



Commercial Debris Blower
Operator's Manual



Patents Pending

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IDENTIFICATION

Record Identification Numbers

If you need to contact an Authorized Service Center for information on servicing, always provide the product model and serial numbers.

You will need to locate the model and serial numbers for the machine and for the engine of your machine and record the information in the spaces provided.

Date of purchase: _____

Dealer name: _____

Dealer phone: _____

PRODUCT IDENTIFICATION NUMBER:

Model Number: _____

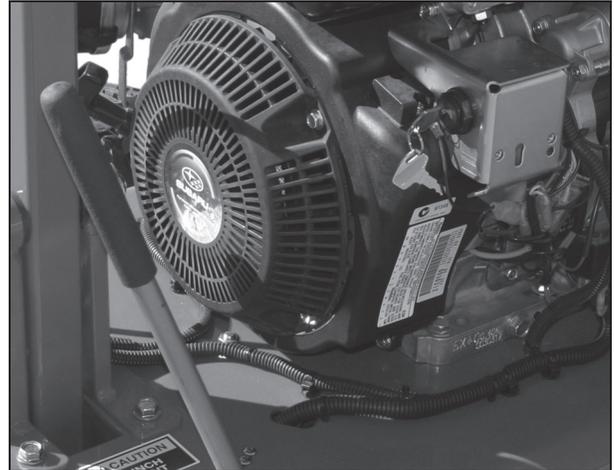
Serial Number: _____

ENGINE MODEL, SPECIFICATION, AND SERIAL NUMBER:

Model Number: _____

Specification: _____

Serial Number: _____



Engine Information can be found on this data plate.



Product Information can be found on this data plate.

INTRODUCTION

Using Your Operator's Manual

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

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

This owners manual explains the features and promotes the safe use of this machine. 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 machine. This will provide maintenance and troubleshooting information for the engine installed in your machine.

Special Messages

Your manual contains special messages to bring attention to potential safety concerns, machine damage as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.

This is the safety alert symbol (). It is used throughout this manual and on the blower's safety labels to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death. Read these instructions carefully. It is essential that you read the instructions and safety precautions before you attempt to work on or use this machine.

WARNING

This symbol with the "WARNING" indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

This symbol with the word "CAUTION" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

SPECIFICATIONS

Engine	14 hp Subaru
Refer to engine manufacturer's owner's manual for engine specifications.	
Drivetrain	
Type	Transaxle
Transaxle	Hydro Gear T-Z-ACED-4X3C-1JX1
Number of Speeds	Variable
Electrical System	
Charging System	12 Volt
Ignition	Flywheel magneto
Starter	Solenoid Shift
Fuse	20 Amp Blade Fuse
Fuel System	
Fuel Type	Regular Unleaded Gasoline
Fuel Tank Location	On top of Engine
Fuel Capacity	.75 gallons
Steering and Brakes	
Steering	Control Pod - Left to Right
Park Brake	Disc Parking Brake
Tires	
Rear	13 x 6.5 - 6
Front	18 x 6.5 - 6
Inflation Rear (Maximum)	Max 20 psi
Inflation Front (Maximum)	Max 14 psi
Battery	5U1L
Voltage	12-volt
BCI Group Size	U1
Capacities	
Fuel Tank	.75 gallons
Hydraulic Oil	Maintenance Free
Engine Oil	1 quart
Dimensions	
Width	2' 11"
Height	4' 2-1/2"
Length	5' 7-1/2"
Weight	480 lbs.

SAFETY

Operator 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 decals.
- All operators and mechanics should be trained. The owner of the machine 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, or property.
- Train operators on the machine 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. Only use accessories and attachments approved by the manufacturer.
- Wear appropriate clothing including 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 machine.
- Use extra care when handling gasoline and other fuels. They are flammable and vapors are explosive.
 - a. Use only an approved container.
 - b. Never remove gas cap or add fuel when engine is running. Do not smoke.
 - c. Never refuel or drain the machine indoors.

- Check that the operator's presence controls, 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 engine. Only start engine from the operator's position.
- Slow down and use extra care on hillsides. Be sure to travel in the recommended direction on hillsides. For this machine, 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 machine 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 machine damage.
- Stop on level ground, engage parking brake, close deflectors, and shut off engine before leaving the operator's position for any reason.
- Stop equipment and inspect 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 machine while under the influence of alcohol or drugs.
- Use care when loading or unloading the machine into or off of a trailer or truck.
- Use care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.
- Inspect machine before you operate. Be sure hardware is tightened securely. Repair or replace damaged, badly worn, or missing parts. Be 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 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 machine is left unattended, stored, or parked, remove the key.

Using a Spark Arrestor

The engine in this machine is not equipped with a spark arrestor muffler. It is a violation of California Public Resource Code Section 4442 to use or operate this engine on or near any forest-covered, brush-covered or grass-covered land unless the exhaust system is equipped with a spark arrestor meeting any applicable local or state laws. Other states or federal areas may have similar laws.

A spark arrestor for your machine is available from your authorized dealer.

An installed spark arrestor 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 blower not running. Slow down when you travel over rough ground.

Parking Safely

1. Stop machine on a level surface, not on a slope.
2. Close deflectors.
3. Engage the parking brake.
4. Stop the engine.
5. Remove the key.
6. Wait for engine and all moving parts to stop before you leave the operator's station.
7. Close fuel shut-off valve, if your machine is equipped.
8. Disconnect the negative battery cable or remove the spark plug wire (for gasoline engines) before servicing the machine.

Rotating Impeller is Dangerous



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 a lawn equipment simply because someone has given them a ride on a machine.
- 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 machine.
- Tragic accidents with children can occur if the operator is not alert to the presence of children, especially when a child approaches a machine from behind. **Before and while backing up, look down and behind** the machine carefully, especially for children.
- **NEVER** carry children on a machine or attachment. Do not tow children in a cart or trailer. They can fall off and be seriously injured or interfere with safe machine operation.
- Never use the machine as a recreational vehicle or to entertain children.
- Never allow children or an untrained person to operate the machine. Instruct all operators not to give children a ride on the machine 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 machine is being operated.
- Stay alert to the presence of children. Never assume that children will remain where you last saw them. Turn the machine 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 machine. 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 machine 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 machine to roll over.
- Use extra care while operating machine with attachments, they can affect stability of the machine. **Do not use on steep slopes.**
- Do not blow near drop-offs, ditches, embankments, or bodies of water. The machine 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 machine very slowly and avoid quick stops.

Keep Riders Off

- Only allow the operator on the machine. Keep riders off.
- Riders on the machine or attachment may be struck by foreign objects or thrown off the machine causing serious injury.
- Riders obstruct the operator's view resulting in the machine 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.
- **Make sure wheel c-clip is properly seated** during the first 100 hours of operation.

Wear Appropriate Clothing

- Always wear safety goggles, or safety glasses with side shields, and a hard hat when operating the machine.
- 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 machine in a closed 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 machine, 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 machine on level ground. Never allow untrained personnel to service machine. Understand service procedure before doing work.
- Use jack stands or lock service latches to support components when required. Securely support any machine elements that must be raised for service work.
- Before servicing machine 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 battery or remove spark plug (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 them. Only **REPLACE** impeller. **Never attempt to straighten or weld them.**
- 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.** Adjust and service as required.
- 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 in 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 machine indoors. Move machine outdoors and provide adequate ventilation.
 - Clean up spilled fuel immediately. If fuel is spilled on clothing, change clothing immediately. If fuel is spilled near machine, do not attempt to start the engine but move the machine away from the area of spillage. Avoid creating any source of ignition until fuel vapors have dissipated.
 - Never store the machine 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.
- ### Prevent Fires
- Remove debris from engine compartment and muffler area, before and after operating machine, especially after blowing in dry conditions.
 - **ALWAYS** shut off fuel when transporting or storing machine, the machine has a fuel shutoff.
 - **DO NOT** store machine 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.

- 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 fueling.
- Remove fuel-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel 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 the fueling is complete. 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 get rid of waste products.
- A Material Safety Data Sheet (MSDS) 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 machine is responsible for providing the MSDS for that product.

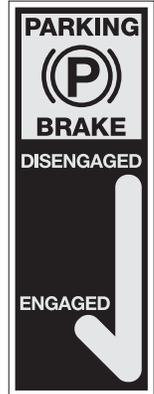
DECALS



Operator Station



Operator Station



Above Operator Platform



Above Operator Platform



Deflector



Top of Impeller Housing



Above Operator Platform



Rear Wheel Cover



Deflector



Impeller Safety Cover



Impeller Housing

OPERATING

Operator Station Controls

- Familiarize yourself with the controls. A clear understanding of the operation and function of each control is essential to the safe and productive use of this machine.

Parking Brake



Parking Brake Engaged

- This photo shows the parking brake in the **ENGAGED** position. The parking brake should be in this position starting, parking, or anytime other than when the machine is in motion with an operator present at the controls.

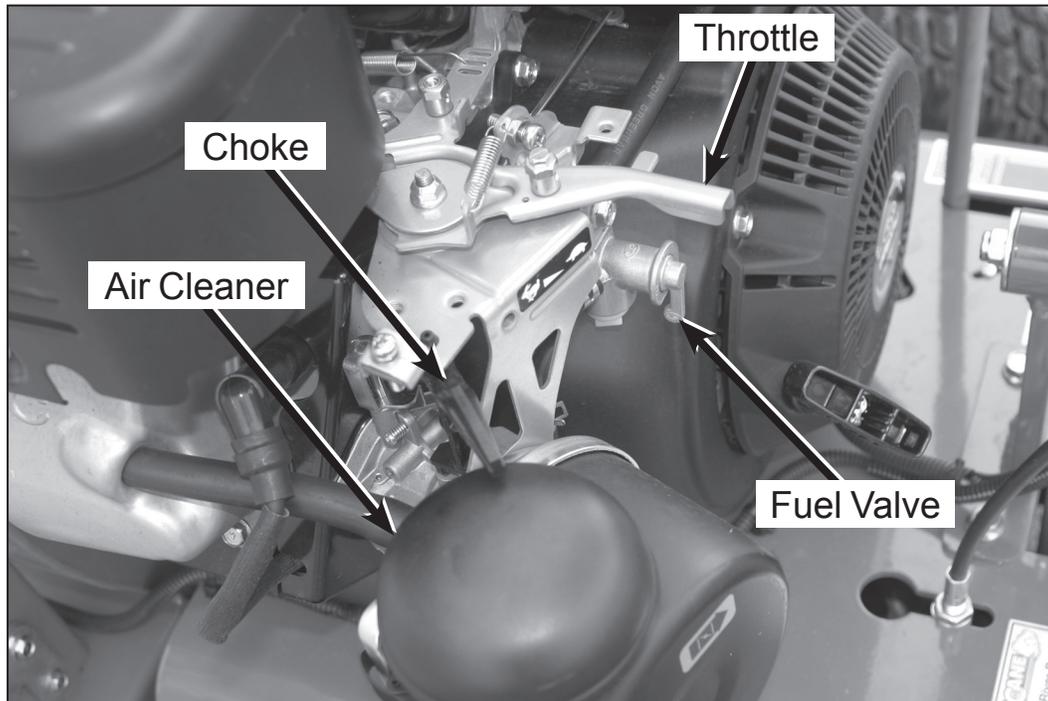


Parking Brake Disengaged

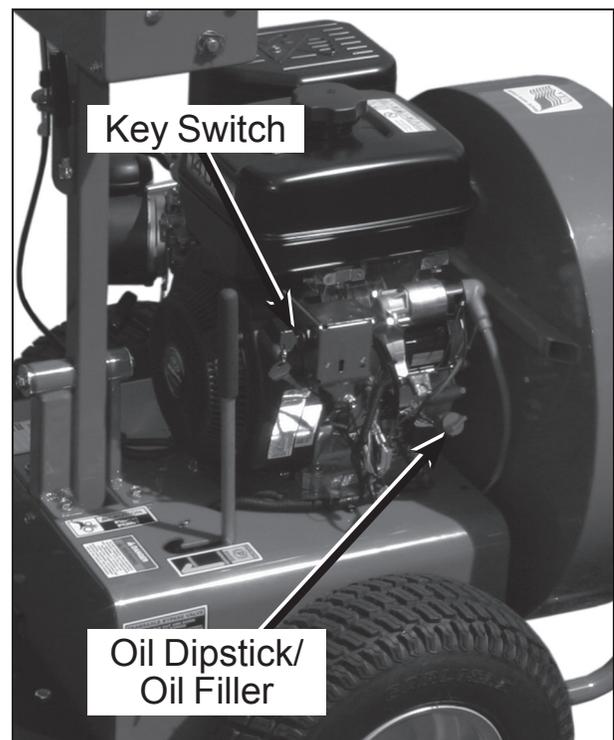
- This photo shows the parking brake in the **DIS-ENGAGED** position.

Misc. Controls and Checks

Step onto the operators platform and disengage parking brake, grasp the handle bar to operate the machine. Engage parking brake before stepping off the platform.



NOTE: If the parking brake is not engaged the engine will not start. If the operator steps off the operators platform the engine will stop running, you must apply the parking brake before stepping off the operators platform.



Testing the Safety Systems

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

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

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

Use the following checkout procedures to check for normal operation of the machines safety systems.

1. Engage parking brake.

Testing Park Brake Switch (Start)

1. Disengage parking brake.
2. Turn key switch to the START position.

Result: The engine must not crank.

Testing Neutral Switch (Start)

1. Engage parking brake.
2. Push motion control lever forward.
3. Turn key switch to the START position. Repeat steps 2 and 3 for other control.

Result: The engine must not crank.

Testing Operator Presence Switch (Run kill)

1. Stand on operator's platform with motion control levers in the NEUTRAL position.
2. Engage parking brake. Start engine. Idle engine.
3. Disengage park brake.
4. Step completely off operator's platform.

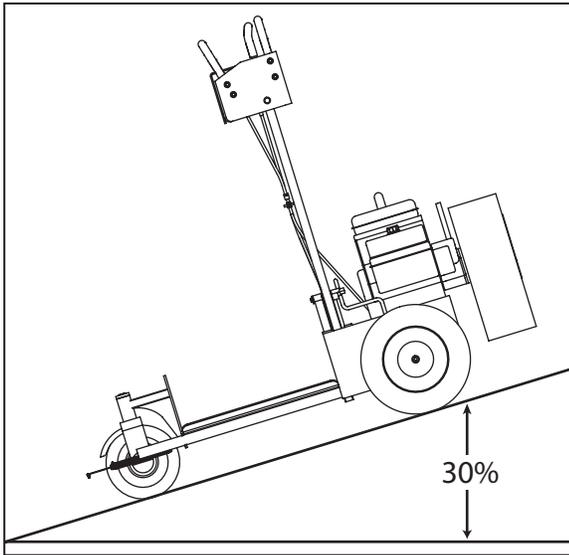
Result: The engine must stop.

Testing Operator Presence Neutral Switches (Run kill)

1. Engage parking brake.
2. Stand on operator's platform with motion control levers in the NEUTRAL position.
3. Start engine. Idle engine.
4. Disengage parking brake.
5. Move motion control levers slightly forward, slower than walking speed.
6. Step completely off operator's platform.
7. Release the motion control levers, allowing them to return to the NEUTRAL position.

Result: The engine must stop.

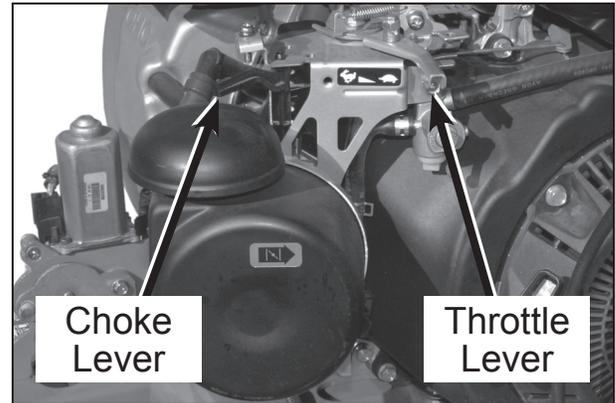
Testing the Parking Brake



1. Stop machine on a 17° slope (30% grade) facing uphill. Stop the engine and engage parking brake.

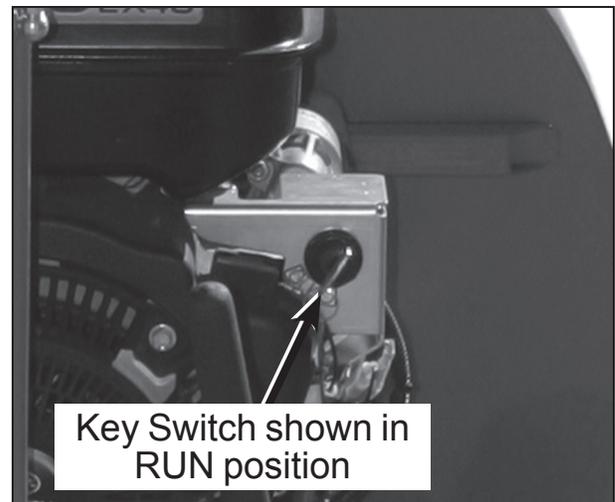
Result: Parking brake must hold the machine stationary. (Machine should move no more than 24 in. (61cm) in one hour.) If machine moves more than that, brakes need to be adjusted. Contact your authorized dealer or refer to **Adjusting the Parking Brake** in the **SERVICE** section.

Using the Throttle and Choke



Starting Using the Throttle and Choke

- Push choke lever forward to the CLOSED position.
- Move throttle lever to the HALF FAST position when starting and warming the engine.
- Turn key switch to the START position and release when engine starts, pulling choke control back to the OPEN position after engine start.



- Blower speed and power can be controlled with the throttle control.

Filling Fuel Tank

Avoid injury! Fuel vapors are explosive and flammable.

- Shut engine OFF before filling fuel tank.
- Do not smoke while handling fuel.
- Keep fuel away from flames or sparks.
- Fill fuel tank outdoors or in well ventilated area.
- Clean up spilled fuel immediately.
- Use clean approved non-metal container to prevent static electric discharge.
- Use clean approved plastic funnel without screen or filter to prevent static electric discharge.

IMPORTANT: Avoid damage! Dirt and water in fuel can cause engine damage:

- Clean dirt and debris from the fuel tank opening.
- Use clean, fresh, stabilized fuel.
- Fill the fuel tank at the end of each day's operation to keep condensation out of the fuel tank.
- Use a non-metallic funnel with a plastic mesh strainer when filling the fuel tank or container.

1. Park machine on a level surface.
2. Allow engine to cool.
3. Remove any debris from around fuel tank cap area.
4. Remove fuel tank cap slowly to allow any pressure built up in tank to escape.
5. Only fill fuel tank to bottom of filler neck. Do not overfill. Clean up spilled fuel immediately.
6. Reinstall fuel tank cap.



Fuel Tank

Using the Hydrostatic Motion Controls

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 machine.

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

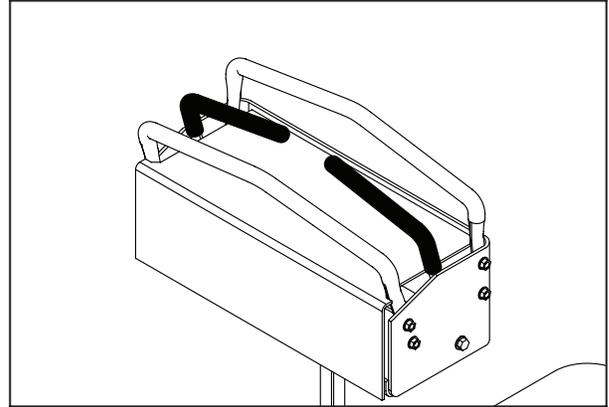
The functions of the hydrostatic motion control levers are:

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

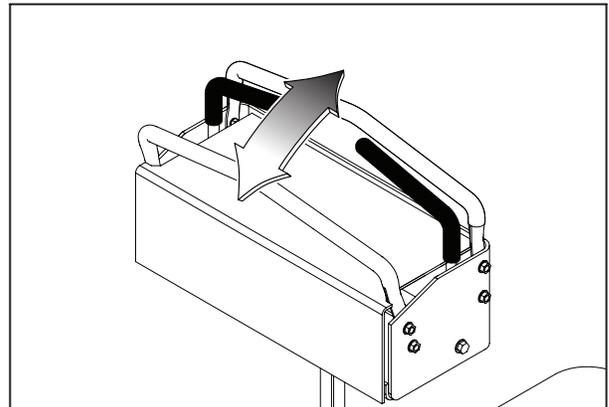


Hydrostatic Motion Controls

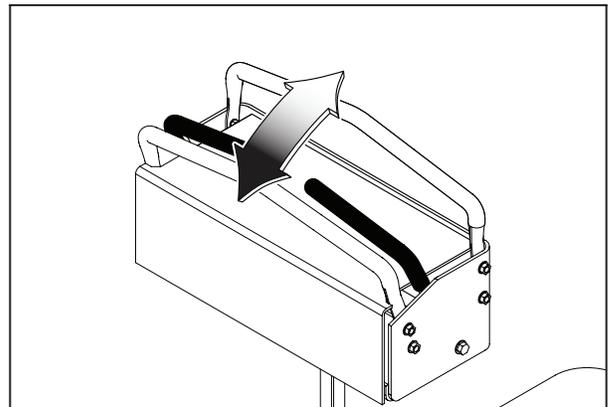
This photo shows the hydrostatic control levers are in the NEUTRAL position.



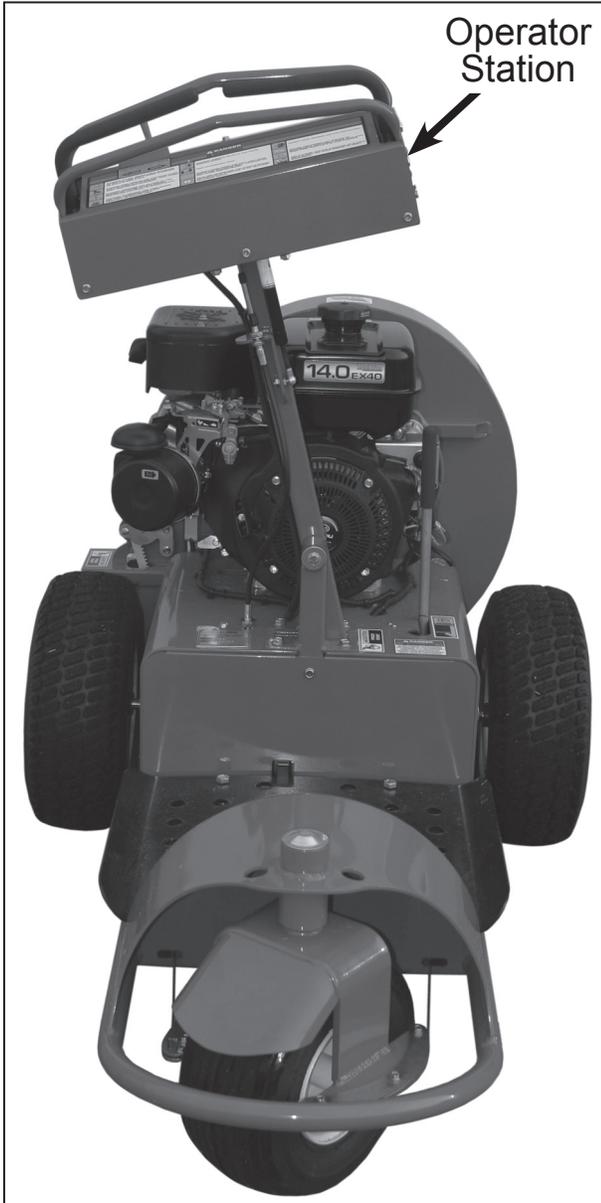
This is the NEUTRAL position.



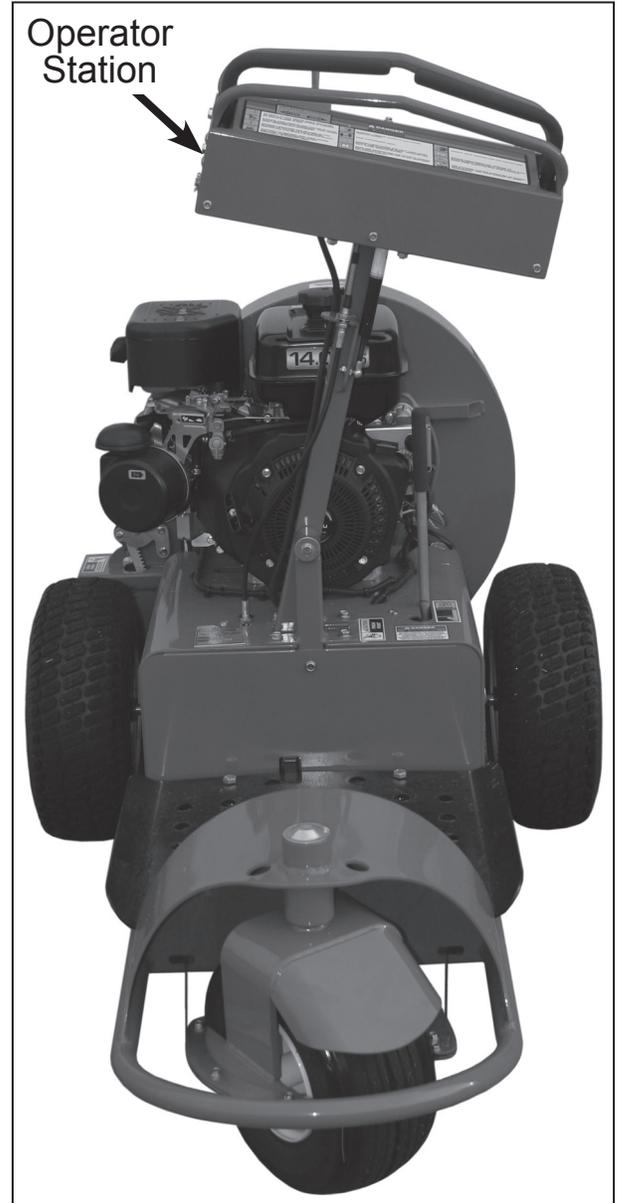
This is the FORWARD travel position. The travel speed is dependant on how far forward the controls are pushed.



This is the REVERSE travel position. The travel speed is dependant on how far rearward the controls are pulled.



To make a left turn, lean body and operator controls to the left. For a gradual turn radius, lean **less**. For tighter turn radius, lean **more**.



To make a right turn, lean body and operator controls to the right. For a gradual turn radius, lean **less**. For tighter turn radius, lean **more**.

Using the Blower and the 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 machines when working together in the same areas.



CAUTION

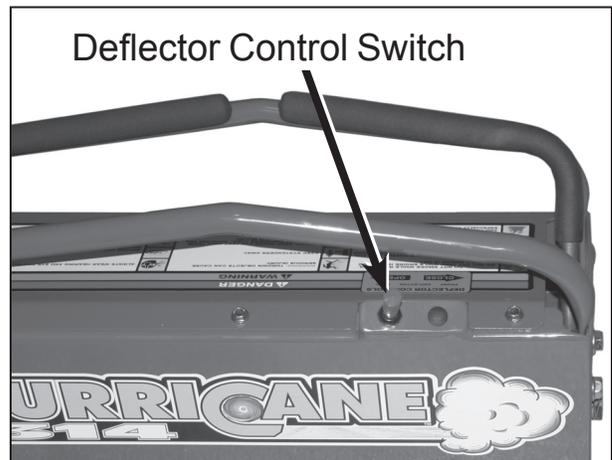
Keep hands and feet away from air intake and air discharge. Pinch points and crushing forces will cause severe injury.

CAUTION

Danger rotating fan - don't 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.

The functions of the Deflector control switch are:

- Starting and Stopping the air stream.
- Adjusting the air pattern.

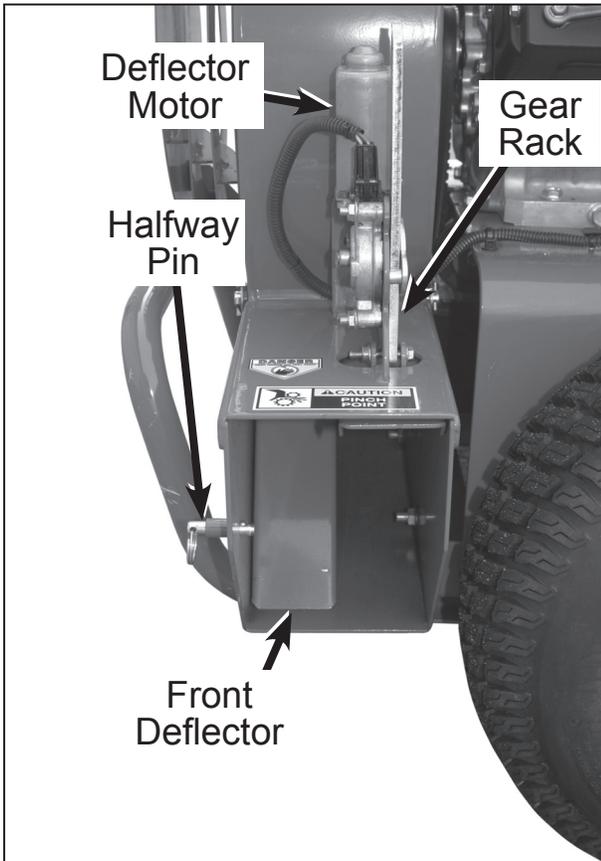


Deflector Control Switch

Dual Deflector System

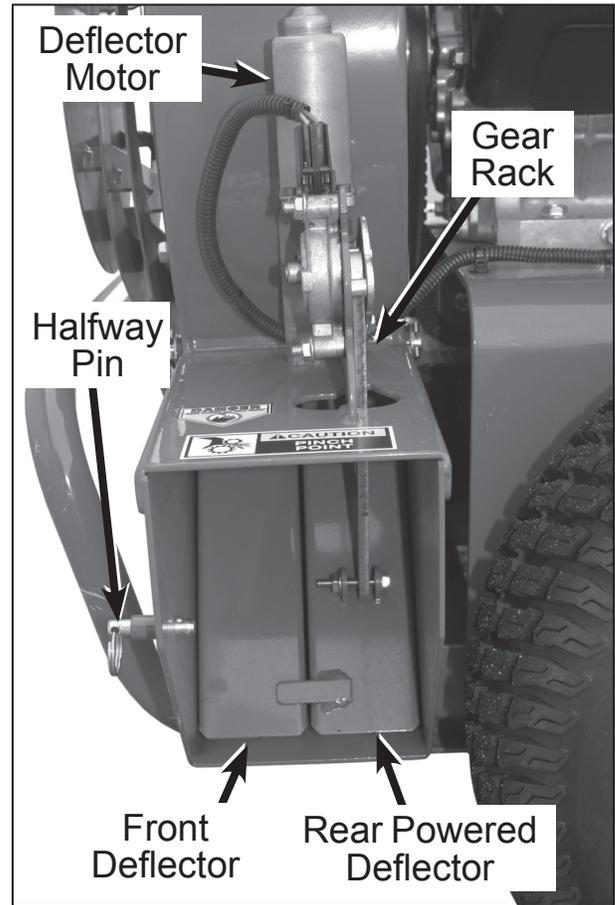
The rear deflector is motor controlled. The front deflector is closed by the rear deflector. For normal blowing, run the front deflector at the halfway pin and adjust the rear deflector in the desired location.

This photo shows the Deflectors in the CLOSED position.

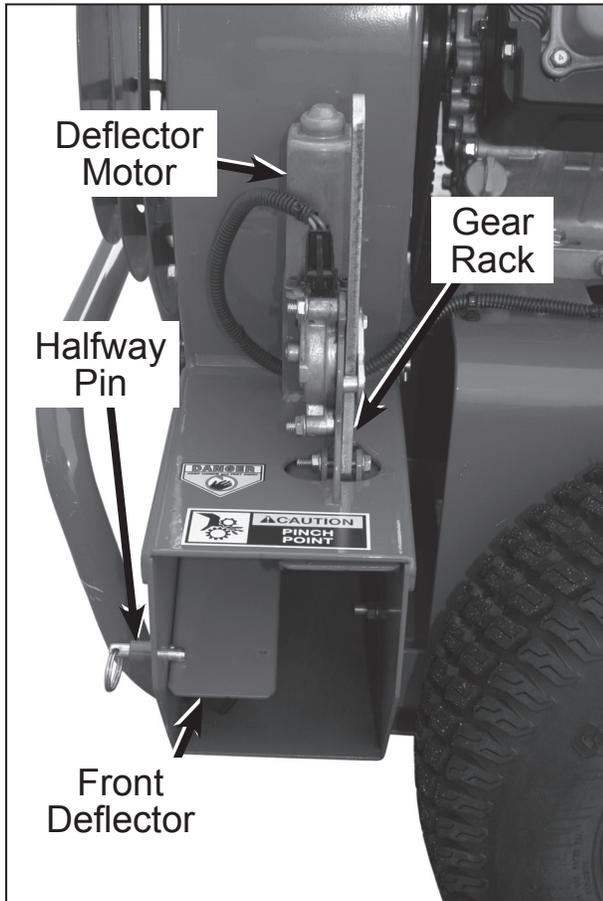


Front Deflector Half Open

For moving large piles of debris, remove the halfway pin allowing deflectors to open fully for maximum air flow.



Deflector Closed



Deflector Open

NOTE: The deflectors can be set in any position between OPEN and CLOSED.

TIP: The photo with the deflectors open is a ideal setting for blowing heavy leaves and debris.

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

HINT: From the operators position, the user can see the deflector gear rack and judge the position of the deflector.

With the deflectors approximately half open, the air stream is directed downward under the debris and is useful for blowing wet leaves, grass and dirt.

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

REMEMBER: Air stream (deflectors) should be closed off when necessary (ie., when traveling from one area to another, past flower and bark beds, etc.).

Transaxle Bypass Valve

IMPORTANT: DO NOT push or tow machine without first engaging the transaxle bypass valve. Transaxle damage may occur.

To move the machine with the engine not running the transaxle bypass valve **must** be engaged.

1. Pull cable out and down to engage transaxle bypass valve.



Transaxle Bypass Valve Engaged

2. After moving the machine, pull cable up allowing cable to retract and disengage transaxle bypass valve.



Transaxle Bypass Valve Disengaged

SERVICE**Service Intervals**

Use the following schedule to perform routine maintenance on your machine.

Service Item	Break-In (After First 10 Hours)	Every 40 Hours	Every 100 Hours	Every 500 Hours	Annually
Change engine oil	x	x			
Check hydraulic fluid level	x	x			
Check and adjust parking brake	x	x			
Check wheel c-clip	x	x			
Check air pressure in tires	x	x			
Check hydraulic pump drive belt tension	x	x	x		
Check air cleaner elements		x			
Clean engine shrouds as needed		x			
Clean behind engine shrouds and exposed fins		x	x		
Clean behind engine cooling fan screen		x	x		
Clean and gap spark plug			x		
Clean battery					x
Change engine oil at least once per season					x
Replace spark plug					x

- Rear Spindle has self lubricating Iigus® bushings, these bushings are non serviceable. The rear caster tire bearings are sealed, they are non serviceable.

Service Engine

Servicing Engine

Refer to engine manufacturer's owner's manual provided with your machine for engine service information.

Engine Oil

Use oil viscosity based on the expected air temperature range during the period between oil changes. Refer to engine manufacturers manual for the oil specifications.

Checking Engine Oil Level

IMPORTANT: Avoid Engine Damage! Failure to check the oil level daily could lead to serious engine problems if oil level is low.

Check oil level **before** operating.

Keep oil level between the FULL and the ADD marks.

Check oil level when engine is stopped, level, and is cooled so oil has had time to drain into the sump.

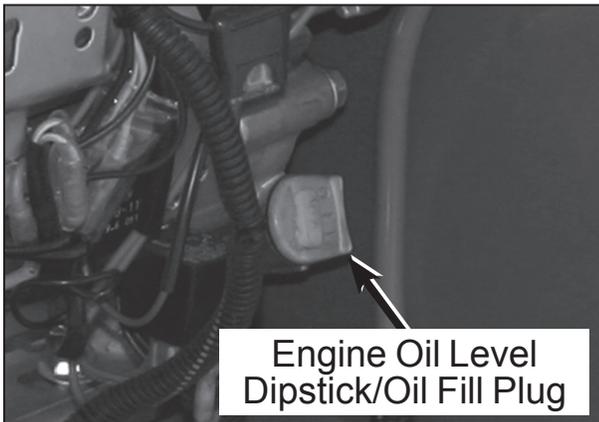
NOTE: Check oil **frequently** if you run engine all day.

Make sure engine is cool when checking engine oil level.

Check oil between jobs during periods of heavy use.

NOTE: Engine has an **OIL ALERT** that will stop the engine if there is a loss of oil pressure and/or will not allow engine to start if it has no oil.

1. Park machine on a level surface.
 2. Check when engine is cool before use or allow engine to cool.
 3. Clean area around engine oil dipstick/oil fill plug to prevent debris from falling into crankcase.
 4. Remove engine oil dipstick/oil fill plug. Wipe with a clean cloth.
 5. Install engine oil dipstick/oil fill plug fully.
 6. Remove engine oil dipstick/oil fill plug and check oil level on engine oil dipstick/oil fill plug. Oil must be between the ADD and FULL marks.
- If oil is low, add oil to bring oil level no higher than the FULL mark on engine oil dipstick/oil fill plug.
 - If oil level is above the FULL mark, drain to proper level.

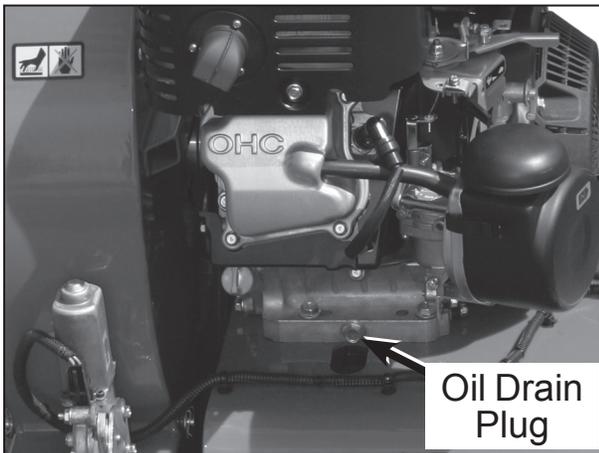


Changing Engine Oil

IMPORTANT: Avoid Damage! Change the oil more often if the machine is used in extreme conditions:

- Extremely dusty conditions.
- Frequent slow or low-speed operation.
- Frequent short trips.

1. Park machine on a level surface.
2. Clean area around dipstick/oil fill plug.
3. Make sure engine is cool.



4. Place oil drain pan under unit.
5. Remove oil drain plug.
6. Allow oil to drain into an oil drain pan.
7. After oil drains, Reinstall oil drain plug and securely tighten.

IMPORTANT: Refer to engine manufacturers owner's manual for correct type and grade of oil.

8. Add approximately 1 quart of oil.
9. Install engine oil dipstick/oil fill plug.
10. Start engine and run at SLOW throttle for approximately two minutes.
11. Stop engine.

12. Check oil level:

- Remove engine oil dipstick/oil fill plug. Wipe clean.
- Reinstall engine oil dipstick/oil fill plug fully and remove.
- Add oil as needed to bring level to the FULL mark without overfilling.

13. Reinstall engine oil dipstick/oil fill plug.

Checking Air Filter Elements

IMPORTANT: Avoid damage! Dirt and debris can enter the engine through a damaged filter element:

- Do not wash paper element.
- Do not attempt to clean paper element by tapping against another object.
- Do not use pressurized air to clean element.
- Do not clean elements, only replace element if it is very dirty, damaged or the seal is cracked.

Your machine is equipped with a Heavy-Duty Air Cleaner assembly.

Check air filter elements at the intervals recommended in the **Service Intervals** section.

NOTE: It may be necessary to check the air filter more frequently if operating machine in dusty or extreme conditions.

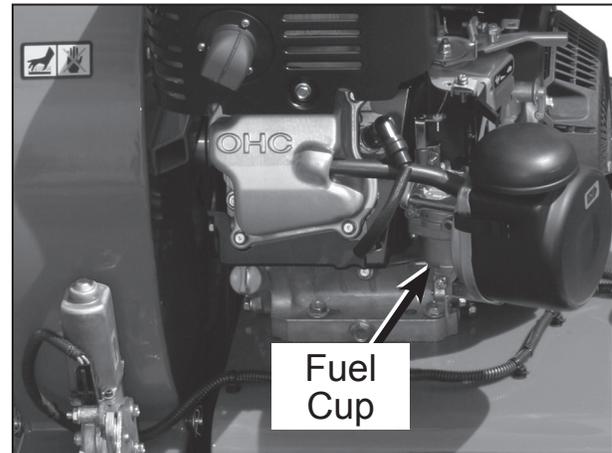
Refer to the engine manufacturer's owner's manual provided with your machine for the complete procedure.

Clean Fuel Cup



Avoid injury! Fuel vapors are explosive and flammable.

- Shut OFF engine before servicing.
- Cool engine before servicing.
- Work in a well-ventilated area.
- Do not smoke while handling fuel.
- Keep fuel away from flames or sparks.
- Clean up spilled fuel immediately.



1. Inspect fuel cup for water and dirt.
2. To remove water and dirt, close the fuel cock and remove the fuel cup.
3. After removing dirt and water, wash the fuel cup with kerosene or gasoline. Reinstall securely to prevent leakage.

Checking Engine Cooling Intake and Fan

IMPORTANT: Avoid damage! An obstructed air intake screen can cause engine damage due to overheating.

 **CAUTION**

Avoid injury! Compressed air can cause debris to fly a long distance.

Clear work area of bystanders.

Wear eye protection when using compressed air for cleaning purposes.

Reduce compressed air pressure to 210 kPa (30 psi).

Keep air intake screen and other external surfaces of the engine, including cooling fins, clean at all times to allow adequate cooling.

Clean air intake screens and engine cooling fins of debris with compressed air to ensure proper cooling. Refer to the engine manufacturer's owner's manual provided with your machine for the complete procedure.

Checking Spark Plug

 **CAUTION**

Avoid injury! Touching hot surfaces can burn skin. The engine, components, and fluids will be hot if the engine has been running. Allow the engine to cool before servicing or working near the engine and components.

Check spark plugs at the intervals recommended in the **Service Intervals** section. Refer to the engine manufacturer's owner's manual provided with your machine for the complete procedure.

Checking Carburetor Adjustment

The carburetor is designed to deliver the correct fuel-to-air mixture to the engine under all operating conditions. To comply with current emissions regulations, the fuel mixture settings are made at the factory and are not adjustable.

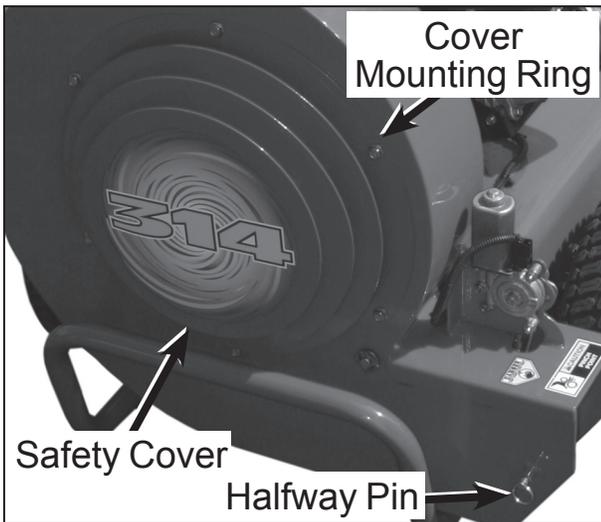
NOTE: To ensure proper engine operation at altitudes above 5000ft (1525M), it may be necessary to have an authorized Subaru service center install a special high-altitude jet kit in the carburetor.

Refer to the engine manufacturer's owner's manual provided with your machine for more information.

Changing Hydraulic Pump Drive Belt and Impeller

Use this procedure to replace a worn or damaged drive belt or a broken or bent impeller. If replacing a bad impeller, it is always a good idea to replace the belt at the same time.

1. Park machine on a level surface. Remove key.
2. Allow machine to cool. Never perform work on a hot machine.
3. Take off the front safety cover by removing the six (6) 5/16 x 3/4 front cover bolts.



4. Remove the six (6) 5/16 x 3/4 impeller bolts.
5. Inspect impeller for cracks or damage. Replace the impeller if any damage is found. Contact your local dealer for original equipment manufacturer replacement parts.

Caution should be used when removing impeller, it 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.

6. Remove toe-kick plate, located in front of the operators platform. On the left side under the engine locate the idler pulley spring, remove the spring. This will allow the belt to be removed in a later step.
7. Remove the 3/8 x 1-1/2 hub bolt. You may need to use a 3-way gear puller to remove the hub.

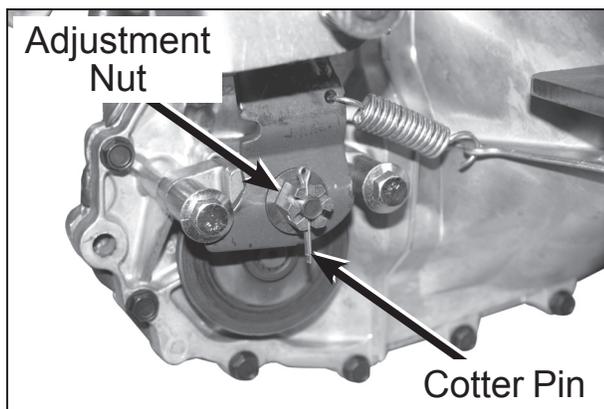
8. Remove wiring harness from deflector motor.
9. Remove four (4) bolts securing the blower housing. There are two (2) 3/8 bolts above the engine shaft and two (2) 3/8 nuts on the right inside bottom of the blower housing. Lift blower housing up while tilting forward to clear the engine shaft.

NOTE: The two (2) 3/8 bolts must have red Loctite® with a torque spec of 40 ft lbs. The six (6) 5/16 x 3/4 impeller bolts must have red Loctite® with a torque spec of 55 ft lbs.

10. Remove worn belt and replace with a new belt.
11. At this time check the battery, if it needs replacing refer to *Removing and Installing Battery* procedure in the **Service Section**.
12. Reassemble the unit by reversing the removal procedure.

Adjusting the Parking Brake

1. Test the parking brake, referring to the **SAFETY** section for the procedure.
2. If the brake is not holding, adjustment is required.
3. Park machine on a level surface, block drive wheels, front and back, to prevent machine from moving.
4. Remove toe-kick plate, located in front of the operators platform.
5. Release parking brake.
6. Locate disc brake inside base box (right side).
7. Remove cotter pin on the adjustment nut.



8. Tighten nut 1/8 turn, replace cotter pin.
9. Test the parking brake. Stop machine on a 17° slope (30% grade) facing uphill. Stop the engine and engage parking brake.

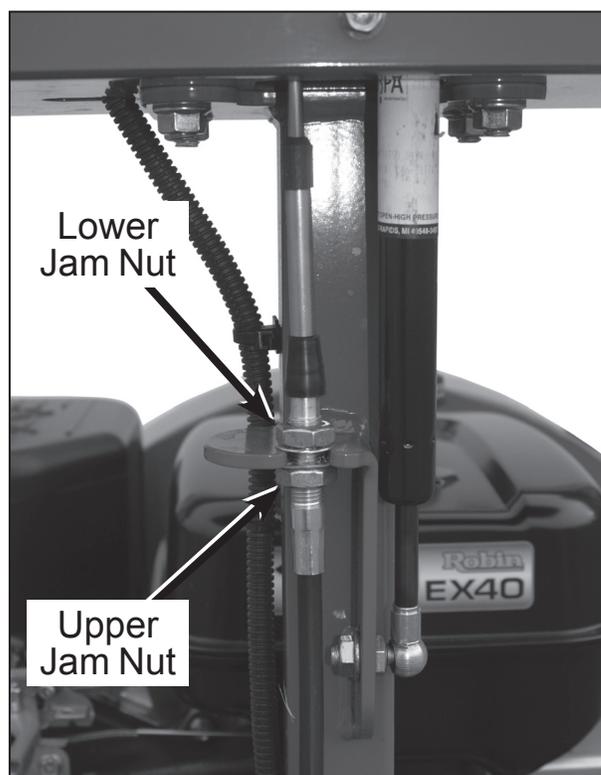
Result: Parking brake must hold the machine stationary. (Machine should move no more than 24 in. (61cm) in one hour.) If machine moves more than that, brakes need to be adjusted.

10. Reassemble the unit by reversing the removal procedure.

Service Motion Controls

Adjusting Motion Controls

1. Park machine on a level surface. Stop engine.
2. Chock wheels. Release parking brake.
3. Move motion controls toward the handle bar full forward.
4. There should be 1/16" between the motion controls and the handle bar. If the distance is greater or the controls touch the handle bar, adjustment is needed.



5. The push/pull cable has adjustments on the top and bottom.
6. Holding the control forward to the handle bar, adjust cable as needed to achieve the 1/16" clearance.
7. Engage parking brake.

Service Tires

Removing and Installing Front Drive Wheels

Removing:

1. Park machine on a level surface.
2. Lift machine with a safe lifting device centered under operator foot pad, placing blocking under the side where tire is being removed.
3. Remove the c-clip.
4. Remove wheel.

Installing:

1. Install wheel with valve stem facing out.
2. Install C-clip.
3. Lower machine.

Removing and Installing Rear Caster Wheel

Removing:

1. Park machine on a level surface.
2. Lift rear of machine with a safe lifting device. Use jackstands.
3. Loosen and remove locknut and axle bolt from caster fork.
4. Slide wheel out of fork.

Installing:

1. Slide replacement wheel into caster fork.
2. Install axle bolt and locknut.
3. Tighten locknut until wheel develops slight rolling resistance.
4. Lower machine.

Checking Tire Pressure



CAUTION

Avoid injury! Explosive separation of tire and rim is possible when serviced incorrectly: Do not attempt to mount a tire without the proper equipment and experience to perform the job. Do not inflate the tires above the recommended pressure. Do not weld or heat a tire and rim assembly. Heat can cause an increase in air pressure resulting in an explosion. Welding can structurally weaken or deform the rim. Do not stand in front or over the tire and rim when inflating.

Use a clip-on chuck and extension hose long enough to allow you to stand to one side.

1. Check tires for damage.
2. Check tire pressure with an accurate gauge.
3. Add or release air as necessary.

Recommended pressures:

Rear tire: **14 PSI - MAXIMUM 20 PSI**

Front tire: **20 PSI - MAXIMUM 28 PSI**

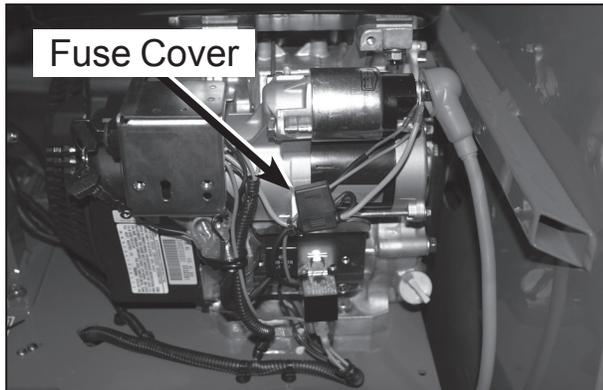
Service Electrical

Replacing Fuse

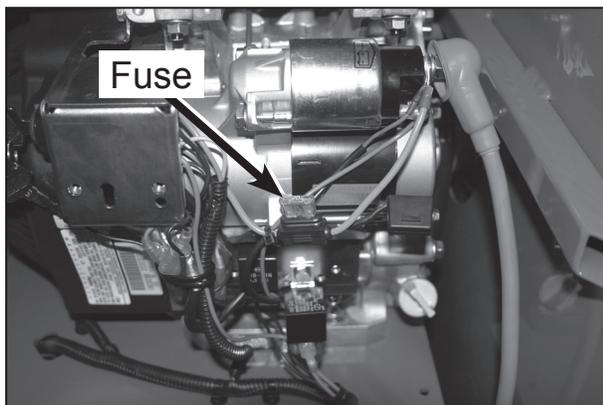
IMPORTANT

Avoid Damage! Help prevent machine electrical damage. Make sure replacement fuse is the correct rating.

1. Park machine on a level surface.
2. Set parking brake.
3. Locate the fuse holder on the engine above the battery.



4. Open the fuse holder by pulling off the black cap.



5. Remove the fuse and replace with the same type and rating. The fuse required is a blade style fuse.

Removing and Installing Battery

CAUTION

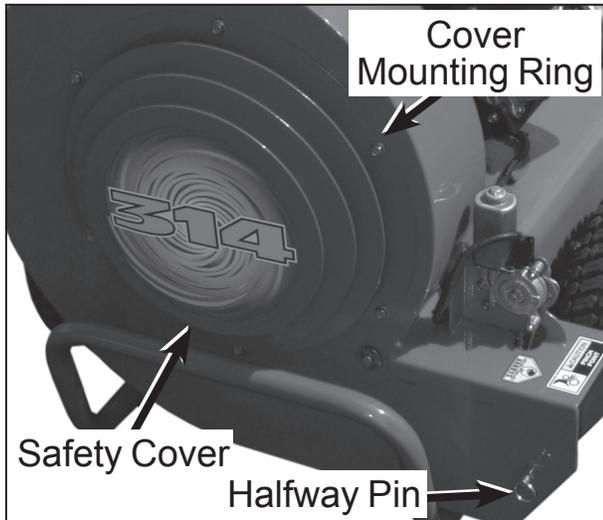
Avoid injury! Battery electrolyte contains sulfuric acid. It is poisonous and can cause serious burns.

- Wear eye protection and gloves.
- Keep skin protected.
- If electrolyte is swallowed, get medical attention immediately.
- If electrolyte is splashed into eyes, flush immediately with water for 15-30 minutes and get medical attention.
- If electrolyte is splashed onto skin, flush immediately with water and get medical attention if necessary.

WARNING

The battery produces a flammable and explosive gas. The battery may explode.

- Do not smoke near battery.
 - Wear eye protection and gloves.
 - Do not allow direct metal contact across battery posts.
 - Disconnect negative cable first when removing battery.
 - Reconnect negative cable last when installing battery.
1. Park machine on a level surface. Remove key.
 2. Allow machine to cool. Never perform work on a hot machine.
 3. Take off the front safety cover by removing the six (6) 5/16 x 3/4 front cover bolts.
 4. Remove the six (6) 5/16 x 3/4 impeller bolts.
 5. Remove wiring harness from deflector motor.



6. Remove four (4) bolts securing the blower housing. There are two (2) 3/8 bolts above the engine shaft and two (2) 3/8 nuts on the right inside bottom of the blower housing. Lift blower housing up while tilting forward to clear the engine shaft.

NOTE: The two (2) 3/8 bolts must have red Loctite® with a torque spec of 40 ft lbs. The six (6) 5/16 x 3/4 impeller bolts must have red Loctite® with a torque spec of 55 ft lbs.

7. Disconnect the Negative (-) battery cable first.
8. Disconnect the Positive (+) battery cable.
9. Remove the two (2) 3/8 nuts that are located directly under the battery.
10. Remove the battery by tilting the battery to the front of the machine and lift out and up at the same time.
11. Install the new battery in battery tray.
12. Connect the Positive (+) cable first.
13. Connect the Negative (-) cable last.
14. Reassemble the unit by reversing the removal procedure.

Cleaning Battery and Terminals

1. Park machine on a level surface.
2. Disconnect and remove battery. Refer to *Removing and Installing Battery* procedure.
3. Clean battery with one gallon of water mixed with four tablespoons of baking soda. **Caution: DO NOT** get the soda solution into the cells.

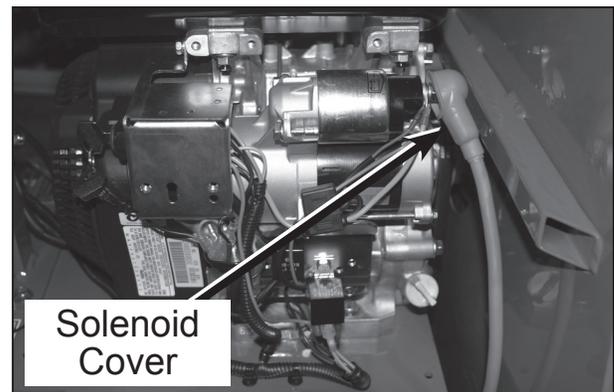
4. Rinse the battery thoroughly with plain water and dry.
5. Clean terminals and battery cable ends with wire brush to remove corrosion. Replace the terminal bolts if corroded.
6. Apply battery terminal grease to the terminals and cable ends to prevent corrosion.
7. Install battery.

Using Booster Battery or Jump Starting

CAUTION

Avoid injury! The battery produces a flammable and explosive gas. The battery may explode.

- Do not smoke or have open flame near battery.
 - Wear eye protection and gloves.
 - Do not jump start or charge a frozen battery. Warm battery to 60°F before starting or charging.
1. Park machine on a level surface.
 2. Remove cover from solenoid.



3. Connect the positive cable to the terminal on solenoid first, and then to the good battery.
4. Connect the negative jumper cable to the engine block first, and then to the good battery.
5. Start engine of disabled machine.
6. Disconnect the jumper cables from the good battery and then the discharged battery.

TROUBLESHOOTING

Using the Troubleshooting Chart

If you are experiencing a problem that is not listed in this chart, refer to the engine manufacturer’s owner’s manual provided with your machine for troubleshooting or contact your authorized service center.

When you have checked all the possible causes listed and you are still experiencing the problem, contact your authorized service center.

Engine	
Poor engine performance	<p>Fuel:</p> <ul style="list-style-type: none"> • Dirt in fuel system or fuel is old. Replace fuel with fresh stabilized fuel. Obtain fuel from another supplier before suspecting machine problems. Suppliers blend fuels differently and changing suppliers will generally solve any performance problems. • Fuel blended with alcohol or ether may contribute to performance problems by causing gum and varnish deposits, especially if fuel is stored for several weeks or more. Obtain fresh fuel. • Replace fuel filter.
Engine will not start or is hard to start	<ul style="list-style-type: none"> • Parking brake lever not in the engaged position. • Check that motion control levers are in NEUTRAL. • Stale, low fuel level or improper fuel. • Plugged fuel filter. • Plugged air intake filter. • Spark plug wire loose or disconnected. • Spark plug not gapped correctly. • Blown fuse. • Electrical problem – dead battery. • Choke applied incorrectly.
Engine will not slow idle	<ul style="list-style-type: none"> • Carburetion problems. Contact your authorized service center. • Bent or kinked throttle cable. • Bent governor control. • Incorrect governor idle control.
Engine runs rough or stalls	<ul style="list-style-type: none"> • Plugged fuel filter. • Plugged air intake system. • Fuel cap vent dirty. • Stale or improper fuel/fuel level. • Spark plug not gapped correctly. • Replace spark plug. • Choke applied incorrectly.
Engine knocks	<ul style="list-style-type: none"> • Engine oil level low. • Fuel is bad. Fill tank with fresh fuel. • Idle speed too slow. Increase engine rpms.

Engine overheats	<ul style="list-style-type: none"> • Clean cooling fins. • Clean engine cooling air intake screen. • Low oil level. • Do not operate at slow idle. Operate at faster idle. • Plugged engine air intake filter.
Engine lacks power	<ul style="list-style-type: none"> • Reduce load. • Plugged engine air intake filter. • Plugged fuel filter. • Improper type of fuel. Drain tank and fill with correct fuel. • Clean cooling fins to help prevent overheating. • Replace spark plug.
Engine backfires through muffler	<ul style="list-style-type: none"> • Throttle lever should be at low idle for thirty seconds before turning off machine.
High fuel consumption	<ul style="list-style-type: none"> • Improper type of fuel. • Plugged air intake system. • Improper valve clearance. Contact your authorized service center. • Restricted air intake filter.
Other symptoms	<ul style="list-style-type: none"> • Refer to engine manufacturer's owner's manual provided with your machine for additional information.
Electrical System	
Starter will not work	<ul style="list-style-type: none"> • Blown fuse. • Park brake not engaged or switch is faulty. • Loose or corroded battery connections. • Motion controls not in NEUTRAL or neutral safety switches faulty. • Key switch, starter relay or starter faulty. Contact your authorized service center.
Battery will not charge	<ul style="list-style-type: none"> • Loose or corroded connections. • Defective battery. • Defective rectifier. • Contact your authorized service center.
Starter turns slowly	<ul style="list-style-type: none"> • Loose or corroded battery connections. • Defective battery. • Low battery - charge battery. • Engine oil viscosity too heavy.
Hydraulics	
Steering	<ul style="list-style-type: none"> • Improper tire inflation. • Hydrostatic transmission oil level low. • Check steering cables.
Machine will not move with engine running	<ul style="list-style-type: none"> • Parking brake engaged. • Transmission oil level low. • Transmission oil cold. Allow machine to warm up. • Pump free-wheel valves open. • Transmission problems. Contact your authorized service center.

Machine	
Excessive machine vibration	<ul style="list-style-type: none"> ● Engine speed too slow. Increase engine rpms. ● Drive belt not tensioned correctly. ● Impeller out of balance. Check impeller for damage, cracks, broken or bent fins. If damaged in any way, REPLACE IMPELLER.
Discharge deflectors not opening or closing	<ul style="list-style-type: none"> ● Deflector switch broken or sticking, replace switch. Contact your authorized service center. ● Deflector motor damaged. Contact your authorized service center.

STORAGE

Storing Machine Safety



CAUTION

Avoid injury! Fuel vapors are explosive and flammable. Engine exhaust fumes contain carbon monoxide and can cause serious illness or death.

- Run the engine only long enough to move the machine to or from storage.
- **DO NOT** store vehicle with fuel in the tank inside a building where fumes may reach an open flame or spark.
- Allow the engine to cool before storing the machine in any enclosure.

Preparing Machine for Storage

1. Repair any worn or damaged parts. Replace parts if necessary. Tighten loose hardware.
2. Remove debris from machine.
3. Wash the machine and apply wax to metal and plastic surfaces.
4. Run machine for five minutes to dry belts and pulleys.
5. Apply light coat of engine oil to pivot and wear points to prevent rust.
6. Check tire pressure.

Preparing Fuel and Engine for Storage

Fuel:

If you have been using “Stabilized Fuel,” add stabilized fuel to tank until the tank is full. Turn OFF fuel shutoff.

NOTE: Filling the fuel tank reduces the amount of air in the fuel tank and helps reduce deterioration of fuel.

If you are not using “Stabilized Fuel”:

1. Park machine safely in a well-ventilated area.

NOTE: Try to anticipate the last time the machine will be used for the season so very little fuel is left in the fuel tank.

2. Turn on engine and allow to run until it runs out of fuel.
3. Turn key to OFF position.
4. Mix fresh fuel and fuel stabilizer in separate container. Follow stabilizer instructions for mixing.
5. Fill fuel tank with stabilized fuel.
6. Run engine for a few minutes to allow fuel mixture to circulate through carburetor on engine.
7. Turn OFF engine. Turn OFF the fuel shutoff.

Engine storage:

1. Change engine oil while engine is warm.
2. Service air filter if necessary.
3. Clean debris from engine air intake screen.
4. Remove spark plug. Put 1 oz of clean engine oil in cylinders. Install spark plug, but do not connect spark plug wire. Crank the engine five or six times to allow oil to be distributed.
5. Clean the engine and engine compartment.
6. Remove battery.
7. Clean the battery and battery posts.
8. Close fuel shut-off valve.
9. Store the battery in a cool, dry place where it will not freeze.

NOTE: The stored battery should be recharged every 90 days.

10. Store the vehicle in a dry, protected place.

NOTE: Put a waterproof cover over on machine if stored outside.

Removing Machine From Storage

1. Check tire pressure.
2. Check engine oil level.
3. Check battery. Charge battery if necessary.
4. Install battery.
5. Check spark plug gap. Install and tighten plug to specified torque.
6. Open fuel shut-off valve.
7. Run the engine 5 minutes at mid throttle with deflectors closed to allow oil to be distributed throughout engine.
8. Be sure to test all safety systems before operating.



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