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KUBOTA Corporation

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English (Australia)
Code No. K1029-7121-4

T2090BR-AU-T2290KW-AU-T2290KWT-AU

OPERATOR'S MANUAL

KUBOTA
LAWN TRACTOR

MODELS T2090BR-AU
T2290KW-AU
T2290KWT-AU

1TBRB00001A01

READ AND SAVE THIS MANUAL

Kubota

ABBREVIATION LIST

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

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
- Gasoline Fuel
- Brake
- Parking Brake
- Engine-Stop
- Engine-Run
- Starter Control
- Power Take-Off Clutch Control-Off Position
- Power Take-Off Clutch Control-On Position
- Cutting Height
- Mower-Lowered position
- Mower-Raised position
- Headlight
- Headlight-ON
- Headlight-OFF
- Fast
- Slow
- Engine Speed Control
- Choke
- Cruise Control

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.

FOREWORD

You are now the proud owner of a KUBOTA LAWN TRACTOR. 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.
The owner/user can prevent and is responsible for accidents or injuries occurring to themselves, other people or property. Read and understand this manual carefully before operating the machine. All operators, no matter how much experience they may have had, must read 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

- Know the controls and how to stop quickly.
- Pay special attention to the safety labels on the machine itself.
- The exhaust gas from the muffler is very hot. To prevent fire, do not expose dry grass, mowed grass, oil or any other combustible materials to exhaust gas. Keep the engine and muffler clean all the time.
- 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 operate the machine or any attachments while under the influence of alcohol, medication, controlled substances or when fatigued.
- 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 36.)
- Keep the machine and attachments in good operating condition and keep safety devices in place and in proper working condition.
- This machine is equipped with many safety devices. Do not attempt to remove or alter them.
- Keep all shields and guards in place. Replace all missing or damaged items for your safety.
- Do not allow any bystanders around or near machine during operation.
  Be sure the area is clear of other people before mowing.
  Stop machine if anyone enters the area.
- Before allowing other people to use your machine, explain proper operation to them and have them read this manual before operation.
- Do not allow passengers or non-qualified operators on the machine at any time. You must operate the machine from the seat only.
- Carefully check the area to be mowed and clear any objects such as rocks, bottles, cans, toys, etc., that may damage the mower, the grass catcher or cause personal injury.
- Keep your machine clean. Accumulations of dirt, grease, and trash can contribute to fires and lead to personal injury.
- Keep all nuts, bolts, and screws tight to be sure the equipment is in safe working condition. Check the mower blade mounting bolts for proper tightness at frequent intervals.
- Use only implements recommended 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.
- Follow the maintenance recommendations. (See MAINTENANCE on page 36.)
- It is recommended that your machine be thoroughly inspected at least once a year by an authorized KUBOTA Dealer.

OPERATING THE MACHINE

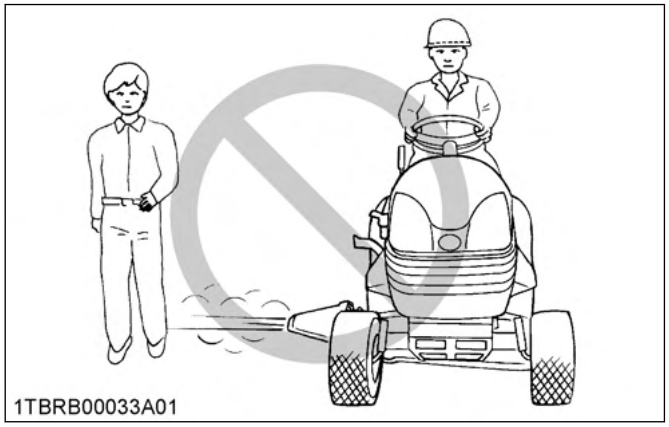
1. Starting to operate the machine

- Never start engine or operate levers from anywhere other than the seat.
- Before starting the engine, make sure that all levers (including auxiliary control levers) are in their neutral positions, that the parking brake is engaged, and that both the mower clutch and the power take-off (PTO) are disengaged.

- Do not start engine by shorting across starter terminals or by by-passing the safety start switch. The machine may start and move if normal starting circuitry is bypassed.
- Do not operate or idle engine in a poorly ventilated area. Exhaust contains poisonous carbon monoxide, a colorless and odorless gas.

2. Working the machine

- Watch where you are going at all times. Watch for and avoid obstacles. Be alert near trees and other obstructions.
- When working in groups, always let others know what you are doing ahead of time.
- Never try to get on or off a moving machine.
- When using any attachments, never direct discharge material toward bystanders. Do not allow anyone near the attachments while in operation.
  Do not mow when bystanders are present in the mowing area.

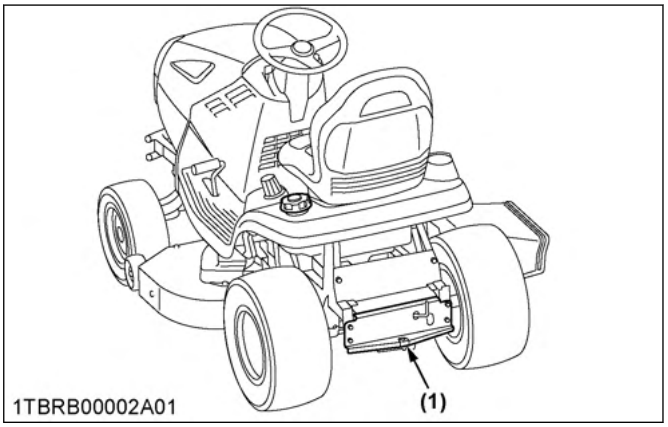


- To reduce fire hazards, keep the engine exhaust area free of grass or leaves.
- Slow down before turning.
- Turn off blades when not mowing.
- Mow only in daylight.
- Be sure rotating blades and engine are stopped and the key is removed before placing hands or feet near blades.
- Shut the engine off and wait for all movement to stop before removing grass catcher or unclogging chute (if equipped).
- Know what is behind you before overriding the KRA system. Do not override the KRA system unless absolutely necessary and safe to do so.
  (See OPERATING THE MOWER on page 33.)
  KUBOTA strongly recommends against overriding the KRA system.
- When mowing for the first time, cut the grass higher than desired.
  This will uncover any unseen object that may damage the mower or grass catcher.
- Always inspect the mower and grass catcher after striking any foreign object. This will insure that all mower and grass catcher parts are safe and secure and not damaged.
  Repair or replace any damaged parts before restarting.
- Use only attachment recommended in this manual. Use proper ballast to front or rear of machine to reduce the risk of upsets. Follow the SAFE OPERATION on page 5 procedures specified in the manuals included with the equipment.
- Do not operate the mower without the entire grass catcher or the discharge chute in place.
  Be aware of the mower discharge direction and do not point it at anyone.
- Watch for traffic when operating near or crossing roadways.
- Never leave a running machine unattended.
  Always turn off blades, set parking brake, stop engine, and remove the key before getting off.
- Be extremely alert for all other traffic when operating the mower and grass catcher near public roads or highways.
- Do not operate where machine could tip or slip.
  Do not operate near ditches, holes, embankments, or other terrain which may collapse under the machine's weight. The risk of machine tip-over is increased when the ground is loose or wet.

3. Pulling loads

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

1. Pull only from the hitch. Never attach loads to the axle housing or any other point above hitch.
2. Limit loads to those you can safely control.
3. Do not turn sharply.
4. Use care when backing.



(1) Hitch hole

4. 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.

Do

- Slowly mow up and down slopes, not across, to avoid machine tip-over. Stay off hills and slopes too steep for safe operation. Do not make sudden changes in speed or direction.
- Remove obstacles such as rocks, tree limbs, etc.
- 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.
- Use slow speed.
- Follow the KUBOTA's recommendations for wheel weights or counterweights to improve stability.
- The weight of grass in the grass catcher may increase the possibility of tip over.
- 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 blades and proceed slowly straight down the slope.
- If the machine stops going uphill, disengage PTO and back slowly down.
- Reduce speed and exercise extreme caution on slopes and in sharp turns to prevent tip-over or loss of control.
- Use special caution when changing direction on slopes.

Do not

- Do not turn on slopes unless necessary and then turn slowly and gradually downhill, if possible.
- Do not mow near drop-offs, ditches, or embankments. The machine could suddenly turn over if a wheel falls over the edge of a cliff or ditch, or if an edge caves in.
- Do not mow on wet grass. Reduced traction could cause sliding.
- Do not try to stabilize the machine by putting your foot on the ground.
- Do not use grass catcher on steep slopes.
- Do not stop or start suddenly when going uphill or downhill.
- Never *"freewheel"*. Do not let the machine travel downhill with HST pedal at neutral position.
- Do not modify or alter the machine.

5. 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. 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.

6. 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 must evaluate their ability to operate the machine safely enough to protect themselves and others from serious injury.

7. Stopping the machine

- Make sure that the machine has come to a complete stop before getting off.
- Before getting off, disengage the PTO, lower all implements, place all control levers in their neutral positions, apply parking brake, turn off the engine and remove the key.
- Do not park the machine on a steep incline. Park on a flat level surface.

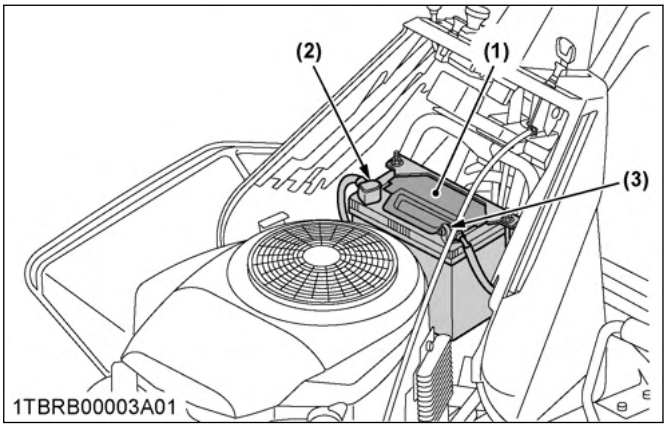
TRANSPORTING THE MACHINE

- 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.
- It is recommended that this machine not be used on public roads.
- Use extra care when loading or unloading the machine into a trailer or truck.

SERVICING AND STORAGE

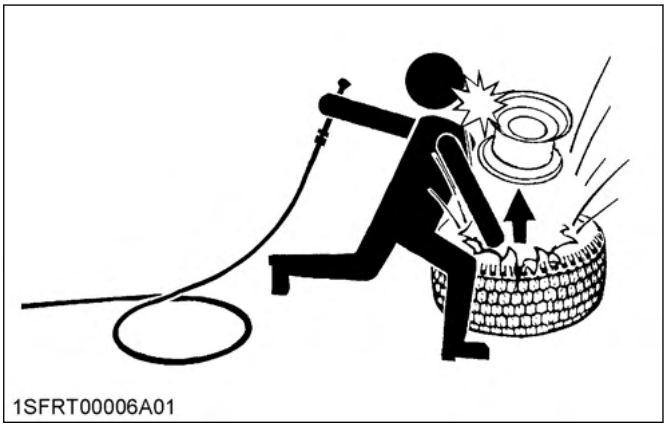
1. Servicing the machine

- Before servicing the machine, park the machine on a firm, level surface, set the parking brake, stop the engine and remove the key.
- To avoid injury, do not adjust, unclog or service the mower or grass catcher with the engine running. Make sure rotating blades are stopped before getting off the machine.
- Disengage power to attachment(s), stop the engine and remove the key before making any repairs or adjustments.
- Allow the machine to cool off before servicing the engine, muffler, etc.
- Keep machine free of grass, leaves, or other debris build-up.
- Use extra care in handling gasoline and other fuels. They are flammable and vapors are explosive.
  1. Use only an approved container.
  2. Never remove fuel cap or refuel with the engine running. Allow engine to cool before refueling. Do not smoke while refueling or when standing near fuel.
  3. Never refuel the machine indoors and always clean up spilled fuel or oil.
  4. Never store the machine or fuel container inside where there is an open flame, such as in a water heater.
- Do not change the engine governor setting or overspeed the engine.
- Never run a 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.
- Keep nuts and bolts, especially blade attachment bolts, tight and keep equipment in good condition.
- Do not smoke when working around the battery. Keep all sparks and flames away from battery. The battery presents an explosion hazard because it gives off hydrogen and oxygen...especially when recharging.
- Before *"JUMP STARTING"* a dead battery, read and follow all of the instructions to help protect the alternator from damage due to extreme load changes. (See JUMP STARTING on page 26.)
  Batteries contain sulfuric acid and produce explosive gases. Follow the instructions below to prevent personal injury.
  – Wear eye and skin protection.
  – Keep sparks and flame away.
  – Always have adequate ventilation while charging or using the battery.
- Keep first aid kit and fire extinguisher available at all times.
- Disconnect the battery's negative (-) cable before working on or near electric components.
- 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.
- To avoid sparks from an accidental short circuit, always disconnect the battery's negative (-) cable first and connect it last.



(1) Battery
(2) Positive cable (+)
(3) Negative cable (-)

- Make sure cotter pins and circlips are properly secured on the front and rear wheels, respectively.
- Never tamper with safety devices.
  Check their proper operation regularly.
- Check brake operation frequently. Adjust and service as required.
- Properly dispose of used lubricants, filters, batteries, and other such components.
- 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 inflation pressure. Do not inflate tires above the recommended pressure shown in the operator's manual.



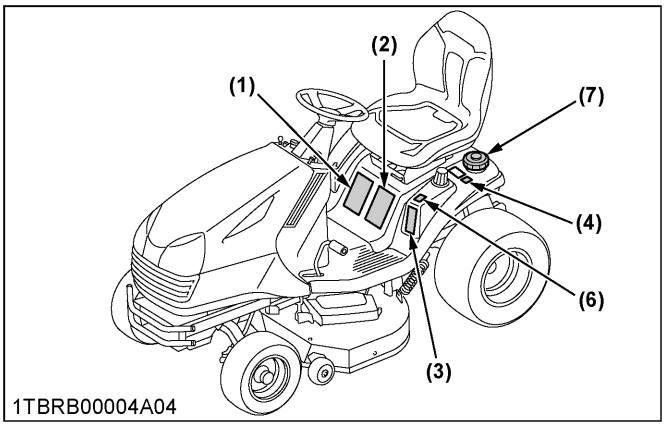
- Securely support the machine when changing wheels or the wheel tread width.

- Make sure that wheel bolts have been tightened to the specified torque.

2. Storage

- Keep the machine and supply of fuel in locked storage and remove the key to prevent children or others from playing or tampering with them.
- When machine is to be stored for a long time, disconnect battery cables or remove the battery. Always remove the negative (-) cable first and reinstall the negative (-) cable last.
- Do not store the machine with fuel in the tank inside a building where fumes may ignite. Allow the engine to cool before storing.
- 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.

SAFETY LABELS



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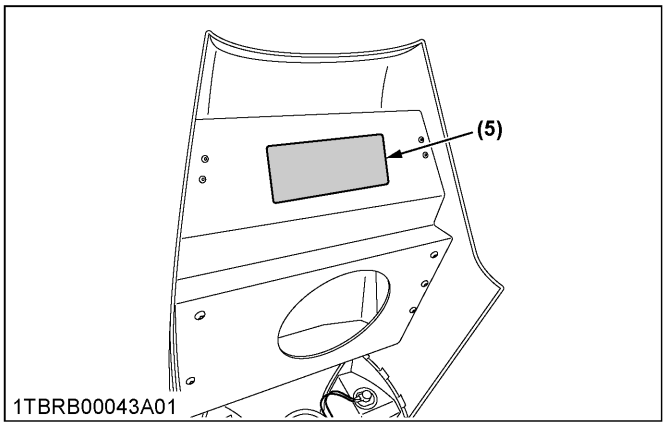

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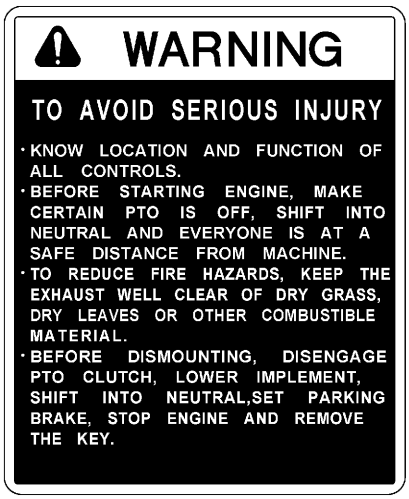
1BDADAFAP0510

(2) Part No. K1042-6534-1



1BDADAFAP129A

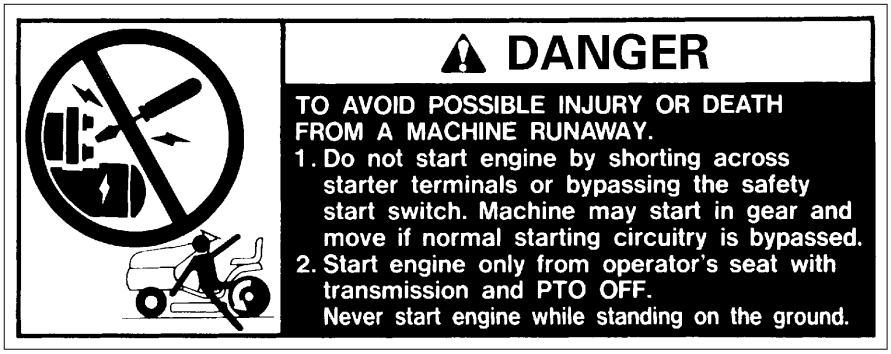
(3) Part No. K1122-6584-2

1BDADAFAP0530

(4) Part No. K1042-6585-1

1BDABBSAP0060

(5) Part No. K1162-6583-1

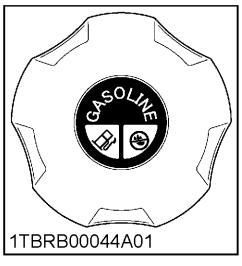


1BDAHADAP0230

(6) Part No. K2651-6568-1

1AYAACAAP1000

(7) Part No. K1032-3412-1



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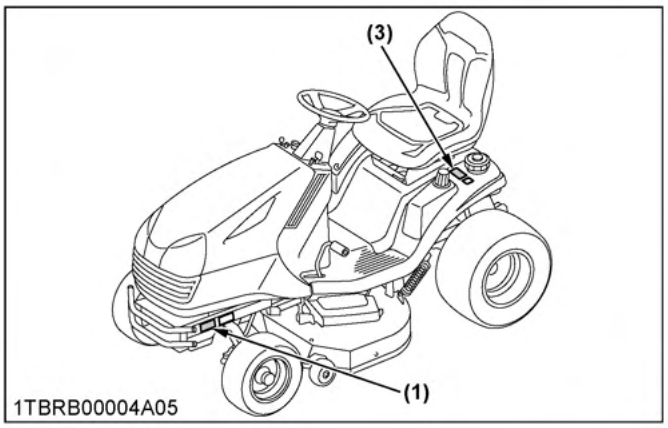

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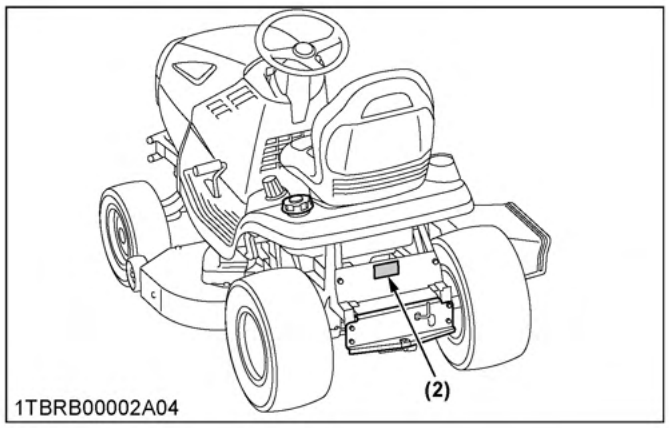
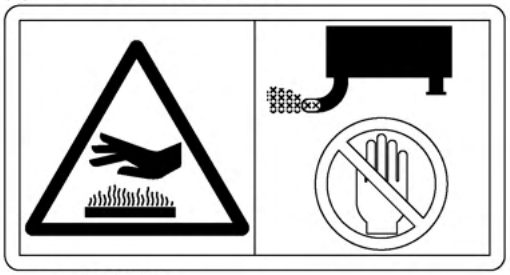


1TBRB00002A04

(1) Part No. K1025-6542-1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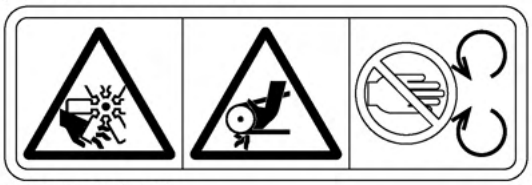
- Hot surface - Burn to finger or hand
- Do not touch muffler.

(2) Part No. K1025-6586-1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- Do not get your hands close to HST fan and fan belt.

(3) Part No. K3014-6569-1


1BDABDYAP076A

- Use ear protection to avoid damage to hearing.
- Always wear protective glasses.

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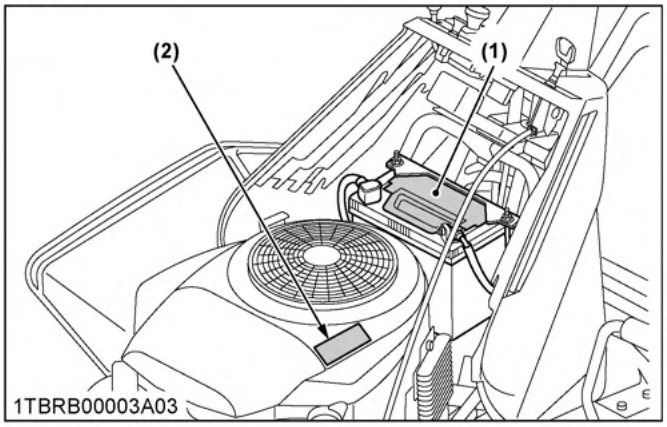
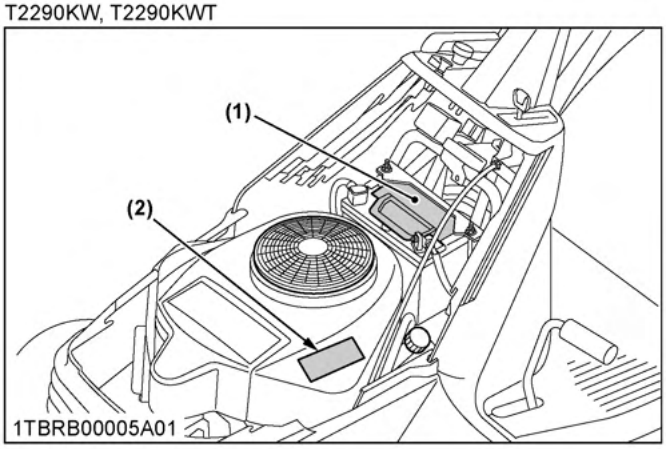
T2090BR



T2290KW, T2290KWT



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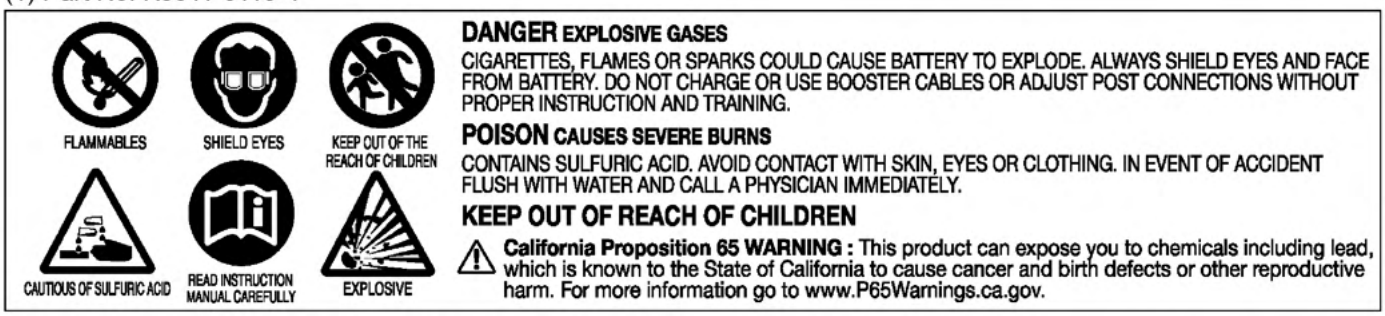

TO AVOID INJURY FROM BATTERY GASES AND ACIDES

- 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.

1BDABDYAP096A

(2) Part No. K1025-6589-1

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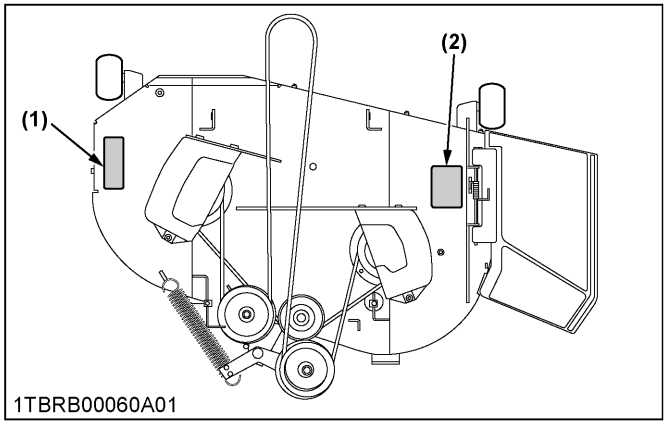
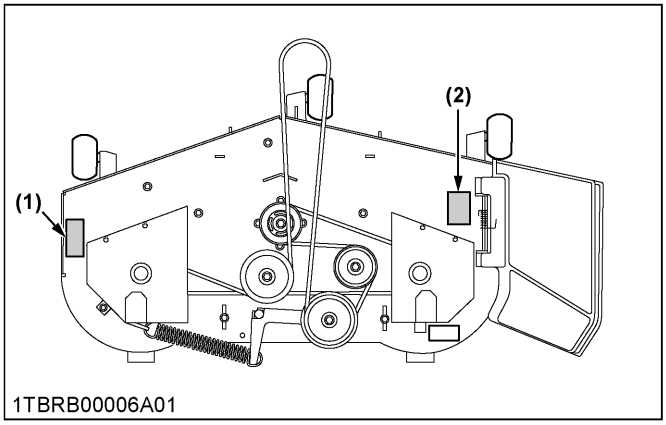
1TBRB00055A01enUS

RCK42P



1TBRB00060A01

RCK48P



1TBRB00006A01

(1) Part No. K5617-7311-1

1BDABBSAP0030

(2) Part No. K5617-7312-1

1BDABBSAP0020

1TBRB00056A01enUS

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

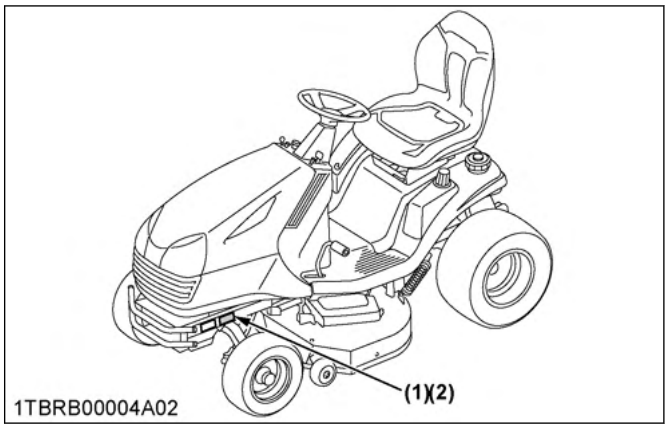
After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself. Your dealer has knowledge of your new machine and has the desire to help you get the best performance and the most value from it.
However, when in need of parts or major service, be sure to consult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

To be filled in by purchaser

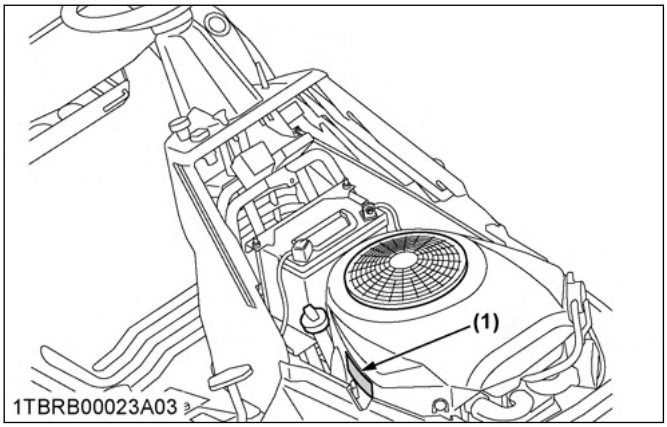
	Type	PIN/Serial number
Machine		
Engine		
Mower		

To be filled in by purchaser



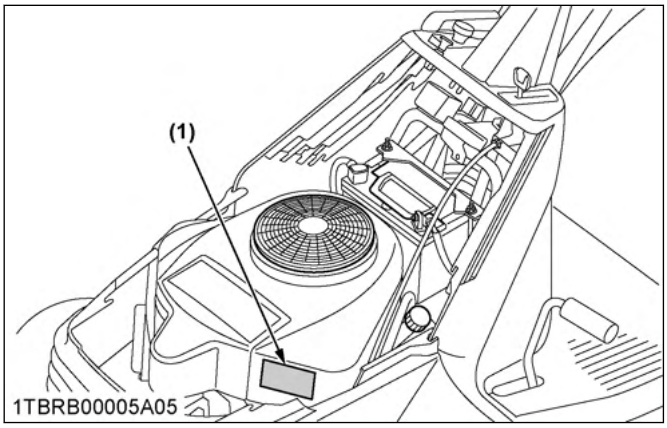
(1) Machine identification plate
(2) Product identification number/serial number

T2090BR



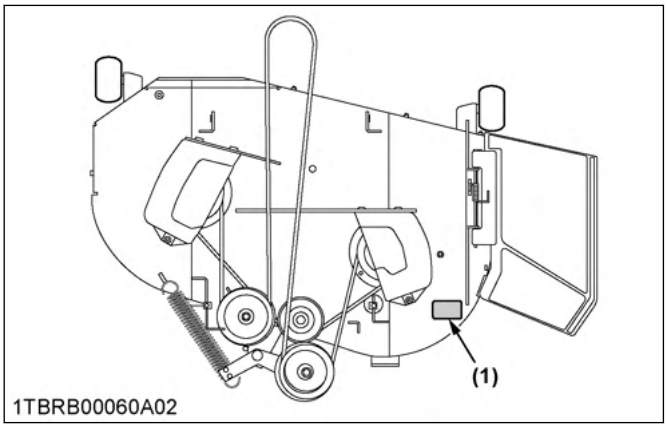
(1) Engine serial number

T2290KW, T2290KWT



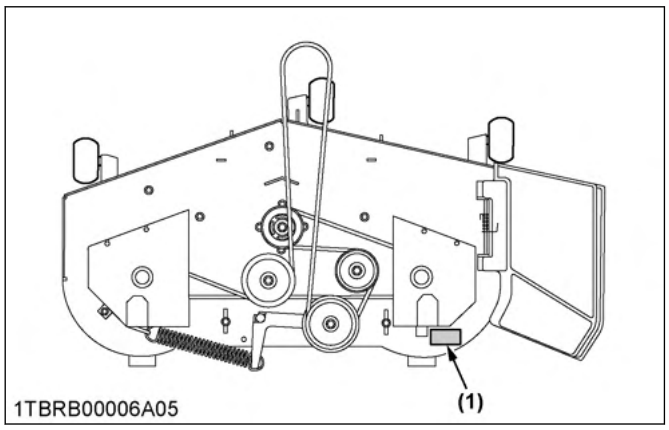
(1) Engine serial number

RCK42P



(1) Mower serial number

RCK48P



(1) 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.

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				T2090BR	T2290KW	T2290KWT
Engine	Model			**GH660V**	**GH739V-3**	
	Type			OHV air cooled gasoline engine		
	Number of cylinders			2		
	Total displacement		cm^3 (cu. in.)	656 (40.0)	726 (44.3)	
	Maximum horse power		kW (HP)	14.9 (20) *1*2	16.0 (21.5) *1*3	
	Cylinder bore and stroke		mm (in.)	75.4 x 73.4 (2.97 x 2.89)	78 x 76 (3.1 x 3.0)	
	Fuel			Automobile unleaded or regular gasoline		
	Starter			Electric starter with battery		
	Lubrication			Full pressure lubrication		
	Cooling			Forced air cooled		
	Battery type			U1-300 (12V, RC:45min, CCA300, CA:410)		
	Spark plug			**CHAMPION XC12YC**	**NGK BPR4ES**	
Capacities	Fuel tank		L (U.S. gals.)	13.6 (3.6)		
	Engine crankcase		L (U.S. qts.)	1.9 (2.0)	2.1 (2.2)	
	Hydrostatic transmission case		L (U.S. qts.)	2.0 (2.1)		2.75 (2.9)
Machine	PTO drive system			Belt		
	Direction of revolution			Clockwise viewed from top		
	Revolution (PTO speed)		rpm	3450		
	PTO clutch			Electric		
	Transmission			Hydrostatic transmission		
	Traviling speeds	Forward	km/h (mph)	0 to 9.2 (0 to 5.7)		0 to 10.8 (0 to 6.7)
		Reverse	km/h (mph)	0 to 5.6 (0 to 3.5)		0 to 6.4 (0 to 3.9)
	Brake			External disk type		
	Tires	Front		15 x 6.00 - 8		16 x 6.00 - 8
		Rear		20 x 10.0 - 10		22 x 10.0 - 10
Dimensions	Overall length		mm (in.)	1900 (74.8)		1910 (75.2)
	Overall width (with mower)		mm (in.)	1392 (54.8)		1540 (60.6)
	Overall height		mm (in.)	1305 (51.4)	1310 (51.6)	
	Wheelbase		mm (in.)	1295 (51.0)		
	Treads	Front	mm (in.)	816 (32.1)		
		Rear	mm (in.)	760 (29.9)		755 (29.7)
	Weight (with mower)		kg (lbs.)	270 (595)	282 (622)	300 (661)

The company reserves the right to change the specifications without notice.

*1 Manufacturer's estimate

*2 The gross power rating for individual gas engine models is labeled in accordance with SAE (Society of Automotive Engineers) code J1940 (Small Engine Power & Torque Rating Procedure), and rating performance has been obtained and corrected in accordance with SAE J1995 (Revision 2002-05). Torque values are derived at 3060 RPM; horsepower values are derived at 3600 RPM. Actual gross engine power will be lower and is affected by, among other things, ambient operating conditions and engine-to-engine variability. Given both the wide array of products on which engines are placed and the variety of environmental issues applicable to operating the equipment, the gas engine will not develop the rated gross power when used in a given piece of power equipment (actual *"onsite"* or net power). This difference is due to a variety of factors including, but not limited to, accessories (air cleaner, exhaust, charging, cooling, carburetor, fuel pump, etc.), application

limitations, ambient operating conditions (temperature, humidity, altitude), and engine-to-engine variability. Due to manufacturing and capacity limitations, Briggs & Stratton may substitute an engine of higher rated power for this Series engine.

*3 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.

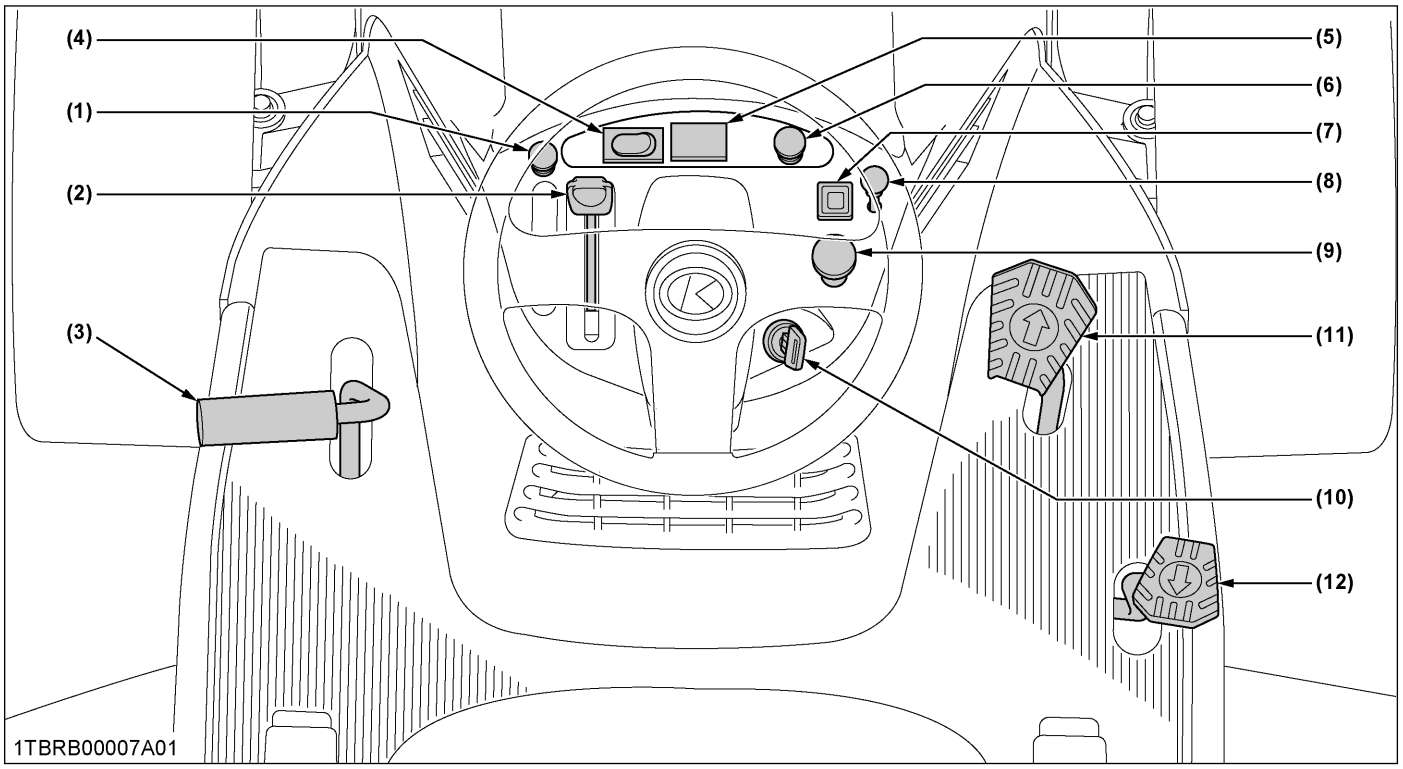
Model				**RCK42P-90T**	**RCK48P-90T**
PRO commercial deck (Fabricated deck)	Suitable machine			**T2090BR**, **T2290KW**	**T2290KWT**
	Mounting method			Parallel linkage	
	Adjustment of cutting hegiht			Dial gauge	
	Cutting width		mm (in.)	1067 (42)	1219 (48)
	Cutting height		mm (in.)	25 to 102 (1.0 to 4.0), 1/4" increment	
	Weight (approximation)		kg (lbs.)	50 (110)	60 (132)
	Blade spindle speed		r/s (rpm)	52.8 (3170) *1	68.5 (4110) *1
	Blade tip velocity		m/s (fpm)	91.0 (17900) *1	
	Blade length		mm (in.)	548 (21.6)	424 (16.7)
	Number of blades			2	3
	Dimensions	Total length	mm (in.)	950 (37.4)	830 (32.7)
		Total width	mm (in.)	1392 (54.8)	1540 (60.6)
		Total height	mm (in.)	310 (12.2)	

The company reserves the right to change the specifications without notice.

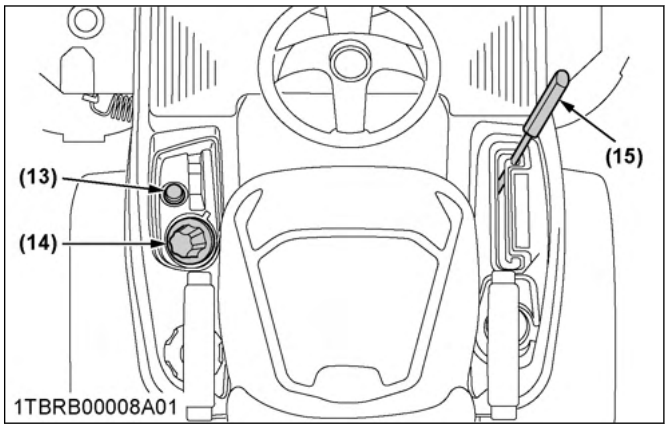
*1 Engine max rpm

INSTRUMENT PANEL AND CONTROLS

INSTRUMENT PANEL, SWITCHES AND CONTROLS



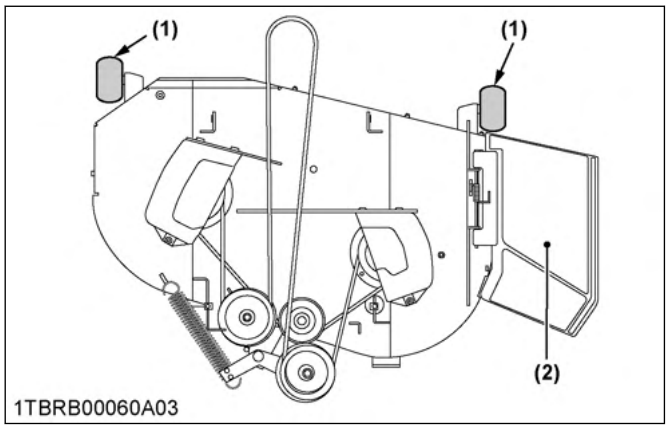
Illustrated contents



Illustrated contents

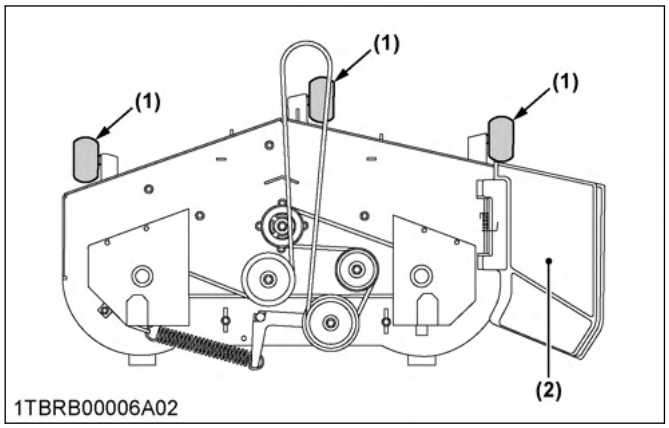
MOWER

RCK42P



(1) Anti-scalp roller (front, bolt shift type) 32
(2) Discharge chute

RCK48P



(1) Anti-scalp roller (front, bolt shift type) 32
(2) Discharge chute

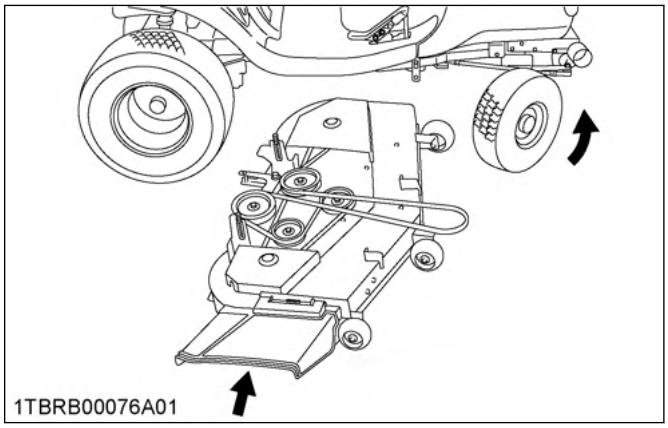
MOWER MOUNTING

ATTACHING THE MOWER

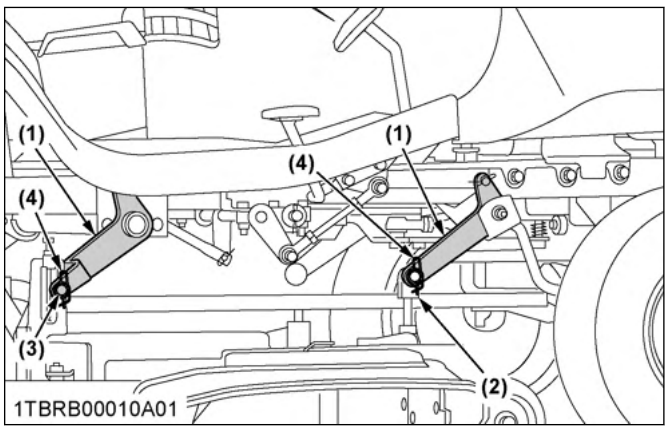
⚠ WARNING
To avoid serious injury or death:
- **Shut off the engine and remove the key before attaching the mower.**

1. Mounting the mower deck

1. Park the machine on level ground and place the mower deck at the right side of machine.
   Raise mower lift lever and lock in raised position.
2. Turn the front wheels to the left. Slide the mower under the machine, then return wheels to straight ahead position.
3. Adjust height control dial to **[1]** and lower mower lift lever and lock in lower position.

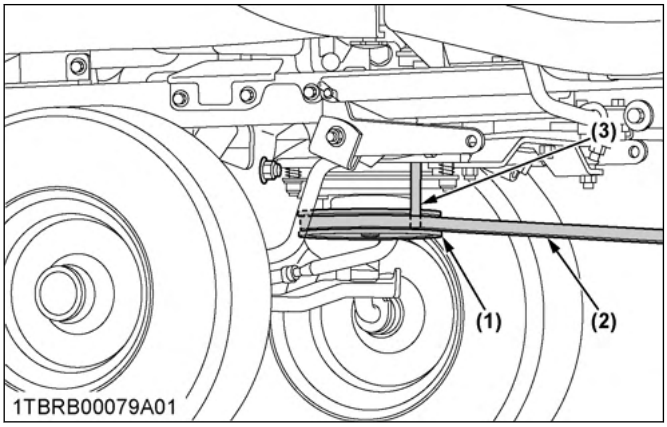


4. Attach the mower deck to the link and mower link with 2 clevis pins and 4 rue-ring pins.



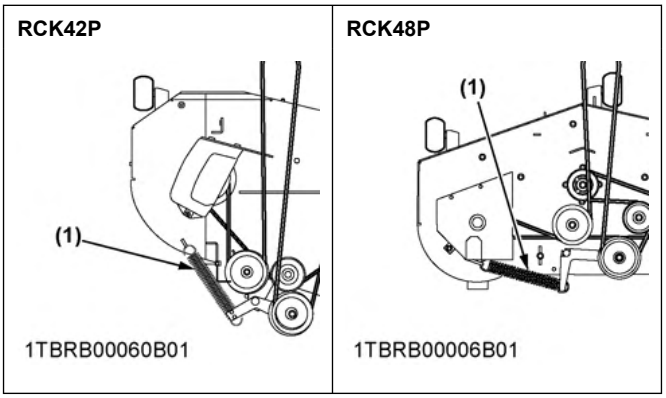
(1) Mower link
(2) Link
(3) Clevis pin
(4) Rue-ring pin

5. Attach the mower belt to the engine pulley. See the belt routing. The mower belt must be outside of the guard pin.



(1) Engine pulley
(2) Mower belt
(3) Guard pin

6. Attach the tension spring.



(1) Tension spring

ADJUSTING THE MOWER DECK (FOR BEAUTIFUL FINISH CUT)

See OPERATING THE MOWER on page 32 and ADJUSTMENT on page 64.

DISMOUNTING THE MOWER DECK

For dismounting the mower deck, reverse the above procedures.

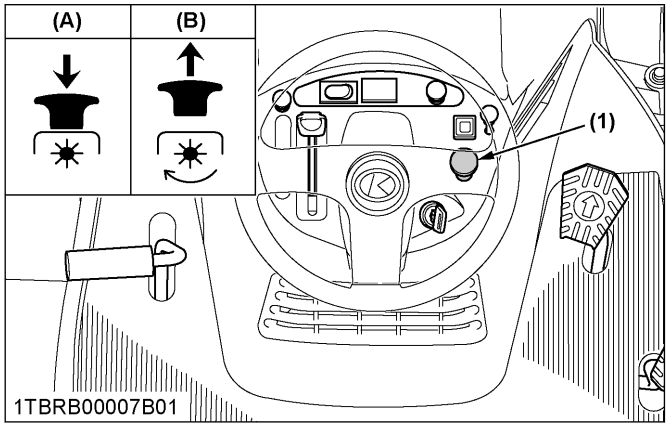
OPERATING THE ENGINE

⚠ 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.**
- **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 with heat shields or guards removed.**

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

STARTING THE ENGINE

1. Apply the parking brake.
   (See Parking brake lock knob on page 22.)
2. Make sure that the PTO switch is in the *"DISENGAGED"* position.



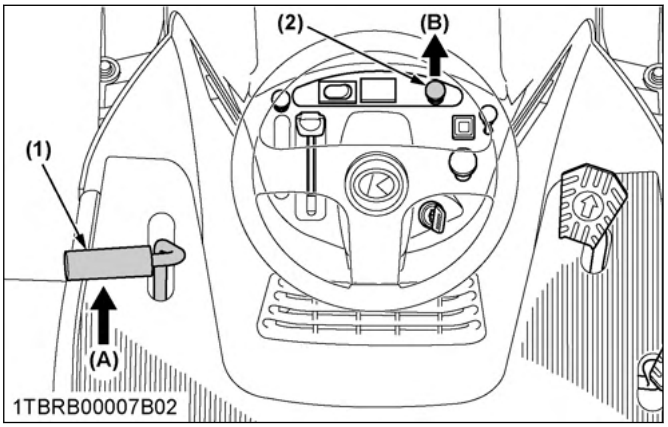
(1) PTO switch
(A) "DISENGAGED" (OFF)
(B) "ENGAGED" (ON)

3. Adjusting the operator's position.
   (See Operator's position on page 22.)
4. Set the throttle lever as follows.
   - If engine is cold,
     T2090
     Place the throttle lever to the *"CHOKE"* position.
     T2290
     Pull the choke knob out.
   - If engine is warm,
     Move the throttle lever to *"HALF SPEED"* position.

   (See Throttle lever and choke knob on page 23.)
5. Insert the key into the key switch. Turn the key switch to *"START"* position and release key to *"ON"* position when the engine starts.
   (See Key switch on page 23.)

1. Parking brake lock knob

To apply the parking brake:
1. Depress the brake pedal firmly.
2. Pull the parking brake lock knob.
3. Release the brake pedal while holding the parking brake lock knob.



(1) Brake pedal
(2) Parking brake lock knob
(A) "DEPRESS"
(B) "PULL"

To release the parking brake:
Depress the brake pedal and release slowly with your left foot.

NOTE :
- **This machine is equipped with safety devices. If you get off from the seat and the parking brake is not applied, the engine will stop automatically. (Operator presence control)**

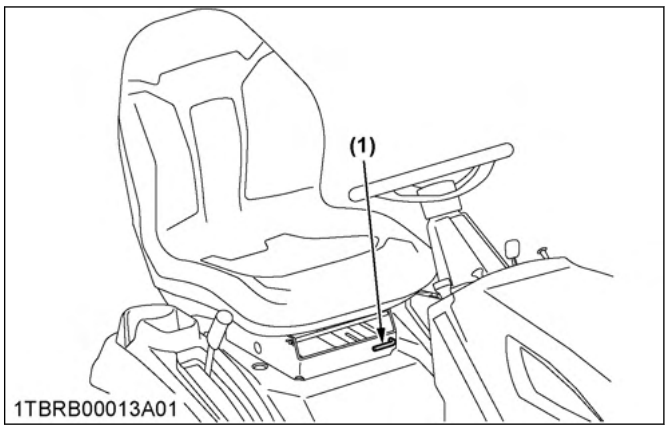
2. Operator's position

The operator's seat position can be adjusted forward and rearward.

1. Pull up the seat sliding lever and slide the seat to the desired position.

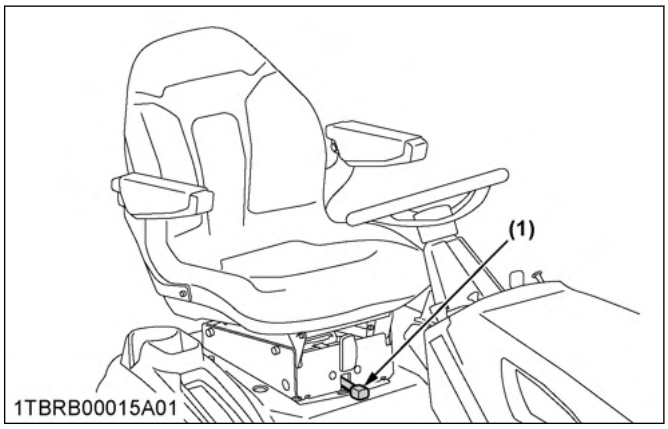
2. Make sure that the seat is locked.

T2090BR



(1) Seat sliding lever

T2290KW



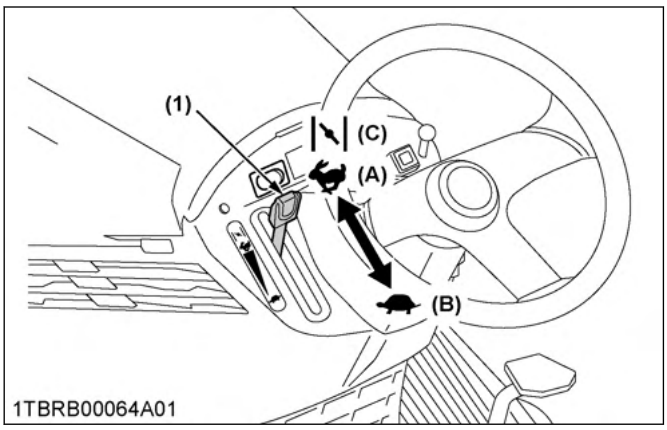
(1) Seat sliding lever

3. Throttle lever and choke knob

T2090BR

Set the throttle lever as follows.

- If the engine is cold:
  Place the throttle lever to the *"CHOKE"* position.
- If the engine is warm:
  Place the throttle lever midway between the *"SLOW"* and the *"FAST"* positions.



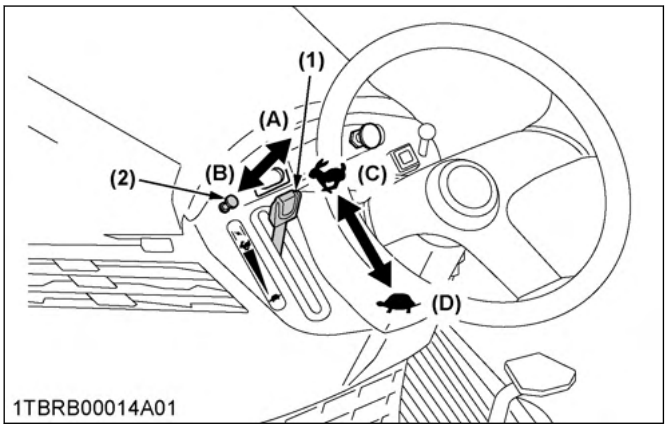
(1) Throttle lever
(A) "FAST"
(B) "SLOW"
(C) "CHOKE"

T2290KW, **T2290KWT**

- Pull the throttle lever downward to decrease the engine speed.
- Push it upward to increase the engine speed.

Always pull the choke knob out to the *"ON"* position to start the engine in cold conditions.

Always push choke knob in to the *"OFF"* position after the engine has started.

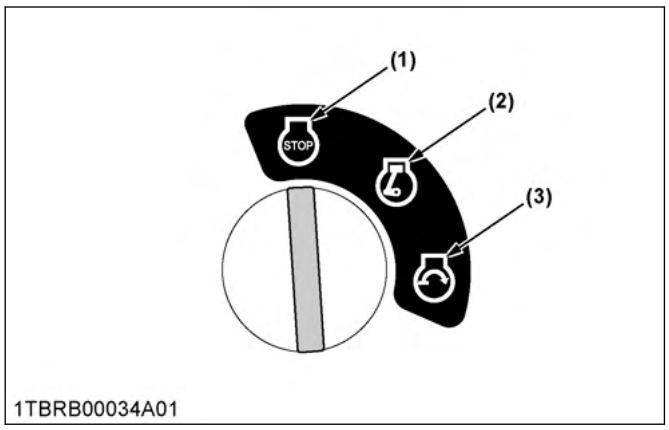


(1) Throttle lever
(2) Choke knob
(A) Pull out: "ON" position
(B) Push in: "OFF" position
(C) "FAST"
(D) "SLOW"

4. Key switch

IMPORTANT :

- **To avoid damage to the starter, do not operate starter more than 5 seconds at a time. If engine does not start, wait 10 seconds before trying again.**
- **Do not turn the key to the *"START"* position while the engine is running.**
- **Do not operate the machine under full load condition until it is sufficiently warmed up 2 or 3 minutes for temperatures above 0 ℃ (32 ℉).**



(1) 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.

(2) ON
The engine is running.

(3) START
Depress the brake pedal fully and push the PTO switch to the *"DISENGAGED"* position, turn the key switch to this position to start the engine.

5. Cold weather starting

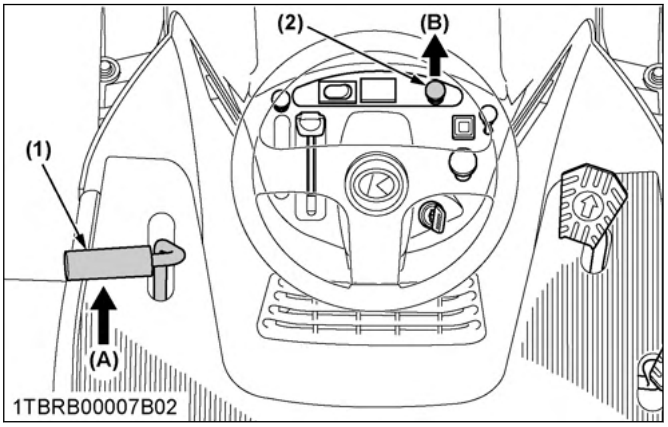
If the ambient temperature is below 0 ℃ (32 ℉) and the engine is very cold, start it in the following manner:

1. Use the choke.
2. Turn the key switch to the *"START"* ( ) position.
   - Operate starter 5 seconds.
   - If engine does not start, wait 10 seconds.
   - Repeat this procedure until engine starts.
3. When the engine starts, release key to *"ON"* ( ) position.
4. Move the throttle lever to *"HALF SPEED"* position.

IMPORTANT :
- **When the temperature is below 0 ℃ (32 ℉). Keep the engine at medium speed to warm up the lubricant of engine and transmission at least 10 minutes. If the machine is operated before the lubricant of engine and transmission is warmed sufficiently, the machine life will be shortened.**
- **Do not operate the machine under full load condition until it is sufficiently warmed up.**

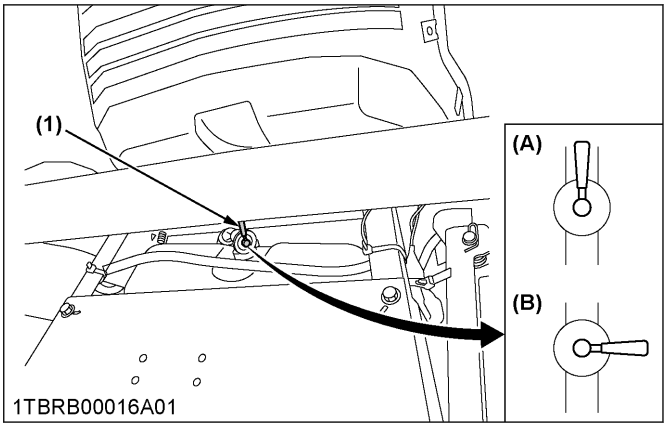
STOPPING THE ENGINE

1. Keep the engine at 1/2 to 3/4 throttle and turn the key switch to the *"OFF"* position.
2. Remove the key.
3. Do not leave the key switch *"ON"* (key in the *"ON"* position) as the battery will discharge when the engine is not running.
4. Set the parking brake.



(1) Brake pedal
(2) Parking brake lock knob
(A) "DEPRESS"
(B) "PULL"

5. Close the fuel valve.



(1) Fuel valve
(A) "OPEN"
(B) "CLOSE"

CHECKING SAFETY SYSTEMS

1. Checking engine start system

The engine start system in your machine is designed to protect you while operating. Check the engine start system periodically. It is recommended to check the engine start system before daily 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 operator's seat for all tests.**

IMPORTANT :
- **Check the following tests before operating the machine.**

Test 1 (operator on the seat)
1. Depress the brake pedal fully.
2. Engage the PTO switch.
3. Turn the key switch to the *"START"* position.
4. The engine should not crank.

Test 2 (operator on the seat)
1. Disengage the PTO switch.
2. Release the brake pedal.
3. Turn the key to *"START"* position.
4. The engine should not crank.

2. Checking OPC system

The OPC (Operator Presence Control) system in your machine is designed to protect you while operating. Check the OPC system periodically. It is recommended to check the OPC system before daily 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 operator's seat for all tests.**

IMPORTANT :
- **Check the following tests before operating the machine.**

Test 1 (operator on the seat)
1. Start and run the engine at half throttle.
2. Engage the PTO switch.
3. Stand up. (Do not get off the machine.)
4. Engine should shut off.

Test 2 (operator on the seat)
1. Start and run the engine at half throttle.
2. Disengage PTO switch.
3. Release the brake pedal.
4. Stand up. (Do not get off the machine.)
5. Engine should shut off.

3. Checking PTO control system

The PTO control system in your machine is designed to protect you while operating. Check the PTO control system periodically - daily is best - to test function of the PTO control 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 operator's seat for all tests.**

IMPORTANT :
- **Check the following tests before operating the machine.**

KUBOTA reverse awareness system

(KRA system) Test 1 (operator on the seat)
1. Start and run the engine at half throttle.
2. Engage the PTO switch.
3. Press slightly on reverse side of speed control pedal.
4. Engine should shut off.

KUBOTA reverse awareness system

(KRA system) Test 2 (operator on the seat)
1. Start and run the engine at 1/4 throttle.
2. Engage the PTO switch.
3. Press the KRA system override switch.
4. The KRA indicator light should flash.
5. Press slightly on the reverse side of speed control pedal.
6. Engine should not shut off.

Remove the fuse located in the panel before test 3.

KUBOTA reverse awareness system

(KRA system) Test 3 (operator on the seat)
1. Start and run the engine at 1/4 throttle.
2. Engage the PTO switch.
3. Press the KRA system override switch.
4. The KRA indicator light should not flash.
5. Press slightly on reverse side of speed control pedal.
6. Engine should shut off.

CHECK WHILE OPERATING THE ENGINE

1. Check color of the exhaust fumes.
2. Check the headlights.
3. Check performance of the PTO clutch.
4. Check safety switch, seat safety control, and PTO safety control.
   If one of these do not operate properly, contact your KUBOTA Dealer immediately.
5. Check for abnormal noise and vibration.

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, result in trouble in 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 the machine under full load condition until it is sufficiently warmed up.**

JUMP STARTING

⚠ WARNING

To avoid serious injury or death:

- **Battery gases can explode. 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.

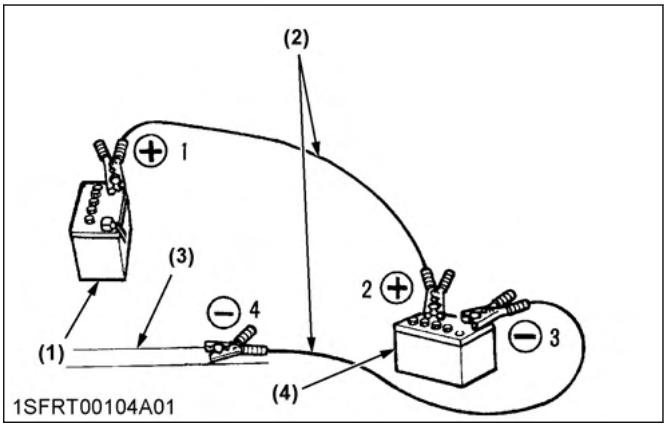
1. Bring a helper vehicle with a battery of the same voltage as the disabled machine within easy cable reach.

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 positive) terminal of the dead battery and clamp the other end of the same cable to the positive (red, (+) or positive) terminal of the helper battery.
6. Clamp the other cable to the negative (black, (-) or negative) 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 36.)

DANGER

To avoid serious injury or death:

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

WARNING

To avoid serious injury or death:

- **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.**
- **Slow down before turning.**
- **To avoid tip-over accidents, mow up and down slopes, not across. Avoid sudden starts and stops on slopes. Slow down and use extra caution when changing direction on a slope. Do not use the machine on a steep incline.**
- **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 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 a machine is equipped with grass catcher.**
- **Clear the work area of objects which might be picked up and thrown by the blades.**
- **Do not direct the opening of the discharge chute at bystanders or animals. Ejected objects may cause injury. Plan your mowing carefully before starting operation.**
- **Keep bystanders, especially children, and animals away from the mowing area.**
- **Be sure to disengage the PTO and sit on the operator's seat before starting the engine.**

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.
   - Operator's seat on page 28
2. Start the engine.
   - STARTING THE ENGINE on page 22
3. Select light switch positions.
   - Light switch on page 28
4. Raise the implement.
   - Lift lever on page 28
5. Accelerate the engine.
   - Throttle lever on page 28

6. Unlock the parking brake.
   - Parking brake on page 29
7. Depress the speed control pedal.
   - Speed control pedal on page 29
   - Cruise control device on page 29

1. Operator's seat

⚠ WARNING

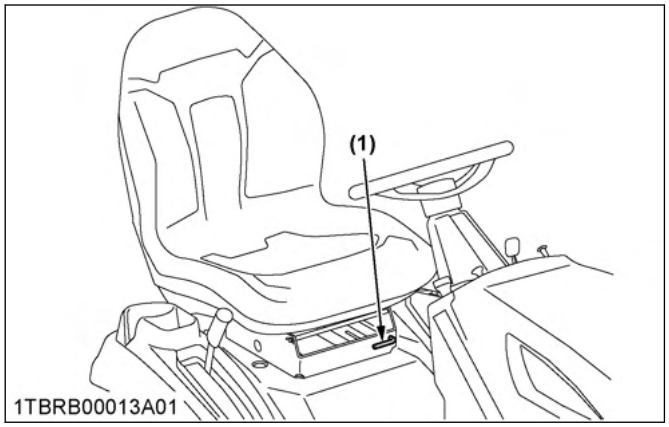
To avoid serious injury or death:

- **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.**

The operator's seat position can be adjusted forward and rearward.

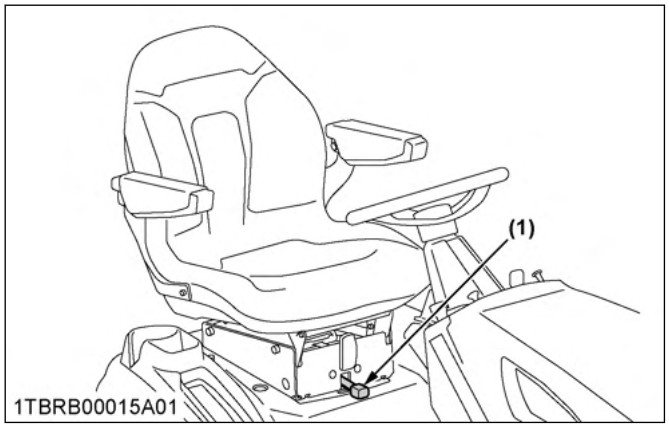
1. Pull up the seat sliding lever and slide the seat to the desired position.
2. Make sure that the seat is locked.

T2090BR



(1) Seat sliding lever

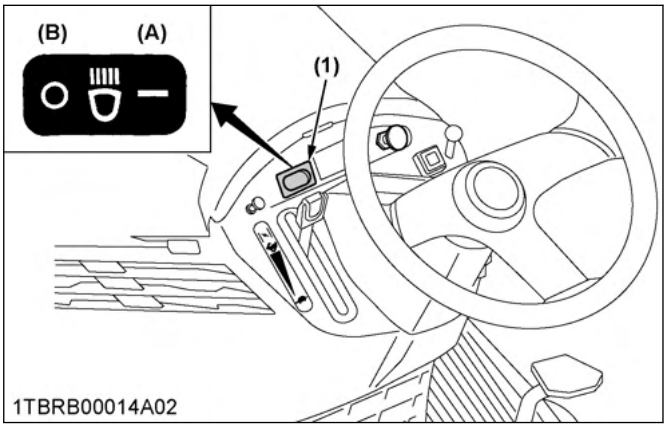
T2290KW



(1) Seat sliding lever

2. Light switch

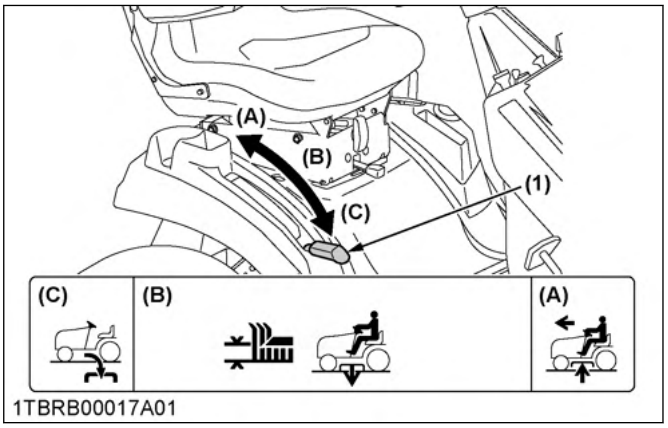
Push the light switch at the right part, to turn on the headlights.
Push the light switch at the left part, to turn off the headlights.



(1) Light switch
(A) "ON"
(B) "OFF"

3. Lift lever

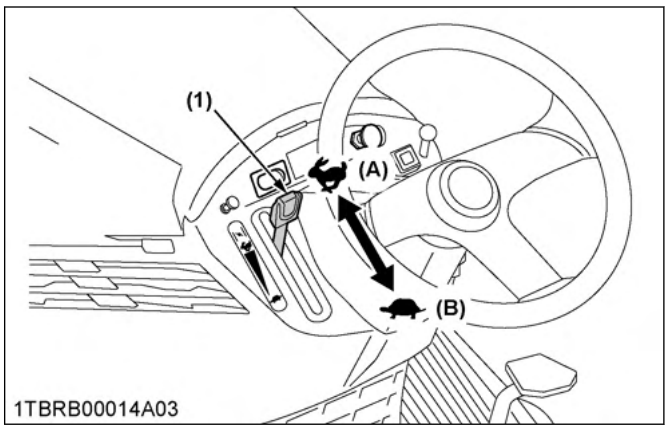
The lift lever is used to raise and lower the mower deck.
To raise the mower deck, pull the lever up and hook it to the top position.
To lower the mower deck, unhook the lever and lower the lever down.



(1) Lift lever
(A) Top (carry) position
(B) Mower operation range
(C) Installation position

4. Throttle lever

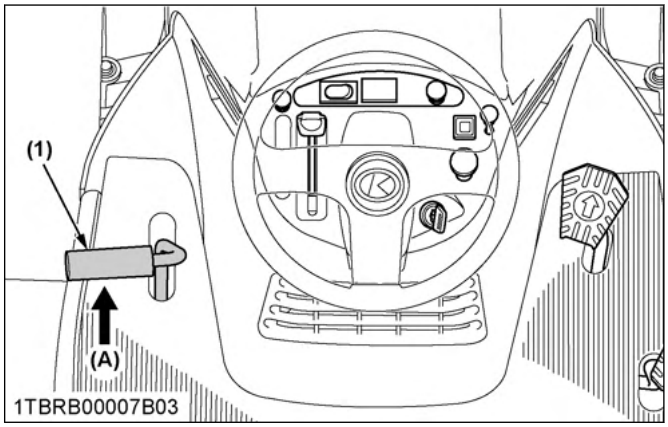
- Pull the throttle lever backward to decrease the engine speed.
- Push it forward to increase the engine speed.



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

5. Parking brake

1. To release the parking brake, depress the brake pedal again.



(1) Brake pedal *(A) "DEPRESS"*

6. Speed control pedal

⚠ WARNING

To avoid serious injury or death:

- **Do not operate if the machine moves on a level ground with foot off speed control pedal.**

"FORWARD" **(⇧)**

Depress the speed control pedal with the toe of your right foot to move forward.

"REARWARD" **(⇩)**

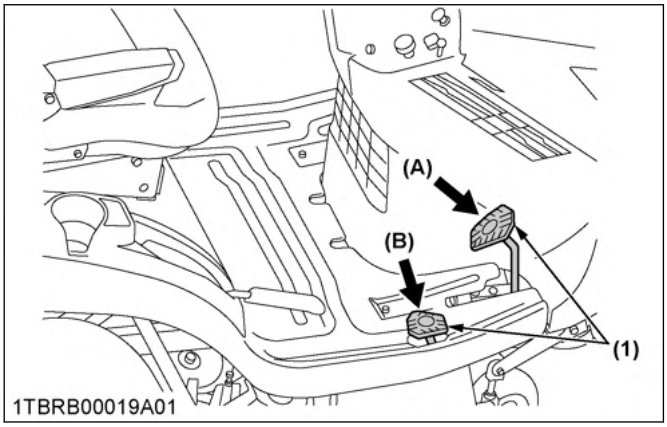
Depress the speed control pedal with the toe of your right foot to move in reverse.

Depress the speed control pedal a little and you can drive slowly.

To increase travel-speed, depress the speed control pedal more until the desired speed is reached.

NOTE :

- **When the parking brake is applied, the speed control pedal is locked in the *"NEUTRAL"* position.**



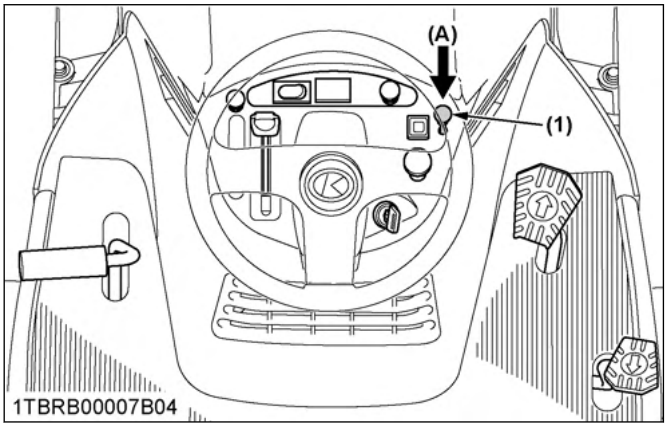
(1) Speed control pedal *(A) "FORWARD"*
(B) "REARWARD"

7. Cruise control device

The cruise control device is designed for machine operating efficiency and operator's comfort. This device will provide a constant forward operating speed by mechanically holding the speed control pedal at a selected position.

To engage cruise control device

1. Accelerate speed to desired level using speed control pedal.
2. Push the cruise control knob.



(1) Cruise control knob *(A) "PUSH"*

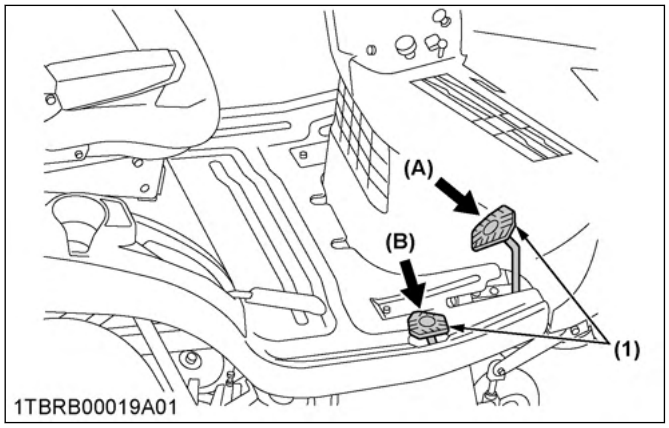
3. Release the speed control pedal while pushing the cruise control knob.
4. Release the cruise control knob and desired speed will be maintained.

To disengage speed set device

- Step on the forward acceleration side of the speed control pedal or depress the brake pedal.

NOTE :
- **Cruise control device will not operate in reverse.**

IMPORTANT :
- **To prevent the damage of cruise control device, do not depress the reverse pedal when the cruise control device is engaged.**



(1) Speed control pedal
(A) "FORWARD"
(B) "REARWARD"

STOPPING THE MACHINE

1. Release the speed control pedal and depress the brake pedal to stop the machine.
2. Push the PTO switch to the *"DISENGAGED"* position.
3. Slow the engine down.

CHECK DURING DRIVING

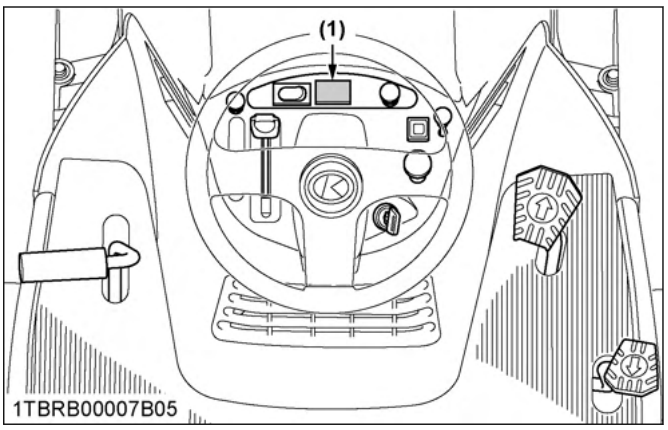
IMPORTANT :
Immediately stop the engine if:
- **The engine suddenly slows down or accelerates.**
- **Unusual noises suddenly occur.**
- **Exhaust fumes suddenly become discolored.**

While driving, make the following checks to see that all the parts are functioning normally:

1. Hour meter

The hour meter indicates in 5 digits the hours the machine has been used; the last digit indicates 1/10 of an hour.

NOTE :
- **As the hour meter works electrically, it starts to work when the key switch is turned to *"ON"*, regardless of the engine running or not.**



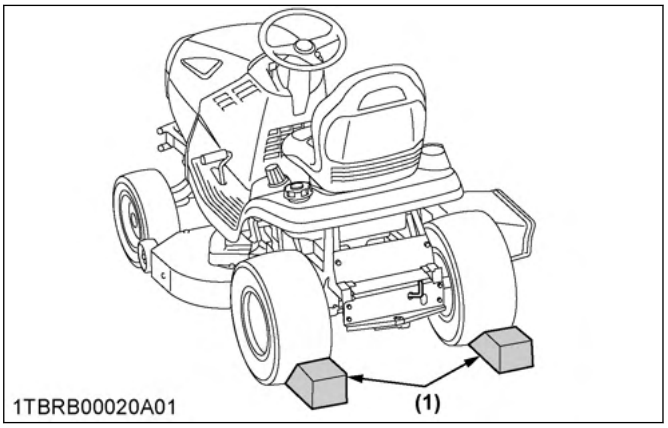
(1) Hour meter

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.**

When parking, be sure to set the parking brake.

To apply the parking brake:
1. Depress the brake pedal firmly.
2. Pull the parking brake lock knob.
3. Release the brake pedal while holding the parking brake lock knob.
4. Before getting off the machine, disengage the PTO, lower all implements to the ground, set the parking brake, stop the engine and remove the key.
5. If it is 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

TRANSPORTING THE MACHINE

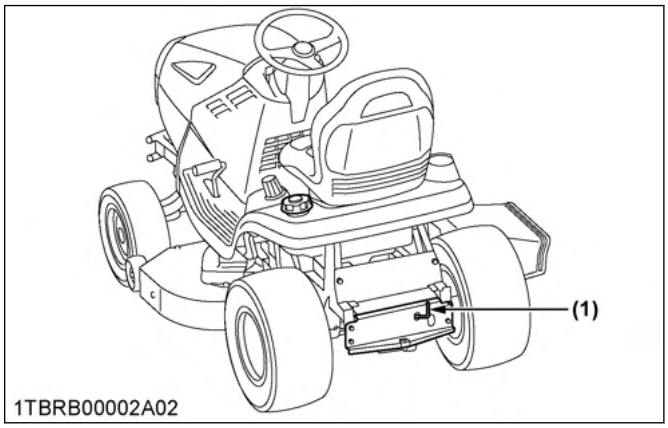
1. Transport the machine on a trailer.
   - Fasten the machine to the trailer.
   - To prevent the hood from opening by wind while in transit, it is necessary to either load the machine forward or use a suitable tie down for the hood.
2. Do not attempt to tow this machine, or damage to the transmission may result.

1. Hydrostatic transaxle bypass rod

IMPORTANT :

- **Do not push the machine without pulling the bypass rod or transmission damage may occur.**
- **Never pull the rod with the engine running.**

1. To push the machine, pull the HST bypass rod and hook it.
2. After moving the machine, release the rod and it will return automatically to normal position.



(1) HST bypass rod

OPERATING THE MOWER

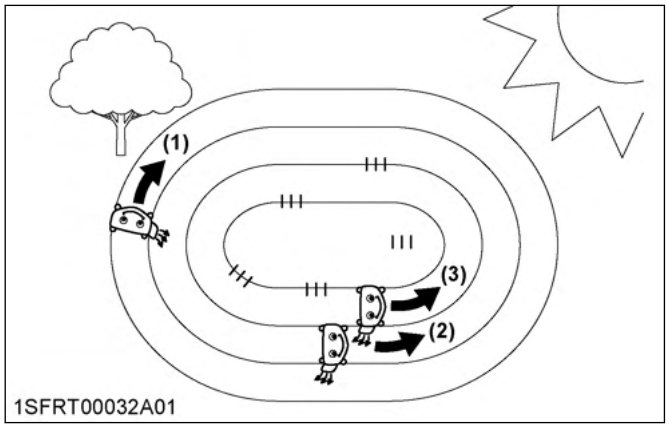
MOWING TIPS

⚠ WARNING

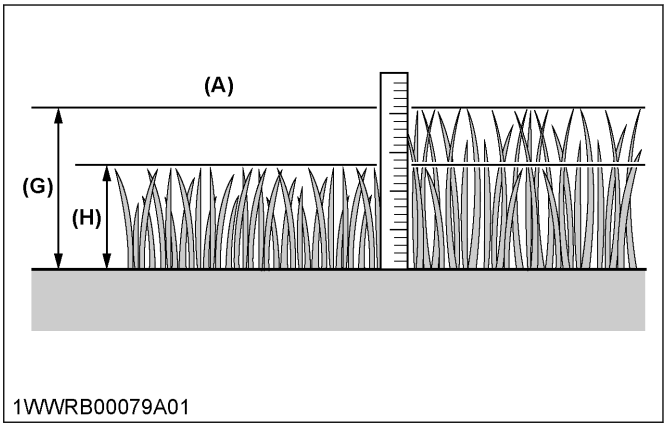
To avoid serious injury or death:

- **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.**
- **Be sure to disengage the PTO and sit on the operator's seat before starting the engine.**

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

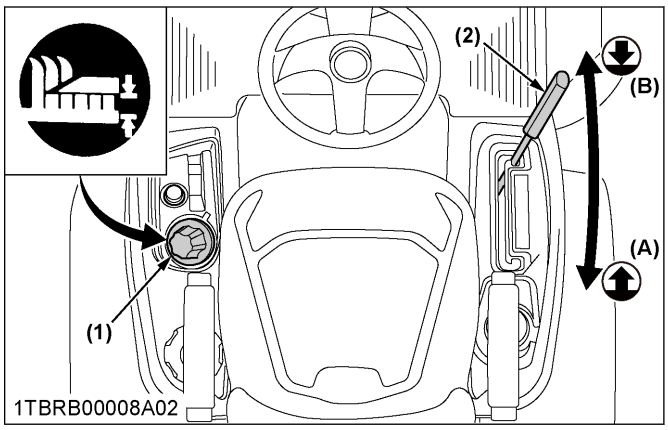
⚠ DANGER

To avoid serious injury or death:

- **Do not operate mower in the *"TOP"* position.**

1. Cutting height control dial

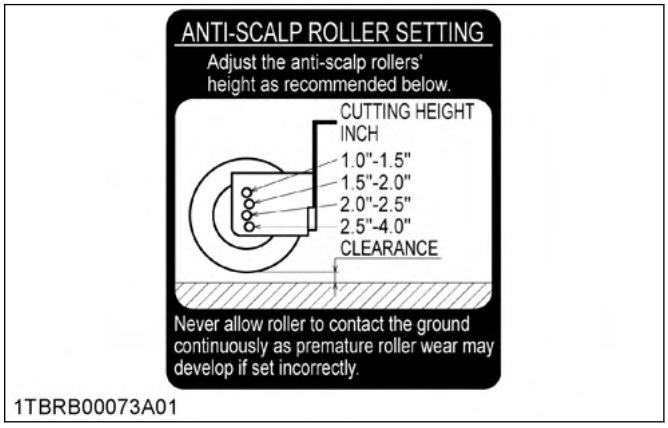
Cutting height control dial can adjust the cutting height from 25 mm (1 in.) to 102 mm (4 in.) with 6 mm (0.25 in.) step.



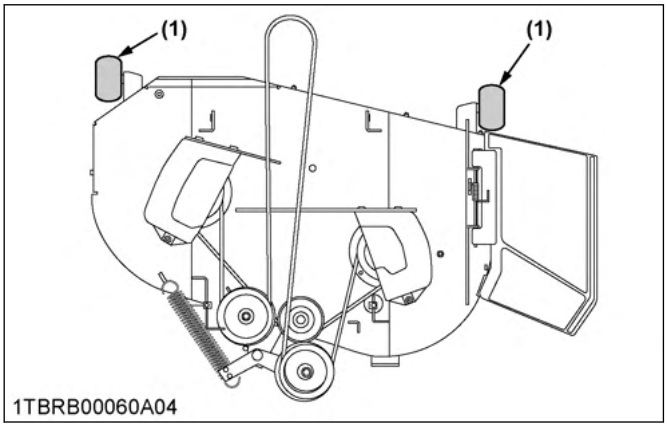
(1) Cutting height control dial
(2) Lift lever
(A) "RAISE"
(B) "LOWER"

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, pull the mower lift lever up to raise the mower deck to the *"TOP"* position.
3. Turn the cutting height control dial to adjust the height.
4. • Use higher settings for mowing in a rough area or when mowing tall grass.
   • Use lower settings only for smooth lawns where short grass is desired.
5. Lower the mower deck by gently pushing the mower lift lever down. This lowers the mower deck from the *"TOP"* position to the *"OPERATING"* position.
6. Adjust the anti-scalp rollers' height as recommended below for normal operating condition.

IMPORTANT :
- **Never allow roller 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 (1/4in.) to the ground.**

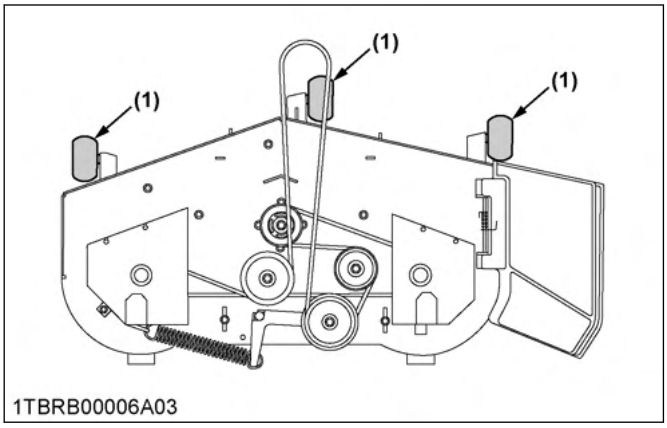


RCK42P



(1) Anti-scalp roller

RCK48P



(1) Anti-scalp roller

OPERATING THE MOWER

⚠ DANGER

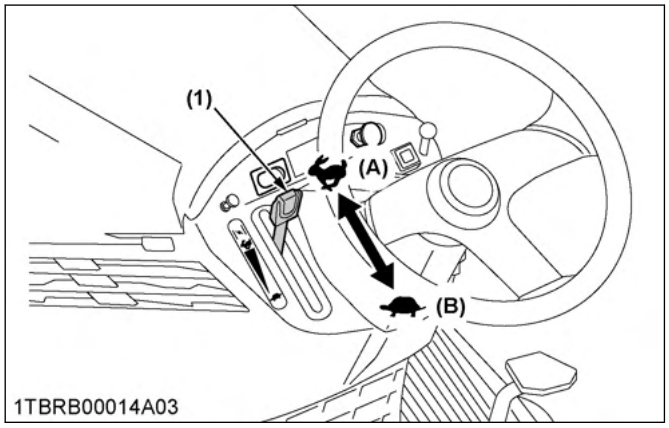
To avoid serious injury or death:
- **Do not operate the mower without the discharge chute being in place properly.**

NOTE :
- **This machine is equipped with the KRA (KUBOTA reverse awareness) system. This feature shuts down the engine if the operator attempts reverse travel while any PTO driven implement is engaged. The purpose of the KRA system is to increase operator awareness of the risk of back-over accidents.**
- **The KRA system incorporates an override switch on the panel that allows the operator to override the system and keep the PTO engaged during reverse travel.**
  KUBOTA strongly recommends against overriding the KRA system, but if the operator thinks it absolutely necessary and safe to do so, he may activate the override switch.

The override switch light flashes while activated as a reminder to the operator that the PTO (i.e. mower, grass catcher, snowblower, etc.) remains engaged during reverse travel. The operator should return the KRA system to normal operating mode as soon as possible by momentarily disengaging the PTO.

1. KRA system normal operating mode

1. Start the engine.
2. Set the throttle lever to the *"FAST"* position.

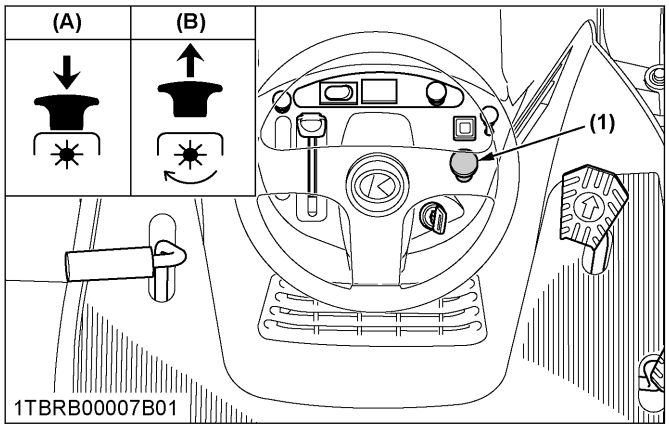


(1) Throttle lever
(A) "FAST" position
(B) "SLOW" position

3. Pull up the PTO switch to the *"ENGAGED"* position.

2. 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) "DISENGAGED" (OFF)
(B) "ENGAGED" (ON)

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.**

3. KRA system override mode

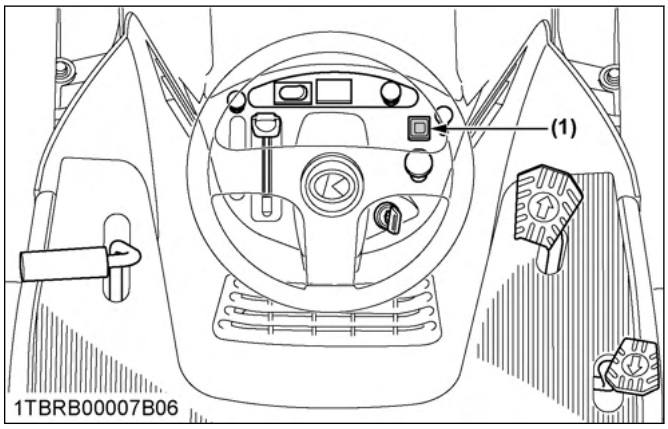
⚠ WARNING

To avoid serious injury or death:
- **Before and when backing, look down and behind the machine to be sure no bystanders, especially children, have entered the area.**
- **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 with heat shields or guards removed.**

NOTE :
- **KRA system override switch allows the operator to mow or operate attachments while in reverse if the operator deems it absolutely necessary and safe to do so. (i.e. the operator should make sure that no bystanders, especially children, have entered the area.)**
  If the owner does not wish certain operators to utilize the override switch allowing mowing or implement operation in reverse, then he or she may remove the fuse from the system to prevent override. (See NOTE (4) below.)

1. Start the engine.
2. Set the throttle to the *"FAST"* position.
3. Pull the PTO switch to the *"ENGAGED"* position.
4. Stop the machine (Set the speed control pedal to *"NEUTRAL"*.) or depress the speed control pedal forward.

5. Push the KRA system override switch.

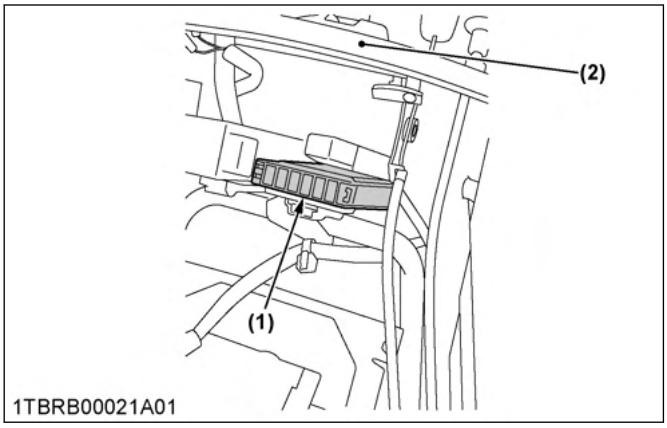


(1) KRA system override switch

6. Look down and behind the machine to be sure that no bystanders, especially children have entered the area.
7. Depress the speed control pedal with the heel of your right foot to move in the reverse direction.

NOTE :

1. **The KRA system override mode can not be activated by pushing the switch while the speed control pedal is depressed to initiate rearward movement.**
2. **The override switch light flashes while activated as a reminder to the operator that PTO (for example mower, grass catcher, snow blower and so on.) remains engaged during reverse travel.**
3. **The KRA system override mode will remain activated until the PTO swich is returned to the *"DISENGAGED"* position.**
4. **To prevent use of the KRA system override mode, remove the fuse located in the panel:**
   - **The engine can be started.**
   - **The machine PTO can be engaged if the speed control pedal is in the neutral or forward position.**
   - **Selection of PTO operation (for example mower, grass catcher, snow blower and so on.) during reverse travel is not possible.**



(1) KRA fuse
(2) Panel

MAINTENANCE

SERVICE INTERVALS

The following servicing tasks should be carried out on the machine at the stated running-time intervals.
T2090BR

No.	Items			Indication hour meter (Hr)														Ref. page	
				25	50	100	150	200	250	300	350	400	450	500	550	600	After since		
1	Air cleaner	Precleaner element	Clean	●	●	●	●	●	●	●	●	●	●	●	●	●	every 25Hr or every 1 year	46	*1
			Replace			●		●		●		●		●		●	every 100Hr or every 1 year	53	
		Air cleaner element	Check	●	●	●	●	●	●	●	●	●	●	●	●	●	every 25Hr or every 1 year	46	*2
			Replace			●		●		●		●		●		●	every 100Hr or every 1 year	53	
2	Brake		Check	◎	●	●	●	●	●	●	●	●	●	●	●	●	every 50Hr	47	*3 *4
3	Tire		Check		●	●	●	●	●	●	●	●	●	●	●	●	every 50Hr	47	
4	Engine oil		Change			●		●		●		●		●		●	every 100Hr or every 1 year	47	
5	Engine oil filter		Replace			●		●		●		●		●		●	every 100Hr or every 1 year	49	
6	Engine shroud		Clean			●		●		●		●		●		●	every 100Hr	49	
7	Spark plug condition and gap		Check			●		●		●		●		●		●	every 100Hr	50	
			Replace														every 1 year	61	
8	Fuel filter		Check			●		●		●		●		●		●	every 100Hr	54	
			Replace			●		●		●		●		●		●	every 100Hr or every 1 year	54	*3
9	Throttle cable		Adjust			●		●		●		●		●		●	every 100Hr	51	
10	Battery condition		Check			●		●		●		●		●		●	every 100Hr	52	
11	Electric clutch		Adjust											●			every 500Hr	58	
12	Combustion chamber		Clean											●			every 500Hr	59	
13	Engine valve clearance		Check														every 1 year	61	*3 *5
14	Fuel line		Check														every 1 year	60	*6
			Replace														every 4 years	61	*3
15	Fuse		Replace														Service as required	61	
16	Light bulb		Replace															61	
17	Mower blade		Check															61	

(Continued)

No.	Items		Indication hour meter (Hr)														Ref. page	
			25	50	100	150	200	250	300	350	400	450	500	550	600	After since		
17	Mower blade	Replace														Service as required	61	
18	Mower belt	Replace															62	

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

*2 Clean or replace as necessary.

*3 Consult your local KUBOTA Dealer for this service.

*4 The initial 25 hours should not be an adjustment (check) cycle.

*5 Not required unless engine performance problems are noted.

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

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.**

T2290KW, T2290KWT

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	Air cleaner	Air cleaner paper element	Clean				●		●		●		●		●		●	every 100Hr	55	*1
			Replace						●				●				●	every 200Hr	56	
2	Brake		Check		◎	●	●	●	●	●	●	●	●	●	●	●	●	every 50Hr	47	*2 *3
3	Tire		Check			●	●	●	●	●	●	●	●	●	●	●	●	every 50Hr	47	
4	Engine oil		Change	◎			●		●		●		●		●		●	every 100Hr	47	*1 *3
5	Engine oil filter		Replace						●				●				●	every 200Hr	57	*1
6	Engine shroud		Clean				●		●		●		●		●		●	every 100Hr	49	
7	Spark plug condition and gap		Check				●		●		●		●		●		●	every 100Hr	50	
			Replace															every 1 year	61	
8	Fuel filter		Check				●		●		●		●		●		●	every 100Hr	54	
			Replace				●		●		●		●		●		●	every 100Hr or every 1 year	54	*2
9	Throttle cable		Adjust				●		●		●		●		●		●	every 100Hr	51	
10	Choke cable		Adjust				●		●		●		●		●		●	every 100Hr	52	
11	Battery condition		Check				●		●		●		●		●		●	every 100Hr	52	
12	Combustion chamber		Clean								●						●	every 300Hr	58	*2
13	Valve seats and clearance		Clean								●						●	every 300Hr	58	*2
			Adjust								●						●	every 300Hr	58	*2
14	Electric clutch		Adjust												●			every 500Hr	58	
15	Transaxle fluid (**T2290KWT**)		Change														●	every 600Hr	60	
16	Transaxle oil filter (**T2290KWT**)		Replace														●	every 600Hr	59	
17	Fuel line		Check															every 1 year	60	*4
			Replace															every 4 years	61	*2
18	Engine valve clearance		Check															every 1 year	61	*2 *5
19	Fuse		Replace															Service as required	61	
20	Light bulb		Replace																61	
21	Mower blade		Check																61	
			Replace																	
22	Mower belt		Replace																62	

*1 This maintenance should be done daily or more often in dusty conditions than in normal conditions. Replace as necessary.

*2 Consult your local KUBOTA Dealer for this service.

*3 The initial 8 and 25 hours should not be a change (check) cycle.

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

*5 Not required unless engine performance problems are noted.

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.**

LUBRICANTS AND FUEL

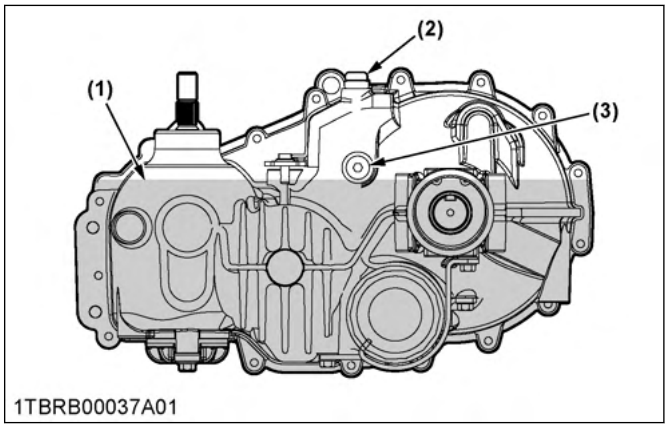
Place	Capacities		Lubricants
	T2090BR	**T2290KW, T2290KWT**	
Engine crankcase	1.9 L (2.0 U.S.qts.)	2.1 L (2.2 U.S.qts.)	• Engine oil: API service classification SG, SH, SJ or higher Above 10 ℃ (50 ℉) ... SAE30 Between -18 ℃ (0 ℉) to 38 ℃ (100 ℉) ... SAE10W-30 Below 0 ℃ (32 ℉) ... SAE5W-30
Hydrostatic transmission (**T2290KWT**)	2.7 to 2.75 L (2.85 to 2.9 U.S.qts.)		• Engine oil: API service classification SL SAE 20W-50
Seat adjuster	Moderate amount		• Oil or spray type grease
Throttle cable			
Mower link			
Fuel tank	13.6 L (3.6 U.S.gals.)		• Automobile unleaded or regular gasoline • Unleaded gasoline 87 octane or higher

NOTE :

- **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 above.
- **Indicated capacity of oil are manufacture's estimate.**
- **Gasohol (up to 10% ethyl alcohol, 90% unleaded gasoline by volume) or Methyl Tertiary Butyl Ether (MTBE) and unleaded gasoline blends (up to a maximum of 15% MTBE by volume) are approved for the engine. Other gasoline/alcohol blends are not approved.**

1. Hydrostatic transmission (T2290KWT)

Checking oil level: Be sure to check the oil level when the transmission is cold. Remove the oil level check port. The correct level should be even with the bottom of the port.
If necessary to add oil, remove breather tube and add from top port plug. Be sure to use correct oil which is specified in the table in LUBRICANTS AND FUEL on page 40.



(1) Oil level
(2) Top port plug
(3) Oil level check port

PERIODIC SERVICE

OPEN THE HOOD

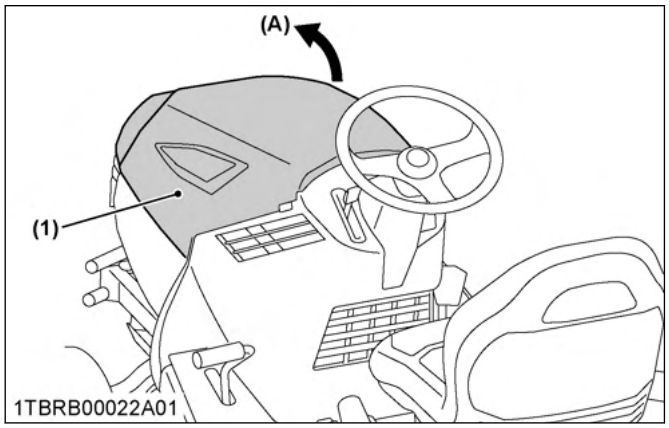
⚠ WARNING

To avoid serious injury or death from contact with moving parts:

- **Never open the hood while the engine is running.**
- **Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.**

1. Hood

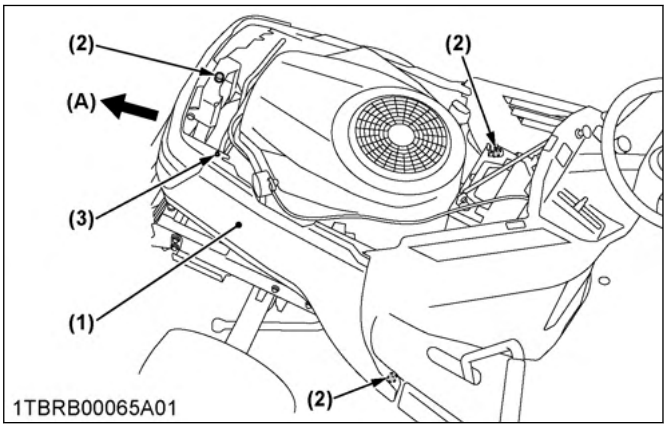
1. To open the hood, lift the hood.



(1) Hood *(A) "PULL"*

2. Engine cover

1. Open the hood, loosen the knob bolts, remove the harness clamp and then pull engine cover forward to remove.



(1) Engine cover *(A) "PULL"*
(2) Knob bolt (under step)
(3) Harness clamp

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.**

	No.	Check item	Ref. page
Walking around the machine	1	Tire pressure, wear and damage	47
	2	Fuel and oil leak	43, 54, 60
	3	Engine oil level	43
	4	Fuel level	43
	5	Damage of machine body, tightness of all bolts and nuts	-
	6	Cooling air intake screen	44
	7	Check the air cleaner	46, 55
	8	Oiling	45
Mower	1	Make sure blade bolts are tight.	61

(Continued)

	No.	Check item	Ref. page
Mower	2	Check blades for wear or damage.	61
	3	Check all hardware.	-
	4	Make sure all pins are in place.	21
While sitting in the operator's seat	1	Speed control pedal Brake pedal	29, 47
	2	Parking brake	47
Turning the key switch *"ON"*	1	Headlights	61
Starting the engine	1	Color of the exhaust fumes	70
	2	Engine start system, OPC system, PTO control system. If either of these do not operate properly, contact your local KUBOTA Dealer immediately.	24, 25, 25
	3	Check for abnormal noise and vibration.	-
Others	1	Check the areas where previous trouble was experienced.	-

1. Checking the engine oil level

⚠ WARNING

To avoid serious injury or death:

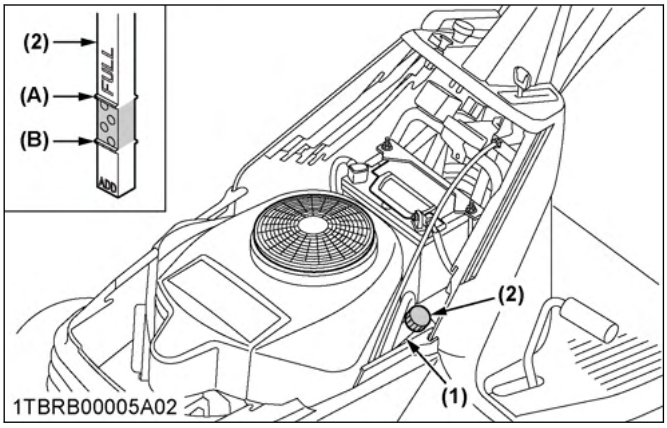
- **Always stop the engine and remove the key before checking the oil.**

Oil level check

1. Check engine oil before starting the engine or 5 minutes or more after the engine has stopped.
2. Wipe dipstick area clean.
3. To check the oil level.

T2290KW, T2290KWT

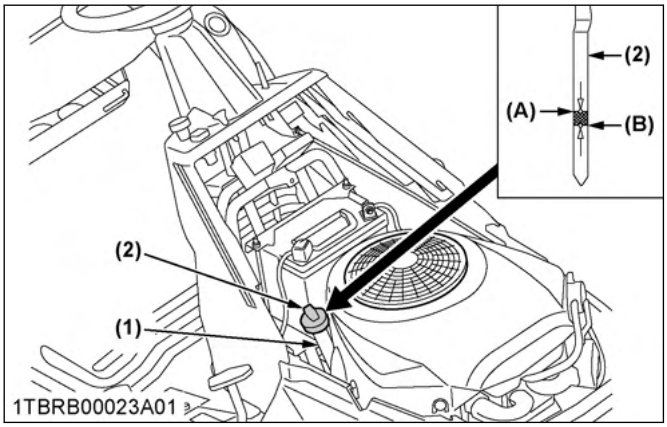
Remove the dipstick, wipe it clean, replace it and draw it out again. Check to see that the oil level is between the 2 marks.



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

T2090BR

Remove the dipstick, wipe it clean, replace it, and draw it out again. Check to see that the oil level is between the 2 marks.



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

4. Add new oil to the prescribed level at the oil port if necessary.

IMPORTANT :

- **When using a different brand or viscosity oil from the previous one, remove all of the old oil. Never mix 2 different types of oil.**
- **Use the proper SAE engine oil according to the ambient temperature.**
  (See LUBRICANTS AND FUEL on page 40.)

2. Checking the amount of fuel and refueling

⚠ WARNING

To avoid serious injury or death:

- **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.**

- **Never use fire.**
- **Do not smoke while filling the fuel tank or servicing the fuel system. Fill fuel tank only to bottom of filler neck. Do not fill 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.**
- **Be sure to close the fuel tank cap after refueling.**

Check the fuel level. Take care that the fuel tank does not become empty. When refueling it, park the machine on a level surface.

Fuel tank capacity	13.6 L (3.6 U.S.gals.)

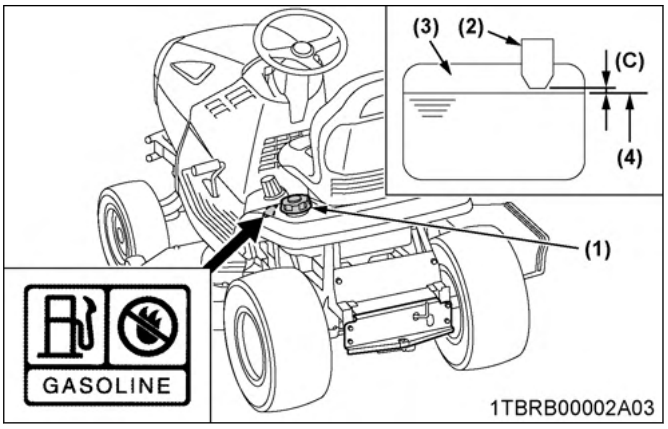
IMPORTANT :
- **Do not mix oil with gasoline.**
  Unleaded fuel is recommended. Regular leaded gasoline with an octane rating index of 87 or higher may be used. Avoid switching from unleaded to regular gasoline to prevent engine damage.

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 by varnish 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 machine operation, fill the fuel tank at the end of daily operation.**

IMPORTANT :
- **Do not use stale fuel.**
- **Fill fuel tank at the end of daily operation to prevent condensation in the fuel tank.**

Gasoline/Alcohol blends
Gasohol (up to 10% ethyl alcohol, 90% unleaded gasoline by volume) is approved as a fuel. Other gasoline/alcohol blends including E20 and E85 are not to be used and any failures resulting from use of these fuels will not be warranted.

Gasoline/Ether blends
Methyl Tertiary Butyl Ether (MTBE) and unleaded gasoline blends (up to a maximum of 15% MTBE by volume) are approved as a fuel. Other gasoline/ether blends are not approved.



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

3. Checking cooling air intake screen

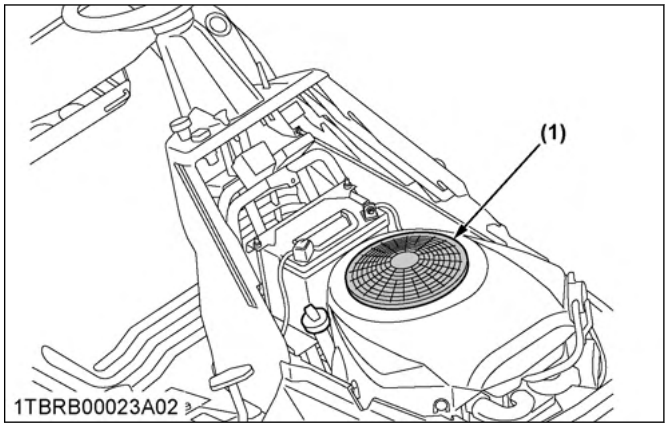
⚠ WARNING
To avoid serious injury or death:
- **Be sure to stop the engine before checking or cleaning air intake screens.**

IMPORTANT :
- **Air intake screens must be clear of debris to prevent engine from overheating.**

1. Lift hood and check that the pedestal and air intake screens are clear of grass clippings and debris.
2. If screens are dirty, clean screens with a brush or cloth.

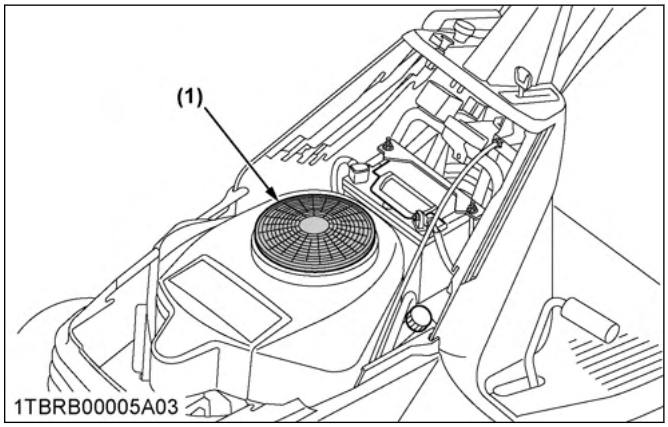
3. If the dust or chaff is accumulated inside of the panel, clean the inside of the panel completely.
   After cleaning, place the air intake screen properly.

T2090BR



(1) Screen

T2290KW, T2290KWT



(1) Screen

4. Oiling

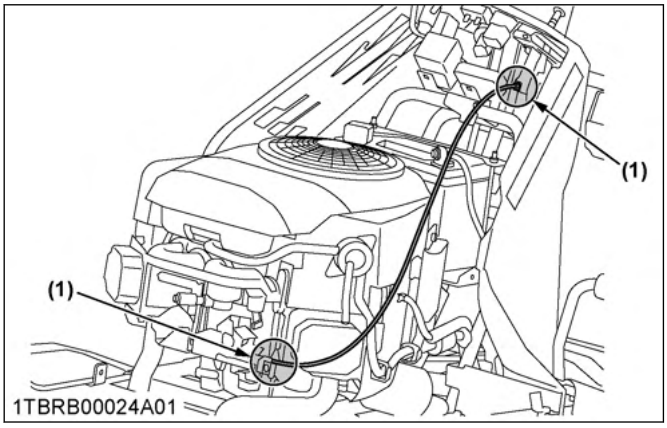
⚠ WARNING

To avoid serious injury or death:

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

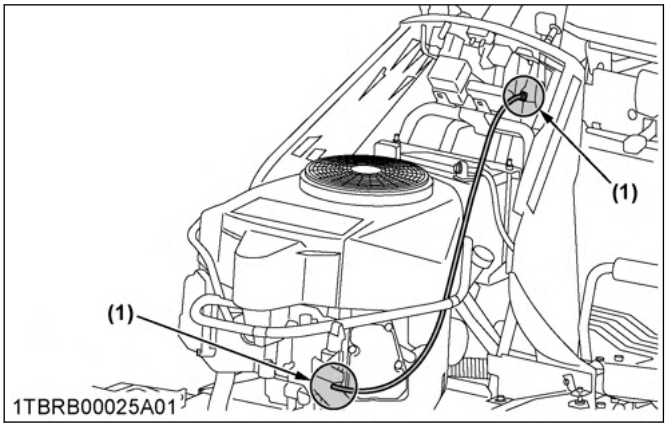
Oil the following points before starting.
Oil the ends of outer wires.

T2090BR



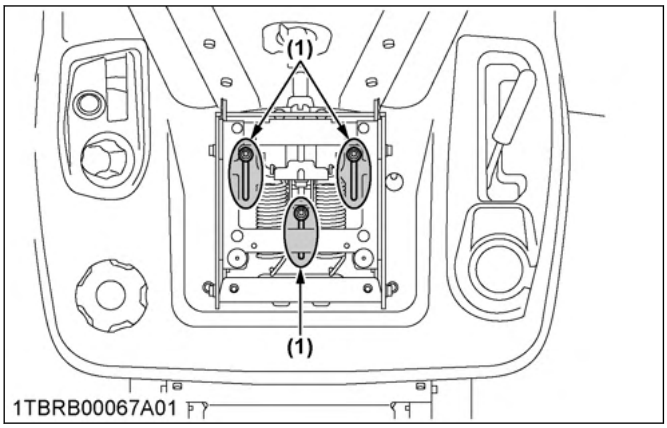
(1) Throttle cable

T2290KW, T2290KWT



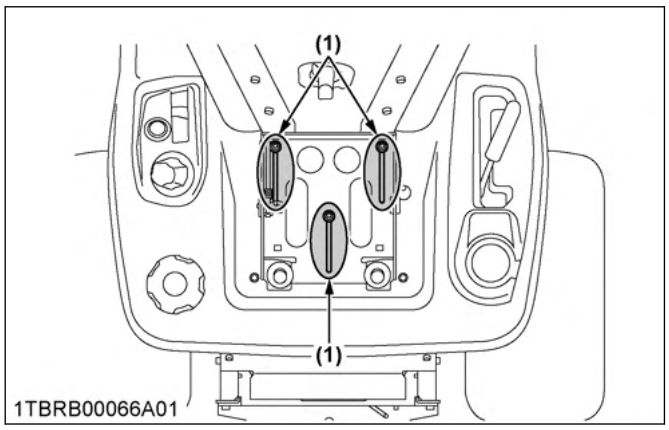
(1) Throttle cable

T2290KW, T2290KWT



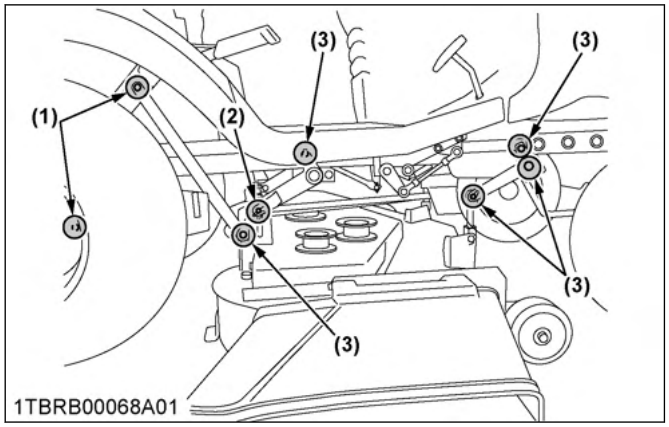
(1) Seat slider

T2090BR



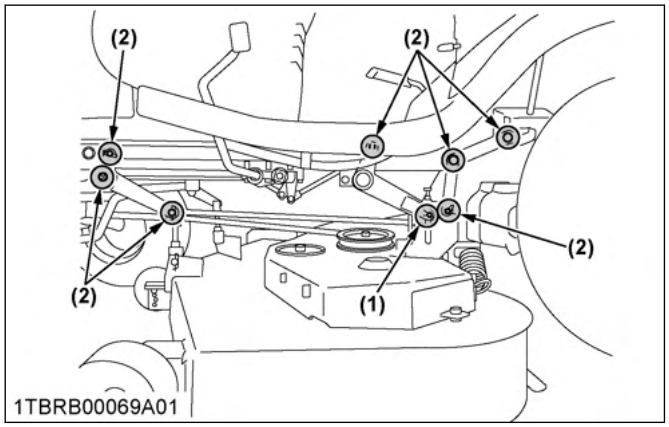
(1) Seat slider

RH



(1) Pivot of lift arm
(2) Around the pin
(3) Pivot of mower link

LH



(1) Around the pin
(2) Pivot of mower link

NOTE :

- **Oil these points on both sides of the machine.**

EVERY 25 HOURS

1. Cleaning air cleaner

T2090BR

Check the air cleaner daily or before starting the engine. Check for a buildup of dirt and debris around the air cleaner system. Keep this area clean. Also check for loose or damaged components. Replace all bent or damaged air cleaner components.

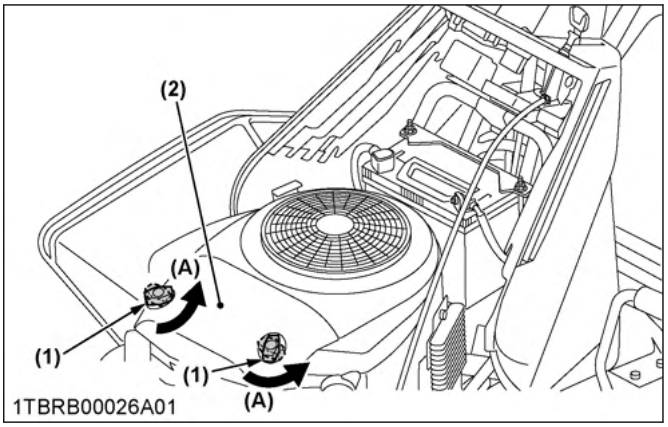
IMPORTANT :

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

Clean precleaner

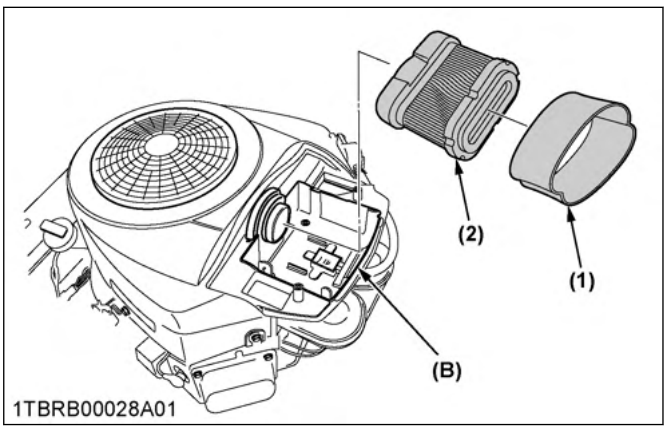
Wash and reoil the precleaner every 25 hours of operation. (more often under extremely dusty or dirty conditions.)

1. Loosen the air cleaner cover knobs and remove the air cleaner cover.



(1) Air cleaner cover knob *(A) "LOOSEN"*
(2) Air cleaner cover

2. Remove air cleaner element as an assembly for servicing, remove precleaner from the air cleaner element. Make sure the base and the sealing area is clean before reassembly is performed.



(1) Precleaner *(B) Base*
(2) Air cleaner element

3. Wash the precleaner in warm water with detergent. Rinse the precleaner thoroughly until all traces of detergent are eliminated. Squeeze out excess water. (do not wring.) Allow the precleaner to air dry.

4. Reinstall the precleaner over the paper element and install the assembly on the base.
5. Reinstall the air cleaner cover and secure it with 2 knobs.

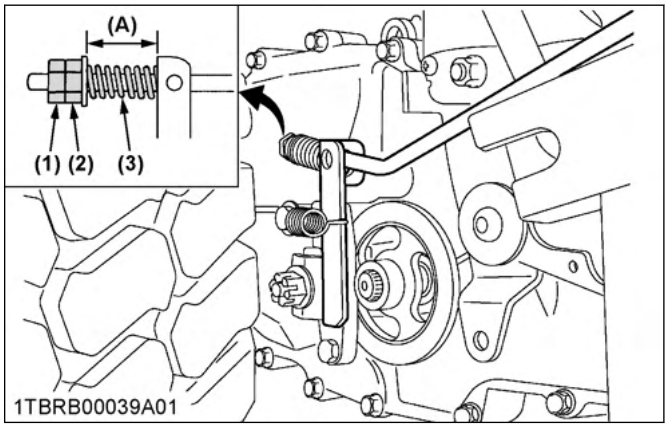
NOTE :
- **Operating in dusty condition may require more frequent maintenance than above.**

EVERY 50 HOURS

1. Checking brake pedal

WARNING
To avoid serious injury or death:
- **When making adjustments, park the machine on a flat area, block wheels, stop engine and remove the key.**

1. Check the length of brake spring when the parking brake is applied. Correct length ranges from 28 to 29 mm (1.1 in.).
2. If it is not correct, loosen the lock nut (1) and turn the nut (2) in the desired direction until the proper play is achieved.
3. After adjustment, retighten lock nut securely.



(1) Lock nut
(2) Nut
(3) Spring
(A) Length 28 to 29 mm (1.1 in.)

2. Checking the tire pressure

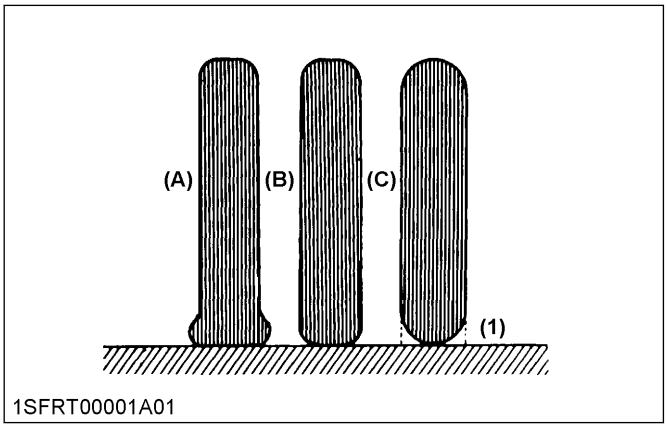
WARNING
To avoid serious injury or death:
- **Do not attempt to mount a tire on a rim. This should be done by a qualified person with the proper equipment.**
- **Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure shown in the operator's manual.**

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

2.1 Inflation pressure

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

Normal wheel tire pressures cold	
Front	**Rear**
100 kPa 14 psi 1.0 kgf/cm^2	110 kPa 16 psi 1.1 kgf/cm^2



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

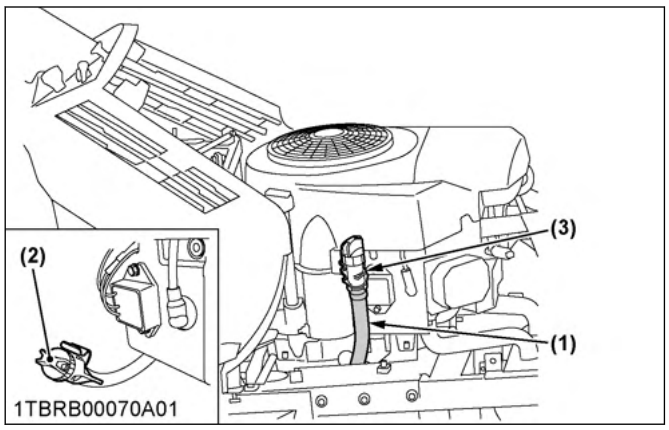
IMPORTANT :
- **When jacking up the rear tires, be sure**
  1. **To block the front tires.**
  2. **To position a jack inside beside either of the supporting plates.**

EVERY 100 HOURS

1. Changing engine oil

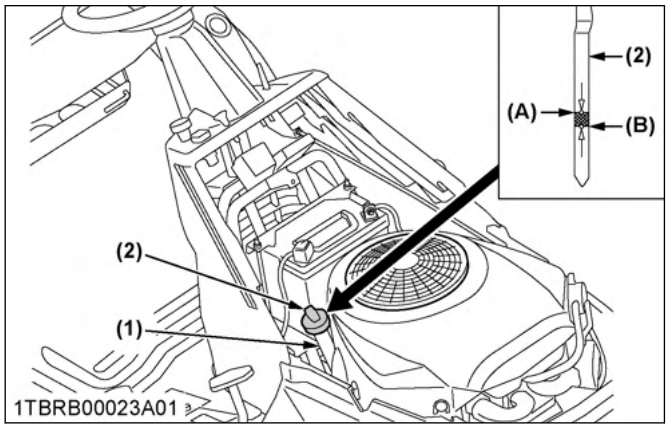
WARNING
To avoid serious injury or death:
- **Be sure to stop the engine and remove the key before changing the oil.**
- **Allow the engine to cool down sufficiently. Oil can be hot and may cause burns.**

T2090BR
Every 100 hours of operation or annually change the engine oil.
1. To change the used oil, unhook the drain hose, direct the hose down and open the drain valve. The used oil can be drained out more easily if the engine is warm.



(1) Drain hose
(2) Drain valve
(3) Hook

2. Close the drain valve. Put back the drain hose. Fill with the new oil up to the upper level on the dipstick. Do not overfill.



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

3. To check the oil level. Remove the dipstick, wipe it clean, insert it and draw it out again. Check to see that the oil level is between the 2 marks.

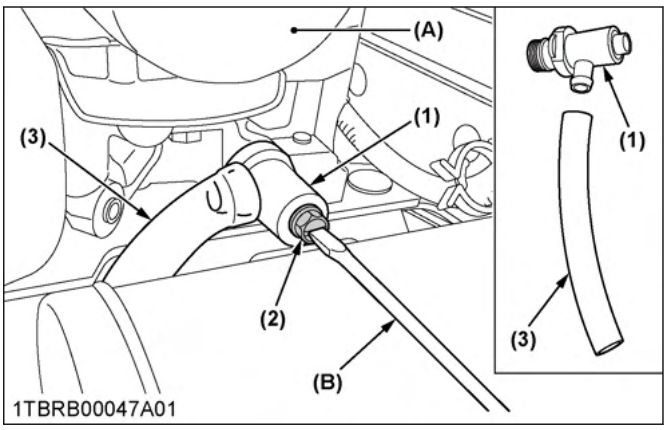
NOTE :
- **Do not overfill.**

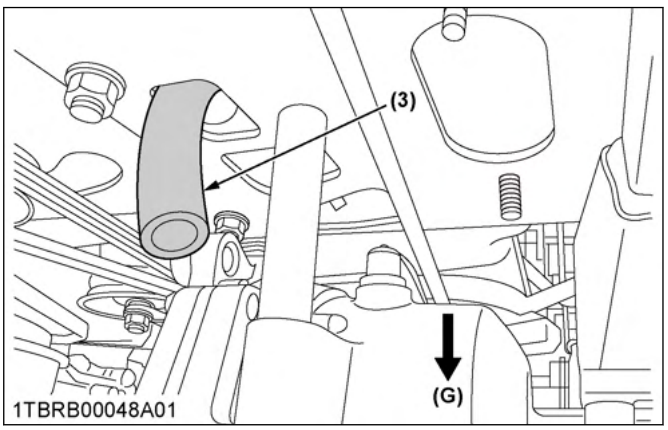
T2290KW, T2290KWT

After the first 8 hours, change the engine oil.

1. Insert the hose attached with the machine to the T-type pipe fitting on the right side of the engine.
   In the case of no hose attached, use the hydraulic hose of inner diameter 0.5 in., length about 6 in.
   Direct the hose down, loosen the nut of the T-type pipe fitting and drain the engine oil. Tighten the nut.

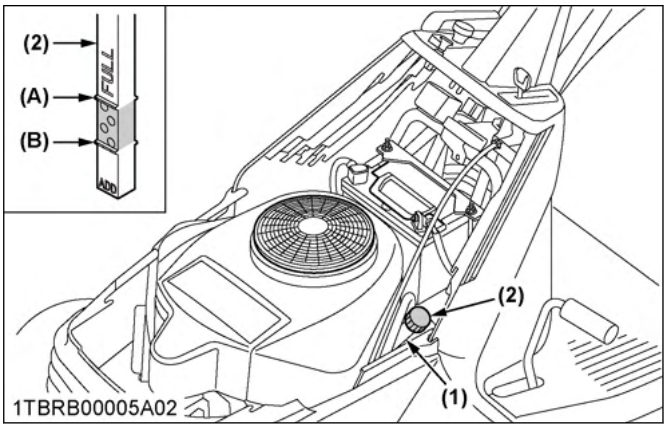
   NOTE :
   - **The used oil can be drained out more easily if the engine is warm.**





(1) T-type pipe fitting
(2) Nut
(3) Hose
(A) Engine
(B) Screw driver
(C) Ground

2. Fill with the new oil up to the upper level on the dipstick.



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

3. To check the oil level. Remove the dipstick, wipe it clean, insert it and draw it out again. Check to see that the oil level is between the 2 marks.

   NOTE :
   - **Do not overfill**

2. Replacing engine oil filter (T2090BR)

WARNING

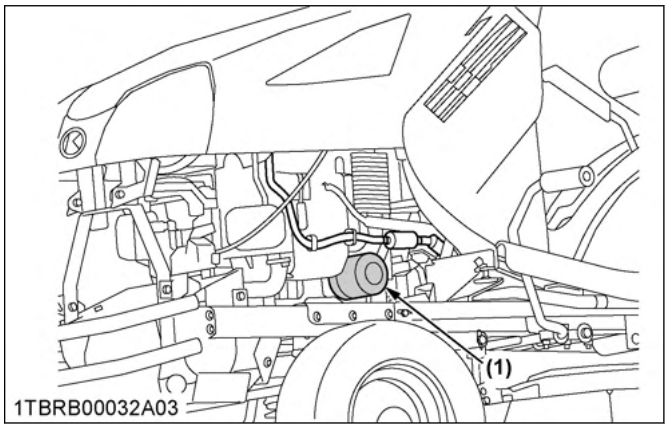
To avoid serious injury or death:

- **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 cartridge.**
- **Allow engine to cool down sufficiently; oil can be hot and may cause burns.**

The oil filter cartridge must be changed every 100 service hours or annually.
Always use a genuine oil filter.

T2090BR

1. To change the used oil, unhook the drain hose, direct the hose down and open the drain valve. The used oil can be drained out more easily if the engine is warm.
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 through the threaded center hole. Stop pouring when the oil reaches the bottom of the threads. Allow a minute or 2 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 filter.
5. Install the replacement oil filter to the mounting pad. Turn the oil filter clockwise until the rubber gasket contacts the pad, then tighten the filter an additional 1/2 to 3/4 turn.



(1) Engine oil filter cartridge

6. Fill the crankcase, with new oil of the proper type, to the upper level on the dipstick. See LUBRICANTS AND FUEL on page 40. Always check the level with the dipstick before adding more oil.
7. Reinstall the oil fill cap/dipstick and push firmly into place.
8. Test run the engine to check for leaks. Stop the engine, allow a minute for the oil to drain down, and recheck the level on the dipstick. Add more oil, as necessary, so the oil level is up to but not over the upper 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 lower level or over the upper level on the dipstick.**

3. Cleaning engine shroud

WARNING

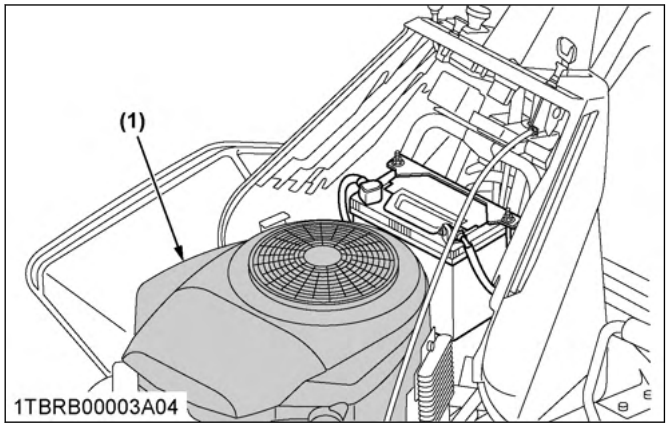
To avoid serious injury or death:

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

1. Remove the engine shroud mounting bolts and detach the shroud.

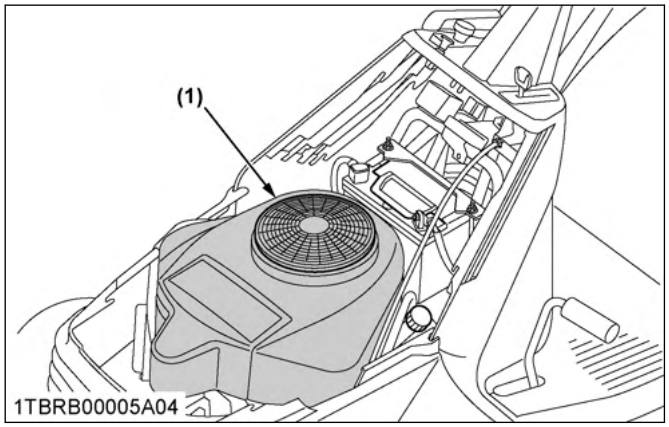
2. Check to see if the engine's cooling fins are blocked with dust and dirt. Clean them with compressed air if required.

T2090BR



(1) Shroud

T2290KW, T2290KWT



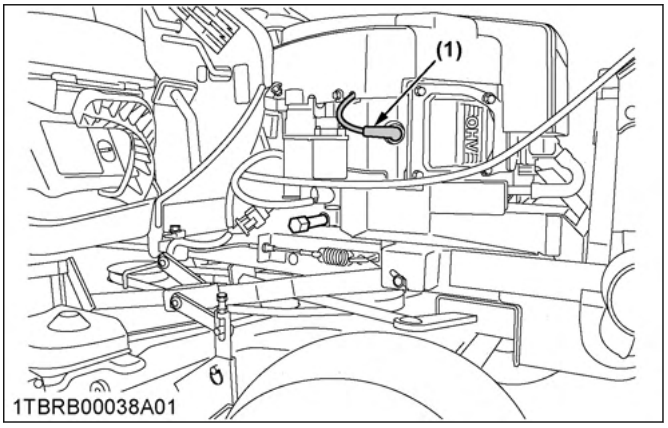
(1) Shroud

4. Checking spark plug

Every 100 hours of operation check the spark plug condition and gap.

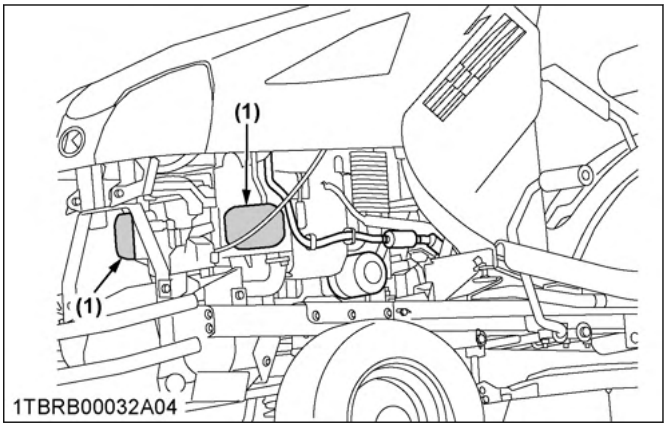
1. Lift hood and remove the engine cover.
2. Remove the spark plug wire from spark plug.
3. Use a spark plug wrench to remove plug.

T2290KW, T2290KWT



(1) Spark plug (both sides)

T2090BR



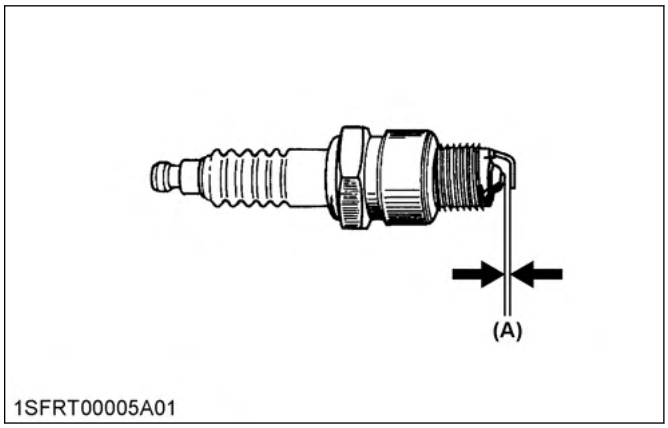
(1) Spark plug

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

5. Check spark plug gap with gap gauge.

Recommended spark plug	**T2090BR**	CHAMPION XC12YC
	T2290KW, T2290KWT	NGK BPR4ES

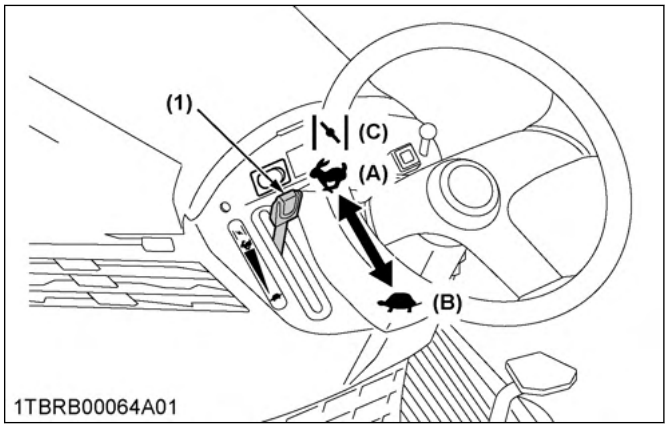
NOTE :
- **This engine is equipped with resistor-type spark plug.**



(A) 0.76 mm (0.03 in.)

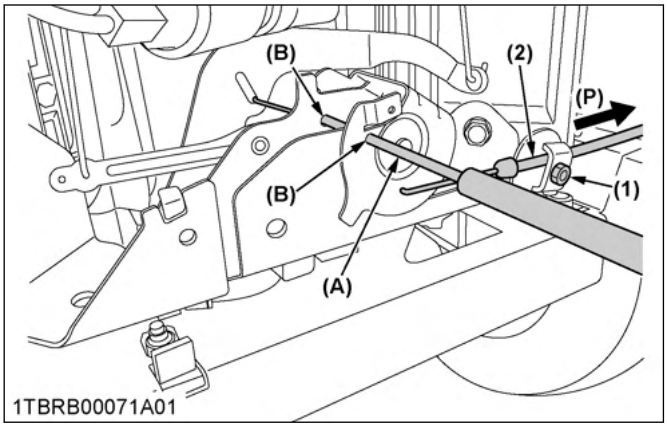
5. Adjusting throttle cable (T2090BR)

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



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

2. Attempt to pass a pin (A) with a diameter of 3 mm through the holes indicated.

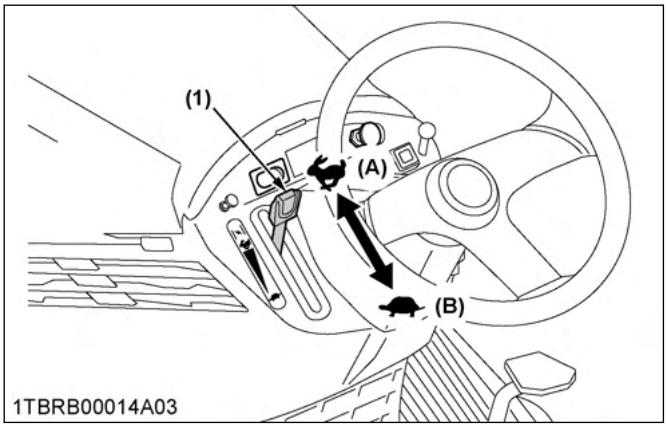


(1) Bolt
(2) Throttle lever cable sheath
(A) Pin with a diameter of 3 mm
(B) Hole
(P) "CHOKE"

3. If not possible, loosen the bolt (1) and pull the throttle lever cable sheath (2) in the direction of the arrow so that the pin (A) passes through all the required holes (B). And then tighten the bolt (1).

6. Adjusting throttle cable (T2290KW, T2290KWT)

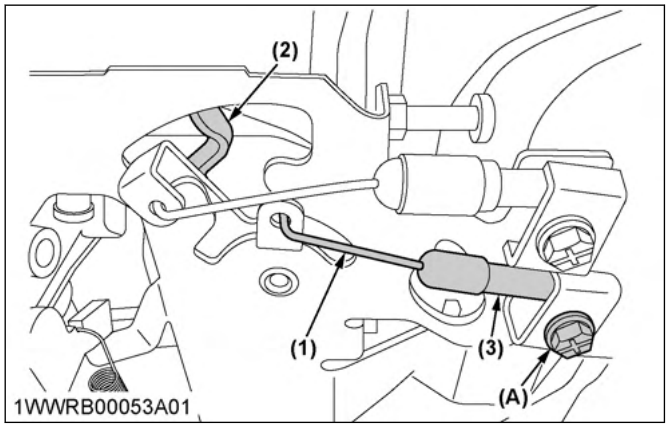
1. Move the throttle lever to the *"FAST"* position.



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

2. 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).
3. Pull up the sheath (3) of the throttle cable until the inner wire of throttle cable has almost no slack, and tighten the cable clamp bolt (A).

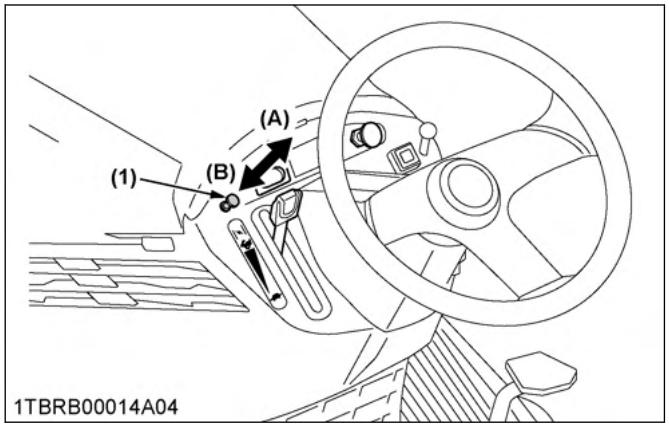
4. Move the throttle lever to *"SLOW"* position. Make sure that the carburetor throttle valve is moved smoothly.



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

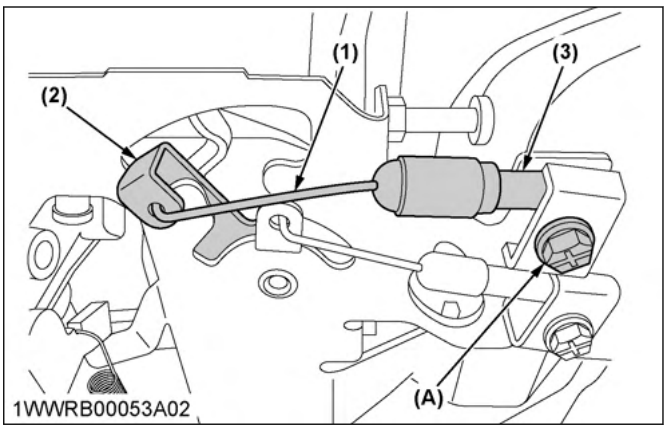
7. Adjusting choke cable (T2290KW, T2290KWT)

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



(1) Choke knob
(A) Pull out: "ON" position
(B) Push in: "OFF" position

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 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 equipment choke knob.



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

8. 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)	Capacity 20 HR (Ah)	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%

8.1 Charging the battery

⚠ DANGER

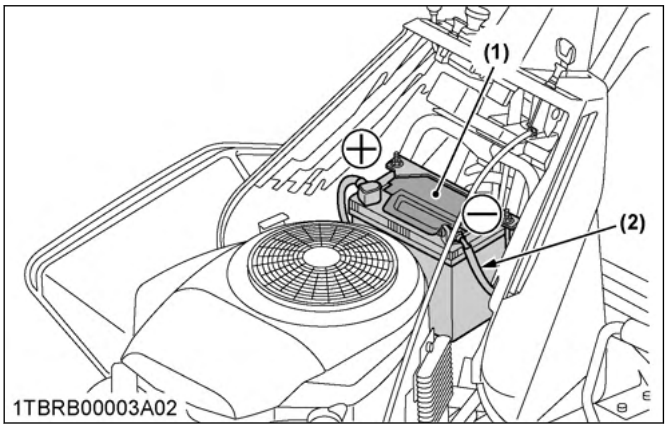
To avoid serious injury or death:

- **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 *(+) Positive terminal*
(2) Ground cable *(-) 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 to 10 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.

8.2 Storing the battery

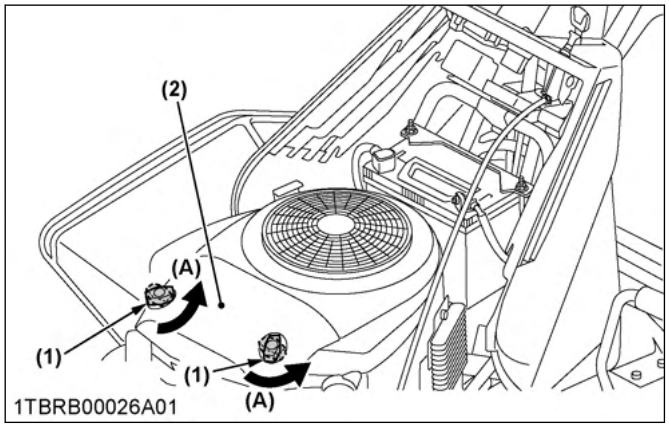
1. When storing the machine for a long period, remove the battery from machine, adjust the electrolyte to the proper level and store in a dry place out of direct sunlight.
2. The battery self-discharges while it is stored.
   Recharge it once a month in hot seasons and once every 2 months in cold seasons.

9. Replacing air cleaner paper element

T2090BR

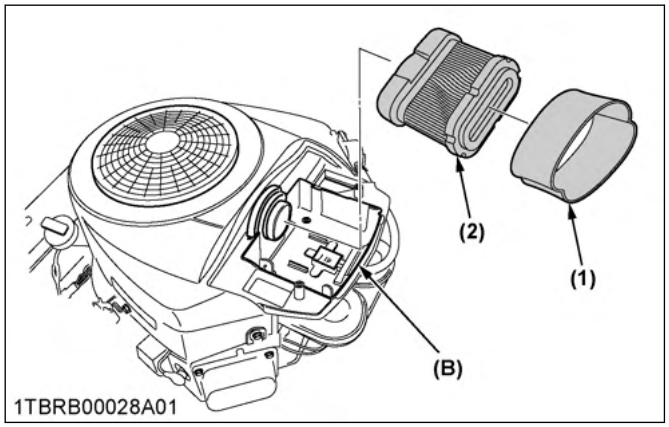
Every 100 hours of operation or annually replace the paper element if equipped with a precleaner. Check every 25 hours of operation or annually if not equipped with a precleaner.
(More often under extremely dusty or dirty conditions.)

1. Loosen the air cleaner cover knobs and remove the air cleaner cover.



(1) Air cleaner cover knob
(2) Air cleaner cover
(A) "LOOSEN"

2. Remove air cleaner element with precleaner.
3. Remove the precleaner from the paper element.



(1) Precleaner
(2) Air cleaner element
(B) Base

4. Gently tap the paper element to remove dirt. Do not wash the paper element or use pressurized air, as this will damage the element. Replace a dirty, bent, or damaged element with a genuine part. Handle the new element carefully; do not use if the sealing surfaces are bent or damaged.
5. Clean the air cleaner base as required and check condition.
6. Reinstall the precleaner over the paper air cleaner element and install it on the base.
7. Reinstall the air cleaner cover and secure with the 2 knobs.

10. Checking fuel filter

⚠ WARNING

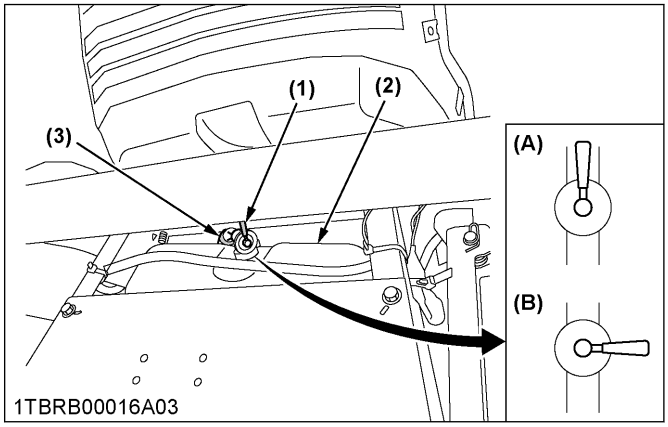
To avoid serious injury or death:

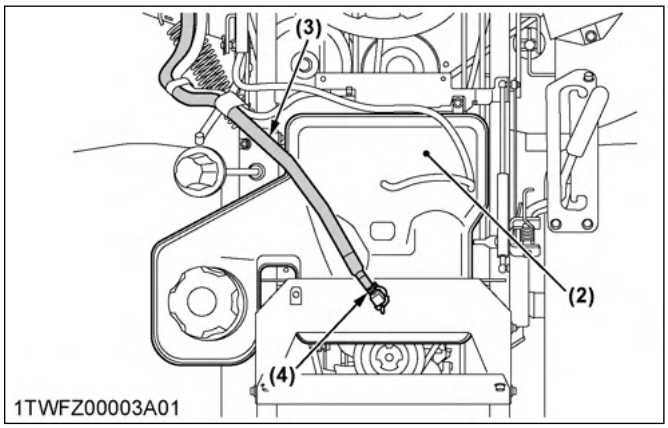
- **Be sure to stop the engine and remove the key when attempting to make the following checks and changes.**
- **Never fail to check the fuel lines periodically. The fuel lines are subject to wear and aging. Fuel may leak out onto the running engine, causing a fire.**

The fuel line is made of rubber and ages regardless of service period.

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

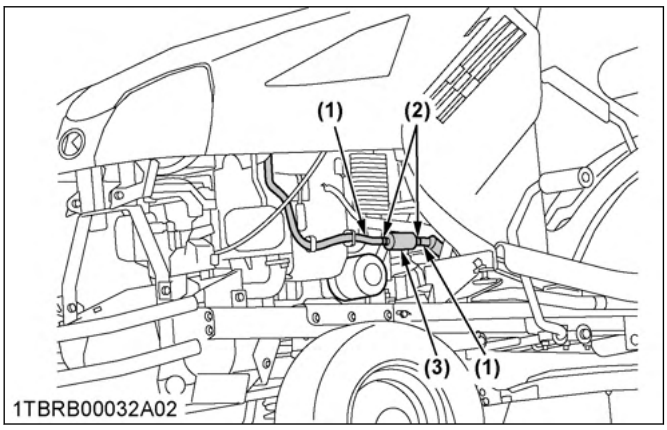
   IMPORTANT :
   - **When the fuel line is disconnected for maintenance or repair, close both ends of the fuel line with a piece of clean cloth or paper to prevent dust and dirt from entering. In addition, particular care must be taken not to admit dust and dirt into the fuel pump. Entrance of dust and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





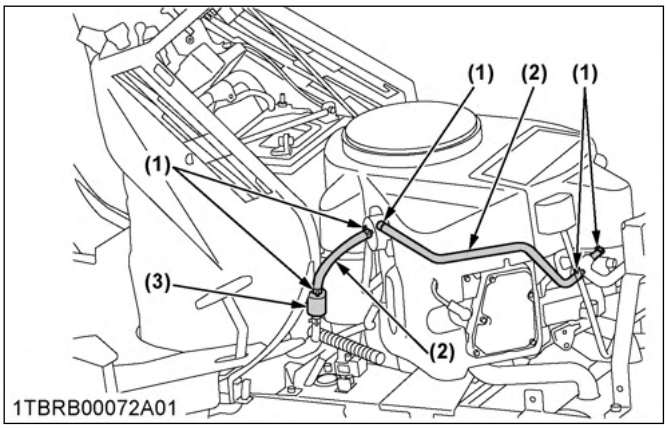
(1) Fuel valve
(2) Fuel tank
(3) Fuel line
(4) Pipe clamps
(A) "OPEN"
(B) "CLOSE"

T2090BR



(1) Fuel hose
(2) Fuel hose clamp
(3) Fuel filter

T2290KW, T2290KWT

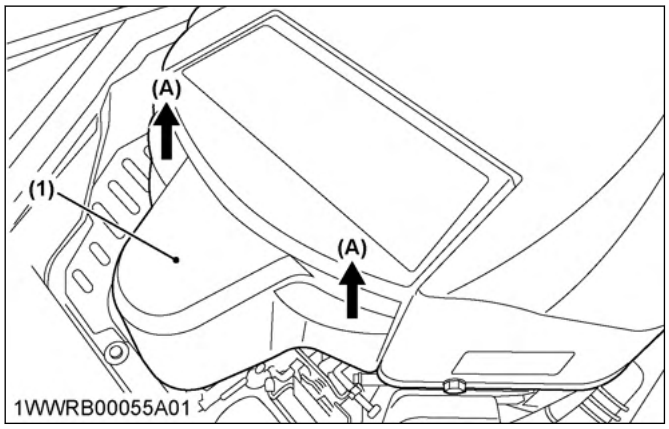


(1) Pipe clamps
(2) Fuel line
(3) Fuel filter

11. Cleaning air cleaner paper element (T2290KW, T2290KWT)

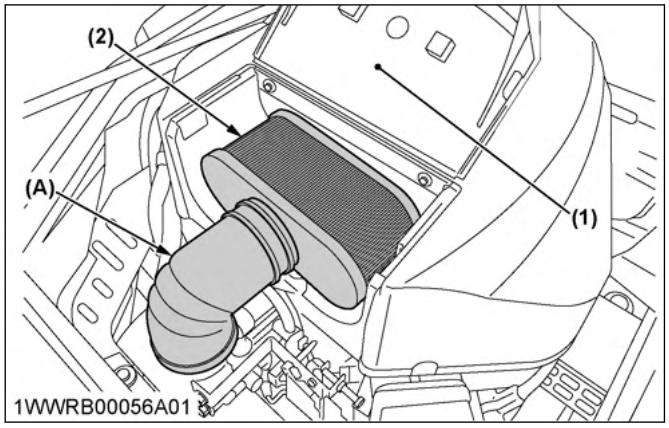
Every 100 hours of operation or annually replace the paper element.
Check the air cleaner daily or before starting the engine. Check for a buildup of dirt and debris around the air cleaner system. Keep this area clean. Also check for loose or damaged components. Replace all bent or damaged air cleaner components.

1. Lift up the tabs to open the air cleaner cover.



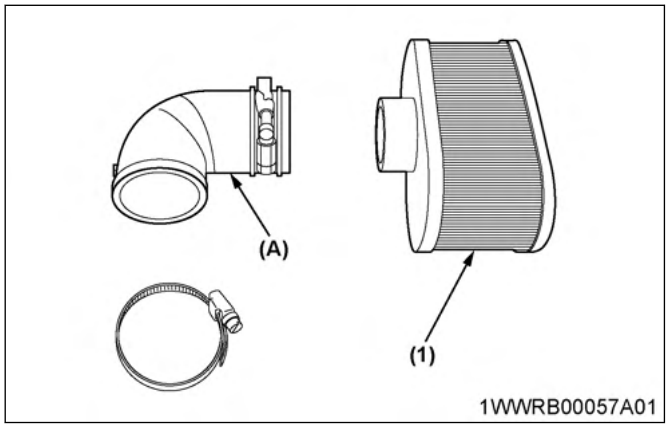
(1) Air cleaner cover (A) "LIFT UP"

2. Remove the air cleaner paper element and the air intake hose.



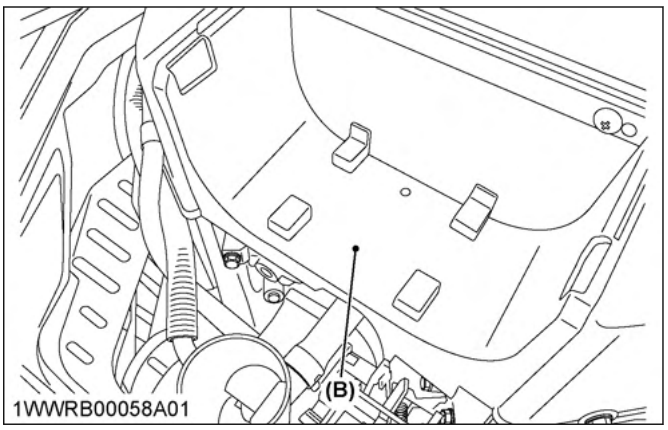
(1) Air cleaner cover (A) Air intake hose
(2) Air cleaner paper element

3. Replace a dirty, bent, or damaged element with a genuine part. Handle the new element carefully; do not use if the sealing surfaces are bent or damaged.



(1) Air cleaner paper element (A) Air intake hose

4. Clean the air cleaner base as required and check condition.



(B) Air cleaner base

5. Install the air cleaner paper element into the air intake hose, and reinstall them in place.
6. Close the air cleaner cover.

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

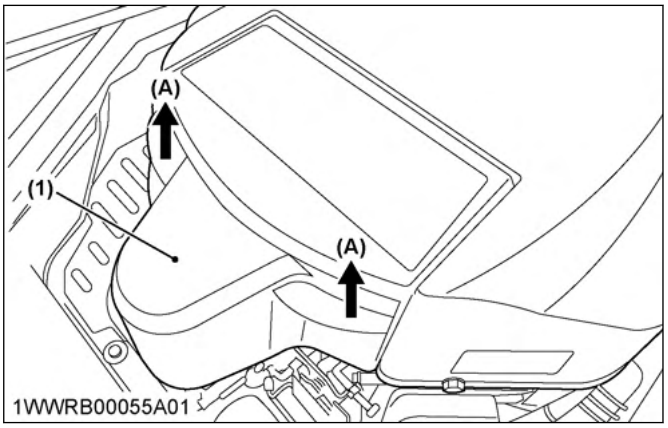
EVERY 200 HOURS

1. Replacing air cleaner paper element

T2290KW, T2290KWT

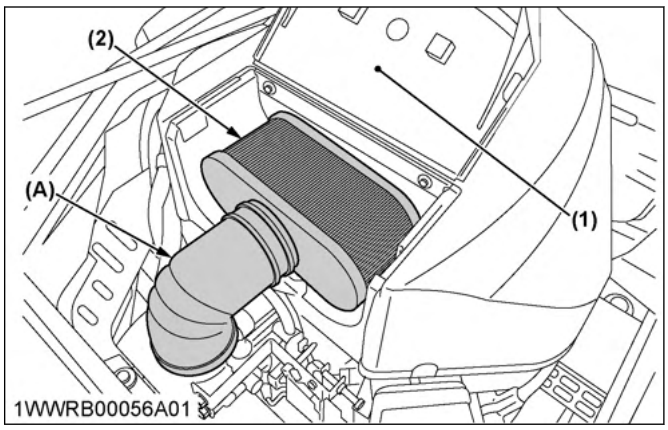
Every 200 hours of operation or annually replace the paper element.

1. Lift up the tabs to open the air cleaner cover.



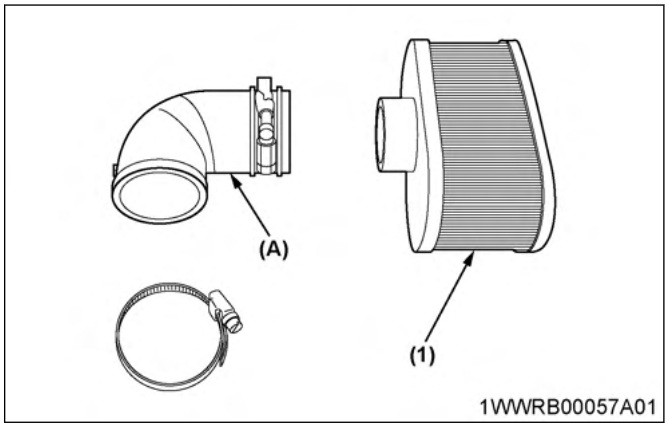
(1) Air cleaner cover (A) "LIFT UP"

2. Remove the air cleaner paper element and the air intake hose.



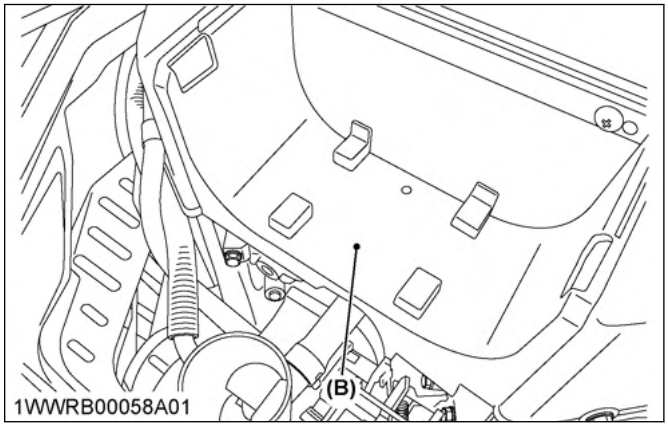
(1) Air cleaner cover (A) Air intake hose
(2) Air cleaner paper element

3. Replace a dirty, bent, or damaged element with a genuine part. Handle the new element carefully; do not use if the sealing surfaces are bent or damaged.



(1) Air cleaner paper element (A) Air intake hose

4. Clean the air cleaner base as required and check condition.



(B) Air cleaner base

5. Install the air cleaner paper element into the air intake hose, and reinstall them in place.
6. Close the air cleaner cover.

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

2. Replacing 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 cartridge.**
- **Allow engine to cool down sufficiently; oil can be hot and may cause burns.**

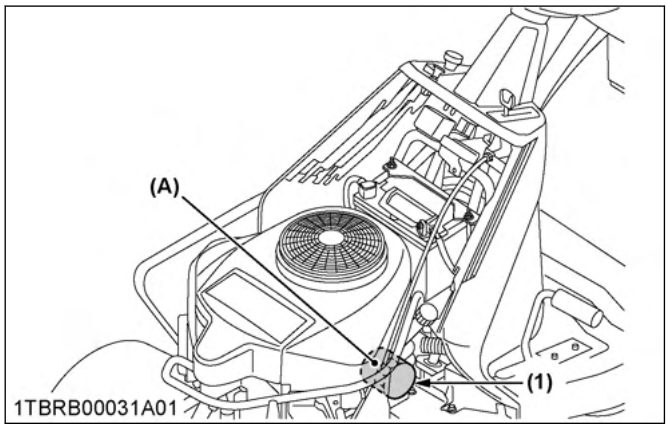
The oil filter cartridge must be changed every 200 service hours.
Always use a genuine oil filter.

T2290KW, T2290KWT

1. Insert the hose attached with the machine to the T-type pipe fitting on the oil filter side of the engine.
   In the case of no hose attached, use the hydraulic hose of inner diameter 0.5 in., length about 150 mm.
   Direct the hose down, loosen the nut of the T-type pipe fitting and drain the engine oil. Tighten the nut.
2. Remove the old filter and wipe off the filter adapter with a clean cloth. After draining the oil, return the nut of the t-type pipe fitting to its original position.
3. Place a new replacement filter in a shallow pan with the open end up. Pour new oil, of the proper type, in through the threaded center hole. Stop pouring when the oil reaches the bottom of the threads. Allow a minute or 2 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 3/4-1 turn.
6. Fill the engine with the proper oil to the upper level on the dipstick. Always check the oil level with the dipstick before adding more oil.
7. Reinstall the oil fill cap/dipstick and tighten securely.
8. Start the engine and check for oil leaks. Recheck oil level before placing the engine into service.
   Stop the engine, correct any leaks, and allow a 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 lower level or above the upper level on the dipstick.**



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

EVERY 300 HOURS

1. Cleaning combustion chamber (T2290KW, T2290KWT)

If you do not have the proper tools and/or are not mechanically proficient, consult your local KUBOTA Dealer for this service.

2. Checking engine valve seats and clearance

Consult your local KUBOTA Dealer for this service.

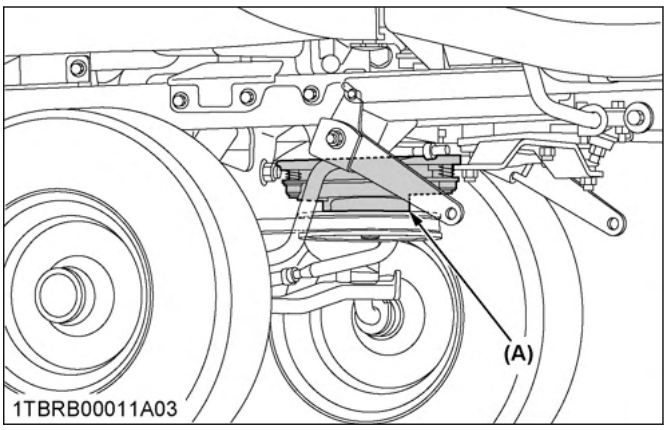
EVERY 500 HOURS

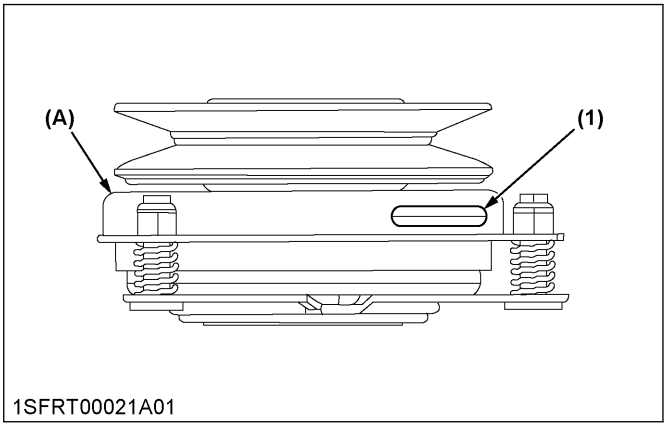
1. Adjusting the electric clutch

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.

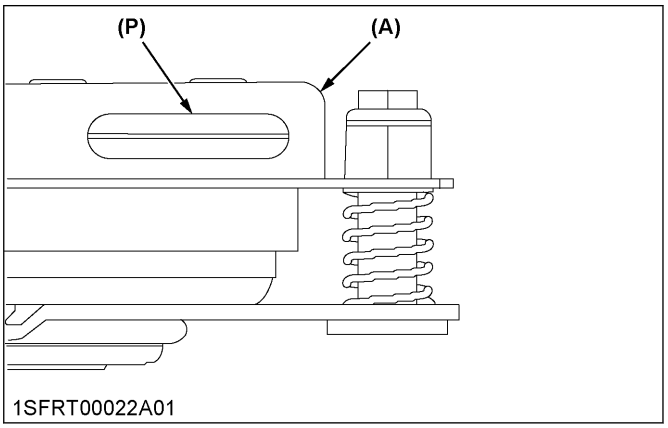
When the clutch is disengaged, the air gap between the armature and rotor must be adjusted to 0.4 mm (0.015 in.) for proper operation. The air gap adjustment is made with 3 bolts on the clutch. There are 3 inspection windows, one next to each adjusting bolt.





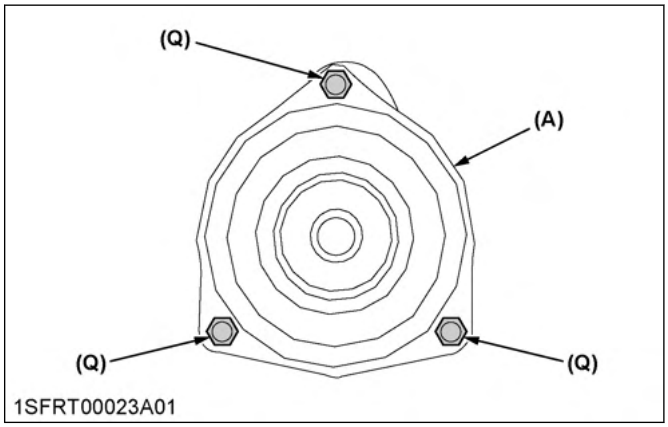
(1) Inspection window (x3) (A) Electric clutch

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.

2. Cleaning combustion chamber (T2090BR)

If you do not have the proper tools and/or are not mechanically proficient, consult your local KUBOTA Dealer for this service.

EVERY 600 HOURS

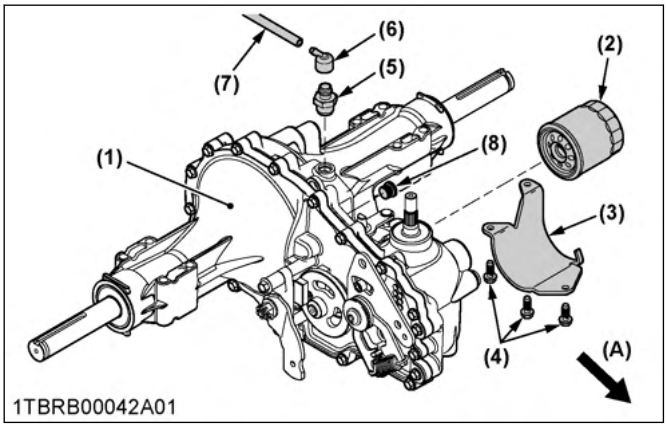
1. Replacing transaxle filter (T2290KWT)

⚠ 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.**

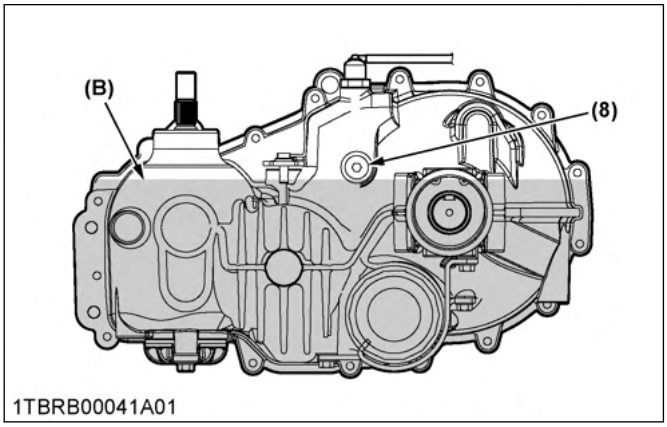
1. Apply the bypass valve.
2. Remove the hex head bolts (4), and filter guard (3). Clean any loose debris from around the perimeter of the oil filter (2).
3. Place an oil drain pan (12" or more diameter and 8 qt. capacity is optimal) beneath the oil filter. Remove the oil filter (2) and discard it.

NOTE :
- **Always replace the filter when preforming 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 the filter base surface off and apply a film of new oil to the gasket of the new replacement filter (Hydro-gear part number 52114).
6. Install the new filter by hand, turn 3/4 to 1 full turn after the filter gasket contacts the filter base surface.



Left side view of transaxle



(1) Transaxle
(2) Transaxle oil filter
(3) Filter guard
(4) Hex flange head bolt
(5) Metal fitting assembly
(6) Barbed cap
(7) Hose
(8) Oil level check port plug
(A) "FRONT"
(B) "OIL LEVEL"

7. Re-install the filter guard (3) with 3 hex head bolts (4). Torque bolts (4) to 7.35 N·m (5.42 lbf·ft) securely.
8. Remove the oil level check port plug (9) from the transaxle prior to filling with oil. This will allow the transaxle to vent during oil fill.
9. Remove the hose (7), the barbed cap (6) and the metal fitting assembly (5).

10. Fill with 20W50 motor oil until oil just appears at the bottom of the oil level check port. Install the oil level check port plug (9) into transaxle. Torque the plug (9) to 20.34 N·m (15.0 lbf·ft).
11. Install the metal fitting assembly (5) to the transaxle (1) and torque the metal fitting assembly (5) to 20.34 N·m (15.0 lbf·ft). Then install the barbed cap (6) and the hose (7).
12. Proceed to the purge procedure.

2. Changing transaxle fluid

(See Replacing transaxle filter (**T2290KWT**) on page 59.)

EVERY 1 YEAR

1. Checking fuel line

⚠ WARNING

To avoid serious injury or death:

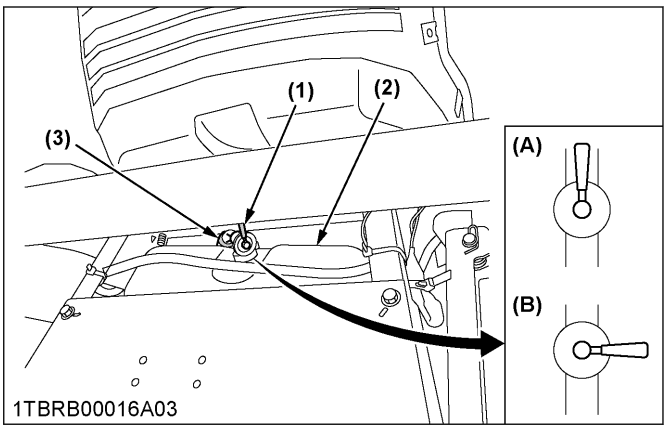
- **Be sure to stop the engine and remove the key when attempting to make the following checks and changes.**
- **Never fail to check the fuel lines periodically. The fuel lines are subject to wear and aging. Fuel may leak out onto the running engine, causing a fire.**

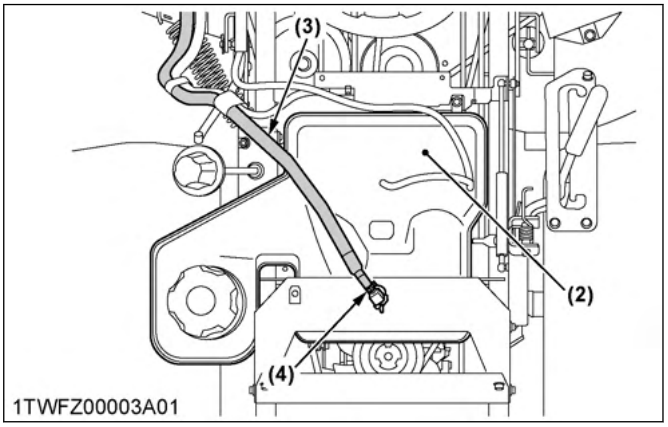
The fuel line is made of rubber and ages regardless of service period.

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

   IMPORTANT :

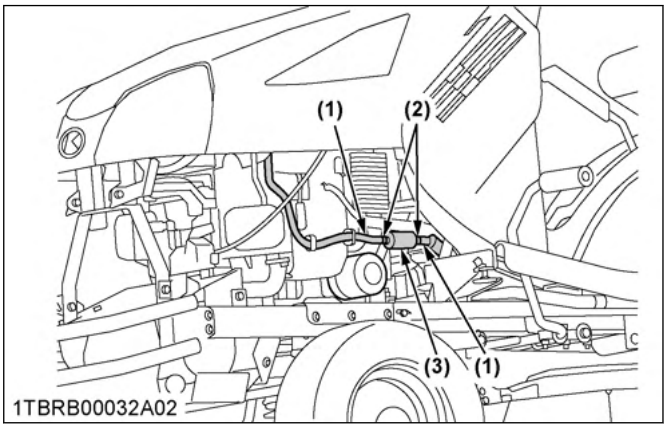
   - **When the fuel line is disconnected for maintenance or repair, close both ends of the fuel line with a piece of clean cloth or paper to prevent dust and dirt from entering. In addition, particular care must be taken not to admit dust and dirt into the fuel pump. Entrance of dust and dirt causes malfunction of the fuel pump.**





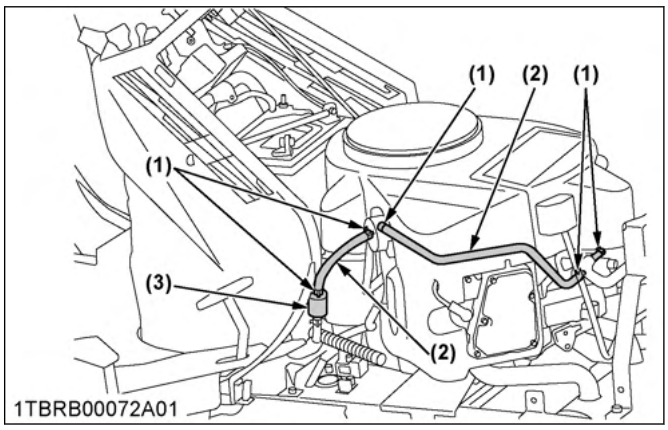
(1) Fuel valve
(2) Fuel tank
(3) Fuel line
(4) Pipe clamps
(A) "OPEN"
(B) "CLOSE"

T2090BR



(1) Fuel hose
(2) Fuel hose clamp
(3) Fuel filter

T2290KW, T2290KWT



(1) Pipe clamps
(2) Fuel line
(3) Fuel filter

2. Replacing spark plug

(See Checking spark plug on page 50.)

3. Checking engine valve clearance

Consult your local KUBOTA Dealer for this service.

EVERY 4 YEARS

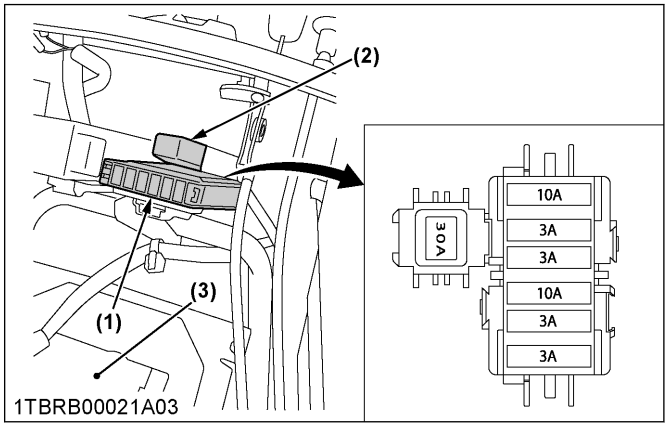
1. Replacing fuel lines

This should be done by your local KUBOTA Dealer.

SERVICE AS REQUIRED

1. Replacing fuses

1. Open the hood.
2. Remove the blown fuse.
3. Place a new 3 A or 10 A fuse in position.



(1) Fuse location
(2) Slow blow fuse
(3) Battery

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, etc.**

Protected circuit

Fuse number (id label)		Capacity (A)	Protected circuit
(1)	START	10	
(2)	KRA	3	KRA system
(3)	OPC	3	Engine running circuit
(4)	PTO	10	
(5)	ACC	3	
(6)	(extra fuse)	3	
(7)	Slow blow fuse	30	Check circuit against wrong battery connection

2. Replacing bulbs

Replacement of the headlight bulb

1. Open the hood.
2. Turn bulb socket to remove socket from headlight housing.
3. Push bulb down and turn 1 quarter turn to remove bulb from the socket.
4. Install new bulb to the socket.
5. Install the socket in housing.
6. Close the hood.

Headlight LED bulb	12.8 rated voltage/0.1 AMP/ 7.96 MSCP

3. 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.**

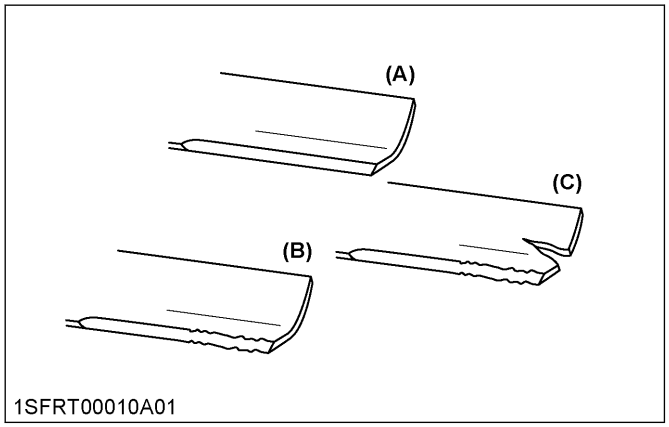
NOTE :

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

Checking

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 look like blade (C).

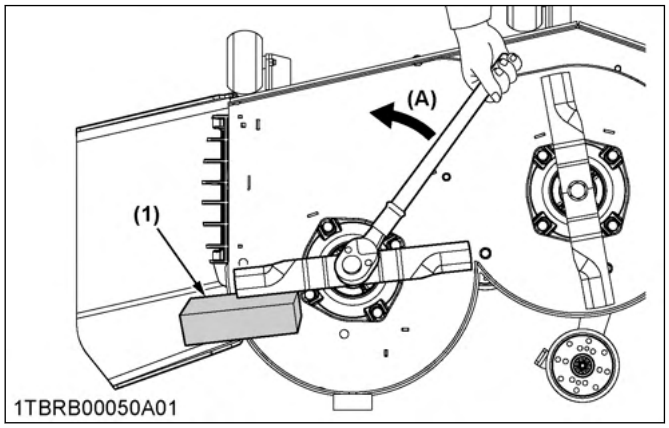


(A) New blade
(B) Worn blade
(C) Cracked blade

Replacing

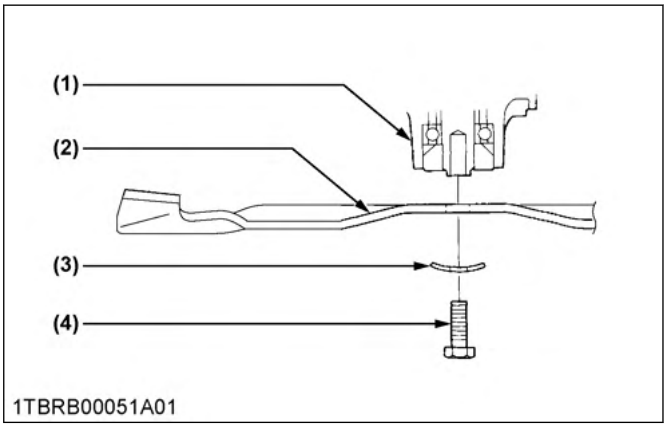
1. Dismount the mower deck from the machine.
   (See DISMOUNTING THE MOWER DECK on page 21.)
   Then turn it over to expose the blades.
2. Wedge a block of wood between the blade and mower housing or use a box wrench over the pulley nut to prevent the spindle from rotating while removing the blade bolts; loosen the blade bolt as illustrated.

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



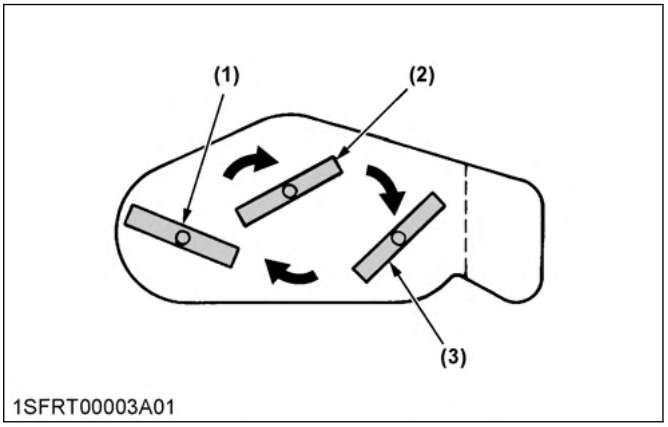
(1) Block *(A) "LOOSEN"*

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. 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) Blade
(3) Cup washer
(4) Bolt

IMPORTANT :
- **Tighten the blade bolts from 103 to 118 N·m (76 to 87 lbf·ft) of torque.**
- **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 figure below periodically. RCK42P also.**



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

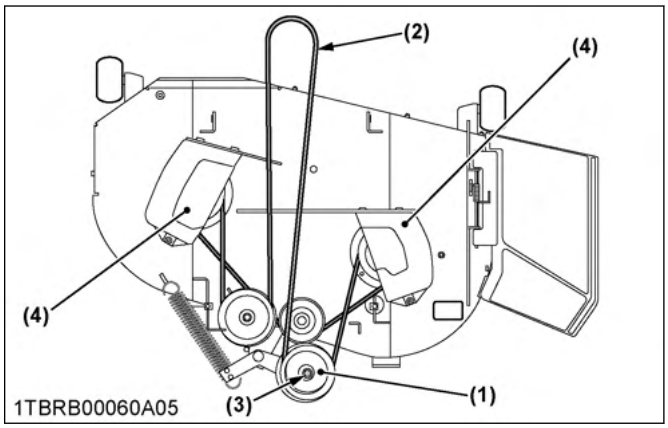
4. Replacing the mower belt

⚠ WARNING

To avoid serious injury or death:
- **Be sure to reinstall the removed cover after replacing the belt.**

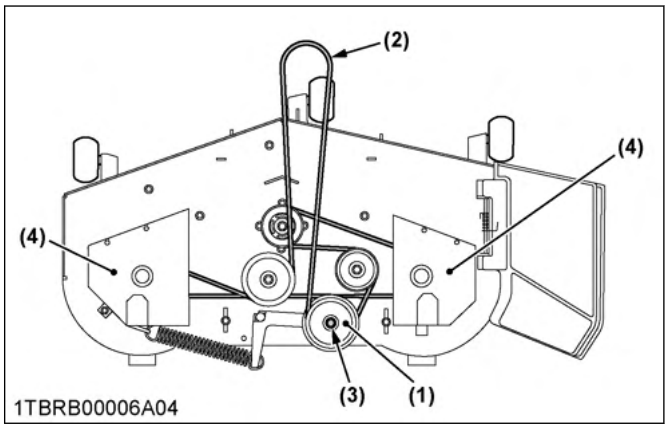
1. Remove the mower deck from the machine. (See DISMOUNTING THE MOWER DECK on page 21.)
2. Remove the left and right hand shield from the mower deck.
3. Remove the belt.
4. To install a new belt, reverse the above procedure.

RCK42P



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

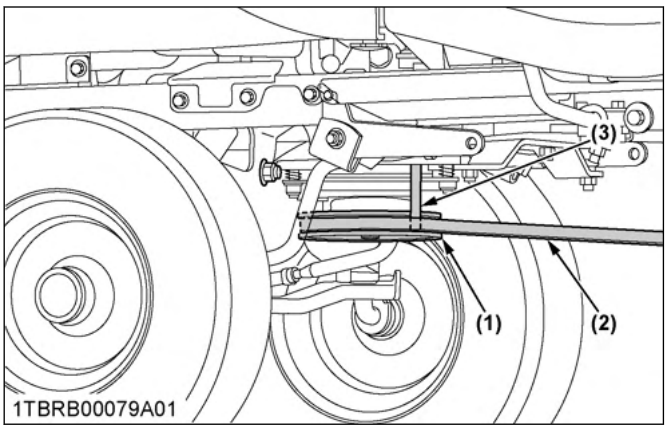
RCK48P



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

NOTE :

- **The mower belt must be outside of the guard pin.**



(1) Engine pulley
(2) Mower belt
(3) Guard pin

ADJUSTMENT

MOWER DECK LEVEL

1. Anti-scalp rollers

⚠ WARNING

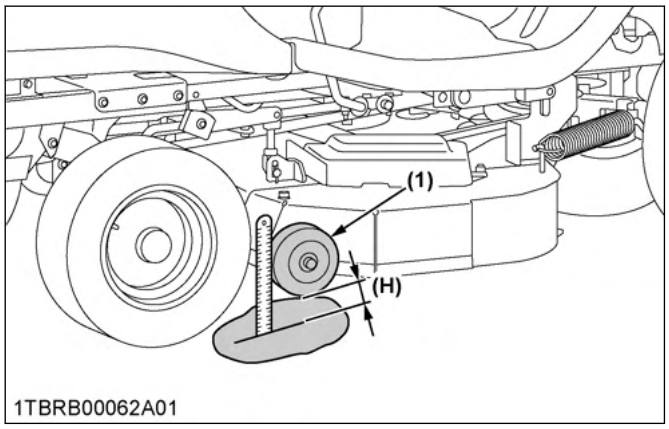
To avoid serious injury or death:

- **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 Checking the tire pressure on page 47.)
2. Start the engine.
3. Raise up the mower deck to the top position (the top end of the lift).
4. Turn the cutting height control dial to adjust the height.
5. Lower the mower deck.
6. 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.)

7. Attach 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 Checking the tire pressure on page 47.)**

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 top 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

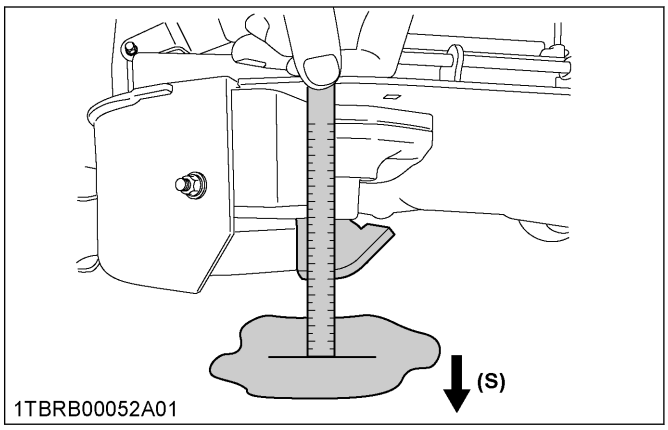
Height of the blade at the flat surface	76 mm (3 in.)

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.

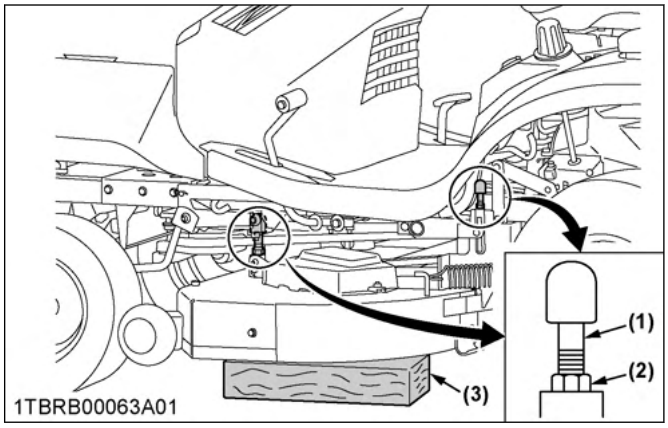
Side-to-side adjustment	Less than 3 mm (0.13 in.)



(S) Side

Adjusting the level (side-to-side)

1. Raise up the mower deck to the top position (the top end).
2. Turn the cutting height set dial to the 3 in. cutting height position.
3. Place 51 mm (2 in.) height 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) 51 mm (2 in.) height wood blocks

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 :

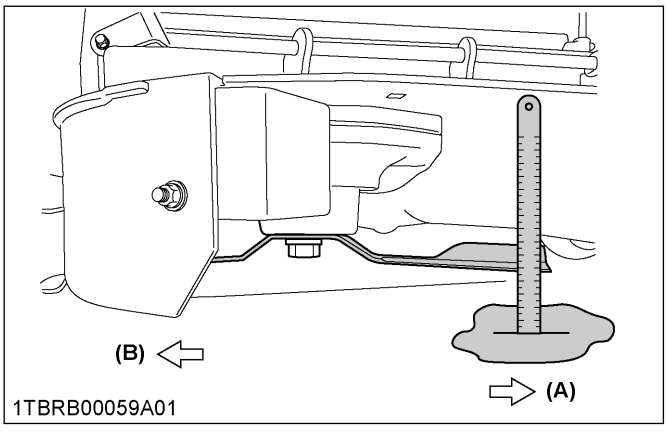
- **Check the machine tire pressure.**
  Inflate the tires to the correct pressure.
  (See Checking the tire pressure on page 47.)

Checking the level (front-to-rear)

NOTE :

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

1. Raise the mower deck to the top 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

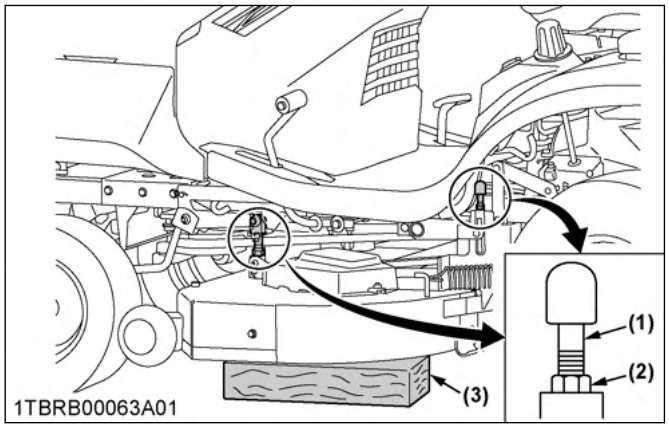
Front-to-rear adjustment	Less than 6 mm (0.25 in.) The front side must be lower than the rear side.

Adjusting the level (front-to-rear)

1. Raise up the mower deck to the top position (the top end).
2. Turn the cutting height set dial to the 3 in. cutting height position.
3. Place 51 mm (2 in.) height 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
(3) 51 mm (2 in.) height wood blocks

GENERAL TORQUE SPECIFICATION

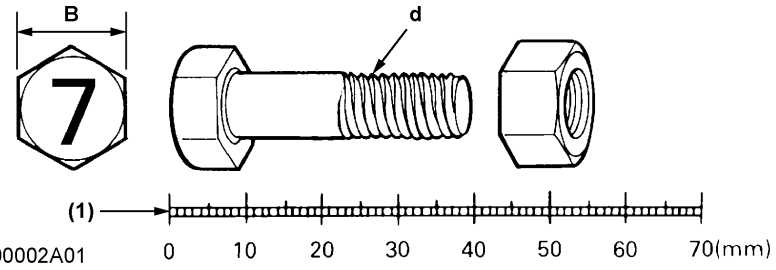
American standard cap screws with UNC or UNF threads				Metric cap screws			
SAE grade no.		GR.5	GR.8	Property class		Class 8.8	Class 10.9
1/4	(lbf·ft)	8-9.6	12-14.4	M6	(lbf·ft)	7.2-8.3	
	(N·m)	10.7-12.9	16.1-19.3		(N·m)	9.81-11.3	
	(kgf·m)	1.11-1.33	1.66-1.99		(kgf·m)	1.0-1.15	
5/16	(lbf·ft)	17-20.5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



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(1) Scale

STORAGE

⚠ WARNING

To avoid serious injury or death:

- **To reduce fire hazards, allow the engine and exhaust system to cool before storing the machine in an enclosed space or near combustible materials.**
- **To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building 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 to avoid unauthorized persons from operating the machine and getting injured.**

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 hot seasons and once every 2 months in cold seasons.
7. Drain 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 where it is dry and sheltered from rain. Cover the machine with a tarpaulin.
9. Moisture content in most grasses can damage the mower and grass catcher if these components are not properly cleaned after use. Make sure the mower and the grass catcher are clean and completely empty before storage.

REMOVING THE MOWER FROM STORAGE

1. Check the tire inflation pressure and adjust as required.
2. Install the battery. Before installing the battery, make sure it is fully charged.
3. Do daily checking.
   (See DAILY CHECK on page 42.)
4. Check all fluid levels. (engine oil, hydrostatic oil)
5. Start the engine. Shut the engine off and walk around the machine and make a visual inspection looking for evidence of oil or other fluids.
6. Run engine a couple of minutes before you put engine under load.
7. With the engine fully warmed up, release the parking brake and test the brakes for proper adjustment as you move forward. Adjust the brakes as necessary.

TROUBLESHOOTING

ENGINE TROUBLESHOOTING

If the engine is not performing correctly, refer to the table below for the cause and its corrective measure.

If	Check
Engine is difficult to start.	• Fuel tank or fuel filter is clogged by dirt.
	• Spark plug malfunction.
	• Dirt or water in the fuel system.
	• In winter, oil viscosity increases, and engine cranks slowly.
	• Battery is discharged.
Insufficient engine power.	• Air cleaner element is clogged.
	• Insufficient fuel flow or quality.
Engine stops suddenly.	• Insufficient fuel.
Exhaust fumes are colored.	• Fuel quality is poor.
Black smoke is emitted from the muffler during operation; power output is lowered.	• Air cleaner element clogged.
	• Choke not fully opened.
Bluish white smoke is emitted from the muffler during operation.	• Too much engine oil.
Engine will not idle.	• Spark plug not gapped correctly.
	• Faulty spark plug.
Engine loses power or overheats.	• Engine overheating.
	• Dirty air cleaner.
	• Dirt or water in fuel lines, filter, etc.
	• Out of fuel.
	• Engine cooling air intake screen or air cleaner element plugged.
Engine knocks.	• Stale or low octane fuel.

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

BATTERY TROUBLESHOOTING

If	Check
The starter does not function.	• Battery discharged.
	• Poor terminal connection.
	• The battery life has expired.
When viewed from the top, the top of the plates look whitish.	• Electrolyte level is low.
	• The battery was used too much without recharging.
Recharging is impossible.	• The battery life has expired.
Terminals are severely corroded and heated up.	• Poor terminal connection or stained terminal.
The battery electrolyte level drops rapidly.	• There is a crack or pin holes in the electrolytic cells.
	• Charging system trouble.

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

MACHINE TROUBLESHOOTING

If	Check
The machine operation is not smooth.	• The hydrostatic transmission oil is low.
The machine does not move while the engine is running.	• The parking brake is on.
	• Transmission oil is insufficient.
	• HST belt slipping or broken.
Machine moves when speed control pedal is not depressed. (Engine is operated.)	• Hydrostatic neutral system is not correctly adjusted.

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

MOWER TROUBLESHOOTING

If	Check
Discharge chute plugged.	• Grass too wet.
	• Grass too long.
	• Cutting too low.
	• Engine rpm too low.
	• Ground speed too fast.
Streaking of grass uncut.	• Ground speed too fast.
	• Engine rpm too low.
	• Grass too long.
	• Blades dull or damaged.
	• Debris in mower deck.
Uneven cut.	• Mower deck not level.
	• Ground speed too fast.
	• Blades dull.
	• Blades worn.
	• Tire inflation.
	• Mower rollers not adjusted correctly.
Blades scalping grass.	• Cutting height too low.
	• Blades speed too fast.
	• Ridges in terrain.
	• Rough or uneven terrain.
	• Bent blade(s).
	• Low tire inflation.
	• Anti-scalp rollers not adjusted correctly.
Belt slipping.	• Belt tension incorrect.
	• Mower deck plugged.
	• Debris in pulleys.
	• Worn belt.
Excessive vibration.	• Debris on mower deck or in pulleys.
	• Damaged drive belt or mower belt twisted.
	• Damaged pulleys.
	• Pulleys out of alignment.
	• Blades out of balance.
Mower loads down machine.	• Engine rpm too low.
	• Ground speed too fast.
	• Debris wrapped around mower spindles.
Grass tips are jagged and turn grayish brown.	• Blades dull.
	• Blades worn.
	• Mower deck is not level.

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

INDEX

K

L

M

O

P

S

T

W