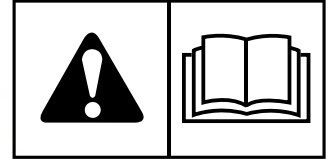




OPERATOR'S MANUAL

FB1000 Series Commercial Debris Blower



Model
5902012

Description
FB1000 Series Commercial Debris Blower

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General Information

Using Your Operator's Manual

This manual is an important part of your unit and should remain with the unit when you sell it.

Use the safety and operating information in the unit's Operator's Manual to operate and service the unit safely and correctly.

This operator's manual explains the features and promotes the safe use of this unit. Please read it in its entirety and follow the instructions carefully so that you may have many years of safe and productive operation.

An engine manufacturer's owner's manual has been provided with your unit. This will provide maintenance and troubleshooting information for the engine installed in your unit.

Products Covered by This Manual

The following products are covered by this manual:

5902012

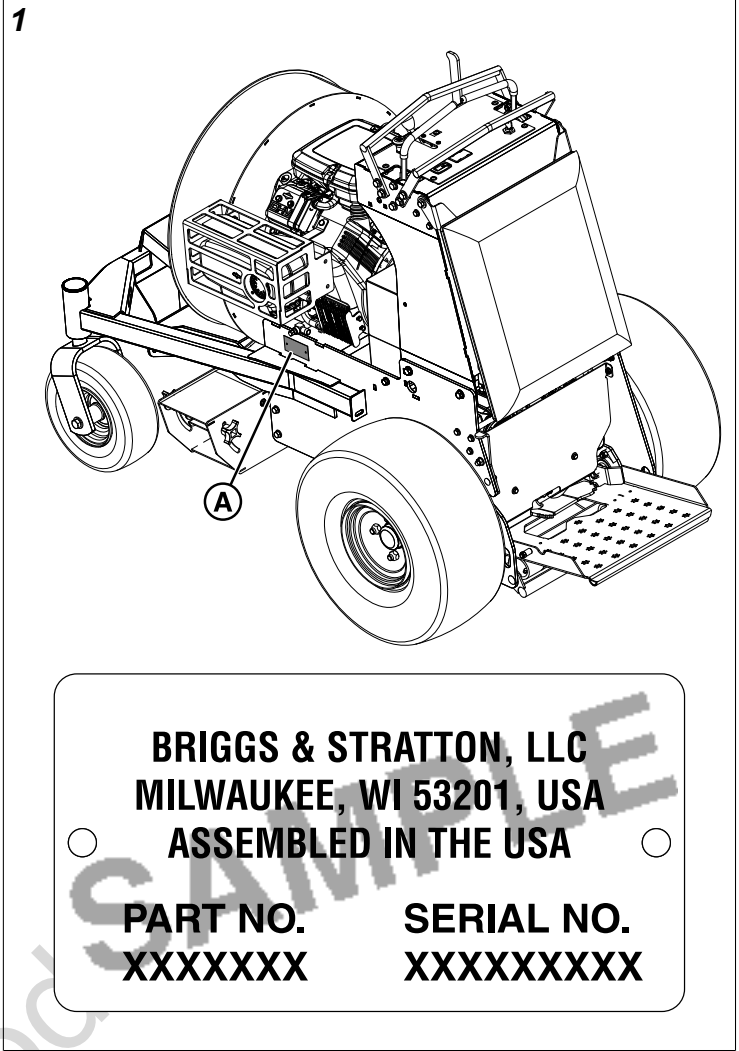
The images in this document are representative, and are meant to complement the instructional copy they accompany. Your unit may vary from the images displayed. *LEFT* and *RIGHT* are as seen from the operator's position.

Ferris is a registered trademark of Briggs & Stratton.

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

Product Identification

The product identification tag (A, Figure 1) can be found in the area on the unit as shown in Figure 1.



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

PRODUCT REFERENCE DATA	
Unit Model Number:	
Unit Serial Number:	
Dealer Name:	
Date Purchased:	


ENGINE REFERENCE DATA	
Engine Make:	
Engine Model:	
Engine Type/Specifications:	
Engine Code/Serial Number:	

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

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

Operator Safety

Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of the unit, severe personal injury or death to you, or bystanders, or damage to property or equipment.

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

California Proposition 65



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

Operating Training Required

- Read the operator's manual and other training material. If the operator or mechanic cannot read English, it is the owner's responsibility to explain this material to them. This publication is available in other languages.
- Become familiar with the safe operation of the equipment, operator controls, and safety signs.
- All operators and mechanics should be trained. The owner of the unit is responsible for training the users.
- Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.
- The owner/user can prevent, and is responsible for, accidents or injuries occurring to themselves, other people, and/or property.
- Train operators on the unit in an open, unobstructed area under the direction of an experienced operator.

Preparation

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job. Use only accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including a hard hat, safety glasses, and hearing protection. Tie back long hair, remove loose clothing or jewelry that may get tangled in moving parts.
- Inspect the area where the equipment is to be used and remove all objects such as rocks, toys, etc. which can be thrown by the unit.
- Use extra care when handling gasoline or other fuels. They are flammable and vapors are explosive.
- Allow engine to cool before fueling.
 1. Use only an approved container.
 2. Never remove the fuel cap or add fuel when the engine is running. Do not smoke.

3. Never add fuel or drain fuel from the unit while it is indoors.

- Check that the safety switches and shields are attached and functioning properly. Do NOT operate unless they are functioning properly.

Operating Safely

- **NEVER** run an engine in an enclosed area where dangerous carbon monoxide fumes can collect.
- Only operate in good light, keeping away from holes and hidden hazards.
- Be sure all drives are in NEUTRAL and parking brake is ENGAGED before starting the engine. Only start the engine from the operator's position.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on slopes. For this unit, drive **across** hillsides, **not up and down**. Turf conditions can affect the machine's stability. Use caution while operating near drop-offs. **DO NOT** operate the unit within 5 feet of an embankment or drop-off.
- Slow down and use caution when making turns and when changing directions on slopes.
- **NEVER** operate with the shields, or other guards, not securely in place. Be sure all interlocks are attached, adjusted properly, and functioning properly.
- Do not change the engine governor setting or overspeed the engine. Operating the engine at excessive speed can increase the hazard of personal injury and damage to the unit.
- Stop on level ground, engage the parking brake, close the deflectors, and shut off the engine before leaving the operator's position for any reason.
- Stop the equipment and inspect the impeller if an abnormal vibration occurs. Make necessary repairs before resuming operations.
- Keep hands and feet away from the intake and discharge.
- Look behind and down before backing up to be sure of a clear path.
- Never carry passengers. Keep pets and bystanders away.
- Slow down and use caution when making turns and crossing roads and sidewalks. Close deflectors if not blowing. Watch for traffic when operating near or crossing roadways.
- Be aware of the blower discharge direction and **DO NOT** point it at anyone.
- **DO NOT** operate the unit while under the influence of alcohol and/or drugs.
- Use care when loading or unloading the unit into or off of a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.
- Inspect the unit before you operate. Make sure hardware is tight. Repair or replace damaged, badly worn, or missing parts. Make sure guards and shields are in good condition and fastened in place. Make any necessary adjustments before you operate.

- Before using, **always visually inspect** to see that the impeller, its bolt, and the blower assembly are not worn or damaged. Replace worn or damaged impeller and bolt.
- Keep safety decals visible when installing accessories and attachments.
- Do not wear radio or music headphones. Safe service and operation require your full attention.
- When the unit is left unattended, stored, or parked, remove the key.

Spark Arrester



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.

An installed spark arrester must be maintained in good working order by the operator.

Checking Working Area

- Evaluate the terrain to determine what accessories and attachments are needed to properly and safely perform the job.
- **Clear work area** of objects that might be thrown. Keep people and pets out of working area.
- Study working area. Set up a safe blowing pattern. Do not blow where traction or stability is doubtful.
- Test drive through area with all deflectors closed. Slow down when you travel over rough ground.

Parking Safely

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Wait for the engine and all moving parts to stop before stepping off the operator's platform.
3. Close the fuel shut-off valve, if your unit is equipped.
4. Disconnect the negative battery cable or remove the spark plug wires (for gasoline engines) before servicing the unit.

Rotating Impeller is Dangerous



WARNING

Rotating impeller can cut off arms and legs, and throw objects. Failure to observe safety instructions could result in serious injury or death.

- **Keep hands, feet and clothing away** from blower housing when engine is running.
- Be alert at all times, drive forward carefully. People, especially children can move quickly into the working area before you know it.

Protect Children

- Death or serious injury can occur when young children associate having fun with lawn equipment simply because someone has given them a ride on a unit.
- Children are attracted to lawn equipment and activities. They don't understand the dangers or the fact that the operator is unaware of their presence.
- Children who have been given rides in the past may suddenly appear in the work area for another ride and be run over or backed over by the unit.
- Tragic accidents with children can occur if the operator is not alert to the presence of children, especially when a child approaches a unit from behind. **Before and while backing up, look down and behind the unit carefully, especially for children.**
- **NEVER** carry children on a unit or attachment. Do not tow children in a cart or trailer. They can fall off and be seriously injured or interfere with safe unit operation.
- Never use the unit as a recreational vehicle or to entertain children.
- Never allow children or an untrained person to operate the unit. Instruct all operators not to give children a ride on the unit or in an attachment.
- Keep children indoors, out of the work area, and in the watchful eye of a responsible adult, other than the operator, when a unit is being operated.
- Stay alert to the presence of children. Never assume that children will remain where you last saw them. Turn the unit OFF if a child enters the work area.

Avoid Tipping

- Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. **Operation on all slopes requires extra caution.**
- Blow across slopes, not up and down.
- Watch for holes, ruts, bumps, rocks, or other hidden objects. Uneven terrain could overturn the unit. Tall grass can hide obstacles.
- Choose a low ground speed so you will not have to stop while on a slope.
- Do not blow or operate unit on wet grass. Tires may lose traction.
- Tires may lose traction on slopes even though the brakes are functioning properly.
- Avoid starting, stopping, or turning on a slope. If the tires lose traction, turn and proceed slowly, straight down the slope.
- Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction, which could cause the unit to roll over.

- Use extra care while operating unit with attachments, they can affect stability of the unit. **Do not use on steep slopes.**
- Do not blow near drop-offs, ditches, embankments, or bodies of water. The unit could suddenly roll over if a wheel goes over the edge or the edge caves in.
- Follow the manufacturer's recommendations for wheel weights or counterweights for added stability when operating on slopes or using front or rear mounted attachments. Remove weights when not required.
- Drive unit very slowly and avoid quick stops.

Keep Riders Off

- Only allow the operator on the unit. Keep riders off.
- Riders on the unit or attachment may be struck by foreign objects or thrown off the unit causing serious injury.
- Riders obstruct the operator's view resulting in the unit being operated in an unsafe manner.

Avoid High Pressure Fluids

- Hydraulic hoses and lines can fail due to physical damage, kinks, age, and exposure. Check hoses and lines regularly. Replace damaged hoses and lines.
- Hydraulic fluid connections can loosen due to physical damage and vibration. **Check connections regularly.** Tighten loose connections.
- Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.
- Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.
- If an accident occurs, **see a doctor immediately.** Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source.

Checking Wheel Hardware

- An accident could occur causing serious injury if wheel hardware is not fastened.
- Check wheel hardware tightness often during the first 100 hours of operation. Torque to 90 ft-lbs (122 Nm).
- Wheel hardware must be tightened to specified torque using the proper procedure anytime it is loosened.

Wear Appropriate Clothing

- Always wear safety goggles, or safety glasses with side shields, and a hard hat when operating the unit.
- Wear close fitting clothing and safety equipment appropriate for the job.
- While blowing, always wear substantial footwear and long trousers. **DO NOT** operate the equipment when barefoot or wearing open sandals.

- Wear a suitable hearing protection device such as earplugs. Loud noise can cause impairment or loss of hearing.

Maintenance and Storage

- **NEVER** operate the unit in a enclosed area where dangerous carbon monoxide fumes can collect.
- Disengage drives, engage parking brake, stop engine and remove key or disconnect spark plug (for gas engines). Wait for all movement to stop before adjusting, cleaning or repairing.
- Clean all debris from unit, drives, mufflers, and engine to help prevent fires. Clean up oil or fuel spillage.
- Let engine cool before storing and do not store near flame.
- Shut off fuel while storing or transporting. Do not store fuel near flames or drain indoors.
- Park unit on level ground. Never allow untrained personnel to service unit. Understand service procedure before doing work.
- Use jack stands or lock service latches to support components when required. Securely support any unit elements that must be raised for service work.
- Before servicing unit or attachment, carefully release pressure from any components with stored energy, such as hydraulic components or springs.
- Release hydraulic pressure by moving hydraulic control levers back and forth with the engine OFF.
- Disconnect the battery or remove the spark plugs (for gas engines) before making any repairs. Disconnect the negative terminal first and the positive last. Reconnect positive first and negative last.
- Use care when checking impeller. Wear gloves and use caution when servicing the impeller. Only **REPLACE** impeller. **Never attempt to straighten or weld an impeller.**
- Keep hands, feet, clothing, jewelry, and long hair away from moving parts. If possible, do not make adjustments with the engine running.
- Charge battery in an open well ventilated area, away from spark and flames. Unplug charger before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.
- Keep all parts in good working condition and all hardware tightened. Replace all worn or damaged decals.
- Keep all nuts and bolts tightened securely, especially impeller attachment bolts, to be sure the equipment is in safe working condition.
- **Check brake operation frequently.**

Prevent Fires

- Remove debris from engine compartment and muffler area, before and after operating unit, especially after blowing in dry conditions.
- **ALWAYS** shut off fuel when transporting or storing unit, if the unit is equipped with a fuel shut off valve.

- **DO NOT** store unit near an open flame or source of ignition, such as a water heater or furnace.
- Check fuel lines, tank, cap, and fittings frequently for cracks or leaks. Replace if necessary.

Tire Safety

Explosive separation of a tire and rim parts can cause serious injury or death:

- Do not attempt to mount a tire without the proper equipment and experience to perform the job.
- Always maintain the correct tire pressure. **DO NOT** inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.
- When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly.
- Check tires for low pressure, cuts, bubbles, damaged rims or missing studs and nuts.

Handling Fuel Safely

To avoid personal injury or property damage, **use extreme care when handling fuel**. Fuel is extremely flammable and fuel vapors are explosive:

- Extinguish all cigarettes, cigars, pipes, and other sources of ignition.
- Use only an approved fuel container. Use only non-metal, portable fuel containers approved by the Underwriter's Laboratory (U.L.) or the American Society for Testing & Materials (ASTM). If using a funnel, make sure it is plastic and has no screen or filter.
- Never remove the fuel tank cap or add fuel with the engine running. Allow engine to cool before refueling.
- Never add fuel to or drain fuel from the unit indoors. Move unit outdoors and provide adequate ventilation.
- Clean up spilled fuel immediately. If fuel is spilled on clothing, change clothing immediately. If fuel is spilled near unit, do not attempt to start the engine but move the unit away from the area of spillage. Avoid creating any source of ignition until fuel vapors have dissipated.
- Never store the unit or fuel container where there is an open flame, spark, or pilot light such as on a water heater or other appliance.
- Prevent fire and explosion caused by static electric discharge. Static electric discharge can ignite fuel vapors in an ungrounded fuel container.
- Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before adding fuel.
- Remove fuel-powered equipment from the truck or trailer and add fuel to it on the ground. If this is not possible, then add fuel to such equipment with a portable container, rather than from a fuel dispenser nozzle.
- Keep the nozzle in contact with the rim of the fuel tank or container opening at all times until you have finished adding fuel. Do not use a nozzle lock open device.

- **Never overfill fuel tank.** Replace fuel tank cap and tighten securely.
- Replace all fuel container caps securely after use.
- For gasoline engines, do not use gas with methanol. Methanol is harmful to your health and to the environment.

Handling Waste Product and Chemicals

Waste products, such as used oil, fuel, coolant, brake fluid, and batteries, can harm the environment and people:

- **DO NOT** use beverage containers for waste fluids - someone may drink from them.
- Contact your local Recycling Center or authorized dealer to learn how to recycle or dispose of waste products.
- Safety Data Sheets (SDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques. The seller of the chemical products used with your unit is responsible for providing the SDS for that product.

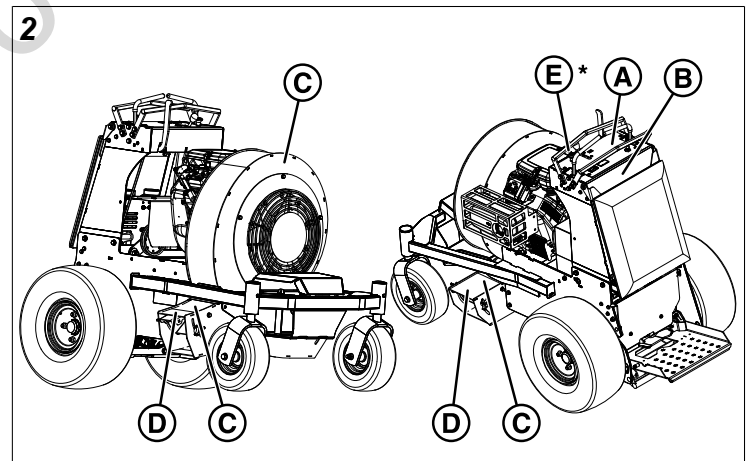
Safety Decals and Icons

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



WARNING

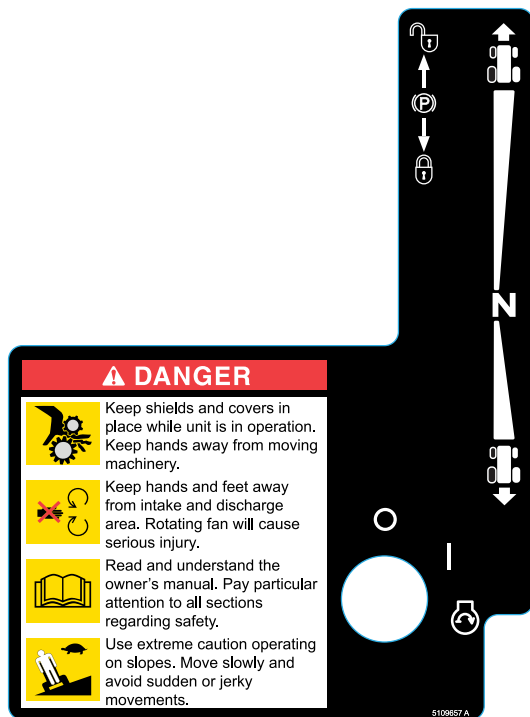
If any safety decals become worn or damaged, and cannot be read, order replacement decals from your local dealer.



* Located on backside of blower housing by engine manifold.

- A. **Part Number: 5109657 - Decal, Dash Panel, RH, Warning/Controls**
- B. **Part Number: 5109767 - Decal, Warning, P2**
- C. **Part Number: 5106775 - Decal, Danger**
- D. **Part Number: 5106773 - Decal, Pinch**
- E. **Part Number: 5106771 - Decal, Hot**

5109657 - Decal, Warning/Controls



	The safety alert triangle signifies important cautions or warnings which MUST be followed.
	DANGER: Keep shields and covers in place while machine is in operation. Keep hands away from moving machinery.
	DANGER: Keep hands and feet away from intake and discharge area. Rotating fan will cause serious injury.
	Read and understand the operator's manual. Pay particular attention to all sections regarding safety.
	Use extreme caution operating on slopes. Move slowly and avoid sudden or jerky moments.

5109767 - Decal, Warning



	The safety alert triangle signifies important cautions or warnings which MUST be followed.
	WARNING: Do not smoke while refueling. Do not fill tank while engine is running or while engine is hot.
	WARNING: Improper use or care of this blower or failure to wear proper protection can result in serious injury.

	WARNING: Thrown objects can cause serious injury.
	Keep Bystanders away.
	WARNING: To prevent fire, keep engine and pump compartments clean. Especially in exhaust area.
	Always wear hearing and eye protection.

5106775 - Decal, Danger



	Danger: Keep hands and feet away.
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5106773 - Decal, Pinch Point




	The safety alert triangle signifies important cautions or warnings which MUST be followed.
	CAUTION: Pinch Point.


5106771 - Decal, Hot Surface





	Hot Surface
	

Safety Alert Symbol and Signal Words

The safety alert symbol  identifies safety information about hazards that can result in personal injury. A signal word (**DANGER**, **WARNING**, or **CAUTION**) is used with the alert symbol to indicate the likelihood and the potential severity of injury. In addition, a hazard symbol may be used to represent the type of hazard.

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

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

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

NOTICE indicates information considered important but not hazard-related.

Test the Safety Systems

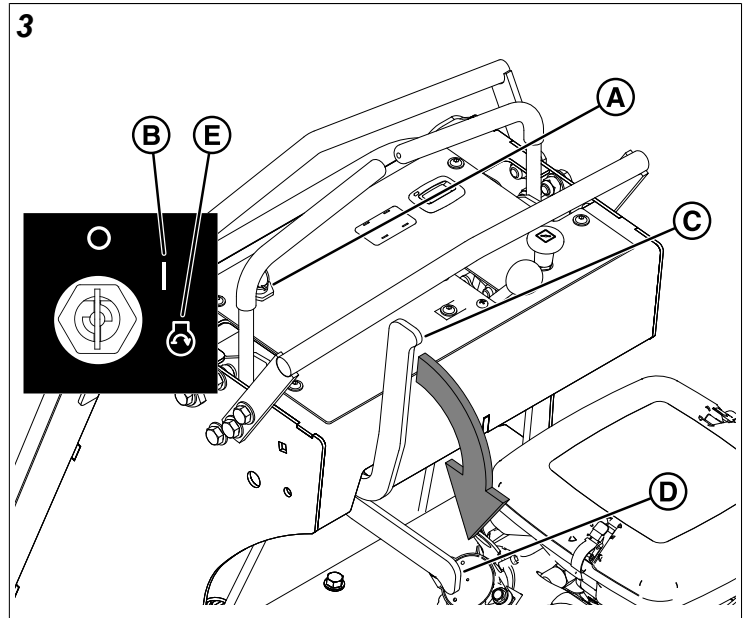
The safety systems installed on your unit should be tested before each use. Be sure you have read this manual and are completely familiar with the operation of the unit before performing these safety system checks.

If there is a malfunction during one of these procedures, do not operate the unit. Contact your authorized dealer for service.

Perform these tests in a clear, open area outdoors. Keep bystanders away.

Use the following procedures to check for normal operation of the unit's safety systems.

Test the Parking Brake Switch (Start):

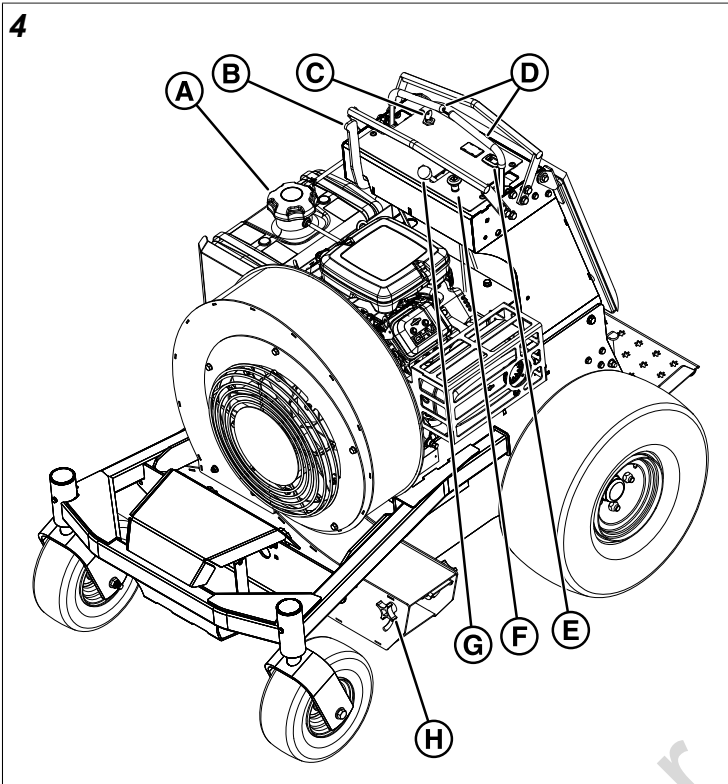


1. Turn the ignition switch key (A, Figure 3) to the ON position (B).
2. Move the parking brake (C) to the disengaged position (D).
3. Turn the ignition switch key to the START position (E).

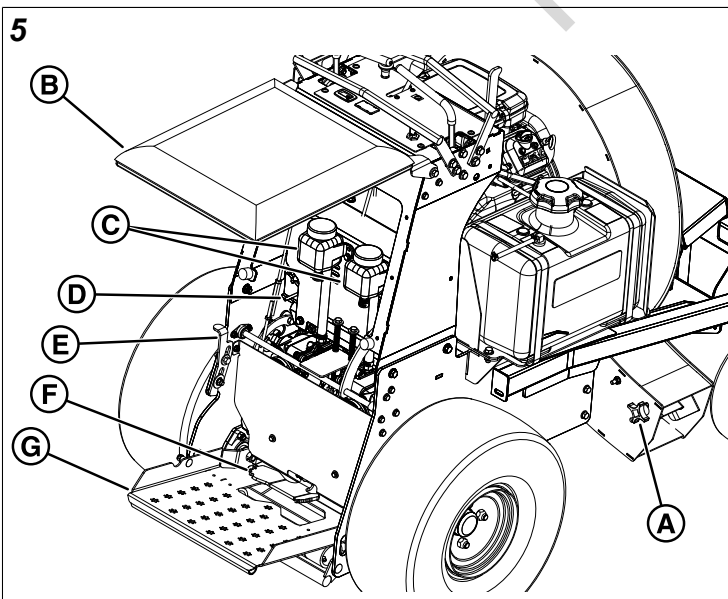
Result: The engine must not crank.

Features and Controls

Control Functions and Locations



- A. Fuel Tank Cap
- B. Parking Brake Lever
- C. Ignition Key Switch
- D. Motion Control Levers
- E. Tach/Hour Meter
- F. Choke Control Knob
- G. Engine Throttle Control Lever
- H. Deflector Adjustment Knobs



- A. Deflector Adjustment Knobs
- B. Operator Support Cushion (Shown in raised position for clarity of image)
- C. Hydraulic Oil Tanks (One tank per transmission)
- D. Hydraulic Bypass Release Levers (One per transmission. Left side shown.)
- E. Operator Platform Release Latch
- F. Air Stream Control Foot Pedal
- G. Operator Platform

Fuel Tank Cap



To remove the fuel tank cap, turn **counter-clockwise**.

Parking Brake Lever



Parking Brake: pull the parking brake lever rearward and up to engage the parking brake. Move the lever fully forward and down to disengage the parking brake.



DISENGAGE: Releases the parking brake.



ENGAGE: Locks the parking brake.

Ignition Key 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.

Motion Control Levers

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



FORWARD



NEUTRAL



REVERSE

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

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

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

See *Driving the Unit* for steering instructions.

Tach/Hour Meter

The Tach/hour meter shows the engine revolutions per minute when the engine is running and the engine hours when engine is off. The meter will also show reminders when to change the engine oil. The meter only runs when the engine is running and is independent of the key switch.

Choke Control Knob



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

Engine Throttle Control Lever

The throttle controls engine speed. Move the throttle forward to increase engine speed and back to decrease engine speed.



FAST engine throttle speed

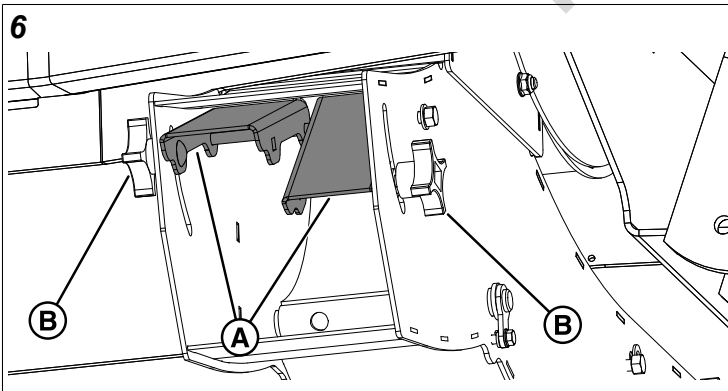


SLOW engine throttle speed

Deflector Adjustment Knobs

The unit is equipped with two (2) discharge chutes. One discharge chute is located on the left side of the unit and the other chute is on the right side.

Each discharge chute has two deflector paddles (A, Figure 6) which are used to adjust the air patterns.



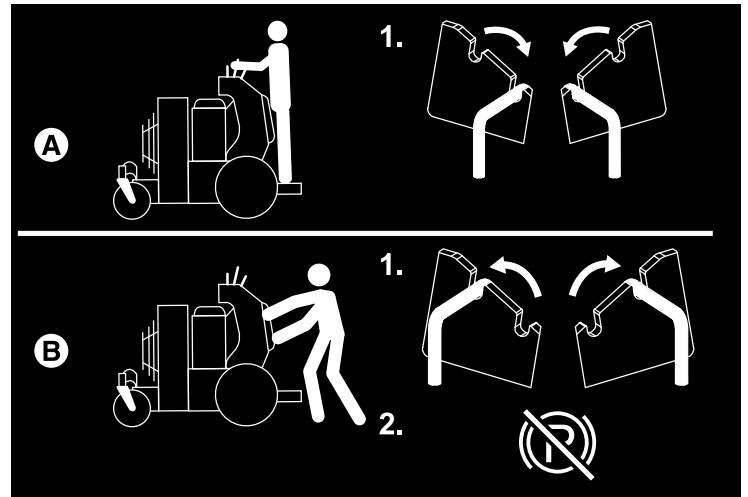
To adjust the deflector paddles loosen the associated knob (B) and move the paddle up or down to the desired position and then tighten the knob.

Hydraulic Oil Tanks

Transmission oil is added through the hydraulic oil tanks. It also serves as extra holding capacity for oil as the transmissions heat up and the hydraulic oil expands. See *Check/Fill Transmission Oil* for oil level check and fill procedures.

Hydraulic Pump Bypass Valves

This unit is equipped with (2) hydraulic pump bypass valves. The hydraulic pump bypass valves deactivate the transaxle so that the unit can be pushed by hand. Both hydraulic pump bypass valves must be in the same position whether you are driving the unit or pushing it by hand. See *Pushing the Unit by Hand* for operational information.

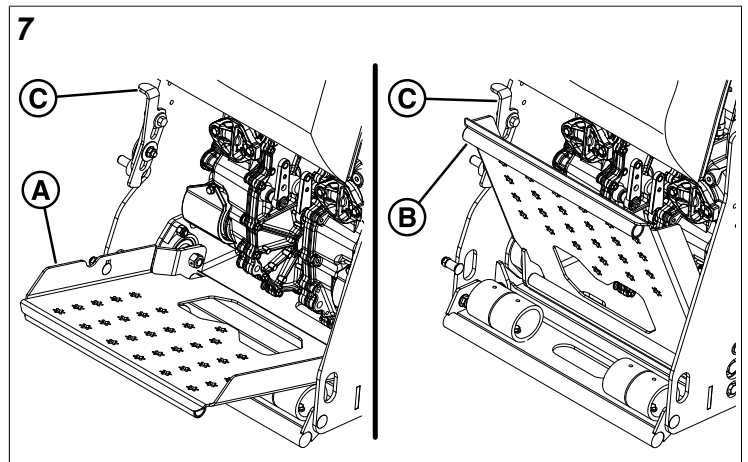


A. **ENGAGED** (run) position

B. **DISENGAGED** (bypass) position

Operator Platform Release Latch

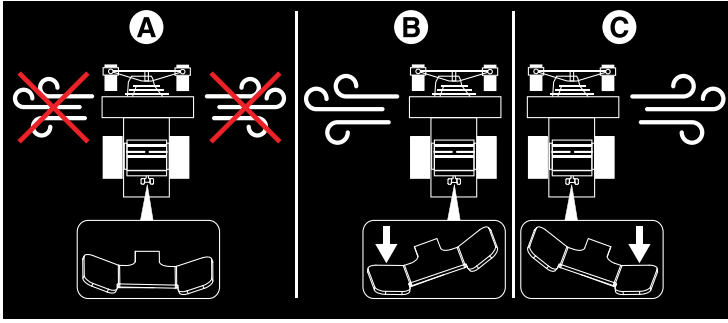
The operator platform (A, Figure 7) can be locked into the raised position (B) to help save room when trailering or storing.



Tilt the operator platform up to the raised position. The operator platform release latch (C) will lock it into place. Pull the release latch up and lower the operator platform to the operating position (A) using your hand.

Air Stream Control Foot Pedal

The air stream control foot pedal adjusts the air pattern by starting and stopping an air stream. See *Using the Blower and Deflector Controls* for operational instructions.



- A. Stop all air streams.
- B. Open the left air stream.
- C. Open the right air stream.

Not for
Reproduction

Operation

Before First Time Operation

- Be sure to read all information in the *Operator Safety* and *Operation* sections before attempting to operate this unit.
- Become familiar with all of the controls and how to stop the unit.
- Drive in an open area to become accustomed to the unit.

WARNING

- Never operate on slopes greater than 12°.
- Select slow ground speed before driving onto a slope.
- Blow across the face of slopes, not up and down, use caution when changing direction on slopes and do NOT start or stop on a slope.

WARNING

- Never allow passengers to ride on the unit.
- Before leaving the operator's platform for any reason, engage the parking brake, turn the ignition switch to OFF, and remove the ignition key.
- To reduce fire hazard, keep the engine and unit free of grass, leaves, and excess grease. Do NOT stop or park unit over dry leaves, grass, or combustible materials.
- Fuel is highly flammable and must be handled with care. Never fill the tank when the engine is still hot from recent operation. Do NOT allow open flame, smoking, or matches in the area. Avoid over-filling and wipe up any spills.

WARNING

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

Checks Before Starting

1. Check the engine oil level using the engine oil dipstick. If necessary, add oil through the engine oil fill. See the engine owner's manual for instructions, the location of the engine oil fill, engine oil dipstick, and oil recommendations.
2. Make sure that all nuts, bolts, screws and pins are in place and tight.
3. Fill the fuel tank with fresh fuel. Refer to the engine owner's manual for fuel recommendations.
4. Check the hydraulic oil level. If necessary, add oil through the hydraulic oil tanks.

Starting the Engine

WARNING

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

- If you do not understand how a specific control functions, or have not yet thoroughly read the *Features and Controls* section, do so now.
 - Do NOT attempt to operate the unit without first becoming familiar with the location and function of all controls.
1. While standing on the operator's platform, engage the parking brake and make sure that the motion control levers are locked in the NEUTRAL position.
 2. A warm engine might not require choking. Set the engine throttle control to the FAST position. Fully close the choke by pulling the knob OUT fully.
 3. Insert the key into the ignition switch and turn it to START.
 4. After the engine starts, gradually open the choke (push knob down fully). Reduce to half throttle speed and allow engine to warm.
Warm up the engine by running it for atleast a minute before driving the unit.

In the event of an emergency the engine can be stopped by simply turning the ignition switch to STOP. Use this method only in emergency situations. For normal engine shut down follow the procedure given in *Stopping the Unit*.

Stopping the Unit

1. Stop the unit's movement by returning the motion control levers to their NEUTRAL positions. The ground speed control levers are spring-loaded and when released the levers will automatically return to NEUTRAL.
2. Engage the parking brake by pulling the parking brake lever up and back until it locks into position.
3. Move the throttle control to the mid-throttle position and turn the ignition key to OFF. Remove the key.

Driving the Unit

CAUTION

Avoid injury! Learn the proper use of the motion control levers and practice at low throttle until becoming proficient and comfortable with the operation of the unit.

DO NOT rapidly move the motion control levers from FORWARD to REVERSE or REVERSE to FORWARD position. Sudden direction changes could cause loss of control or damage the unit.

The functions of the motion control levers are:

- Forward and reverse movement
- Steering
- Acceleration and Deceleration
- Stopping

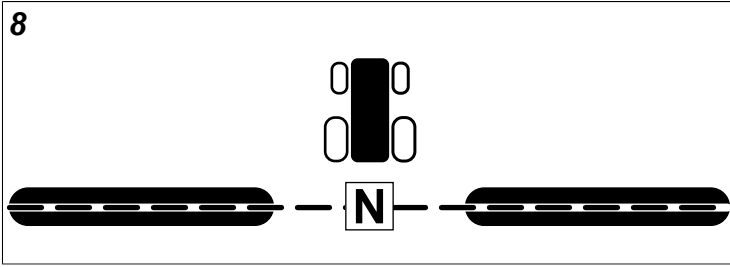


Figure 8 depicts the NEUTRAL position.

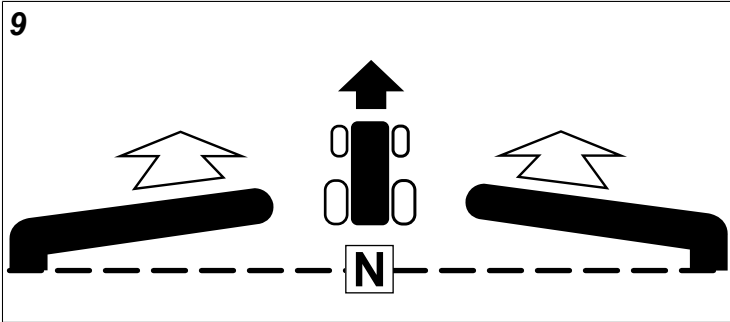


Figure 9 depicts the FORWARD travel position. The travel speed depends on how far forward the motion control levers are pushed.

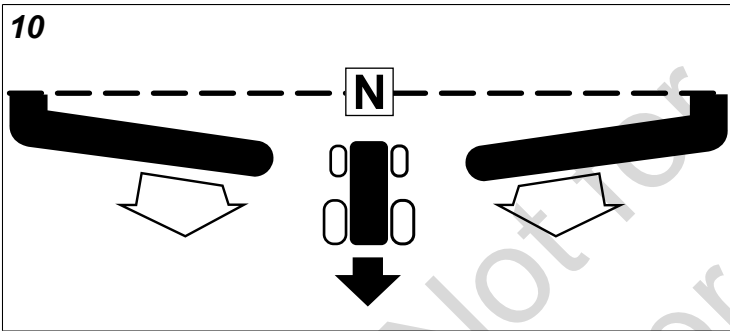
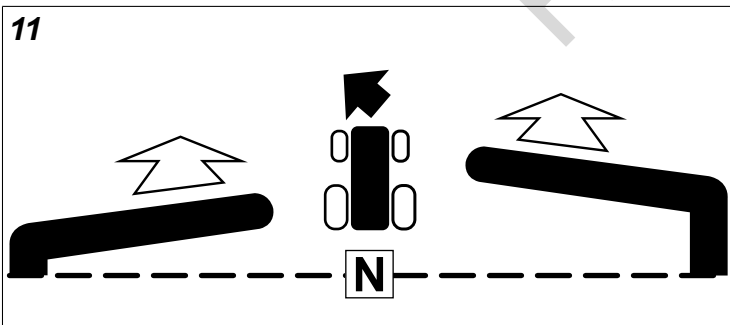
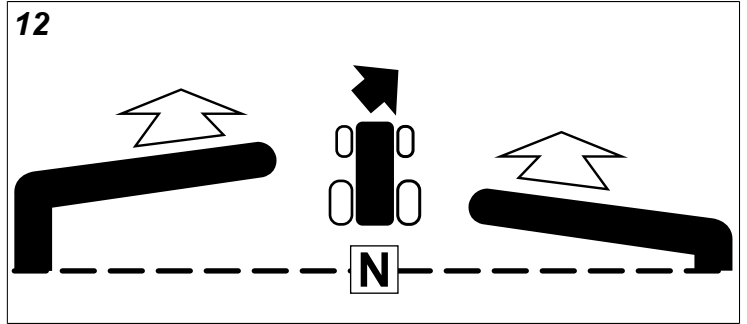


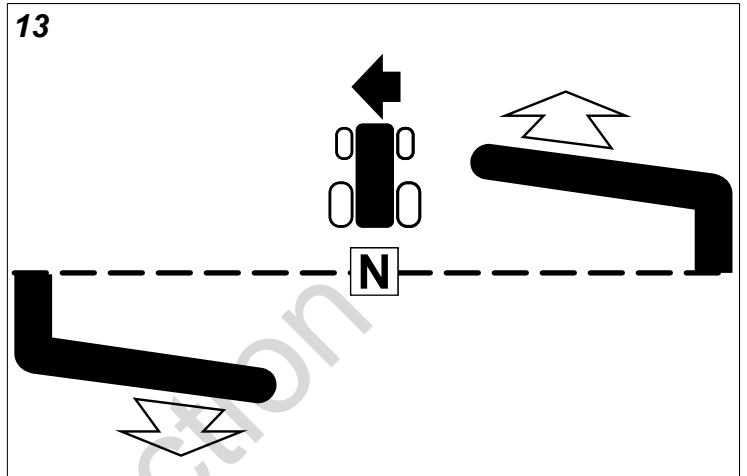
Figure 10 depicts the REVERSE travel position. The travel speed depends on how far rearward the motion control levers are pulled.



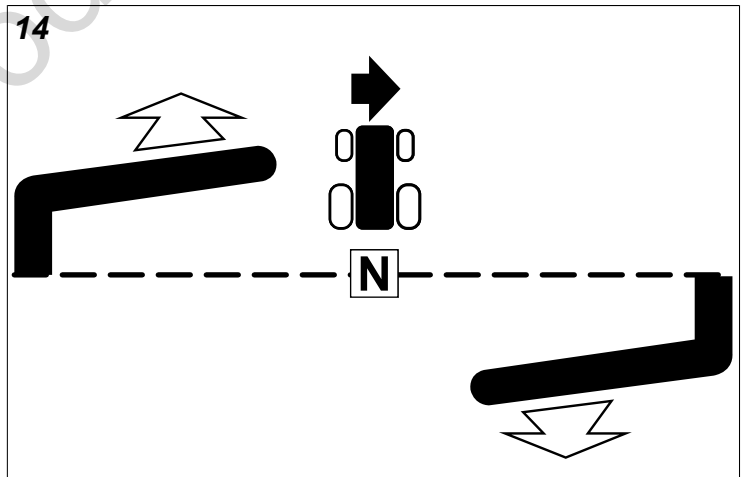
For a gentle left turn, push the right motion control lever further forward than the left motion control lever.



For a gentle right turn, push the left motion control lever further forward than the right motion control lever.



For a sharp left turn, pull the left motion control lever rearward and push the right motion control lever forward.



For a sharp right turn, push the left motion control lever forward and pull the right motion control lever rearward.

Using the Blower and Deflector Controls

CAUTION

Avoid injury and property damage! **DO NOT** position discharge where it will blow debris towards people, vehicles, buildings, or other objects in vicinity. Flying debris may damage, harm, or cause injury to people or objects in air flow range. Keep a safe distance between two or more operators and units when working together in the same areas.

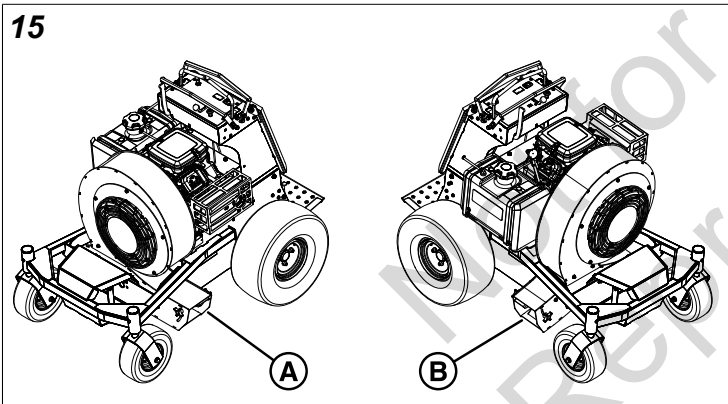
CAUTION

Keep hands and feet away from air intake and air discharge. Pinch points and crushing forces will cause severe injury.

DANGER

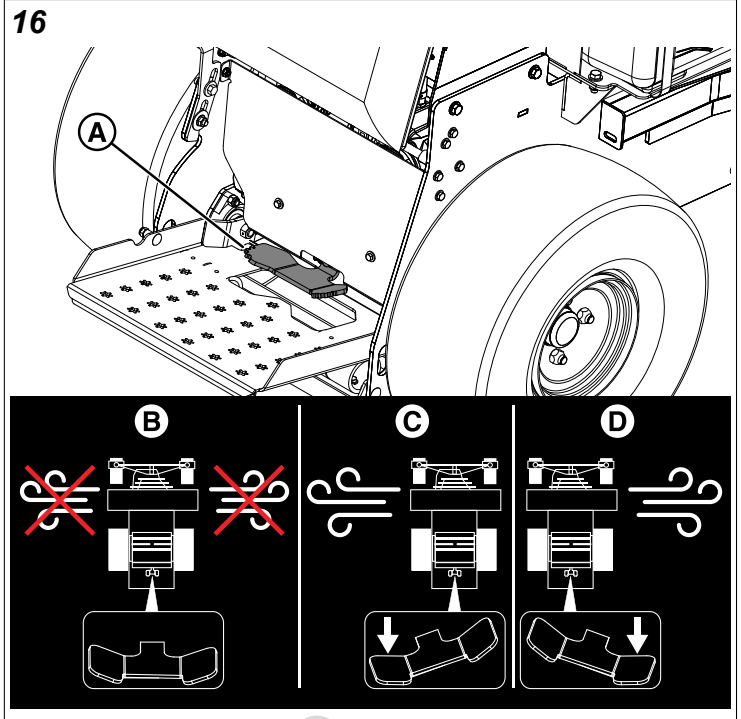
ROTATING FAN - DO NOT attempt to remove materials from intake or discharge when blower is running. Engage parking brake, stop engine, remove key and wait until all machinery has come to a complete stop.

This unit features two (2) discharge chutes (A and B, Figure 15).



Each discharge chute features a dual deflector system. Both deflectors are adjusted using the associated adjustment knob.

The air stream control foot pedal (A, Figure 16) starts and stops an air stream.



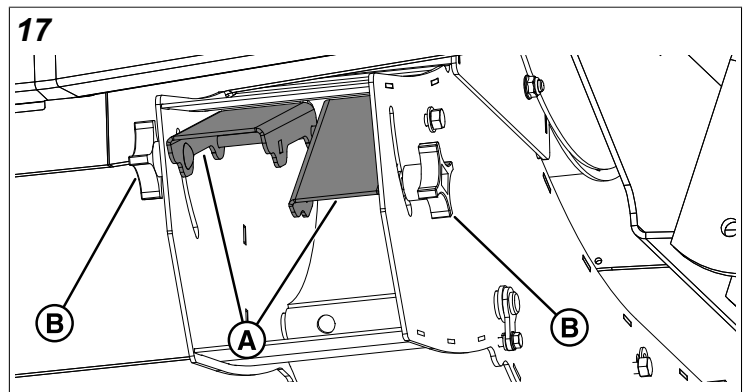
When the air stream control foot pedal is not depressed down on either side (**CLOSED** position) (B) the air stream out of both discharge chutes is blocked.

When the air stream control foot pedal is pressed down on the **LEFT** side (C) the air stream is directed out of the **LEFT** discharge chute.

When the air stream control foot pedal is pressed down on the **RIGHT** side (D) the air stream is directed out of the **RIGHT** discharge chute.

Dual Deflector System

Each discharge chute features two (2) deflector paddles (A, Figure 17) which are used to adjust the air stream.



To adjust the deflector paddles loosen the associated knob (B) and move the paddle up or down to the desired position and then tighten the knob. The deflector paddles can be set in any position as determined by the slots in the housing where the knobs travel.

With a little time and experience, an operator can become proficient in the setting the deflector paddles at the optimum positions for the task.

With the deflector paddles position towards the bottom of the slot, the air stream is directed downwards under the debris and is useful for blowing wet leaves, grass, and dirt.

For moving large piles of debris position the deflector paddles to the top of the slots so they are fully open for maximum air flow.

REMEMBER: Air velocity can be controlled by the engine throttle control as well as by the deflectors.

REMEMBER: The air stream control foot pedal should be set to the **CLOSED** position when necessary (for example, when traveling from one area to another, past flower and bark beds, etc.).

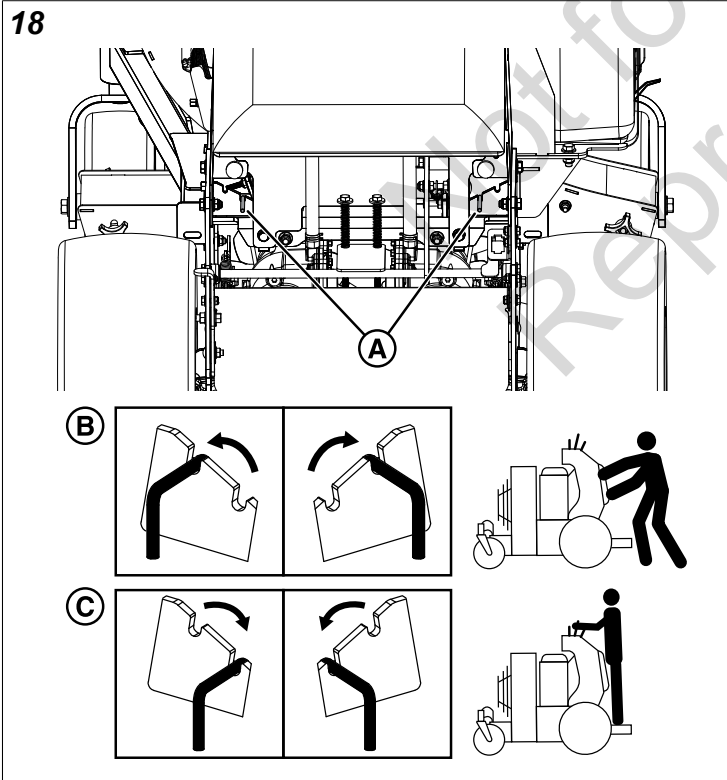
Pushing the Unit by Hand

NOTICE

Do not tow unit.

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

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Raise the operator support cushion to gain access to the hydraulic bypass release levers (A, Figure 18) which are located near the transaxles and the hydraulic oil tanks.



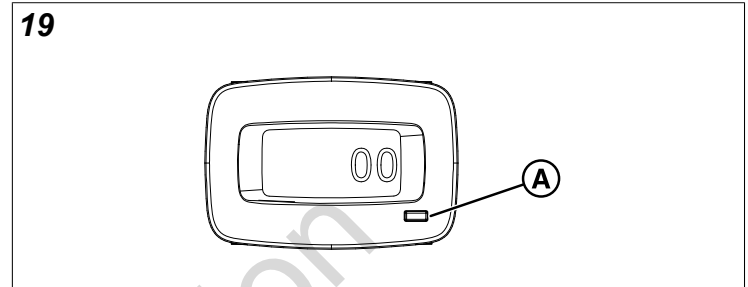
3. To open the transaxle bypass valves (bypass position) (B), move both hydraulic bypass release levers out of the inner lower slots to the upper higher slots so they lock in the bypass position.

4. Disengage the parking brake. The unit can be pushed by hand.
5. After moving the unit, close the bypass valves (run position) (C) by moving both hydraulic bypass release levers out of the upper higher slots to the inner lower slots so they lock in the run position.
6. Lower the operator support cushion back into place.

Note: Both hydraulic bypass release levers must be in the same position.

Using the Tach/Hour Meter

This tach/hour meter features multiple modes. The meter can display the run time of the engine, the RPM of the engine, and service reminder for oil change intervals.



To view the run time of the engine: View the meter. The run time of the engine is the default display.

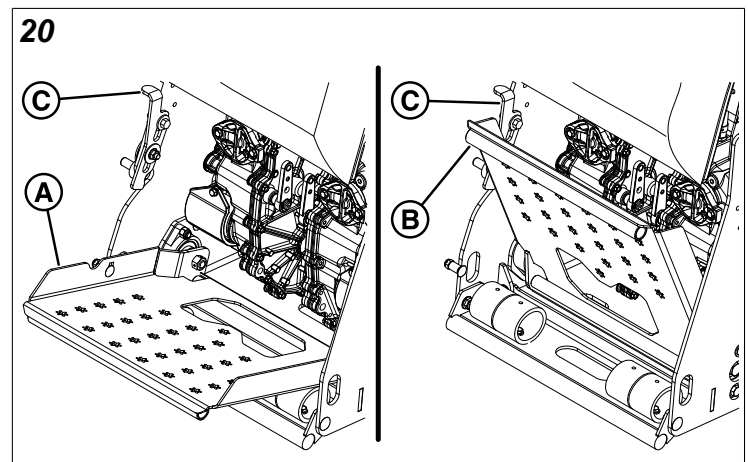
To view the RPM of the engine: Press the MODE button (A, Figure 19).

To view the remaining hours to the next service interval: Press the MODE button.

To reset a service reminder displayed on the screen: Press and hold the MODE button for three (3) seconds.

Using the Operator Platform Release Latch

The operator platform (A, Figure 20) can be locked into the raised position (B) to help save room when trailering or storing.



1. Tilt the operator platform up to the raised position (B). The operator platform release latch (C) will lock it into place.
2. Pull the release latch up and lower the operator platform to the operating position (A) using your hand.

Storage

Temporary Storage (30 Days or Less)

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



WARNING

Never store the unit, with gasoline in engine or fuel tank, in a heated shelter or in an 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 and sparks.

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

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

Long Term Storage (Longer Than 30 Days)

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

1. Drain crankcase oil while engine is hot and fill with a grade of oil that will be required when unit is used again.
2. Clean external surfaces and engine.
3. Prepare engine for storage. See engine owner's manual.
4. Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.
5. Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt, and insects.
6. Completely grease and oil unit as outlined in the *Lubrication* section.
7. Clean up unit and apply paint or rust preventative to any areas where paint is chipped or damaged.

8. Be sure the battery is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. If battery is left in unit, disconnect the negative cable.
9. 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. Remove the covers installed into the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh gasoline. See engine manual for recommendations.
5. See engine owner's manual and follow all instructions for preparing engine after storage.
6. Check crankcase oil level and add proper oil if necessary. If any condensation has developed during storage, drain crankcase oil and refill.
7. Inflate tires to proper pressure. Check fluid levels.
8. Start the engine and let it run slowly. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated area.

Maintenance Schedule

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

UNIT MAINTENANCE
Before Each Use
Check the safety interlock system.
Check the parking brake operation.
Check the unit for loose hardware.
Check the hydraulic oil level.
Check the tire pressures.
Every 25 Hours
Lubricate the unit.*
First 75 Hours
Initial change hydraulic oil and filters.
Every 100 Hours
Clean battery and battery cables.
Check hydraulic pump drive belt.
Every 400 Hours or Yearly
Check and change hydraulic oil and filters.

ENGINE MAINTENANCE
Before Each Use
Check engine oil level.
Clean any visible debris from engine compartment and cooling fins.
Every 50 Hours
Inspect/Clean Spark Arrester.**
Every 100 Hours
Check and change fuel filter.
Refer to engine owner's manual
Service air filter.
Change engine oil and filter.
Check/Replace spark plugs.

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

** If equipped. Replace if damaged.

Maintenance Procedures

Checking/Adding Fuel



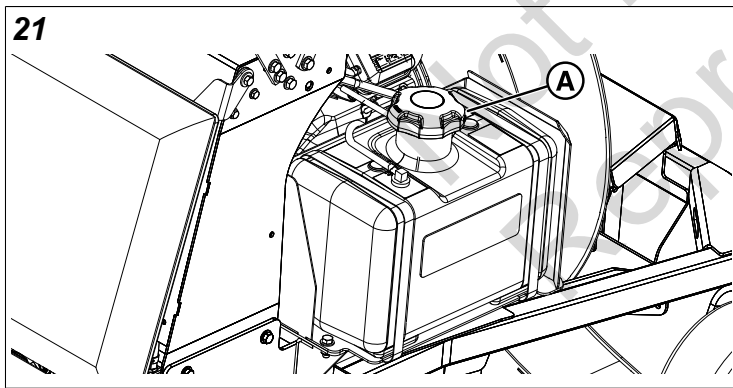
Gasoline is highly flammable and must be handled with care.

- Allow engine to cool for at least three (3) minutes before adding fuel.
- Do NOT allow open flame, smoking, or matches in the area.
- Avoid over-filling and wipe up any spills.
- Use clean approved non-metallic container to prevent static electric discharge.
- Use clean approved non-metallic funnel with a plastic mesh strainer when filling the fuel tank.

RECOMMENDATION: Fill the fuel tank at the end of each day's operation to keep condensation out of the fuel tank.

To add fuel:

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Allow the engine to cool for at least three (3) minutes.
3. Remove any dirt and/or debris from around the fuel cap (A, Figure 21).



4. Remove the fuel cap slowly to allow any pressure built up in the tank to escape.
5. Add fuel to the fuel tank using a non-metallic funnel with a plastic mesh strainer. Only fill fuel tank to the bottom of the filler neck. Do NOT overfill. Clean up spilled fuel immediately.
6. Install the fuel cap.

Replace the Fuel Filter



Fuel and its vapors are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

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

If filter is dirty or clogged, replace as follows:

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

Check Engine Oil Level

Interval: Before Each Use

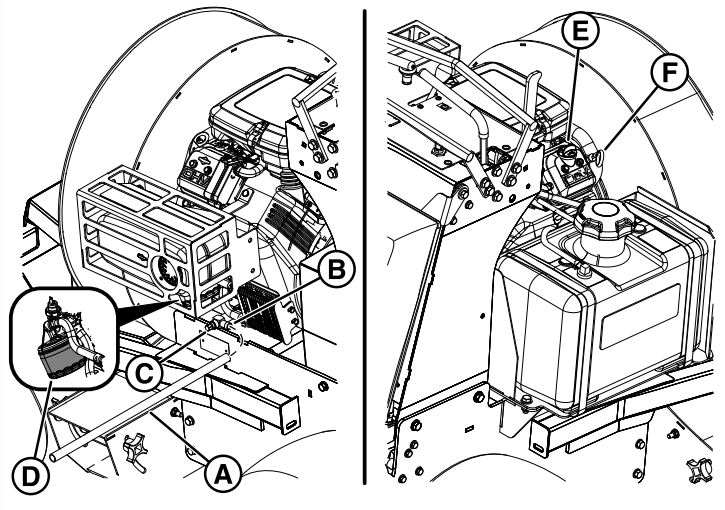
Refer to the engine owners manual for dipstick and oil fill locations and specific engine oil check and fill procedures.

Change the Engine Oil and Filter

NOTICE

Avoid damage! Change the engine oil and filter more often if the unit is used in the following conditions:

- Extremely dusty conditions.
 - Frequent slow or low-speed operation.
 - Frequent short trips.
1. Warm the engine by running it for a few minutes. (Refer to the engine owner's manual for oil and filter replacement instructions.)
 2. Engage the parking brake, turn the ignition switch to OFF, and remove the key.
 3. Place an oil drain pan beside the engine on the oil drain valve side.
 4. Place 18" of 1/2" ID hose (A, Figure 22) onto the drain valve (B)



5. Open the oil drain valve (C) fully.
6. Allow oil to drain into an oil drain pan.
7. After oil drains, securely tighten oil drain valve.
8. Remove the drain hose.
IMPORTANT: Be sure the engine and exhaust system is cool before proceeding.
9. Place an absorbent shop cloth under the engine oil filter (D) to contain any spilled oil.
10. Turn the filter **counter-clockwise** to remove.
11. Apply a film of clean engine oil to the gasket of the new filter.
12. Install the new filter. Turn the filter **clockwise** until gasket makes contact with the mounting surface. Tighten 1/2 to 3/4 turn after gasket contact.
13. Add engine oil (refer to engine operator's manual) in the fill tube (E) and check the amount of oil in the engine using the engine oil dipstick (F).
14. Remove the shop cloth and wipe up any spilled oil.

Engine Maintenance

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

Containing Spilled Fluids and Proper Disposal of Waste

Make sure that fluids are contained when performing inspection, maintenance, testing, adjustment, and repair of the unit. Be prepared to collect the fluid with suitable leakproof containers before opening or disassembling any component containing fluids. Do not pour waste onto the ground, down a drain, or into any source of water.



Improper disposal of waste can threaten the environment. Dispose of all fluids according to local regulations and mandates.

Service Air Filter

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

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.

Clean the Engine Compartment Area with Pressurized Air and Water

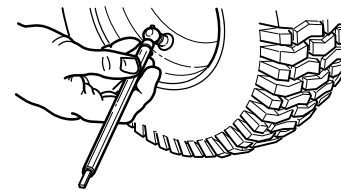
Pressurized air and/or water can cause debris and/or hot water to be blown out. This action could result in personal injury.

When pressurized air and/or pressurized water is used for cleaning wear protective clothing, protective shoes, and eye protection. Eye protection includes goggles or a protective face shield.

The maximum air pressure for cleaning purposes must be below 205 kPa (30 psi). The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi).

Checking Tire Pressures

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



Lubrication

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


Grease:



- front caster wheel axles. (See *Lubricating the Front Casters*).
- front caster yoke axles. (See *Lubricating the Front Casters*).

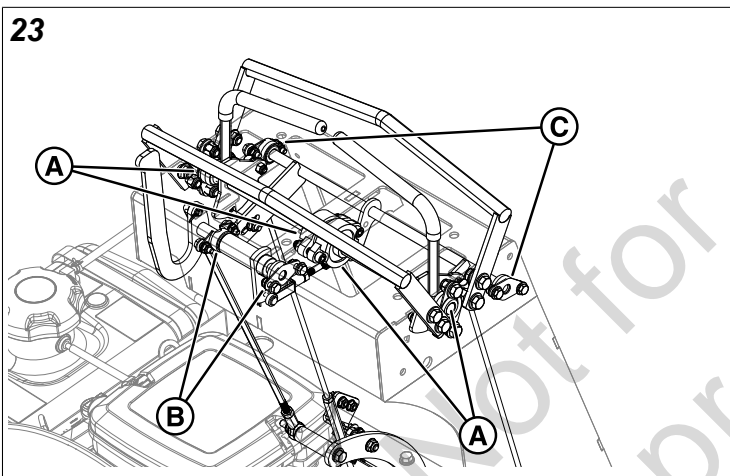
Use grease fittings when present. Disassemble parts to apply grease to moving parts when grease fittings are not installed.

Not all greases are compatible. Grease (p/n 5022285) is a Calcium Sulfonate EP NLGI #2 grease that is recommended and available through your normal parts source. Lithium Complex EP-2 NLGI #2 grease may be used if 5022285 is not available. Using a non-compatible grease could damage or cause premature parts failures.

Oil: 

- motion control pivots (A, Figure 23).
- parking brake pivots (B, Figure 23).
- neutral lockout shaft pivots (C, Figure 23).
- air stream control foot pedal linkages. (See *Lubricating the Air Stream Control Foot Pedal Linkages*).

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

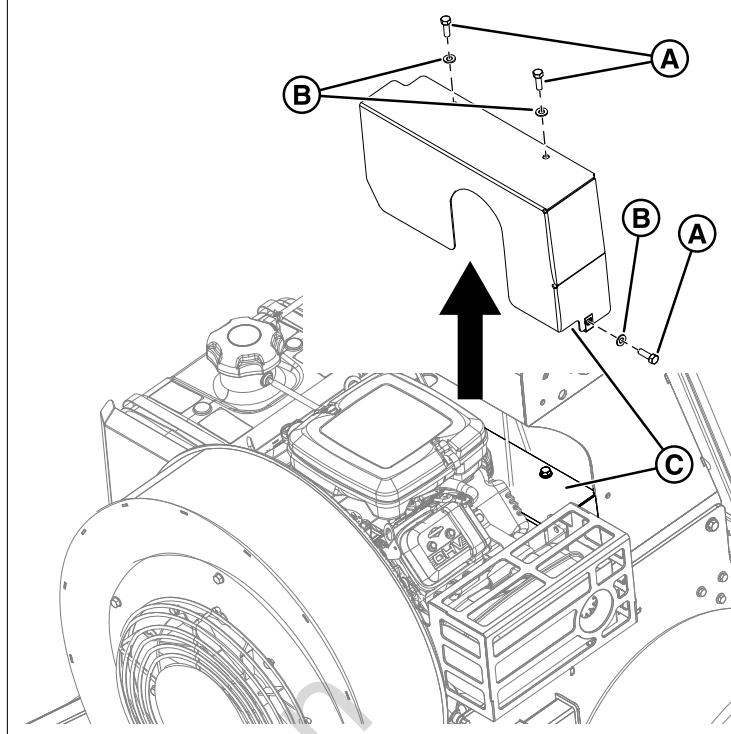


Lubricating the Air Stream Control Foot Pedal Linkages

Interval: Yearly

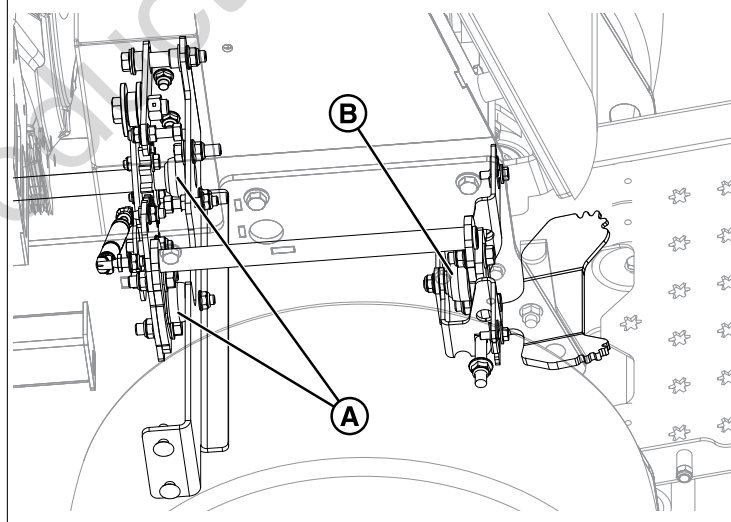
1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Remove the three (3) 5/16" bolts (A, Figure 24) and washers (B) and the belt guard (C) from the unit.

24



3. Apply oil to the control shaft bearings (A, Figure 25).

25



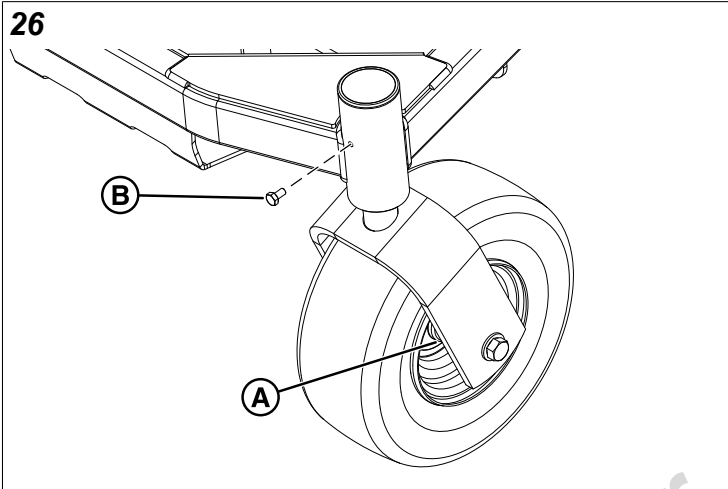
4. Install the belt guard using the three (3) 5/16" bolts and washers.
5. Remove the two (2) 1/4" bolts (A, Figure 29), washers (B), and nuts (C).
6. Remove the two (2) 1/4" bolts (D) and washers (E) from the kick plate (F).
7. Remove the kick plate.
8. Apply oil to the foot pedal bearing (B, Figure 25).
9. Install the kick plate using the hardware previously removed.

Lubricating the Front Casters

Interval: Front caster wheel axles (A, Figure 26) - Every 25 hours.

Interval: Front caster yoke axles - Yearly

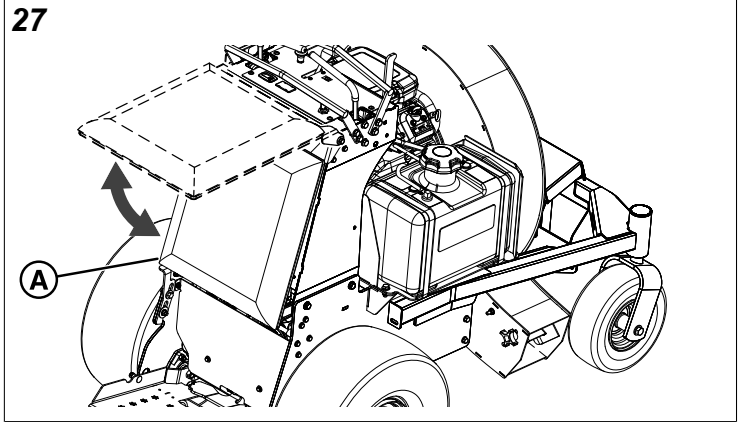
1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Remove the 1/4"-28 bolt (B, Figure 26) from the caster hub.



3. Install a 1/4"-28 grease fitting.
4. Grease the front caster.
5. Remove the 1/4"-28 grease fitting.
6. Install the 1/4"-28 bolt into the caster hub.
7. Repeat the process for the other side of the unit.

Raise and Lower the Operator Support Cushion

This unit is equipped with a hinged operator support cushion (A, Figure 27) which can be raised to gain access to the service components underneath the control tower. Raise the operator support cushion to gain access to the service components underneath the control tower and lower the operator support cushion for normal operation. A block of wood can be used to support the operator support cushion in the upright position while servicing the components beneath the control tower.



Fuse Identification and Location

The electrical system for this unit is equipped with one (1) 20 amp blade type replaceable fuse. The fuse is located underneath the instrument control panel in a sealed fuse holder.

Check/Fill Transmission Oil Level

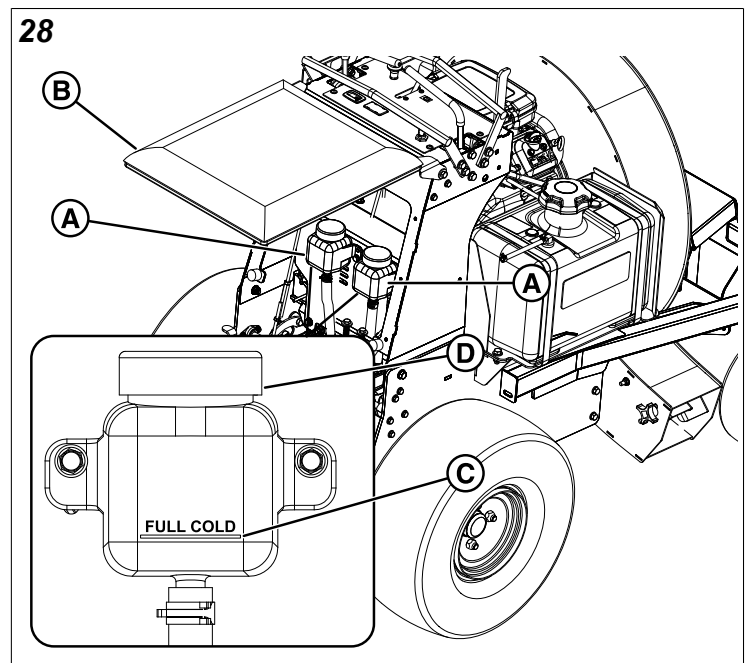
Oil Type: Mobil 1™ synthetic 15W-50 oil or equivalent.



CAUTION
Avoid injury! Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluid.

This unit is equipped with two transmission oil tanks (A, Figure 28). One transmission oil tank only supplies oil to one transmission. The level of oil in both transmission tanks must be checked, and if necessary, filled.



1. Raise the operator support cushion to gain access to the transmission oil tanks.
2. Locate the transmission oil tanks. The transmission oil tanks are located on the rear of the unit between the operator support cushion (B) and the engine.
3. Check the oil level when the unit is cold. The oil should be up to the "FULL COLD" mark (C) on the transmission oil tanks. If the oil is below this level, proceed to step #3.
4. Before removing the tank cap (D), make sure that the area around the tank cap and fill neck of the tank is free of dust, dirt, and other debris. Remove the tank cap.
5. Add oil up to the "FULL COLD" mark.
6. Install the tank cap.
7. Repeat steps #4 to #6 for the other tank if necessary.
8. Lower the operator support cushion into place.

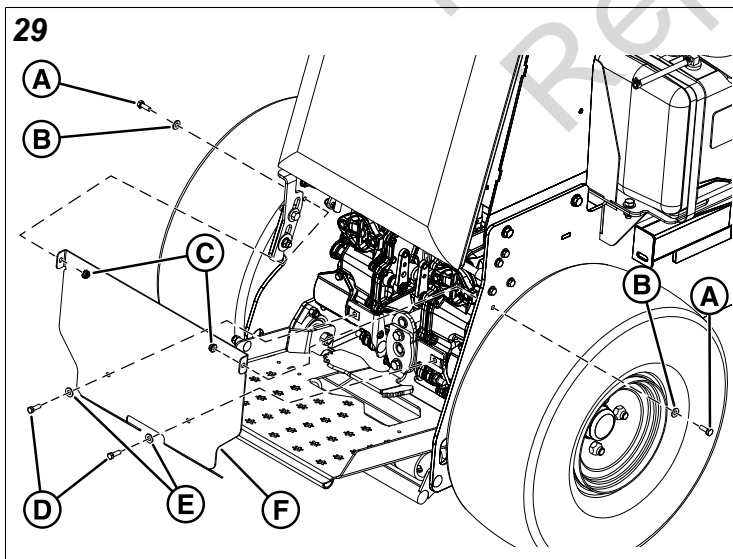
Transmission Oil Filter Change

Change Interval: Every 400 Hours or Yearly (Initial hydraulic oil and filter change after first 75 hours of operation).

Replacement Filter Number: 5101026X1

Note: Removing the oil filter from the transaxle will drain the oil tank. Have a suitable container ready to catch any spilled oil. The manufacturer recommends that this be a dealer only service item.

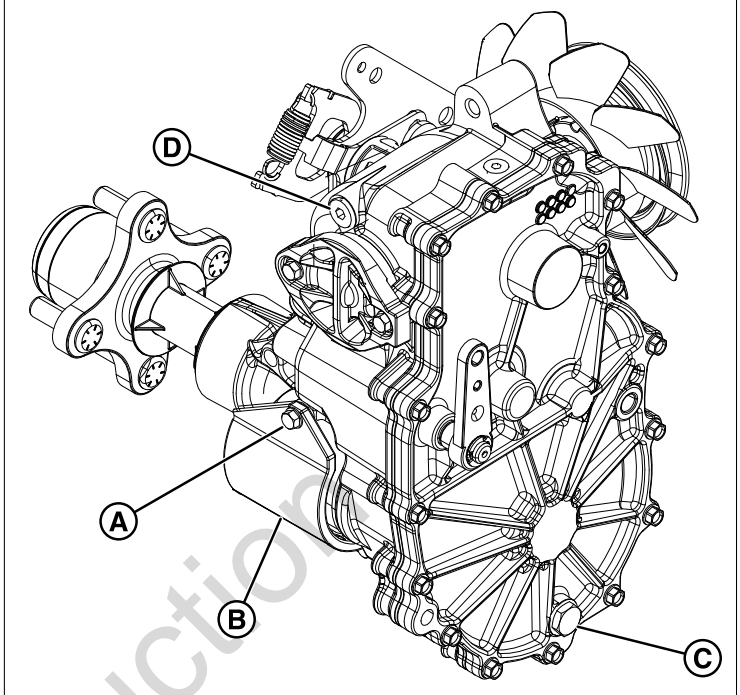
1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Allow the engine and transaxles to cool.
3. Remove the two (2) 1/4" bolts (A, Figure 29), washers (B), and nuts (C).



4. Remove the two (2) 1/4" bolts (D) and washers (E) from the kick plate (F).
5. Remove the kick plate.

6. Position both hydraulic bypass release levers in the bypass position.
7. Remove the filter guard screws (A, Figure 30) and filter guard (B) to access the oil filter. Clean any loose debris from around the perimeter of the filter. Place drain pan beneath the oil filter.

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8. Remove the oil filter from the transaxle. Dispose of used filter properly.
9. Remove the drain plug (C) from the transaxle. Allow all fluid to drain.
10. After the oil has drained, wipe the filter base surface off and apply a film of new oil to the gasket of the new replacement filter.
11. Replace the drain plug.
12. Install the new filter by hand, turn 3/4 to one full turn after the filter gasket contacts the filter base surface. Do not use a wrench.
13. Install the filter guard with filter guard screws. Torque the screws to 65 in-lbs (7 Nm).
14. Repeat steps 7 to 13 on the opposite side transaxle drive.
15. Remove the purge port plug (D) from the back of the transaxle.
16. Raise the operator support cushion to access the hydraulic oil tanks.
17. Remove the caps from the hydraulic oil tanks, fill with Mobil 1™ 15W-50 or equivalent motor oil until oil just appears at the bottom of each transaxle's purge port (approximately 2.5 qts. per transaxle, 5 qts. total). Install the purge port plug into each transaxle as the oil level reaches this port.
18. Torque the purge port plugs to 180 in-lbs (20 Nm).
19. Place both transmission release levers in the run position.

20. Continue to fill the transaxles through the expansion tank until the "FULL COLD" line is reached.
21. Install the expansion tank cap by hand. Be careful to not over tighten.
22. Lower the operator support cushion into place with your hand.
23. Perform the *Purging the Air from the Hydraulic System Procedure*.

Purging the Air from the Hydraulic System

Due to the effects air has on efficiency in hydraulic drive systems, it is critical that it be purged from the system. These purge procedures should be implemented any time a hydraulic system has been opened to facilitate maintenance or any additional oil has been added to the system.

The resulting symptoms of air in the hydraulic system may be:

- Noisy operation.
- Lack of power or drive after short term operation.
- High operation temperature and excessive expansion of oil.

Before starting, make sure the transaxles/transmissions are at the proper oil levels. If they are not, fill to the specifications outlined in the *Check/Fill Transmission Oil Level* procedure.

Purging Air from the Hydraulic System:

1. Chock the front wheels to prevent the unit from rolling. Raise the rear of the unit so that the unit's drive tires do not contact the ground. Position jack stands under the rear of the unit to secure it.
2. Open the transaxle's bypass valves (see *Pushing the Unit by Hand* for the location and function of the bypass valves), start the engine, release the parking brake, and slowly move the unit's motion control levers in both forward and reverse directions (5 to 6 times). As air is purged from the unit, the oil level will drop.
3. Stop the engine and engage the parking brake.
4. Close the transaxle's bypass valves, start the engine, release the parking brake, and slowly move the unit's motion control levers in both forward and reverse directions (5 to 6 times). As air is purged from the unit, the oil level will drop.
5. Stop the engine. Remove the jack stands from underneath the unit.
6. Repeat the process detailed above but with the unit's drive wheels on the ground. The procedure should be performed in an area free of any objects or bystanders.

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

Inspect/Remove Impeller

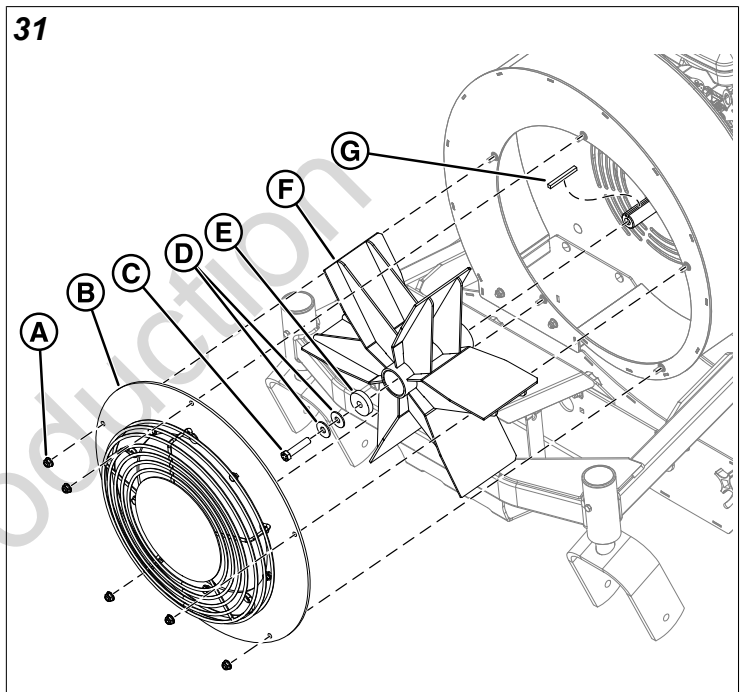


CAUTION

Be careful when removing the impeller. The impeller is heavy and there is not enough room for your fingers in the opening with the impeller. Hold onto the impeller by the fins using gloves to remove from the housing.

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Allow the machine to cool.
3. Remove the six (6) nuts (A, Figure 31) and the front safety cover (B).

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4. Remove the impeller bolt (C), two belleville washers (D), and spacer (E).
5. Inspect the impeller (F) for cracks or damage. Replace the impeller if any damage is found. Contact your local dealer for original equipment replacement parts.
6. Inspect the impeller key (G). Replace if damaged.
7. Install the impeller, the spacer, and the two (2) belleville washers (with their domes facing away from the impeller) onto the engine shaft.
8. When installing the impeller bolt, be sure it is clean of all oil. Use red Loctite® and torque the impeller bolt to 65 ft-lbs (88 Nm).
9. Install the front safety cover using the six (6) nuts.

Changing the Transaxle Drive Belt

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air

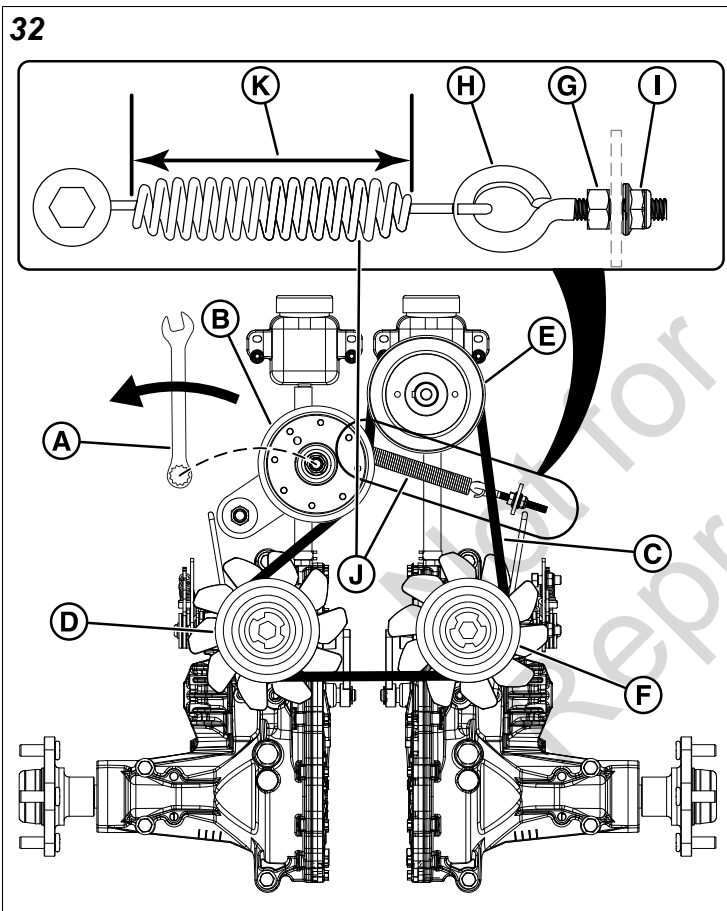
stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.

2. Allow the unit to cool.
3. Remove the three (3) 5/16" bolts (A, Figure 24) and washers (B) and the belt guard (C) from the unit.

WARNING

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

4. Place a 3/4" wrench (A, Figure 32) on the nut of the adjustable idler pulley (B) and rotate the idler arm in a direction that stretches the tension spring. This will relieve the pressure on the belt (C).



5. Remove the belt from the right hand side transaxle pulley (D) then the adjustable idler pulley and then carefully allow the adjustable idler pulley to rotate back into place.
6. Remove the belt from the engine drive pulley (E) and the left hand side drive pulley (F).
7. Install the new belt so that the V-side of the belt goes into the pulley grooves of the engine drive pulley and the left hand side transaxle pulley.
8. Place a 3/4" wrench on the nut of the adjustable idler pulley and rotate the idler arm in a direction that stretches the tension spring.

9. Install the V-side of the belt into the pulley grooves of the right side transaxle pulley and ensure that the flat side of the belt contacts the face of the adjustable idler pulley. Carefully allow the adjustable idler pulley to rotate back into place.
10. Loosen the jam nut (G) on the eye bolt (H).
11. Access the adjustment nut (I) through the access hole on the left side of the control tower.
12. Turn the adjustment nut until the coil-to-coil length of the spring (J) measures 6-5/16" (16 cm) (K).
13. Install the belt guard (C, Figure 24) using the three (3) 5/16" bolts (A) and washers (B).

Neutral Adjustment

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

1. Drive the unit to a flat, level surface, stop the unit, and engage the parking brake.
2. Without touching the forward speed control levers disengage the parking brake. If the unit moves, the neutral systems on the transaxles are not correctly adjusted. **See your dealer for service.**

Neutral Lockout and Tracking Adjustment

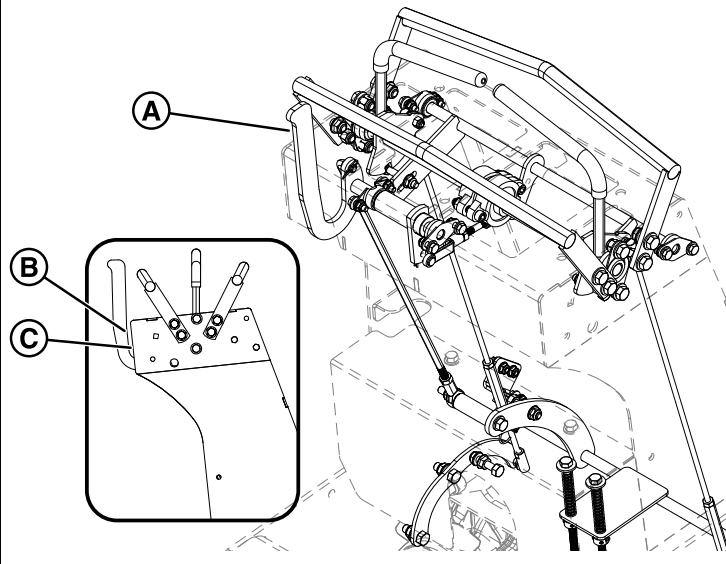
Before making adjustments to the neutral lockout or the unit's tracking, be sure to check the following:

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

Positioning the Parking Brake Handle

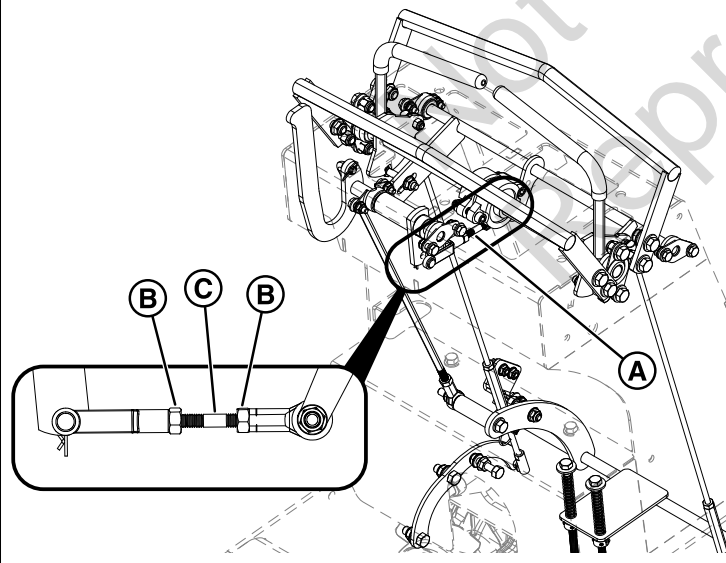
1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Chock the front wheels of the unit to prevent movement and disengage the parking brake.
3. Engage the parking brake by pulling the parking brake lever (A, Figure 33) up and back while moving both motion control levers forward back and forth, so that the neutral lockouts will engage the motion control levers as the parking brake is being engaged.

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4. With the parking brake engaged, observe the flat edge of the parking brake lever (B) in relation to the front of the dash panel (C). The front edge of the parking brake lever should be parallel to the front of the dash panel.
5. To adjust the position of the parking brake lever: Locate the threaded linkage rod (A, Figure 34) that connects the parking brake lever to the neutral lockout shaft. Loosen the two jam nuts (B) and turn the rod (C) until the flat edge of the parking brake lever is parallel to the front of the dash panel.

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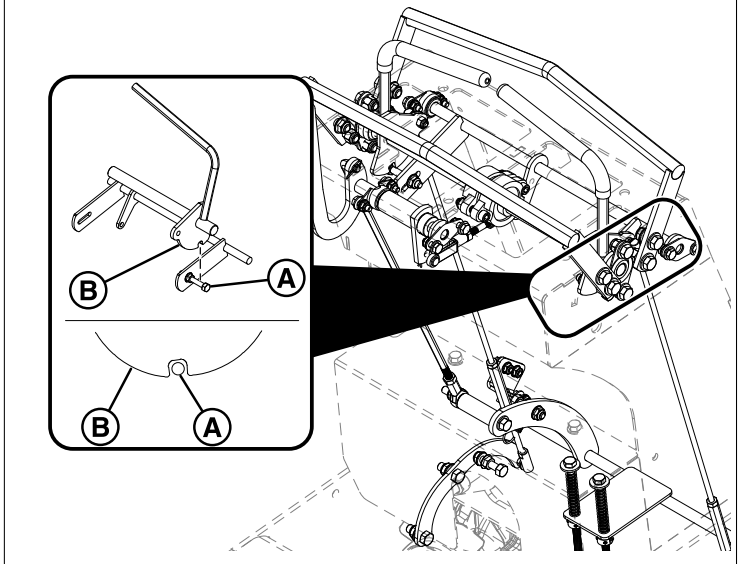


6. Tighten the jam nuts.

Left Hand Side Lockout Bolt Adjustment

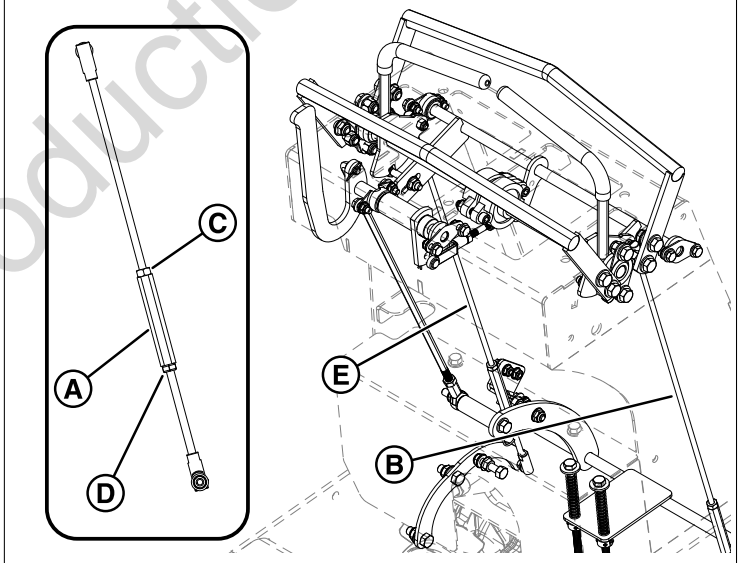
1. Observe the left hand side lockout bolt (A, Figure 35). It should be positioned so that it is in the center of the notch of the lockout plate (B) on the motion control lever.

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2. To adjust the position of the lockout bolt in the notch of the lockout plate on the motion control lever, the turnbuckle (A, Figure 36) on the left motion control rod (B) must be adjusted.

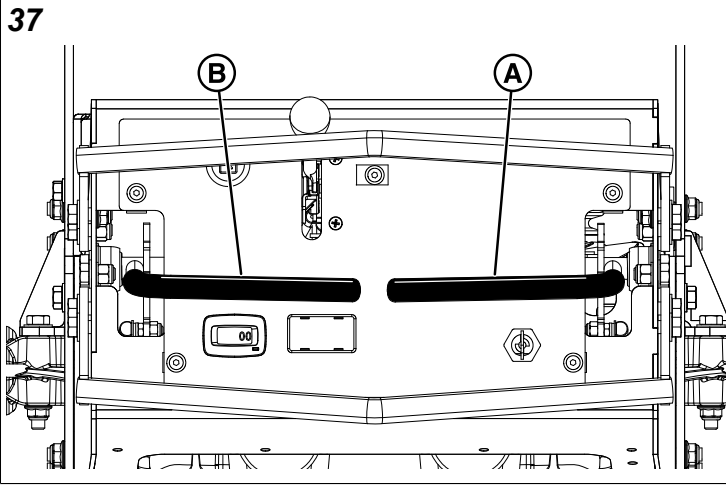
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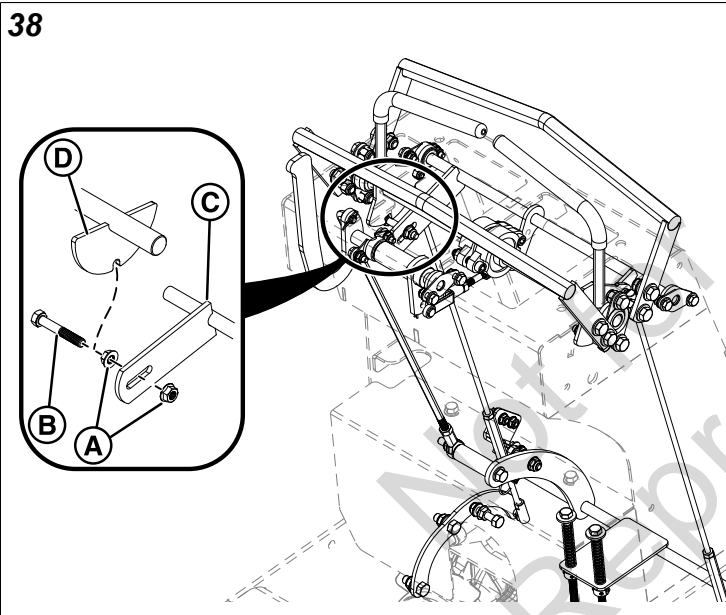
3. There are two nuts (C & D) tightened against the turnbuckle. The top jam nut is left hand threaded and the bottom jam nut is right hand threaded. Loosen the jam nuts on the turnbuckle.
4. Turn the turnbuckle until the lockout bolt is in the center of the notch of the lockout plate.
5. Tighten the jam nuts.

Motion Control Lever Alignment Adjustment

1. Observe the alignment of the right side motion control lever (A, Figure 37) as compared to the left side motion control lever (B).



2. If the motion control levers are not aligned, loosen the jam nuts (A, Figure 38) on the right side lockout bolt (B) so that it can slide back and forth in the slot of the neutral lockout shaft (C).



3. Loosen the jam nuts (C & D, Figure 36) tightened against the turnbuckle (A) on the right side motion control rod (E).
4. Turn the turnbuckle until the two handles align.
5. Tighten the jam nuts against the turnbuckle.
6. Drive the unit outside to a flat, level area with plenty of room to maneuver.
7. Safely drive the unit with the motion control levers in the maximum forward position.
8. If the unit travels straight, tracking is adjusted correctly, proceed to *Right Side Lockout Bolt Adjustment*.
9. If the unit veers to the left or the right, the tracking must be adjusted.

Tracking Adjustment

In this procedure the directions **clockwise** and **counter-clockwise** are meant from the operator's position and looking down at the turnbuckles.

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. If the unit veers to the left, loosen the two jam nuts (C & D, Figure 36) and turn the right hand side turnbuckle (B) 1/8 to 1/4 turn **counter-clockwise**.
3. If the unit veers to the right, loosen the two jam nuts (C & D, Figure 36) and turn the right hand side turnbuckle (B) 1/8 to 1/4 turn **clockwise**.
4. Tighten the jam nuts.
5. Drive the unit on a flat, level surface to test and repeat the steps of this process as necessary.

In some cases, the tracking adjustment may not be achievable by only adjusting the right hand side motion control rod, and the left hand motion control rod (C) must be adjusted by turning it in the opposite direction that you turned the right hand motion control rod. The left hand motion control rod has a limited amount of adjustment available, and after being adjusted, the left hand lockout bolt (A, Figure 35) must fall within the notch of the lockout plate (B) and not touch either side of the notch. The process may need to be performed several times to get the unit to track properly.

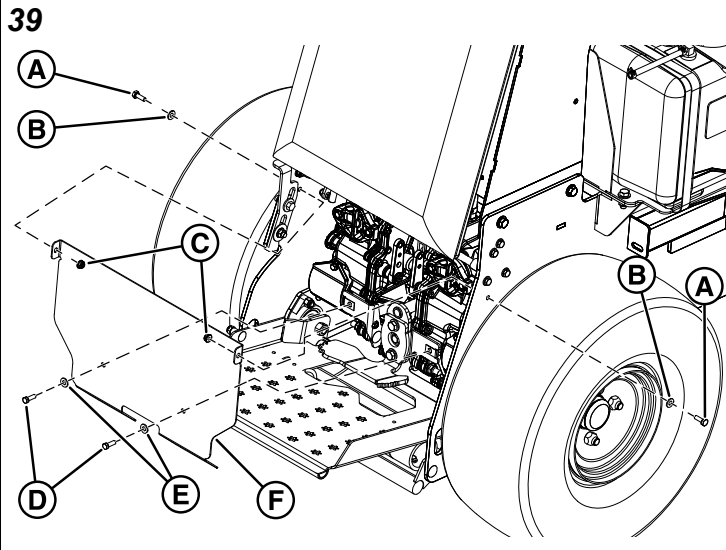
Right Side Lockout Bolt Adjustment

After the tracking of the unit has been adjusted the right hand side lockout bolt (A, Figure 38) needs to be adjusted.

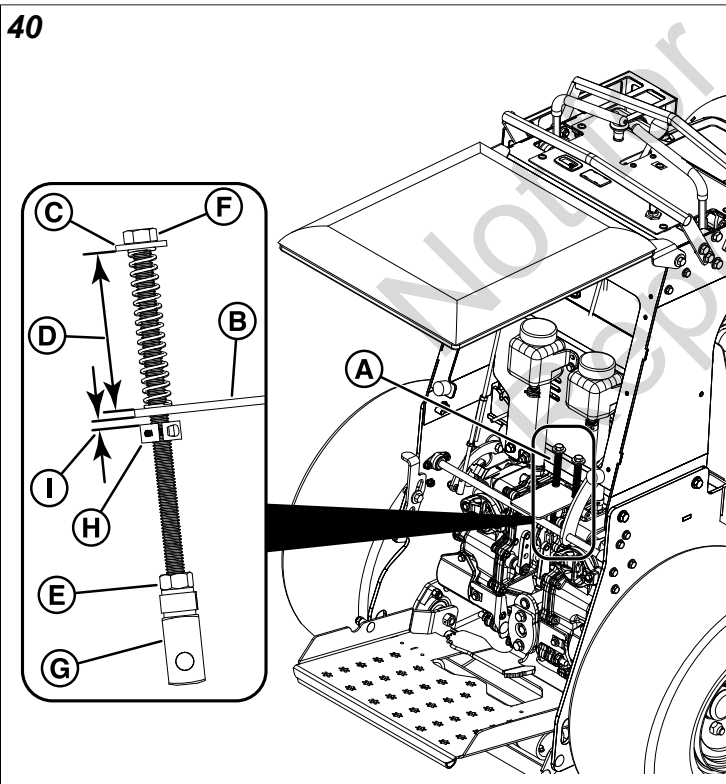
1. Observe the right hand side lockout bolt. It should be positioned so that it is in the center of the notch of the lockout plate (C) on the motion control lever.
2. To adjust the position of the right hand side lockout bolt, move the bolt in whatever direction is necessary in the slot of the neutral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

Parking Brake Adjustment

1. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
2. Remove the two (2) 1/4" bolts (A, Figure 39), washers (B), and nuts (C).



3. Remove the two (2) 1/4" bolts (D) and washers (E) from the kick plate (F).
4. Remove the kick plate.
5. Raise the operator support cushion to gain access to the parking brake springs.
6. Locate the two parking brake spring assemblies (A, Figure 40) as shown in Figure 40.



7. Measure from the top of the parking brake shaft plate (B) to the bottom of the washer (C). The measurement should equal 2-5/32" (5.5 cm) (D). If not, loosen the jam nut (E) and adjust the bolt (F) until the measurement is achieved.
8. Tighten the jam nut against the clevis (G)

9. Measure the distance between the bottom of the parking brake shaft plate and the top of the set collar (H). The measurement should equal 3/16" (0.48 cm) (I). If not, position the set collar until the measurement is achieved.
10. Repeat the process for the other parking brake spring assembly.
11. Install the kick plate onto the unit using the hardware previously removed.

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

Cleaning the Battery and Cables

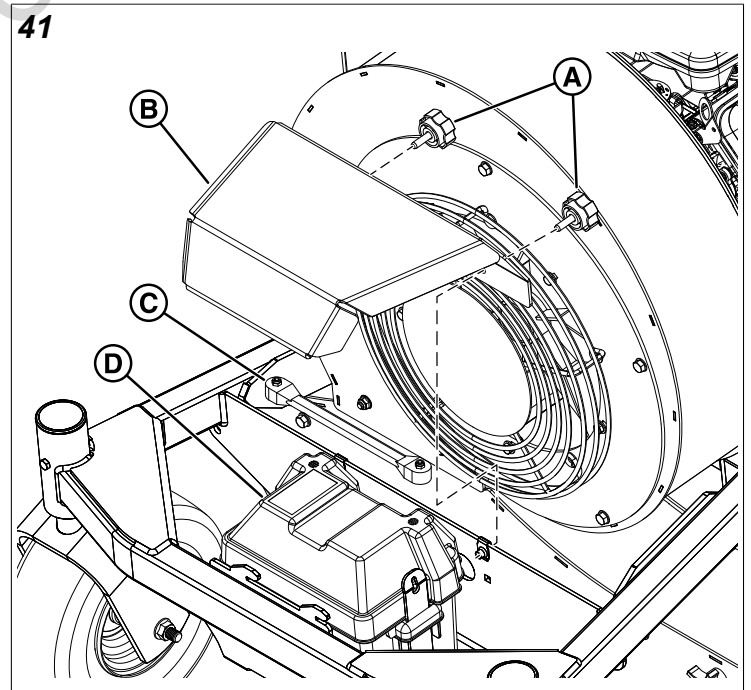
This unit is equipped with a maintenance-free BCIU1 battery.



WARNING

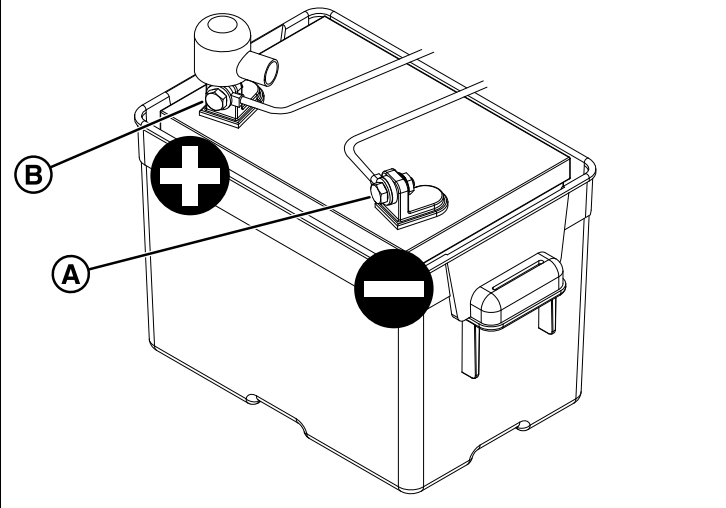
Keep open flames and sparks away from the battery.

- Be careful when handling the battery.
 - Avoid spilling electrolyte.
 - Keep flames and sparks away from the battery.
 - When removing or installing 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. Stop the unit on a flat, level surface and engage the parking brake. The parking brake will lock the motion control levers in the NEUTRAL position. Press the air stream control pedal to the CLOSED position, turn the ignition switch to OFF, and remove the key.
 2. Remove the two (2) knobs (A, Figure 41) and the battery guard (B) from the unit.



3. Remove the battery hold down strap (C) and the battery box cover (D).
4. Disconnect the cables from the battery, negative [-] cable first (A, Figure 42).

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5. Clean the battery terminals and cable ends with a wire brush until shiny.
6. Install the battery and attach the battery cables, positive [+] cable first (B).
7. Coat the cable ends and the battery terminals with petroleum jelly or non-conducting grease.
8. Install the battery box cover and battery hold down strap.
9. Install the battery guard to the unit using the two (2) knobs.

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*.

Charging a Completely Discharged Battery



WARNING

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

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 43.

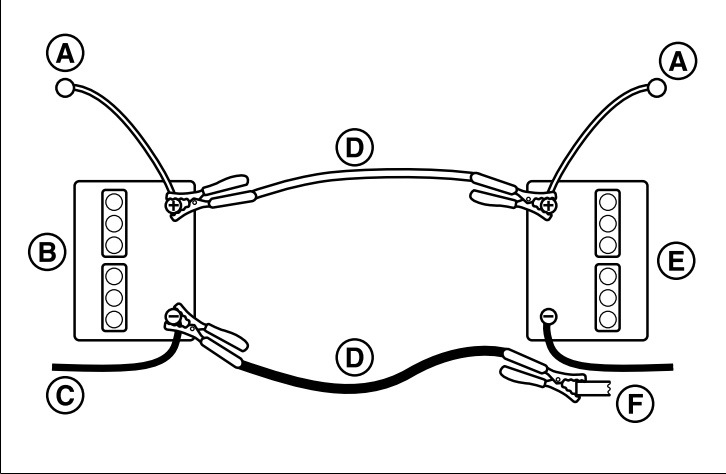


WARNING

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

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

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This hook-up is for negative grounded vehicles.

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

Make sure vehicles do not touch.

- Both batteries must be of the same voltage.
- 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.
- 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.
- Connect positive (+) cable to positive post of discharged battery (wired to starter or solenoid).
- Connect the other end of same cable to same post marked positive (+) on booster battery.

- Connect the second cable negative (-) to other post of booster battery.
- Make final connection on engine block of stalled vehicle away from battery. Do not lean over batteries.
- 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.
- If the vehicle does not start after cranking for ten (10) seconds, STOP PROCEDURE. More than ten (10) seconds seldom starts the engine unless some mechanical adjustment is made. Allow a sixty (60) second cool down period between starting attempts. Failure to follow these guidelines can burn out starter motor.
- After starting, allow the engine to return to idle speed. Remove the cable connection at the engine or frame. Then remove the other end of the same cable from the booster battery.
- Remove the other cable by disconnecting at the discharged battery first and then disconnect the opposite end from the booster battery.
- Discard the damp cloths that were placed over the battery vent caps.



Any procedure other than the preceding could result in:

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

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

Troubleshooting

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

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

Troubleshooting the Unit

FAILURE MODE	CAUSE OF PROBLEM	CORRECTIVE ACTION
Engine will not turn over or start.	Parking brake is not engaged.	Engage the parking brake.
	Out of fuel.	If engine is hot, allow it to cool, then add fuel to the fuel tank.
	Engine flooded.	Move choke control to the closed position.
	Blown fuse.	Replace fuse.
	Battery terminals are dirty.	Clean the battery terminals.
	Battery discharged or dead.	Charge or replace battery.
	Wiring loose or broken.	Visually check wiring and replace broken or frayed wires. Tighten any loose connections.
	Safety interlock switch faulty.	Replace as needed. See authorized service dealer.
	Spark plug(s) faulty, fouled, or incorrectly gapped.	Clean and gap or replace. See engine owner's manual.
	Water in fuel.	Drain fuel and replace with fresh fuel.
Gas is old or stale.	Drain fuel and replace with fresh fuel.	
Engine starts hard or runs poorly.	Fuel mixture is too rich.	1. Clean air filter. 2. Check choke adjustment.
	Spark plug(s) faulty, fouled, or incorrectly gapped.	Replace as needed. See engine owner's manual.
	Fuel filter is plugged.	Replace fuel filter.
Engine knocks.	Low oil level.	Check/Add oil as required.
	Using wrong grade oil.	See engine owner's manual.
Excessive oil consumption.	Engine running too hot.	Clean engine fins, blower screen, and air cleaner.
	Using wrong weight engine oil.	See engine owner's manual.
	Too much oil in crankcase.	Drain excess oil.
Engine exhaust is black.	Dirty air filter.	Replace air filter. See engine owner's manual.
	Choke control is in closed position.	Move choke control to the open position.
Engine runs but unit will not drive.	Hydraulic Pump bypass valve(s) in bypass position.	Move hydraulic bypass valve(s) to run position.
	Drive belt is broken.	See <i>Changing the Transaxle Drive Belt</i> .
	Drive belt is slipping.	See problem and cause below.
	Brake is not fully released.	See authorized service dealer.
Drive belt slips.	Pulleys or belt is greasy or oily.	Clean as required.
	Belt is stretched or worn.	Replace belt.
	Belt tension is too loose.	Adjust belt tension. See <i>Changing the Transaxle Drive Belt</i> .

FAILURE MODE	CAUSE OF PROBLEM	CORRECTIVE ACTION
Parking brake will not hold.	Brake is incorrectly adjusted.	See authorized service dealer.
Unit steers or handles poorly.	Motion control lever linkages are loose.	Check and tighten any loose connections.
	Improper tire inflation.	See <i>Specifications</i> for proper tire inflation and adjust tire pressures accordingly.
	Tracking needs adjustment.	See <i>Tracking Adjustment</i> .

Troubleshooting the Blower

FAILURE MODE	CAUSE OF PROBLEM	CORRECTIVE ACTION
Excessive unit vibration.	Engine speed is too low.	Increase engine speed.
	Drive belt is not tensioned correctly.	Adjust the belt tension. See <i>Change Drive Belt</i> .
	Impeller is out of balance.	Check impeller for damage, cracks, broken or bent fins. If damaged in any way, REPLACE IMPELLER.
Air stream deflectors not opening or closing.	Air stream control foot pedal linkage broken.	See authorized service dealer.

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Specifications

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

ENGINE

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

Fits models: 5902012

Briggs & Stratton	
Make	Briggs & Stratton
Model	356447-3545-G1
Electrical System	12 volt, 16 amp alternator; Battery: 340 CCA

CHASSIS

Fuel Tank Capacity	5 gallons (19 L) total
Rear Wheels	
Tire Size	20 X 8.00 - 8
Inflation Pressure	22 psi (1,5 bar)

Front Wheels	
Tire Size	11 X 4 - 5
Inflation Pressure	N/A (flat free tire)

TRANSMISSIONS

Make	Hydro-Gear®
Model	ZT3100 Transaxles
Hydraulic Fluid	Mobil 1™ 15W-50 synthetic or equivalent
Speed	Infinitely Variable

DIMENSIONS

Width	34-3/4" (88 cm)
Height	46-5/8" (118 cm)
Length (with operator platform down)	60.5" (154 cm)
Length (with operator platform folded up)	54.5" (138 cm)
Weight	664 lbs (301 kg)

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Warranty Statement

BRIGGS & STRATTON WARRANTY POLICY (April 2021)

LIMITED WARRANTY

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

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

WARRANTY PERIOD		
Item	Standard Warranty Period	Rental Warranty Period
Ride On Debris Blower	2 years (24 months) / unlimited hours	1 year
+Belts, Tires, Hoses, Battery, Switches, Bearings, Electrical Components	90 days	90 days
+Attachments	1 year	90 days
+Engine*	See Engine Operator's Manual	See Engine Operator's Manual

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

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

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

To ensure prompt and complete warranty coverage, register your product at the website shown above or at www.onlineproductregistration.com, or mail the completed registration card (if provided), or call 1-800-743-4115 (in USA).

Save your proof of purchase receipt. If you do not provide proof of the initial purchase date at the time warranty service is requested, the manufacturing date of the product will be used to determine the warranty period. Product registration is not required to obtain warranty service on Briggs & Stratton products.

ABOUT YOUR WARRANTY

Warranty service is available only through *Ferris* Authorized Service Dealers. This warranty only covers defects in materials or workmanship. It does not cover damage caused by improper use or abuse, improper maintenance or repair, normal wear and tear, or stale or unapproved fuel.

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

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

Normal Wear and Tear - Like all mechanical devices, the unit is subject to wear even when properly maintained. This warranty does not cover replacement or repairs when normal use has exhausted the life of a part or the equipment. Except as noted in the warranty period, maintenance and wear items such as filters, belts, cutting blades, and brake pads (except engine

brake pads) are not covered by warranty due to wear characteristics alone, unless the cause is due to defects in material or workmanship.

Stale or Unapproved Fuel - In order to function correctly, this product requires fresh fuel that conforms to the criteria specified in the Operator's Manual. Engine or equipment damage caused by stale fuel or the use of unapproved fuels (such as E15 or E85 ethanol blends) is not covered by warranty.

Other Exclusions - This warranty excludes damage due to accident, abuse, modifications, alterations, improper servicing, freezing or chemical deterioration. Attachments or accessories that were not originally packaged with the product are also excluded. This warranty does not include used, reconditioned, second-hand, or demonstration equipment or engines. This warranty also excludes failures due to acts of God and other force majeure events beyond the manufacturer's control.

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