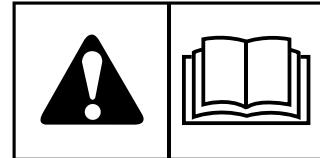




# OPERATOR'S MANUAL

## SRS Z3X Series Zero-Turn Riding Mower



Model	Description	Model	Description
5901691	SRSZ3XKAVE3061	5901951	SRSZ3XBVE3761
5901692	SRSZ3XBVE3761	5901953	SRSZ3XBVE3772
5901693	SRSZ3XKAVE3072	5901955	SRSZ3XKAV2752
5901694	SRSZ3XBVE3772	5901957	SRSZ3XBVE3752
5901784	SRSZ3XBVE3352		
5901789	SRSZ3XBVE3361		
5901809	SRSZ3XBVE3752		

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

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Thank you for purchasing this quality-built Ferris Zero-Turn Stand-On 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 Stand-On Mower was designed to be used as described in this operator's manual and operated by trained professionals for finish cutting of established lawns and is not intended for any other purpose. It is important that you read and understand the instructions thoroughly before attempting to start or operate this equipment. Save these original instructions for future reference.

## Products Covered by This Manual

The following products are covered by this manual:

5901691, 5901692, 5901693, 5901694, 5901784, 5901789, 5901809, 5901951, 5901953, 5901955 & 5901957

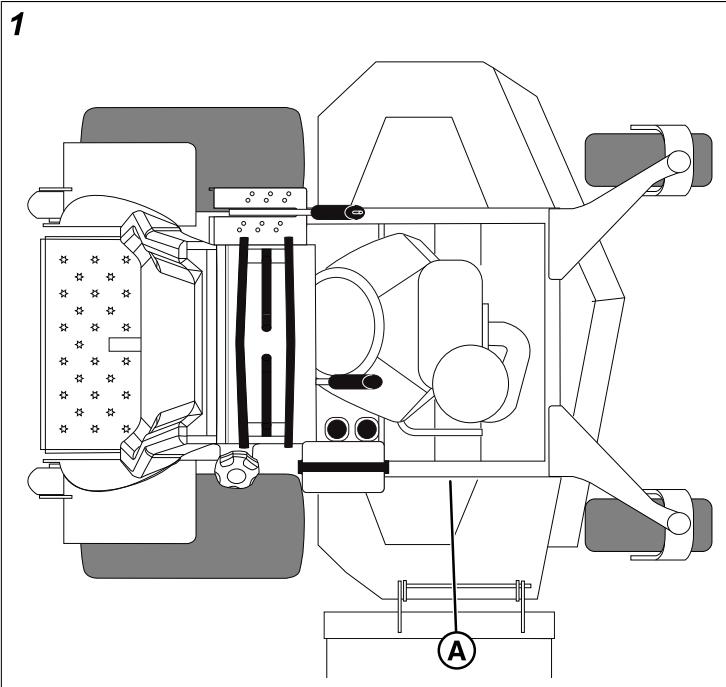
The images in this document are representative, and are meant to complement the instructional copy they accompany. Your unit may vary from the images displayed. *LEFT* and *RIGHT* are as seen from the operator's position.

Ferris is a registered trademark of Briggs & Stratton.

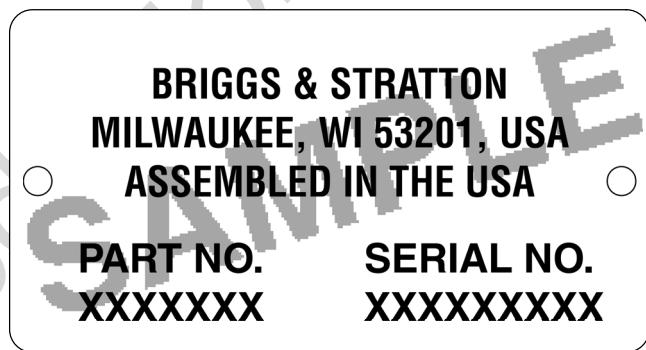
The Illustrated Parts Lists for this machine can be downloaded from [ferrismowers.com](http://ferrismowers.com). Please provide model and serial number when ordering replacement parts.

## Product Identification Tag

The product identification tag (A, Figure 1) can be found on the left frame rail of the unit.



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



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

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

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

# 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.



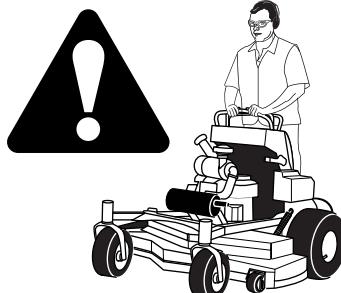
This product can expose you to chemicals including gasoline engine exhaust, which is known to the State of California to cause cancer, and carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

## Operating Safely

Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of the 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.

Keep both feet on the operator platform at all times.

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

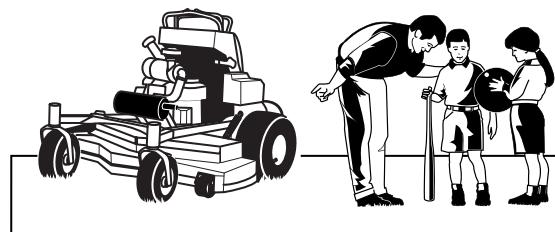


The operator's manual contains important safety information you need to be aware of BEFORE you operate your unit as well as DURING operation.

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.

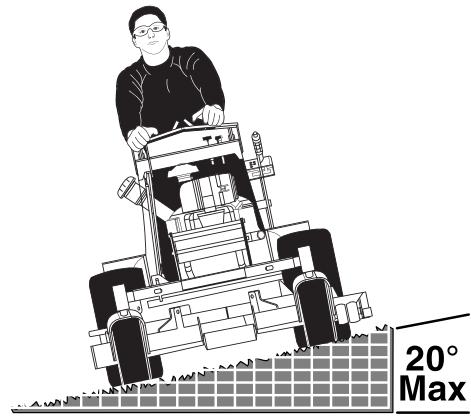
Be sure to completely read the *Safety Rules and Information* found on the following pages. Also completely read the *Operation* section.

## 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. Slopes are a major factor related to accidents, which can result in severe injury or death. 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.

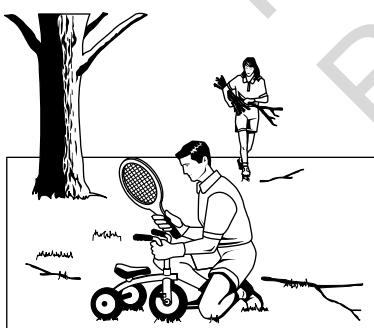
You should not operate on a slope greater than 20 degrees.

Always mow across slopes, not up and down (to maintain traction on the wheels) and 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

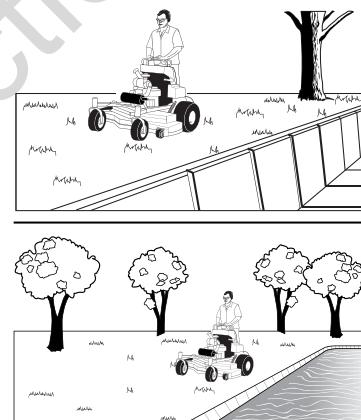


This equipment has many moving parts that can injure you or someone else. However, if you stay in the operator zone (stay seated in the seat), and follow the safety rules in this operator's manual, the unit is safe to operate.

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.

## Retaining Walls, Drop-Offs and Water



Retaining walls and drop-offs around steps and water are a common hazard. 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.

## Fuel and Maintenance



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

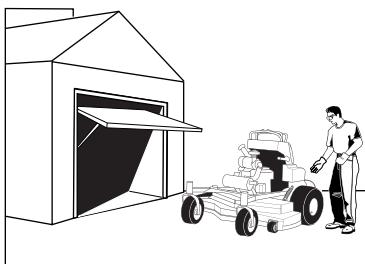
Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

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.

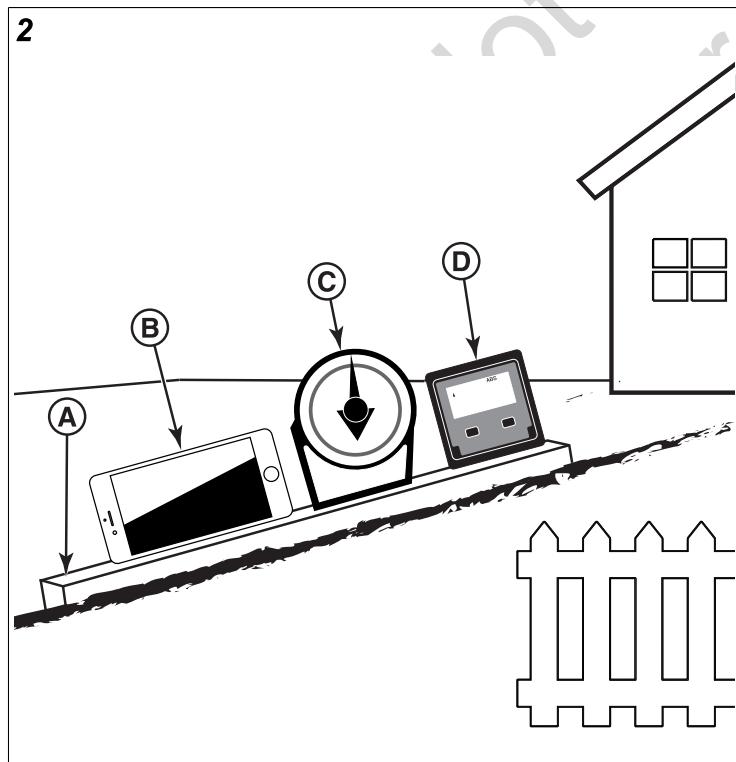
Proper maintenance is critical to the safety and performance of your unit. Keep the unit free of grass, leaves, and excess oil. Be sure to perform the maintenance procedures listed in this manual, especially periodically testing the safety system.

## 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 20 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

- Keep both feet on the operator platform at all times.
- 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 and behind before and while traveling in reverse.
- 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.
- Look behind and down before backing up to be sure of a clear path.
- 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.



## DANGER

### Loss of control

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

- Avoid sudden turns or rapid speed changes.
- If machine stops forward motion on a slope, stop the blades and drive slowly off the slope.
- Go across slopes, NOT up and down.
- Reduce speed and use extreme caution on slopes.
- Do NOT operate on slopes over 20\* degrees.

\* 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 20 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.



## 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. Tires may lose traction and cause sliding and loss of control.
- Do NOT operate on slopes when soil is soft (such as after heavy rains). Tires may lose traction and cause sliding and loss of control.



## DANGER

### Water, retaining walls and drop-off hazard

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

- Do NOT operate near water, retaining walls, drop-offs or embankments. The machine could suddenly roll over if a wheel goes over the edge or the edge breaks away.
- Give yourself a minimum of two mower widths of clearance around these hazards.

#### Do:

- Mow across slopes, not up and down.
- 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. If tires lose traction (i.e. machine stops forward motion on a slope), disengage the blade(s) (PTO) and drive slowly off the slope.

- Do not turn on slopes unless necessary, and then, turn slowly and gradually uphill, if possible. Never mow down slopes.
- Do not mow near drop-offs, ditches, or embankments. The operator could lose footing or balance or mower could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- 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.

### 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.

## Safety Decals and Icons

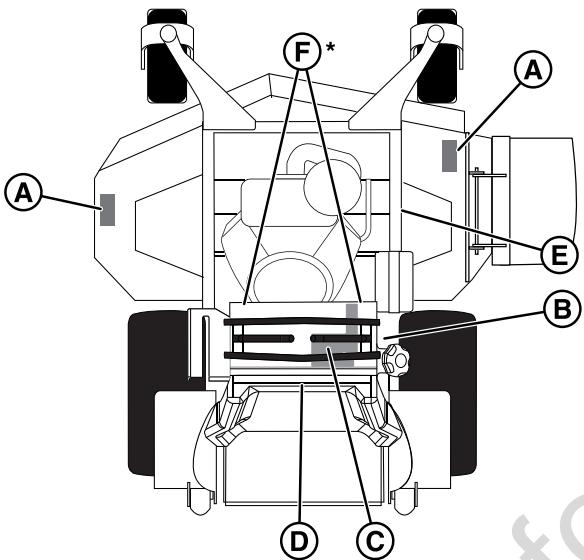
Read the safety decals before operating your unit. The cautions and warnings are for your safety. Understand and follow all safety decals to avoid a personal injury or damage to the unit.



### WARNING

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

3



\* Located near the transmission fans.

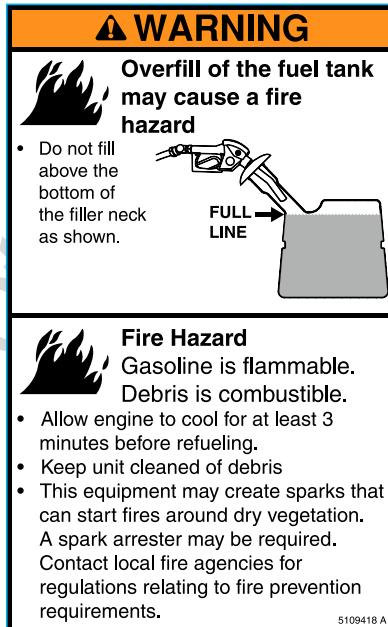
- A. Part Number: 7101665 - Decal, Danger
- B. Part Number: 5109418 - Decal, Warning, Tank Overfill
- C. Part Number: 5105095 - Decal, Dash Panel, RH, Warning/Controls
- D. Part Number: 5104636 - Decal, Danger, Stand-On
- E. Part Number: 5061245 - Decal, Pinch Point
- F. Part Number: 5103184 - Decal, Warning, Hand in Pulley

### 7101665 - Decal, Danger, Discharge



	Safety alert triangle.
	<b>DANGER</b>
	Keep hands and feet away from deck.
	Do not operate mower unless discharge chute or entire grass catcher is in its proper place.

### 5109418 - Decal, Warning, Fuel Overfill



5109418 A

	Safety alert triangle.
	<b>WARNING</b>
	Overfill of the fuel tank may cause a fire hazard.
	<ul style="list-style-type: none"> <li>• Do not fill above the bottom of the filler neck as shown.</li> </ul>
	<b>Fire Hazard</b>
	Gasoline is flammable. Debris is combustible.
	<ul style="list-style-type: none"> <li>• Allow engine to cool for at least 3 minutes before refueling.</li> <li>• Keep unit cleaned of debris</li> <li>• 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.</li> </ul>

**Fire hazard.**

Gasoline is flammable.

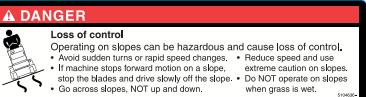
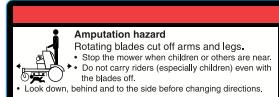
Debris is combustible.

- Allow engine to cool for at least 3 minutes before refueling.
- Keep unit cleaned of debris.
- This equipment may create sparks that can start fires around dry vegetation. A spark arrester may be required. Contact local fire agencies for regulations relating to fire prevention requirements.

## 5105095 - Decal, Dash Panel, RH, Warning/Controls



## 5104636 - Decal, Danger, Stand-On



### Safety alert triangle.



### DANGER

**Amputation hazard.**

Rotating blades cut off arms and legs.

- Stop the mower when children or others are near.
- Do not carry riders (especially children) even with the blades off.
- Look down, behind and to the side before changing directions.

**Loss of control.**

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

- Avoid sudden turns or rapid speed changes.
- If machine stops forward motion on a slope, stop the blades and drive slowly off the slope.
- Go across slopes, not up and down.
- Reduce speed and use extreme caution on slopes.
- Do not operate on slopes when grass is wet.



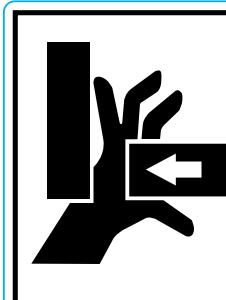
### Safety alert triangle.

### WARNING

**Avoid serious injury or death.**

- Read operator's manual before using this product.
- Know the location and function of all controls.
- Remove objects that could be thrown by the blade.
- When leaving machine, shut off, remove key and set parking brake.
- Do not operate this machine unless you are trained.
- Keep safety devices (guards, shields, switches, etc.) in place and working.
- Be sure blades and engine are stopped before placing hands or feet near blades.

## 5061245 - Decal, Pinch Point



### WARNING

**PINCH POINT**  
To avoid injury from loaded spring, read operator's manual before removing spring.

61245



### Safety alert triangle.

### WARNING

**Pinch Point.**

To avoid injury from loaded spring, read operator's manual before removing spring.



	<b>Safety alert triangle.</b>
<b>WARNING</b>	
	<b>Amputation and Pinch Point Hazard.</b> To avoid injury from rotating parts, stay clear of parts and keep all shields and guards in place.

## 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:

- The parking brake lever is in the DISENGAGED position.

#### Test 2 - Engine SHOULD crank if:

- The parking brake lever is in the ENGAGED position.

#### Test 3 - Engine should SHUT OFF if:

- The ignition switch is turned to the OFF position.

#### Test 4 - PTO Switch (blades) should SHUT OFF if:

- If the PTO switch is ON and the operator steps off the operator platform, OR
- The operator presses the PTO switch down to the OFF position.

#### Test 5 - PTO Switch (blades) SHOULD turn on if:

- Operator stands on the operator platform and the PTO switch is pulled up to the ON position.

#### Test 6 - Blade Brake Check:

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 steps off the operator platform). If the mower drive belt does not stop within seven (7) seconds, see your dealer.

Note: Once the engine has been stopped, the parking brake lever must be in the ENGAGED position, the ground speed control levers should be in the NEUTRAL position, the operator should be standing on the operator platform, and the PTO switch should be in the OFF position in order to start the engine.

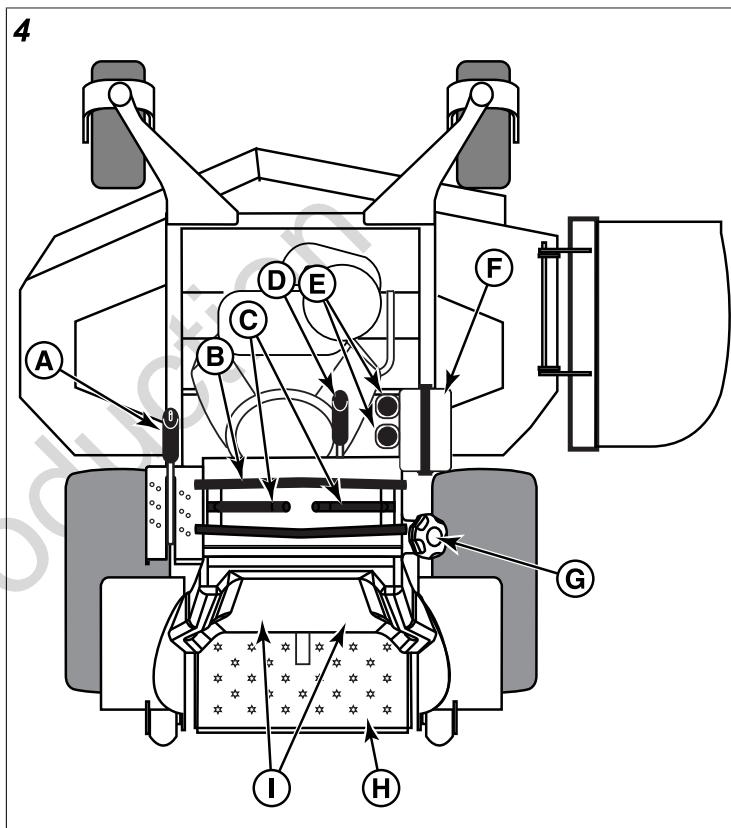


If the unit does not pass a safety test, do NOT operate it. See your authorized dealer. Under no circumstance should you attempt to defeat the purpose of the safety interlock system.

## 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.

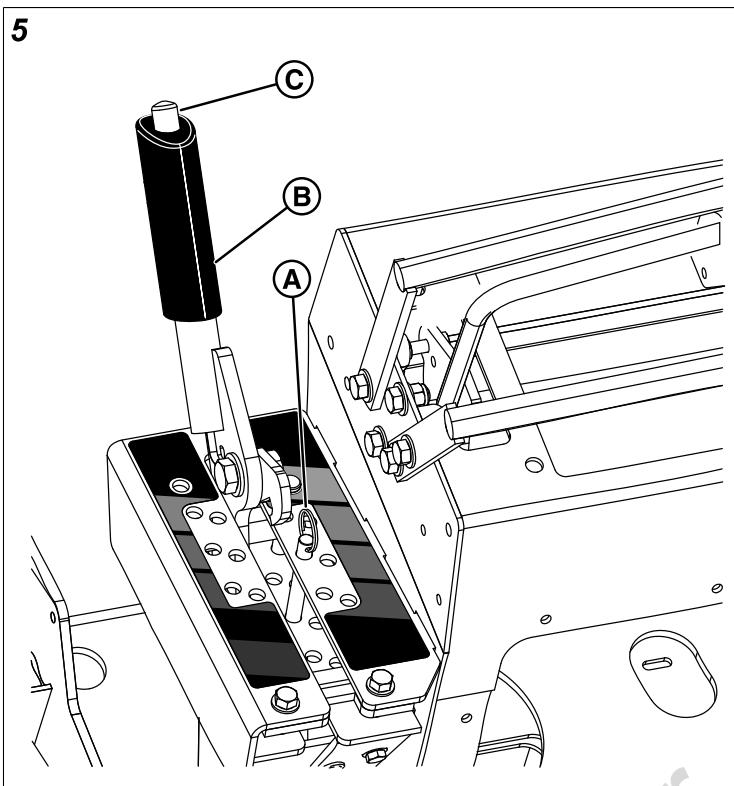


Callout	Description
<b>A</b>	Deck Lift Lever, Cutting Height Adjustment Pin, and Deck Lift Release Button
<b>B</b>	Maximum Forward Speed Bar
<b>C</b>	Ground Speed Control Levers
<b>D</b>	Parking Brake
<b>E</b>	Transmission Oil Fill (Transmission Oil Reservoirs)
<b>F</b>	Battery Box
<b>G</b>	Fuel Tank Cap
<b>H</b>	Operator Platform
<b>I</b>	Transaxle Release Levers (Located on the rear of the engine deck)

**Deck Lift Lever, Cutting Height Adjustment Pin, and Deck Lift Release Button:** The deck lift lever (B, Figure 5), cutting height adjustment pin (A), and deck lift release button (C) are

used together to control the cutting height of the mower deck. See *Cutting Height Adjustment* for instructions on using these controls.

**5**



Cutting Height Adjustment Pin



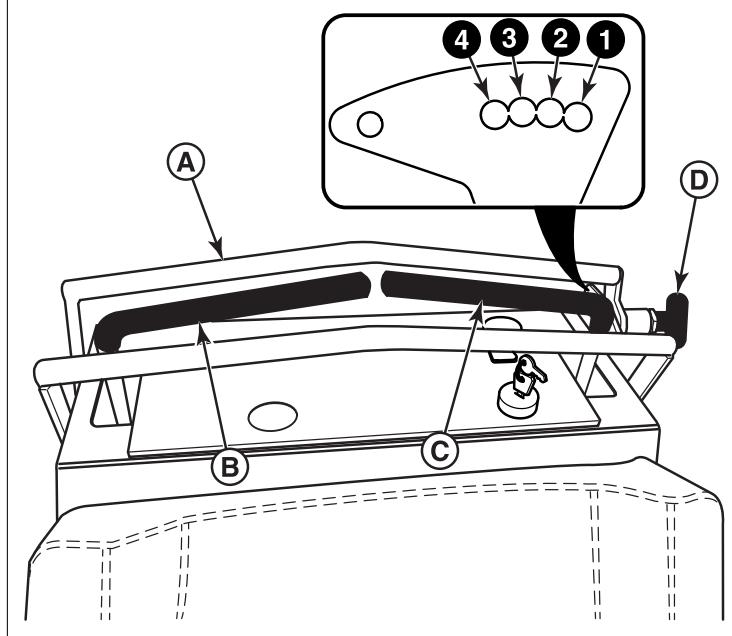
Storage Hole for Cutting Height Adjustment Pin



Deck Lift Lock Lever

**Maximum Forward Speed Bar:** This unit is equipped with an adjustable Maximum Forward Speed Bar (A, Figure 6), which is located in front of the Ground Speed Control Levers (B & C).

**6**



The Maximum Forward Speed Bar can be adjusted in four different positions to suit the desired maximum forward speed of the operator. The positioning hole closest to the ground speed control levers (labeled as #1 in Figure 6) is the slowest setting and the positioning hole furthest from the ground speed control levers (labeled as #4) is the fastest.

To adjust the position of the Maximum Forward Speed Bar pull the T-handle knob (D) out to release the maximum forward speed bar, position the Maximum Forward Speed Bar in the desired location, and then release the T-handle knob. Make sure that the T-handle knob locks the maximum forward speed bar into place.

**You should only adjust the position of the Maximum Forward Speed Bar after you have stopped all movement of the unit.**

**Ground Speed Control Levers:** These levers control the ground speed of the unit. The left lever (B, Figure 1) controls the left rear drive wheel and the right lever controls (C) the right drive wheel.

	FORWARD
	NEUTRAL
	REVERSE

Moving a lever forward increases the FORWARD speed of the associated wheel, and pulling back on a lever increases the REVERSE speed.

The ground speed control levers cannot be moved from the NEUTRAL position until the parking brake lever is moved to the DISENGAGED position.

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

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

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

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

**Operator Platform:** The operator stands on the operator platform while driving the machine. Keep both feet on the operator platform at all times.

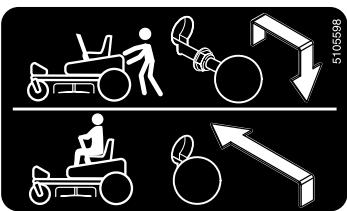
The operator platform is integral to the safety interlock system:

- If the operator steps off the operator platform while the unit is running and the PTO switch is engaged, the PTO will shut off.

**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.

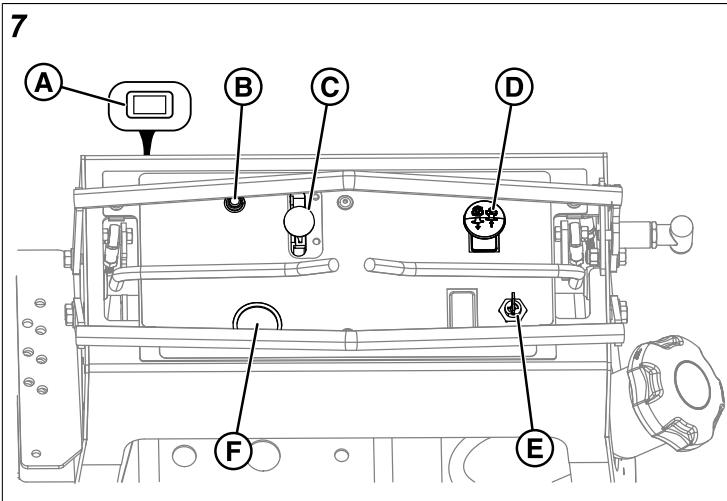
**Fuel Tank Cap:** To remove the cap, turn **counter-clockwise**.

#### Transmission Release Levers:

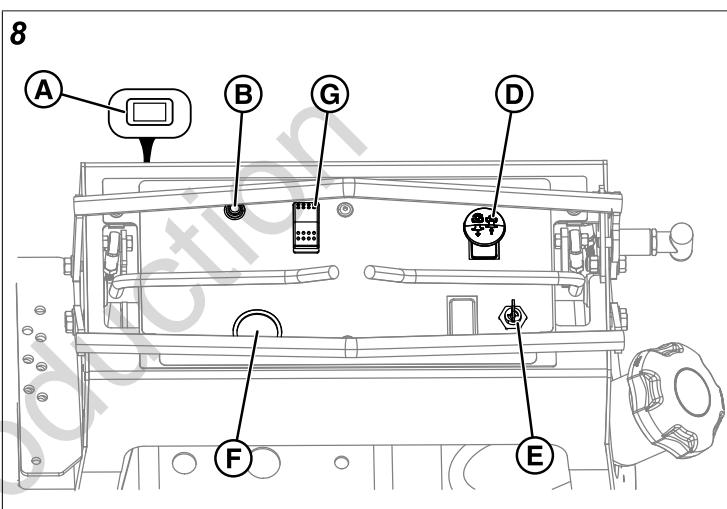
Icon	Control Name
	Transmission Release Levers
	

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

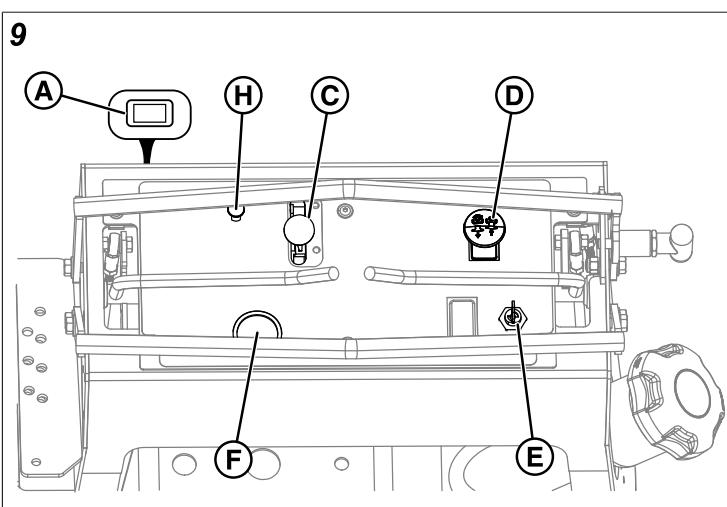
#### Instrument Control Panel - Briggs & Stratton Electronic Fuel Injected (EFI) Models:



**Instrument Control Panel - Kawasaki Electronic Fuel Injected (EFI) Models:**



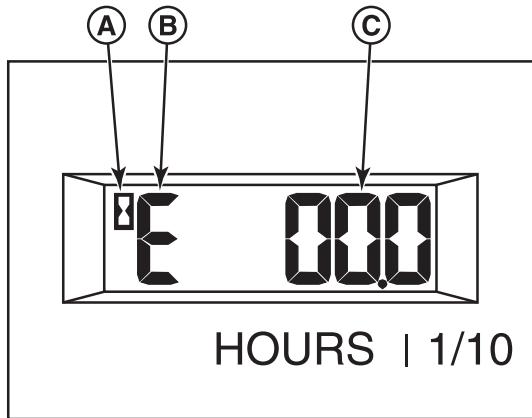
**Instrument Control Panel - Kawasaki Carbureted Models:**



- Hour Meter
- Malfunction Indicator Lamp (M.I.L.)
- Throttle Control
- PTO (Power Take Off) Switch

- E. Ignition Switch
- F. Fuel Level Gauge
- G. Throttle Rocker Switch
- H. Choke Control

**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.

**Malfunction Indicator Lamp (M.I.L.):** The malfunction indicator lamp detects problems with the engine. If the malfunction indicator lamp begins to flash while you are operating the unit, see the engine operator's manual.

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

	Fast throttle speed.
	Slow throttle speed.

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

**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.

**Fuel Level Gauge:** Displays the fuel level in the tank. The fuel level gauge is installed in the top of the fuel tank and is viewed by looking through the port hole in the instrument control panel.

**Throttle Control Rocker Switch:** Pressing the throttle control rocker switch forward will increase the throttle position. Pressing the throttle control rocker switch backwards will decrease the throttle position. Always operate at FULL throttle when mowing.

	Fast throttle speed.
	Slow throttle speed.

**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.

## Operation

### Before First Time Operation

- Be sure to read all information in the *Operator Safety* and *Operation* sections before attempting to operate this unit.
- 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 20°.
- Select slow ground speed before driving onto a slope. Use extra caution when operating on slopes with any collection accessories attached to the unit.
- 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 platform for any reason, engage the parking brake, disengage the PTO, stop the engine, and remove the key.
- To reduce fire hazard, keep the engine, unit, and mower deck free of grass, leaves, and excess grease. Do NOT stop or park unit 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-turning mower 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 unit. This unit 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 the engine oil level using the engine oil dipstick. If necessary, add oil through the engine oil fill. See engine operator's manual for instructions, the location of the engine oil fill, engine oil dipstick, and oil recommendations.
- Make sure that all nuts, bolts, screws and pins are in place and tight.
- Fill the fuel tank with fresh fuel. Refer to the engine manual for fuel recommendations.

- Check the hydraulic oil level. If necessary, add oil through the hydraulic oil tanks.

## **Starting the Engine - Briggs & Stratton Fuel Injected Models**



### **WARNING**



**Read the operator's manual before attempting to operate this unit.**

- 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.

**Note:** To prime a dry fuel system, turn key switch to ON position for one minute. Allow fuel pump to cycle and prime system. Turn key switch OFF.

1. While standing on the operator's platform, engage the parking brake, make sure that the PTO switch is disengaged, and that the ground speed control levers are in the NEUTRAL position.
2. Position the throttle control midway between SLOW and FAST positions.
3. Insert the key into the ignition switch and turn it to the START position. Release the switch as soon as the engine starts. If the starter does not turn the engine over, shut off the key switch immediately, and consult the engine operator's manual. *Warm up the engine by running it for at least a minute before engaging the PTO switch or driving the unit.*
4. 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 STOP.** Use this method only in emergency situations. For normal engine shutdown follow the procedure given in *Stopping the Unit*.

## **Starting the Engine - Kawasaki Fuel Injected Models**



### **WARNING**



**Read the operator's manual before attempting to operate this unit.**

- 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 standing on the operator's platform, engage the parking brake, make sure that the PTO switch is disengaged, and that the ground speed control levers are in the NEUTRAL position.

2. Insert the key into the ignition switch and turn it to START position.
3. The throttle will self-adjust to idle when starting. After the engine starts allow the engine to warm. *Warm up the engine by running it for at least a minute before engaging the PTO switch or driving the rider.*
4. 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 STOP.** Use this method only in emergency situations. For normal engine shut down follow the procedure given in *Stopping the Unit*.

## Starting the Engine - Carbureted Models



**Read the operator's manual before attempting to operate this unit.**

- 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 standing on the operator's platform, engage the parking brake, make sure that the PTO switch is disengaged, and that the ground speed control levers are 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 atleast a minute before engaging the PTO switch or driving the rider.*
  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 STOP.** Use this method only in emergency situations. For normal engine shut down follow the procedure given in *Stopping the Unit*.

## Stopping the Unit

1. Stop the rider movement by returning the ground speed control levers to their NEUTRAL positions. The ground speed control levers are spring-loaded and when released they will automatically return to NEUTRAL.
2. Disengage the PTO by pushing down on the PTO switch.
3. Engage the parking brake by pulling the handle up and back until it locks into position.

4. Move the throttle control to the mid-throttle position and turn the ignition key to OFF. Remove the key.

## Driving the Zero-Turn Riding Mower

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 of the unit's controls.

Keep both feet on the operator platform at all times.

The ground speed control levers of this 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.

Spending some time going through the maneuvers shown and becoming familiar with how the unit accelerates, travels, and steers, **before you begin mowing**, is absolutely essential to getting the most out of the zero-turn riding mower.

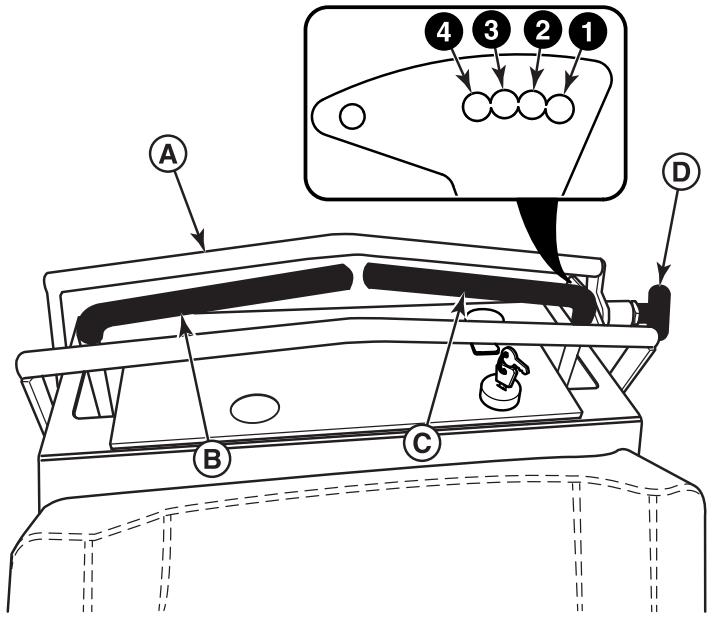
Locate a smooth, flat area of your lawn, one with plenty of room to maneuver. Clear the area of objects, people, and animals before you begin. Operate the unit at mid-throttle during this practice session (ALWAYS operate at full throttle when mowing), and turn slowly to prevent tire slippage and damage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

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

Prior to moving the ground speed control levers, the operator must be standing on the operator platform and the parking brake must be disengaged.

## Adjusting the Maximum Forward Speed Bar

This zero-turn riding mower is equipped with an adjustable maximum forward speed bar (A, Figure 10), which is located in front of the ground speed control levers (B & C). The maximum forward speed bar can be adjusted in four different positions to suit the desired maximum forward speed of the operator. The positioning hole closest to the ground speed control levers (labeled as #1 in Figure 10) is the lowest setting and the positioning hole furthest from the ground speed control levers (labeled as #4) is the fastest.

**10**

For operator's learning to drive the machine it is recommended that the slowest speed setting (position # 1) be used until the operator is comfortable driving the machine.

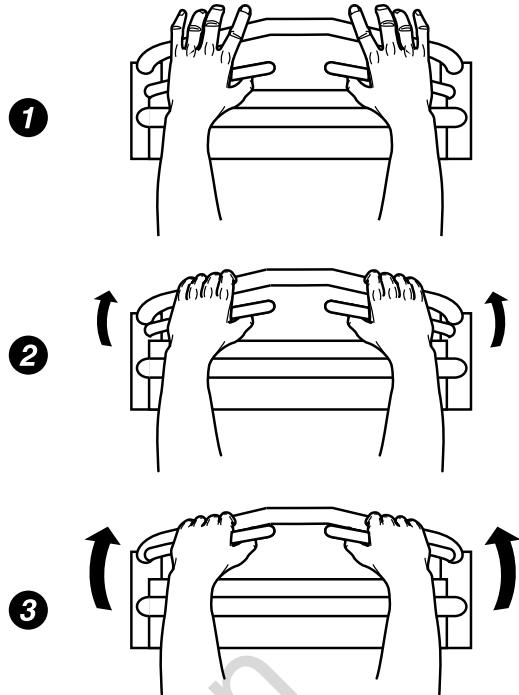
**To adjust the Maximum Forward Speed Bar to the desired position:**

1. Bring the mower to a complete stop.
2. Pull the T-handle knob (D) out, move the maximum forward speed bar desired hole location, release the T-handle knob. Make sure that the T-handle knob locks the maximum forward speed bar into place.

### 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.

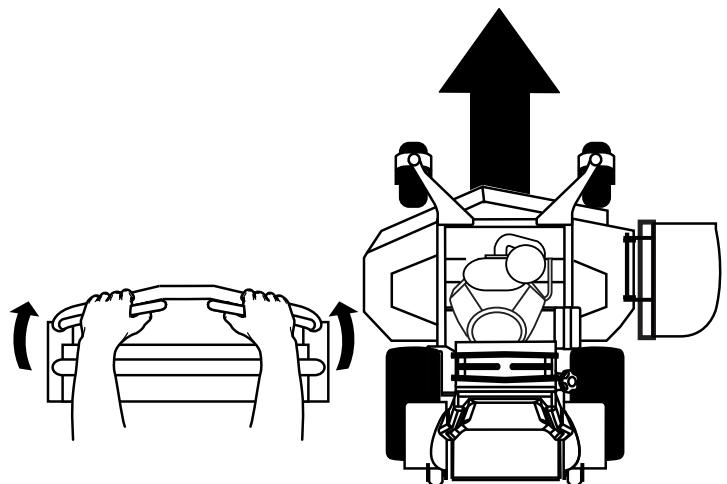
**11**

**FIRST**, place your hands on the ground speed control levers and the maximum forward speed bar as shown.

**SECOND**, to go forward gradually push the ground speed control levers with the palms of your hands evenly towards the maximum forward speed lever.

**THIRD**, to speed up squeeze the ground speed control levers to the maximum forward speed lever. To slow down smoothly, slowly move the levers evenly towards neutral.

### Basic Driving Forward Travel Practice

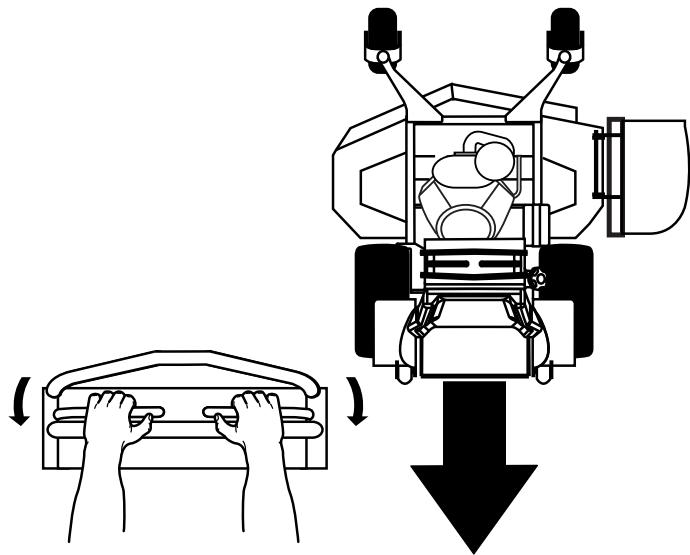
**12**

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

Note: Straight forward travel takes practice. If the unit veers to either direction while both ground speed controls levers are pressed against the maximum forward speed bar see Tracking Adjustment in the Maintenance Procedures section.

#### Reverse Travel Practice

13

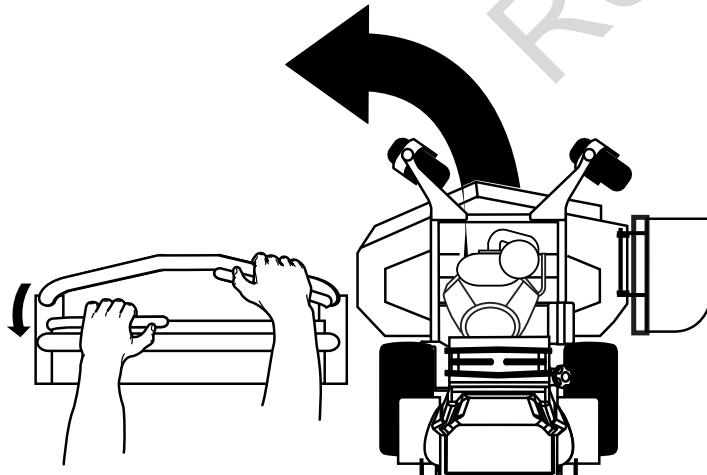


LOOK DOWN & BEHIND, then gradually move both ground speed control levers evenly BACK from neutral. Slow down and repeat.

Note: Practice backing up for several minutes before attempting to do so near objects. The zero-turn riding mower turns sharply in reverse as well as forward, and backing up straight takes practice.

#### Practice Turning Around a Corner

14

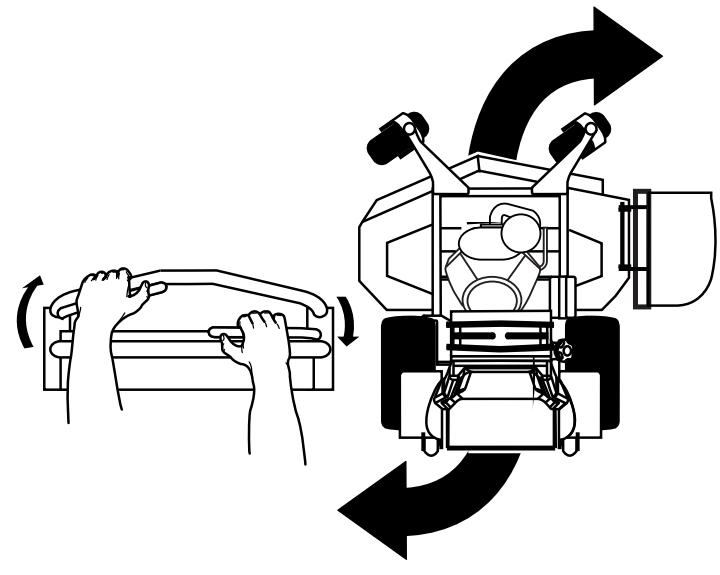


While traveling forward allow one handle to gradually return back toward neutral. Repeat several times.

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

#### Practice Turning In Place

15

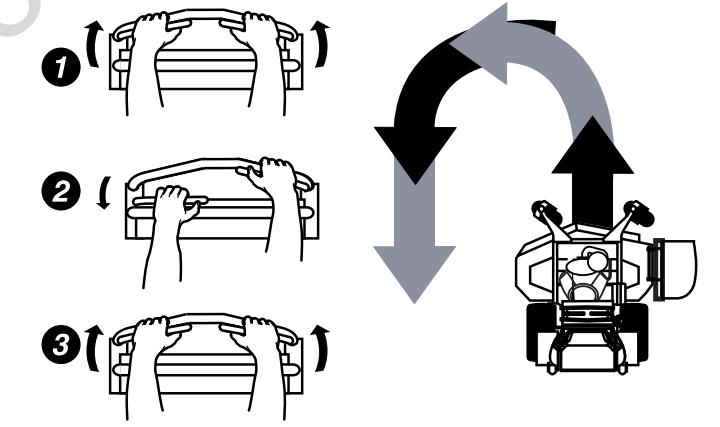


To turn in place, "Zero-Turn," gradually move one ground speed control lever forward from neutral and one lever back from neutral simultaneously. Repeat several times.

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

#### Advanced Driving Executing an End-Of-Row Zero Turn

16



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 rider LEFT and slightly overlaps the row just cut, eliminating the need to back up and re-cut missed grass.

*As you become more familiar and experienced with operating the zero-turn riding mower, you will learn more maneuvers that will make your mowing time easier and more enjoyable.*

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

## Operating on Slopes

**Learn how to operate the stand-on mower on slopes and use your body position to improve traction and control of the mower.**

Operation on slopes can be dangerous. Slopes are a major factor related to accidents, which can result in severe injury or death. 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. If you feel unsure about operating the unit on a slope, don't do it. It's not worth the risk.

### **Mow across slopes, NOT up and down:**

- Lean your body slightly rearward and towards the uphill side drive wheel, while keeping a firm grip on the control levers. This body position adds more weight to the uphill side drive wheel to maximize traction and control.
- Do NOT accelerate quickly, as this may cause the mower's front wheels to come off the ground.

### **Mow up and down slopes (only if you cannot mow across the slope):**

- It is recommended to mow up and down slopes only when you cannot mow across slopes.
- Mow up the slope and lean your body forward (towards the control panel), while keeping a firm grip on the control levers. This body position helps keep the front wheels on the ground.
- Mow down the slope and lean your body rearward with your arms out-stretched, while keeping a firm grip on the handlebar. This body position adds more weight to the drive wheels and improves traction, downhill braking, and control.
- Always be very gentle operating the controls, travel at a **slower** speed than normal.
- Do NOT accelerate quickly or change speed or direction suddenly while mowing, as this may cause the mower's front wheels to come off the ground (up slopes) and to reduce the tendency to cause the mower to slip and slide (down slopes).

## Mowing

1. Engage the parking brake. Make sure that the PTO switch is disengaged, the ground speed control levers are in the NEUTRAL position, and the operator is standing off the operator platform.
2. Start the engine. See *Starting the Engine*.
3. Set the cutting height.
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 Unit*.

## Mowing Recommendations

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

### 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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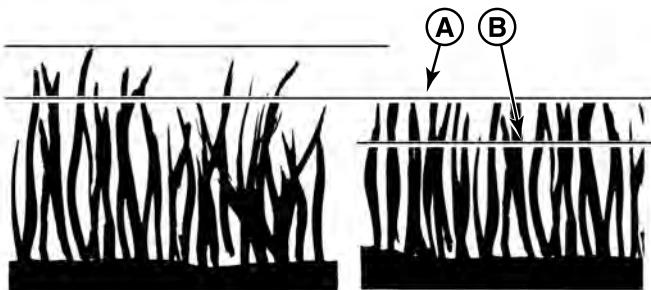


The amount of grass you are able to cut in one pass is also effected by the type of mowing system you are using (for example, broadcasting with side discharge decks can process a much larger volume of grass than mulching does).

**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.

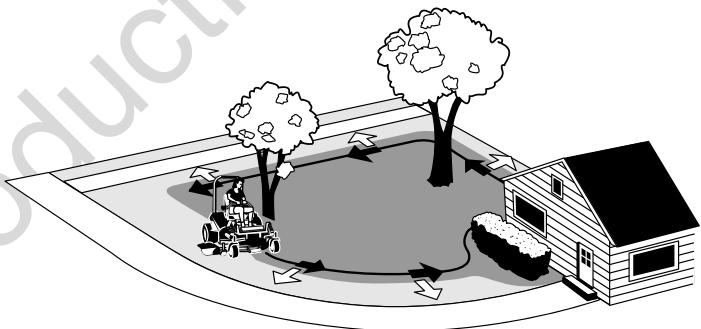
If you hear the engine slowing down, you are mowing too fast—using a slower ground speed will improve the cutting efficiency of the blades and prevents many common cutting problems. Use an appropriate ground speed for the thickness and height of the grass you are cutting (3rd gear or slower for manual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

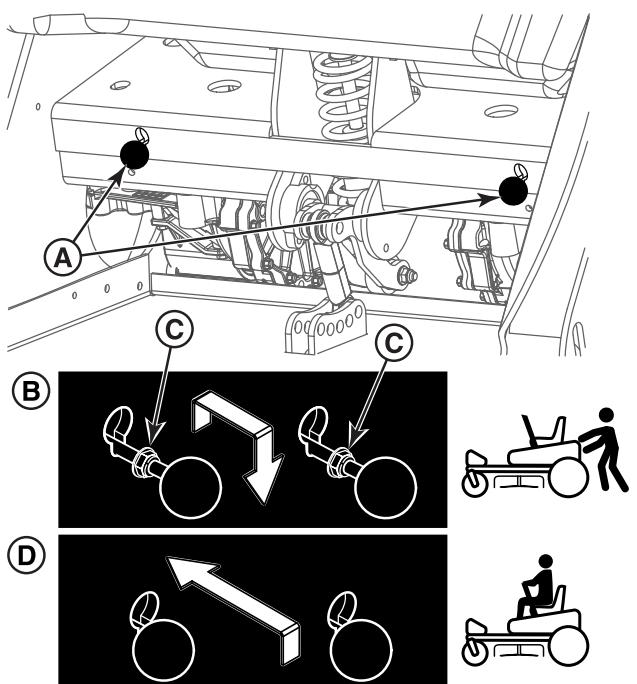
**NOTICE** Do NOT tow the zero-turn rider.

Towing the units while the transmissions are engaged will cause hydraulic 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) on the back of the engine deck. There is one transmission

release lever on each transmission. The transmission release levers open and close the transmission bypass valves.

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3. To open the transmission bypass valve (bypass position) (B), take hold of the black knob and move the transmission release lever up and pull it towards the rear of the machine. When the flanged nut (C) 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) (D) by taking hold of the black knob and raising the transmission release lever up so that the flanged nut clears the slot, and then push the lever towards the front of the machine. Repeat the process for the other side of the unit.

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

### 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:

- 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 Maintenance and Storage instructions in the Safety Rules 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 of a light coat of oil to prevent rusting.
3. Clean external surfaces and engine.
4. Prepare the engine for storage. See the engine owner'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:** Gasoline, 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 gasoline. See engine manual for recommendations.
5. See engine owner'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	
<b>Before each use</b>	
Check safety interlock system.	
Check unit brakes.	
Check unit for loose hardware.	
Check hydraulic oil level.	
Check tire pressures.	
<b>Every 25 Hours</b>	
Clean mower deck and check / Replace mower blades.*	
Lubricate unit and mower deck.*	
<b>Every 100 Hours</b>	
Check mower blade stopping time.	
Clean battery and cables.	
Initial change of hydraulic oil.	
<b>Every 400 Hours or Yearly</b>	
Change hydraulic oil filter.	

## ENGINE MAINTENANCE

### Before each use

Check engine oil level.

Clean visible debris from engine compartment and mower deck.

### Every 50 Hours

Inspect / Clean spark arrester.\*\*

### Every 100 Hours

Check fuel filter.

### Refer to engine owner's manual

Service air filter.

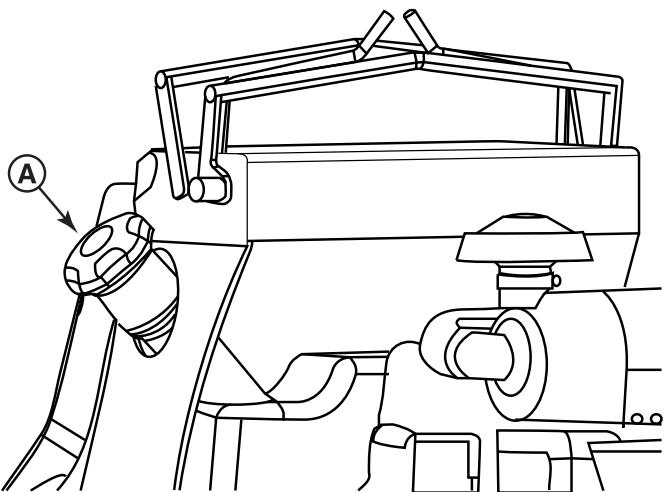
Change engine oil and filter.

Check / Replace spark plugs.

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

\*\*If equipped. Replace if damaged.

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## Maintenance Procedures

### Service and Maintenance Safety



#### 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



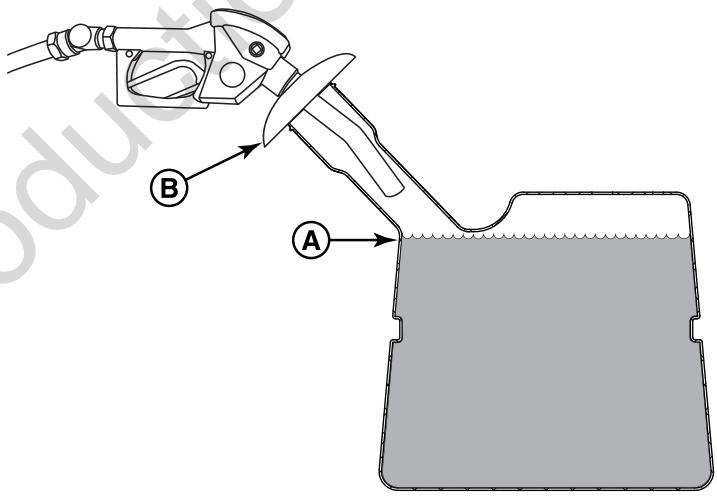
Gasoline is highly flammable and must be handled with care. Allow engine to cool for at least 3 minutes before refueling. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

### To add fuel:

1. Remove the fuel cap (A, Figure 22).

2. Do not fill above the bottom of the filler neck (A, Figure 23). This will allow for fuel expansion. If you are filling the tank from a fueling station make sure that the nozzle is inserted into the tank far enough that the splash guard (B) contacts the opening of the filler neck.

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3. Install and hand tighten the fuel cap.

### NOTICE

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

## Replacing the Fuel Filter



Fuel and its vapors are extremely flammable and explosive.

**Fire or explosion can cause severe burns or death.**

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

**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 owners manual for dipstick and oil fill locations and specific engine oil check and fill procedures.

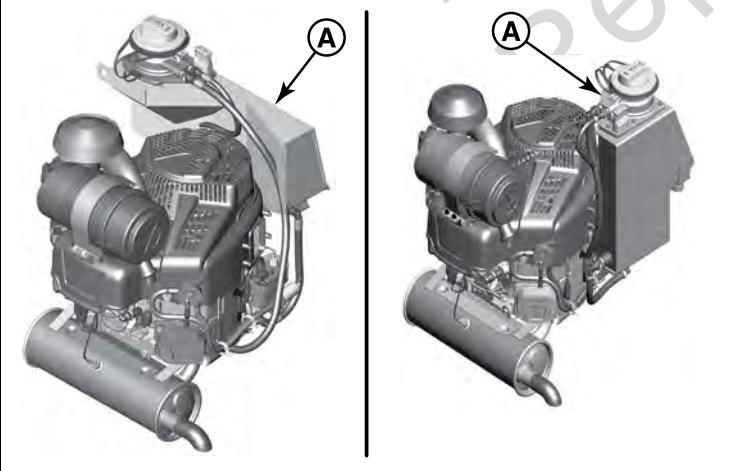
## Briggs & Stratton Vanguard Engines with Remote Oil Tank (Select Models)

Some models in this series of mower feature a remote oil tank (A, Figure 24) that supplies oil to the engine. Units equipped with a Vanguard engine with remote oil tank are factory filled with specially formulated Vanguard 15W-50 synthetic oil.

**Note:** This specific grade of oil is not required to keep engine warranty in effect.

For more information regarding this engine and other operational and maintenance information, please refer to the engine operator's manual included with your unit.

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## Changing the Engine Oil and Filter (Engines with Remote Oil Tank)

**Engine Oil Type:** 15W-50 synthetic oil. (See the engine operator's manual for other oil recommendations.)

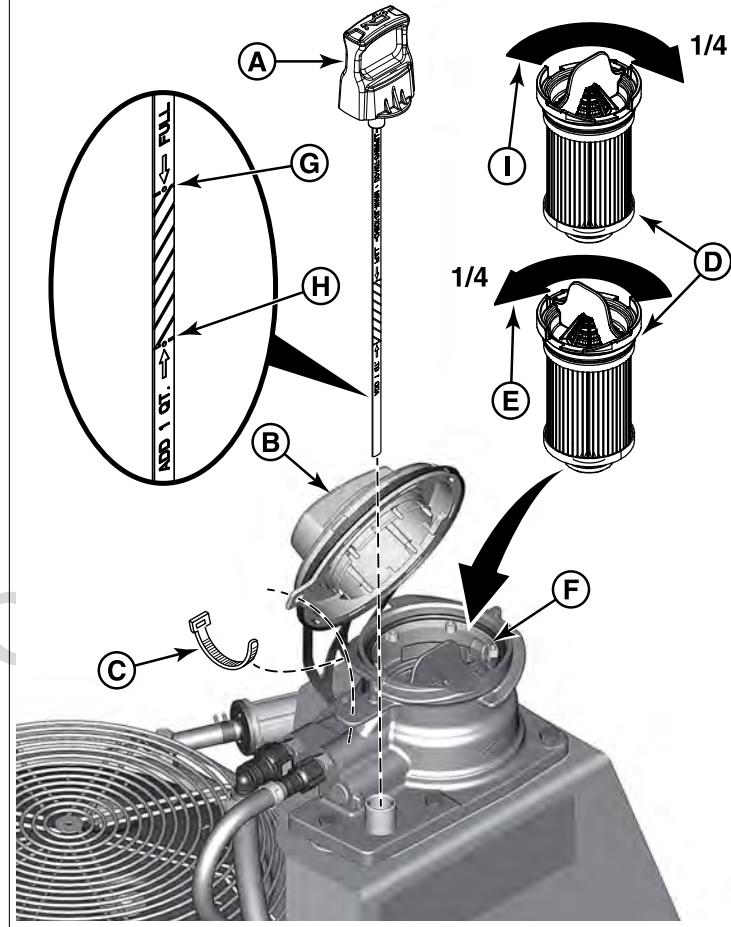
**Engine Oil Change Amount:** 5 qt (4.73 L).

**Oil Change Interval:** Every 500 hours.

**Important:** Always make sure that the mower is parked on a flat, level surface when checking the engine oil level.

1. Park the machine on a flat, level surface. Engage the parking brake and disengage the PTO. Allow the engine to run until it is warm. This will warm the oil so it will drain better. Turn the ignition switch to OFF, remove the ignition key, and wait for all moving parts to stop before leaving the operator's position.
2. Clean the area around the engine oil dipstick (A, Figure 25) and oil fill cover (B) to remove any debris.

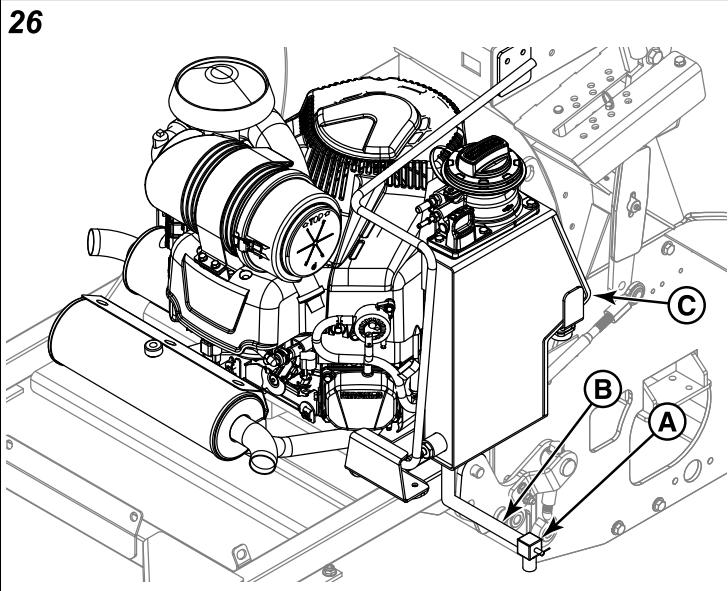
25



3. Remove the engine oil dipstick and wipe with a clean cloth.
4. Cut the self-locking tie (C) that keeps the oil fill cover securely closed. Open the oil fill cover.
5. Have a suitable container ready to capture dripping oil from the engine oil filter (D) after it is removed. Remove the oil filter by turning it **counter-clockwise** a 1/4 turn (E) and then pulling up. Dispose of the used oil filter properly.
6. This mower is equipped with an oil drain valve (A, Figure 26) that is used to drain the oil from the remote oil tank. The drain is located at the end of the oil drain hose (B) which is connected to the bottom of the remote oil tank (C). There is a clamp on the left hand side of the control tower where the oil drain hose is stored when not in use.

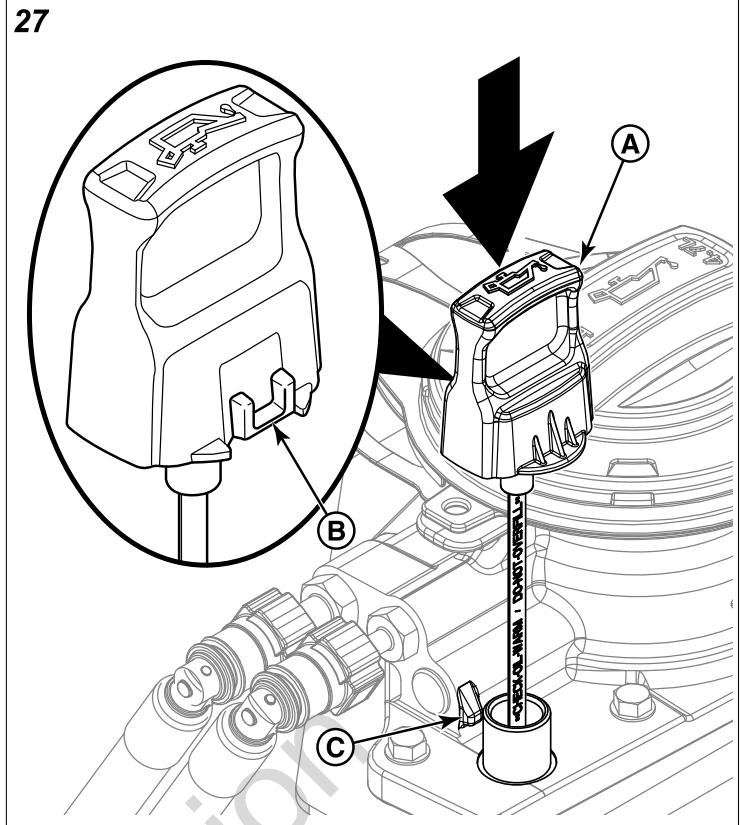
To catch the drained engine oil, place a suitable container underneath the oil drain valve.

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7. Remove the oil drain hose from it's storage location.
8. Remove the cap from the drain spout of the oil drain valve.
9. To operate the oil drain valve, turn **counter-clockwise** to open and drain the engine oil into a suitable container.
10. After the engine oil has drained, turn the oil drain valve **clockwise** to close and re-install the cap on the oil drain valve. Re-install the oil drain hose into it's storage location.
11. Pour oil into the engine oil fill (F, Figure 25). The remote oil tank is designed to hold 5 qt (4,73 L) of engine oil.
12. Install the engine oil dipstick (A, Figure 27) into the tank by pressing down firmly with your hand. The engine oil dipstick has a detent (B) and it must snap into place on the lip (C) of the tank housing so that the dipstick is fully installed into the tank. This action requires moderate force.

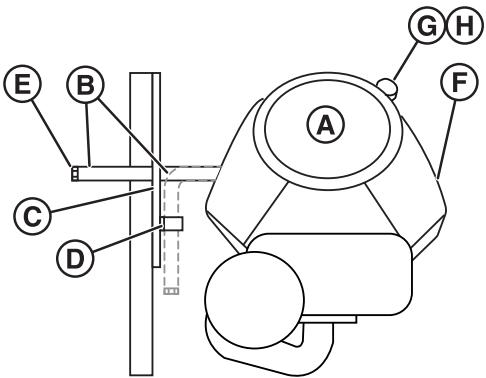
27



13. Remove the engine oil dipstick and check the oil level. Maximum oil level is the "FULL" line (G, Figure 25) on the dipstick. If the oil level is at or below the "ADD 1 QT." line (H), add more oil.
14. Re-install the dipstick.
15. Install a new engine oil filter by lowering it into the engine oil fill and then turning **clockwise** a 1/4 turn (I).
16. Close the oil fill cover.
17. Start and run the engine. As the engine warms up, check for oil leaks.
18. Stop the engine and check oil level. Add more if necessary.
19. If desired, a new self-locking tie can be installed to keep the oil fill cover securely closed.

## Changing the Engine Oil and Filter (All Other Models)

Some models in this series of mower feature a Kawasaki FX engine (A, Figure 28). Refer to Figure 28 for the location of components used in this procedure.



1. Warm engine by running for a few minutes. (Refer to the engine operator's manual for oil & filter replacement instructions.)
2. The oil drain hose (B) is routed along the right side frame plate (C) of the unit underneath the hydraulic oil tanks. The hose is stored in the storage clamp (D) when it is not in use.
3. Remove the oil drain hose from the storage clamp and route the hose through the opening in the right side frame plate and into a position so that when the oil drain cap (E) is removed the oil can be drained into an adequately sized pan.
4. Place an adequately sized 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.
5. After draining, replace the cap and wipe up any spilled oil. Reinstall the oil drain hose into its storage clamp so it is retained during normal operation.
6. Place an absorbent shop cloth under the engine oil filter (F). Remove the engine oil filter and replace with a new one.
7. Add engine oil (refer to engine operator's manual) in the fill tube (G) and check the amount of oil in the engine using the engine oil dipstick (H).
8. 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.

## Electronic Fuel Injection (EFI) System - EFI Models

EFI is an electronically-controlled fuel management system which is monitored by an Electronic Control Unit (ECU). A Malfunction Indicator Lamp (M.I.L.) will illuminate if problems or faults are detected. Servicing by an authorized dealer is necessary.



### CAUTION

Do not disconnect or reconnect ECU wiring harness connector or any individual components with the ignition switch in the "ON" position. This can send a damaging voltage spike through the ECU.

Unplug harness from ECU before performing any welding on equipment.

## 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

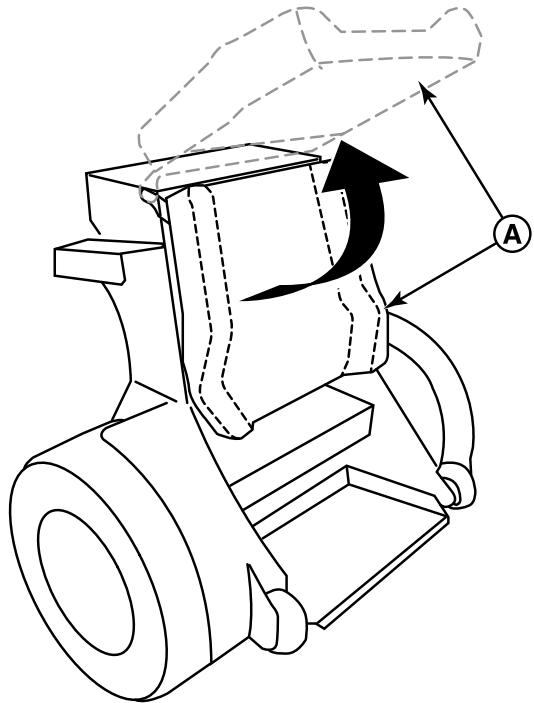
Replacement parts must be the same and installed in the same position as the original parts or fire could result.

## Raise and Lower the Operator Support Cushion

This unit is equipped with a hinged operator support cushion (A, Figure 29) which can be raised to gain access to the service components underneath the control tower. Raise the operator support cushion to gain access to the service components underneath the control tower and lower the operator support cushion for normal operation. A block of

wood can be used to support the operator support cushion in the upright position while servicing the components beneath the control tower.

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## 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.

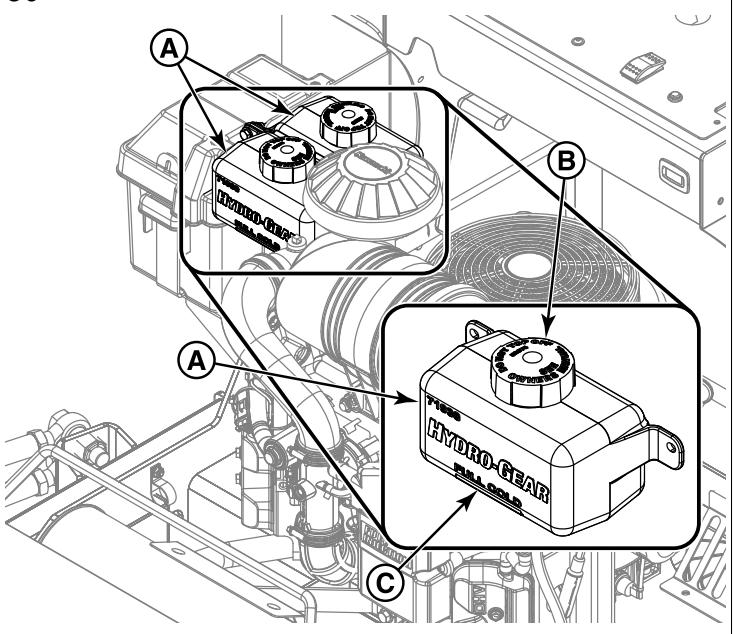
Circuit	Amperage	Approximate Location
Main	20 amp	Mounted by the battery box on the right hand side of the machine.
PTO Clutch	15 amp	Mounted under the control panel on the right hand side of the machine.

## Check / Fill Transmission Oil Level

Oil Type: SAE 20W-50 motor oil.

This unit is equipped with two transmission oil tanks (A, Figure 30). 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.

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1. Locate the transmission oil tanks. The transmission oil tanks are located on the right side of the engine between the engine and the battery box.
2. Check the oil level when the unit is cold. The oil should be up to the "FULL COLD" mark (B) on the transmission oil tanks. If the oil is below this level, proceed to step #3.
3. Before removing the tank cap (C), make sure that the area around the tank caps and fill neck of the tank is free of dust, dirt, and other debris. Remove the tank caps.
4. Add oil up to the "FULL COLD" mark.
5. Re-install 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.

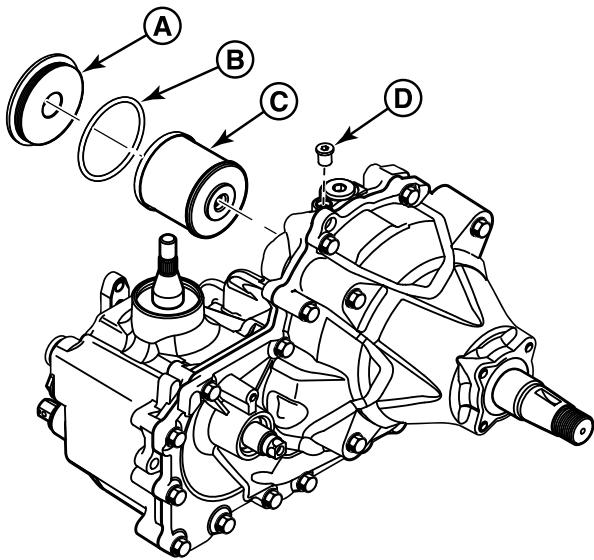
## Transmission Oil Filter Change

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

**Filter Part Number:** 5104385X1

**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 hydraulic oil filter on the side of the transaxle.
2. Remove the oil filter cover (A, Figure 31) from the transaxle to drain the oil. Remove the O-ring (B) from the cover and discard the O-ring.



3. After the oil has drained from the transaxle, remove the oil filter (C) from the transaxle housing.
4. Install a new filter and a new O-ring onto the filter cover and install the filter cover. Torque the filter cover to 480-580 in-lbs (54.2 - 65.5 Nm).
5. Remove the top oil fill vent port (D) and fill the transaxle with new 20W50 motor oil through the expansion tank until the oil reaches the oil fill vent port.
6. Install the top oil fill vent port plug and continue filling the system with oil until the fill line is reached in the expansion tank.
7. Repeat this process for the other side of the machine.
8. 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:

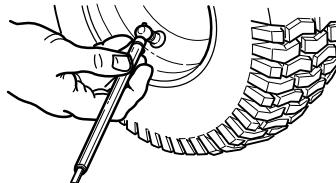
1. Chock the front wheels to prevent the machine from rolling. Raise the rear of the machine so that the vehicle's rear tires do not contact the ground. Position jack stands under the rear bumper of the machine to secure it.

2. Open the transaxle's bypass valves (see *Pushing the Rider by Hand* for the location and function of the bypass valves), start the engine, release the parking brake, and slowly move the zero-turn rider's ground speed control levers in both forward and reverse directions (5 to 6 times), as air is purged from the unit, the oil level will drop.
3. Stop the engine and engage the parking brake.
4. Close the transaxle's bypass valves, start the engine, release the parking brake, and slowly move the zero-turn rider's ground speed control levers in both forward and reverse directions (5 to 6 times), as air is purged from the unit, the oil level will drop.
5. Stop the engine. Remove the jack stands from underneath the machine.
6. Repeat the process detailed above but with the unit's drive wheels on the ground. The procedure should be performed in an area free of any objects or bystanders.

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

## 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.



## Lubrication

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



### Grease:

- Deck lift lever pivot block.
- Deck lift pivot blocks.
- Front caster wheel axles and yokes.
- Lower parking brake shaft.
- Mower deck hanger linkages.
- Mower deck spindles.

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 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.

The operator platform and suspension pivot bearings (A, Figure 35) are greased at the factory and do not require maintenance.

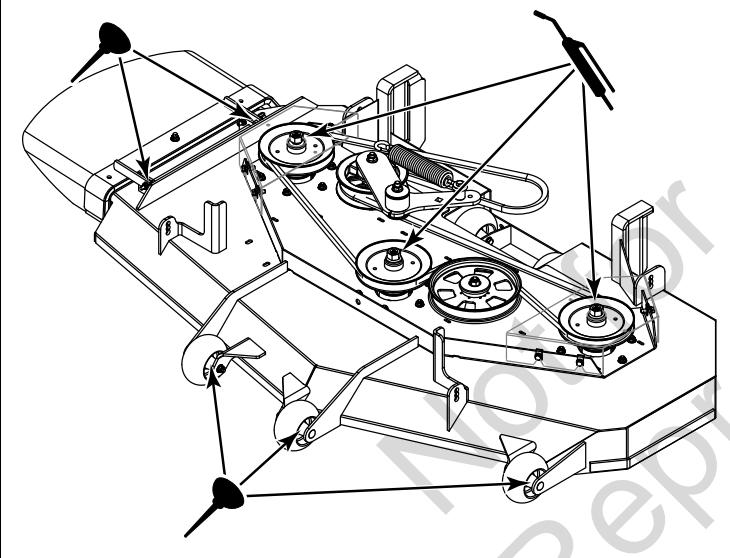


#### Oil:

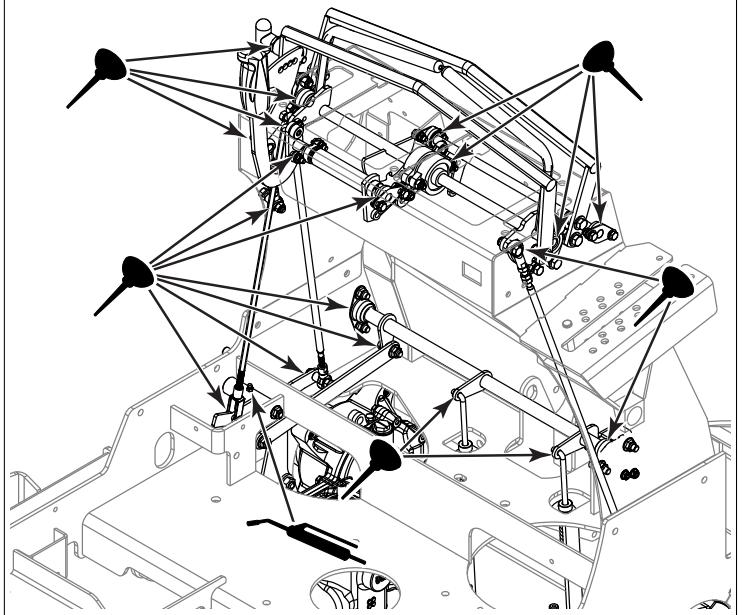
- Deck lift pivots.
- Discharge chute hinge.
- Ground speed control and parking brake lever pivots.
- Motion control shafts and linkages.
- Parking brake shafts and linkages.

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.

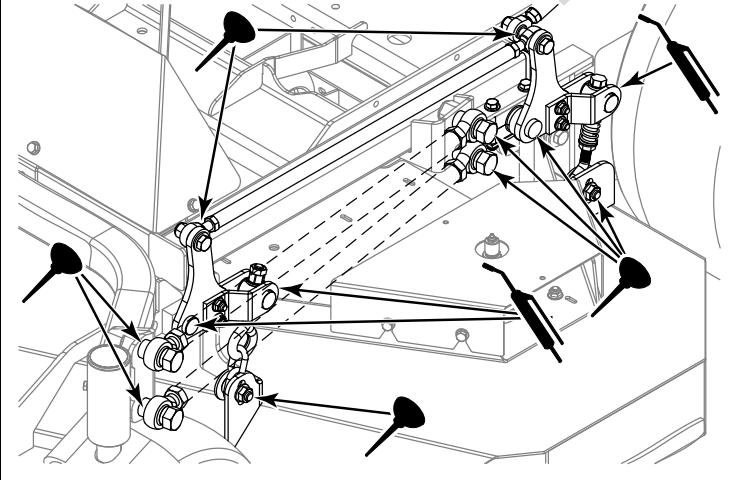
32



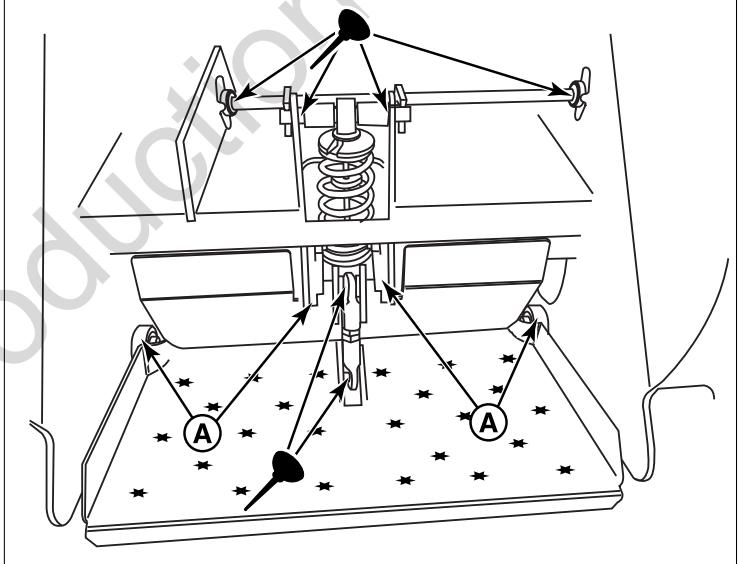
34



33



35



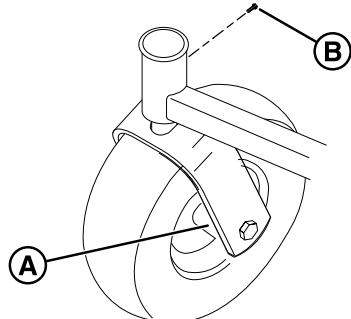
## Lubricating the Front Casters

**Interval:** Front caster wheel axles (A, Figure 36) - Every 25 hours.

**Interval:** Front caster yoke axles - Yearly.

1. Remove the 1/4-28 bolt (B, Figure 36) screwed into the caster and install a 1/4-28 grease fitting.

36



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

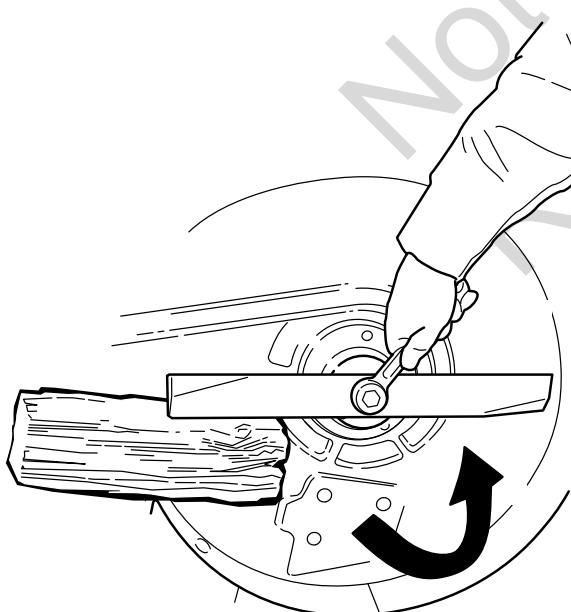
##### Laceration hazard

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 37.

37



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

## Inspecting the Mower Blades



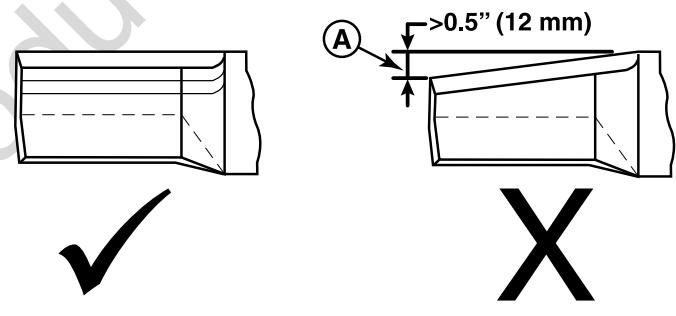
#### Thrown objects hazard

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

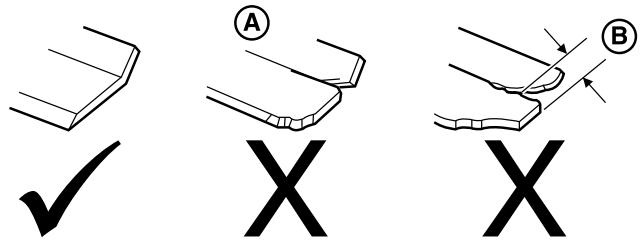
- Inspect the mower blade every 25 hours or at least once per year.
- If the mower blade hits a solid object, stop the engine immediately and inspect the mower blades.
- Never weld or straighten bent mower blades.

1. Remove the mower blade from the unit. See Removing the Mower Blades.
2. Inspect the mower blade (Figures 38 and 39). Discard the mower blade if it has any of the following conditions:
  - More than .5" (12,7 mm) of the mower blade metal has been removed from previous sharpening or wear (A, Figure 38)
  - The air lifts are excessively eroded (A, Figure 39) and the notch (B) is .25" (6,35 mm) deep or greater.
  - The mower blade is broken or bent.

38



39



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

## Sharpening the Mower Blades



### Thrown objects and fire hazard

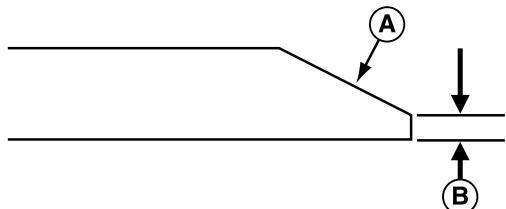
Grinding mower blades throws sparks and fine metal particles that are capable of igniting gasoline and gasoline vapors, and that can injure unprotected eyes.

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

Always wear safety glasses or goggles when grinding mower blades.

1. Sharpen mower blades with a grinder, hand file, or electric blade sharpener.
2. Sharpen the blade by removing an equal amount of material from the cutting edge of each end of the blade.
3. Keep the original bevel (A, Figure 40) when grinding. DO NOT change the mower blade bevel.

**40**



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

## Balancing the Mower Blades



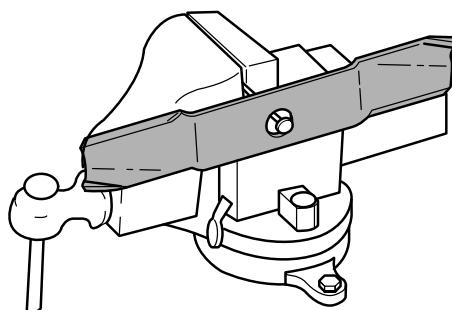
### Thrown objects hazard

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

Be sure blade is balanced before installing.

1. Clean the blade to remove any dried grass or other debris.
2. Clamp a nail in a bench vise, hang the blade on the nail, and position the blade in a level horizontal position as shown in Figure 41.

**41**

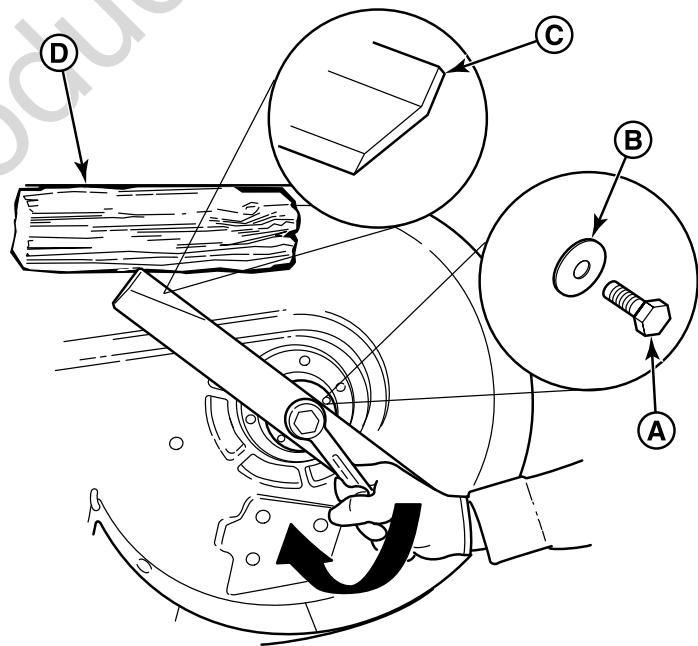


3. Check the balance of the blade. If either end of the blade moves downward the end that moves downward is heavier than the other. Sharpen the heavy end until balance is achieved. See Sharpening the Mower Blades for sharpening instructions.
4. Repeat the process until the mower blade remains in the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

## Installing the Mower Blades

1. Install each mower blade with the air lifts (C, Figure 42) pointing up towards the mower deck as shown in Figure 42 and secure with the mower blade mounting bolt (A) and flat washer (B).

**42**



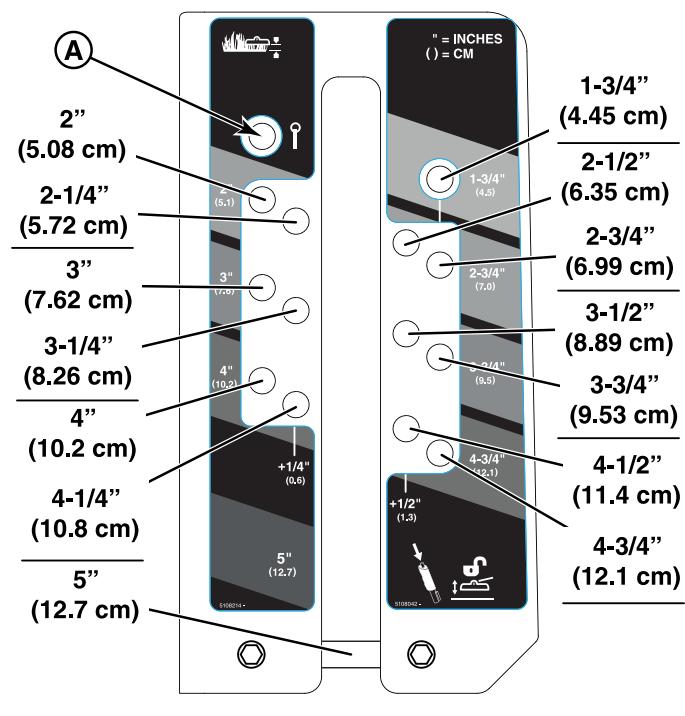
2. Wedge a wooden block (D) between the mower blade and the mower deck housing to keep the mower blade from turning and torque the blade mounting bolt to 120 ft. lbs (163 Nm).

## Cutting Height Adjustment

The cutting height is adjustable between 1-3/4" (4,5 cm) and 5" (12,7 cm) in 1/4" (0,64 cm) increments. Figure 43 depicts the cut height plate and the cut height decal for the unit. This

figure is intended to help you better understand the available cutting heights for this unit.

### 43



#### To set the cutting height at 1-3/4" (4,5 cm):

- Pull the deck lift lever (A, Figure 44) back towards the operator position until it locks into the 5" (12,7 cm) TRANSPORT position.

- Remove the cutting height adjustment pin (B) from the hole that it is installed in and put it in the storage location hole (C, Figure 44 or A, Figure 43).
- Pull the deck lift lever back towards the operator position and depress the deck lift release button (D, Figure 44) to release the transport position lock.
- Push the deck lift lever forward until it contacts the stationary pin in the 1-3/4" (4,5 cm) hole.

#### To set the cutting height in the range of 2" (5,08 cm) and 4-3/4" (12,1 cm):

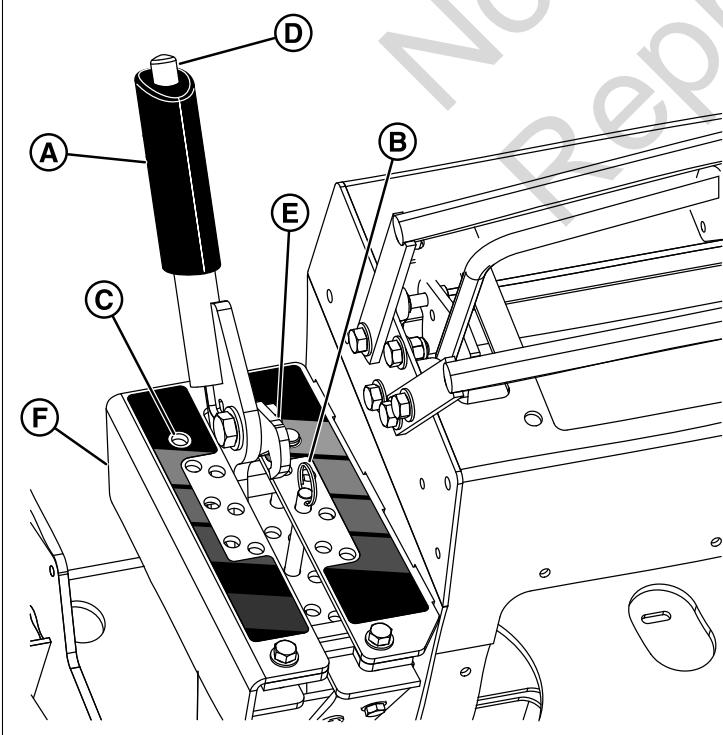
- Pull the deck lift lever back towards the operator position until it locks into the 5" (12,7 cm) TRANSPORT position.
- Place the cutting height adjustment pin in the desired cutting height hole.
- Pull the deck lift lever back towards the operator position and depress the deck lift release button to release the transport position lock.
- Push the deck lift lever forward until it contacts the cutting height adjustment pin.

#### To set the cutting height at 5" (12,7 cm):

- Pull the deck lift lever back towards the operator position until it locks into the 5" (12,7 cm) TRANSPORT position.
- Place the cutting height adjustment pin in any open hole. The deck lift lock latch (E) holds the mower deck at the 5" (12,7 cm) position while cutting.

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

### 44



## Neutral Adjustment

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

- Drive the machine to a flat, level surface. Engage the parking brake and disengage the PTO.
- Without touching the forward speed control levers disengage the parking brake. If the unit moves, the neutral systems on the transaxles are not correctly adjusted. **See your dealer.**

## Neutral Lockout and Tracking Adjustment

**Before making adjustments to the neutral lockout or the unit's tracking, be sure to check the following:**

- Drive tires are properly inflated.
- Caster tires are greased and turn freely.
- All controls are free from damage and operate freely.
- Machine is at full operating temperature.
- Make sure that the machine is in NEUTRAL when the ground speed control levers are released per the procedure detailed in *Neutral Adjustment*.

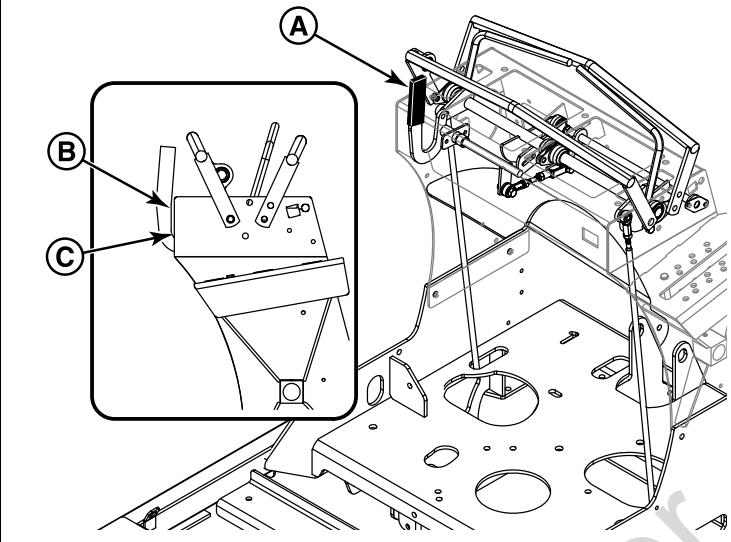
## Positioning the Parking Brake Handle

- Park the machine 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.

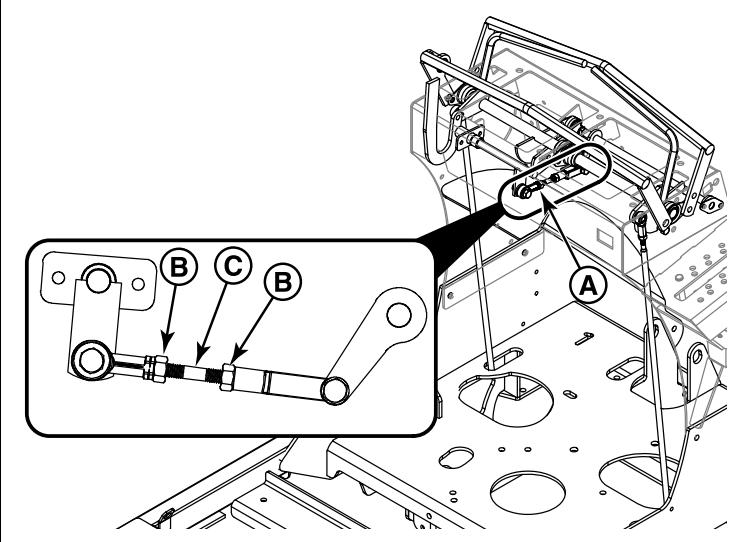
2. Chock the front wheels of the unit to prevent movement and disengage the parking brake.
3. Engage the parking brake by pulling the parking brake lever (A, Figure 45) up and back while moving both ground speed control levers forward back and forth, so that the neutral lockouts will engage the ground speed control levers as the parking brake is being engaged.

**45**



4. With the parking brake engaged observe the flat edge of the parking brake lever (B) in relation to the front of the dash panel (C). The front edge of the parking brake lever should be parallel to the front of the dash panel.
5. To adjust the position of the parking brake lever: Locate the threaded linkage rod (A, Figure 46) that connects the parking brake lever to the neutral lockout shaft. Loosen the two jam nuts (B) and turn the rod (C) until the flat edge of the parking brake lever is parallel to the front of the dash panel.

**46**

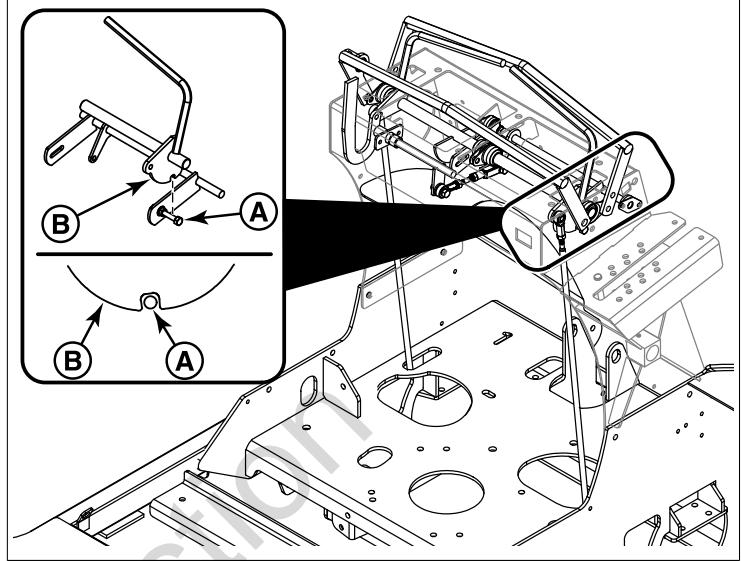


6. Tighten the jam nuts.

## Left Hand Side Lockout Bolt Adjustment

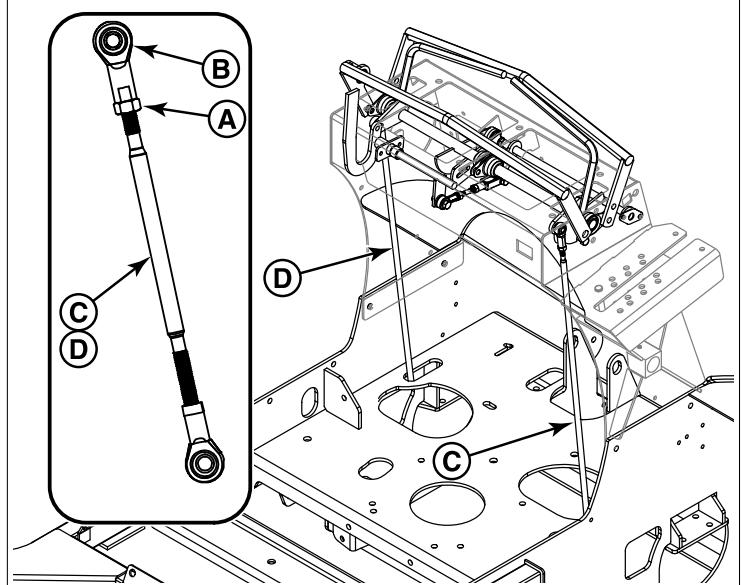
1. Observe the left hand side lockout bolt (A, Figure 47). It should be positioned so that it is in the center of the notch of the lockout plate (B) on the ground speed control lever.

**47**



2. To adjust the position of the left hand side lockout bolt in the notch of the lockout plate on the ground speed control lever, loosen the jam nut (A, Figure 48) tightened against the upper ball joint (B) on the left hand side motion control rod (C) and turn the rod until the left hand side lockout bolt is in the center of the notch of the lockout plate.

**48**

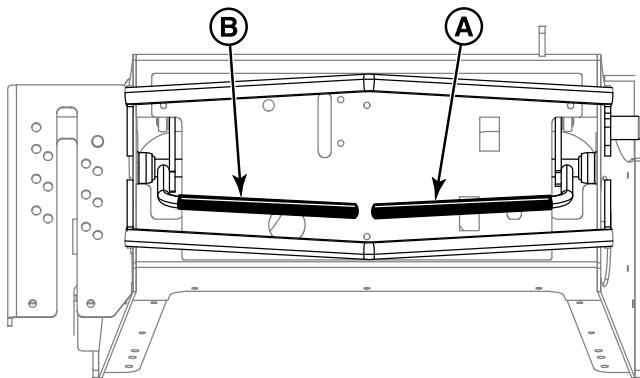


3. Re-tighten the jam nut.

## Ground Speed Control Lever Alignment Adjustment

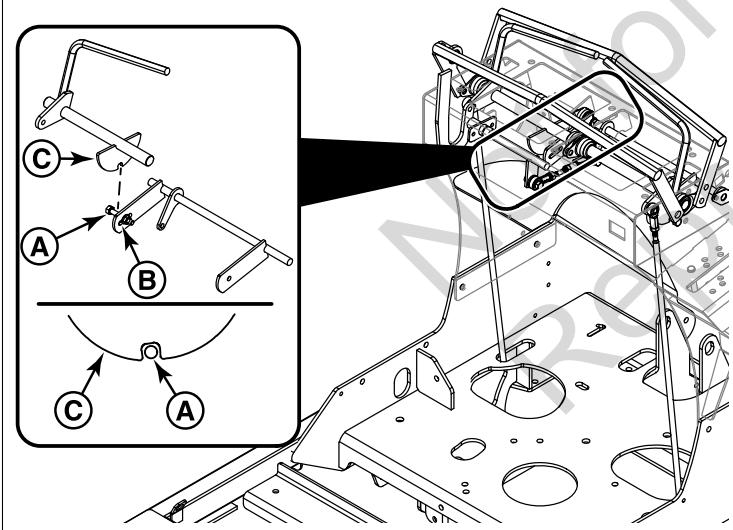
1. Observe the alignment of the right side ground speed control lever (A, Figure 49) as compared to the left side ground speed control lever (B).

49



2. If the ground speed control levers are not aligned, loosen the right side lockout bolt (A, Figure 50) so that it can slide back and forth in the slot of the neutral lockout shaft (B).

50



3. Loosen the jam nut (A, Figure 48) on the right side motion control rod (D) and turn the linkage rod until the two handles align.
4. Tighten the jam nut.
5. Drive the unit outside to a flat, level area with plenty of room to maneuver.
6. Safely drive the unit with the ground speeds in the maximum forward position.
7. If the unit travels straight, tracking is adjusted correctly, proceed to *Right Side Lockout Bolt Adjustment*.
8. If the unit veers to the left or the right, the tracking must be adjusted.

## Tracking Adjustment

1. Park the machine 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 key.
2. If the unit veers to the left, loosen the jam nut (A, Figure 48) turn the right hand side linkage (D) rod 1/8 to 1/4 turn **counter-clockwise**.
3. If the unit veers to the right, loosen the jam nut (A, Figure 48) turn the right hand side linkage rod (D) 1/8 to 1/4 turn **clockwise**.
4. Re-tighten the jam nut.
5. Drive the machine on a flat, level surface to test and repeat steps this process as necessary.

In some cases, the tracking adjustment may not be achievable by only adjusting the right hand side motion control rod and the left hand motion control rod (C) must be adjusted by turning it in the opposite direction that you turned the right hand motion control rod. The left hand motion control rod has a limited amount of adjustment available, and after being adjusted the left hand lockout bolt (A, Figure 47) must fall within the notch of the lockout plate (B) and not touch either side of the notch. The process may need to be performed several times to get the unit to track properly.

## Right Side Lockout Bolt Adjustment

After the tracking of the unit has been adjusted the right hand side lockout bolt (A, Figure 50) needs to be adjusted.

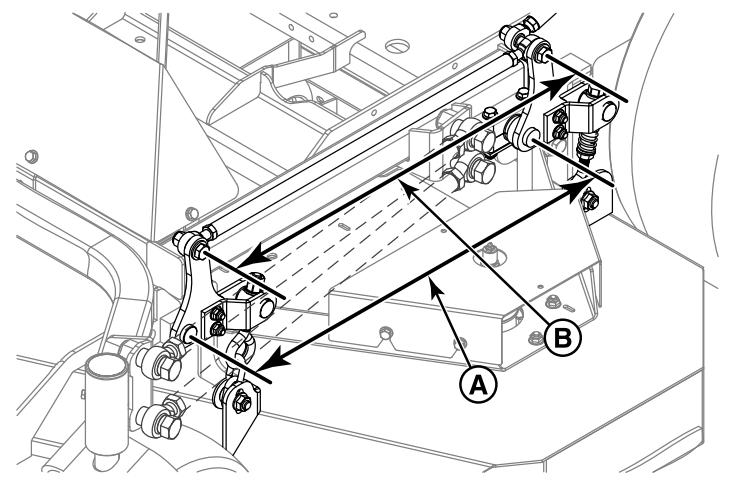
1. Observe the right hand side lockout bolt. It should be positioned so that it is in the center of the notch of the lockout plate (C) on the ground speed control lever.
2. To adjust the position of the right hand side lockout bolt, move the bolt in whatever direction is necessary in the slot of the neutral lockout shaft (B) so that it is centered in the notch of the lockout plate (C) slot of the ground speed control lever and re-tighten the jam nut.

## Deck Lift Rod Timing Adjustment

*Note:* Figures 51 and 52 depict the rods for the pivoting front end as dashed lines to provide better visibility of the components used in this procedure.

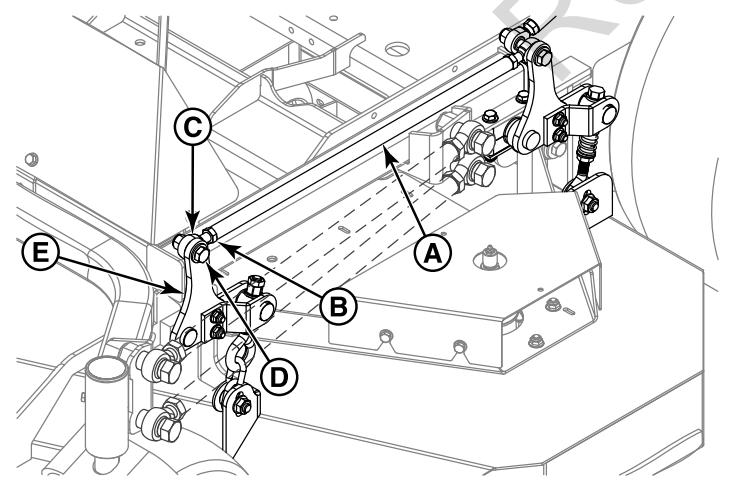
1. Park machine on a flat, level surface. Disengage the PTO, stop the engine, and engage the parking brake.
2. Verify the tires are inflated to the correct pressure.
3. To check the deck lift rod timing, measure and record the distance between the lift pivots (A, Figure 51) and the rod pivots (B). Repeat this process fo the other side of the unit.

51



4. If the measurements for the lift pivots and rod pivots 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 step #5.
5. Pull the deck lift lever back towards the operator's position to raise and then lock the mower deck in the 5" (12,7 cm) position.
6. Remove the deck height adjustment pin and lower the mower deck to its lowest cutting position. To ensure that the deck is in the lowest position, push the deck lift lever as far forward as possible.
7. Install the cutting height adjustment pin in the 3" (7,6 cm) position to hold the mower deck in place.
8. Place blocking under the mower deck until all tension is removed from all deck hangers.
9. To adjust the length of the deck lift rod (A, Figure 52), loosen the jam nut (B) on the front ball joint (C).

52



10. Remove the 1/2" hardware (D) fastening the ball joint to the lift pivot arm (E).

11. Turn the ball joint **clockwise** to shorten the distance between the rod pivots or **counter-clockwise** to lengthen the distance between the rod pivots.
12. Once the measurement between the rod pivots (B, Figure 51) equals the measurement between the lift pivots, re-install the ball joint on the lift pivot arm and secure with the 1/2" hardware previously removed.
13. Tighten the jam nut against the deck lift rod.
14. Repeat this process for the other side of the unit, if necessary.
15. Remove all blocking from under the mower deck.
16. Remove the cutting height adjustment pin from behind the deck lift lever. Raise the mower deck and re-install the cutting height adjustment pin in the desired height.

## Mower Deck Leveling Procedure

Before adjusting the levelness of the mower deck, the deck lift rod timing must be checked and, if necessary, adjusted.

### Determining if the Mower Deck Needs to be Leveled

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 in the TRANSPORT position. Place the cutting height adjustment pin in the 4" position and lower the deck lift lever until it 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.



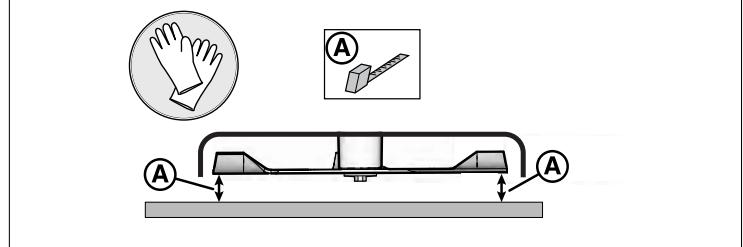
### WARNING

#### Avoid Injury! Mower blades are sharp.

Always wear gloves when handling blades or working near blades.

5. See Figure 53. Position the outside mower blades so they face front-to-back.

53



6. Measure the front tip (A, Figure 53) 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).

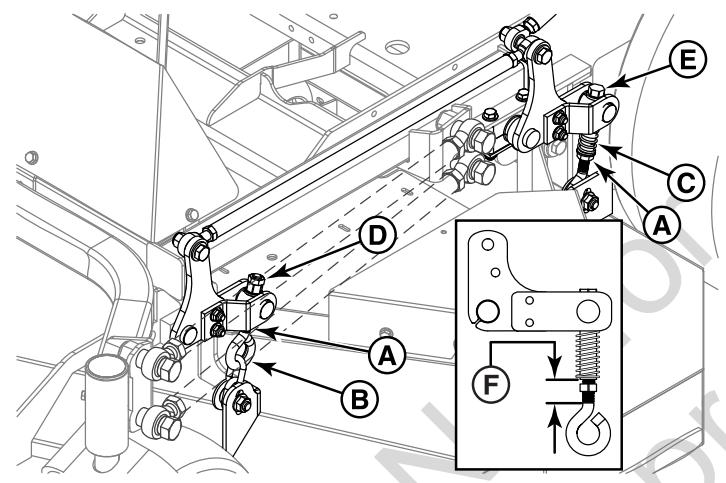
If the measurements do not equal the measurements as listed above, adjust the deck leveling.

## Deck Leveling Procedure

Note: Figures 54 and 55 depict the rods for the pivoting front end as dashed lines to provide better visibility of the components used in this procedure.

1. Position the mower deck in the 4" (10,2 cm) cutting position.
2. Loosen the locking nuts (A, Figure 54) on the two (2) front hanger chains (B) and the two (2) rear deck linkages (C).
3. Turn the adjustment nut (D) on the front hanger chains **clockwise** to raise the mower deck or **counter-clockwise** to lower the mower deck.

**54**



Note: If you are lowering the mower deck and the end of the eye bolt becomes flush with the top of the adjustment nut, do not lower the mower deck by turning the adjustment nut further.

4. Turn the hex adjusters on the rear deck linkages (E) **clockwise** to raise the mower deck or **counter-clockwise** to lower the mower deck.

Note: If you are lowering the mower deck, measure the amount of visible threads (F) on the deck linkages. If the amount of visible threads shown reaches 1-1/2" (3,8 cm), do not lower the mower deck by adjusting the deck linkage any further.

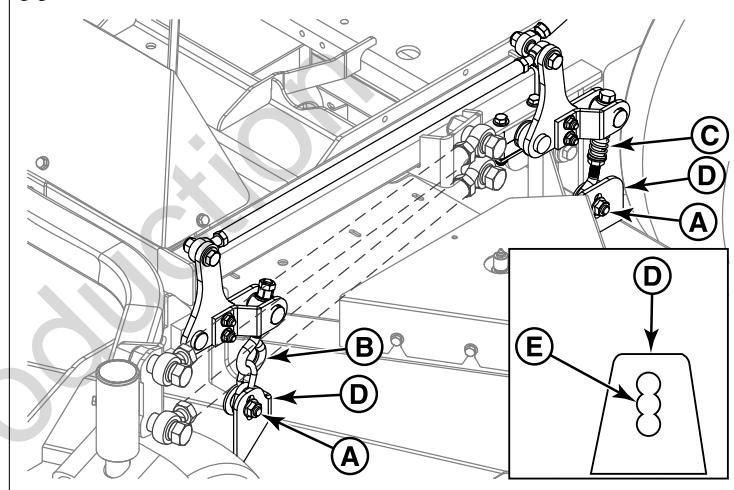
5. Re-check the measurements from the tips of the mower blades to the ground. The front measurements should equal 4" (10,2 cm) and the rear measurements should equal 4-1/4" (10,8 cm).

- If the measurements equal 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear, tighten the locking nuts on the front hanger chains and the rear deck linkages. The adjustment procedure is complete.

- If the measurements do not equal 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear, the mounting hole that the front hanger chains and rear deck linkages are mounted in will have to be changed.

6. Pull the deck lift lever back towards the operator's position to raise and then lock the mower deck in the 5" (12,7 cm) position.
7. Remove the deck height adjustment pin and lower the mower deck to it's lowest cutting position. To ensure that the deck is in the lowest position, push the deck lift lever as far forward as possible.
8. Install the cutting height adjustment pin in the 3" (7,6 cm) position to hold the mower deck in place.
9. Place blocking underneath all four corners of the mower deck.
10. Re-position the hardware (A, Figure 55) that secures the front hanger chains (B) and rear deck linkages (C) to the mounts on the mower deck (D).

**55**



- If the mower deck was being raised when it was unable to achieve the 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear measurement, position the hardware in the next lower hole (E) in the mower deck mount.
- If the mower deck was being lowered when it was unable to achieve the 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear measurement, position the hardware in the next higher hole in the mower deck mount.

11. Remove the blocking from under the mower deck.
12. Re-check the measurements from the tips of the mower blades to the ground. The front measurements should equal 4" (10,2 cm) and the rear measurements should equal 4-1/4" (10,8 cm).
  - If the measurements equal 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear, tighten the jam nuts on the front hanger chains and the rear deck linkages. The adjustment procedure is complete.
  - If the measurements do not equal 4" (10,2 cm) in the front and 4-1/4" (10,8 cm) in the rear, turn the adjustment nut on the front hanger chain until the

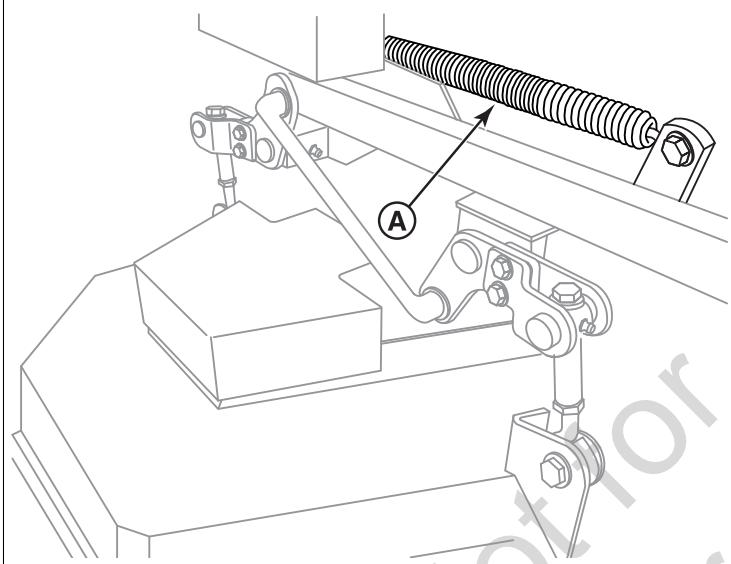
measurements equal 4" (10,2 cm) in the front and turn the hex adjusters on the rear deck linkages until the measurements equal 4-1/4" (10,8 cm) in the rear.

13. Tighten the jam nuts on the front hanger chains and the rear deck linkages.
14. Remove the cutting height adjustment pin from behind the deck lift lever. Raise the mower deck and re-install the cutting height adjustment pin in the desired height.

## Deck Lift Assist Springs

Some models are equipped with deck lift assist springs (A, Figure 56) that assist the operator in raising the mower deck with the deck lift lever. The deck lift assist springs are factory set to provide optimal lifting performance.

**56**



Although it is fastened with an adjustable anchor, **this is not an adjustment point**.

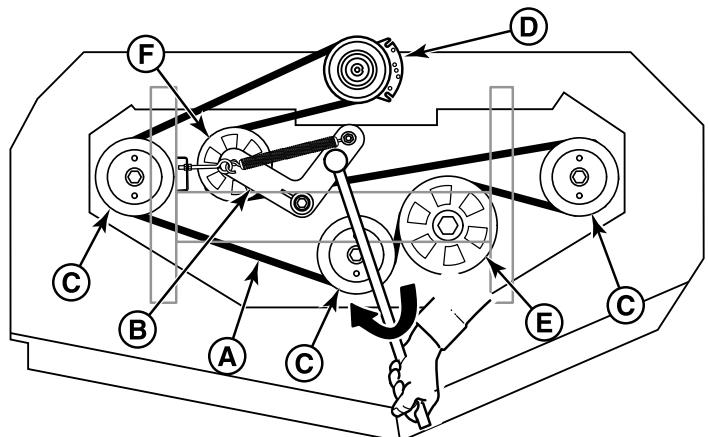
Do NOT attempt to adjust the spring length or lifting performance will be compromised.

## Mower Deck Drive Belt Replacement - 52" & 61" Mower Decks

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

1. Park the mower 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 decks guards to gain access to the mower deck drive belt (A, Figure 57).

**57**

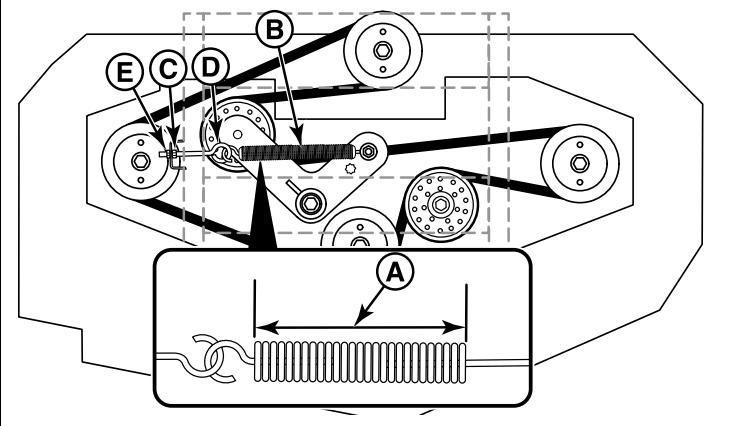


### ! WARNING

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

3. Using the 1/2" breaker bar, place the square end in the opening in the idler arm (B) and rotate the idler arm **clockwise**, which will relieve the tension on the belt exerted from the idler arm.
4. Slide the drive belt over the edge of the trim side spindle pulley (C). Carefully release the tension on the breaker bar.
5. Remove the old belt and replace with a new one.
6. Install the belt onto the PTO clutch pulley (D) and the center and discharge side spindle pulleys (C). Install the belt on the stationary idler pulley (E) and the adjustable idler pulley (F).
7. Carefully rotate the breaker bar **clockwise** and install the belt on the trim side spindle pulley, making sure that the V-side of the belt runs in the grooves of the pulley.
8. Carefully release the tension on the breaker bar.
9. Set the mower deck in the 3-1/2" (8,89 cm) cutting position.
10. Determine the correct spring length for your machine: **For units with 52" mower decks: 10-1/2" (26,7 cm). For units with 61" mower decks: 9-3/4" (24,8 cm)**.
11. Measure the coil length (A, Figure 58) of the mower belt tensioning spring (B). The measurement should be the measurement as indicated in step #10. If not, loosen the jam nut (C) on the eye bolt (D) and turn the adjustment nut (E) until the measurement is achieved.

58



12. Tighten the jam nut.

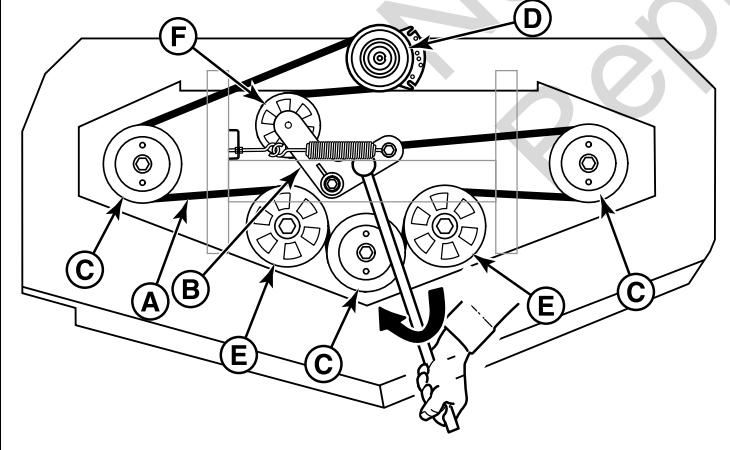
13. Install the mower deck guards.

## Mower Deck Drive Belt Replacement - 72" Mower Decks

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

1. Park the mower 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 decks guards to gain access to the mower deck drive belt (A, Figure 59).

59



### WARNING

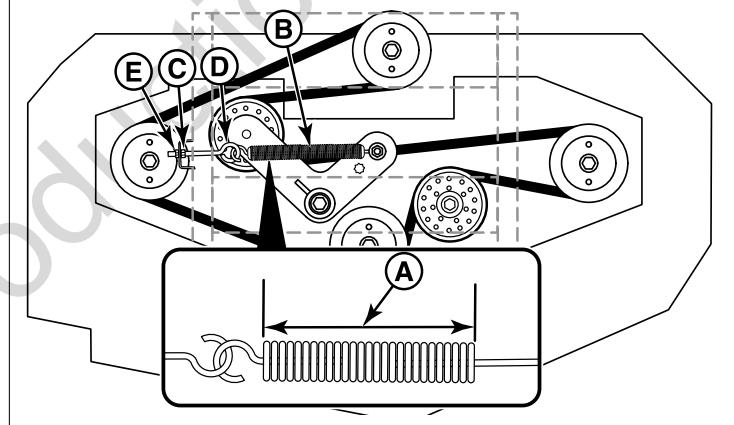
Use extreme caution when rotating the idler arm with the breaker bar, due to the increased tension in the spring as the idler arm is being rotated. Injury may result if the breaker bar is prematurely released while the spring is under tension.

3. Using the 1/2" breaker bar, place the square end in the opening in the idler arm (B) and rotate the idler arm

**clockwise**, which will relieve the tension on the belt exerted from the idler arm.

4. Slide the drive belt over the edge of the trim side spindle pulley (C). Carefully release the tension on the breaker bar.
5. Remove the old belt and replace with a new one.
6. Install the belt onto the PTO clutch pulley (D) and the center and discharge side spindle pulleys (C). Install the belt on the stationary idler pulleys (E) and the adjustable idler pulley (F).
7. Carefully rotate the breaker bar **clockwise** and install the belt on the trim side spindle pulley, making sure that the V-side of the belt runs in the grooves of the pulley.
8. Carefully release the tension on the breaker bar.
9. Set the mower deck in the 3-1/2" (8,89 cm) cutting position.
10. Measure the coil length (A, Figure 60) of the mower belt tensioning spring (B). The measurement should equal 10-1/2" (26,7 cm). If not, loosen the jam nut (C) on the eyebolt (D) and turn the adjustment nut (E) until the measurement is achieved.

60



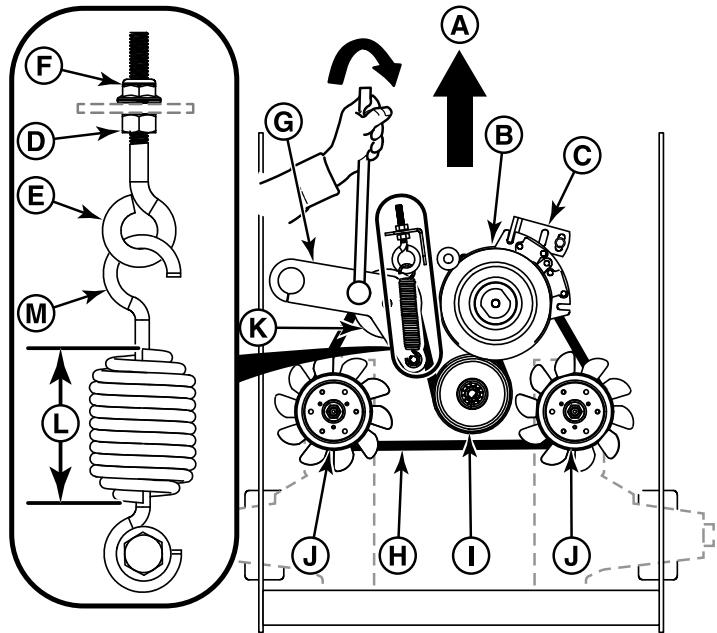
11. Re-tighten the jam nut.

12. Re-install the mower deck guards.

## Transaxle Drive Belt Replacement

Figure 61 depicts the transmission drive belt as seen from underneath the unit and looking up at it. The arrow (A, Figure 61) indicates the front of the unit.

61



- Park the unit on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the ignition, and remove the ignition key.
- Remove the mower deck drive belt. See *Mower Deck Drive Belt Replacement* for removal instructions.
- Disconnect the wire harness from the PTO clutch (B).
- Loosen the hardware that secures the PTO clutch anchor (C) to the engine deck and rotate the PTO clutch anchor away from the slot in the PTO clutch.
- Loosen the jam nut (D) on the spring anchor eye bolt (E).
- Loosen the adjustment nut (F) on the spring anchor eye bolt to release the majority of the belt tension.



#### 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.

- Using a 1/2" breaker bar, place the square end in the opening in the idler arm (G) and rotate the idler arm **clockwise**, which will relieve the tension on the belt exerted from the idler arm.
- Slide the drive belt (H) over the edge of the stationary idler pulley (I). Carefully release the tension on the breaker bar.
- Remove the old belt and replace with a new one. Make sure that the V-side of the belt runs in the grooves of the transmission pulleys (J), PTO clutch pulley (B), and the adjustable idler pulley (K).
- Carefully rotate the breaker bar **clockwise** and install the belt on the stationary idler pulley making sure that the

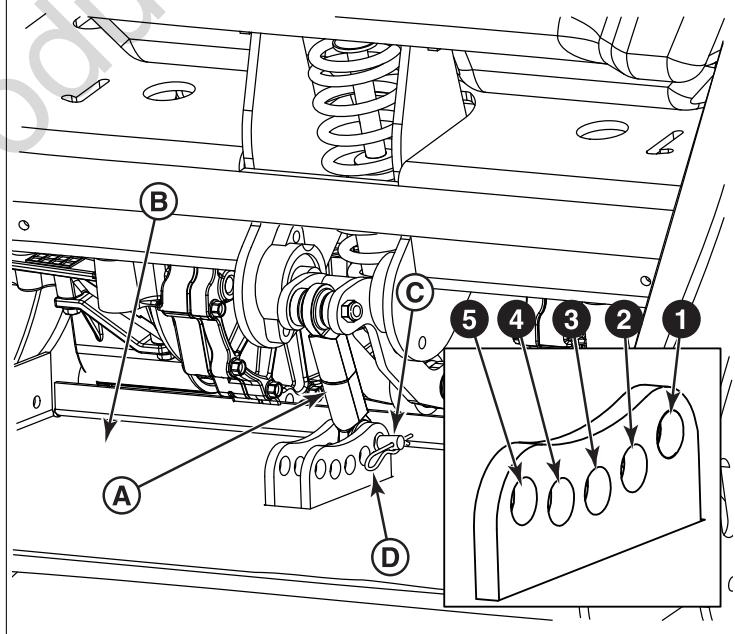
back side of the belt contacts the face of stationary idler pulley.

- Carefully release the tension on the breaker bar.
- Reposition the PTO clutch anchor into the slot of the PTO clutch and tighten its hardware to secure it in place.
- Turn the adjustment nut until the coil-to-coil measurement (L) of the spring (M) equals 3-5/8" (9.2 cm).
- Tighten the jam nut.
- Reconnect the wire harness to the PTO clutch.
- Re-install the mower deck drive belt. See *Mower Deck Drive Belt* for re-installation instructions.

## Operator Platform Suspension Adjustment

The lower mounting position of the shock assembly linkage (A, Figure 62) that connects to the operator platform (B) can be positioned into one of the five available positions to customize the ride according to the operator's weight and/or operating conditions. The lower mounting position closest to the engine (labelled # 1, Figure 62) is for light-weight operators, which will provide a softer, more cushioned ride. As the shock assembly linkage is moved towards the furthest lower mounting position away from the engine deck (labelled # 5) the machine can accommodate heavier-weight operators, and provide a stiffer more rigid ride.

62



## To Adjust the Lower Mounting Position:

- Park the machine on a flat, level surface. Disengage the PTO, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
- Remove the clevis pin (C, Figure 62) and hair pin (D) that secure the shock assembly linkage (A) to the operator platform (B).

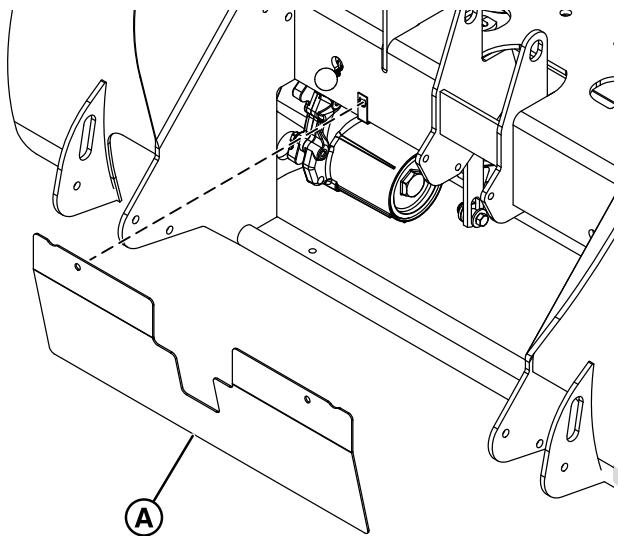
- Pivot the shock assembly linkage to the next higher numbered hole (see Figure 62) and secure to the operator platform using the clevis pin and hair pin.
- Continue to reposition the shock assembly linkage to the next higher numbered hole until the desired ride is achieved.

## Parking Brake Adjustment

Prior to adjusting the parking brake the neutral lockout and tracking adjustment procedures must be checked and adjusted correctly. See *Neutral Lockout and Tracking Adjustment*

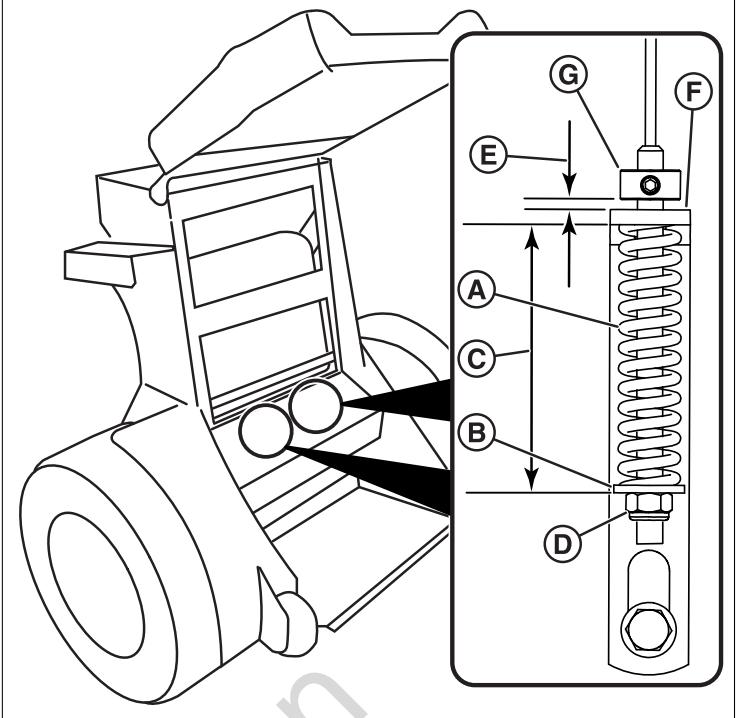
- Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn the ignition to OFF, and remove the ignition key.
- Remove the foot guard (A, Figure 63) and the hardware that retains it from the back of the unit.

**63**

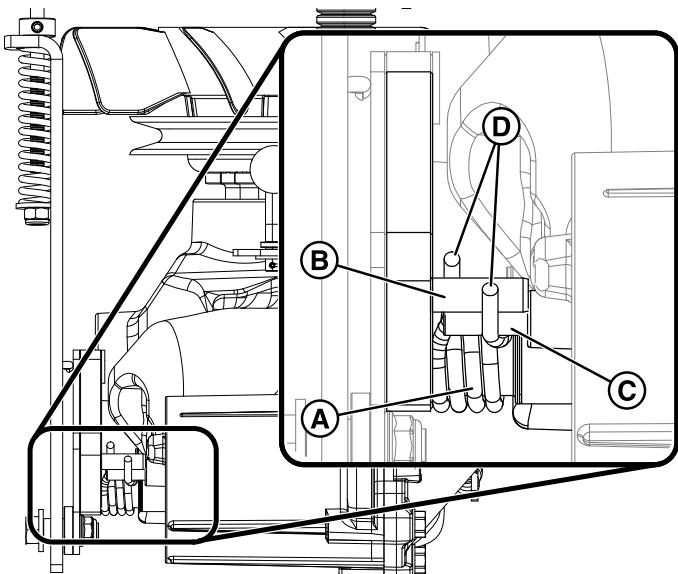


- Locate the two parking brake springs (A, Figure 64) below the engine deck by the unit's transaxles.

**64**



- Measure the distance from the end of the spring to the bottom face of the flat washer (B). This measurement is identified as "C" in Figure 64. The measurement should equal 2-3/4" (7,0 cm). If not, position the adjustment nut (D) until the measurement equals 2-3/4" (7,0 cm).
- Measure the distance (E) between the top of the lower parking brake bracket (F) and the bottom edge of the set collar (G). The measurement should be 3/16" (0,48 cm). If not, position the set collar until the measurement equals 3/16" (0,48 cm).
- Repeat this process for the parking brake spring on the other transaxle.
- Chock the front wheels of the unit to prevent the unit from moving and then release the parking brake.
- Inspect the control arm spring (A, Figure 65) on the transaxles. When the parking brake lever post (B) will come into alignment with the stationary housing post (C). The two posts (D) of the spring will rest on the stationary post. If the parking brake is correctly adjusted you should be able to move the parking brake lever slightly with your hand.

**65**

- Put the foot guard back onto the unit using the hardware that previously retained it.

**Note:** If this does not correct your braking problem, see your authorized dealer.

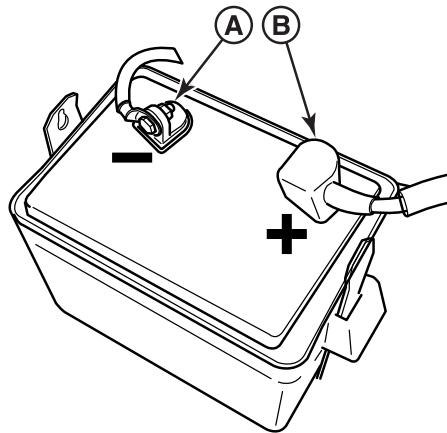
## Cleaning the Battery and Cables

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



### Keep open flames and sparks away from the battery.

- Be careful when handling the battery.
  - Avoid spilling electrolyte.
  - Keep flames and sparks away from the battery.
  - When removing or installing battery cables, disconnect the negative cable FIRST and reconnect it LAST. If not done in this order, the positive terminal can be shorted to the frame by a tool.
- Remove the rubber strap and battery box cover.
  - Disconnect the cables from the battery, negative [-] cable first (A, Figure 66).

**66**

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

## Battery Service



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

### Checking Battery Voltage

A voltmeter can be used to determine condition of battery. When engine is off, the voltmeter shows battery voltage, which should be 12 volts. When 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 dealer. If you need to replace the battery, follow the steps under *Cleaning the Battery & Cables*.

## Charging a Completely Discharged Battery



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

- Be aware of all the safety precautions you should observe during the charging operation. If you are unfamiliar with the use of a battery charger and hydrometer, have the battery serviced by your dealer.

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

### **Jump Starting With Auxiliary (Booster) Battery**

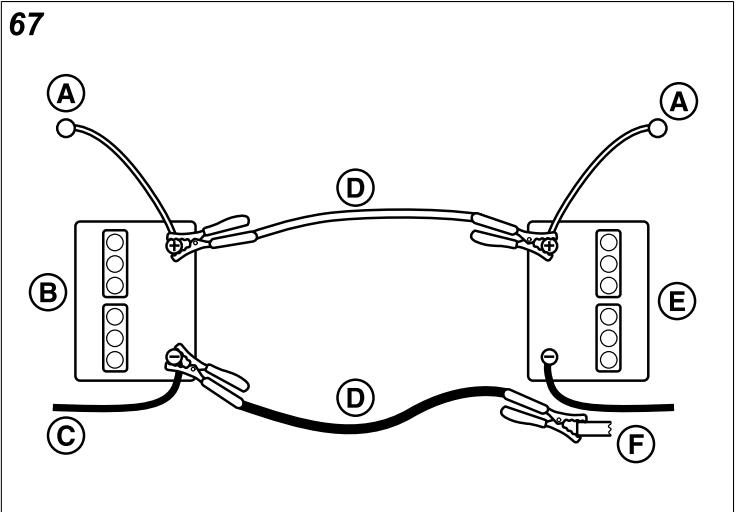
Jump starting is not recommended. However, if it must be done, follow these directions. Both booster and dis-charged batteries should be treated carefully when using jumper cables. Follow the steps below EXACTLY, being careful not to cause sparks. Refer to Figure 67.



#### **WARNING**

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

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



**This hook-up is for negative grounded vehicles.**

Callout	Description
A	To Starter Switch
B	Starting Vehicle Battery
C	To Ground
D	Jumper Cable
E	Discharged Vehicle Battery
F	Engine Block

**Make sure vehicles do not touch.**

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

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



Any procedure other than the preceding could result in:

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

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

## Troubleshooting

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

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

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



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 Unit

#### **Problem: Engine will not turnover or start.**

Cause	Remedy
Parking brake not engaged.	Engage parking brake.
Out of fuel.	If engine is hot, allow it to cool, then refill the fuel tank.

#### **Problem: Engine will not turnover or start.**

Engine flooded.	<b>Carbureted Models:</b> Move choke control to the closed position. <b>Fuel Injected Models:</b> See authorized service dealer.
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 & replace broken or frayed wires. Tighten loose connections.
Safety interlock switch faulty.	Replace as needed. See authorized service dealer.
Spark plug(s) faulty, fouled or incorrectly gapped.	Clean and gap or replace. See engine manual.
Water in fuel.	Drain fuel and replace with fresh fuel.
Gas is old or stale.	Drain fuel and replace with fresh fuel.
<b>Fuel Injected Models Only:</b> Malfunction in fuel injection system.	See authorized service dealer.

#### **Problem: Engine starts hard or runs poorly.**

Cause	Remedy
Fuel mixture is too rich.	1.) Clean air filter. 2.) <b>Carbureted Models:</b> Check choke adjustment. <b>Fuel Injected Models:</b> See authorized service dealer.
Spark plug faulty, fouled, or incorrectly gapped.	Clean and gap or replace. See engine manual.

#### **Problem: Engine knocks.**

Cause	Remedy
Low oil level.	Check / Add oil as required.
Using wrong grade oil.	See engine 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 manual.
Too much oil in crankcase.	Drain excess oil.

#### **Problem: Engine exhaust is black.**

Cause	Remedy
Dirty air filter.	Replace air filter. See engine manual.
<b>Carbureted Models:</b> Engine choke control is in closed position.	Open choke control.

#### **Problem: Malfunction Indicator Lamp (M.I.L.) is flashing (Fuel Injected Models Only).**

Cause	Remedy
Problem with the fuel injection system.	See authorized service dealer.

#### **Problem: Engine runs but mower will not drive.**

Cause	Remedy
Transmission release lever(s) in "disengaged" position.	Move transmission release lever(s) to the "engaged" position.
Transmission drive belt is broken.	See "Transmission Drive Belt Replacement".

### **Problem: Engine runs but mower will not drive.**

Transmission drive belt is slipping.	See problem and cause below.
Brake is not fully released.	See authorized service dealer.

### **Problem: Transmission drive belt slips.**

Cause	Remedy
Pulleys or belt is greasy or oily.	Clean as required.
Tension is too loose.	Adjust spring tension. See "Transmission Drive Belt Replacement".
Belt stretched or worn.	Replace belt.

### **Problem: Parking brake will not hold.**

Cause	Remedy
Brake is incorrectly adjusted.	See "Parking Brake Adjustment".

### **Problem: Mower steers or handles poorly.**

Cause	Remedy
Ground speed control lever linkages are loose.	Check and tighten any loose connections.
Improper tire inflation.	See "Specifications" for proper tire inflation and adjust tire pressures accordingly.
Tracking needs adjustment.	See "Tracking Adjustment".

## **Troubleshooting the Mower Deck**

### **Problem: Mower deck will not raise.**

Cause	Remedy
Lift Linkage not properly attached or damaged.	See authorized service dealer for repair.

### **Problem: Engine stalls easily with mower deck 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, and then at the desired cutting height for the second pass.
Discharge chute jamming with cut grass.	Cut grass with discharge pointing towards previously cut area.

### **Problem: Excessive mower deck vibration.**

Cause	Remedy
Blade mounting bolts are loose.	Tighten to 120 ft. lbs. (163 N.m.).
Mower blades, arbors, or pulleys are bent.	Check and replace as necessary.
Mower blades are out of balance.	Remove, sharpen, and balance blades. See "Servicing the Mower Blades".
Belt installed incorrectly.	Reinstall the belt correctly. See "Mower Deck Drive Belt Replacement".

### **Problem: Excessive belt wear or breakage.**

Cause	Remedy
Bent or rough pulleys.	Repair or replace.
Using incorrect belt.	Replace with correct belt.

### **Problem: Mower deck drive belt slips or fails to drive.**

Cause	Remedy
Idler pulley spring broken or not properly attached.	Repair or replace as needed.
Mower deck drive belt is broken.	Replace mower deck drive belt.

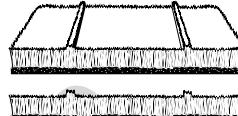
### **Problem: Mower (blades) does not engage.**

Cause	Remedy
Electrical wiring damage.	Locate and repair damaged wire.
Operator is not standing on the operator platform.	Operator stands on the operator platform and pulls up on the PTO (Power Take Off) switch.

## **Troubleshooting Common Cutting Problems**

### **Problem: Streaking**

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



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

### **Problem: Scalping**

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

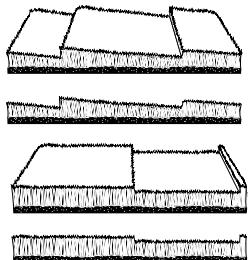


Cause	Remedy
Lawn is uneven or bumpy.	Roll or level the lawn.
Mower deck cutting height is set too low.	Raise the cutting height.
Ground speed is too fast.	Slow down.
Deck is not leveled correctly.	Correctly level the deck.
Tire pressure is low or uneven.	Check and inflate the tires.

### **Problem: Stepped Cutting**

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

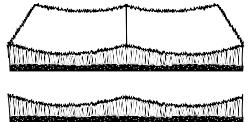
### Problem: Stepped Cutting



Cause	Remedy
Deck is not leveled correctly.	Level the deck correctly.
Tires are not properly inflated.	Check and inflate the tires.
Blades are damaged.	Replace the blades.
Deck shell is damaged.	Repair or replace the deck.
Mower spindle is bent or loose.	Repair or replace the spindle.
Blades are installed incorrectly.	Reinstall the blades correctly.

### Problem: Uneven Cutting

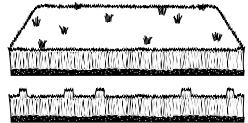
Uneven cutting is waviness or smooth troughs in the lawn surface. Uneven cutting is usually caused by mower deck damage or misadjustment.



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

### Problem: Stringers

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



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

### ENGINE

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

Fits models: 5901955

#### Kawasaki FX850V

Make	Kawasaki
Model	FX850V-LS00-S
Electrical System	12 volt, 15 amp charging coil; Battery: 350 CCA

Fits models: 5901692, 5901694, 5901809, 5901951, 5901953 & 5901957

#### Briggs & Stratton Vanguard EFI

Make	Briggs & Stratton
Model	61E877-0005-J1 / 61E877-0008-J1 / 61E877-0112-J1
Electrical System	12 volt, 20 amp alternator, Battery: 350 CCA

Fits models: 5901691 & 5901693

#### Kawasaki FX850 Electronic Fuel Injected (EFI)

Make	Kawasaki
Model	FX850V-AS42-S
Electrical System	12 volt, 30 amp charging coil, Battery: 350 CCA

Fits models: 5901784 & 5901789

#### Briggs & Stratton Vanguard EFI

Make	Briggs & Stratton
Model	54E677-0003-J1
Electrical System	12 volt, 20 amp alternator, Battery: 350 CCA

Fuel Tank Capacity 10.5 gallons (39,7 L) total

#### Rear Wheels

Tire Size (Models with 52" Mower Deck)	23 X 9.50 - 12
Tire Size (Models with 61" Mower Deck)	24 X 12.00 - 12
Tire Size (Models with 72" Mower Deck)	24 X 12.00 - 12

Inflation Pressure 18 psi (1,24 bar)

#### Front Wheels

Tire Size	13 X 6.5 - 6
Inflation Pressure	N/A Flat free tire

LH 1710-1065L (5105286)

RH 1710-1065R (5105285)

Type ZT-4400 Transaxles

Hydraulic Fluid SAE 20W-50 motor oil

#### Speeds

Forward 0-12 MPH (0-19,3 km/h)

## Specifications

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

Reverse	0-5 MPH (0-8,05 km/h)
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### Models with 52" Mower Decks

Overall Length	69" (175 cm)
Overall Width (with discharge chute up)	54-3/8" (138 cm)
Overall Width (with discharge chute down)	65" (165 cm)
Height	48-1/2" (123 cm)
Weight (approximate):	1184 lbs (537 kg)

### Models with 61" Mower Decks

Overall Length	73-3/4" (187,32 cm)
Overall Width (with discharge chute up)	67" (170,18 cm)
Overall Width (with discharge chute down)	75-1/4" (191,14 cm)
Height	48-3/8" (122,87 cm)
Weight (approximate):	1267 lbs (874,70 kg)

### Models with 72" Mower Decks

Overall Length	74-1/2" (189,23 cm)
Overall Width (with discharge chute up)	77" (195,58 cm)
Overall Width (with discharge chute down)	85-1/4" (216,54 cm)
Height	48-3/8" (122,87 cm)
Weight (approximate):	1327 lbs (601,92 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](http://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
+Transaxles	3 years (36 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
+Attachments	1 year	90 days
+Engine*	See Engine Operator's Manual	See Engine Operator's Manual

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

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

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

To ensure prompt and complete warranty coverage, register your product at the website shown above or at [www.onlineproductregistration.com](http://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.

**5419127 Revision -**

## Notes

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