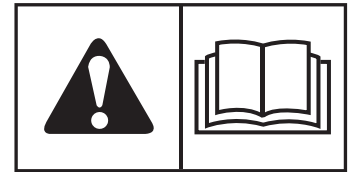




OPERATOR'S MANUAL

Comfort Control DD Series

Walk-Behind Mowers



Tractor:

Model Number:

5900633
5900635
5900637
5900638
5900972

Description

CCWKAV19,
CCWKAV25,
CCWKAV19CE,
CCWKAV25CE,
CCWKAV26,

Combo Models:

Model Number:

5900677
5900678
5900679
5900680
5900688
5900689
5900727
5900973
5900974
5900975
5900976
5900552
5900553
5900555
5900554

Description

CCWKAV1948
CCWKAV1952
CCWKAV2552
CCWKAV2561
CCWKAV1948CE
CCWKAV2552CE
CCWKAV1948SDCE
CCWKAV2652
CCWKAV2661
CCWKAV2048
CCWKAV2052
CCWKAV2148
CCWKAV2152
CCWKAV2452
CCWKAV2461

Mower Deck:

Model Number:

5900636
5900644
5900645
5900646
5900647

Description

CCW/48, 48" Cut
CCW/52, 52" Cut
CCW/61, 61" Cut
CCW/48CE, 48" Cut
CCW/52CE, 52" Cut

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

This manual contains safety information to make you aware of the hazards and risks associated with this machine and how to avoid them. This machine is designed and intended to be used and maintained according to the manual and operated by trained professionals for finish cutting of established lawns and is not intended for any other purpose. It is important that you read and understand these instructions thoroughly before attempting to start or operate this equipment. **Save these original instructions for future reference.**

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

See Features & Controls Section for the location of Identification Numbers

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 Milwaukee, WI, USA.

Contact Information:

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

 **WARNING**

Engine exhaust from this product contains chemicals known by 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 or other reproductive harm. Wash hands after handling.

Table of Contents

Safety Rules & Information	2
Identification Tags	8
Safety Decals	9
Safety Interlock System	10
Safety Icons	11
Features & Controls	12
Control Functions (S/N: 2013964104 & Below)	12
Control Functions (S/N: 2013964105 & Above)	14
Operation	
General Operating Safety	16
Checks Before Starting	16
Starting the Engine	17
Stopping the Mower	17
Driving the Mower	18
Mowing	20
Mowing Recommendations	20
Mowing Methods	21
Pushing the Mower by Hand	22
Storage	23
Starting After Long Term Storage	23
Regular Maintenance	
Maintenance Schedule	24
Checking Tire Pressures	25
Checking/Adding Fuel	25
Fuel Filter	25
Oil & Filter Change	25
Check Hydraulic Oil Level	26
Check / Change Air Filter	26
Lubrication	27
Cleaning the Battery and Cables	28
Servicing the Mower Blades	29
Troubleshooting, Adjustments & Repair	
Troubleshooting the Mower	30
Troubleshooting the Mower Deck	31
Troubleshooting Common Cutting Problems	32
Mowing Height Adjustment	33
Deck Lift Rod Timing Adjustment	33
Deck Leveling Adjustment	34
Mower Belt Replacement	35
Transmission Drive Belt Replacement	37
Transmission Neutral & Tracking Adjustments	38
Transmission Maintenance & Service	39
Battery Service	40
Specifications	42
Slope Identification Guide	43

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.

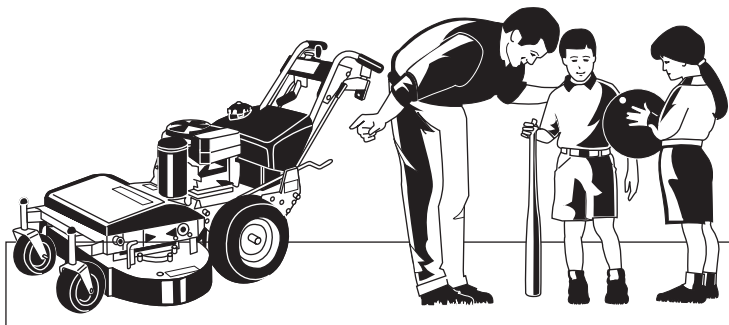
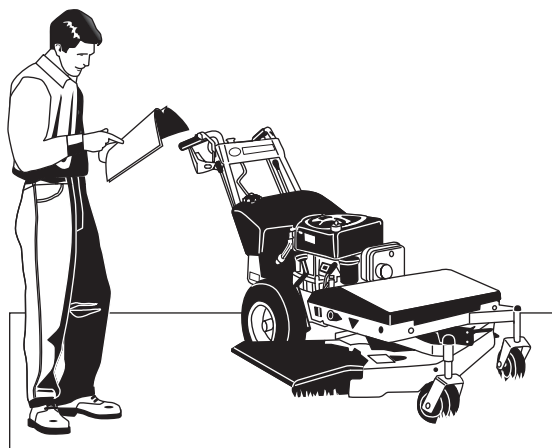
Use common sense, and think through what you are doing. If you are not sure that the task you are about to perform can be safely done with the equipment you have chosen, ask a professional: contact your local authorized dealer.

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.)

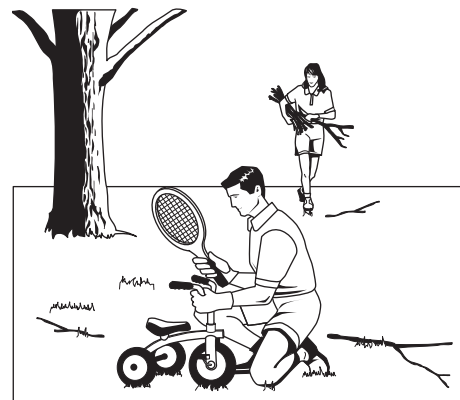
Also, note that the surface you are on can greatly impact your ability to safely operate this machine. Wet grass or soft soil can seriously affect your footing and traction of the unit. Do not operate on slopes that are slippery, wet, or have soft soil.

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.

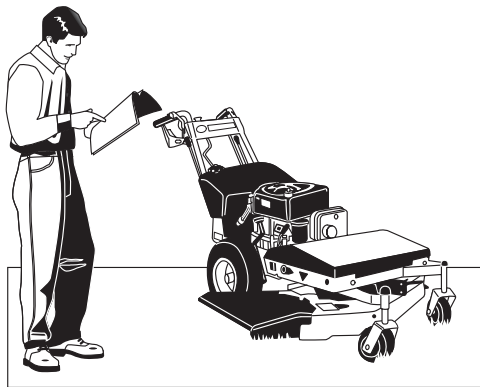
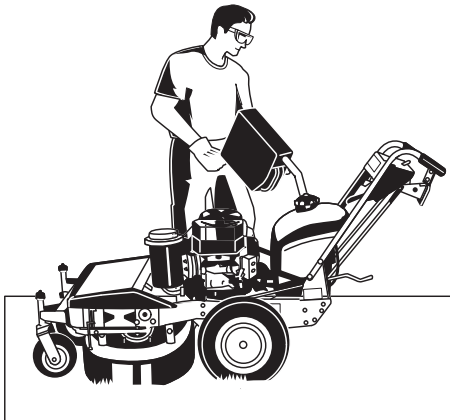


Moving Parts

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.

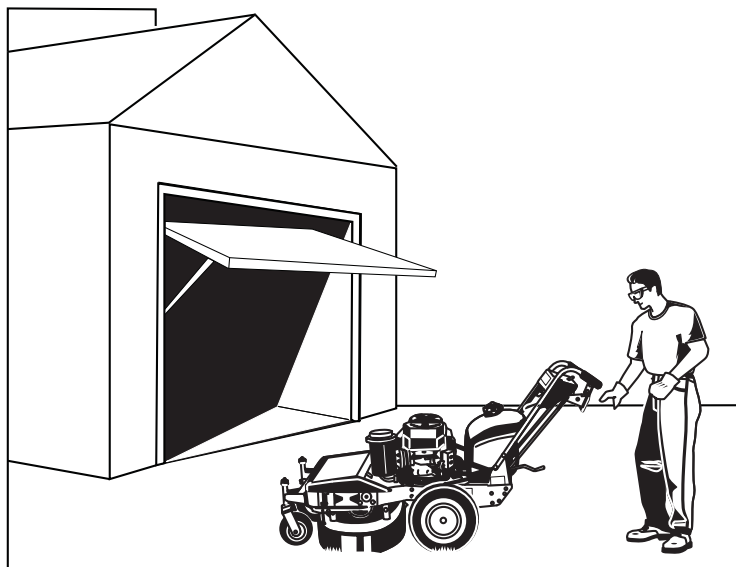
Do not add fuel indoors, in an enclosed trailer, garage or other enclosed area that is not well ventilated. Gasoline spills should be cleaned up promptly and before operation begins.

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,

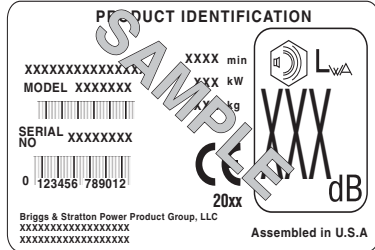
mufflers, and engine to prevent fires. Clean up oil or fuel spillage.

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.

Identification Numbers



North American Models



CE Models

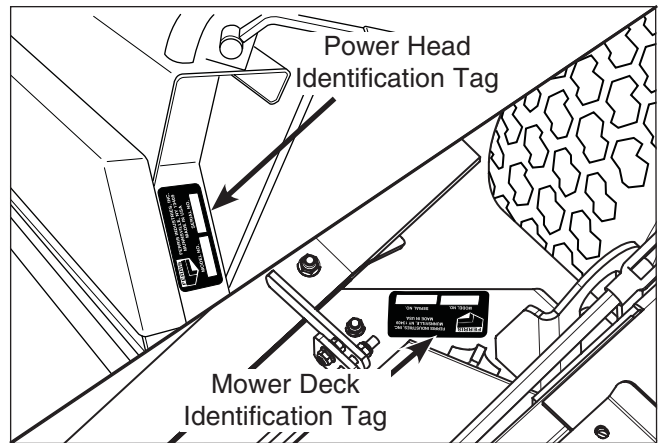


Fig. 1 Location of Identification Tags.

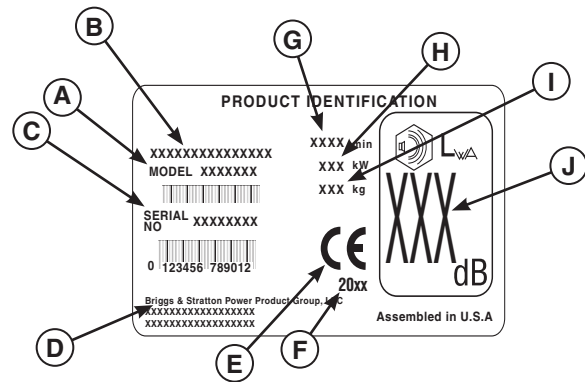
When contacting your authorized dealer for replacement parts, service, or information you **MUST** have these numbers.

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 the engine owner's manual.

CE IDENTIFICATION TAG MARKINGS

- 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 in Kilograms
- J. Sound Power in Decibels*



This unit complies with European Harmonized Lawn Mower Standard EN 836, European Machinery Directive 2006/42/EC, and European EMC Directive 2004/108/EEC

* Tested according to 2000/14/EC

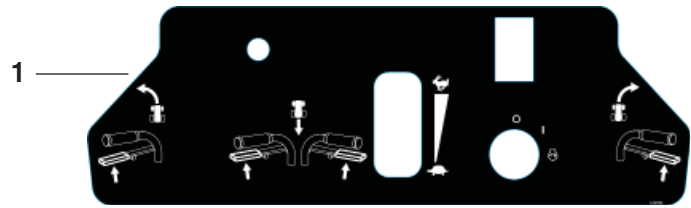
SAFETY DECALS

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 the safety decals.

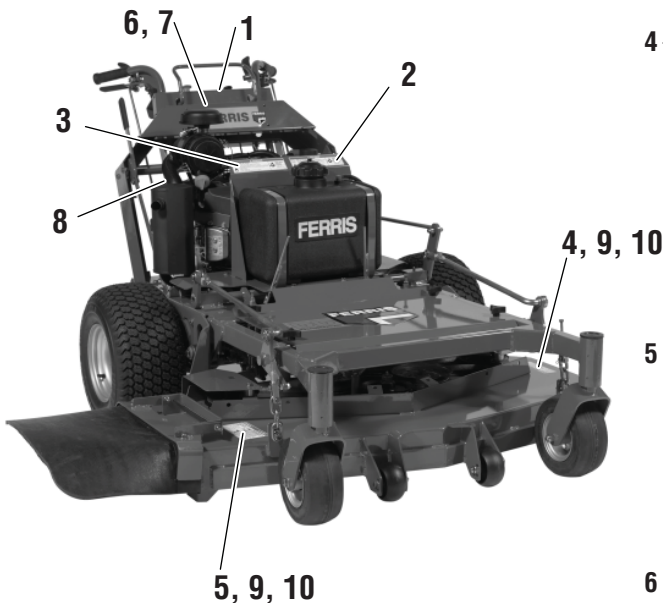
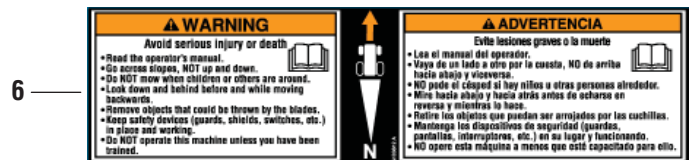
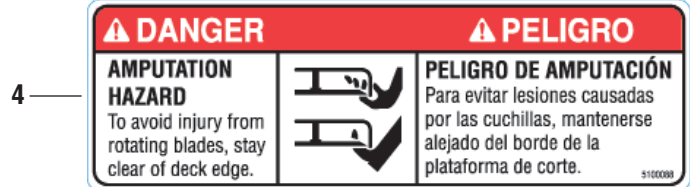
⚠️ WARNING

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

ALL MODELS



NORTH AMERICAN MODELS



CE MODELS (EXPORT)



This decal is installed on the battery for CE models only.



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
- Motion control handle is not in the NEUTRAL position

Test 2 — Engine SHOULD crank if:

- PTO switch is NOT engaged, AND
- Parking brake is engaged, AND
- Motion control handle is in the NEUTRAL position

Test 3 — Engine should SHUT OFF if:

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

Test 4 — Blade Brake Check

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


NOTE: Once the engine has stopped, PTO switch must be turned off, parking brake must be engaged, and the motion control handle must be returned to the NEUTRAL position in order to start the engine.



WARNING

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

Safety Icons

The alert symbol  is used to identify safety information about hazards that can result in personal injury. A signal word (DANGER, WARNING, or CAUTION) is used with the alert symbol to indicate the likelihood and the potential severity of the injury. In addition, a hazard icon may be used to represent the type of hazard. An explanation of hazard levels and icons are as follows:

DANGER

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

WARNING

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

CAUTION

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

CAUTION or NOTICE

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

NORTH AMERICAN SAFETY ICONS

Hazard	Safety Icon	Hazard	Safety Icon
Alert		Amputation Foot in Blade	
Toxic Fumes		Thrown Objects	
Read the Manual		Maintain a safe distance	
Open flame hazard		Keep children away	
Fire Hazard		Hot surface	
Amputation Rotating Parts		Wear Protective Gear	
Amputation Hand in Blade		Pinch Point	

CE SAFETY ICONS

Warning: Read Operator's Manual.

Read and understand the Operator's Manual before using this machine.



Danger: Thrown Objects.

This machine is capable of throwing objects and debris. Keep bystanders away.



Warning: Remove Key Before Servicing.

Remove the key and consult technical literature before performing repairs or maintenance.



Danger: Machine Rollover.

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



Danger: Machine Rollover.

Do not operate on any slopes when wet or slippery. Do not operate near drop-offs or near water.



Danger: Dismemberment.

This machine can amputate limbs. Keep bystanders and children away when engine is running.



Danger: Dismemberment.

This mower deck can amputate limbs. Keep hands and feet away from blades.



Danger: Dismemberment.

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



Danger: Dismemberment.

This machine can crush and cut. Keep hands away from deck lift rod.



Danger: Carbon Monoxide Poisoning.

Do not operate the engine in an unventilated area.



Danger: Fire Hazard.

Keep 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.



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.



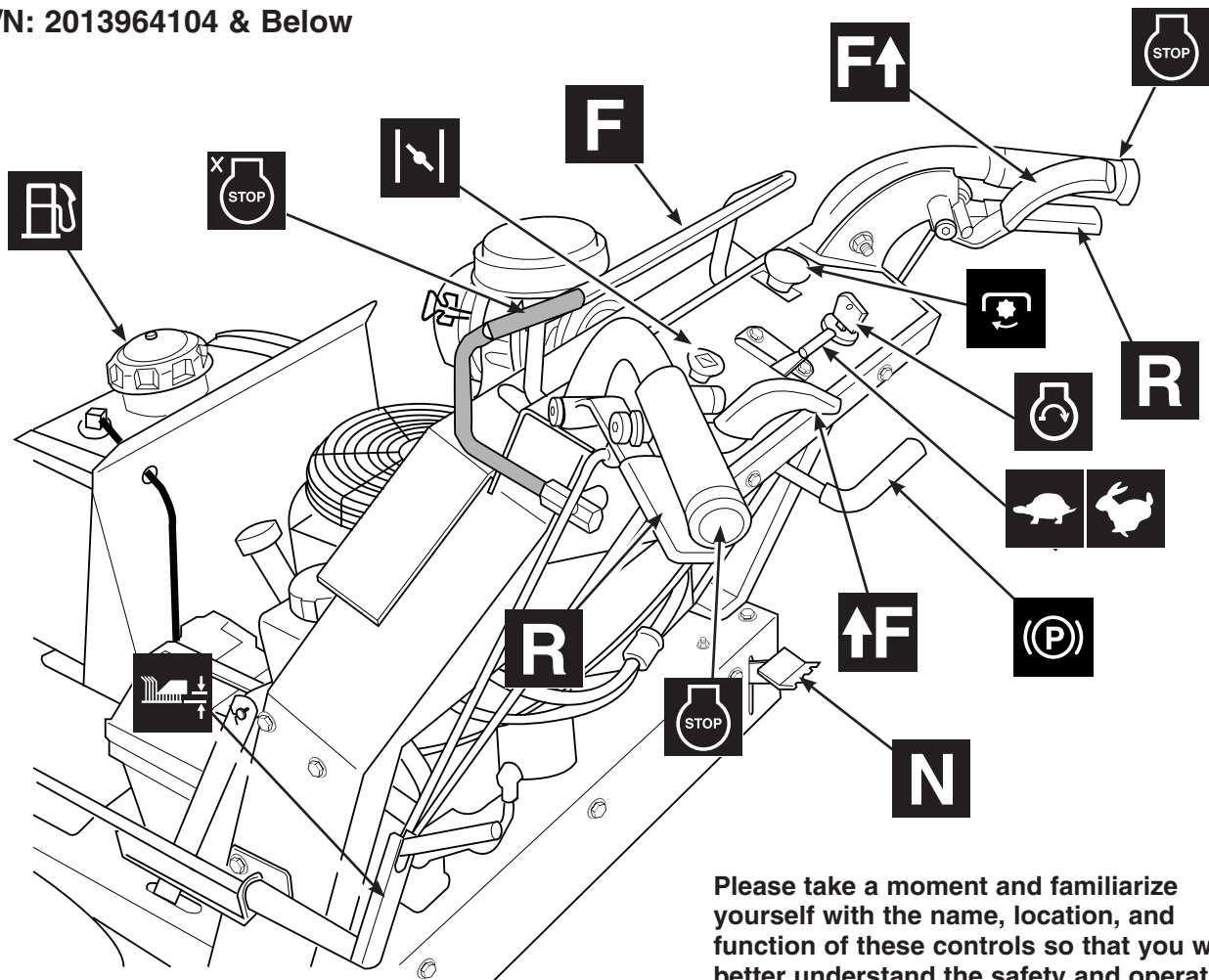
Important: Do not discard a battery in the trash

Contact local authorities for disposal and/or recycling of batteries.



Features & Controls

S/N: 2013964104 & Below



Please take a moment and familiarize yourself with the name, location, and function of these controls so that you will better understand the safety and operating instructions provided in this manual.

CONTROL FUNCTIONS

The information below briefly describes the function of individual controls. Starting, stopping, driving, and moving 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 lever control the forward ground speed of both drive wheels.

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

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

See the Operation section for steering instructions.

F↑ Left Hand Forward Speed Override Lever

F↑ Right Hand Forward Speed Override Lever




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.

Ignition Switch

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

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

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

Parking Brake Handle

The parking brake is released by pushing DOWN on the parking brake handle until it stops. To engage the parking brake, pull UP on the handle until it locks over center.

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.

Engine Kill/Operator Presence Handles

These handles are a major factor in the safety interlock system of the mower. The handles are sensitive to touch, and if you release the handles while operating the machine, the machine will stall. The operator must be touching the handles in order to deactivate the engine kill system. The operator must be in the operator's area touching the handles to engage the Engine Kill / Operator Presence Handles before disengaging the parking brake and engaging the PTO switch. Also, see Auxillary Engine Kill/Operator Presence Lever.

Throttle Control

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

Choke

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

Neutral Return Pedal

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

See the Operation section for steering instructions.

Fuel Tank Cap

To remove the cap, turn counterclockwise.

Cutting Height Adjust Handle

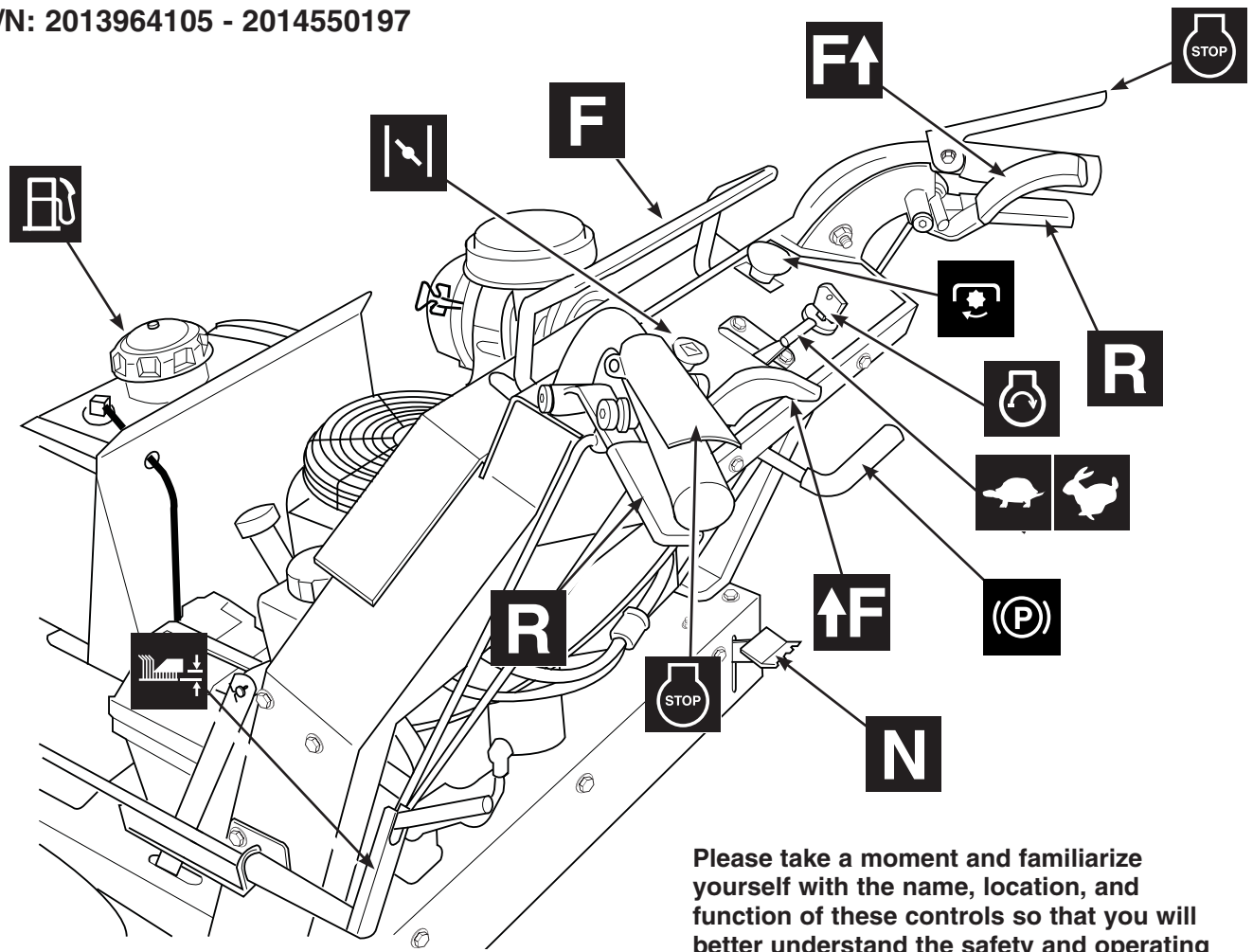
The Cutting height adjust handle controls the mower cutting height. To adjust the mower cutting height, turn the crank handle clockwise to raise the cutting height. Turn the crank handle counterclockwise to lower the cutting height.

Auxillary Engine Kill/Operator Presence Lever

This lever is a major factor in the safety interlock system of the mower. The engine kill/operator presence handles are sensitive to touch, and if you wear gloves while operating this machine, the handles may not detect your presence. The operator must be touching the handles or have the auxillary lever depressed in order to deactivate the engine kill system. The operator must be in the operator's area touching the handles or depress the auxillary lever to engage the Engine Kill / Operator Presence Safety System before disengaging the parking brake and engaging the PTO switch.

Features & Controls

S/N: 2013964105 - 2014550197



Please take a moment and familiarize yourself with the name, location, and function of these controls so that you will better understand the safety and operating instructions provided in this manual.

CONTROL FUNCTIONS

The information below briefly describes the function of individual controls. Starting, stopping, driving, and moving 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 lever control the forward ground speed of both drive wheels.

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

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

See the Operation section for steering instructions.

F↑ Left Hand Forward Speed Override Lever

F↓ Right Hand Forward Speed Override Lever

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.

Parking Brake Handle

The parking brake is released by pushing **DOWN** on the parking brake handle until it stops. To engage the parking brake, pull **UP** on the handle until it locks over center.

Engine Kill/Operator Presence Handles

These handles are a major factor in the safety interlock system of the mower. The handles are not tied together, but the safety switches are, so depressing one handle will operate the safety interlock system. 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.

Throttle Control

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

Choke

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

Neutral Return Pedal

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

See the Operation section for steering instructions.

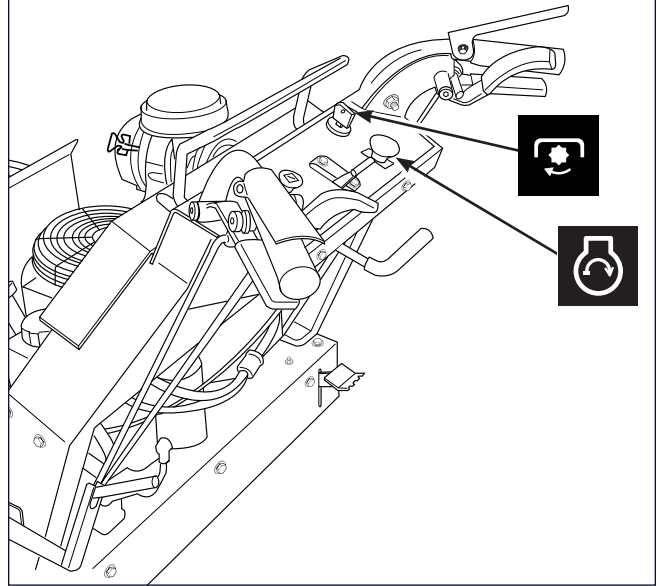
Fuel Tank Cap

To remove the cap, turn counterclockwise.

Cutting Height Adjust Handle




The Cutting height adjust handle controls the mower cutting height. To adjust the mower cutting height, turn the crank handle clockwise to raise the cutting height. Turn the crank handle counterclockwise to lower the cutting height.

S/N: 2014550198 & Above



Ignition Switch

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

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

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

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.

GENERAL OPERATING SAFETY

Before first time operation:

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

WARNING

Before leaving the operator's position for any reason, engage the parking brake, disengage the PTO, stop the engine and remove the key. To reduce fire hazard, keep the engine, tractor and mower free of grass, leaves and excess grease. Do not stop or park tractor over dry leaves, grass or combustible materials. Gasoline is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills.

CHECKS BEFORE STARTING

- Check that crankcase is filled to full mark on dipstick (B, Figure 2). See the engine Operator's Manual for instructions and oil recommendations.
- Make sure all nuts, bolts, screws and pins are in place and tight.
- Fill the fuel tank (A) with fresh fuel. Refer to engine manual for fuel recommendations.
- Check the hydraulic oil tank (C) and make sure that the oil level is up to the FULL COLD mark.

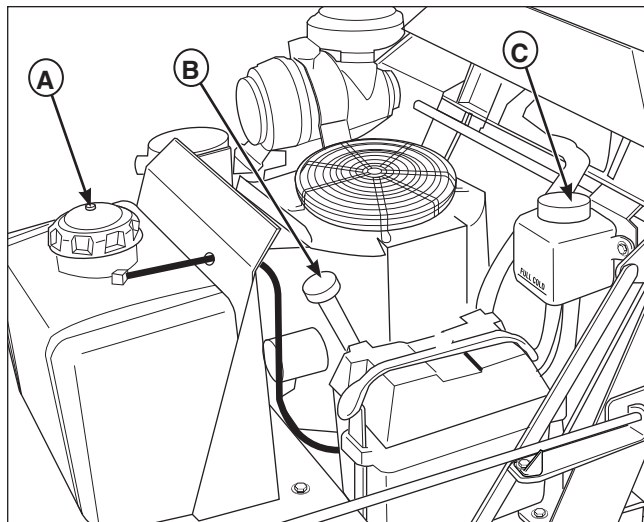


Figure 2. Pre-start Checks

- A. Fuel Tank Filler Neck**
- B. Crankcase Oil Fill**
- C. Hydraulic Oil Fill**

 **WARNING**

If you do not understand how a specific control functions, or have not yet thoroughly read the **FEATURES & CONTROLS** section, do so now. Do **NOT** attempt to operate the tractor without first becoming familiar with the location and function of **ALL** controls.

STARTING THE ENGINE

1. Engage the parking brake and make sure the PTO switch is disengaged and the motion 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 steering control levers evenly to stop the machine.
3. Once the machine is stopped, firmly depress the neutral return pedal to place the transmissions in neutral.
2. Disengage the PTO by pushing down on the PTO switch.
3. Engage the parking brake by pulling the handle up and back until it stops.
4. Move the throttle control to mid-throttle position and turn the ignition key to OFF. Remove the key.

DRIVING THE MOWER

NOTE: 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 steering 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 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 blade engagement switch in the "OFF" position until you are familiar with the controls.

TO MOVE FORWARD AND SET FORWARD SPEED (See Figure 3.)

1. Disengage the parking brake.
2. Gently move the forward speed control lever (A, Figure 3) forward until desired speed is achieved.

TO MOVE BACKWARD (See Figure 4.)

1. Disengage the parking brake.
2. Gently squeeze both reverse steering control levers (A, Figure 4) evenly, until desired speed is achieved.

TO SLOW OR STOP MACHINE

1. Gently squeeze both steering control levers evenly to slow the machine.
2. Continuing to squeeze the steering 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 steering control levers after the machine is stopped, will cause the machine to move in reverse.

TO TURN MACHINE

NOTE: ALWAYS REDUCE SPEED IN A TURN.

To make a left-hand turn (See Figure 5):

Gently squeeze the left hand steering control lever (A, Figure 5). A sharp or gentle turn is determined by the amount of force applied to the steering control lever.

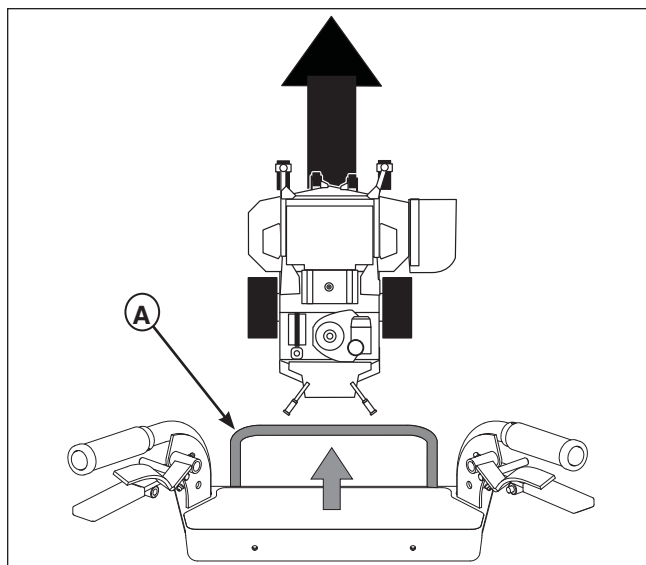


Figure 3. Forward Travel.
A. Forward Speed Control Lever

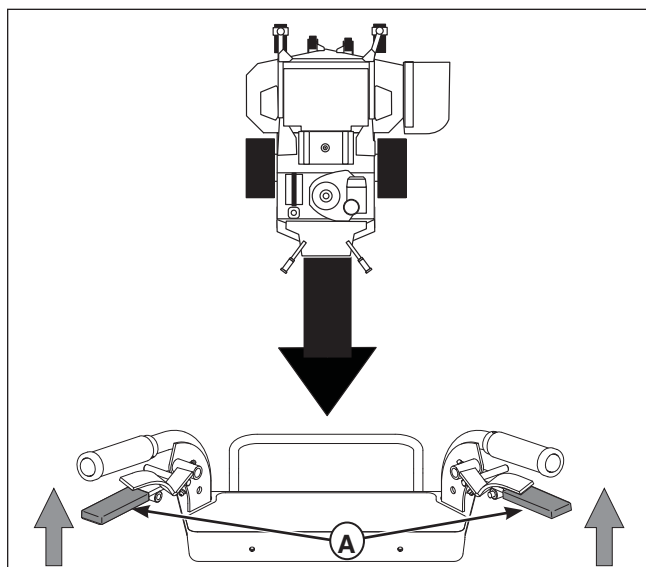


Figure 4. Reverse Travel.
A. Reverse Steering Control Levers

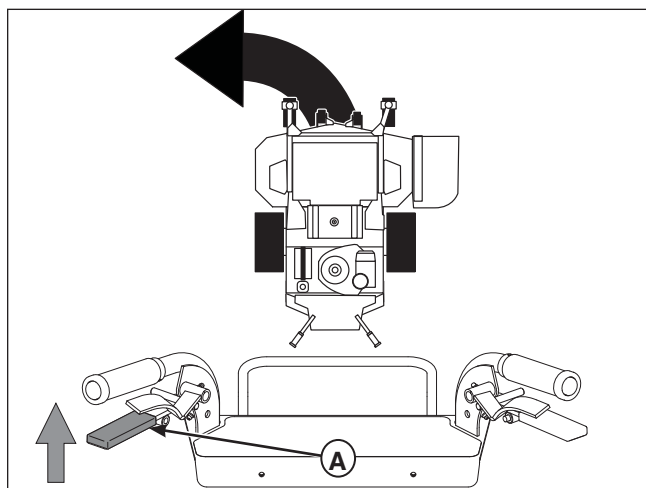


Figure 5. Left Turn Travel.
A. Left Hand Steering Control Lever

To make a right-hand turn (See Figure 6):

Gently squeeze the right hand steering control lever (A, Figure 6). A sharp or gentle turn is determined by the amount of force applied to the steering control lever.

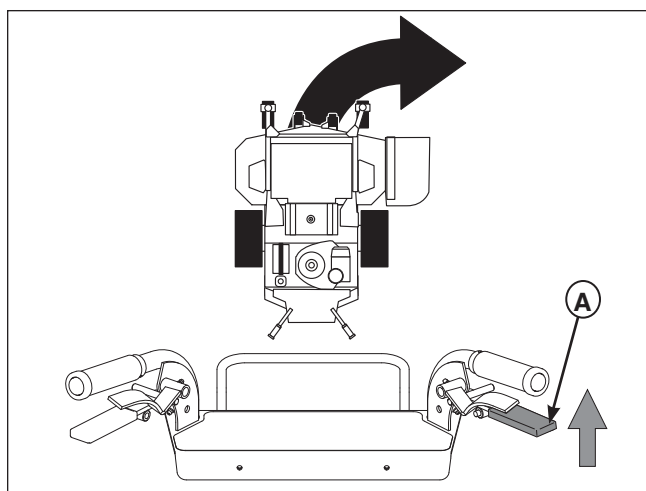


Figure 6. Right Turn Travel.
A. Right Hand Steering Control Lever

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 (See Figure 7):

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

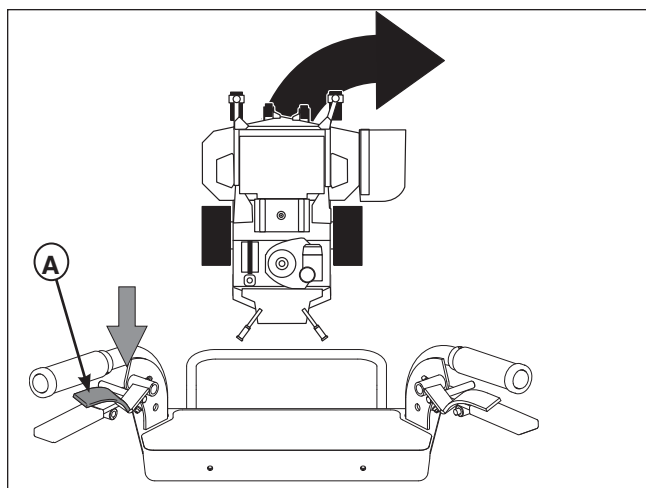


Figure 7. Increase Speed To The Left Wheel.
A. Left Hand Forward Speed Override Lever

To increase the forward speed to the right hand wheel (See Figure 8):

Gently depress the right hand forward speed override lever (A, Figure 8) 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.

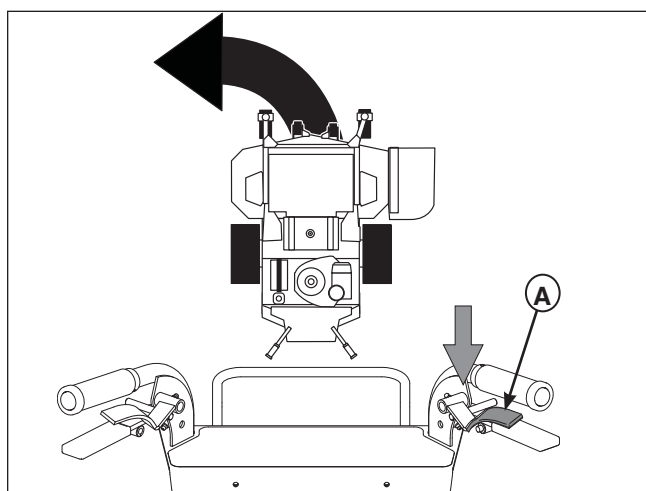
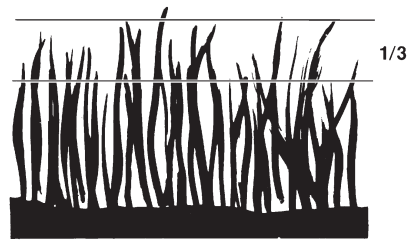


Figure 8. Increase Speed To The Right Wheel.
A. Right Hand Forward Speed Override Lever

MOWING

Before mowing, set the cutting height as described in the *Troubleshooting, Adjustments & Repair* section.

1. Engage the parking brake. Make sure the PTO switch is disengaged and the motion 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.
6. When finished, shut off the PTO.
7. Stop the engine (see STOPPING THE TRACTOR AND ENGINE).



MOWING RECOMMENDATIONS

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

Height of Grass

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

Cutting the grass too short causes weak, thin grass plants, which are easily damaged by dry periods and pests. Cutting too short is often more damaging than allowing the grass to be slightly higher.

Letting grass grow a bit longer—especially when it is hot and dry—reduces heat build-up, preserves needed moisture and protects the grass from heat damage and other problems. However, allowing grass to grow too high can cause thin turf and additional problems.

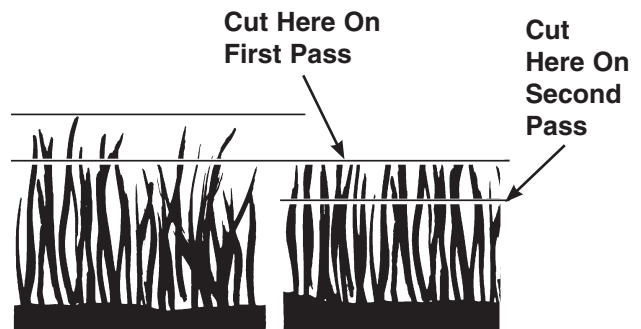
Cutting off too much at one time shocks the plant's growth system and weakens the grass plants. **A good rule of thumb is the 1/3 rule: to cut no more than one third of the grass height, and never more than 1 inch at a time.**

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

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

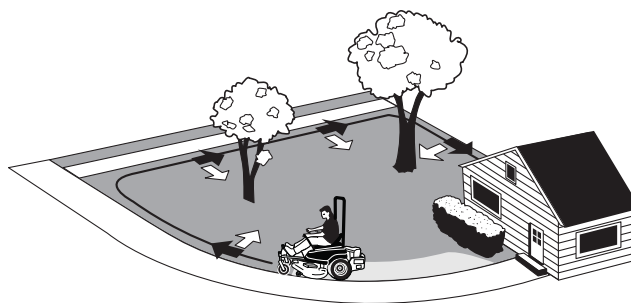
Always start mowing on a smooth, level area.

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.

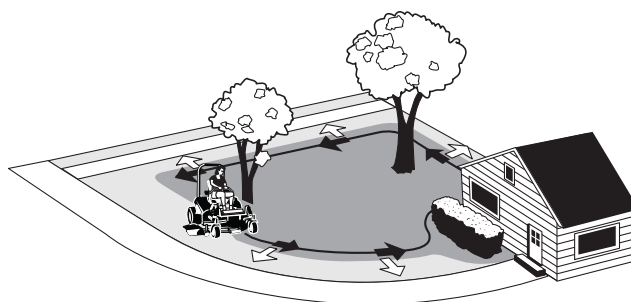
1. Cut long straight strips overlapping slightly.
2. Where possible, change patterns occasionally to eliminate matting, graining or a corrugated appearance.
3. For a truly professional cut, mow across the lawn in one direction, then recut the lawn by mowing perpendicular to the previous cut.

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.

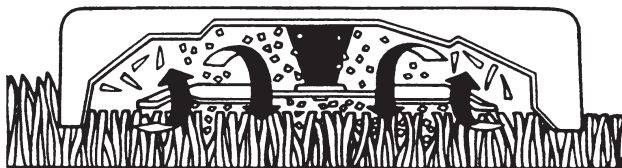
Do not use the mower as a mulching mower during the first two or three mowings in the spring. The long grass blades, quick growth, and often wetter conditions are more suitable for broadcasting (side-discharging) or grass bagging operation.

ENGINE SPEED & GROUND SPEED FOR BROADCASTING

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

HOW MUCH GRASS TO MULCH

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



PUSHING THE MOWER BY HAND



DO NOT TOW MACHINE

Towing the machine will cause hydraulic transaxle damage. Do not use another vehicle to push or pull this unit.

1. Disengage the PTO, engage the parking brake, turn the ignition OFF, and remove the key.
2. To disengage the transmissions (free-wheel position), lift the hydraulic release levers (A, Figure 9) located in front of the gas tank. Lock into position shown in Figure 9.
3. Disengage the parking brake.
The mower can now be pushed by hand.
4. After moving the mower, re-engage the transmissions (drive position) by unlocking the levers and returning them to the down position. If the levers are not completely down, a partial by-pass may potentially damage the transmissions.

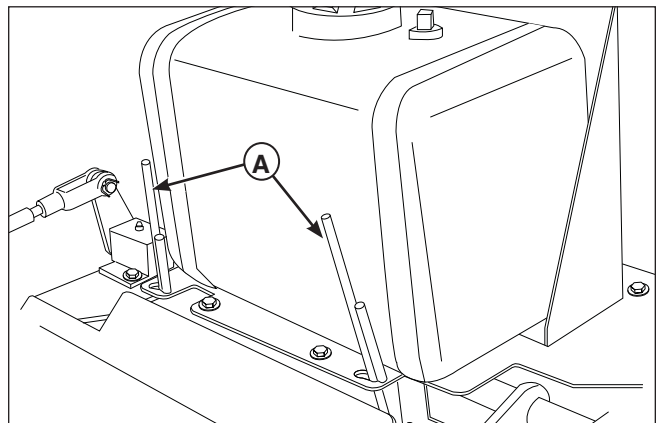


Figure 9. Hydraulic System By-Pass
A. Hydraulic Release Levers

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

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.

10. Drain fuel system completely or add a gasoline stabilizer to the fuel system. If you have chosen to use a fuel stabilizer and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of gasoline fumes. Remember, gasoline fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

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

STARTING AFTER LONG TERM STORAGE

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

1. Remove any blocks from under the unit.
2. Install the battery if it was removed.
3. Unplug the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh gasoline. See engine manual for recommendations.
5. See engine owner's manual and follow all instructions for preparing engine after storage.
6. Check crankcase oil level and add proper oil if necessary. If any condensation has developed during storage, drain crankcase oil and refill.
7. Inflate tires to proper pressure. Check fluid levels.
8. Start the engine and let it run slowly. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

MAINTENANCE SCHEDULE & PROCEDURES

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

SAFETY ITEMS	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Every 250 Hours	Spring & Fall
Check Safety Interlock System	•					•
Check Rider Brakes	•					•
Check Mower Blade Stopping Time				•		•
RIDER MAINTENANCE	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Every 250 Hours	Spring & Fall
Check Rider / Mower for loose hardware	•	•				
Clean Deck & Check / Replace Mower Blades***			•			
Lubricate Rider & Mower ***			•			
Clean Battery & Cables				•		
Check Tire Pressure			•			
Check Hydraulic Oil	•				•	
Change Hydraulic Oil and Filter ***						Every 500 Hours
ENGINE MAINTENANCE	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Every 250 Hours	Spring & Fall
Check Engine Oil Level	•					
Check / Clean Cooling Fins & Intake *,***			•			
Service Air Filter *,*** (See Check / Change Air Filter)					•	
Change Oil & Filter **,***						Every 50 Hours
Check / Replace Spark Plugs *				•		
Check / Replace Fuel Filter *				•		
Inspect Muffler and Spark Arrester****						Every 50 Hours

* See the engine manufacturer's owner's manual.

** Change original engine oil after first 5 hours of operation.

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

**** If equipped. Replace if damaged.

CHECK TIRE PRESSURES

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

Tire	Pressure
Front	N/A (Flat free tire)
Rear	15 psi (103 kPa)

CHECKING / ADDING FUEL

To add fuel:

1. Remove the fuel cap (see A, Figure 11).
2. Fill the tank to the bottom of the filler neck. This will allow for fuel expansion.

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

3. Install and hand tighten the fuel cap.

FUEL FILTER

The fuel filter is located in the fuel line between fuel tank and carburetor, near the fuel pump. If filter is dirty or clogged, replace as follows:

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

INSPECT MUFFLER AND SPARK ARRESTER

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

! WARNING

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

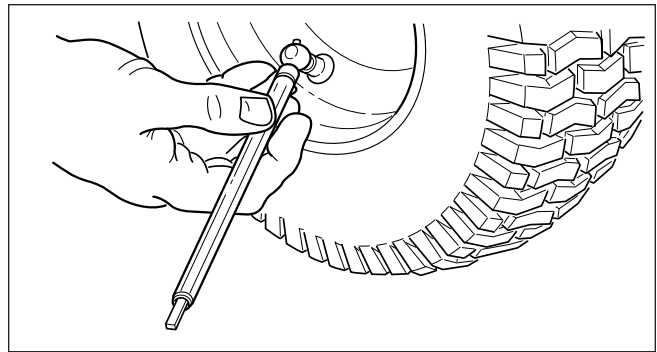


Figure 10. Checking Tire Pressure

! WARNING

Gasoline is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do not allow open flame, smoking or matches in the area. Avoid over-filling and wipe up any spills. Do not remove fuel filter when engine is hot, as spilled gasoline may ignite. DO NOT spread hose clamps further than necessary. Ensure clamps grip hoses firmly over filter after installation.



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

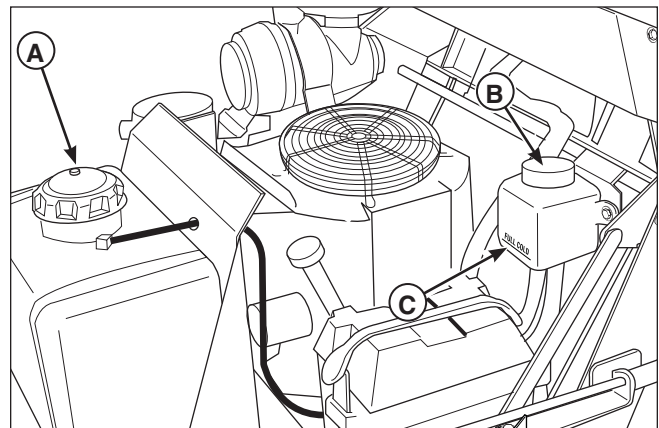


Figure 11. Fuel Tank, Oil Reservoir & Fuel Filter

- A. Fuel Cap
- B. Oil Reservoirs
- C. “FULL” Line

CHECK HYDRAULIC OIL LEVEL

1. Observe the oil reservoir (B, Figure 11). The oil level should be at the "FULL" line (C).
2. Before removing the reservoir cap, make sure the area around the reservoir cap is free of dust, dirt, or other debris.
3. If necessary, unscrew the reservoir cap and add SAE straight 20 or 30 weight motor oil. **DO NOT** use multi-grade oils. Fill until oil level reaches "FULL" line.
4. Reinstall oil reservoir cap.

CHANGE OIL & FILTER

1. Warm engine by running for a few minutes. (Refer to the engine operator's manual for oil & filter replacement instructions.)
2. Remove the oil drain hose (A, Figure 12) from the cable clamp (C) on the back left-hand side of the engine deck and route over the back of the engine deck as shown in Figure 12.
3. Place a small pan under the oil drain hose to catch the oil. Using the appropriate tools, remove the cap from the oil drain hose (A) and drain the engine oil.
4. After draining, replace the cap and wipe up any spilled oil. Reinstall the oil drain hose into the cable clamp to retain the hose during normal operation.
5. Place an absorbent shop cloth under the engine oil filter. Remove the engine oil filter and replace with a new one.
6. Add engine oil (Refer to the engine operator's manual for oil filling instructions.)
7. Remove the shop cloth and wipe up any spilled oil.

CHANGE AIR FILTER

Refer to engine owners manual.

Primary Element: Replace the primary element every 250 hrs.

Secondary Element: Replace the secondary element with a new one, if the secondary element is dirty when the primary element is checked **OR**

Replace the secondary element with a new one every 500 hrs.

1. Unfasten the two retaining clamps (A, Figure 13) and remove the cap (B) from the air cleaner body (C.)
2. Remove the primary element (B, Figure 14) and the secondary element (A) from the air cleaner body by pulling them out.

3. Install the new air cleaner elements into the air cleaner body.
4. Reinstall the case and the cap then securely fasten the two retaining clamps.

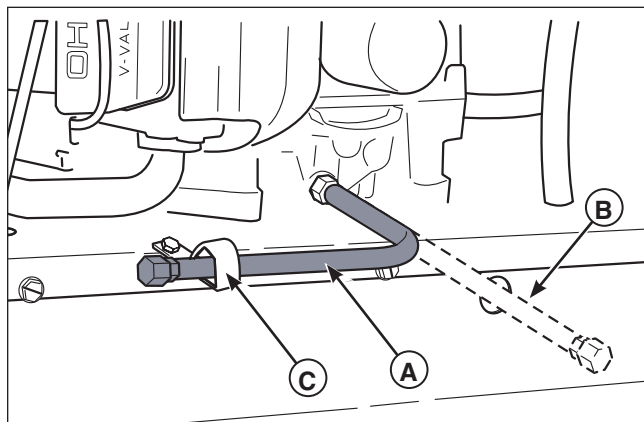


Figure 12. Engine Oil Drain
A. Oil Drain Hose (Storage Position)
B. Oil Drain Hose (Draining Position)
C. Cable Clamp

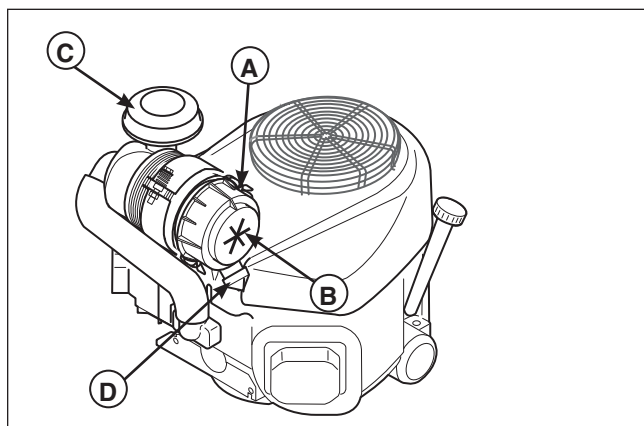


Figure 13. Changing the Air Filter
A. Retaining Clamps
B. Cap
C. Air Cleaner Case
D. Dust Cap

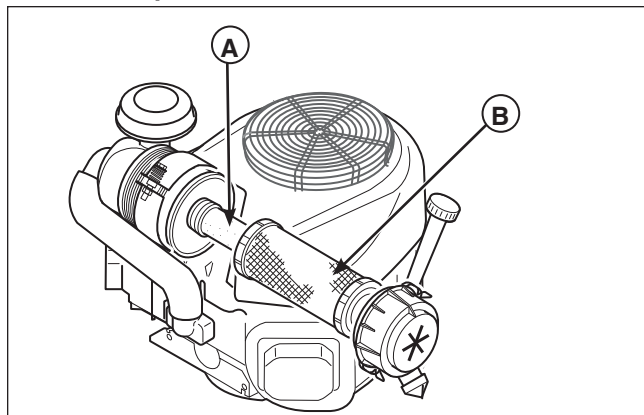


Figure 14. Air Cleaner Elements
A. Secondary Element
B. Primary Element

LUBRICATION

Lubricate the unit at the locations shown in Figure 15 as well as the following lubrication points.

Grease:



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

Use grease fittings when present. Apply grease to moving parts when grease fittings are not installed.

Not all greases are compatible. Ferris 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

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.

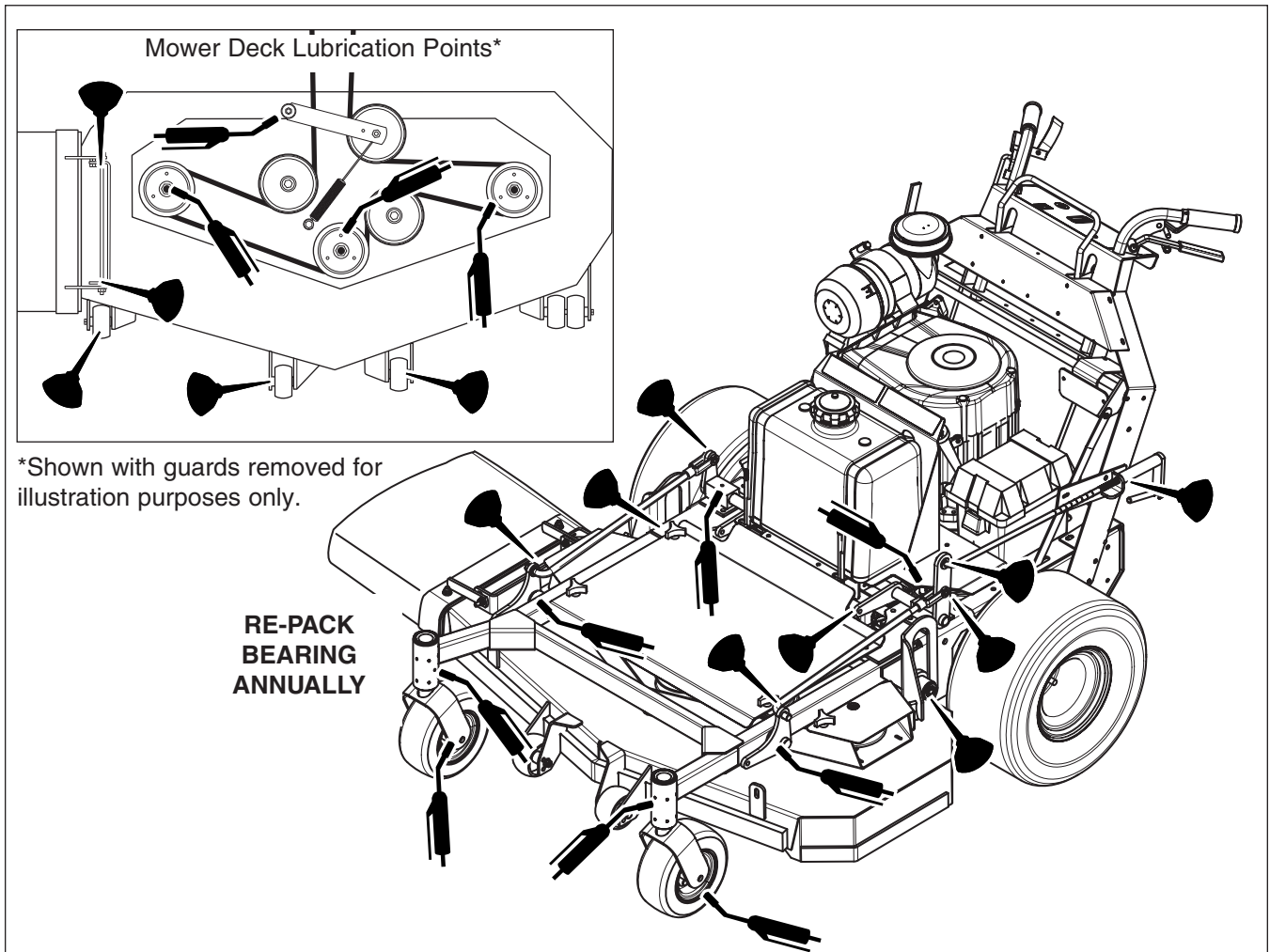
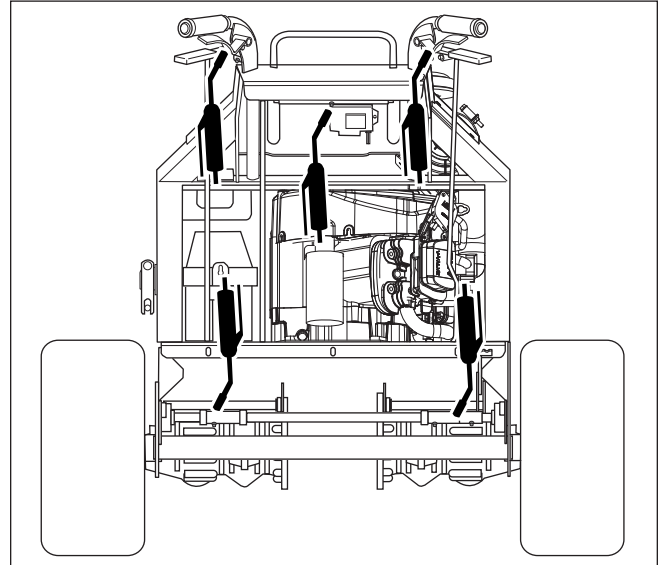


Figure 15. Lubrication Points

CLEANING THE BATTERY AND CABLES

⚠ WARNING

Be careful when handling the battery. Avoid spilling electrolyte. Keep flames and sparks away from the battery.

When removing or installing battery cables, disconnect the negative cable **FIRST** and reconnect it **LAST**. If not done in this order, the positive terminal can be shorted to the frame by a tool.

1. Disconnect the cables from the battery, negative cable first (B, Figure 16).
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 (A).
4. Coat the cable ends and battery terminals with petroleum jelly or non-conducting grease.

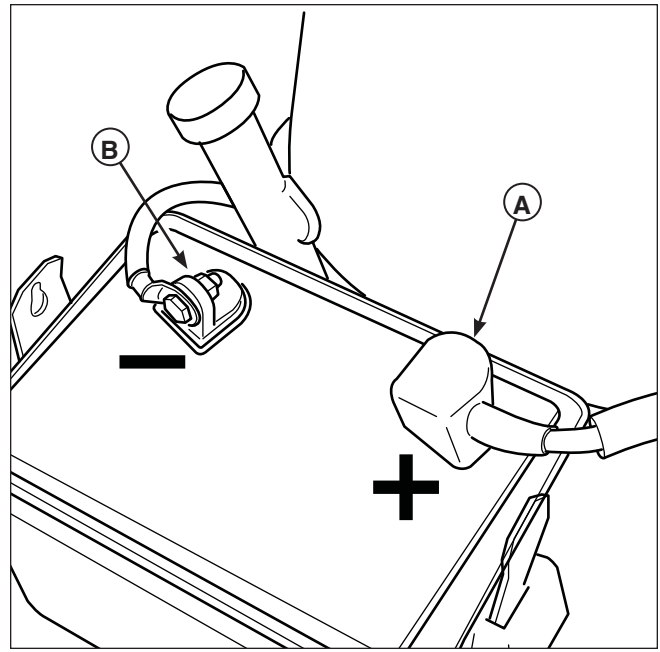


Figure 16. Battery Compartment
A. Positive (+) Cable & Terminal
B. Negative (-) Cable & Terminal

SERVICING THE MOWER BLADES

⚠ WARNING

Mower blades are sharp. For your personal safety, do not handle mower blades with bare hands. Careless or improper handling of blades may result in serious injury. For your personal safety, blade mounting bolts must each be installed with a flat washer then securely tightened. Torque blade mounting bolts to 70-90 ft.lbs. (94-120 N.m.)

1. Blades should be sharp and free of nicks and dents. If not, sharpen blades as described in following steps.
2. Remove the deck guard.
3. Raise the mower deck and secure with jack stands.
4. To remove blade for sharpening, use two (2) 15/16" wrenches to remove the nut from the top of the blade bolt. (Figure 17).
5. Use a file or hand-held grinder, sharpen blade to fine edge. Remove all nicks and dents in blade edge. If blade is severely damaged, it should be replaced.
6. Balance the blade as shown in Figure 18. Center the blade's hole on a nail lubricated with a drop of oil. A balanced blade will remain level.
7. Reinstall each blade with the tabs pointing up toward deck as shown in Figure 19. The blade spacers, blade, washer and bolt must be reinstalled in the exact same order in which they were removed. Torque bolts to 70-90 ft.lbs. (94-120 N.m.).

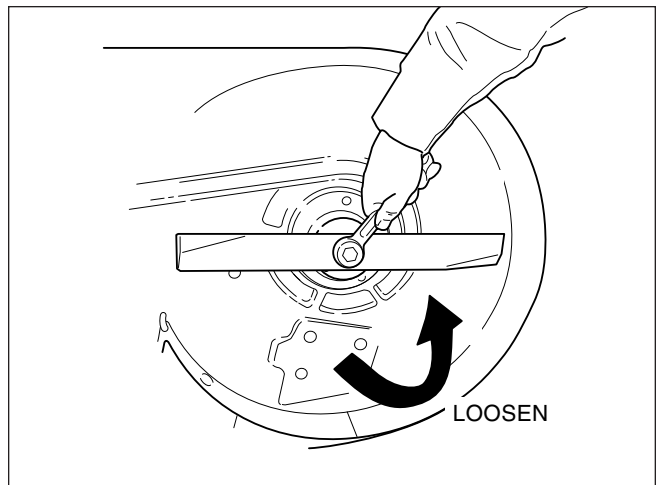


Figure 17. Removing the Blade

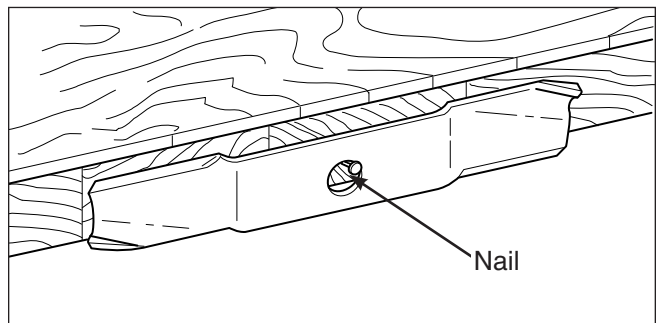


Figure 18. Balancing the Blade

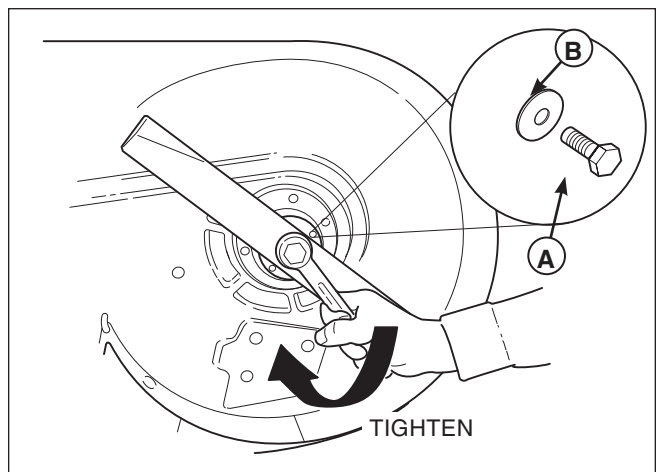


Figure 19. Installing the Blade

- A. Bolt
- B. Flat Washer

TROUBLESHOOTING

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

To avoid serious injury, perform maintenance on the mower only when the engine is stopped and the parking brake 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"> 1. Parking brake not engaged. 2. PTO (electric clutch) switch in ON position. 3. Out of fuel. 4. Engine flooded. 5. Fuse blown. 6. Battery terminals require cleaning. 7. Battery discharged or dead. 8. Wiring loose or broken. 9. Solenoid or starter motor faulty. 10. Safety interlock switch faulty. 11. Spark plug(s) faulty, fouled or incorrectly gapped. 12. Water in fuel. 13. Gas is old or stale. 	<ol style="list-style-type: none"> 1. Engage parking brake. 2. Place in OFF position. 3. If engine is hot, allow it to cool, then refill the fuel tank. 4. Move throttle control out of CHOKE position. 5. Replace fuse. 6. Clean the battery terminals 7. Recharge or replace. 8. Visually check wiring & replace broken or frayed wires. Tighten loose connections. 9. Repair or replace. See authorized service dealer 10. Replace as needed. See authorized service dealer. 11. Clean and gap or replace. See engine manual. 12. Drain fuel & refill with fresh fuel. 13. Drain fuel & replace with fresh fuel.
Engine starts hard or runs poorly.	<ol style="list-style-type: none"> 1. Fuel mixture too rich. 2. Spark plug faulty, fouled, or incorrectly gapped. 	<ol style="list-style-type: none"> 1. Clean air filter. Check choke adjustment (throttle control). 2. Clean and gap or replace. (See engine manual.)
Engine knocks.	<ol style="list-style-type: none"> 1. Low oil level. 2. Using wrong grade oil. 	<ol style="list-style-type: none"> 1. Check/add oil as required. 2. See engine manual.
Excessive oil consumption.	<ol style="list-style-type: none"> 1. Engine running too hot. 2. Using wrong weight oil. 3. Too much oil in crankcase. 	<ol style="list-style-type: none"> 1. Clean engine fins, blower screen and air cleaner. 2. See engine manual. 3. Drain excess oil.
Engine exhaust is black.	<ol style="list-style-type: none"> 1. Dirty air filter. 2. Engine choke control is in closed position. 	<ol style="list-style-type: none"> 1. Replace air filter. See engine manual. 2. Open choke control.

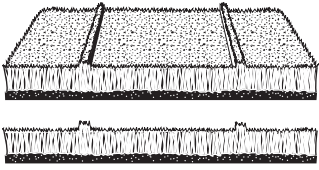
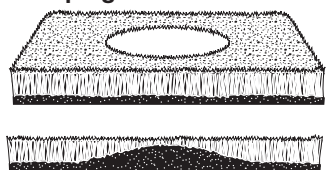
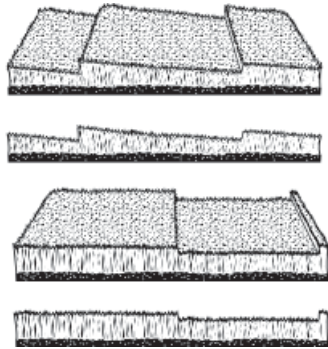
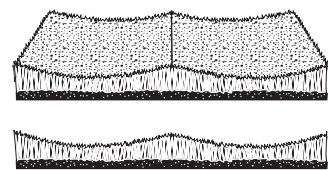
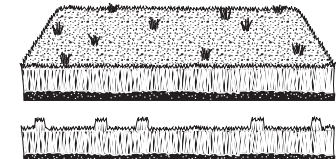
Rider Troubleshooting Continued.

PROBLEM	CAUSE	REMEDY
Engine runs, but mower will not drive.	<ol style="list-style-type: none"> 1. Transmission release lever(s) in "neutral" position. 2. Belt is broken. 3. Drive belt slips. 4. Brake is not fully released. 	<ol style="list-style-type: none"> 1. Move into drive position. 2. See Drive Belt Replacement. 3. See problem and cause below. 4. See authorized service dealer
Transmission drive belt slips.	<ol style="list-style-type: none"> 1. Pulleys or belt greasy or oily. 2. Belt stretched or worn. 	<ol style="list-style-type: none"> 1. Clean as required. 2. Replace belt.
Brake will not hold.	<ol style="list-style-type: none"> 1. Internal brake disc on 	<ol style="list-style-type: none"> 1. See authorized service dealer transaxle worn.
Mower steers hard 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
Engine stalls easily with mower 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 vibration.	<ol style="list-style-type: none"> 1. Blade mounting screws 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 70-90 ft.lbs. (94-120 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. Belt tension improperly adjusted. 2. Idler pulley spring broken or not properly adjusted. 3. Mower drive belt broken. 	<ol style="list-style-type: none"> 1. Adjust belt tension. See Belt Replacement 2. Repair or adjust as needed. 3. Replace drive belt.

TROUBLESHOOTING COMMON CUTTING PROBLEMS

PROBLEM	CAUSE	REMEDY
<p>Streaking.</p> 	<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.
<p>Scalping.</p> 	<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.
<p>Stepped Cutting.</p> 	<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.
<p>Uneven Cutting.</p> 	<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.
<p>Stingers.</p> 	<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.

MOWING HEIGHT ADJUSTMENT

See Figure 20. The mowing height adjustment can be changed by turning the cutting height adjustment handle.

To Raise the Mower Deck:

Turn the cutting height adjustment handle (A, Figure 20) clockwise.

To Lower the Mower Deck:

Turn the cutting height adjustment handle counter clockwise.

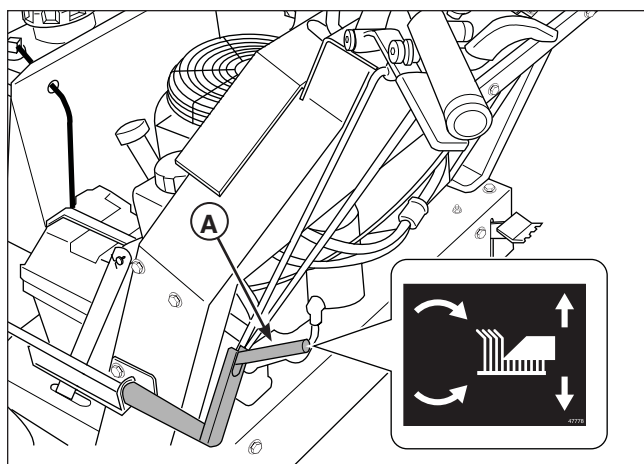


Figure 20. Mowing Height Adjustment
A. Cutting Height Adjustment Handle

DECK LIFT ROD TIMING ADJUSTMENT

1. Park 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 (103 kPa).
2. Crank the deck height adjustment handle so that the rear deck lift rod lever (A, Figure 21) is straight up and down. This is the middle height adjustment.

S/N: 2015444202 & Below:

- 3a. Position the cutting height indicator (B) so that it is centered between the fourth and fifth height indication line and tighten.

S/N: 2015444203 & Above:

- 3b. Position the deck height plate (C) so that the cutout is centered on the notched area (D) on the deck lift rod (E).
4. To check the deck lift rod timing, measure and record the distance between the lift pivots and the rod pivots. Repeat for other side of unit. See Figure 22.
5. If the measurements for the rods and pivots are equal, no further adjustment is required. If the measurements are NOT equal (greater than 1/8" (3,17 mm) difference,) adjustment is required, continue with Step 5.
6. Block up the mower deck until all hanger chains are slack.

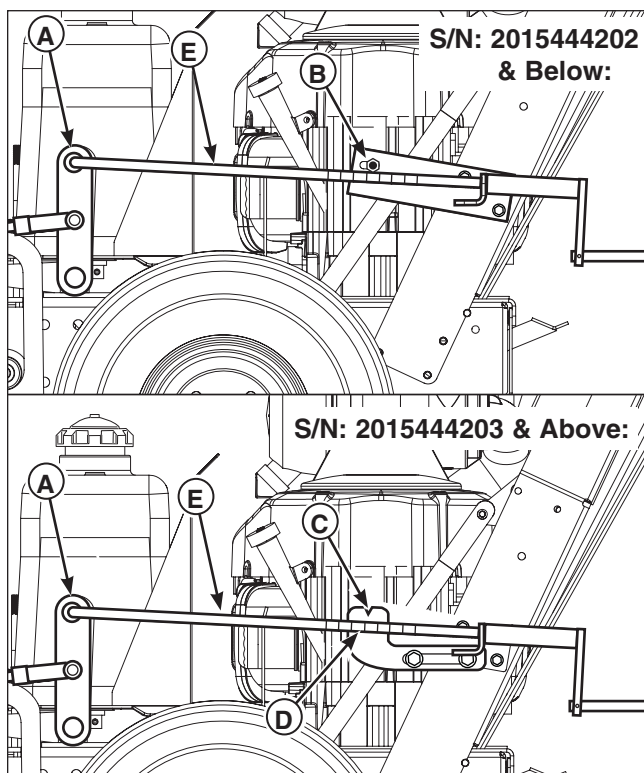


Figure 21. Deck Height Position
A. Rear Deck Lift Rod Lever
B. Cutting Height Indicator
C. Deck Lift Height Plate
D. Notched Area
E. Deck Lift Rod

Troubleshooting, Adjustment & Repair

7. Refer to Figure 23. To adjust the lift rods the 1/2-20 steel clevises (A, Figure 23) will need to be adjusted. Loosen the 1/2-20 jam nut (B) that tightens against the clevis. Remove the cotter pin (C), and the clevis pin (D) that are connected to the rear deck lift rod (E). Turn the clevis to adjust the length of the rod. Reinstall the clevis pin and the hair pin. Tighten the 1/2-20 jam nut. Measure and record the distance between the lift pivots and the rod pivots. Repeat this process until the measurements are equal.

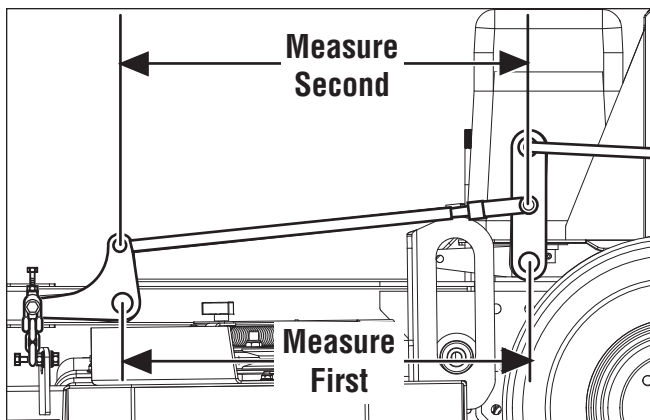


Figure 22. Measure and Adjust Deck Lift Rod Timing

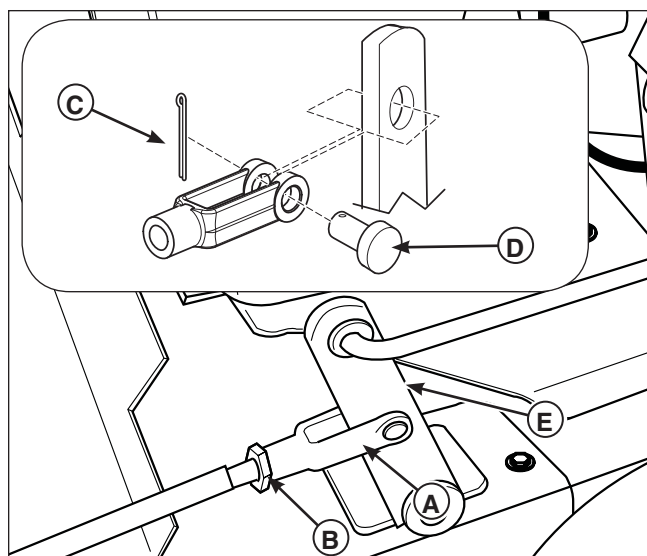


Figure 23. Lift Rod Clevis Adjustment

- A. Clevis, 1/2-20
- B. 1/2-20 Jam Nut
- C. Cotter Pin
- D. Clevis Pin
- E. Rear Deck Lift Rod

DECK LEVELING ADJUSTMENT

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

1. Park machine on a flat, level surface. Disengage the PTO, stop the engine, engage the parking brake, and remove the key from the ignition. Rear tires must be inflated to 15 psi (103 kPa);
2. Crank the deck height adjustment handle so that the rear deck lift rod lever (A, Figure 21) is straight up and down. This is the middle height adjustment.
3. Place 2 x 4 blocks under each corner of the mower deck with the 3-1/2" sides being vertical. See Figure 24.
4. Adjust the front 3-link hanger chain bolt to the top of the slot on the deck and tighten. Adjust the rear 5-link hanger chain bolt to the bottom of the slot on the rear of the deck and tighten.
5. Remove the blocks from under the deck.

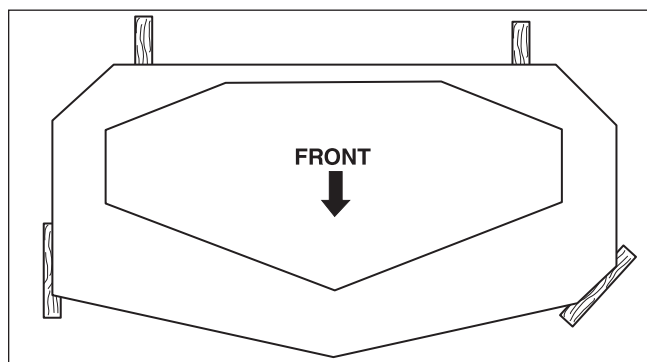


Figure 24. 2x4 Position

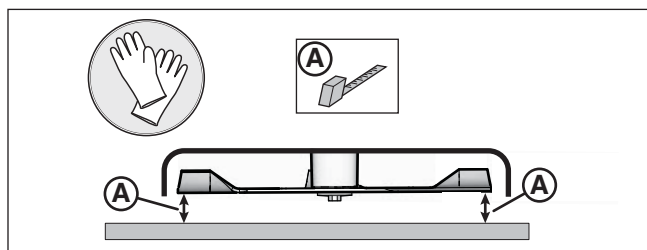


Figure 25. Measuring the Blade Height

WARNING

Mower blades are sharp. For your personal safety, do not handle mower blades with bare hands. Careless or improper handling of blades may result in serious injury or death.

- Manually position the left hand mower blade so that the tip of the blade is pointing towards the front and back of the mower. Measure from the front tip of the blade on the cutting edge to the ground. Record this distance. Measure from the back tip of the blade on the cutting edge to the ground. Record this distance.

Repeat this process for the right hand mower blade.

The front measurement should be 3" and the rear measurement should be 3-1/4". If the measurements are correct, no further adjustment is necessary. If they are not correct continue with Step 7.

- Loosen the jam nut (A, Figure 26) on the adjuster bolt (B) in the chain hanger clevis (C). Turn the adjuster bolt until the correct measurements are achieved. Ensure that all four hanger chains are taut, then retighten the jam nut against the chain hanger clevis.

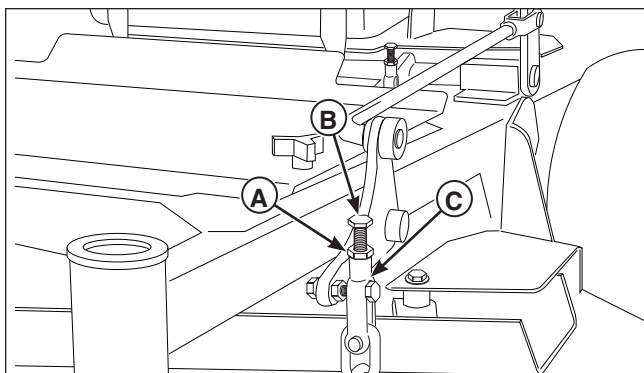


Figure 26. Deck Level Adjustment

- A. Jam nut**
- B. Adjuster Bolt**
- C. Chain Hanger Clevis**

MOWER BELT REPLACEMENT



To avoid damaging belts, **DO NOT PRY BELTS OVER PULLEYS.**

PTO Clutch to Deck Belt

- Park the machine 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.
- Remove the mower deck guard.



WARNING

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

- Using a 1/2" breaker bar, place the square end in the square hole located on the end of the idler arm (A, Figure 27). Carefully rotate the breaker bar COUNTER-CLOCKWISE, which will relieve the tension on the belt exerted from the idler arm.

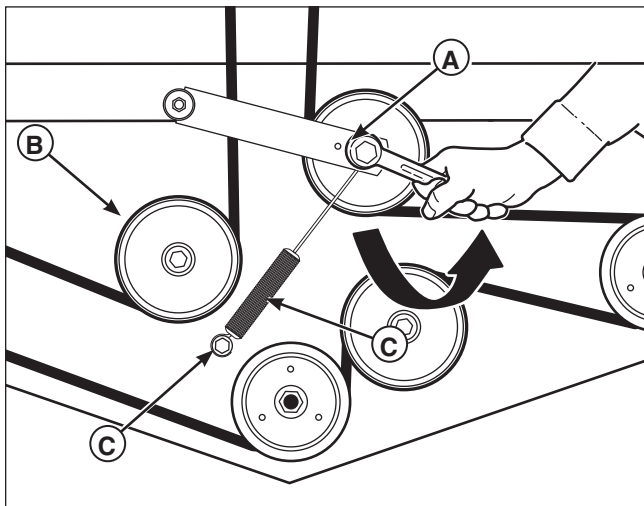


Figure 27. Mower PTO Belt

- A. Idler Arm**
- B. Stationary Idler Pulley**
- C. Idler Tension Spring**
- D. Anchor Bolt**

Troubleshooting, Adjustment & Repair

- Slide the drive belt over the edge of the stationary idler pulley (B). Carefully release the tension on the breaker bar until the idler arm comes to a stop.
- Unhook the idler tension spring (C) from the anchor bolt (D). Remove the old belt and replace with a new one. Make sure the V-side of the belt runs in the pulley grooves.
- Install the drive belt on the PTO pulley, the spindle pulleys, and all idler pulleys except the stationary pulley. Rehook the idler tension spring from the anchor bolt. Carefully rotate the breaker bar COUNTER-CLOCKWISE and install the belt on the stationary idler pulley. Carefully release the tension on the breaker bar. The belt should be routed exactly as shown in Figure 28.
- Reinstall the mower deck guard.
- Run the mower under no-load condition for about 5 minutes to break-in the new belt.

Check / Adjust the Mower Belt Idler Tensioner Spring Length

52" & 61" Models - S/N: 2015782584 & Below: feature a stationary mower belt idler tensioner and cannot be adjusted.

48" Models - All; 52" & 61" Models - 2015782585 & Above: feature an adjustable mower belt idler tensioner which must be checked to make sure the mower deck belt is set to the correct tension.

- Position the mower deck at its middle cutting position.
- Use the Mower Belt Idler Tensioner Spring Length chart to determine the correct spring length

Mower Belt Idler Tensioner Spring Length	
48" Mower Decks	5-3/4" (14.6 cm)
52" & 61" Mower Decks	6-1/2" (16.5 cm)

- Measure the coil length of the mower belt tensioner spring (A, Figure 29). The measurement should equal the measurement as indicated in the chart. If it does not, adjustment is necessary, continue with step # 3.
- Loosen the jam nut (C).
- Turn the adjustment nut (D) until the measurement as indicated in the chart is achieved.
- Retighten the jam nut.

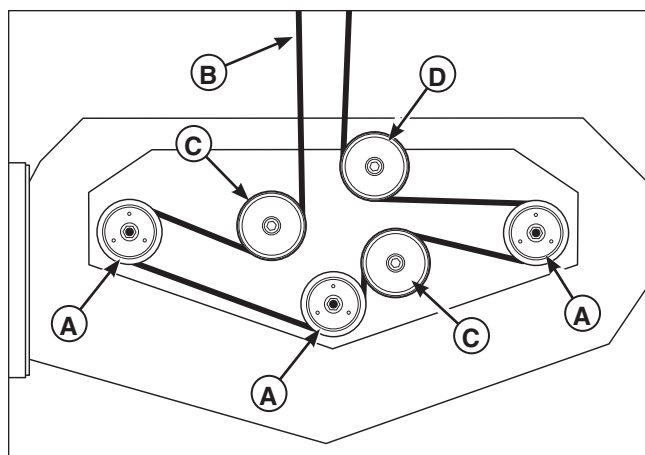


Figure 28. Mower PTO Belt Routing

- A. Spindle Pulley**
- B. PTO Drive Belt**
- C. Stationary Idler Pulley**
- D. Spring-loaded Idler Pulley**

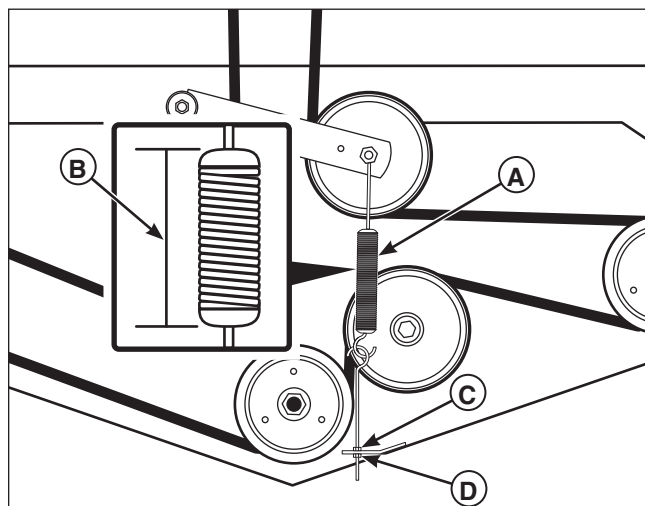


Figure 29. Check / Adjust the Mower Belt Idler Tensioner Spring Length

- A. Mower Belt Tensioner Spring**
- B. Measurement**
- C. Jam Nut**
- D. Adjustment Bolt**

TRANSMISSION DRIVE BELT REPLACEMENT



To avoid damaging belts, DO NOT PRY BELTS OVER PULLEYS.

1. Remove the deck drive belt. See *MOWER BELT REPLACEMENT* sections.
2. Remove the clutch anchor bolts (A, Figure 30) that fasten the clutch anchor pad to the anchor.
3. Unplug the PTO clutch from the wire harness.
4. Remove the spring anchor nut (E) and remove the belt tension spring (D).

WARNING

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

5. Drop the belt (H) from the crankshaft pulley and around the PTO clutch.
6. From the front of the machine, pull the belt towards the front while sliding it up and over the transmission cooling fans.
7. Remove the old belt and replace with a new one. Make sure the V-side of the belt runs in the pulley grooves.
8. Install belt over the transmission cooling fans and on the transmission input pulleys (G), around the idler pulleys (F & I) and on the crankshaft pulley.
9. Reinstall the belt tension spring (D) onto the anchor bolt and reinstall the nylon nut (E).
10. Plug the PTO clutch into the wire harness.
11. Reinstall the clutch anchor pad and hardware (B & A). Tighten securely.
12. Reinstall the deck drive belt. See *MOWER BELT REPLACEMENT* section.

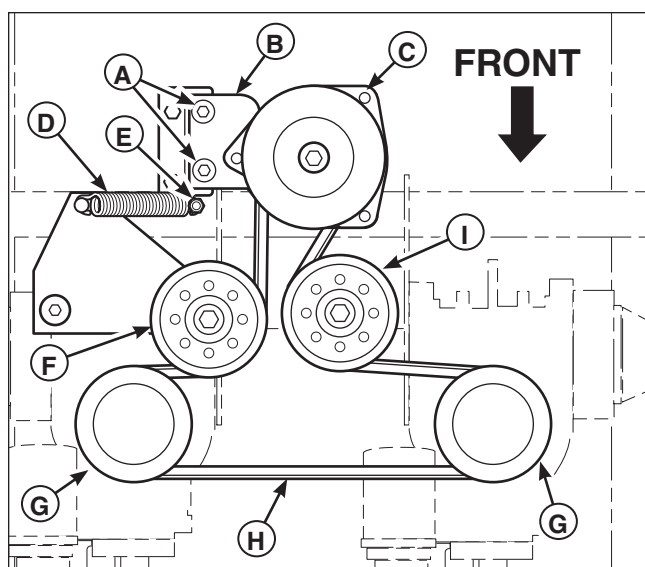


Figure 30. Transmission Drive Belt

- A. Anchor Hardware
- B. Clutch Anchor Pad
- C. PTO Clutch & Drive Pulley
- D. Belt Tension Spring
- E. Spring Anchor Nut
- F. Spring-loaded Idler Pulley
- G. Transmission Input Pulley
- H. Belt
- I. Stationary Idler Pulley

TRANSMISSION NEUTRAL & TRACKING ADJUSTMENTS

Neutral Adjustment

1. Park the machine on a smooth, 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 engine, and remove the ignition key.
2. Chock the front caster wheels. Raise the drive wheels off the ground and secure the machine with jack stands.
3. Start the engine and adjust throttle control to SLOW (lowest setting). See the *STARTING THE ENGINE* section for proper starting instructions.
4. Disengage the parking brake.
5. Using a 1/2" deep socket, SLOWLY turn the adjustment nut COUNTER-CLOCKWISE until the drive tire begins to rotate forward.
6. SLOWLY turn the adjustment nut CLOCKWISE until the drive tire begins to rotate backwards.
7. Set the adjustment half way in between where the forward and backwards rotations began.
8. Adjust the throttle control to FULL (highest setting). Cycle the speed control lever and neutral return pedal several times to insure and accurate adjustment has been made.

Tracking Adjustment

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

- Drive tires are inflated to 15 psi (103 kPa).
- 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. Turn the LEFT adjustment nut 1/8 - 1/4 turn COUNTER-CLOCKWISE.
2. Turn the RIGHT adjustment nut 1/8 - 1/4 turn CLOCKWISE.
3. Drive machine on a flat, level surface to test and repeat steps 1 & 2 as necessary.

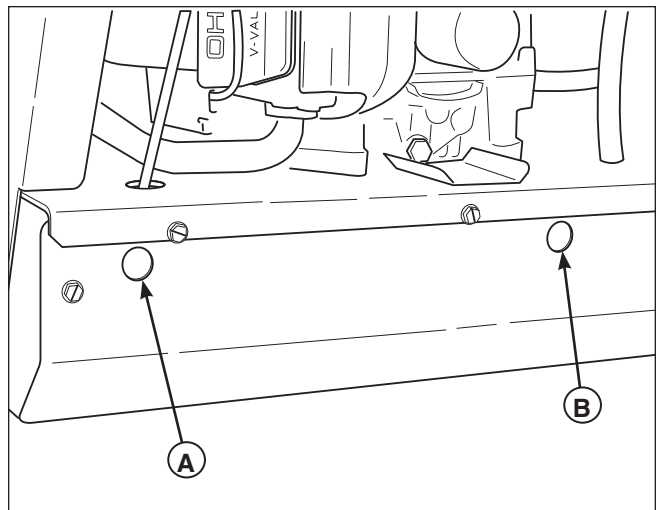


Figure 31. Neutral & Tracking Adjustment Points
A. Left-Hand Adjustment
B. Right-Hand Adjustment

If Machine Veers to the RIGHT:

1. Turn the RIGHT adjustment nut 1/8 - 1/4 turn COUNTER-CLOCKWISE.
2. Turn the LEFT adjustment nut 1/8 - 1/4 turn CLOCKWISE.
3. Drive machine on a flat, level surface to test and repeat steps 1 & 2 as necessary.

TRANSMISSION MAINTENANCE

The hydrostatic transmissions are sealed units that require no maintenance other than the following.

- Keep the machine and the transmission cooling fins clear of grass, leaves and debris.
- Keep oil level in the reservoir (A, Figure 32) at the “FULL” line (B). Extra oil in the reservoir will not benefit the machine.
- If it is necessary to add oil to the reservoir, use SAE straight 20 or 30 weight motor oil. **DO NOT** use a multi-grade oils. Make sure the area around the oil reservoir is free from dust, dirt and debris before opening the reservoir.
- Make sure the oil reservoir cap are tight.
- Keep water, dirt and debris from entering the oil reservoir. A small amount of a contaminant could damage the transmissions.



Make sure transmissions and immediate surrounding areas are free from dirt and debris before changing the oil and filters. Cleanliness while performing this operation is extremely important.

Changing Oil & Filters

1. Park the machine 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. Place a drain pan under each transmission and remove the filters to drain the oil. See Figure 33.

NOTE: Before removing the right hand transmission filter the filter guard must be removed.

3. Once oil has drained from transmissions, replace with new filters (P/N 5021068X1), placing a light film on the seal of the filter before installing. Hand-tighten filter only.
4. Fill oil reservoirs 3/4 full with SAE straight 20 or 30 weight motor oil.

To Bleed Air From Transmissions

1. Locate the machine in a secure area, away from bystanders and preferably facing a wall. Raise the drive tires off the ground and secure with jack stands.
2. Continue to fill reservoirs to the FULL LINE until the oil level stops going down.

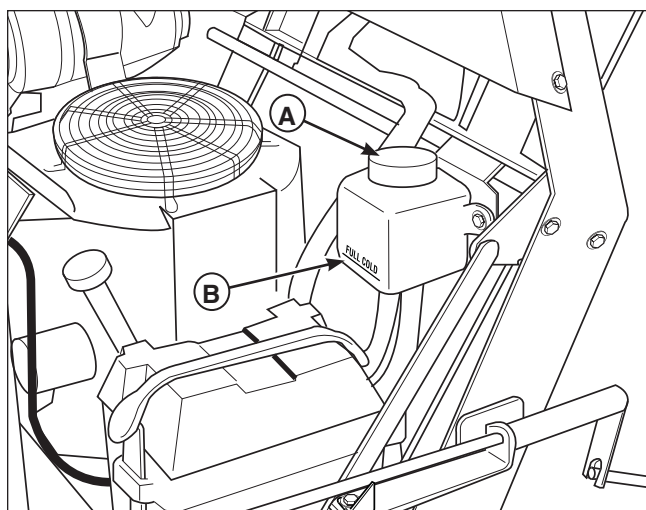


Figure 32. Oil Reservoirs

- A. Oil Reservoirs**
B. “FULL” Line

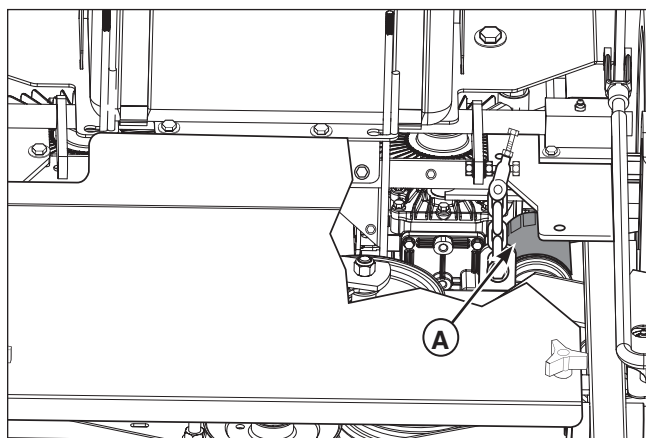


Figure 33. Transmission Oil Filter Location (left-hand side shown with deck guard cut away.)
A. Transmission Oil Filter

3. Start the engine and adjust throttle control to just above idle. See the *STARTING THE ENGINE* section for proper starting instructions.
4. Run engine for 5 minutes. Watch the oil level in the reservoirs. Add oil to the “FULL” line (B, Figure 32) as necessary.
5. With engine running, cycle controls forward and reverse until positive response to the drive is achieved. Do not attempt to move the unit until bleeding is complete or serious damage may occur.
6. Watch oil levels for the next few days and add oil to the reservoirs as necessary.

BATTERY SERVICE

WARNING

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

Checking Battery Voltage

A voltmeter can be used to determine condition of battery. When engine is off, the voltmeter shows battery voltage, which should be 12 volts. When engine is running, the voltmeter shows voltage of charging circuit which normally is 13 to 14 volts.

A dead battery or one too weak to start the engine may not mean the battery needs to be replaced. For example, it may mean that the alternator is not charging the battery properly. If there is any doubt about the cause of the problem, see your dealer. If you need to replace the battery, follow the steps under Cleaning the Battery & Cables in the Regular Section.

Charging a Completely Discharged Battery

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

Jump Starting With Auxiliary (Booster) Battery

Jump starting is not recommended. However, if it must be done, follow these directions. Both booster and dis-charged batteries should be treated carefully when using jumper cables. Follow the steps below EXACTLY, being careful not to cause sparks. Refer to Figure 34.

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

10. After starting, allow the engine to return to idle speed. Remove the cable connection at the engine or frame. Then remove the other end of the same cable from the booster battery.

11. Remove the other cable by disconnecting at the discharged battery first and then disconnect the opposite end from the booster battery.

12. Discard the damp cloths that were placed over the battery vent caps.

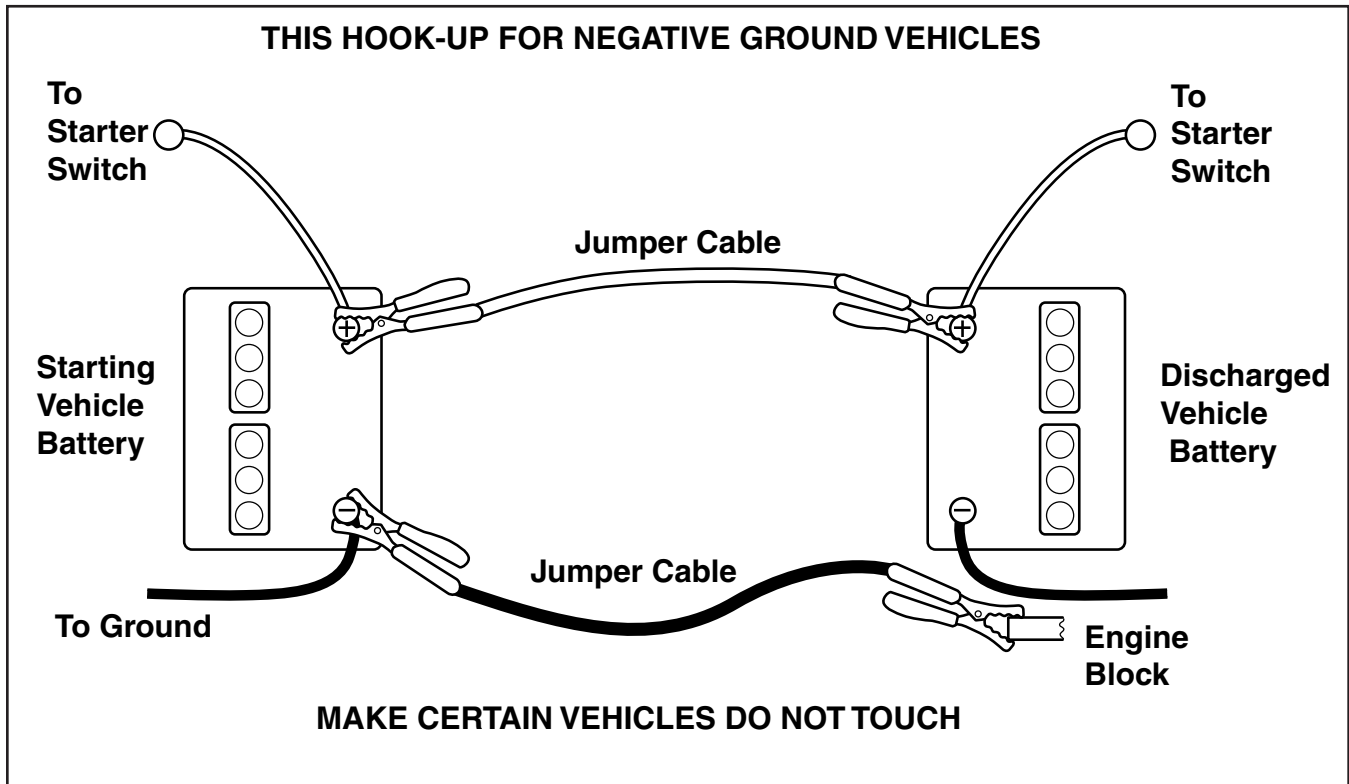


Figure 34. Jump Starting

⚠ WARNING

Any procedure other than the preceding could result in:

- (1) personal injury caused by electrolyte squirting out 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 care when jump starting. Never expose battery to open flame or electric spark – battery action generates hydrogen gas which is flammable and explosive. Do not allow battery acid to contact skin, eyes, fabrics, or painted surfaces. Batteries contain a sulfuric acid solution which can cause serious personal injury or property damage.

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 battery while engine is running. Be sure terminal connections are tight before starting.

Specifications

SPECIFICATIONS

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

ENGINE:

19 Gross HP† Kawasaki

Make Kawasaki
Model FH580V
Displacement 35.7 Cu. in (585 cc)
Electrical System 12 Volt, 13 amp, Alternator, Battery: 340 CCA
Oil Capacity 1.9 US qt. (1.8 L) w/ Filter

20 Gross HP† Kawasaki

Make Kawasaki
Model FX600V
Displacement 36.8 Cu. in (603 cc)
Electrical System 12 Volt, 15 amp, Alternator, Battery 340 CCA
Oil Capacity 1.8 US qt. (1.7 L) w/ filter

20.5 Gross HP† Kawasaki

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

23.5 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

25 Gross HP† Kawasaki

Make Kawasaki
Model FH721V
Displacement 41.2 Cu. in (675 cc)
Electrical System 12 Volt, 13 amp, Alternator, Battery: 340 CCA
Oil Capacity 2.0 US qt. (1.9 L) w/ Filter

26 Gross HP† Kawasaki

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 Tanks Capacity: 5 Gallons (18.9 L)
Rear Wheels Tire Size: 17 x 7.50 -12
Inflation Pressure: 15 psi (1,03 bar)
Front Wheels Tire Size: 9 x 3.5 - 6

TRANSMISSION:

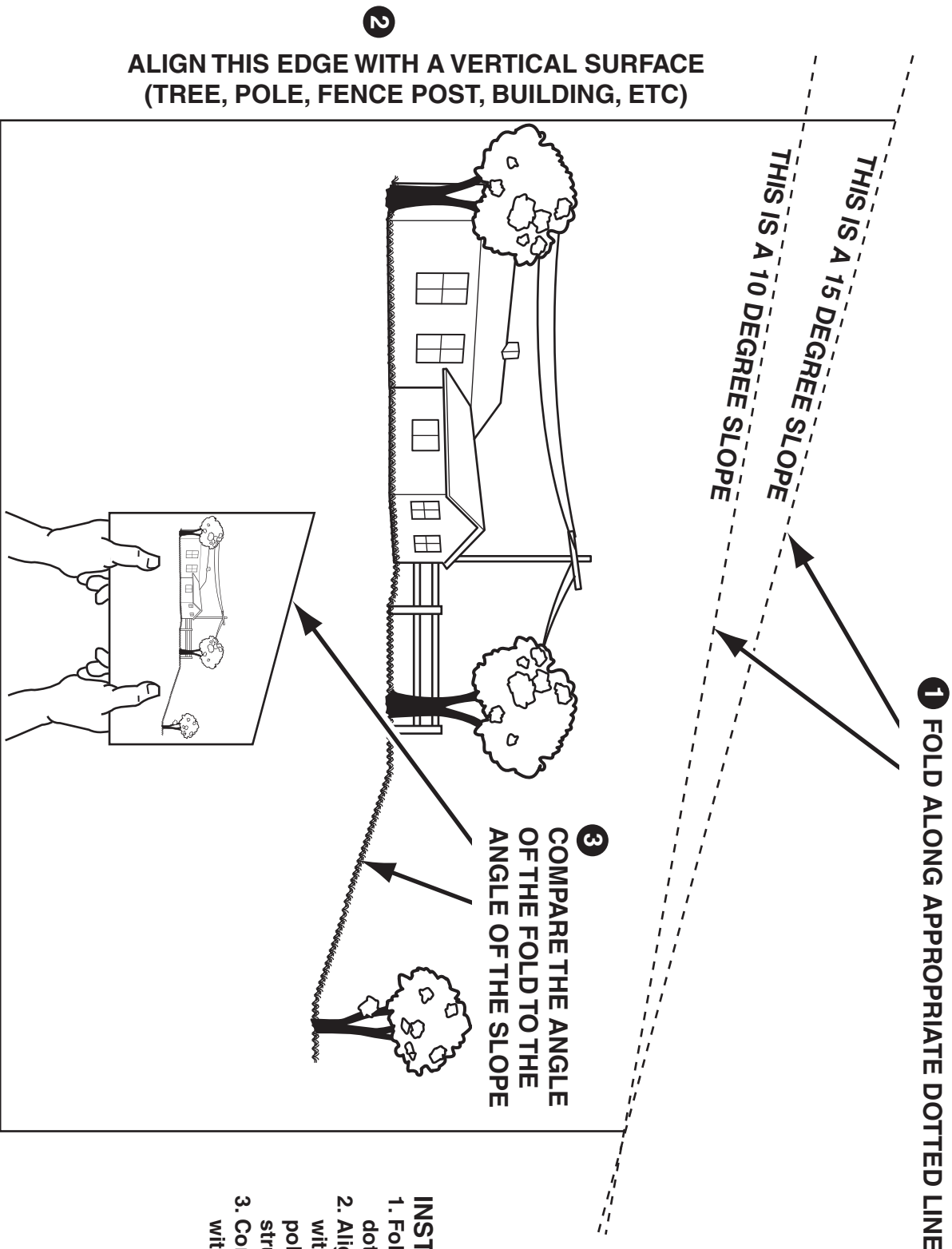
Eaton 771-101 & 771-102

Type Unitized Drive Transaxles
Hydraulic Fluid Mobil DTE26 Hydraulic Oil OR SAE 20W-20 Motor Oil OR SAE 30 Motor Oil
Speeds Forward: 0-6 MPH (0-9.65 km/h)
@ 3400 rpm Reverse: 0-2 MPH (0-3.22 km/h)

DIMENSIONS:

	48" Model	52" Model	61" Model
Overall Length	74.5" (189 cm)	76.5" (194 cm)	87" (221 cm)
Overall Width (Deflector down)	54" (137 cm)	57.5" (146 cm)	66" (168 cm)
Overall Width (Deflector up)	49" (124 cm)	53.5" (136 cm)	62" (cm)
Height	42" (107 cm)		
Weight (apx.)	739 lbs. (335 kg)	780 lbs. (353.8 kg)	815 lbs. (370 kg)

SLOPE IDENTIFICATION GUIDE



INSTRUCTIONS

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

Ferris Industries - a division of 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.

General Conditions

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

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

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



OPERATOR'S MANUAL

Comfort Control DD Series
Walk-Behind Mowers