

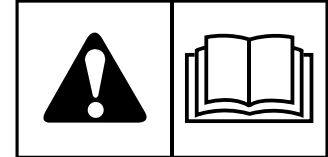


OPERATOR'S MANUAL

IS600Z Series

Zero-Turn Riding Mower

S/N: 4000036372 & Above



Model	Description	Model	Description
5901699	IS600ZB2544	5901906	IS600ZB2552
5901700	IS600ZB2552	5901907	IS600ZB2548
5901701	IS600ZB2548	5901908	IS600ZKAV1948
5901702	IS600ZKAV1948	5901911	IS600ZKAV2352
5901703	IS600ZKAV1952	5901915	IS600ZB2548 AUS
5901715	IS600ZB2548 CAL	5902109	IS600ZB2552
5901716	IS600ZB2552 CAL	5902110	IS600ZB2548
5901776	IS600ZKAV2352	5902112	IS600ZB2548 AUS
5901815	IS600ZKAV2352 CAL		

**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.

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

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.

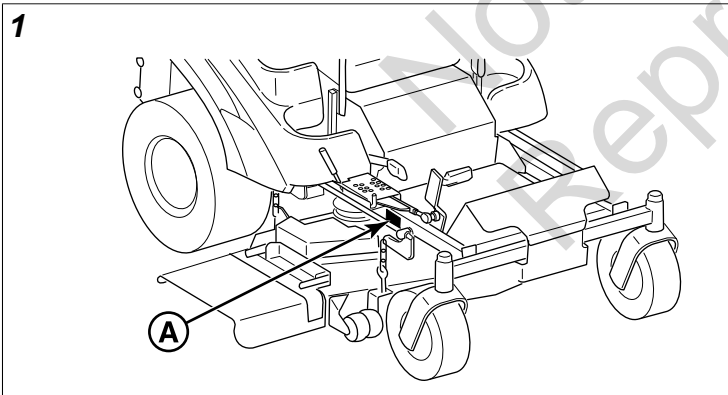
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Identifying Your Unit

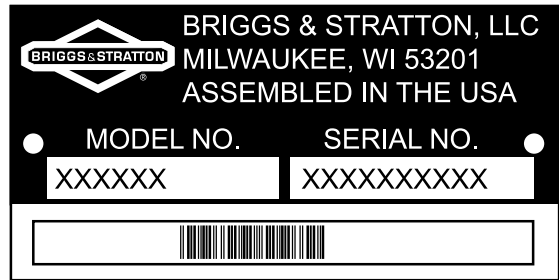
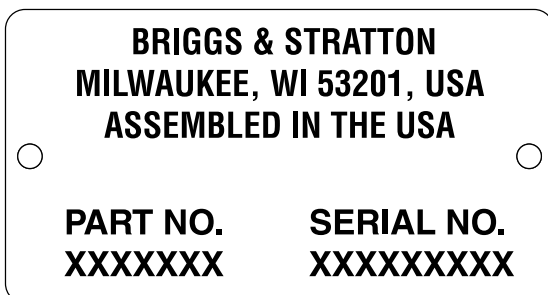
The following products are covered by this manual:

5901699, 5901700, 5901701, 5901702, 5901703, 5901715, 5901716, 5901776, 5901815, 5901906, 5901907, 5901908, 5901911, 5901915, 5902109, 5902110 & 5902112

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's 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



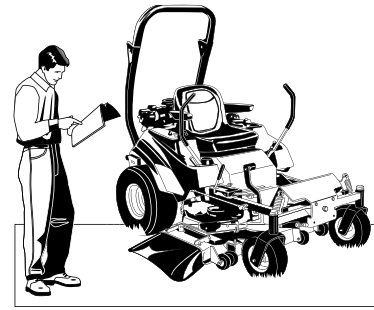
Congratulations on purchasing a superior-quality piece of lawn and garden equipment. Our products are designed and manufactured to meet or exceed all industry standards for safety.

Do not operate this machine unless you have been trained. Reading and understanding this operator's manual is a way to train yourself.

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

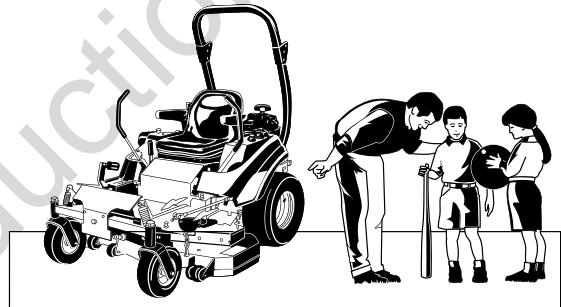


The operator's manual contains important safety information you need to be aware of **BEFORE** you operate your unit as well as **DURING** operation.

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.

Slope Operation



Operation on slopes can be dangerous. Using the unit on a slope that is too steep where you do not have adequate wheel traction (and control) can cause sliding, loss of steering, control, and possible rollover. You should not

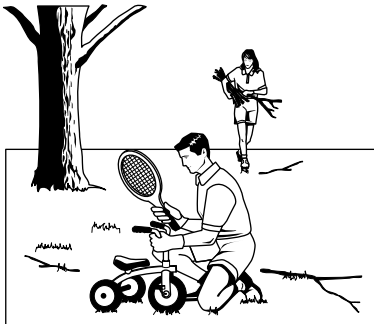
operate on a slope greater than 15 degrees (a 5.4 foot rise over a 20 foot length).

Avoid turning down slopes; if possible turn up slopes. Avoid sudden turns or rapid speed changes. Reduce speed and use extreme caution on ALL slopes.

Also, note that the surface condition you are on can greatly impact your ability to safely operate this machine. Operating on wet or slippery slopes can cause sliding and loss of steering and control. Do not operate on slopes that are slippery, wet, or have soft soil conditions.

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

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 and remove objects that could be thrown by the blade **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.

Moving Parts



This equipment has many moving parts that can injure you or someone else. However, if you stay in the operator zone (stay seated in the seat), and follow the safety rules in this operator's manual, 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 unit while it is running! Keep safety devices (guards, shields, and switches) in place and working.

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.

Roll Bar Use (For Models Equipped with a Rigid Roll Bar)



Keep the roll bar in position and fasten the seat belt. Do not jump off if the mower tips (it is safer to be secured by the seat belt.)

NEVER remove the roll bar.

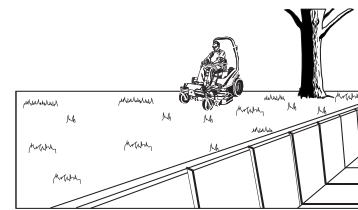
Roll Bar Use (For Models Equipped with a Folding Roll Bar)



Keep the roll bar in the raised position and fasten the seat belt. There is no roll over protection when the roll bar is down! Do not jump off if the mower tips (it is safer to be secured by the seat belt with the roll bar raised.)

Lower the roll bar only when necessary (such as to temporarily clear a low overhanging obstacle) and NEVER remove it. Do NOT use the seat belt when the roll bar is down. Raise the roll bar as soon as clearance permits.

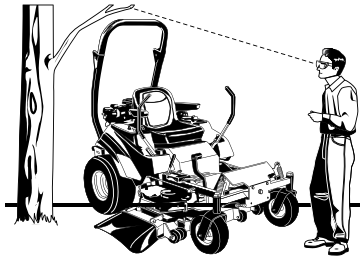
Retaining Walls, Drop-Offs and Water



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.

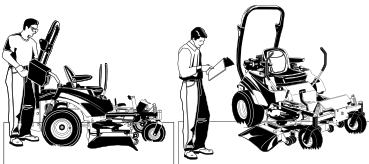
Give yourself a minimum of two mower widths of clearance around these hazards and hand-trim with a walk behind mower or string trimmer. Wheels dropping over retaining walls, edges, ditches, embankments, or into water can cause rollovers, which may result in serious injury, death, or drowning.

Overhead Obstacles



Check for overhead clearances before driving under any objects. Do not allow the roll bar to contact low overhanging obstacles such as tree branches and guide wires.

Fuel and Maintenance



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

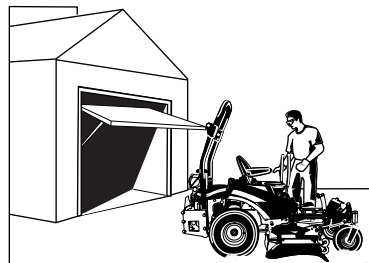
Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

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.

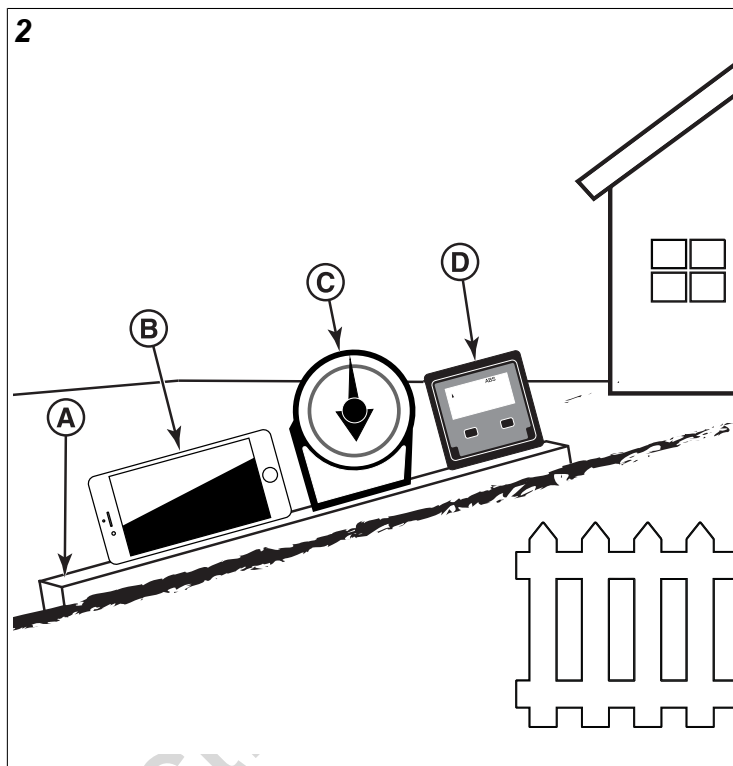
Enclosed Areas



Only operate this unit outdoors and away from unventilated areas such as inside garages or enclosed trailers. The engine emits poisonous carbon monoxide gas and prolonged

exposure in an enclosed area can result in serious injury or death.

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 15 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

Training

- Read, understand, and follow all instructions in the manual and on the unit before starting. If the operator(s) or mechanic(s) can not read English it is the owner's responsibility to explain this material to them.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner is responsible for training the users.
- Only allow responsible adults, who are familiar with the instructions, to operate the unit.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people or property.
- Data indicates that operators, age 60 years and above, are involved in a large percentage of riding mower-related injuries. These operators should evaluate their ability to operate the riding mower safely enough to protect themselves and others from serious injury.

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Use only accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including safety shoes, safety glasses and ear protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is to be used and remove all objects such as rocks, toys and wire, which can be thrown by the machine.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
- Use only an approved container.
- Never remove fuel cap or add fuel with the engine running. Allow engine to cool before refueling. Do not smoke.
- Never refuel or drain the machine indoors.
- Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

Operation

- Never run an engine in an enclosed area.
- Mow only in the daylight or with good artificial light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine. Only start engine from the operator's position. Use seat belts if provided.
- Be sure of your footing while using pedestrian controlled equipment, especially when backing up. Walk, don't run. Reduced footing could cause slipping.

- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. Turf conditions can affect the machines stability. Use caution when operating near drop-offs.
- Do not mow in reverse unless absolutely necessary. Always look down, behind and to the side before changing directions.
- Be aware of the mower discharge direction and do not point it at anyone. Do not operate the mower without either the entire grass catcher or the deflector in place.
- Slow down and use caution when making turns and when changing directions on slopes.
- Never raise deck with the blades running.
- Never leave a running unit unattended. Always disengage the PTO, set parking brake, stop engine, and remove keys before dismounting. Keep hands and feet away from the cutting units.
- Turn off the PTO switch to disengage the blades when not mowing.
- Never operate with guards not securely in place. Be sure all interlocks are attached, adjusted properly and functioning properly.
- Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- Do not change the engine governor setting or overspeed the engine.
- Stop on level ground, lower implements, disengage drives, engage parking brake, shut off engine before leaving the operator's position for any reason including emptying the grass catchers or unclogging the chute.
- Stop equipment and inspect blades after striking objects or abnormal vibration occurs. Make necessary repairs before resuming operations.
- Keep hands and feet away from the cutting units.
- Never carry passengers and keep pets and bystanders away.
- Do not operate the unit while under the influence of alcohol or drugs.
- Slow down and use caution when making turns and crossing roads and sidewalks. Stop blades if not mowing.
- Use care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees or other objects that may obscure vision.
- To reduce fire hazard, keep unit free of grass, leaves & excess oil. Do not stop or park over dry leaves, grass or combustible materials.

WARNING

It is a violation of California Public Resource Code, Section 4442, to use or operate the engine on any forest-covered, brush-covered or grass-covered land unless the exhaust system is equipped with a spark arrester, as defined in Section 4442, maintained in effective working order. Other states or federal jurisdictions may have similar laws. Contact an Authorized Service Dealer to obtain a spark arrester designed for the exhaust system installed on this engine.

- OSHA regulations may require the use of hearing protection when exposed to sound levels greater than 85 dBA for an 8 hour time period.

CAUTION

This machine produces sound levels in excess of 85 dBA at the operator's ear and can cause hearing loss through extended periods of exposure.

Wear hearing protection when operating this machine.

Slope Operation

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution. If you cannot back up the slope or if you feel uneasy on it, do not drive on it.

WARNING

Do not use this machine on slopes greater than 15°.*

Select slow ground speed before driving onto slope. 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 direction and **DO NOT START OR STOP ON SLOPE.**

* 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 15 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.

Do:

- Remove obstacles such as rocks, tree limbs, etc.
- Watch for holes, ruts, or bumps. Uneven terrain could overturn the unit. Tall grass can hide obstacles.
- Use slow speed. Choose a slow speed so that you will not have to stop or change speed while on the slope.
- Use extra care with grass catchers or other attachments. These can change the stability of the unit.
- Keep all movement on the slopes slow and gradual. Do not make sudden changes in speed or direction.
- See your authorized dealer for recommendations of available weights to improve stability.

Do NOT:

- Avoid starting, stopping, or turning on a slope. Do NOT make sudden changes in speed or direction, which could cause the mower to rollover.
- Do not mow down slope towards or 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.
- Do not mow on wet grass. Reduced footing or traction could cause sliding.
- Do not try to stabilize the unit by putting your foot on the ground. (ride-on units).
- Do not mow excessively steep slopes.
- Do not use grass catcher on steep slopes.
- Do not mow slopes if you cannot back up them.

Towed Equipment (Ride-On Units)

- Tow only with a machine that has a hitch designed for towing. Do not attach towed equipment except at the hitch point.
- Follow the manufacturer's recommendations for weight limit for towed equipment and towing on slopes. See attaching a trailer under OPERATION.
- Never allow children or others in or on towed equipment.
- On slopes, the weight of the towed equipment may cause loss of traction and loss of control.
- Travel slowly and allow extra distance to stop.
- 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.

- Keep children out of the mowing area and under the watchful care of another responsible adult.
- Be alert and turn unit off if children enter the area.
- Before and during reverse operation, look behind and down for small children.
- 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.
- Never allow children to operate the unit.
- Use extra care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

Emissions

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

Service and Maintenance

To avoid personal injury or property damage, use extreme care in handling gasoline. Gasoline is extremely flammable and the vapors are explosive.

Safe Handling of Gasoline

- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only approved gasoline containers.
- Never remove the gas cap or add fuel with the engine running. Allow the engine to cool before refueling.
- Never fuel the machine indoors.
- 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.
- 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.
- 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.
- 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.
- If fuel is spilled on clothing, change clothing immediately.
- Never over-fill the fuel tank. Replace gas cap and tighten securely.
- Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.
- 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.
- Replace all fuel tank caps and fuel container caps securely.

Maintenance and Storage

- Always observe safe refueling and fuel handling practices when refueling the unit after transportation or storage.
- Always follow the engine manual instructions for storage preparations before storing the unit for both short and long term periods.
- Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
- Never store the machine or fuel container inside where there is an open flame, such as in a water heater. Allow unit to cool before storing.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Keep all hardware, especially blade attachment bolts, tight and keep all parts in good working condition. Replace all worn or damaged decals.
- Never tamper with safety devices. Check their proper operation regularly.
- Disengage drives, lower implement, set parking brake, stop engine and remove key or disconnect spark plug

wire. Wait for all movement to stop before adjusting, cleaning or repairing.

- Clean grass and debris from cutting units, drives, mufflers, and engine to prevent fires. Clean up oil or fuel spillage.
- Let engine cool before storing and do not store near flame.
- Stop and inspect the equipment if you strike an object. Repair, if necessary, before restarting.
- Park machine on level ground. Never allow untrained personnel to service machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.
- Disconnect battery or remove spark plug wire before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking blades. Wrap the blade(s) or wear gloves, and use caution when servicing them. Only replace blades. Never straighten or weld them.
- Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
- Charge batteries in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothes and use insulated tools.
- Grass catcher components are subject to wear, damage, and deterioration, which could expose moving parts or allow objects to be thrown. Frequently check components and replace with manufacturer's recommended parts, when necessary.
- Check brake operation frequently. Adjust and service as required.
- Use only factory authorized replacement parts when making repairs.
- Always comply with factory specifications on all settings and adjustments.
- Only authorized service locations should be utilized for major service and repair requirements.
- 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.

 **WARNING**

Units with hydraulic pumps, hoses, or motors: 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.

 **WARNING**

Stored energy device. Improper release of springs can result in serious personal injury. Springs should be removed by an authorized technician.

 **WARNING**

Units equipped with an engine radiator: 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.

Roll Bar Instructions

For models equipped with factory-installed Roll Over Protection System (ROPS).

 **WARNING**

In order to avoid serious injury or death from roll over, it is important to follow the warnings listed below.

Operational Warnings

(Specific to Units Equipped with a Rigid Roll Bar):

- Always use the seat belt when the roll bar is in position.

(Specific to Units Equipped with a Folding Roll Bar):

- Always use the seat belt when the roll bar is in the raised position.
- Never use the seat belt when the roll bar is in the down position.
- Remember there is no roll over protection when the roll bar is in the down position so it is very important to always keep the roll bar in the raised position whenever possible.
- Lower the roll bar to the down position only when it is absolutely necessary.

(All Models):

- Check for overhead clearances before driving under any objects. Do not allow roll bar to contact low overhanging obstacles such as tree branches and guide wires.
- Never remove the roll bar from the vehicle.

- Do not exceed the machine weight rating of the roll bar.
- Read and follow all of the instructions shown below regarding the inspection and maintenance of the roll bar structure and the seat belt.

Inspection of the Roll Bar Protective Structure

 **WARNING**

Failure to properly inspect and maintain the ROLL BAR protective structure can cause serious injury or death.

A ROLL BAR, like any other safety device, needs to be periodically inspected to verify that the integrity of the device has not been compromised through normal machine use, misuse, age degradation, modifications, or a roll over.

To maintain operator roll over protection and roll bar effectiveness:

- If a ROLL BAR becomes damaged for any reason, such as a collision, roll over, or impact, the ROLL BAR must be replaced. Small undetectable cracks can reduce the effectiveness of the ROLL BAR. Never weld, straighten, or repair the ROLL BAR.
- Never alter the ROLL BAR by welding anything to it or by drilling additional holes.
- BEFORE FIRST TIME USE - Inspect the ROLL BAR structure and mounting hardware for:
 - 1) Check to make sure the machine GVW (Gross Vehicle Weight), including attachments, restrained payload, fuel and operator, is not in excess of the maximum weight specified on the ROLL BAR label.
 - 2) Make sure there isn't any missing, damaged, or loose mounting hardware.
 - 3) Make sure the ROLL BAR has been correctly and completely installed.
- EVERY 100 HOURS - Inspect the ROLL BAR structure and mounting hardware for:
 - 1) Any cracks in the structure (structural members and/or welds).
 - 2) Significant corrosion on any part of the ROLL BAR structure or hardware.
 - 3) Missing, damaged, or loose mounting hardware.
 - 4) Mounting hardware that is of a grade less than specified.
 - 5) Machine GVW (Gross Vehicle Weight), including attachments, restrained payload, fuel, and operator, in excess of the maximum weight specified on the ROLL BAR label.
 - 6) Any modifications that have been made, such as unauthorized welds and holes.
 - 7) Any permanent deformation or twisting of the ROLL BAR structure.
 - 8) That the ROLL BAR label is still in place and is readable.

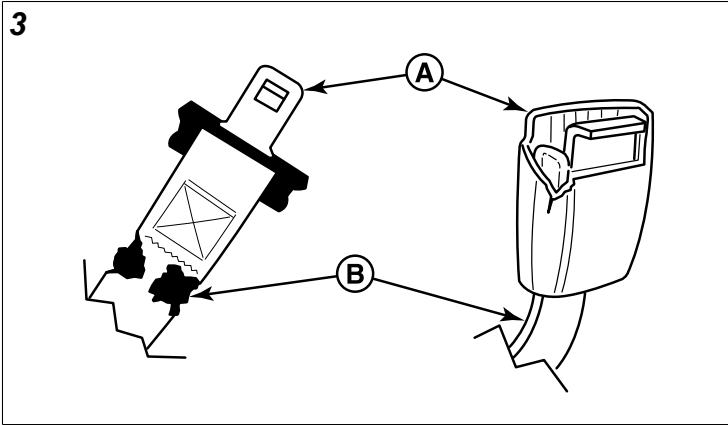
9) That the ROLL BAR on-product warning labels are still on the ROLL BAR and are readable.

- If there is any doubt as to the condition of the ROLL BAR, remove the machine from service and contact your dealer for assistance.

Inspection and Maintenance of the Roll Bar Seat Belt

WARNING

Failure to properly inspect and maintain the seat belt can cause serious injury or death.



- The seat belt like the ROLL BAR, needs to be periodically inspected to verify that the integrity has not been compromised through normal machine use, misuse, age degradation, modifications, or a roll over. If the seat belt does not pass all of the following tests, it should be replaced.
- BEFORE EACH USE – Conduct the following inspections/maintenance of the seat belt and retraction mechanism:
 - 1) Check for dirt or debris in the retraction mechanism. If dirt or debris is found, it should be removed.
 - 2) Check to make sure the retraction mechanism retracts easily and completely.
 - 3) Check for damage to any part of the seat belt (A, Figure 3) such as nicks, cuts, loose stitching, or fraying.
 - 4) Check that the buckle and latch (B) operate properly and that the latch plate is not excessively worn, deformed, or the buckle is damaged or cracked. The seat belt should latch and release easily.

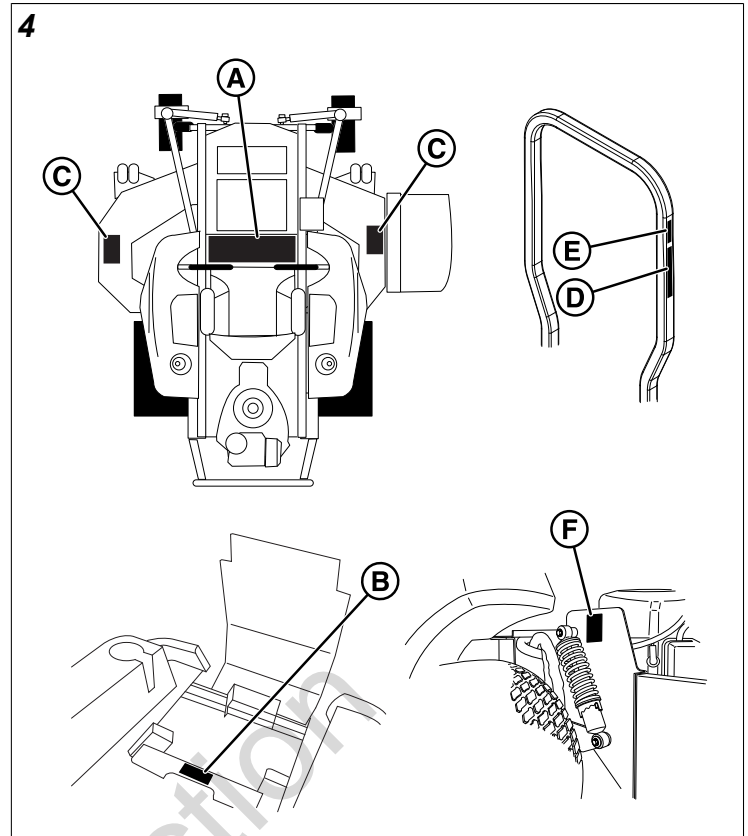
Safety Decals and Symbols

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

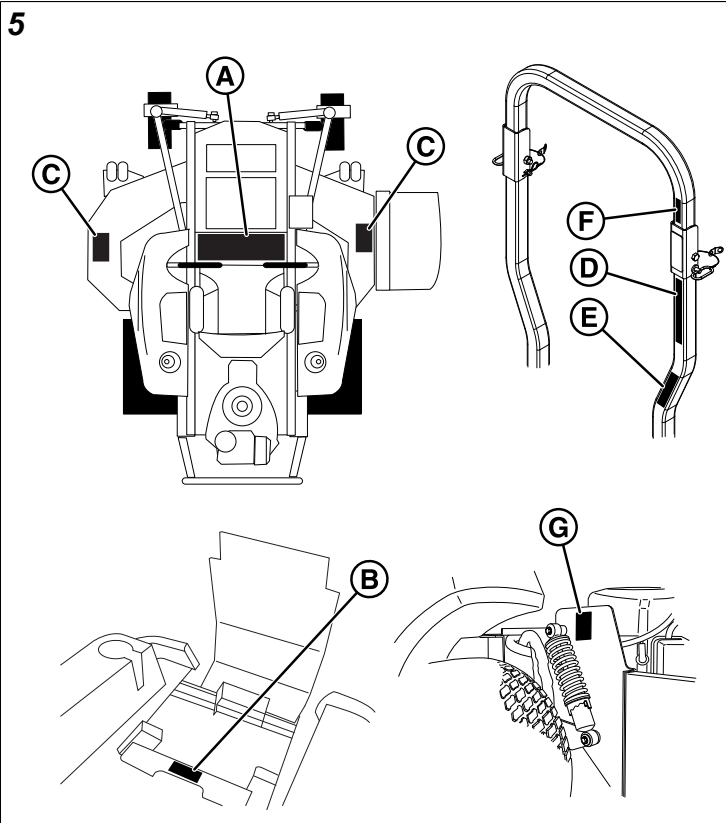
If any safety decals become worn or damaged and cannot be read, order replacement decals from your local dealer.

NORTH AMERICAN MODELS WITH RIGID ROLL BARS:



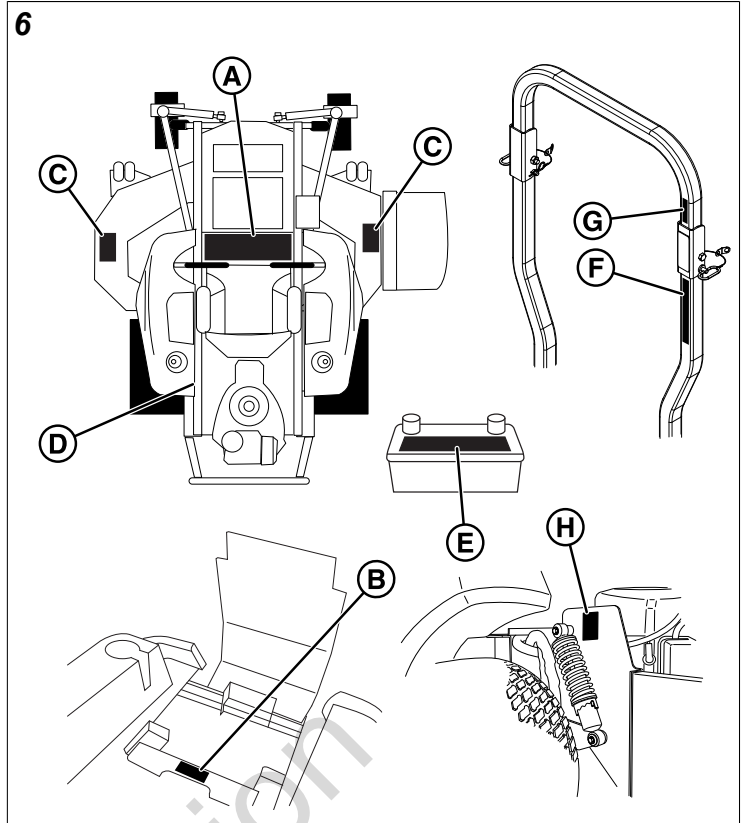
- A. Part Number: 84008252 - Decal, Main Safety
- B. Part Number: 84008200 - Decal, Warning
- C. Part Number: 84007896 - Decal, Danger
- D. Part Number: 5100935 - Decal, Warning and Caution, Roll Bar
- E. Part Number: 5100405 - Decal, Warning, ROPS
- F. Part Number: 5100683 - Decal, Warning, ROPS Removed

NORTH AMERICAN MODELS WITH FOLDING ROLL BARS:



- A. Part Number: 84008252 - Decal, Main Safety
- B. Part Number: 84008200 - Decal, Warning
- C. Part Number: 84007896 - Decal, Danger
- D. Part Number: 5104082 - Decal, Warning, Folding Roll Bar
- E. Part Number: 5104083 - Decal, Caution, Folding Roll Bar
- F. Part Number: 5104005 - Decal, Warning, ROPS
- G. Part Number: 5100683 - Decal, Warning, ROPS Removed

EXPORT MODELS



- A. Part Number: 5106565 - Decal, Main Safety
- B. Part Number: 5061042 - Decal, Warning
- C. Part Number: 7106109 - Decal, Danger
- D. Part Number: 5102456 - Decal, Fire
- E. Battery Safety Decal
- F. Part Number: 5100536 - Decal, Safety, CE Roll Bar
- G. Part Number: 5100537 - Decal, Safety, CE Roll Bar OBS
- H. Part Number: 5100685 - Decal, Warning, Roll Bar, CE

Decal, Main Safety
Part Number: 84008252

<p>WARNING</p> <p>Avoid serious injury or death</p> <ul style="list-style-type: none"> Read operator's manual before using the product. 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. Wear eye and ear protection. Remove objects that could be thrown by the blades. Be sure blades and engine are stopped before clearing debris or feet near blades. When leaving machine, shut off, remove key and set parking brake. <p>Fire hazard</p> <p>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 an clearance of yard 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. 	<p>DANGER</p> <p>Amputation hazard</p> <p>Rotating blades cut off arms and legs.</p> <ul style="list-style-type: none"> Stop the mower when children or others are near. Keep bystanders away. Do not carry (especially children) with the blades off. They may fall off or return to another site when you are not expecting it. Look down, behind and to the side before changing directions and while working. <p>Loss of control and roll-over hazard</p> <p>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 15 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</p> <p>Wheels dropping over edges may result in serious injury, death or drowning.</p> <ul style="list-style-type: none"> 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>Wet or soft slope hazard</p> <p>Wet or soft slopes can cause sliding and loss of control.</p> <ul style="list-style-type: none"> Do NOT operate on slopes when grass is wet. Do NOT operate on slopes when soil is soft (such as after heavy rains).
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! WARNING



Avoid serious injury or death.

- Read operator's manual before using this product.
- 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. Wear eye and ear protection.
- Remove objects that could be thrown by the blade.
- Be sure blades and engine are stopped before placing hands or feet near blades.
- When leaving machine, shut off, remove key and set parking brake.

! WARNING



Fire hazard.

Gasoline is flammable. Yard debris is combustible.

- Allow engine to cool for at least 3 minutes before refueling.
- Keep unit cleaned of yard 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.

! DANGER



Amputation hazard.

Rotating blades cut off arms and legs.

- Stop the mower when children or others are near. Keep bystanders away.
- 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 and while backing.

! DANGER



Loss of control and roll-over hazard.



Operating on slopes can be hazardous and cause loss of control and roll-overs.

- Do not operate on slope over 15 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.

! DANGER



Water, retaining walls, and drop-off hazards.

Wheels dropping over edges may result in serious injury, death or drowning.

- Do NOT operate down slopes towards or near water, retaining walls or drop-offs.
- Give yourself a minimum of two mower widths of clearance around these hazards.

! DANGER



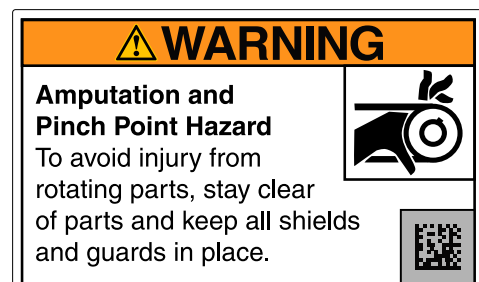
Wet or soft slope hazard.

Wet or soft slopes can cause sliding and loss of control.

- Do NOT operate on slopes when grass is wet.
- Do NOT operate on slopes when soil is soft (such as after heavy rains).

Decal, Warning, Hand in Belt

Part Number: 84008200



WARNING



Amputation and Pinch Point Hazard.

To avoid injury from rotating parts, stay clear of parts and keep all shields and guards in place.

Decal, Danger, Cut Hand/Foot

Part Number: 84007896

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.

DANGER



Keep hands and feet away from deck.



Do not operate mower unless discharge chute or entire grass catcher is in its proper place.

Rigid Roll Bar Decals

<p>5100935 - Decal, Warning & Caution Roll Bar</p> <div style="border: 1px solid black; padding: 5px;"> </div>	<p>5100405 - Decal, Warning Overhang</p> <div style="border: 1px solid black; padding: 5px;"> </div>
<p>5100683 - Decal, Warning, Roll Bar</p> <div style="border: 1px solid black; padding: 5px;"> </div>	

	<p>Safety alert triangle.</p>
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WARNING



Avoid serious injury or death from roll over.

- Do not jump off if mower tips.
- Read and follow all operating instructions and warnings in the operator's manual.
- Keep roll bar in position and use seat belt.
- Never remove roll bar.

CAUTION

N/A

Roll over protective structure.

To maintain operator protection and roll bar certification:

- Replace a damaged roll bar, do not attempt to repair or modify.
- Any alteration of the roll bar must be approved by the manufacturer.
- Do not exceed the machine weight rating on the roll bar.

WARNING



Low overhanging obstacles hazard.

- Check for overhead clearances before driving under any objects. Do not allow roll bar to contact lower overhanging obstacles, such as tree branches and guides wires.

WARNING



Avoid serious injury or death from rollover.

- Do not operate without the roll bar installed and operational.









Folding Roll Bar Decals








<p>5104082 - Decal, Warning, Folding Roll Bar</p> <div style="border: 1px solid black; padding: 5px;"> </div>	<p>5100405 - Decal, Warning, ROPS</p> <div style="border: 1px solid black; padding: 5px;"> </div>
<p>5104083 - Decal, Caution, Folding Roll Bar</p> <div style="border: 1px solid black; padding: 5px;"> </div>	<p>5100683 - Decal, Warning, ROPS Removed</p> <div style="border: 1px solid black; padding: 5px;"> </div>

<p>CAUTION</p> <p>ROLL OVER PROTECTIVE STRUCTURE</p> <p>To maintain operator protection and roll bar certification:</p> <p>Replace a damaged roll bar, do NOT attempt to repair or modify.</p> <p>Any alteration of the roll bar must be approved by the manufacturer.</p> <p>DO NOT exceed the machine weight rating of the roll bar.</p>	<p>WARNING</p> <p>Avoid serious injury or death from rollover. Do not operate without the roll bar installed and operational.</p> 
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5106565 - Decal, Main Safety

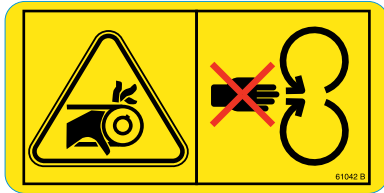


	Safety alert triangle.
	WARNING
	<p>Avoid serious injury or death from roll over.</p> <ul style="list-style-type: none"> Keep roll bar in the raised position and use seat belt. There is no roll over protection when the roll bar is down. Lower the roll bar only when necessary and never remove it. Do not use seat belt when the roll bar is down. Raise the roll bar as soon as clearance permits. Do not jump off if mower tips. Read and follow all operating instructions and warnings in the operator's manual.
	CAUTION
N/A	<p>Roll Over Protective Structure.</p> <p>To maintain operator protection and roll bar certification:</p> <ul style="list-style-type: none"> Replace a damaged roll bar, do not attempt to repair or modify. Any alteration of the roll bar must be approved by the manufacturer. Do not exceed the machine weight rating of the roll bar.
	WARNING
	<p>Low overhanging obstacles hazard.</p> <ul style="list-style-type: none"> Check for overhead clearances before driving under any objects. Do not allow roll bar to contact low overhanging obstacles, such as tree branches and guide wires.
	WARNING
	<p>Avoid serious injury or death from rollover.</p> <ul style="list-style-type: none"> Do not operate without the rollbar installed and operational.

	Warning: Read and understand the Operator's Manual before using this unit. Know the location and function of all controls. Do not operate this machine unless you are trained.
	Warning: Consult technical literature before performing technical repairs or maintenance. When leaving the machine, shutoff engine, set the parking brake to the lock position, and remove the ignition key.
	Danger - Amputation and dismemberment hazard: To avoid injury from rotating blades and moving parts, keep safety devices (guards, shields and switches) in place and working.
	Danger - Loss of traction, sliding, steering and control on slopes hazard: If machine stops forward motion, stop the blades, and drive slowly off the slope.
	Danger - Amputation hazard: Do not mow when children or others are around. Never carry riders especially children even with the blades off. Do not mow in reverse unless absolutely necessary. Look down and behind – before and while backing.
	Danger - Tipping and slipping hazard: Operating on slopes can be hazardous and cause a loss of control and roll-overs. Do not operate on slopes over 15* degrees. Avoid sudden turns or rapid speed changes. Reduce speed and use extreme caution on slopes. Avoid turning down slopes; if possible, turn up slopes. Do not operate down slopes towards or near water, retaining walls, or drop-offs. Give yourself a minimum of two mower widths of clearance around these hazards.
	Danger - Thrown objects hazard: Keep bystanders and children a safe distance away. Remove objects that can be thrown by the blade. Do not mow without discharge chute in place.

*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 15 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.

5061042 - Decal, Danger



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

7106109 - Decal, Danger, Discharge



Danger - Thrown Objects Hazard: Do not mow without discharge chute or entire grass catcher in place.



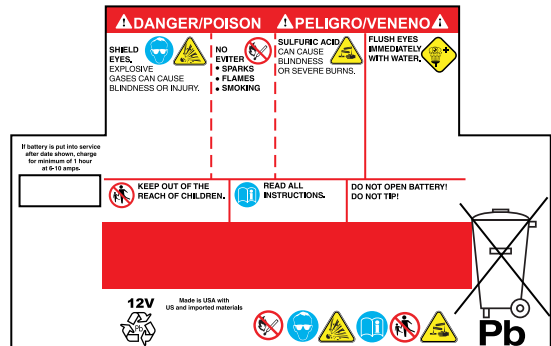
Danger - Amputation and Thrown Objects Hazard: To avoid injury from rotating blades, stay clear of deck edge and keep others away.

5102456 - Decal, Fire



Danger: Fire Hazard: Keep unit free of grass, leaves and excess oil. Do not add fuel while engine is hot or running. Stop engine, remove key and allow to cool for at least 3 minutes prior to adding fuel. Do not add fuel indoors, in an enclosed trailer, garage or other enclosed areas. Clean up spilled fuel. Do not smoke while operating this machine.

Battery Safety Decal



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



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



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



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

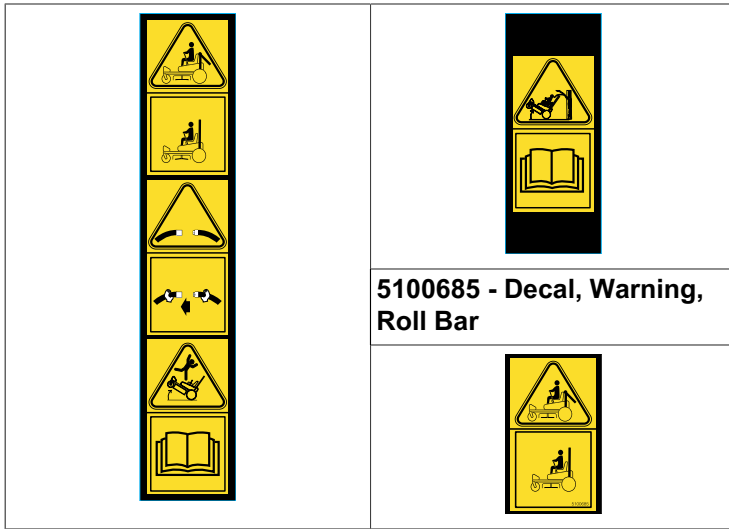


Flush eyes immediately with water. Get medical help fast.

Roll Bar Decals

5100536 - Decal, Safety, Roll Bar

5100537 - Decal, Safety, Overhead Obstacles



	<p>Warning: Avoid Serious Injury or Death from Roll Over - Keep roll bar in the raised position and use seat belt. There is no roll over protection when roll bar is down. Lower roll bar only when necessary and NEVER remove it. Raise the roll bar as soon as clearance permits.</p>
	<p>Warning: Avoid Serious Injury or Death from Roll Over - Keep roll bar in the raised position and use seat belt. Do NOT use seat belt when the roll bar is down.</p>
	<p>Warning: Avoid Serious Injury or Death from Roll Over - Do NOT jump off if the mower tips. Read and follow all operating instructions and warnings in the operator's manual.</p>
	<p>Warning: Low Overhanging Obstacles Hazard - Check for overhead clearances before driving under any objects. Stay clear. Do NOT allow roll bar to contact low overhanging obstacles, such as tree branches and guide wires. Read and follow all operating instructions and warnings in the operator's manual.</p>

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

This unit is equipped with safety interlock switches. These safety systems are present for your safety, do not attempt to bypass safety switches, and never tamper with safety devices. Check their operation regularly.

Operational SAFETY Checks

Test 1 - Engine SHOULD NOT crank if:

- PTO switch is engaged, OR
- Parking brake is not engaged.

Test 2 - Engine SHOULD crank if:

- PTO switch is not engaged, AND
- Parking brake is engaged.

Test 3 - Engine should SHUT OFF if:

- Operator rises off seat with PTO engaged, OR
- Operator rises off seat with parking brake disengaged.

Test 4 - Blade Brake Check

The mower blades and mower drive belt should come to a complete stop within seven (7) seconds after electric PTO switch is turned off (or operator rises off seat). If the unit fails the blade brake check, it is advised not to use the unit until it is repaired and passes the blade brake check.

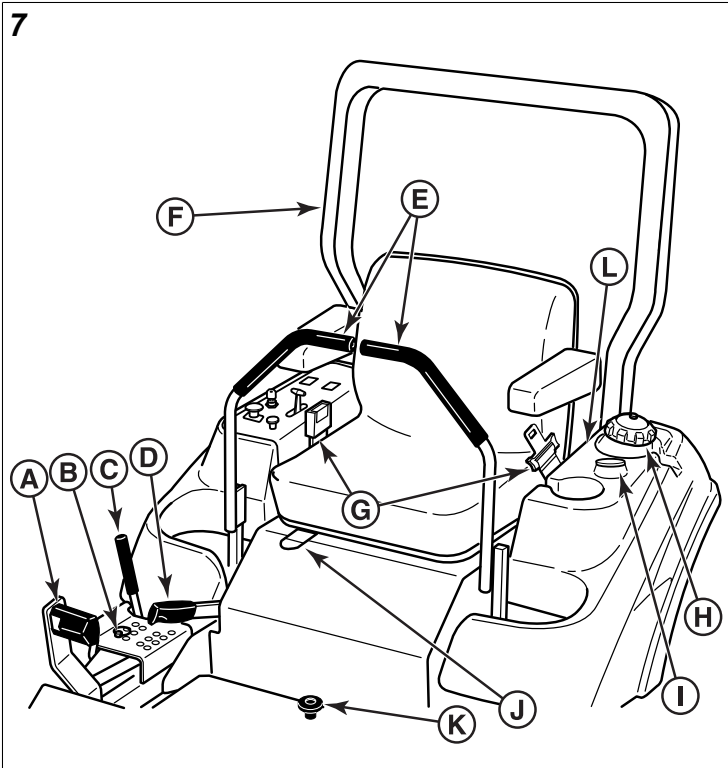
Note: Once the engine has stopped, PTO switch must be turned off, parking brake must be engaged, and the ground speed control levers must be locked in the NEUTRAL position after the operator returns to the seat in order to start the engine.

Features and Controls

Control Functions and Locations

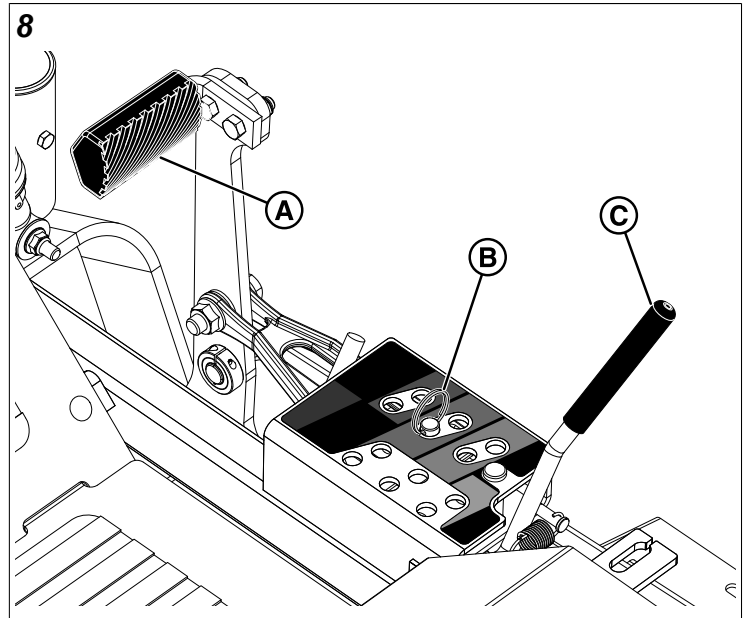
The information below briefly describes the function of individual controls. Starting, stopping, driving, and mowing require the combined use of several controls applied in specific sequences. To learn what combination and sequence of controls to use for various tasks see the OPERATION section.

Zero-Turn Rider Controls



- A. Deck Lift Pedal
- B. Cutting Height Adjustment Pin
- C. Deck Lift Lock Lever
- D. Parking Brake
- E. Ground Speed Control Levers
- F. Roll Bar
- G. Retractable Seat Belt
- H. Fuel Tank Cap
- I. Fuel Level Gauge
- J. Seat Adjustment Lever
- K. Removable Floor Plate
- L. Transmission Oil Fill/Tanks (One per transmission)
- M. Transmission Release Levers (One per transmission)

Deck Lift Pedal, Cutting Height Adjustment Pin, and Deck Lift Lock Lever: The deck lift pedal (A, Figure 8), the adjustment pin (B), and deck lift lock lever (C) are used together to control the cutting height of the mower deck. See *Cutting Height Adjustment* for instructions on using these controls.





		
Cutting Height Adjustment Pin	Storage Hole for Cutting Height Adjustment Pin	Deck Lift Lock Lever

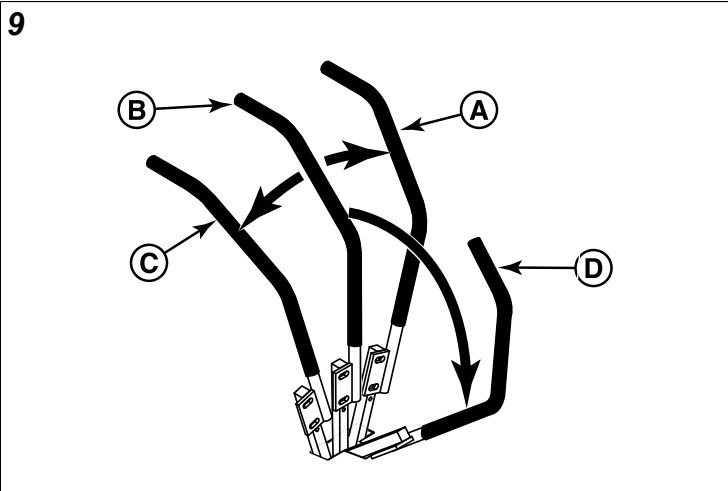
(P) Parking Brake: Pull the parking brake lever up and back to engage the parking brake. Move the lever fully forward and down to disengage the parking brake.

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

Engaging the parking brake locks the ground speed control levers in the NEUTRAL position. The parking brake must be disengaged before moving the ground speed control levers out of the NEUTRAL position.

	
DISENGAGE: Releases the parking brake.	ENGAGE: Locks the parking brake.

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

The parking brake must be disengaged before attempting to move the ground speed control levers from the NEUTRAL position.

Moving a lever forward (A) 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 the levers outwards (D) from the NEUTRAL position locks the levers in the NEUTRAL LOCKOUT 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.

Retractable Seat Belt: The seat belt is used to secure the operator to the seat.

(Specific to models with a rigid Roll Bar):

The seat belt should **always** be worn when using this equipment with a Roll Bar.

(Specific to models with a folding Roll Bar):

The seat belt should **always** be worn when the Roll Bar is in the raised position. The seat belt should never be worn when the Roll Bar is in the down position.

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



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

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

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.

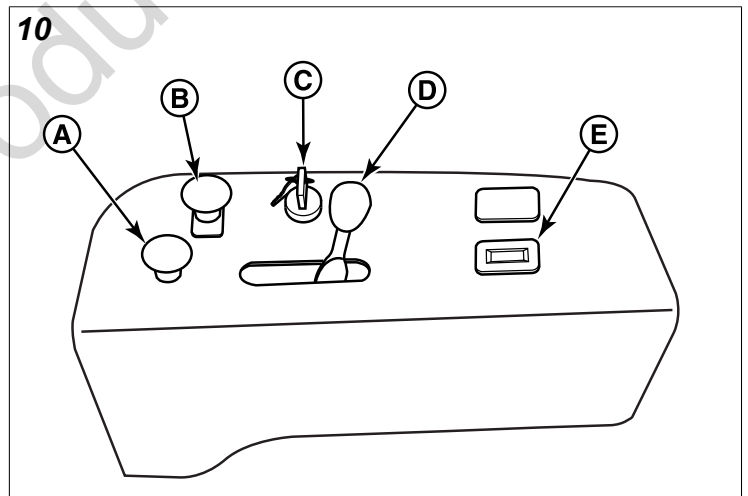
Transmission Oil Fill: Transmission oil is added through the hydraulic oil tanks. It also serves as extra holding capacity for oil as the transmissions heat up and the hydraulic oil expands. See *Check / Fill Transmission Oil* for oil level check and fill procedures.

Transmission Release Levers:

Symbols	Control Name
	Transmission Release Levers

Each transmission is equipped with a transmission release lever. These levers 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.

Instrument Control Panel



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



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.

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

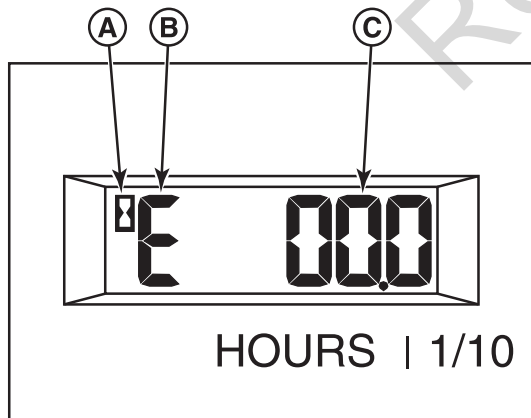
	OFF: Stops the engine and shuts off the electrical system.
	RUN: Allows the engine to run and powers the electrical system.
	START: Cranks the engine for starting.

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

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.

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



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

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

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

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

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

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

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

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

To stop recording engine hours, engage the parking brake.

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

Operation

Before First Time Operation

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



WARNING

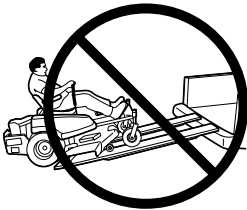
- Never operate on slopes greater than 15°.
- Select slow ground speed before driving onto a slope. Use extra caution when operating on slopes with a rear-mounted grass catcher.
- Mow across the face of slopes, not up and down, use caution when changing direction on slopes and **do NOT start or stop 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, stop the engine and remove the 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. Drive the unit to a flat, level surface and return the ground speed control levers to the middle position to 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 handle up until it locks into position.
4. Move the throttle control to mid-throttle position and turn the ignition switch 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.

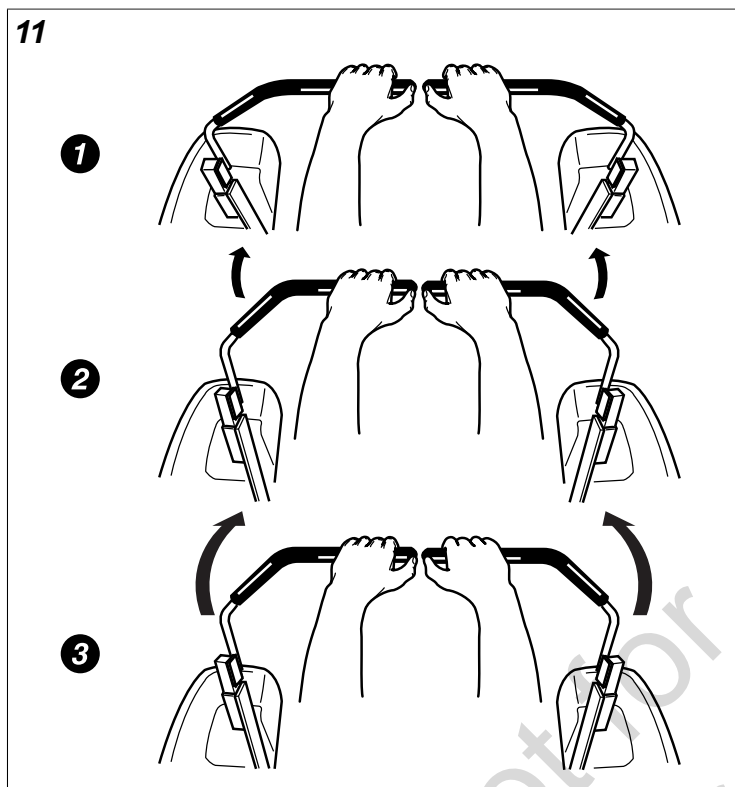
We suggest you begin with the *Smooth Travel* procedure, and then advance through the forward, reverse, and turning maneuvers.

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 11.



FIRST, place your hands onto the levers as shown.

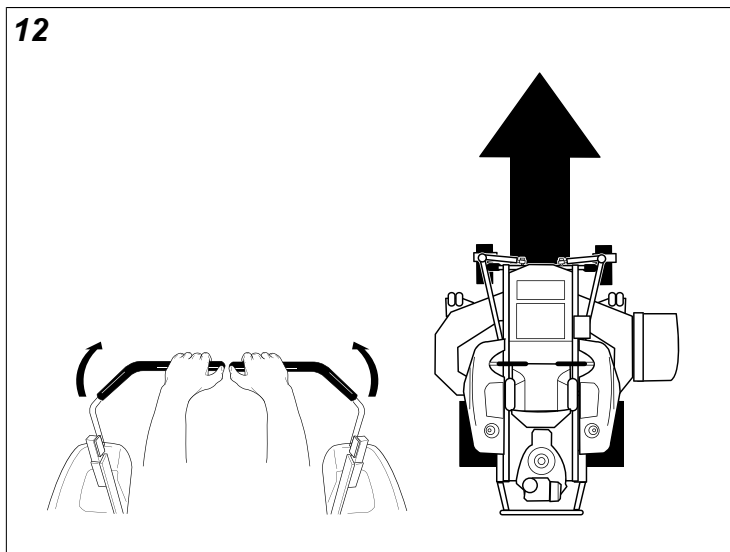
SECOND, to go forward gradually push the levers forward with your palms.

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

Basic Driving

Forward Travel Practice

12

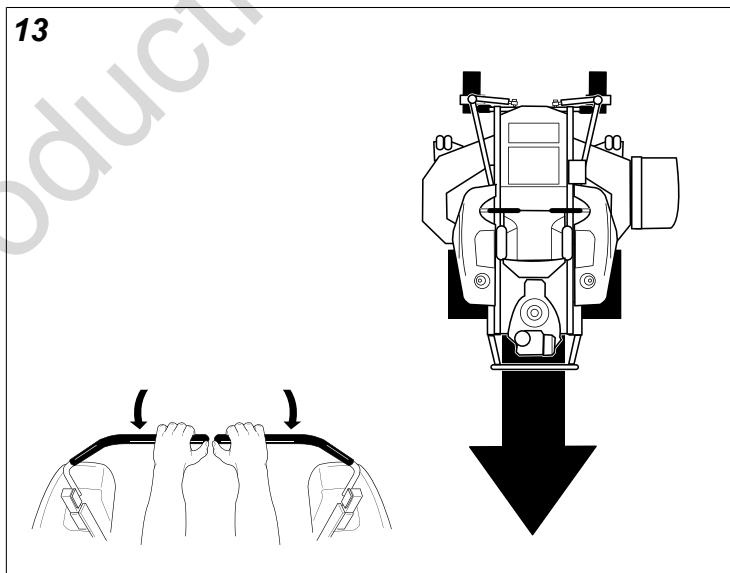


Gradually move both ground speed control levers — evenly FORWARD from neutral. Slow down and repeat.

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

13

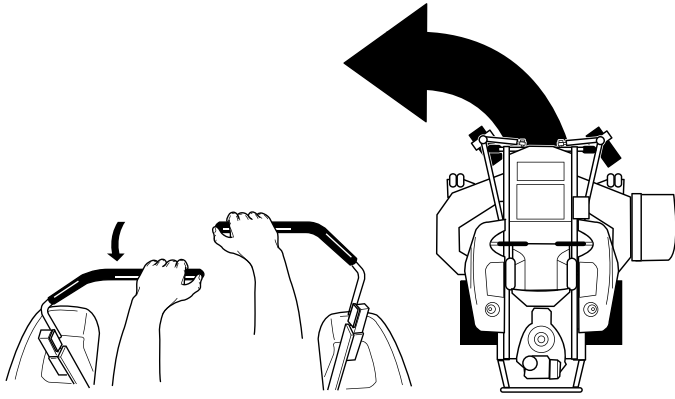


LOOK DOWN AND BEHIND, then gradually move both ground speed control levers evenly BACK from neutral. Slow down and repeat.

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

14

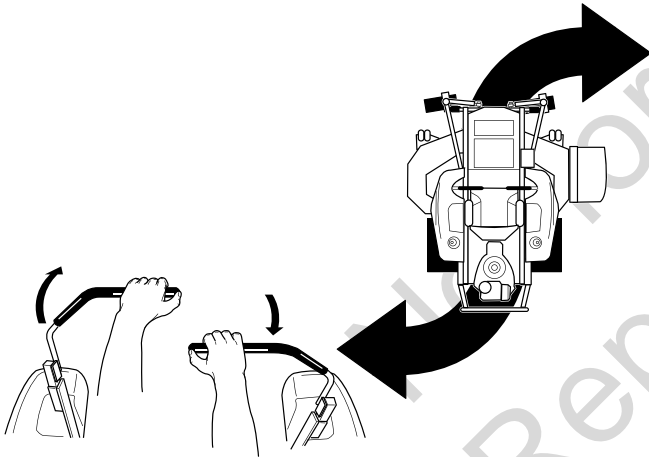


While traveling forward allow one ground speed control lever to gradually return back toward neutral. Repeat several times.

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

15



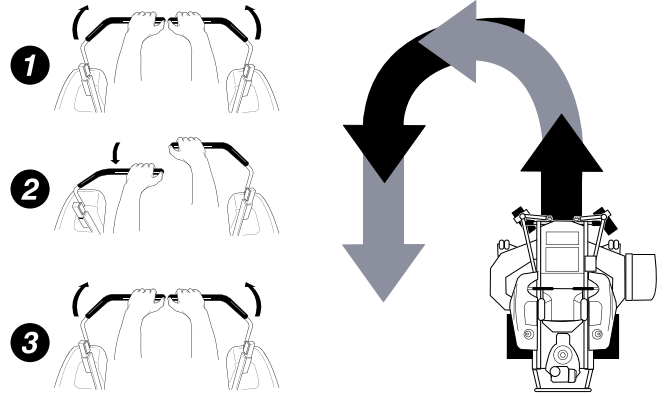
To turn in place, “zero-turn,” gradually move one ground speed control lever forward from neutral and the other lever back from neutral simultaneously. Repeat several times.

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

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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

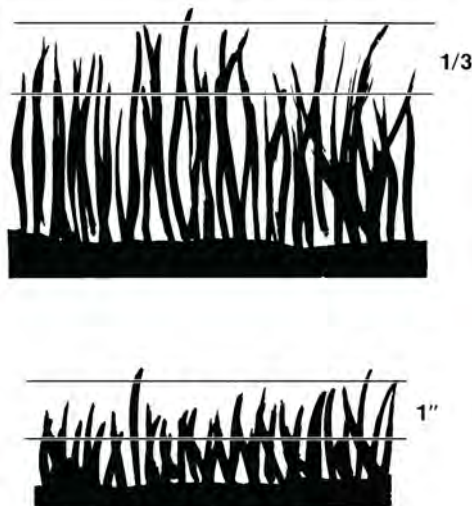
Often cutting height is a matter of personal preference. Typically, you should mow the grass when it is between three and five inches high. The proper cutting height range for a specific lawn will depend upon several factors, including the type of grass, the amount of rainfall, the prevailing temperature,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

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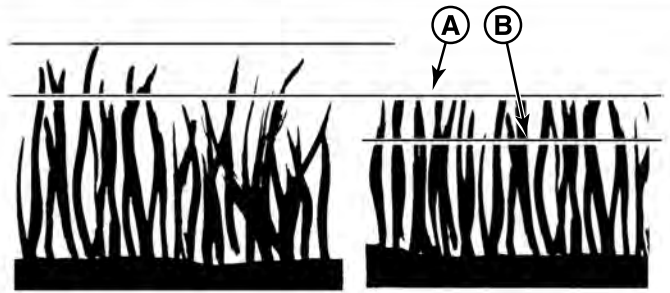


The amount of grass you are able to cut in one pass is also effected by the type of mowing system you are using (for example, broadcasting with side discharge decks can process a much larger volume of grass than mulching does).

Tall grass requires incremental cutting. For extremely tall grass, set the cutting height at maximum for the first pass (A, Figure 18), 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.

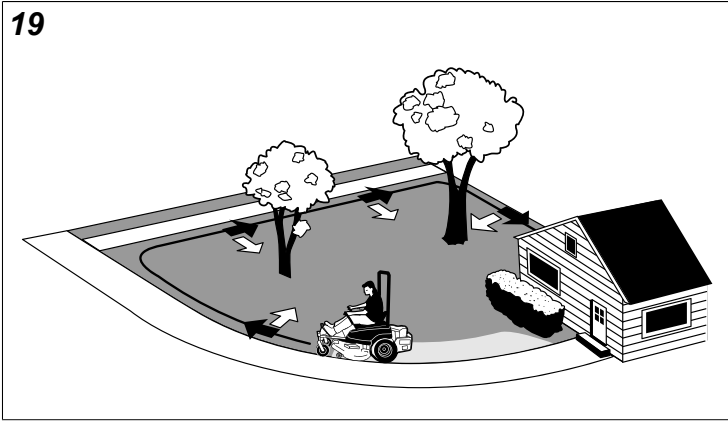
The size and type of area to be mowed will determine the best mowing pattern to use. Obstructions such as trees, fences and buildings, and conditions such as slopes and grades must also be considered.

- 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.

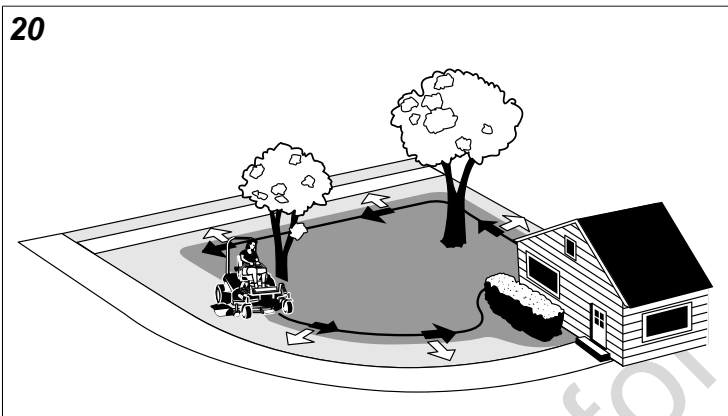
If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems. Use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual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

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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.

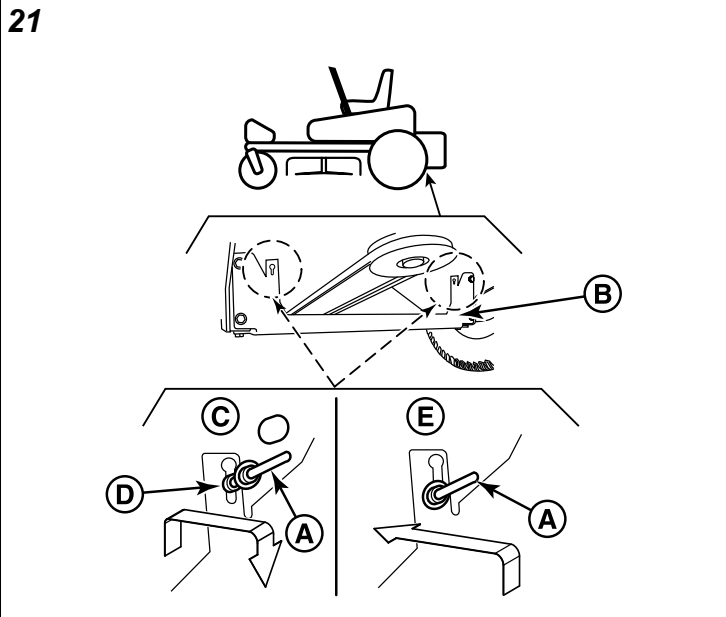
DO NOT disengage the transmissions and coast down slopes. DO NOT use transaxle release levers to disengage the transmissions unless the unit's motion can be controlled and the engine is off.

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 OFF, and remove the key.
2. Locate the transmission release levers (A, Figure 21) underneath the engine deck of the unit between the two

rear wheels on the transmission cradle (B). 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) (C), move the transmission release lever up and pull it towards the rear of the unit. When the second nut (D) has passed through the hole, lower the rod down into the slot so it will stay in the bypass position. Repeat the 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) (E) by raising the transmission release lever so that the back nut clears the slot, push the lever towards the front of the unit. Repeat the process for the other side of the unit.

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

Raise and Lower the Roll Bar

Follow these instructions if your model is equipped with a folding roll bar follow the safety and operational instructions listed below.



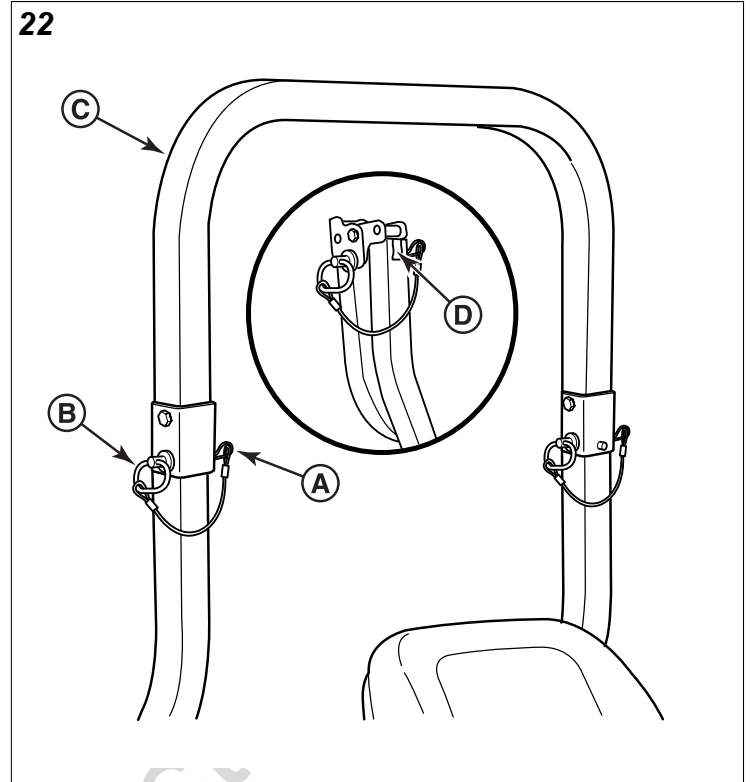
WARNING

Avoid serious injury or death from roll over:

- Keep roll bar in the raised position and use seat belt.
- There is no roll over protection when the roll bar is down.
- Lower the roll bar only when necessary and NEVER remove it.
- Do NOT use seat belt when the roll bar is down.
- Raise the roll bar as soon as clearance permits.
- Do NOT jump off if mower tips.

To lower the roll bar:

1. Pull the hair pin clips (A, Figure 22) out of the retainer pins (B).



2. Push or pull the top of the roll bar (C) forward against the spring clips (D) and remove the retainer pins (B).
3. Lower the roll bar and reinstall the retainer pins and hair pin clips to secure the roll bar in the down position (see insert, Figure 22).

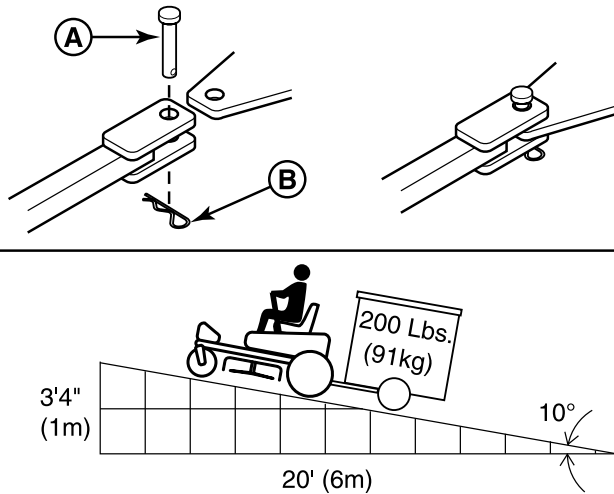
To raise the roll bar:

1. Pull the hair pin clips (A) out of the retainer pins (B) and remove the retainer pins.
2. Raise the roll bar (C) until the top of the roll bar (C) contacts the spring clips (D) on the upright tubes.
3. Push or pull the top of the roll bar forward against the spring clips and reinstall the retainer pins and hair pin clips to secure the roll bar in the raised position.

Attaching a Trailer

The maximum weight of a towed trailer should be less than 200 lbs (91kg). Secure the trailer with an appropriately sized clevis pin (A, Figure 23) and clip (B).

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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 10°. See SLOPE OPERATION and TOWED EQUIPMENT in the safety section of this manual for additional safety information.

Storage

Temporary Storage (30 Days or Less)

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



WARNING

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

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

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

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

- Park the unit on a flat level surface. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
- Keep the unit in an area away from where children may come into contact with it. If there's any chance of unauthorized use, remove the spark plug(s) and put in a

safe place. Be sure the spark plug openings are protected from foreign objects with a suitable cover.

- If the unit can't be stored on a reasonably level surface, chock the wheels.
- Clean all grass and dirt from the mower.

Long Term Storage (Longer Than 30 Days)

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

1. Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when unit is used again.
2. Prepare the mower deck for storage as follows:
 - A. Clean the underside of the mower deck.
 - B. Coat all bare metal surfaces with paint or a light coat of oil to prevent rusting.
3. Clean external surfaces and engine.
4. Prepare the engine for storage. See the engine operator's manual.
5. Clean any dirt or grass from cylinder head cooling fins, engine housing, and air cleaner element.
6. Cover the air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt, and insects.
7. Completely grease and oil unit as outlined in the *Lubrication* section.
8. Clean up the unit and apply paint or rust preventative to any areas where paint is chipped or damaged.
9. Make sure that the battery is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. If battery is left in unit, disconnect the negative cable.
10. Drain fuel system completely or add a fuel stabilizer to the fuel system. If you have chosen to use a fuel stabilizer and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of gasoline fumes. Remember, fuel fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

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

Starting After Long Term Storage

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

1. Remove any blocks from under the unit.
2. Install the battery if it was removed.
3. Unplug the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh fuel. See engine operator's manual for recommendations.

5. See engine operator's manual and follow all instructions for preparing engine after storage.
6. Check crankcase oil level and add proper oil if necessary. If any condensation has developed during storage, drain crankcase oil and refill.
7. Inflate tires to proper pressure. Check fluid levels.
8. Start the engine and let it run slowly. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

Maintenance Schedule

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

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

UNIT MAINTENANCE
Before Each Use
Check Safety Interlock System
Check Rider Brakes
Check Rider / Mower for Loose Hardware
Check Hydraulic Oil Level
Every 25 Hours
Clean Deck & Check/Replace Mower Blades*
Lubricate Rider & Mower*
Check Tire Pressures
Every 100 Hours
Check Mower Blade Stopping Time
Clean Battery & Cables
Initial Change of Hydraulic Oil
Every 400 Hours or Yearly
Change Hydraulic Oil & Filter

ENGINE MAINTENANCE
Before Each Use
Check Engine Oil Level
Every 25 Hours
Check/Clean Cooling Fins & Intake*
Every 50 Hours
Check/Clean Spark Arrester**
Refer to Engine Owner's Manual
Service Air Filter
Change Oil & Filter
Check/Replace Spark Plugs
Check/Replace Fuel Filter

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

**If equipped, replace if damaged.

Maintenance Procedures

Service and Maintenance Safety

WARNING

Amputation and crushing hazard

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

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

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

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

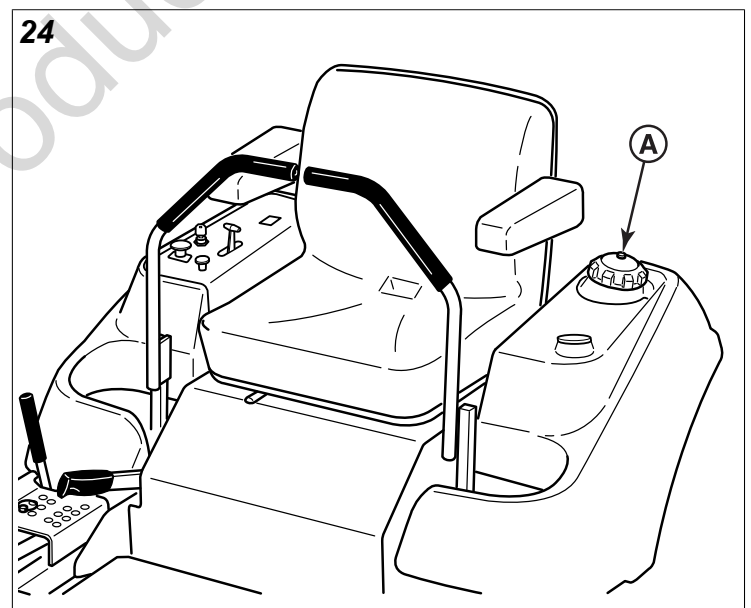
Checking / Adding Fuel

WARNING

Fuel is highly flammable and must be handled with care. Allow the engine to cool for at least three (3) minutes before refueling. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

To add fuel:

1. Remove the fuel cap (A, Figure 24).



2. Fill the fuel tank to the bottom of the filler neck. This will allow for fuel expansion.
Note: Do not overfill. Refer to your engine operator's manual for specific fuel recommendations.
3. Install and hand tighten the fuel cap.
4. If your unit is equipped with two fuel tanks, repeat this process to fill the other fuel tank.

NOTICE

Refer to your engine operator's manual for specific fuel recommendations.

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

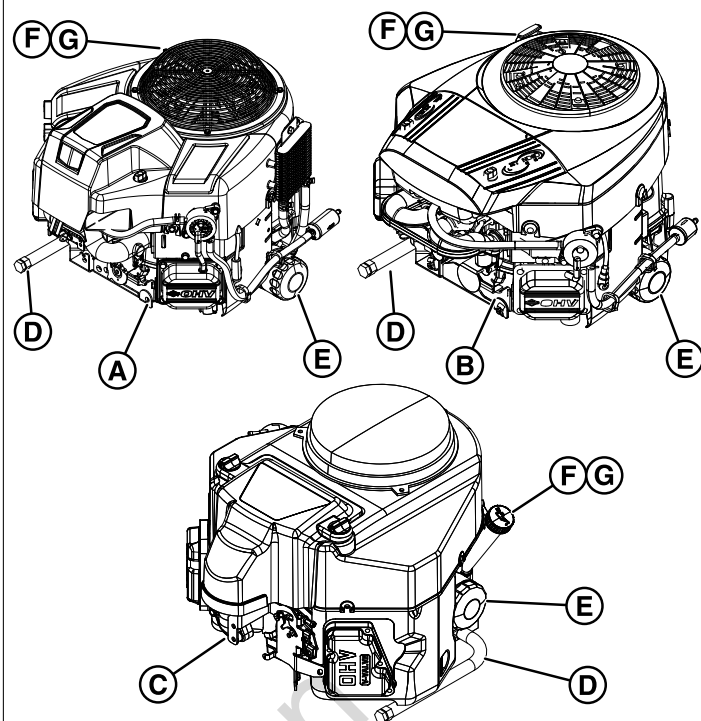
Interval: Before Each Use

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 Series (A, Figure 25), Briggs & Stratton Professional Series (B), and Kawasaki (C). Please reference figure 25 as the location of the components listed for this procedure may vary by specific engine option.

25



1. Warm engine by running 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. Install 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 (D). 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 (E) and check the amount of oil in the engine using the engine oil dipstick (F).
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 two replaceable fuses. See the chart below for the circuit, amperage, and approximate location of the fuses.

Circuit	Amperage	Approximate Location
Main	20 amp	Instrument control panel.
PTO Clutch	15 amp	Behind the seat on the left hand side of the machine.

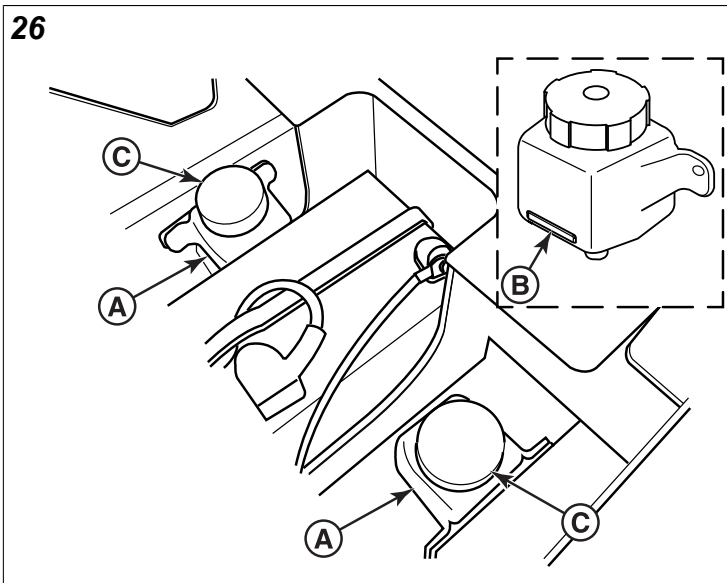
Check / Fill Transmission Oil Level

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 tanks must be checked, and if necessary, filled.

Oil Type: 20W-50 conventional detergent motor oil

1. Locate the transmission oil tanks (A, Figure 26).

26



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. If the unit is not driving properly perform the *Purging the Air from the Hydraulic System* procedure.

Transmission Oil Filter Change

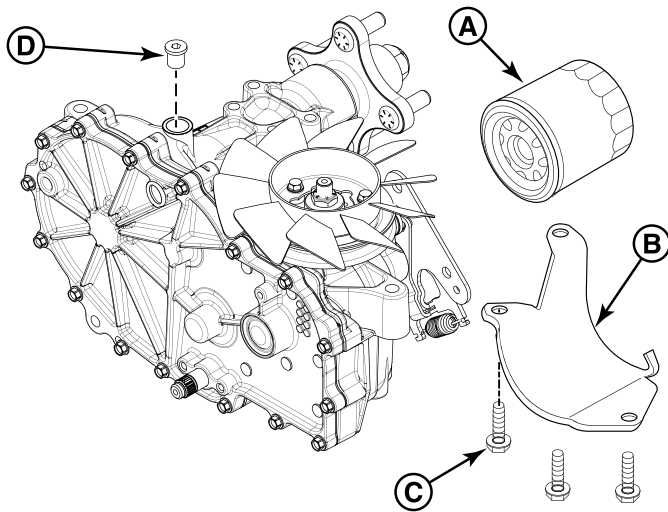
Change Interval: Every 400 Hours or Yearly (Initial hydraulic oil and filter change after first 100 hours of operation)

Replacement Filter Number: 5101026X1

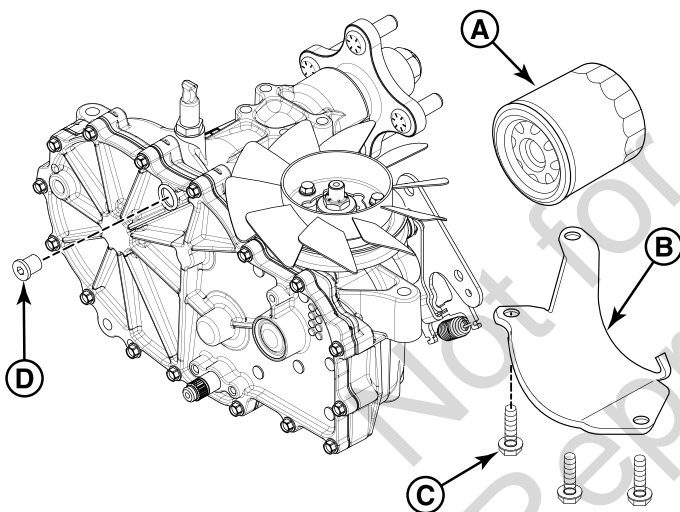
Note: Removing the oil filter from the transaxle will drain the oil tank. Have a suitable container ready to catch any spilled oil. The manufacturer recommends that this be a dealer-only service item.

1. Locate the transmission oil filters (A, Figures 27 & 28) underneath the rear of the machine on the transmissions.

27



28



- Remove the three 1/4" filter guard screws (C) and the filter guard (B).
- Clean the area around the filter base and remove the filter.
- Apply a film of new oil to the gasket of the new replacement filter. After the oil has drained, thread the new filter onto the filter base until the gasket makes contact, then tighten 3/4 of a turn more.
- Reinstall the filter guard with the three 1/4" filter guard screws.
- Locate the port plug (D) on your transmission.

- If your unit has hydraulic hoses that connect to the side of the transmission then the port is located on the top of the transmission. See Figure 27 for a reference to the port location.

- If your unit has hydraulic hoses that connect to the top of the transmissions then the port is located on the side of the transmission. See Figure 28 for a reference to the port location.

- Using a hex bit swivel socket or a modified allen wrench remove the top port plug from the transmissions.
- Remove the transmission oil tank cap and fill with oil until oil appears at the bottom of the transmission's port (approximately 2 qts (1,89 L).
- Reinstall the port plug and tighten to 15 ft lbs (20,38 Nm).
- Continue to add oil to the transmission oil expansion tank until the oil level reaches the "FULL COLD" mark. Put the transmission oil tank cap back on and hand tighten.
- Repeat this process for the other side of the machine.
- Perform the *Purging the Air from the Hydraulic System* procedure.

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:


- 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.
- 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.
- Stop the engine and engage the parking brake.
- 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.
- Stop the engine. Remove the jack stands from underneath the unit.

- 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.

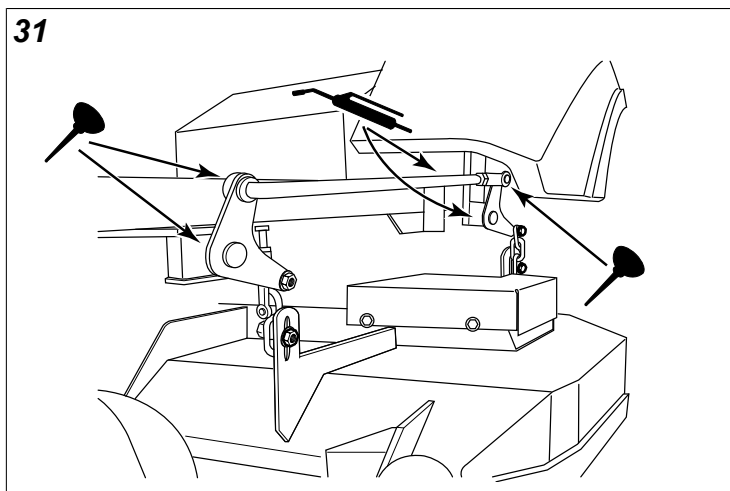
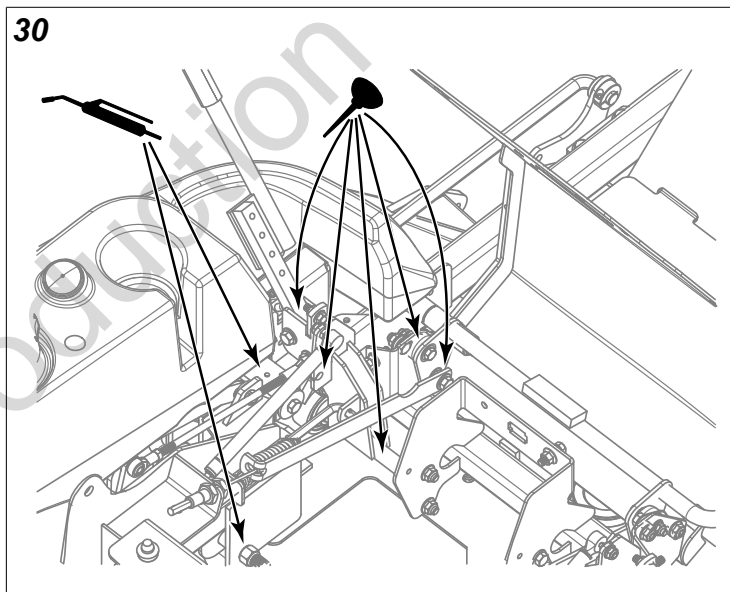
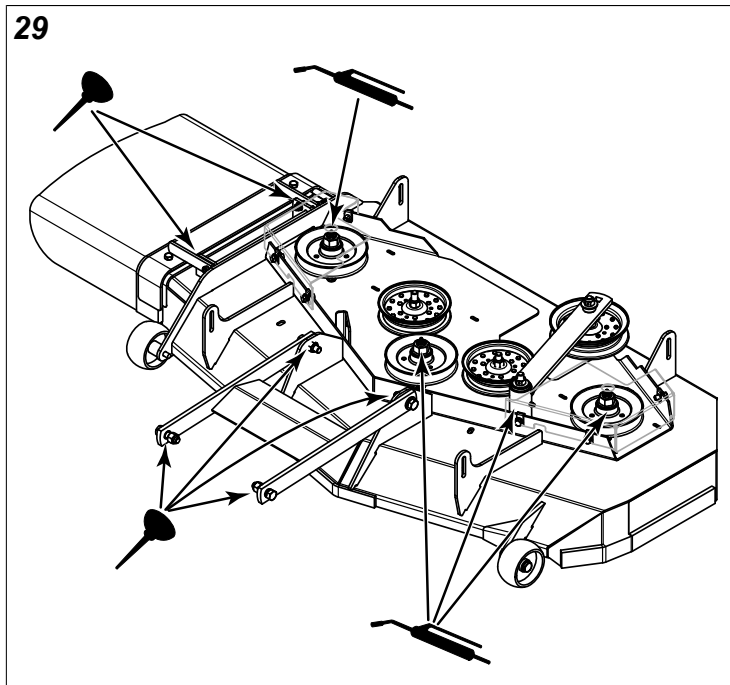
Grease	
	Front caster wheel axles & yokes
	Transmission cradle pivots
	Deck lift pivot blocks
	Mower deck spindles
	Mower deck idler arm

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	
	Control handle pivots & linkages
	Parking brake shaft pivots
	Seat plate pivots
	Deck lift pivot points
	Discharge chute hinge

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.

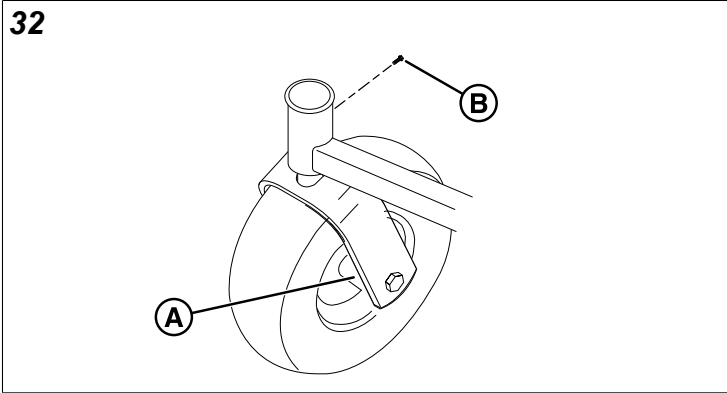


Lubricating the Front Casters

Interval: Front caster wheel axles (A, Figure 32) - Every 25 hours.

Interval: Front caster yoke axles - Yearly.

1. Remove the 1/4-28 bolt (B, Figure 32) screwed into the caster and install a 1/4-28 grease fitting.



2. Grease the front caster.
3. Remove the 1/4-28 grease fitting and reinstall the 1/4-28 bolt.
4. Repeat the process for the other side of the unit.

Servicing the Mower Blades

Removing the Mower Blades



CAUTION

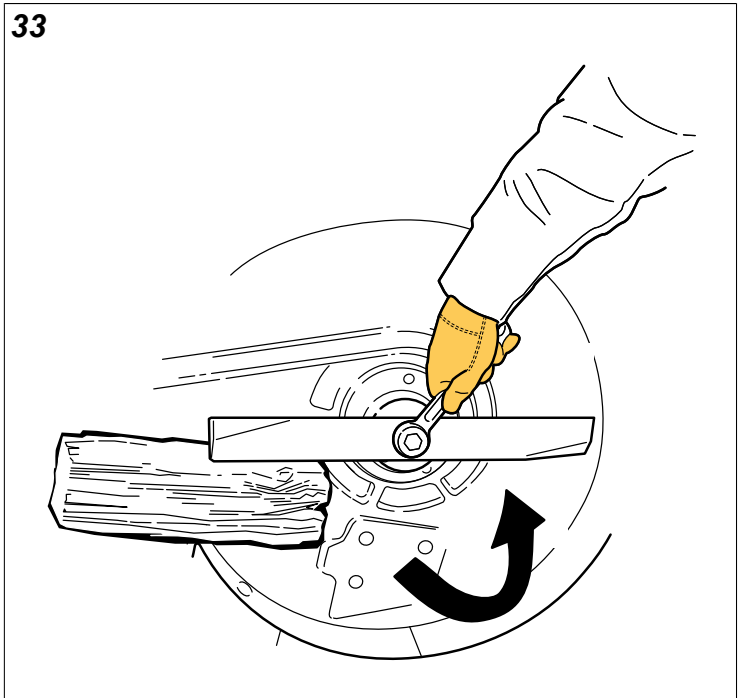
Laceration hazard

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 33.

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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

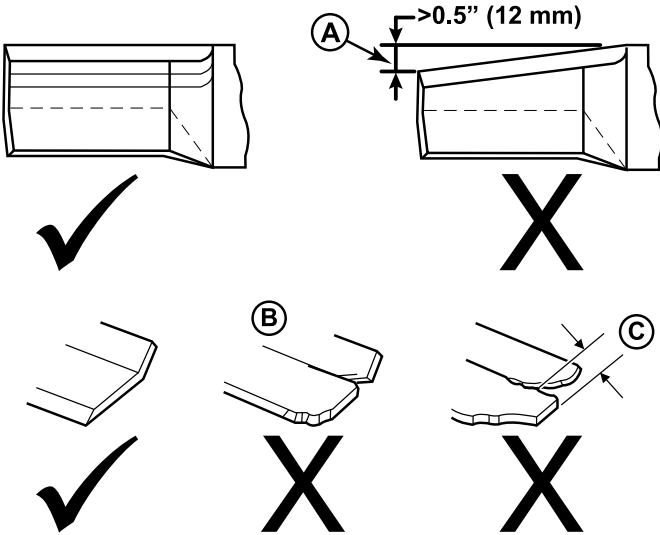
Thrown objects hazard

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 34). 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

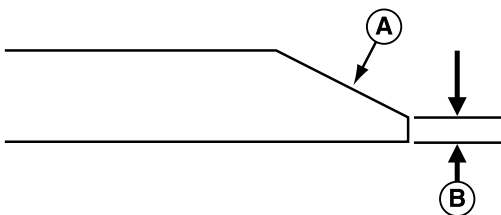
Grinding mower blades throws sparks and fine metal particles that are capable of igniting gasoline and gasoline vapors, and that can injure unprotected eyes.

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 35) when grinding. DO NOT change the mower blade bevel.

35



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



CAUTION

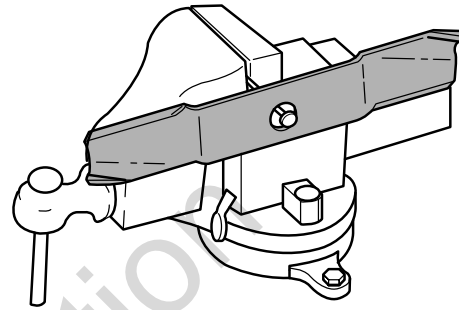
Thrown objects hazard.

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 36.

36



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 the Mower Blades



CAUTION

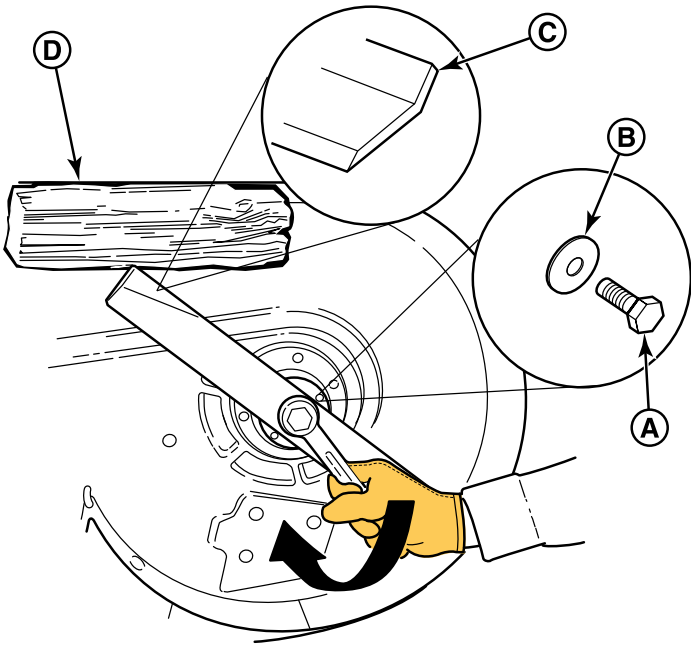
Laceration hazard.

Mower blades are sharp.

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

1. Install each mower blade with the air lifts (C, Figure 37) pointing up towards the mower deck as shown in Figure 37 and secure with the mower blade mounting bolt (A) and flat washer (B).

37

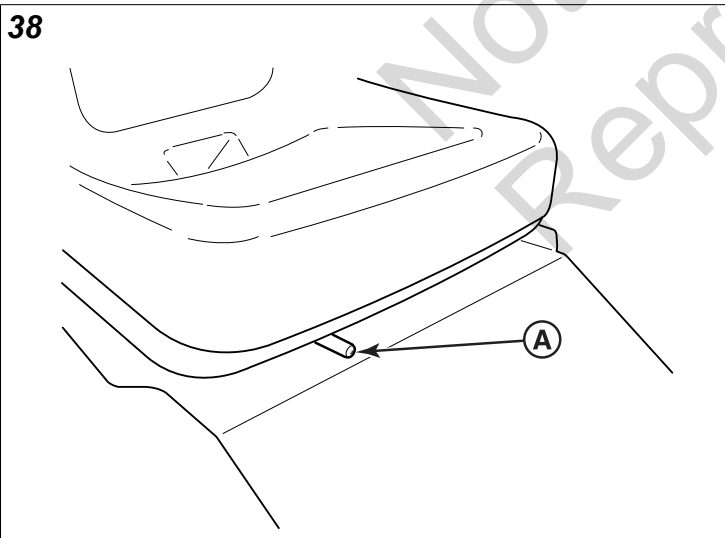


- Wedge a wooden block (D) between the mower blade and the mower deck housing to keep the mower blade from turning and torque the blade mounting bolt to 120 ft. lbs (163 Nm).

Seat Adjustment

The seat can be adjusted forward and back. Move the lever (A, Figure 38) towards the left, position the seat as desired, and release the lever to lock the seat into position.

38



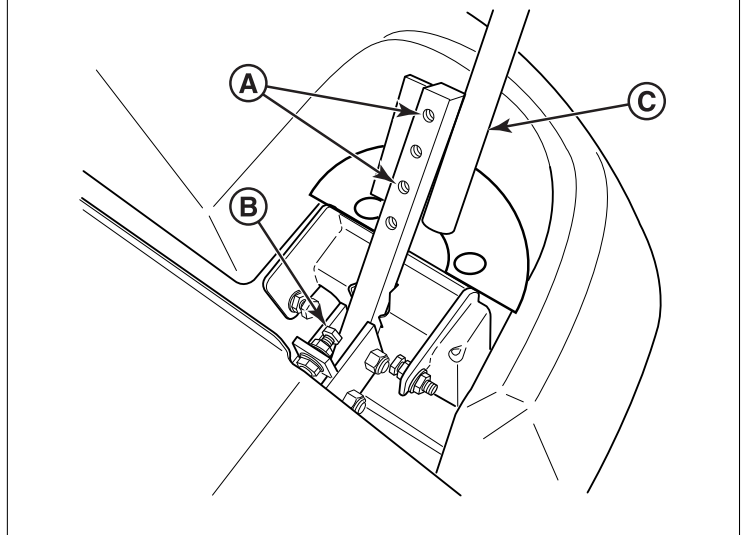
Ground Speed Control Lever Adjustment

The control levers can be adjusted in three ways. The alignment of the control levers, the placement of the control levers (how close the ends are to one another), and the height of the control levers can be adjusted.

To Adjust the Control Lever Alignment

Loosen the mount bolts (A, Figure 39) and pivot the control lever(s) (C) to align with each other.

39



To Adjust the Control Lever Placement

Loosen the jam nuts and adjust the placement bolt (B) in or out to properly adjust the control lever end spacing.

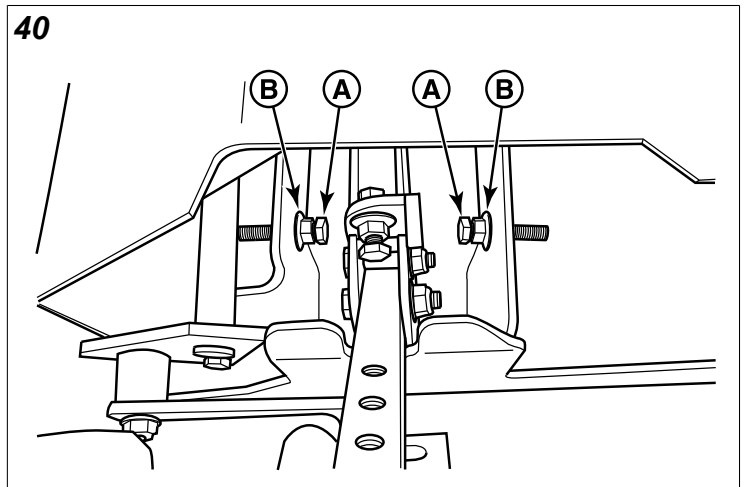
To Adjust the Control Lever Height

Remove the mounting hardware and position the control lever either up or down from its original position. You will need to adjust the control lever alignment as described above.

Speed Balancing 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 by turning the adjustment bolt(s) (A, Figure 40). Only adjust the speed of the wheel that is traveling faster.

40



To Reduce the Speed of the Faster Wheel

- Loosen the securing nut (B).
- Turn the top speed adjustment bolt **counter-clockwise** to reduce the speed.
- Tighten the securing nut when adjustment is complete.



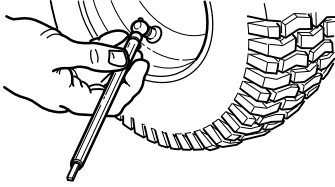
WARNING

Unsafe Operation Hazard.

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

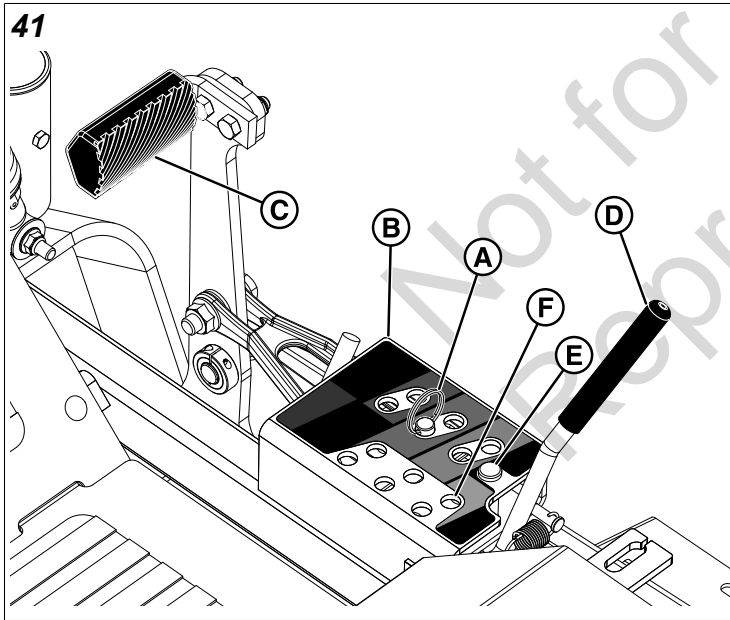
Checking Tire Pressures

Tire pressure should be checked periodically, 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 cutting height adjustment pin (A, Figure 41) controls the mower's 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.



Note: Make sure that the cutting height adjustment pin is inserted into the holes in both upper and lower plates of the pin box (B).

To set the cutting height at 1-1/2" (3,37 cm):

1. While sitting in the operator's seat, press the deck lift foot pedal (C) forward until it locks into the 4-1/2" (11,4 cm) position.
2. Remove the cutting height adjustment pin from the hole that it is installed in.
3. Press the deck lift foot pedal forward and then push the lock lever (D) towards the right to release the lock.

4. Slowly release the deck lift foot pedal until it comes to rest against the stationary pin (E) in the 1-1/2" (3,37 cm) cutting height hole.
5. Place the cutting height adjustment pin in the storage hole (F).

To set the cutting height in the range of 1-3/4" (4,40 cm) and 4-1/4" (10,8 cm):

1. While sitting in the operator's seat, press the deck lift foot pedal forward until it locks into the 4-1/2" (11,4 cm) position.
2. Place the cutting height adjustment pin in the desired cutting height.
3. Press the deck lift pedal forward and then push the lock lever towards the right to release the lock.
4. Slowly release the deck lift foot pedal until it comes to rest against the cutting height adjustment pin.

To set the cutting height at 4-1/2" (11,4 cm):

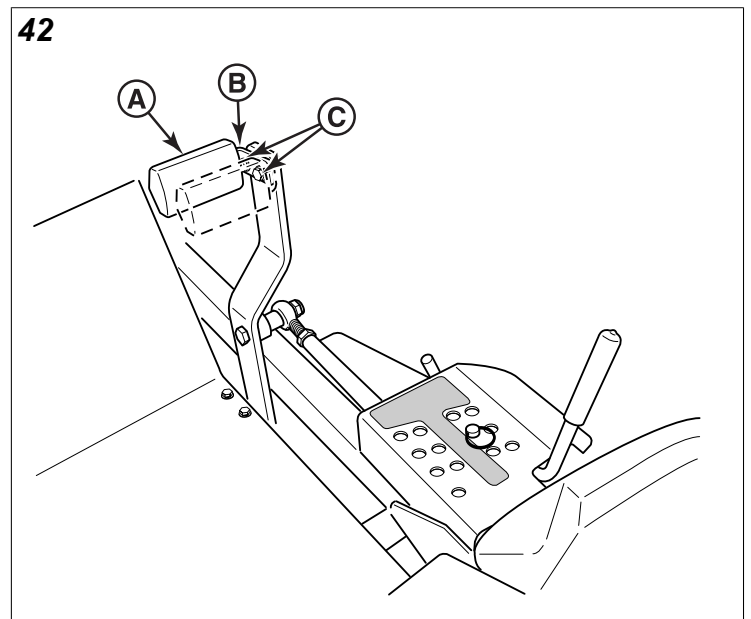
1. While sitting in the operator's seat, press the deck lift foot pedal forward until it locks into the 4-1/2" (11,4 cm) position.
2. Place the cutting height adjustment pin in any open cutting height hole. The lift lock lever holds the mower deck at 4-1/2" (11,4 cm) while cutting.

Foot Pedal Adjustment

The deck lift foot pedal can be adjusted to accommodate the operator's height for optimal comfort.

To adjust pedal position:

1. Remove the foot pedal (A, Figure 42) from the pedal mount tab (B).



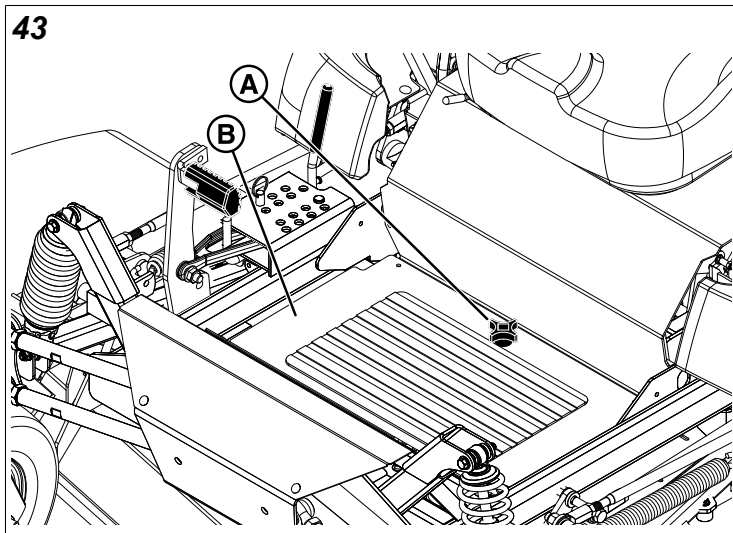
2. Remove the pedal mount hardware (C) and rotate the tab 180 degrees.
3. Reinstall the pedal mount hardware and tighten securely.

4. Reinstall the foot pedal on the pedal mount tab in the proper orientation as shown in Figure 42.

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.

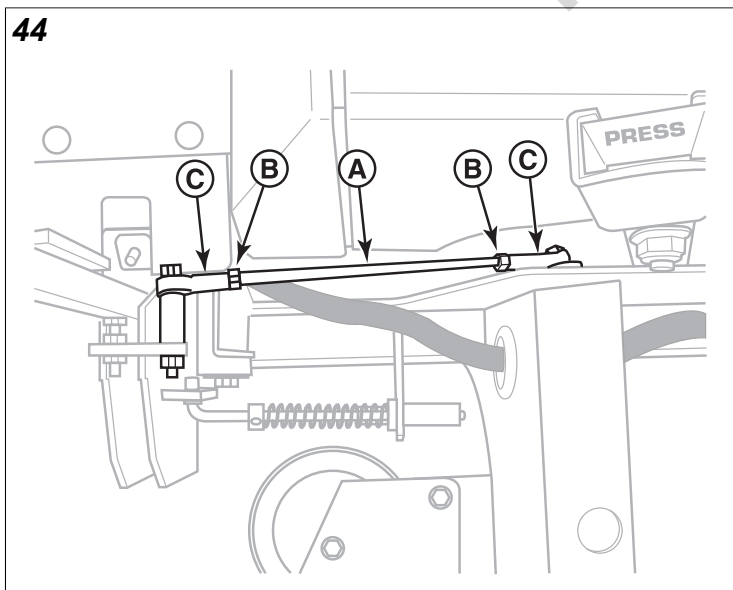
1. Loosen and remove the retaining hardware (A, Figure 43) that secures the floor pan to the frame of the unit.



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 consists of two neutral linkage rods and a pivot that connects the ground speed control lever to the transmission. The lower rod that connects the transmission to the pivot is factory preset and should not be changed for neutral adjustment purposes. The adjustment is achieved by changing the length of the upper rod (A, Figure 44) that connects the ground speed control lever to the pivot.



Determining if Adjustment is Necessary: If the unit "creeps" while the ground speed control levers are locked in the NEUTRAL LOCKOUT position, then it may be necessary to adjust the linkage rods.

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

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

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

Return-to-Neutral Adjustment

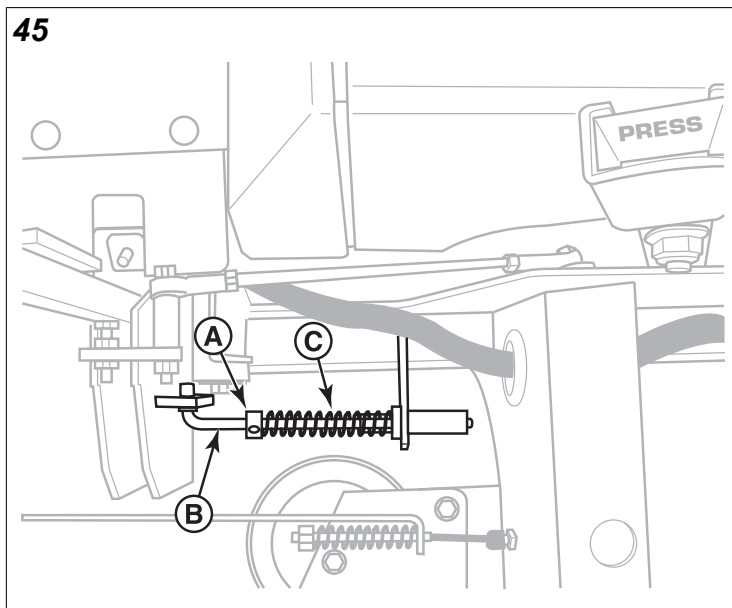
Prior to performing this procedure the *Neutral Adjustment* procedure must be completed.



WARNING

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

1. Position the ground speed control levers into the NEUTRAL LOCKOUT position
2. Loosen the set collar (A, Figure 45) on the neutral return rod (B).



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

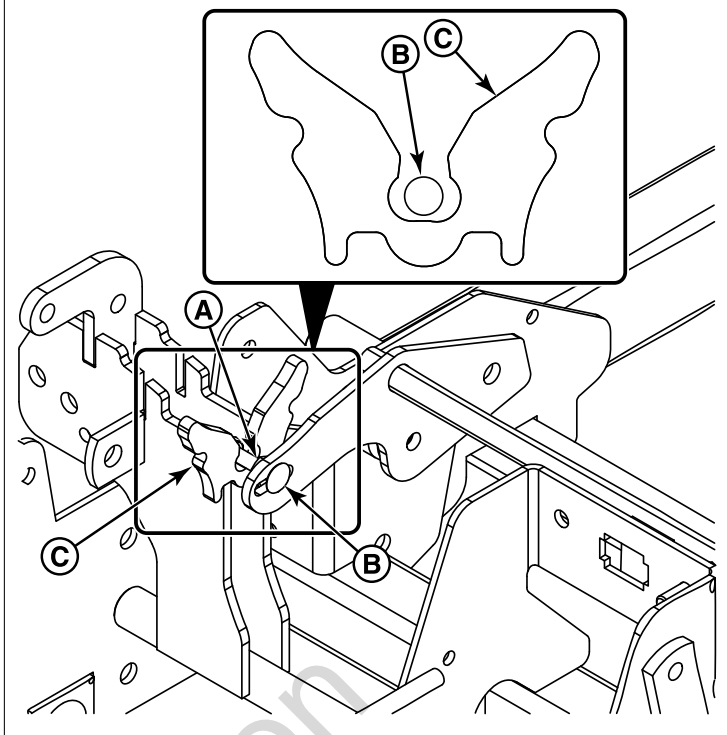
Note: It is important to note that after every adjustment of the neutral return rod, the lever must be pulled rearward and released to properly check the return-to-neutral position.

Neutral Lockout Adjustment

Prior to adjusting the neutral lockout, the neutral and return-to-neutral must be properly adjusted.

1. Park the unit on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
2. Chock the wheels of the unit to prevent movement.
3. Raise the seat to gain access to the neutral lockout components.
4. Loosen the jam nuts (A, Figure 46) on the neutral lockout bolts (B).

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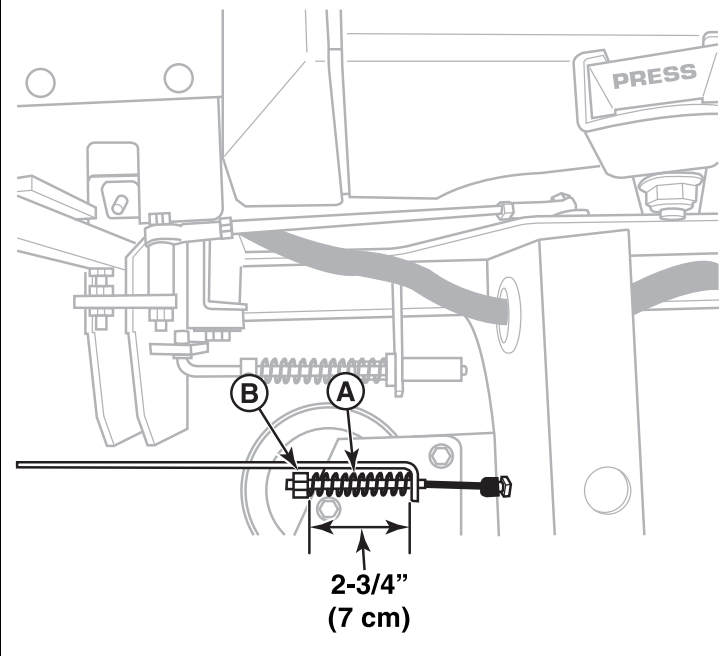
5. Engage the parking brake. The neutral lockout bolts will enter the notches of the neutral lockout plates (C).
6. Position the neutral lockout bolts to the center of the notches of the neutral lockout plates.
7. Re-tighten the jam nuts.

Parking Brake Adjustment

The parking brake mechanism consists of two parking brake cables, with a spring on both ends, that routes from the transmission to the parking brake lever shaft. The position of the parking brake cables and the compressed length of the lower springs located by the transmissions are factory preset and should not be changed for parking brake adjustment procedures. The adjustment is achieved by changing the compressed spring length of the upper parking brake springs.

1. Disengage the PTO, engage the parking brake, stop the engine, and chock the tires.
2. Raise the seat plate.
3. Locate the parking brake springs (A, Figure 47).

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4. With the parking brake engaged measure the compressed spring length. The spring should measure 2-3/4" (7 cm) when compressed.
5. If the spring length is not 2-3/4" (7 cm), release the parking brake, and turn the adjustment nut (B) to compress or release the spring.
6. Engage the parking brake and re-measure the spring.

CAUTION

Do not adjust the spring to be shorter than 2-1/2" (6.4 cm) when compressed. This may damage the brake mechanism.

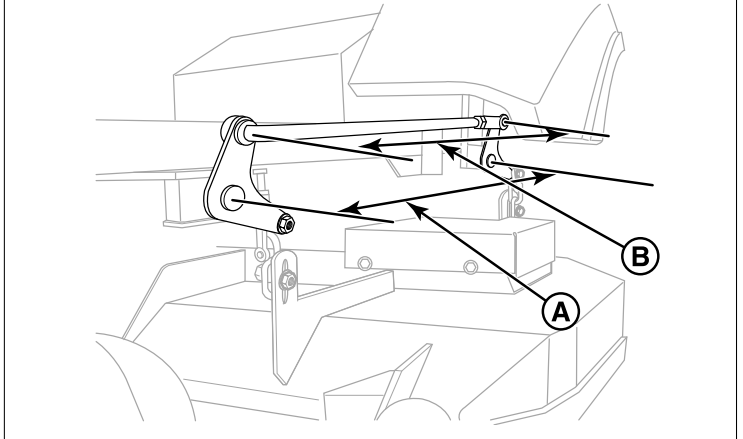
If this does not correct the braking problem, see your dealer.

Deck Lift Rod Timing Adjustment

Checking the Deck Lift Rod Timing

1. Park the machine on a flat, level surface. Disengage the PTO, engage the parking brake, turn off the engine and remove ignition key. Check that the tires are properly inflated.
2. To check the lift rod timing, measure and record the distance between the lift pivots (A, Figure 48) and the rod pivots (B). Repeat for the other side of the unit.

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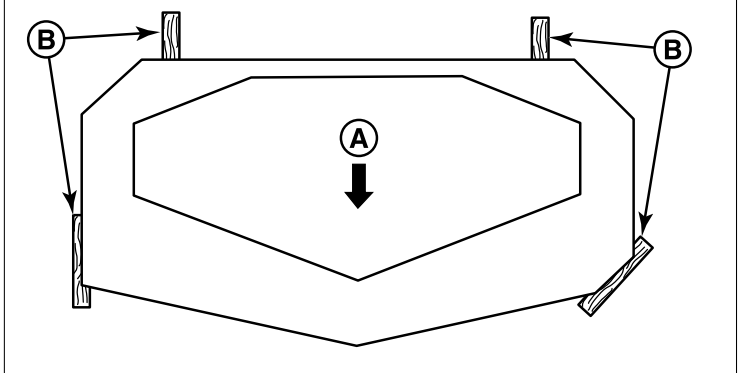


3. If the measurements for the rods are equal, no further adjustment is required. If the measurements are not equal (greater than 1/8" (3.17 mm) difference), adjustment is required, continue with **Adjusting the Deck Lift Rod Timing**.

Adjusting the Deck Lift Rod Timing

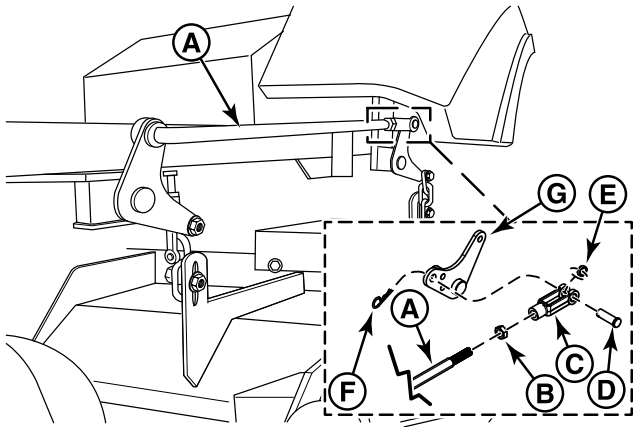
1. Lock the deck lift pedal in the 4-1/2" (11.4 cm) position. Remove the cutting height adjustment pin and lower the mower deck.
2. To ensure that the deck is in the lowest position, push the pedal by hand towards the rear of the unit and install the height adjustment pin in the 3" (7.6 cm) position to hold in place.
3. Block up the mower deck with 2 X 4's (B, Figure 49) until all hanger chains are slack. The arrow (A) indicates the front of the mower deck.

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4. To adjust the deck lift rod (A, Figure 50), loosen the jam nut (B) on the clevis (C) then remove the 1/2" clevis pin (D), spacer (E) and hair pin (F) fastening the clevis to the lift pivot arm (G). Turn the clevis clockwise to shorten the distance between the rod pivots until the measurements between the lift pivots and rod pivots are the same. Reinstall the clevis on the lift pivot arm and secure with the 1/2" clevis pin, spacer and hair pin previously removed. Tighten the jam nut against the clevis.

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5. Remove the blocks from under the mower deck.
6. Remove the cutting height adjustment pin from in front of the deck lift pedal arm. Lift the mower deck and reinstall the adjustment pin in the desired mowing height.

Deck Leveling Adjustment

Before adjusting the deck level, the deck lift rod timing must be checked and/or adjusted.

Determining if the Deck Leveling Needs to be Adjusted

1. Park the unit on a flat, level surface. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
2. Lock the deck lift pedal in the TRANSPORT position. Place the cutting height adjustment pin in the 4" position and lower the deck lift pedal until the deck lift arm contacts the cutting height adjustment pin.
3. Verify that the tires are inflated to the correct pressure.
4. Verify that the mower blades are flat, and not bent or broken. A bent or broken blade must be replaced.



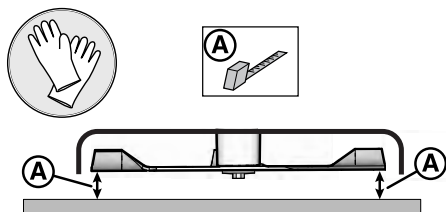
WARNING

Avoid Injury! Mower blades are sharp.

Always wear gloves when handling blades or working near blades.

5. See Figure 51. Position the outside mower blades so they face front-to-back.

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6. Measure the front tip (A, Figure 51) of the blade from the cutting edge to the ground.

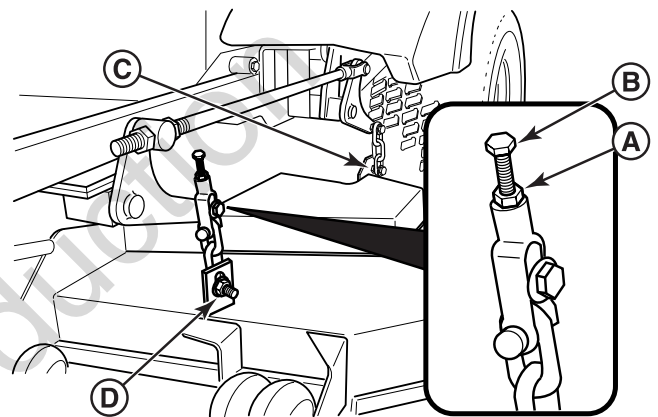
7. Measure the rear tip (A) of the blade from the cutting edge to the ground.
8. Repeat the process on the other side of the machine.
 - the front measurements should equal 4" (10,2 cm).
 - the rear measurements should equal 4-1/4" (10,8 cm)

If the measurements do not equal the measurements as listed above, adjust the deck leveling.

Deck Leveling Adjustment

1. Place the deck height adjustment pin in the 4" (10,2 cm) position.
2. Place 2 X 4 blocks under each corner of the mower deck with the 3-1/2" sides being vertical. Place a 1/4" (0,64 cm) thick spacer on the top of the rear blocks.
3. Loosen the nuts (D, Figure 52) and allow the front of the deck to rest on the 2 X 4's. Slide the chains in the slots until the chains are tight and tighten the nuts.

52

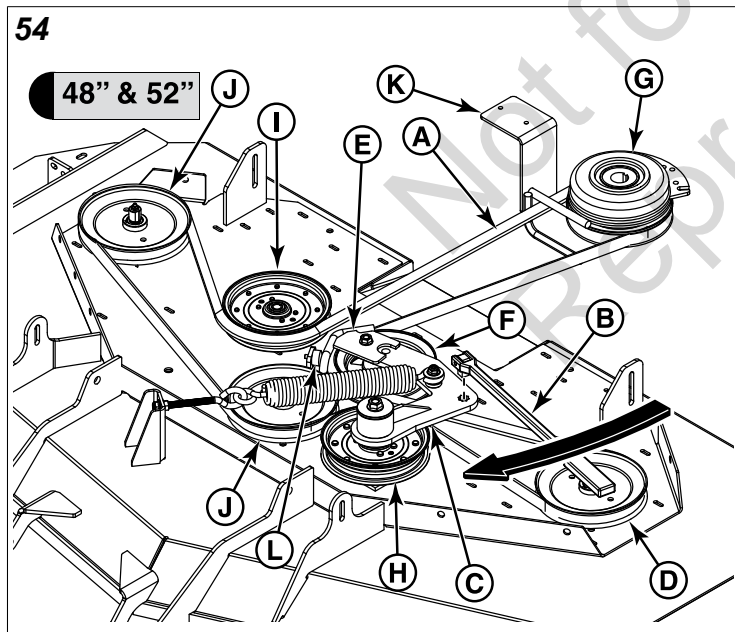
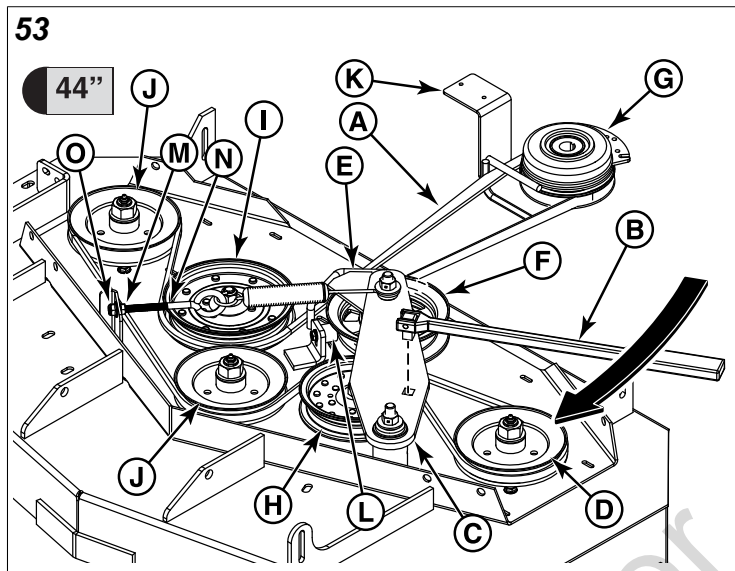


4. Loosen the nuts (C) and allow the rear of the deck to rest on the 2 X 4's and 1/4" spacers. Slide the chains in the slots until the chains are tight and tighten the nuts.
5. Repeat the process for the other side of the unit.
6. Remove all the blocks and spacers for under the mower deck.
7. Perform the *Determining if the Deck Leveling Needs to be Adjusted* procedure to verify that the deck has been leveled correctly.
 - If the mower deck does not measure 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear, proceed with step #8.
8. Loosen the jam nut (A) and turn the fine adjustment bolt (B) to adjust the deck height.
 - Turn the bolt **clockwise** to raise the deck.
 - Turn the bolt **counter-clockwise** to lower the deck.
9. Once the desired measurements are achieved, re-tighten the jam nut.
10. Repeat the process for the other side of the unit.

Mower Deck Drive Belt Replacement

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

1. Park the unit on a smooth level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
2. Lower the mower deck to its lowest cutting position and remove the mower deck guards and floor pan to gain access to the mower deck drive belt (A, Figures 53& 54).



3. **44" Models Only:** Loosen the jam nut (M) on the eye bolt (N) and then loosen the adjustment nut (O) to relieve the majority of the tension exerted on the belt from the idler arm.

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.

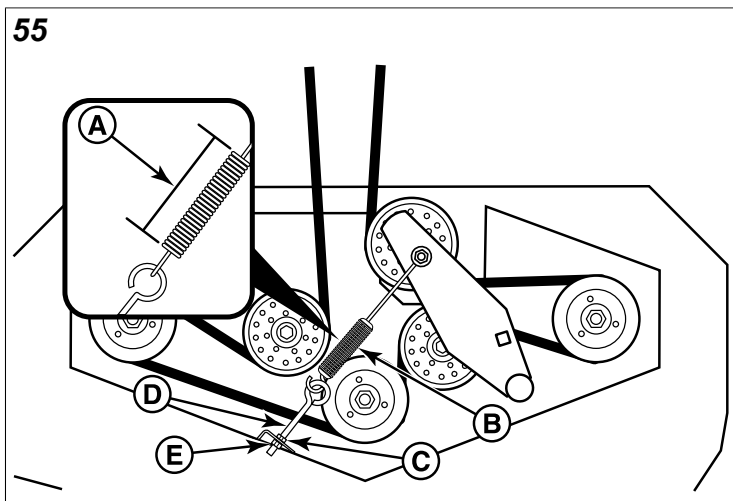
4. Using a 1/2" breaker bar (B, Figures 53& 54) place the square end in the opening in the idler arm (C) and rotate the idler arm **clockwise**, which will relieve tension on the belt exerted from the idler arm. Remove the belt from the left hand side spindle pulley (D). Pull the length of the belt removed from the left hand spindle pulley towards the center of the deck.
5. Rotate the idler arm **clockwise** so that it is pulled away from the idler arm stop (L). To remove the belt from the belt guide (E), start with the leg of the belt between the adjustable idler pulley (F) and the PTO clutch pulley (G) and press the belt down below the belt guide and then pull it around and then above the belt guide. Carefully release the tension on the breaker bar.
6. Remove the old belt from the front stationary idler pulley (H), rear stationary idler pulley (I), and the remaining spindle pulleys (J).
7. Install the new belt onto the right hand side and the center spindle pulleys (J) and the PTO clutch pulley (G). Make sure that the V-side of the belt runs in the pulley grooves and that the belt is correctly routed through the PTO clutch belt guide (K) and that the back side of the belt contacts the faces of the front stationary idler pulley (H) and the rear stationary idler pulley (I).
8. Rotate the idler arm **clockwise** so that it is pulled away from the idler arm stop. To install the belt into the belt guide, start with the leg of the belt between the adjustable idler pulley and the PTO clutch pulley and raise the belt up into the belt guide. Pull the length of belt towards the left hand spindle pulley. Carefully release the tension on the breaker bar.
9. Verify that the V-side of the belt runs in the grooves of the right hand side and center spindle pulleys and the PTO clutch pulley. Verify that the back side of the pulley contacts the face of the adjustable idler pulley, front stationary idler pulley, and the rear stationary idler pulley. Verify that the belt is correctly routed through the belt guides.
10. Rotate the idler arm **clockwise** and install the belt on the left hand spindle pulley.
11. Carefully release the tension on the breaker bar.
12. Set the mower deck to the 3-1/2" (8,9 cm) cutting height.
13. Use the Spring Length chart to determine the correct spring length for your unit.

Spring Length	
Deck Size	Measurement
44"	7" (17,8 cm)
48"	11" (27,9 cm)

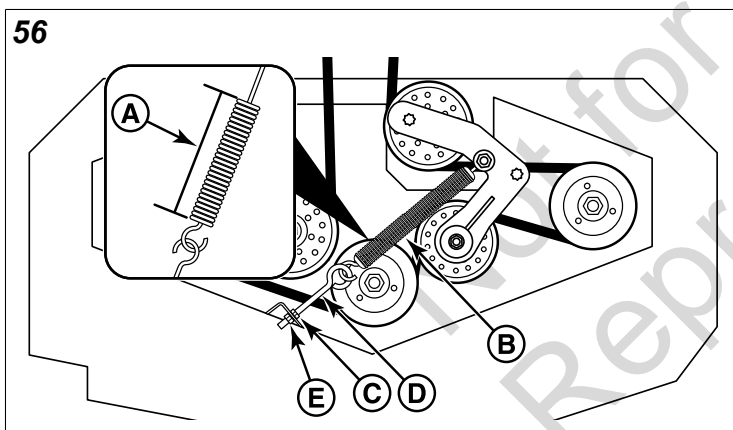
Spring Length	
52"	11" (27,9 cm)

14. Measure the coil-to-coil length (A, Figure 55 & 56) of the deck belt tensioning spring (B). The measurement should equal the measurement as indicated in the chart. If not, continue with step #15.

• 44" Mower Deck



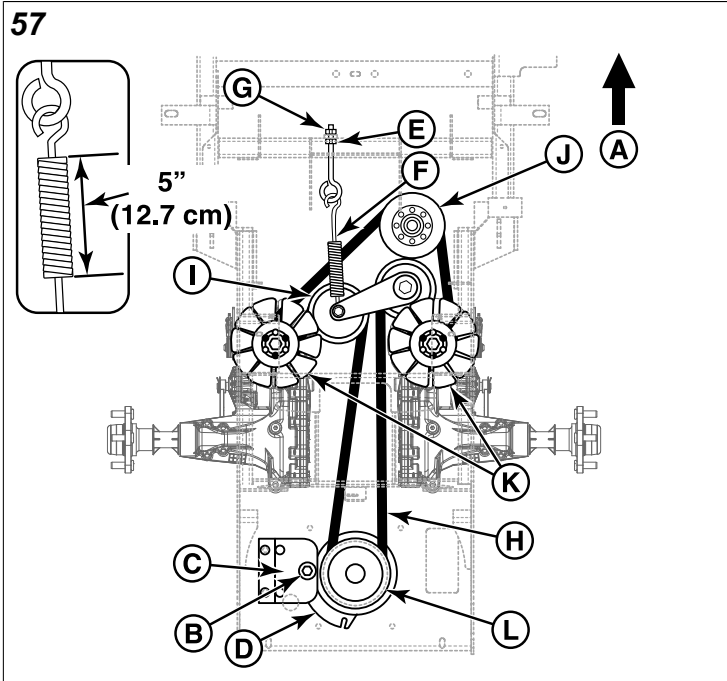
• 48" Mower Deck / 52" Mower Deck



15. Loosen the jam nut (C) on the eye bolt (D).
16. Turn the adjustment nut (E) until the measurement as indicated in the chart is achieved.
17. Re-tighten the jam nut.
18. Re-install the mower deck guards and the floor pan.
19. Run the mower under no-load condition for about five (5) minutes to break in the new belt.

Transmission Drive Belt Replacement

The illustration depicts the transmission drive belt setup as seen from the top side of the unit and the arrow (A, Figure 57) indicates the front of the unit.



1. Park the mower on a smooth, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the ignition, and remove the key.
2. Remove the mower belt. See Mower Drive Belt Replacement for removal instructions.
3. Remove the hardware (B) that secures the clutch anchor pad (C) to the PTO clutch (D) and disconnect the wire harness from the PTO clutch.



WARNING

STORED ENERGY DEVICE: Improper release of the belt tension spring can result in personal injury. Use extreme caution when removing the spring.

4. Loosen the jam nut (E) on the spring anchor eyebolt (F).
5. Loosen the adjustment nut (G) on the spring anchor eyebolt to release the majority of the belt tension. Use caution to remove the nut to completely release the tension.
6. Remove the old belt and replace with a new one (H). Make sure the V-side of the belt runs in the grooves of the adjustable idler pulley (I), front stationary idler pulley (J), both transmission pulleys (K) and the crankshaft pulley (L).
7. Reinstall the spring anchor eyebolt into the spring anchor tab and loosely fasten the adjustment nut.
8. Tighten the nut until the spring achieves a coil-to-coil measurement of 5" (12.7 cm).
9. Tighten the jam nut.
10. Reinstall the clutch anchor pad to the PTO clutch and secure using the hardware previously removed. Reconnect wire harness to the PTO clutch.

11. Reinstall the PTO belt. See Mower Drive Belt Replacement for instructions.

Rear Suspension Adjustment

The shock assembly can be adjusted in two ways to allow the operator to customize the ride according to operator's weight and/or operating conditions. You have the option of adjusting the spring pre-load and/or the upper mounting position.

Items to consider before adjusting the suspension.

- Less spring pre-load should be used with light weight operators, which will provide a softer, more cushioned ride.
- More spring pre-load or upper mounting position #2 should be used with heavy weight operators, or when a rear-mount grass bagger system is installed, which will provide a stiffer, more rigid ride.

To Adjust the Spring Pre-Load:

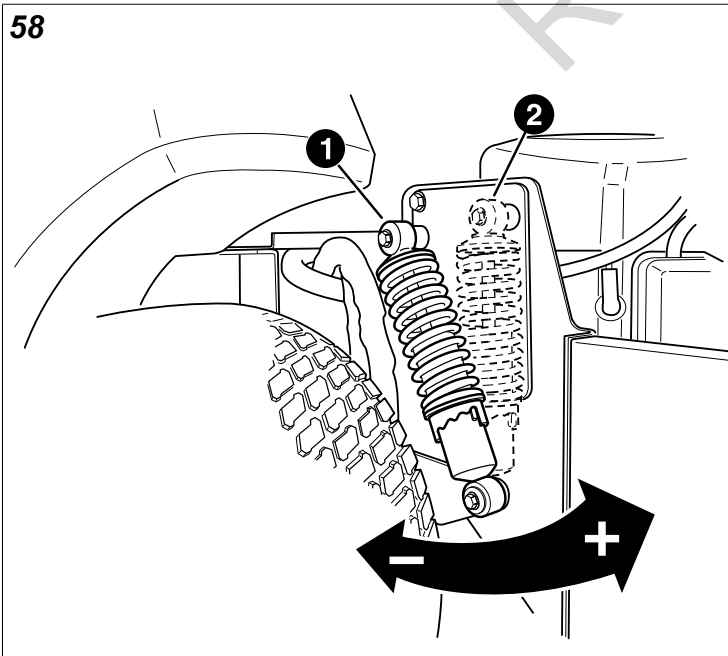
1. Park machine on a flat, level surface. Disengage the PTO, stop the engine and engage the parking brake.
2. Raise the rear of the machine and secure with jack stands. Chock the front wheels to prevent the machine from rolling.
3. Remove the rear drive tires.



WARNING

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

4. See Figure 58. Using the supplied spanner wrench (p/n 5022853), insert the tip of the wrench into the notch in the pre-load adjuster. While holding the wrench in place with one hand, turn **counter-clockwise** to increase the pre-load, turn **clockwise** to decrease the pre-load. Make sure both shocks are set to the same amount of pre-load.



5. Reinstall the rear drive tires. Torque the lug bolts to 85-95 ft/lbs. (115-129 Nm). Remove the jackstands from under the machine.

NOTE: Spanner wrench is located under the seat on the right-hand side of the machine.

To Adjust the Upper Mounting Position:

1. Park machine on a flat, level surface. Disengage the PTO, stop the engine and engage the parking brake.
2. Raise the rear of the machine and secure with jack stands. The jack stands must be under the bumper. Chock the front wheels to prevent the machine from rolling.
3. Position the jack under the cross member that ties the suspension arms together and slowly raise the rear suspension to relieve the pressure on the upper shock mounting bolts.

Note: This will require small adjustments to the jack's position. The shock should move freely on the mounting bolt when the pressure is relieved.

4. Remove the upper shock mounting hardware and pivot the shock to the position #2 (see Figure 58). Adjust the jack to align the shock mounts to the shocks.
5. Reinstall the upper shock mounting hardware and tighten securely.
6. Remove the jack from under the suspension cross member.
7. Remove the jack stands from under the machine.

Battery Maintenance



DANGER

Be careful when handling the battery.

Battery acid can cause severe burns. Avoid contact with skin. Wear protective gear (safety goggles/face shield and gloves) when working with the battery.

Keep the battery out of reach of children.

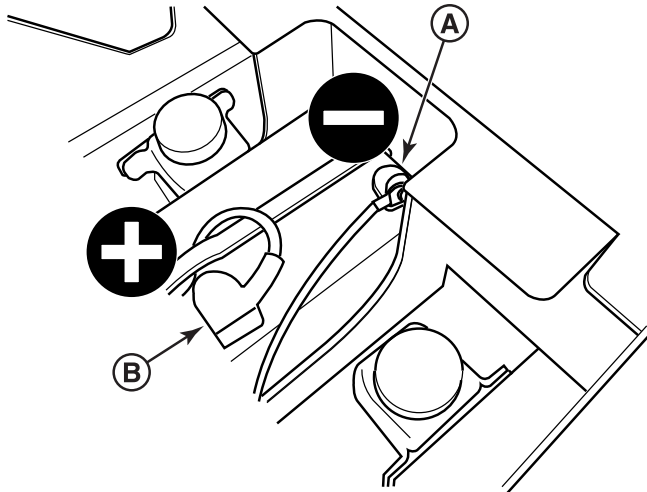
To avoid an explosion, keep open flames and sparks away from the battery, especially while charging.

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

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

1. Disconnect the cables from the battery, negative [-] cable first (A, Figure 59).



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.

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

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 authorized Ferris servicing 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.

Jump Starting with Auxiliary (Booster) Battery

Jump starting is not recommended.

Troubleshooting

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

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

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



WARNING

Remove ignition key prior to performing maintenance on the unit.

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

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

Troubleshooting Charts

Troubleshooting the Rider

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

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

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

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

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

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

Problem: Rider drive belt slips.	
Cause	Remedy
Pulleys or belt is greasy or oily.	Clean as required.
Tension too loose.	Adjust the spring tension. See Transmission Drive Belt Replacement.
Belt stretched or worn.	Replace belt.

Problem: Brake will not hold.	
Cause	Remedy
Brake is incorrectly adjusted.	See Parking Brake Adjustment.
Braking components in transmission worn.	See authorized dealer.

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

Troubleshooting the Mower Deck

Problem: Mower will not raise.	
Cause	Remedy

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

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

Problem: Excessive mower vibration.	
Cause	Remedy
Blade mounting bolts are loose.	Tighten to 120 ft-lbs (163 Nm).
Mower blades, arbors, or pulleys are bent.	Check and replace as necessary.
Mower blades are not balanced.	Remove, sharpen, and balance blades. See Servicing the Mower Blades.
Belt installed incorrectly.	Reinstall the belt correctly.

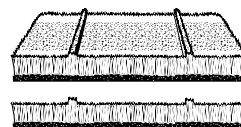
Problem: Excessive belt wear or breakage.	
Cause	Remedy
Bent or rough pulleys.	Repair or replace.
Using incorrect belt.	Replace with correct belt.

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

Problem: Mower does not engage.	
Cause	Remedy
Electrical wiring damage.	Locate and repair damaged wire.
Battery voltage too low.	Recharge battery and check alternator. See Battery Maintenance.

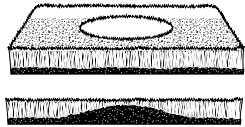
Troubleshooting Common Cutting Problems

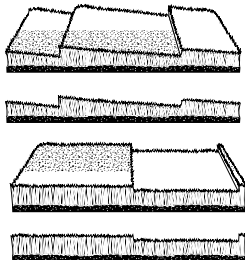
Problem: Striking	
Striking is when thin strips of uncut grass are left behind the mower. Striking is usually caused by operator error or poor blade maintenance.	

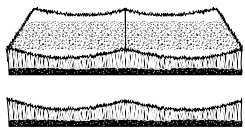


Cause	Remedy
Blades are not sharp.	Sharpen your blades.
Blades are worn down too far.	Replace your blades.
Engine speed is too slow.	Always mow at full throttle.
Ground speed is too fast.	Slow down.
Deck is plugged with grass.	Clean out the mower.
Not overlapping cutting rows enough.	Overlap your cutting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

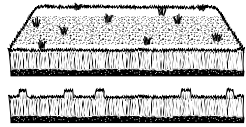
Problem: Striking	
Not overlapping enough when turning.	When turning your effective cutting width decreases—overlap more when turning.

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.

Problem: Uneven Cutting	
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: 5901702, 5901703 & 5901908

18.5 HP Kawasaki	
Make	Kawasaki
Model	FS600V-DS00-S (S/N: 2016360971 and below) FS600V-ES00-S (S/N: 2016360972 and above)
Electrical System	12 volt, 15 amp charging coil; Battery: 340 cca

Fits models: 5901699, 5901701, 5901703, 5901715, 5901716, 5901906, 5901907 & 5901915

Briggs & Stratton Commercial Turf 44T977	
Make	Briggs & Stratton
Model	44T977-0005-G1
Electrical System	12 volt, 16 amp. alternator; Battery: 350 CCA

Fits models: 5901776, 5901815 & 5901911

Kawasaki FS691V	
Make	Kawasaki
Model	FS691V-ES00-S
Electrical System	12 volt, 15 amp charging coil; Battery: 350 CCA

Fits models: 5902109, 5902110 & 5902112

Briggs & Stratton® CXi 44T977	
Make	Briggs & Stratton®
Model	44T977-0054-G1

Briggs & Stratton® CXi 44T977

Electrical System	12 volt, 16 amp. alternator; Battery: 350 CCA
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CHASSIS

Fuel Tank Capacity	6 gallons (22,7 L) total
Rear Wheels	
Tire Size (44" Mower Decks)	20 X 8 - 10
Tire Size (48" and 52" Mower Decks)	22 X 11 - 10
Inflation Pressure	15 psi (1,03 bar)
Front Wheels	
Tire Size (44" Mower Decks)	11 X 4 - 5
Tire Size (48" and 52" Mower Decks - S/N: 4000771923 and below)	13 X 5 - 6
Tire Size (48" and 52" Mower Decks - S/N: 4000771924 and above)	13 X 6.5 - 6
Inflation Pressure	25 psi (1,72 bar)

TRANSMISSIONS

Serial Number: 4001547047 and below	
LH	ZJ-KYEF-8T7C-14RX (5105085)
RH	ZJ-GYEF-8T7B-14RX (5105086)
Serial Number: 4001547048 and above	
LH	ZJ-KYEF-9T7C-14RX (5109252)
RH	ZJ-GYEF-9T7B-14RX (5109251)
Type	ZT-3200 Transaxles
Hydraulic Fluid	SAE 20W-50 motor oil
Speeds @3400 rpm	
Forward (Models with 44" Mower Decks)	0-8.6 MPH (0-13,8 km/h)
Forward (Models with 48" Mower Decks)	0-9.5 MPH (0-15,3 km/h)
Forward (Models with 52" Mower Decks)	0-9.5 MPH (0-15,3 km/h)

Reverse (Models with 44" Mower Decks)	0-4 MPH (0-6,4 km/h)
Reverse (Models with 48" Mower Decks)	0-5 MPH (0-8 km/h)
Reverse (Models with 52" Mower Decks)	0-5 MPH (0-8 km/h)

DIMENSIONS

Models with 44" Mower Decks:

Overall Length	80" (203 cm)
Overall Width (with discharge chute down)	59" (150 cm)
Overall Width (with discharge chute up)	48" (119 cm)
Height	61-1/2" (164 cm)
Weight (approximate)	920 lbs (417 kg)

Models with 48" Mower Decks:

Overall Length	80" (203 cm)
Overall Width (with discharge chute down)	63" (160 cm)
Overall Width (with discharge chute up)	51" (130 cm)
Height	65-1/2" (165 cm)
Weight (approximate)	942 lbs (427 kg)

Models with 52" Mower Decks:

Overall Length	80" (203 cm)
Overall Width (with discharge chute down)	66-3/4" (170 cm)
Overall Width (with discharge chute up)	56-1/2" (144 cm)
Height	65-1/2" (165 cm)
Weight (approximate)	964 lbs (437 kg)

Warranty

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

Warranty Statement

BRIGGS & STRATTON WARRANTY POLICY (November 2018)

LIMITED WARRANTY

Briggs & Stratton warrants that, during the warranty period specified below, it will repair or replace, free of charge, any part that is defective in material or workmanship or both. Transportation charges on product submitted for repair or replacement under this warranty must be borne by purchaser. This warranty is effective for and is subject to the time periods and conditions stated below. For warranty service, find the nearest Authorized Service Dealer in our dealer locator map at ferrismowers.com. The purchaser must contact the Authorized Service Dealer, and then make the product available to the Authorized Service Dealer for inspection and testing.

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

WARRANTY PERIOD		
Covered Parts	Standard Warranty Period	Rental Warranty Period
Riding mowers - except as noted below +	4 years (48 months) or 500 hours, whichever occurs first. Unlimited hours during the first 2 years (24 months)	90 days
+Coil over shocks and all suspension related components	5 years (60 months) unlimited hours	90 days
+Hydro Drive Belt, Tires, Brake Pads, Hoses, Battery, Blades	90 days	90 days
+Mower Deck Drive Belt (Conventional Single Belt Deck Drive Systems)	1 year (12 months) or 100 hours, whichever occurs first	90 days
+Mower Deck Drive Belt (Two Belt Deck Drive Systems)	3 years (36 months) or 300 hours, whichever occurs first. (Parts and labor in year one; parts only in years two and three)	90 days
+Attachments	1 year	90 days
+Engine*	See Engine Operator's Manual	See Engine Operator's Manual

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

** In Australia, 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, Kemp's 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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