FERRIS®

OPERATOR'S MANUAL

EVOLUTION Series

Compact Zero-Turn Riding Mower

Model Number:	Description
5900778	EVKAV1936, 19HP Kawasaki, 36" Mower Deck
5900779	EVKAV2748, 27HP Kawasaki, 48" Mower Deck
5900854	EVKAV1936 CAL, 19HP Kawasaki, 36" Mower Deck
5900834	EVKAV2048, 20HP Kawasaki, 48" Mower Deck

Briggs & Stratton Power Products Group, LLC.
5375 North Main Street
Munnsville, NY 13409
800-933-6175

5101835
Rev F

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

This manual contains safety information to make you aware of the hazards and risks associated with this machine and how to avoid them. This machine is designed and intended to be used and maintained according to the 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 these instructions thoroughly before attempting to start or operate this equipment.
Save these original instructions for future reference.

PRODUCT REFERENCE DATA	
Unit Model Number	Unit SERIAL Number
Mower Deck Model Number	Mower Deck SERIAL Number
Dealer Name	Date Purchased
ENGINE REFERENCE DATA	
Engine Make	Engine Model
Engine Type/Spec.	Engine Code/Serial Number

See FEATURES AND CONTROLS for the location of Identification Numbers

⚠ WARNING

Engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

⚠ WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds — chemicals know to the State of California to cause cancer or reproductive harm. Wash hands after handling.

Contact Information:

Briggs & Stratton Power Products Group, LLC.
5375 N. Main St.
Munnsville, NY 13409-4003
(800) 933-6175
www.ferrisindustries.com

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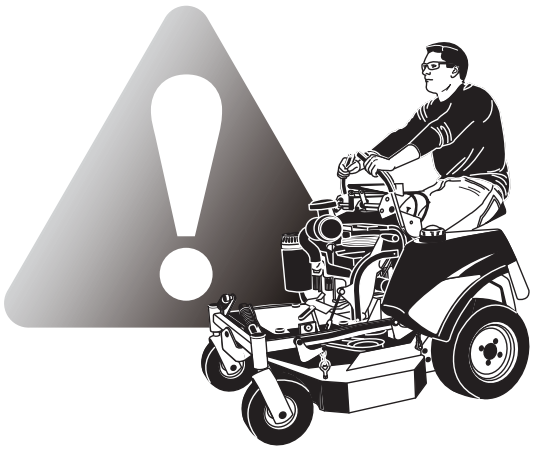
NOTE: In this manual, “left” and “right” are referred to as seen from the operating position.



Operating Safety

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

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

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

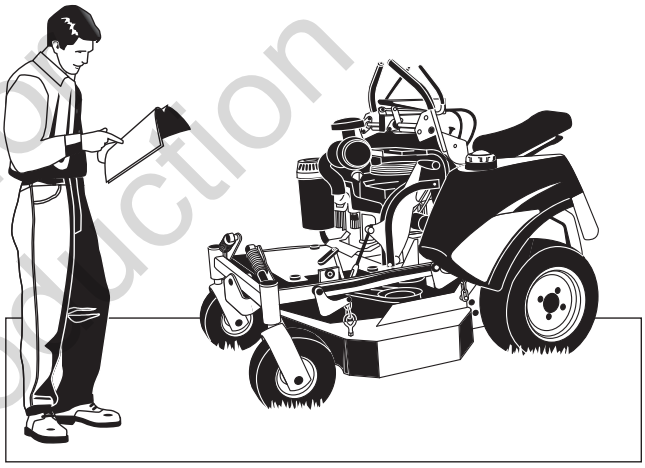
Use common sense, and think through what you are doing. If you are not sure that the task you are about to perform can be safely done with the equipment you have chosen, ask a professional: contact your local authorized dealer.

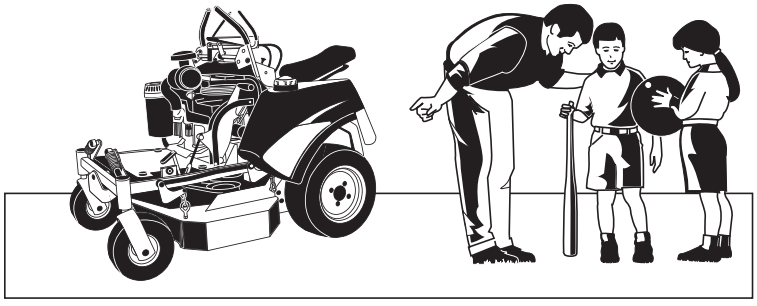
Read the Manual

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

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

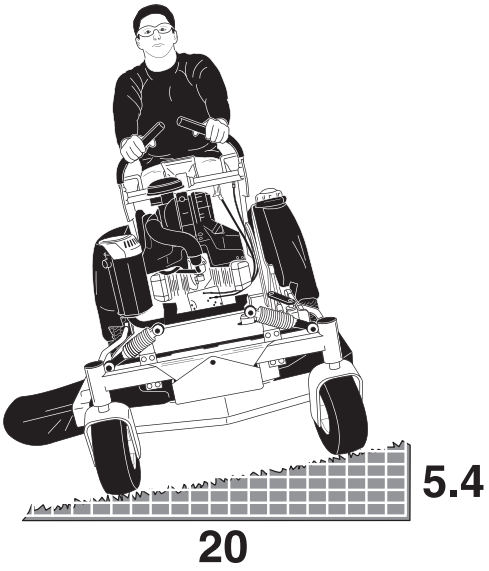
Be sure to completely read the Safety Rules and Information found on the following pages. Also completely read the Operation section.





Children

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



Slope Operation

Operation on slopes can be dangerous. Using the unit on a slope that is too steep where you do not have adequate wheel traction (and control) can cause sliding, loss of steering, control, and possible rollover. You should not operate on a slope greater than a 5.4 foot rise over a 20 foot length (15 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.

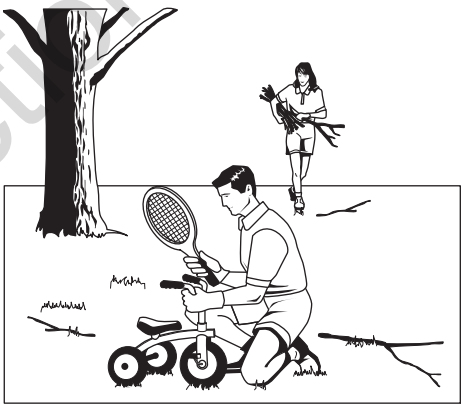
If you feel unsure about operating the unit on a slope, don't do it. It's not worth the risk.

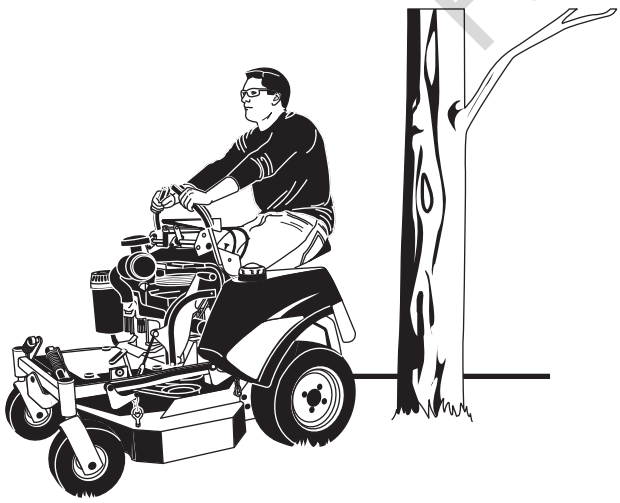
Thrown Objects

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

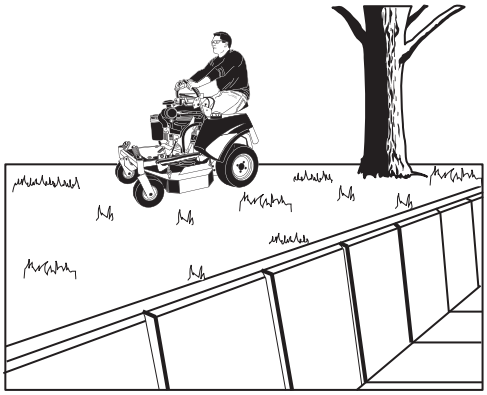
This equipment has many moving parts that can injure you or someone else. However, if you stay in the operator zone (stay seated in the seat), and follow the safety rules in this operator's manual, the unit is safe to operate.

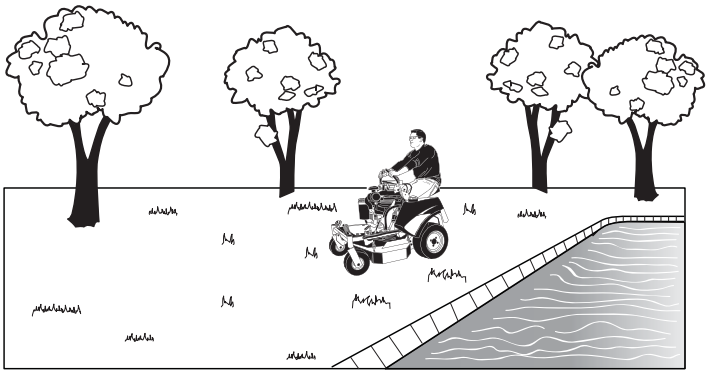
The mower deck has spinning mower blades that can amputate hands and feet. Do not allow anyone near the unit while it is running! Keep safety devices (guards, shields, and switches) in place and working.

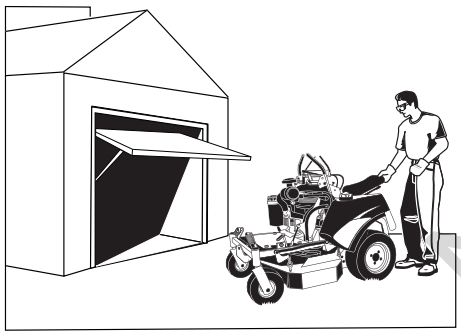
To help you, the operator, use this equipment safely, it is equipped with an operator-present safety system. Do NOT attempt to alter or bypass the system. See your dealer immediately if the system does not pass all the safety interlock system tests found in this manual.

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.







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.

Fuel and Maintenance

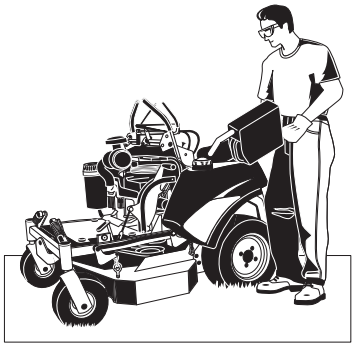
Always disengage all drives, shutoff the engine, and remove the key before doing any cleaning, refueling, or servicing.

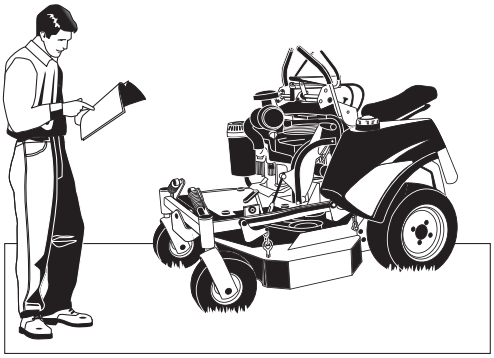
Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

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.





Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of unit, severe personal injury or death to you, or bystanders, or damage to property or equipment. **This mowing deck is capable of amputating hands and feet and throwing objects.** The triangle ⚠ in text signifies important cautions or warnings which must be followed.

TRAINING

1. 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.
2. Become familiar with the safe operation of the equipment, operator controls, and safety signs.
3. All operators and mechanics should be trained. The owner is responsible for training the users.
4. Only allow responsible adults, who are familiar with the instructions, to operate the unit.
5. Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
6. The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people or property.
7. 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

1. 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.
2. Wear appropriate clothing including safety shoes, safety glasses and ear protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
3. 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.
4. Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
   a) Use only an approved container.
   b) Never remove fuel cap or add fuel with the engine running. Allow engine to cool before refueling. Do not smoke.
   c) Never refuel or drain the machine indoors.
5. Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

OPERATION

1. Never run an engine in an enclosed area.
2. Mow only in the daylight or with good artificial light, keeping away from holes and hidden hazards.
3. 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.
4. Be sure of your footing while using pedestrian controlled equipment, especially when backing up. Walk, don't run. Reduced footing could cause slipping.
5. 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.
6. Do not mow in reverse unless absolutely necessary. Always look down and behind before and while traveling in reverse.
7. 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.
8. Slow down and use caution when making turns and when changing directions on slopes.
9. Never raise deck with the blades running.
10. 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.
11. Turn off the PTO switch to disengage the blades when not mowing.
12. Never operate with guards not securely in place. Be sure all interlocks are attached, adjusted properly and functioning properly.
13. Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
14. Do not change the engine governor setting or overspeed the engine.
15. 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.
16. Stop equipment and inspect blades after striking objects or abnormal vibration occurs. Make necessary repairs before resuming operations.
17. Keep hands and feet away from the cutting units.
18. Look behind and down before backing up to be sure of a clear path.
19. Never carry passengers and keep pets and bystanders away.
20. Do not operate the unit while under the influence of alcohol or drugs.
21. Slow down and use caution when making turns and crossing roads and sidewalks. Stop blades if not mowing.
22. Use care when loading or unloading the machine into a trailer or truck.
23. Use care when approaching blind corners, shrubs, trees or other objects that may obscure vision.
24. 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.

25. 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 though extended periods of exposure.

Wear hearing protection when operating this machine.

SLOPE OPERATION

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

⚠ WARNING

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

Select slow ground speed before driving onto slope. Use extra caution when operating on slopes with rear-mounted grass catchers.

Mow across the face of slopes, not up and down, use caution when changing directions and DO NOT START OR STOP ON SLOPE.

Do

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

*This limit was determined per CEN Standard EN 836:1997, Section 5.2.2 and is based on the EN 836 Stability Test procedure described in Section 4.2.4.2. The 15 degree "limit of stability" is equal to 50% of the angle at which machine lift-off occurred in static tests. Actual dynamic stability may vary depending on operating conditions.

Do Not

1. 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 slow off the slope.
2. Do not turn on slopes unless necessary, and then, turn slowly and gradually uphill, if possible. Never mow down slopes.
3. 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.
4. Do not mow on wet grass. Reduced footing or traction could cause sliding.
5. Do not try to stabilize the unit by putting your foot on the ground. (ride-on units)
6. Do not mow excessively steep slopes.
7. Do not use grass catcher on steep slopes.
8. Do not mow slopes if you cannot back up them.

TOWED EQUIPMENT (RIDE-ON UNITS)

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

CHILDREN

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the unit and the mowing activity. Never assume that children will remain where you last saw them.

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

EMISSIONS

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

IGNITION SYSTEM (GASOLINE MODELS)

1. This spark ignition system complies with Canadian ICES-002.

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

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

Maintenance and Storage

1. Always observe safe refueling and fuel handling practices when refueling the unit after transportation or storage.
2. Always follow the engine manual instructions for storage preparations before storing the unit for both short and long term periods.
3. Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
4. 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.
5. Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
6. Keep all hardware, especially blade attachment bolts, tight and keep all parts in good working condition. Replace all worn or damaged decals.
7. Never tamper with safety devices. Check their proper operation regularly.
8. 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.
9. Clean grass and debris from cutting units, drives, mufflers, and engine to prevent fires. Clean up oil or fuel spillage.
10. Let engine cool before storing and do not store near flame.
11. Stop and inspect the equipment if you strike an object. Repair, if necessary, before restarting.
12. Park machine on level ground. Never allow untrained personnel to service machine.
13. Use jack stands to support components when required.
14. Carefully release pressure from components with stored energy.
15. 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.
16. 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.
17. Keep hands and feet away from moving parts. If possible, do not make adjustments with the engine running.
18. 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.
19. 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.
20. Check brake operation frequently. Adjust and service as required.
21. Use only factory authorized replacement parts when making repairs.
22. Always comply with factory specifications on all settings and adjustments.
23. Only authorized service locations should be utilized for major service and repair requirements.
24. 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.
25. Units with hydraulic pumps, hoses, or motors: WARNING: Hydraulic fluid escaping under pressure may have sufficient force to penetrate skin and cause serious injury. If foreign fluid is injected into the skin it must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result. Keep body and hands away from pin holes or nozzles that eject hydraulic fluid under high pressure. Use paper or cardboard, and not hands, to search for leaks. Make sure all hydraulic fluid connections are tight and all hydraulic hoses and lines are in good condition before applying pressure to the system. If leaks occur, have the unit serviced immediately by your authorized dealer.
26. WARNING: Stored energy device. Improper release of springs can result in serious personal injury. Springs should be removed by an authorized technician.
27. Models equipped with an engine radiator: WARNING: Stored energy device. To prevent serious bodily injury from hot coolant or steam blow-out, never attempt to remove the radiator cap while the engine is running. Stop the engine and wait until it is cool. Even then, use extreme care when removing the cap.

Safety Decals

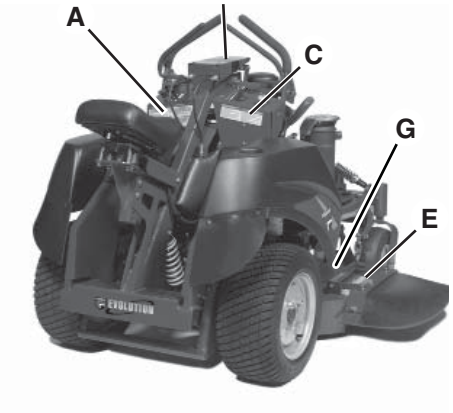
This unit has been designed and manufactured to provide you with the safety and reliability you would expect from an industry leader in outdoor power equipment manufacturing.

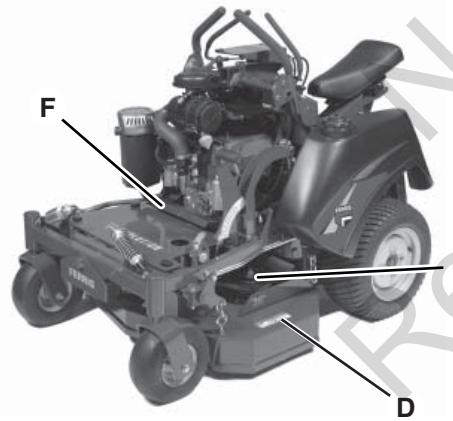
Although reading this manual and the safety instructions it contains will provide you with the necessary basic knowledge to operate this equipment safely and effectively, we have placed several safety labels on the unit to remind you of this important information while you are operating your unit.

All DANGER, WARNING, CAUTION and instructional messages on your rider and mower should be carefully read and obeyed. Personal bodily injury can result when these instructions are not followed. The information is for your safety and it is important! The safety decals below are on your rider and mower.

If any of these decals are lost or damaged, replace them at once. See your local dealer for replacements.

These labels are easily applied and will act as a constant visual reminder to you, and others who may use the equipment, to follow the safety instructions necessary for safe, effective operation.





A

B

C

D

E

F

48” Models Only

G

Qty: 1 (36” Models); Qty: 2 (48” Models)

Safety Interlock System

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

Operational SAFETY Checks

Test 1 — Engine should NOT crank if:

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

Test 2 — Engine SHOULD crank if:

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

Test 3 — Engine should SHUT OFF if:

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

Test 4 — Blade Brake Check

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

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

⚠ WARNING

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.

Safety Icons

The alert symbol ⚠ is used to identify 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 the injury. In addition, a hazard icon may be used to represent the type of hazard. An explanation of hazard levels and icons are as follows:

⚠ DANGER

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

⚠ WARNING

This indicates a hazard which, if not avoided, **could result in serial injury or death.**

⚠ CAUTION

This indicates a hazard which, if not avoided, **might result in minor or moderate injury.**

CAUTION or NOTICE

These messages presented without the alert symbol indicate a situation where the unit or property could be damaged.

North American Safety Icons

Features and Controls

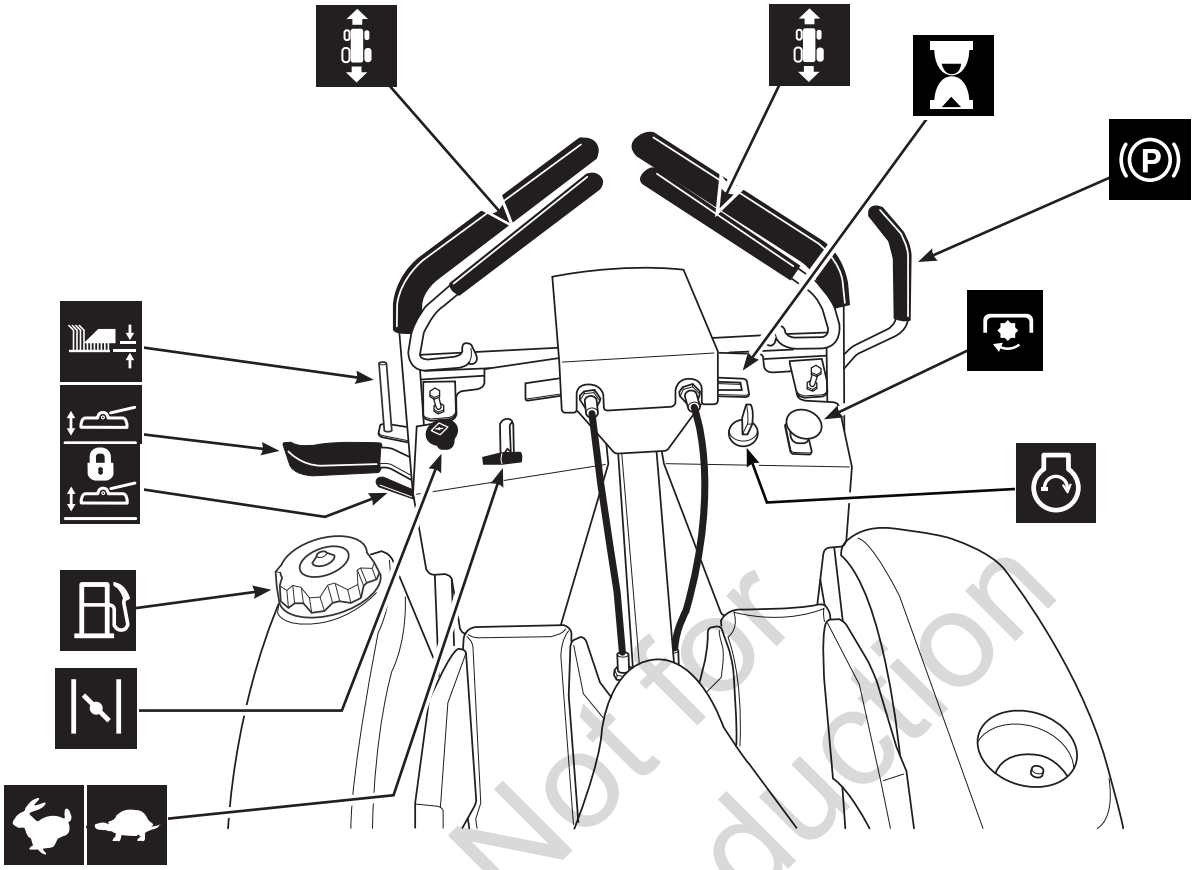
Identification Numbers

USA Models

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

Record your part number, serial number and engine serial numbers in the space provided for easy access. These numbers can be found in the locations shown.

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



Control Functions

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.

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.

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 to knob DOWN to open the choke.

Fuel Tank Cap

To remove the cap, turn counterclockwise.

Deck Transport Adjustment Handle, Cutting Height Adjustment Handle & Deck Lift Lock Lever

These control the cutting height of the mower deck:

Cutting Height Adjustment Handle: Turn the cutting height adjustment handle CLOCKWISE to raise the cutting height of the mower; COUNTER-CLOCKWISE to lower the cutting height of the mower.

Deck Transport Adjustment Handle & Deck Lift Lock Lever: Pull the deck transport handle adjustment backwards and up until it latches into place to raise the cutter deck to the TRANSPORT position. To lower the cutter deck to the OPERATION position, release the deck lift lock lever and push the deck transport handle forward and down.

Ground Speed Control Levers

These levers control the ground speed of the rider. The left lever controls the left rear drive wheel and the right lever controls the right rear drive wheel.

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

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

See the OPERATION section for steering instructions.

Hour Meter

The hour meter measures the number of hours the PTO has been engaged. The hour meter has a self contained power source so the total hours are always visible.

Parking Brake

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

Pull the parking brake lever back to engage the parking brake. Move the lever fully forward to disengage the parking brake. *NOTE: To start the unit the parking brake must be engaged.*

PTO (Power Take Off) Switch

The PTO switch engages and disengages the mower. 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:

O OFF	Stops the engine and shuts off the electrical system.
I 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.

Operation

General Operating Safety

Before first time operation:

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

⚠ WARNING

Never operate on slopes greater than 15°.

Select slow ground speed before driving onto a slope. Use extra caution when operating on slopes with a rear-mounted grass catcher.

Mow across the face of slopes, not up and down, use caution when changing directions and
DO NOT START OR STOP ON SLOPE.

⚠ WARNING

Never allow passengers to ride on the unit.

Before leaving the operator's position for any reason, engage the parking brake, disengage the PTO, stop the engine and remove the key.

To reduce fire hazard, keep the engine, tractor and mower free of grass, leaves and excess grease. Do not stop or park tractor over dry leaves, grass or combustible materials.

Gasoline 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.

Checks Before Starting

- Check that crankcase is filled to full mark on dipstick (**B, Figure 1**). See the engine Operator's Manual for instructions and oil recommendations.
- Make sure all nuts, bolts, screws and pins are in place and tight.
- Fill the fuel tank with fresh fuel. Refer to engine manual for fuel recommendations.

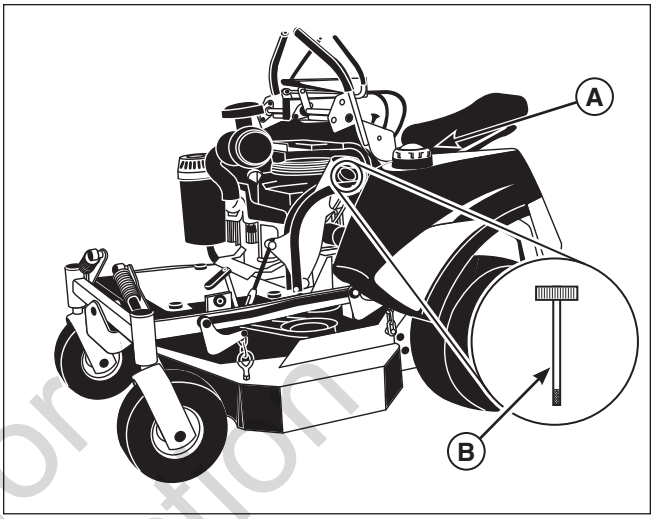


Figure 1. Pre-start Checks
A. Fuel Tank Cap
B. Crankcase Oil Fill & Dipstick

⚠ WARNING

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

⚠ WARNING

If you do not understand how a specific control functions, or have not yet thoroughly read the FEATURES & CONTROLS section, do so now.

Do NOT attempt to operate the tractor without first becoming familiar with the location and function of ALL controls.

Starting the Engine

1. While sitting in the operator's seat, engage the parking brake and make sure the PTO switch is disengaged and the ground speed control levers are in the NEUTRAL position.
2. ***NOTE: 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 the engine to warm up.

Warm up the engine by running it for at least 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 RIDER.*

Stopping the Rider

1. Releasing the ground speed control levers so they can return to the NEUTRAL position will stop rider movement.
2. Disengage the PTO by pushing down on the PTO switch.
3. Engage the parking brake by pulling the handle back until it locks into position.
4. Move the throttle control to mid-throttle position and turn the ignition key to OFF. Remove the key.

Pushing the Rider by Hand

DO NOT TOW RIDER
Towing the unit will cause hydraulic pump and wheel motor 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. To disengage the pumps (free-wheel position), turn the hydraulic release valves (**A, Figure 2**) located on the pumps COUNTER-CLOCKWISE a maximum of 2 full turns.
4. Disengage the parking brake.

   The unit can now be pushed by hand.
5. After moving the unit, re-engage the pumps (drive position) by turning the release valves CLOCKWISE and tighten to 80-120 in. lbs. of torque.

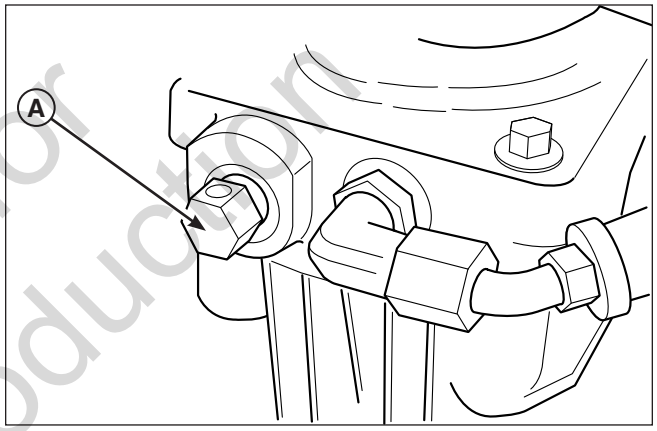


Figure 2. Hydraulic System By-Pass
A. Hydraulic Release Valve (left-hand pump shown)

Zero Turn Driving Practice

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

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

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

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

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

Smooth Travel

The lever controls of the Zero Turn rider are responsive.

The BEST method of handling the ground speed control levers is in three steps — as shown in Figure 3.

FIRST place your hands onto the levers as shown.

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

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

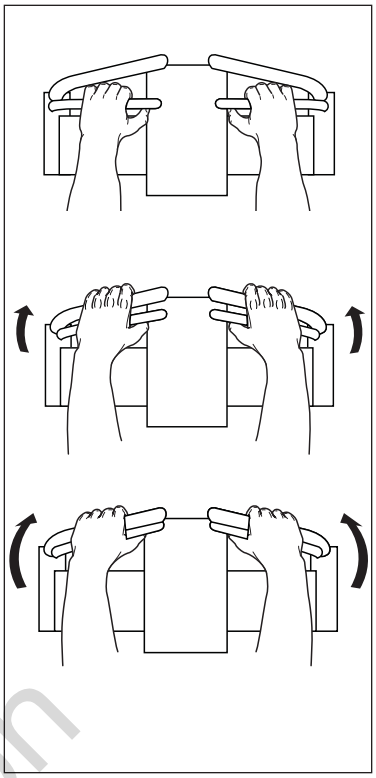


Figure 3. Move Control Levers Gradually

Basic Driving

Forward Travel Practice

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

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

Reverse Travel Practice

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

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

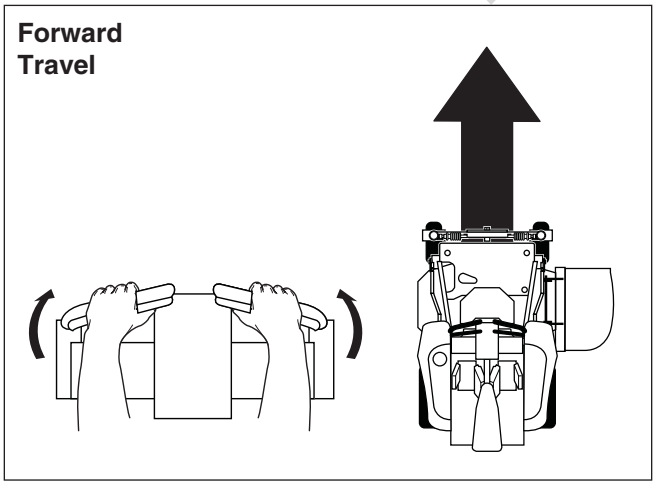


Figure 4. Forward Travel

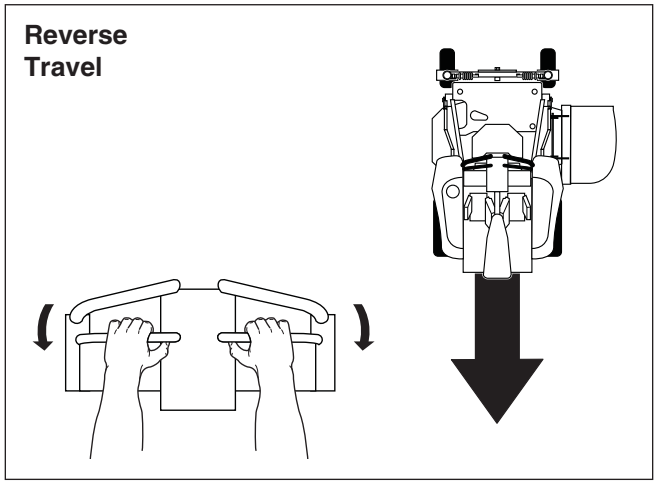


Figure 5. Reverse Travel

Practice Turning Around a Corner

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.

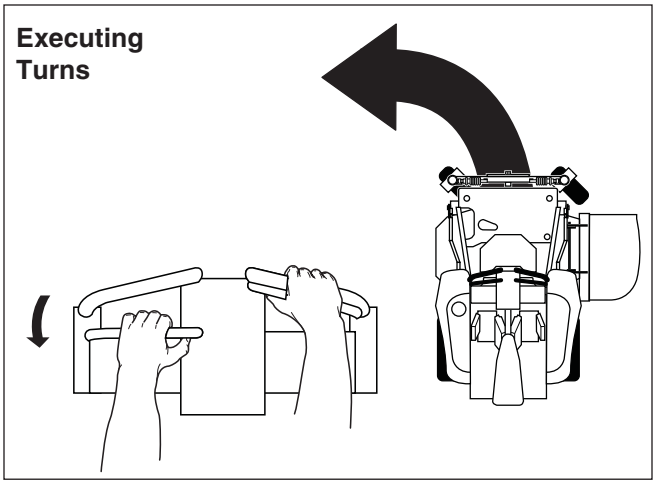


Figure 6. Turning Around a Corner

Practice Turning In Place

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.

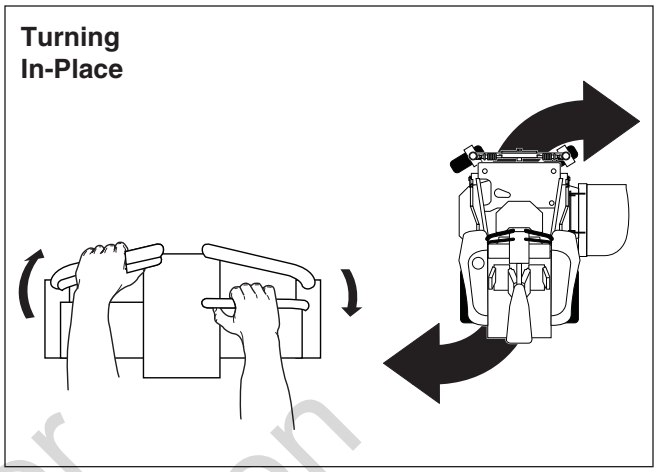


Figure 7. Turning in Place

Advanced Driving

Executing an End-Of-Row Zero Turn

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

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

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

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

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

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

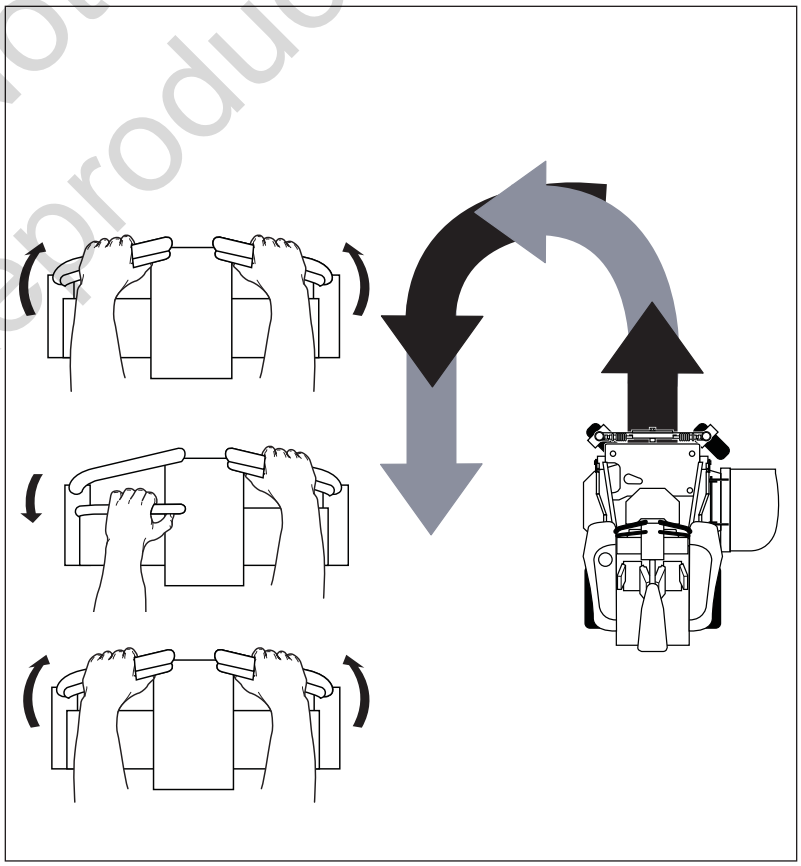


Figure 8. Executing an End-Of-Row Turn

Mowing

1. Engage the parking brake. Make sure the PTO switch is disengaged, the ground speed control levers are in the NEUTRAL position and the operator is on the seat.
2. Set the mower cutting height.
3. Start the engine (see STARTING THE ENGINE).
4. Set the throttle to FULL.
5. Engage the PTO by pulling up on the PTO switch.
6. Begin mowing.
7. When finished, shut off the PTO.
8. Stop the engine (see STOPPING THE TRACTOR AND ENGINE).

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.**

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).

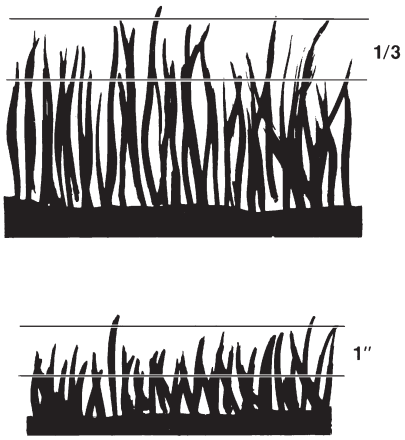


Figure 9. Proper Cutting Height

Tall Grass Requires Incremental Cutting

For extremely tall grass, set the cutting height at maximum for the first pass, and then reset it to the desired height and mow a second 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.

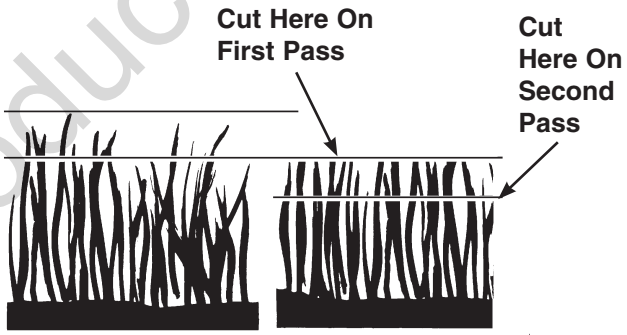


Figure 10. Incremental Cutting

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:

1. Mow when the grass is between three and five inches high.
2. 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.
3. Mow at time of day when the grass is cool and dry. Late afternoon or early evening often provide these ideal mowing conditions.
4. 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

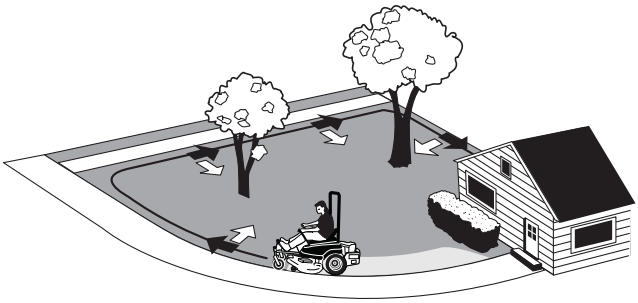
Always start mowing on a smooth, level area.

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.

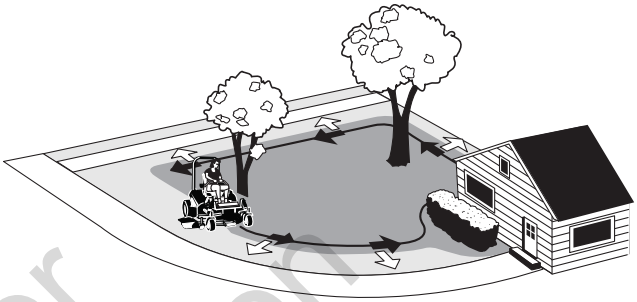
1. Cut long straight strips overlapping slightly.
2. Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.
3. For a truly professional cut, mow across the lawn in one direction, then recut the lawn by mowing perpendicular to the previous cut.

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.



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.



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

Proper 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 that 1 inch of grass in a single pass

Proper Mulching

Mulching consists of a mower deck which cuts and recuts 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 BROADCASTING

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.

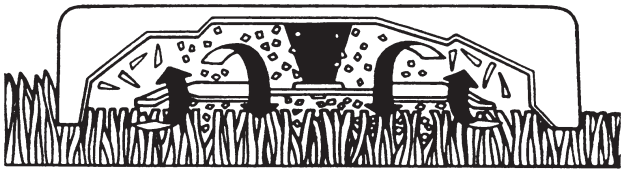


Figure 11. Mulching Action

Storage

Temporary Storage (30 Days Or Less)

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

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

- Keep the unit in an area away from where children may come into contact with it. If there's any chance of unauthorized use, remove the spark plug(s) and put in a safe place. Be sure the spark plug opening is protected from foreign objects with a suitable cover.
- If the unit can't be stored on a reasonable level surface, chock the wheels.
- Clean all grass and dirt from the mower.

Long Term Storage (Longer Than 30 Days)

Before you store your unit for the off-season, read the Maintenance and Storage instructions in the Safety Rules section, then perform the following steps:

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. Remove mower deck from the unit.
   b. Clean underside of mower deck.
   c. Coat all bare metal surfaces with paint or light coat of oil to prevent rusting.
3. Clean external surfaces and engine.
4. Prepare engine for storage. See engine owner's manual.
5. Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.
6. Cover 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 unit and apply paint or rust preventative to any areas where paint is chipped or damaged.
9. Be sure the battery is filled to the proper level with water and 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.

⚠ WARNING

Fuel and its vapors are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

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

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

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

10. Drain fuel system completely or add a gasoline 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, gasoline 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 gasoline 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

Maintenance Schedule

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

SAFETY ITEMS	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Every 250 Hours	Spring & Fall
Check Safety Interlock System	•					•
Check Rider Brakes	•					•
Check Mower Blade Stopping Time				•		•
RIDER MAINTENANCE	**Before Each Use**	**Every 5 Hours**	**Every 25 Hours**	**Every 100 Hours**	**Every 250 Hours**	**Spring & Fall**
Check Rider / Mower for loose hardware	•	•				
Clean Deck & Check / Replace Mower Blades**			•			
Lubricate Rider & Mower **			•			
Clean Battery & Cables				•		
Check Tire Pressure			•			
Check Hydraulic Oil	•				•	
Change Hydraulic Oil Filter **					•	
ENGINE MAINTENANCE	**Before Each Use**	**Every 5 Hours**	**Every 25 Hours**	**Every 100 Hours**	**Every 250 Hours**	**Spring & Fall**
Check Engine Oil Level	•					
Check / Clean Cooling Fins & Intake **			•			
Service Air Filter *						
Change Oil & Filter *						
Check / Replace Spark Plugs *						
Check / Replace Fuel Filter *						
Check / Clean Spark Arrester***			Every 50 hours			

* Refer to engine owner's manual. Change original engine oil after initial break-in period.
** More often in hot (over 85° F: 30° C) weather or dusty operating conditions.
*** If equipped. Replace if damaged.

Check Tire Pressures

Tire pressure should be checked periodically, and maintained at the levels shown in the 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, improve cut quality, and extend tire life.

Tire	Pressure	
	psi	bar
Front	N/A	N/A
Rear	18	1,24

Checking / Adding Fuel

To add fuel:

1. Remove the fuel cap (see Figure 1).
2. Fill the tank to the bottom of the filler neck. This will allow for fuel expansion.

NOTE: Do not overfill. Refer to your engine manual for specific fuel recommendations.

3. Install and hand tighten the fuel cap.

Fuel Filter

The fuel filter is located in the fuel line between fuel tank and carburetor, near the 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.

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.

Service Air Filter

Refer to engine manufacturer’s owners manual.

Check / Replace Spark Plugs

Refer to engine manufacturer’s owners manual.

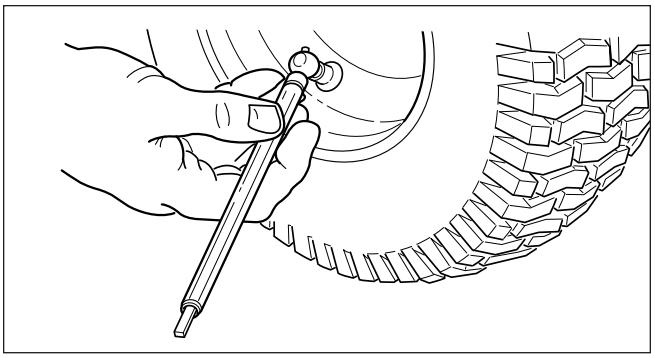


Figure 12. Checking Tire Pressure

⚠ WARNING

Gasoline 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.

Do not remove fuel filter when 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.

Do not use gasoline containing METHANOL, gasohol containing more than 10% ethanol, gasoline additives, premium gasoline, or white gas because engine/fuel system damage could result.

⚠ WARNING

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

Change Oil & Filter

1. Warm engine by running for a few minutes. (Refer to the engine operator's manual for oil & filter replacement instructions.)
2. Route the oil drain hose (**A, Figure 13**) over the side of the engine deck and underneath the fuel tank.
3. Place a small pan under the oil drain hose to catch the oil. Using the appropriate tools, remove the cap from the oil drain hose and drain the engine oil.
4. After draining, replace the cap and wipe up any spilled oil. Reposition the oil drain hose so that is curved away from the engine and in front of the left hydraulic pump.
5. Place an absorbent shop cloth under the engine oil filter (**B**). Remove the engine oil filter and replace with a new one.
6. Remove the shop cloth and wipe up any spilled oil.
7. Add new oil through the engine oil fill (**C**). See the engine operator's manual for specific oil recommendations.

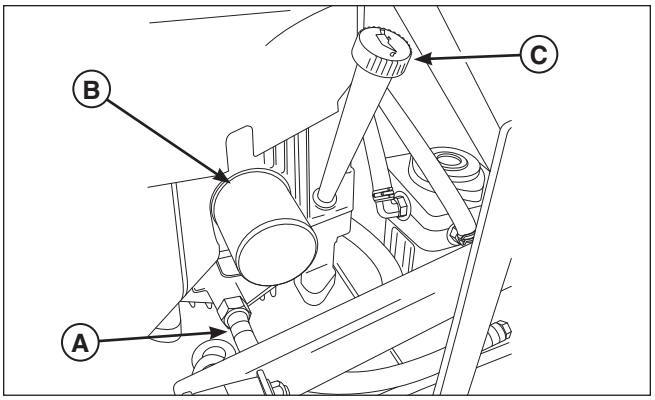


Figure 13. Engine Oil Drain
A. Oil Drain Hose
B. Engine Oil Filter
C. Engine Oil Fill

Servicing the Hydraulic System

Removing the Tank

The right hand tank (**A, Figure 14**) must be removed prior to checking and/or changing the hydraulic oil.

1. Unscrew the three (3) wing bolts (**B**) that secure the tank to the unit.
2. Remove the tank from the unit.

Check Hydraulic Oil

1. Before removing the reservoir cap, make sure the area around the reservoir cap and fill neck of the reservoir is free of dust, dirt, or other debris.
2. Unscrew the reservoir cap (**A, Figure 15**).
3. Look down the filler neck of the hydraulic oil reservoir (**B**) and observe the oil level. When cold, the oil level should be approximately 4" (10 cm) below top of the filler neck.
4. If necessary, add either Mobil 1™, 15W-50 synthetic oil or Castrol Syntec™ 5W-50 oil. DO NOT use conventional oils.
5. Reinstall the reservoir cap.

Change the Hydraulic Oil Filter

Change Interval: Every 250 Hours

Filter Part Number: 1719168

NOTE: Removing the oil filter from the filter base will drain the oil reservoir. Have a suitable container ready to catch any spilled oil. It is recommended that this be a dealer-only service item.

1. Locate the transmission oil filter (**C**).
2. Lubricate the new filter base with a few drops of transmission oil. Fill the filter half full of oil.
3. Clean the area around the filter base and remove the filter. Do NOT drain the hydraulic system oil.
4. Thread the new filter onto the filter base until the gasket makes contact, then tighten 3/4 of a turn more.
5. Run the unit for several minutes and check the transmission oil level.

IMPORTANT NOTE: Use caution after changing the filter; air in the hydraulic system may affect the responsiveness of the control levers. Repeat step 5 until the air is out of the system.

Reinstalling the Tank

1. Position the tank back on the unit.
2. Secure the tank to the unit using the three (3) wing bolts.

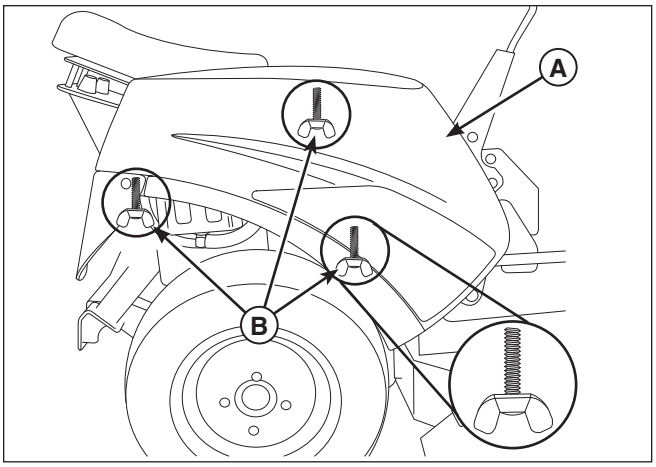


Figure 14. Removing the Tank
A. Tank
B. Wing Bolts

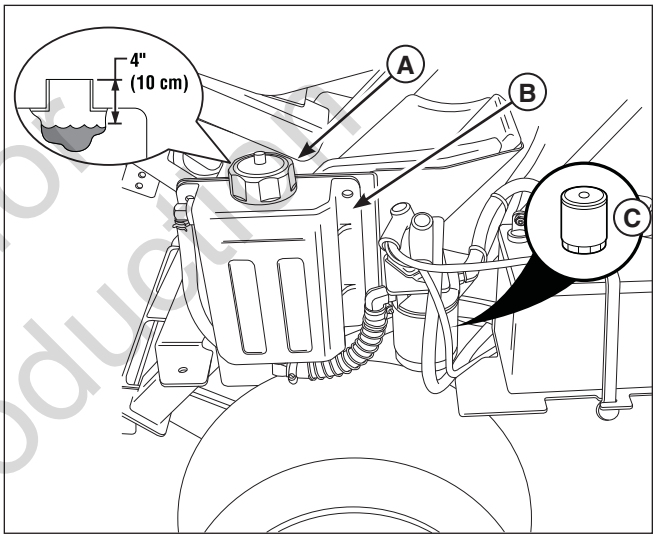


Figure 15. Servicing the Hydraulic System
A. Reservoir Cap
B. Reservoir
C. Transmission Oil Filter

Lubrication

Lubricate the unit at the locations shown in Figures 16 through 20 as well as the following lubrication points.

Grease:

- front caster wheel axles & yokes
- deck lift pivot blocks
- mower deck & pump drive idler arm
- operator compartment front pivots

Use grease fittings when present. Disassemble parts to apply grease to moving parts when grease fittings are not installed. Not all greases are compatible. Red Grease (p/n 5022285) is recommended, automotive-type high-temperature, lithium grease may be used when this is not available.

Oil:

- control handle pivots
- deck rollers
- deck lift pivots
- discharge chute hinge

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

Lubricating the Front Casters

NOTE: Front casters should be lubricated annually.

1. Remove the 1/4-28 bolt (**A, Figure 16**) screwed into the caster and install a 1/4-28 grease fitting.
2. Grease the front caster
3. Remove the 1/4-28 grease fitting and reinstall the 1/4-28 bolt
4. Repeat the process for the other side of the machine.

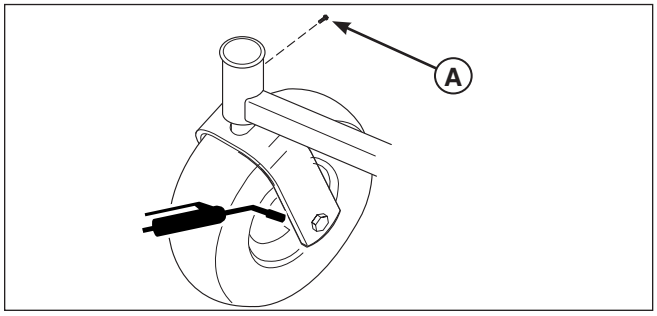


Figure 16. Front Caster & Wheel
A. 1/4-28 Bolt

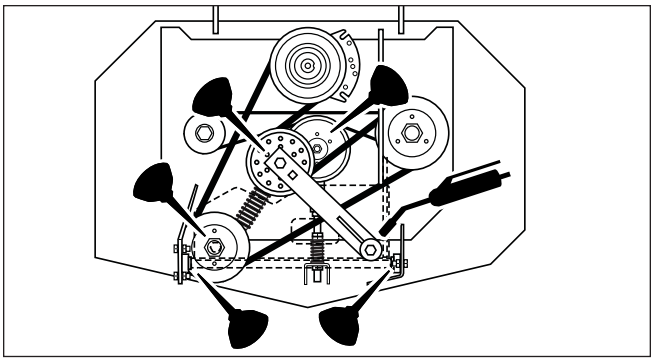


Figure 17. Mower Deck Lubrications Points

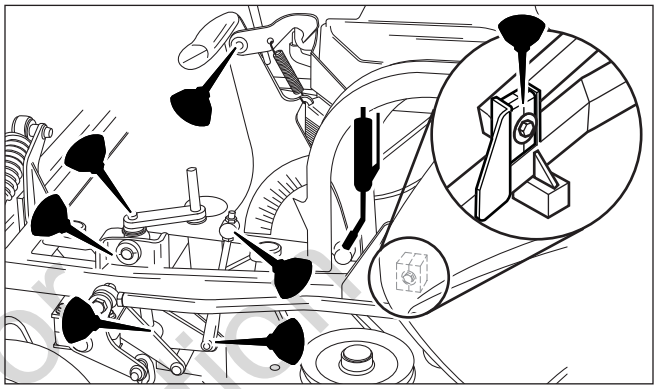


Figure 19. Deck Lift System

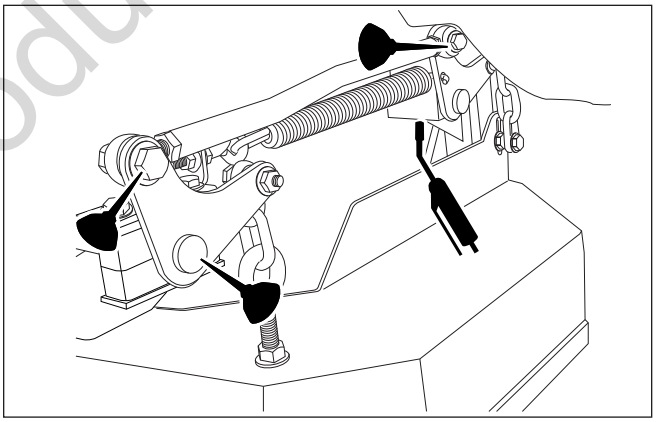


Figure 18. Deck Lift Rods

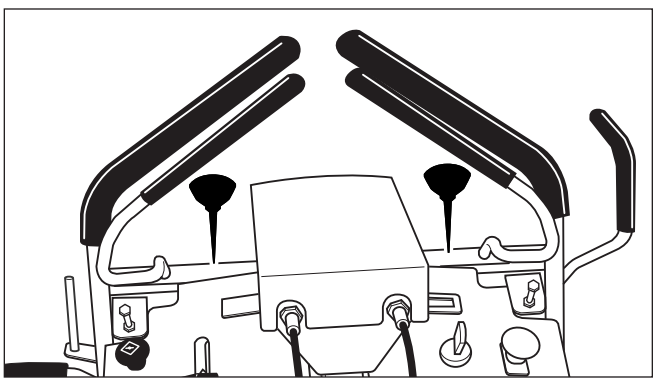


Figure 20. Ground Speed Control Levers

Servicing the Mower Blades

Removing the Mower Blade

⚠ CAUTION

Avoid injury. Mower blades are sharp.

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

1. To remove the mower blade, wedge a wooden block between the mower blade and the mower deck housing to keep the blade from turning and remove the mower blade mounting bolt with a 15/16" wrench (**Figure 21**).

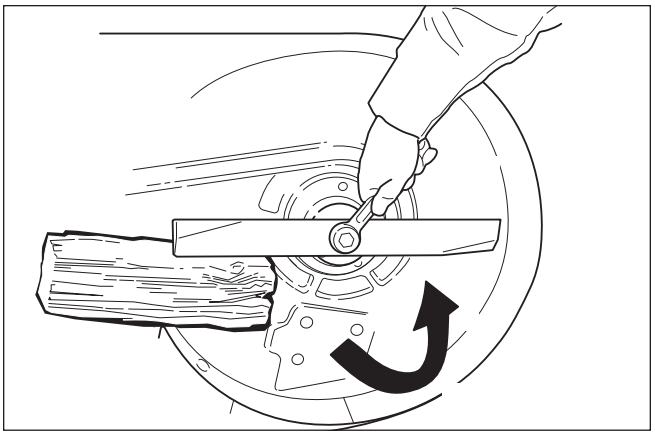


Figure 21. Loosening the Mower Blade for Removal

Inspecting the Mower Blade

⚠ DANGER

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

• Inspect the mower blade every 25 hours or at least once a year.

• If the mower blade hits a solid object, stop the engine immediately and inspect the mower blade.

• Never weld or straighten bent mower blades.

1. Remove the mower blade from the unit.
2. Inspect the mower blade (**Figures 22 & 23**). Discard the mower blade if it has any of the below conditions:

   A.) Has more than .5" (12,7 mm) of the mower blade metal removed from previous sharpening or wear (**D, Figure 22**).

   B.) The air lifts are excessively eroded (**B & C, Figure 23**) and the notch (**C**) is .25" (6,35 mm) deep or greater.

   C.) Mower blade is bent or broken.
3. If the cutting edges are not sharp or have nicks, sharpen the blades. See SHARPENING THE MOWER BLADES.

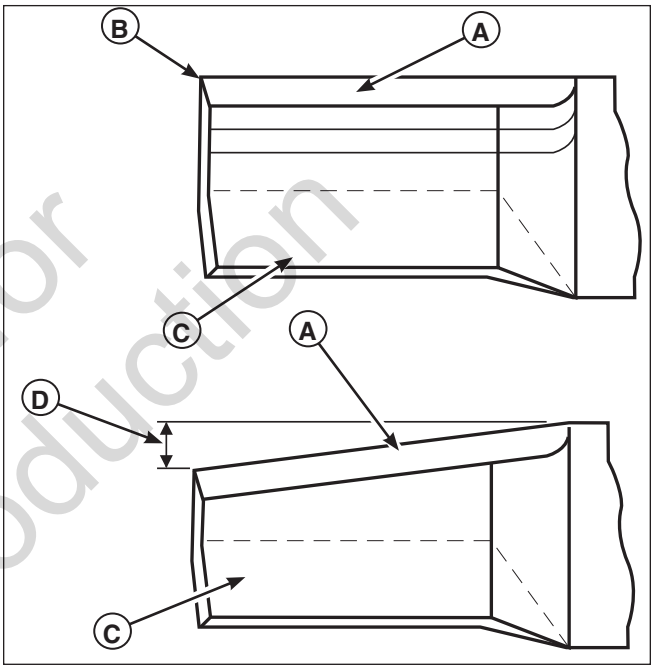


Figure 22. Inspecting the Mower Blade Tips
A. Mower Blade Cutting Edge
B. Square Corner
C. Air Lift
D. Wear Measurement - DISCARD Mower Blade If greater than .5" (12,7 mm)

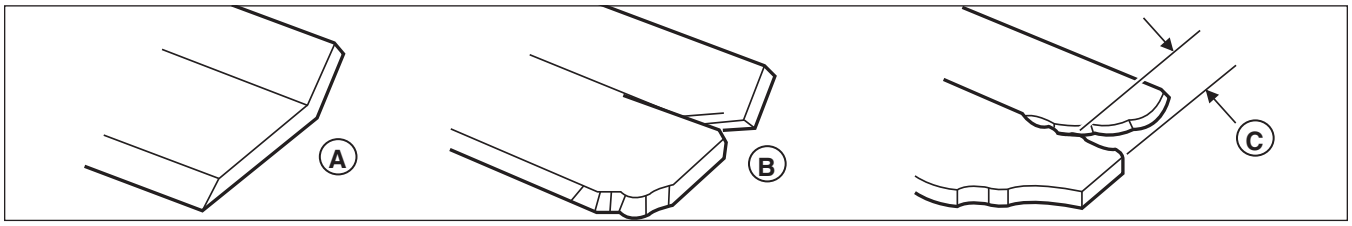


Figure 23. Inspecting the Mower Blade Air Lifts
A. New Mower Blade
B. Mower Blade at Wear Limit (A notch begins to form)
C. Mower Blade in Dangerous Condition (Notch measures .25" (6,35 mm) or greater DO NOT USE. Replace with new mower blade.)

Sharpening the Mower Blades

⚠ CAUTION

Avoid injury. Mower blades are sharp.

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

• Always wear safety eye protection when grinding

1. Sharpen the mower blade with a grinder, hand file, or electric blade sharpening.
2. Sharpen the mower blade by removing an equal amount of material from each end of the mower blade.
3. Keep the original bevel (**A, Figure 24**) when grinding. Do NOT change the mower blade bevel.
4. The mower blade should have a maximum 1/64" (0,40 mm) cutting edge (**B**) or less.
5. Balance the mower blade before installing.

Balancing the Mower Blades

⚠ CAUTION

Avoid injury. Keep mower blades balanced.

• An unbalanced mower blade can create excessive vibration and damage the unit or cause mower blade failure.

1. Clean the mower blade to remove any dried grass or other debris.
2. See Figure 25. Put the mower blade on a nail in a vise and turn the blade to the horizontal position.
3. Check the balance of the mower blade. If either end of the mower blade moves downward, sharpen the heavy end until the mower blade is balanced. See SHARPENING THE MOWER BLADES for proper sharpening instructions.
4. Repeat the process until the mower blade remains in the horizontal position.

Reinstalling the Mower Blades

1. Reinstall each mower blade with the air lifts pointing up towards the mower deck as shown in Figure 26. Secure with the mower blade mounting bolt and flat washer (**A & B, Figure 26**) and torque to 70 ft. lbs (94 Nm).
2. Wedge a wooden block between the mower blade and the mower deck housing to keep the mower blade from turning.

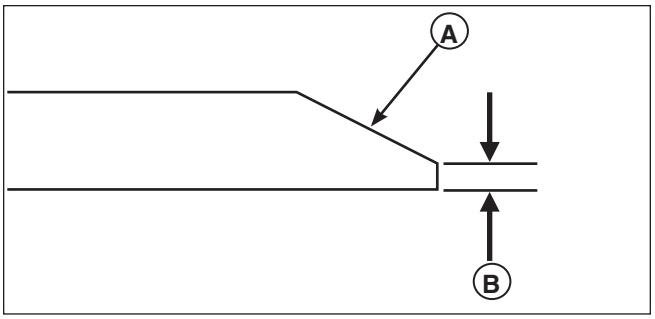


Figure 24. Sharpening the Mower Blade
A. Mower Blade Bevel
B. Mower Blade Cutting Edge

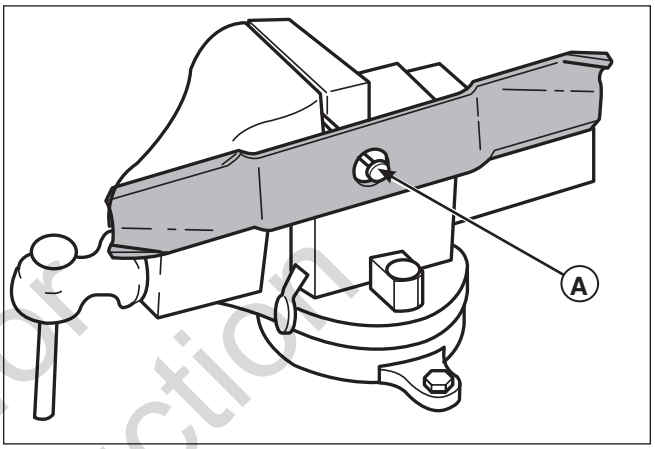


Figure 25. Balancing the Mower Blade
A. Nail

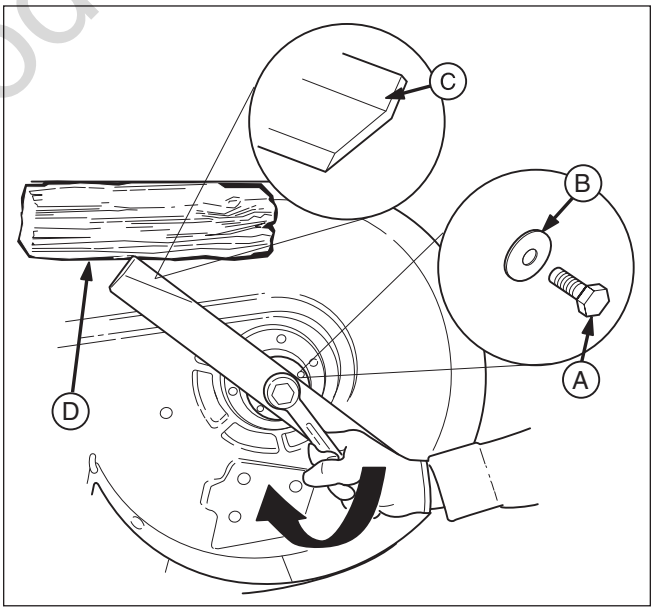


Figure 26. Tightening the Mower Blade for Installation
A. Mower Blade Mounting Bolt
B. Flat Washer
C. Mower Blade Air Lift (Points Up For Installation)
D. 4 X 4 Wooden Block

Seat Adjustment

The height of the seat (**A, Figure 27**) can be adjusted either up or down and the position of the seat can be adjusted forward or back to accomidate the operator's comfort level.

1. Remove the seat height adjustment hardware (**B**).
2. Position the seat at the desired height and distance and reinstall and tighten the seat adjustment hardware.

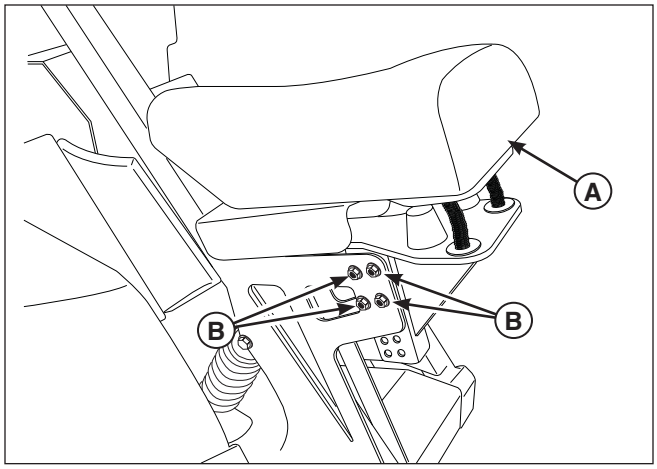


Figure 27. Seat Height Adjustment
A. Seat
B. Seat Height Adjustment Hardware

Neutral Adjustment

If the unit "creeps" while the ground speed control levers are in the NEUTRAL position, then it may be necessary to adjust the linkage adjuster rods.

1. Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake and turn off the engine.

⚠ CAUTION
This adjustment should not be performed while the machine is running.

2. Loosen the jam nut (**A, Figure 28**).
3. Turn the linkage rod adjuster (**B**) to adjust the neutral of the machine:
   - If the machine creeps forward, turn the linkage rod adjuster CLOCKWISE.
   - If the machine creeps backwards, turn the linkage rod adjuster COUNTER-CLOCKWISE.
4. Retighten the jam nut when adjustment is complete.
5. Start the engine.
6. Disengage the parking brake and make sure all controls are in the NEUTRAL position.
7. If the machine still "creeps" repeat the NEUTRAL ADJUSTMENT procedure. It may take several attempts to achieve neutral depending on how much the machine creeps.

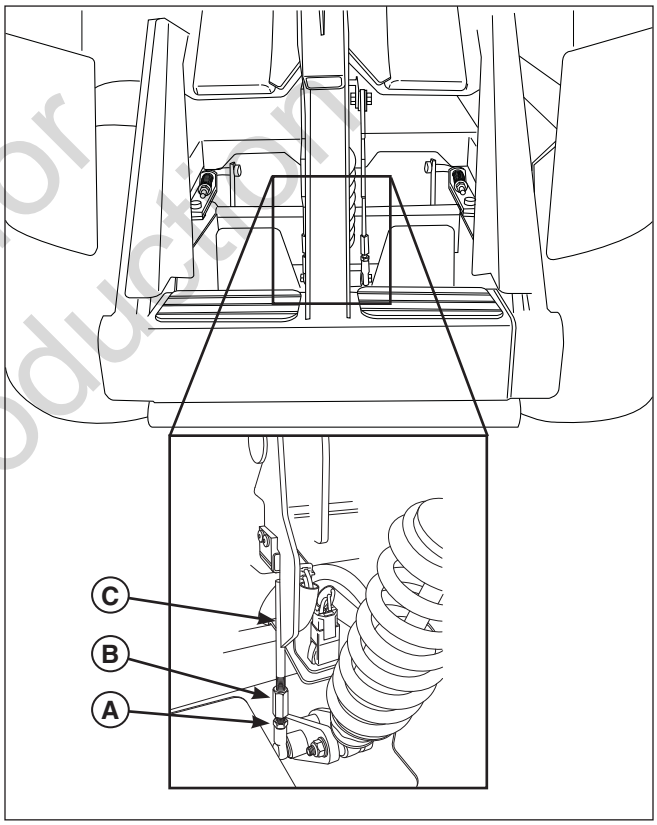


Figure 28. Neutral Adjustment
A. Jam Nut
B. Linkage Rod Adjuster
C. Control Ramp Rod

Speed Balancing Adjustment

If the unit veers to the right or left when the ground speed control levers are in either the maximum forward (both ground speed control levers contacting the handle bars) or reverse position (both ground speed control levers contacting the top speed adjustment bolt), the top speed of the ground speed control levers can be adjusted. Only adjust the speed of the wheel that is travelling faster.

To reduce the forward speed of the faster wheel:

Coarse Adjustment

1. Loosen the inner jam nut (**A, Figure 29**).
2. Turn the adjustment nut (**B**) CLOCKWISE to reduce the speed.
3. Retighten the securing nut.

NOTE: If you cannot achieve the proper adjustment using the Coarse Adjustment Procedure proceed to the Fine Adjustment Procedure.

Fine Adjustment

1. Loosen the jam nut (**A, Figure 30**).
2. Loosen and remove the eyebolt hardware (**B**) that secures they eyebolt (**C**) to the ground speed control lever arm (**D**).
3. Turn the eyebolt CLOCKWISE to reduce the speed.
4. Reinstall the eyebolt to the ground speed control lever arm with the eyebolt hardware.
5. Retighten the jam nut when the adjustment is complete.

To reduce the reverse speed of the faster wheel:

1. Loosen the securing nut (**A, Figure 31**).
2. Turn the top speed adjustment bolt (**B**) COUNTER-CLOCKWISE to reduce the speed.
3. Retighten the securing nut when adjustment is complete.

⚠ WARNING

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

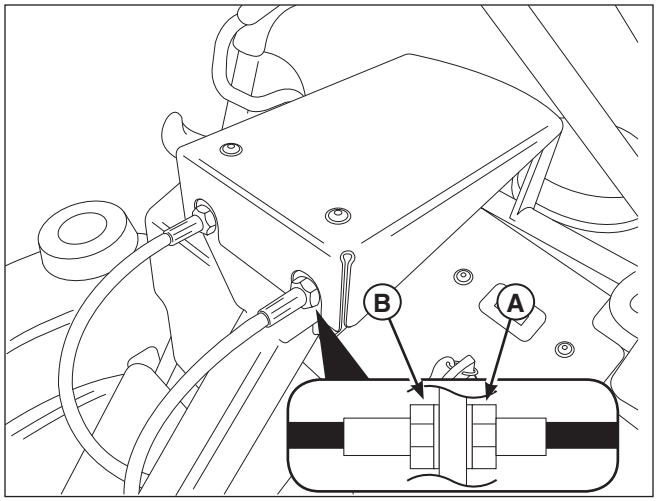


Figure 29. Speed Balancing Coarse Adjustment
A. Inner Jam Nut
B. Adjustment Nut

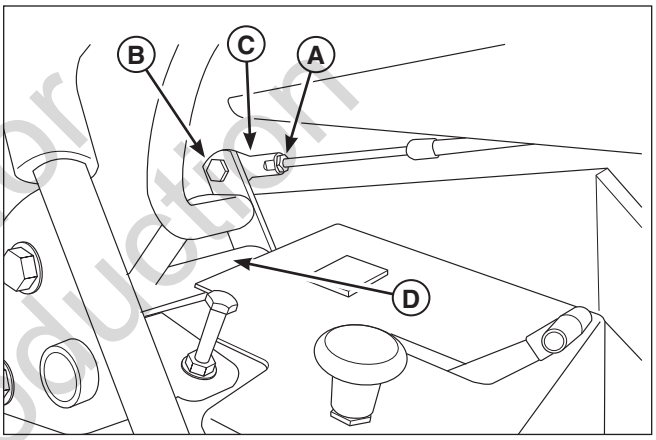


Figure 30. Speed Balancing Fine Adjustment
A. Jam Nut
B. Eyebolt Hardware
C. Eyebolt
D. Ground Speed Control Lever Arm

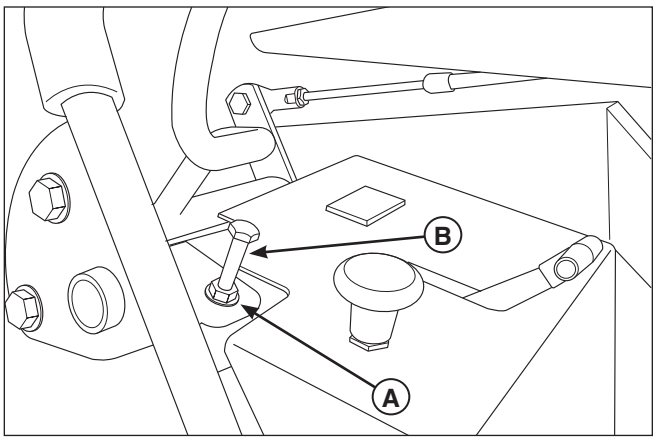


Figure 31. Reverse Speed Balancing Adjustment
A. Securing Nut
B. Top Speed Adjustment Bolt

Parking Brake Adjustment (S/N: 2013521289 & Below)

There are two brake springs located by the rear wheels of the unit. If the parking brake springs need to be adjusted both parking brake springs must be adjusted equally.

1. Disengage the PTO, engage the parking brake, stop the engine and remove the ignition key.
2. Locate the two (2) brake springs (**A, Figure 32**).
3. With the parking brake engaged, measure the compressed spring length. The spring should be 2-5/8" - 2-11/16" (6,67 cm - 6,83 cm) when compressed.
4. If the spring is not within this range, release the parking brake and turn the adjustment nut (**B**) to compress or release the spring.
5. Engage the parking brake and re-measure the spring.

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

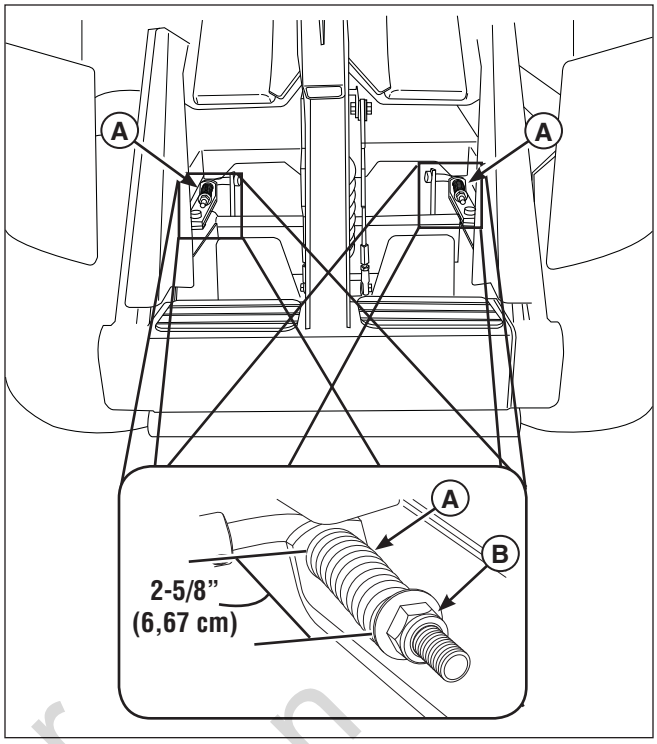


Figure 32. Parking Brake Adjustment
A. Brake Spring
B. Adjustment Nut

Parking Brake Adjustment (S/N: 2013521290 & Above)

The parking brake system consists of two range selector plates and two parking brake springs which are located by the rear wheels of the unit. If the parking brake needs to be adjusted the range selector plates must be adjusted first, and then the length of the parking brake springs must be set.

Adjusting the Range Selector Plate

1. Disengage the PTO, engage the parking brake, stop the engine and remove the ignition key.
2. Chock the front tires to prevent the machine from moving. Jack up the rear of the machine and secure with jackstands.
3. Remove both of the rear wheels.
4. Disengage the parking brake.
5. Remove the range selector hardware (**A, Figure 33**).
6. Loosen the range selector pivot hardware (**B**) just enough so that you can pivot the range selector plate (**C**).
7. Pivot the range selector plate towards the front of the machine as far as you can and insert the range selector hardware in the nearest hole.

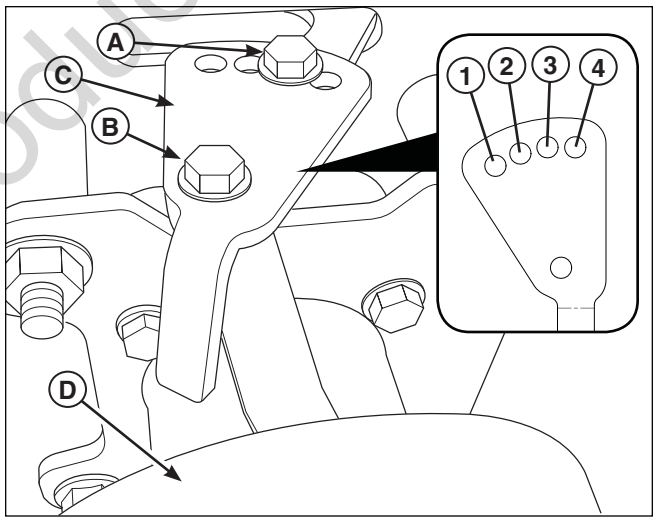


Figure 33. Adjusting the Range Selector Plate
A. Range Selector Hardware
B. Range Selector Pivot Hardware
C. Range Selector Plate
D. Brake Hub

8. With the parking brake disengaged, attempt to pull the brake hub (**D**) off of the unit.
   - If their is resistance when you remove the brake hub from the unit, continue with step # 9.
   - If their is no resistance when you remove the brake hub off the unit, place the brake hub back on the unit and skip to step # 11.
9. Remove the range selector hardware and pivot the range selector plate until you can insert the range selector hardware in the next lowest numbered hole.
10. Re-check the hub for resistance by pulling the brake up on and off the unit again. If their is resistance move the range selector hardware in the next lowest number hole until you can pull the brake hub on and off without resistance. Place the hub back on the unit.
11. Tighten the range selector hardware (A) and the range selector pivot hardware (B),
12. Reinstall the rear wheel.
13. Repeat the process for the other side of the unit.
14. Remove the jack and jack stands from underneath the machine

Adjusting the Parking Brake Spring

1. Locate the two (2) brake springs (**A, Figure 34**).
2. With the parking brake engaged, measure the compressed spring length. The spring should be 2-3/8" (6 cm) when compressed.
3. If the spring length does not equal the measurement, the spring length will need to be adjusted.
4. Disengage the parking brake.
5. Loosen the set collar (**B**) and slide it away from the back of the parking brake bracket (**C**).
6. Turn the adjustment nut (**D**) to compress or release the spring.
7. Engage the parking brake and re-measure the spring. Continue this process until the compressed spring length measures 2-3/8" (6 cm).
8. Position the set collar 1/4" (.64 cm) away from the parking brake bracket and tighten.

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

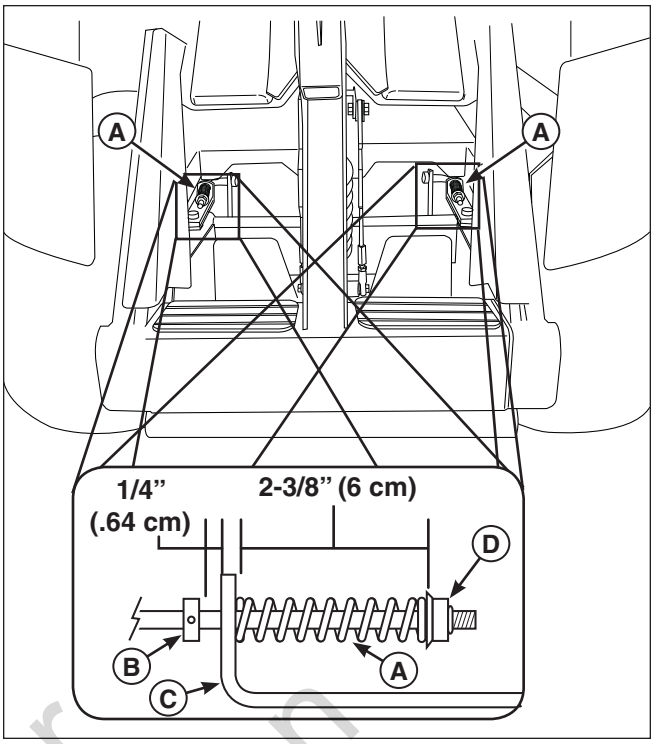


Figure 34. Parking Brake Adjustment
A. Brake Spring
B. Set Collar
C. Parking Brake Bracket
D. Adjustment Nut

Suspension Adjustment

The front shock assemblies (**A, Figure 35**) and the operator compartment shock assembly (**B**) can be adjusted to vary the amount of pre-load applied to the springs. This allows the operator to maintain the ride height.

Use less pre-load for light weight operators. Use more pre-load for heavy weight operators.

To adjust the spring pre-load:

1. Park the machine on a flat, level surface. Disengage the PTO, stop the engine and engage the parking brake.

⚠ WARNING

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

2. See Figure 35. Using the supplied spanner wrench (P/N 5022853), insert the tip of the wrench into the notch in the pre-load adjuster. While holding the wrench with both hands, turn CLOCKWISE to decrease the pre-load, turn COUNTER-CLOCKWISE to increase the pre-load.

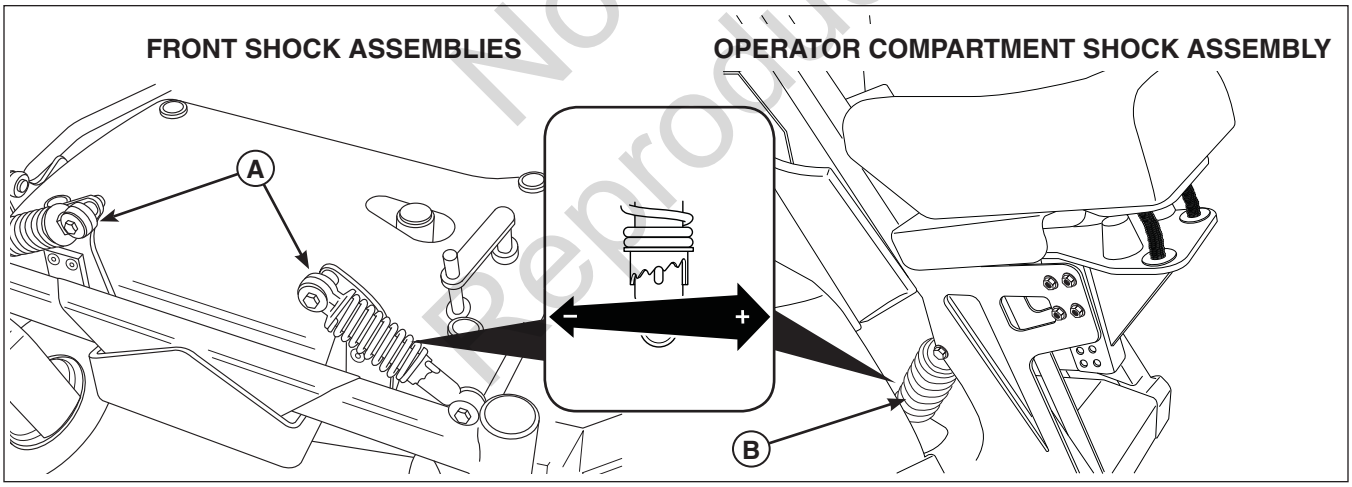


Figure 35. Suspension Adjustment
A. Front Shock Assemblies
B. Operator Compartment Shock Assembly

Mowing Height Adjustment

See Figure 36. The mowing height can be adjusted by turning the cutting height adjustment handle.

To Raise the Mower Deck:

Turn the cutting height adjustment handle (**A, Figure 36**) CLOCKWISE.

To Lower the Mower Deck:

Turn the cutting height adjustment handle COUNTER-CLOCKWISE.

Raising the Mower Deck for Transport

To raise the mower deck for transport, pull the deck transport adjustment handle (**A, Figure 36**) backwards and up until it latches into place.

To lower the mower deck to the operating position, release the deck lift lock lever (**B**) and slowly lower the deck transport adjustment handle forward and down.

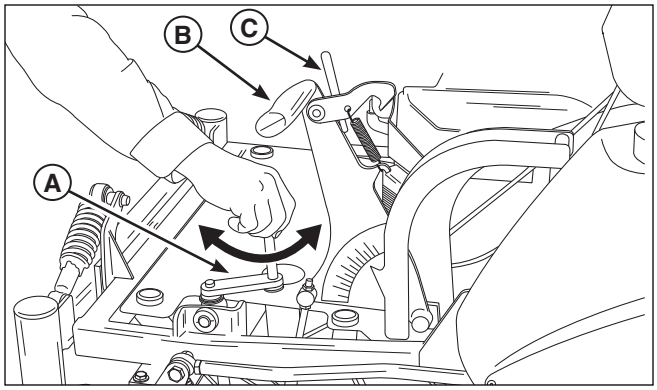


Figure 36. Mowing Height Adjustment
A. Cutting Height Adjustment Handle
B. Deck Transport Adjustment Handle
C. Deck Lift Lock Lever

Deck Lift Rod Timing Adjustment

1. Park the machine on a flat, level surface. Disengage the PTO, stop the engine, and engage the parking brake. Rear tires must be inflated to 18 psi (1,24 bar).
2. Measure and record the distance between the lift pivots and the rod pivots. Repeat for the other side of the unit. See Figure 37.
3. 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 4.
4. Lower the mower deck to the lowest cutting position.
5. Block up the mower deck until all of the hanger chains are slack. See Figure 38.
6. Refer to Figure 39. To adjust the lift rod, loosen the jam nut on the front ball joint then remove the 1/2" hardware fastening the ball joint to the lift pivot arm. Turn the ball joint CLOCKWISE to shorten the distance between the rod pivots or COUNTER-CLOCKWISE to lengthen the distance between the rod pivots. Reinstall the ball joint on the lift pivot arm and secure with the 1/2" hardware previously removed. Tighten the jam nut against the lift rod.
7. Remove the blocks from under the mower deck.
8. Adjust the cutting height to the desired position.

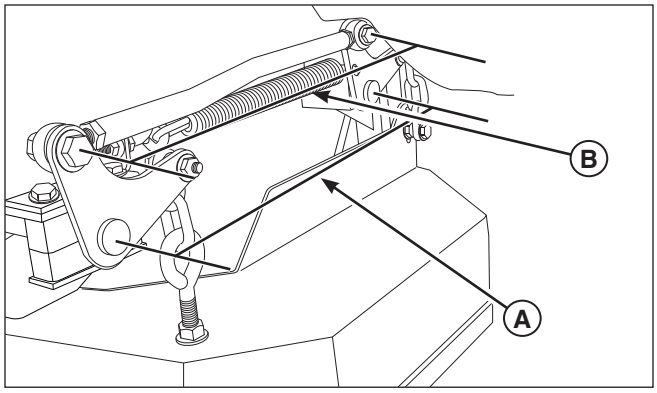


Figure 37. Measure the Lift Pivots and Rod Pivots
A. First Measurement
B. Second Measurement

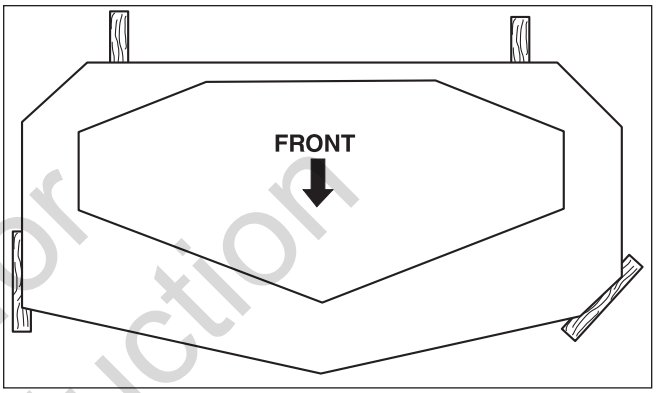


Figure 38. Block Positions

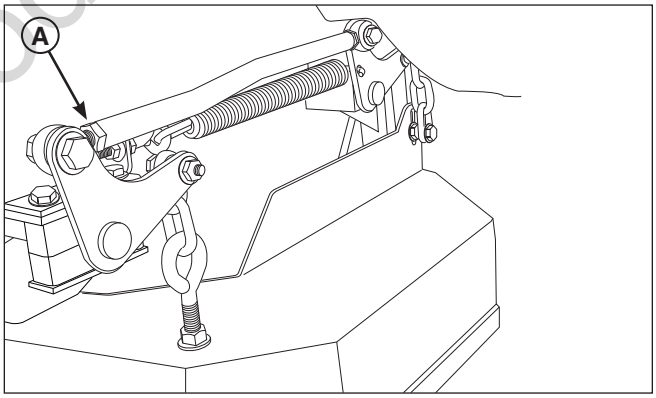


Figure 39. Adjust the Lift Rod Lengths
A. Adjustment Point

Deck Leveling Adjustment

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

1. Park the machine on a flat, level surface. Disengage the PTO, stop the engine and engage the parking brake. Rear tires must be inflated to 18 psi (1,24 bar).
2. Adjust the mower deck in the 4" (10,2 cm) position.
3. Place 2 X 4 blocks under each corner of the mower deck with the 3-1/2" sides being vertical. Place a 1/4" (0,64 cm) thick spacer on top of the rear 2 X 4" blocks. See Figure 40.
4. Adjust the front eyebolts until the chains are tight and the deck is still resting on the 2 X 4's. Tighten the jam nuts. See Figure 41.
5. Loosen the nuts and allow the rear of the deck to rest on the 2 X 4's and 1/4" spacers. Slide the chains down in the slots until the chains are tight and tighten the nuts. See Figure 41.
6. Remove all 2 X 4 blocks and spacers from under the mower.

⚠ CAUTION

Avoid injury! Mower blades are sharp.

Always wear gloves when handling blades or working near blades.

7. See Figure 42. Position the outside mower blades so they face front-to-back.
8. Measure from the front tip of the blade from the cutting edge to the ground. Measure from the rear tip of the blade from the cutting edge to the ground. Repeat this process for the other side of the machine.
   - The front measurement should be 4" (10,2 cm);
   - The back measurement should be 4-1/4" (11,43 cm).

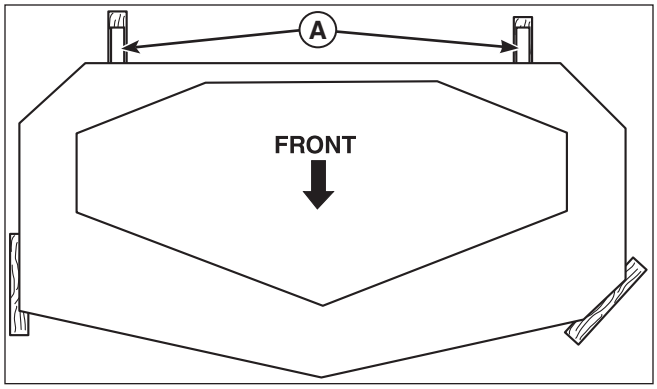


Figure 40. 2 X 4 Locations
A. 1/4 Spacers

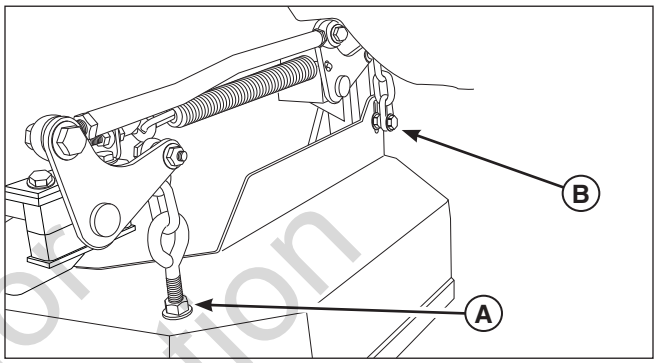


Figure 41. Hanger Chain Adjustment
A. Front Adjustment Point
B. Rear Adjustment Point

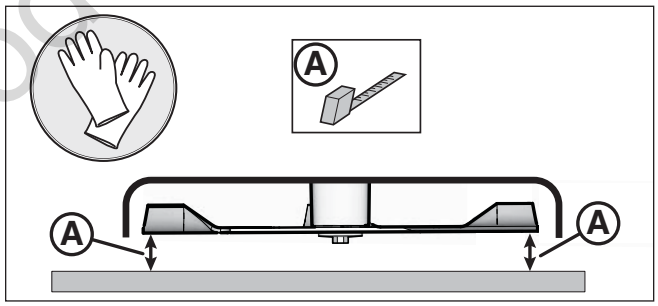


Figure 42. Checking the Blade Height Adjustment

Deck Lift Assist Spring

The deck lift assist springs (**A, Figure 43**) are factory set to provide optimal lifting performance.

Although it is fastened with a multi-position anchor, this is NOT AN ADJUSTMENT POINT.

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

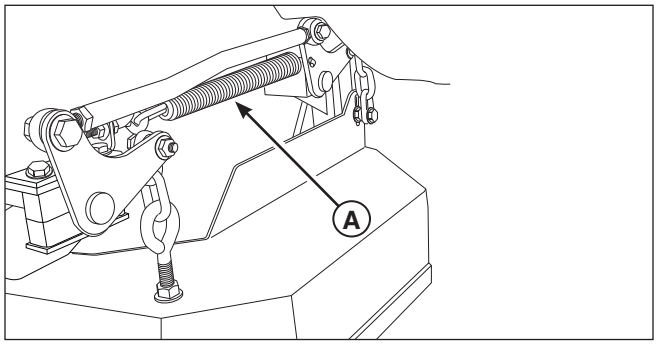


Figure 43. Deck Lift Assist Springs Location
A. Deck Lift Assist Springs

PTO Drive Belt Replacement

NOTICE

To avoid damaging belts, **DO NOT pry belts over pulleys.**

1. Park the unit on a smooth, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Remove the mower deck guard.
3. Position the mower deck in the TRANSPORT position.

⚠ WARNING

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

4. Using a 1/2" breaker bar, place the square end in the square hole located in the end of the idler arm (**A, Figure 44**). Carefully rotate the breaker bar CLOCKWISE, which will relieve the tension on the belt exerted from the idler arm.
5. Slide the PTO drive belt over the edge of the left spindle pulley (**B**). Carefully release the tension on the breaker bar.
6. Remove the old belt and replace with a new one. Make sure the V-side of the belt runs in the pulley grooves.
7. Install the PTO drive belt (**A, Figure 45**) on the PTO clutch pulley (**B**), the front idler pulley (**C**) and the idler arm pulley (**D**). Carefully rotate the breaker bar CLOCKWISE and install the belt on the left spindle pulley (**E**). Carefully release the tension on the breaker bar.
8. Reinstall the mower deck guard.
9. Run the mower under no-load condition for about 5 minutes to break-in the new belt.

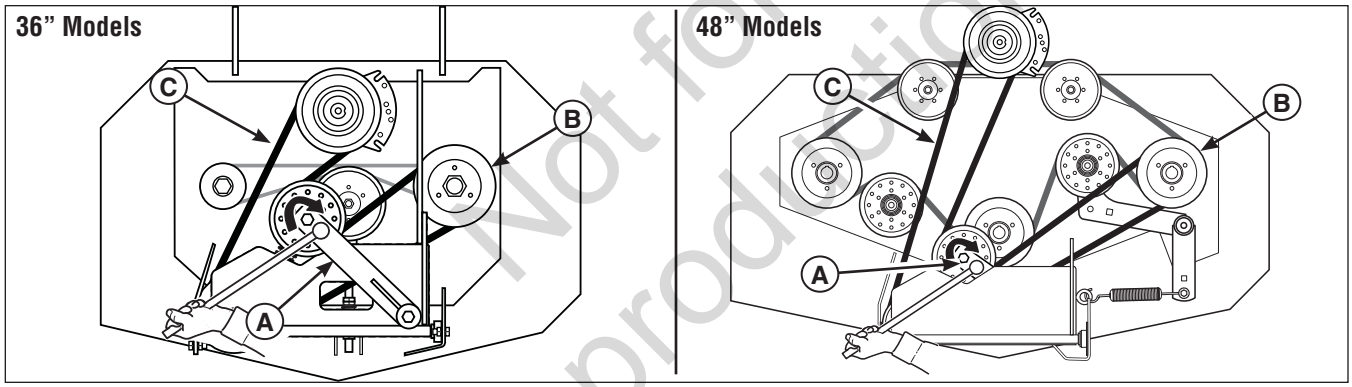


Figure 44. Removing the PTO Drive Belt
A. Idler Arm
B. Left Spindle Pulley
C. PTO Drive Belt

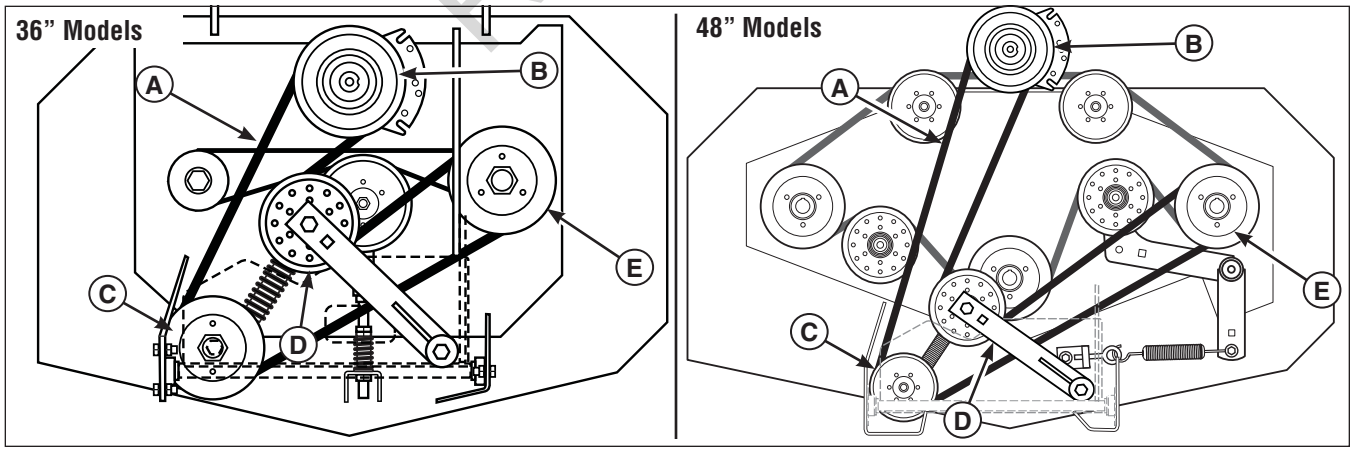


Figure 45. PTO Drive Belt Routing
A. PTO Drive Belt
B. PTO Clutch Pulley
C. Front Idler Pulley
D. Idler Arm Pulley
E. Left Spindle Pulley

Mower Deck Drive Belt Replacement - 36" Models

1. Park the unit on a smooth, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Remove the mower deck guard.
3. Remove the PTO drive belt (see PTO DRIVE BELT REPLACEMENT for removal instructions).
4. Lower the mower deck to its lowest cutting position.
5. Loosen the idler pulley bolt (**A, Figure 46**) 2 full turns. DO NOT remove the nut.
6. Loosen the spring placement jam nut (**B**).
7. Rotate the spring adjustment nut (**C**) COUNTER-CLOCKWISE to release the tension on the mower deck drive belt adjustment spring (**D**). Slide the adjustable idler pulley (**E**) towards the front of the mower deck to remove all the tension from the mower deck drive belt (**F**).
8. Remove the old belt and replace with a new one. Install the new belt on the LH sprocket (**G**) and make sure the belt is properly seated in the chevron of the sprocket.
9. Refer to Figure 47. Align the holes in the sprockets with the spindle mounting hardware as shown. The blades will be perpendicular to each other.
10. Install the belt on the RH sprocket (**H, Figure 46**), again making sure the belt is properly seated in the chevron of the sprocket.
11. Rotate the spring adjustment nut (**C**) CLOCKWISE until the belt tension spring is compressed to 1-3/4" (4,45 cm) long.
12. Retighten the spring placement jam nut (**B**).
13. Tighten the idler pulley bolt (**A**) and torque to 55 ft. lbs. (74.5 Nm).
14. Reinstall the PTO drive belt (see PTO DRIVE BELT REPLACEMENT for re-installation instructions).

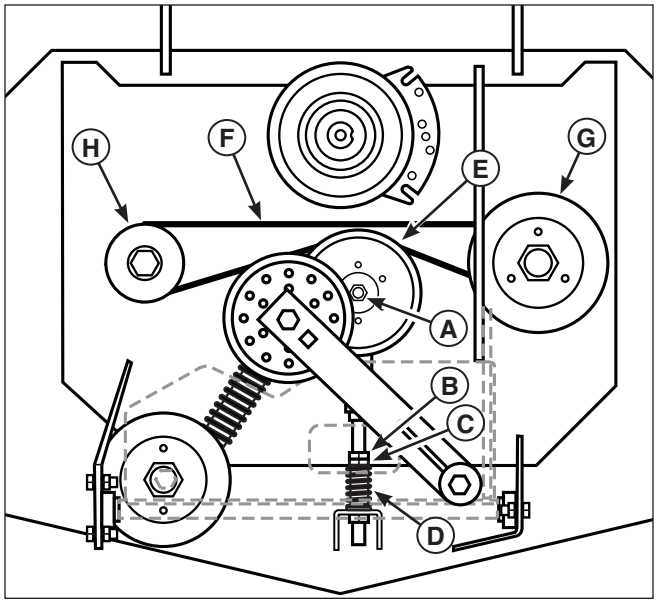


Figure 46. Mower Deck Drive Belt Removal
A. Idler Pulley Bolt
B. Spring Placement Jam Nut
C. Spring Adjustment Nut
D. Mower Deck Drive Belt Adjustment Spring
E. Adjustable Idler Pulley
F. Mower Deck Drive Belt
G. LH Sprocket
H. RH Sprocket

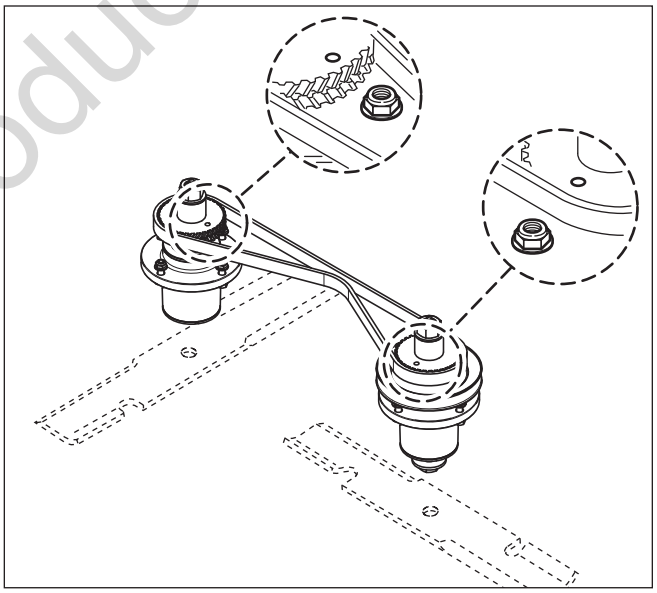


Figure 47. Blade Alignment

Mower Deck Drive Belt Replacement - 48" Models

NOTICE

To avoid damaging belts, **DO NOT pry belts over pulleys.**

1. Park the unit on a smooth, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Remove the mower deck guard.
3. Remove the PTO drive belt (see PTO DRIVE BELT REPLACEMENT for removal instructions).
4. Lower the mower deck to its lowest cutting position.

⚠ 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.

5. Using a 1/2" breaker bar, place the square end in the square hole located in the end of the idler arm (**A, Figure 48**). Carefully rotate the breaker bar COUNTER-CLOCKWISE, which will relieve the tension on the belt exerted from the idler arm.
6. Slid the mower deck drive belt over the edge of the left spindle pulley (**B**). Carefully release the tension on the breaker bar.
7. Remove the old belt and replace with a new one. Make sure that the V-side of the belt runs in the pulley grooves.
8. See Figure 49. Install the mower deck drive belt (**A, Figure 49**) on the stationary idler pulleys (**B**), the spring-loaded idler pulley (**C**) and all of the spindle pulleys (**D**) except for the left spindle pulley (**E**). Carefully rotate the breaker bar COUNTER-CLOCKWISE and install the belt on the left spindle pulley. Carefully release the tension on the breaker bar.
9. Reinstall the PTO drive belt (see PTO DRIVE BELT REPLACEMENT for re-installation instructions).
10. Reinstall the mower deck guards.
11. Run the mower under no-load condition for about 5 minutes to break-in the new belt.

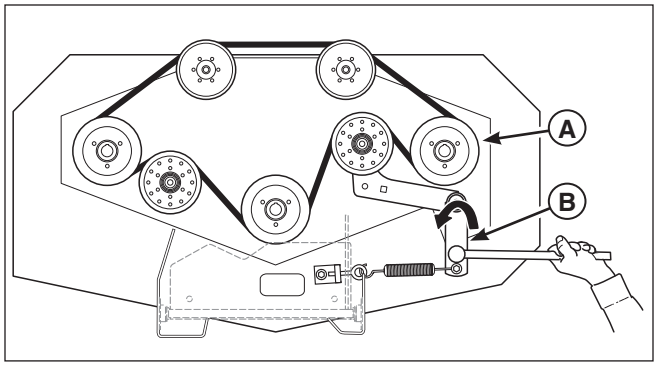


Figure 48. 48" Mower Deck Belt Removal
A. Idler Arm
B. Left Spindle Pulley

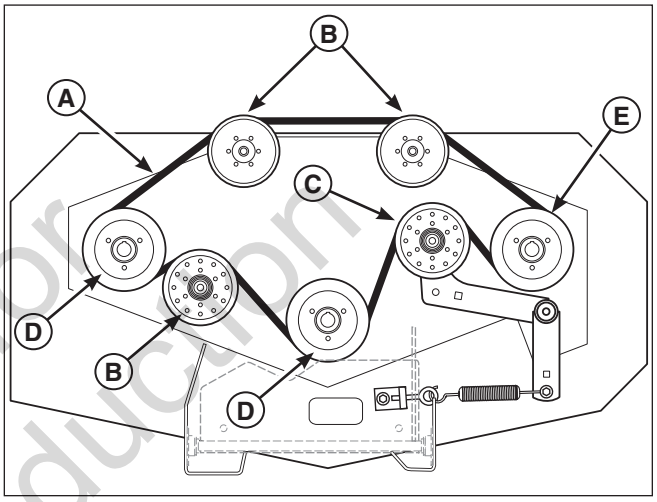


Figure 49. 48" Mower Deck Belt Routing
A. Mower Deck Drive Belt
B. Stationary Idler Pulley
C. Spring-loaded Idler Pulley
D. Spindle Pulleys
E. Left Spindle Pulley

Hydraulic Pump Drive Belt Replacement

1. Park the unit on a smooth, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Remove the PTO drive belt (see PTO DRIVE BELT REPLACEMENT for removal instructions).
3. Lower the mower deck to its lowest cutting position.
4. Disconnect the PTO clutch wire harness.
5. Loosen and remove the crankshaft bolt (**A, Figure 50**) and the PTO clutch (**B**) from the engine crankshaft.
6. Loosen the inner jam nut (**A, Figure 51**) on the idler arm stabilizer.
7. Loosen the nut (**B**) on the spring anchor eyebolt (**C**) to release the majority of the belt tension. Use caution and remove the nut to completely release the tension.
8. Remove the old belt and replace it with a new one. Make sure that the belt is properly seated in the chevron of the pump drive sprockets (**D**) and the crankshaft sprocket (**E**). See Figure 51 for proper belt routing.
9. Reinstall the spring anchor eyebolt into the anchor tab (**F**) and loosely fasten the nut. Adjust the anchor eyebolt until a measurement of 5" (12,7 cm) is achieved on the spring coils (**G**). Tighten the nuts.
10. Tighten the nuts on the idler arm stabilizer so that the idler arm is locked into place.
11. Reinstall the PTO clutch (**B, Figure 50**) on the engine crankshaft so that the slot in the PTO clutch lines up with the PTO clutch mounting tab (**C**) and secure with the crankshaft bolt (**A**). Tighten the crankshaft bolt to 65 ft. lbs (88 Nm).

NOTE: Make sure that the slot in the PTO clutch lines up with the PTO clutch mounting tab underneath the engine deck.

11. Reconnect the PTO clutch wire harness and wire tie the harness out of the way of the PTO clutch and the pump drive belt.
12. Reinstall the PTO drive belt.

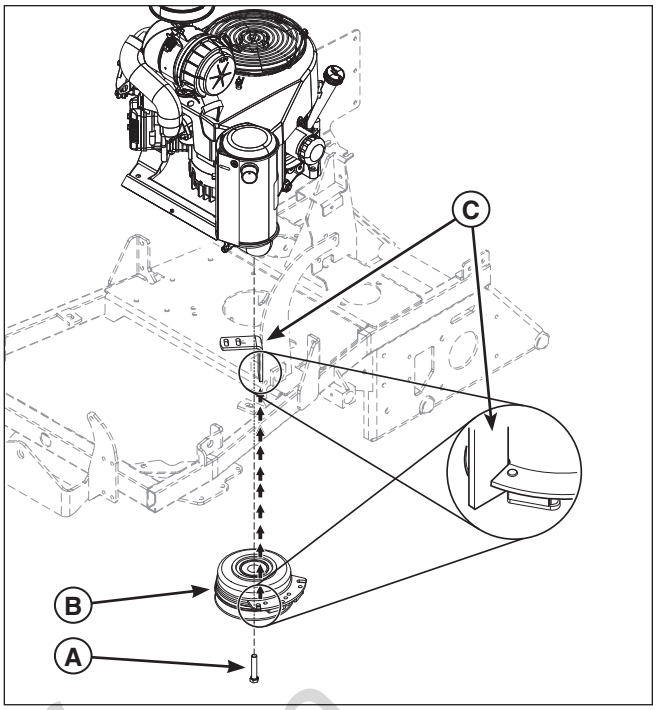


Figure 50. Removing the PTO Clutch
A. Crankshaft Bolt
B. PTO Clutch
C. PTO Clutch Mounting Tab

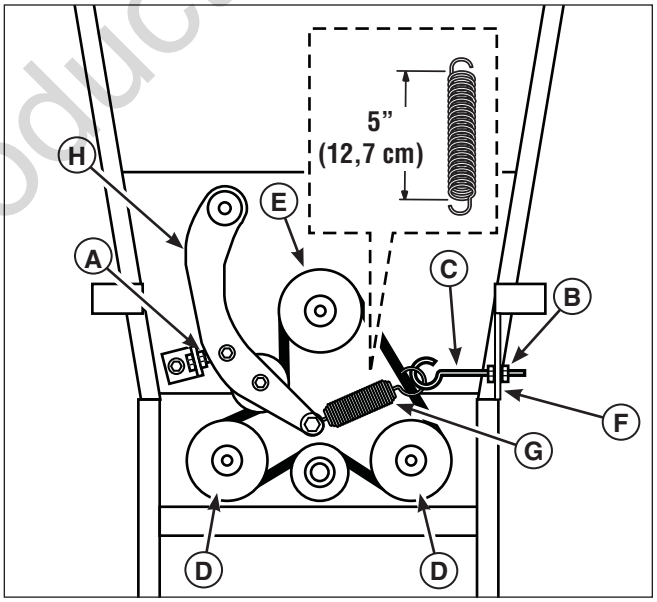


Figure 51. Pump Drive Belt Routing
A. Inner Jam Nut
B. Nut
C. Spring Anchor Eyebolt
D. Pump Drive Sprockets
E. Crankshaft Sprocket
F. Anchor Tab
G. Spring
H. Idler Arm

Removing the Mower Deck

It may be necessary to remove the mower deck to facilitate servicing the mower deck. The following procedure details how to remove the mower deck from the unit.

1. Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Remove the PTO drive belt (see PTO DRIVE BELT REPLACEMENT for removal instructions).
3. Lower the mower deck to its lowest cutting position.
4. Block up the mower deck until all hanger chains are slack. See Figure 52.
5. Loosen and remove the hardware that secures the top of the hanger chains (**A, Figure 53**) to the deck lift rod pivots (**B**)
6. Loosen and remove the hardware (**A, Figure 54**) that secures the idler arm mount plate (**B**) to the mower deck (**C**).
7. Loosen and remove the 1/2" hardware (**A, Figure 55**) that secure the pusher rollers to the unit. Remove the pusher rollers from the unit.
8. Remove the blocking from underneath the mower deck.
9. Turn the front wheels of the mower so they face side-to-side instead of front-to-back and pull the mower deck out from underneath the unit.

Installing the Mower Deck

1. Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Turn the front wheels of the mower so they face side-to-side instead of front-to-back and slide the mower deck underneath the unit.
3. Place blocking underneath the mower deck to raise the deck.
4. Install the rear of the mower deck to the unit using the pusher rollers and secure as shown in figure 51 using the 1/2" hardware. The 1/2"-13 X 3-1/2" bolt (**A, Figure 55**) is routed through the frame of the unit, the deck guide (**B**), the mower deck roller post, the sleeve bushing (**C**), the roller (**D**), the 1/2 USS washer (**E**) and secured using the 1/2-13 hex nylock flange nut (**F**).
5. Connect the idler mount plate (**B, Figure 54**) to the mower deck and secure using the 5/16" hardware (**A**).

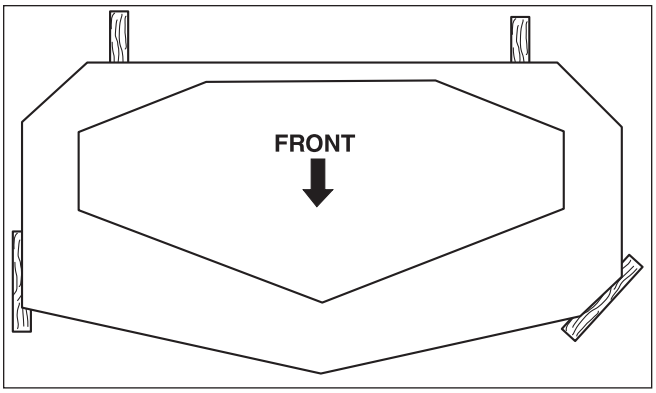


Figure 52. Block Positions

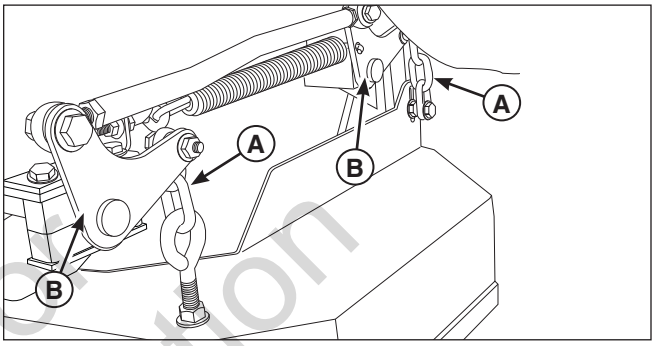


Figure 53. Removing the Hanger Chains
A. Hanger Chain
B. Deck Lift Rod Pivot

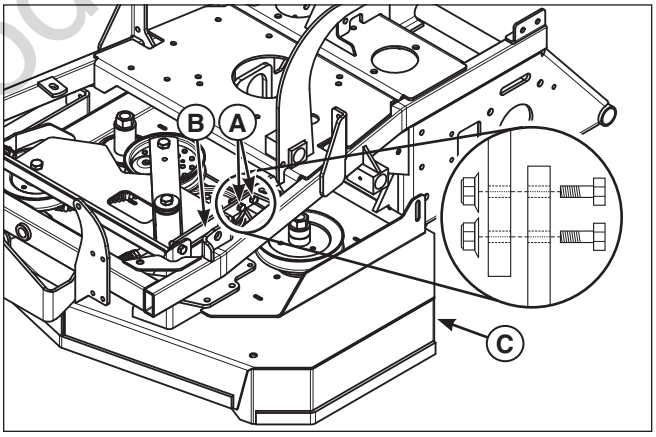


Figure 54. Disconnecting the Idler Arm Mount Plate
A. Mounting Hardware
B. Idler Arm Mount Plate
C. Mower Deck

Installing the Mower Deck continued.

6. Install the hanger chains to the deck lift rod pivots as shown in figure 53.
7. Remove the blocking from underneath the unit.
8. Reinstall the PTO drive belt.

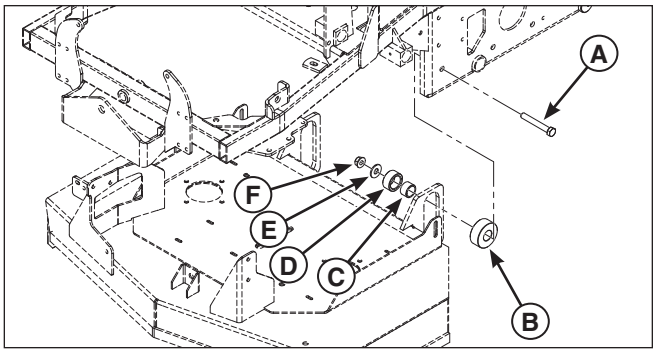


Figure 55. Pusher Rollers
A. 1/2"-13 X 3-1/2" Bolt
B. Deck Guide
C. Sleeve Bushing
D. Roller
E. 1/2 USS Washer
F. 1/2-13 Hex Nylock Flange Nut

Removing the Operator Compartment Assembly

It may be necessary to remove the operator compartment assembly to facilitate servicing the unit. The following procedure details how to remove the operator compartment assembly from the unit.

1. Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Remove the right tank (**A, Figure 56**) from the unit by unscrewing the three (3) wing bolts (**B**) from the tank and pulling the tank off the unit.
3. Remove the left fuel tank (**A, Figure 57**) from the unit by unbolting the three (3) bolts, lock washers and washers (**B**) that secure the fuel tank to the unit. The fuel line is still connected to the fuel tank. Position the tank so that you can access the operator compartment pivot hardware, but do not remove the tank from the unit.

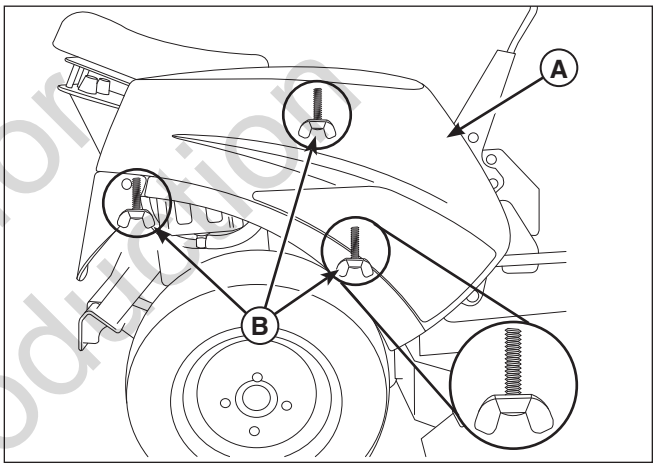


Figure 56. Removing the Tank
A. Tank
B. Wing Bolts

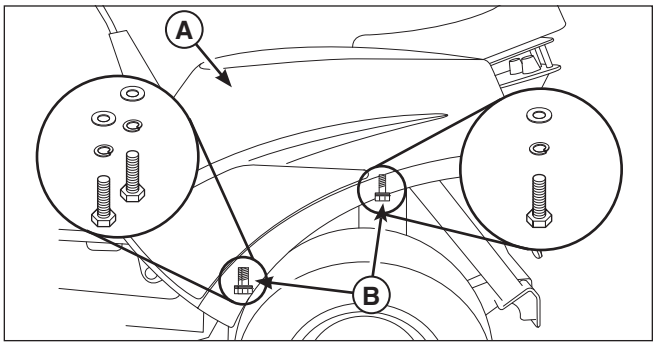


Figure 57. Removing the Fuel Tank
A. Fuel Tank
B. Fuel Tank Mount Hardware

4. Loosen and remove the four (4) allen head screws (**A, Figure 58**) that secure the choke and throttle cable plate (**B**) to the dash panel assembly.

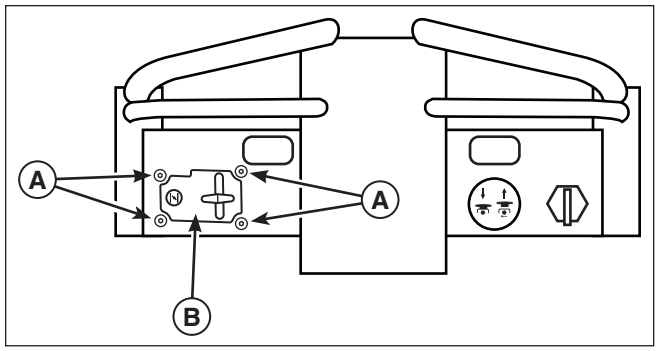


Figure 58. Disconnect the Cable Plate
A. Allen Head Screw
B. Choke and Throttle Cable Plate

5. Loosen and remove the two (2) allen head bolts (**A, Figure 59**) that secure the top motion control guard (**B**) to the unit. Remove the top motion control guard from the unit
6. Loosen and remove the 1/4 bolts (**C**) and washers (**D**) that secure the cable plates (**E**) to the operator compartment. Pull the cables plates and cables towards the side of the machine to remove the cables plates from the unit.

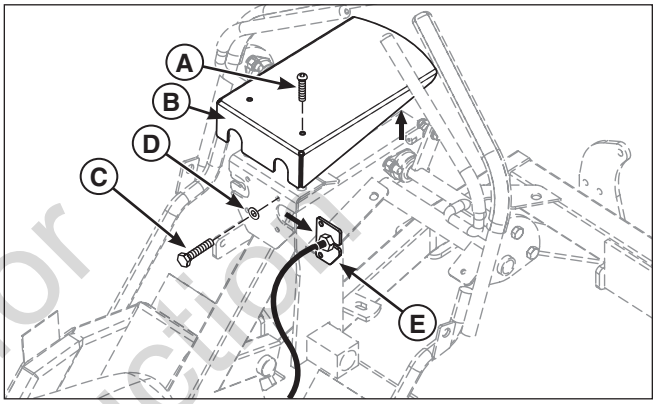


Figure 59. Motion Control Cables
A. Allen Head Screws
B. Top Motion Control Guard
C. 1/4 Bolt
D. 1/4 Washer
E. Cable Plate

7. Remove the eyebolt hardware (**B, Figure 60**) that secures the eyebolt (**C**) to the ground speed control lever arm (**A**).

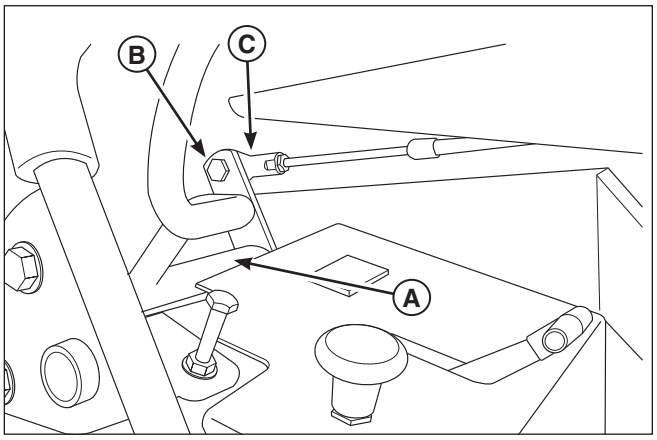


Figure 60. Removing the Cables
A. Ground Speed Control Lever Arm
B. Eyebolt Hardware
C. Eyebolt

8. Locate the wire harness disconnect points under the right instrument control panel. Disconnect the wire harnesses by squeezing the quick release tabs and pulling the main unit wire harness connector (**B, Figure 61**) from the instrument panel wire harness connector (**B**).

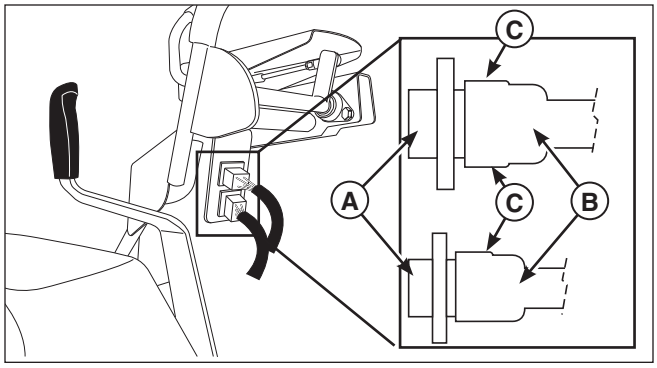


Figure 61. Wire Harness
A. Instrument Panel Wire Harness Connector
B. Main Unit Wire Harness Connector
C. Quick Release Tabs

9. There are two (2) 1/2" bolts and washers (**A & B, Figure 62**) that secure the operator compartment (**C**) to the unit at the front pivots. Loosen and remove both 1/2" bolts and washers.

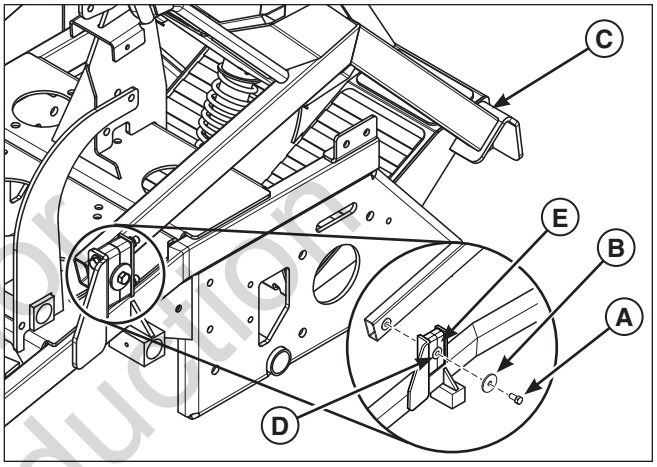


Figure 62. Operator Compartment Front Pivots
A. 1/2" Bolt
B. Washer
C. Operator Compartment
D. Spacers
E. Rubber Pivot Mounts

10. Loosen and remove the 3/8 X 2-1/2" bolt, 3/8 washer and 3/8-16 nylock flange nut (**A, Figure 63**) that secures the shock (**B**) to the bottom shock mount (**C**).
11. The operator compartment can now be removed from the unit by raising the compartment up and pulling it backwards from the unit.

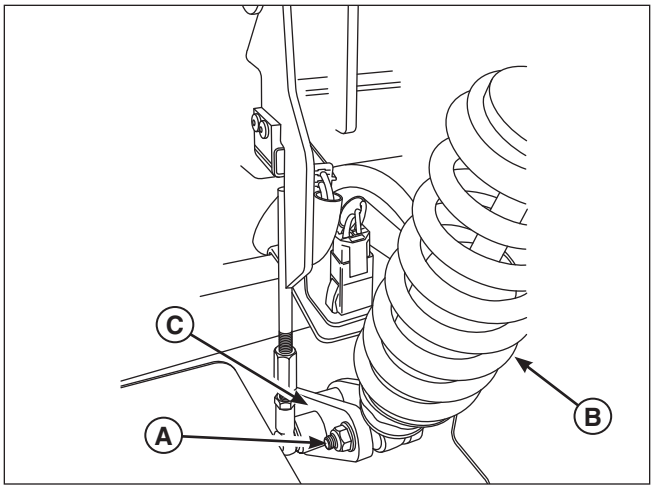


Figure 63. Bottom Shock Mount
A. Shock Hardware
B. Shock
C. Bottom Shock Mount

Installing the Operator Compartment Assembly

1. Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the engine, and remove the ignition key.
2. Place the operator compartment assembly (**C, Figure 62**) on the unit and loosely install the two (2) 1/2" bolts and washers (**A & B**) through the spacers (**D**) in the rubber pivot mounts (**E**) and into operator compartment front pivots.
3. Install the shock (**B, Figure 63**) to the bottom shock mount (**C**) and secure in place using the 3/8 X 2-1/2" bolt, 3/8 washer and 3/8-16 nylock flange nut (**A**).
4. Install the eyebolt (**C, Figure 60**) to the ground speed control lever arm (**A**) and secure using the eyebolt hardware (**B**). The eyebolt should be on the inside edge of the ground speed control lever arm tab and the hardware should be routed so it faces towards the center of the unit.
5. Install the cable plates (**E, Figure 59**) to the operator compartment and secure using the four (4) 1/4 bolts (**C**) and washers (**D**).
6. Install the top motion control guard (**B**) onto the unit and secure in place using the two (2) allen head bolts (**A**).
7. Connect the wire harness by pushing the instrument panel wire harness connector (**A, Figure 61**) into the main unit wire harness connector (**B**).
8. Install the choke and throttle cable plate (**B, Figure 58**) into the instrument panel and secure using the four (4) allen head screws (**A**).
9. Position the left fuel tank (**A, Figure 56**) onto the machine and secure in place using the three (3) bolts, lock washers and washers (**B**).
10. Install the right tank (**A, Figure 57**) on the machine and secure in place using the three (3) wing bolts (**B**).

Fuse Locations

The fuse block is located underneath the left instrument control panel. Refer to Figure 64 for the location and amperage of the fuses used in this machine.

A. **Main:** 20 amp fuse
B. **Charge:** 20 amp fuse
C. **Safety:** 15 amp fuse
D. **Clutch:** 15 amp fuse

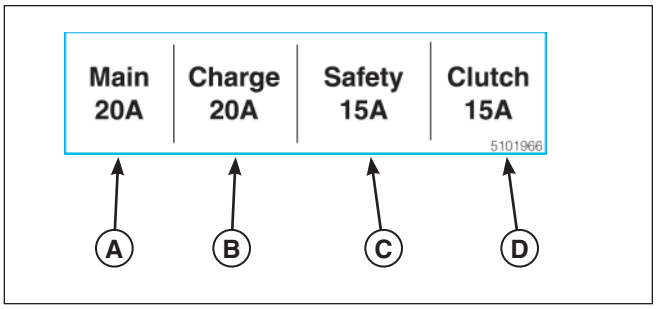


Figure 64. Fuse Location Decal
A. Main
B. Charge
C. Safety
D. Clutch

Battery Maintenance

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

Removing the Tank

The right hand tank (**A, Figure 65**) must be removed prior to performing maintenance on the battery.

1. Unscrew the three (3) wing bolts (**B**) that secure the tank to the unit.
2. Remove the tank from the unit.

⚠ WARNING

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.

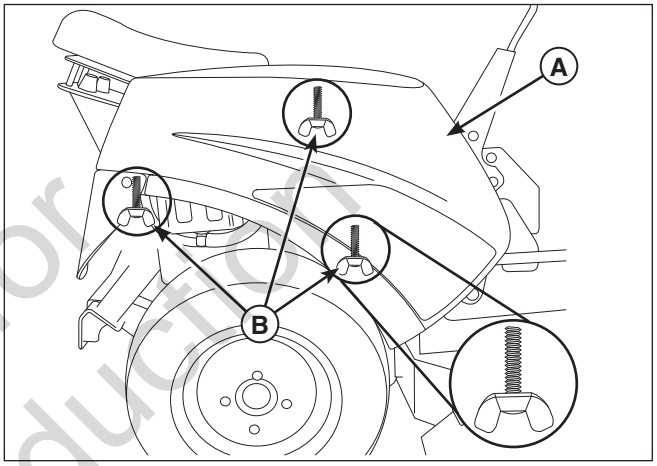


Figure 65. Removing the Tank
A. Tank
B. Wing Bolts

Cleaning the Battery and Cables

1. Disconnect the cables from the battery, negative (black) cable first (**A, Figure 66**).
2. Clean the battery terminals and cable ends with a wire brush until shiny.
3. Reinstall the battery and reattach the battery cables, positive (red) cable first.
4. Coat the cable ends and battery terminals with petroleum jelly or non-conducting grease.
5. Reinstall the tank by reversing the removal process.

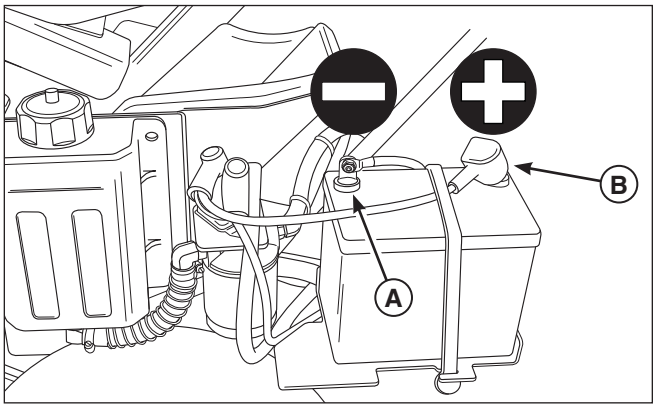


Figure 66. Battery Maintenance
A. Negative (-) Battery Cable
B. Positive (+) Battery Cable

Battery Service

⚠ WARNING

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

Checking Battery Voltage

A voltmeter can be used to determine condition of 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* in the REGULAR MAINTENANCE Section.

Charging a Completely Discharged Battery

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

Jump Starting with Auxillary (Booster) Battery

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

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 thirty seconds, STOP PROCEDURE. More than thirty seconds seldom starts the engine unless some mechanical adjustment is made.
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.
11. Remove the other cable by disconnecting at the discharged battery first and then disconnect the opposite end from the booster battery.
12. Discard the damp cloths that were placed over the battery vent caps.

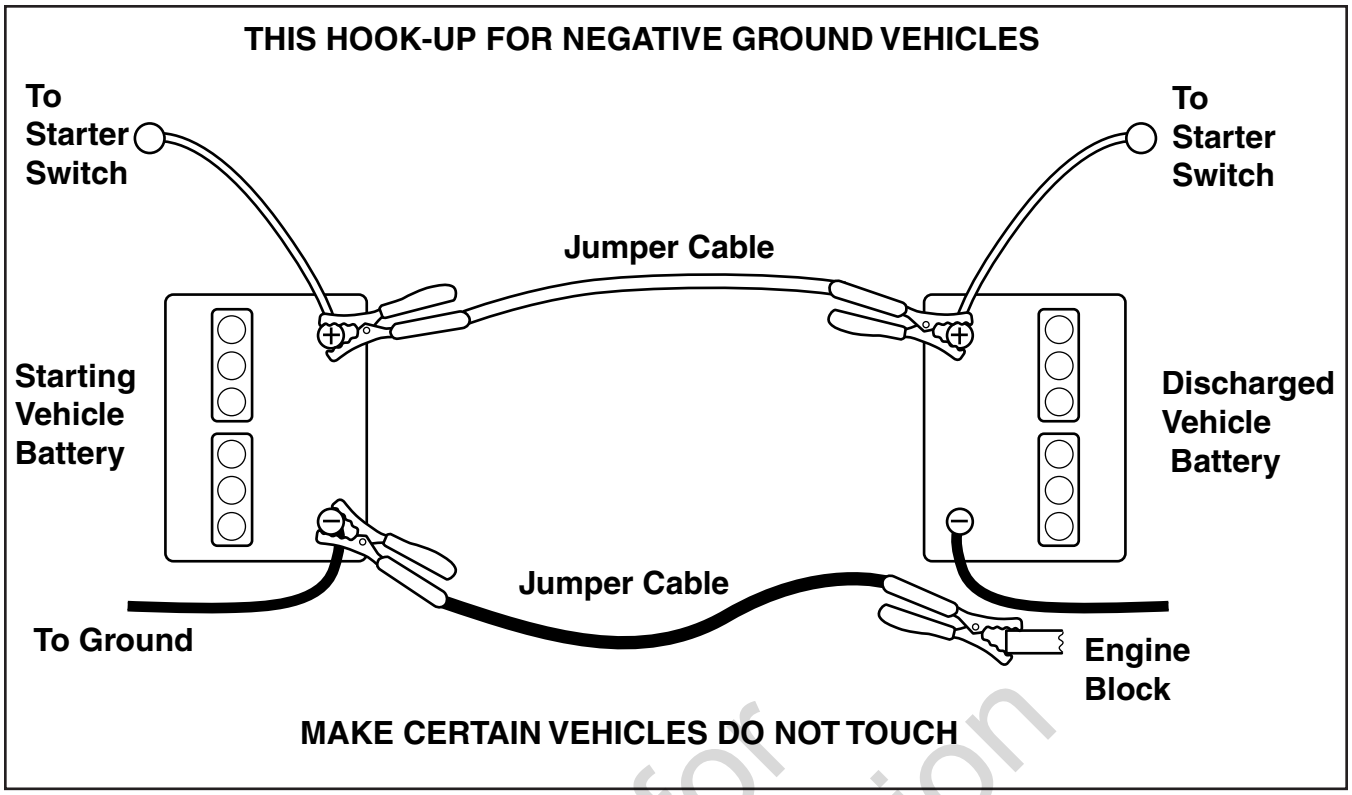


Figure 67. Jump Starting

⚠ WARNING

Any procedure other than the proceeding could result in:

(1) Personal injury caused by electrolyte squirting out of the battery vents.

(2) Personal injury or property damage due to battery explosion.

(3) 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.

⚠ WARNING

For your personal safety, use extreme caution 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.

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.

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

Troubleshooting

Troubleshooting Chart

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 operating properly.

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

See the information in the MAINTENANCE Section for instructions on how to perform most of these minor adjustments and service repairs yourself. If you prefer, all of these procedures can be performed for you by your local authorized dealer.

⚠ WARNING

Remove the ignition key prior to performing maintenance on the unit.

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

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

Troubleshooting the Rider

PROBLEM	CAUSE	REMEDY
Engine will not turnover or start.	1. Parking brake not engaged.	1. Engage parking brake.
	2. PTO (electric clutch) switch in ON position.	2. Place if OFF position.
	3. Out of fuel	3. If engine is hot allow to cool, the refill the fuel tank.
	4. Engine flooded.	4. Move choke control to CLOSED position.
	5. Fuse blown.	5. Replace fuse.
	6. Battery terminals require cleaning.	6. Clean the battery terminals.
	7. Battery discharged or dead.	7. Recharge or replace.
	8. Wiring loose or broken.	8. Visually check wiring & replace broken or frayed wires. Tighten loose connections.
	9. Solenoid or starter motor faulty.	9. Repair or replace. See authorized dealer.
	10. Safety interlock switch faulty.	10. Replace as needed. See authorized service dealer.
	11. Spark plug(s) faulty, fouled or incorrectly gapped.	11. Clean and gap or replace. See engine manual.
	12. Water in fuel.	12. Drain fuel & replace with fresh fuel.
	13. Gas is old or stale.	13. Drain fuel & replace with fresh fuel.
Engine starts hard or runs poorly.	1. Fuel mixture too rich.	1. Clean air filter. Check choke adjustment.
	2. Spark plug(s) faulty, fouled, or incorrectly gapped.	2. Clean and gap or replace. See engine manual.
Engine knocks	1. Low oil level.	1. Check/add oil as required.
	2. Using wrong grade engine oil.	2. See engine manual.
Excessive oil consumption	1. Engine running too hot.	1. Clean engine fins, blower screen and air cleaner.
	2. Using wrong weight oil.	2. See engine manual.
	3. Too much oil in crankcase.	3. Drain excess oil.
Engine exhaust is black.	1. Dirty air filter.	1. Replace air filter. See engine manual.
	2. Engine choke control is in CLOSED position.	2. Open choke control.

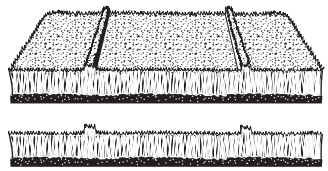
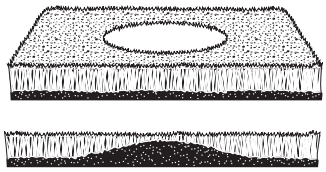
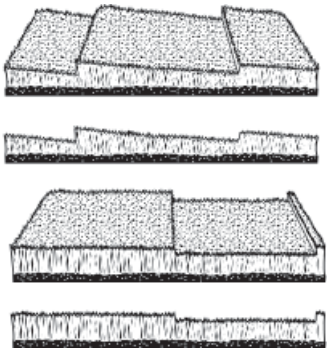
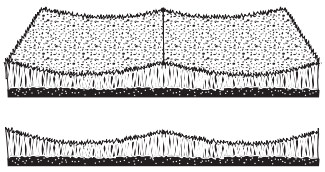
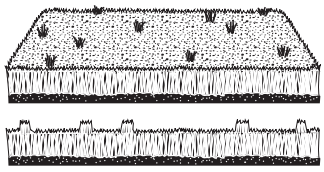
Troubleshooting the Rider continued

PROBLEM	CAUSE	REMEDY
Engine runs, but rider will not drive.	1. Hydraulic release valve(s) in “open” position. 2. Belt is broken. 3. Drive belt slips. 4. Brake is not fully released.	1. Turn hydraulic release valve(s) CLOCKWISE to close. 2. See Drive Belt Replacement. 3. See Problem and Cause below. 4. See authorized service dealer.
Rider drive belt slips.	1. Pulleys or belt greasy or oily. 2. Tension too loose. 3. Belt stretched or worn.	1. Clean as required. 2. Adjust spring tension. See Drive Belt Replacement. 3. Replace belt.
Brake will not hold.	1. Brake is incorrectly adjusted. 2. Brake pads worn.	1. See Brake Adjustment. 2. Replace with new brake pads.
Rider steers or handles poorly.	1. Steering linkage is loose. 2. Improper tire inflation.	1. Check and tighten any loose connections. 2. See Operation section.

Troubleshooting the Mower

PROBLEM	CAUSE	REMEDY
Mower will not raise.	1. Lift linkage not properly attached or damaged.	1. See authorized service dealer for repair.
Engine stalls easily with mower engaged.	1. Engine speed too slow. 2. Ground speed too fast. 3. Cutting height set too low. 4. Discharge chute jamming with cut grass.	1. Set to full throttle. 2. Decrease ground speed. 3. Cut tall grass at maximum cutting height during first pass. 4. Cut grass with discharge pointing towards previously cut grass.
Excessive mower vibration.	1. Blade mounting bolts are loose. 2. Mower blades, arbors or pulleys are bent. 3. Mower blades are out of balance. 4. Belt installed incorrectly.	1. Tighten to 70 ft.lbs (94 Nm) 2. Check and replace as necessary. 3. Remove, sharpen and balance blades. See Maintenance section. 4. Reinstall correctly.
Excessive belt wear or breakage.	1. Bent or rough pulleys. 2. Using incorrect belt.	1. Repair or replace. 2. Replace with correct belt.
Mower drive belt slips or fails to drive.	1. Idler pulley spring broken or not properly attached. 2. Mower drive belt broken.	1. Repair or replace as needed . 2. Replace drive belt.
Mower does not engage.	1. Electrical wiring damage. 2. Battery voltage too low.	1. Locate and repair damaged wire. 2. Recharge battery and check alternator. See Battery Maintenance section.

Troubleshooting Common Cutting Problems

PROBLEM	CAUSE	REMEDY
Streaking		
	1. Blades are not sharp. 2. Blades are worn down too far. 3. Engine speed is too slow. 4. Ground speed is too fast. 5. Deck is plugged with grass. 6. Not overlapping cutting rows enough. 7. Not overlapping enough when turning.	1. Sharpen your blades. 2. Replace your blades. 3. Always mow at FULL throttle. 4. Slow down. 5. Clean out the mower. 6. Overlap you cutting rows. 7. When turning your effective cutting width decreases—overlap more when turning.
Scalping		
	1. Lawn is uneven or bumpy. 2. Mower deck cutting height is set too low. 3. Ground speed is too fast. 4. Deck is not levelled correctly. 5. Tire pressure is low or uneven.	1. Roll or level the lawn. 2. Raise the cutting height. 3. Slow down. 4. Correctly level the deck. 5. Check and inflate the tires.
Stepped Cutting.		
	1. Deck is not leveled correctly. 2. Tires are not properly inflated. 3. Blades are damaged. 4. Deck shell is damaged. 5. Mower spindle is bent or loose. 6. Blades are installed incorrectly.	1. Level the deck correctly. 2. Check and inflate the tires. 3. Replace the blades. 4. Repair or replace the deck. 5. Repair or replace the spindle. 6. Reinstall the blades correctly.
Uneven Cutting		
	1. Deck is not leveled correctly. 2. Blades are dull or worn. 3. Blades are damaged. 4. Deck is clogged with grass clippings. 5. Deck shell is damaged. 6. Mower spindle is bent or loose. 7. Blades are installed incorrectly. 8. Tires are not properly inflated.	1. Level the deck correctly. 2. Sharpen or replace the blades. 3. Replace the blades. 4. Clean out the deck. 5. Repair or replace the deck. 6. Repair or replace the spindle. 7. Reinstall the blades correctly. 8. Check and inflate the tires.
Stingers		
	1. Blades are not sharp or nicked. 2. Blades are worn down too far. 3. Engine speed is too low. 4. Ground speed is too fast. 5. Deck is plugged with grass.	1. Sharpen your blades. 2. Replace your blades. 3. Always mow at full throttle. 4. Slow down. 5. Clean out the mower.

Specifications

NOTE: Specifications are correct at time of printing and are subject to change without notice.
** Actual sustained equipment horsepower will likely be lower due to operating limitations and environmental factors.*

ENGINE

19 HP Kawasaki

Make	Kawasaki
Model	FH580V-CS01-S
Horsepower	19 @ 3600
Displacement	35.7 cu. in. (585 cc)
Electrical System	12 Volt, 15 amp. Alternator, Battery: 340 CCA
Oil Capacity	1.9 Qt. (1.8 L) w/ Filter

20 HP Kawasaki

Make	Kawasaki
Model	FX600V-AS02-S
Horsepower	20 @ 3600
Displacement	36.8 cu. in. (603 cc)
Electrical System	12 Volt, 15 amp. Alternator, Battery: 340 CCA
Oil Capacity	1.8 Qt. (1.7 L) w/ Filter

27 HP Kawasaki

Make	Kawasaki
Model	FX751V-AS00-S
Horsepower	27 @ 3600
Displacement	52 cu. in. (862 cc)
Electrical System	12 Volt, 15 amp. Alternator, Battery: 340 CCA
Oil Capacity	1.9 Qt. (1.8 L) w/ Filter

CHASSIS

Fuel Tank	5.2 gallons
Drive Tires	18 X 8.5 - 10 (36” models) 22X 10.00 - 10 (48” models)
Front Caster Tires	11 X 4.00 - 5

TRANSMISSIONS

Pump & Wheel Motor

Hydro Gear PJ-2H / HGM-15P-7131

Type	Pump & Wheel Motor
Hydraulic Fluid	Mobil 1™ 15W-50 synthetic oil or Castor Syntec™ 5W-50 oil.
Speeds @ 3400 rpm	Forward 0-8; Reverse 0-4 (36” models) Forward 0-10; Reverse 0-4 (48” models)
Continuous Torque Output	265.5 lbs.ft
Maximum Weight on Axle	950 lbs

DIMENSIONS

Overall Length	
36” Models:	62” (157 cm)
48” Models:	65” (165 cm)
Overall Width (deflector down / up)	
36” Models:	50” (127 cm) / 36.5” (93 cm)
48” Models:	60” (152 cm) / 49” (124 cm)
Height (All Models)	45” (114 cm)
Weight	
36” Models:	818 lbs (371 kg)
48” Models:	978 lbs (443 kg)

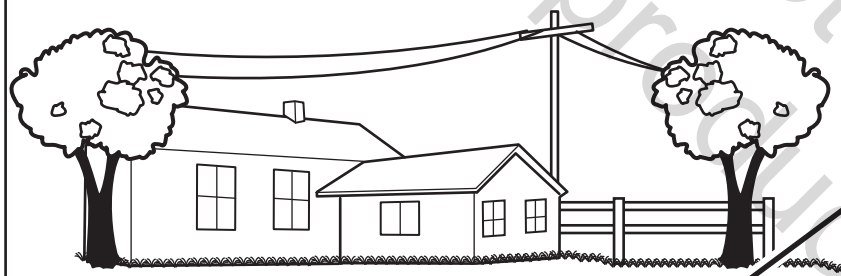
SLOPE INDENTIFICATION GUIDE

1 FOLD ALONG APPROPRIATE DOTTED LINE

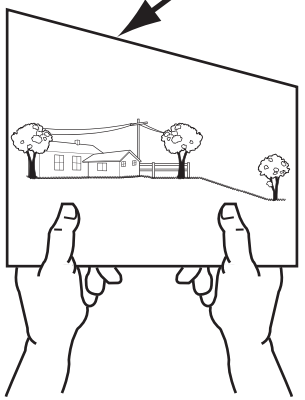
THIS IS A 15 DEGREE SLOPE

THIS IS A 10 DEGREE SLOPE

2 ALIGN THIS EDGE WITH A VERTICAL SURFACE (TREE, POLE, FENCE POST, BUILDING, ETC)



3 COMPARE THE ANGLE OF THE FOLD TO THE ANGLE OF THE SLOPE



INSTRUCTIONS

1. Fold this page along the dotted line indicated above.
2. Align the left edge of this guide with a vertical tree, a power line pole, a fence post, or any vertical structure.
3. Compare the angle of the fold with the angle of the hill.

Ferris Industries - a division of Simplicity Manufacturing Inc.
Owner's Limited Warranty Information

(Effective 04/28/2004)

Thank you for purchasing Ferris commercial mowing equipment. Please take a few minutes to read this limited warranty information. It contains all the information you will need to have your Ferris mower repaired in the unlikely event that a breakdown covered by this limited warranty should occur.

Owner's Responsibilities - As a condition to our obligations under this limited warranty, you shall have read the operator's manual and you shall have completed and submitted to Ferris, within 20 days from the date of purchase, the Ferris Product Registration. You must properly service and maintain your Ferris product as described in the operator's manual. Such routine maintenance, whether performed by a dealer or by you, is at your expense. The Ferris equipment, including any defective part covered by this limited warranty, must be returned to an authorized Ferris dealer within the warranty period for warranty service. This limited warranty extends only to equipment operated under normal conditions and in accordance with Ferris' instructions.

Warranty Start Date - The limited warranty coverage begins on the day you buy your new Ferris commercial mowing equipment. An authorized Ferris dealer will assist you in filling out a Ferris Product Registration with specific information for the model you purchase and your personal information, which must be returned to Ferris.

Limited Warranty - The limited warranty, set forth below, is a written guarantee by Ferris, during the warranty period, to repair or replace parts which have a substantial defect in materials or workmanship. The warranty is "limited" because it is for a specified period of time, applies to the original purchaser only, and is subject to other restrictions.

FERRIS LIMITED WARRANTY

Ferris Industries (Ferris) warrants, in accordance with the provisions below, to the original purchaser only, for the periods described below that the commercial mower shall be free from substantial defects in material or workmanship under normal use and service. If you wish to file a claim under this limited warranty, you must provide prompt notice of your claim to an authorized Ferris dealer during the warranty period. Ferris' obligation under this limited warranty is, at Ferris' option, to repair or replace any part or parts of the mower, which, in the judgment of Ferris, are found to be defective and covered by this limited warranty. An authorized Ferris dealer will repair or replace the defective part or parts, at the dealer's place of business, at no charge for the labor or parts. This limited warranty applies only to mowers sold in the United States and Canada and is subject to the following limitations.

Covered Parts	**Warranty Period**
All Mowers	2-years (24 months) from date of retail purchase by the original purchaser for parts & labor (90 days for rental mowers) (Except as noted below*)
*Belts, Tires, Brake Pads And Hoses, Battery, Blades	90 days from date of retail purchase by the original purchaser
*Attachments	1 year from date of retail purchase by the original purchaser
*Engine	If the engine manufacturer provides any warranty on the mower's engine, Ferris will assign that warranty to the original purchaser of the mower if such assignment is reasonably practicable. Please refer to the engine manufacturer's warranty statement, if any, that is included in the owner's packet. We are not authorized to handle warranty adjustments or repairs on engines. Ferris offers **NO WARRANTY** on mower engines. Ferris does not guarantee or represent that any engine manufacturer will comply with the terms of its warranty.

Items and Conditions Not Covered

This warranty does not cover, and Ferris makes **NO WARRANTY** regarding, the following:

- Mowers or their parts if a complete and accurate Ferris Product Registration has not been received by Ferris.
- Loss or damage to person or property other than that expressly covered by the terms of this limited warranty.
- Pickup and delivery charges and risk of loss or damage in transit to and from any authorized Ferris dealer.
- Any damage or deterioration due to normal use, wear and tear, or environmental or natural elements, or exposure.
- Cost of regular maintenance service or parts, such as but not limited to, filters, fuel, lubricants, tune-up parts, and adjustments.
- Claims arising due to failure to follow Ferris' written instructions, or improper storage or maintenance.
- Any repairs necessary due to use of parts, accessories or supplies, including gasoline, oil or lubricants, incompatible with the mowing equipment, or other than as recommended in the operator's manual or other written operational instructions provided by Ferris.
- Use of non-Ferris approved parts or accessories.
- Any overtime or other extraordinary repair charges or charges relating to repairs or replacements.
- Rental of like or similar replacement equipment during the period of any warranty, repair or replacement work.
- Loss of revenue, time or use of the mowing equipment.
- Travel, telephone or other communication charges.
- Damage from continued use of defective mowing equipment.
- Freight charges on replacement parts.
- Any mowing equipment or part which, in the judgment of Ferris, has been altered or tampered with in any way or has been subjected to misuse, abuse, abnormal usage, unauthorized repair, neglect or accident, damage in transit, or has had the serial numbers altered, effaced or removed.
- Any equipment, part or item not mentioned under "Covered Parts," above.

General Conditions

Ferris is continually striving to improve its products, and therefore reserves the right to make improvements or changes without incurring any obligation to make changes or additions to products sold previously. Any oral or written description of Ferris products is for the sole purpose of identifying the products and shall not be construed as an express warranty. No warranty claim shall give rise to a right for the purchaser to cancel or rescind any sale. No person is authorized to make any warranty or assume for Ferris any liability not strictly in accordance with this limited warranty. Any assistance Ferris provides to or procures for the purchaser outside the terms, limitations or exclusions of this limited warranty will not constitute a waiver of the terms, limitations or exclusions of this limited warranty, nor will such assistance extend or revive the limited warranty. Ferris will not reimburse the purchaser for any expenses incurred by the purchaser in repairing, correcting or replacing any defective products except for those incurred with Ferris' prior written permission and in accordance with this limited warranty.

Ferris' sole and exclusive liability with respect to this limited warranty, and the purchaser's exclusive remedy, shall be repair or replacement as set forth herein. All warranty work must be performed by an authorized Ferris dealer using only Ferris approved replacement parts. **FERRIS SHALL HAVE NO LIABILITY FOR ANY OTHER COST, LOSS OR DAMAGE, INCLUDING BUT NOT LIMITED TO, ANY INCIDENTAL, COMPENSATORY, INDIRECT, PUNITIVE, SPECIAL OR CONSEQUENTIAL LOSS OR DAMAGE. FERRIS' AGGREGATE LIABILITY WITH RESPECT TO A DEFECTIVE PRODUCT OR PART SHALL BE LIMITED TO AN AMOUNT EQUAL TO THE MONIES PAID BY THE PURCHASER FOR THAT DEFECTIVE PRODUCT OR PART. THIS LIMITED WARRANTY, AND FERRIS' OBLIGATIONS HEREUNDER, ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTY OF MERCHANTABILITY AND THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. FERRIS SHALL NOT BE LIABLE TO THE PURCHASER, OR TO ANYONE CLAIMING UNDER THE PURCHASER, FOR ANY OTHER OBLIGATIONS OR LIABILITIES, INCLUDING, BUT NOT LIMITED TO, OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR WARRANTY, NEGLIGENCE OR OTHER TORT OR ANY THEORY OF STRICT LIABILITY, WITH RESPECT TO FERRIS PRODUCTS OR FERRIS' ACTS OR OMISSIONS OR OTHERWISE.**

It is the express wish of the parties that this agreement and any related documents be drafted in English. Il est la volonté expresse des parties que cette convention et tous les documents s'y rattachent soient rédigés en anglais.

OPERATOR'S MANUAL

EVOLUTION Series

Compact Zero-Turn Riding Mower

Briggs & Stratton Power Products Group, LLC.
5375 North Main Street
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