

**P-REX MINI:
Pioneer Line Remover
Operators Manual**



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Cleveland, OH 44135

800-877-1500
PioneerAthletics.com



WARNING

The engine exhaust from this product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

NOTICE OF REQUIREMENT OF SPARK ARRESTER MUFFLER

This equipment may create sparks that can start fires around dry vegetation. California Public Resources Code Section 4442.6 provides that it is unlawful to use or operate an internal combustion engine on any forest-covered, brush-covered, or grass-covered land unless the engine is equipped with a spark arrester maintained in effective working order. A spark arrester is a device constructed of nonflammable materials specifically for the purpose of removing and retaining carbon and other flammable particles over 0.0232 of an inch in size from the exhaust flow of an internal combustion engine that uses hydrocarbon fuels or which is qualified and rated by the United States Forest Service. Other states or federal areas may have similar laws. The Operator Should Contact Local Fire Agencies For Laws or Regulations Relating to Fire Prevention Requirements. THIS EQUIPMENT DOES NOT HAVE A SPARK ARRESTER AND YOU SHOULD CONTACT YOUR AUTHORIZED DEALER FOR THE PURCHASE OF A SPARKARRESTER.

Inspect spark arrester daily; replace every 500 hours or as needed.

The Engine Owner's Manual provides information regarding the U.S. Environmental Protection Agency (EPA) and the California Emission Control Regulation of emission systems, maintenance and warranty.

Keep Engine Owner's Manual with your unit. Should the Engine Owner's Manual become damaged or illegible, replace immediately. Replacements may be ordered per the information found in the Product Information section of the owner's manual.

Federal law and California State law prohibit the following acts or the causing thereof:

- 1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair, replacement, of any device or element of design incorporated into any equipment for the purposes of emissions control prior to or after its sales or delivery to the ultimate purchaser or while it is in use, or**
- 2. The use of the equipment after such device or element of design has been removed or rendered inoperative by any person.**

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GENERAL INFORMATION

To the New Owner

Operators must read this manual carefully. It contains operation and maintenance information that will help you achieve years of dependable service.

The Engine Owner's Manual, included in the owner's packet, contains engine information that will not be repeated in this manual.

The owner's responsibilities include, but are not limited to, making certain that the operators and mechanics:

- read and understand the engine owner's manual before attempting to operate or repair the engine.
- read and understand the operator manual and all decals before operating this machine.
- are qualified and physically able individuals, properly trained in the operation and maintenance of this equipment. Before they are allowed to operate or maintain this machine, they must be familiar with its safe operation, operator controls, and decals.
- know they are responsible for their own safety as well as the safety of other persons within the vicinity. Remember, the operator is responsible for accidents or hazards occurring to other people or their property.
- who cannot read and understand English have this material explained to them.

IMPORTANT: As the owner/operator you can prevent accidents. You are responsible for accidents or injuries occurring to yourself, other people or property.

Never let children or untrained people operate or service the equipment. Local regulations may restrict the age of the operator.

For more detailed maintenance and adjustment information refer to the proper General Service Manual.

Using this Manual

This manual contains general operation information as well as basic adjustment and maintenance information. Since operating conditions vary considerably, all conditions cannot be addressed

individually. Through training and experience, operators should develop safe operating practices. Directions used in this manual, for example RIGHT or LEFT, refer to directions when in the operator position and facing forward, unless otherwise stated.

Service Program

This manual is part of a service package for the P-REX Mini. Use of this manual in conjunction with other component manuals will provide the information necessary for service and maintenance.

This manual is to assist owners in the operation and maintenance of the Pioneer P-REX Mini. Please review this portion of your manual for correct operation of the unit before you begin.

The Pioneer P-REX Mini uses a Hustler® FasTrak as a base drive unit on which a high-pressure water and Blitz spray system, and a hydraulic brush system have been added to remove paint from synthetic turf. These portions of the unit are unique to the P-REX Mini. Please follow the recommendations for routine maintenance and procedures that apply to the central unit. It's important that you read and understand the Operator's Manual before using the P-REX Mini.

This General Service Manual is a service guide for use by Service Technicians. It provides the necessary information needed to perform normal maintenance requirements on these units.

The Parts Manual provides a complete parts listing for the base unit. Use this manual when ordering parts.

The Operator's Manual provides fundamental operational information and operational safety that is needed when operating the P-REX Mini.

The component manuals are furnished by the various manufacturers to be used for the troubleshooting and servicing of their components.

Maintenance Introduction

Regular maintenance is the best prevention for downtime or premature failure. The following pages contain suggested maintenance information and schedules which the operator/mechanic should follow on a routine basis.

Remain alert for unusual noises, they could be signaling a problem. Visually inspect the machine for any abnormal wear or damage. A good time to detect potential problems is while performing scheduled maintenance service. Correcting the problem as quickly as possible is the best insurance.

Clear away heavy build-up of grease, oil and dirt, especially in the engine compartment and under the seat platform areas; minute dust particles are abrasive to close-tolerance engine and hydraulic assemblies.

Some repairs require the assistance of a trained service mechanic and should not be attempted by unskilled personnel.

Information included in this manual was current at the time of printing, but subsequent production changes may cause your machine to vary slightly in detail. Pioneer reserves the right to redesign and change the machine as deemed necessary, without notification. If a change has been made to your machine which is not reflected in this service manual contact the Customer Service Department at Pioneer for additional information.

Warranty

Warranty repair must be approved by Pioneer before warranty credit can be allowed.

IMPORTANT: Any unauthorized modification, alteration, or use of non-approved attachments voids the warranty and releases Manufacturer from any liability arising from subsequent use of this equipment. Do not use or operate any attachment not approved.

IMPORTANT: Damage caused by unauthorized replacement parts is not covered by this warranty. Manufacturer expressly excludes liability for defects or damage caused by such 'unauthorized' articles or service.

Model and Serial Number

The serial identification plate, located directly to the right of the operator's platform and in front of the ROPS mount, contains the model and serial numbers.

Parts and Service

Use original replacement parts, or parts that are equivalent in overall performance. For prompt, efficient service, always provide the following information when ordering parts:

1. Correct part description.
2. Correct part number.
3. Correct model number.
4. Correct serial number.

All arrangements for warranty repair and service must be handled through an authorized dealer.

SAFETY



This safety alert symbol is used to call attention to a message intended to provide a reasonable degree of **PERSONAL SAFETY** for operators and other persons during the normal operation and servicing of this equipment.



– denotes immediate hazards which **WILL** result in severe personal injury or death.



– denotes a hazard or unsafe practice which **COULD** result in severe personal injury or death.


This manual uses two other words to highlight information:

- A. **IMPORTANT** – calls attention to special mechanical information.
- B. **NOTE** – emphasizes general information worthy of special attention.


The owner's responsibilities include, but are not limited to,

- making certain that the operators and mechanics read and understand this manual and all decals before operating this machine.
- making certain that before the operators and mechanics are allowed to operate or maintain this machine, they must be familiar with its safe operation, operator controls, and decals.
- ensuring that the operators and mechanics know they are responsible for their own safety as well as the safety of other persons within the vicinity. Remember, the operator is responsible for accidents or hazards occurring to other people or their property.





Improper use, adjustment, or maintenance by the operator, mechanic or owner can result in injury or

death. Reduce the potential for injuries by following these safety instructions. Pay close attention to the safety alert symbol  and the instructions that follow it. Failure to comply with these instructions may result in personal injury or death.




This product is capable of amputating hands and feet and throwing objects. Always follow all safety instructions to avoid serious injury or death.

 Never allow persons to operate this unit without proper instruction or allow children to operate. Allow only responsible adults who are familiar with these instructions to operate.

Safe Operation

-  Evaluate the terrain to determine to properly and safely perform the job.
-  Do not use any unauthorized attachment or modify the unit.
-  Always be alert and inspect area for hazards such as rocks, metal objects and other debris which may be thrown or entangled. Remove these objects before starting. Watch out for holes or deep depressions.
-  Always operate with adequate lighting.

Personal Safety

-  Always wear long pants and safety shoes with slip-resistant soles when operating.
 - Do not wear sandals, tennis shoes, sneakers, shorts or any type of loose-fitting clothing as they may get tangled in moving parts.
 - Do not wear a towel from the waist, or use a towel as a headband or neck wrap.
 - Long hair or jewelry may get tangled in moving parts.
-  Always wear adequate ear protection, such as earplugs. Prolonged exposure to loud noise can cause impairment or loss of hearing.
 - Do not wear radios or music headphones while operating. Safe operation requires your full attention.
-  Always wear safety goggles or safety glasses with side shields when operating.

- ⚠ Do not operate if you are fatigued, sick or while under the influence of alcohol or drugs, if you are pregnant or under 18 years old.
- ⚠ Poor posture or operating the unit for extended periods of time may lead to fatigue or injury, resulting in loss of control. Occasionally, stop and get off the seat to stretch and relax.

Operation

- ⚠ Always secure the ROPS in the raised position and buckle the seat belt before starting the unit.
- ⚠ Never leave a running unit unattended. Before leaving the operator's seat for any reason, including:
 - Always stop on level ground.
 - Disengage the brush clutch.
 - Place the steering control levers in the park brake position.
 - Stop the engine.
 - Remove the ignition key.
 - Wait for the engine and all moving parts to come to a complete stop.
- ⚠ Always inspect unit for damage after striking a foreign object. If damage is found, repair immediately.
- ⚠ Always remain seated while operating. Only start the engine from the operator's position.
- ⚠ Always keep safety shields and covers in place, except for servicing.
- ⚠ Never put hands or feet under any part of the unit while it is running.
- ⚠ Follow daily and weekly checklists, making sure hoses are tightly secured and bolts are tightened.
 - Never operate a poorly maintained unit.
- ⚠ Clean flammable material from unit. Prevent fires by keeping the engine compartment, exhaust area, battery, fuel line, fuel tank and operator's station clean of accumulated debris. Always clean up spilled fuel and oil.
- ⚠ Prevent fires by keeping the engine and exhaust areas clear of debris.
- ⚠ Allow the engine, to cool in a well-ventilated area before storing inside a building or other enclosure.
- ⚠ Do not change the engine governor setting or over speed the engine. Operating the engine at excessive speed may increase the hazard of personal injury.

- ⚠ Rapid movement of the steering control levers in either direction could result in a reaction that can cause serious injury.
 - Never push forward suddenly on your steering control levers while in rearward motion.
 - Never pull back suddenly on your steering control levers while in forward motion.
- ⚠ Always be aware of what is behind the unit before backing up. Always look down and behind before and while backing up.
- ⚠ Slow down before turning.
- ⚠ Never attempt high speed maneuvering, especially in crowded or congested areas.
- ⚠ Always maintain a safe distance from people and pets. Always stop if someone enters the area.
- ⚠ Never carry passengers.
- ⚠ Always observe traffic laws while driving from one location to another. Watch for traffic when operating near or crossing roadways.
 - Use care when approaching blind corners, shrubs, trees, or other objects that may obscure your vision.
- ⚠ Do not tow the machine. Move it by hand or use a winch to load on a trailer for transporting. When transporting on another vehicle, the unit should be facing forward and it must be secured.
- ⚠ Secure frame to transport vehicle with at least two straps, chains, cables, or ropes. Never secure unit from rods or linkages to vehicle, otherwise damage could occur.

Using a Ramp

- ⚠ Exercise extreme caution when loading and unloading onto a truck or trailer with a ramp.
- ⚠ Use only a single, full width ramp; do not use individual ramps for each side of the unit. Having a full width ramp provides a surface for the frame to contact if the unit starts to tip backwards. It also reduces the risk of a wheel going off and tipping over.
- ⚠ Do not exceed a 15-degree angle between the ramp and the ground or between the ramp and the trailer or truck.
- ⚠ Avoid sudden acceleration when on a ramp.

Slope Operation

Slopes are a major factor in loss-of-control and tip-over accidents, which can result in severe injury or

death. All slopes require extra caution. If you feel uneasy on the slope; do not travel on it.

REMINDER: Only operate on slopes of 15 degrees or less.

⚠ Use extreme caution when operating on slopes.

- Be extremely careful changing directions on a slope. Slow down.
- Do not operate where the unit could slip or tip.
- Turn slowly.
- Turn on the most level part of the slope.
- To maximize traction, it is better to turn the front of the unit uphill, rather than downhill. If drive tires lose traction, steering control is lost which could cause serious injury or death.
- If it becomes necessary to turn downhill, turn slowly and gradually, if possible.

⚠ Do not remove or modify the stabilizer wheels.

⚠ Watch for holes, ruts, bumps, rocks or other hidden objects. Uneven terrain could overturn the unit. Tall grass can hide obstacles.

⚠ Remove obstacles such as rocks, tree limbs, etc.

⚠ Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction.

⚠ Avoid starting and stopping on a slope. If tires lose traction, proceed slowly straight down the slope.

⚠ Operate a safe distance (minimum of 10 feet) away from drop-offs, retaining walls, drainage ditches, embankments, water, and other types of hazards to avoid a wheel dropping over the edge or to avoid the ground from breaking away. This will reduce the risk of the unit suddenly rolling over causing serious injury or death.

⚠ Slippery conditions reduce traction which could cause sliding and loss of control.

⚠ Do not try to stabilize the unit by putting your foot on the ground.

⚠ When operating on slopes, if the unit's tires lose traction, disengage all cleaning activity, place the steering control levers in the park brake position, stop the engine, remove the ignition switch key, and get help.

⚠ Never make sudden starts, stops, turns, or reversals of direction, especially when maneuvering on slopes. The steering is designed for sensitive response. Rapid movement of the control levers in either direction could result in an action that can cause serious injury.

⚠ Never stop suddenly while backing down slopes. This action may result in a reaction of the unit that can cause serious physical injury.

⚠ This unit capable of operating horizontally (traverse) on moderately steep slopes. When operating on slopes up to 15 degrees, be aware of any conditions that may cause the drive tires to lose traction resulting in a possible loss of control. An operator should not operate on a slope unless thoroughly familiar with the equipment. Do not operate on slopes greater than 15 degrees.

Refer to the Slope Guide, when determining the degree of slope.

It is strongly recommended that the operator drive of the slope slowly, using extreme caution, if any sign of loss of traction is detected. Wait until the condition that caused the problem is resolved before attempting to operate on the slope again.

Terrain conditions can affect traction resulting in possible loss of control. Some of the conditions to be aware of are:

- Wet terrain
- Depressions in the ground; i.e. holes, ruts, washouts
- Mounds of dirt
- Soil type; i.e., sand, loose dirt, gravel, clay
- Grass type, density, and height
- Tire pressure

Another consideration for safety on slopes is to be aware of what is located at the bottom of the slope. Extreme caution should be used when there is a hazard located at the bottom of the slope.

These are just a few examples of situations when caution must be used when operating on a slope. There are many other possibilities too numerous to mention. Just remember to always exercise extreme caution when operating on any slope.

⚠ The ROPS **may** minimize chance of injury or death from rollover. The seat belt must be fastened while operating with a ROPS in the raised and secured position. Both retaining pins and hair pins must be installed. Failure to use a seat belt with ROPS may result in serious injury in the event of a roll over.

Children

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the machinery. Never assume that children will remain where you last saw them.

⚠ Never leave the unit unattended with the ignition key in the switch, especially with children present.

⚠ Children or bystanders may be injured if they attempt to move or to operate the unit while it is unattended. Always disengage the brush clutch, place the control levers in park brake position, stop the engine, and remove the ignition key when leaving the operator's seat.

⚠ Keep children out of the area and under the watchful care of a responsible adult other than the operator.

⚠ Be alert and turn the unit off if children enter the area.

⚠ Before and while backing, look behind and down for small children.

⚠ **Never carry children.** They may fall off and be seriously injured. Children who have been given rides in the past may suddenly appear in the area for another ride and be run over or backed over.

⚠ Never allow children to operate the unit.

⚠ Never allow children or others in or on towed equipment.

⚠ Use care when approaching blind corners, shrubs, trees, the end of a fence or other objects that may obscure vision.

Service Precautions

⚠ Unless specifically required, DO NOT have the engine running when servicing or making adjustments.

- Park on level ground.
- Disengage the brush clutch.
- Place the steering control levers in the park brake position.
- Stop the engine.
- Remove the ignition key.
- Disconnect the negative battery cable.
- Wait for all movement to stop before adjusting, cleaning or repairing.
- Repairs or maintenance requiring engine power should be performed by trained maintenance personnel only.
- To prevent carbon monoxide poisoning, operate the engine in a well-ventilated area only.

- Read and observe all safety warnings in this manual.

⚠ Before working on or under the unit, make certain the engine cannot be accidentally started.

⚠ Always keep belt covers on for safety as well as for cleanliness except when changing or checking the belt.

⚠ Use a stick or similar instrument to clean under the unit making sure that no part of the body, especially arms and hands are under the unit.

⚠ Always wear adequate eye protection when:

- servicing the hydraulic system.
- servicing the battery.

⚠ Never attempt to make any adjustments or repairs to the drive system while the engine is running or brush clutch is engaged. Repairs or maintenance requiring engine power should be performed by trained maintenance personnel only.

⚠ Never work under the machine unless it is safely supported with jack stands.

- Make certain machine is secure when it is raised and placed on the jack stands.
- The jack stands should not allow the machine to move when the engine is running and the drive wheels are rotating.
- Use only certified jack stands. Use only appropriate jack stands, with a minimum weight rating of 2000 pounds (907 kg) to block the unit up.
- Use in pairs only.
- Follow the instructions supplied with the jack stands.

⚠ Exercise caution when releasing spring tension from any of the belt idlers.

⚠ Do not touch hot parts of machine.

⚠ Keep nuts and bolts tight. Keep equipment in good working condition.

⚠ Never tamper with safety devices. Check their proper operation regularly.

⚠ Frequently check components and replace with recommended parts, when necessary.

Battery Service Precautions

⚠ Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

⚠ Charge batteries in a well-ventilated open area, away from sparks and flames. Unplug charger

before connecting or disconnecting from battery. Wear protective clothing and use insulated tools.

⚠ Avoid skin and clothing contact with battery acid.

- Always wear eye protection when checking the battery. Acid can cause serious injury to skin and eyes. If contact occurs, flush area with clean water and call a physician immediately. Acid will also damage clothing.
- Do not drink the battery electrolyte.
- Do not allow open flame near the battery when charging.
- Hydrogen gas forms inside the battery. This gas is both toxic and flammable and may cause an explosion if exposed to flame. Always disconnect the negative (black) battery cable(s) before disconnecting the positive (red) cable(s). Always connect the positive (red) battery cable(s) before connecting the negative (black) cable(s).
- Do not overfill the battery.
- Electrolyte may overflow and damage paint, wiring or structure. When cleaning the battery, use soap and water. Be careful not to get soap and water into the battery. Clean the battery terminals with a solution of four parts water and one part baking soda when they become corroded.

⚠ Shorts caused by battery terminals or metal tools touching metal components can cause sparks.

Sparks can cause a battery gas explosion which will result in personal injury.

- Prevent the battery terminals from touching any metal parts when removing or installing the battery.
- Do not allow metal tools to short between the battery terminals and metal parts.

⚠ Incorrect battery cable routing could cause damage to the unit and battery cables. This can cause sparks which can cause a battery gas explosion which will result in personal injury.

- Always disconnect the negative (black) battery cable(s) before disconnecting the positive (red) cable(s).
- Always connect the positive (red) battery cable(s) before connecting the negative (black) cable(s).

Fuel Handling Precautions

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

- A fire or explosion from gasoline can burn you and others and can damage property.

⚠ Observe the usual gasoline handling precautions:

- Do not smoke while refueling. Extinguish all cigarettes, cigars, pipes and other sources of ignition.
- Do not remove fuel cap or fill tank with engine running or while engine is hot. Clean up any gasoline spills.
- If gasoline is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until gasoline vapors have dissipated.
- Keep gasoline away from open flame or spark and store machine away from open flame or spark or pilot light such as on a water heater or appliances.
- Refuel outdoors. Never refuel or drain the gasoline from the machine indoors, or while in an enclosed trailer or other enclosed area.
- Never attempt to start the engine when there is a strong odor of gasoline fumes present. Locate and correct the cause.
- Store gasoline in an approved container and keep it out of the reach of children. Never buy more than a 30-day supply of gasoline.
- Do not fill fuel containers inside a vehicle or on a truck or trailer bed with interior carpets or plastic truck bed liners. Always place gasoline containers on the ground away from your vehicle before filling.
- When practical, remove the machine from the truck or trailer and refuel the machine with its wheels on the ground. If this is not possible, then refuel such machine on the truck or trailer using a portable container and not a fuel dispenser nozzle. If a fuel dispenser nozzle must be used, keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete. Do not use a nozzle lock-open device.
- Never use gasoline for cleaning parts.
- Read and observe safety precautions elsewhere in this manual.

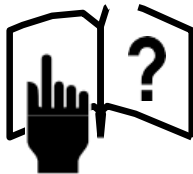
⚠ Gasoline is harmful or fatal if swallowed.

⚠ Avoid prolonged breathing of vapors.

- Long-term exposure to vapors can cause serious injury and illness.
- ▲ Keep gasoline away from eyes and skin.
- Keep face away from nozzle and fuel tank or fuel container opening.
- If gasoline is spilled on clothing, change clothing immediately.

Safety and Instructions Decals

The decals are designed to give the operator and mechanic brief daily operational and service information. Use these decals as an extension of this manual. Do not remove or obliterate the decals. Replace unreadable or missing decals. It is the owner's responsibility to make certain that the operators and mechanics read and understand



all decals before operating this machine.

WARNING

Specific safety warning decals are located on the equipment near the immediate areas of potential hazards. Do not remove or obliterate these decals. Replace them if they become non-readable.

The following illustrations show the safety decals that are located on the unit. A brief explanation is shown to help the operator understand the decal's meaning.

- Read Operator's Manual and Safety Warning Decals before attempting to operate this machine.

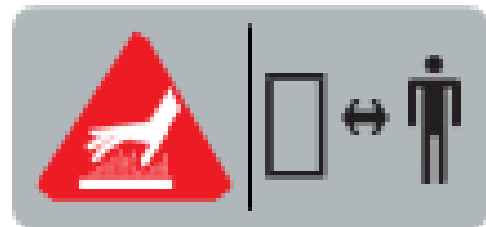


- Do not smoke while refueling.
- Do not remove the fuel tank cap or fill tank with engine running or while the engine is hot.
- Allow the engine, to cool in a well-ventilated area before storing inside a building or other enclosure.

- Store away from open flame or spark if there is fuel in tank.
- Clean up any gasoline spills.
- Do not refuel while in enclosed trailer or other enclosed areas.
- Maximum of 10% ethanol (E10) in fuel. Fuels with greater than 10% ethanol, (such as E15, E20 and E85) voids warranty. Fuels with greater than 10% ethanol are not approved for use and such use could cause equipment failure and pose a fire hazard.

Part Number 602041

WARNING: Hot surface!



- Keep a safe distance from the machine.

Part Number 779280

WARNING: Hot surface!



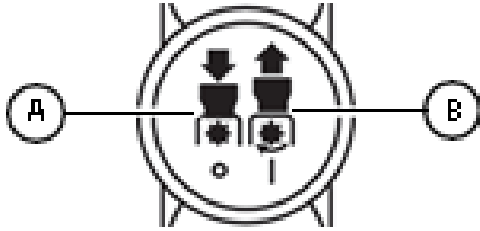
- Avoid skin contact with hot surface

Part Number 600899



- If you lose steering control while operating the machine, place the steering control levers in the park brake position immediately. Inspect the machine and involve your dealer to resolve the problem before continuing to operate.
- If pump belt fails, steering control will be lost. Refer to owner's manual for inspection and replacement intervals and refer to above paragraph for emergency procedures.

Top of Brush Clutch Switch



- A. Brush clutch disengaged (OFF) position
- B. Brush clutch engaged (ON) position

Part Number 601815



- Avoid skin contact with battery acid.
- Do not overfill battery.
- Electrolyte may overflow and damage paint, wiring or structure. When cleaning the battery, use soap and water. Be careful not to get soap and water into the battery. Use soda mixed in water to clean corrosion off the terminals.
- Always wear eye protection when checking the battery, acid can cause serious injury to skin and eyes. If contact occurs, flush area with clean water and call physician immediately. Acid will also damage clothing.
- Do not allow open flame near the battery when charging.
- Hydrogen gas forms inside the battery. This gas is both toxic and flammable and may cause an explosion if exposed to flame. Always remove the negative ground first and replace it last.

Part Number 601967

WARNING: Fire!



- Clean flammable material from machine. Prevent fires by keeping engine compartment, top of deck, exhaust area, battery, fuel line, fuel tank and operator's station clean of accumulated debris. Always clean up spilled fuel and oil.

Part Number 601635



WARNING: Read Operator's Manual and decals before attempting to operate this machine.

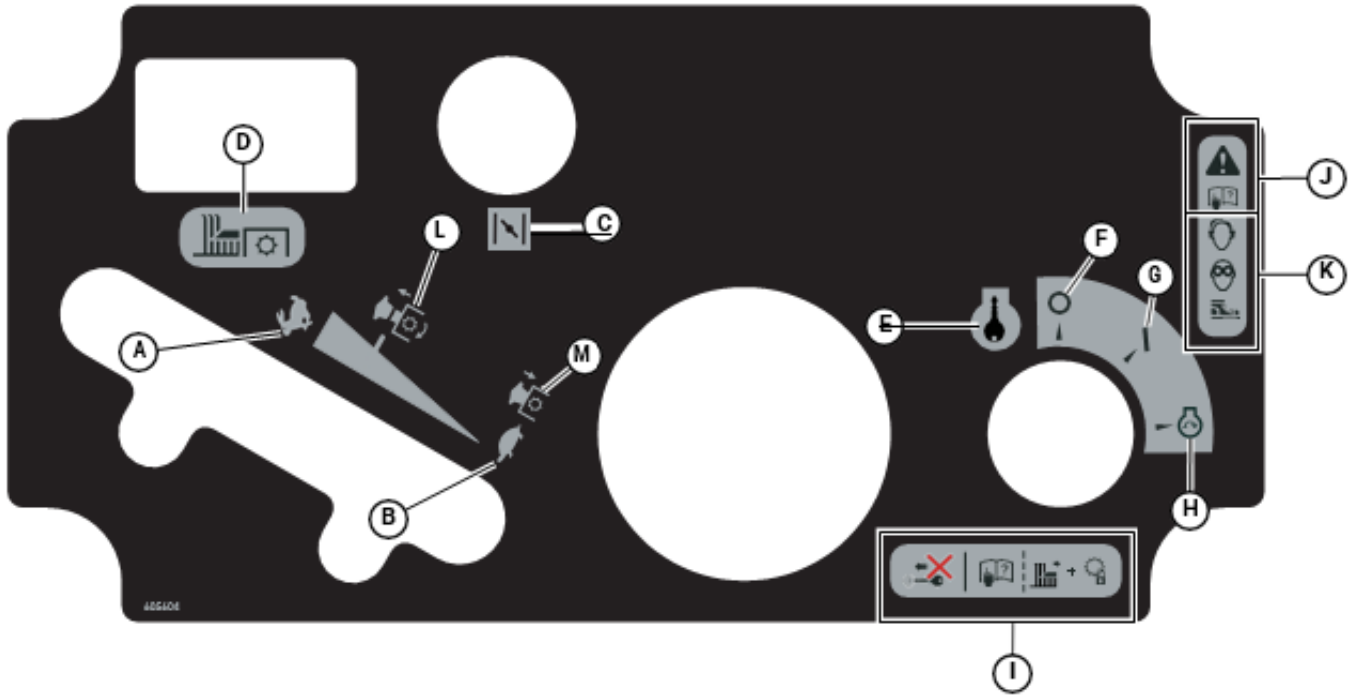
WARNING: This structure's protective capability may be impaired by structural damage, overturn, or alteration. If any of these conditions occur, this structure must be replaced.

WARNING: Roll over!

- Avoid crushing, use seat belt.
- Do not jump if machine tips.
- To minimize chance of injury or death from rollover; keep ROPS in the raised and locked position and use the seat belt.
- Do not remove ROPS.
- Never operate machine on a slope with the ROPS folded down (lowered position).
- There is no roll over protection when the ROPS is in the lowered position.
- Lower the ROPS only when absolutely necessary. Drive slowly and carefully. Raise the ROPS as soon as clearance permits.
- Read and follow slopes operation instructions and warnings.
- Do not wear seat belt when the ROPS is in the lowered position.

WARNING: Ejection!

- Do not attach chains or ropes to the ROPS for pulling purposes, as the machine can tip backwards.



- A. Fast
- B. Slow
- C. Choke
- D. Brush engage/disengage switch
- E. Ignition switch - insert key
- F. OFF
- G. ON
- H. Engine start position
- I. Before starting the engine:
 - Read Operator's Manual
 - Place steering control levers in park brake position

- J. Read Operator's Manual before attempting to operate this machine.
- K. Wear ear protection, eye protection and safety shoes when operating this equipment.
- L. For maximum electric clutch life engage at 1/2–3/4 throttle position.
- M. For maximum electric clutch life disengage at low throttle position.

Slope Guide

Slope Guide
Use this diagram when determining the degree of slope to be mowed.

Slope Guide Lines

Line A

Line B

E (15°)

D (10°)

C (5°)

1. Hold this sheet of paper in front of you. Make sure that Line A is horizontal.
2. Align Line B with a vertical surface such as pole, tree or building.
3. Fold the paper along the slope guide lines (C, D or E).
4. Align the closest slope guide line with the ground slope. This will give you a close estimation of the ground slope to be mowed.

Operation

Safe Operation Practices

Refer to the Safety Precautions section of this manual for operational and personal safety information.

Control Panel

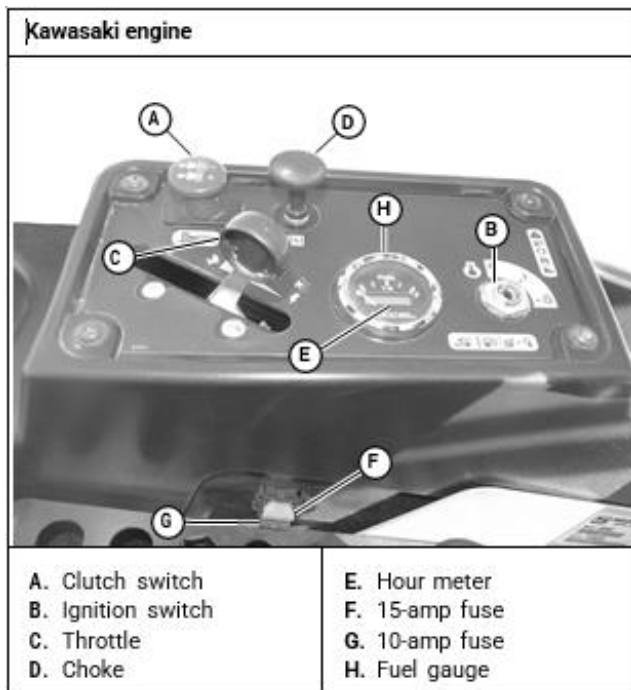


Figure 1

- A. Clutch switch [Figure 1] this switch engages the deck. Pull the switch up to engage and push the switch down to disengage the clutch.
- B. Ignition [Figure 1] — a three position switch: “OFF”, “RUN”, and “START”. With the key inserted, rotate it clockwise to the “START” position; release the key when the engine starts, and the switch will automatically return to the “RUN” position.
- C. Throttle [Figure 1] — a cable is linked to the engine throttle for controlling engine speed. Move the lever forward to increase engine rpm, move the lever rearward to decrease engine rpm.
- D. Choke control [Figure 1] — a cable is linked to manually operate the engine choke. When the lever is in the down position, the choke is in the “OFF” (run) position. When the knob is pulled up, the choke is in the “ON” (start) position. Do

not operate the machine in the “ON” (start) position.

- E. Electronic hour meter [Figure 1] — registers 1/10 hour increments up to 9,999.9 total hours. It is connected to the ignition switch. It records the accumulative time while the ignition key is switched to the “RUN” position.
- F. 15-amp fuse [Figure 1] — 15-amp, blade-type.
- G. 10-amp [Figure 1] — 10-amp, blade-type.
- H. Fuel tank gauge [Figure 1] — This gauge shows the fuel level in the fuel tank.

Controls



The parking brake may not hold the unit if parked on a slope. Block or chock the machine when parked on a slope.

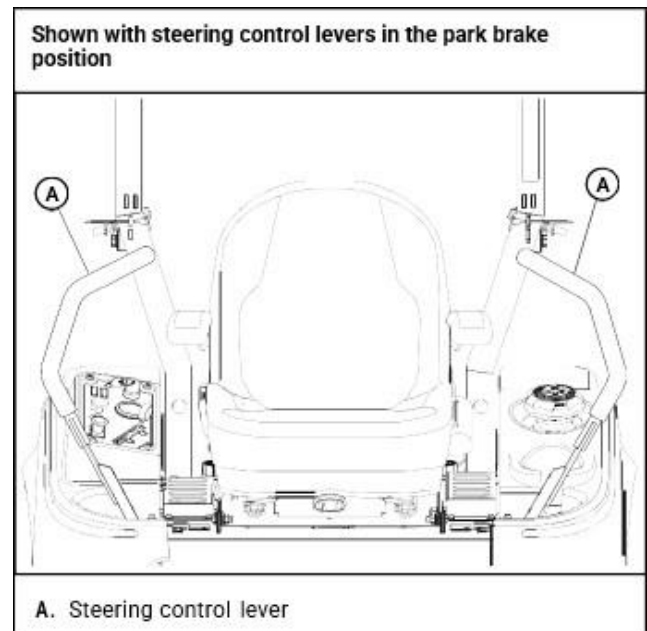


Figure 2

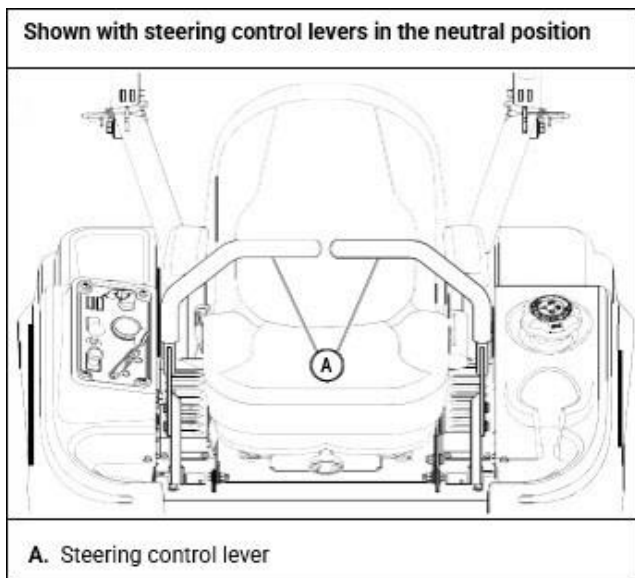


Figure 3

- A. Steering control levers [Figure 2 & Figure 3] - these levers control the mower's speed, direction, stopping, and park brake.

Safety Start Interlock System

The safety start interlock system consists of the park brake switches, seat switch, and clutch switch.

IMPORTANT: Repair this important safety feature immediately if it malfunctions.

Check the safety start interlock system daily, prior to operation.

To inspect the system:

1. Sit on the seat when testing the seat switch.
2. Set both steering control levers in the park brake position.
3. Start the engine and allow it to warm up to operating temperature.
4. With the clutch switch down and the steering control levers in the park brake position, slowly rise off of the seat. The engine should continue to run.
5. With the clutch switch up and/or the steering control levers in the neutral position, slowly rise off of the seat. The engine should stop.
6. If the engine fails to stop when:
 - the clutch switch is up, or
 - one or both of the steering control levers is in the up (out of neutral position), and
 - the operator is off the seat, then

- check the function of the seat switch. Replace the seat switch if it is not operating properly (is not opening or closing) and if the cause cannot be determined. [Figure 4]

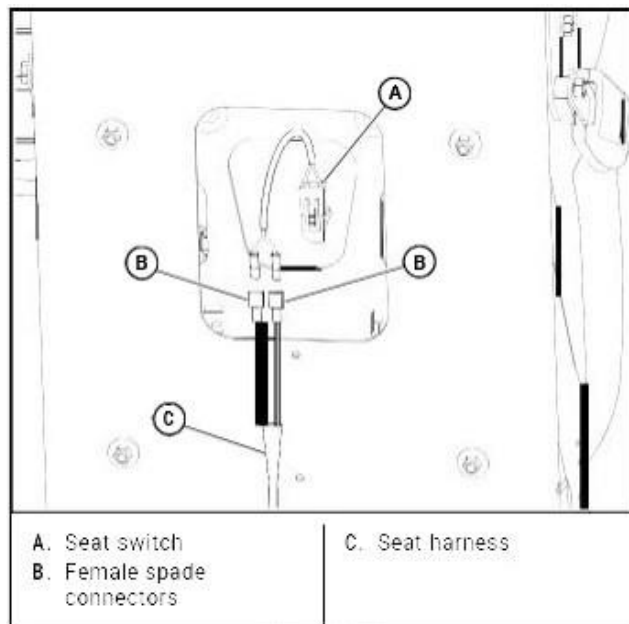


Figure 4



The safety interlock system should always function per steps 4 and 5. If it does not function properly, correct it immediately. Do not operate machine without a properly functioning seat safety switch.

Engine Starting

The safety start interlock system is also designed to protect the operator and others from accidental injury due to unintentional engine starting. The engine starting motor will not engage until:

1. Steering control levers are in the park brake position.
2. Clutch switch is in the down (OFF) position



The safety interlock system should always function per steps 4 and 5. If it does not function properly, correct it immediately. Do not operate machine without a properly functioning seat safety switch.

Start the engine by following these steps.

1. Make sure the steering control levers are in the park brake position and the clutch switch is disengaged. Start the engine from the operator's position only.
2. Use the choke when the engine is cold, or if a warm engine fails to start within 5 seconds of cranking. Avoid flooding by operating the engine without choking as soon as possible.
3. Set the throttle at approximately the 1/2 open position.
4. Insert the key in the ignition switch and rotate it clockwise to engage the starting motor. Release the key when the engine starts.

IMPORTANT: The engine starter should not be operated for periods longer than 30 seconds at a time. At least two minutes between such cranking periods to protect the starter from overheating and burning-out.

5. Perform the test shown in the Safety Start Interlock System section to make sure the safety start interlock system operates properly.
6. Allow the engine to idle two minutes before advancing the throttle and/or engaging the deck clutch.

Stopping the Engine

Use the following procedure to shut the engine off.

1. Place the steering control levers in the park brake position.
2. Throttle the engine back to low idle, then disengage the clutch.
3. Let the engine run at low idle for two minutes.
4. Rotate the ignition key counter-clockwise to the "OFF" position. Remove the key from the switch.

Moving with Stalled Engine

The bypass valves on the transaxles allow the unit to be moved if the engine quits working.



Allow the engine exhaust manifold to cool before engaging or disengaging the bypass valves. The bypass valve rods are located close to the exhaust system.

Before moving the unit, pull out on the bypass valve rod [Figure 5] until the notch in the rod hooks over the edge of the slot; this will lock the bypass valves in the disengaged position.

Place the steering control levers in the neutral position, to release the park brakes, so that the unit can be moved.

Do not tow the machine. Move it by hand or use a winch to load onto a trailer for transporting.

Secure the unit, facing forward, when transporting on another vehicle. Tie the unit down securely using straps, chains, cables, or ropes. Both front and rear straps should be directed down and outward from the machine.

IMPORTANT: Always make certain the two bypass valves are returned to their operating position before running the unit following repairs.

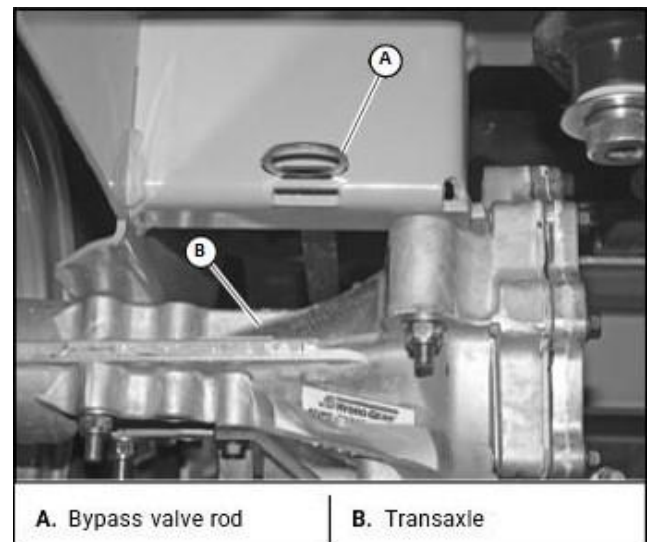


Figure 5

ROPS (Roll Over Protective Structure)

A ROPS may minimize the chance of injury or death from rollover.

A ROPS, when used with a seat belt, is effective in reducing injuries during unit overturn accidents. Overturning the unit without a ROPS or without the ROPS locked in the raised position [Figure 6] can result in serious injury or death.

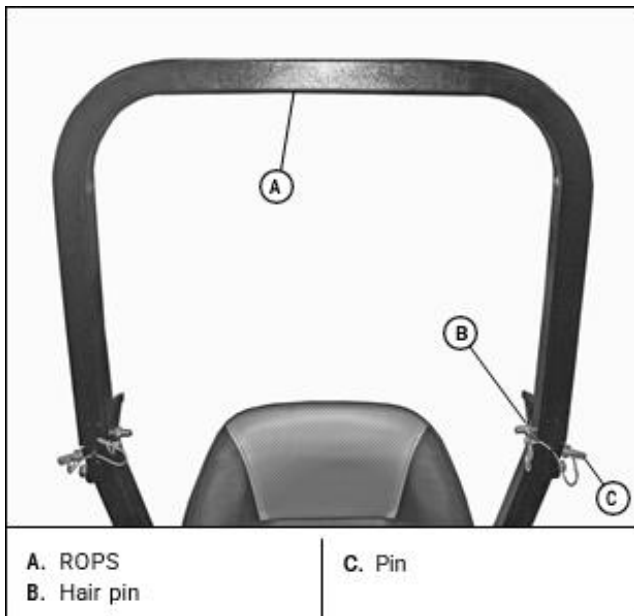


Figure 6

Pivot the two-post ROPS down by removing the right and left hair pins [Figure 6], and pulling out on the spring-loaded pins to allow the machine to operate under low hanging tree limbs or other obstructions.

NOTE: When the ROPS is locked in the raised position make sure the hair pins are inserted into the holes in the end of the spring-loaded pins.

Do not wear the seat belt when the ROPS is in the lowered position. Use the ROPS in the “folded” position only when absolutely necessary.

WARNING Do not operate the mower with the ROPS folded down (lowered position) as a standard operating mode. A folded down ROPS does not provide rollover protection.

WARNING Always wear your seat belt unless the ROPS is folded down. In this case, the seat belt should never be worn.

To minimize chance of injury or death from rollover:

WARNING

- Keep ROPS in the raised and locked position and use the seat belt.
- Never operate the machine on a slope with the ROPS folded down (lowered position).
- There is no roll over protection when the ROPS is in the lowered position.
- Lower the ROPS only when absolutely necessary. Drive slowly and carefully. Raise the ROPS as soon as possible permits. Read and follow slope operation instructions and warnings.
- Do not wear seat belt when the ROPS is in the lowered position or if it is not equipped with one..

WARNING

Do not attach chains or ropes to the ROPS for pulling purposes, as the machine can tip backwards.

Always fasten the seat belt during operation.

Inspect the area for proper overhead clearance (tree limbs, guy wires, doorways, etc.).

Do not contact any overhead object with the ROPS.

Seat Belt Maintenance

Inspect the seat belt system (all seat, seat belt parts, and seat platform) daily for signs of any damage. Replace any parts with signs of:

- cuts,
- fraying,
- extreme or unusual wear,
- significant discoloration due to UV exposure,
- dirt or stiffness,
- abrasion to the seat belt webbing,
- damage to the buckle, latch plate or hardware,
- any other problem.

Use soap and water to clean the seat belt. Do not use carbon tetrachloride, naphtha, or other chemical cleaning agents, as these will weaken the webbing. For the same reason, do not bleach or dye

the webbing. Replace the seat belt if worn or damaged.

Possible Damage to ROPS

If the unit has rolled over or the ROPS has been in some other type of accident (such as hitting an overhead object during transport), replace the ROPS to retain the best protection.

Following an accident, check the ROPS, the operator's seat, the seat belt, seat belt mountings and seat platform for possible damage. Before operating the machine, replace all damaged parts.

IMPORTANT: Do not attempt to weld or straighten the ROPS



The ROPS structure's protective capability may be impaired by structural damage, overturn or alteration. Do not remove or alter any of the ROPS parts. Do not attempt to weld or straighten ROPS. Failure to adhere to these instructions could result in severe injury or death. If the ROPS is replaced, make sure to use the proper hardware and apply the recommended torque values to the attaching bolts.

ROPS Inspection

Inspect the ROPS after the first 20 hours of operation. Following the initial inspection, check the ROPS after every 500 hours of operation or every six months, whichever comes first.

1. Check the torque of the ROPS mounting bolts. Tighten the bolts to the correct torques as shown below if necessary. [Figure 7]
2. Inspect the operator's seat and the mounting parts for the seat belt. Tighten the bolts to the correct torque as shown below if necessary and replace parts that show wear or damage.
3. Check the seat platform to make sure it is secured properly. Adjust or repair it as necessary.



Never operate with the seat platform improperly secured. The seat platform must be properly secured to prevent the seat from moving/tilting in the event of tipping or rollover.

Torque values:

	ft-lbs	N•m
ROPS mounting bolts	73	99
Seat belt mounting hardware	48	65

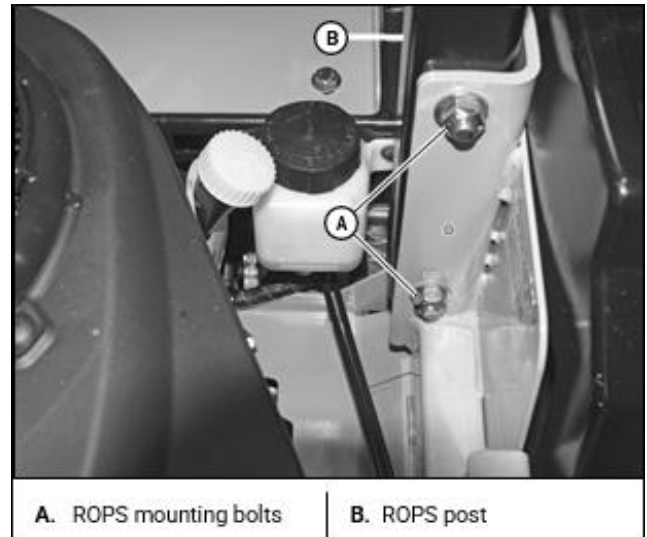


Figure 7

Driving the Unit

The following provides you with detailed information on how to operate the unit.



Never make sudden stops or reverse direction, especially when maneuvering on a slope. The steering is designed for sensitive response. Rapid movement of the control levers in either direction could result in a reaction of the unit that can cause serious injury.

After starting the engine, engage the steering control levers and steer as follows:

To go forward - push the steering control levers forward an equal distance. [Figure 8]

To go in reverse - pull the steering control levers rearward an equal distance. [Figure 8]

To turn left - move the right steering control lever farther forward from neutral than the left steering control lever. [Figure 8]

To turn right - move the left steering control lever farther forward from neutral than the right steering control lever. [Figure 8]

Zero radius turn - move one steering control lever forward and the other steering control lever back of neutral. This allows the drive wheels to counter-rotate. [Figure 8]

To stop or decrease speed - move steering control levers to neutral. When going forward pull back gently on steering control levers. When going in reverse push forward gently on steering control levers.

For emergency stops - when traveling forward or rearward, place the steering control levers in the park brake position immediately.



When moving in the rearward direction push forward gently on steering control levers and avoid sudden movement. Any sudden movement could cause the front of the unit to come off of the ground resulting in possible loss of control, causing serious injury or death.



Always be aware of what is behind the machine before backing up. Always look down and behind before and while backing up.

IMPORTANT: Damage to the hydraulic system components may occur with rapid movement of the steering controls.

To increase speed - increase the steering control lever's distance from neutral. The farther forward the steering control levers are from neutral, the faster the unit will travel forward. The farther back the steering control levers are from neutral, the faster the unit will go in reverse.

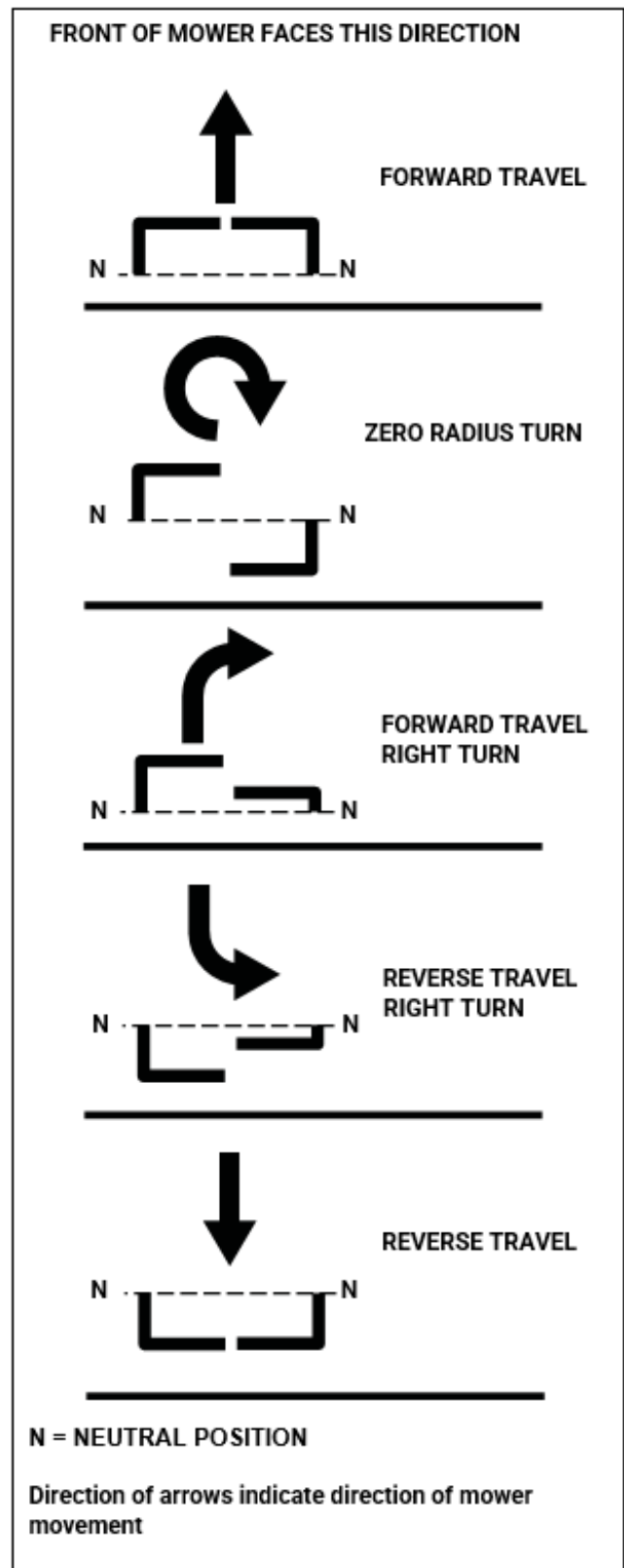


Figure 8

Operating Suggestions



An inexperienced operator should not operate on slopes or on uneven terrain. Before attempting normal speed operation an inexperienced operator should:

- be thoroughly familiar with the proper use and operation of the equipment.
- read the manual completely and thoroughly.
- have attempted slow moving maneuvers.



If you lose steering control while operating the machine, place the steering control levers in the park brake position immediately. Inspect the machine and resolve the problem before continuing to operate.



The unit's steering control levers are very responsive. For smooth operation, move the levers slowly, avoid sudden movement. Skill and ease of operation come with practice and experience. Use caution when making turns and slow down before making turns.

In experienced operators may have a tendency to oversteer and lose control. Practice slow maneuvers

at low engine rpm (idle) on a flat open area before attempting normal speed operation.



Sharp depressions or raised obstacles (such as gutters or curbs) should not be directly approached at high speed in an attempt to "jump" them as the operator could be thrown from the equipment. Approach at a slow speed and angle one drive wheel at the obstruction. Continue at an angle until the wheel clears and then pivot the opposite wheel around.

When turning on soft wet turf, keep both wheels rolling, either forward or backward. Pivoting on one stopped wheel can damage turf. Set the throttle at full rpm for maximum performance. This gives maximum power to the drive wheels. Use the control levers to control ground speed rather than engine rpm.

MAINTENANCE & ADJUSTMENTS

Safe Servicing Practices

Refer to the Safety Precautions section of this manual for more service safety information.

Service Introduction

Regular maintenance is the best prevention for costly downtime or expensive, premature repair. The following pages contain suggested maintenance information and schedules which the operator should follow on a routine basis. For more detailed information order the correct Parts Manual and General Service Manual for your unit. Refer to the Product Literature section of this manual for more information.

Remain alert for unusual noises, which could signal a problem. Visually inspect the machine for any abnormal wear or damage. A good time to detect potential problems is while performing scheduled maintenance service. Correcting the problem as quickly as possible is the best insurance.

Clear away heavy build-up of grease, oil and dirt, especially in the engine and hydraulic component areas; minute dust particles are abrasive to close-tolerance engine and hydraulic assemblies.

Inspect the underside daily for debris. This build-up will harden, restricting component movement which will probably result in a poorer quality paint removal. Therefore, it should be removed routinely. To do this it will be necessary to raise and block the unit using jack stands or blocks. Scrape the build-up off from underneath.

IMPORTANT: Seat arm rests – Place the steering control levers in the park brake position and pivot the arm rests upward before lifting the seat platform to prevent arm rest damage.

Some repairs require the assistance of a trained service mechanic and should not be attempted by unskilled personnel.

Lubrication

Use SAE multi-purpose grease

Torque Values



Particular attention must be given to tightening the drive wheel lug nuts. Failure to correctly torque these items may result in the loss of a wheel, which can cause serious damage or personal injury.

	ft-lbs	N•m
Wheel (lug) nuts	70	95

Lug nuts only - It is recommended that these be checked after the first 2 hours of operation, initially, every 40 hours and following removal for repair or replacement.

For all other torques refer to the General Service Manual for standard torque chart.

For engine torque values, refer to the engine owner's manual.

Tires

It is important that the tires have the same amount of air pressure. The recommended pressures are:

Drive wheels	29–32 psi (200–221 KPa)
Front wheels	25–28 psi (172–193 KPa)

If you wish to use non-pneumatic tires, the tire must be an approved tire. Warranty claims will be denied on any equipment with unapproved non-pneumatic tires.

Electrical System

IMPORTANT: Refer to the Safety section of this manual for detailed battery servicing safety information.

The electrical system is a 12-volt, negative ground. The recommended battery size is:

Garden tractor BCI group U1R with a 225 or better cranking AMP rating.

A maintenance-free battery is recommended. Otherwise, follow battery manufacturer's maintenance, safety, storing and charging specifications.

Master In-Line Fuse

This unit has a master in-line fuse (30 amp) in the electrical system. This is the main fuse to protect the complete electrical system. It is located to the left of the engine. [Figure 9]



Figure 9

Hydraulic System

NOTE: Refer to the General Service Manual for complete hydraulic oil and filter change procedures.

This mower is equipped with two integrated hydrostatic transmissions.

IMPORTANT: Never use hydraulic or automatic transmission fluid in this system; use only the specified motor oil. Remember, dirt is the primary enemy of any hydraulic system.

Each transaxle has its own hydraulic expansion tank. The tanks are located in front of the engine and behind the operator's platform. [Figure 10]



Figure 10

Check the oil level in the hydraulic system after every 50 hours of operation or weekly, whichever occurs first. Check more often if the system appears to be leaking or otherwise malfunctioning.

Use SAE 20W50 motor oil, 15W50 synthetic oil or 20W50 synthetic oil when changing the system oil and filter. For maximum transmission life use Full Synthetic 20W50 Hydrostatic Transmission Oil. When the hydraulic system oil is cold, the fluid level should be at the "Full Cold" line on the expansion tank.

Initial system oil and filter change must be done after the first 75 hours of use or 1 year whichever comes first. Thereafter, replace filter and oil in each transmission every 2 years or 200 hours, whichever comes first.

NOTE: The filter guard must be removed to access the filter. [Figure 11]

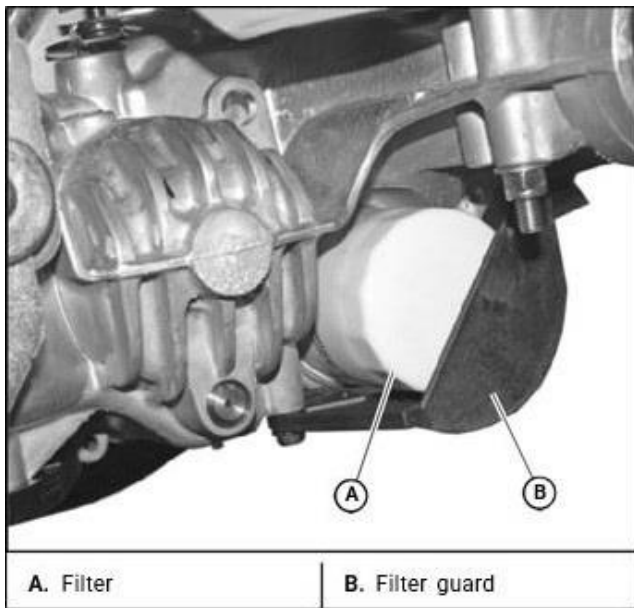


Figure 11

Fuel and Evaporative Emissions Control System

IMPORTANT: Refer to the Safety section of this manual for fuel handling safety information.

IMPORTANT: Refer to the engine owner's manual for additional emissions control information.

The fuel and evaporative emissions control is EPA compliant.

Your evaporative emission control system may include parts such as:

- fuel tanks
- fuel lines
- fuel line fittings
- fuel caps
- carbon canisters
- canister mounting brackets
- carburetor purge port connection
- filters
- vapor hoses
- clamps, control valves
- control solenoids
- electronic controls
- vacuum control diaphragms
- purge valves
- liquid/vapor separator
- other associated components

Modifying or Tampering with the evaporative emissions control system or the fuel system is

prohibited. Federal law and California State law prohibit the following acts or the causing thereof:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair, replacement, of any device or element of design incorporated into any equipment for the purposes of emissions control prior to or after its sales or delivery to the ultimate purchaser or while it is in use, or
2. The use of the equipment after such device or element of design has been removed or rendered inoperative by any person



Use of replacement parts not equivalent to the original parts may result in system failure and pose a safety hazard.

The fuel tank is located under the seat platform with the filler neck and fuel cap located in the left side fender. [Figure 12]

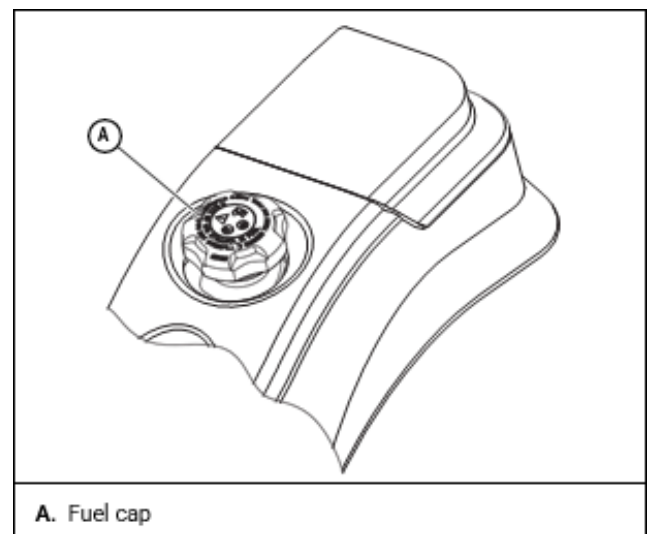


Figure 12

Park on level ground before filling fuel tank.

Clean the area around the fuel cap before removing the cap. Remove the fuel cap slowly.

IMPORTANT: Do not overfill the fuel tank. The fuel tank should be filled **no higher than the bottom of the fill neck**. The fuel system is

designed to leave room for the fuel to expand with fuel temperature changes. [Figure 13]



Overfilling the fuel tank may cause the following:

- Engine damage
- Fire hazard!

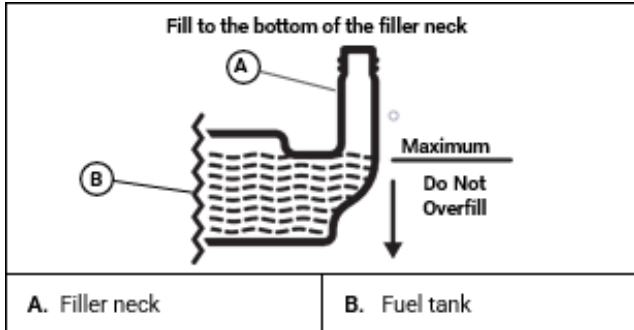


Figure 13

Use regular unleaded gasoline with an octane rating of 87 or higher. Maximum of 10% ethanol (E10) in fuel. Fuels with greater than 10% ethanol (such as E15, E20 and E85) voids warranty. Fuels with greater than 10% ethanol are not approved for use and such illegal use could cause equipment failure and pose a fire hazard.

Refer to the Engine Owner's Manual for additional fuel specification requirements.

Fuel Shut-off Valve

This unit is equipped with a fuel shut-off valve, located behind the seat platform. When closed the fuel valve prevents fuel flow to the engine. [Figure 14]

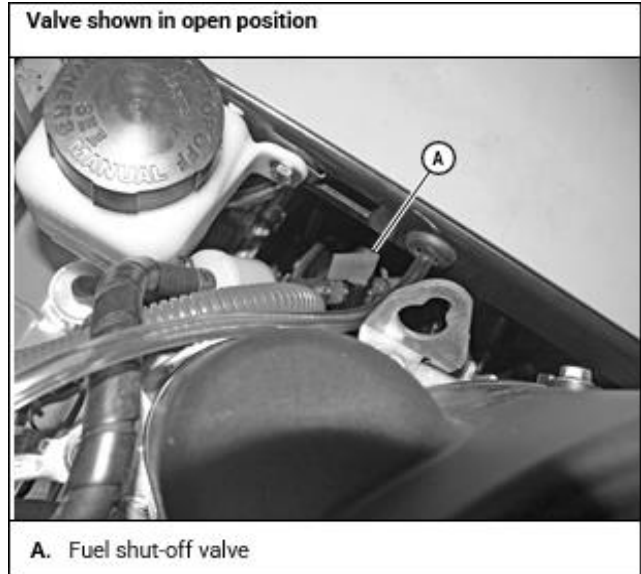


Figure 14

Fuel Evaporation System Filter

This unit has a fuel evaporation system filter. This filter must be checked and replaced every 300 hours or annually whichever comes first. [Figure 15]

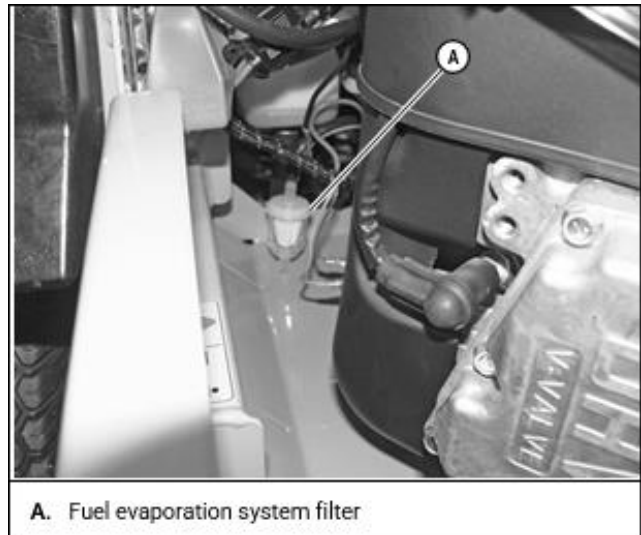


Figure 15

Engine Oil and Filter



Allow the engine to cool before changing the engine oil. If the engine has been running, use caution when changing the engine oil as it will be very hot. You should wear the appropriate protective gear to avoid being burned or exposed to engine oil.

Check the engine oil daily and after every 4 hours of operation. Unit must be level when checking the oil. Refer to the Engine Owner's Manual and maintenance schedule for oil recommendation and capacities. Change the engine oil and filter after the first 5 hours of operation and per the engine manufacturer's recommendations after that. Change the engine oil more frequently if operating in extremely dirty conditions.

IMPORTANT: After the new oil filter has been installed, clean up any oil which may have spilled onto the engine plate, engine exhaust system, and muffler guard.

Draining the Engine Oil:

1. Locate the oil drain valve on the lower right side of the engine. [Figure 16]
2. Position a suitable oil drain container under the machine below the oil drain valve.
3. Use a 10 mm wrench or socket and open the valve approximately 4 turns in the counterclockwise direction. Allow 10 minutes for engine oil to adequately drain.
4. After oil is drained, close the valve by turning it in the clockwise direction until it is fully closed.
5. Once the valve is closed, clean up any spilled oil.

IMPORTANT: All oil drips or spills must be cleaned off of the engine plate, engine exhaust system, and muffler guard before operating the machine.

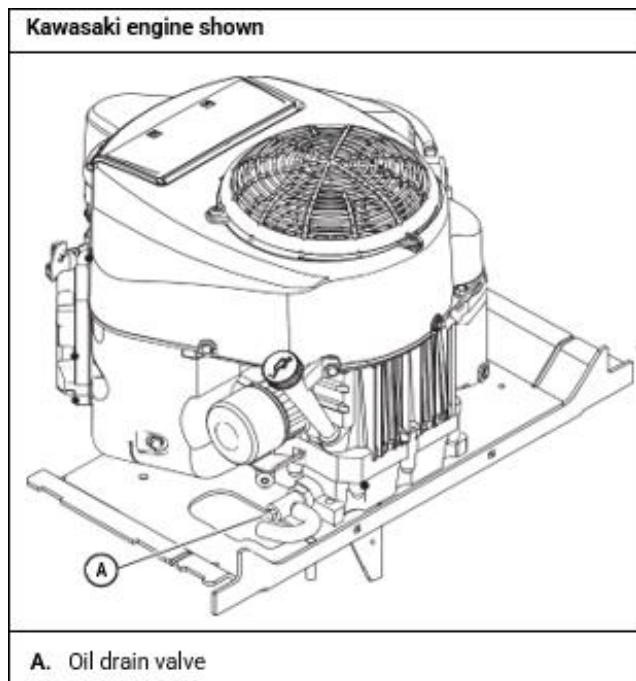


Figure 16

Engine Air Filter

This unit has an integrated air filter. Perform engine air filter maintenance per the Maintenance Schedule shown elsewhere in this manual. [Figure 4-17]

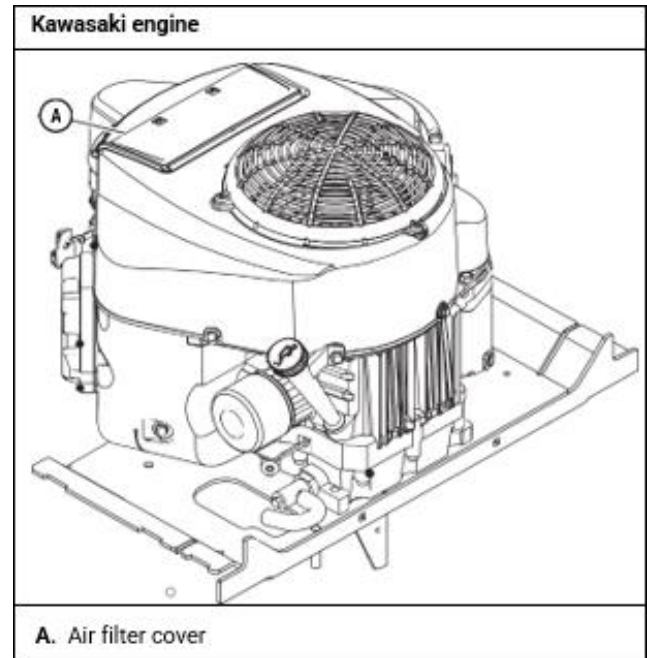


Figure 4-17

Overservicing

Overservicing occurs when an air filter element is removed for cleaning or replacement before it is necessary. Each time the filter is removed a small amount of dirt and dust could fall in the intake system. This accumulated dirt can cause a dusted engine. It only takes a few grams of ingested dirt over the normal service life of an engine to cause a dusted engine.

Do not clean the element, but replace with a new element only. Cleaning used air filter elements, through improper cleaning procedures, can get dust on the inside of the filter causing dirt ingestion and engine failure.

It is important to note that whenever an air filter element is cleaned by any method, the person or company performing the cleaning assumes responsibility for the integrity of the filter from then on. The warranty for air filters expires upon cleaning or servicing in any manner because the

condition of the filter after servicing is completely out of the filter manufacturer's control. Therefore, on a dust ingested engine failure, there will be no warranty consideration if the air filter element has been cleaned or serviced in any manner.

A partially dirty air filter element works better than a new element. Therefore, a dirty filter element is not bad for the engine unless it is excessively restricting the air flow and engine performance is affected. The reason is simple. The media in the filter must be porous to allow air to pass through it. When dirty air passes through the filter, the dirt plugs some of the holes in the media and actually acts as part of the filter media. When the next round of dirt enters, the first dirt helps filter out even smaller particles making the filter more efficient at stopping dirt from entering the engine. This is referred to as barrier filtration. Of course, at some point the filter media becomes too clogged to allow air to pass. The operating conditions will determine the frequency of air filter element changing.

General Engine Maintenance

Detailed instructions and recommendations for break-in and regular maintenance are specified in the Engine Owner's Manual. Please refer to this manual for engine servicing, lubricating oil levels with quality and viscosity recommendations, bolt torques, etc. The engine warranty is backed by the engine manufacturer. Special attention should be paid to applicable data which will not be duplicated here.

Belts

Inspect belts frequently for wear and serviceability. Replace a belt that shows signs of:

- severe cuts
- tears
- separation
- weather checking
- cracking
- burns caused by slipping

Slight raveling of belt covering does not indicate failure, trim ravelings with a sharp knife.

Inspect the belt pulley grooves and flanges for wear. A new belt, or one in good condition, should

never run against the bottom of the groove. Replace the pulley when this is the case, otherwise, the belt will lose power and slip excessively.

Never pry a belt to get it on a pulley as this will cut or damage the fibers of the belt covering.

Keep oil and grease away from belts, and never use belt dressings. Any of these will destroy the belt composition in a very short time.

Hydraulic Pump Belt Adjustment

The transmission drive belt tension remains constant by means of a tension idler and spring. There is no tension adjustment of this belt. [Figure 18]

IMPORTANT: Inspect the belt every 100 hours and replace as needed. Replace the belt every 200 hours or every two (2) years whichever comes first.

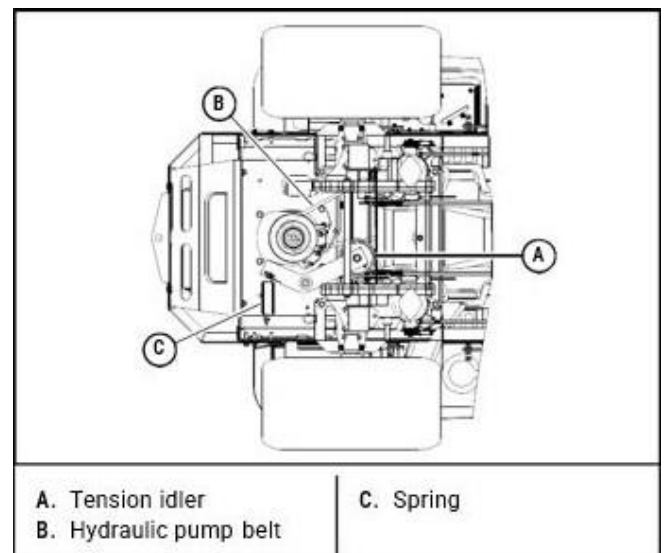


Figure 18

WARNING If the transmission belt fails, loss of control will occur especially when operating on a slope. If you lose steering control while operating the machine, place the steering control levers in the park brake position immediately. Inspect the machine and resolve the problem.

Seat Adjustment

The seat can be adjusted two different ways to obtain the most comfortable position:

1. Use the seat release lever to slide the seat forward and rearward. [Figure 19]
2. Adjust the seat firmness by turning the ride adjustment knob. [Figure 19]

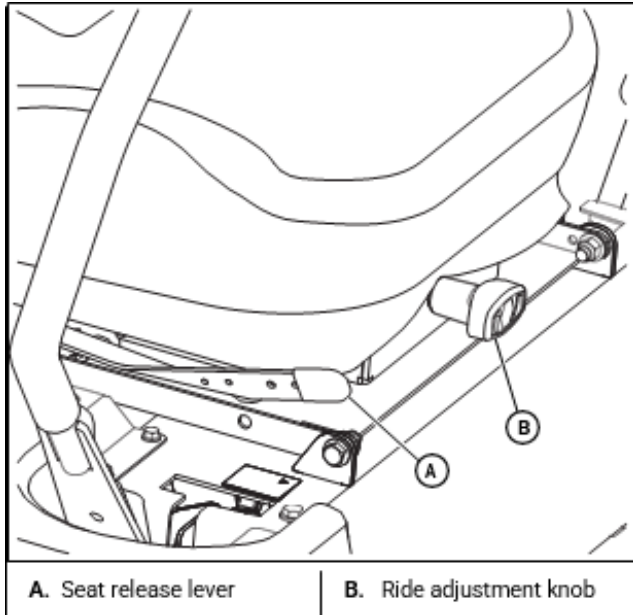


Figure 19

Steering Control Lever Adjustment

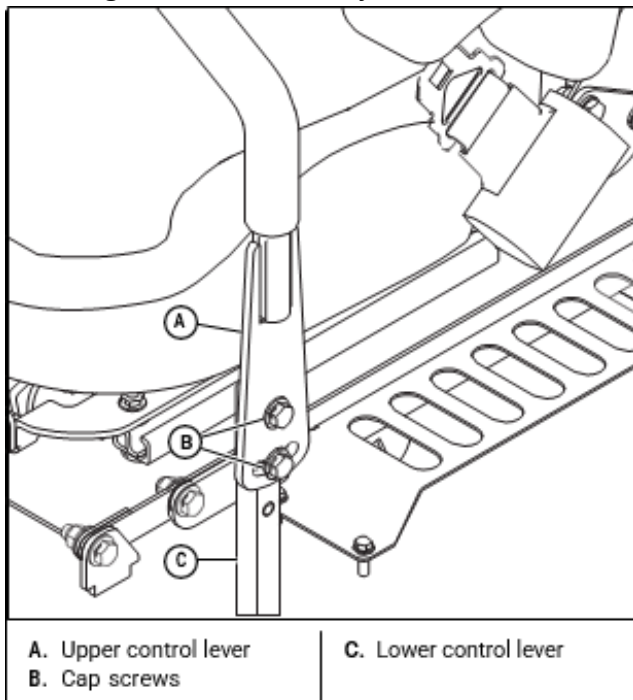


Figure 20

The steering control levers can be adjusted for operator comfort.

- A. To pivot the upper control levers forward or rearward, loosen the cap screws that attach the upper control lever to the lower lever. Then, pivot the upper control lever. Tighten the cap screws. [Figure 20]
- B. To lower and raise the control levers, remove the cap screws. Slide the upper control lever up or down and align the holes in it with the holes in the lower lever. Re-install the cap screws and tighten.

The steering control levers should be adjusted so that they align with each other when in the neutral position.

Engine RPM Settings

The engine RPMs are set for efficiency. Occasionally it may be necessary to check and adjust the settings. The idle speed should be set as follows:

Kawasaki FR691		
ENGINE SPEEDS		
MODEL NO.	LOW IDLE	HIGH IDLE
FR691	1900 ± 100 rpm	3600 ± 50 rpm
Kawasaki FT691V		
ENGINE SPEEDS		
MODEL NO.	LOW IDLE	HIGH IDLE
FT691	1900 ± 100 rpm	3600 ± 50 rpm

NOTE:

Model numbers may or may not end with an extension after the number. There are several different extensions that may be shown; i.e., EX, AU or CE.

Example:

922222 (no extension)
 922222 EX
 922222 CE
 922222 US
 922222 AU

MAINTENANCE

Maintenance Schedule Figure M-1 & Figure M-2			
SERVICE AT INTERVALS INDICATED	WEEKLY OR 50 HOURS	MONTHLY OR 100 HOURS	* ANNUALLY OR 300 HOURS
Verify safety start interlock system		Prior to each use	
Visually inspect unit for loose hardware and/or damaged parts		Prior to each use	
Visually inspect tires		Prior to each use	
Check oil level, engine (1)		Prior to each use or every 4 hours	
Clean air intake screen (8)		Prior to each use or every 4 hours	
Check fuel level		Prior to each use	
Clean engine and transaxle compartment		Daily	
Change transaxle oil and filter (7)		Every 200 hours or 2 years	
Replace engine air cleaner element (4) (10)		As needed	
Grease front wheel bearings	X		
Change engine oil and filter (1) (3)	X		
Clean cylinder and head fins (10)	X		
Check battery connections	X		
Check tire pressure with a gauge	X		
Check hydraulic oil level	X		
Clean engine exterior (10)	X		
Tighten lug nuts on wheels (2)	X		
Clean & regap spark plugs (10)		X	
Check transaxle belt tension and condition (5)		X	
Check fuel system (6)		X	
Check hydraulic lines		X	
Check fuel valve (6)		X	
Check fuel tank grommet (6)		X	
Change fuel filter (6)			X
Replace spark plugs (10)			X
Check ROPS mounting hardware (9)			X
Replace fuel evaporation system filter (8)			X

NOTE:

1. Initial oil change is after 5 hours of operation. Thereafter, change oil after every 40 hours operation. Change more often under dusty or dirty conditions and during hot weather periods.
 2. Torque initially and after first 2 hours of operation.
 3. Change engine oil filter per the engine manufacturer's recommendations. Refer to Engine Owner's Manual for recommendations and other maintenance items.
 4. Service more often under dusty or dirty conditions. Use caution when servicing to prevent dust contamination in the engine. Do not clean filter element. Replace with a new one.
 5. Pump drive belt only - Inspect every 100 hours and replace if worn or cracking is noticed. Otherwise, replace every 200 hours or 2 years whichever comes first.
 6. Check fuel system for any crack or leaks including, but not limit to, fuel line hoses, fuel valve, vent line hoses, vent valve, vapor valve, carbon canister, and grommets. Repair as needed.
 7. Initial system oil and filter change must be after the **first 75 hours of use or 1 year whichever comes first**. Thereafter, replace filter and oil in each transaxle every 2 years or 200 hours, whichever comes first. Full Synthetic 20W50 Hydrostatic Transmission Oil is recommended.
 8. More often under dusty or dirty conditions and during hot weather.
 9. Inspect ROPS after the first 20 hours of operation and then after every 300 hours of operation or yearly whichever comes first.
 10. Refer to engine owner's manual for engine service information.
- * After completing maintenance cycle (300 hours), repeat cycle.

Maintenance Locator Chart

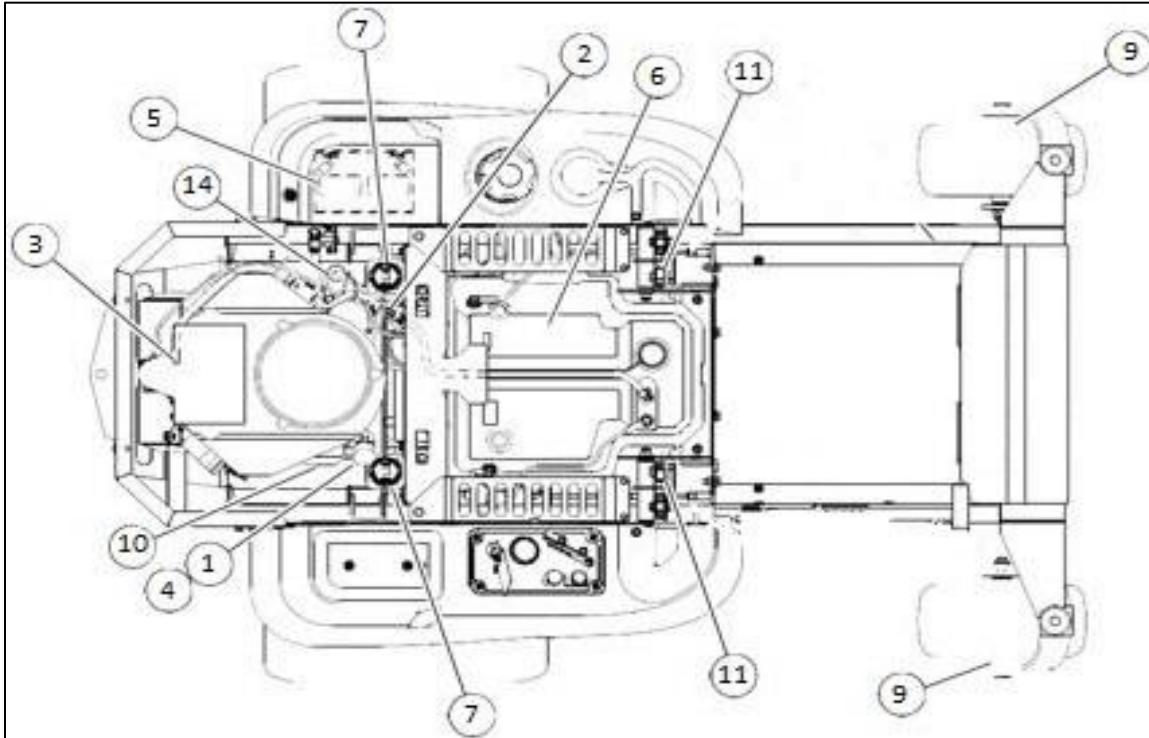


Figure M-1

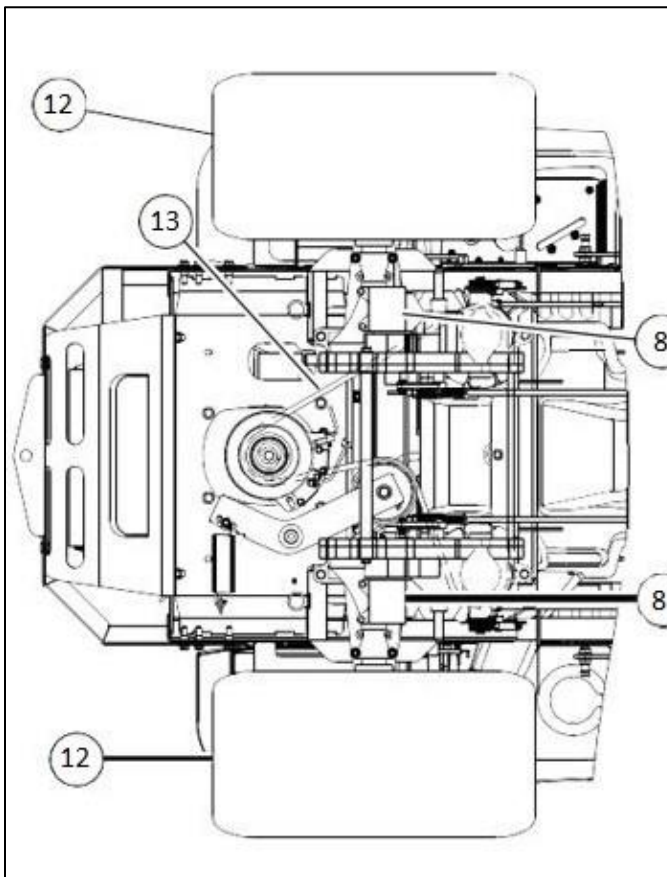


Figure M-2

1. Engine Oil Fill & Dipstick
2. Fuel Filter
3. Engine Air Cleaner
4. Engine Oil Drain Plug
5. Battery
6. Fuel Tank
7. Hydraulic Oil Expansion Tank
8. Hydraulic Oil Filter
9. Front Wheel Bearing Zerks (2)
10. Engine Oil Filter
11. Park Brake Switch
12. Drive Tire
13. Pump Belt
14. Fuel Evaporation System Filter

Maintenance Record

Perform the initial hydraulic system oil and filter change after the first 75 hours of use or yearly whichever comes first.

Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	
Date:	Maintenance/Service Performed	Date:	Maintenance/Service Performed
Hour Meter Reading		Hour Meter Reading	

TROUBLESHOOTING

SYMPTOMS	PROBABLE CAUSES	SUGGESTED REMEDIES
Starting motor does not crank	Steering control levers not in park brake position or switch not adjusted	Place steering control levers in park brake position or re-adjust switch
	Clutch switch engaged	Disengage clutch switch
	Weak or dead battery	Recharge or replace
	Electrical connections are corroded or loose	Check the electrical connections
	Fuse is blown	Check fuses – replace blown fuse
	For additional causes	See engine manual
The engine will not start, starts hard or fails to keep running	No fuel or line plugged	Fill tank or replace line (See Fuel System section for more details)
	Fuel valve is turned off	Open the fuel valve
	There is incorrect fuel in the fuel system	Drain the tank and replace the fuel with the proper type
	There is dirt in the fuel filter	Replace the fuel filter
	Dirt, water or stale fuel in the fuel system	Contact your Dealer
	Numerous	See engine manual
Engine runs with continuous misfiring or engine runs unevenly or erratically	Numerous	See engine manual
Loss of power or system will not operate in either direction	Restrictions in air cleaner	Service air cleaner
	Poor compression	Contact your Dealer
	Steering linkage needs adjustment	Adjust linkage
	Tow valve open	Close tow valve
	The traction drive belt is worn, loose or broken	Install a new traction drive belt
	Air in system	Check filter and fittings
	For additional causes	See engine manual

SYMPTOMS	PROBABLE CAUSES	SUGGESTED REMEDIES
Air cooled engine over-heating	Air intake screen or cooling fins clogged	Clean screen and fin
	For additional causes	See engine manual
Low engine oil pressure	Low oil level	Add oil
	Oil diluted or too light	Change oil and check for source of contamination
	Failed oil pump	Contact your Dealer
High oil consumption	Numerous	Contact your Dealer
Moving jerky when starting or operates in one direction only	Steering control linkage needs adjustment	Adjust linkage
	Loose steering linkage	Tighten linkage
	Transaxle component faulty	Contact your Dealer
Unit creeps when steering control levers are in neutral	Steering linkage needs adjustment	Adjust linkage
Unit circles or veers in one direction	Steering linkage needs adjustment	Adjust linkage
	Loose steering linkage	Tighten linkage
	Tires improperly inflated	Adjust air pressure
	Transaxle component faulty	Contact your Dealer
Unit creeps when parking brake engaged	Steering linkage out of adjustment	Adjust steering linkage
	Brakes need adjustment	Adjust parking brakes
There is abnormal vibration	The engine mounting bolts are loose	Tighten the engine mounting bolts
	The engine pulley, idler pulley is loose	Tighten the appropriate pulley
	The engine pulley is damaged	Contact your Dealer
	Spindle bearing is worn or loose	Replace or tighten spindle bearing
	Tires improperly inflated	Adjust air pressure

TORQUE

Standard Torques

The following chart lists the standard torque values for the threaded fasteners found in this manual. Torque all cap screws, nuts and set screws to these values unless a different torque is shown in the Special Torques section.

Size	ft-lbs	N•m	Size	ft-lbs	N•m
#10	32.4 IN.-LBS.	3.6	M3	12 IN.-LBS.	1.3
.250	98.4 IN.-LBS.	11.1	M4	26.4 IN.-LBS.	3
.312	204 IN.-LBS.	23	M5	54 IN.-LBS.	6.1
.375	30	40	M6	92.4 IN.-LBS.	10.4
.438	48	65	M8	222 IN.-LBS.	25
.500	73	99	M10	37	50
.562	105	143	M12	64	87
.625	145	200	M14	103	140
.750	260	350	M16	160	215
.875	420	565	M20	320	435

Special Torques

Description	ft-lbs	N•m
Wheel (lug) nuts ¹	70	95
Blade spindle bolt top	70	95
Electric clutch mounting bolt ³	47	63
Front wheel axle bolt	100	136
Wheel motor hub nut	230	312
Hydraulic pump pulley screw	14	19
Engine torques ²	N/A	N/A

NOTE:

- Lug nuts only** – It is recommended that these be checked after the first 2 hours of operation and every 50 hours and following removal for repair or replacement.
- Engine torque values** – Refer to the respective engine owner's manual.
- If the clutch mounting bolt is loosened or removed, **do not re-use**. Replace with a new bolt. Use only hand tools to install this fastener.



Particular attention must be given to tightening the drive wheel lug nuts. Failure to correctly torque these nuts may result in the loss of a wheel, which can cause serious damage or personal injury.

Storage

The following items need serviced before storage. If stored for an extended period of time, follow the preparation steps before beginning operation.

General Mower Preparation for Storage

1. Remove all debris.
IMPORTANT: Wash the machine with a mild detergent and water. Do not pressure wash the machine. Avoid excessive use of water, especially near the control panel and engine.
2. Touch up all scrapes with touch-up paint.
3. Install new air filter per Engine Owner's Manual.
4. Check thoroughly for any worn or damaged parts that need replacing and order them from your dealer.
5. Thoroughly lubricate machine, according to the Maintenance section.
6. Block mower up so weight is off tires. Check tire pressure and inflate to proper operating pressure.
NOTE: Do not deflate tires.
7. Perform separate engine and battery preparation as listed below.
8. Store in a clean, dry place.

Preparation of Engine for Storage

If the unit is to be unused for an extended period of time (30 days or more), the engine will need to be prepared for storage. Use the following procedures before storing.

IMPORTANT: Refer to the Fuel Handling Precautions section of this manual for important safety information before proceeding.

1. Add a fuel stabilizer to the fuel system. Refer to the instructions shown on the fuel stabilizer bottle for proper usage.
2. Fill the fuel tank(s) with fresh fuel.
NOTE: Use non-ethanol fuel if possible.



To prevent carbon monoxide poisoning, operate the engine in a well-ventilated area only.

3. Run the engine for a minimum of 10 minutes.



Allow the engine to cool before changing the engine oil. If the engine has been running, use caution when changing the engine oil as it will be very hot. You should wear the appropriate protective gear to avoid being burned or exposed to engine oil.

4. Drain the oil from the crankcase while the engine is still warm.
5. Replace the engine oil filter.
6. Refill with fresh oil of the proper viscosity.
7. Close the fuel shut-off valve.
8. Check the oil filler cap and fuel tank cap(s) to make certain they are securely in place.
9. Refer to the engine manual for more information.

Preparation of Battery for Storage

When the machine is to be unused for long periods, it is best to disconnect the battery and remove it from the unit. At this time perform the following battery maintenance:

1. Remove the battery from machine.
NOTE: Always disconnect the negative (black) battery cable(s) before disconnecting the positive (red) cable(s).
2. Clean the battery, terminals, and cable connectors.
3. Charge the battery, if necessary.
4. Store the battery in a cool, dry place (do not expose to freezing temperatures).
5. Always keep the battery fully charged. Especially important to prevent battery damage when the temperature is below 32°F (0°C).

Starting After Storage

Before starting following storage, this service is required:

1. Remove all debris.
2. Check engine oil and hydraulic oil levels.
3. Install fully charged battery and attach the battery cables.

4. Fill fuel tank(s) with fresh fuel. Run machine at half speed for 5 minutes, checking operation of steering control levers. Stop engine and check for oil leaks, loose fittings, etc.
5. Tighten any bolts that have loosened and make sure all hair pins, cotter pins and clevis pins are in place.
6. Install all safety shields and review safety precautions listed in this manual.
7. Check and inflate tires to correct pressure.
8. Refer to engine manual for more information.



After storage always check that fresh oil has been added to machine. If oil is drained and not replaced, engine damage will result.

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