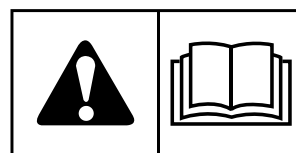
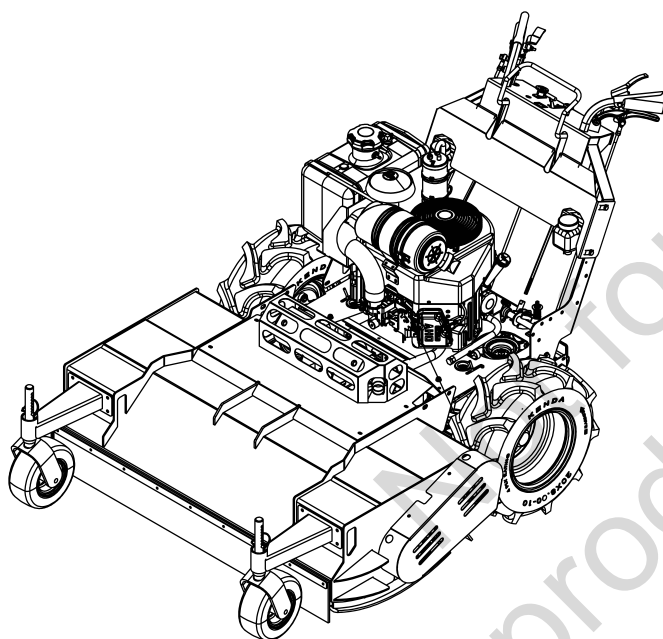




OPERATOR'S MANUAL

FM Series

Walk-Behind Flail Mower



Model
5900520

Description
FMKAV2448CE

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

5103459
Rev -

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

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

This product requires final assembly before use. Refer to the setup guide for instructions on final assembly procedures. Follow the instructions completely.

Products Covered by This Manual

The following products are covered by this manual:

5900520

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

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Briggs & Stratton Power Products Group, LLC.

5375 N. Main Street

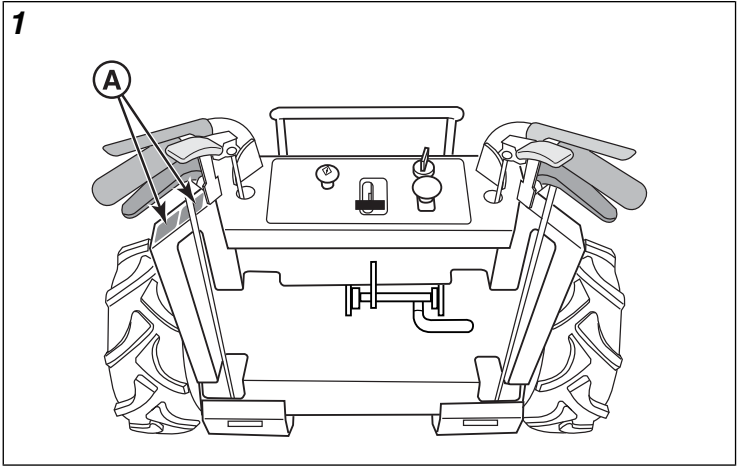
Munnsville, NY 13409-4003

(800) 933-6175

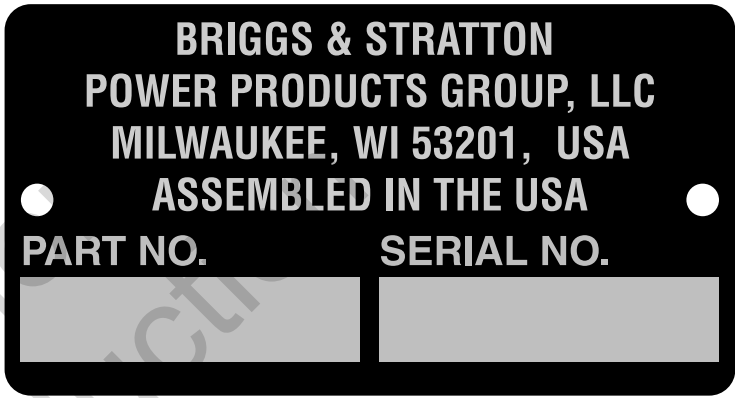
ferrisindustries.com

Identification Tag Location - Flail Mower

The Product Identification tag (A, Figure 1) can be found in the location shown.



Product Identification Tag (Stamped)

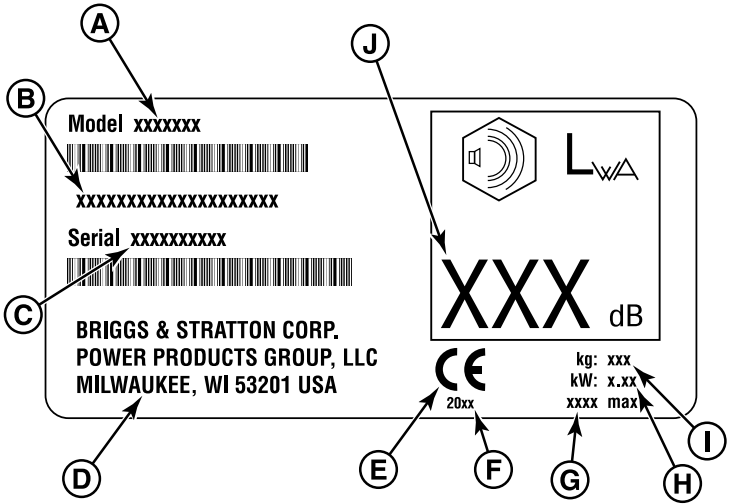


PRODUCT REFERENCE DATA	
Unit Model Number:	
Unit Serial Number:	
Mower Deck Model Number:	
Mower Deck Serial Number:	
Dealer Name:	
Date Purchased:	
ENGINE REFERENCE DATA	
Engine Make:	
Engine Model:	
Engine Type/Spec:	
Engine Code/Serial Number	

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

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

CE Identification Tag Markings - EN12733



A.	Manufacturer's Identification Number
B.	Product Description
C.	Serial Number
D.	Manufacturer's Address
E.	CE Compliance Logo
F.	Year of Manufacture
G.	Maximum Engine Speed in Rotations per Minute
H.	Power Rating in Kilowatts
I.	Mass of Unit of Kilograms
J.	Sound Power in Decibels

This unit complies with European Harmonized Lawn Mower Standard EN 12733, European Machinery Directive 2006/42/EC, and European EMC Directive 2004/108/EEC.


"Vibration measurement uncertainty - machine vibration was recorded using methods and procedures outlined in the appropriate International Standards in effect at the time of manufacture. The uncertainties due to the measurement may result in a variance of up to 5% from the published value shown in the Declaration of Conformity."

Operator Safety

Operator Safety



Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of unit, severe personal injury or death to you, or bystanders, or damage to property or equipment. **This mowing deck is capable of amputating hands and feet and throwing objects.**

The safety alert triangle  in text signifies important cautions or warnings which must be followed.

Operating Safety



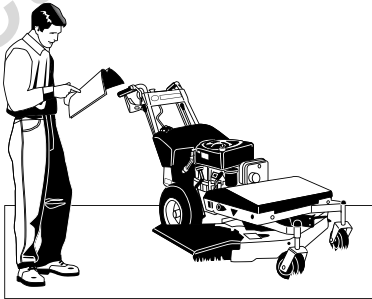
Congratulations on purchasing a superior-quality piece of lawn and garden equipment. Our products are designed and manufactured to meet or exceed all industry standards for safety.

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

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

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

Read the Manual

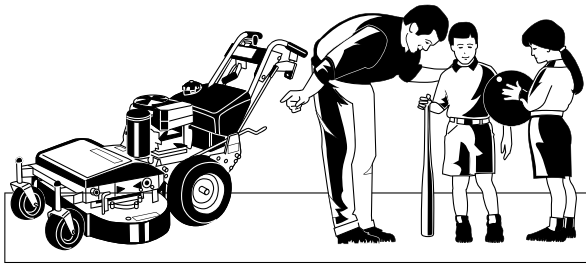


The operator's manual contains important safety information you need to be aware of BEFORE you operate your unit as well as DURING operation.

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

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

Children



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

Slope Operation

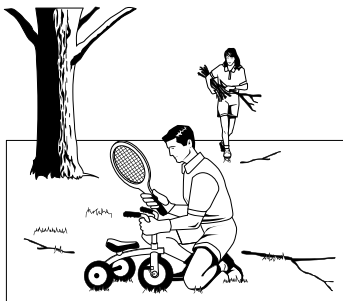


You could be seriously injured if you use this unit on too steep of a slope. Using the unit on a slope that is too steep where you do not have adequate footing and unit traction (and control) can cause you to lose control and possibly slip and fall or roll the unit over.

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

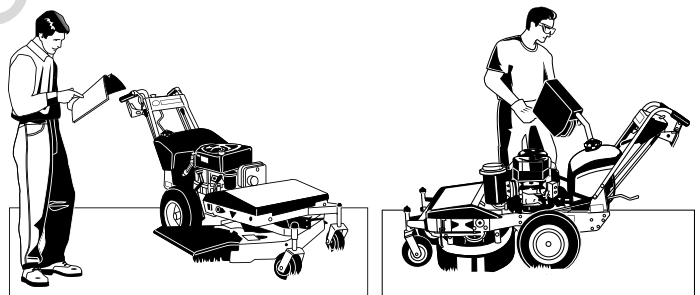


This equipment has many moving parts that can injure you or someone else. However, if you stay in the operator zone (area behind the handles and controls), and follow the safety rules in this operator's manual, the unit is safe to operate.

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.

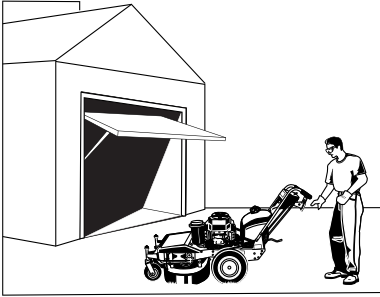
Gasoline and its vapors are extremely flammable. Do not smoke while operating or refueling. Do not add fuel while engine is hot or running. Allow engine to cool for at least 3 minutes prior to adding fuel.

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.

Training

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

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Use only accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including safety shoes, safety glasses and ear protection. Long hair, loose clothing or jewelry may get tangled in moving parts.
- Inspect the area where the equipment is to be used and remove all objects such as rocks, toys and wire, which can be thrown by the machine.

- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
- Use only an approved container.
- Never refuel or drain the machine indoors.
- Never remove fuel cap or add fuel with the engine running. Allow engine to cool before refueling. Do not smoke.
- Check that operator's presence controls, safety switches and shields are attached and functioning properly. Do not operate unless they are functioning properly.

Operation

- Never run an engine in an enclosed area.
- Mow only in the daylight or with good artificial light, keeping away from holes and hidden hazards.
- Be sure all drives are in neutral and parking brake is engaged before starting engine. Only start engine from the operator's position. Use seat belts if provided.
- Be sure of your footing while using pedestrian controlled equipment, especially when backing up. Walk, don't run. Reduced footing could cause slipping.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. Turf conditions can affect the machines stability. Use caution when operating near drop-offs.
- Do not mow in reverse unless absolutely necessary. Always look down and behind before and while traveling in reverse.
- Be aware of the mower discharge direction and do not point it at anyone. Do not operate the mower without either the entire grass catcher or the deflector in place.
- Slow down and use caution when making turns and when changing directions on slopes.
- Never raise deck with the blades running.
- Never leave a running unit unattended. Always disengage the PTO, set parking brake, stop engine, and remove keys before dismounting. Keep hands and feet away from the cutting units.
- Turn off the PTO switch to disengage the blades when not mowing.
- Never operate with guards not securely in place. Be sure all interlocks are attached, adjusted properly and functioning properly.
- Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- Do not change the engine governor setting or over-speed the engine.
- Stop on level ground, lower implements, disengage drives, engage parking brake, shut off engine before leaving the operator's position for any reason including emptying the grass catchers or unclogging the chute.
- Stop equipment and inspect blades after striking objects or abnormal vibration occurs. Make necessary repairs before resuming operations.

- Keep hands and feet away from the cutting units.
- Look behind and down before backing up to be sure of a clear path.
- Never carry passengers and keep pets and bystanders away.
- Do not operate the unit while under the influence of alcohol or drugs.
- Slow down and use caution when making turns and crossing roads and sidewalks. Stop blades if not mowing.
- Use care when loading or unloading the machine into a trailer or truck.
- Use care when approaching blind corners, shrubs, trees or other objects that may obscure vision.
- To reduce fire hazard, keep unit free of grass, leaves & excess oil. Do not stop or park over dry leaves, grass or combustible materials.



Fire hazard

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

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



Loud noise hazard

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

Wear hearing protection when operating this machine.

Slope Operation

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



Equipment roll-over crushing hazard

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

Select a slow ground speed before driving onto slopes. Use extra caution when operating on slopes with grass catchers. Mow across the face of slopes, not up and down. Use caution when changing directions and **DO NOT START OR STOP ON A SLOPE.**

Do:

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

Do not:

- Avoid starting, stopping, or turning on a slope. If tires lose traction (i.e. machine stops forward motion on a slope), disengage the blade(s) (PTO) and drive slow off the slope.
- Do not turn on slopes unless necessary, and then, turn slowly.
- Do not mow near drop-offs, ditches, or embankments. The operator could lose footing or balance or mower could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- Do not mow on wet grass. Reduced footing or traction could cause sliding.
- Do not mow excessively steep slopes.
- 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.

- Keep children out of the mowing area and under the watchful care of another responsible adult.
- Be alert and turn unit off if children enter the area.
- Before and during reverse operation, look behind and down for small children.
- Never allow children to operate the unit.

- Use extra care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

Emissions

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

Ignition System (Gasoline Models)

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

Service and Maintenance Safety



WARNING

Amputation and crushing hazard

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

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

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

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

Safe Handling of Gasoline



DANGER

Fire and explosion hazard








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





- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only approved gasoline containers.
- Never remove the gas cap or add fuel with the engine running. Allow the engine to cool before refueling.
- Never fuel the machine indoors.
- Never store the machine or fuel container where there is an open flame, spark, or pilot light such as near a water heater or other appliance.
- Never fill containers inside a vehicle or on a truck bed with a plastic bed liner. Always place containers on the ground away from your vehicle before filling.

- Remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.
- Keep nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete. Do not use a nozzle lock-open device.
- If fuel is spilled on clothing, change clothing immediately.
- Never over-fill the fuel tank. Replace gas cap and tighten securely.
- Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.
- If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have dissipated.
- Replace all fuel tank caps and fuel container caps securely.


Maintenance and Storage


- Always observe safe refueling and fuel handling practices when refueling the unit after transportation or storage.
- Always follow the engine manual instructions for storage preparations before storing the unit for both short and long term periods.
- Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
- Never store the machine or fuel container inside where there is an open flame, such as in a water heater. Allow unit to cool before storing.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Keep all hardware, especially blade attachment bolts, tight and keep all parts in good working condition. Replace all worn or damaged decals.
- Never tamper with safety devices. Check their proper operation regularly.
- Disengage drives, lower implement, set parking brake, stop engine and remove key or disconnect spark plug wire. Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean grass and debris from cutting units, drives, mufflers, and engine to prevent fires. Clean up oil or fuel spillage.
- Let engine cool before storing and do not store near flame.
- Stop and inspect the equipment if you strike an object. Repair, if necessary, before restarting.
- Park machine on level ground. Never allow untrained personnel to service machine.
- Use jack stands to support components when required.
- Carefully release pressure from components with stored energy.


	Danger: Fire Hazard - Keep the unit free of grass, leaves and excess oil. Do not add fuel while engine is hot or running. Stop engine and allow to cool for at least 3 minutes prior to adding fuel. Do not add fuel indoors, in an enclosed trailer, garage or other enclosed areas. Clean up spilled fuel. Do not smoke while operating this machine.
	Danger: Thrown Objects - This machine is capable of thrown objects and debris. Keep bystanders away.
	Danger: Dismemberment - This mower deck can amputate limbs. Keep hands and feet away from blades.
	Danger: Carbon Monoxide Poisoning - Do not operate the engine in an unventilated area.
	Danger: Machine Rollover - Operating on steep slopes can cause sliding and loss of steering, control and rollover.
	Danger: Dismemberment - This machine can crush and cut. Keep hands away from belts and pulleys.
	Warning: Hot Surface - Avoid contact with engine and hot surfaces. Wait for unit to cool before touching.


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

Safety Alert Symbol and Signal Words

The safety alert symbol  indicates a potential personal injury hazard. A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to designate a degree or level of hazard seriousness. A safety symbol may be used to represent the type of hazard. The signal word NOTICE is used to address practices not related to personal injury.

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

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

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

NOTICE addresses practices not related to personal injury.

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:

Rotor blades and rotor and gearbox drive belts should come to a complete stop within five (5) seconds after electric PTO switch is turned off (or operator releases the operator presence handles). If rotor and gearbox drive belts does not stop within five (5) 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

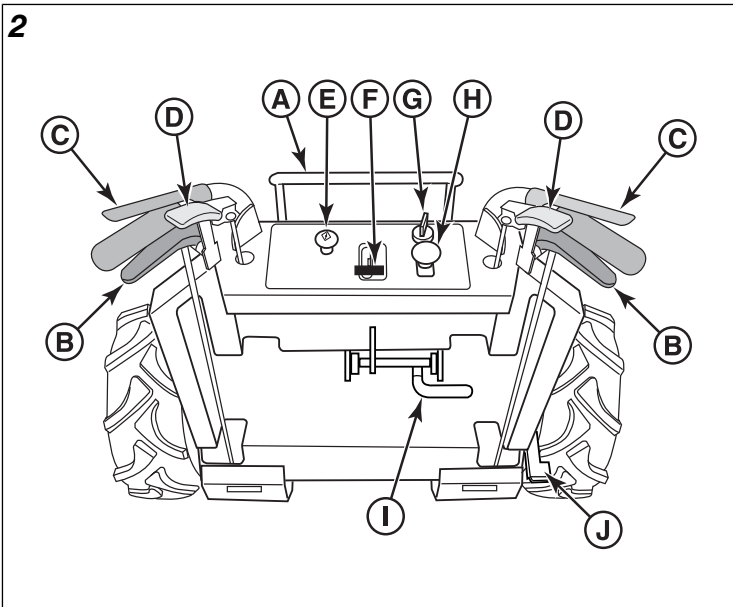
If the unit does not pass a safety test, do NOT operate it. See your authorized dealer. Under no circumstance should you attempt to defeat the purpose of the safety interlock system.

Features and Controls

Control Locations & 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.

Control Locations & Functions - Operator's Position



Callout	Control Name
A	Forward Speed Control Lever
B	Reverse Speed Control Levers
C	Engine Kill / Operator Presence Handles
D	Forward Speed Override Levers
E	Choke
F	Throttle Control
G	Ignition Switch
H	PTO (Power Take Off) Switch
I	Parking Brake
J	Neutral Return Pedal

Forward / Reverse Speed Control Levers

These levers control the ground speed of the mower.

Icon	Control Name
	Forward Speed Control Levers
	Reverse Speed Control Levers

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 *Driving the Mower* section for proper steering instructions.

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.

Forward Speed Override Control Levers

The forward speed override levers were designed to provide increased traction and controllability for operation on slopes and sidehills.

To increase the speed of the left drive tire press the Left Hand Forward Speed Override Lever down.

To increase the speed of the right drive tire press the Right Hand Forward Speed Override Lever down.

Choke

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

Throttle Control

The throttle controls engine speed. Move the throttle forward to increase engine speed and back to decrease engine speed. Always operate at FULL throttle.

Icon	Position
	Fast throttle speed.
	Slow throttle speed.

Ignition Switch

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

Icon	Name	Description
	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.

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.

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.*

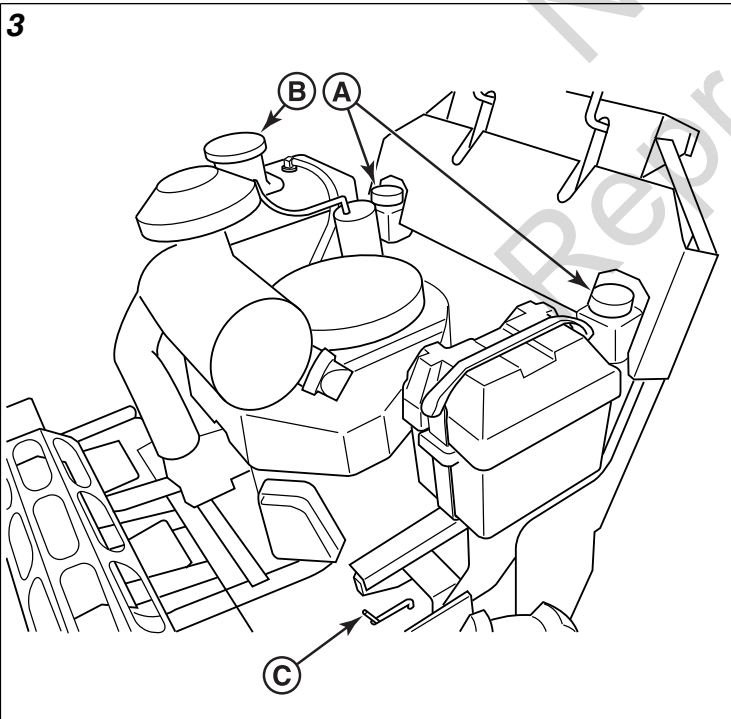
Icon	Name	Description
	Disengage	Releases the parking brake.
	Engage	Locks the parking brake.

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 *Stopping the Mower* section for operating instructions of the neutral return pedal.

Control Locations & Functions - Left Side of Mower



Callout	Control Name
A	Transmission Oil Fill
B	Fuel Tank Cap
C	Transmission Release Levers

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.

Fuel Tank Cap

To remove the cap, turn counterclockwise.

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.

Operation

Before First-Time Use

- 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.
- Operate in an open area without engaging the PTO to become accustomed to the unit.

WARNING

Read the operator's manual before attempting to operate the machine.

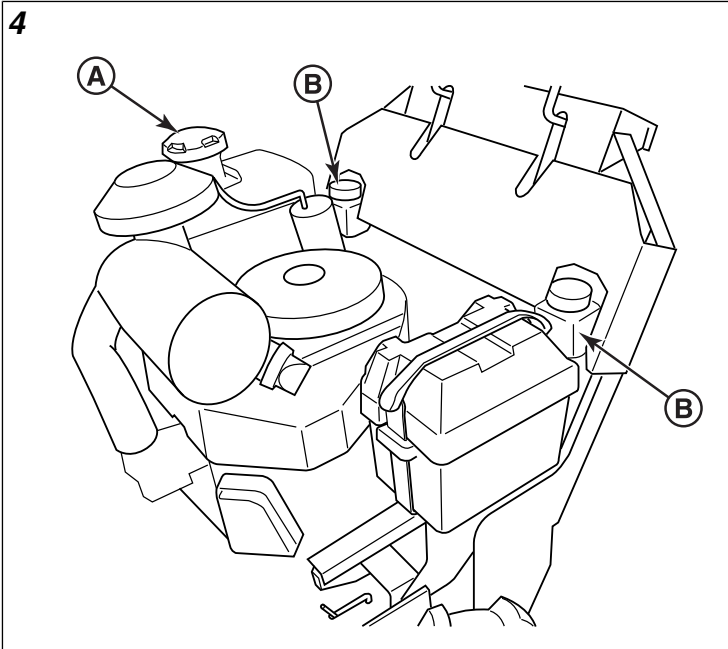
If you do not understand how a specific control functions, or have not yet thoroughly read the Features and Controls section, do so now.

Do not attempt to operate the mower 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 and mower free of grass, leaves and excess grease. Do NOT stop or park unit over dry leaves, grass or combustible materials.
- Gasoline is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do NOT allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

Checks Before Starting



- Check that crankcase is filled to full mark on dipstick. See the engine Operator's Manual for, engine oil dipstick location, oil fill instructions and oil recommendations.
- Make sure all nuts, bolts, screws and pins are in place and tight.
- Fill the fuel tank (A, Figure 4) with fresh fuel. Refer to engine manual for fuel recommendations.
- Check the hydraulic oil tank (B) and make sure that the oil level is up to the FULL COLD mark.

Starting the Engine



WARNING

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

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

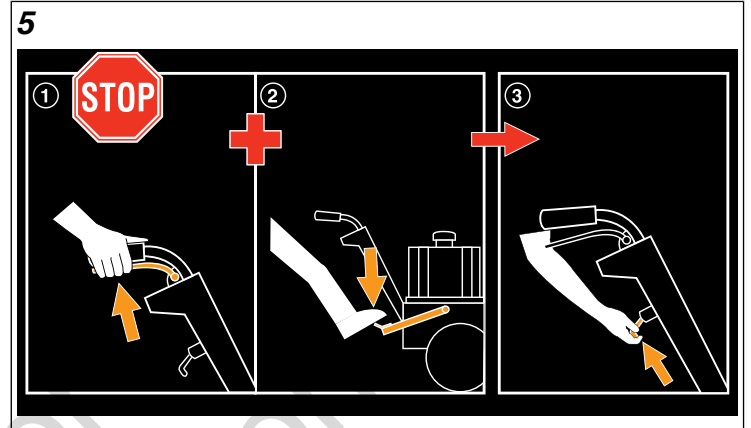
1. Engage the parking brake and make sure the PTO switch is disengaged and the forward speed control lever is in the NEUTRAL position.
2. Set the engine throttle control to FULL throttle position. Then fully close the choke by pulling the knob OUT fully. **NOTE: A warm engine may not require choking.**
3. Insert the key into the ignition switch and turn it to the START position.
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 mower.

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 (inset 1, Figure 5) evenly to stop the unit.



2. Once the unit is stopped, firmly depress the neutral return pedal (inset 2) to place the transmission in neutral.
3. Disengage the PTO by pushing down on the PTO switch.
4. Engage the parking brake (inset 3) 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.

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.

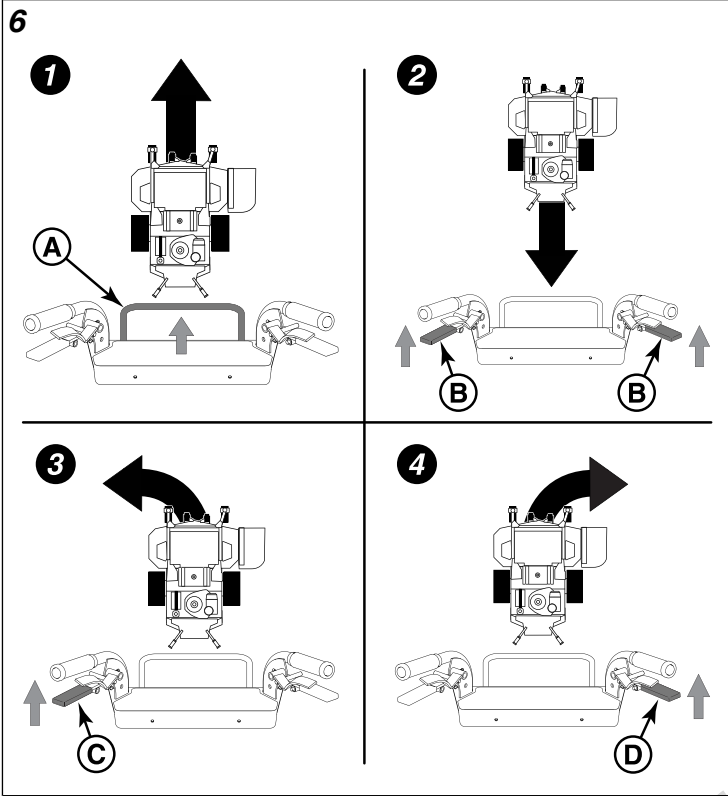
The hydrostatic transmission has an infinite number of speeds between full speed forward and reverse, with the faster speeds being achieved by moving the forward speed control lever and reverse speed control levers farthest in the direction of travel.

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 6, inset 1) forward until desired speed is achieved.



To Move Backward

1. Disengage the parking brake.
2. Gently squeeze both reverse speed control levers (B, inset 2) 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, inset 3). A sharp or gentle turn is determined by the amount of force applied to the steering control lever.

Turning Right:

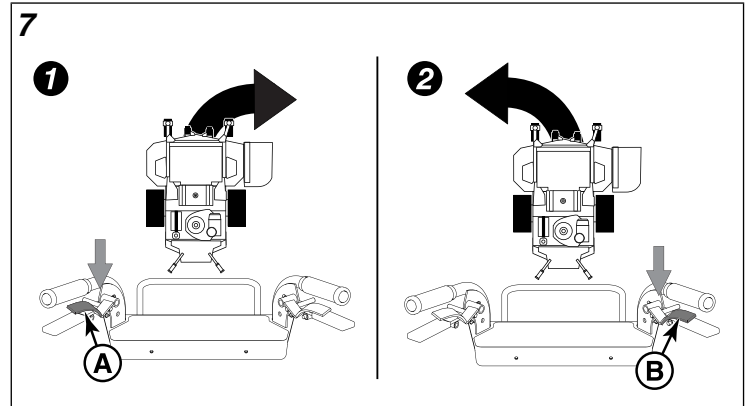
Gently squeeze the right hand reverse speed control lever (D, inset 4). A sharp or gentle turn is determined by the amount of force applied to the steering control lever.

Temporarily Increase Forward Speed

The forward override levers were designed to provide increased traction and controllability for operation on slopes and side hills.

To increase the forward speed to the left hand wheel:

Gently depress the left hand forward speed override lever (A, Figure 7, inset 1) to temporarily increase the speed to the left hand wheel.



To increase the forward speed to the right hand wheel:

Gently depress the right hand forward speed override lever (B, inset 2) to temporarily increase the speed to the right hand wheel.

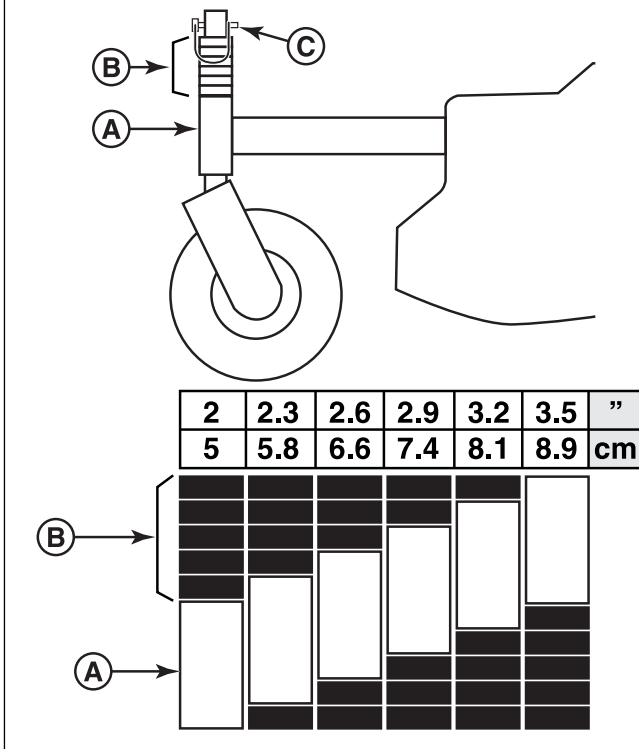
Increase forward movement speed:

Gently depress both forward speed override levers evenly to temporarily increase the forward speed of the machine.

Cutting Height Adjustment

The cutting height is adjustable between 2" and 3-1/2". The mowing height is determined by the number of caster spacers (A, Figure 8) below the caster arm (B).

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1. Park the machine on a flat, level surface such as a concrete floor. Engage the parking brake, disengage the PTO, turn off the engine and remove the ignition keys
2. Use the Cutting Height Adjustment Chart to determine the number and placement of caster spacers necessary for the desired cutting height.

Cutting Height Adjustment	
Cutting Height	Number of Spacers Below Caster Arm
2" (5 cm)	0
2.3" (5.8 cm)	1
2.6" (6.6 cm)	2
2.9" (7.4 cm)	3
3.2" (8.1 cm)	4
3.5" (8.9 cm)	5

3. Have an assistant push down on the handle bars to raise the front end off of the ground.
4. Remove the pin with latch (C) from the caster axle shaft.
5. Position the correct amount of spacers for the desired cutting height below the caster arm and the rest above the caster arm.
6. Reinstall the pin with latch.
7. Repeat the process for the other side of the unit.

Skid Shoe Height Adjustment



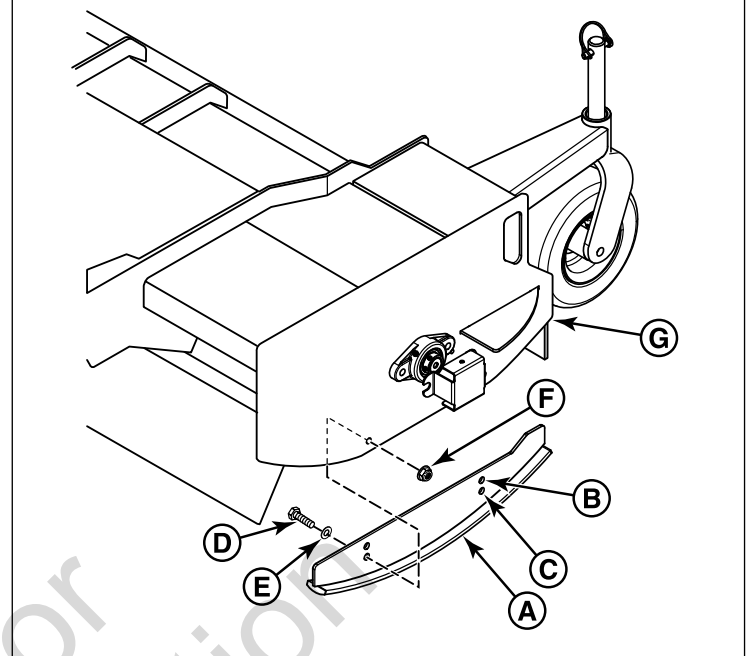
WARNING



Do NOT operate the unit without the skid shoes in place.

There are two sets of holes in the skid shoes (A, Figure 9) that allow the operator to adjust the height of the skid shoes in the rotor housing to their preference.

9



The upper set of holes (B) can be used on smoother ground and while cutting shorter grass.

The lower set of holes (C) can be used on rougher ground and while cutting taller grass.

1. Park the machine on a flat, level surface such as a concrete floor. Disengage the PTO, engage the parking brake, turn off the ignition and remove the ignition key. Disconnect the spark plug wire(s).
2. Remove the two bolts (D), washers (E) and nuts (F) that secure the skid shoe to the rotor housing (G).
3. Reposition the skid plate to the other set of holes in the rotor housing and secure in place using the two bolts, washers and nuts.
4. Repeat process for the other side of the unit.

Mowing

Before mowing, set the cutting height as described in *Cutting Height Adjustment*.

1. Engage the parking brake. Make sure that 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 the switch.
5. Begin mowing.
6. When finished, shut off the PTO by pushing the PTO switch down completely.
7. Stop the engine (see *Stopping the Engine*).

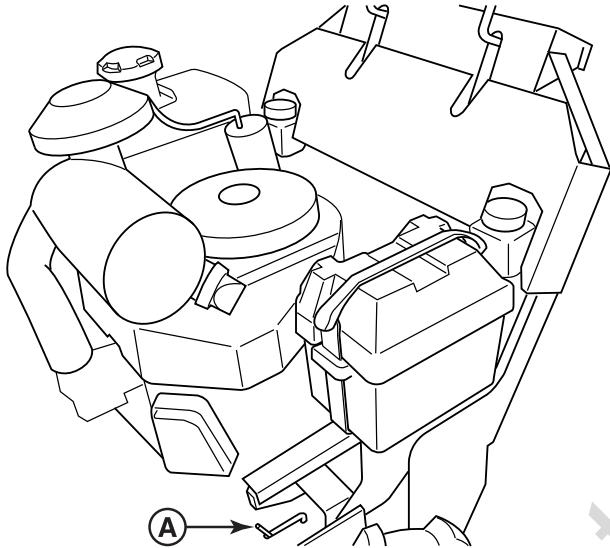
Pushing the Unit by Hand

NOTICE

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

1. Disengage the PTO, engage the parking brake, turn the ignition OFF, and remove the key.
2. Locate the transmission release levers (A, Figure 10) by the rear wheels of the unit.

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3. To disengage the pumps (free-wheel position), pull both transmission release levers back and out (C) 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 (B) to release them from the disengaged position and then allow them to move to the engaged (drive) position.

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.



WARNING

Never store the unit, with gasoline in 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.

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

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

Long Term Storage (Longer Than 30 Days)

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

1. Drain crankcase oil while engine is hot and refill with a grade of oil that will be required when unit is used again.
2. Prepare the mower deck for storage as follows:
 - a.) Remove mower deck from the unit.
 - b.) Clean underside of mower deck.
 - c.) Coat all bare metal surfaces with paint or light coat of oil to prevent rusting.
3. Clean external surfaces and engine.
4. Prepare engine for storage. See engine owner's manual.
5. Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.
6. Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt and insects.
7. Completely grease and oil unit as outlined in the *Lubrication* section.
8. Clean up unit and apply paint or rust preventative to any areas where paint is chipped or damaged.
9. Be sure the battery is filled to the proper level with water and is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. If battery is left in unit, disconnect the negative cable.

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.

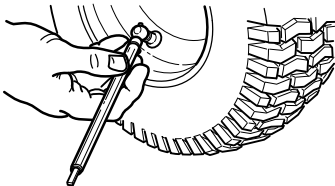
Starting After Long Term Storage

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.

Checking Tire Pressures

Tire pressure should be checked periodically, and maintained at the levels shown in the Specifications chart. Note that these pressures may differ slightly from the "Max Inflation" stamped on the side-wall of the tires. The pressures shown provide proper traction and extend tire life.



Checking / Adding Fuel



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.

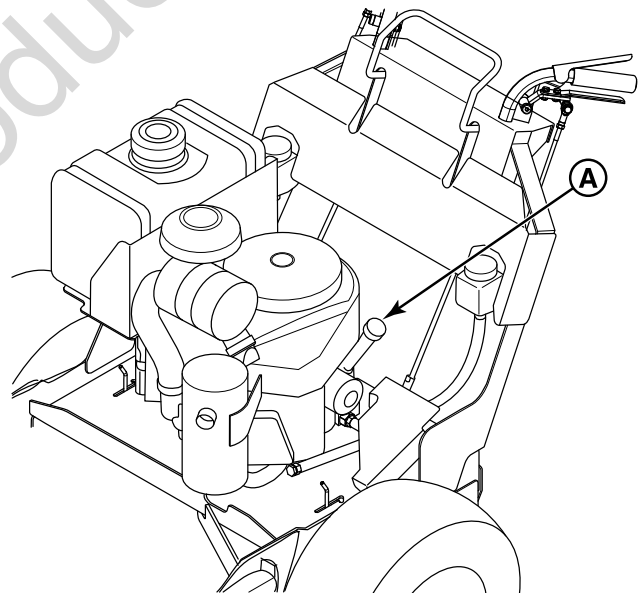
To add fuel:

1. Stop the engine and allow it to cool for at least 3 minutes.
2. Remove the fuel cap.
3. 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.
4. Install and hand tighten the fuel cap.

Check Engine Oil Level

1. Use the dipstick (A, Figure 11) to check the engine oil level. If necessary add engine oil. Refer to the engine manufacturer's owner's manual for oil recommendations.

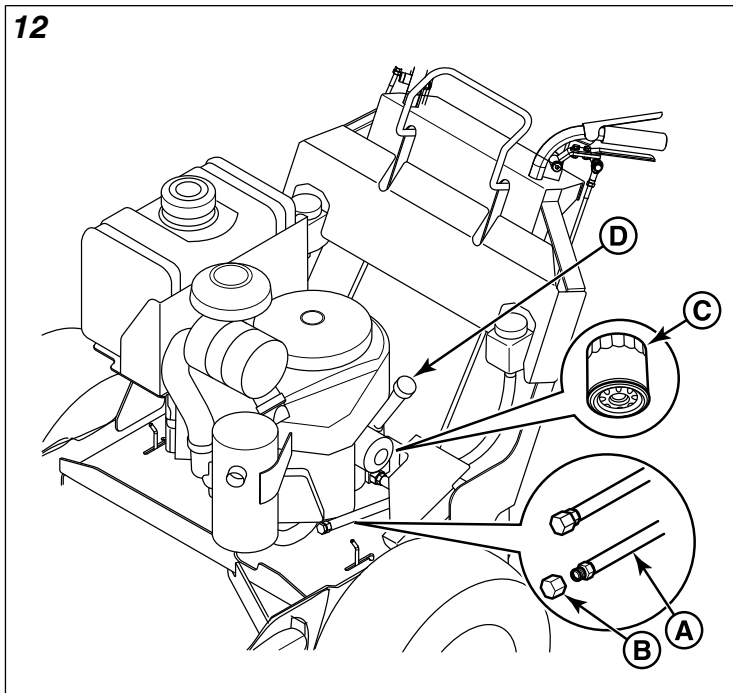
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Change Engine Oil & Filter

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, Figure 12) over the rear end of the engine deck.

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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


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

Service Air Filter

Refer to the engine owner's manual for air filter service instructions.


Lubrication

Lubricate the unit at the locations shown in Figures 1, 1 and 15 as well as the following lubrication points

Grease	
	front caster wheel axles & yokes
	reverse speed control lever pivots
	rotor bearings
	parking brake pivots

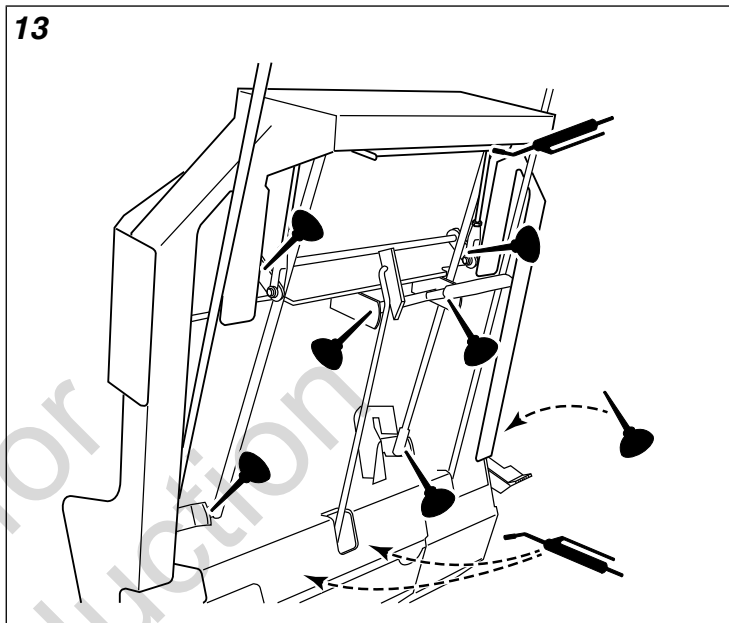
Not all greases are compatible. Red Grease (p/n 5022285) is recommended, automotive-type high-temperature, lithium grease may be used when this is not available.

Oil

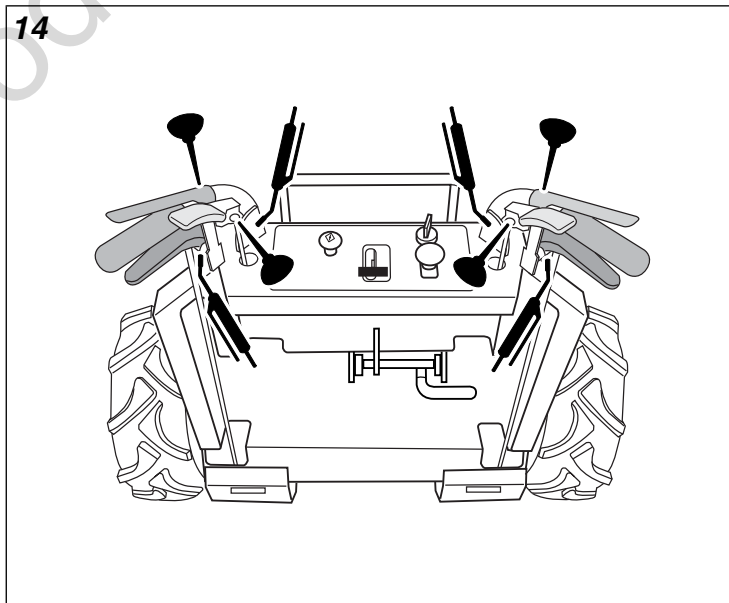
	control handle pivots
	neutral return pedal pivots
	control linkage rods
	parking brake handle pivots.

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.

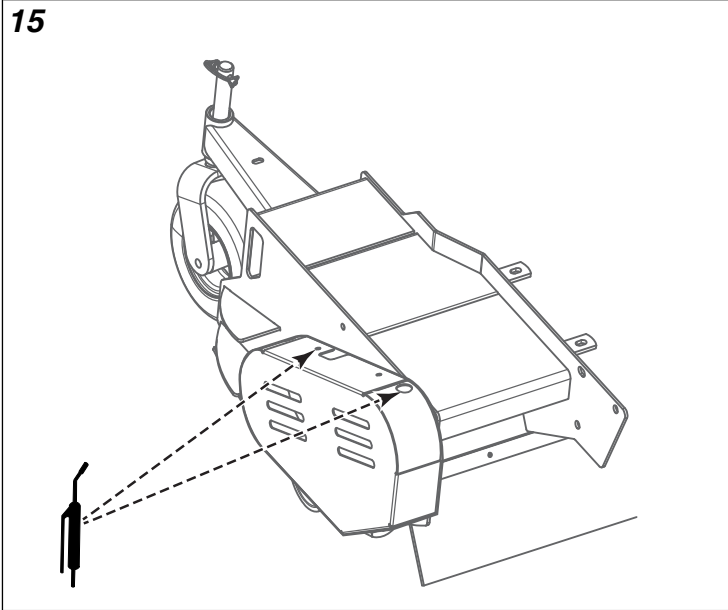
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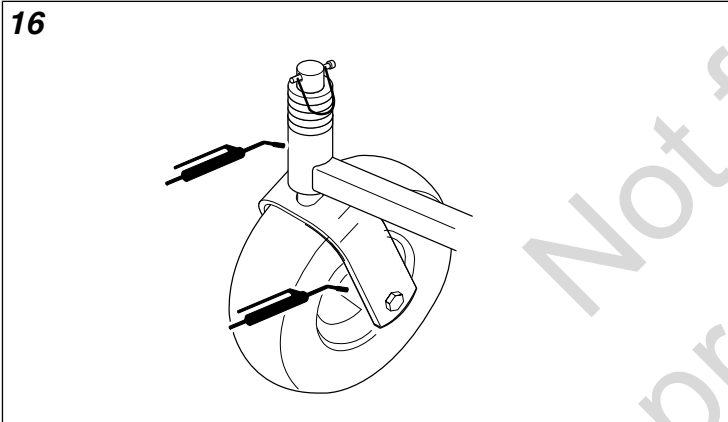
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Lubricating the Front Casters

Interval: Daily

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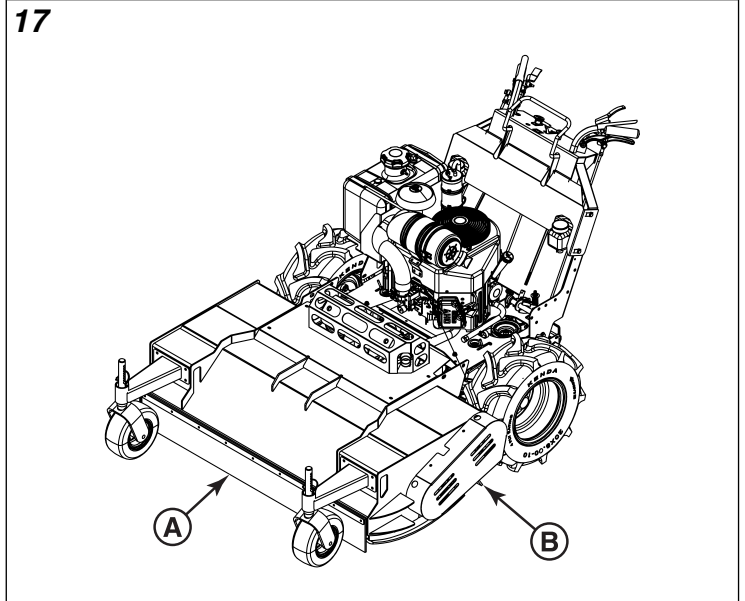


Rubber Discharge Guard Inspection

Interval: The rubber discharge guards should be inspected daily.

Inspect the rear rubber guard (A, Figure 17) and the front rubber guard (B) for wear or damage.

17



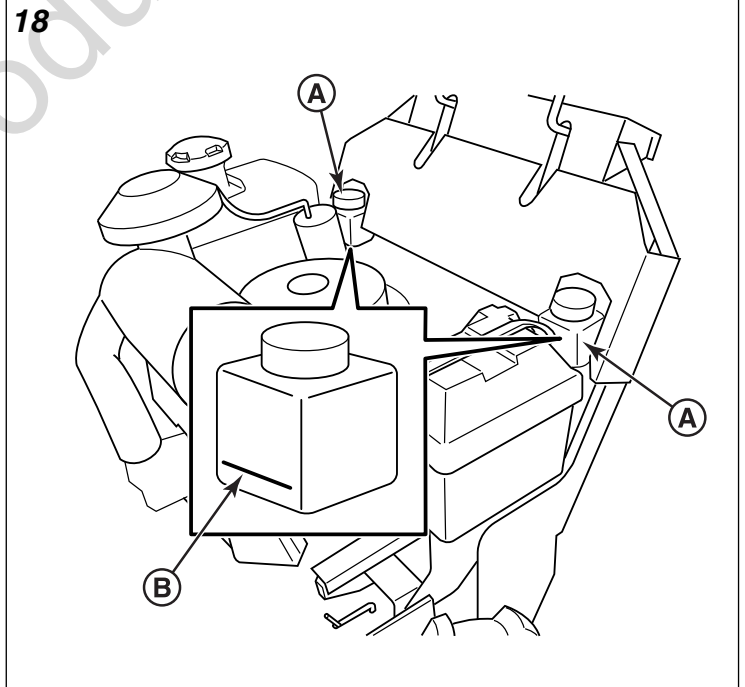
Damaged rubber guards must be replaced to prevent objects from being thrown into the operator's or bystander's area.

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 18) 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.

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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.

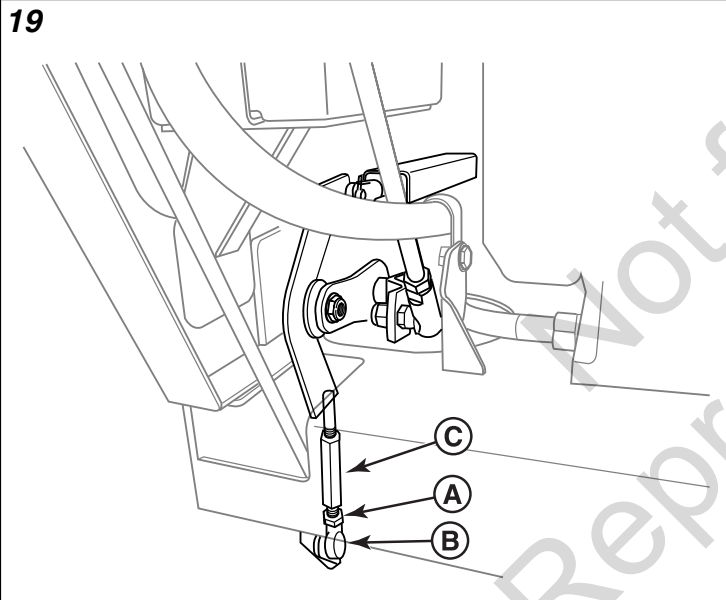
Neutral Adjustment & Tracking Adjustment

If the unit "creeps" while the forward speed control lever is in the neutral position, then it may be necessary to adjust the adjustment linkage rods.

The illustration depicts the left side of the machine.

Neutral Adjustment

1. Park the machine on a flat, level surface such as a concrete floor, away from bystanders and preferably facing a wall. Disengage the PTO, engage the parking brake, turn off the ignition and remove the ignition key.
2. Chock the front caster wheels. Raise the drive wheels off the ground and secure the machine with jackstands.
3. Start the engine and adjust the throttle control to the SLOW position. See *Starting the Engine* section for proper starting instructions.
4. Disengage the parking brake.
5. Loosen the jam nut (A, Figure 19) that is tightened against the ball joint (B).



6. Slowly turn the adjustment linkage rod (C) **clockwise** until the drive tire begins to rotate backwards.
7. Slowly turn the adjustment linkage rod **counter-clockwise** until the drive tire begins to rotate forward.
8. Set the adjustment halfway in between where the forward and backwards rotations begin.
9. Re-tighten the adjustment nut.
10. Perform this adjustment for the other side of the machine.
11. Adjust the throttle control to FULL (highest setting). Cycle the forward speed control lever and the neutral return pedal several times to insure an accurate adjustment has been made. If the unit still creeps, perform the adjustment procedure again. If the unit does not creep, no further neutral adjustments are necessary.

Tracking Adjustment

Before making a tracking adjustment, be sure to check the following:

- Drive tires are properly inflated.
- Caster tires are greased and turn freely.
- All controls are free from damage and operate freely.
- Machine is at full operating temperature.
- Make sure the machine is in neutral when the foot pedal is depressed. If not, adjust neutral as described above.

If machine veers to the LEFT:

1. Loosen the adjustment nut.
2. Turn the LEFT adjustment linkage rod 1/8 - 1/4 turn **counter-clockwise**.
3. Turn the RIGHT adjustment linkage rod 1/8 - 1/4 turn **clockwise**.
4. Re-tighten the jam nut.
5. Drive machine on a flat, level surface to test and repeat steps 1 - 4 as necessary.

If machine veers to the RIGHT:

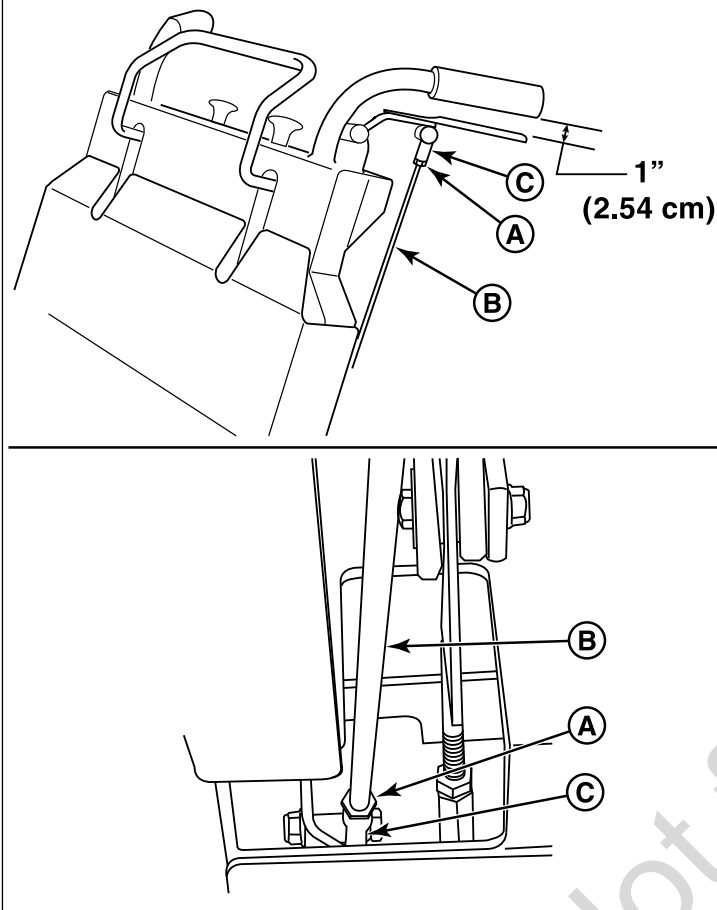
1. Loosen the adjustment nut.
2. Turn the RIGHT adjustment linkage rod 1/8 - 1/4 turn **counter-clockwise**.
3. Turn the LEFT adjustment linkage rod 1/8 - 1/4 turn **clockwise**.
4. Re-tighten the jam nut.
5. Drive machine on a flat, level surface to test and repeat steps 1 - 4 as necessary.

Handle Placement Adjustment

There should be approximately 1" (2.54 cm) of clearance in between the handle bars and the reverse speed control lever when the forward speed control lever is in the neutral position.

To Adjust:

1. Loosen the jam nuts (A, Figure 20) that are located on top and bottom of the reversing linkage rods (B).



The illustration depicts the left side of the unit.

- Adjust the linkage rod: To increase the amount of clearance between the handle bars and the reverse speed control levers, turn the linkage rod (C) **clockwise**. To decrease the amount of clearance between the handle bars and the reverse speed control levers, turn the linkage rod **counter-clockwise**.
- Once the measurement of 1" (2.54 cm) is achieved, tighten the jam nuts against the linkage rod ball joints.
- Repeat the process for the other side of the unit. **Both reverse speed control levers should be adjusted equally.**

Maintenance Schedule

The following schedule should be followed for normal care of your unit. You will need to keep a record of your operating time.

UNIT MAINTENANCE	
Before each use	
Check safety interlock system.	
Check unit brakes.	
Check unit for loose hardware.	
Check hydraulic oil level.	
Check tire pressures.	
Every 25 Hours	

UNIT MAINTENANCE

- Clean debris from under rotor housing.
- Check rotor blades.
- Change hydraulic oil filter.*

ENGINE MAINTENANCE

Before each use

- Check engine oil level.
- Clean visible debris from engine compartment.

Every 50 Hours

- Inspect / Clean spark arrester**.

Every 100 Hours

- Check fuel filter.

Refer to engine owner's manual

- Service air filter.
- Change engine oil and filter.
- Check / Replace spark plugs.

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

**If equipped. Replace if damaged.

Specifications

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

ENGINE

Fits model 5900520

24 Gross HP† Kawasaki

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

†**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	20.00 X 8.00 - 10
Inflation Pressure	15 psi (1.03 bar)
Front Wheels	
Tire Size	9.00 X 3.50 - 4
Inflation Pressure	N/A (Flat Free)

TRANSMISSIONS

LH	ZJ-GMFE-3B5B-1RLX (5102809)
----	-----------------------------

RH	ZJ-KMFE-3C5C-1RLX (5102810)
Type	ZT3100
Hydraulic Fluid	SAE 20W-50 motor oil
Speeds	
Forward	0-7 MPH (0-11.27 km/h)
Reverse	0-3 MPH (0-4.83 km/h)

DIMENSIONS

Overall Length	80" (203 cm)
Overall Width	55" (140 cm)
Height	41" (104 cm)
Weight (aprox.)	811 lbs (368 kg)

Not for
Reproduction

Ferris Industries - a division of Briggs & Stratton Power Products Group, LLC.

Owner's Limited Warranty Information

(Effective 04/28/2004)

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

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

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

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

FERRIS LIMITED WARRANTY

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

Covered Parts

All Mowers

Warranty Period

2-years (24 months) from date of retail purchase by the original purchaser for parts & labor (90 days for rental mowers)
(Except as noted below*)

*Belts, Tires, Brake Pads
And Hoses, Battery, Blades

90 days from date of retail purchase by the original purchaser

*Attachments

1 year from date of retail purchase by the original purchaser

*Engine

If the engine manufacturer provides any warranty on the mower's engine, Ferris will assign that warranty to the original purchaser of the mower if such assignment is reasonably practicable. Please refer to the engine manufacturer's warranty statement, if any, that is included in the owner's packet. We are not authorized to handle warranty adjustments or repairs on engines. Ferris offers **NO WARRANTY** on mower engines. Ferris does not guarantee or represent that any engine manufacturer will comply with the terms of its warranty.

Items and Conditions Not Covered

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

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

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