Children



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.

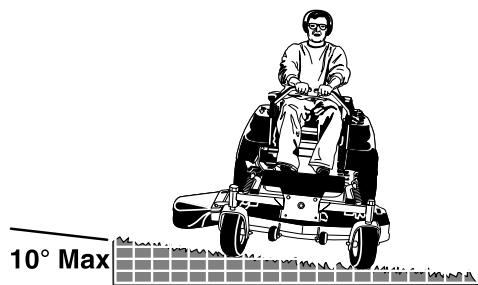
DO NOT GIVE CHILDREN RIDES ON THIS UNIT! This encourages them to come near the unit in the future while it is running, and they could be seriously hurt. They may then approach the unit for a ride when you are not expecting it, and you may run over them.

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



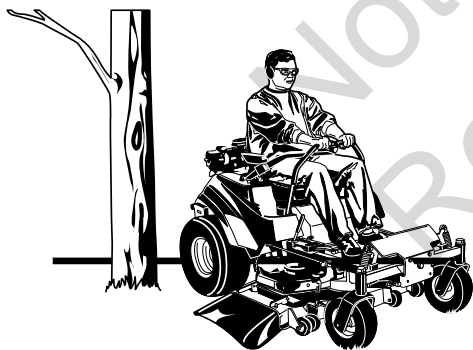
You could be seriously injured or even killed if you use this unit on too steep an incline. Using the unit on a slope that is too steep or where you don't have adequate traction can cause you to lose control or roll over. Refer to the **Slope Identification Guide** to measure the slope of a lawn surface.

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

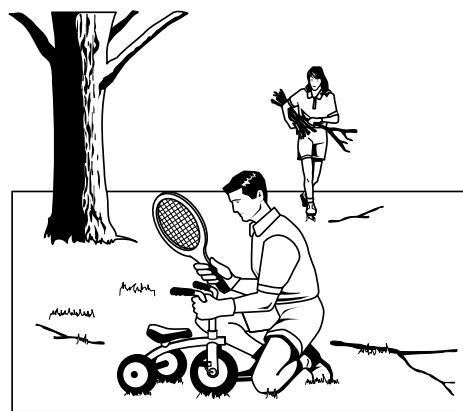


This equipment has many moving parts that can injure you or someone else. However, if you are seated in the seat properly, and follow all the rules in this book, the unit is safe to operate.

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

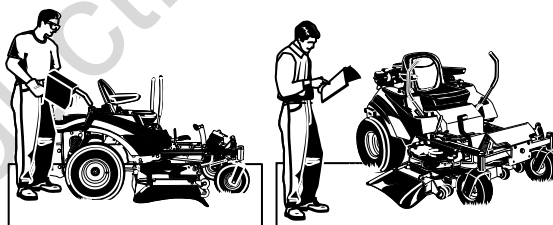


This unit has spinning mower blades. These blades can pick up and throw debris that could seriously injure a bystander. Be sure to clean up the area to be mowed BEFORE you start mowing.

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.

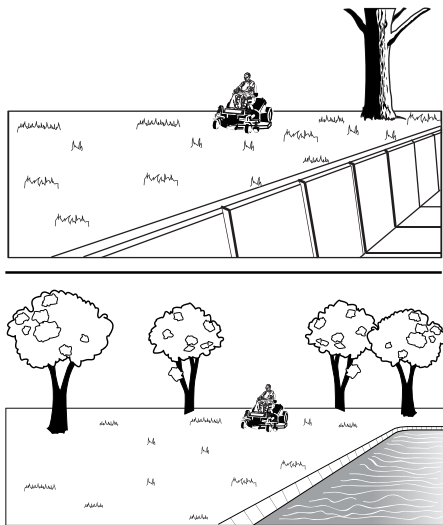
Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

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.

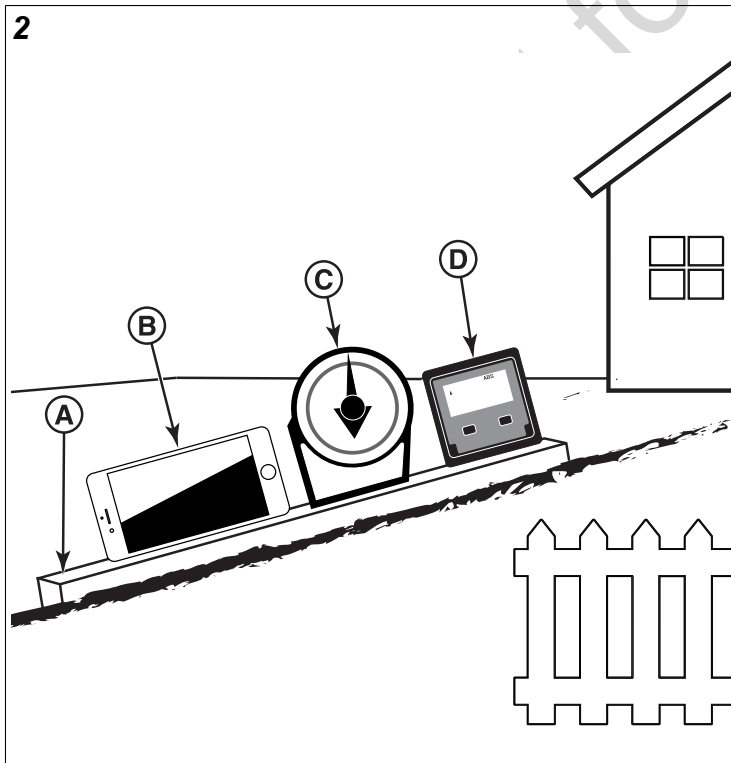
Retaining Walls, Drop-Offs, and Water



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.
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.

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.

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.

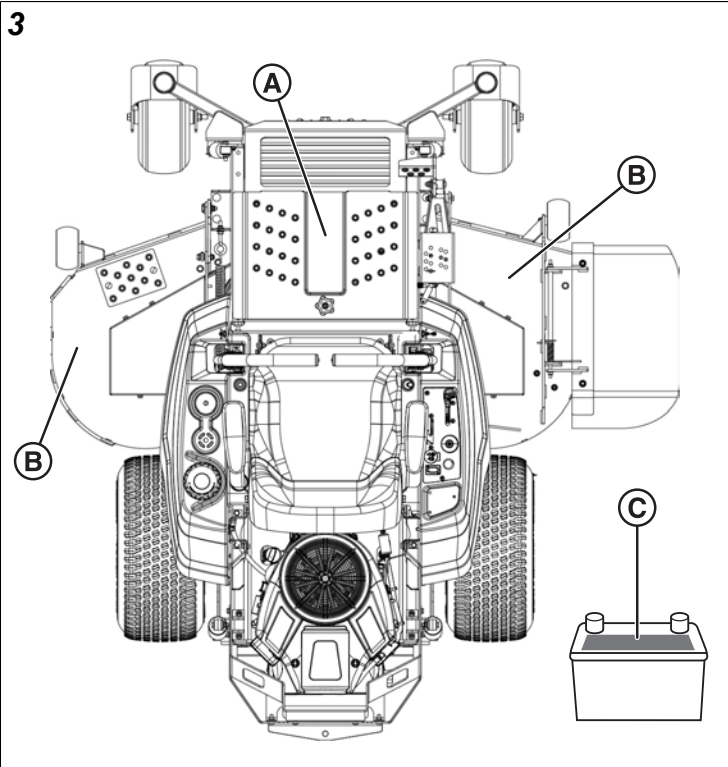
Safety Decals and Icons

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.

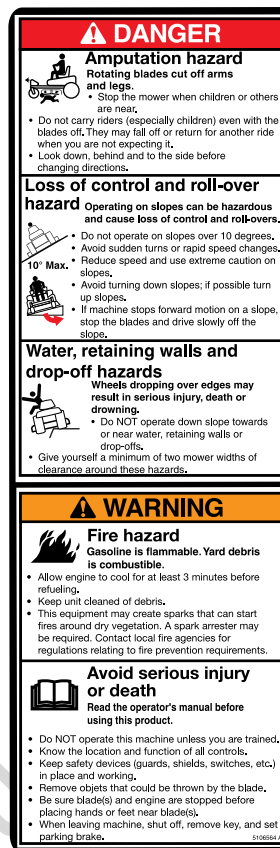


WARNING

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



5106564 - Decal, Main Safety





North American Models:

- A. Part Number: 5106564 - Decal, Main Safety
- B. Part Number: 7101665 - Decal, Danger, Discharge
- C. Battery Safety Decal


Export Models:


- A. Part Number: 5106566 - Decal, Main Safety
- B. Part Number: 7106109 - Decal, Danger, Discharge
- C. Battery Safety Decal

	Safety alert triangle.
	DANGER
	Amputation hazard. Rotating blades cut off arms and legs. <ul style="list-style-type: none"> • Stop the mower when children or others are near. • Do not carry riders (especially children) even with the blades off. They may fall off or return for another ride when you are not expecting it. • Look down, behind and to the side before changing directions.

	<p>Loss of control and roll-over hazard. Operating on slopes can be hazardous and cause loss of control and roll-overs.</p> <ul style="list-style-type: none"> 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. If machine stops forward motion on a slope, stop the blades and drive slowly off the slope.
	<p>Water, retaining walls, and drop-off hazards. Wheels dropping over edges may result in serious injury, death or drowning.</p> <ul style="list-style-type: none"> 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.

WARNING

	<p>Fire hazard. Gasoline is flammable. Yard debris is combustible.</p> <ul style="list-style-type: none"> Allow engine to cool for at least 3 minutes before refueling. Keep unit cleaned of debris. This equipment may create sparks that can start fires around dry vegetation. A spark arrester may be required. Contact local fire agencies for regulations relating to fire prevention requirements.
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	<p>Avoid serious injury or death. Read the operator's manual before using this product.</p> <ul style="list-style-type: none"> Do not operate this machine unless you are trained. Know the location and function of all controls. Keep safety devices (guards, shields, switches, etc.) in place and working. Remove objects that could be thrown by the blade. Be sure blade(s) and engine are stopped before placing hands or feet near blade(s). When leaving machine, shut off, remove key, and set parking brake.
---	--

7101665 - Decal, Danger, Discharge

⚠ DANGER



Amputation and thrown objects hazard



- Keep hands and feet away from deck.
- Do not operate mower unless discharge chute or entire grass catcher is in its proper place.



7101665

⚠ DANGER	
	Keep hands and feet away from deck.
	Do not operate mower unless discharge chute or entire grass catcher is in its proper place.

5106566 - Decal, Main Safety















































5106566 -



	<p>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.</p>
	<p>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.</p>
	<p>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.</p>
	<p>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.</p>
	<p>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.</p>
	<p>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.</p>
	<p>DANGER: Engage parking brake, remove key, and consult technical literature before performing service or maintenance.</p>

	<p>DANGER - FIRE HAZARD: Remove key and wait three (3) minutes before refueling.</p>
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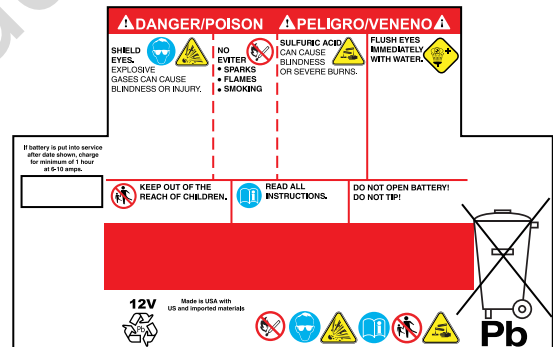
*This limit was determined per International Standard ISO 5395-3:2013, Section 4.6 and is based on the ISO 5395-3 Stability Test procedure described in Annex A. The 10 degree "limit of stability" is equal to 60% of the angle at which machine lift-off occurred in static tests. Actual dynamic stability may vary depending on operating conditions.





7106109 - Decal, Danger, Discharge



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

Battery Safety Decal



	<p>Warning: Fire Hazard - Keep children, open flames and sparks away from the battery, which could ignite explosive gases.</p>
	<p>Warning: Sulfuric acid can cause blindness or severe burns - Always wear safety goggles or a face shield when working on or near a battery.</p>
	<p>Warning: Batteries produce explosive gases - Read and understand the Operator's Manual before using this machine.</p>
	<p>Important: Do not discard a battery in the trash - Contact local authorities for disposal and/or recycling of batteries.</p>



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



WARNING

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

Operational SAFETY Checks

Test 1 - Engine SHOULD NOT crank if:

- PTO switch is engaged, OR;
- Parking brake is not engaged, OR;
- Ground speed control levers are not in the NEUTRAL position.

Test 2 - Engine SHOULD crank if:

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

Test 3 - Engine should 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 - Blade Brake Check

Mower blades and mower drive belt should come to a complete stop within five (5) seconds after electric PTO switch is turned off (or operator rises off seat). If mower drive

belt does not stop within five (5) seconds, see your authorized Ferris® servicing dealer.

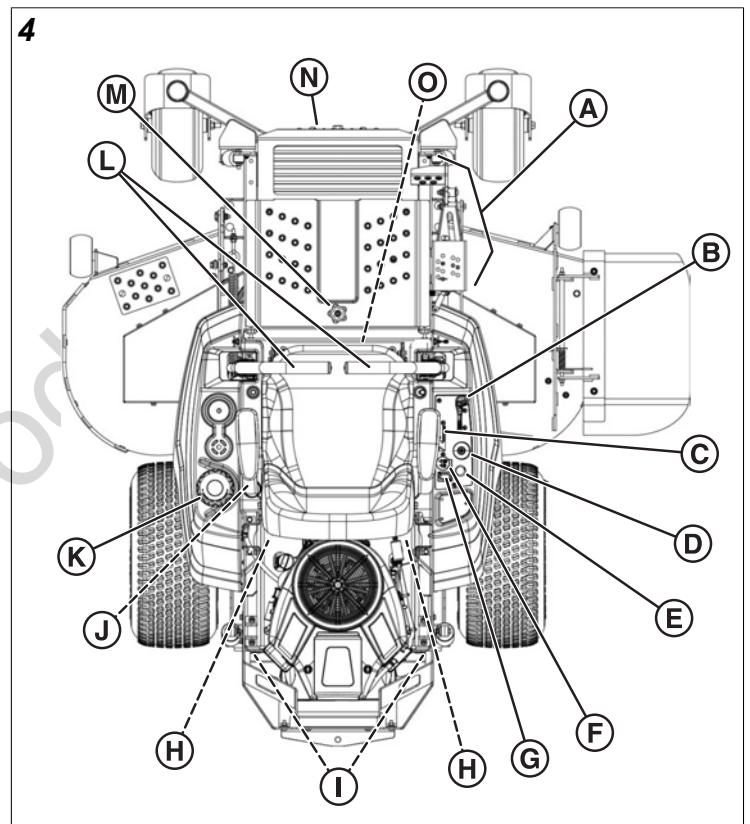
Note: Once the engine has stopped, the PTO switch must be turned off, the parking brake must be engaged, and the ground speed control levers must be locked in the NEUTRAL position after the operator returns to the seat in order to start the engine.

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

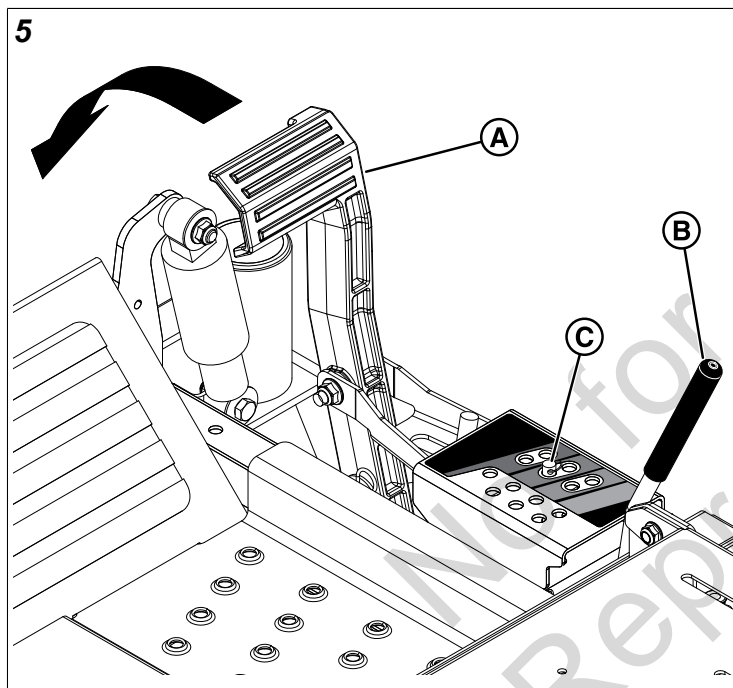



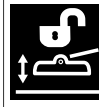
- A. Deck Lift Pedal, Cutting Height Adjustment Pin, and Deck Lift Lock Lever
- B. Throttle Control
- C. Parking Brake
- D. Ignition Switch
- E. Choke
- F. PTO (Power Take Off) Switch
- G. Hour Meter
- H. Transmission Oil Fill / Tanks (One per transmission)
- I. Transmission Release Levers (One per transmission)
- J. Fuel Level Gauge

- K. Fuel Tank Cap
- L. Ground Speed Control Levers
- M. Removable Floor Plate
- N. Headlight
- O. Seat Adjustment Lever


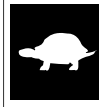
Deck Lift Pedal, Cutting Height Adjustment Pin, and Deck Lift Lock Lever: These controls are used to adjust the cutting height of the mower deck.

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



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.






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.

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.



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.



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.



Hour Meter: This unit is equipped with an hour meter that records the number of hours that the engine has been run.

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:

Symbols	Control Name
	Transmission Release Levers

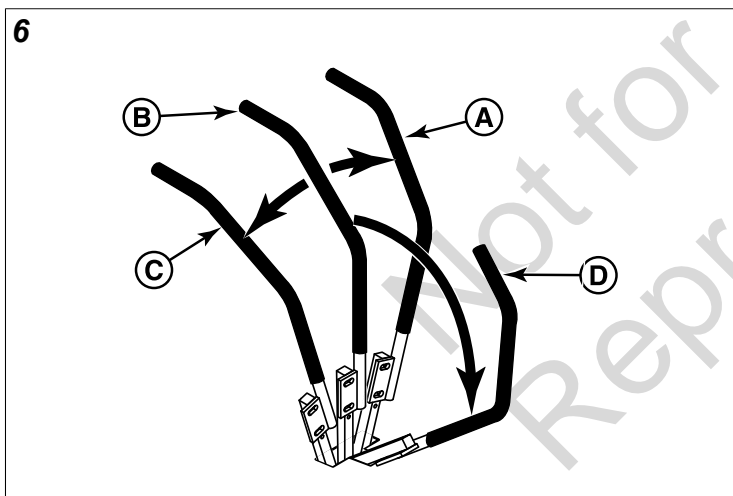
Each transmission is equipped with a transmission release lever. These lever deactivate the transmissions so that the unit can be pushed by hand. Both transmission release levers must be in the same position whether you are driving the unit or pushing it by hand. See *Pushing the Unit by Hand* for operational information and control location.



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

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

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.



	N	
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.

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.



Headlight: The headlight is controlled by the key switch. When the key switch is turned to the RUN position the headlight is on. When the the key switch is turned to the OFF position the headlight is off.



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

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 Riding Mower Driving Practice

Before attempting to drive the zero-turn riding mower make sure you have read the FEATURES AND CONTROLS section and understand the location and function of all the unit's controls.

The ground speed control levers of the zero-turn riding mower are responsive and learning to gain a smooth and efficient control of the unit's forward, reverse, and turning movements will take some practice.

Before you begin mowing, spend some time going through the maneuvers shown in this manual and become familiar with how the unit accelerates, travels, and steers.

Locate a smooth, flat area of your lawn 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.

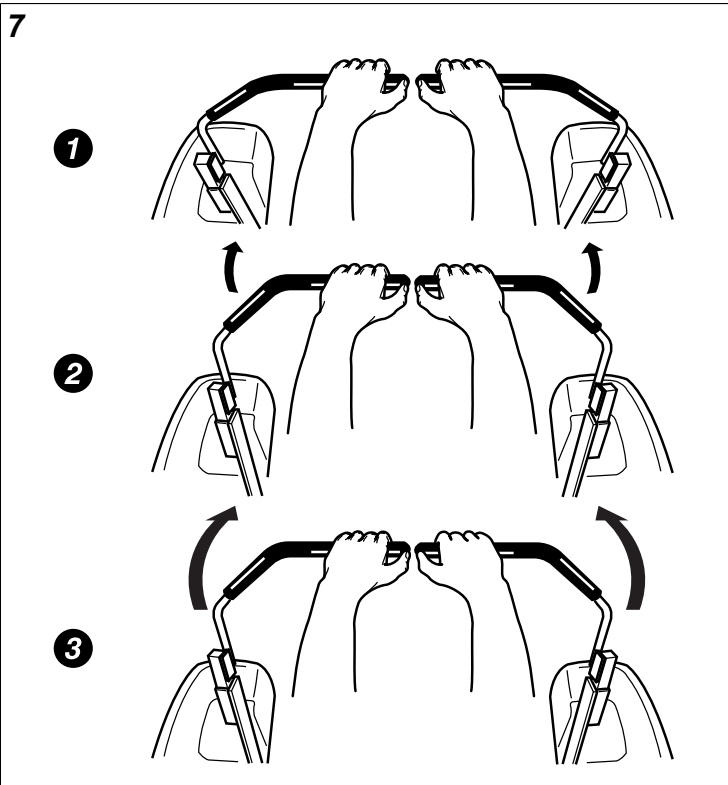
We suggest you begin with the *Smooth Travel* procedure, and then advance through the forward, reverse, and turning maneuvers.

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

Smooth Travel

The ground speed control levers of the zero-turn riding mower are responsive.

The BEST method of handling the ground speed control levers is in three steps — as shown in Figure 7.

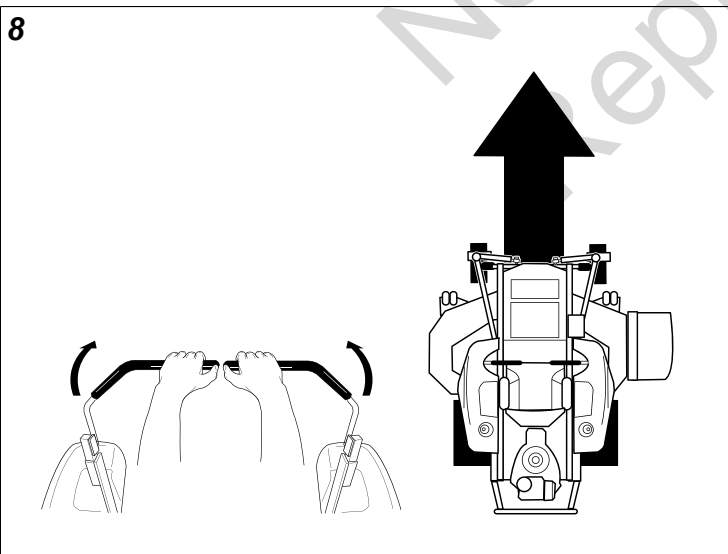


FIRST, place your hands onto the levers as shown.

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.

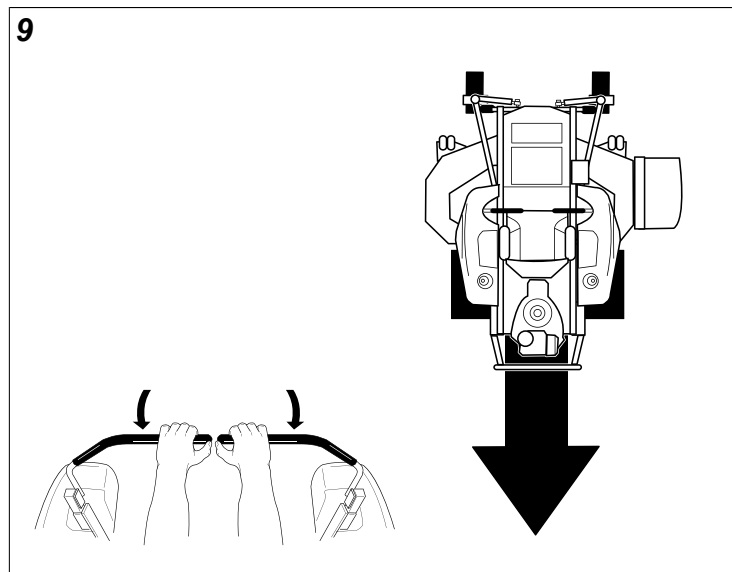
Basic Driving Forward Travel Practice



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 MAINTENANCE PROCEDURES section of this manual.

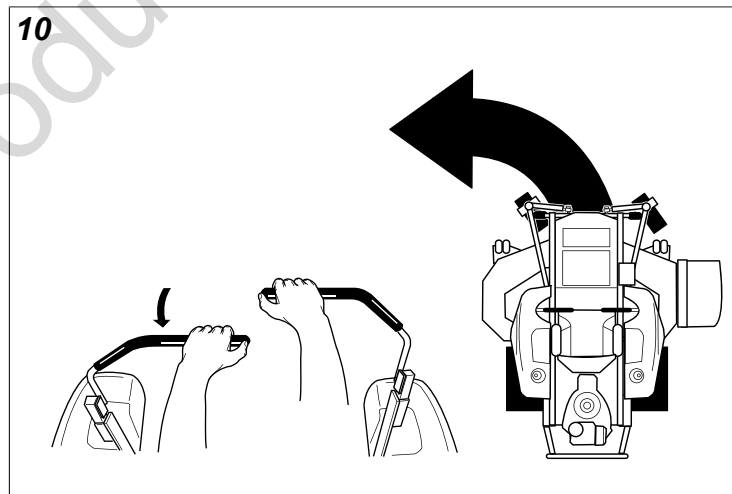
Reverse Travel Practice



LOOK DOWN AND 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 zero-turn riding mower turns sharply in reverse as well as forward, and backing up straight takes practice.

Practice Turning Around A Corner

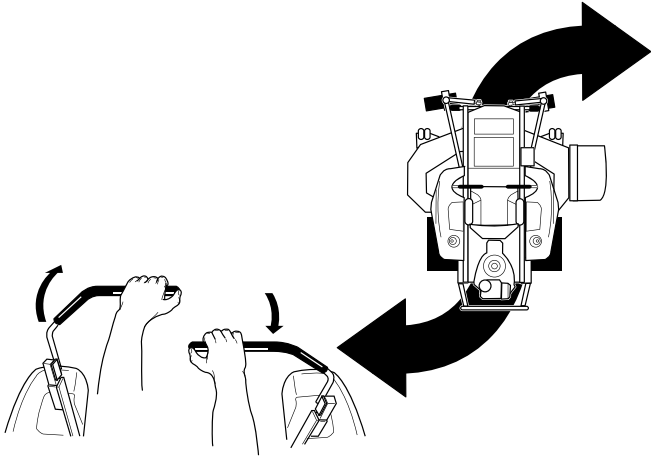


While traveling forward allow one ground speed control lever to gradually return back toward neutral. Repeat several times.

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

11



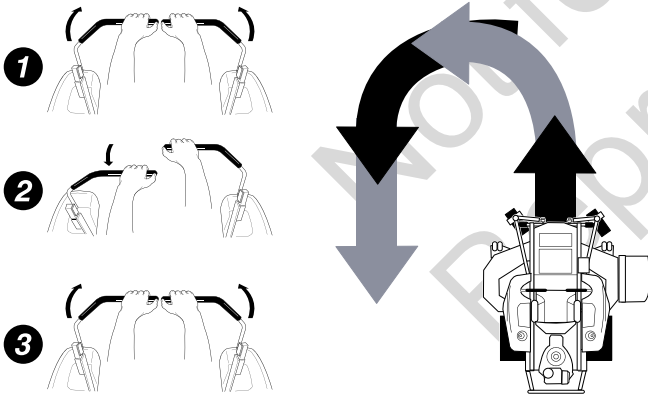
To turn in place, “zero-turn,” gradually move one ground speed control lever forward from neutral and the other lever back from neutral simultaneously. Repeat several times.

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

Advanced Driving

Executing an End-Of-Row Zero-Turn

12



Your zero-turn riding mower'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 unit LEFT and slightly overlaps the row just cut — eliminating the need to back up and re-cut missed grass.

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

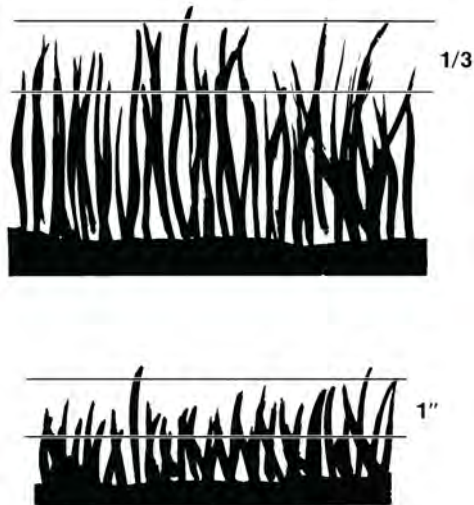
Often cutting height is a matter of personal preference. Typically, you should mow the grass when it is between three and five inches high. The proper cutting height range for a specific lawn will depend upon several factors, including the type of grass, the amount of rainfall, the prevailing temperature,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

13

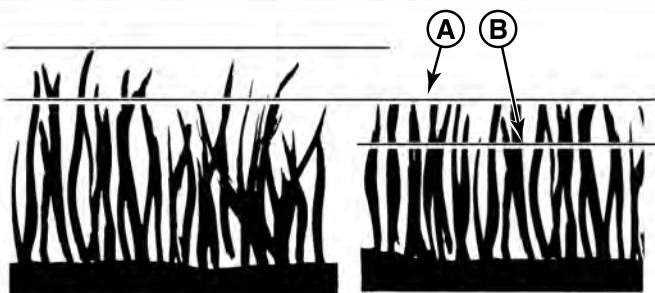


The amount of grass you are able to cut in one pass is also effected by the type of mowing system you are using (for example, broadcasting with side discharge decks can process a much larger volume of grass than mulching does).

Tall grass requires incremental cutting. For extremely tall grass, set the cutting height at maximum for the first pass (A, Figure 14), 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.

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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.

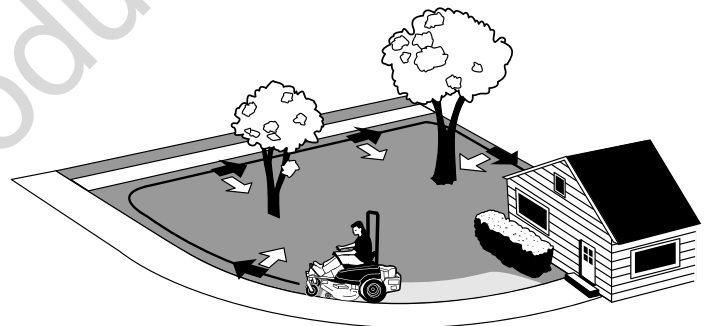
The size and type of area to be mowed will determine the best mowing pattern to use. Obstructions such as trees, fences and buildings, and conditions such as slopes and grades must also be considered.

- 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.

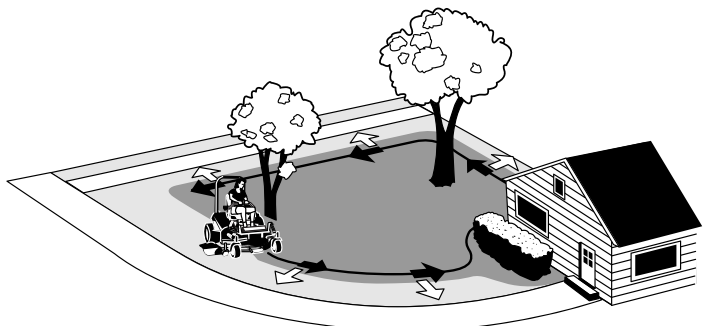
If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems. Use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual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

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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.

16



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 Unit By Hand



WARNING

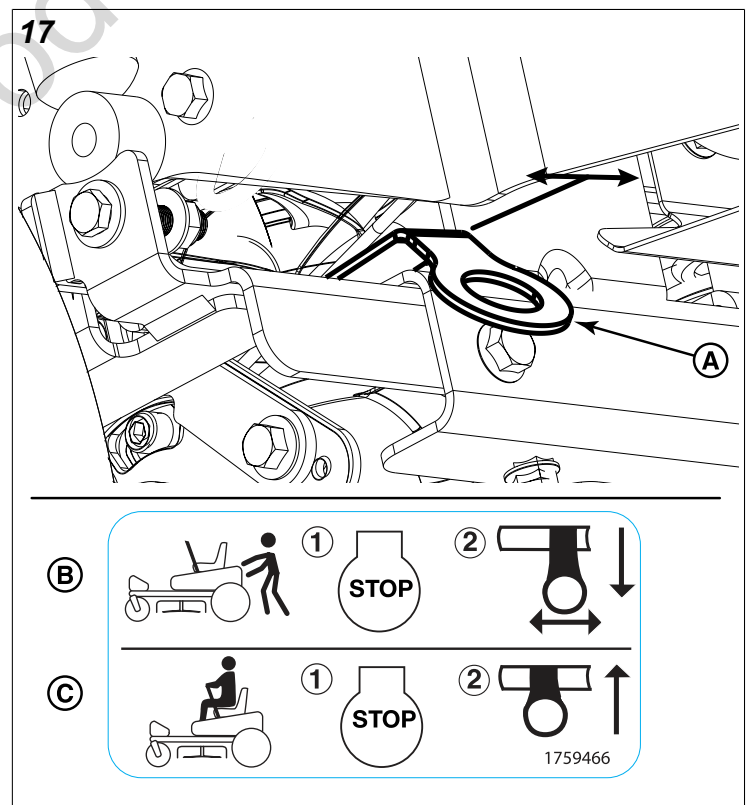
Unsafe Operation Hazard.

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

NOTICE

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

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 17) on the rear of the unit 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 unit and then towards the center of the unit. Repeat this process for the other side of the unit.

4. Disengage the parking brake. The unit can now be pushed by hand.
5. After moving the unit, close the bypass valve (run position) (C) by pulling out towards the side of the unit and then push forward. Repeat this process for the other side of the unit.

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

Attaching a Trailer

Secure the trailer with an appropriately sized clevis pin (A, Figure 18) and clip (B). See OPERATOR SAFETY for additional safety information regarding towed equipment and towing.



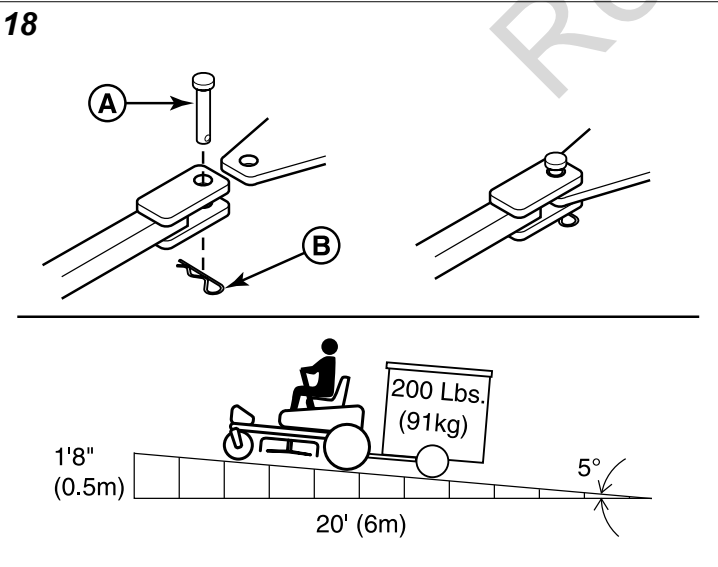
WARNING

Towing Hazard

Towed loads can be hazardous and cause loss of control 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 with towed equipment.

- The maximum gross (trailer & load) weight of the trailer should not exceed 200 lbs (91 kg).
- The maximum tongue weight should not exceed 20 lbs (9,1 kg).
- Do not operate on slope exceeding 5 degrees.
- Reduce speed and use extreme caution on slopes.
- Do not tow with a grass bagger attached.



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°.

Storage



WARNING



Fuel and its vapors are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

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

Temporary Storage (30 Days or Less):

Remember, the fuel tank will still contain some gasoline, 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.

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

- 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 opening is protected from foreign objects with a suitable cover.
- If the unit can't be stored on a reasonable 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 Maintenance and Storage instructions in the Safety Rules section, then perform the following steps:

- Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when unit is used again.
- Prepare the mower deck for storage as follows:
 1. Remove mower deck from the unit.
 2. Clean underside of mower deck.
 3. Coat all bare metal surfaces with paint or light coat of oil to prevent rusting.
- Clean external surfaces and engine.
- Prepare engine for storage. See engine operator's manual.
- Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.

- Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt and insects.
- Completely grease and oil unit as outlined in the Lubrication section.
- Clean up unit and apply paint or rust preventative to any areas where paint is chipped or damaged.

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.

ZERO-TURN RIDER AND MOWER
Every 8 Hours or Daily. *
Check the safety interlock system.
Clean debris off rider and mower deck. **
Every 25 Hours or Annually. *
Check mower blade stopping time.
Check rider and mower for loose hardware.
Check tire pressure.
Every 50 Hours or Annually. *
Check rider brakes.
Clean battery and cables.
After First 100 Hours of Operation
See dealer for initial change of hydraulic oil.
Every 400 Hours
See dealer for hydraulic oil and filter change.
See Dealer Annually to:
Lubricate rider and mower. **
Check / Adjust belt tensions.
Check the mower blades. **

* Whichever comes first.

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

ENGINE
Every 8 Hours or Daily. *
Check engine oil level.
Clean debris from engine compartment. **
Every 50 Hours or Annually. *
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.

* Whichever comes first.

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

*** If equipped. Replace if damaged.

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 in order to prevent accidental ignition.

Adding Fuel



WARNING



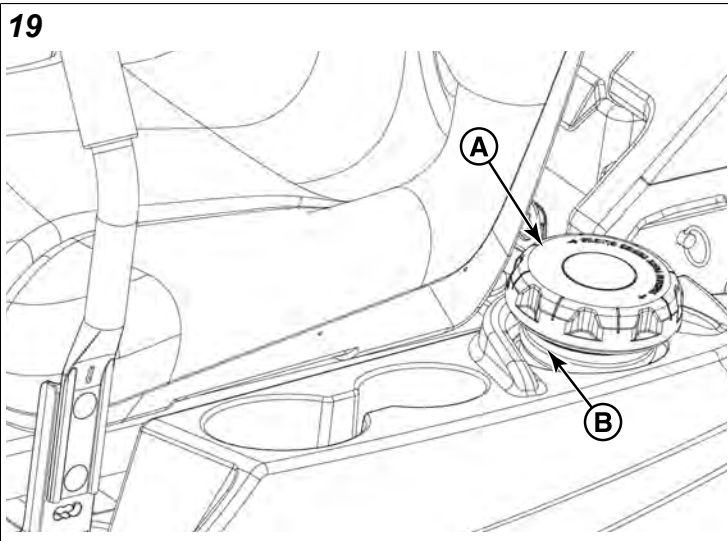
Fuel and its vapors are extremely flammable and explosive.

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.
 - Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
 - Fill fuel tank outdoors or in a 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, 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 19).
 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.

Maintenance Procedures



Replacing the Fuel Filter



WARNING

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.

Carbureted 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.

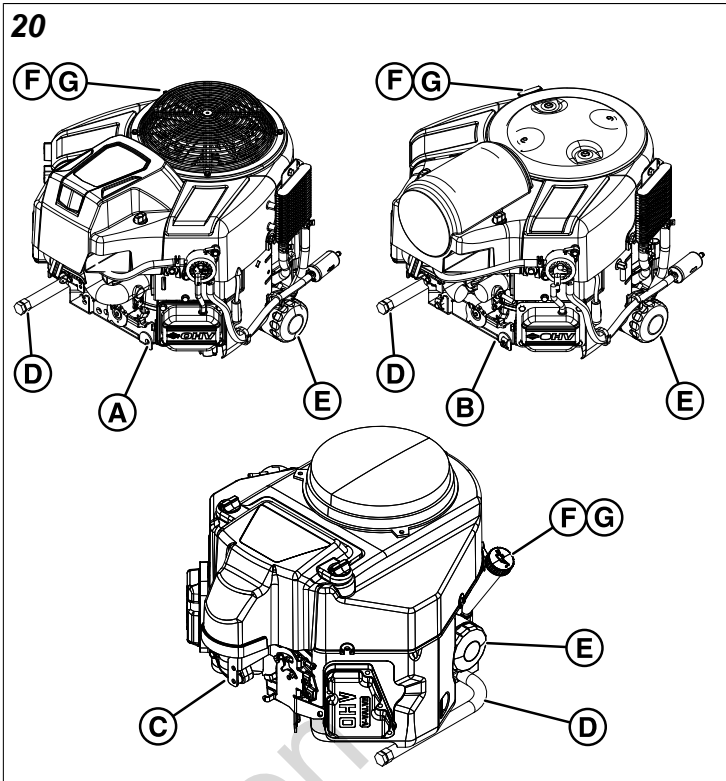
Check Engine Oil Level

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 has different engine options: Briggs & Stratton CXi (A, Figure 20), Briggs & Stratton Commercial Turf (B) and Kawasaki FR Series (C). Please reference figure 20 as the location of the components listed for this procedure may vary by specific engine option.



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

Clean the Engine Compartment Area with Pressurized Air and Water

Pressurized air and/or water can cause debris and/or hot water to be blown out. This action could result in personal injury.

When pressurized air and/or pressurized water is used for cleaning wear protective clothing, protective shoes, and eye protection. Eye protection includes goggles or a protective face shield.

The maximum air pressure for cleaning purposes must be below 205 kPa (30 psi). The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi).

Engine Maintenance

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

Containing Spilled Fluids and Proper Disposal of Waste

Make sure that fluids are contained when performing inspection, maintenance, testing, adjustment, and repair of the unit. Be prepared to collect the fluid with suitable leakproof containers before opening or disassembling any component containing fluids. Do not pour waste onto the ground, down a drain, or into any source of water.



Improper disposal of waste can threaten the environment. Dispose of all fluids according to local regulations and mandates.

Inspect Muffler and Spark Arrester

Inspect the muffler for cracks, corrosion, or other damage. Remove the spark arrester, 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 a replaceable fuse. See the chart below for the circuit, amperage, and approximate location of the fuses.

Circuit	Amperage	Approximate Location
Main	20 amp	Center of the unit and near the battery.

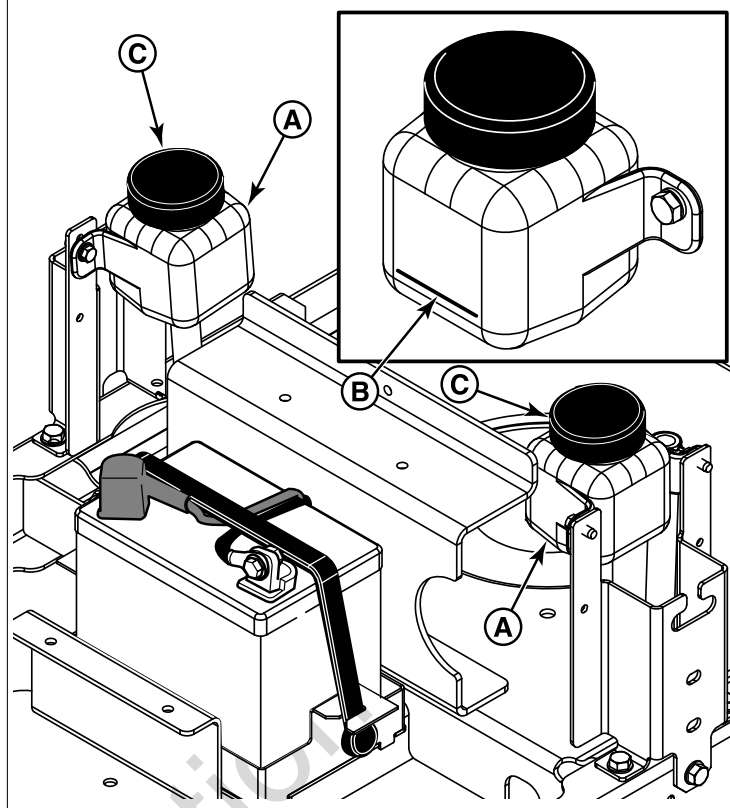
Check / Fill Transmission Oil Level

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.

1. Locate the transmission oil tanks (A, Figure 21).

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2. 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.
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.
4. Add oil up to the "FULL COLD" mark.
5. Reinstall the tank caps.
6. 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.

Purging the Air from the Hydraulic System

Due to the effects air has on efficiency in hydraulic drive systems, it is critical that it be purged from the system.

These purge procedures should be implemented any time a hydraulic system has been opened to facilitate maintenance or any additional oil has been added to the system.

The resulting symptoms of air in the hydraulic system may be:

- Noisy operation.
- Lack of power or drive after short term operation.
- High operation temperature and excessive expansion of oil.

Before starting, make sure the transaxles/transmissions are at the proper oil levels. If it is not, fill to the specifications outlined in the *Check / Fill Transmission Oil Level* procedure.

Purging Air from the Hydraulic System:

1. Chock the front wheels to prevent the unit from rolling. Raise the rear of the unit so that the unit's rear tires do not contact the ground. Position jack stands under the rear bumper of the unit to secure it.
2. Open the transaxle's bypass valves (see *Pushing the Unit by Hand* for the location and function of the bypass valves), start the engine, release the parking brake, and slowly move the unit's ground speed control levers in both forward and reverse directions (5 to 6 times), as air is purged from the unit, the oil level will drop.
3. Stop the engine and engage the parking brake.
4. Close the transaxle's bypass valves, start the engine, release the parking brake, and slowly move the unit's ground speed control levers in both forward and reverse directions (5 to 6 times), as air is purged from the unit, the oil level will drop.
5. Stop the engine. Remove the jack stands from underneath the unit.
6. Repeat the process detailed above but with the unit's drive wheels on the ground. The procedure should be performed in an area free of any objects or bystanders.

It may be necessary to repeat the process detailed above until all the air is completely purged from the system. When the transaxles/transmissions operate at normal noise levels and move smoothly forward and reverse at normal speeds, then the transaxles/transmissions are considered purged.

Lubrication

Lubricate the unit at the location shown in the following figures as well as the lubrication points listed below.

Grease:



- Mower deck spindles (A, Figure 22) / Quantity: 3.
- Mower deck idler arm (A, Figures 23, 24, & 25) / Quantity: 1.
- Rear transmission cradle pivots (A, Figure 26) / Quantity: 2.
- Front caster wheel axles (A, Figure 27) / Quantity: 2.

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

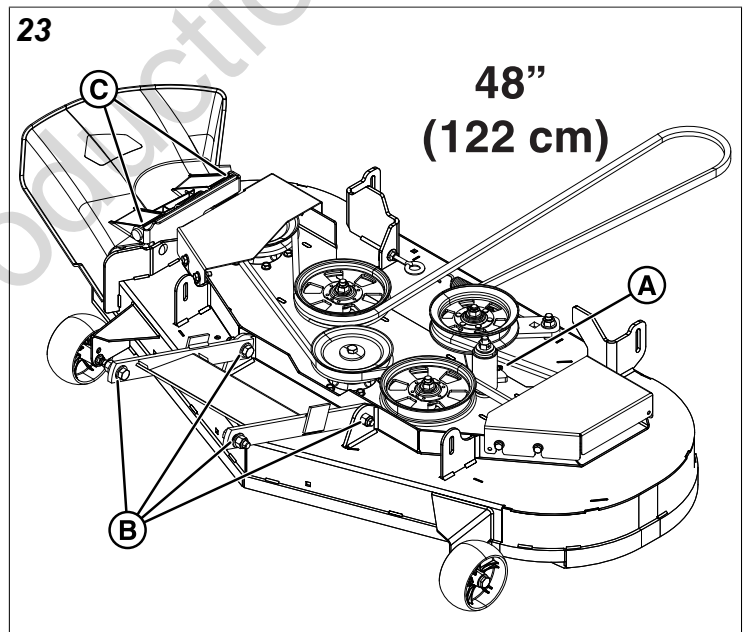
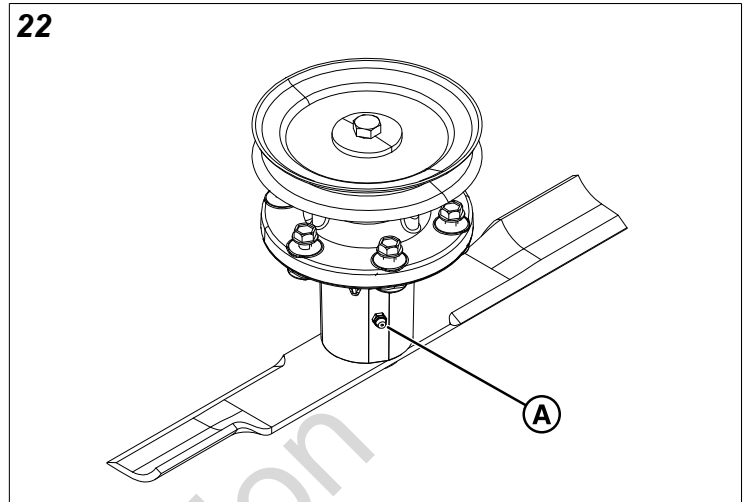
Not all greases are compatible. Your product is manufactured using Heavy Duty Lithium Complex EP, NLGI grade 2 grease (p/n 5109902X1). It is recommended that you service your product with similar grease. 5109902X1 is available through your normal part source. Using non-compatible grease could damage or cause premature parts failures.

Oil:

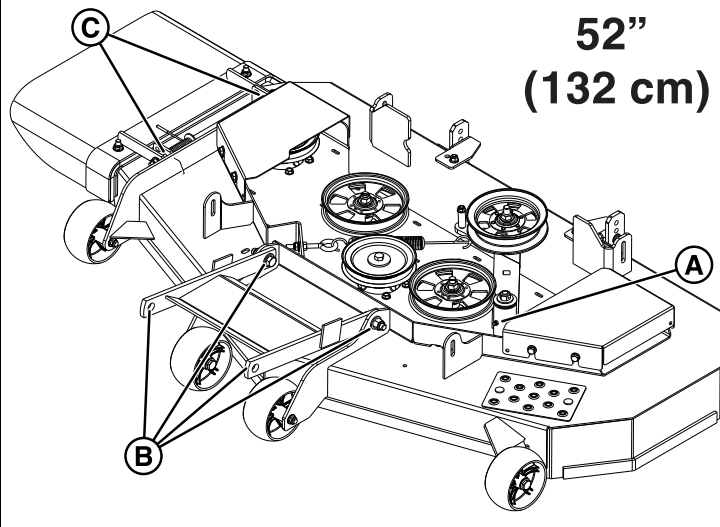


- Deck lift linkage pivots (B, Figures 23, 24, & 25).
- Discharge chute hinges (C, Figures 23, 24, & 25).

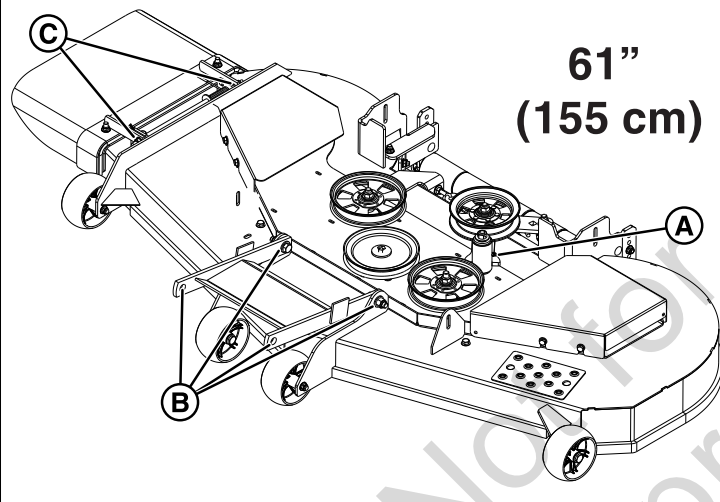
Generally, all moving metal parts should be oiled where contact is made with other parts. Keep oil and grease off belts and pulleys. Remember to wipe fittings and surfaces clean both before and after lubrication.



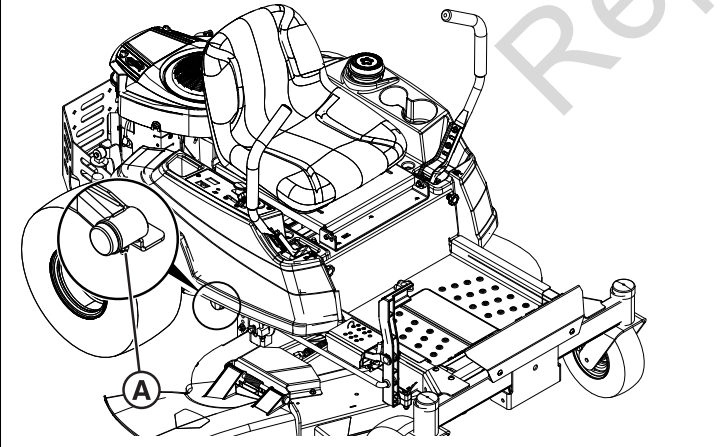
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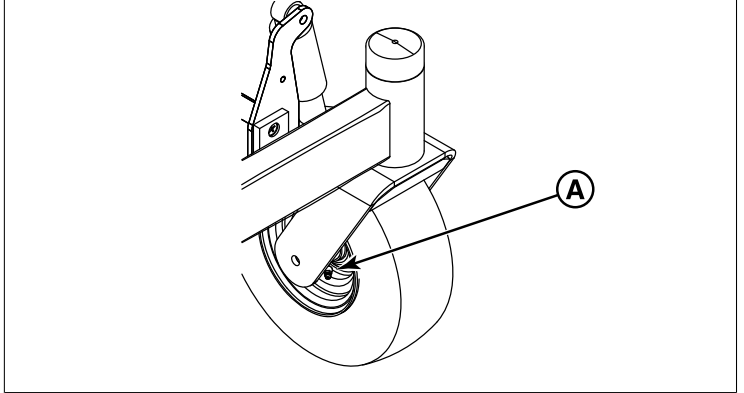
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26



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Servicing the Mower Blades

Removing the Mower Blades

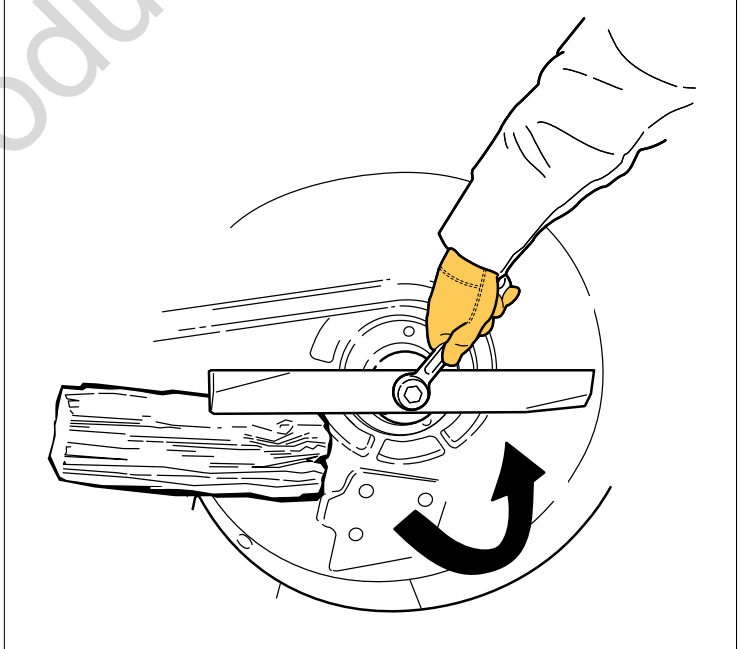
CAUTION

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 28.

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

Inspecting, Sharpening, and Balancing the Mower Blades



CAUTION Laceration hazard.

Mower blades are sharp.

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

1. Remove the mower blade from the unit. See *Removing the Mower Blades*.
2. Clean the blade to remove any dried grass or other debris.

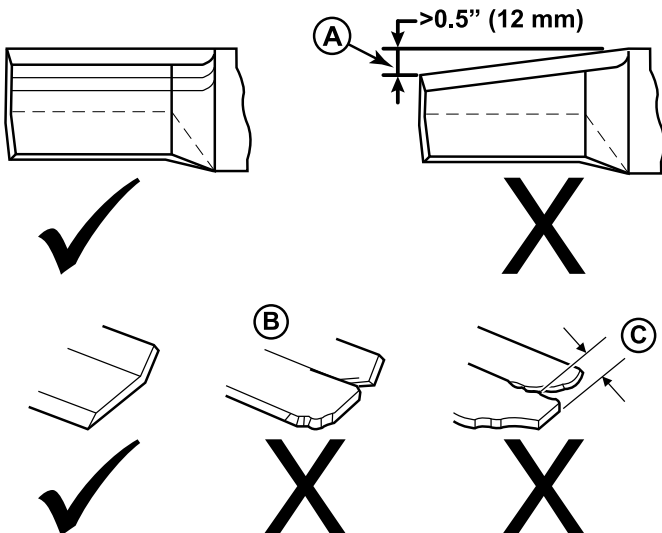


DANGER Thrown objects hazard

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.
3. Inspect the mower blade (Figure 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).
 - The air lifts are excessively eroded (B) and the notch (C) is .25" (6,35 mm) deep or greater.
 - The mower blade is broken or bent.

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4. If the cutting edges are not sharp or have nicks, sharpen the blades.



WARNING Thrown objects and fire hazard

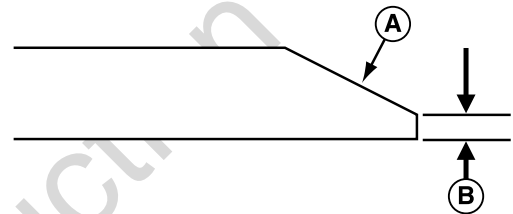
Grinding mower blades throws sparks and fine metal particles that are capable of igniting gasoline and gasoline vapors, and that can injure unprotected eyes.

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

Always wear safety glasses or goggles when grinding mower blades.

5. Use a grinder, hand file, or electric blade sharpener to sharpen the mower blades by removing an equal amount of material from the cutting edge of each end of the blade.
6. Keep the original bevel (A, Figure 30) when grinding. DO NOT change the mower blade bevel.

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



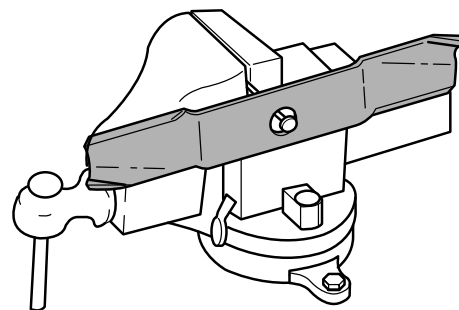
CAUTION Thrown objects hazard.

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.

8. 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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9. 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.
10. Repeat the process until the mower blade remains in the horizontal, level position.

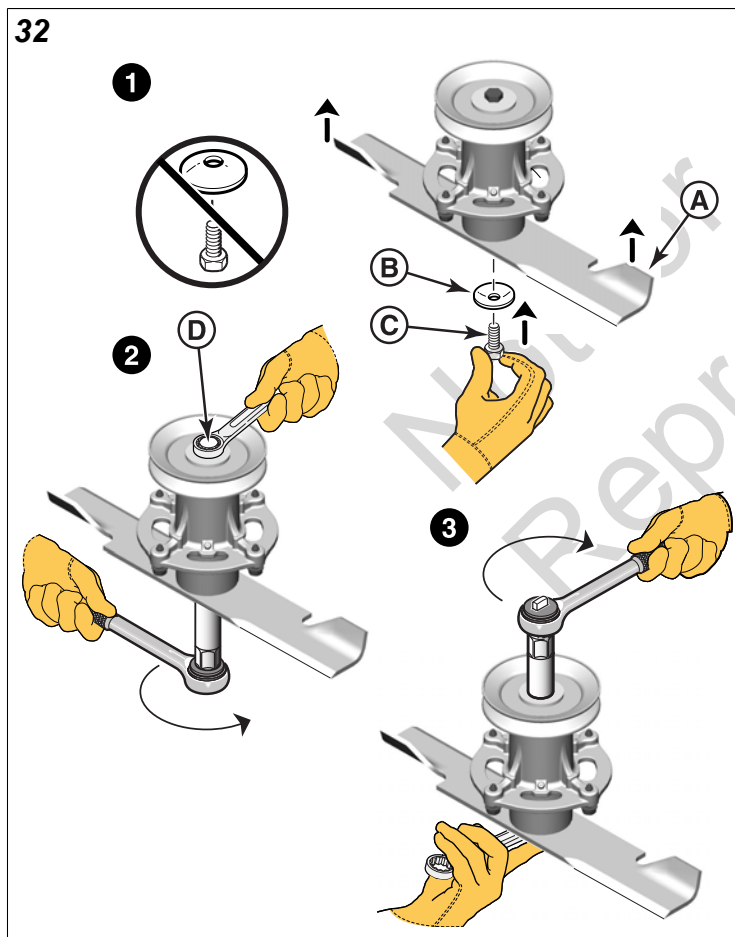
Installing Mower Blades

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).



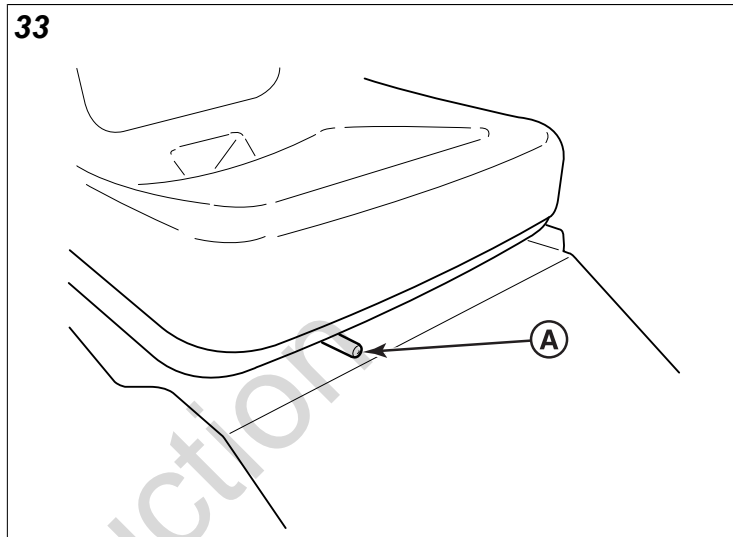
2. Tighten the blade mounting bolt to 50 - 60 ft. lbs. (68 - 81 Nm) of torque while holding onto the pulley bolt (D) with a wrench.
3. Tighten the pulley bolt to 50 - 60 ft. lbs. (68 - 81 Nm) of torque while holding onto the blade mounting bolt with a wrench.

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.

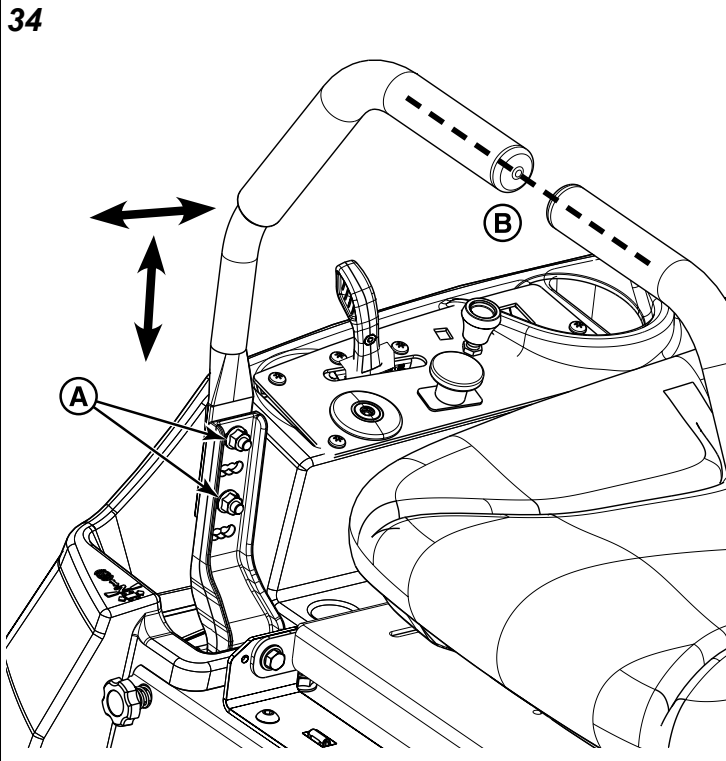
Seat Adjustment

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.



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).



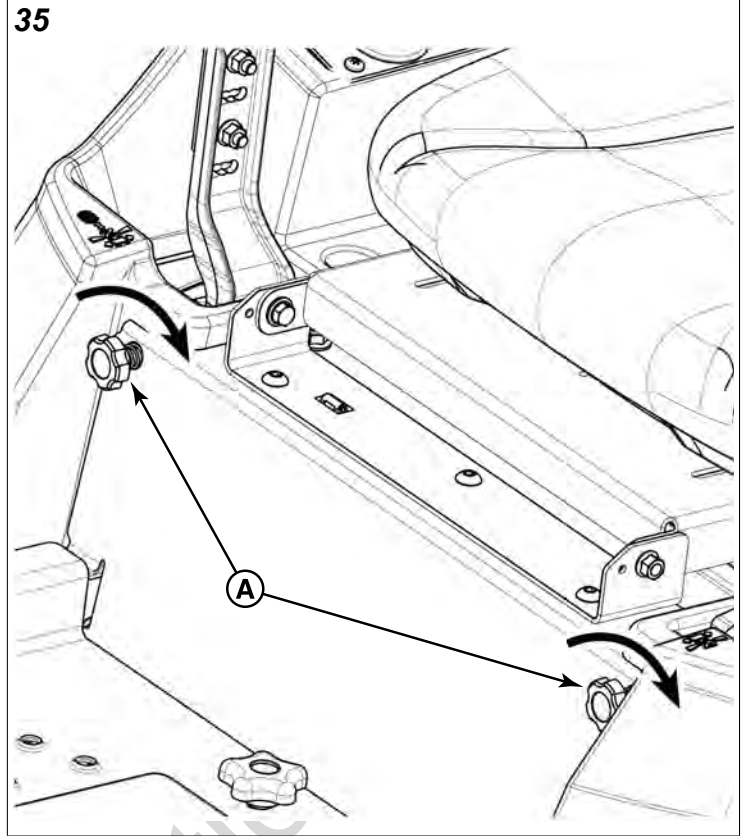
Speed Balancing (Tracking) Adjustment

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.

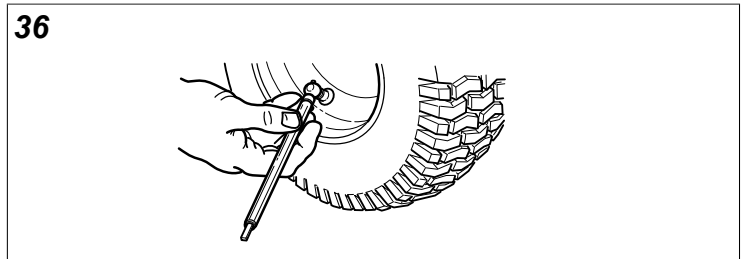
WARNING

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.

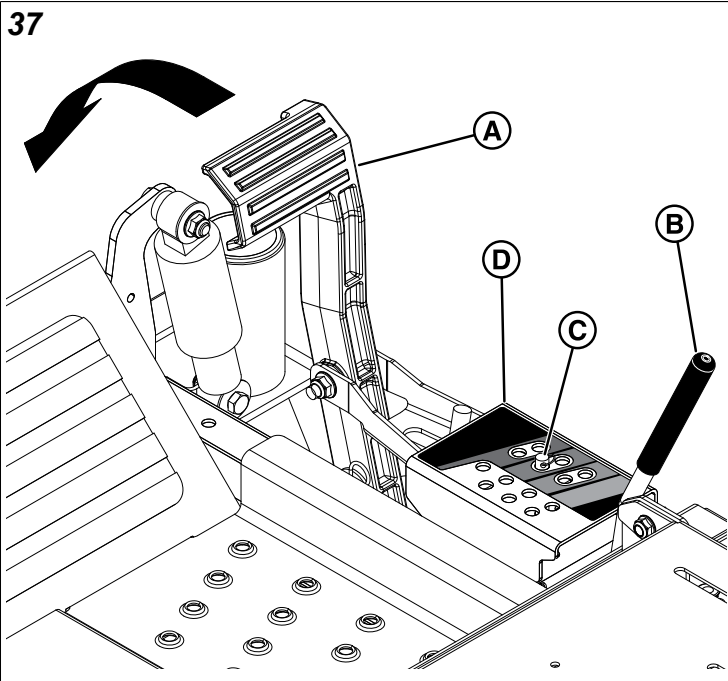


Cutting Height Adjustment

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.

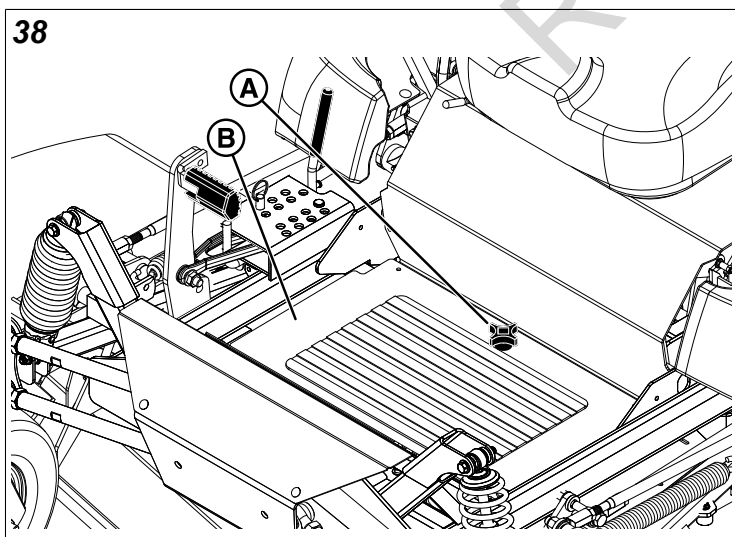
Note: Make sure the pin is inserted into the holes in both upper and lower plates of the adjustment bracket (D).

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.

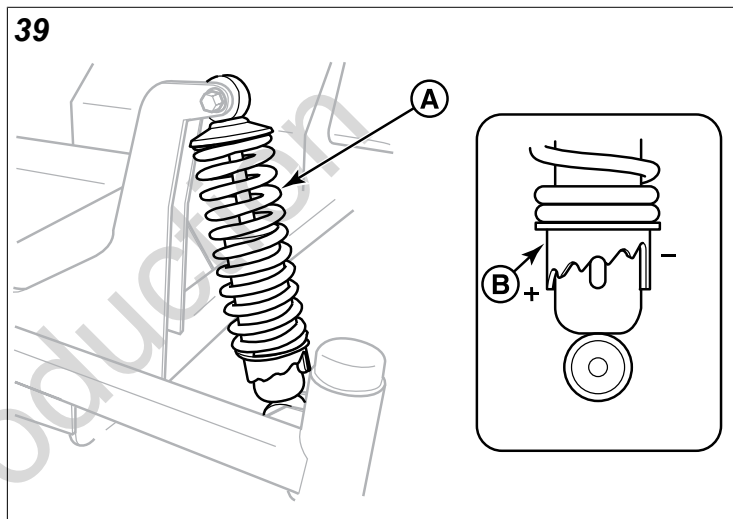
Neutral Adjustment

The neutral system for this unit is a function of the transaxles.

1. Drive the unit to a flat, level surface. Engage the parking brake and disengage the PTO.
2. Without touching the ground speed control levers disengage the parking brake. If the unit moves, the neutral systems on the transaxles are not correctly adjusted. See your authorized Ferris® servicing dealer.

Suspension Adjustment

The shock assemblies (A, Figure 39 - 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.



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:

1. Park unit on a flat, level surface. Disengage the PTO, pivot the ground speed control levers out to the NEUTRAL position, and stop the engine.
2. Turn the pre-load adjustment collar (B, Figure 39) with your hand to a higher notch (-) to decrease the pre-load, or to a lower notch (+) to increase the pre-load.

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.

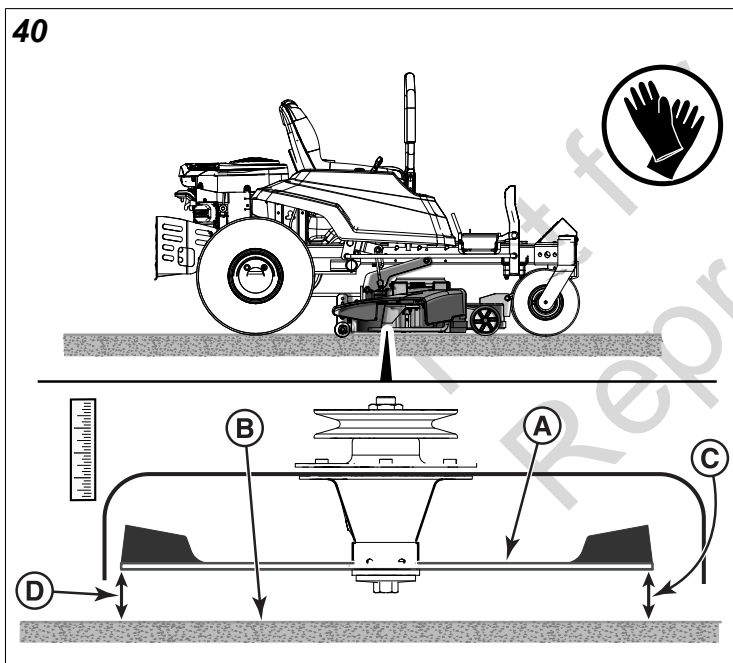
Deck Leveling Adjustment



WARNING

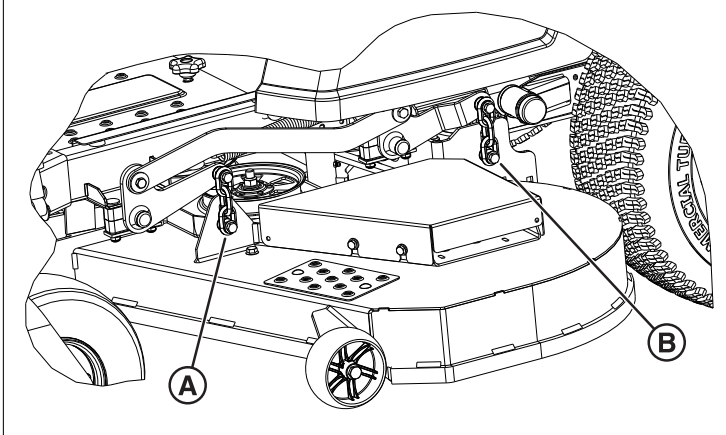
Wear heavy gloves when handling or working around cutting blades. Blades are extremely sharp and can cause severe injury.

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.
2. Set the mower deck to the 4" (10,2 cm) cutting height.
3. Turn the front caster wheels so that they are facing front-to-back.
4. Verify that the tires pressures are correct.
 - Front: 22 psi (1,72 bar)
 - Rear: 12 psi (0,83 bar)
5. Verify that the mower blades are flat, and not bent or broken. A bent or broken blade must be replaced.
6. Position the two outside mower blades so that they are facing front-to-back.
7. Measure the distance between the outside tips of the blades (A, Figure 40) and the ground (B).



- The front measurements (C) should equal 4" (10,2 cm).
 - The rear measurements (D) should equal 4-1/4" (10,8 cm).
8. If the measurements do not equal the measurements as listed above, adjust the deck leveling.
 9. Place 3-1/2" of blocking under each corner of the mower deck. Place a 1/4" (0,64 cm) thick spacer on top of the rear blocks.
 10. Loosen the nuts (A, Figure 41) and allow the front of the deck to rest on the blocking. Slide the chains in the slots until the chains are tight and tighten the nuts.

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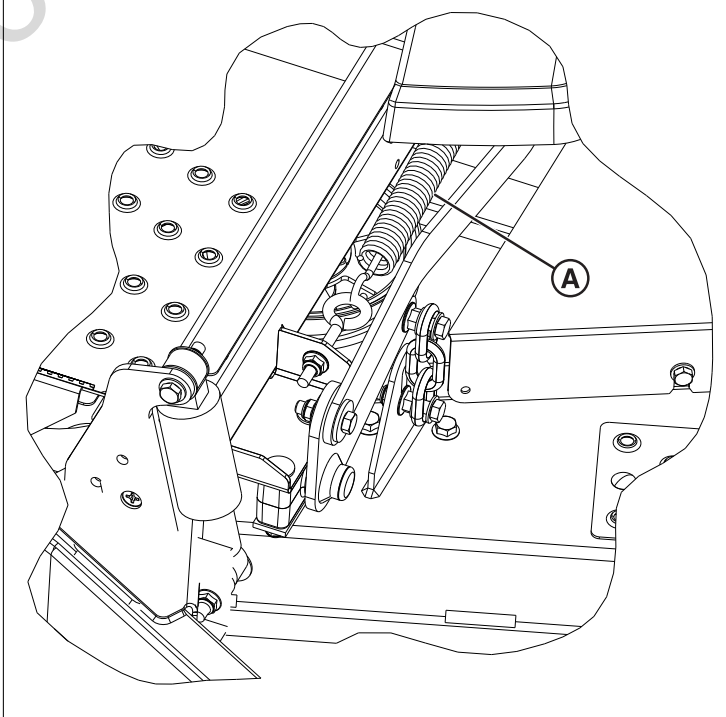


11. Loosen the nuts (B) and allow the rear of the deck to rest on the blocking and 1/4" spacers. Slide the chains in the slots until the chains are tight and tighten the nuts.
12. Repeat the process for the other side of the unit.
13. Remove all blocks and spacers from under the mower deck.
14. Verify that all four measurements are correct.

Deck Lift Assist Spring

Models are equipped with a deck lift assist spring (A, Figure 42) that assists the operator in raising the mower deck with the deck lift pedal. The deck lift assist spring is factory set to provide optimal lifting performance.

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Although it is fastened with a multi-position anchor, this is **not an adjustment point**.

NOTICE Do NOT attempt to adjust the spring length or lifting performance will be compromised.

Mower Deck Drive Belt Replacement

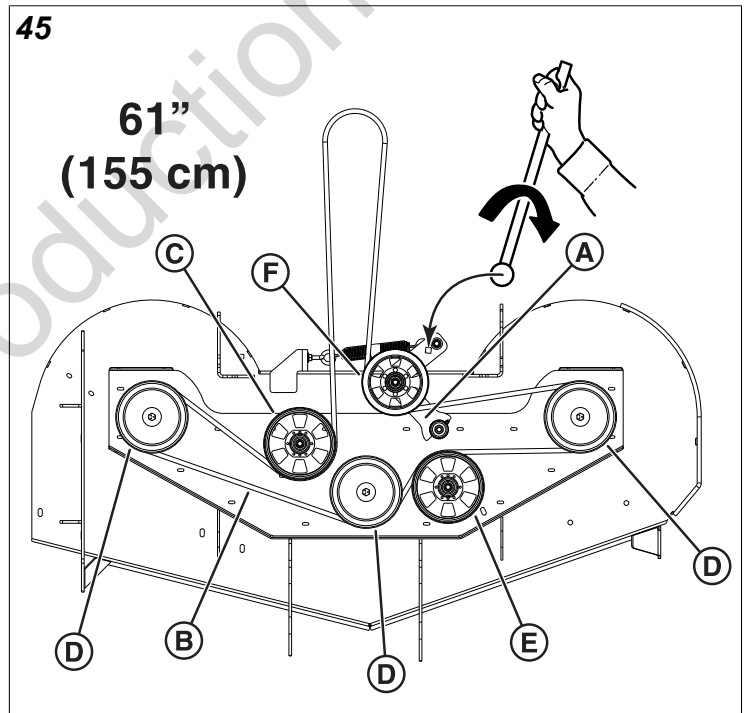
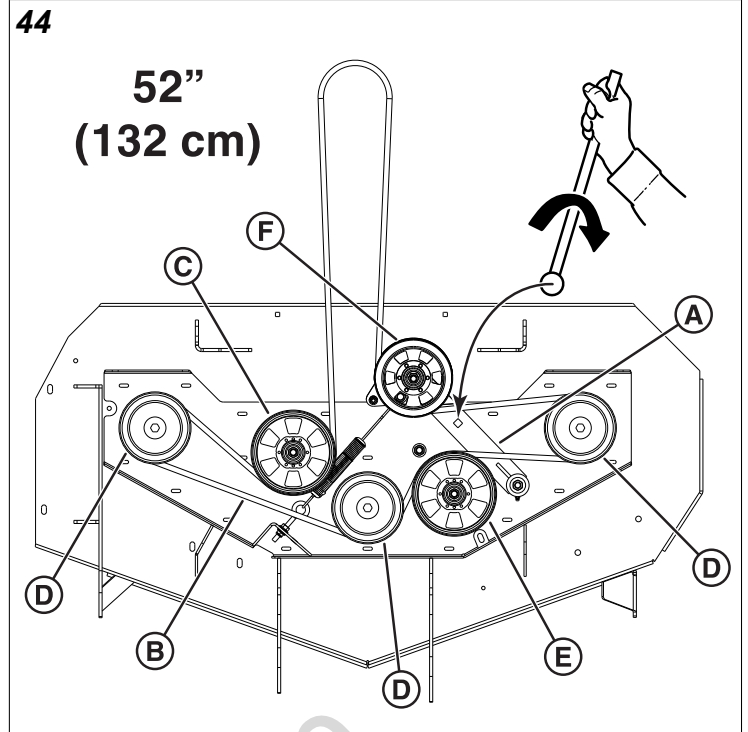
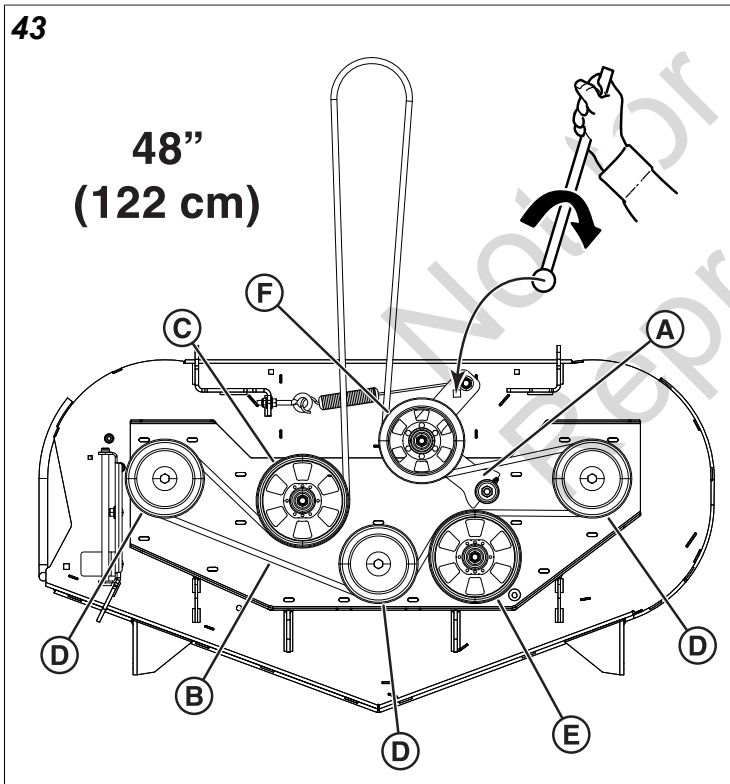
NOTICE To avoid damaging belt, do not pry over pulleys

1. Park the mower on a flat, level surface, such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the ignition, and remove the key.
2. Lift the deck to the TRANSPORT position. Remove the mower deck guards and floor pan to gain access to the mower deck drive belt.

WARNING

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

3. Using a 1/2" breaker bar, place the square end in the square hole located in the idler arm (A, Figures 43, 44 & 45). Carefully rotate the breaker bar **clockwise**, which will relieve the tension on the belt exerted from the idler arm.



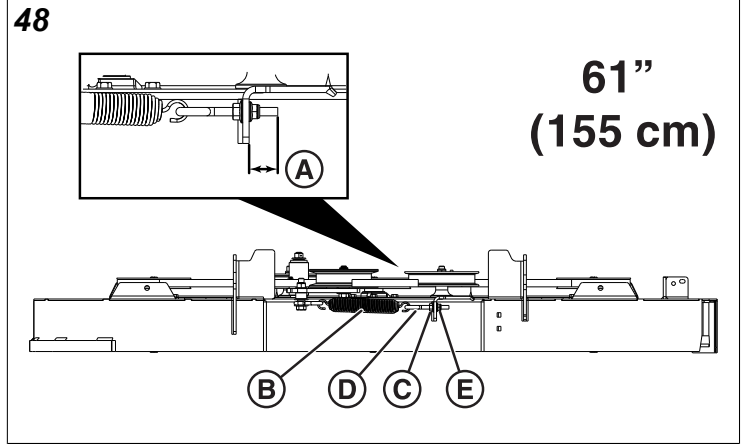
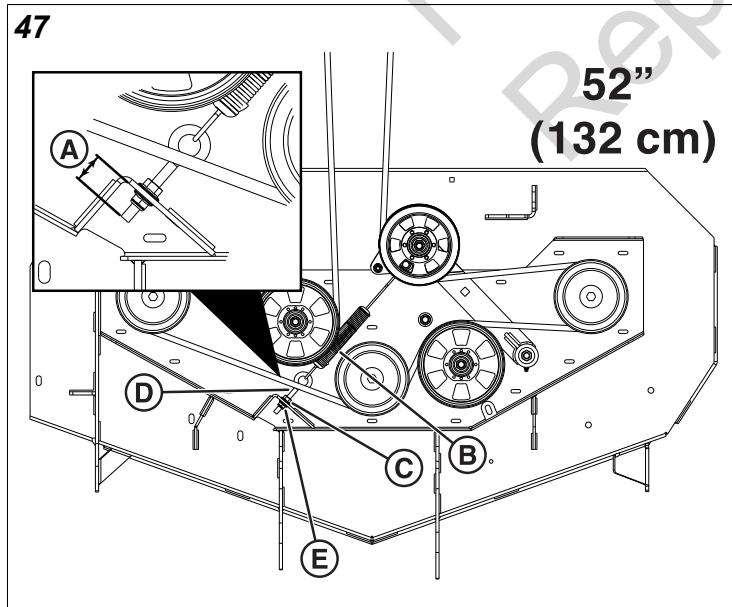
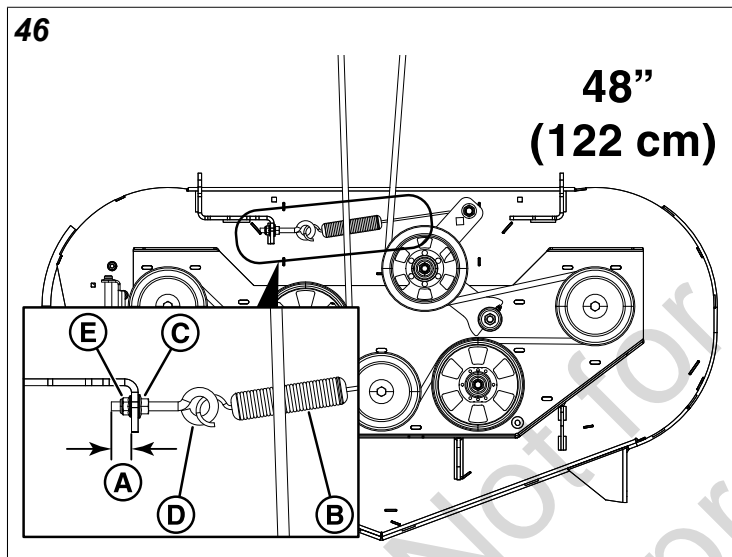
4. Slide the drive belt (B) over the edge of the rear stationary idler pulley (C). Carefully release the tension on the breaker bar.
5. Remove the old belt and replace with a new one. Make sure that the V-side of the belt runs in the spindle pulley (D) grooves.
6. Install the drive belt on the PTO pulley, the spindle pulleys (D), the front stationary idler pulley(s) (E), and the adjustable idler pulley (F). Carefully rotate the breaker bar clockwise and install the belt on the rear stationary idler pulley (C).

- Carefully release the tension on the breaker bar.

Check / Adjust the Mower Deck Drive Belt Tensioning Spring

Mower Deck Drive Belt Tensioning Spring Setting	
Deck Size	Measurement
48" (122 cm) Mower Deck	3/4" (1,9 cm)
52" (132 cm) Mower Deck	3/4" (1,9 cm)
61" (155 cm) Mower Deck	1/2" (1,3 cm)

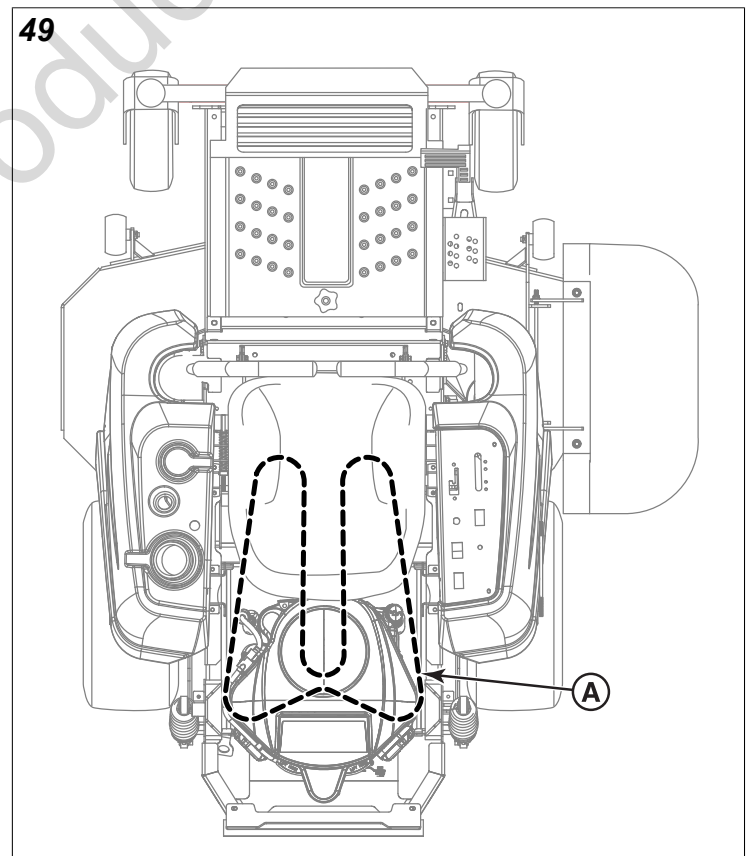
- Set the mower deck to its middle cutting position.
- Use the *Mower Deck Drive Belt Tensioning Spring Setting* chart to determine the correct spring setting for your unit.
- Measure the distance (A, Figures 46, 47, and 48) between the threaded end of the eye-bolt to the next wall. The measurement should equal the measurement as indicated in the chart. If not, continue with step #4.



- Loosen the jam nut (C) on the eyebolt (D).
- Turn the adjustment nut (E) until the measurement as indicated in the chart is achieved.
- Tighten the jam nut.
- Install the mower deck guards and the floor pan.
- Run the mower 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 49) that is located under the engine deck of the unit.



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 49) 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.

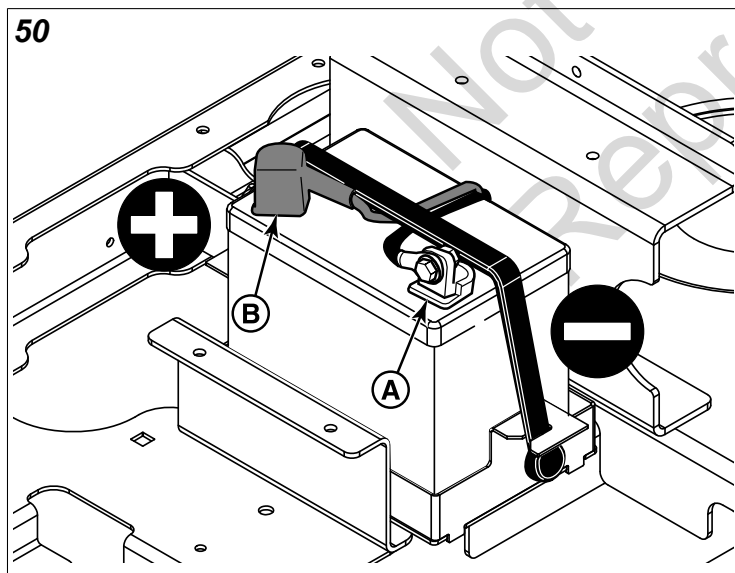


Keep open flames and sparks away from the battery.

- 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 50).



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

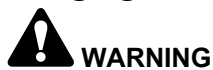
Keep open flames and sparks away from the battery; the gasses coming from it are highly explosive. Ventilate the battery well during charging.

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 The Battery



WARNING

Explosion and Fire Hazard

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

A dead battery or one too weak to start the engine may be the result of a defect in the charging system or other electrical component. If there is any doubt about the cause of the problem, see your dealer.

To charge the battery, follow the instructions provided by the battery charger manufacturer as well as all warnings included in the **Operator Safety** section of this manual. Charge the battery until fully charged. Do not charge at a rate higher than 10 amps.

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 the Zero-Turn Riding Mower

Problem: Engine will not turn over or start.	
Cause	Remedy
Parking brake is not engaged.	Engage the parking brake.
PTO (electric clutch) switch in ON position.	Place in OFF position.
Ground speed control levers are not in NEUTRAL LOCK position.	Move ground speed levers to the NEUTRAL LOCK position.
Out of fuel.	If engine is hot, allow it to cool, then fill the fuel tank.
Engine flooded.	Move choke control to the closed position.
Battery terminals require cleaning.	Clean the battery terminals.
Battery discharged or dead.	Recharge or replace.
Spark plug(s) faulty, fouled, or incorrectly gapped.	Clean and gap, or replace. See engine operator's manual.

Problem: Engine starts hard or runs poorly.	
Cause	Remedy
Fuel mixture too rich.	Clean air filter. Check choke adjustment. See engine operator's manual.
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. See engine operator's manual.
Using wrong grade oil.	See engine operator's manual.
Too much oil in crankcase.	Drain excess oil.

Problem: 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 or drives and handles poorly.	
Cause	Remedy
Transmission release lever(s) in "bypass" position.	Move transmission release lever(s) to the "drive" position.
Transmission drive belt or pulleys is greasy or oily.	Clean as required.
Steering lever linkages are loose.	Check and tighten any loose connections.
Improper tire inflation.	See <i>Checking Tire Pressures</i> .

Problem: Mower will not raise.	
Cause	Remedy
Mower will not raise.	See authorized Ferris® servicing dealer.

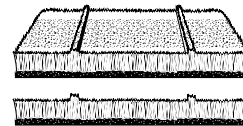
Problem: Engine stalls easily with mower engaged.	
Cause	Remedy
Engine speed too slow.	Set to full throttle.
Ground speed is too fast.	Decrease ground speed.
Cutting height set too low.	Cut tall grass at maximum cutting height during first pass.
Discharge chute jamming with cut grass.	Cut grass with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

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 <i>Servicing the Mower Blades</i> .
Belt installed incorrectly.	See authorized Ferris® servicing dealer.

For all other issues, see authorized dealer.

Troubleshooting Common Cutting Problems

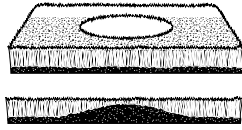
Problem: Striking	
Striking is when thin strips of uncut grass are left behind the mower. Striking is usually caused by operator error or poor blade maintenance.	



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

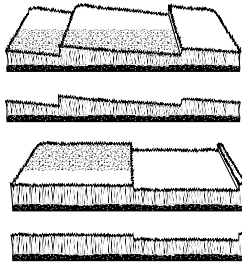
Scalping is when the mower deck comes close to or hits the ground. Scalping can be caused by the mower deck misadjustment, unevenness in the lawn, or by mower deck bouncing because the ground speed is too fast.



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

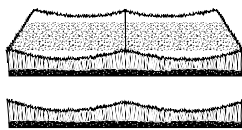
Stepped cutting is sharp ridges or uneven levels left in the lawn surface. Stepped cutting is usually caused by mower deck damage or misadjustment, or damage to the mower blades.



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

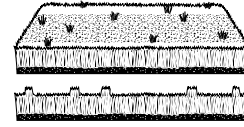
Uneven cutting is waviness or smooth troughs in the lawn surface. Uneven cutting is usually caused by mower deck damage or misadjustment.



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: 5902051, 5902052 & 5902053

Briggs & Stratton® Commerical Turf 44T977

Make	Briggs & Stratton
Model	44T977-0005-G1
Electrical System	12 volt, 16 amp. alternator; Battery: 230 CCA

Fits models: 5902101, 5902102, 5902103, 5902182 & 5902183

Briggs & Stratton® CXi 44T977

Make	Briggs & Stratton®
Model	44T977-0054-G1
Electrical System	12 volt, 16 amp. alternator; Battery: 230 CCA

Fits models: 5902056

Kawasaki® FR730V

Make	Kawasaki®
Model	FR730V-AS25-R
Electrical System	12 volt, 15 amp. charging coil; Battery: 230 CCA

CHASSIS

Fuel Tank Capacity	3 gallons (11,4 L)
Rear Wheels	
Tire Size - Models with 48" Mower Decks	22 X 10 - 10
Tire Size - Models with 52" Mower Decks	22 X 11 - 10
Tire Size - Models with 61" Mower Decks	22 X 11 - 10
Inflation Pressure	12 psi (0,83 bar)
Front Wheels	

Tire Size - All Models	13 X 6.5 - 6
Inflation Pressure	22 psi (1,72 bar)

TRANSMISSIONS

Fits models: 5902051 & 5902101

Make	Hydro-Gear®
LH Model	ZK-HPBB-UL7B-2XLX (84007619)
RH Model	ZK-LPBB-UL7C-3XLX (84007620)
Type	ZT-2800
Hydraulic Fluid	SAE 20W-50 motor oil
Speeds @ 3400	Forward: 0 - 8 mph (0 - 13 km/h) Reverse: 0 - 4 mph (0 - 6 km/h)

Fits models: 5902052, 5902053, 5902056, 5902102, 5902103, 5902183 & 5902182

Make	Hydro-Gear®
LH Model	ZL-HPHH-UL7B-2XLX (84008004)
RH Model	ZL-LPHH-UL7C-3XLX (84007997)
Type	ZT-3100® Transaxles
Hydraulic Fluid	SAE 20W-50 motor oil
Speeds @ 3400 rpm	Forward: 0-8.5 mph (0-13,7 km/h) Reverse: 0-4 mph (0-6,4 km/h)

DIMENSIONS

Models with 48" Mower Decks	
Overall Length	78-1/2" (199 cm)

Models with 48" Mower Decks	
Overall Width (with discharge chute up)	50" (127 cm)
Overall Width (with discharge chute down)	58" (147 cm)
Height	48" (122 cm)
Weight (approximate)	770 lbs (350 kg)

Models with 52" Mower Decks	
Overall Length	78-1/2" (199 cm)
Overall Width (with discharge chute up)	54" (137 cm)
Overall Width (with discharge chute down)	64" (163 cm)
Height	48" (122 cm)
Weight (approximate)	860 lbs (390 kg)

Models with 61" Mower Decks	
Overall Length	80" (203 cm)
Overall Width (with discharge chute up)	63" (160 cm)
Overall Width (with discharge chute down)	74" (188 cm)
Height	48" (122 cm)
Weight (approximate)	860 lbs (390 kg)

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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 (August 2021)

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		
Item	Consumer Use	Commercial Use
Equipment	3 years (36 months)	90 days (3 months)
Engine *	See Engine Operator's Manual.	See Engine Operator's Manual.
Battery (if equipped)	1 year (12 months)	1 year (12 months)

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

** In Australia, the following applies, notwithstanding any other provision: 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 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. Unless required under Australian Consumer Law, Ferris® shall not be liable under this Warranty to the Customer or any other person in connection with this Warranty, for consequential, direct or indirect damages, loss or costs incurred or suffered by the Customer or any other person; or any damage to property, loss of turnover, loss of profits, loss of business or loss of goodwill, arising out of the failure of any product to operate properly. 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 salesenquiries@briggsandstratton.com.au, Briggs & Stratton Australia Pty Ltd, 3 Imperata Pl, Kemps Creek, NSW, Australia, 2178.

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.

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Evaporative Emissions Warranty

For details on the Evaporative Emissions Control System Warranty, contact your Ferris® Authorized Service Dealer to start Evaporative Emissions Warranty service or refer to the Evaporative Emissions Control System Warranty statement located at ferrismowers.com. The warranty can be located by typing "Emissions Warranty" in the FAQ or by calling 1-800-444-7774. For Exhaust Emissions Control System Warranty related to the engine refer to the engine operator's manual.

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