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KUBOTA Corporation

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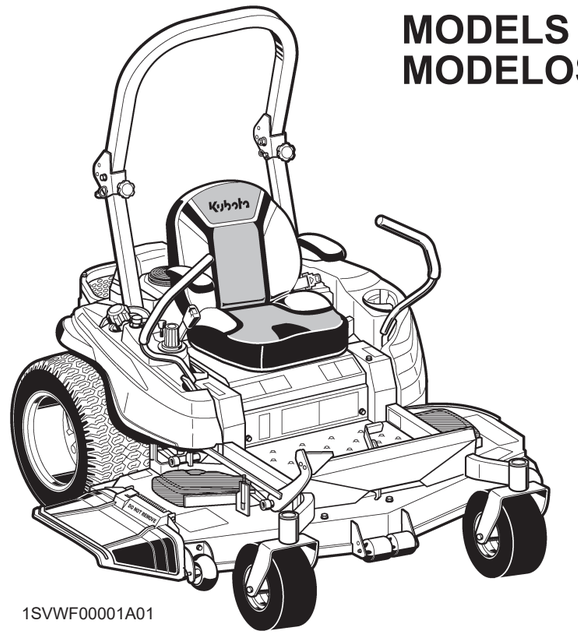
English, Spanish (U.S.A.)
Code No.
Código n° K3071-7123-2

Z412KW · Z422KW · Z422KWT · Z411KW · Z421KW · Z421KWT

OPERATOR'S MANUAL
KUBOTA
ZERO TURN MOWER

MANUAL DEL OPERADOR
KUBOTA
SEGADORA DE GIRO CERO

MODELS **Z412KW**
MODELOS **Z422KW**
Z422KWT
Z411KW
Z421KW
Z421KWT



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READ AND SAVE THIS MANUAL
LEA Y CONSERVE ESTE MANUAL

Kubota

PRINTED IN U.S.A.
IMPRESO EN E.E.U.U.

KUBOTA Corporation is ···

Since its inception in 1890, KUBOTA Corporation has grown to rank as one of the major firms in Japan.

To achieve this status, the company has through the years diversified the range of its products and services to a remarkable extent, until today, 30 plants and 35,000 employees produce over 1,000 different items, large and small.

All these products and all the services which accompany them, however, are unified by one central commitment. KUBOTA makes products which, taken on a national scale, are basic necessities. Products which are indispensable, products intended to help individuals and nations fulfill the potential inherent in their environment. For KUBOTA is the Basic Necessities Giant.

This potential includes water supply, food from the soil and from the sea, industrial development, architecture, construction and transportation.

Thousands of people depend on KUBOTA's know-how, technology, experience and customer service. You too can depend on KUBOTA.

KUBOTA Corporation es ···

Desde su creación en 1890, KUBOTA Corporation ha crecido hasta convertirse en una de las empresas más importantes de Japón.

Para conseguir esta posición, la empresa a lo largo de los años, ha diversificado la gama de sus productos y servicios de forma notable, hasta llegar hoy en día, con 30 fábricas y 35.000 empleados a fabricar por encima de 1.000 elementos distintos grandes y pequeños.

Todos estos productos y todos los servicios que los acompañan, sin embargo están unificados por un compromiso central. KUBOTA fabrica productos que, tomados a escala nacional, cubren necesidades básicas. Productos que son indispensables, productos destinados a ayudar a las personas y a las naciones y a desarrollar el potencial inherente de su entorno. Por eso KUBOTA es el gigante de las necesidades básicas.

Estas aptitudes potenciales incluyen el abastecimiento de aguas, la producción de alimentos en la tierra y en el mar, el desarrollo industrial, la arquitectura, la construcción y el transporte.

Miles de personas confían en el saber hacer de KUBOTA y su tecnología, experiencia y servicio al cliente. Usted también puede confiar en KUBOTA.

OPERATOR'S MANUAL

KUBOTA
ZERO TURN MOWER

MODELS
Z412KW
Z422KW
Z422KWT
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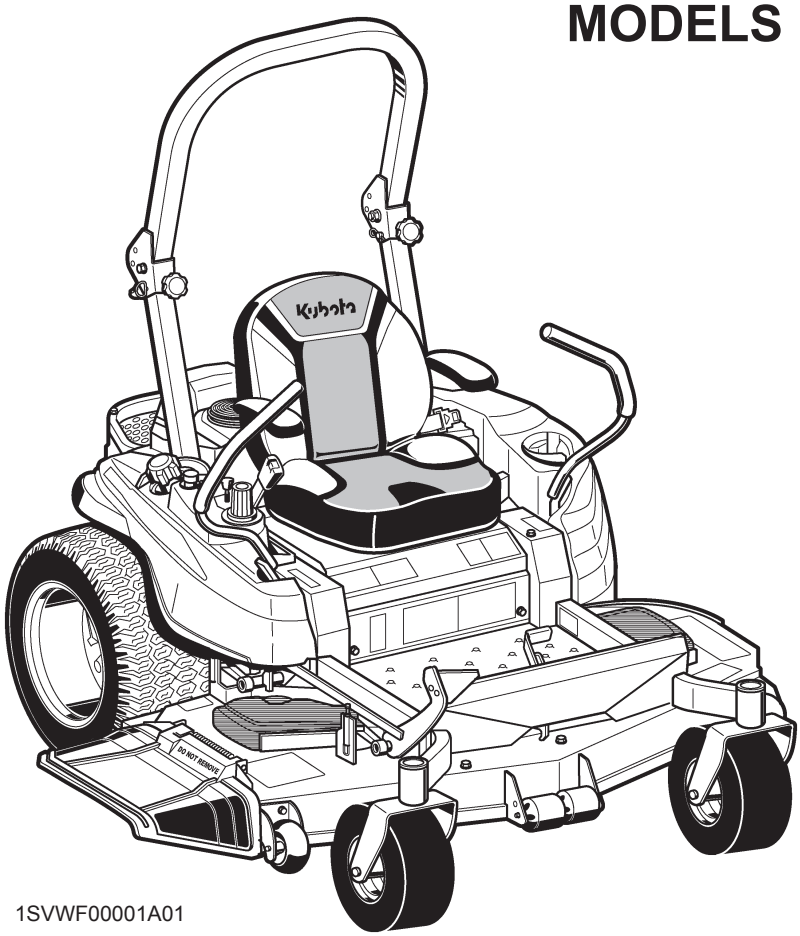
Z421KWT



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ABBREVIATION LIST

Abbreviations	Definitions
API	American Petroleum Institute
fpm	Feet Per Minute
HST	Hydrostatic Transmission
m/s	Meters Per Second
PTO	Power Take Off
RH/LH	Right-hand and left-hand sides are determined by facing in the direction of forward travel
ROPS	Roll-Over Protective Structures
rpm	Revolutions Per Minute
r/s	Revolutions Per Second
SAE	Society of Automotive Engineers

UNIVERSAL SYMBOLS

As a guide to the operation of your machine, various universal symbols have been utilized on the instruments and controls. The symbols are shown below with an indication of their meaning.


Safety Alert Symbol


Read Operator's Manual


Gasoline Fuel


Fuel-Level


Parking Brake-Engaged position


Parking Brake-Disengaged position

Engine-Stop


Engine-Run


Starter Control


Power Take-Off Switch Control-Off Position (Disengaged)


Power Take-Off Switch Control-On Position (Engaged)


Hours


Cutting Height


Fast


Slow


Engine Speed Control


Choke

California Proposition 65

⚠ WARNING ⚠

Engine exhaust, some of its constituents, certain vehicle components and fluids, contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

IMPORTANT

The engine in this machine is not equipped by the manufacturer with a standard spark arrester.
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 land, or grass- covered land unless the exhaust system is equipped with a working spark arrester meeting state laws. Other states or federal areas may have similar laws.

Canadian Electromagnetic Compatibility (EMC):
This machine complies with Industry Canada ICES-002.

FOREWORD

You are now the proud owner of a KUBOTA ZERO TURN MOWER. This machine is a product of KUBOTA's quality engineering and manufacturing. It is made of excellent materials and under a rigid quality control system. It will give you long, satisfactory service. To obtain the best use of your machine, please read this manual carefully. It will help you become familiar with the operation of the machine and contains many helpful hints about machine maintenance. It is KUBOTA's policy to utilize, as quickly as possible, every advance in our research. The immediate use of new techniques in the manufacturing of products may cause some small parts of this manual to become outdated. KUBOTA distributors and dealers will have the most up-to-date information. Please do not hesitate to consult them.

SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use this unit.

DANGER :	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING :	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION :	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
IMPORTANT :	Indicates that equipment or property damage could result if instructions are not followed.
NOTE :	Gives helpful information.

CONTENTS

SAFE OPERATION

Careful operation is your best insurance against an accident.
Read and understand this manual carefully before operating the machine. All operators, no matter how much experience they may have had, must read and understand this and other related manuals before operating the machine or any implement attached to it. It is the owner's obligation to instruct all operators in safe operation.
If the operator(s) or mechanic(s) cannot understand the contents, it is the owner's responsibility to explain this material to them. This mowing machine is capable of amputating hands, feet and throwing objects. Failure to observe the following safety instructions could result in serious injury or death.

BEFORE OPERATING THE MACHINE

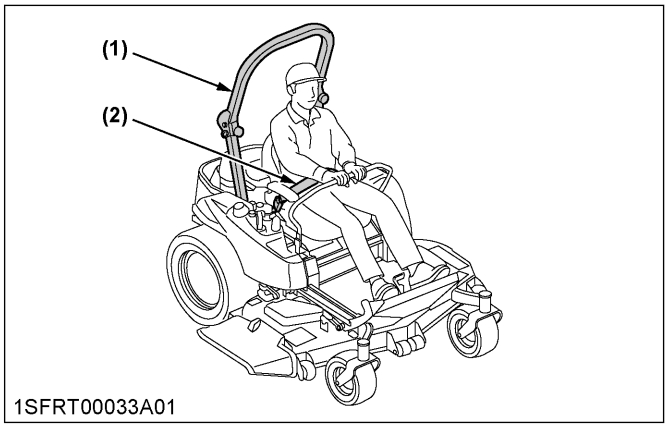
Know your equipment and its limitations. Read all instructions in this manual before attempting to start and operate the machine.

1. General

- The zero turn mowing machine has different steering characteristics than other machines with a steering wheel and does not have a service brake pedal (but, has a parking brake pedal that can be used to stop the machine in an emergency). Normal slowing down and stopping is done with the motion control levers. Read and understand the operator's manual before operating the machine. Practice operating the machine at low engine speed in an unobstructed area without engaging the mower.
- Pay special attention to the safety labels on the machine itself.
- Do not allow any bystanders around or near the machine during operation.
- Do not allow passengers, children or non-qualified operators on the machine at any time. The operator must remain in the machine seat throughout operation.
- Do not operate the machine or any attachments while under the influence of alcohol, medication, controlled substances or when fatigued.
- Do not wear loose, torn, or bulky clothing around the machine. The clothing may catch on moving parts or controls, leading to the risk of an accident. Wear and use any additional safety items such as a hard hat, safety boots or shoes, eye and hearing protection, gloves and so on, as appropriate or required.
- Do not wear radio or music headphones while operating the machine. Do not operate the machine or any attachments while using or texting with a cellphone or any other electronic device.
  Safe operation requires your full attention.
- Carefully check the vicinity before operating machine or any implement attached to it. Clear the work area of objects (such as wires and rocks,) that might be picked up and thrown. Check for overhead clearance which may interfere with the grass catcher or ROPS.
- Check brakes and other mechanical parts for correct adjustment and wear. Replace worn or damaged parts promptly. Check the tightness of all nuts and bolts regularly.
  (See MAINTENANCE on page 48 and ADJUSTMENT on page 73.)
- Keep all shields and guards in place. Replace any that are damaged or missing. Do not operate unless they are functioning properly.
- Before allowing other people to use your machine, explain how to operate and have them read this manual before operation.
- In addition to the design and configuration of equipment, hazard control and accident prevention are dependent upon the awareness, concern and prudence of personnel involved in the operation, transport and maintenance of the equipment.
- Keep the machine and attachments in good operating condition and keep safety devices in place and in proper working condition. Do not operate unless they are functioning properly.
- Do not modify the machine. Unauthorized modification may affect the function of the machine, which may result in personal injury.
- Use only implements approved by KUBOTA. Use proper ballast on the front or rear of the machine to reduce the risk of upsets. Follow the safe operating procedures specified in the manuals of the equipment.
- Keep your machine clean. Accumulations of dirt, grease, and trash can contribute to fires and lead to personal injury.
- The exhaust gas from the muffler is very hot. To prevent fire, do not expose dry grass, mowed grass, oil and any other combustible materials to the exhaust gas. Use a spark arrester where required. Keep the engine and muffler clean all the times.

2. ROPS

- The ROPS is an integral and effective safety device.
- KUBOTA recommends the use of a roll-over protective structure (ROPS) and seat belt in almost all applications. This combination will reduce the risk of serious injury or death, should the machine be upset.
- The machine is equipped with a foldable ROPS, which may be temporarily folded down only when absolutely necessary for areas with height constraints.
  There is no operator protection provided by the ROPS in the folded position. For operator safety the ROPS must be placed in the upright and locked position and the seat belt fastened for all other operations.
- Do not remove the ROPS.
- If the ROPS is loosened or removed for any reason, make sure that all parts are reinstalled correctly before operating the machine.
- Never modify or repair a ROPS because welding, bending, drilling, grinding, or cutting may weaken the structure.
- If any structural member of the ROPS is damaged, replace the entire structure at your local KUBOTA Dealer. Any alterations to a ROPS must be approved by the manufacturer.
- Check the area to be mowed and never fold down a foldable ROPS in areas where there are slopes, drop-offs or water.
- Check carefully for overhead clearances (such as branches, doorways and electrical wires) before driving under any objects and do not contact them.
- Keep the ROPS in safe operating condition by periodically and thoroughly inspecting for damage and keeping all mounting fasteners tight.
- Always use the seat belt if the machine has a ROPS. Check the seat belt regularly and replace if frayed or damaged. Be certain that the seat belt can be released quickly in the event of an emergency.



(1) ROPS
(2) Seat belt

OPERATING THE MACHINE

1. Starting to operate the machine

- Always sit in the operator's seat when starting the engine or operating levers or controls.
- Before starting the engine make sure that the motion control levers are in neutral lock, the parking brake is applied, and the power take-off (PTO) is disengaged (OFF).
- Do not start the engine by shorting across starter terminals. The machine may start in gear and move if the normal starting circuitry is bypassed.
- Do not operate or idle the engine in a non-ventilated area. Carbon monoxide gas is colorless, odorless, and deadly.
- Do not start the engine when the front or rear tires are not on the ground.
- Check before each use that the operator presence control (OPC) system is functioning correctly.
  Test the safety systems.
  (See Checking the engine start system on page 58 and Checking the OPC system on page 59.)
  Do not operate unless they are functioning correctly.
- Check all fluids before starting.

2. Working the machine

- Do not turn sharply when driving at high speed.
- To avoid tip-over accidents, slow down when turning on uneven terrain or before stopping.
- Do not operate near ditches, holes, embankments, or other terrain, which may collapse under the machine's weight. The risk of machine tip-overs increases when the ground is loose or wet.
- Park the machine on a firm and level surface. Before you get off, apply the parking brake, place the motion control levers in their neutral lock positions, disengage the PTO, lower all attachments to the ground, turn off the engine, and remove the key.

- Watch where you are going at all times. Watch for and avoid obstacles. Be alert at curbs, near trees, and other obstructions and hidden hazards.
- Know what is behind you before backing up. Look to the rear before and when backing. Do not mow while in reverse. Operate in reverse with the blades engaged only when absolutely necessary and make sure the area immediately behind you is clear of obstructions or holes, and small children. Use extra caution when the machine is equipped with a grass catcher as your view to the rear is restricted.
- When working in groups, always let others know what you are doing ahead of time.
- Do not drive the machine on streets or highways. Watch for traffic when you cross roads or operate near roads.
- Be aware of the mower discharge direction and do not point it at anyone.
  Never operate with the discharge deflector raised, removed or altered, unless using a grass catcher.
- When using any attachments, never direct discharge material toward bystanders. Do not allow people or pets near the attachments while in operation.
  Do not mow when bystanders are present in the mowing area.
- To reduce fire hazards, keep the engine exhaust area free of grass or leaves.
- Be sure that the rotating blades and the engine are stopped and the key is removed before placing hands or feet near blades and cleaning blockages or unclogging the discharge deflector. Keep hands and feet away from the cutting units.
- Shut the engine off and wait for all movement to stop before removing the grass catcher or unclogging the discharge deflector.
- Maintain all screens to avoid overheating conditions.
- Always inspect the mower for damage after striking a foreign object. Repair or replace any damaged parts before restarting.
- Operate during daylight or in bright artificial light.
- If the machine starts to vibrate abnormally, disengage the drive to the attachments, stop the engine and remove the key. Then check the machine immediately.
- Do not operate the machine when there is a possibility of lightning. Even if the machine is equipped with a cabin, the operator is not protected from lightning.
- Never raise the deck with the blades running. Disengage the PTO and stop the blades from rotating if not mowing.

3. Safety for children

Tragic accidents can occur if the operator is not alert of the presence of children. Children are attracted to the machine and mowing activity.

- Never assume that children will remain where you last saw them.
- Keep children out of the mowing area and under the watchful care of another responsible adult.
- Be alert and turn the machine off if children enter the area.
- Before and when backing, look behind and down for small children.
- Never carry children. There is no safe place for them to ride. They may fall off and be seriously injured or interfere with safe machine operation.
- Never allow children to operate the machine, even under adult supervision.
- Use extra care when approaching blind corners, shrubs, trees, or other obstructions that might hide children from sight.
- Do not mow in reverse. Operate in reverse with the blades engaged only when it is absolutely necessary and make sure that the area to the rear is clear of children before doing so.

4. Operators, age 60 years and older

Data indicates that operators, age 60 years and older, are involved in a large percentage of machine-related injuries. These operators should evaluate their ability to operate the machine safely enough to protect themselves and others from serious injury.

5. Pulling loads

Use extra care when pulling loads to reduce the risk of serious personal injury or death due to a machine tip-over.

- Pull only from the hitch. Never attach loads to the axle housing or any other point above the hitch.
- Limit loads to those you can safely control.
- Do not turn sharply.
- Use care when backing.
- Use front ballast or wheel weights when suggested in this operator's manual.
  - Stopping distance increases with speed and weight of towed load. Travel slowly and allow extra time and distance to stop.
  - Never allow children or others in, or on, towed equipment.
  - Use additional caution when turning or operating under adverse surface conditions.

6. Operating on slopes

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution.
If you cannot back up the slope or if you feel uneasy on it, do not mow it.
If the engine stops when operating on a slope, apply the parking brake immediately to prevent machine runaway.

Do

- To avoid tip-over accidents, operate across slopes, not up and down. Stay off hills and slopes too steep for safe operation.
- Remove obstacles such as rocks and tree limbs.
- Stay alert for holes in the terrain and other hidden hazards. Keep away from drop-offs. Uneven terrain could overturn the machine. Tall grass can hide obstacles.
- Follow the manufacturer's recommendations for wheel weight or counterweights to improve stability.
- Keep all movement on slopes slow and gradual. Do not make sudden changes in speed or direction.
- Avoid starting or stopping on a slope.
  If tires lose traction, disengage the PTO and proceed slowly straight down the slope.
- Reduce the speed and exercise extreme caution on slopes and in sharp turns to prevent tip-over accidents or loss of control.
- Use special caution when changing direction on slopes. Slow down, and use extra caution when changing direction on a slope.

Do not

- Do not turn on slopes unless necessary. If necessary, turn uphill slowly and gradually.
- Do not mow near drop-offs, ditches, or embankments. The mower could suddenly turn over if a wheel is over the edge of cliff or ditch, or if an edge caves in.
- Do not mow on wet grass. Reduced traction could cause sliding and loss of control.
- Do not try to stabilize the machine by putting your foot on the ground.
- Do not use the grass catcher on steep slopes.
- Do not start or stop suddenly on slopes. If tires lose traction, disengage the PTO and proceed slowly straight down the slope.
- Never *"freewheel"*. Do not let the machine travel downhill with motion control levers at the neutral lock position or in neutral.
- Do not operate the machine without the mower deck installed.

7. Stopping the machine

- Park the machine on level ground.
- Make sure that the machine and all attachments have come to a complete stop before you get off.
- Before you get off, apply the parking brake, place the motion control levers in their neutral lock positions, disengage the PTO, lower all attachments to the ground, turn off the engine, and remove the key.
- Do not park the machine on dry grass or leaves.

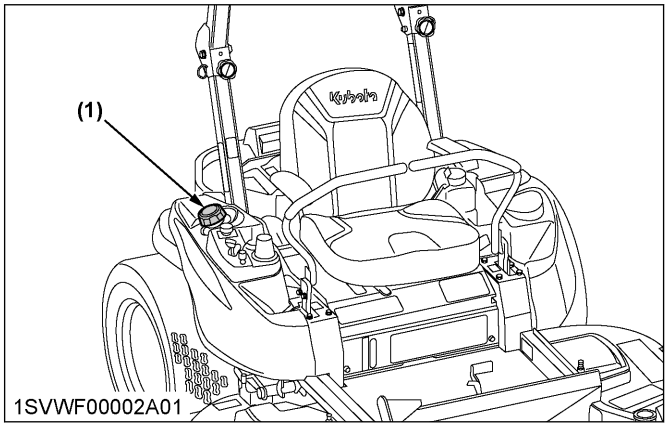
TRANSPORTING THE MACHINE

- Disengage power to attachment(s) when transporting or not in use.
- Do not tow this machine. Use a suitable truck or trailer when transporting on public roads.
- Use extra care when loading or unloading the machine into a trailer or truck. Use full width ramps for loading machine into a trailer or truck.
- This machine is not allowed to be used on public roads.
- Shut off fuel while storing or transporting.
- Tie the machine down securely using straps, chains, cables, or ropes.
- Both front and rear straps should be directed down and outward from the machine.

SERVICING AND STORAGE

1. Servicing the machine

- Before servicing, park the machine on a firm, level surface and apply the parking brake. Remove the key to prevent an accidental start-up.
- Allow the machine time to cool before touching the engine, muffler and so on.
- Always stop the engine before refueling. Avoid spills and overfilling. Wipe up spilled fuel immediately.



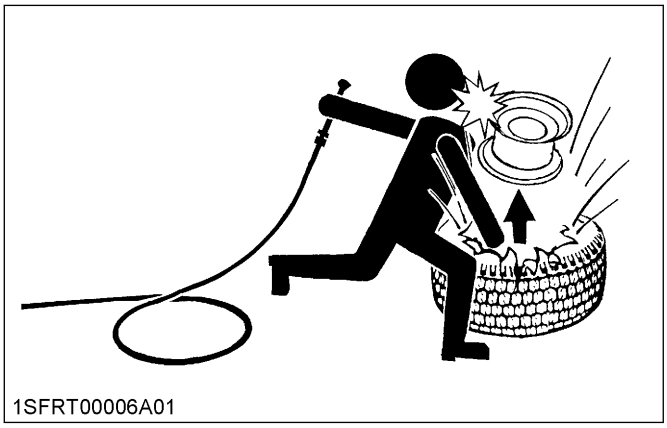
(1) Fuel tank cap

- Use extra care when handling gasoline fuels. They are flammable.
  1. Use only an approved container.
  2. Do not remove the fuel cap or refuel with the engine running. Allow the engine to cool before

refueling. Do not smoke while refueling or when standing near fuel.

3. Do not refuel the machine indoors and always clean up spilled fuel or oil.
4. Do not store the machine or fuel container inside where there is an open flame, such as in a water heater.

- Do not smoke when working around battery or when refueling. Extinguish all cigarettes, cigars, pipes, and other sources of ignition. Keep all sparks and flames away from battery and fuel tank.
- 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 filling.
- Remove 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 fueling is complete. Do not use a nozzle lock open device.
- If fuel is spilled on clothing, change the clothing immediately. Replace the fuel cap and tighten securely.
- Charge batteries in an open, well-ventilated area, away from spark and flames. A battery, especially when charging, will give off hydrogen and oxygen gases, which can explode and cause serious personal injury.
- Unplug the charger before connecting or disconnecting from battery.
- Before *"jump starting"* a dead battery, read and observe all of the instructions:
- Disconnect the battery or remove the spark plug wire before making any repairs.
  Disconnect the negative terminal first and the positive last. Reconnect the positive first and negative last. Wear protective clothing and use insulated tools.
- Do not use or charge the refillable type battery if the fluid level is below the **[LOWER]** (lower limit level) mark. Otherwise, the battery component parts may prematurely deteriorate, which may shorten the battery's service life or cause an explosion. Check the fluid level regularly and add distilled water as required so that the fluid level is between the **[UPPER]** and **[LOWER]** levels.
- Keep a first aid kit and fire extinguisher handy at all times.
- Never allow untrained personnel to service the machine. Do not attempt to mount a tire on a rim unless qualified to do so and all proper safety precautions are followed.
- Always maintain the correct tire inflation pressure. Do not inflate tires above the recommended pressure shown in the operator's manual.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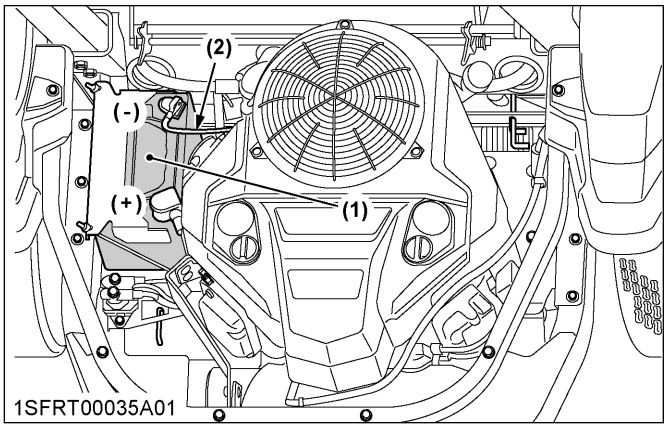
- Provide adequate support when changing wheels.
- Make sure that wheel nuts and bolts have been tightened to the specified torque.
- Keep hands and feet away from moving parts. If possible, do not make adjustments or repairs with the engine running.
- Keep the machine free of grass, leaves, or other debris build-up.
- Do not change the engine governor setting or overspeed the engine.
- Do not run the machine inside a closed area.
- Mower blades are sharp and can cut your hands. Wrap the blade(s) or wear gloves, and use extra caution when servicing them. Never straighten or weld blades.
- Keep nuts and bolts, especially blade attachment bolts, tight and keep equipment in good condition.
- Never tamper with safety devices. Check their operation for proper function regularly.
- Waste products such as used oil, fuel, coolant, brake fluid, and batteries can harm the environment, people, pets and wildlife. Please dispose of the waste products properly.
- Do not use beverage containers for waste fluids or other products. Someone, particularly children, may drink them by mistake.
- Securely support the machine or any machine elements with stands or suitable blocking before working underneath. For your safety, do not rely on hydraulically supported devices as they may leak down, suddenly drop or be accidently lowered.
- Consult your local recycling center or KUBOTA 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 upon request.

2. Storage

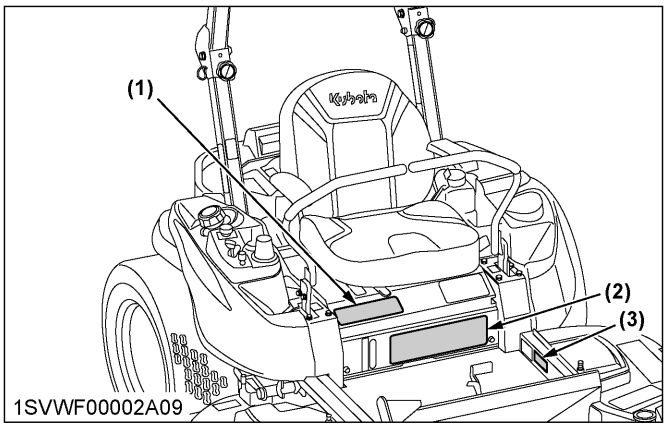
- Keep the machine and supply of fuel in locked storage and remove the ignition key to prevent children or others from playing or tampering with them.
- To avoid sparks from an accidental short circuit, always disconnect the battery's ground cable (-) first and reconnect it last.



(1) Battery
(2) Ground cable
(+) Positive terminal
(-) Negative terminal

- To avoid the danger of exhaust fume poisoning, do not operate the engine indoors without adequate ventilation.
- To reduce fire hazards, clean the machine thoroughly before storage. Dry grass and leaves around the engine and muffler may ignite.
- Let the engine cool before storing and do not store near flames.
- Shut off fuel while storing or transporting.

SAFETY LABELS



(3) Part No. K3441-6596-1

California Proposition 65

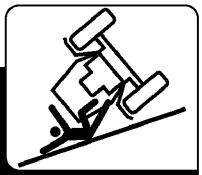
⚠ WARNING ⚠

Engine exhaust, some of its constituents, certain vehicle components and fluids, contain or emit chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

1BDABENAP115A

(1) Part No. K3071-6581-1

⚠ WARNING



TO AVOID SERIOUS INJURY OR DEATH

1. Mow across slopes
   - Not up and down.
2. Use extreme caution when operating on slopes.
3. Loss of traction may occur when operating on slopes.
4. Drive slowly on slopes.
5. Do not operate on wet slopes.
6. Avoid sudden starts.
7. Execute turns slowly.

⚠ ADVERTENCIA

PARA EVITAR LESIONES PERSONALES GRAVES O LA MUERTE

1. Corte el césped de manera transversal en las colinas
   - No de arriba hacia abajo.
2. Tenga mucho cuidado durante la operación en colinas.
3. Se puede perder tracción durante la operación en colinas.
4. Conduzca lentamente en las colinas.
5. No use la máquina en colinas húmedas.
6. Evite arranques súbitos.
7. Realice las vueltas lentamente.

1BDABFDAP070A

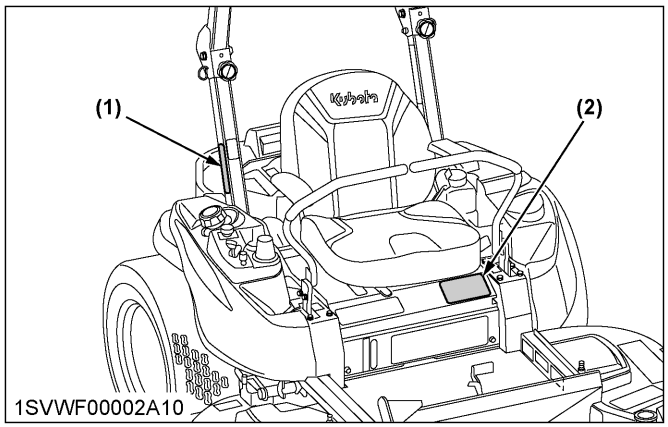
(2) Part No. K3851-6585-1

⚠ WARNING TO AVOID SERIOUS INJURY OR DEATH

1. Read and understand the operator's manual before operation.
2. Do not operate this machine unless you are trained.
3. Before allowing other people to use the machine, have them read the operator's manual.
4. Check the tightness of all nuts and bolts regularly.
5. Before starting the engine, make certain that everyone is at a safe distance from the machine, PTO is disengaged and motion control levers are in neutral lock.
6. Remove objects that could be thrown by the blade.
7. Do not operate the machine when children and/or others are around.
8. Do not carry children or others on the machine at any time.
9. Before dismounting, disengage PTO clutch, lower the implement, place motion control levers in neutral lock position, set the parking brake, stop the engine and remove the key.
10. Keep safety devices (guards, shields and switches) in place, and working.
11. To reduce the fire hazard, keep the exhaust clear of dry grass, dry leaves or other combustible materials.
12. This machine is not for street or highway use.
13. Securely support the machine and implement before working underneath.

1BDABEAAP146A

1SVWF00029A01enUS



(1) Part No. K3811-6563-1

1BDABEAAP093A

(2) Part No. K3082-6582-1

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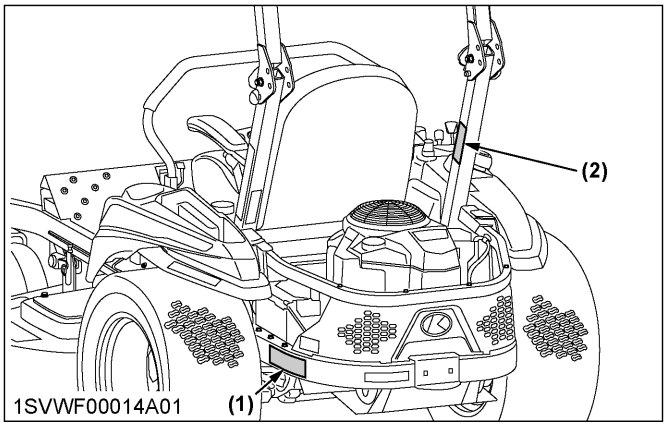
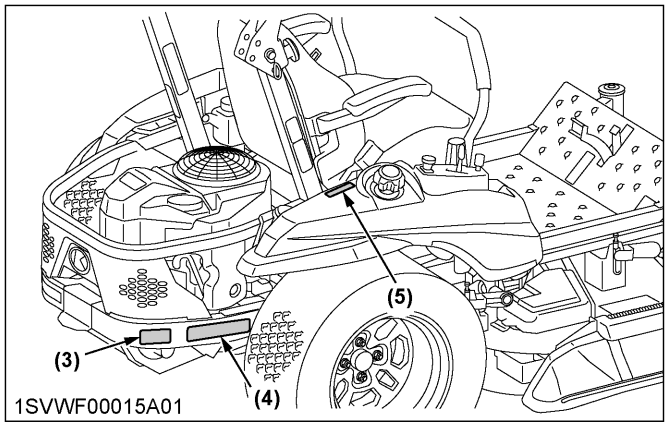
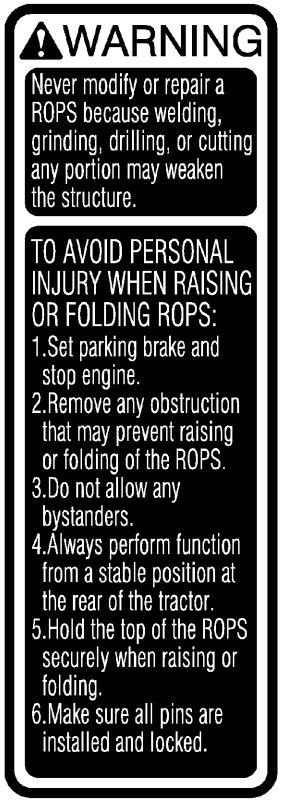




(1) Part No. K3071-6541-1

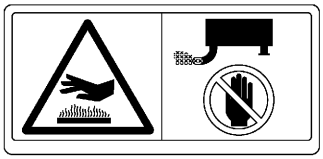
1BDABEDAP080A

(2) Part No. K3851-6564-1



1BDABEAAP150A

(3) Part No. K3811-6532-1



1BDABEAAP095A

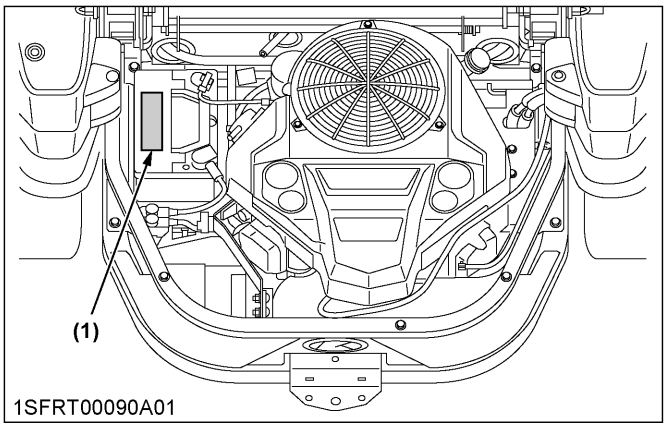
(4) Part No. K3071-6571-1

1BDABEDAP071A

(5) Part No. K3071-6584-1

1BDABEAAP096A

1SVWF00009A01enUS



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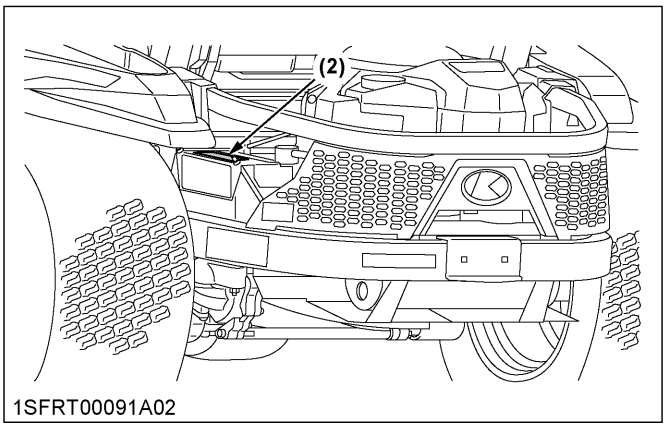

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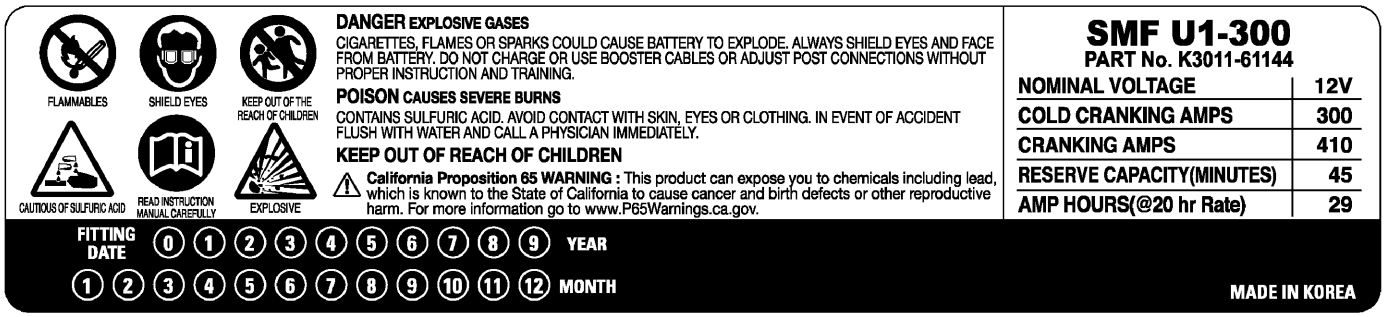
(1) Part No. K3011-6118-4

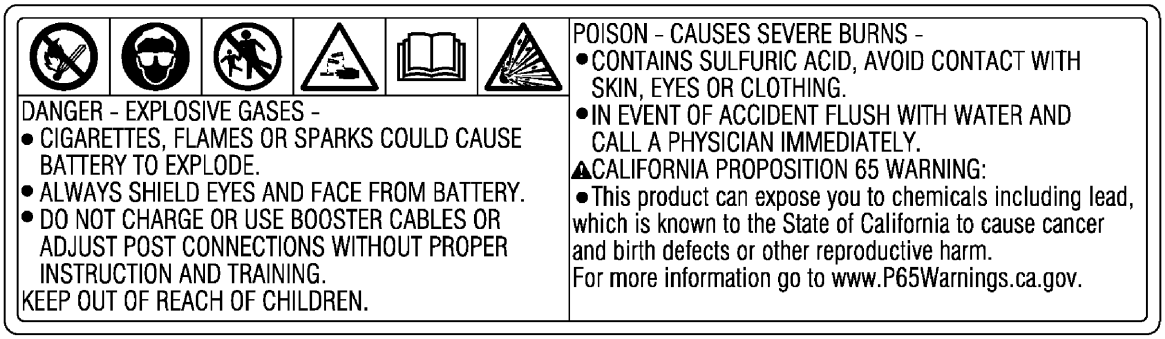


TO AVOID INJURY FROM BATTERY GASES AND ACIDES

- Keep away cigarettes, flames or sparks.
- Always shield eyes and face from battery.
- Keep out of reach of children.
- Poison causes severe burns.
- Contains sulfuric acid.
- Read and understand operator's manual.
- Danger explosive gases.

1SFRT00107A01

(2) Part No. K3071-6542-2



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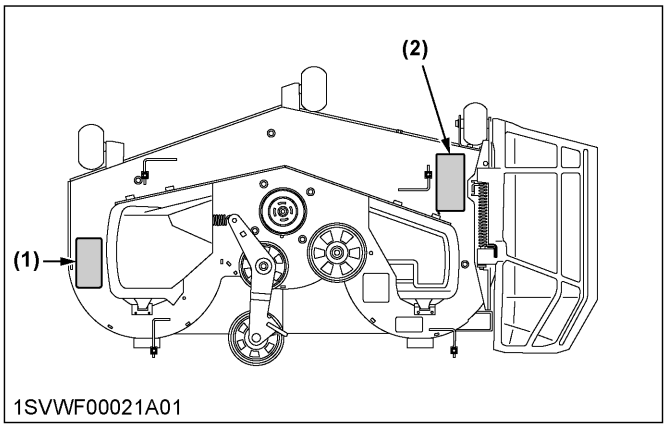
RCK48P



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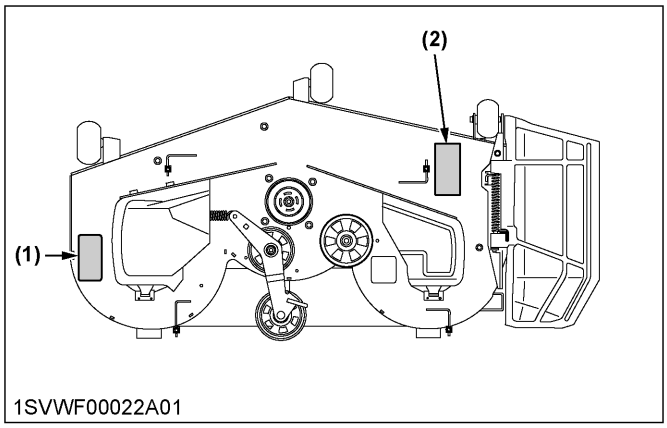
RCK54P



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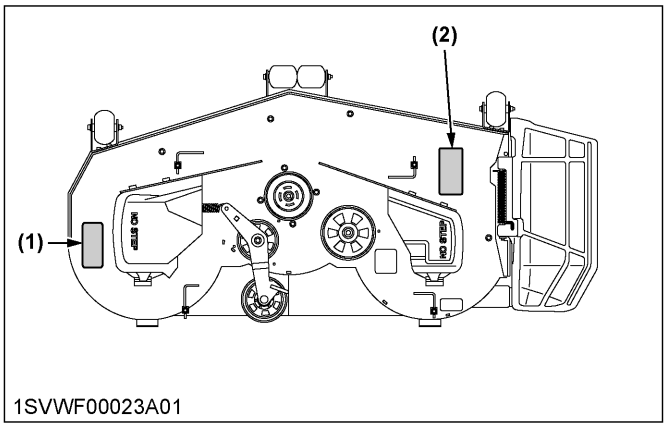
RCK60P



1SVWF00023A01

(1) Part No. K5591-7312-1

1BDACAEAP015B

(2) Part No. K5591-7310-1

1BDABFDAP091A

1SVWF00031A01enUS

CARE OF SAFETY LABELS

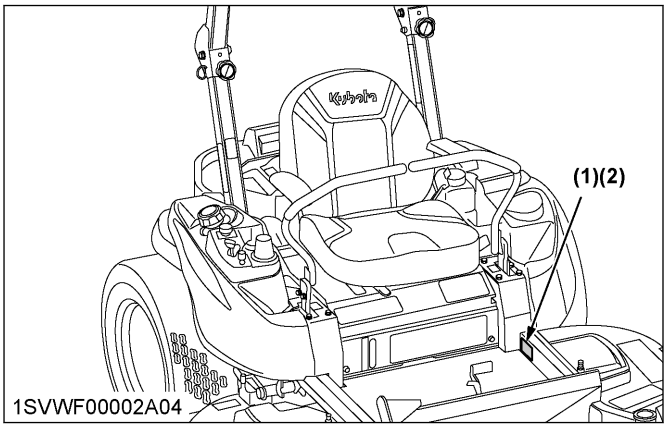
- Keep safety labels clean and free from obstructing material.
- Clean safety labels with soap and water, and dry with a soft cloth.
- Replace damaged or missing safety labels with new labels from your local KUBOTA Dealer.
- If a component with safety label(s) attached is replaced with a new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
- Attach new safety labels by applying on a clean dry surface and pressing any bubbles to the outside edge.

SERVICING OF MACHINE

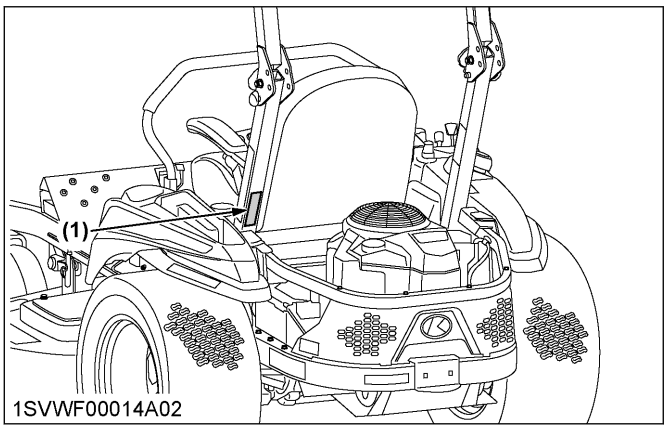
DEALER SERVICE

After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself. Your dealer has knowledge of your new machine and has the desire to help you get the best performance and the most value from it.
However, when in need of parts or major service, be sure to consult your local KUBOTA Dealer. When in need of parts, be prepared to give your dealer the product identification number (PIN), and the ROPS, engine and mower serial numbers.
Locate the PIN and serial numbers now, and record them in the space provided.

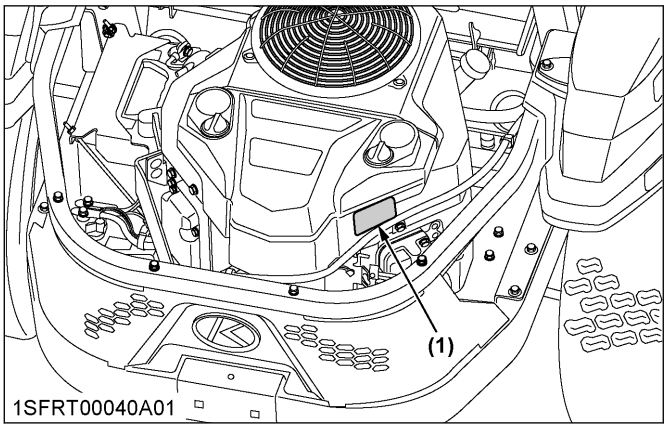
Date of purchase		
Name of dealer		
Machine type		
PIN		
	Type	Serial number
ROPS		
Engine		
Mower		



(1) Machine identification plate
(2) Product identification number

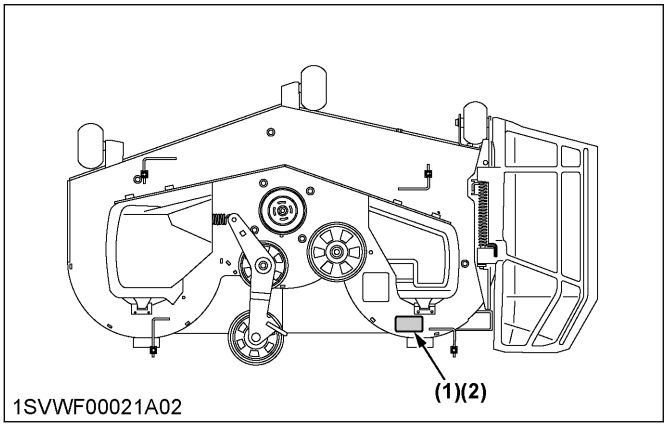


(1) ROPS serial number



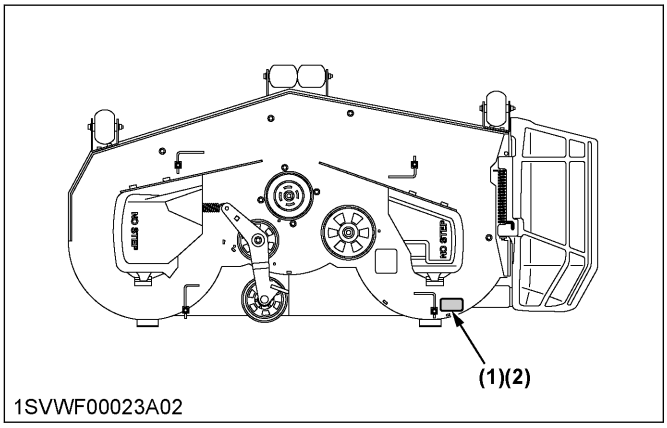
(1) Engine serial number

RCK48P, RCK54P



(1) Mower identification plate
(2) Mower serial number

RCK60P



(1) Mower identification plate
(2) Mower serial number

WARRANTY

This machine is warranted under the **KUBOTA Limited Express Warranty**, a copy of which may be obtained from your selling dealer. No warranty shall, however, apply if the machine has not been handled according to the instructions given in the operator's manual, even if it is within the warranty period.
The engine is warranted under the Kawasaki Limited Warranty, a copy of which has been provided with your machine purchase.
Refer to the Kawasaki Limited Warranty for details regarding warranty coverage, owner obligations, warranty limitations, and liabilities.

SCRAPPING THE MACHINE AND ITS PROCEDURE

To put the machine out of service, correctly follow the local rules and regulations of the country or territory where you scrap it. If you have questions, consult your local KUBOTA Dealer.

SPECIFICATIONS

SPECIFICATION TABLE

Model				Z411KW	Z421KW	Z421KWT
Engine	Model			**GH7302V**	**GH7301V**	**GH7301V**
	Max. engine power (gross)		kW (HP)	16.4 (22.0) *1*2	17.9 (24.0) *1*2	17.9 (24.0) *1*2
	Type			Air-cooled gasoline engine		
	Number of cylinders			2 (V-Twin)		
	Bore and stroke		mm (in.)	78 x 76 (3.07 x 2.99)		
	Total displacement		cm^3 (cu. in.)	726 (44.3)		
	Rated revolution		rpm	3600		
	Fuel			Unleaded gasoline		
	Starter			Electric		
	Lubrication			Full pressure lubrication		
	Cooling			Air-cooled		
	Battery			U1 (12 V, RC: 45 min, CCA: 300, CA: 410)		
Capacities	Fuel tank		L (U.S.gals.)	25.7 (6.8)		
	Engine crankcase (with filter)		L (U.S.qts.)	2.1 (2.2)		
	Transmission case including rear axle gear case		L (U.S.qts.)	4.8 (5.1) *3		
Dimensions	Overall length		mm (in.)	2055 (80.9)		
	Overall width without mower deck		mm (in.)	1236 (48.7)		1376 (54.2)
	Overall height (with ROPS)		mm (in.)	1772 (69.8)		
	Wheelbase		mm (in.)	1255 (49.4)		
	Min. ground clearance		mm (in.)	124 (4.9)		
	Tread	Front	mm (in.)	944 (37.2)		
		Rear	mm (in.)	1000 (39.4)		1070 (42.1)
Weight (with mower deck)			kg (lbs.)	396 (874) with **48"**	401 (884) with **54"**	422 (930) with **60"**
Traveling system	Tires	Front		13 x 5.0 - 6 (pneumatic tire) smooth		13 x 6.5 - 6 (pneumatic tire) smooth
		Rear		24 x 9.5 - 14 (4PR) low profile turf		24 x 12 - 14 (4PR) low profile turf
	Traveling speeds	Forward	mph (km/h)	0 to 10.0 (0 to 16.0)		
		Reverse	mph (km/h)	0 to 5.0 (0 to 8.0)		
	Steering			2 - hand levers		
	Transmission			2 - HST with gear		
	Parking brake			Foot applied, released		
	Min. turning radius		mm (in.)	0 (0)		
PTO	Drive system			Belt		
	Clutch type			Electric		

Specifications and design subject to change without notice.

*1 Manufacturer's estimate

*2 These Kawasaki engines have been tested in accordance with SAE J1995, verified by TÜV Rheinland Group, and certified by SAE International. The gross power ratings of these engines were determined by using measurements according to SAE J1995 which were witnessed by

SAE-approved witnesses from TÜV Rheinland Group. Torque ratings of these engines were not certified by SAE. Actual power and torque output will vary depending on numerous factors, including, but not limited to, the operating speed of the engine in application, environmental conditions, maintenance, and other variables.

*3 Oil amount when the oil level is at the upper level.

Model				Z412KW	Z422KW	Z422KWT
Engine	Model			GH7302V	GH7301V	GH7301V
	Max. engine power (gross)		kW (HP)	16.4 (22.0) *1*2	17.9 (24.0) *1*2	17.9 (24.0) *1*2
	Type			Air-cooled gasoline engine		
	Number of cylinders			2 (V-Twin)		
	Bore and stroke		mm (in.)	78 x 76 (3.07 x 2.99)		
	Total displacement		cm^3 (cu. in.)	726 (44.3)		
	Rated revolution		rpm	3600		
	Fuel			Unleaded gasoline		
	Starter			Electric		
	Lubrication			Full pressure lubrication		
	Cooling			Air-cooled		
	Battery			U1 (12 V, RC: 45 min, CCA: 300, CA: 410)		
Capacities	Fuel tank		L (U.S.gals.)	25.7 (6.8)		
	Engine crankcase (with filter)		L (U.S.qts.)	2.1 (2.2)		
	Transmission case including rear axle gear case		L (U.S.qts.)	4.8 (5.1) *3		
Dimensions	Overall length		mm (in.)	2055 (80.9)		
	Overall width without mower deck		mm (in.)	1236 (48.7)		1376 (54.2)
	Overall height (with ROPS)		mm (in.)	1772 (69.8)		
	Wheelbase		mm (in.)	1255 (49.4)		
	Min. ground clearance		mm (in.)	124 (4.9)		
	Tread	Front	mm (in.)	944 (37.2)		
		Rear	mm (in.)	1000 (39.4)		1070 (42.1)
Weight (with mower deck)			kg (lbs.)	410 (904) with **48"**	416 (918) with **54"**	433 (954) with **60"**
Seat				With 3 inch stroke suspension		
Traveling system	Tires	Front		13 x 6.5 - 6 (pneumatic tire) smooth		
		Rear		24 x 9.5 - 14 (4PR) low profile turf		24 x 12 - 14 (4PR) low profile turf
	Traveling speeds	Forward	mph (km/h)	0 to 10.0 (0 to 16.0)		
		Reverse	mph (km/h)	0 to 5.0 (0 to 8.0)		
	Steering			2 - hand levers		
	Transmission			2 - HST with gear		
	Parking brake			Foot applied, released		
	Min. turning radius		mm (in.)	0 (0)		
PTO	Drive system			Belt		
	Clutch type			Electric		

Specifications and design subject to change without notice.

*1 Manufacturer's estimate

*2 These Kawasaki engines have been tested in accordance with SAE J1995, verified by TÜV Rheinland Group, and certified by SAE International. The gross power ratings of these engines were determined by using measurements according to SAE J1995 which were witnessed by SAE-approved witnesses from TÜV Rheinland Group. Torque ratings of these engines were not certified by SAE. Actual power and torque output will vary depending on numerous factors, including, but not limited to, the operating speed of the engine in application, environmental conditions, maintenance, and other variables.

*3 Oil amount when the oil level is at the upper level.

Model			RCK48-400Z	RCK54-400Z	RCK60-400Z
Suitable machine			**Z411KW**, **Z412KW**	**Z421KW**, **Z422KW**	**Z421KWT**, **Z422KWT**
Mounting method			Parallel linkage		
Adjustment of cutting height			Dial gauge		
Mower deck			PRO commercial deck (fabricated deck)		
Cutting width		mm (in.)	1219 (48)	1372 (54)	1524 (60)
Cutting height		mm (in.)	38 to 127 (1.5 to 5.0)		
Weight (approximation)		kg (lbs.)	78 (171)	84 (185)	93 (206)
Blade spindle speed		r/s (rpm)	72 (4320) *1	63.7 (3820) *1	56.7 (3400) *1
Blade tip velocity		m/s (fpm)	95.5 (18800) *1	95 (18700) *1	93 (18300) *1
Blade length		mm (in.)	423 (16.7)	474 (18.7)	523 (20.6)
Number of blades			3		
Dimensions	Total length	mm (in.)	867 (34.1)	885 (34.8)	925 (36.4)
	Total width	mm (in.)	1552 (61.1)	1710 (67.3)	1870 (73.6)
	Total height	mm (in.)	340 (13.3)		

*1 Engine maximum rpm

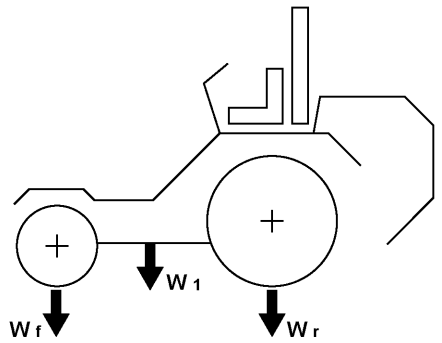
IMPLEMENT LIMITATIONS

The KUBOTA Machine has been thoroughly tested for proper performance with implements sold or approved by KUBOTA.
Use with implements below may result in malfunctions or failures of the machine, damage to other property and injury to the operator or others.

- Implements which are not sold or approved by KUBOTA
- Implements which exceed the maximum specifications listed below, or
- Implements which are otherwise unfit for use with the KUBOTA Machine

Any malfunctions or failures of the machine resulting from use with improper implements are not covered by the warranty.

Unit	Maximum loading weight		Implement weight W_1	Maximum total weight
	Front axle W_f	Rear axle W_r		
Z411KW, **Z421KW**, **Z412KW**, **Z422KW**	108 kg (238 lbs.)	545 kg (1202 lbs.)	166 kg (366 lbs.)	653 kg (1440 lbs.)
Z421KWT, **Z422KWT**	113 kg (249 lbs.)	555 kg (1225 lbs.)	166 kg (366 lbs.)	668 kg (1473 lbs.)



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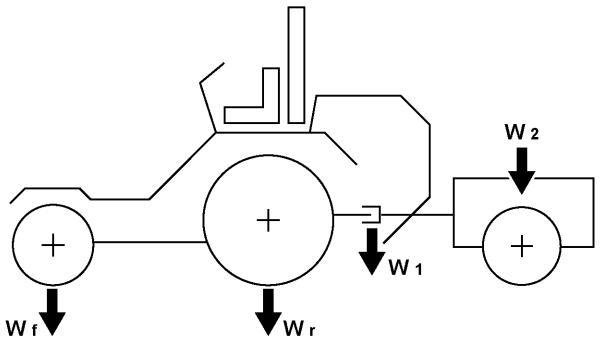
IMPORTANT :

- **Do not operate with trailer on an incline greater than 10°.**
- **Total towed weight must not exceed the combined weight of the pulling machine, ballast and operator.**
- **Follow the manufacturer's recommendations for weight limits for towed equipment.**

Unit	Maximum loading weight		Maximum total weight	Tongue weight W_1	Towing capacity W_2
	Front axle W_f	Rear axle W_r			
Z411KW, **Z421KW**, **Z412KW**, **Z422KW**	99 kg (218 lbs.)	422 kg (930 lbs.)	521 kg (1148 lbs.)	34 kg (75 lbs.)	113 kg (250 lbs.)
Z421KWT, **Z422KWT**	103 kg (227 lbs.)	433 kg (955 lbs.)	536 kg (1182 lbs.)	34 kg (75 lbs.)	113 kg (250 lbs.)

See the following figure.



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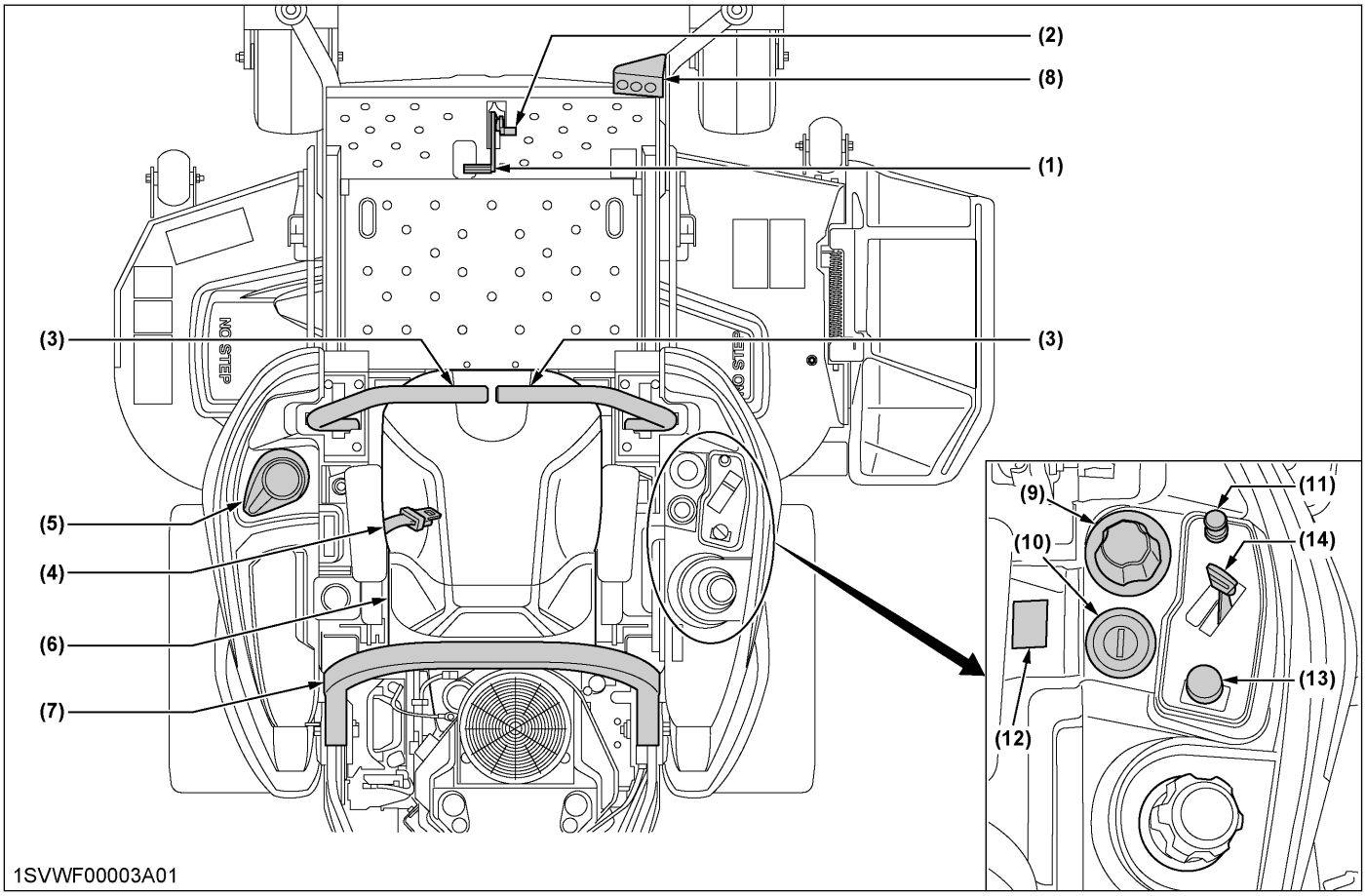
INSTRUMENT PANEL AND CONTROLS

INSTRUMENT PANEL, SWITCHES AND HAND CONTROLS

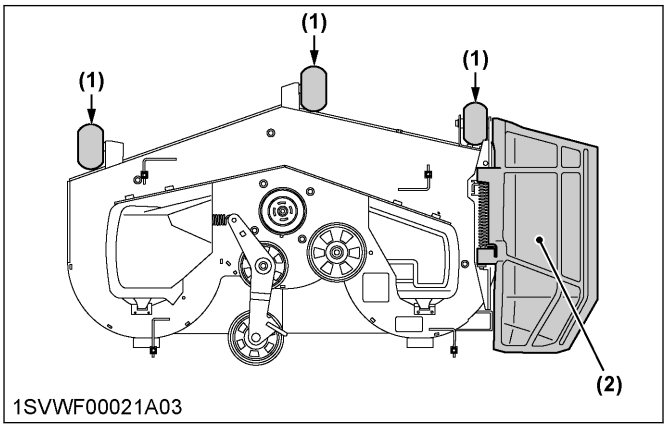


Illustrated contents

(1) Parking brake pedal…29, 41
(2) Parking brake lock pedal…29, 41
(3) Motion control lever…29, 38
(4) Seat belt…37
(5) Cup holder…-
(6) Operator's seat…37
(7) Foldable ROPS…35
(8) Mower lift pedal…43
(9) Cutting height control dial…43
(10) Key switch…31
(11) Choke knob…30
(12) Hour meter…32
(13) PTO switch…45
(14) Throttle lever…38

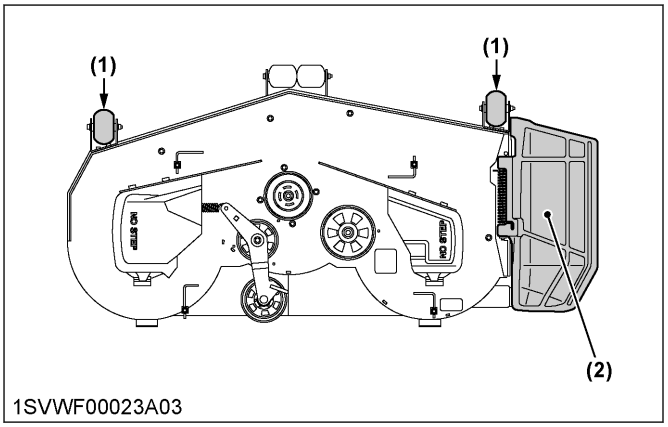
MOWER

RCK48P, RCK54P



(1) Anti-scalp roller (front, bolt shift type)…43
(2) Discharge deflector

RCK60P



(1) Anti-scalp roller (front, bolt shift type)…43
(2) Discharge deflector

MOWER MOUNTING

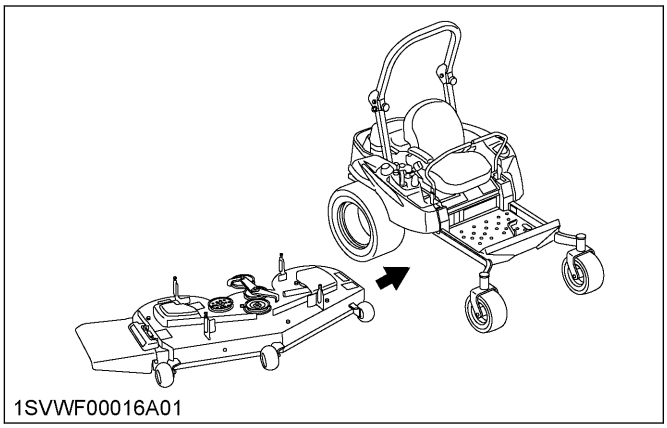
MOUNTING THE MOWER DECK

⚠ WARNING

To avoid serious injury or death:

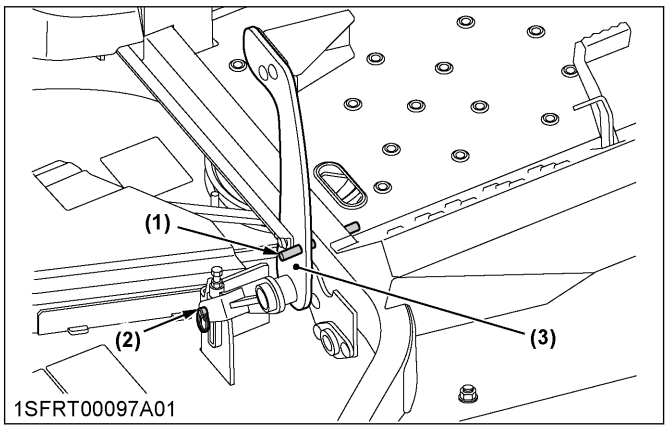
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key.**

1. Before mounting the mower deck, raise the lift links to the full up position.
   (See ADJUSTING THE CUTTING HEIGHT on page 43.)
2. Adjust the cutting height control dial to the 38.1 mm (1.5 in.) position.
3. Change the direction of the front tires as shown in the following illustration.
4. Place the mower deck at the right side of the machine.



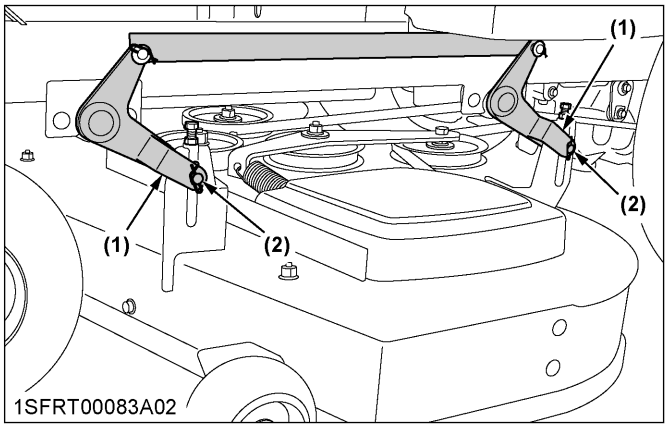
5. Slide the mower deck under the machine, then lower the mower lift links.
6. Put a Φ9.5 mm (0.37 in.) × 100 mm (4 in.) shaft in the hole of the front right side lift link.

   IMPORTANT :
   - **Use a shaft at least 100 mm (4 in.) or longer.**
   - **The shaft passes through a hole in the frame.**



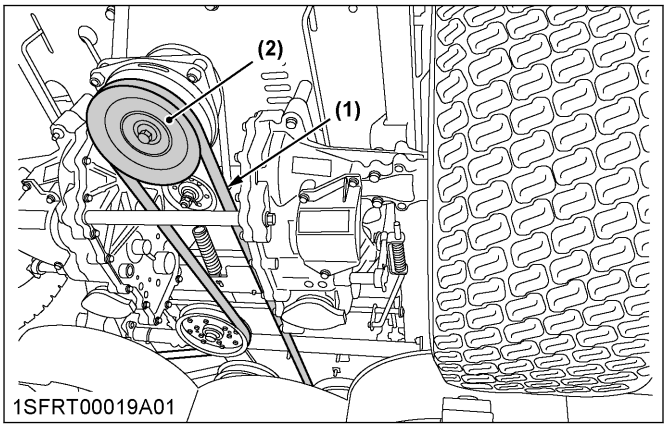
(1) Shaft (Φ9.5 mm × 100 mm, 0.37 in. × 4 in.)
(2) Clevis pin
(3) Lift link

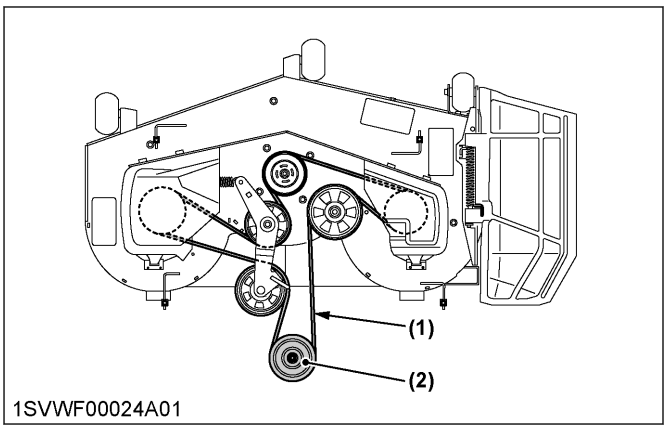
7. Attach the lift links to the mower deck with attaching hardware.



(1) Lift link
(2) Clevis pin, snap pin

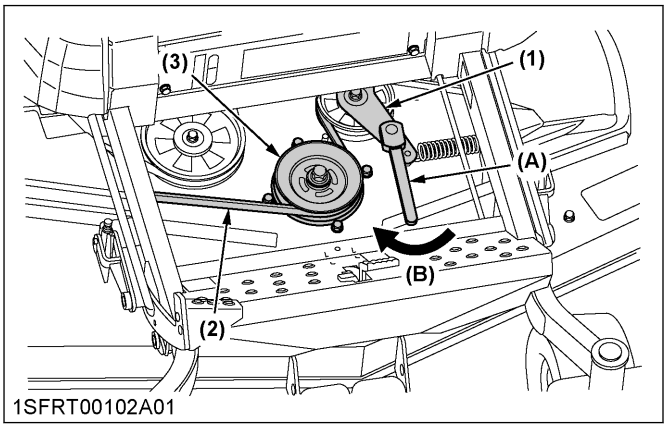
8. Raise the mower deck to 76 mm (3.0 in.) or higher. Attach the PTO belt to the PTO clutch pulley.





(1) PTO belt
(2) PTO clutch pulley

9. Remove the step.
   (See OPENING THE STEP on page 52.)
10. Turn the tension arm clockwise with a square wrench.



(1) Tension arm
(2) Mower belt
(3) Mower pulley
(A) Square wrench
(B) "CLOCKWISE"

11. Attach the mower belt to the mower pulleys.
12. After mounting the mower, check the mower level. If necessary, adjust the mower level and anti-scalp rollers.

ADJUSTING THE MOWER

(See OPERATING THE MOWER on page 43 and ADJUSTMENT on page 73.)

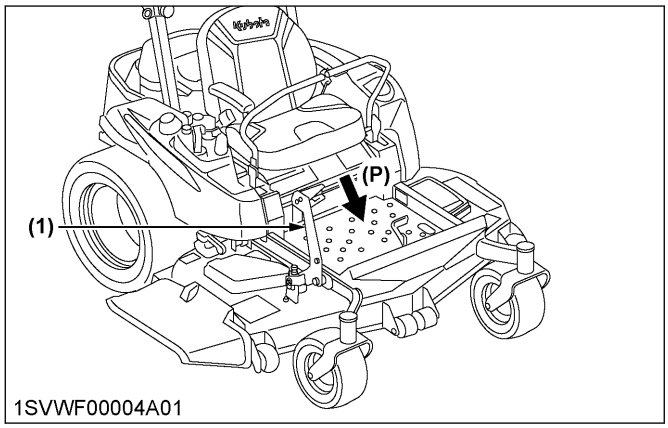
DISMOUNTING THE MOWER DECK

⚠ WARNING

To avoid serious injury or death:

- **Push the mower deck lift pedal with enough strength. If the strength is not enough, the mower link will jump up when the Φ9.5 mm (0.37 in.) shaft is removed from the right side of the machine due to the power of the spring.**
- **Keep all hands and feet clear of the mower links during this time.**

1. Raise or lower (as needed) the mower deck to a cutting height of 76 mm (3.0 in.) or higher.
2. Remove the mower belt.
3. Adjust the cutting height control dial to the 38.1 mm (1.5 in.) position.
   (See ADJUSTING THE CUTTING HEIGHT on page 43.)

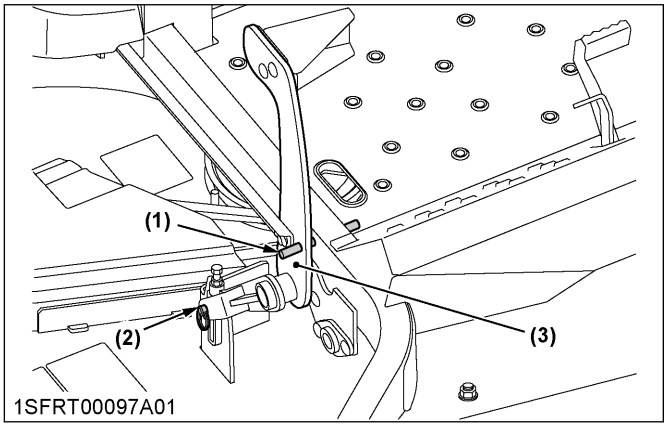


(1) Mower lift pedal *(P) "PUSH"*

4. Adjust the anti-scalp rollers to the 38.1 mm (1.5 in.) position.
   (See ADJUSTING THE CUTTING HEIGHT on page 43.)

5. Put a Φ9.5 mm (0.37 in.) x 100 mm (4 in.) shaft in the hole of the front right side lift link.

   IMPORTANT :
   - **The shaft passes through a hole in the frame.**



(1) Shaft (Φ9.5 mm × 100 mm, 0.37 in. × 4 in.)
(2) Clevis pin
(3) Lift link

6. Remove the 4 clevis pins mounting the mower deck.
7. Push the mower lift pedal toward the seat and remove the Φ9.5 mm (0.37 in.) shaft from the hole in the rear right side lift link.
8. Slowly push the mower lift pedal to the full up position.
9. Slide the mower deck from under the machine to the right side of it.

OPERATING THE ENGINE

⚠ WARNING

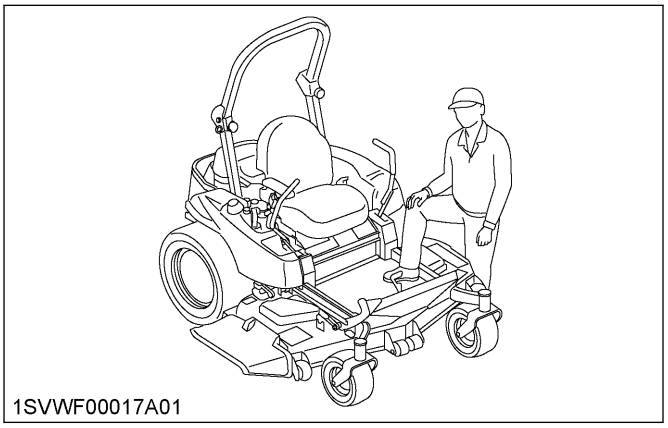
To avoid serious injury or death:

- **Read and understand the safe operation section.**
- **Read and understand the safety labels located on the machine.**
- **To avoid the danger of exhaust fume poisoning, do not operate the engine indoors without proper ventilation.**
- **Never start the engine while standing on the ground. Start the engine only from the operator's seat.**

Details regarding safe operation can be found in a different section.
(See SAFE OPERATION on page 5.)

GETTING ON AND OFF THE MACHINE SAFELY

Do not step on either side of the mower deck when you get on and off the machine. When you get on and off the machine from either side, step over the mower deck.

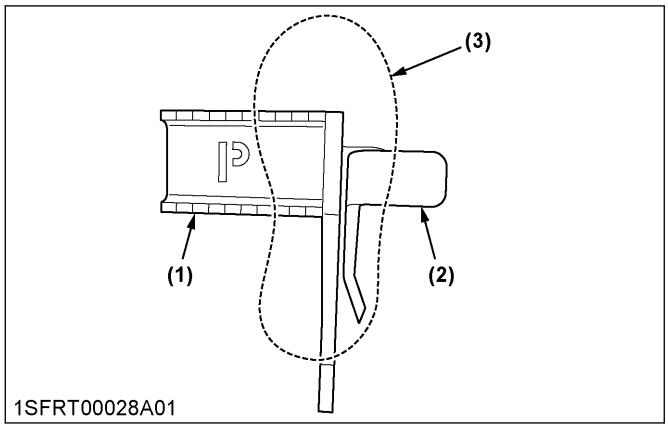


STARTING THE ENGINE

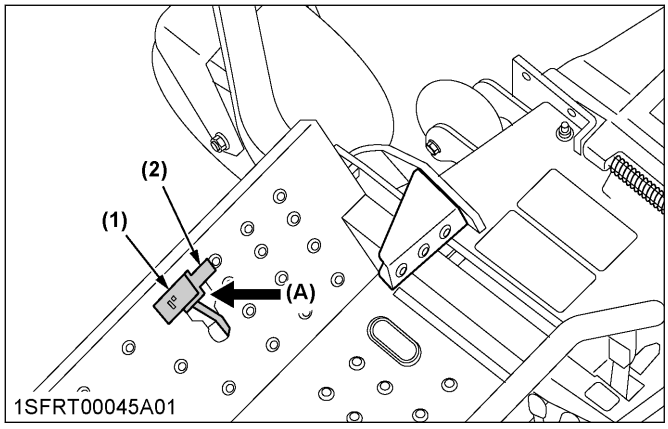
1. Sit on the operator's seat. Put on the seat belt.
2. Apply the parking brake.

   To apply the parking brake:

   a. Depress the parking brake pedal firmly with the left side of your right foot.
   b. While keeping the parking brake pedal depressed, use the right side of your right foot to depress the parking brake lock pedal.
   c. Release the parking brake pedal while holding down the parking brake lock pedal.
   d. Release the parking brake lock pedal.



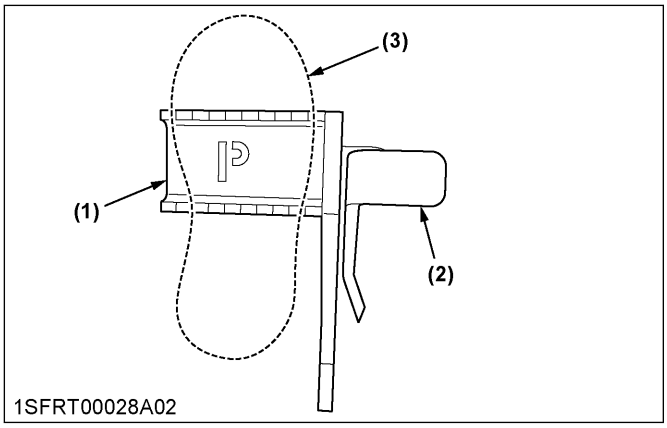
(1) Parking brake pedal
(2) Parking brake lock pedal
(3) Right foot



(1) Parking brake pedal
(2) Parking brake lock pedal
(A) "DEPRESS"

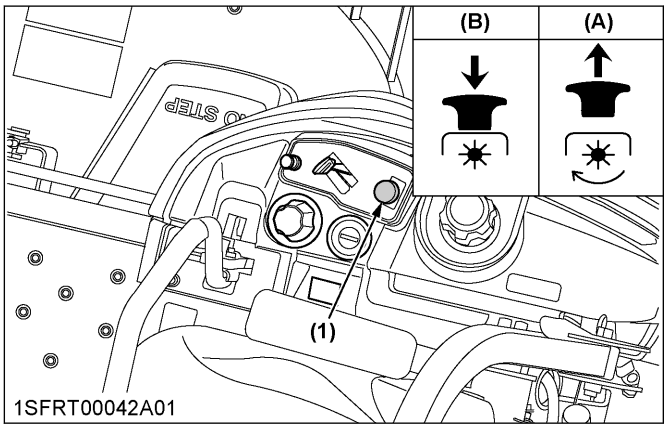
To release the parking brake:

Depress the parking brake pedal and release it slowly with your right foot without pressing the parking brake lock pedal.



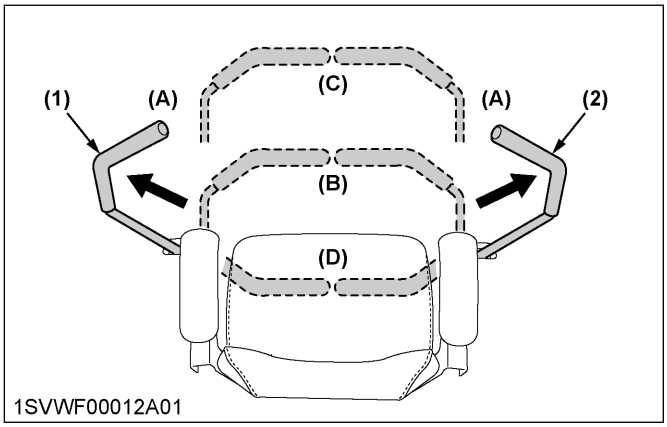
(1) Parking brake pedal
(2) Parking brake lock pedal
(3) Right foot

3. Make sure that the PTO switch is in the *"DISENGAGED"* (OFF) position.



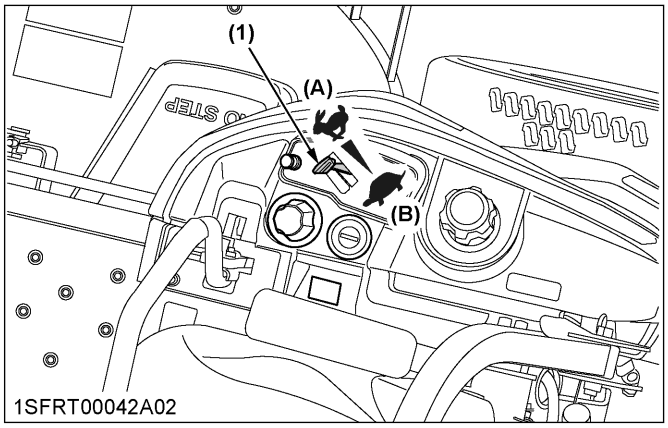
(1) PTO switch
(A) "ENGAGED" (ON)
(B) "DISENGAGED" (OFF)

4. Place the motion control levers in the *"NEUTRAL LOCK"* position.



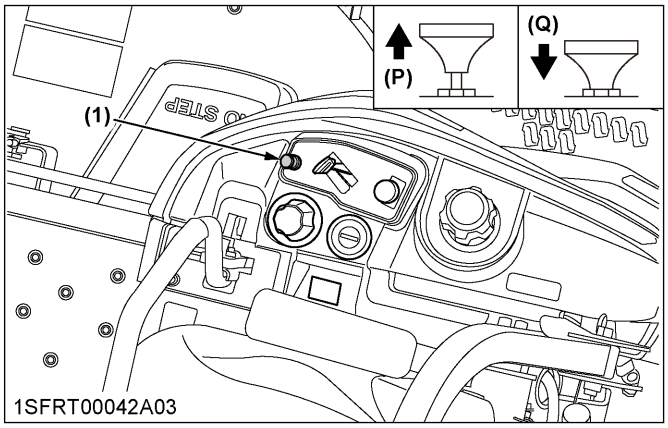
(1) Motion control lever (LH)
(2) Motion control lever (RH)
(A) "NEUTRAL LOCK" position
(B) "NEUTRAL" position (held by hands)
(C) "FORWARD"
(D) "REARWARD"

5. Set the throttle lever as follows.
   Place the throttle lever midway between the *"SLOW"* and the *"FAST"* positions.



(1) Throttle lever
(A) "FAST"
(B) "SLOW"

6. Set the choke knob to the *"ON"* position.



(1) Choke knob
(P) "PULL" (ON)
(Q) "PUSH" (OFF)

7. Insert the key into the key switch. Turn the key switch to the *"START"* position and release the key to the *"ON"* position when the engine starts.
   (See Key switch on page 31.)

   IMPORTANT :
   - **Because of the start interlocks, the engine can not be started except when the PTO switch is disengaged (OFF), the parking brake is applied, motion control levers are in *"NEUTRAL LOCK"* position and the operator is sitting on the seat.**

8. Warm up the engine by running at medium speed.

1. Choke knob

Pull the choke knob to engage the choke.
Push in the choke knob to disengage the choke.
When the engine is cold
Always engage the choke to start the engine in cold conditions.
The engine and equipment may be operated during the warmup period, but it may be necessary to leave the choke partially on until the engine warms up.

When the engine is warm
Always place the throttle lever to the usual position after the engine starts.

2. Throttle lever

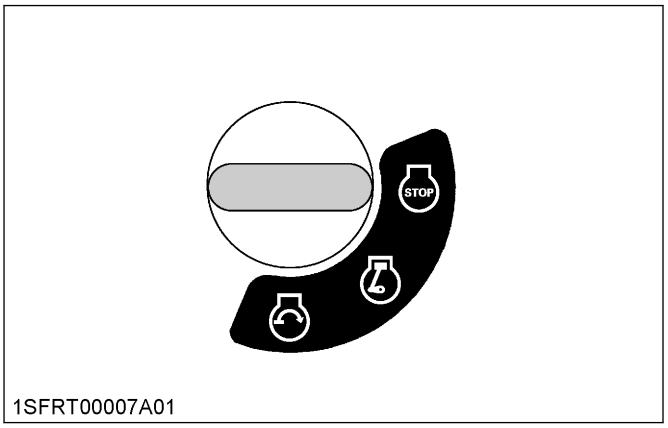
Pulling the throttle lever backward decreases the engine speed and pushing it forward increases the engine speed.

3. Key switch

OFF
The position where the key can be inserted into or removed from the key switch. When the key is turned to this position, the engine shuts off.

ON
The engine keeps running.

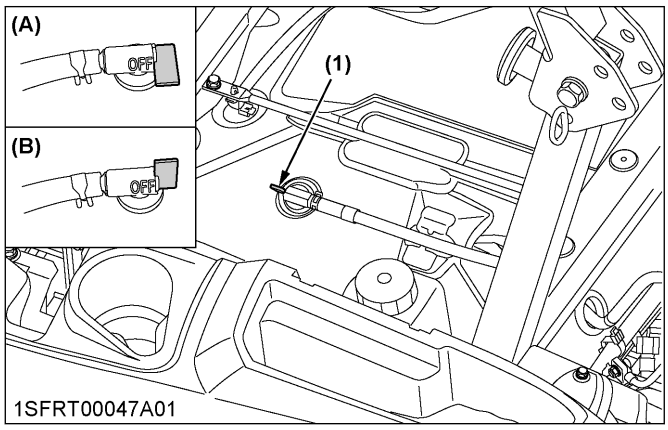
START
Apply the parking brake and turn the key switch to this position to start the engine.



IMPORTANT :
- **Do not use starting fluid or ether.**
- **To protect the battery and the starter, make sure that the starter is not continuously turned for more than 10 seconds at a time.**
  If the engine does not start, allow a 60 seconds cool down period between starting attempts.
- **If the starter does not turn the engine over, shut off the starter immediately. Do not make further attempts to start the engine until the condition is corrected. Do not jump start using another battery.**
  Consult your local KUBOTA Dealer.
- **Do not turn the key switch to the *"START"* position while the engine is running.**
- **When the temperature is below 0 ℃ (32 ℉), run the engine at medium speed to warm up the lubricant of the engine and the transmission for at least 10 minutes. If the machine is operated before the lubricant is warm enough, the machine operating life will be shortened.**
- **Do not operate the machine under full load until it is sufficiently warmed up 2 or 3 minutes for temperature above 0 ℃ (32 ℉).**
- **When the ambient temperature is less than -15 ℃ (5 ℉), remove the battery from the machine and store it somewhere warm until the next operation.**

STOPPING THE ENGINE

1. After slowing the engine to half speed, turn the key switch to the *"OFF"* position.
2. Remove the key.
3. Do not leave the key switch at *"ON"* (key in the *"ON"* position), as the battery will discharge when the engine is not running.
4. Apply the parking brake.
5. If stopping the machine for a long time, turn the fuel valve to the *"STOP"* (OFF) position.



(1) Fuel valve
(A) "STOP" (OFF)
(B) "RUN"

IMPORTANT :
- **Do not stop the engine when the machine is on an incline for a long time. The engine oil may go into the carburetor and the muffler through the valve system.**
- **Before stopping the engine, place the throttle control lever in the half speed position to help prevent the engine from backfiring.**

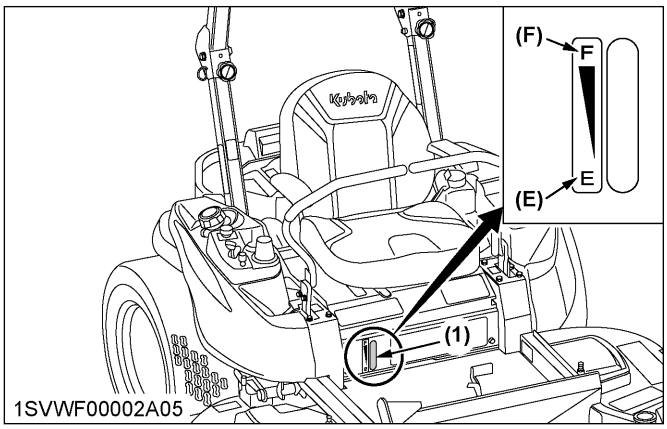
CHECK DURING OPERATING

IMPORTANT :
Immediately stop the engine if:
- **The engine suddenly slows down or accelerates.**
- **Unusual noises suddenly occur.**
- **Exhaust fumes suddenly become discolored.**

While operating, make the following checks to see that all the parts are functioning normally:
- Fuel gauge on page 32
- Hour meter on page 32

1. Fuel gauge

The fuel gauge indicates the fuel level.

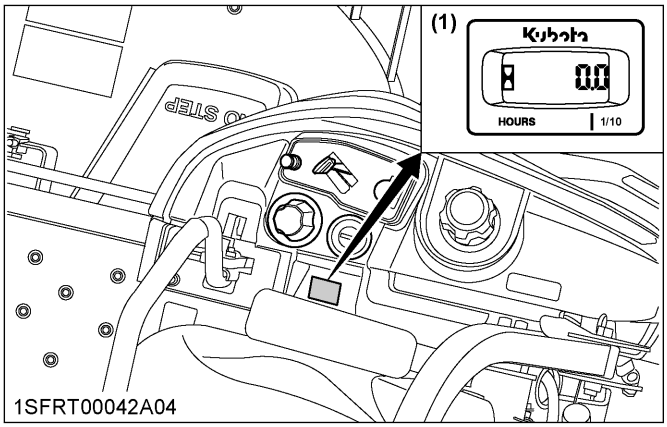


(1) Fuel gauge
(E) "EMPTY"
(F) "FULL"

IMPORTANT :
- **Do not refuel over [F]. Fill the tank only to the bottom of the filler neck in the fuel tank.**
- **Refuel on a level ground.**

2. Hour meter

This meter indicates the number of hours the engine has run.



(1) Hour meter

COLD WEATHER STARTING

If the ambient temperature is below 0 ℃ (32 ℉) and the engine is very cold, start it in the following manner:

1. Pull the choke knob out (*"CHOKE ON"* position).
2. Place the throttle lever midway between the *"SLOW"* and the *"FAST"* positions.
3. Turn the key switch to the *"START"* position.
   a. Operate the starter 5 seconds.
   b. If the engine does not start, wait 10 seconds.
   c. Repeat this procedure until the engine starts.
4. When the engine starts, release the key to the *"ON"* position.
5. Push in the choke knob (*"CHOKE OFF"* position).

WARMING UP THE ENGINE

⚠ WARNING

To avoid serious injury or death:
- **Be sure to apply the parking brake during warm-up.**

For 5 minutes after the engine start-up, allow the engine to warm up without applying any load. This is to allow oil to reach every part of the engine. If load is applied to the engine without this warm-up period, problems such as seizure, breakage or premature wear may appear.

1. Warm-up and transmission oil in the low temperature range

Hydraulic oil serves as transmission oil. In cold weather conditions, the oil may be cold with increased viscosity. This can cause delayed oil circulation or abnormally low hydraulic pressure for some time after engine start-up. This, in turn, can create problems with the hydraulic system.
To prevent this from happening warm up the engine at about 50% of rated rpm according to the following table.

Ambient temperature	Warm-up time requirement
Higher than 0 ℃ (32 ℉)	Approximately 5 minutes
-10 to 0 ℃ (14 to 32 ℉)	5 to 10 minutes
-20 to -10 ℃ (-4 to 14 ℉)	10 to 15 minutes
Below -20 ℃ (-4 ℉)	More than 15 minutes

IMPORTANT :
- **Do not operate unless the engine is well warmed up. If operation is attempted while the engine is still cold, the hydraulic mechanism will not function properly and its service life will be shortened.**
- **If noises are heard after you operate the motion control levers, the hydraulic mechanism is not adjusted properly. Unless corrected, the unit will be damaged. Contact your local KUBOTA Dealer for adjustment.**

JUMP STARTING

⚠ WARNING

To avoid serious injury or death:

- **Keep cigarettes, sparks, and flames away from the battery.**
- **If the machine battery is frozen, do not jump start the engine.**
- **Do not connect the other end of the negative jumper cable to the negative terminal of the machine battery.**

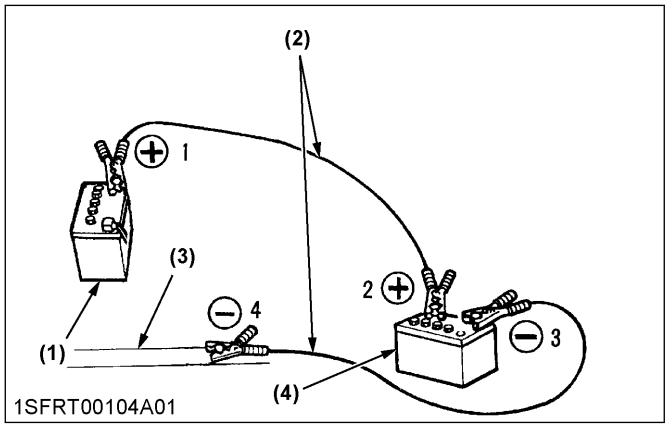
When jump starting the engine, observe the following instructions to start the engine safely:

1. Bring a helper vehicle with a battery of the same voltage as the disabled machine within easy cable reach.

   IMPORTANT :
   - **The vehicles must not touch.**

2. Apply the parking brakes of both vehicles and put the shift levers in the neutral position. Shut the engine off.
3. Put on safety goggles and rubber gloves.
4. Ensure that vent caps are securely in place (if equipped).
5. Attach the red clamp to the positive (red, (+) or pos.) terminal of the dead battery and clamp the other end of the same cable to the positive (red, (+) or pos.) terminal of the helper battery.
6. Clamp the other cable to the negative (black, (-) or neg.) terminal of the helper battery.
7. Clamp the other end to the engine block or the frame of the disabled machine as far from the dead battery as possible.
8. Start the helper vehicle and let its engine run for a few moments. Start the disabled machine.
9. Disconnect the jumper cables in the exact reverse order of attachment (steps 7, 6 and 5).

   Connect cables in numerical order.
   Disconnect in reverse order after use.



(1) Dead battery
(2) Jumper cables
(3) Engine block or frame
(4) Helper battery

IMPORTANT :

- **This machine has a 12 volt negative (-) ground starting system.**
- **Use only same voltage for jump starting.**
- **Use of a higher voltage source on the machine could result in severe damage to the machine electrical system.**
  Use only a matching voltage source when *"jump starting"* a low or dead battery.

OPERATING THE MACHINE

OPERATING A NEW MACHINE

How a new machine is operated and maintained will determine the operating life of the machine.
A new machine just off the factory production line has been tested, but the various parts are not accustomed to each other, so care should be taken to operate the machine for the first 50 hours at a slower speed and avoid excessive work or operation until the various parts become *"broken-in"*. The manner in which the machine is handled during the *"breaking-in"* period greatly affects the life of your machine. Therefore, to obtain the maximum performance and the longest operating life of the machine, it is very important to properly break-in your machine. In handling a new machine, the following precautions should be observed.

1. Changing lubricating oil for new machine

The lubricating oil is especially important in the case of a new machine. The various parts are not *"broken-in"* and are not accustomed to each other. Small metal grit may develop during the operation of the machine and this may wear out or damage the parts. Therefore, care should be taken to change the lubricating oil a little earlier than it would ordinarily be required.
Details regarding normal service intervals can be found in a different section.
(See SERVICE INTERVALS on page 48.)

2. Engine break-in

After the first 8 hours of operation, change the engine oil.
(See SERVICE INTERVALS on page 48 and EVERY 100 HOURS on page 60.)

3. Machine break-in

After the first 100 hours of operation, change the transaxle fluid and the oil filter.
(See EVERY 100 HOURS on page 60.)

⚠ DANGER

To avoid serious injury or death:

- **Do not operate the mower without the discharge deflector in the down position.**

⚠ WARNING

To avoid serious injury or death:

- **The machine relies upon the engine driven transmission for speed, direction, and motion control. If the engine is not running, the machine cannot be driven or controlled.**
  If the engine stops when operating on a slope, apply the parking brake immediately to prevent a machine runaway.
- **Do not allow anyone other than the driver to ride on the machine.**
- **Do not drive the machine close to the edges of ditches or banks which may collapse under the weight of the machine, especially when the ground is loose or wet.**
- **When making a turn, be sure to reduce the travel speed and operate the motion control levers carefully.**
- **To avoid tip-over accidents, operate across slopes, not up and down. Avoid sudden starts and stops on slopes. Slow down and use extra caution when changing direction on a slope.**
  Park the machine on a firm and level surface.
- **Watch where you are going at all times. Watch for and avoid obstacles. Be alert at curbs, near trees, and other obstructions and hidden hazards.**
- **Do not mow near drop-offs, ditches or embankments. The mower could turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.**
- **Do not drive the machine on streets or highways. Watch for traffic when you cross roads or operate near roads.**
- **Look to the rear before and when backing. Make sure the area immediately behind you is clear of obstructions or holes, and small children. Use extra caution when the machine is equipped with a grass catcher.**
- **Keep bystanders, especially children, and animals away from the mowing area.**
- **Clear the work area of objects which might be picked up and thrown by the blades.**
- **Do not direct the opening of the mower at bystanders or animals. Ejected objects may cause injury. Plan your mowing carefully before starting operation.**
- **Be sure to disengage the PTO and sit on the operator's seat before starting the engine.**

OPERATING THE FOLDABLE ROPS

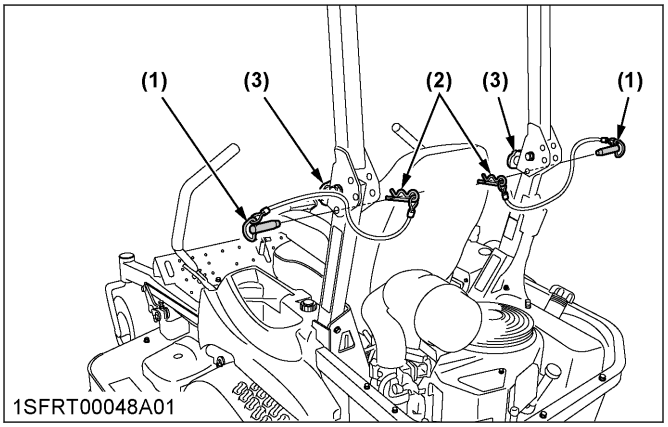
⚠ WARNING

To avoid serious injury or death:

- **When raising or folding the ROPS, apply the parking brake, stop the engine and remove the key.**
  Always fold the ROPS from a stable position at the rear of the machine.
- **Fold the ROPS down only when absolutely necessary and fold it up and lock it again as soon as possible.**
- **Before proceeding to fold the ROPS, check for any possible interference with installed implements and attachments.**
  If an interference occurs, contact your local KUBOTA Dealer.

1. Folding the ROPS

1. Loosen the knob bolts 1 to 2 turns.
2. Remove both lock pins.



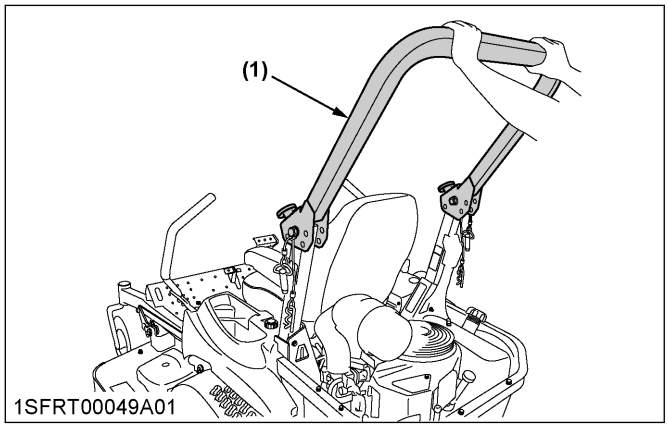
(1) Lock pin
(2) Snap pin
(3) Knob bolt

3. Fold the ROPS.

⚠ CAUTION

To avoid personal injury:

- **Hold the ROPS tightly with both hands and fold the ROPS slowly and carefully.**



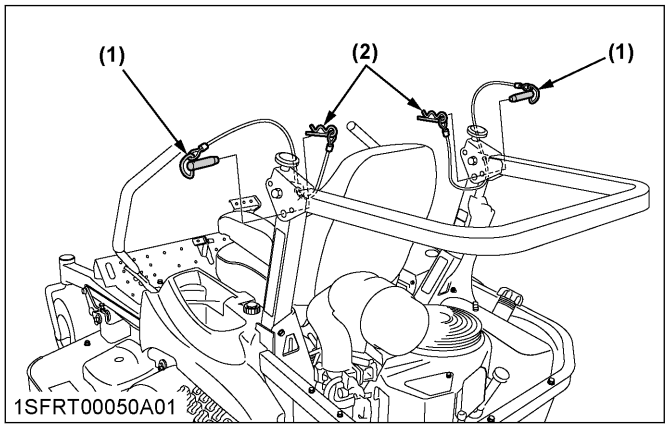
(1) ROPS

4. Align the lock pin holes and insert both lock pins and secure them with the snap pins.

⚠ WARNING

To avoid serious injury or death:

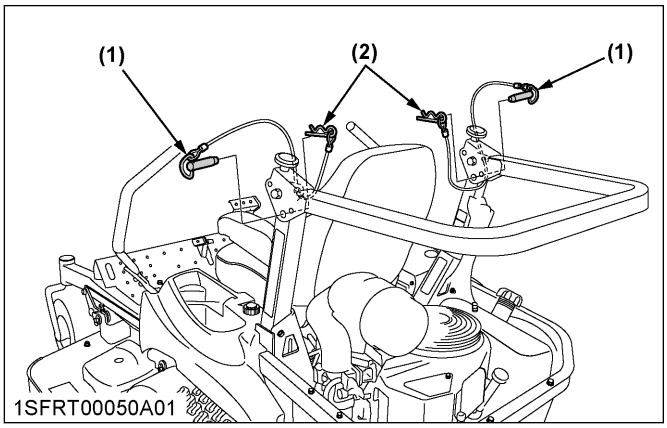
- **Make sure that both lock pins are properly installed and secured with the snap pins.**
- **Do not use your fingers to align the holes.**



(1) Lock pin
(2) Snap pin

2. Raising the ROPS to the upright position

1. Remove both snap pins and lock pins.



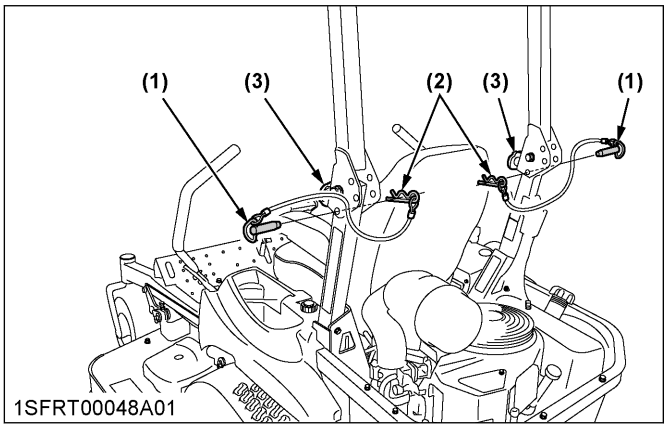
(1) Lock pin
(2) Snap pin

2. Raise the ROPS to the upright position.

⚠ WARNING
To avoid serious injury or death:
- **Hold the ROPS tightly with both hands and raise the ROPS slowly and carefully.**
- **Do not use your fingers to align the holes.**

3. Align the lock pin holes, insert both lock pins and secure them with the snap pins. Do not use your fingers to align the holes.
4. Tighten the knob bolts slightly.

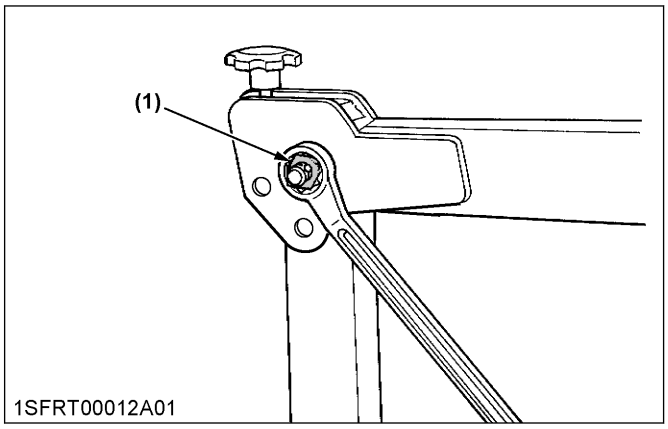
⚠ CAUTION
To avoid personal injury:
- **Make sure that both lock pins are properly installed as soon as the ROPS is in the upright position and secured with the snap pins.**



(1) Lock pin
(2) Snap pin
(3) Knob bolt

3. Adjusting the foldable ROPS

1. Adjust the free fall of the ROPS upper frame regularly.
2. If you feel less friction when folding the ROPS, tighten the nut (1) until you feel the right friction when moving it. Then replace the snap pin.



(1) Nut

STARTING THE MACHINE

⚠ WARNING
To avoid serious injury or death:
- **Read and understand the safe operation section.**
- **Read and understand the safety labels located on the machine.**
- **To avoid the danger of exhaust fume poisoning, do not operate the engine indoors without proper ventilation.**
- **Never start the engine while standing on the ground. Start the engine only from the operator's seat.**

1. Adjust the operator's position and apply the seat belt.
   - Operator's seat on page 37
   - Seat belt on page 37
2. Start the engine.
   See OPERATING THE ENGINE on page 29.
3. Raise the implement.
   - Mower lift pedal on page 38
4. Accelerate the engine.
   - Throttle lever on page 38
5. Unlock the parking brake.
   - Parking brake pedal on page 38
6. Operate the machine.
   - Motion control lever on page 38
   - Stop position of the motion control lever on page 39
   - Operating position of the motion control lever on page 39

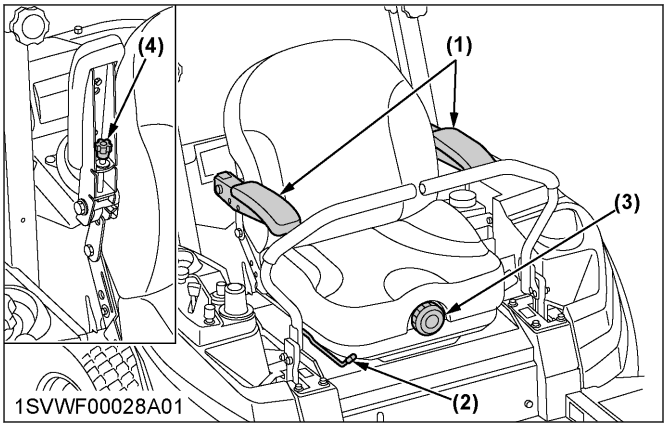
1. Operator's seat

⚠ WARNING

To avoid serious injury or death:

- **Make adjustments to the seat only while the machine is stopped.**
- **Make sure that the seat is completely secured after each adjustment.**
- **Do not allow anyone other than the driver to ride on the machine.**

1.1 Suspension type on Z412KW, Z422KW, Z422KWT



(1) Armrest
(2) Seat adjusting lever
(3) Suspension adjusting knob
(4) Armrest angle adjuster

Fore-aft adjustment
Pull the seat adjusting lever and slide the seat.

Suspension adjustment
Turn the suspension adjustment knob to achieve the optimal suspension setting.
Clockwise: firm ride
Counterclockwise: soft ride

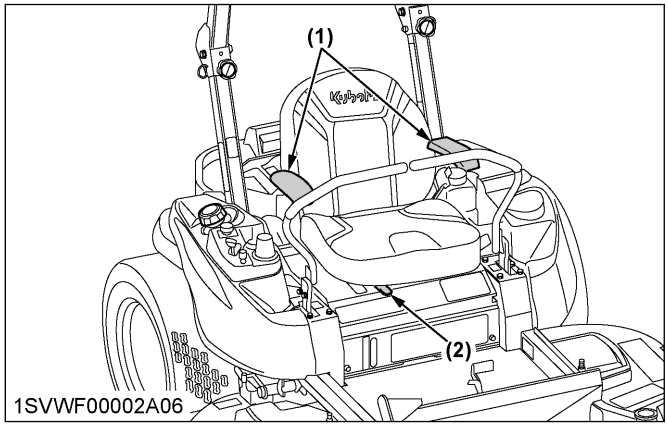
Armrest
The armrest may be set at the upright position if desired.

Armrest angle adjustment
Turn the armrest angle adjuster to the desired angle.

IMPORTANT :

- **After adjusting the operator's seat, be sure to check and see that the seat is securely locked.**

1.2 Standard type on Z411KW, Z421KW, Z421KWT



(1) Armrest
(2) Seat adjusting lever

Fore-aft adjustment
Pull the seat adjusting lever and slide the seat.

Armrest
The armrest may be set at the upright position if desired.

IMPORTANT :

- **After adjusting the operator's seat, be sure to check and see that the seat is securely locked.**

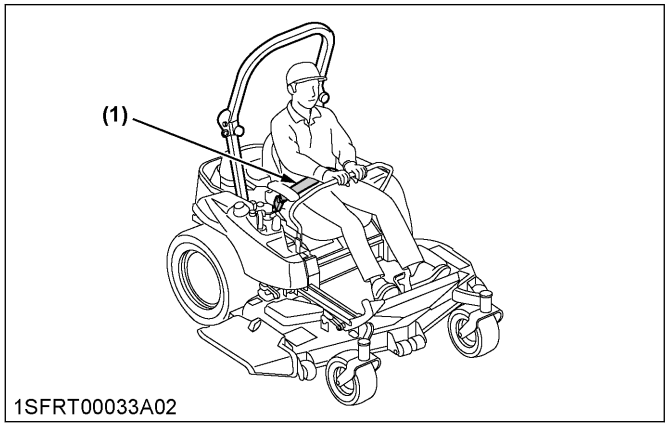
2. Seat belt

⚠ WARNING

To avoid serious injury or death:

- **Always use the seat belt when the ROPS is installed.**
- **Do not use the seat belt if a foldable ROPS is down or if there is no ROPS.**

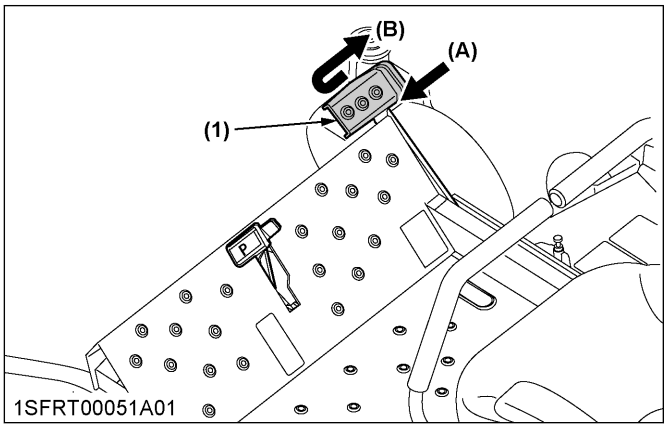
Adjust the seat belt for proper fit and connect to the buckle. The seat belt is an auto-locking retractable type.



(1) Seat belt

3. Mower lift pedal

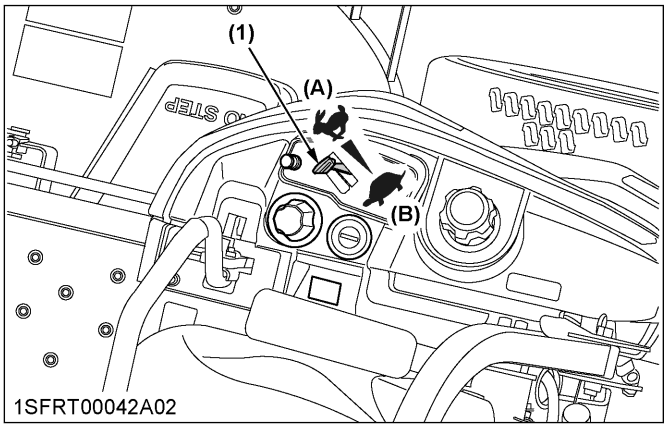
1. The mower lift pedal is used to raise and lower the mower deck.
   - To raise and lock the mower deck at the carry position, push the pedal to the end of the pedal stroke.
   - To lower the mower deck, push the pedal all the way then release the pedal to the desired mower deck cutting height.



(1) Mower lift pedal
(A) "RAISE and LOCK" position
(B) "LOWER" position

4. Throttle lever

- Move the throttle lever backward to decrease the engine speed.
- Move it forward to increase the engine speed.

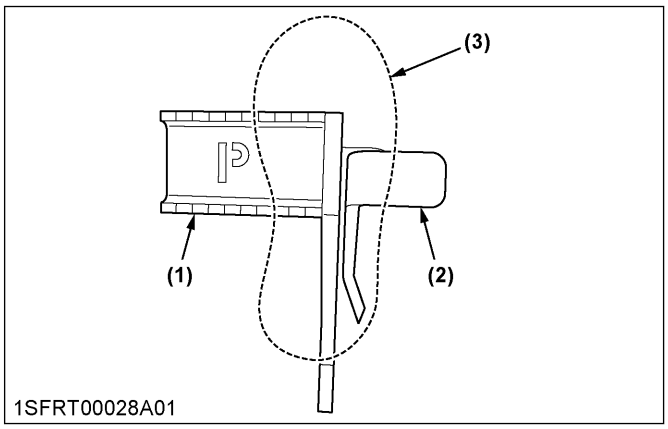


(1) Throttle lever
(A) "INCREASE"
(B) "DECREASE"

5. Parking brake pedal

To apply the parking brake:

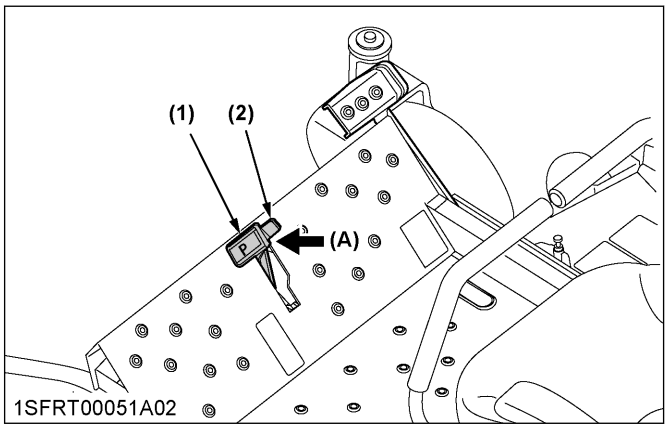
1. Depress the parking brake pedal firmly with the left side of your right foot.
2. While keeping the parking brake pedal depressed, use the right side of your right foot to depress the parking brake lock pedal.
3. Release the parking brake pedal while holding down the parking brake lock pedal.
4. Release the parking brake lock pedal.



(1) Parking brake pedal
(2) Parking brake lock pedal
(3) Right foot

To release the parking brake:

Depress the parking brake pedal and release it slowly with your right foot, without pressing the parking brake lock pedal.



(1) Parking brake pedal
(2) Parking brake lock pedal
(A) "DEPRESS"

6. Motion control lever

⚠ WARNING

To avoid serious injury or death:

- **Understand how to use the motion control levers and practice in an unrestricted area at slightly more than idle speed without the mower engaged until becoming proficient in the operation of the machine.**
- **Do not move motion control levers from the *"FORWARD"* to *"REARWARD"* or from the *"REARWARD"* to *"FORWARD"* position rapidly. Sudden direction changes could cause the loss of control or damage to the machine or property.**
- **Do not make sharp turns at high speed.**

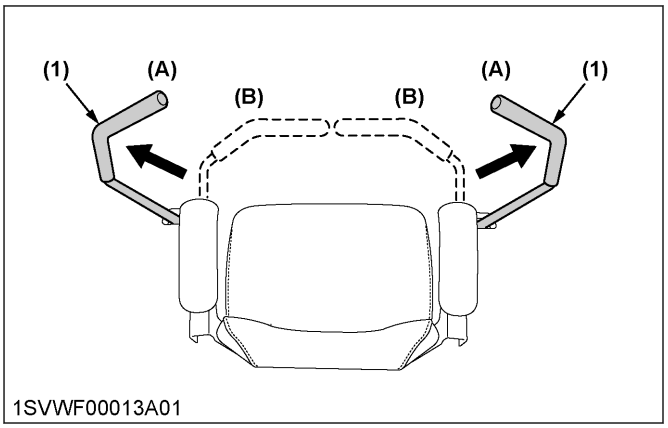
Fast and sharp turns could cause the loss of control.

- **Motion control levers must be in the *"NEUTRAL LOCK"* position to safely enter and exit the operator's seat or to carry out maintenance and safety checks.**
- **This machine can make sharp turns. Always make sure your intended path is clear of obstructions or people.**

6.1 Stop position of the motion control lever

Neutral lock position

Forward and rearward movements of the motion control levers are locked when these levers are in the *"NEUTRAL LOCK"* position (the engine can only be started with levers in this position).



(1) Motion control levers
(A) "NEUTRAL LOCK" position
(B) "NEUTRAL" position (held by hand)

6.2 Operating position of the motion control lever

Machine speed and steering is controlled by the motion control levers, when the engine is running and the parking brake is released.

⚠ WARNING

To avoid serious injury or death:

- **No control is provided by the motion control levers when the engine is off.**

Neutral position

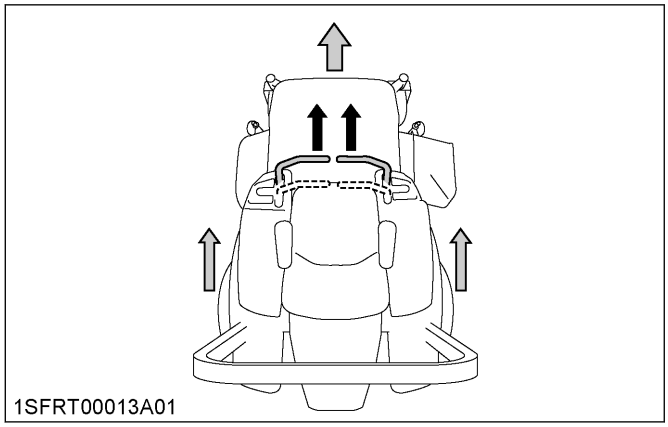
Grasp the motion control levers and move them inward from the *"NEUTRAL LOCK"* position so that the machine is in *"NEUTRAL"* (the engine cannot be restarted).

Forward and rearward motion:

1. Move the throttle lever to the *"FAST"* position.
2. Release the parking brake.
3. Move both motion control levers from the *"NEUTRAL LOCK"* position inward to the *"NEUTRAL"* position.
4. To move your machine, see the following figures.
   To stop:
   Move and hold both motion control levers to the *"NEUTRAL"* position until the machine comes to a stop.

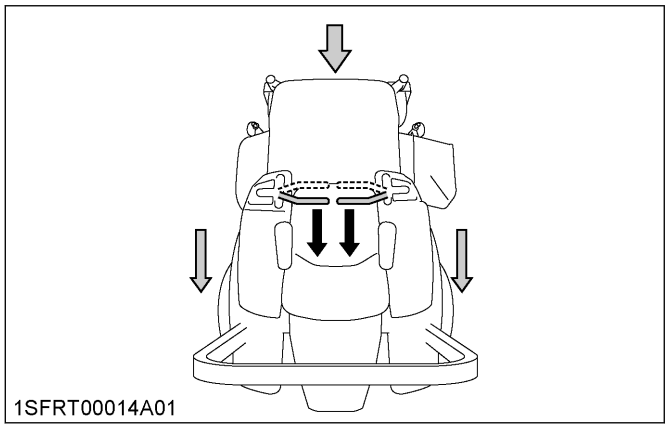
Forward:

For forward travel in a straight line, push both motion control levers forward equally and slowly.



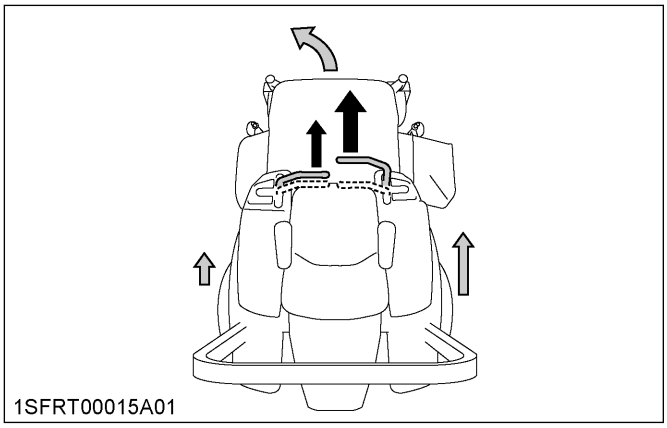
Rearward:

For rearward travel in a straight line, pull both motion control levers past center rearward equally and slowly.

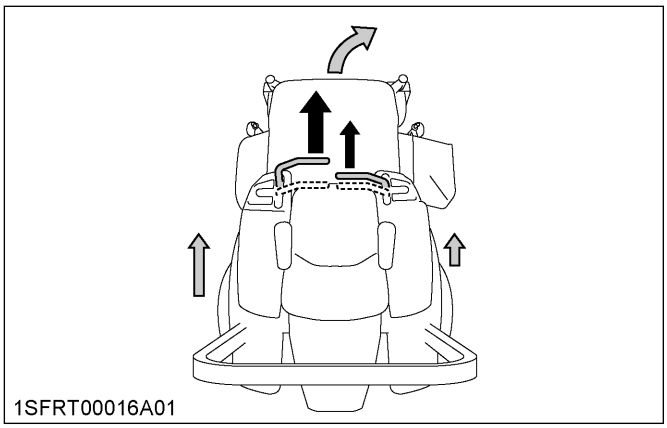


General left turn:

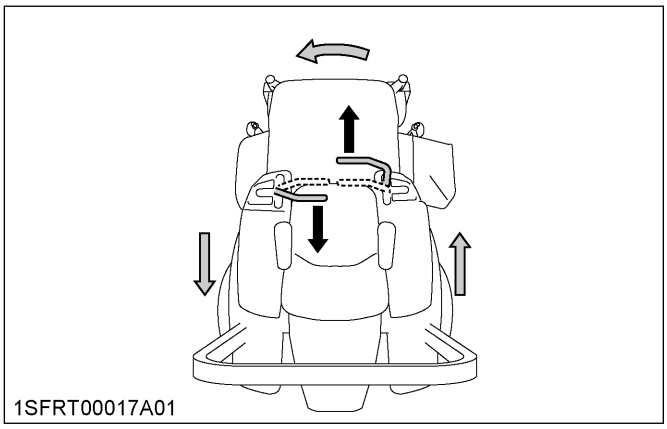
For forward travel to the left, push the right motion control lever further forward than the left motion control lever.



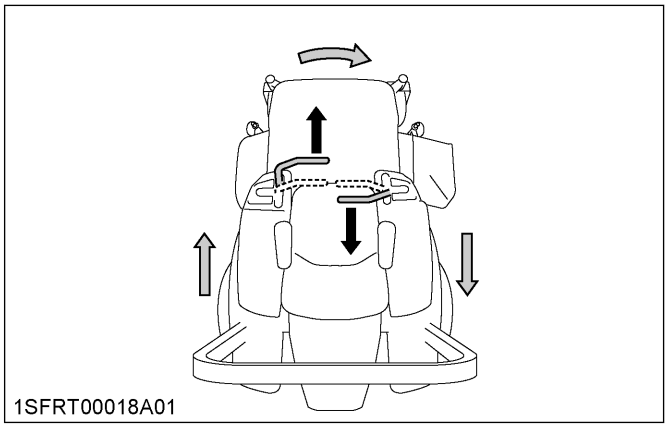
General right turn:
For forward travel to the right, push the left motion control lever further forward than the right motion control lever.



Sharp (zero) left turn:
Push the right motion control lever forward and pull the left motion control lever rearward at the same time.



Sharp (zero) right turn:
Push the left motion control lever forward and pull the right motion control lever rearward at the same time.



Adjustment

⚠ WARNING
To avoid serious injury or death:
- **The motion control lever adjustment is important to ensure the machine operates properly.**

NOTE :
- **The motion control levers are adjustable.**
  (If adjustment is required, see ADJUSTMENT on page 73.)
  We recommend you to contact your local KUBOTA Dealer.

STOPPING THE MACHINE

⚠ WARNING
To avoid serious injury or death:
- **Park the machine on level ground.**
  If necessary to park on an incline, stop the machine, apply the parking brake, and then stop the engine.
- **If you stop the engine on an incline without applying the parking brake, the machine could move and run away.**

IMPORTANT :
- **The parking brake is for parking use only. If the parking brake is applied when the motion control levers are not in the *"NEUTRAL LOCK"* position, the engine will stop. This feature is to prevent brake and transmission damage during operation.**
- **If on a slope and the engine quits, use the parking brake as the emergency brake and immediately stop the unit.**

1. Move both motion control levers to the *"NEUTRAL"* position to stop the machine.

2. Move both motion control levers to the *"NEUTRAL LOCK"* position.
3. Apply the parking brake.
4. Move the throttle lever to the half speed position and push the PTO switch to the *"DISENGAGE"* (OFF) position.
5. Lower all implements to the ground.
6. Turn off the engine and remove the key.

IMPORTANT :
- **Do not stop the engine when the machine is on an incline for a long time. The engine oil may go into the carburetor and the muffler through the valve system.**
- **Before stopping the engine, place the throttle control lever in the half speed position to help prevent the engine from backfiring.**

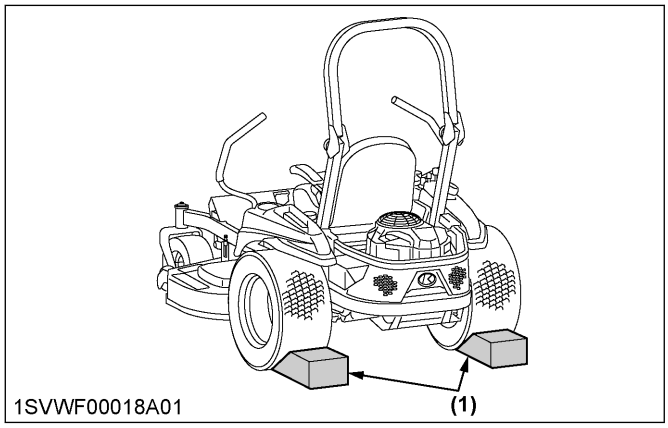
PARKING THE MACHINE

⚠ WARNING
To avoid serious injury or death:
Before leaving the operator's position:
- **Apply the parking brake.**
- **Lower all implements to the ground.**
- **Shut off the engine.**
- **Remove the key.**
- **Place the motion control levers in the *"NEUTRAL LOCK"* position.**

To lock:
1. Depress the parking brake pedal firmly with the left side of your right foot.
2. While keeping the parking brake pedal depressed, use the right side of your right foot to depress the parking brake lock pedal.
3. Release the parking brake pedal while holding the parking brake lock pedal down.
4. Release the parking brake lock pedal.

To unlock:
Depress the parking brake pedal and release it slowly with your right foot without pressing the parking brake lock pedal.

If necessary to park on an incline, be sure to chock the wheels on the downhill side to prevent accidental rolling of the machine.



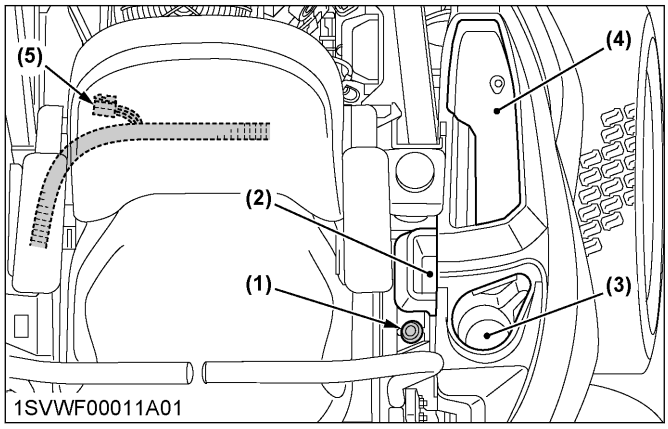
(1) Chock

ACCESSORIES

1. Electric outlet (12 volt), plug, smartphone holder, cup holder and utility box

- A 12 volt outlet is on the left-hand fender. An electrical charger or other device may be connected to this outlet.
- A 12 volt plug is behind the seat in the blue tape. An auxiliary light or other device may be connected to this plug.
- The outlet and plug are only powered when the key switch is at the *"ON"* or *"START"* position.
- Do not connect lights or other devices that draw more than a total of 84 watts to these power points, or the battery may discharge very rapidly, or the outlet or plug may fail.

IMPORTANT :
- **Do not use the outlet as a cigarette lighter.**
- **Do not use the outlet or the plug when it is wet.**
- **Make sure that the outlet cap is closed when the outlet is not used.**



(1) 12 volt outlet
(2) Smartphone holder
(3) Cup holder
(4) Utility box
(5) 12 volt plug

TRANSPORTING THE MACHINE

- To transport the machine on a trailer:
  - Turn the fuel valve to the *"OFF"* position.
  - Fasten the machine to the trailer.
- Do not attempt to tow this machine, or damage to the transmission may result.
- When trailering the machine over a long distance:
  - Make sure to lower the mower to the 38.1 mm (1.5 in.) cutting height by using the mower lift pedal.
- When transporting the machine under its own power:
  - Make sure to lift the mower to the *"TRANSPORT"* position by using the mower lift pedal.

1. Hydrostatic transaxle bypass rods

DANGER

To avoid serious injury or death:

- **Do not use bypass levers on or around slopes. The machine can run away and cause injury or death easily.**

WARNING

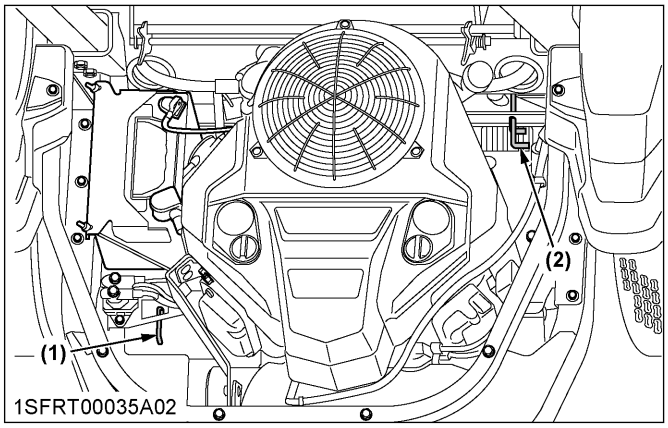
To avoid serious injury or death:

- **Do not touch the muffler or exhaust pipes while they are hot. Severe burns could result.**

IMPORTANT :

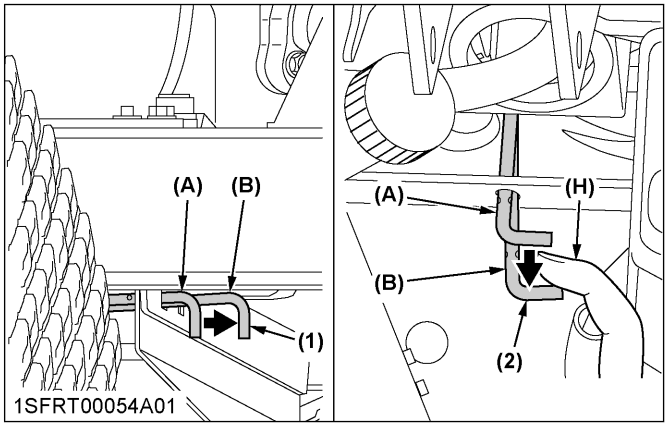
- **Do not push the machine without pulling the bypass rods, or transmission damage may occur.**
- **Never pull the rods with the engine running except for purging the transaxle.**

1. Face the machine from the rear, lift and pull the left side HST bypass rod from the *"OPERATING POSITION"* and push it down to the *"BYPASS POSITION"*.



(1) Left side HST bypass rod
(2) Right side HST bypass rod

2. Pull the right side HST bypass rod from the *"OPERATING POSITION"* to the *"BYPASS POSITION"*. Continue to hold the right side HST bypass rod in the *"BYPASS POSITION"* in order to move the machine.



(1) Left side HST bypass rod
(2) Right side HST bypass rod
(A) Operating position
(B) Bypass position
(H) "HOLD"

3. After moving, place both the right side and left side HST bypass rod back into the *"OPERATING POSITION"*.

OPERATING THE MOWER

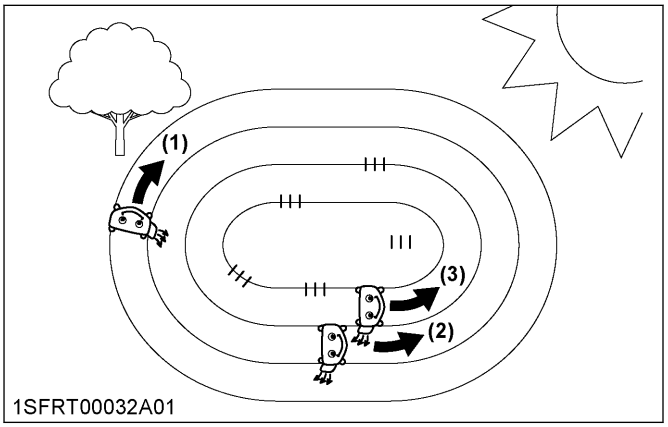
MOWING TIPS

⚠ WARNING

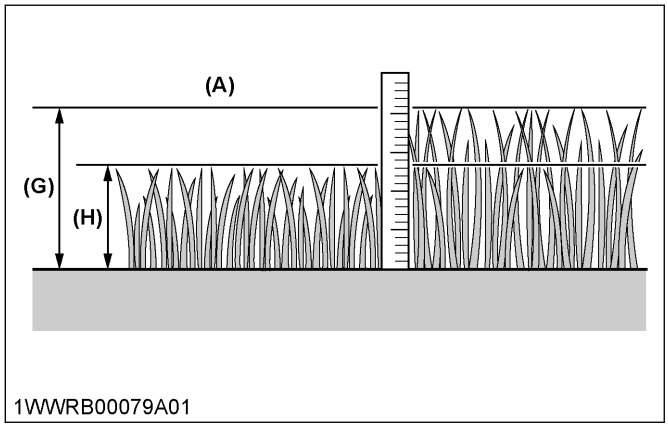
To avoid serious injury or death:

- **Clear the work area of objects which might be picked up and thrown by the blades.**
- **Keep bystanders and animals away from the mowing area.**

1. When using the mower for the first time, choose a smooth level area and cut in straight and slightly overlapping strips.
2. The size and type of the area to be mowed will determine the proper mowing pattern. Take into account obstructions, such as trees, fences and buildings.
   To keep grass clippings off fences, sidewalks and so on, it is advisable to go over the outside of the area to be mowed several times in a clockwise direction.
   To mow the area remaining, work in a counterclockwise direction so that the clippings are dispersed onto the previously cut area.



3. Always keep the left side of the mower toward trees, posts or other obstacles on the first trip around the obstacle.
4. Most lawns must be mowed to keep the grass approximately 50 to 80 mm (2 to 3 in.) high. Best results are obtained by cutting often and not too short.
   For a healthy lawn, only 1/3 of the grass plant should be removed in one mowing. For example, tall grass with the height of 75 mm (3 in.) can be cut to a minimum of 50 mm (2 in.).
   For extremely tall grass, set the cutting height at maximum cutting height for the first mowing, then reset to the desired height and mow again. Allow the grass to grow to 80 mm (3 in.), then cut off only the top 25 mm (1 in.).
5. Clippings may be left on the lawn unless they form clumps or rows.



(A) H/G>2/3
(G) Before mowing
(H) Best cut grass height: 50 to 80 mm

6. For best appearance, grass must be cut in the afternoon or evening when it is free of moisture.

ADJUSTING THE CUTTING HEIGHT

⚠ DANGER

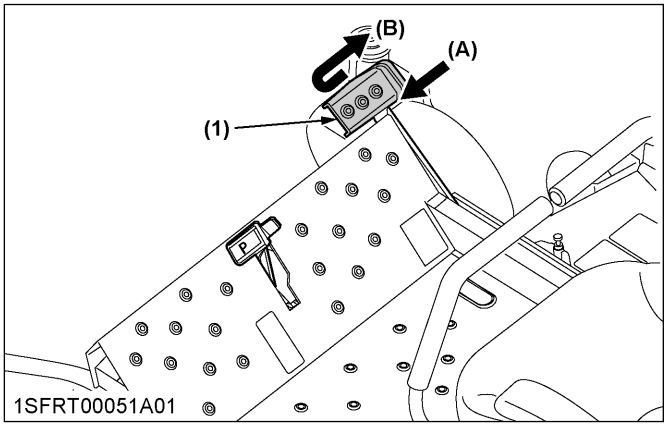
To avoid serious injury or death:

- **Do not engage the mower in the transport position.**

The cutting height control dial can adjust the cutting height from 38 mm (1.5 in.) to 127 mm (5 in.) at 6 mm (0.25 in.) increments.

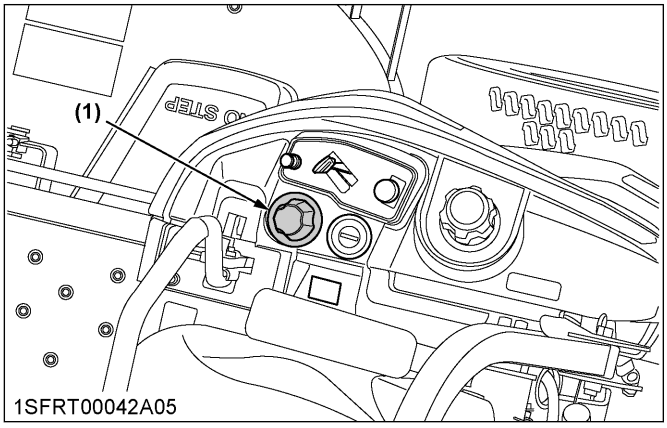
1. Before adjusting the cutting height, check that all tire pressures are correct. If necessary, adjust to the correct tire pressure.

2. To set the cutting height, push the mower lift pedal to raise the mower deck to the top position. Then adjust the cutting height control dial to the desired height.



(1) Mower lift pedal
(A) "RAISE and LOCK" position
(B) "LOWER" position

3. Use higher settings for mowing in a rough area or when mowing tall grass. Lower settings should be used only for smooth lawns where short grass is desired.



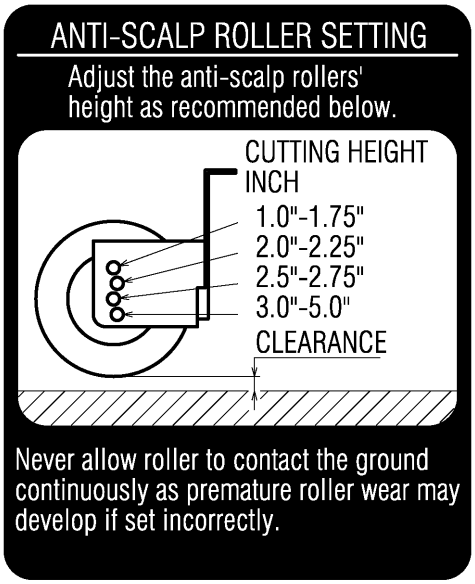
(1) Cutting height control dial

4. Lower the mower deck by pushing the mower lift pedal again. This lowers the mower deck from the *"TRANSPORT"* position to the *"OPERATING"* position.
5. Adjust the anti-scalp rollers' height as follows for normal operating condition.

IMPORTANT :

- **Never allow the rollers to contact the ground continuously as premature roller wear may develop if set incorrectly.**
- **Anti-scalp rollers must maintain a minimum clearance of 6 mm (0.25 in.) to the ground.**

Bolt setting



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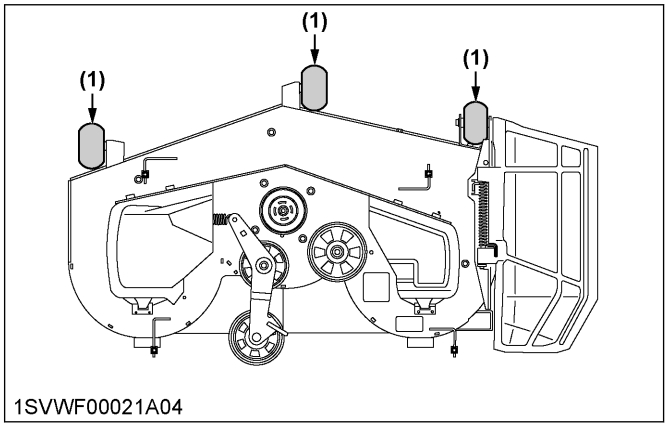
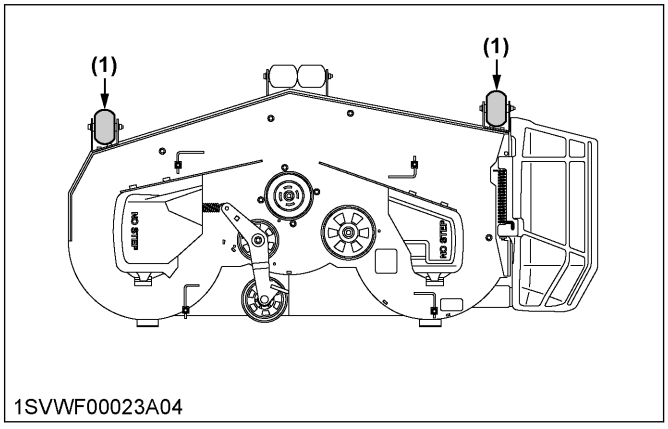
RCK48P, RCK54P



(1) Anti-scalp roller (front, bolt shift type)

RCK60P



(1) Anti-scalp roller (front, bolt shift type)

OPERATING THE MOWER

⚠ DANGER

To avoid serious injury or death:

- **Do not operate the mower without the discharge deflector being in place properly.**

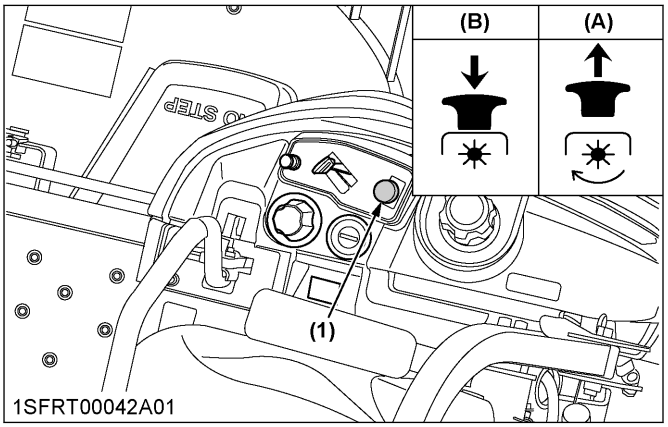
⚠ WARNING

To avoid serious injury or death:

- **Clear the work area of objects which might be picked up and thrown.**
- **Do not direct the opening of the discharge deflector at bystanders, especially children, or animals. Discharged objects may cause injury. Plan your mowing carefully before starting the operation.**
- **Keep bystanders and animals away from the mowing area.**
- **Be sure to disengage the PTO clutch of the mower before attempting to start the engine.**

1. PTO switch

1. To engage the PTO, pull the PTO switch to the *"ENGAGED"* (ON) position.
2. To disengage the PTO, push the PTO switch *"DISENGAGED"* (OFF) position.



(1) PTO switch

(A) "ENGAGED" (ON)
(B) "DISENGAGED" (OFF)

NOTE :

- **If you get off the seat while the PTO is running, the engine will stop automatically (operator presence control).**
- **Before starting the engine, push the PTO switch to the *"DISENGAGED"* (OFF) position. If it is at the *"ENGAGED"* (ON) position, the engine will not start.**
- **These interlock features are built-in.**

2. Starting the machine

⚠ WARNING

To avoid serious injury or death:

- **Engine components can get extremely hot from operation. To prevent severe burns, do not touch these areas while the engine is running, or immediately after it is turned off.**
- **Never operate the engine without heat shields or guards.**

1. Sit on the operator's seat.
   Put on the seat belt. Make sure that the parking brake is engaged.
2. Start the engine.
3. Engage the PTO switch.
4. Disengage the parking brake.
5. Speed up the engine by moving the throttle lever forward.
6. Push or pull the motion control levers to move forward or rearward.

IMPORTANT :

- **Never attempt to move the machine with the parking brake *"ON"*.**

NOTE :

- **Keep the engine running at full throttle for best results. Control the travel speed with the motion control levers.**
- **During heavy duty use, operate the machine at a slower ground speed or go over the area twice.**
- **Keep the mower deck in the raised position when the mower is disengaged.**
- **The mower will not cut cleanly if the ground speed is too high or if the blade speed drops due to an overload.**
- **If debris builds up on the grass screen or other cooling air intake areas, stop the engine and clean them. Operating the engine with blocked or dirty air intake and cooling areas causes damage due to overheating.**

TIRES AND WHEELS

TIRES

⚠ WARNING
To avoid serious injury or death:
- **Do not attempt to mount a tire. This should be done by a qualified person with the proper equipment.**
- **Always maintain the correct tire pressure. Do not inflate tires above the recommended pressure shown in the operator's manual.**
- **The inflation pressure in the front tires rises quickly when using compressed air.**
- **Never operate the machine with a loose rim, wheel, or axle.**
- **Whenever bolts are loosened, retighten to the specified torque.**
- **Check all the bolts frequently and keep them tightened.**

1. Inflation pressure

Even though the inflation pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Therefore, check it everyday and inflate as necessary.

Z411KW, Z421KW

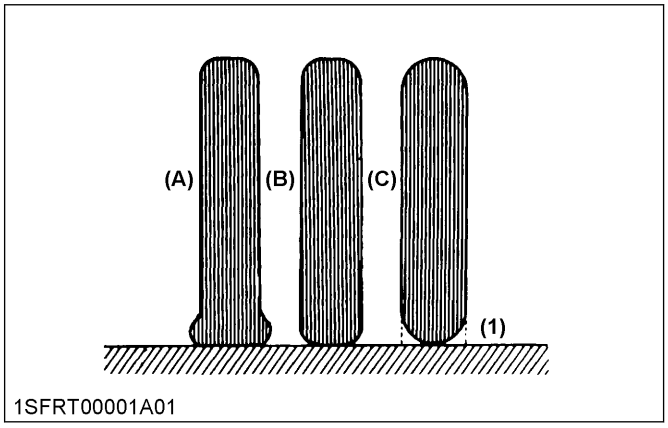
	Tire sizes	Recommended inflation pressure
Front	13 × 5 - 6, 4PR smooth	170 kPa 1.7 kgf/cm^2 25 psi
Rear	24 × 9.5 - 14, 4PR turf	83 kPa 0.84 kgf/cm^2 12 psi

Z412KW, Z422KW

Front	13 × 6.5 - 6, 4PR smooth	170 kPa 1.7 kgf/cm^2 25 psi
Rear	24 × 9.5 - 14, 4PR turf	83 kPa 0.84 kgf/cm^2 12 psi

Z421KWT, Z422KWT

Front	13 × 6.5 - 6, 4PR smooth	170 kPa 1.7 kgf/cm^2 25 psi
Rear	24 × 12 - 14, 4PR turf	83 kPa 0.84 kgf/cm^2 12 psi

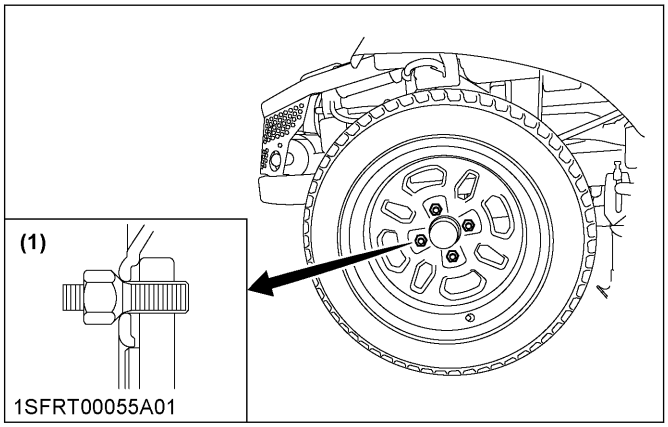


(1) Ground
(A) "INSUFFICIENT"
(B) "NORMAL"
(C) "EXCESSIVE"

WHEELS

IMPORTANT :
- **When refitting a wheel, tighten the wheel bolt to the following torques then recheck after traveling 200 m (200 yards), changing directions several times.**

Rear



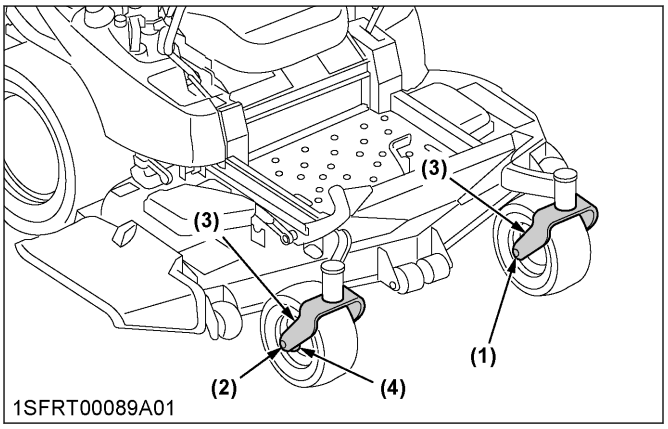
(1) 108.5 to 130.2 N·m
80 to 96 lbf·ft
11.1 to 13.3 kgf·m

When using wheels with beveled or tapered holes, use tapered wheel nuts.

1. Removing the front caster wheels

⚠ WARNING
To avoid serious injury or death:

- **Do not place your body under the machine or the mower deck while lifting the machine.**
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before removing the front caster wheels.**



(1) Lock nut
(2) Wheel bolt
(3) Yoke
(4) Dust cover

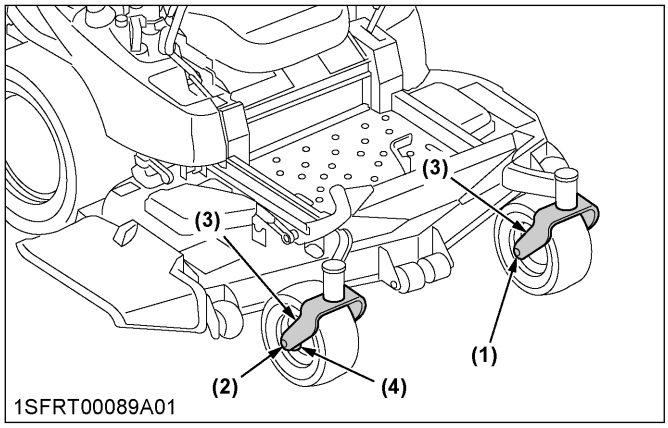
1. Lift the front of the machine with a safe lifting device.
2. Remove the lock nut with nylon sleeve and the wheel bolt.
3. Remove the wheel and dust covers from the yoke assembly.

2. Installing the front caster wheels

⚠ WARNING

To avoid serious injury or death:

- **Do not place your body under the machine or the mower deck while lifting the machine.**
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before removing the front caster wheels.**



(1) Lock nut
(2) Wheel bolt
(3) Yoke
(4) Dust cover

1. Install the replacement wheel and dust covers.
2. Install the wheel bolt and the lock nut with nylon sleeve.
3. Tighten the nut.
4. After installing, add grease to the grease fittings.

   IMPORTANT :
   - **Insert the wheel bolt from the outside of the yoke.**
   - **Tighten the nut gradually until the wheel bearing play is eliminated and the wheel turns freely by hand.**

Tightening torque	20 to 25 N·m 14.8 to 18.4 lbf·ft 2 to 2.5 kgf·m

5. Lower the machine.

MAINTENANCE

SERVICE INTERVALS

The following servicing tasks should be carried out on the machine at the stated running-time intervals.

No.	Items			Indication hour meter (hr)															Ref. page	
				8	25	50	100	150	200	250	300	350	400	450	500	550	600	After since		
1	Engine oil		Change	◎			○		○		○		○		○		○	every 100 hr	60	*1
2	Cylinder and cylinder head fins		Clean		○	○	○	○	○	○	○	○	○	○	○	○	○	every 25 hr	56	
3	Air cleaner	Foam element	Clean		○	○	○	○	○	○	○	○	○	○	○	○	○	every 25 hr	57	*2
		Paper element	Clean				○		○		○		○		○		○	every 100 hr	61	*2
			Replace						○				○				○	every 200 hr or 1 year	65	*2
4	Engine start system		Check			○	○	○	○	○	○	○	○	○	○	○	○	every 50 hr	58	
5	OPC system		Check			○	○	○	○	○	○	○	○	○	○	○	○	every 50 hr	59	
6	Front wheel, seat adjuster		Greasing			○	○	○	○	○	○	○	○	○	○	○	○	every 50 hr	60	
7	Carbon canister air filter		Check			○	○	○	○	○	○	○	○	○	○	○	○	every 50 hr	59	
			Replace															every 2 years	69	
8	Muffler and spark arrester (if equipped)		Check			○	○	○	○	○	○	○	○	○	○	○	○	every 50 hr or 1 year	60, 69	
9	Fuel filter		Check				○		○		○		○		○		○	every 100 hr	62	
			Replace						○				○				○	every 200 hr	65	*K
10	Battery condition		Check				○		○		○		○		○		○	every 100 hr	63	
11	Throttle cable		Adjust				○		○		○		○		○		○	every 100 hr	64	
12	Choke cable		Adjust				○		○		○		○		○		○	every 100 hr	64	
13	Mower link bushings		Greasing				○		○		○		○		○		○	every 100 hr	65	
14	Spark plug		Check				○		○		○		○		○		○	every 100 hr	61	
			Replace												○			every 500 hr	67	
15	Engine oil filter		Replace						○				○				○	every 200 hr	65	
16	Engine valve clearance		Adjust								○						○	every 300 hr	66	*K
17	Combustion chamber, valve seating surface		Clean, lap								○						○	every 300 hr	66	*K
18	Transaxle oil filter		Replace				◎						○					every 400 hr	66	*3
19	Transaxle fluid		Change				◎						○					every 400 hr	67	*3
20	Crankshaft		Lubricating												○			every 500 hr	68	
21	Electric clutch		Adjust												○			every 500 hr or 1 year	68	*4
22	Fuel line		Check															every 1 year	69	*5
			Replace															every 4 years	70	*K
23	Hydraulic hose		Check															every 1 year	69	*5
			Replace															every 4 years	70	*K

(Continued)

No.	Items		Indication hour meter (hr)														Ref. page	
			8	25	50	100	150	200	250	300	350	400	450	500	550	600	After since	
24	Fuse	Replace															Service as required	70	
25	Blade	Replace																70	
26	Mower belt	Replace																72	

*1 The initial 8 hour oil change is not the scheduled maintenance cycle.

*2 This maintenance should be done daily or more often in dusty conditions than in normal conditions.

*K Consult your local KUBOTA Dealer for this service.

*3 The initial 100 hour oil change and oil filter replacement are not the scheduled maintenance cycle.

*4 Every 500 hours or every 1 year, whichever comes first.

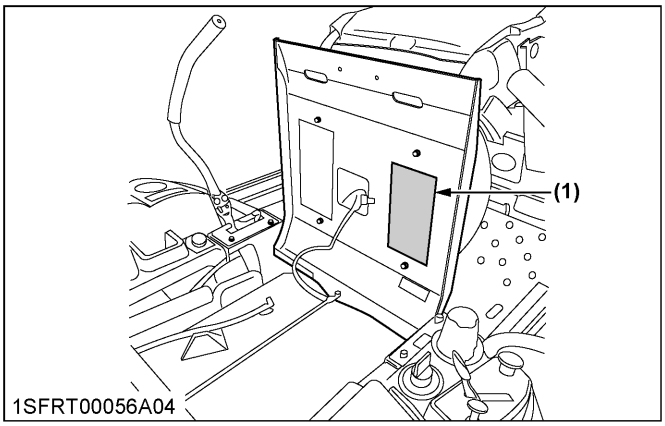
*5 Replace if any deterioration or damage occurred (crack, hardening, scar or deformation).

IMPORTANT :

- **The jobs indicated by ◎ must be done initially.**
- **Maintenance instructions related to gasoline engine emissions:**
  - **Non-warranty maintenance, repairs, or replacement of the emission control devices and systems should be performed by a qualified repair establishment or an individual who has the experience and equipment to perform such work.**
    See the Emissions Warranty Statement.
  - **To ensure the best quality and reliability, use new KUBOTA genuine parts or their equivalents for repairs and replacement, whenever you have maintenance done.**

PERIODIC SERVICE CHART LABEL

This label is for your quick reference. The label shows the recommended services from daily to every 4 years, including fluid capacities, tire pressure and so on. For detail, refer to operator's manual.



(1) Part No. K3071-6551-5 (ENGLISH)

PERIODIC SERVICE CHART

INTERVAL		RECOMMENDED SERVICE ※	
DAILY	CHECK	1.Tire pressure, wear, or damage. 2.Fuel and oil leakage from machine and mower. 3.Engine and transmission oil and fuel level. 4.Damage to machine body, tightness of all bolts, nuts and pins, etc. 5.All blades and belts for wear or damage. 6.Parking brake, speed control levers, all safety switches and easy checker functions. 7.Color of the exhaust fumes, abnormal noise and vibrations. 8.Dial cam rotation force.	
	CLEAN	Mower deck / Engine and muffler area / Cutting height cam area / Air inlet screen ★	
FIRST 8 Hrs.		CHANGE	Engine oil [BREAK-IN](MUST BE DONE)
FIRST 100 Hrs. [BREAK-IN](MUST BE DONE)		CHANGE	Transmission fluid
		REPLACE	Transmission oil filter
EVERY 25 Hrs.	CLEAN	Air cleaner foam element ★ / Cylinder & Cylinder head fins ◆ ★	
EVERY 50 Hrs.	CHECK	Engine start system / OPC system	
	GREASE	Front wheel (2 places) / Seat adjuster (2 places)	
EVERY 100 Hrs.	CHECK	Fuel filter element / Battery condition / Spark plug condition and gap / Filter (Carbon canister)	
	CLEAN	Air cleaner paper element ★	
	CHANGE	Engine oil ◆	
	GREASE	Mower link bushing (4 places)	
	ADJUST	Throttle cable / Choke cable	
EVERY 200 Hrs.	REPLACE	Engine oil filter / Fuel filter element / Air cleaner paper element ★◇	
EVERY 300 Hrs.	CLEAN	Combustion Chamber ☆/ Valve seats (Relap) ☆	
	ADJUST	Valve Clearance ☆	
EVERY 400 Hrs.	CHANGE	Transmission fluid	
	REPLACE	Transmission oil filter	
EVERY 500 Hrs.	REPLACE	Spark plugs	
	LUBRICATE	Crankshaft	
	ADJUST	Electric clutch	
EVERY 1 Year	CHECK■	Fuel line / Hydraulic hose	
	REPLACE	Air cleaner paper element ★◇	
EVERY 2 Years	REPLACE☆	Filter (Carbon canister)	
EVERY 4 Years	REPLACE☆	Fuel line / Hydraulic hose	

※ : See Operator's manual in details.
☆ : Should be serviced by KUBOTA Dealer.
■ : Replace if necessary.
★ : Required more often in dusty conditions.
◆ : More frequently under severe conditions.
◇ : Whichever comes first.

Approximate fluid capacities.

	Z411KW / Z412KW	Z421KW / Z422KW	Z421KWT / Z422KWT
Engine	2.1 L (2.2 qts.)		
Transmission	4.8 L (5.1 qts.) (Transmission case (LH & RH) with filter,hose and tank)		

Tire pressure and tightening torque recommendation.

Front	13x5.0-6 13x6.5-6	172 kPa (25 psi)	Ensure smooth rotation of wheel. <Do not over tighten.>
Rear	24x9.5-14 24x12-14	83 kPa (12 psi)	108.5-130.2 Nm (80.0-96.0 ft lbs)

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LUBRICANTS AND FUEL

Locations	Capacities Z411KW, Z421KW, Z421KWT, Z412KW, Z422KW, Z422KWT	Lubricants
Fuel tank	25.7 L (6.8 U.S. gals.)	• Automobile unleaded or regular gasoline • Unleaded gasoline 87 octane or higher
Engine crankcase	2.1 L (2.2 U.S.qts.)*1	• Engine oil: API service Classification **SF**, **SG**, **SH**, **SJ** or **SL** Above 20 ℃ (68 ℉)...SAE40 0 ℃ (32 ℉) to 35 ℃ (86 ℉)...SAE30 -20 ℃ (-4 ℉) to 35 ℃ (86 ℉)...SAE10W-30 or SAE10W-40 Below 0 ℃ (32 ℉)...SAE5W-20
Transmission case with filter, hose and tank (RH & LH)	4.8 L (5.1 U.S.qts.)	• 20W50 oil with API service classification **SL**

Greasing	No. of greasing points	Capacity	Type of grease
Front wheel	2	Until grease overflows	• Multipurpose EP2 Grease (NLGI Grade no.2)
Mower link bushing	4	Moderate amount	
Cutting height cam	1		
Seat adjuster	2		
Crankshaft	1	Moderate amount	• Copper-based anti-seize

*1 Oil amount when the oil level is at the upper level of the oil level gauge.

IMPORTANT :

- **To prevent serious damage to the hydraulic systems, use only the fluid recommended in the previous table.**

Fuel:

- Clean, fresh, unleaded gasoline.
- A minimum of 87 octane/87AKI (90 RON).
- Gasoline with up to 10% ethanol (ethyl or grain alcohol) or up to 15% methyl tertiary butyl ether (MTBE) by volume is acceptable.
- Do not use unapproved gasoline, such as E85. Do not mix oil in gasoline or modify the engine to run on alternate fuels. This will damage the engine components and void the engine warranty.
- High altitude:
  This engine may require a high altitude carburetor kit to ensure correct engine operation at altitudes above 3300 ft. (1006 meters). Operation without this kit will cause decreased performance, increased fuel consumption, and increased emissions.
  This engine should be operated in its original configuration below 3300 ft. (1006 meters) as damage may occur if a high altitude carburetor kit is installed and operated below 3300 ft. (1006 meters).
- The indicated capacity of fuel is the manufacturer's estimate.

Engine oil:

- Oil used in the engine should have an American Petroleum Institute (API) service classification and proper SAE Engine oil according to the ambient temperatures as shown in the previous table.
- The indicated capacity of oil is the manufacturer's estimate.

Transmission oil:

- The indicated capacity of oil is the manufacturer's estimate.

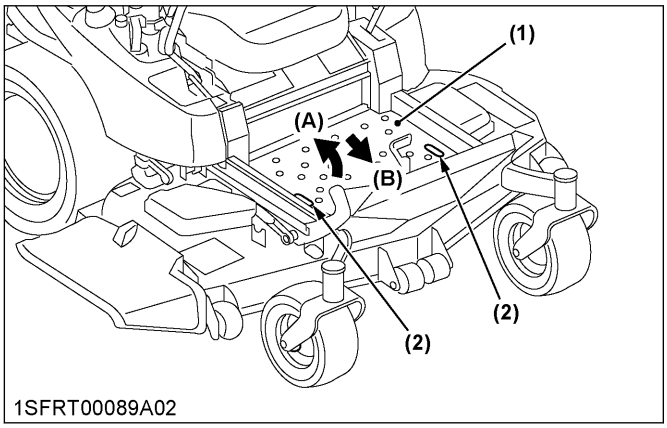
PERIODIC SERVICE

OPENING THE STEP

⚠ WARNING
To avoid serious injury or death from contact with moving parts:
- **Never open the step while the engine is running.**

1. Step

1. To open the step, use the grip to rotate the step in direction (A), then remove the step in direction (B).



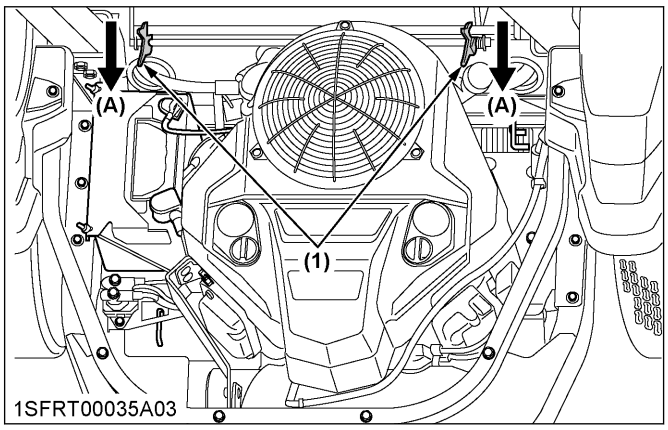
(1) Step *(A) "ROTATE"*
(2) Grip *(B) "REMOVE"*

RAISING AND LOWERING THE OPERATOR'S SEAT

Raising

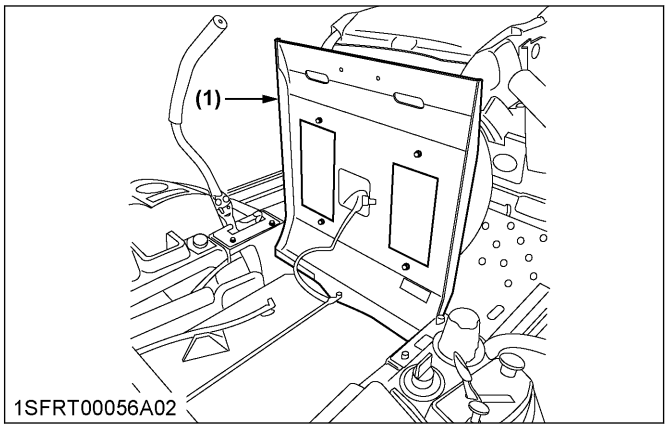
⚠ WARNING
To avoid serious injury or death:
- **Fully raise the operator's seat to the resting position.**
  Do not keep the seat halfway.

1. Pull the latch lever on the seat panel rearward.



(1) Latch lever *(A) "PULL"*

2. Raise the operator's seat to the resting position.



(1) Operator's seat

Lowering

⚠ WARNING
To avoid serious injury or death:
- **Do not drop the seat when lowering it.**
- **Watch your hands. Do not place your hands under the seat when lowering it.**

1. Lower the seat slowly to lock.

DAILY CHECK

To prevent trouble from occurring, it is important to know the condition of the machine. Check it before starting.

⚠ WARNING
To avoid serious injury or death:
- **Be sure to check and service the machine on a level surface with the engine shut off, the key**

removed and the parking brake securely set or the rear wheels chocked.

	No.	Check item	Ref. page
Walking around the machine	1	Damage to machine body, tightness of all bolts, nuts, pins, and so on.	46
	2	Fuel and oil leak	62
	3	Tire pressure, wear and damage	46, 55
	4	Engine oil level	53
	5	Fuel level	53
	6	Air intake screen	54
	7	Transaxle fluid level	55
	8	Air cleaner (foam element)	57
	9	Machine body cleaning	—
	10	Clean area around the muffler and engine controls.	—
Mower	1	Check all hardware.	—
	2	Make sure all pins are in place.	26
	3	Mower deck cleaning	70
	4	Make sure blade bolts are tight.	70
	5	Blades and belt wear or damage	70
While sitting in the operator's seat	1	Motion control lever	73
	2	Parking brake	38
	3	Other movable parts	56
Starting the engine	1	Color of the exhaust fumes	31
	2	Check for abnormal noise and vibration.	31
	3	Engine start system/OPC system. If either of these do not operate properly, contact your local KUBOTA Dealer immediately.	58, 59
Others	1	Check the areas where previous trouble occurred.	—

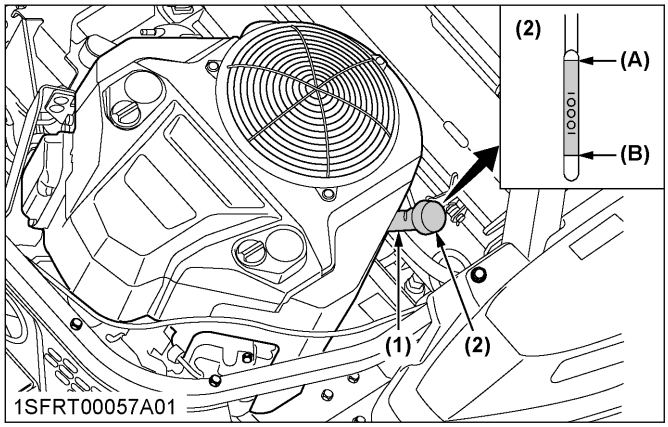
1. Checking the engine oil level

⚠ WARNING

To avoid serious injury or death:

- **Always stop the engine and remove the key before checking the oil.**

1. Check the engine oil before starting and 5 minutes or more after the engine has stopped.
2. Wipe the dipstick area clean.
3. To check the oil level, remove the dipstick and wipe it clean. Reinsert the dipstick into the tube, rest the cap on the tube and do not thread the cap onto the tube. Remove the dipstick again. Check to see that the oil level is between the 2 notches.
4. Add new oil to the prescribed level at the oil port if necessary.



(1) Engine oil port
(2) Oil level dipstick
(A) "UPPER LEVEL"
(B) "LOWER LEVEL"

IMPORTANT :

- **When using a different brand or viscosity oil from the previous one, remove all of the old oil and the oil filter. Never mix 2 different types of oil.**
- **Use the proper SAE engine oil according to the ambient temperature.**
  (See LUBRICANTS AND FUEL on page 51.)

2. Checking the amount of fuel and refueling

⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Handle the fuel carefully. If the engine is running, do not fill the fuel tank. If the engine is hot, let the engine cool down several minutes before adding fuel.**
- **Do not smoke while filling the fuel tank or servicing the fuel system. Fill the fuel tank only to the bottom of the filler neck. Do not fill until completely full. The empty space in the tank allows gasoline to expand when it heats up.**
- **Never remove the fuel tank cap or add fuel when the fuel tank is hot.**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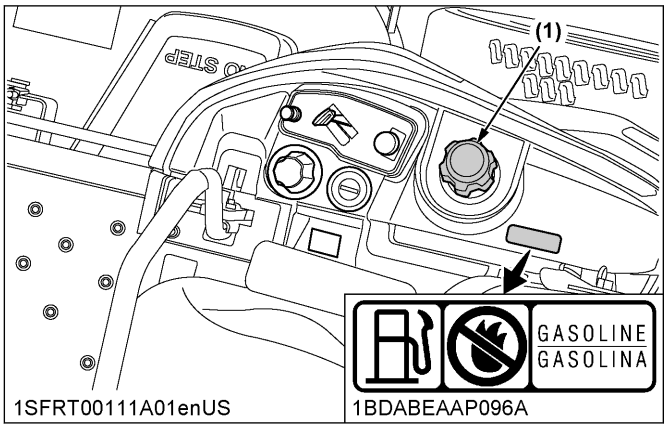

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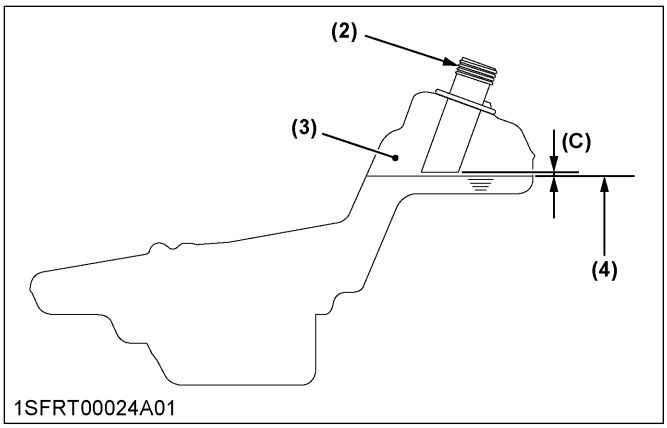

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(1) Fuel tank cap
(2) Fuel tank filler neck
(3) Empty space
(4) Maximum fuel level
(C) Clearance (fuel level is under the filler neck)

Check the fuel level. Take care that the fuel tank does not become empty.

Fuel tank capacity	25.7 L (6.8 U.S.gals.)

IMPORTANT :
- **Do not mix oil with gasoline.**
- **Tighten the fuel cap until it clicks.**
- **Do not use a fuel cap other than one approved by KUBOTA.**
- **Do not permit dirt, trash or water to get into the fuel system.**
- **Be careful not to spill fuel while refueling. If a spill should occur, wipe it off at once, or it may cause a fire.**
- **Do not use old fuel.**

Use only unleaded gasoline with an octane rating index of 87 or higher.

NOTE :
- **Use fuel within approximately 30 days after purchase to avoid deterioration in fuel quality, or add fuel stabilizer to keep fuel fresh and stabilized.**
- **Fuel blend differs from season to season for the best seasonal engine performance. To prevent engine performance troubles such as vapor lock or hard starting, use fuel within the season in which the fuel is purchased.**
- **Infrequent use of the engine during a season can make fuel stale in the fuel tank of the machine. Stale fuel condition can cause engine performance troubles due to varnished and plugged carburetor components.**
- **Seal the fuel storage container tightly and store it out of sunlight and heat to prevent fuel degradation.**
- **Condensation in the fuel tank may occur because of various operating or environmental conditions. To reduce condensation and to avoid affecting the machine operation, fill the fuel tank at the end of daily operations.**

Use of alcohol mixed gasoline
Only use gasoline containing ethanol when the ethanol is 10% or less of the fuel. When using gasoline containing MTBE, the MTBE must be 15% or less of the fuel mixture. The use of methanol additive is not recommended. For best results, use unleaded fuel with a minimum of 87 octane.

3. Checking and cleaning the air intake screen

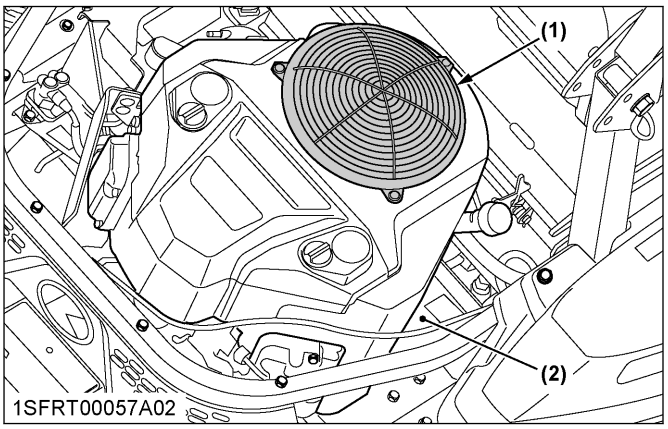
⚠ WARNING
To avoid serious injury or death:
- **Be sure to stop the engine and remove the key before cleaning.**
- **Make sure that the engine is cool to the touch before cleaning.**

IMPORTANT :
- **The air intake screen and air intake area must be clear of debris to prevent the engine from overheating.**

Daily or after every 5 hours of operation, make sure the air intake screen and the air intake area are clean.

Dirt or chaff around the air intake screen, air intake area, or the engine cooling area decrease cooling performance.

1. Check that the air intake screen is clear of grass clippings and debris.
2. If the screen is dirty, clean it with a brush or cloth.
3. Remove the dust and all foreign material from the engine plate.



(1) Air intake screen
(2) Engine plate

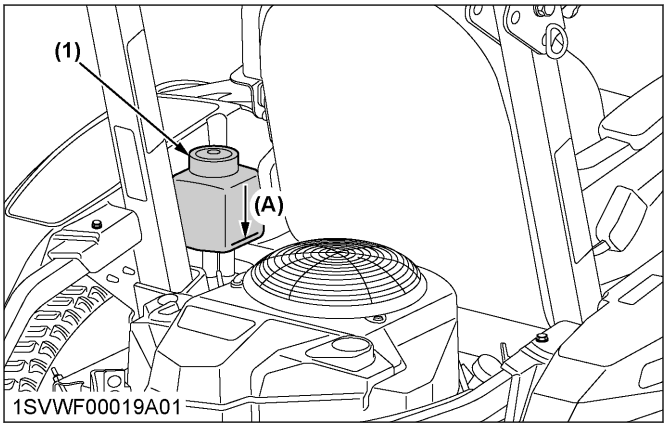
4. Checking the transaxle fluid level

⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before checking the transaxle fluid level.**

1. Check to see that the oil level lies at the *"FULL COLD"* line while the machine is at ambient temperature. If the level is too low, add new oil into the tank up to the prescribed level.
(See LUBRICANTS AND FUEL on page 51.)



(1) Transaxle fluid tank (A) "FULL COLD" line

IMPORTANT :

- **If the oil level is low, do not run the engine. Add new oil into the tank up to the prescribed level.**
- **Do not overfill the tank.**

5. Checking the tire pressure

⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before checking the tire pressure.**
- **Do not attempt to mount a tire on a rim. This should be done by a qualified person with the proper equipment.**
- **Always maintain the correct tire pressure. The inflation pressure in the front tires rises quickly when using compressed air. Do not inflate the tires above the recommended pressure shown in the operator's manual.**

IMPORTANT :

- **Do not use tires larger than specified.**

5.1 Inflation pressure

Even though the inflation pressure is factory-set to the prescribed level, it naturally drops slowly in the course of time. Therefore, check it everyday and inflate as necessary.

Z411KW, Z421KW

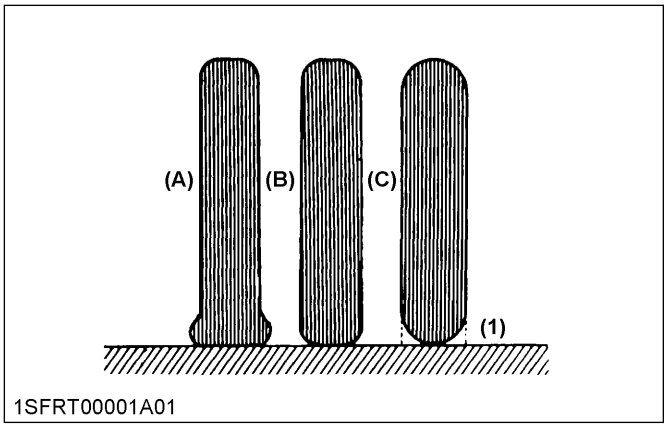
	Tire sizes	Recommended inflation pressure
Front	13 × 5 - 6, 4PR smooth	170 kPa 1.7 kgf/cm^2 25 psi
Rear	24 × 9.5 - 14, 4PR turf	83 kPa 0.84 kgf/cm^2 12 psi

Z412KW, Z422KW

Front	13 × 6.5 - 6, 4PR smooth	170 kPa 1.7 kgf/cm^2 25 psi
Rear	24 × 9.5 - 14, 4PR turf	83 kPa 0.84 kgf/cm^2 12 psi

Z421KWT, Z422KWT

Front	13 × 6.5 - 6, 4PR smooth	170 kPa 1.7 kgf/cm^2 25 psi
Rear	24 × 12 - 14, 4PR turf	83 kPa 0.84 kgf/cm^2 12 psi



(1) Ground
(A) "INSUFFICIENT"
(B) "NORMAL"
(C) "EXCESSIVE"

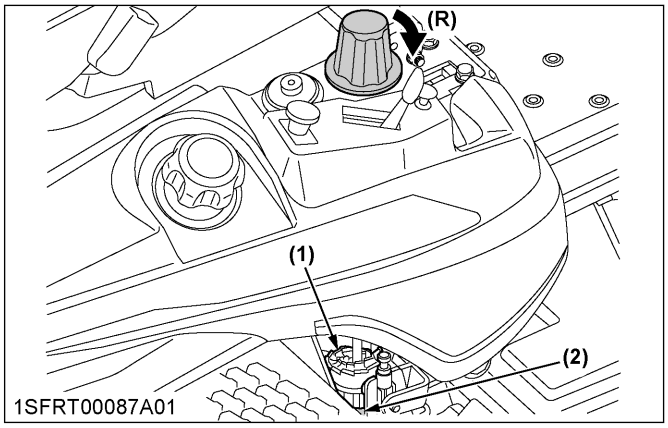
6. Checking the dial cam rotation strength

⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Disengage the PTO (OFF).**
- **Stop the engine and remove the key before checking the dial cam rotation strength.**

1. Raise the implement to the *"TRANSPORT"* position. (See ADJUSTING THE CUTTING HEIGHT on page 43.)
2. Rotate the cutting height control dial and check for smoothness.
3. If the rotation strength is too high, clean the dial cam area and apply grease under the dial cam between the dial cam and the frame.



(1) Dial cam
(2) Frame surface
(R) "ROTATE"

7. Checking movable parts

If any of the movable parts, such as levers and pedals, cannot be smoothly moved because of rust or anything sticky, do not attempt to force it into motion.
In this case, remove the rust or the sticky object, and apply oil or grease on the relevant spot. Otherwise, the machine may get damaged.

EVERY 25 HOURS

1. Cleaning the cylinder and cylinder head fins

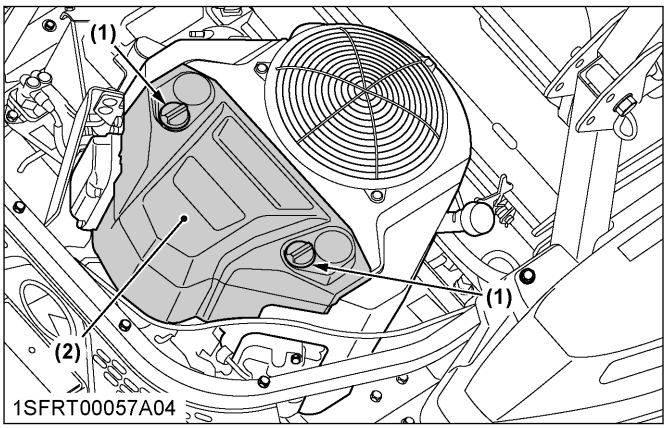
⚠ WARNING

To avoid serious injury or death:

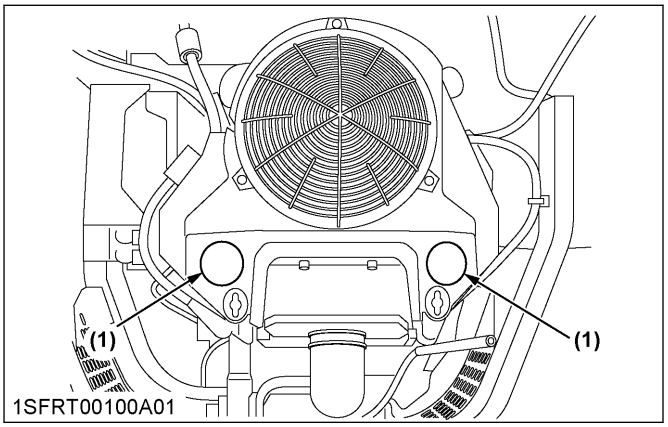
- **Make sure the engine is cool to the touch before removing shrouds.**
- **Always shield eyes and face from air deposits and objects.**

1. Turn the fasteners counterclockwise.
2. Remove the air cleaner cover.

3. Use the clean out ports to check if the engine's cooling fins are blocked with dust or debris. Clean them with compressed air if required.



(1) Fastener
(2) Air cleaner cover



(1) Clean out ports

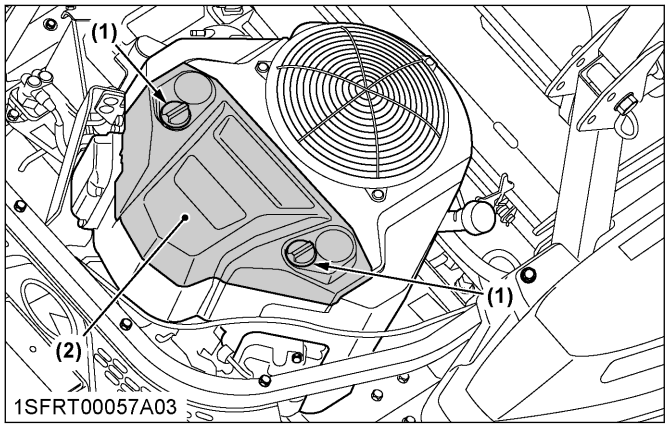
2. Cleaning the foam element

⚠ WARNING

To avoid serious injury or death:

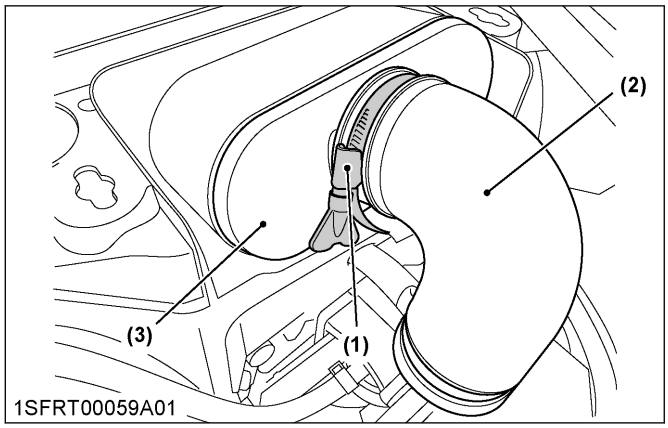
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before cleaning the foam element.**

1. Turn the fasteners counterclockwise.
2. Remove the air cleaner cover.



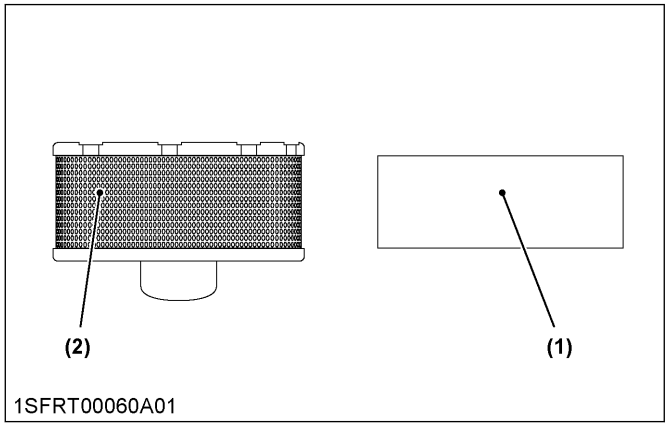
(1) Fastener
(2) Air cleaner cover

3. Loosen the clamp.
4. Remove the element assembly from the intake hose.



(1) Clamp
(2) Intake hose
(3) Element assembly

5. Disassemble the element assembly by removing the foam element from the paper element.



(1) Foam element
(2) Paper element

6. Clean the foam element in a bath of detergent and water, and let the element air-dry thoroughly.

7. Clean the paper element by tapping it gently on a flat surface to remove dust. If the element is very dirty, replace it with a new one.

IMPORTANT :
- **Do not wash paper elements. Do not oil paper elements or foam elements. Do not use pressurized air to clean paper elements or foam elements.**

NOTE :
- **Operating the engine with loose or damaged air filter components could allow unfiltered air into the engine causing premature wear and failure.**
- **Operating in dusty conditions may require more frequent maintenance than above.**

EVERY 50 HOURS

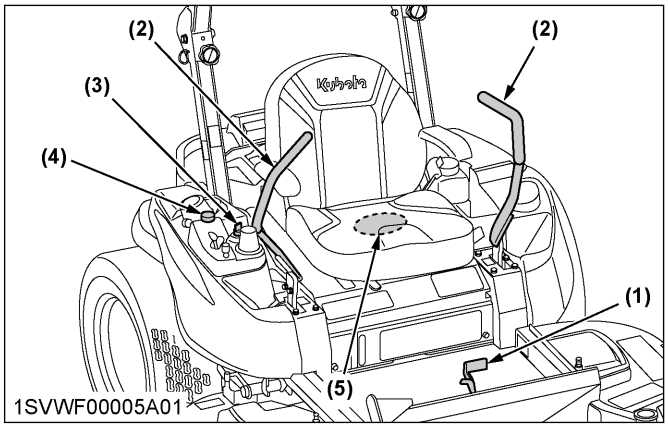
1. Checking the engine start system

The engine start system in your machine is designed to protect you while operating. Check the engine start system periodically (daily is best) to test the function of the engine start system before operation.

⚠ WARNING

To avoid serious injury or death:
- **Do not allow anyone near the machine while testing.**
- **If the machine does not pass one of the following tests, do not operate the machine. Consult your local KUBOTA Dealer.**
- **Sit on the operator's seat for all tests except for test 1.**

IMPORTANT :
- **Test the following before operating the machine:**



(1) Parking brake pedal
(2) Motion control lever
(3) Key switch
(4) PTO switch
(5) Seat switch

Test 1 (operator not on the seat)
1. Securely set the parking brake.
2. Set the PTO switch to the *"DISENGAGE"* (OFF) position.
3. Set the motion control levers to the *"NEUTRAL LOCK"* position.
4. Turn the key switch to the *"START"* position.
5. The engine must not crank.

Test 2 (operator on the seat)
1. Do not set the parking brake (release it from test 1).
2. Set the PTO switch to the *"DISENGAGE"* (OFF) position.
3. Set the motion control levers to the *"NEUTRAL LOCK"* position.
4. Turn the key switch to the *"START"* position.
5. The engine must not crank.

Test 3 (operator on the seat)
1. Securely set the parking brake.
2. Set the PTO switch to the *"DISENGAGE"* (OFF) position.
3. Grasp the motion control levers and move them inward from the *"NEUTRAL LOCK"* position to the *"NEUTRAL"* position and then release the levers.
4. Turn the key switch to the *"START"* position.
5. The engine must not crank.

Test 4 (operator on the seat)
1. Securely set the parking brake.
2. Set the PTO switch to the *"ENGAGE"* (ON) position.
3. Set the motion control levers to the *"NEUTRAL LOCK"* position.
4. Turn the key switch to the *"START"* position.
5. The engine must not crank.

NOTE :
- **If the engine cranks in tests 1 through 4, consult your local KUBOTA Dealer to have the unit checked before operation.**

Test 5 (operator on the seat)
1. Start the engine.
2. Keep the parking brake securely set.
3. Set the PTO switch to the *"DISENGAGE"* (OFF) position.
4. Grasp the motion control levers and move them inward from the *"NEUTRAL LOCK"* position to the *"NEUTRAL"* position and then release the levers.
5. The engine must shut off.

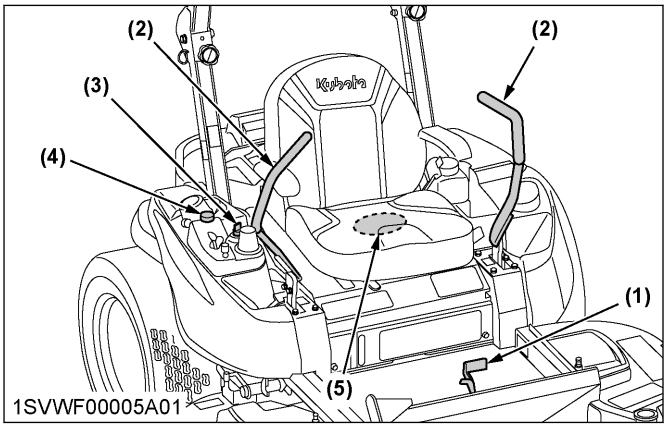
NOTE :
- **If the engine keeps running in test 5, consult your local KUBOTA Dealer to have the unit checked before operation.**

2. Checking the OPC system

The operator presence control (OPC) system in your machine is designed to protect you while operating. Check the OPC system periodically (daily is best) to test function of the OPC system before operation.

⚠ WARNING

To avoid serious injury or death:
- **Do not allow anyone near the machine while testing.**
- **If the machine does not pass one of the following tests, do not operate the machine. Consult your local KUBOTA Dealer.**



(1) Parking brake pedal
(2) Motion control lever
(3) Key switch
(4) PTO switch
(5) Seat switch

Test 1 (operator on the seat)
1. Start the engine.
2. Do not set the parking brake.
3. Set the PTO switch to the *"DISENGAGE"* (OFF) position.
4. Stand up. Do not get off the machine.
5. The engine must shut off.

Test 2 (operator on the seat)
1. Start the engine.
2. Do not set the parking brake.
3. Set the PTO switch to the *"ENGAGE"* (ON) position.
4. Stand up. Do not get off the machine.
5. The engine must shut off.

NOTE :
- **If the engine keeps running in tests 1 through 2, consult your local KUBOTA Dealer to have the unit checked before operation.**

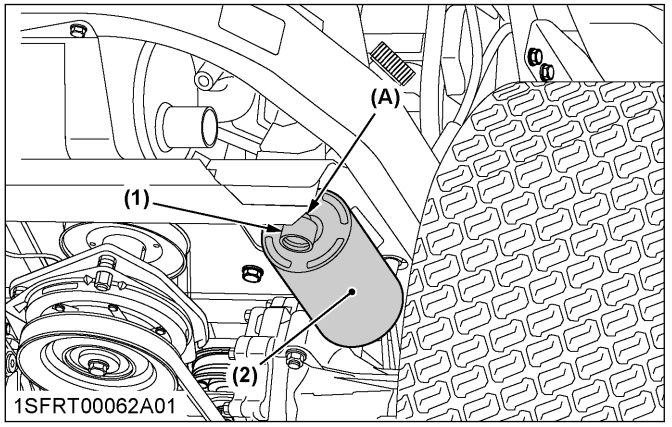
3. Checking the carbon canister air filter

Check the carbon canister air filter every 50 hours of operation (more often under extremely dusty or dirty conditions).

⚠ WARNING

To avoid serious injury or death:
- **Always stop the engine, set the parking brake, remove the key, and disengage the PTO.**

1. Remove the carbon canister air filter.



(1) Canister air filter *(A) Air port*
(2) Carbon canister

2. Check to see if the carbon canister air filter is worn out, damaged or dirty.
3. If the air filter is dirty, wash the air filter in warm water with detergent. Then rinse the air filter thoroughly until all traces of detergent are eliminated. Squeeze out excess water (do not wring). Allow the air filter to air-dry. Do not use high pressure air to clean the filter.
4. If the air filter is worn out, damaged or too dirty to wash clean, replace it with a new one.
5. Reinstall the carbon canister air filter.

NOTE :
- **Operating in dusty condition may require more frequent maintenance than in normal conditions.**

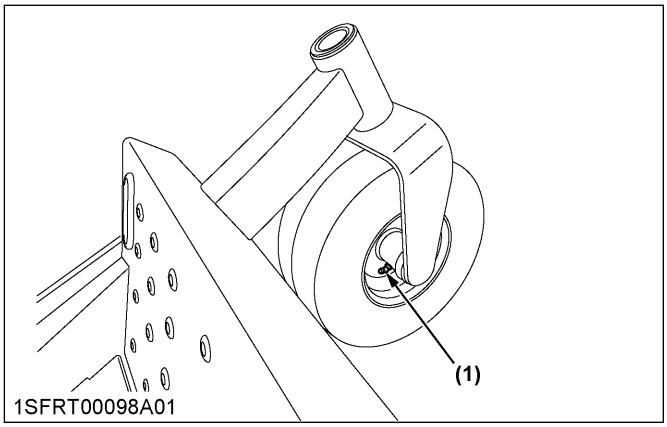
4. Greasing

⚠ WARNING

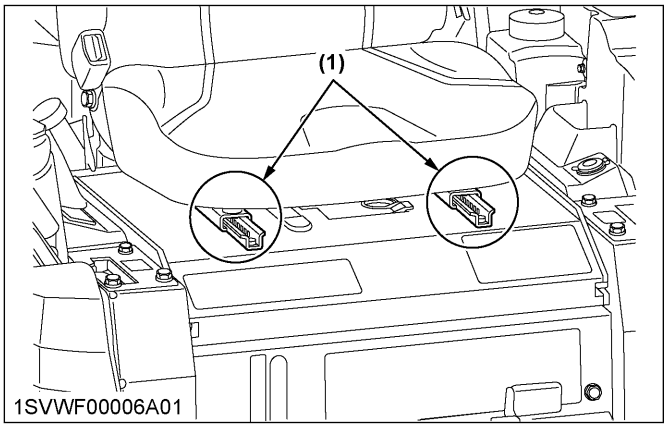
To avoid serious injury or death:

- **Be sure to stop the engine and remove the key before greasing.**

1. Apply a small amount of multipurpose grease to the following points every 50 hours.
   If you operated the machine in extremely wet and muddy conditions, lubricate the grease fittings more often.



(1) Front wheel (LH, RH)



(1) Seat adjuster

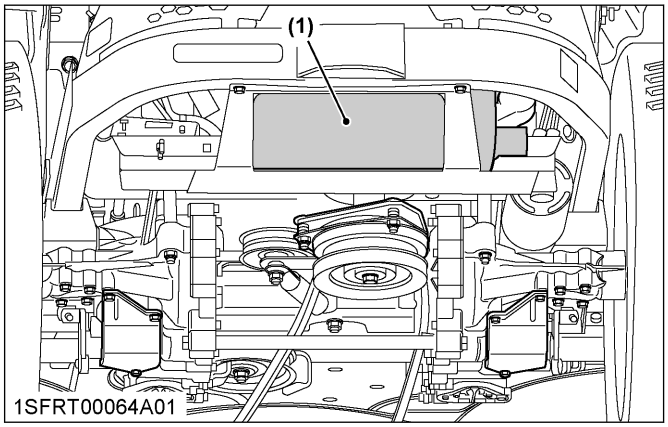
5. Checking the muffler and spark arrester (if equipped)

⚠ WARNING

Running engines produce heat. Engine parts, especially the muffler, become extremely hot.
Severe thermal burns can occur on contact.
Combustible debris, such as leaves, grass, brush, and so on can catch fire.
To avoid serious injury or death:

- **Allow the muffler, engine cylinder and fins to cool before touching.**
- **Remove accumulated debris from the muffler area and cylinder area.**
- **It is a violation of California Public Resource Code, Section 4442, to use or operate the engine on any forest-covered, brush-covered, or grass-covered land unless the exhaust system is equipped with a spark arrester, as defined in Section 4442, maintained in effective working order. Other states or federal jurisdictions may have similar laws. Contact the original equipment manufacturer, retailer, or dealer to obtain a spark arrester designed for the exhaust system installed on this engine.**
- **Replacement parts must be of the same design and installed in the same position as the original parts. Other parts may not perform as well, may damage the unit, and may result in injury.**

1. Remove accumulated debris from the muffler and cylinder area.
2. Inspect the muffler for cracks, corrosion, or other damage.
3. Remove the spark arrester, if equipped, and inspect for damage or carbon blockage.
4. If damage is found, install replacement parts before operating.



(1) Muffler

EVERY 100 HOURS

1. Changing the engine oil

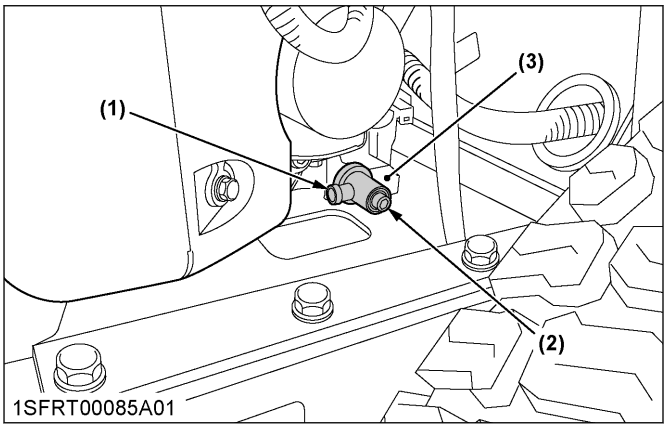
⚠ WARNING

To avoid serious injury or death:

- **Be sure to stop the engine and remove the key before changing the oil.**
- **Allow the engine to cool down sufficiently, as oil can be hot and may cause burns.**

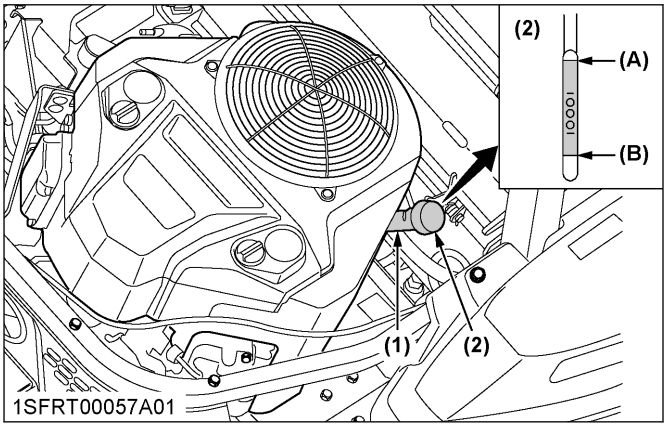
1. To change the used oil, use the oil drain valve connected to the engine block. To drain the oil, loosen the hex plug until oil begins to drain. Then, remove the oil level dipstick to allow the engine to vent.

   NOTE :
   - **The used oil can be drained out more easily if the engine is warm.**



(1) Oil drain valve
(2) Hex plug
(3) Engine block

2. After all the used oil has drained, tighten the hex plug.
3. Fill with new oil up to the upper level on the dipstick.



(1) Engine oil port
(2) Oil level dipstick
(A) "UPPER LEVEL"
(B) "LOWER LEVEL"

4. To check the oil level:
   Remove the dipstick, wipe it clean, insert it without screwing it in and draw it out again. Check to see that the oil level is between the 2 marks.

   NOTE :
   - **Do not overfill.**

2. Cleaning the air cleaner paper element

(See Cleaning the foam element on page 57.)

3. Checking the spark plug

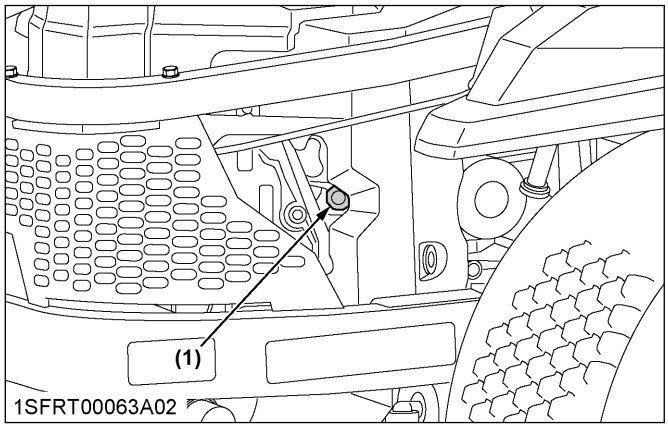
⚠ WARNING
To avoid serious injury or death:
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before checking the spark plug.**

Check the spark plug condition and gap every 100 hours of operation. Replace the spark plug annually.

1. Remove the spark plug wire from the spark plug.
2. Use a spark plug wrench to remove the plug.

   NOTE :
   - **This engine is equipped with a resistor-type spark plug.**

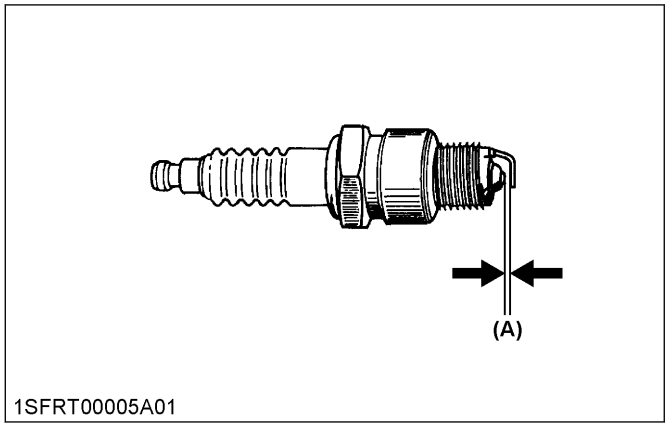
3. Inspect the spark plug for cracked porcelain, pitted electrodes, or other wear and damage. Replace the spark plug if necessary.



(1) Spark plug (both sides)

4. Check the spark plug gap with a gap gauge.

Recommended spark plug	**NGK BPR4ES**



(A) 0.7 to 0.8 mm, 0.028 to 0.031 in.

5. Reinstall the spark plug into the cylinder head.

Tightening torque	22 N·m 16 lbf·ft

4. Checking the fuel filter and fuel lines

⚠ WARNING

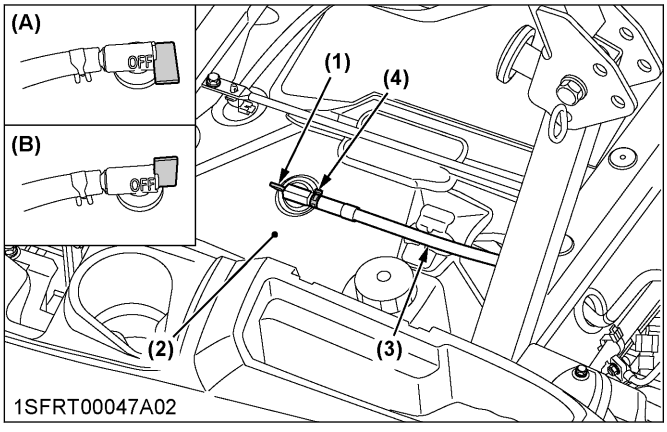
To avoid serious injury or death:

- **Be sure to stop the engine and remove the key when attempting to make the following checks and changes.**
- **Never fail to check the fuel lines periodically. The fuel lines are subject to wear and aging. Fuel may leak out onto the running engine, causing a fire.**

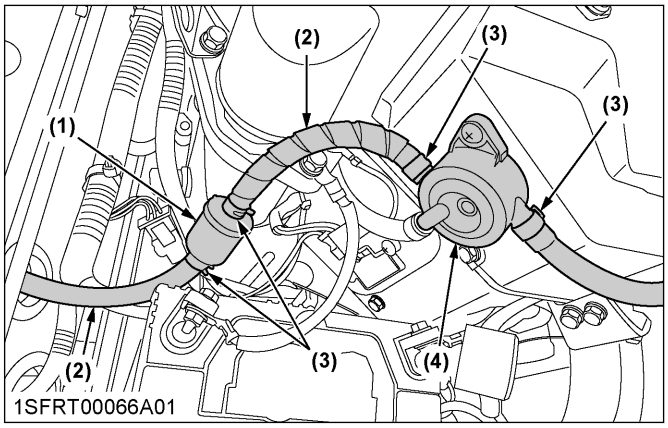
The fuel line is made of rubber and ages regardless of service period.
See the following figures.

1. If the fuel line, clamps and fuel filter are found damaged or deteriorated, replace them.

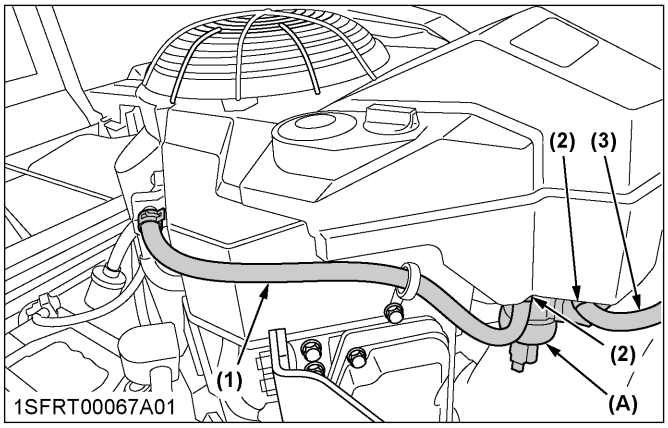
   IMPORTANT :
   - **When the fuel line is disconnected for maintenance or repairs, close both ends of the fuel line with a piece of clean cloth or paper to prevent dust and dirt from entering.**
   - **Particular care must be taken not to allow dust and dirt to enter into the fuel pump. Entrance of dust and dirt causes malfunction of the fuel pump.**



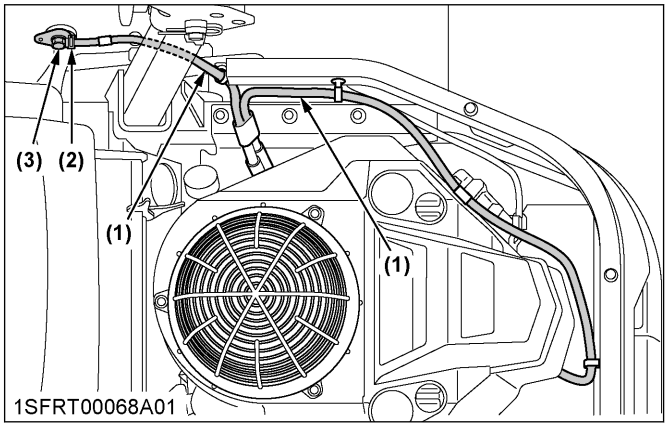
(1) Fuel valve
(2) Fuel tank
(3) Fuel line
(4) Pipe clamp
(A) "CLOSE" (OFF)
(B) "OPEN"



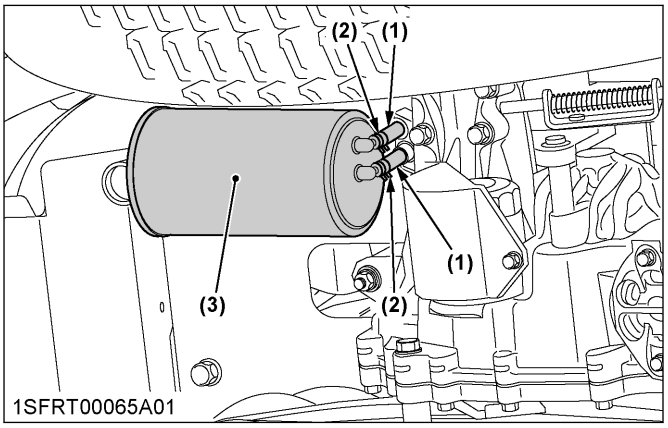
(1) Fuel filter
(2) Fuel line
(3) Pipe clamp
(4) Fuel pump



(1) Fuel line
(2) Pipe clamp
(3) Vent hose
(A) Carburetor



(1) Vent hose
(2) Pipe clamp
(3) 2-way valve (assembled in the fuel tank)



(1) Vent hose
(2) Pipe clamp
(3) Carbon canister

5. Checking the battery condition

DANGER

To avoid the possibility of battery explosion:
For the refillable type battery, follow these instructions:

- **Do not use or charge the refillable type battery if the fluid level is below the [LOWER] (lower limit level) mark. Otherwise, the battery component parts may prematurely deteriorate, which may shorten the battery's service life or cause an explosion.**
- **Check the fluid level regularly and add distilled water as required so that the fluid level is between the [UPPER] and [LOWER] levels.**
- **When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.**

WARNING

To avoid serious injury or death:

- **Batteries, battery posts, terminals and related accessories contain lead, lead compounds and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**
- **Never remove the battery cap while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with electrolyte, wash it away completely with water immediately and get medical attention.**
- **Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.**
- **Wear eye protection and rubber gloves when working around the battery.**

NOTE :

- **The factory-installed battery is a non-refillable type.**
  If the battery is weak, charge the battery or replace it with a new one.

IMPORTANT :

- **Mishandling the battery shortens the service life and adds to maintenance costs.**
  The original battery is maintenance free, but needs some servicing.
  If the battery is weak, the engine will be difficult to start and the lights will be dim. It is important to check the battery periodically.
- **When exchanging an old battery with a new one, use a battery of equal specifications (as described in the following table).**

Battery type	Volts (V)	Reserve capacity (min)	Cold cranking amps	Normal charging rate (A)
U1-300	12	45	300	6.5

Regarding non-accessible maintenance-free type batteries:
Maintenance-free, non-accessible batteries are designed to eliminate the need to add water. Yet the volume of electrolyte above the plates may eventually become depleted due to abnormal conditions such as high heat or improper regulator settings. Use a voltmeter to check the state of charge.
(See the following reference chart to determine if charging is necessary.)

Battery voltage	Reference state of charge
12.6	100% (full charge)
12.4	75%
12.2	50%
12.0	25%
11.8	0%

5.1 Charging the battery

DANGER

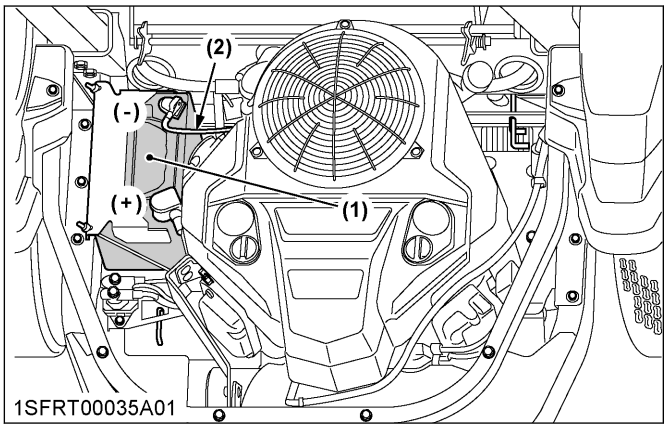
To avoid serious injury or death:

- **When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.**

⚠ WARNING

To avoid serious injury or death:

- **When disconnecting the cable from the battery, start with the negative terminal first. When connecting the cable to the battery, start with the positive terminal first.**
- **Never check the battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.**



(1) Battery
(2) Ground cable
(+) Positive terminal
(-) Negative terminal

1. To slow charge the battery, connect the battery positive terminal to the charger positive terminal and the negative to the negative. Then, charge for at least 1 hour at 6.5 amperes.
2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time. When using a boost-charged battery, it is necessary to recharge the battery as early as possible. Failure to do this will shorten the battery's service life.
3. When the specific gravity of electrolyte is between 1.27 and 1.29, the charging is completed.

5.2 Storing the battery

1. When storing the machine for a long period, remove the battery from the machine, adjust the electrolyte to the proper level and store in a dry place out of direct sunlight.
2. The battery self-discharges while it is stored. Recharge it once every 3 months in the hot season and once every 6 months in the cold season.
3. Nut size for the battery terminals: +10 mm, -10 mm

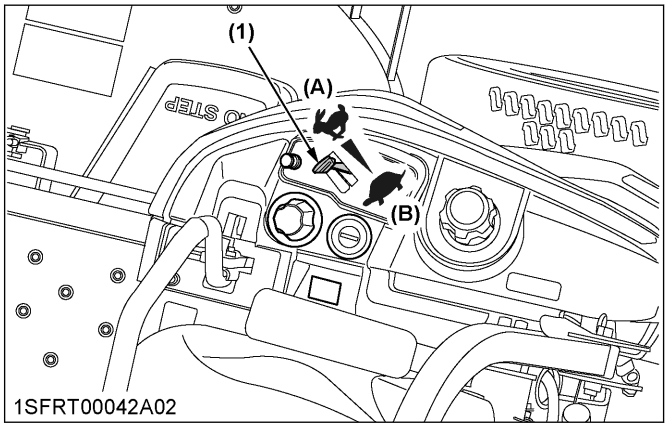
6. Adjusting the throttle cable

⚠ WARNING

To avoid serious injury or death:

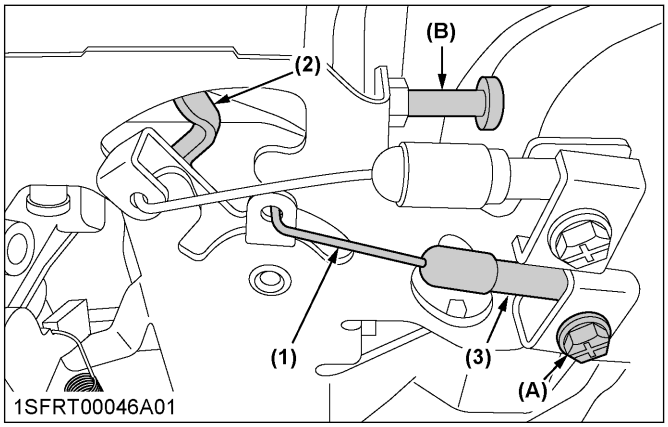
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before adjusting the throttle cable.**

1. Move the throttle lever to the *"FAST"* position.



(1) Throttle lever
(A) "FAST"
(B) "SLOW"

2. Make sure the speed control lever (2) contacts the high idle adjustment bolt (B).
3. Link the throttle cable (1) to the speed control lever (2) and loosely clamp the throttle cable sheath (3) with the cable clamp bolt (A).
4. Pull up the sheath (3) of the throttle cable until the inner wire of the throttle cable has almost no slack, and tighten the cable clamp bolt (A).
5. Move the throttle lever to the *"SLOW"* position. Make sure that the carburetor throttle valve is moved smoothly.



(1) Throttle cable
(2) Speed control lever
(3) Throttle cable sheath
(A) Throttle cable clamp bolt
(B) High idle adjustment bolt

7. Adjusting the choke cable

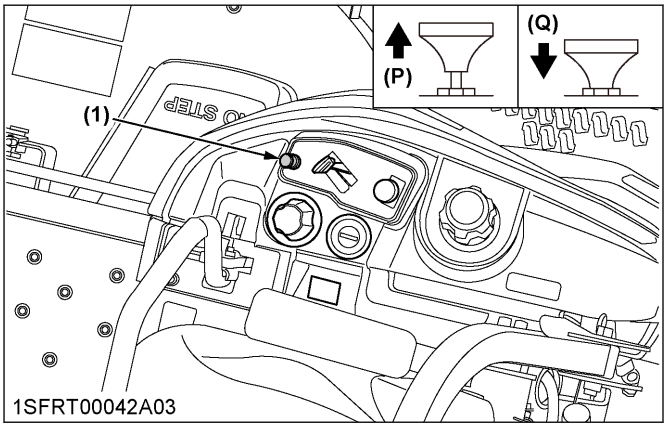
⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**

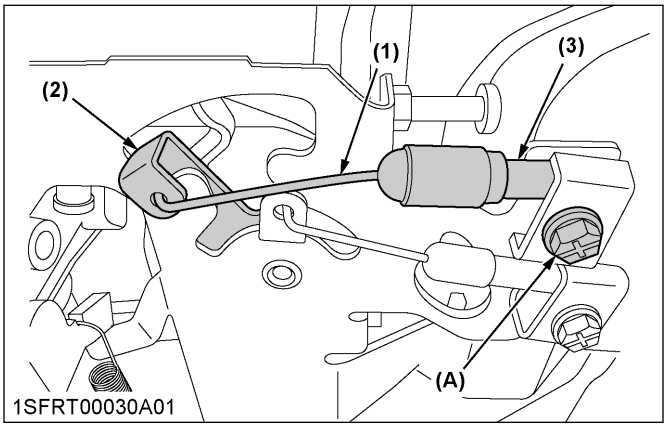
- **Stop the engine and remove the key before adjusting the choke cable.**

1. Move the choke knob to the *"OFF"* position.



(1) Choke knob
(P) "PULL" (ON)
(Q) "PUSH" (OFF)

2. Link the choke cable (1) to the choke control lever (2), and loosely clamp the choke cable sheath (3) with the cable clamp bolt (A). Make sure that the carburetor choke valve is fully opened.
3. Pull up the sheath (3) of the choke cable until the inner wire of the choke cable has almost no slack, and tighten the cable clamp bolt (A).
4. Move the choke knob to the *"ON"* position. Make sure that the carburetor choke valve is completely closed.
5. Make sure that the choke valve turns from fully closed position to fully opened position when actuating the choke knob.



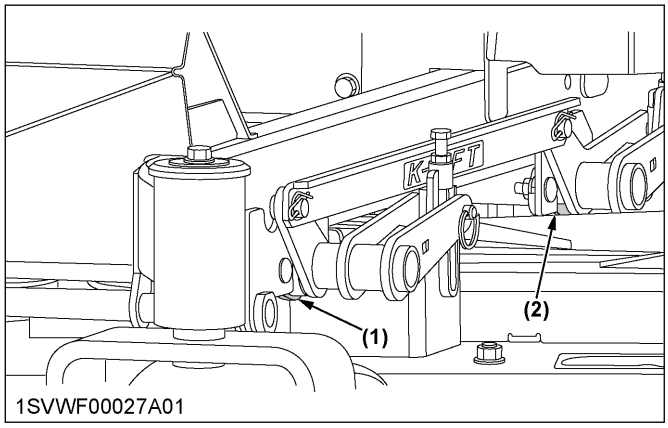
(1) Choke cable
(2) Choke control lever
(3) Choke cable sheath
(A) Choke cable clamp bolt

8. Greasing mower link bushings

⚠ WARNING
To avoid serious injury or death:

- **Be sure to stop the engine and remove the key before greasing.**

1. Apply a small amount of multipurpose grease to the following points every 100 hours.
   If you operated the machine in extremely wet and muddy conditions, lubricate the bushings more often.



(1) Front mower link bushing (LH, RH)
(2) Rear mower link bushing (LH, RH)

EVERY 200 HOURS OR EVERY 1 YEAR

Replace every 200 hours or every 1 year, whichever comes first.

1. Replacing the air cleaner paper element

(See Cleaning the foam element on page 57.)

NOTE :
- **Operating the engine with loose or damaged air cleaner components could allow unfiltered air into the engine causing premature wear and failure.**

EVERY 200 HOURS

1. Replacing the fuel filter

(See Checking the fuel filter and fuel lines on page 62.)

2. Replacing the engine oil filter

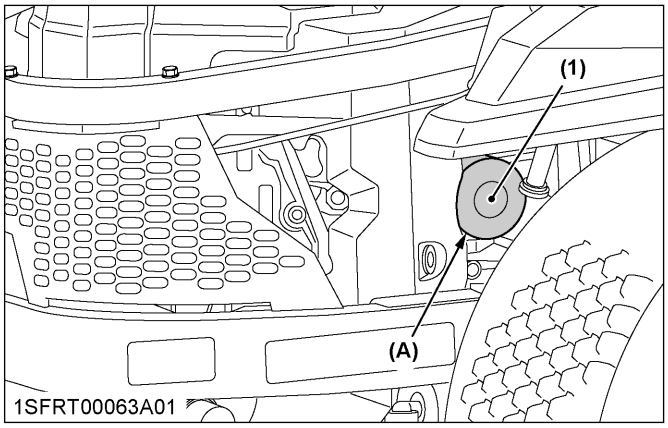
⚠ WARNING
To avoid serious injury or death:
- **Engine oil is a toxic substance. Dispose of used oil properly. Contact your local authorities for approved disposal methods or possible recycling.**

- **Be sure to stop the engine and remove the key before changing the oil and the oil filter.**
- **Allow the engine to cool down sufficiently. Oil can be hot and may cause burns.**

The oil filter must be changed every 200 service hours. Always use a genuine oil filter.

1. Drain the engine oil.
   Drain the engine oil by following steps 1 and 2 from changing engine oil section.
   (See Changing the engine oil on page 60.)
2. Remove the old filter and wipe off the filter adapter with a clean cloth.
3. Place a new replacement filter in a shallow pan with the open end up. Pour new oil, of the proper type, in the threaded center hole. Stop pouring when the oil reaches the bottom of the threads. Allow a few minutes for the oil to be absorbed by the filter material.
4. Apply a thin film of clean oil to the rubber gasket on the new oil filter.
5. Install the new oil filter to the filter adapter. Hand tighten the filter clockwise until the rubber gasket contacts the adapter, then tighten the filter an additional 3/4 turn.
6. Fill the engine with the proper oil up to the **[FULL]** or **[F]** mark on the dipstick. Always check the oil level with the dipstick before adding more oil.
7. Reinstall the oil fill cap and dipstick, and then tighten securely.
8. Start the engine and check for oil leakage. Recheck the oil level before placing the engine into service. Stop the engine, correct any leakage, and allow 1 minute for the oil to drain down, then recheck the level on the dipstick.

NOTE :
- **To prevent extensive engine wear or damage, always maintain the proper oil level in the crankcase. Never operate the engine with the oil level below the [ADD] or [L] mark or above the [FULL] or [F] mark on the dipstick.**



(1) Engine oil filter *(A) "MOUNTING SURFACE"*

EVERY 300 HOURS

1. Adjusting the engine valve clearance

Consult your local KUBOTA Dealer for this service.

2. Cleaning the combustion chamber, lapping the valve seating surface

Consult your local KUBOTA Dealer for this service.

EVERY 400 HOURS

1. Replacing the transaxle oil filter

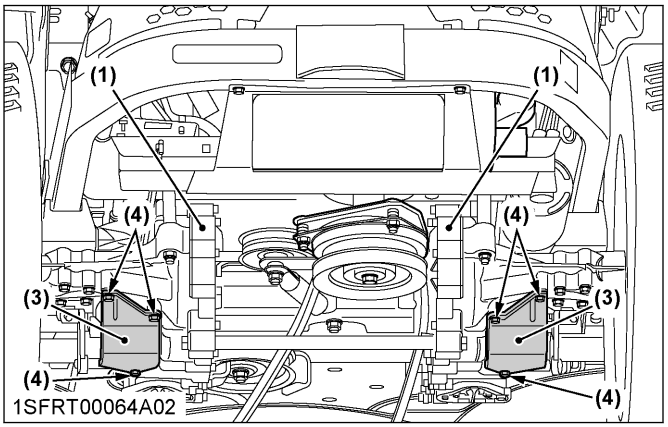
⚠ WARNING

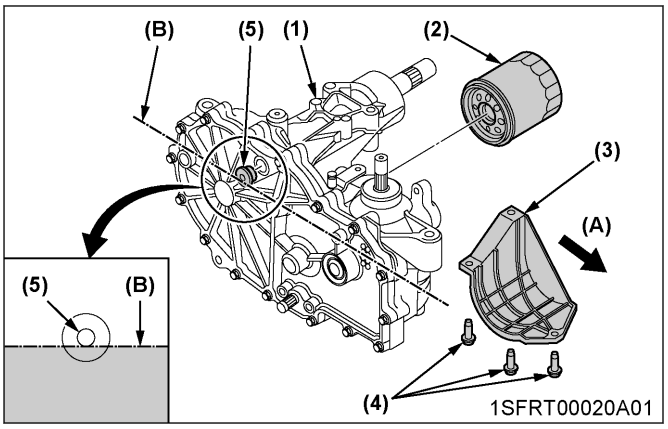
To avoid serious injury or death:
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Be sure to stop the engine and remove the key before changing or checking the oil.**
- **Allow the transmission case to cool down sufficiently, as oil can be hot and may cause burns.**

1. Apply the bypass valve.
   (See Hydrostatic transaxle bypass rods on page 42.)
2. Remove the hex head bolts (4), and filter guard (3). Clean any loose debris from around the perimeter of the oil filter (2).
3. Place an oil drain pan (12 in. diameter or larger and 8 qt. capacity is optimal) beneath the oil filter. Remove the oil filter (2) and discard it.

NOTE :
- **Always replace the filter when performing any internal maintenance to the transaxle.**

4. After the oil has drained, inspect all parts for excessive wear or damage. Replace if necessary.
5. Wipe off the filter base surface and apply a film of new oil to the gasket of the new replacement filter.
6. Install the new filter by hand and turn 3/4 to 1 full turn after the filter gasket contacts the filter base surface.





(1) Transaxle
(2) Transaxle oil filter
(3) Filter guard
(4) Hex flange head bolt
(5) Breather port plug
(A) Front
(B) Oil level

7. Reinstall the filter guard (3) with 3 hex head bolts (4). Tighten bolts (4) to 7.35 N·m (5.42 lbf·ft) securely.
8. Repeat steps 2 through 7 on the opposite side transaxle drive.
9. Drain the old oil filters of all free flowing oil prior to disposal. Place the used oil in appropriate containers and deliver to an approved recycling collection facility.
10. Remove the breather port plug (5) from the left side and right side transaxles prior to filling with oil. This will allow the transaxles to vent during oil fill.
11. Remove the cap from the transaxle fluid tank located on the machine frame.
12. Fill with 20W-50 motor oil until oil appears just at the bottom of the breather port. Install the breather port plug (5) into the transaxle. Tighten the plug (5) to 20.34 N·m (15.0 lbf·ft).
13. Continue to fill the transaxles through the transaxle fluid tank until the *"FULL COLD"* line is reached on the transaxle fluid tank.
14. Reinstall the transaxle fluid tank cap by hand. Be careful not to overtighten.
15. Proceed to the purge procedure.

Purging procedures

Due to the effects air has on efficiency in hydrostatic drive applications, it is critical to purge it from the system.

Air creates inefficiency because its compression and expansion rate is higher than the one of the oil approved for use in hydrostatic drive systems.

These purge procedures should be performed anytime a hydrostatic system has been opened to facilitate maintenance or the oil has been changed.

The resulting symptoms in hydrostatic systems may be:

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

Before starting, make sure the transaxle oil is at the proper oil level. If it is not, fill to the specifications outlined in this manual.

The following procedures are best performed with the machine drive wheels off the ground. Then, repeat under normal operating conditions. If this is not possible, then the procedure should be performed in an open area free of any objects or bystanders.

1. Disengage the brake if activated.
2. With the bypass valve open and the engine running, slowly move the motion control levers in both forward and rearward directions (5 or 6 times).
3. With the bypass valve closed and the engine running, slowly move the motion control levers in both forward and rearward directions (5 to 6 times). Check the oil level, and add oil as required after stopping the engine.
4. It may be necessary to repeat steps 2 and 3 until all the air is completely purged from the system. When the transaxle operates at normal noise levels and moves smoothly forward and rearward at normal speed, then the transaxle is considered purged.

2. Changing the transaxle fluid

(See Replacing the transaxle oil filter on page 66.)

EVERY 500 HOURS

1. Replacing the spark plug

(See Checking the spark plug on page 61.)

2. Lubricating the crankshaft

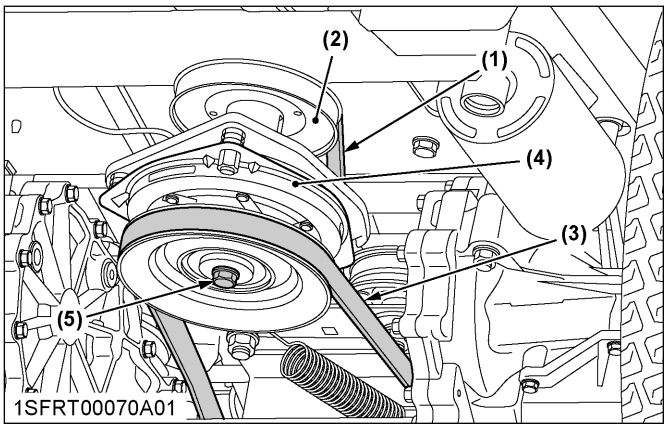
WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before lubricating the crankshaft.**

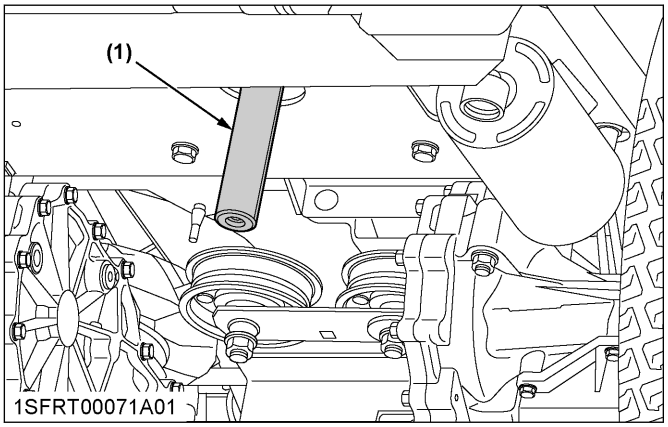
The engine crankshaft should be lubricated every 500 hours to ensure that critical components such as the electric clutch, transaxle drive pulley and the engine can be removed if needed.

1. Remove the mower belt.
2. Remove the transaxle belt.
3. Remove the electric clutch and transaxle drive pulley.



(1) Transaxle belt
(2) Transaxle drive pulley
(3) Mower belt
(4) Electric clutch
(5) Clutch mounting bolt

4. Apply a light coating of copper-based anti-seize lubricant to the engine crankshaft.



(1) Engine crankshaft

5. Reinstall the transaxle drive pulley, electric clutch, and clutch mounting bolt.
6. Tighten the clutch mounting bolt to 67 to 75 N·m (50 to 55 lbf·ft).
7. Reinstall the transaxle belt.
8. Reinstall the mower belt.

EVERY 500 HOURS OR EVERY 1 YEAR

1. Adjusting the electric clutch

WARNING

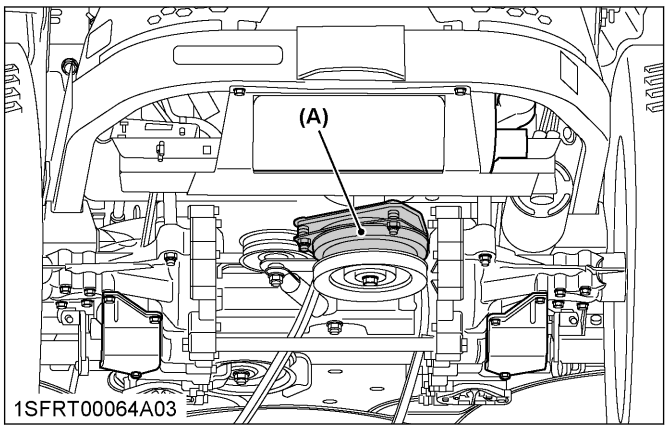
To avoid serious injury or death:

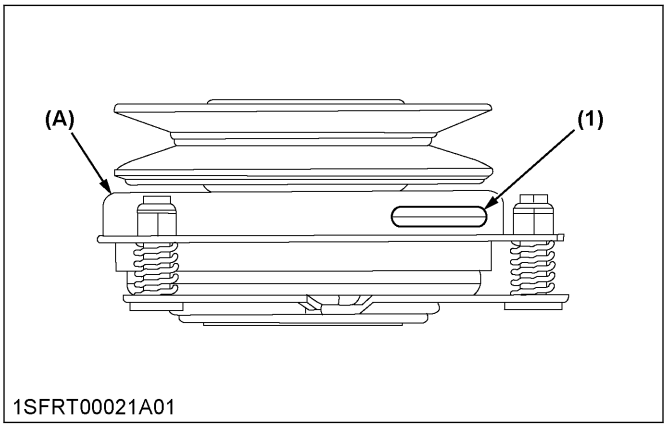
- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before adjusting the electric clutch.**

The electric clutch serves 2 functions in the operation of the mower:

- Starting and stopping the power flow to the cutter blades.
- The clutch also acts as a brake to assist in stopping blade rotation when the PTO is switched off or the operator presence control is interrupted.

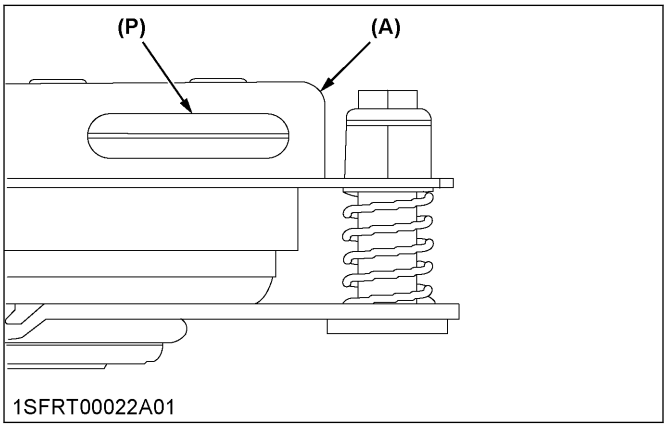
When the clutch is disengaged, the air gap between the armature and rotor must be adjusted to 0.4 mm (0.015 in.) for proper operation. The air gap adjustment is made with 3 bolts on the clutch. There are 3 inspection windows, one next to each adjusting bolt.





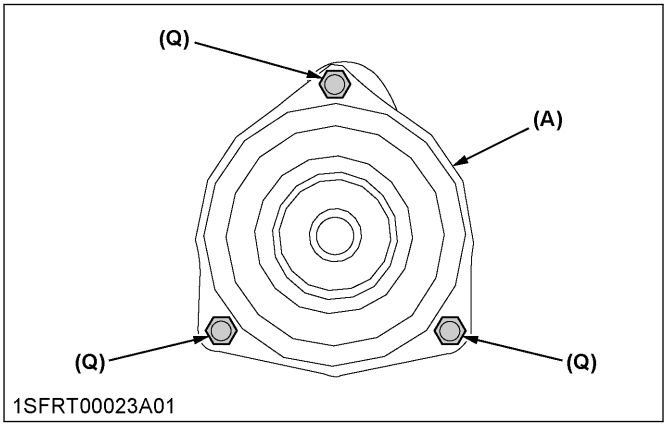
(1) Inspection window (×3) *(A) Electric clutch*

1. Locate the inspection windows on the clutch.
2. Place a 0.4 mm (0.015 in.) feeler gauge in the slot between the rotor and the armature.



(A) Electric clutch
(P) "INSERT 0.4 mm (0.015 in.) FEELER GAUGE HERE"

3. Tighten or loosen the adjusting nut as needed to achieve the 0.4 mm (0.015 in.) air gap. Perform this operation at all 3 inspection windows.



(A) Electric clutch
(Q) Adjustment nut

This adjustment should be done every 500 hours of operation or annually, whichever comes first. In case the machine is heavily used, air gap settings should be checked more often.

If the air gap is too narrow, the clutch armature may drag when disengaged, resulting in premature failure.

EVERY 1 YEAR

1. Checking fuel lines

(See Checking the fuel filter and fuel lines on page 62.)

2. Checking the muffler and spark arrester (if equipped)

(See Checking the muffler and spark arrester (if equipped) on page 60.)

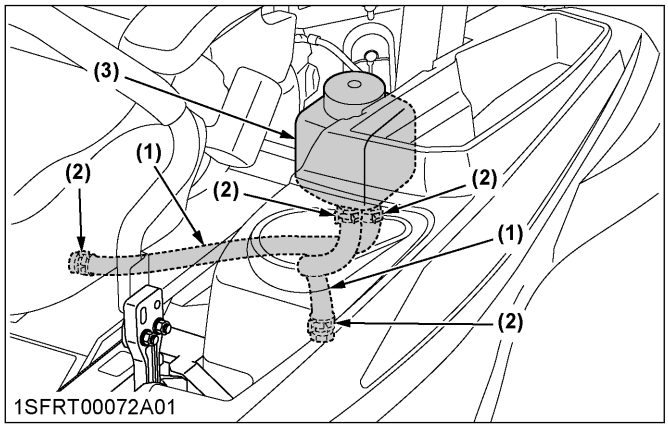
3. Checking hydraulic hoses

⚠ WARNING

To avoid serious injury or death:

- **Be sure to stop the engine, remove the key, and relieve the pressure before checking and replacing the hydraulic hoses.**
- **Allow the transmission case to cool down sufficiently as oil can be hot and may cause burns.**

1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.



(1) Hydraulic hose
(2) Hose clamp
(3) Transaxle fluid tank

EVERY 2 YEARS

1. Replacing the carbon canister air filter

(See Checking the carbon canister air filter on page 59.)

EVERY 4 YEARS

1. Replacing hydraulic hoses

Consult your local KUBOTA Dealer for this service.

2. Replacing fuel lines

Consult your local KUBOTA Dealer for this service.

SERVICE AS REQUIRED

1. Replacing fuses

⚠ WARNING

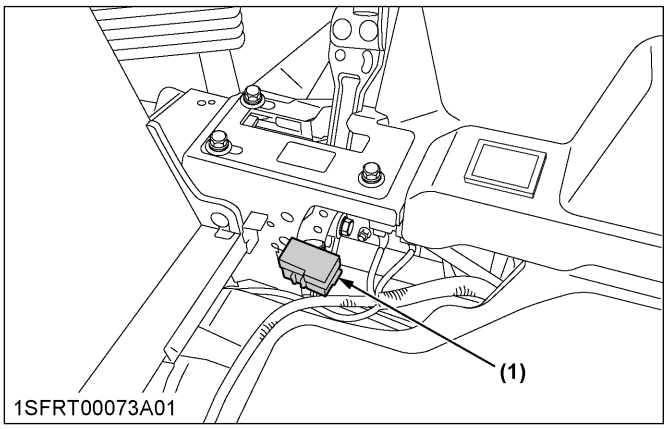
To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key before replacing fuses.**

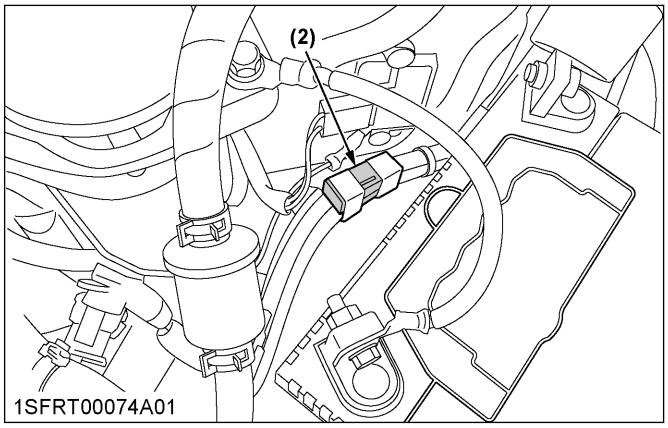
IMPORTANT :

- **If the new fuse happens to blow out within a short time, contact your dealer for inspection and repair. Never *"jump"* the fuse with wire or foil, or install a larger capacity fuse than recommended.**

1. Raise the operator's seat.
2. Remove the blown fuse.
3. Place a new fuse of the same capacity in position.



(1) Fuse location



(2) Slow blow fuse (under red tape)

Fuse no.	Capacity (A)	Protected circuit
(1)	7.5	Start
	3	Operator control
	7.5	PTO clutch
	10	Accessories
	–	–
	–	–
(2)	Slow blow fuse 30	Check circuit against wrong battery connection

2. Checking and replacing blades

⚠ WARNING

To avoid serious injury or death:

- **Be sure to stop the engine and remove the key.**
- **Blades may be sharp. When you handle blades, wear heavy gloves or wrap the end of the blades with a rag.**

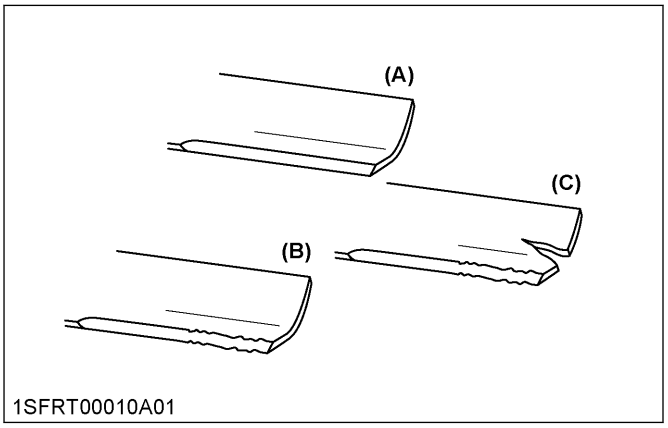
NOTE :

- **Before checking or replacing the blades, wipe grass and mud off the top and inside of the mower.**
  Especially, clean inside the belt cover, otherwise the belt life will be reduced.

Checking the blade

The blade cutting edges should be kept sharp at all times.

1. Sharpen the cutting edges if they look like blade (B).
2. Replace the blades if they appear similar to blade (C).

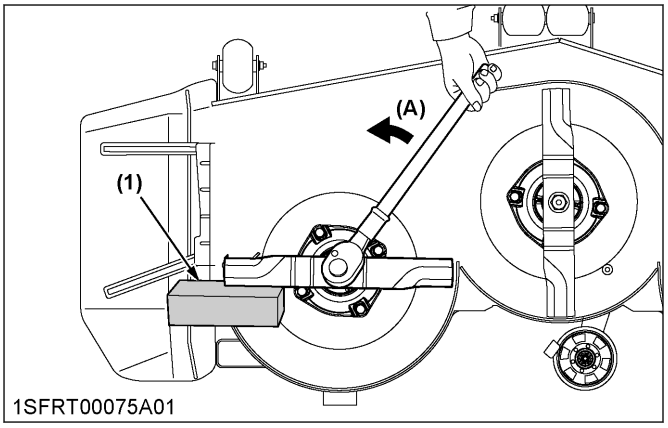


(A) New blade
(B) Worn blade
(C) Cracked blade

Replacing the blade

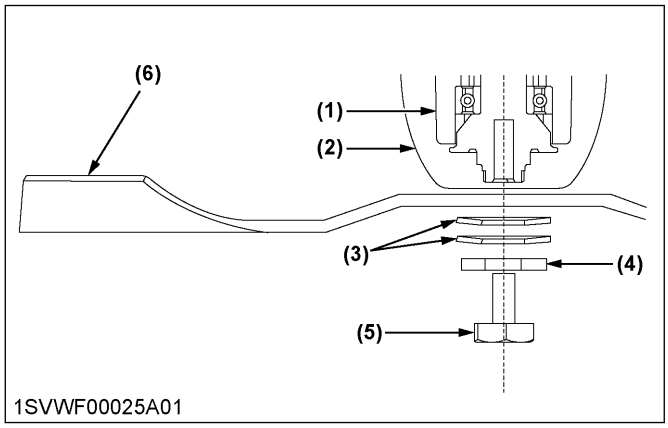
1. Dismount the mower deck from the machine.
   (See DISMOUNTING THE MOWER DECK on page 27.)
   Then turn it over to expose the blades.
2. To prevent the spindle from rotating while removing the blade bolts, perform one of the following methods:
   - Wedge a block of wood between the blade and mower housing.
   - Use a box wrench over the pulley nut.
     Then, loosen the blade bolt as illustrated.

   IMPORTANT :
   - **Use the proper metric size box or socket wrench to tighten or loosen the blade mounting bolt.**



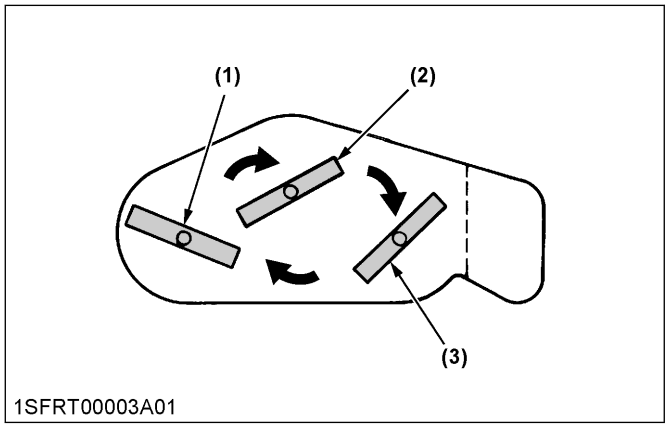
(1) Block *(A) "LOOSEN"*

3. To sharpen the blades yourself, clamp the blade securely in a vise.
   Use a large mill file and file along the original bevel until sharp.
4. To check the blade for balance, place a small rod through the center hole. If the blade is not balanced, file the heavy side of the blade until balance is achieved.
5. Before installing blades, clean any debris and grass from inside the cover. If the cover is damaged, replace with a new one.
   Install the cover between the spindle holder and blade.
6. To attach blades, be sure to install the cup washer between the blade and bolt head. Then tighten the bolt securely.



(1) Spindle holder
(2) Cover
(3) Cup washer
(4) Lock washer
(5) Bolt
(6) Blade

IMPORTANT :
- **Tighten the blade bolts from 103 to 118 N·m (76 to 87 lbf·ft).**
- **The blade bolts have right hand threads. Turn them counterclockwise to loosen.**
- **To prolong the service life of the blades, reposition them as shown in the following figure periodically.**



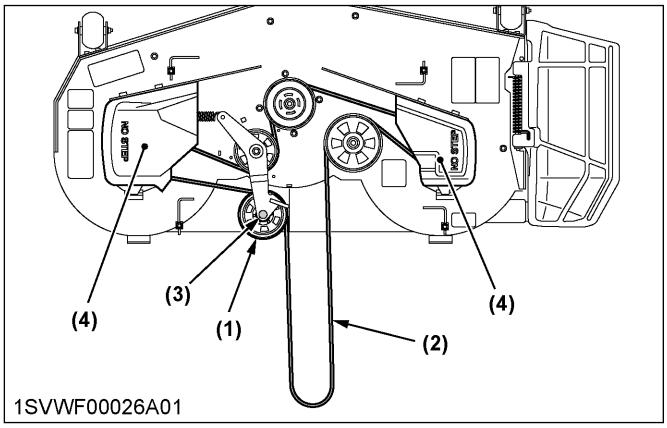
(1) LH blade
(2) Center blade
(3) RH blade

3. Replacing the mower belt

1. Remove the mower deck from the machine. (See DISMOUNTING THE MOWER DECK on page 27.)
2. Remove the left and right hand shield from the mower deck.
3. Remove the tension pulley, and remove the belt.
4. To install a new belt, reverse the previous procedure.

NOTE :

- **Tighten the tension pulley bolt securely from 77.6 to 90.2 N·m (8.0 to 9.2 kgf·m, 57.1 to 66.5 lbf·ft).**



(1) Tension pulley
(2) Belt
(3) Bolt
(4) Shield

ADJUSTMENT

MOTION CONTROL LEVER

⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **If it is necessary to run the engine indoors, use a gas tight exhaust pipe extension to remove the fumes.**
- **Always try to work in a well-ventilated area.**
- **Lift up and secure with jack stands or by blocking the rear of the machine. Do not run the machine while adjusting.**
  Remove the rear wheels.
- **Do not make only one of the following adjustments (except *"MOTION CONTROL LEVER ALIGNMENT"*).**
  They are interlinked.
- **If you feel you are unable to make the following adjustments correctly and safely, contact your local KUBOTA Dealer.**

Details regarding motion control lever alignment can be found in a different section.
(See Motion control lever alignment on page 74.)

IMPORTANT :

- **Right and left motion control levers can be adjusted independently.**

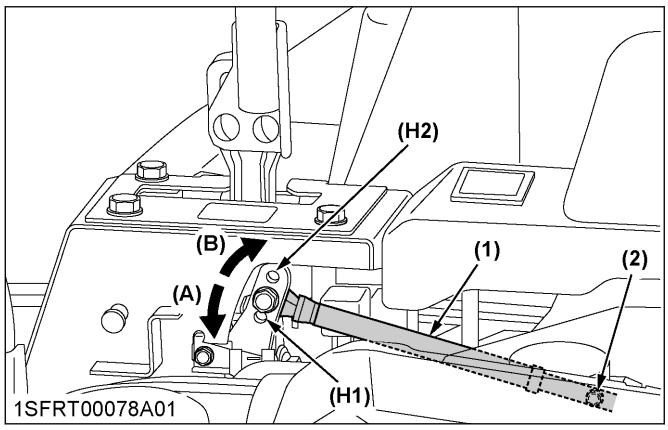
1. Adjusting the motion control lever operating strength

The strength required to move the motion control levers can be adjusted to 3 levels depending on operator preference.

NOTE :

- **Adjust the dampers after adjusting HST neutral.**
- **Adjusting the motion control lever strength will affect the maneuverability.**

1. Change the upper side of the damper to the desired hole location.
   Tighten the upper side damper nut.



(1) Damper
(2) Nut
(A) "LIGHTER"
(B) "HEAVIER"
(H1) Hole for lighter setting
(H2) Hole for heavier setting

2. Loosen the nut on the bottom side of the damper.
3. Move the motion control lever to the rearmost position and release the motion control lever.
4. After the motion control lever and damper have stopped moving, place the motion control lever in the *"NEUTRAL LOCK"* position.
5. Tighten the bottom side damper nut.

2. HST neutral

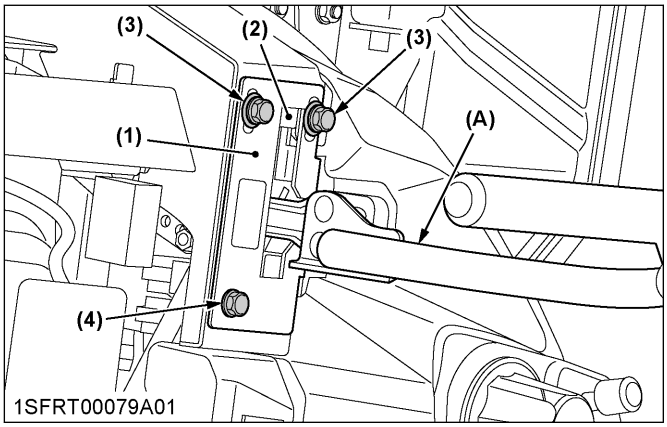
1. Lift up and secure with jack stands or by blocking the rear of the machine frame.
2. Remove both rear wheels.
3. Start the engine and run at maximum speed.
4. Place the motion control lever in the *"NEUTRAL LOCK"* position.
5. If either rear axle is turning, observe the following steps to adjust the neutral position.
6. Loosen the 3 bolts of the guide plate corresponding to the rotating axle (LH or RH).
   Adjust the guide position until the rear axle rotation stops.
7. Tighten the rear guide plate bolt and check that the rear axle does not rotate.
   If the axle does not stop rotating, adjust the *"HST NEUTRAL"* again.

Tightening torque	23.6 to 27.4 N·m (2.4 to 2.8 kgf·m, 17.4 to 20.2 lbf·ft)

8. Adjust the opposite side axle *"HST NEUTRAL"* if required.

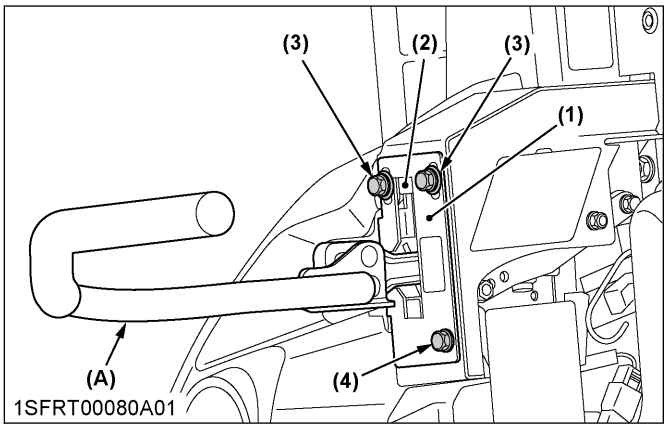
9. After adjustment, make sure to stop the engine immediately.

Right hand side



(1) Guide plate
(2) Speed adjust plate
(3) Bolt (front)
(4) Bolt (rear)
(A) Motion control lever

Left hand side



(1) Guide plate
(2) Speed adjust plate
(3) Bolt (front)
(4) Bolt (rear)
(A) Motion control lever

10. Slide the speed adjustment plate all the way forward. Push the motion control lever forward until it reaches the end of its range of motion. Slide the speed adjustment plate back until it touches the motion control lever. Then move the speed adjustment plate an additional 3 to 4 mm rearward and tighten the 2 front bolts.
    Repeat this step for the other side.

Tightening torque	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft

11. If at full speed the machine pulls one direction or the other, it is an indication that one wheel is turning faster than the other.
    To adjust the condition, proceed as follows:
    a. Park the machine on a firm and level surface.
    b. Stop the engine.
    c. Loosen the 2 front bolts of the faster side.
    d. Move the speed adjust plate slightly rearward.
    e. Tighten the 2 front bolts securely.
    f. Operate the machine and check the adjustment. Readjust as necessary.

Tightening torque	23.6 to 27.4 N·m 2.4 to 2.8 kgf·m 17.4 to 20.2 lbf·ft

3. Maximum speed (forward)

Consult your local KUBOTA Dealer for this service.

4. Motion control lever alignment

⚠ WARNING

To avoid serious injury or death:

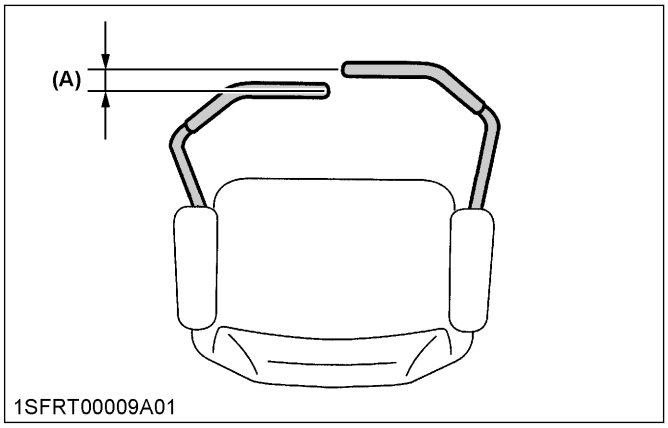
- **Park the machine on a firm and level surface.**
- **Stop the engine, remove the key and apply the parking brake.**

4.1 Checking the alignment

1. Check the gap and space between the levers at the maximum forward position.

Recommended gap:	0 to 2 mm 0 to 0.08 in.

If the positions of the motion control levers are unequal, adjustment is necessary.



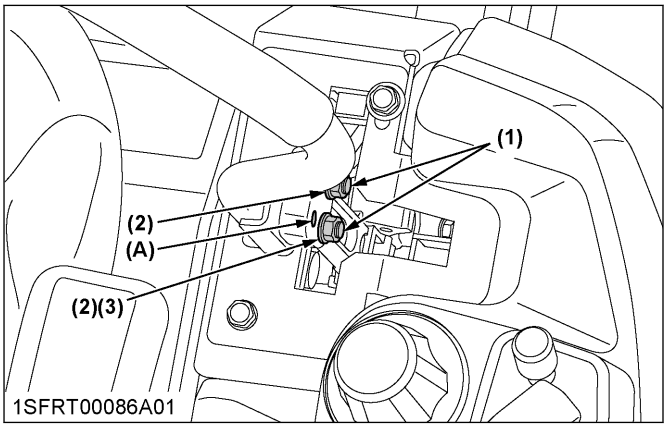
(A) "GAP"

4.2 Aligning the motion control levers

1. Stop the engine and apply the parking brake.

Lever position (high or low)

1. Remove the bolts and select the motion control lever position, high or low.
2. Tighten the bolts.



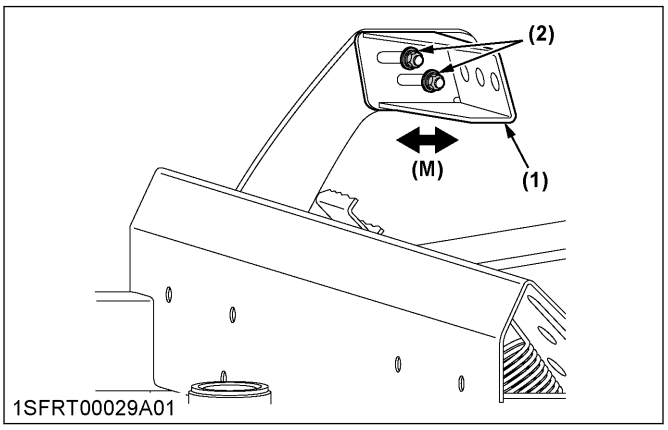
(1) Bolt *(A) High position*
(2) Flange nut
(3) Tab slot

Lever alignment (right and left)

1. Loosen the bolts.
2. Slide both levers forward or rearward to the desired position within tab slots until the levers are aligned.
3. Tighten the bolts.

5. Adjusting the mower lift pedal

1. Stop the engine and apply the parking brake.
2. Loosen the nut and adjust the pedal position.



(1) Pedal *(M) "MOVE"*
(2) Nut (M8)

3. Tighten the nuts.

MOWER DECK LEVEL

1. Anti-scalp rollers

⚠ WARNING

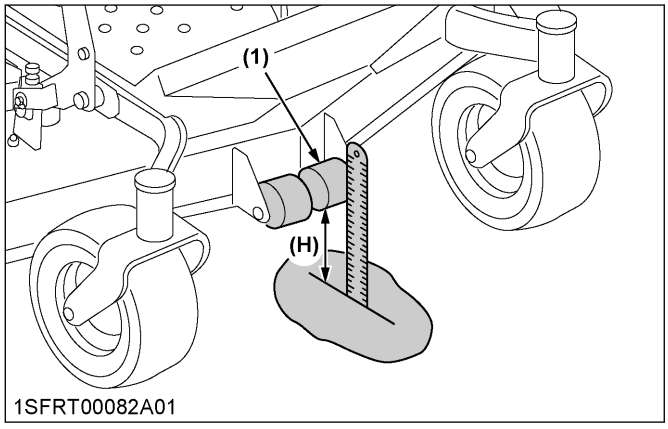
To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Stop the engine and remove the key.**
- **Wait for all moving parts to stop.**

NOTE :

- **The flattest cut can be achieved by having the anti-scalp rollers adjusted off the ground.**
  Check the anti-scalp roller adjustments each time the mower deck cutting height is changed.
  It is recommended that all the anti-scalp rollers be kept off the ground to minimize scuffing.

1. Check the machine tire pressure.
   Inflate tires to the correct pressure.
   (See TIRES AND WHEELS on page 46.)
2. Raise up the mower deck to the transport position (the top end of the lift).
3. Turn the cutting height control dial to adjust the height.
4. Lower the mower deck.
5. Adjust the height of the front side anti-scalp roller to 1 of the 4 positions, to approximately 19 mm (0.75 in.) between the rollers and the ground.
   Adjust the other 3 rollers to the same height.



(1) Front side anti-scalp roller *(H) 19 mm (0.75 in.)*

6. Install the roller with the attaching hardware.

2. Leveling the mower deck (side-to-side)

⚠ WARNING

To avoid serious injury or death:

- **Park the machine on a firm and level surface.**
- **Apply the parking brake.**
- **Disengage the PTO (OFF).**
- **Stop the engine and remove the key while checking or adjusting the level of the mower deck.**

IMPORTANT :

- **Check the machine tire pressure.**
  Inflate the tires to the correct pressure.
  (See TIRES AND WHEELS on page 46.)

Checking the level (side-to-side)

NOTE :
- **The mower deck anti-scalp rollers should not contact the ground.**

1. Raise the mower deck to the transport position (the top end).
2. Turn the cutting height set dial to the 3 in. cutting height position.
3. Lower the mower deck.
4. Position the right mower blade in the side-to-side position.
5. Measure from outside the blade tip to the level surface with a short ruler or leveling gauge.

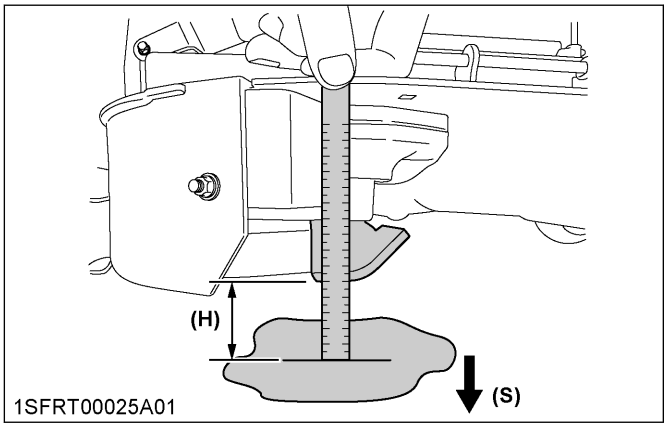
Reference

Height of the blade at the flat surface	76 mm (3 in.)

NOTE :
- **There is a difference of blade height between flat surface and ground measurements.**

6. Check that the left side blade has the same height. The difference between both measurements is less than 3 mm (0.13 in.).
7. If the side-to-side adjustment is not within the given tolerance, adjustment is necessary.

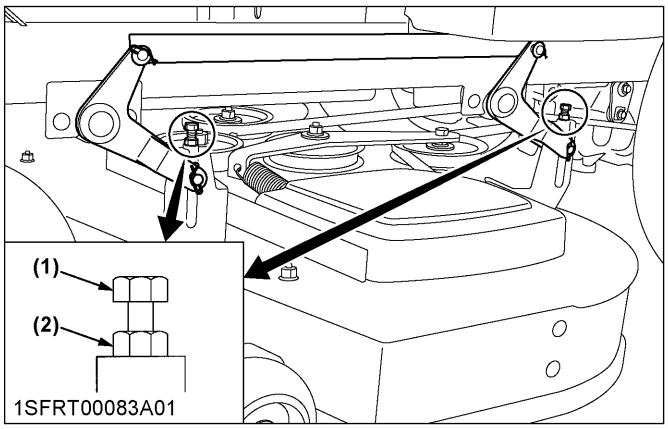
Side-to-side adjustment	Less than 3 mm (0.13 in.)



(S) Side
(H) Height of blade

Adjusting the level (side-to-side)

1. Raise up the mower deck to the transport position (the top end).
2. Turn the cutting height set dial to the 3 in. cutting height position.
3. Place 51 mm (2 in.) heigh wood blocks under each side of the mower deck.
   Anti-scalp rollers must not rest on the wood block.
4. Lower the mower deck.
5. Position the mower blade in the side-to-side position.
6. Loosen the jam nuts of the right side of the machine.
7. Adjust the cutting height fine tuning bolts to set 76 mm (3 in.) blade height.
   Front and rear side bolts must be adjusted.
8. Jam the nuts.
9. Adjust the left side equally.
10. Check the side-to-side level. If it is not level, adjustment is necessary.



(1) Cutting height fine tuning bolt
(2) Jam nut

3. Leveling the mower deck (front-to-rear)

⚠ WARNING

To avoid serious injury or death:
- **Park the machine on a firm and level surface.**
- **Engage the parking brake.**
- **Disengage the PTO.**
- **Stop the engine and remove the key while checking or adjusting the level of the mower deck.**

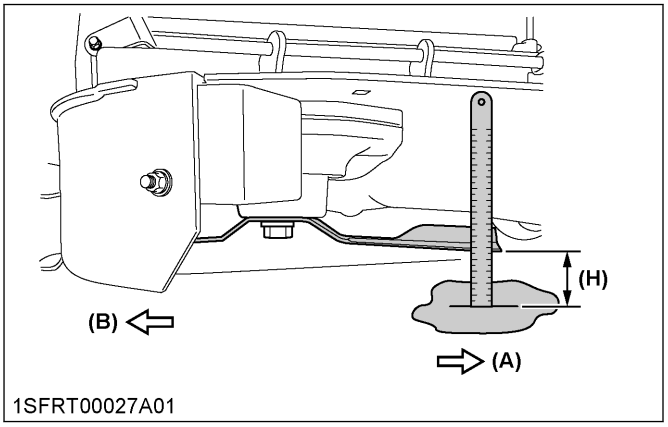
IMPORTANT :
- **Check the machine tire pressure.**
  Inflate the tires to the correct pressure.
  (See TIRES AND WHEELS on page 46.)

Checking level (front-to-rear)

NOTE :
- **The mower deck anti-scalp rollers should not contact the ground.**

1. Raise the mower deck to the transport position (the top end).
2. Turn the cutting height set dial to the 3 in. cutting height position.
3. Lower the mower deck.

4. Position the right mower blade in the front-to-rear position.
5. Measure from the right front blade tip to the level surface with a short ruler or leveling gauge.
6. Turn the blade 180° and measure from the right rear blade tip to the level surface.
7. Check that the left side blade has the same dimensions. The difference between both measurements should be less than 6 mm (0.25 in.). The front side must be lower than the rear side.
8. If the front-to-rear adjustment is not within the given tolerance, adjustment is necessary.



(A) Front
(B) Rear
(H) Height of blade

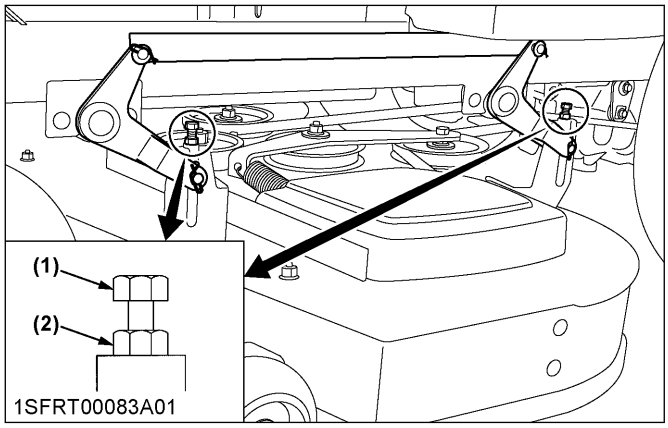
Front-to-rear adjustment	Less than 6 mm (0.25 in.) The front side must be lower than the rear side.

Adjusting the level (front-to-rear)

1. Raise up the mower deck to the transport position (the top end).
2. Turn the cutting height set dial to the 3 in. cutting height position.
3. Place 51 mm (2 in.) heigh wood blocks under each side of the mower deck.
   Anti-scalp rollers must not rest on the wood block.
4. Lower the mower deck.
5. Loosen the jam nuts of the front side of the machine.
6. Adjust the cutting height fine tuning bolts to set 76 mm (3 in.) blade height.
   Both front side bolts must be adjusted.
7. Jam the nuts.
8. Adjust the other side equally.

   IMPORTANT :
   - **The difference between both measurements should be less than 6 mm (0.25 in.).**
     The front side must be lower than the rear side.

9. Check the front-to-rear level. If it is not level, adjustment is necessary.



(1) Cutting height fine tuning bolt
(2) Jam nut

GENERAL TORQUE SPECIFICATION

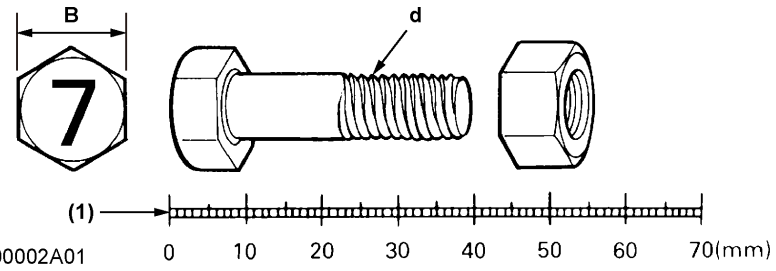
American standard cap screws with UNC or UNF threads				Metric cap screws			
SAE grade no.		GR.5	GR.8	Property class		Class 8.8 (8.8)	Class 10.9 (10.9)
1/4	(lbf·ft) (N·m) (kgf·m)	8-9.6 10.7-12.9 1.11-1.33	12-14.4 16.1-19.3 1.66-1.99	M6	(lbf·ft) (N·m) (kgf·m)	7.2-8.3 9.81-11.3 1.0-1.15	
5/16	(lbf·ft) (N·m) (kgf·m)	17-20.5 23.1-27.8 2.35-2.84	24-29 32.5-39.3 3.31-4.01	M8	(lbf·ft) (N·m) (kgf·m)	17.4-20.2 23.6-27.4 2.4-2.8	21.7-25.3 29.4-34.3 3.0-3.5
3/8	(lbf·ft) (N·m) (kgf·m)	35-42 47.5-57.0 4.84-5.82	45-54 61.0-73.2 6.22-7.47	M10	(lbf·ft) (N·m) (kgf·m)	35.5-41.2 48.1-55.8 4.9-5.7	44.9-52.1 60.8-70.5 6.2-7.2
1/2	(lbf·ft) (N·m) (kgf·m)	80-96 108.5-130.2 11.07-13.29	110-132 149.2-179.0 15.22-18.27	M12	(lbf·ft) (N·m) (kgf·m)	57.2-66.5 77.5-90.1 7.9-9.2	76.0-86.8 103-117 10.5-12.0
9/16	(lbf·ft) (N·m) (kgf·m)	110-132 149.2-179.0 15.22-18.27	160-192 217.0-260.4 22.14-26.57	M14	(lbf·ft) (N·m) (kgf·m)	91.2-108 124-147 12.6-15.0	123-144 167-196 17.0-20.0
5/8	(lbf·ft) (N·m) (kgf·m)	150-180 203.4-244.1 20.75-24.91	220-264 298.3-358.0 30.44-36.53	M16	(lbf·ft) (N·m) (kgf·m)	145-166 196-225 20.0-23.0	192-224 260-303 26.5-31.0

TIGHTENING TORQUE CHART

Thread size d (mm)	Hex. bolt head size B (mm)	No mark			7T		
		lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m
M8	12 or 13	13.0-15.2 (14.1 ± 1.1)	17.8-20.6 (19.2 ± 1.4)	1.9-2.1 (2.0 ± 0.1)	17.5-20.3 (18.9 ± 1.4)	23.5-27.5 (25.5 ± 2.0)	2.4-2.8 (2.6 ± 0.2)
M10	14 or 17	28.9-33.3 (31.1 ± 2.2)	39.3-45.1 (42.2 ± 2.9)	4.0-4.6 (4.3 ± 0.3)	35.4-41.2 (38.3 ± 2.9)	48.1-55.9 (52.0 ± 3.9)	4.9-5.7 (5.3 ± 0.4)
M12	17 or 19	46.3-53.5 (49.9 ± 3.6)	62.8-72.6 (67.7 ± 4.9)	6.4-7.4 (6.9 ± 0.5)	57.1-66.5 (61.8 ± 4.7)	77.6-90.2 (83.9 ± 6.3)	8.0-9.2 (8.6 ± 0.6)
M14	19 or 22	79.6-92.6 (86.1 ± 6.5)	107.9-125.5 (116.7 ± 8.8)	11.0-12.8 (11.9 ± 0.9)	91.1-108.5 (99.8 ± 8.7)	123.6-147.0 (135.3 ± 11.7)	12.6-15.0 (13.8 ± 1.2)

NOTE :

- **Figure [7] on the top of the bolt indicates that the bolt is made of special material.**
- **Before tightening, check the figure on top of the bolt.**



1SFRT00002A01

(1) Scale

STORAGE

⚠ WARNING

To avoid serious injury or death:

- **To reduce fire hazards, allow the engine and the exhaust system to cool before storing the machine indoors or near combustible materials.**
- **To avoid the danger of exhaust fume poisoning, do not operate the engine indoors without proper ventilation.**
- **Do not clean the machine with the engine running.**
- **To avoid fire hazards, do not leave grass and leaves in the mower and the grass catcher.**
- **When storing, remove the key from the key switch to avoid operation by unauthorized persons.**

STORING THE MACHINE

When the machine will not be operated for over 2 months, clean the machine and perform the following operations before storage:

1. Repair parts as necessary.
2. Check bolts and nuts and tighten as necessary.
3. Apply grease or engine oil to parts most likely to rust.
4. Inflate the tires to a little above the standard pressure levels (approximately 110%).
5. Lower the mower to the ground.
6. Remove the battery from the machine, recharge it, adjust the electrolyte to the proper level, and store in a cool dry place.
   The battery discharges over time even while in storage. Recharge it once a month in the hot season and once every 2 months in the cold season.
7. Drain the fuel tank, fuel lines and carburetor or use a fuel stabilizer to prevent deterioration of the gasoline. If you choose to use a fuel stabilizer, follow the manufacturers recommendations and add the correct amount for the capacity of the fuel system. Fill the fuel tank with clean, fresh gasoline. Run the engine for 2 to 3 minutes to get stabilized fuel into the carburetor.
8. Store the machine in a dry place sheltered from rain. Cover the machine with a vinyl tarp.
9. Moisture content in most grasses can damage the mower and grass catcher if they are not properly cleaned after use. Make sure the mower and the grass catcher are clean and completely empty before storage.
10. Store the machine only on flat, level ground.

REMOVING THE MACHINE FROM STORAGE

1. Check the tire inflation pressure and adjust as required.
2. Install the battery. Before installing the battery, be sure it is fully charged.
3. Do the daily check.
   (See DAILY CHECK on page 52.)
4. Check all fluid levels (engine oil, hydrostatic oil).
5. Start the engine. Shut the engine off, walk around the machine and make a visual inspection looking for leakage of oil or other fluids.
6. Run the engine a couple of minutes before you put the engine under load.

TROUBLESHOOTING

ENGINE TROUBLESHOOTING

If something is wrong with the engine, refer to the following table for the cause and its corrective measure.

Symptom (if)	Cause	Remedy
The engine is difficult to start or will not start.	• No operator on the seat.	• Sit on the operator's seat.
	• Parking brake pedal not in the proper position.	• Apply the parking brake.
	• PTO switch not in the proper position.	• Make sure the PTO switch is in the *"DISENGAGED"* (OFF) position.
	• The motion control levers not in the proper position.	• Make sure motion control levers are in the *"NEUTRAL LOCK"* position.
	• The key switch not in the proper position.	• Make sure the key switch is in the *"ON"* position.
	• No fuel.	• Fill with fuel.
	• Improper or stale fuel. (Fuel quality is poor.)	• Replace fuel and the fuel filter.
	• Water or dirt in the fuel system.	• Replace fuel and consult your local KUBOTA Dealer.
	• Fuel hose or fuel filter clogged or damaged.	• Clean or replace fuel lines and consult your local KUBOTA Dealer.
	• Air cleaner clogged.	• Clean or replace the air cleaner.
	• Spark plug damaged.	• Adjust the spark plug gap or replace the spark plug.
		• Check the spark plug wire connection.
	• Fuse blown.	• Replace the fuse.
	• The engine oil viscosity is wrong.	• Use oils of different viscosities, depending on the ambient temperature.
	• The battery becomes weak and the engine does not turn over quick enough.	• Clean battery cables and terminals.
		• Charge the battery.
		• In cold weather, always remove the battery from the engine, charge and store it indoors. Install it on the machine only when the machine is going to be used.
	• Over choking or choke adjusted incorrectly.	• Check and consult your local KUBOTA Dealer.
Insufficient engine power.	• Insufficient or dirty fuel.	• Check the fuel system.
	• Fuel filter clogged.	• Replace the fuel filter.
	• Air cleaner clogged.	• Clean or replace the air cleaner.
	• Spark plug damaged.	• Adjust the spark plug gap or replace it.
The engine stops suddenly.	• Insufficient fuel.	• Refuel. • Check the fuel valve position. • Check the carburetor fuel valve position.
Rough engine running.	• Spark plug damaged.	• Adjust the spark plug gap or replace it.

(Continued)

Symptom (if)	Cause	Remedy
Rough engine running.	• Spark plug wire damaged.	• Consult your local KUBOTA Dealer.
	• Carburetion problems.	• Consult your local KUBOTA Dealer.
	• Ignition coil damaged.	• Consult your local KUBOTA Dealer.
	• Choke adjusted incorrectly.	• Consult your local KUBOTA Dealer.
	• Fuel hose or fuel filter clogged or damaged.	• Clean or replace fuel lines and consult your local KUBOTA Dealer.
	• Improper or stale fuel. (Fuel quality is poor.)	• Replace fuel and the fuel filter.
	• Air cleaner clogged.	• Clean or replace the air cleaner.
Exhaust fumes are colored (black, dark or gray).	• Overload.	• Reduce load.
	• Low grade fuel used.	• Use specified fuel.
	• Fuel filter clogged.	• Replace the fuel filter.
	• Air cleaner clogged.	• Clean or replace the air cleaner element.
	• Choke not fully opened.	• Check the choke position.
Exhaust fumes are colored (white or blue).	• Excessive engine oil.	• Reduce to the specified oil level.
	• Piston ring worn or stuck.	• Consult your local KUBOTA Dealer.
Engine overheats.	• Engine overloaded.	• Lower speed or reduce load.
	• Engine oil insufficient.	• Fill engine oil.
	• The engine air intake screen and cooling fins are dirty.	• Clean the air intake screen and cooling fins.
	• Air cleaner element plugged.	• Clean or replace the air cleaner element.
	• Engine speed too low.	• Operate at *"FAST"* speed.
	• Operating ground speed too fast.	• Operate the machine at slower ground speed.
The engine knocks.	• Stale or low octane fuel.	• Use specified fuel.
	• Engine overloaded.	• Lower ground speed or reduce load.
	• Engine speed too low.	• Operate at *"FAST"* speed.
The engine will not idle.	• Spark plug damaged.	• Adjust the spark plug gap or replace it.
	• Faulty spark plug.	• Replace the spark plug.
	• Carburetion problem.	• Consult your local KUBOTA Dealer.

If you have any questions, contact your local KUBOTA Dealer.

BATTERY TROUBLESHOOTING

Symptom (if)	Cause	Remedy	Preventive measure
The starter does not function.	• Battery overuse, dim lights.	• Charge the battery sufficiently.	• Charge the battery properly.
	• The battery has not been recharged.		
	• Poor terminal connection.	• Clean the terminal and tighten securely.	• Keep the terminal clean and tight. Apply grease and treat with anti-corrosives.
	• The battery life has expired.	• Replace the battery.	
The starter does not function from the beginning, and lights soon become dim.	• Insufficient charging.	• Charge the battery sufficiently.	• The battery must be serviced properly before initial use.
When viewed from the top, the top of the plates look whitish.	• The battery was used with an insufficient amount of electrolyte.	• Add distilled water and charge the battery.	• Regularly check the electrolyte level.
	• The battery was used too much without recharging.	• Charge the battery sufficiently.	• Charge the battery properly.
Recharging is impossible.	• The battery life has expired.	• Replace the battery.	
Terminals are severely corroded and heated up.	• Poor terminal connection.	• Clean the terminal and tighten securely.	• Keep the terminal clean and tight. Apply grease and treat with anti-corrosives.
The battery electrolyte level drops rapidly.	• There is a crack or pin holes in the electrolytic cells.	• Replace the battery.	
	• Charging system trouble.	• Contact your local KUBOTA Dealer.	

If you have any questions, contact your local KUBOTA Dealer.

MACHINE TROUBLESHOOTING

Symptom (if)	Cause	Remedy
The machine operation is not smooth.	• The hydrostatic transaxle fluid is insufficient.	• Fill with oil.
	• The filter is clogged.	• Replace the filter.
The machine does not move while the engine is running.	• The parking brake is on.	• Release the parking brake.
	• The transaxle fluid level is insufficient.	• Fill with oil.
The machine moves when the motion control levers are in the *"NEUTRAL LOCK"* position (operating the engine).	• The hydrostatic lever linkage is not correctly adjusted.	• Ask your dealer for hydrostatic lever linkage adjustment.
	• The control linkage pivots are sticking.	• Pull up and lubricate linkage.
All electrical equipment do not operate.	• Slow blow fuse blown.	• Replace the slow blow fuse.

If you have any questions, contact your local KUBOTA Dealer.

MOWER TROUBLESHOOTING

Symptom (if)	Cause	Remedy
Blades do not rotate.	• The PTO system is not normal: PTO system malfunctioning.	• Consult your local KUBOTA Dealer.
	• The PTO system is normal: broken mower belt.	• Replace.
Mower belt slipping.	• Weaken tension spring.	• Replace.
	• Worn mower belt.	• Replace.
	• Mower plugged.	• Unplug and clean the mower deck.
	• Debris in pulleys.	• Clean.
Discharge deflector plugged.	• Grass too wet.	• Wait for grass to dry.
	• Grass too long.	• Raise the cutting height and cut grass twice.
	• Cutting too low.	• Raise the cutting height.
	• Engine rpm too low.	• Mow at full throttle.
	• Ground speed too fast.	• Slow down.
Streaking of grass uncut.	• Ground speed too fast.	• Slow down.
	• Engine rpm too low.	• Mow at full throttle, check and reset the engine rpm.
	• Grass too long.	• Cut grass twice.
	• Blades dull or damaged.	• Replace blades or have blades sharpened.
	• Debris in mower deck.	• Clean the mower deck.
Uneven cut.	• Mower deck not level.	• Level the mower deck.
	• Ground speed too fast.	• Slow down.
	• Blades dull.	• Have blades sharpened.
	• Blades worn or damaged.	• Replace the blades.
	• Low tire inflation.	• Add air to correct pressure.
	• Anti-scalp rollers not adjusted correctly.	• Adjust the anti-scalp rollers.
	• Wheels pressure not adjusted correctly.	• Set both tire pressure to the correct pressure. (See TIRES on page 46.)
Blades scalping grass.	• Cutting height too low.	• Raise the cutting height.
	• Turning speed too fast.	• Reduce speed on turns.
	• Ridges in terrain.	• Change the mowing pattern.
	• Rough or uneven terrain.	• Adjust wheels pressure and anti-scalp rollers.
	• Anti-scalp rollers not adjusted correctly.	• Adjust wheels pressure and anti-scalp rollers.
	• Bent blade(s).	• Replace blade(s).
Excessive vibration.	• Debris on mower deck or in pulleys.	• Clean the mower deck and pulleys.
	• Damaged mower belt.	• Replace the mower belt.
	• Damaged pulleys.	• Replace pulleys.
	• Pulleys out of alignment.	• Check pulleys.
	• Blades out of balance.	• Have blades balanced.
Mower loads down machine.	• Engine rpm too low.	• Mow at full throttle, check and reset the engine rpm.

(Continued)

Symptom (if)	Cause	Remedy
Mower loads down machine.	• Ground speed too fast.	• Slow down.
	• Debris wrapped around mower spindles.	• Clean the mower.
	• Front of deck too low.	• Adjust the mower deck. (See MOWER DECK LEVEL on page 75.)

If you have any questions, contact your local KUBOTA Dealer.

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