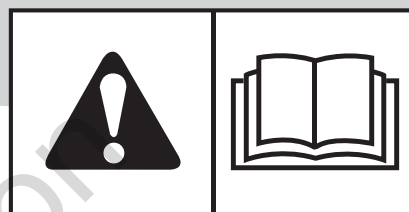




SW30 Series

Walk-Behind Mowers



Model Number	Description
5900855	SW30KAV1852, 52" Cut Walk-Behind Mower
5900856	SW30KAV2061, 61" Cut Walk-Behind Mower
5900887	SW30KAV2052, 52" Cut Walk-Behind Mower
5900899	SW30KAV2661, 61" Cut Walk-Behind Mower
5900964	SW30KAV1848, 48" Cut Walk-Behind Mower
5900547	SW30KAV1948, 48" Cut Walk-Behind Mower
5900548	SW30KAV1952, 52" Cut Walk-Behind Mower
5900549	SW30KAV2152, 52" Cut Walk-Behind Mower
5900550	SW30KAV2461, 61" Cut Walk-Behind Mower

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

Thank you for purchasing this quality-built SNAPPER PRO product. We're pleased that you've placed your confidence in the SNAPPER PRO brand. When operated and maintained according to the instructions in this manual, your SNAPPER PRO 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.**

⚠ WARNING

The 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 known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

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

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Contact Information:

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

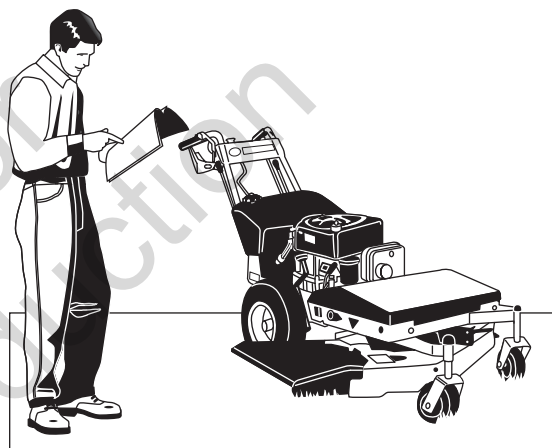
Use common sense, and think through what you are doing. If you are not sure that the task you are about to perform can be safely done with the equipment you have chosen, ask a professional: contact your local authorized dealer.

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.

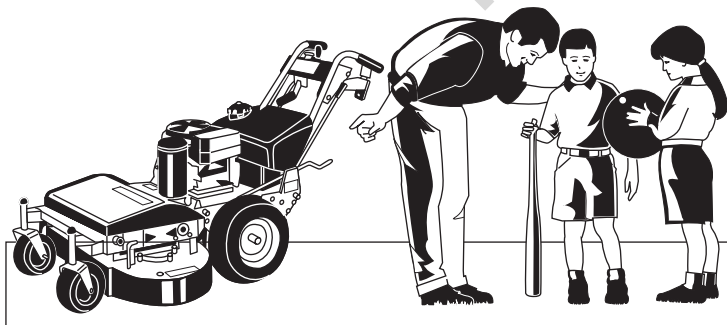
Safe operating techniques, an explanation of the product's features and controls, and maintenance information is included to help you get the most out of your equipment investment.

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



You could be seriously injured if you use this unit on too steep of a slope. Using the unit on a slope that is too steep where you do not have adequate footing and unit traction (and control) can cause you to lose control and possibly slip and fall or roll the unit over.

Always mow across slopes, not up and down (you could slip and fall.)

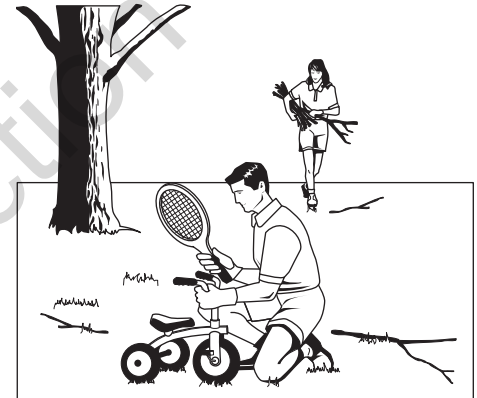
Also, note that the surface you are on can greatly impact your ability to safely operate this machine. Wet grass or soft soil can seriously affect your footing and traction of the unit. Do not operate on slopes that are slippery, wet, or have soft soil.

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.



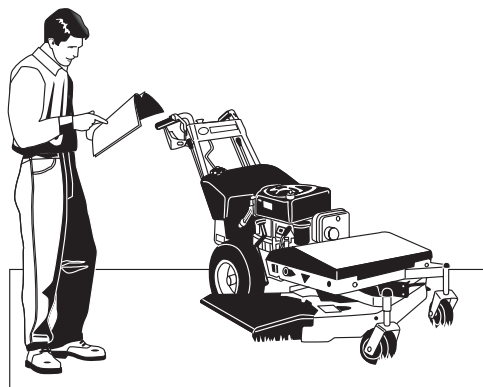
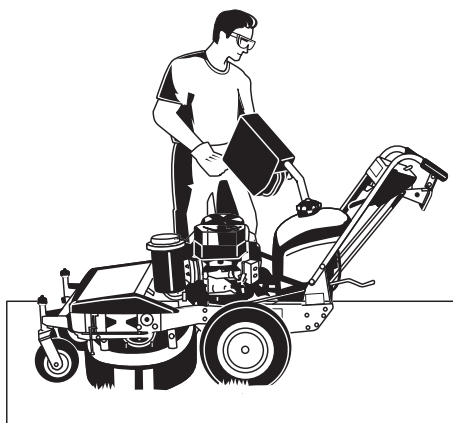
Moving Parts

This equipment has many moving parts that can injure you or someone else. However, if you stay in the operator zone (area behind the handles and controls), 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.





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 other enclosed area that is not well ventilated. Gasoline spills should be cleaned up promptly and before operation begins.

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


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

Enclosed Areas

Only operate this unit outdoors and away from unventilated areas such as inside garages or enclosed trailers. The engine emits poisonous carbon monoxide gas and prolonged exposure in an enclosed area can result in serious injury or death.





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.
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.

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.

Safety Rules & Information


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

Operating on steep slopes can cause sliding and loss of steering, control and rollover.

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.

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.
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 mow excessively steep slopes.
6. Do not use grass catcher on steep slopes.

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 allow children to operate the unit.
5. 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.

Operator Safety

Safety Decals

Before operating your unit, read the safety decals. The cautions and warnings are for your safety. To avoid a personal injury or damage to the unit, understand and follow all safety decals.

⚠ WARNING

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

⚠ WARNING

Avoid serious injury or death

- Read operator's manual before using this product.
- Go across slopes, NOT up and down.
- Lock down and behind before and while backing.
- Stop the mower when children or others are near.
- Remove objects that could be thrown by the blades.

- Keep safety devices (guards, shields, switches, etc.) in place and working.
- Do NOT operate this machine unless you are trained.
- Know the location and function of all controls.
- Avoid steep slopes. Reduce speed and use extreme caution on slopes.

1

⚠ WARNING

Fire Hazard

Gasoline is flammable. Debris is combustible.

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

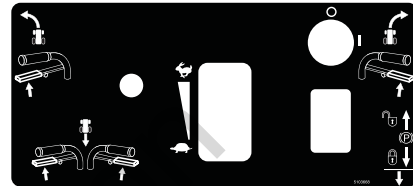
2

⚠ DANGER

Amputation and thrown objects hazard

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

3



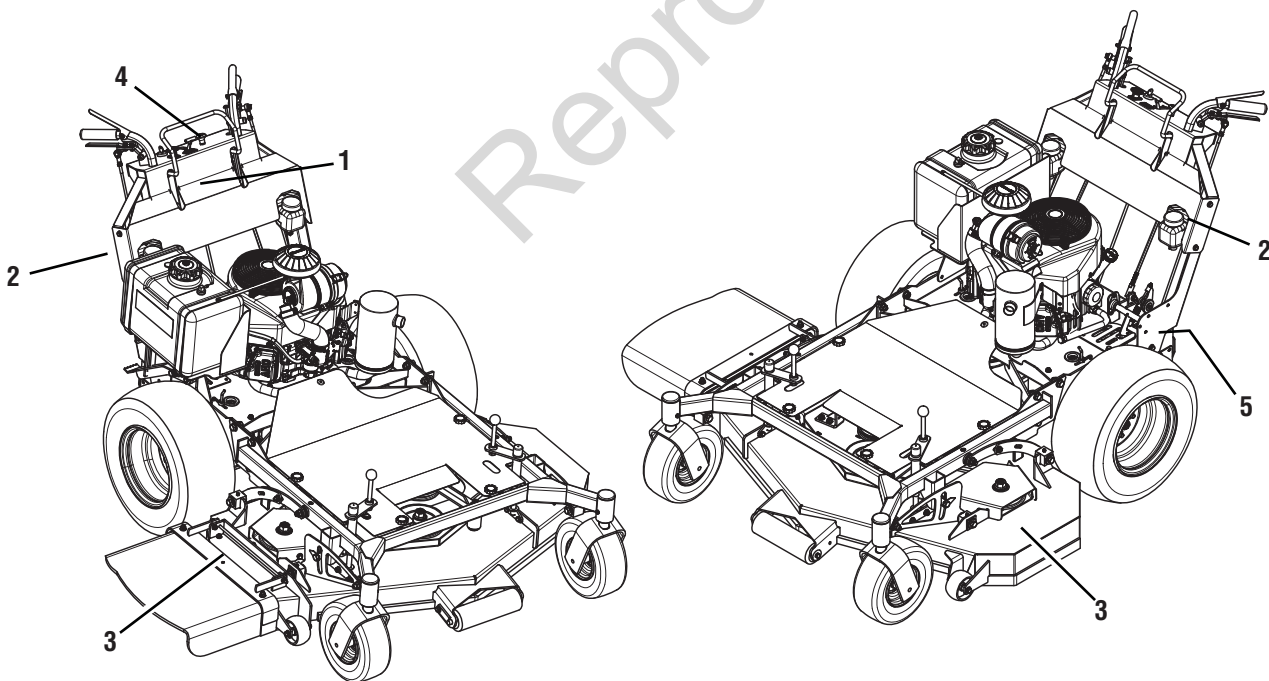
4

⚠ WARNING

Amputation and Pinch Point Hazard

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

5





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
- Forward speed control lever is not in the NEUTRAL position.

Test 2 — Engine SHOULD crank if:

- PTO switch is NOT engaged, AND
- Parking brake is engaged, AND
- Forward speed control lever is in the NEUTRAL position.

Test 3 — Engine should SHUT OFF if:

- Operator releases the operator presence handles with the PTO engaged OR
- Operator releases the operator presence handles with the parking brake disengaged.

Test 4 — Blade Brake Check:


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

NOTE: Once the engine has stopped, PTO switch must be turned off, parking brake must be engaged, the forward speed control lever must be locked in the NEUTRAL position, and the operator must engage the operator presence handles 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 serious injury or death.**

CAUTION

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

NOTICE

This message presented without the alert symbol indicates a situation where the unit or property could be damaged.

North American Safety Icons



Alert



Toxic Fumes



Read the Manual



Open Flame Hazard



Fire Hazard



Amputation - Rotating Parts



Amputation - Hand In Blade



Amputation - Foot In Blade



Thrown Objects



Hot Surface



Wear Protective Gear



Pinch Point



Kickback



Remove Key Before Servicing

Features and Controls

Features and Controls

Identification Numbers



North American Models

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

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

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

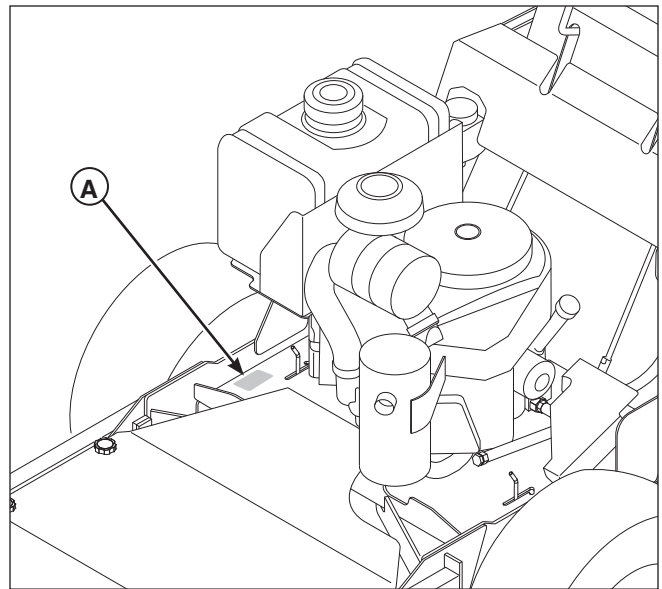


Figure 1. Identification Numbers
A. Identification Tag

Control Locations & Functions

S/N: 2014523388 & Above

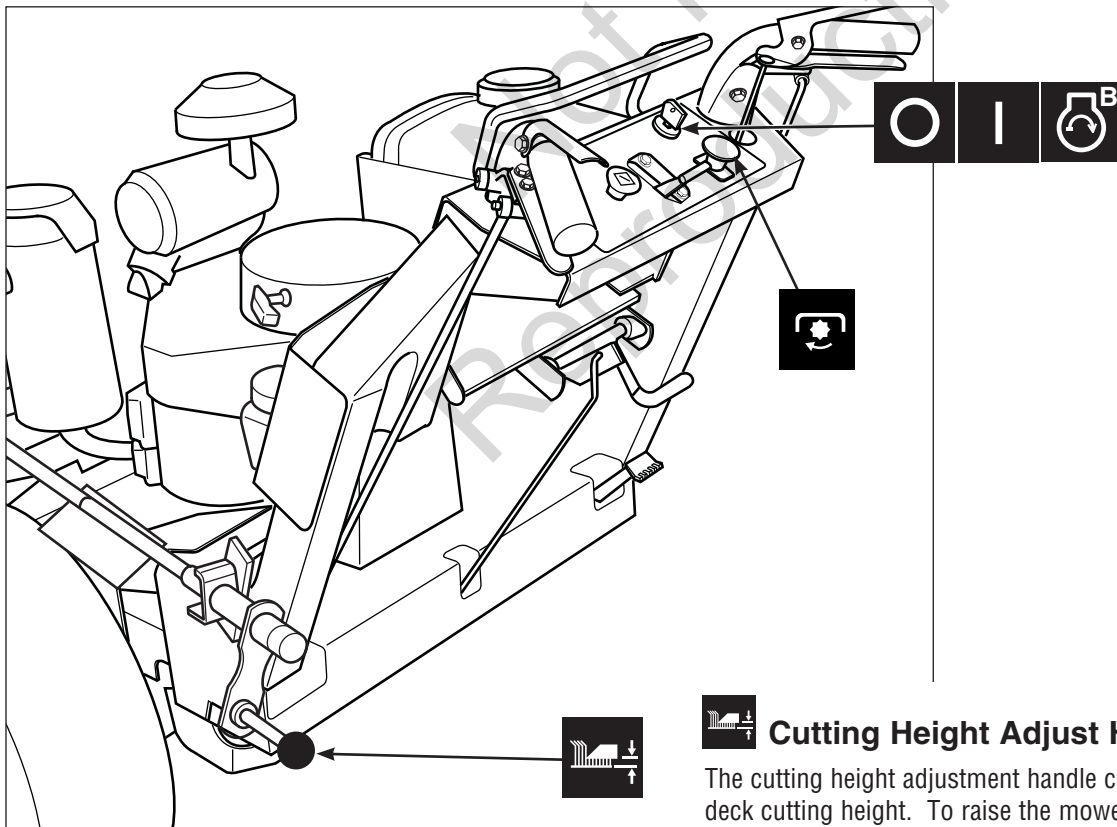


Figure 2. Control Locations (S/N: 2014523388 & Above)

Cutting Height Adjust Handle

The cutting height adjustment handle control the mower deck cutting height. To raise the mower deck cutting height crank the cutting height adjustment handles clockwise. To lower the mower deck cutting height, crank the cutting height adjustment handles counter-clockwise.

S/N: 2014523387 & Below

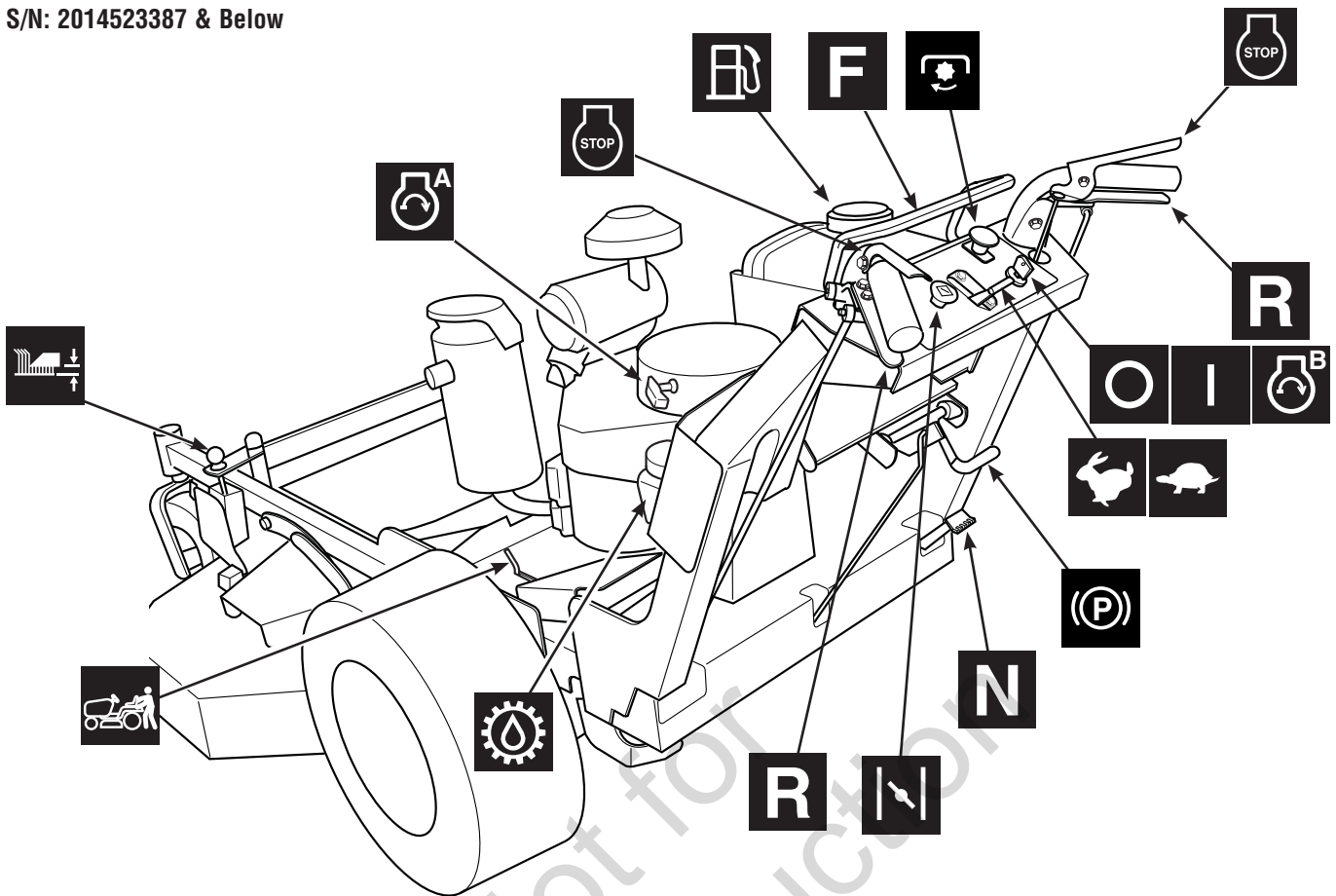


Figure 2A. Control Locations (S/N: 2014523387 & Below)

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.

F Forward Speed Control Lever

R Reverse Speed Control Levers

These levers control the ground speed of the mower.

The forward speed control lever controls the forward ground speed of both drive wheels.

The left reverse speed control lever controls the steering and reverse ground speed of the left drive wheel. The right reverse speed control lever controls the steering and reverse ground speed of the right drive wheel.

See the Operation section for proper steering instructions.

O I Ignition Switch (Manual Start Models)

The ignition switch starts and stops the engine, it has two positions:

- O** OFF Stops the engine
- I** RUN Rotate the ignition switch to the RUN position before pulling on the starter rope to start the engine.

A Recoil Starter Handle (Manual Start Models)

The recoil starter handle is used to start the engine.

Features and Controls



Ignition Switch (Electric Start Models)

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



OFF Stops the engine and shuts off the electrical system.



RUN Allows the engine to run and powers the electrical system.



START Cranks the engine for starting.

NOTE: Never leave the ignition switch in the run position with the engine stopped-this drains the battery.



Parking Brake

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

Pull the parking brake handle up to engage the parking brake. Push the parking brake handle down 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.



Neutral Return Pedal

The neutral return pedal provides a hands-free return to neutral. The pedal is used in conjunction with the Reverse Speed Control Levers to properly stop the machine.

See the Operation section for Driving Instructions.



Throttle Control

The throttle controls the engine speed. Move the throttle control forward towards the FAST position to increase the engine speed and back towards the SLOW position to decrease the engine speed. Always operate at FULL throttle.



FAST Speeds up the engine speed.



SLOW Slows down the engine speed.



Cutting Height Adjustment Handles

The cutting height adjustment handles control the mower deck cutting height. To raise the mower deck cutting height crank the cutting height adjustment handles clockwise. To lower the mower deck cutting height, crank the cutting height adjustment handles counter-clockwise. To ensure an even cut, both cutting height adjustment handles must be adjusted to the same height.



Fuel Tank Cap

To remove the cap, turn counterclockwise.



Engine Kill / Operator Presence Handles

These handles are a major factor in the safety interlock system of the mower. Both handles are tied together so depressing one handle depresses both. The operator must depress the handles in order to deactivate the engine kill system. Handles must be depressed to disengage the parking brake and engage the PTO switch.



Transmission Release Valves

The transmission release levers deactivate the transaxle so that the unit can be pushed by hand. See PUSHING THE UNIT BY HAND for operational information.



Transmission Oil Fill

Transmission oil is added through the transmission oil reservoirs. It also serves as extra holding capacity for oil as the transmissions heat up and the oil expands. See CHECK TRANSMISSION OIL for oil level check and fill procedures.



Choke Control

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

Operation

General Operating Safety

Before first time operation:

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

Checks Before Starting

- Check that crankcase is filled to full mark on the engine oil dipstick (B, Figure 3). See the engine Operator's Manual for instructions and oil recommendations.
- Fill the fuel tank (A) with fresh fuel. Refer to engine manual for fuel recommendations.
- Make sure all nuts, bolts, screws and pins are in place and tight.
- Check the tire pressures. See *Check Tire Pressures*.
- Check the hydraulic oil tank (C) and make sure that the oil level is up to the FULL COLD mark.
- Adjust the height of the mower deck to the desired position. See *Mowing Height Adjustment*.

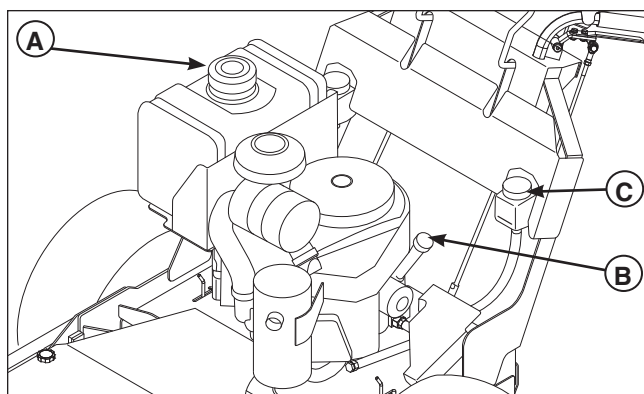


Figure 3. Pre-start Checks

- A. Fuel Tank Filler Neck
- B. Engine Oil Dipstick
- C. Hydraulic Oil Fill

⚠ WARNING

If you do not understand how a specific control functions, or have not yet thoroughly read the Features and Controls section, do so now.

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

⚠ WARNING

- 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, unit 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.

⚠ WARNING

Operating on steep slopes can be dangerous.

- Select slow ground speed before driving onto a slope.
- Mow across the face of slopes, not up and down, use caution when changing directions and DO NOT START OR STOP ON A SLOPE.

Starting the Engine (Manual Start Engines)

1. Engage the parking brake and make sure that the PTO switch is disengaged and the forward speed control lever is in the NEUTRAL position.
2. **NOTE: A warm engine may not require choking.** Set the engine throttle control to FULL 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 RUN.
4. Grasp the recoil starter handle and pull slowly until resistance is felt and then pull rapidly. (You may have to pull several times before the engine starts. If the engine fails to start within a reasonable number of attempts, discontinue and check engine manual for further instructions.)
5. After the engine starts, gradually open the choke (push knob down fully). Reduce to half throttle speed and allow to warm up.

Warm up the engine by running it for at least a minute before engaging the PTO switch or driving the unit.

6. **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 MOWER.

Starting the Engine (Electric Start Engines)

1. Engage the parking brake and make sure that the PTO switch is disengaged and the forward speed control lever is in the NEUTRAL position.
2. **NOTE: A warm engine may not require choking.**
Set the engine throttle control to FULL 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 to warm up.

Warm up the engine by running it for at least a minute before engaging the PTO switch or driving the unit.

5. **After warming the engine, ALWAYS operate the unit at FULL THROTTLE when mowing.**

In the event of an emergency the engine can be stopped by simply turning the ignition switch to STOP.

Use this method only in emergency situations. For normal engine shut down follow the procedure given in STOPPING THE MOWER.

Stopping the Mower

1. Gently squeeze both reverse speed control levers evenly to stop the unit.
2. Once the unit is stopped, firmly depress the neutral return pedal to place the transmission in neutral.
3. Disengage the PTO by pushing down on the PTO switch.
4. Engage the parking brake by pulling the handle up until it locks into position.
5. Move the throttle control to mid-throttle position and turn the ignition key to OFF. Remove the key.

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	
Front	N/A (Flat Free Tire)	
Rear	15 psi	1.03 bar

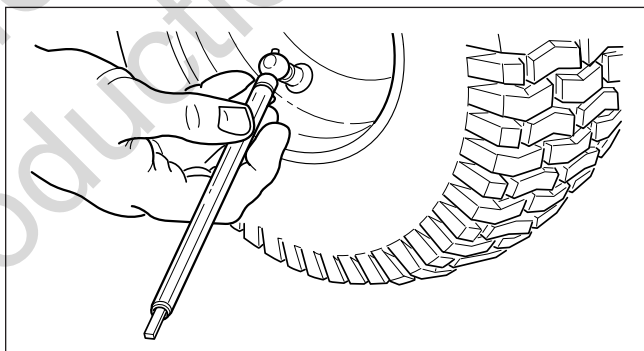


Figure 4. Checking Tire Pressure

Cutting Height Adjustment

S/N: 2014523388 & Above

The cutting height indicator (B, Figure 5) will help you identify the cutting height.

To Raise the Mower Deck:

Turn the cutting height adjustment handle (A, Figure 5) clockwise.

To Lower the Mower Deck:

Turn the cutting height adjustment handle counter-clockwise.

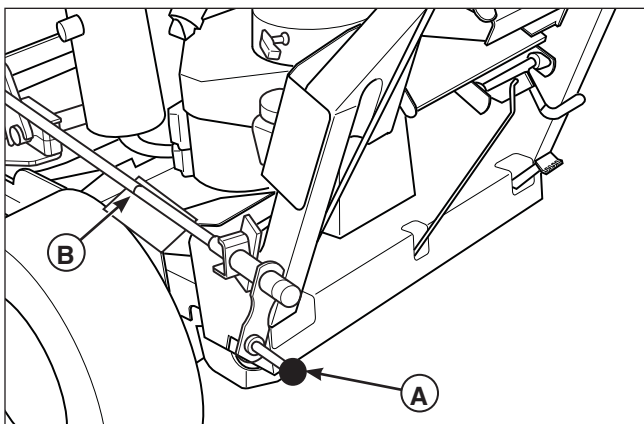


Figure 5. Cutting Height Adjustment
A. Cutter Height Adjustment Handle
B. Cutting Height Indicator

S/N: 2014523387 & Below

The cutting height indicators will help you identify the cutting height.

1. Pull the cutting height adjustment handle (A, Figure 6) up and out of the handle lock position (B) and crank the handle **CLOCKWISE** to raise the deck to the desired cutting height. Crank the handle **COUNTER-CLOCKWISE** to lower the deck to the desired cutting height. After the desired cutting heights are achieved position the cutting height adjustment handles into the handle lock position.
2. Repeat the process for the other side of the machine.

NOTE: Both sides of the cutter deck must be adjusted to the same height to insure a proper cut.

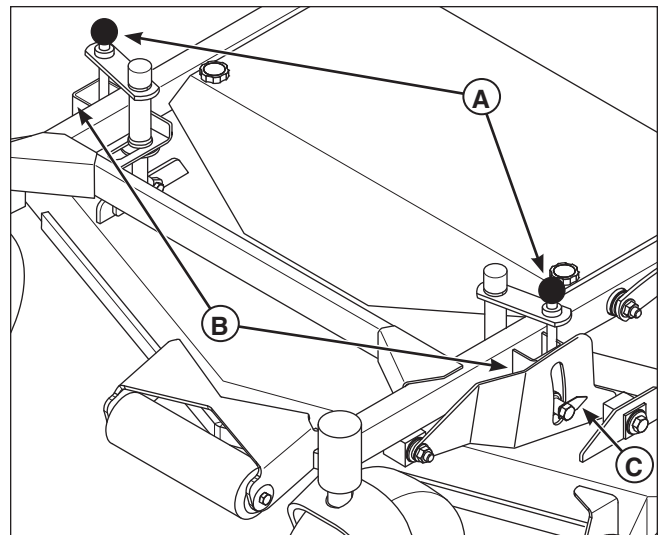


Figure 6. Cutting Height Adjustment
 A. Cutter Height Adjustment Handle
 B. Handle Lock Position
 C. Cutting Height Indicator

Pushing the Mower By Hand

1. Disengage the PTO, engage the parking brake, turn the ignition OFF, and remove the key.

NOTICE

Towing the units will cause hydraulic pump and wheel motor damage. Do NOT use another vehicle to push or pull this unit.

2. Locate the transmission release levers (A, Figure 7) by the rear wheels of the unit.
3. To disengage the pumps (free-wheel position), pull both transmission release levers back and out so they lock in the disengaged (free-wheel) position.
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 pulling the transmission release levers rearward and inward to release them from the disengaged position and then allow them to move to the engaged (drive) position.

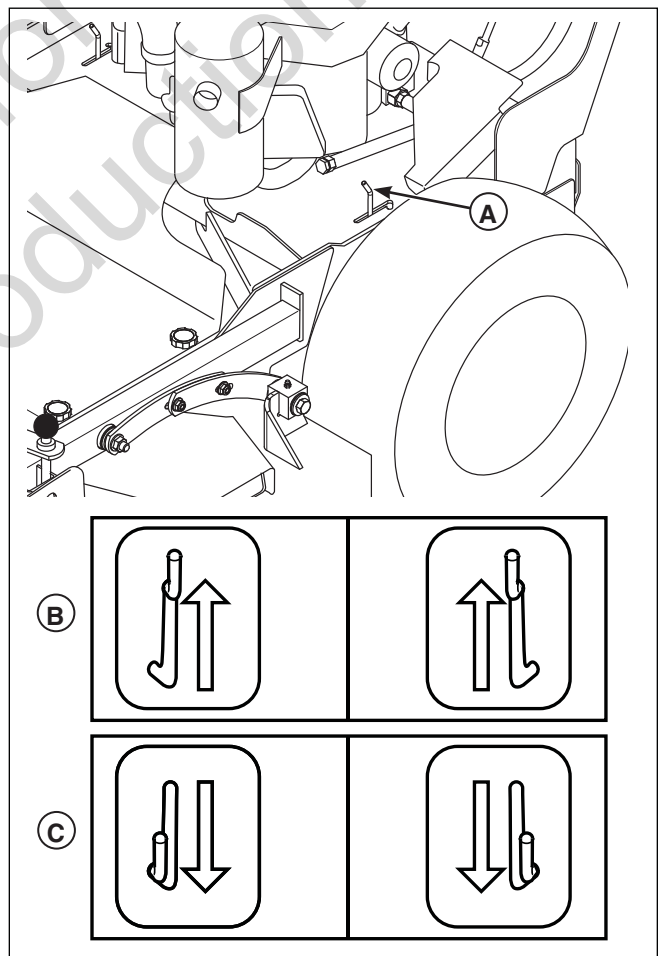


Figure 7. Transmission Release Levers (LH Shown)
 A. Transmission Release Levers
 B. Engaged Position (Drive Position)
 C. Disengaged Position (Free-Wheel Position)

Driving The Mower

Before attempting to drive the mower make sure you have read the Features and Controls section and understand the location and function of the controls.

The hydrostatic transmission has an infinite number of speeds between full speed forward and reverse, with the faster speeds being achieved by moving the forward speed control lever and reverse speed control levers farthest in the direction of travel.

For normal use, the throttle should be kept fully open and the ground speed of the machine determined by the forward speed control lever. When transporting the machine or when loading or unloading from a truck or trailer, partial throttle should be used to slow the reaction time of the controls and reduce noise.

Practice maneuvering the machine at a slow engine speed on level ground with the PTO switch in the "OFF" position until you are familiar with the controls.

To Move Forward and Set Forward Speed

1. Disengage the parking brake.
2. Gently move the forward speed control lever (A, Figure 8) forward until desired speed is achieved.

To Move Backward

1. Disengage the parking brake.
2. Gently squeeze both reverse speed control levers (B) evenly, until desired speed is achieved.

To Slow or Stop Machine

1. Gently squeeze both reverse speed control levers evenly to slow the machine.
2. Continuing to squeeze the reverse speed control levers will stop the machine.
3. Once the machine is stopped, firmly depress the neutral return pedal to place the transmissions in neutral.
4. Engage the parking brake.

NOTE: Continuing to squeeze the reverse speed control levers after the machine is stopped, will cause the machine to move in reverse.

Turning the Machine

Note: Always reduce speed in a turn.

Turning Left:

Gently squeeze the left hand reverse speed control lever (C). A sharp or gentle turn is determined by the amount of force applied to the steering control lever.

Turning Right:

Gently squeeze the right hand reverse speed control lever (D). A sharp or gentle turn is determined by the amount of force applied to the steering control lever.

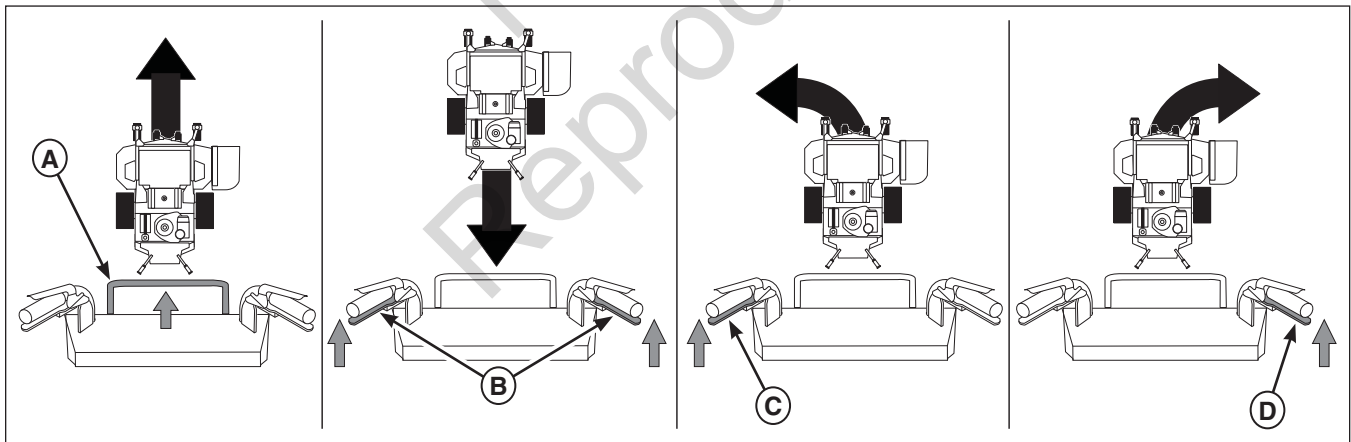


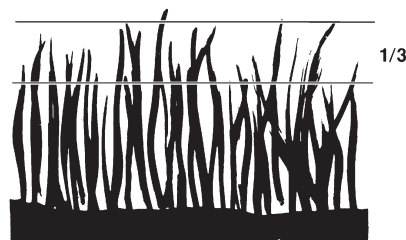
Figure 8. Driving the Mower

- A. Forward Speed Control Lever
- B. Reverse Speed Control Levers
- C. Left Hand Speed Control Lever
- D. Right Hand Speed Control Lever

Mowing

Before mowing, set the cutting height as described in CUTTING HEIGHT ADJUSTMENT.

1. Engage the parking brake. Make sure the PTO switch is disengaged and the forward speed control lever is in the NEUTRAL position
2. Start the engine (see *Starting The Engine*).
3. Set the throttle to FULL.
4. Engage the PTO by pulling up on the PTO switch.
5. Begin mowing. See *Mowing Recommendations* for tips on mowing patterns, lawn care, and trouble shooting information.
6. When finished, shut off the PTO by pushing the PTO switch down completely.
7. Stop the engine (see *Stopping The 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.

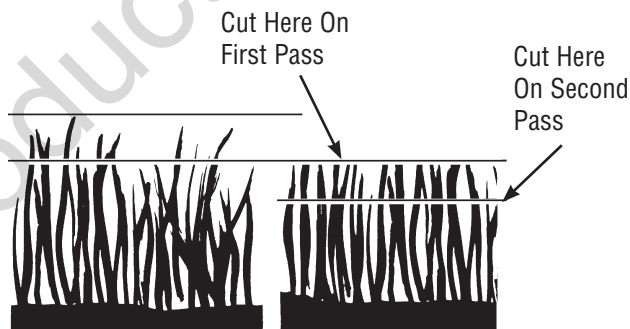
Cutting off too much at one time shocks the plant's growth system and weakens the grass plants. **A good rule of thumb is the 1/3 rule: to cut no more than one third of the grass height, and never more than 1 inch at a time.**

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).

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.



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

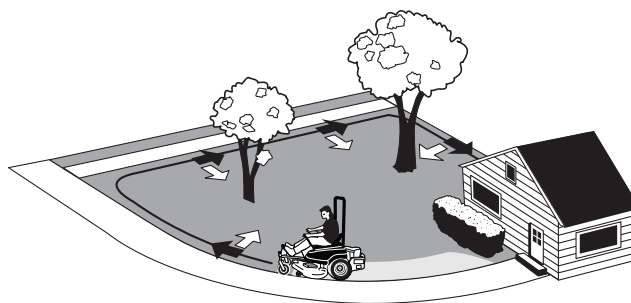
Always start mowing on a smooth, level area.

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.

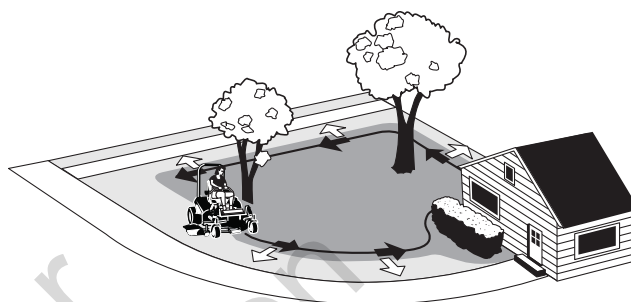
1. Cut long straight strips overlapping slightly.
2. Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.
3. For a truly professional cut, mow across the lawn in one direction, then recut the lawn by mowing perpendicular to the previous cut.

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 than 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 too high to cut. Even more than normal mowing, mulching requires that the grass be dry and the appropriate amount is cut.

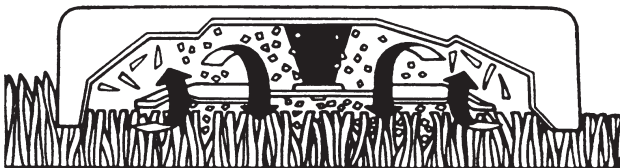
Do not use the mower as a mulching mower during the first two or three mowings in the spring. The long grass blades, quick growth, and often wetter conditions are more suitable for broadcasting (side-discharging) or grass bagging operation.

Engine Speed & Ground Speed for Mulching

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

How Much Grass to Mulch

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



Regular Maintenance

Maintenance Schedule

The following schedule should be followed for normal care of your mower and mower deck. 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 200 Hours	Spring & Fall
Check Safety Interlock System	•					•
Check Mower Brakes	•					•
Check Mower Blade Stopping Time				•		•
Mower Maintenance	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Every 200 Hours	Spring & Fall
Check Unit for Loose Hardware	•	•				
Clean Deck & Check / Replace Mower Blades**			•			
Lubricate Mower & Mower Deck **			•			
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 200 Hours	Spring & Fall
Check Engine Oil Level	•					
Clean Visible Debris From Engine Compartment	•					
Service Air Filter *			•			
Change Oil & Filter *				•		
Check / Replace Spark Plugs *				•		
Check / Replace Fuel Filter *				•		
Inspect / 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.

Checking / Adding Fuel

To add fuel:

1. Remove the fuel cap (E, Figure 9).
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. Place a container below the fuel filter (F) to catch spilled fuel.
2. Using pliers, open and slide hose clamps from fuel filter.
3. Remove hoses from filter.
4. Install new filter in proper flow direction in fuel line.
5. Secure with hose clamps.
6. Reconnect the negative battery cable when finished.

Change Oil & Filter

1. Warm engine by running for a few minutes. (Refer to the engine operator's manual for oil and filter replacement instructions.)
2. Route the oil drain hose (A) over the rear end of the engine deck.
3. Place a small pan under the oil drain hose to catch the oil. Using the appropriate tools, remove the cap (B), from the oil drain hose and drain the engine oil into the pan.
4. After draining, replace the cap and wipe up any spilled oil. Reposition the oil drain hose so that it is facing towards the back of the machine.
5. Place an absorbent shop cloth under the engine oil filter (C). Remove the engine oil filter and replace with a new one.
6. Remove the oil dipstick (D) and refill with oil. (Refer to the engine operator's manual for oil recommendations.)
7. Remove the shop cloth and wipe up any spilled oil.

Engine Maintenance

Refer to engine owner's manual for all engine maintenance procedures and recommendations.

Inspect Muffler and Spark Arrester

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

⚠ WARNING



Fuel and its vapors are extremely flammable and explosive.



Fire or explosion can cause severe burns or death.

- 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.

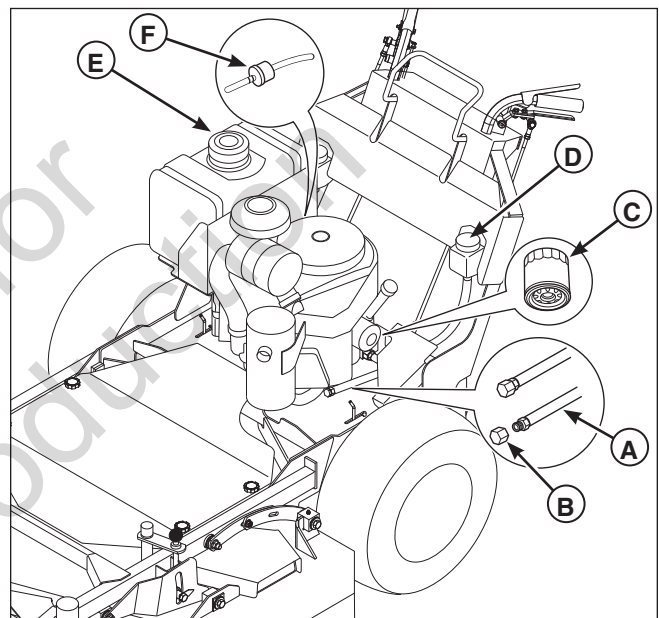


Figure 9. Engine Oil Drain

- A. Oil Drain Hose
- B. Cap
- C. Oil Filter
- D. Oil Dipstick
- E. Fuel Tank Cap
- F. Fuel Filter

NOTICE

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.

Regular Maintenance

Lubrication

Lubricate the unit at the locations shown in Figures 10 & 11 as well as the following lubrication points.

Grease:



- front caster wheel axles & yokes
- deck lift pivot blocks & linkages
- mower deck spindles
- mower deck idler arm

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 lift pivots
- discharge chute hinge
- neutral return pedal pivots

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 11) screwed into the front 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 process for the other side of the machine.

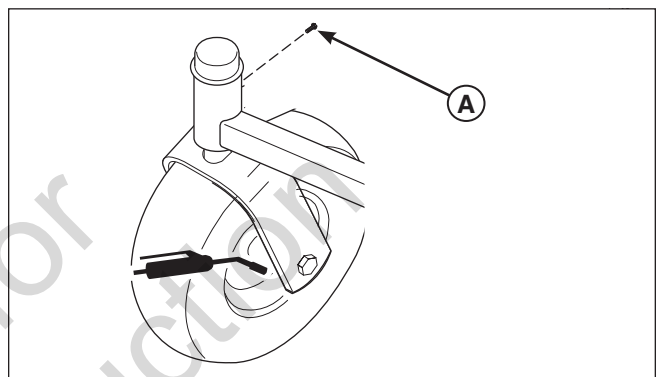
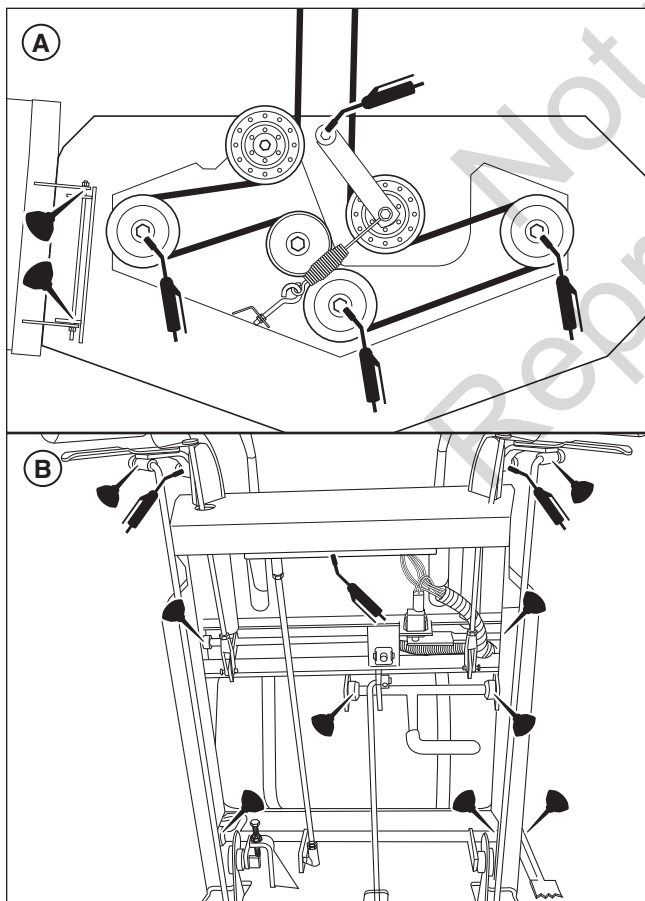


Figure 11. Front Caster & Wheel
A. 1/4-28 Bolt

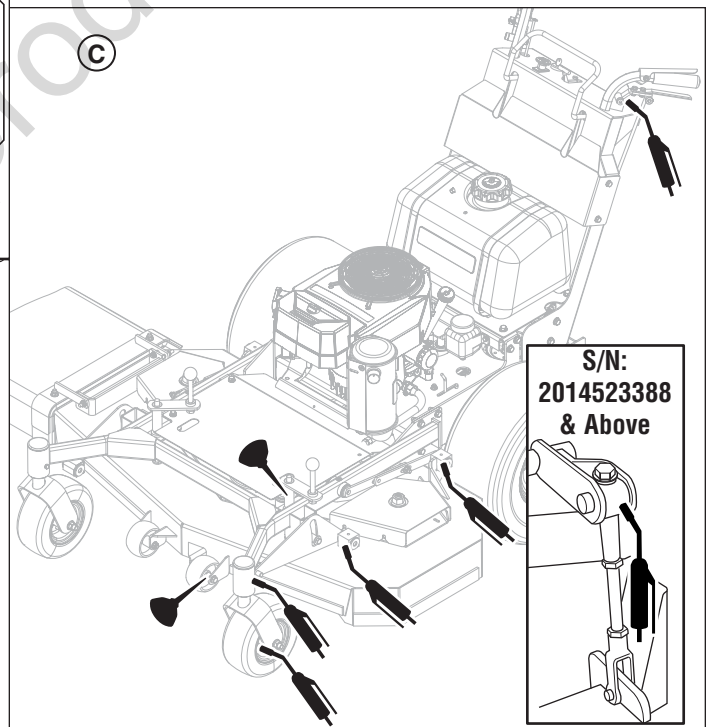


Figure 10. Lubrication Points
A. Mower Deck Lubrication Points B. Handle Bar Lubrication Points
C. General Lubrication Points (Left Side Shown, Right Side points identical.)

Check / Fill Transmission Oil

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

1. Check the oil level when the unit is cold. Locate the transmission oil reservoirs (A, Figure 12) located on the handle bar assembly. The oil should be up to the "FULL COLD" mark (B). If the oil is below this level, proceed to step 2.
2. Before removing the reservoir caps, make sure the area around the reservoir cap and fill neck of the reservoir is free of dust, dirt, or other debris. Remove the reservoir cap.
3. Add oil up to the "FULL COLD" mark (B).
4. Reinstall the reservoir caps.

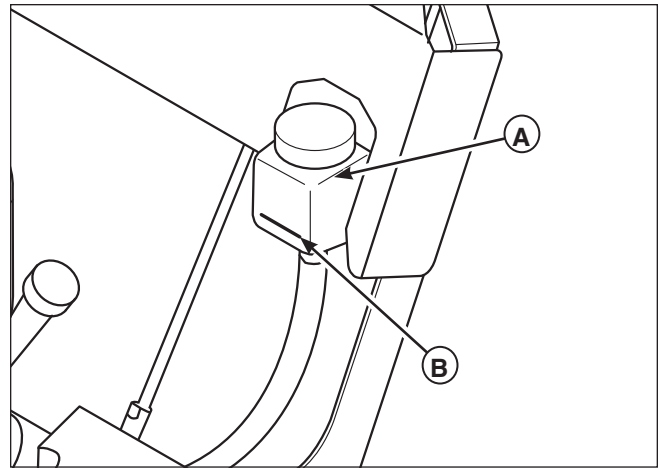


Figure 12. Transmission Oil Reservoir (LH Shown)
 A. Transmission Oil Reservoir
 B. "FULL COLD" Mark

Transmission Oil Filter Change

Change Interval: Every 200 Hours

Replacement Filter Number: 5101026X1

1. Locate the transmission oil filters (A, Figure 13) underneath the rear of the machine on the transmissions.
2. Remove the three 1/4" filter guard screws (C) and the filter guard (B).
3. Clean the area around the filter base and remove the filter.
4. Apply a film of new oil to the gasket of the new replacement filter. After the oil has drained, thread the new filter onto the filter base until the gasket makes contact, then tighten 3/4 of a turn more.
5. Reinstall the filter guard with the three 1/4" filter guard screws
6. Using a hex bit swivel socket or a modified allen wrench remove the top port plug from the transmissions.
7. Remove the transmission reservoir cap and fill with oil until oil appears at the bottom of the transmission's top port (approximately 2 qts (1,89L).
8. Reinstall the top port plug and tighten to 15 ft lbs (20,38 Nm).
9. Continue to add oil to the transmission oil reservoirs until the oil level reaches the "FULL COLD" mark. Reinstall the oil reservoir cap.
10. Repeat this process for the other side of the machine.
11. Run the unit for several minutes and check the transmission oil level.

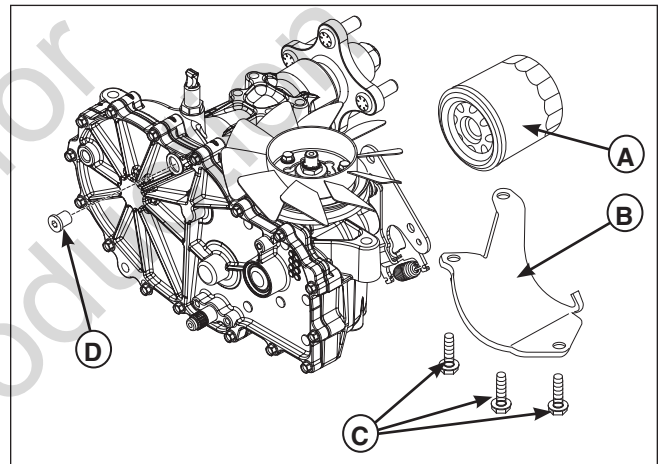



Figure 13. Transmission (Left Side Shown.)
 A. Transmission Oil Filter
 B. Filter Guard
 C. 1/4" Filter Guard Screws
 D. Top Port Plug

IMPORTANT NOTE: Use caution after changing the filter; air in the hydraulic system may affect the responsiveness of the ground speed control levers. Repeat step 11 until the air is out of the system.

Regular Maintenance

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, use a 1" wrench on the flats of the spindle shaft and remove the mower blade mounting bolt with a 15/16" wrench (Figure 14).
2. If there are no flats on the spindle shaft, wedge a wooden block between the mower blade and the mower deck housing to keep the mower blade from turning.

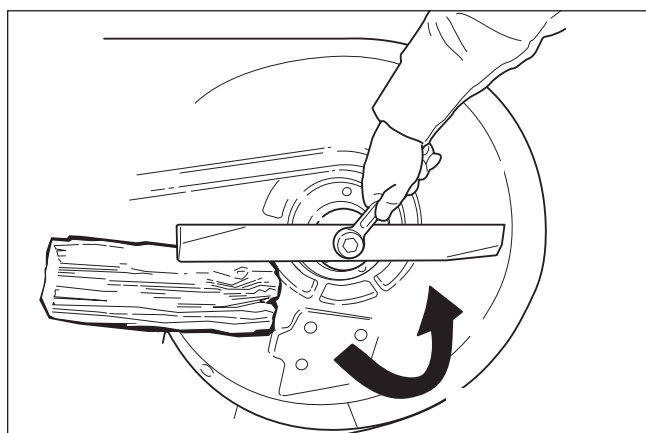



Figure 14. Loosening the Mower Blade for Removal

Inspecting the Mower Blades

1. Remove the mower blade from the unit. See *Removing the 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.
<ul style="list-style-type: none"> • 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 blades. • Never weld or straighten bent mower blades. 	

2. Inspect the mower blade (Figures 15 & 16). **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 15).
 - B.) The air lifts are excessively eroded (B & C, Figure 16) 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*.

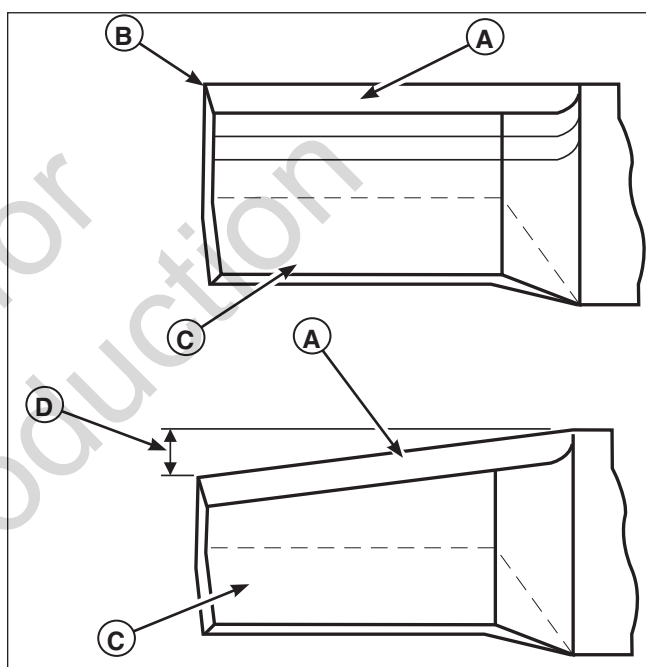


Figure 15. inspecting the Mower Blade Tips

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

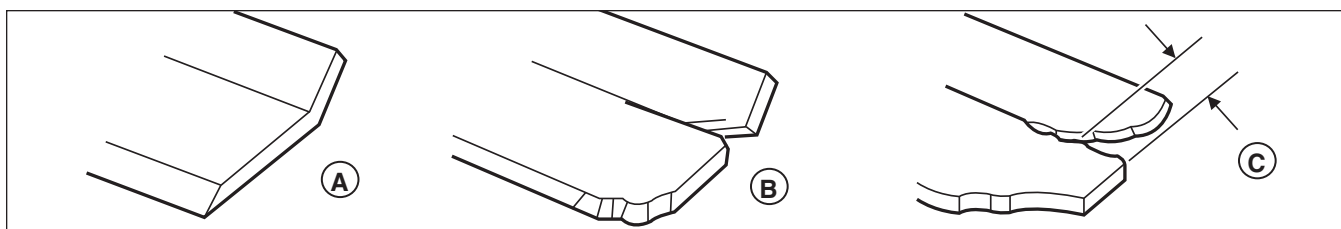



Figure 16. inspecting the Mower Blade Air Lifts

- 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.**)

Sharpening the Mower Blade

⚠ CAUTION	
	Avoid injury! Mower blades are sharp.
<ul style="list-style-type: none"> • Always wear gloves when handling mower blades or working near blades. • Always wear safety eye protection when grinding. 	

1. Sharpen the mower blades with grinder, hand file, or electric blade sharpener.
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 17) 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 blades before installing.

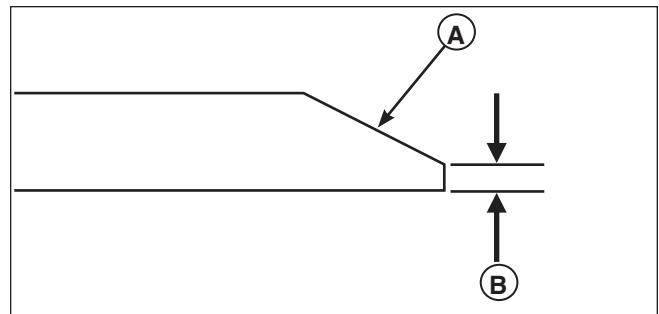



Figure 17. Sharpening the Mower Blade
A. Mower Blade Bevel
B. Mower Blade Cutting Edge

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 18. Put the mower blade on a nail in a vise and turn the mower 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.

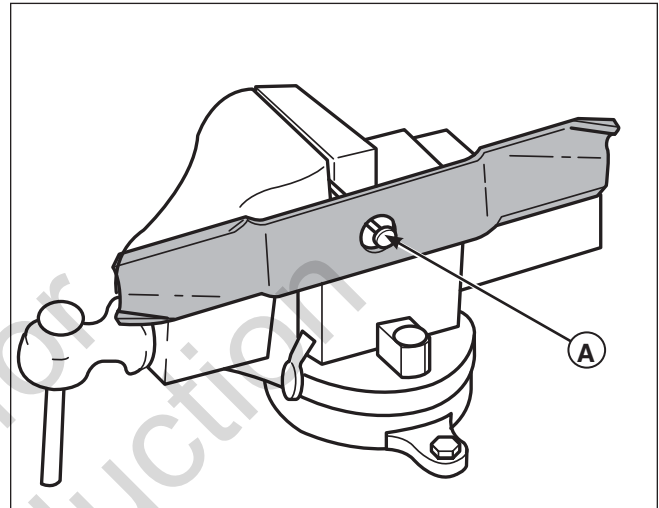


Figure 18. Balancing the Mower Blade
A. Nail

Reinstalling the Mower Blades

1. Reinstall each mower blade with the air lifts pointing up towards the mower deck as shown in Figure 19. Secure with the mower blade mounting bolt and flat washer (A & B, Figure 19) and torque to 70 ft. lbs (94 Nm).
2. If there are no flats on the spindle shaft, wedge a wooden block between the mower blade and the mower deck housing to keep the mower blade from turning.

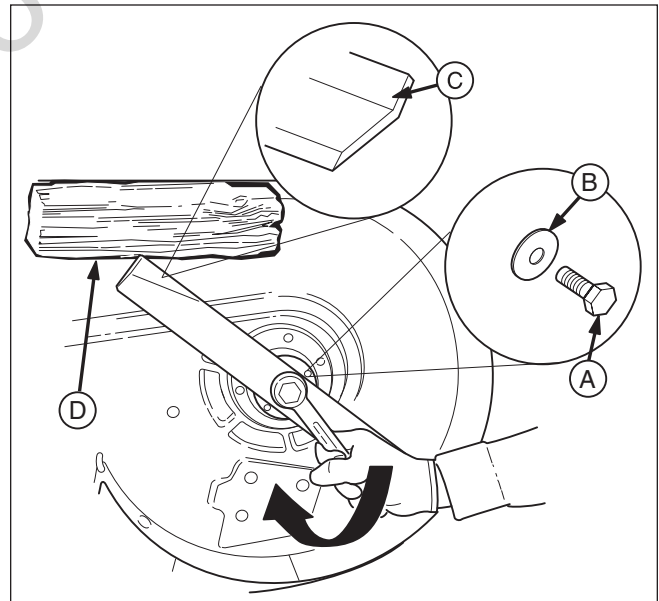


Figure 19. Tightening the Mower Blade for Installation
A. Mower Blade Mounting Bolt
B. Flat Washer
C. Mower Blade Air Lift (Points Up For Installation)
D. 4 X 4 Wooden Block

Neutral Adjustment

If the unit “creeps” while the forward speed control lever is locked in the NEUTRAL position, then it may be necessary to adjust the adjustment linkage rods

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

1. Disengage the PTO, engage the parking brake and turn off the engine.
2. There are two jam nuts (B, Figure 20) on each linkage rod (C). Loosen the jam nuts on both linkage rods and turn the linkage rods evenly to adjust. If the machine creeps forward, turn the rods COUNTER-CLOCKWISE (while standing at the rear of the machine, looking down), if the machine creeps backward, turn the rods CLOCKWISE.
3. Lock the jam nuts (B) against the ball studs (A) when neutral is achieved.

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

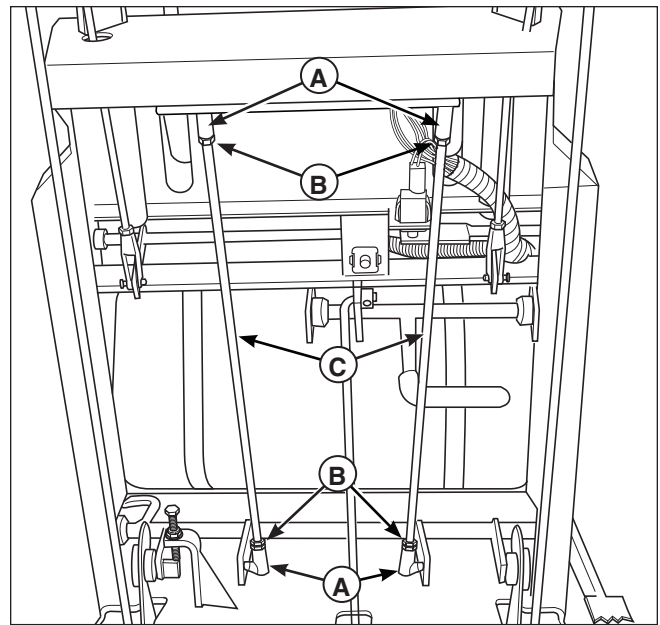


Figure 20. Neutral Adjustment
A. Ball Stud
B. Nuts
C. Adjustment Linkage Rod

Speed Balancing Adjustment

(S/N: 2014523387 & Below)

If the unit veers to the right or left when you are driving the machine, the top speed of each wheel can be balanced by turning the linkage adjuster rod (C, Figure 21). Only adjust the speed of the wheel that is traveling faster.

To Reduce the Speed of the Faster Wheel:

1. Loosen the jam nut (B).
2. Turn the linkage adjuster rod COUNTER-CLOCKWISE to reduce the speed.
3. Retighten the jam nut when adjustment is complete.

WARNING

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

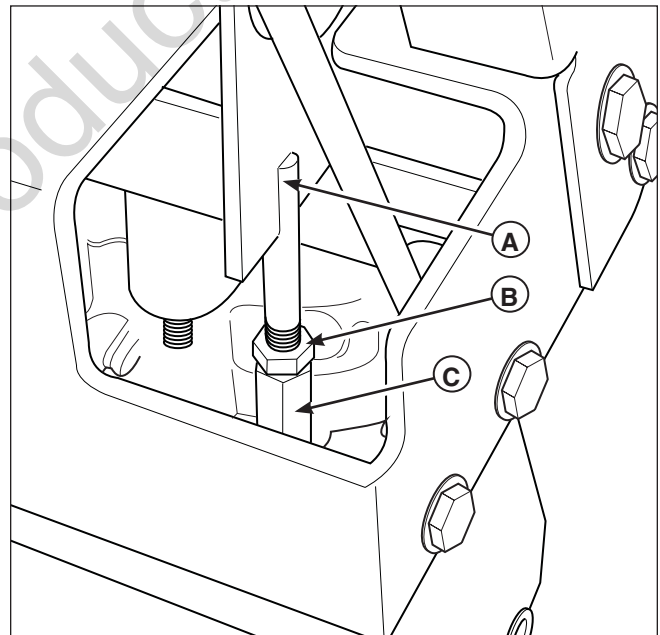


Figure 21. Adjusting the Speed of the Faster Wheel (RH side shown)
A. Control Ramp Rod
B. Jam Nut
C. Linkage Adjuster Rod

(S/N: 2014523388 & Above)

To Reduce the Speed of the Faster Wheel:

There are three (3) nuts (A, Figure 22) on the linkage rod (B). The first two are to be used together to turn the rod and the third is used to lock the rod in place.

1. Loosen the jam nut that locks against the clevis.
2. Turn the linkage rod COUNTER-CLOCKWISE to reduce the speed.
3. Retighten the jam nut when adjustment is complete.

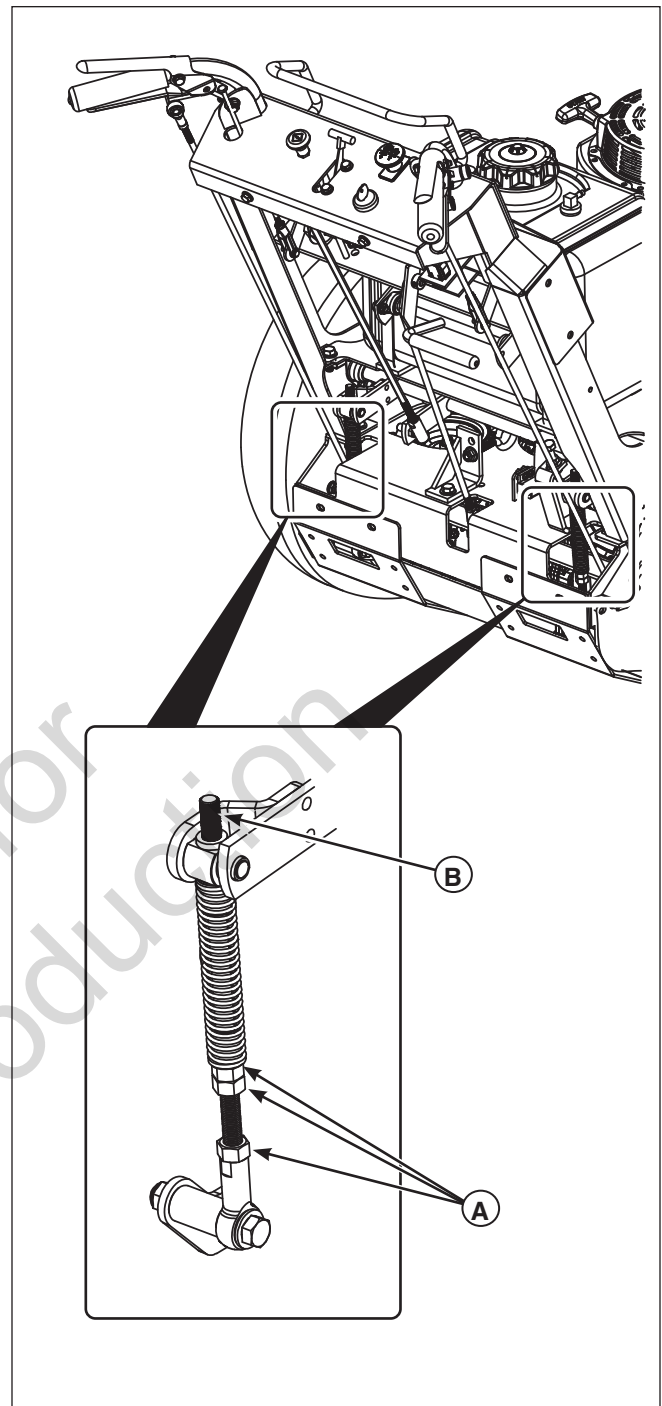


Figure 22. Adjusting the Speed of the Faster Wheel

A. Nuts

B. Adjustment Linkage Rod

Parking Brake Adjustment

1. Disengage the PTO, stop the engine, remove the ignition key, and engage the parking brake.
2. Locate the brake springs (A, Figure 23) underneath the rear of the machine.
3. With the parking brake engaged, measure the compressed spring length of the brake spring. The spring should be 2-1/2" (6,35 cm) when compressed. If not, position the lock nut until the measurement equals 2-1/2" (6,35 cm).
4. Measure the distance between the back of the brake pivot link (G) and the front edge of the set collar (F). The measurement should be 1/8" (0,32 cm). If not, position the set collar until the measurement equals 1/8" (0,32 cm).

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

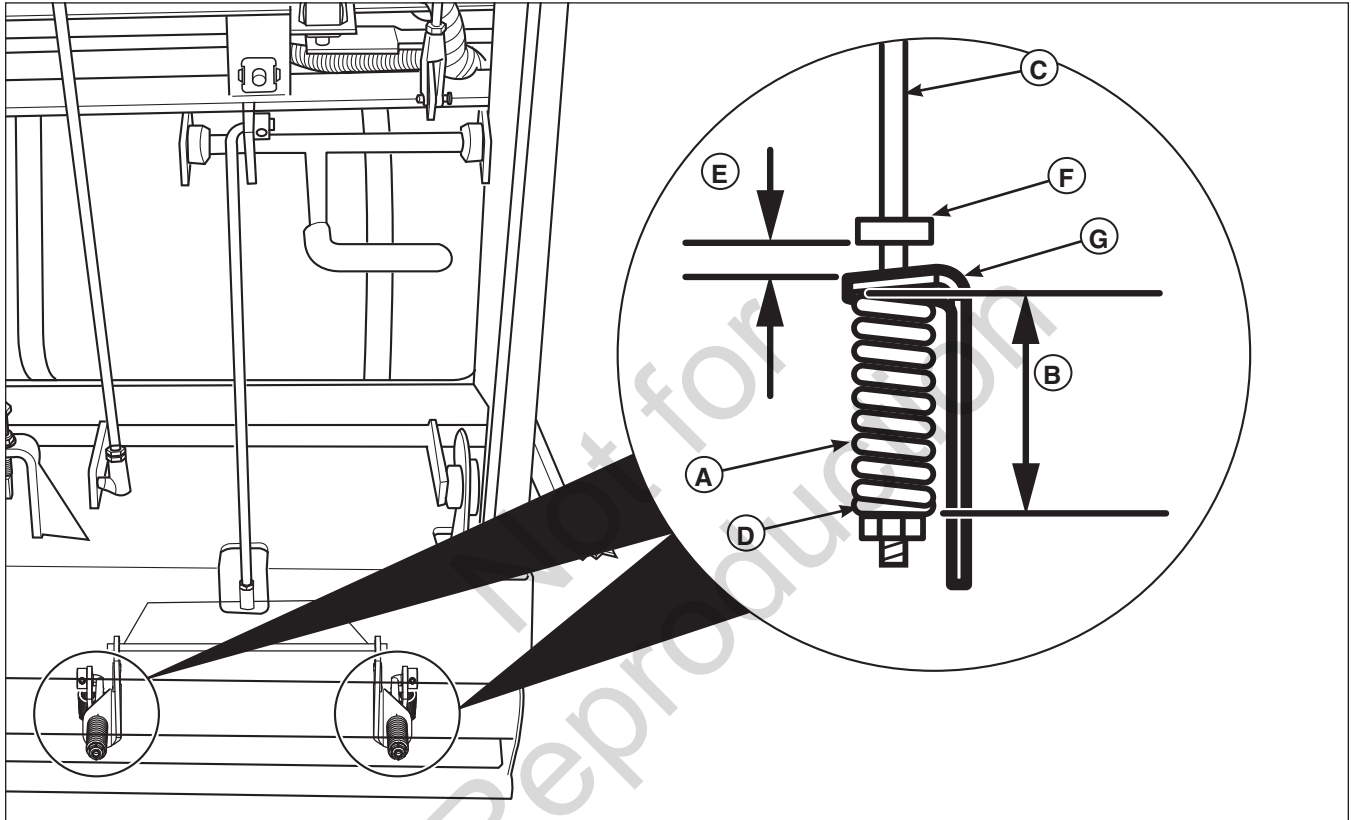


Figure 23. Parking Brake Adjustment

- A. Brake Spring
- B. First Measurement - 2-1/2" (6,35 cm)
- C. Brake Spring Rod
- D. Lock Nut
- E. Second Measurement - 1/8" (0,32 cm)
- F. Set Collar
- G. Brake Pivot Link

Deck Leveling Adjustment

S/N: 2014523388 & Above

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 15 psi (1,03 bar).
2. Remove the mower deck guard.
3. Adjust the mower deck height to the 4" (10,2 cm) position.
4. Place the 2 X 4 blocks under each corner of the mower deck with the 3-1/2" sides being vertical. See Figure 24.
5. Loosen the deck leveling hardware (A, Figure 25) on both sides of the machine.
6. Inspect the deck lift rods (A, Figure 26) to see if the hex heads (B) are contacting the pivot links (C) and that the rear of the deck is resting on the 2 X 4's.
 If the hex head is contacting the pivot link and the rear of the deck is resting on the 2 X 4's, skip to step # 8.
 If the hex head is NOT contacting the pivot link and the rear of the deck is not resting on the 2 X 4's, loosen the jam nut (D) and turn the hex head until contact is made.
7. Tighten the deck lift rod jam nuts (D, Figure 26).
8. Make sure that the front of the deck is resting on the 2 X 4's.
9. Tighten the deck leveling hardware (A, Figure 25).
10. Remove all 2 X 4 blocks from under the mower deck and reinstall the mower deck guard.

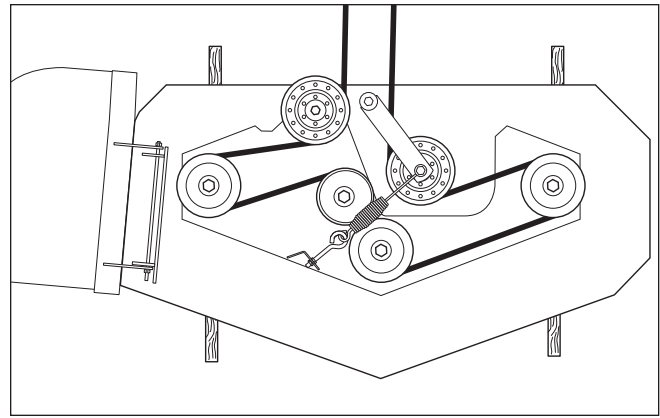


Figure 24. 2 x 4 Locations

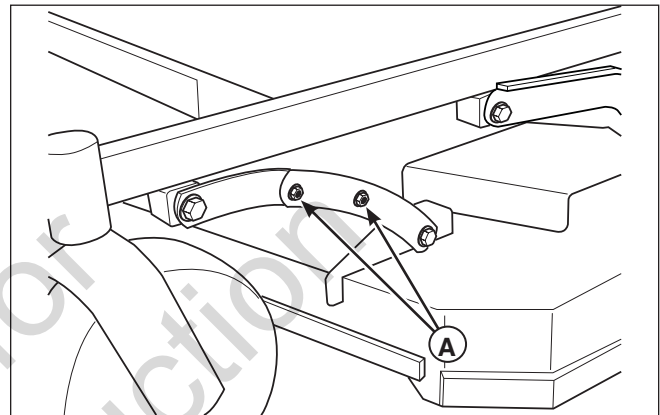


Figure 25. Deck Leveling Adjustment
A. Deck Leveling Hardware

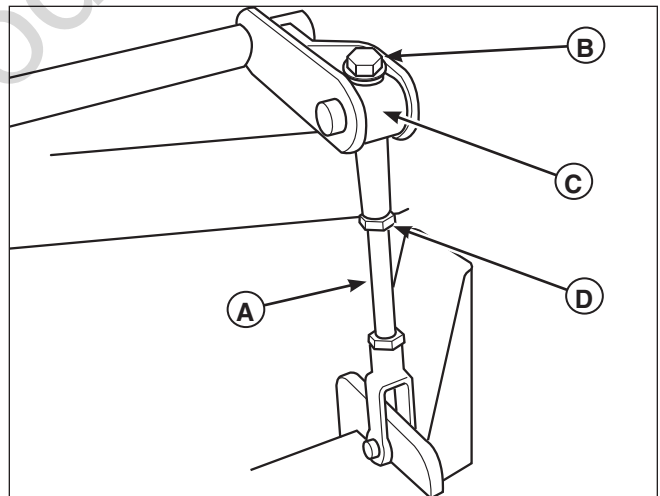


Figure 26. Deck Lift Rod Adjustment
A. Deck Lift Rod
B. Hex Head
C. Pivot Link
D. Jam Nut

Deck Leveling Adjustment

S/N: 2014523387 & Below

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 15 psi (1,03 bar).
2. Pull the cutting height adjustment handle (A, Figure 27) up and out of the handle lock position (B) and adjust the deck to the 3" (7,6 cm) position.
3. Repeat process for other side of machine.

NOTE: Both sides of the deck must be adjusted to the same height.

4. Place 2 x 4 blocks under the rear of the mower deck with the 3-1/2" sides being vertical. See Figure 28.
5. Loosen the deck leveling hardware (D, Figure 27) on both sides of the machine.
6. Make sure that the rear of the deck is resting on the 2 x 4's. Tighten the deck leveling hardware on both sides of the machine.
7. Remove all 2 x 4 blocks from under the mower deck.

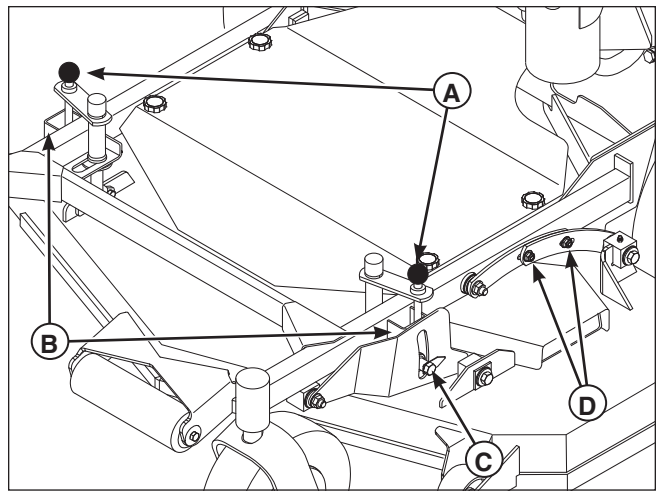


Figure 27. Deck Leveling Adjustment

- A. Cutter Height Adjustment Handle
- B. Handle Lock Position
- C. Cutting Height Indicator
- D. Deck Leveling Hardware

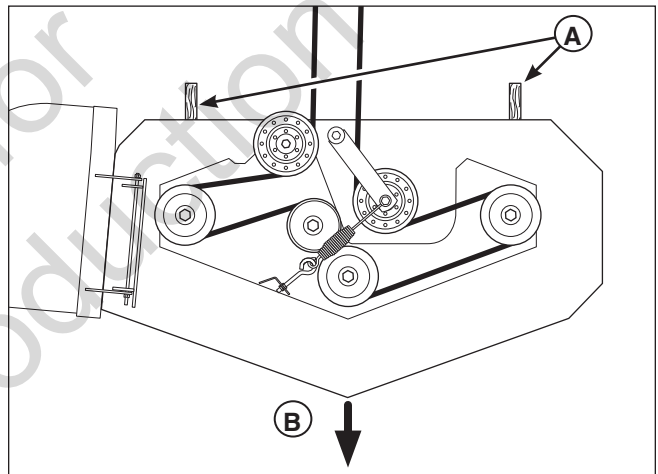


Figure 28. 2 x 4 Locations

- A. 2 x 4 Blocks
- B. Arrow Indicating the Front of the Machine

Mower 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. Lower the mower deck to its lowest cutting position and remove the mower deck guard.
3. Using a 3/4" combination wrench, carefully rotate the idler arm (A, Figure 29) **counter-clockwise**, which will relieve the tension on the belt exerted from the idler arm.
4. Slide the mower drive belt over the edge of the rear stationary idler pulley (B). Carefully release the tension on the idler arm.

WARNING



Spring loaded components can kick back causing injury.

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

5. Remove the old belt (C) and replace with a new one. Make sure the V-side of the belt runs in the pulley grooves.
6. Install the mower drive belt on the PTO pulley, the spindle pulleys (D) and all idler pulleys (E) except the rear stationary pulley (B). Carefully rotate the 3/4" combination wrench **counter-clockwise** and install the belt on the rear stationary idler pulley. Carefully release the tension on the 3/4" combination wrench.
7. Adjust the mower deck cutting height to 3" (7,62 cm).
8. Use the Mower Belt Idler Spring Length chart to determine the correct spring length.

Mower Belt Idler Spring Length

	Measurement	
48" Models	6-1/2"	(16,5 cm)
52" & 61" Models	6-3/8"	(16,2 cm)

9. The measurement should equal the measurement as designated in the chart. If the measurement does not equal the measurement as designated in the chart, adjust the anchor eyebolt (A, Figure 30) until the desired measurement is achieved.
10. Reinstall the mower deck guards.
11. Run the mower under no-load condition for about 5 minutes to break-in the new belt.

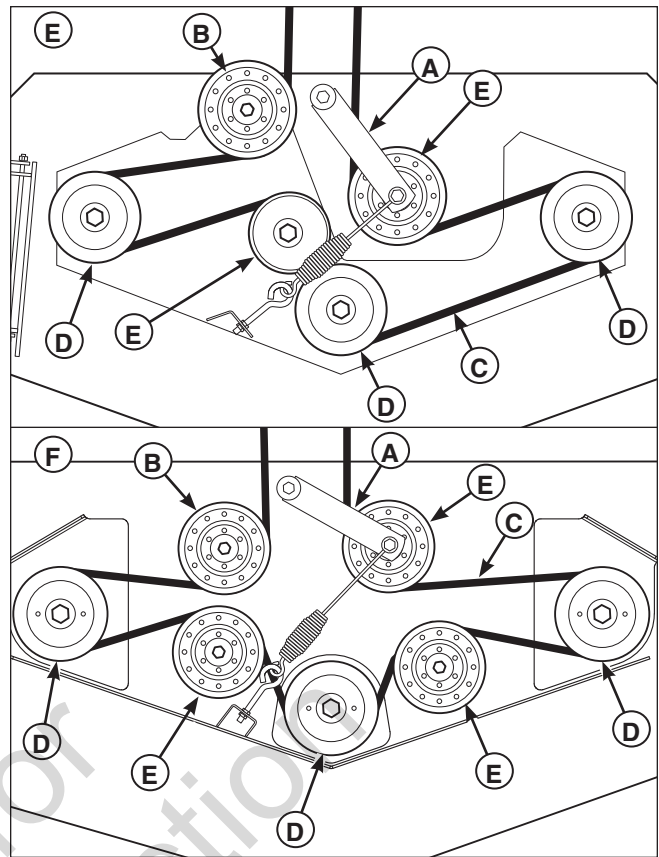


Figure 29. Mower Deck Belt Routing

- A. Adjustable Idler Arm
- B. Rear Stationary Idler Pulley
- C. Mower Deck
- D. Spindle Pulleys
- E. Idler Pulley
- F. 48" & 52" Mower Deck
- G. 61" Mower Deck

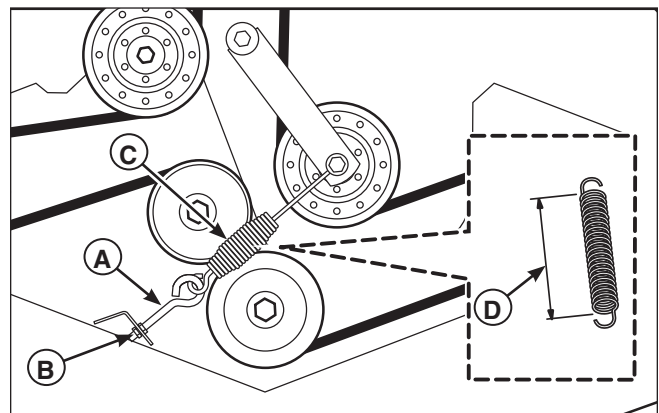


Figure 30. Mower Belt Tensioner Spring Measurement

- A. Anchor Eyebolt
- B. Adjustment Nut
- C. Mower Belt Tensioner Spring
- D. Measurement

Transmission 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. Loosen and remove the hardware that secures the skid plate assembly (A, Figure 31) to the engine deck. Remove the skid plate assembly from the engine deck.
3. Remove the PTO drive belt (see MOWER BELT REPLACEMENT for removal instructions.)
4. Cut the wire tie that secures the PTO clutch wire harness to the engine deck frame.
5. Unplug the PTO clutch wire harness from the PTO clutch (B).
6. Loosen and remove the hardware that secures the PTO clutch mounting tab (C) to the engine deck. Remove the PTO clutch mounting tab.
7. Loosen the nuts on the spring anchor eyebolt (G, Figure 32) to release the majority of the belt tension. Use caution and remove the nut to completely release the tension.

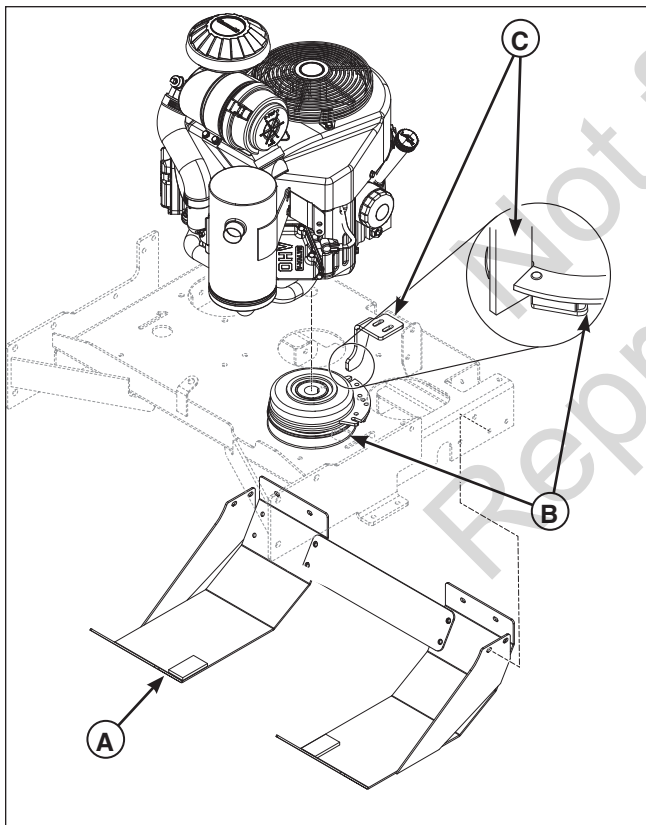


Figure 31. Remove the PTO Clutch Mounting Tab
 A. Skid Plate Assembly
 B. PTO Clutch
 C. PTO Clutch Mounting Tab

8. Remove the old belt and replace it with the new one. Make sure that the V-side of the belt runs in the grooves of the crankshaft pulley and transmission pulleys (B & C).
 9. Reinstall the spring anchor eyebolt (G) into the anchor tab and loosely fasten the nut. Adjust the anchor eyebolt until a coil-to-coil measurement of 4-7/8" (12,4 cm) is achieved. Tighten the nut.
 10. Using the hardware that was previously removed reinstall the clutch anchor to the engine deck.
- NOTE: Make sure that the slot in the PTO clutch lines up with the PTO clutch mounting tab (C, Figure 31) underneath the engine deck.
11. Reconnect the PTO clutch wire harness to the PTO clutch.
 12. Using a new wire tie secure the PTO clutch wire harness to the frame and away from moving components.
 13. Reinstall the PTO drive belt.
 14. Using the hardware that was previously removed reinstall the skid plates to the engine deck.

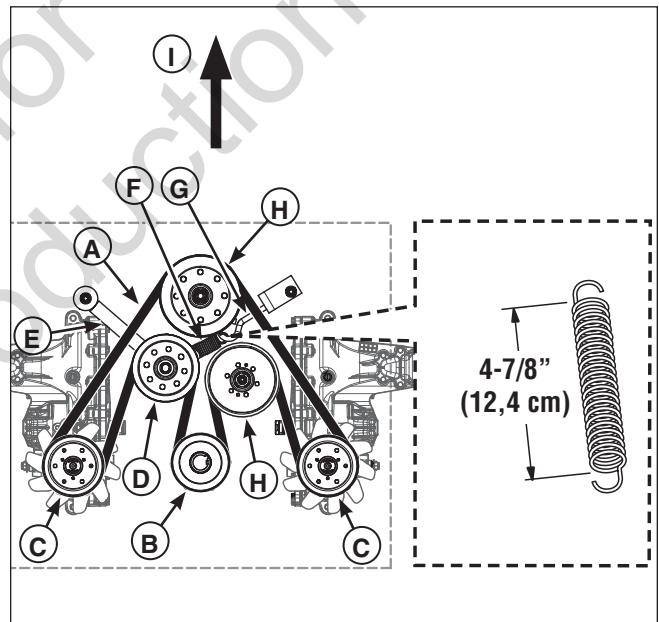


Figure 32. Hydraulic Pump Drive Belt Replacement

- A. Transmission Drive Belt
- B. Crankshaft Pulley
- C. Transmission Pulleys
- D. Idler Pulley
- E. Idler Arm
- F. Spring
- G. Spring Anchor Eyebolt
- H. Stationary Idler Pulley
- I. Arrow Indicating the Front of the Machine

Reverse Speed Control Levers

Comfort Adjustment (S/N: 2014522399 & Below)

The amount of pressure necessary to depress the Reverse Speed Control Levers (A, Figure 33) can be adjusted to meet the comfort needs of the operator.

1. Disengage the PTO, engage the parking brake and turn off the engine.
2. To increase the amount of pressure necessary to depress the Reverse Speed Control Levers turn the lock nut (B) **CLOCKWISE** until the desired comfort level is achieved. To decrease the amount of pressure necessary to depress the Reverse Speed Control Levers turn the lock nut **COUNTER-CLOCKWISE** until the desired comfort level is achieved.
3. Repeat process for other side of the unit.

NOTE: Both Reverse Speed Control Levers should be adjusted so that it takes the same amount of pressure to depress both handles.

Handle Placement Adjustment (All Models)

There should be approximately 1" (2,54 cm) to clearance in between the handle bars and the reverse speed control levers when the forward speed control lever is in the neutral position.

To adjust:

1. Loosen the jam nuts (B, Figure 34) that are located on the top and the bottom of the reversing linkage rod (A).
2. Adjust the linkage rod:
 - To increase the amount of clearance between the handle bars and the reverse speed control levers, turn the linkage rod (A) **clockwise**.
 - To decrease the amount of clearance between the handle bars and the reverse speed control levers, turn the linkage rod **counter-clockwise**.
3. Once the measurement of 1" (2.54 cm) is achieved, tighten the jam nuts against the linkage rod ball joints.
4. Repeat the process for the other side of the unit.

Both reverse speed control levers should be adjusted equally.

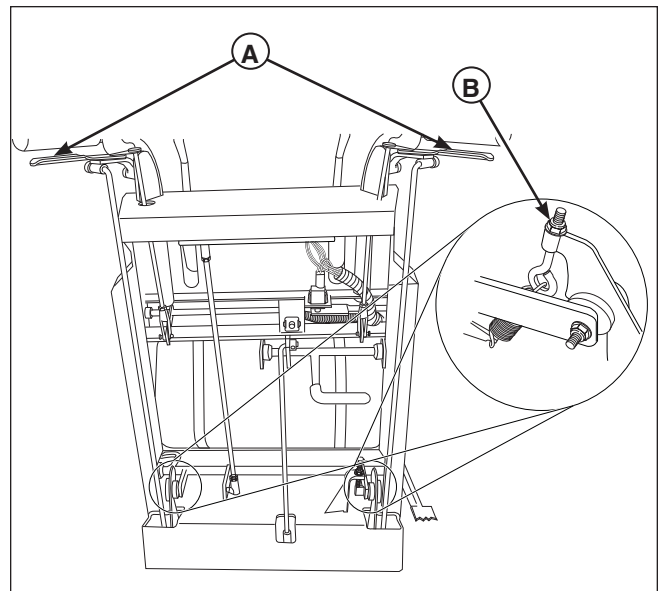


Figure 33. Reverse Speed Control Levers Comfort Adjustment

- A. Reverse Speed Control Levers
B. Lock Nut

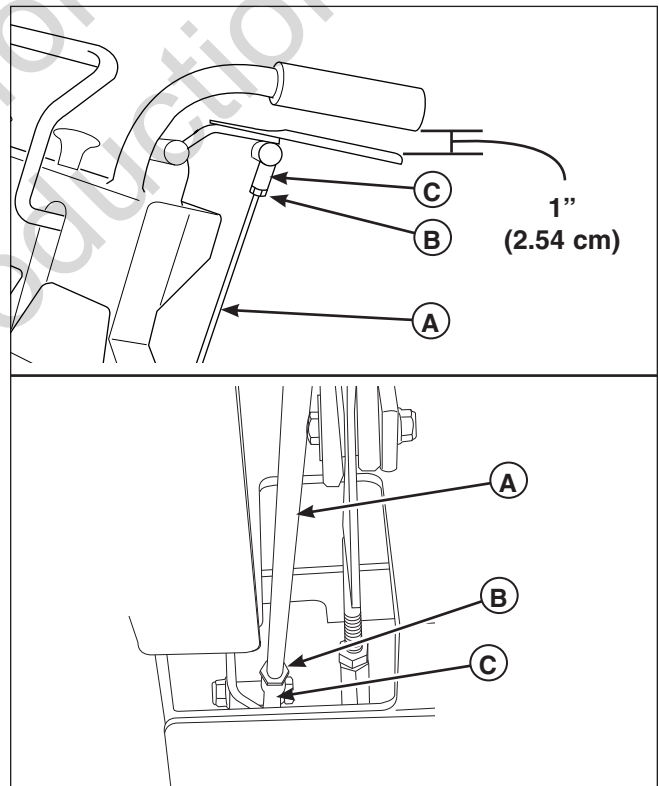


Figure 34. Handle Placement Adjustment

- A. Reversing Linkage Rod
B. Jam Nuts
C. Linkage Rod Ball Joints

Regular Maintenance

Battery Maintenance

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

Cleaning the Battery and Cables

1. Disconnect the cables from the battery, negative [-] cable first (A, Figure 35).
2. Clean the battery terminals and cable ends with a wire brush until shiny.
3. Reinstall the battery and reattach the battery cables, positive [+] cable first (B).
4. Coat the cable ends and the battery terminals with petroleum jelly or non-conducting grease.

WARNING



Keep open flames and sparks away from the battery.

- Be careful when handling the battery.
- Avoid spilling electrolyte.
- Keep flames and sparks away from the battery.
- When removing or installing the 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.

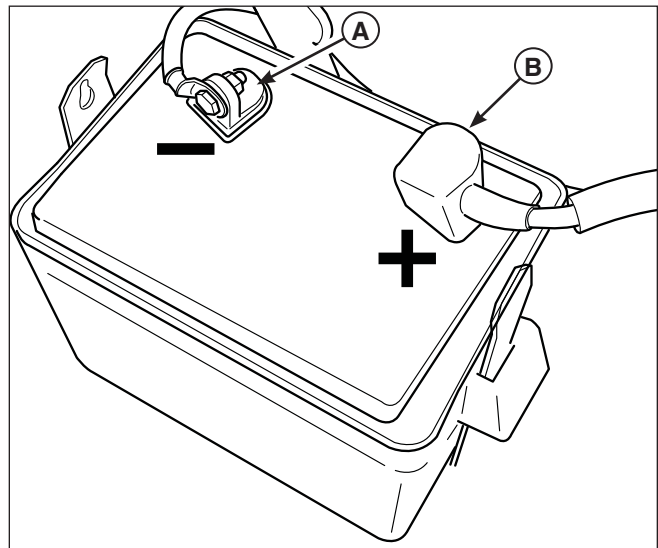


Figure 35. Battery Compartment
A. Negative [-] Cable & Terminal
B. Positive [+] Cable & Terminal

Battery Service

 WARNING
 
<ul style="list-style-type: none">• Keep open flame 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 the condition of the battery. When engine is off, the voltmeter shows battery voltage, which should be 12 volts. When engine is running, the voltmeter shows the voltage of the 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 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 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 the 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 for making sure that the battery is fully 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 a low charging rate and less than 0.003 change in specific gravity occurs over a three year period.

Jump Starting With Auxiliary (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 36.

1. Both batteries must be the same voltage.
2. Position the vehicle with the booster battery adjacent to the vehicle with the discharged battery so that the booster cables can be connected easily to the batteries in both vehicles. **Make certain that the vehicles do not touch each other.**
3. Wear safety glasses and shield eyes and face from batteries at all times. Be sure that the vent caps are tight. Place a damp cloth over the vent caps on both batteries.
4. Connect the positive [+] cable to the positive post of the discharged battery (wired to starter or solenoid).
5. Connect the other end of the same cable to the same post marked positive [+] on the booster battery.
6. Connect the second cable negative [-] to the other post of the booster battery.
7. Make the final connection on the 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 has been 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 opposite end from the booster battery.
12. Discard the damp cloths that were placed over the battery vent caps.

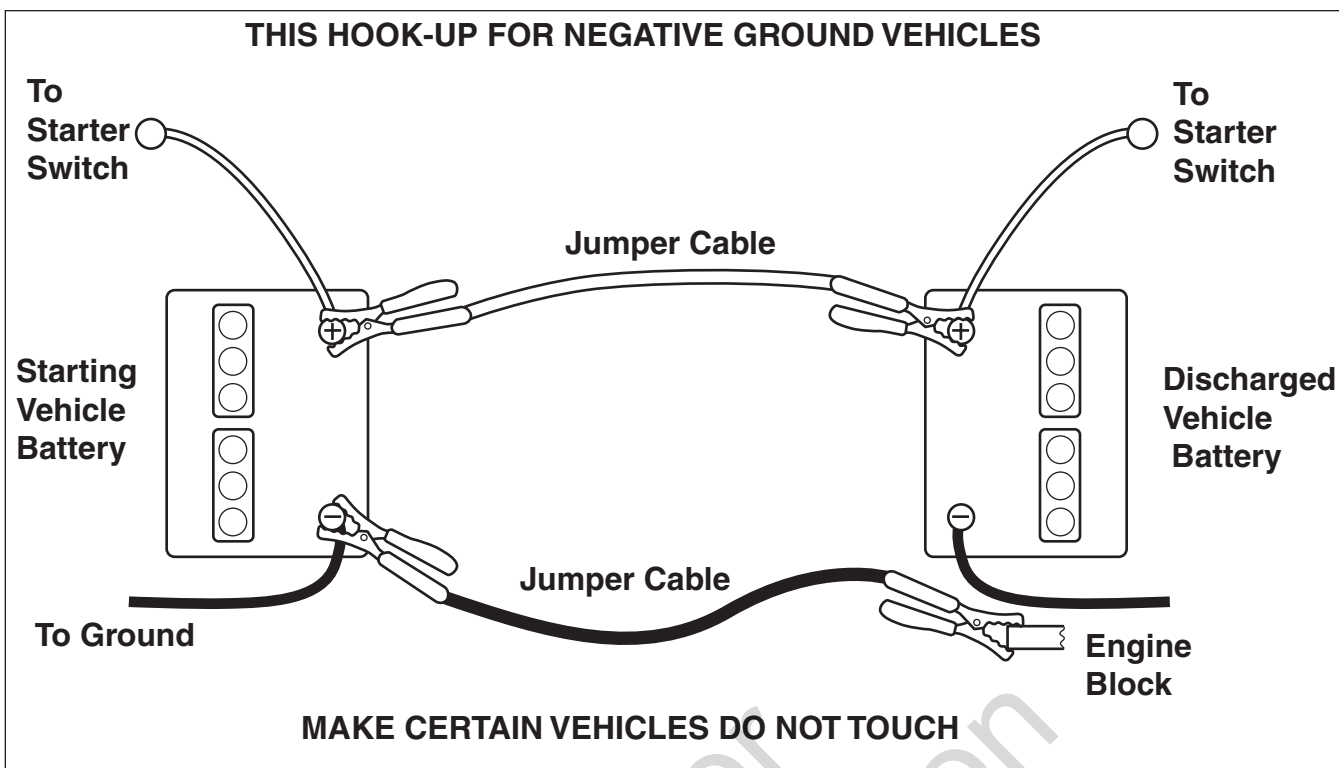


Figure 36. Jump Starting

⚠ 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.

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 Normal Care 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	
 	<p>Fuel and its vapors are extremely flammable and explosive.</p> <p>Fire or explosion can cause severe burns or death.</p>
<ul style="list-style-type: none"> • 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 result 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.


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 on the following pages 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.
<ul style="list-style-type: none"> 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 Mower

Problem	Cause	Remedy
Engine will not turnover or start.	<ol style="list-style-type: none"> Parking brake not engaged. PTO (electric clutch) switch in ON position. Out of fuel. Engine flooded. Fuse blown. Wiring loose or broken. Safety interlock switch faulty. Spark plug(s) faulty, fouled or incorrectly gapped. Water in fuel. Gas is old or stale. 	<ol style="list-style-type: none"> Engage parking brake. Place in OFF position. If engine is hot, allow it to cool, then refill the fuel tank. Move choke control to closed position. Replace fuse. Visually check wiring & replace broken or frayed wires. Tighten loose connections. Replace as needed. See authorized service dealer. Clean and gap or replace. See engine manual. Drain fuel & replace with fresh fuel. Drain fuel & replace with fresh fuel.
Engine starts hard or runs poorly.	<ol style="list-style-type: none"> Fuel mixture too rich. Spark plug faulty, fouled, or incorrectly gapped. 	<ol style="list-style-type: none"> Clean air filter. Check choke adjustment. Clean and gap or replace. (See engine manual.)
Engine knocks.	<ol style="list-style-type: none"> Low oil level. Using wrong grade oil. 	<ol style="list-style-type: none"> Check/add oil as required. See engine manual.
Excessive oil consumption.	<ol style="list-style-type: none"> Engine running too hot. Using wrong weight oil. Too much oil in crankcase. 	<ol style="list-style-type: none"> Clean engine fins, blower screen and air cleaner. See engine manual. Drain excess oil.
Engine exhaust is black.	<ol style="list-style-type: none"> Dirty air filter. Engine choke control is in closed position. 	<ol style="list-style-type: none"> Replace air filter. See engine manual. Open choke control.

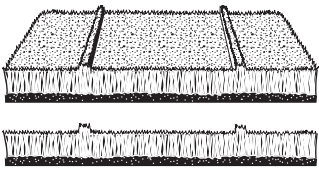
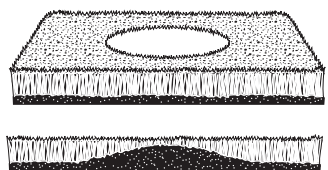
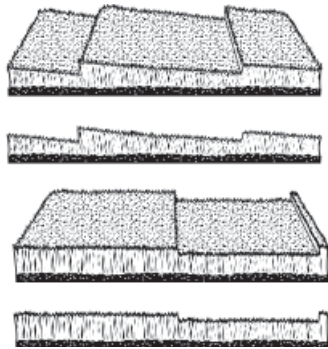
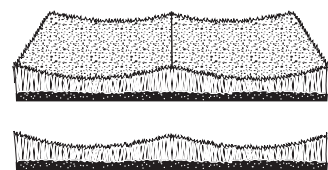
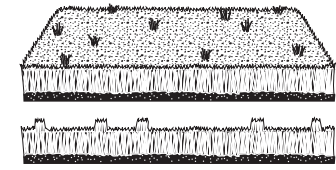
Mower Troubleshooting Continued.

Problem	Cause	Remedy
Engine runs, but mower will not drive.	<ol style="list-style-type: none"> 1. Transmission release lever(s) in "disengaged" position. 2. Belt is broken. 3. Drive belt slips. 4. Brake is not fully released. 	<ol style="list-style-type: none"> 1. Move transmission release lever(s) to the "engaged" position. 2. See Drive Belt Replacement. 3. See problem and cause below. 4. See authorized service dealer
Mower drive belt slips.	<ol style="list-style-type: none"> 1. Pulleys or belt greasy or oily. 2. Tension too loose. 3. Belt stretched or worn. 	<ol style="list-style-type: none"> 1. Clean as required. 2. Adjust spring tension. See Drive Belt Replacement 3. Replace belt.
Brake will not hold.	<ol style="list-style-type: none"> 1. Brake is incorrectly adjusted. 	<ol style="list-style-type: none"> 1. See Brake Adjustment.
Mower steers or handles poorly.	<ol style="list-style-type: none"> 1. Steering linkage is loose. 2. Improper tire inflation. 	<ol style="list-style-type: none"> 1. Check and tighten any loose connections. 2. See Regular Maintenance Section.

Troubleshooting the Mower Deck

Problem	Cause	Remedy
Mower Deck will not raise.	<ol style="list-style-type: none"> 1. Lift linkage not properly attached or damaged. 	<ol style="list-style-type: none"> 1. See authorized service dealer for repair.
Engine stalls easily with mower deck engaged.	<ol style="list-style-type: none"> 1. Engine speed too slow. 2. Ground speed too fast. 3. Cutting height set too low. 4. Discharge chute jamming with cut grass. 	<ol style="list-style-type: none"> 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 toward previously cut area.
Excessive mower deck vibration.	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Tighten to 70 ft.lbs. (94 N.m.). 2. Check and replace as necessary. 3. Remove, sharpen, and balance blades. See Maintenance Section. 4. Reinstall Correctly.
Excessive belt wear or breakage.	<ol style="list-style-type: none"> 1. Bent or rough pulleys. 2. Using incorrect belt. 	<ol style="list-style-type: none"> 1. Repair or replace. 2. Replace with correct belt.
Mower drive belt slips or fails to drive.	<ol style="list-style-type: none"> 1. Idler pulley spring broken or not properly attached. 2. Mower drive belt broken. 	<ol style="list-style-type: none"> 1. Repair or replace as needed. 2. Replace drive belt.
Mower does not engage.	<ol style="list-style-type: none"> 1. Electrical wiring damage. 	<ol style="list-style-type: none"> 1. Locate & repair damaged wire.

Troubleshooting Common Cutting Problems

Problem	Cause	Remedy
Streaking. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Sharpen your blades. 2. Replace your blades. 3. Always mow at full throttle. 4. Slow down. 5. Clean out the mower. 6. Overlap your cutting rows. 7. When turning your effective cutting width decreases—overlap more when turning.
Scalping. 	<ol style="list-style-type: none"> 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 leveled correctly. 5. Tire pressure is low or uneven 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Blades are not sharp or nicked. 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. 	<ol style="list-style-type: none"> 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.

ENGINE:

18 Gross HP† Kawasaki Manual Start

Make Kawasaki
Model FX541V
Displacement 36.8 Cu. in (603 cc)
Oil Capacity 1.8 US qt. (1,7 L) w/ Filter

19 Gross HP† Kawasaki Manual Start

Make Kawasaki
Model FX600V-DS01-S
Displacement 36.8 Cu. In. (603 cc)
Oil Capacity 1.8 US qt. (1,7 L) w/ Filter

20 Gross HP† Kawasaki Electric Start

Make Kawasaki
Model F600V
Displacement 36.8 Cu. in (603 cc)
Electrical System 12 Volt, 15 amp Charging Coil;
 Battery: 340 CCA
Oil Capacity 1.8 US qt. (1,7 L) w/ Filter

21 Gross HP† Kawasaki Electric Start

Make Kawasaki
Model FX651V-DS00-S
Displacement 44.3 Cu. In. (726 cc)
Electrical System 12 Volt, 15 amp Charging Coil;
 Battery: 340 CCA
Oil Capacity 2.2 US qt (2.1 L) w/ filter

24 Gross HP† Kawasaki Electric Start

Make Kawasaki
Model FX730V-DS00-S
Displacement 44.3 Cu. In. (726 cc)
Electrical System 12 Volt, 15 amp Charging Coil;
 Battery: 340 CCA
Oil Capacity 2.2 US qt. (2.1 L) w/ filter

26 Gross HP† Kawasaki Electrical Start

Make Kawasaki
Model FX730V
Displacement 44.3 Cu. in (726 cc)
Electrical System 12 volt, 15 amp. alternator,
 Battery: 340 CCA
Oil Capacity 2.2 US qt. (2,1 L) w/ Filter

†**Power Ratings:** All power levels are stated gross horsepower per SAE J2723 as rated by Kawasaki and tested per the SAE J1995 test standard. The gross power curves and more information can be viewed at www.kawasaki-criticalpower.com.

CHASSIS

Fuel Tank Capacity: 5 Gallons (18,73 L)
Rear Wheels Tire Size: 20 x 7 - 10 (48" Models)
 Tire Size: 20 x 8 - 10 (52" & 61" Models)
 Inflation Pressure: 15 psi (1.03 bar)
Front Wheels Tire Size: 11 x 4 - 5
 Inflation Pressure: Flat Free Tire

TRANSMISSIONS

S/N: 2014600769 & Below:

Hydro-Gear ZJ-KMEE-3B5A-1RLX (RH)

Hydro-Gear ZJ-GMEE-3B5A-1RLX (LH)

S/N: 2014600770 & Above:

Hydro-Gear ZJ-KMFE-3B5B-1RLX (RH)

Hydro-Gear ZJ-GMFE-3B5B-1RLX (LH)

Type ZT3100

Hydraulic Fluid SAE 20W-50 motor oil

Speeds Forward: 0-7 MPH (0-11.27 km/h)

@ 3400 rpm Reverse: 0-3 MPH (0-4.83 km/h)

DIMENSIONS

Deck Size	48"	52"	61"
Overall Length	80" (203 cm)	81" (206 cm)	82.5" (209.5 cm)
Overall Width (chute up)	48" (122 cm)	52" (132 cm)	61" (155 cm)
Overall Width (chute down)	61" (155 cm)	67.25" (171 cm)	77" (195.6 cm)
Height	41" (104 cm)	41" (104 cm)	41" (104 cm)
Weight (aprox.)	754 lbs. (342 kg)	675 lbs. (306 kg)	800 lbs. (363 kg)

SLOPE IDENTIFICATION GUIDE

1 FOLD ALONG APPROPRIATE DOTTED LINE

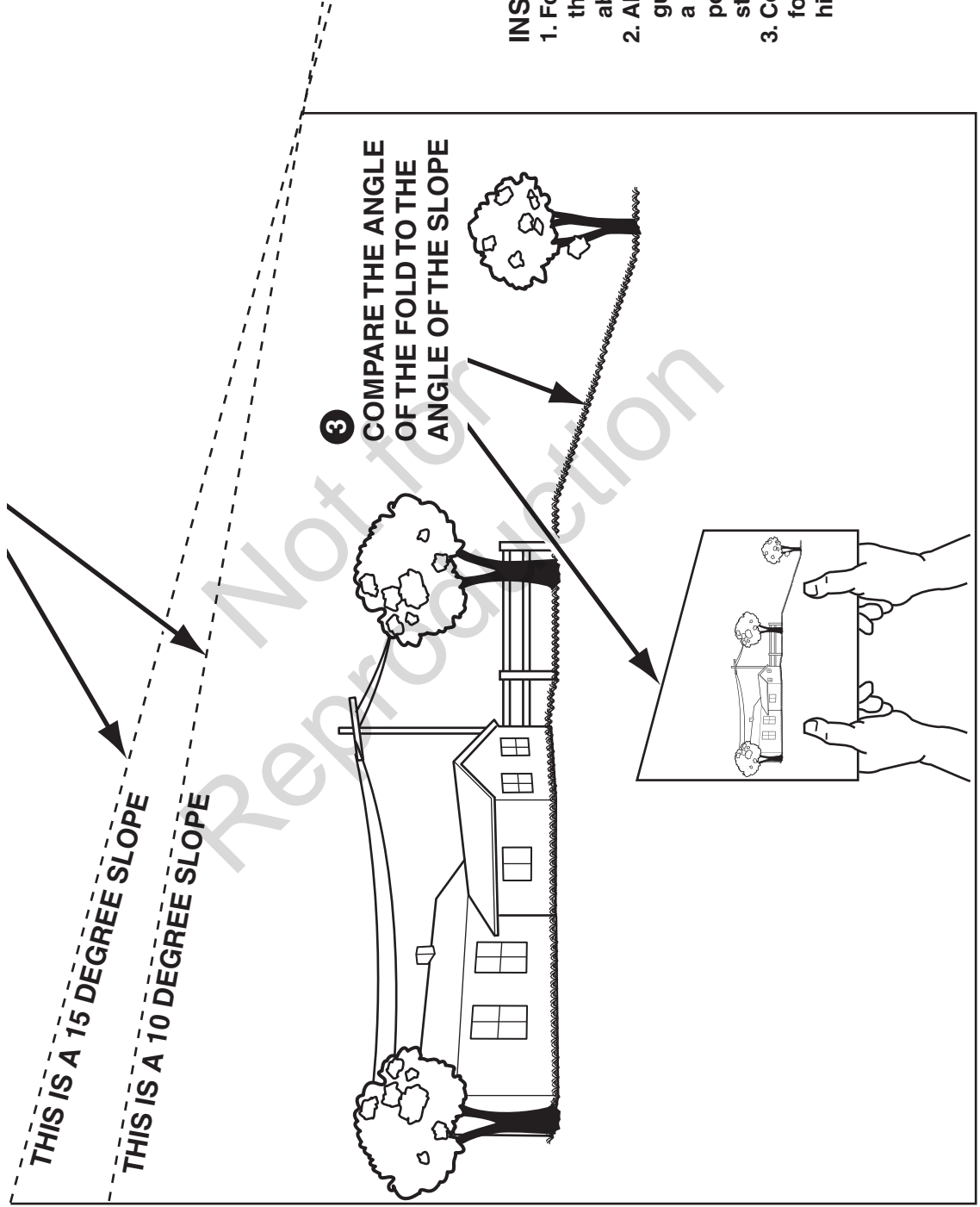
THIS IS A 15 DEGREE SLOPE

THIS IS A 10 DEGREE SLOPE

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

2

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.

LIMITED WARRANTY

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

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

WARRANTY PERIOD

Covered Parts	Standard Warranty Period	Rental Warranty Period
Riding mowers	4 years (48 months) or 500 hours, whichever occurs first. Unlimited hours during the first 2 years (24 months) (+Except as noted below)	90 days
Walk mowers (over 30 inches of cutting width)	2 years (24 months) unlimited hours (+Except as noted below)	90 days
+Belts, Tires, Brake Pads, Hoses, Battery, Blades	90 days	90 days
+Attachments	1 year	90 days
+Engine*	See Engine Operator's Manual	See Engine Operator's Manual

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

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

The warranty period begins on the date of purchase by the first retail end user, and continues for the period of time or hours stated in the table above.

No warranty registration is necessary to obtain warranty on Briggs & Stratton products. Save your proof of purchase receipt. If you do not provide proof of the initial purchase date at the time warranty service is requested, the manufacturing date of the product will be used to determine the warranty period.

ABOUT YOUR WARRANTY

We welcome warranty repair and apologize to you for being inconvenienced. Warranty service is available only through *SNAPPER PRO* Authorized Service Dealers. Most warranty repairs are handled routinely, but sometimes requests for warranty service may not be appropriate. This warranty only covers defects in materials or workmanship. It does not cover damage caused by improper use or abuse, improper maintenance or repair, normal wear and tear, or stale or unapproved fuel.

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

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

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

Stale Fuel - In order to function correctly, this product requires fresh fuel that conforms to the criteria specified in the Operator's Manual. Damage caused by stale fuel (carburetor leaks, clogged fuel tubes, sticking valves, etc) is not covered by warranty.

Other Exclusions - This warranty excludes damage due to accident, abuse, modifications, alterations, improper servicing, freezing or chemical deterioration. Attachments or accessories that were not originally packaged with the product are also excluded. There is no warranty coverage on equipment used for primary power in place of utility power or on equipment used in life support applications. This warranty also excludes failures due to acts of God and other force majeure events beyond the manufacturer's control.

California, U.S. EPA, and Briggs & Stratton Corporation Emissions Control Warranty Statement September 2012 Your Warranty Rights And Obligations

The California Air Resources Board, U.S. EPA, and Briggs & Stratton (B&S) are pleased to explain the emissions control system warranty on your Model Year 2012-2013 engine/equipment. In California, new small off-road engines and large spark ignited engines less than or equal to 1.0 liter must be designed, built, and equipped to meet the State's stringent anti-smog standards. B&S must warrant the emissions control system on your engine/equipment for the periods of time listed below provided there has been no abuse, neglect, or improper maintenance of your engine or equipment.

Your emissions control system may include parts such as the carburetor or fuel injection system, fuel tank, ignition system, and catalytic converter. Also included may be hoses, belts, connectors, sensors, and other emissions-related assemblies.

Where a warrantable condition exists, B&S will repair your engine/equipment at no cost to you including diagnosis, parts, and labor.

Manufacturer's Warranty Coverage:

Small off-road engines and large spark ignited engines less than or equal to 1.0 liter, and any related emissions components of the equipment, are warranted for two years*. If any emissions-related part on your B&S engine/equipment is defective, the part will be repaired or replaced by B&S.

* Two years or for the time period listed in the respective engine or product warranty statement, whichever is greater.

Owner's Warranty Responsibilities:

- As the engine/equipment owner, you are responsible for the performance of the required maintenance listed in your owner's manual. B&S recommends that you retain all receipts covering maintenance on your engine/equipment, but B&S cannot deny warranty solely for the lack of receipts or your failure to ensure the performance of all scheduled maintenance.
- As the engine/equipment owner, you should however be aware that B&S may deny you warranty coverage if your engine/equipment or a part has failed due to abuse, neglect, improper maintenance, or unapproved modifications.
- You are responsible for presenting your engine/equipment to a B&S distribution center, servicing dealer, or other equivalent entity, as applicable, as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days. If you have any questions regarding your warranty rights and responsibilities, you should contact B&S at (414) 259-5262.

Briggs & Stratton Emissions Control Warranty Provisions

The following are specific provisions relative to your Emissions Control Warranty Coverage. It is in addition to the B&S engine warranty for non-regulated engines found in the Operator's Manual.

1. Warranted Emissions Parts

Coverage under this warranty extends only to the parts listed below (the emissions control systems parts) to the extent these parts were present on the B&S engine and/or B&S supplied fuel system.

a. Fuel Metering System

- Cold start enrichment system (soft choke)
- Carburetor and internal parts
- Fuel pump
- Fuel line, fuel line fittings, clamps
- Fuel tank, cap and tether
- Carbon canister

b. Air Induction System

- Air cleaner
- Intake manifold
- Purge and vent line

c. Ignition System

- Spark plug(s)
- Magneto ignition system

d. Catalyst System

- Catalytic converter
- Exhaust manifold
- Air injection system or pulse valve

e. Miscellaneous Items Used in Above Systems

- Vacuum, temperature, position, time sensitive valves and switches
- Connectors and assemblies

2. Length of Coverage

For a period of two years from date of original purchase, B&S warrants to the original purchaser and each subsequent purchaser that the engine is designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board; that it is free from defects in material and workmanship that could cause the failure of a warranted part; and that it is identical in all material respects to the engine described in the manufacturer's application for certification. The warranty period begins on the date the engine is originally purchased.

The warranty on emissions-related parts is as follows:

- Any warranted part that is not scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the warranty period stated above. If any such part fails during the period of warranty coverage, the part will be repaired or replaced by B&S at no charge to the owner. Any such part repaired or replaced under the warranty will be warranted for the remaining warranty period.
 - Any warranted part that is scheduled only for regular inspection in the owner's manual supplied, is warranted for the warranty period stated above. Any such part repaired or replaced under warranty will be warranted for the remaining warranty period.
 - Any warranted part that is scheduled for replacement as required maintenance in the owner's manual supplied, is warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part will be repaired or replaced by B&S at no charge to the owner. Any such part repaired or replaced under warranty will be warranted for the remainder of the period prior to the first scheduled replacement point for the part.
 - Add on or modified parts that are not exempted by the Air Resources Board may not be used. The use of any non exempted add on or modified parts by the owner will be grounds for disallowing a warranty claim. The manufacturer will not be liable to warrant failures of warranted parts caused by the use of a non exempted add on or modified part.
3. Consequential Coverage
- Coverage shall extend to the failure of any engine components caused by the failure of any warranted emissions parts.
4. Claims and Coverage Exclusions

Warranty claims shall be filed according to the provisions of the B&S engine warranty policy. Warranty coverage does not apply to failures of emissions parts that are not original equipment B&S parts or to parts that fail due to abuse, neglect, or improper maintenance as set forth in the B&S engine warranty policy. B&S is not liable for warranty coverage of failures of emissions parts caused by the use of add-on or modified parts.

Look For Relevant Emissions Durability Period and Air Index Information On Your Small Off-Road Engine Emissions Label

Engines that are certified to meet the California Air Resources Board (CARB) small off-road Emissions Standard must display information regarding the Emissions Durability Period and the Air Index. Briggs & Stratton makes this information available to the consumer on our emissions labels. The engine emissions label will indicate certification information.

The **Emissions Durability Period** describes the number of hours of actual running time for which the engine is certified to be emissions compliant, assuming proper maintenance in accordance with the Operating & Maintenance Instructions. The following categories are used:

Moderate:

Engine is certified to be emissions compliant for 125 hours of actual engine running time.

Intermediate:

Engine is certified to be emissions compliant for 250 hours of actual engine running time.

Extended:

Engine is certified to be emissions compliant for 500 hours of actual engine running time. For example, a typical walk-behind lawn mower is used 20 to 25 hours per year.

Therefore, the **Emissions Durability Period** of an engine with an **intermediate** rating would equate to 10 to 12 years.

Briggs & Stratton engines are certified to meet the United States Environmental Protection Agency (USEPA) Phase 2 or Phase 3 emissions standards. The Emissions Compliance Period referred to on the Emissions Compliance label indicates the number of operating hours for which the engine has been shown to meet Federal emissions requirements.

For engines less than 225 cc displacement.

Category C = 125 hours, Category B = 250 hours, Category A = 500 hours

For engines of 225 cc or more displacement.

Category C = 250 hours, Category B = 500 hours, Category A = 1000 hours



Operator's Manual

SW30 Series

Walk-Behind Mowers

Not for
Reproduction

BRIGGS & STRATTON POWER PRODUCTS GROUP, LLC
5375 NORTH MAIN STREET
MUNNSVILLE, NY 13409
800 933 6175