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HARBOR FREIGHT TOOLS
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OPERATOR'S MANUAL
KUBOTA LIQUID COOLED GASOLINE/LPG ENGINE

MANUEL DE L'OPERATEUR
MOTEUR À ESSENCE/LPG REFROIDI PAR LIQUIDE DE KUBOTA

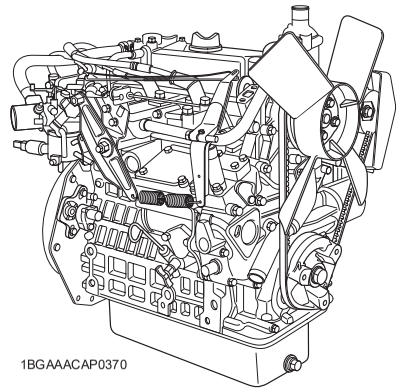
BEDIENUNGSANLEITUNG
FLÜSSIGKEITSGEKÜHLTER BENZIN-/LPG-MOTOR VON KUBOTA

MANUALE DELL'OPERATORE
MOTORE KUBOTA A BENZINA/LPG CON RAFFREDDAMENTO A LIQUIDO

MANUAL DE INSTRUCCIONES
MOTOR KUBOTA DE GASOLINA/LPG REFRIGERADO POR LÍQUIDO

ENGLISH
FRANÇAIS
DEUTSCH
ITALIANO
ESPAÑOL

WG972-E2 · DF972-E2



1BGAAACAP0370

READ AND SAVE THIS BOOK
MANUEL A LIRE ET A CONSERVER
DIESE ANLEITUNG BITTE SORGFÄLTIG DURCHLESEN UND GRIFFBEREIT AUFBEWAHREN
LEGGETE E CONSERVATE QUESTO MANUALE
LEAN Y CONSERVEN ESTE MANUAL

Kubota

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California Proposition 65

⚠ WARNING ⚠

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

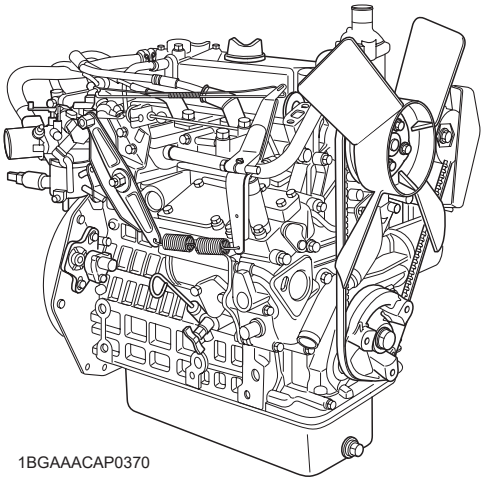
ENGLISH

OPERATOR'S MANUAL

KUBOTA

LIQUID COOLED GASOLINE/LPG ENGINE

MODELS WG972-E2·DF972-E2



1BGAAACAP0370

READ AND SAVE THIS BOOK

Kubota

FOREWORD

You are now the proud owner of a KUBOTA Engine. This engine is a product of KUBOTA quality engineering and manufacturing. It is made of fine materials and under a rigid quality control system. It will give you long, satisfactory service. To obtain the best use of your engine, please read this manual carefully. It will help you become familiar with the operation of the engine and contains many helpful hints about engine 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 The immediate use of new techniques in the manufacture of products may cause some small parts of this manual to be outdated. KUBOTA distributors and dealers will have the most up-to-date information. Please do not hesitate to consult with them.

This Operator's Manual should be considered a permanent part of the engine and should remain with the engine when it is resold.

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.

ENGLISH

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SAFE OPERATION

Careful operation is your best assurance against an accident. Read and understand this section carefully before operating the engine. All operators, no matter how much experience they may have, should read this and other related manuals before operating the engine or any equipment attached to it. It is the owner's obligation to provide all operators with this information and instruct them on safe operation.

Observe the following for safe operation.

1. OBSERVE SAFETY INSTRUCTIONS

- Read and understand carefully this "OPERATOR'S MANUAL" and "LABELS ON THE ENGINE" before attempting to start and operate the engine.
- Learn how to operate and work safely. Know your equipment and its limitations. Always keep the engine in good condition.
- Before allowing other people to use your engine, explain how to operate and have them read this manual before operation.
- DO NOT modify the engine. UNAUTHORIZED MODIFICATIONS to the engine may impair the function and/or safety and affect engine life. If the engine does not perform properly, consult your local Kubota Engine Distributor first.



1AAACAAAP008B

2. WEAR SAFE CLOTHING AND PERSONAL PROTECTIVE EQUIPMENT (PPE)

- DO NOT wear loose, torn or bulky clothing around the machine that may catch on working controls and projections or into fans, pulleys and other moving parts causing personal injury.
- Use additional safety items-PPE, e.g. hard hat, safety protection, safety goggles, gloves, etc., as appropriate or required.
- DO NOT operate the machine or any equipment attached to it while under the influence of alcohol, medication, or other drugs, or while fatigued.
- DO NOT wear radio or music headphones while operating the engine.


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3. CHECK BEFORE STARTING AND OPERATING THE ENGINE

- Inspect the engine before operation. Do not operate the engine if there is something wrong with it. Repair it immediately.
- Ensure all guards and shields are in place before operating the engine. Replace any that are damaged or missing.
- Check to see that you and others are a safe distance from the engine before starting.
- Always keep the engine at least 3 feet (1 meter) away from buildings and other facilities.
- DO NOT allow children or livestock to approach the machine while the engine is running.
- DO NOT start the engine by shorting across starter terminals.



1BAABADAP0010

4. KEEP THE ENGINE AND SURROUNDINGS CLEAN

- Stop the engine before cleaning.
- Keep the engine clean and free of accumulated dirt, grease and trash to avoid a fire. Store flammable fluids in proper containers and cabinets away from sparks and heat.
- Check for and repair leaks immediately.
- DO NOT stop the engine without idling; Allow the engine to cool down, first. Keep the engine idling for about 5 minutes before stopping unless there is a safety problem that requires immediate shut down.



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5. SAFE HANDLING OF FUEL AND LUBRICANTS -KEEP AWAY FROM FIRE

- Always stop the engine before refueling and/or lubricating.
- DO NOT smoke or allow flames or sparks in your work area. Fuel is extremely flammable and explosive under certain conditions.
- Refuel at a well ventilated and open place. When fuel and/or lubricants are spilled, refuel after letting the engine cool down.
- Do not use unapproved containers e.g. buckets, bottles, jars. Use approved fuel storage containers and dispensers.



1BGAAAIAP013A

- If running the engine on LPG, use the standard LPG fuel recommended by KUBOTA. The use of other fuel may cause a hazardous or dangerous condition.
- LPG fuel in the gaseous state is heavier than air and will settle in low areas, this may be hazardous.
  Please follow all operator's manual instructions when changing the fuel tank and servicing the fuel system.

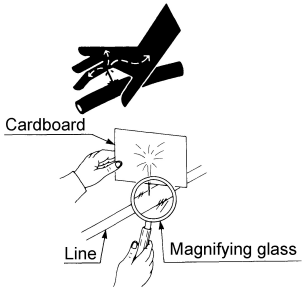
6. EXHAUST GASES AND FIRE PREVENTION

- Engine exhaust fumes can be very harmful if allowed to accumulate. Run the engine in a well ventilated location and where there are no people or livestock near the engine.
- The exhaust gas from the muffler is very hot. To prevent a fire, do not expose dry grass, mowed grass, oil or any other combustible materials to exhaust gas. Keep the engine and muffler clean at all times.
- To avoid a fire, be alert for leaks of flammable substances from hoses and lines. Check for leaks from hoses or pipes, such as fuel and hydraulic fluid by following the maintenance check list.
- To avoid a fire, do not short across power cables and wires. Check to see that all power cables and wirings are in good condition. Keep all electrical connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.



7. ESCAPING FLUID

- Relieve all pressure in the air, the oil and the cooling systems before disconnecting any lines, fittings or related items.
- Be cautious of possible pressure relief when disconnecting any device from a pressurized system that utilizes pressure. DO NOT check for pressure leaks with your hand. High pressure oil or fuel can cause personal injury.
- Escaping fluid under pressure has sufficient force to penetrate skin causing serious personal injury.
- Fluid escaping from pinholes may be invisible. Use a piece of cardboard or wood to search for suspected leaks: do not use hands and body. Use safety goggles or other eye protection when checking for leaks.
- If injured by escaping fluid, see a medical doctor immediately. This fluid can produce gangrene or severe allergic reaction.



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8. CAUTIONS AGAINST BURNS AND BATTERY EXPLOSION

- To avoid burns, be cautious of hot components, e.g. muffler, muffler cover, radiator, hoses, engine body, coolants, engine oil, etc. during operation and after the engine has been shut off.
- DO NOT remove the radiator cap while the engine is running or immediately after stopping. Otherwise hot water will spout out from the radiator. Wait until the radiator is completely cool to the touch before removing the cap. Wear safety goggles.
- Close the coolant drain valve, secure the pressure cap, and fasten the pipe band before operating. If these parts are taken off, or loosened, it will result in serious personal injury.
- The battery presents an explosive hazard. When the battery is being charged, hydrogen and oxygen gases are extremely explosive.
- DO NOT use or charge the battery if its fluid level is below the LOWER mark.
  Otherwise, the component parts may deteriorate earlier than expected, which may shorten the service life or cause an explosion. Immediately, add distilled water until the fluid level is between the UPPER and LOWER marks.
- Keep sparks and open flames away from the battery, especially during charging. DO NOT strike a match near the battery.
- DO NOT check the battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.
- DO NOT charge a frozen battery. There is a risk of explosion. When frozen, warm the battery up to at least 16°C (61°F).



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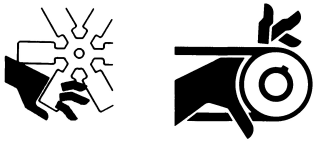
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9. KEEP HANDS AND BODY AWAY FROM ROTATING PARTS

- Stop the engine before checking or adjusting the belt tension and cooling fan.
- Keep your hands and body away from rotating parts, such as the cooling fan, V-belt, fan drive pulley or flywheel. Contact with rotating parts can cause severe personal injury.
- DO NOT run the engine without safety guards. Install safety guards securely before operation.

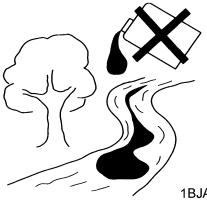


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10. ANTI-FREEZE AND DISPOSAL OF FLUIDS



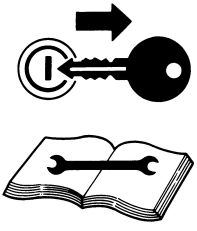
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- Anti-freeze is poisonous. If it is swallowed, seek immediate medical help. Do NOT make a person throw up unless told to do so by poison control or a health care professional. Use standard first aid and CPR for signs of shock or cardiac arrest. Call your local Poison Control Center or your local emergency number for further assistance.
- Wear rubber gloves to avoid personal injury, when you treat anti-freeze. In case of contact with skin, wash it off immediately.
- DO NOT mix different types of Anti-freeze. The mixture can produce a chemical reaction causing harmful substances. Use approved or genuine KUBOTA Anti-freeze.
- Be mindful of the environment and the ecology. Before draining any fluids, determine the correct way to dispose of them. Observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters and batteries.
- When draining fluids from the engine, place a suitable container underneath the engine body.
- DO NOT pour waste onto the ground, down a drain, or into any water source. Dispose of waste fluids according to environmental regulations.

11. CONDUCTING SAFETY CHECKS AND MAINTENANCE

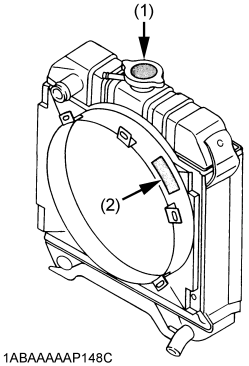


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- When inspecting the engine or servicing, place the engine on a large flat surface. DO NOT work on anything that is supported ONLY by lift jacks or a hoist. Always use blocks or the correct stands to support the engine before servicing.
- Disconnect the battery from the engine before conducting service. Put a "DO NOT OPERATE!" tag on the starter switch to avoid accidental starting.
- To avoid sparks from an accidental short circuit always disconnect the battery's ground cable (-) first and reconnect it last.
- Stop the engine and remove the key when conducting daily and periodic maintenance, service and cleaning.
- Check or conduct maintenance after the engine, coolant, muffler, or muffler cover have cooled off completely.
- Always use the appropriate tools and fixtures. Verify that they are in good condition before performing any service work. Make sure you understand how to use them before service.
- Use ONLY correct engine barring techniques for manually rotating the engine. DO NOT attempt to rotate the engine by pulling or prying on the cooling fan and V-belt. This practice can cause serious personal injury or premature damage to the cooling fan and belt.

- Replace fuel pipes and lubricant pipes with their hose clamps every 2 years or earlier whether they are damaged or not. They are made of rubber and age gradually.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Keep a first aid kit and fire extinguisher handy at all times.

12. SAFETY LABELS



1ABAAAAAP148C

(1) The following label is just an example. A different label might be applied on the actual machine.



1ABACAAAP036K

(2) Part No.TA040-4957-1
Do not get your hands close to engine fan and fan belt.


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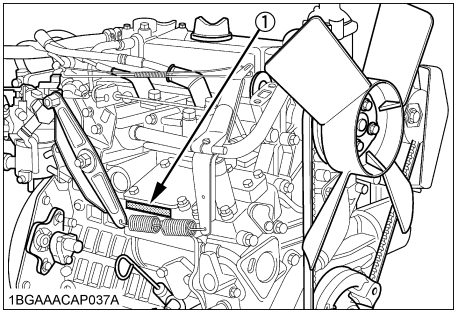
13. CARE OF SAFETY LABELS

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

SERVICING THE ENGINE

Your dealer has knowledge of your new engine and has the desire to help you get the most value from it. After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself.
However, when in need of parts or major service, see your KUBOTA dealer.
For service, contact the KUBOTA Dealership from which you purchased your engine or your local KUBOTA dealer. When in need of parts, be prepared to give your dealer the engine serial number.
Locate the serial number now and record them in the space provided.

	Type	Serial No.
Engine		
Date of Purchase		
Name of Dealer		
(To be filled in by purchaser)		



(1) Engine serial number

ENGLISH

IMPORTANT INFORMATION OF EMISSION REGULATION

The off-road spark ignited engine at or below 19kW manufactured after January 1st 2024 must not be sold into California since the zero-emission requirements in the CARB SORE regulations (13CCR § 2403(b)(1)) start from 2024 Model Year.

1. INLET AND EXHAUST SYSTEM (COMMON)

THE WG972-E2/DF972-E2 ENGINE MUST USE THE BELOW AIR CLEANER AND INLET PIPE, AND EXHAUST BACK PRESSURE OF THE MUFFLER MUST BE WITHIN THE BELOW VALUES;

PART	PART NO.
GENUINE AIR CLEANER	1G657-1101-1
GENUINE INLET PIPE	EG561-1164-1

BRAKE HORSE POWER	SAE net int.	ALLOWABLE MAXIMUM EXHAUST BACK PRESSURE
23.1 kW (31.0 HP)/ 3600 rpm		19.6 kPa (147.1 mmHg, 0.2 kgf/cm², 2.8 psi)/ 3600 rpm

2. KUBOTA RECOMMENDED LPG FUEL SPECIFICATIONS [DF972-E2]

- **Commercial Propane gas only.**
- **Equivalent to Propane H-D-5 of GPA* standards.**

C_3H_8	C_3H_6	C_4H_{10}	Others	
≧90%	≦5%	≦2.5%	-	(vol. %)

*GPA means Gas Processors Association (U.S.A.)

3. LENGTH OF THE LPG VAPOR HOSE [DF972-E2]

The length of the LPG vapor hose between the LPG carburetor and its regulator should be within 300 ± 20 mm (11.8 ± 0.78 in.) for KUBOTA recommendation.

4. LPG REGULATOR WITH VAPORIZER [DF972-E2]

When operating DF972-E2 on LPG, only a KUBOTA GENUINE LPG REGULATOR KIT can be used.
Only this regulator can be installed by an authorized KUBOTA DISTRIBUTOR or the manufacturer of the equipment in which this engine is used.

5. HIGH ALTITUDE OPERATION

IMPORTANT :

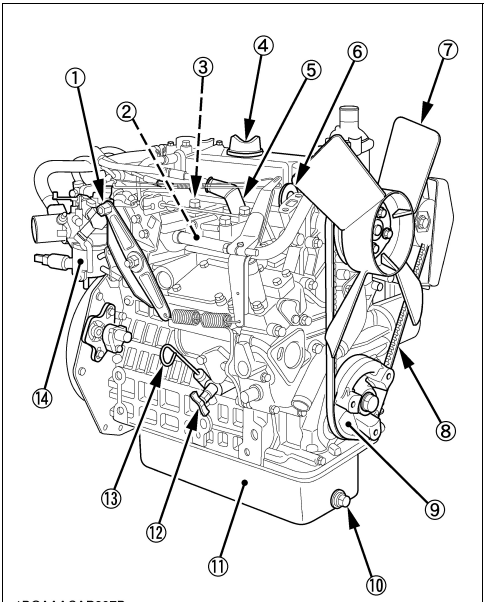
- EPA emission regulation require the ultimate users of non-road SI engine, as their obligation, to adjust the emissions by installing the appropriate genuine altitude compensation kit. And the engine manufacturer must provide such kit when the engine is operated at an altitude that exceeds the standard level, as guarantied by the engine manufacturer. For this purpose, KUBOTA prepared genuine altitude compensation kit described below. The ultimate users of SI engines must comply with the regulations through the installation of the appropriate altitude compensation kit for the altitude range where the engine will be operated.

Altitude Compensation Kit	Applicable Altitude Ranges
Original carburetor 0 m (with 0 m kit) 0 ft	⟷ 700 m 2300 ft
1000 m compensation kit	300 m 1000 ft ⟷ 1700 m 5600 ft
2000 m compensation kit	1300 m 4300 ft ⟷ 2700 m 8900 ft

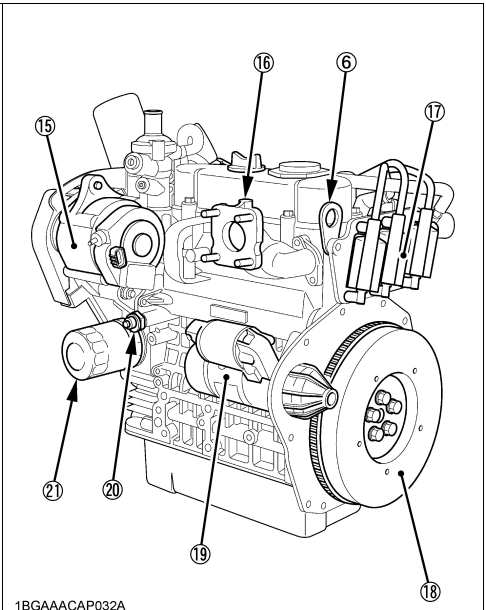
*Prepare for the users who have lost original carburetor's jet.
Altitude compensation kit part number: Please contact your local KUBOTA dealer and specify your engine type and engine serial No.
Please consult your local KUBOTA dealer for further information on the altitude compensation kit.

CONSULT YOUR LOCAL KUBOTA DEALER FOR FURTHER INFORMATION ON THIS PROCEDURE.

NAMES OF PARTS



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1BGAAACAP032A

Ref. No.	Part Name	Type		Ref. No.	Part Name	Type	
		G	GL			G	GL
(1)	Speed control lever	○	○	(12)	Coolant drain plug	○	○
(2)	Intake manifold	○	○	(13)	Oil level gauge	○	○
(3)	Spark plug	○	○	(14)	Carburetor	○	○
(4)	Oil filler plug	○	○	(15)	Alternator	○	○
(5)	Plug cap	○	○	(16)	Exhaust manifold	○	○
(6)	Engine hook	○	○	(17)	Ignition coil	○	○
(7)	Cooling fan	○	○	(18)	Flywheel	○	○
(8)	Fan belt	○	○	(19)	Starter	○	○
(9)	Fan drive pulley	○	○	(20)	Oil pressure switch	○	○
(10)	Oil drain plug	○	○	(21)	Oil filter cartridge	○	○
(11)	Oil pan	○	○				

G Type : WG972-E2, GL Type : DF972-E2

ENGLISH

PRE-OPERATION CHECK

BREAK-IN

During the engine break-in period, observe the following by all means:

1. Change engine oil and oil filter cartridge after the first 50 hours of operation. (See "ENGINE OIL" in "PERIODIC SERVICE" section.)
2. When ambient temperature is low, operate the machine after the engine has been completely warmed up.

DAILY CHECK

To prevent trouble from occurring, it is important to know the conditions of the engine well. Check it before starting.

WARNING

To avoid personal injury or death:

- **Install shields and safeguards attached to the engine when operating.**
- **Stop the engine at a flat and wide space when checking.**
- **Keep dust or fuel away from the battery, wiring, muffler and engine to prevent a fire. Check and clear them before operating everyday. Pay attention to the heat of the exhaust pipe or exhaust gas so that it can not ignite trash.**

Item		Ref. page
1. Parts which had trouble in previous operation		-
2. By walking around the machine	(1) Oil or water leaks	17 to 21
	(2) Engine oil level and contamination	17, 18
	(3) Amount of fuel	16
	(4) Amount of coolant	19 to 21
	(5) Dust in air cleaner dust cup	22
	(6) Damaged parts and loosened bolts and nuts	-
3. By inserting the key into the starter switch	(1) Proper functions of meters and pilot lamps; no stains on these parts	-
4. By starting the engine	(1) Unusual engine noise	9
	(2) Engine start-up condition	5
	(3) Slow-down and acceleration behavior	9

OPERATING THE ENGINE

STARTING THE ENGINE (NORMAL)

⚠ WARNING

To avoid personal injury or death:

- **Do not allow children to approach the machine while the engine is running.**
- **Install the machine on which the engine is installed, on a flat place.**
- **Do not run the engine on gradients.**
- **Do not run the engine in an enclosed area. Exhaust gas can cause air pollution and exhaust gas poisoning.**
- **Keep your hands away from rotating parts (such as fan, pulley, belt, flywheel etc.) during operation.**
- **Do not operate the machine while under the influence of alcohol or drugs.**
- **Do not wear loose, torn or bulky clothing around the machine. It may catch on moving parts or controls, leading to the risk of accident. Use additional safety items, e.g. hard hat, safety boots or shoes, eye and hearing protection, gloves, etc., as appropriate or required.**
- **Do not wear radio or music headphones while operating engine.**
- **Check to see if it is safe around the engine before starting.**
- **Reinstall safeguards and shields securely and clear all maintenance tools when starting the engine after maintenance.**

IMPORTANT :

- When starting the engine after a long storage (of more than 3 months), activate the starter for about 10 seconds to allow oil to reach every engine part.

Gasoline

1. Open the fuel valve of the gasoline line.

2*. Turn the fuel selector switch* to the "GASOLINE" position.

NOTE:
*The step "2" above is for GL type only.
*The fuel selector switch is not provided by KUBOTA.

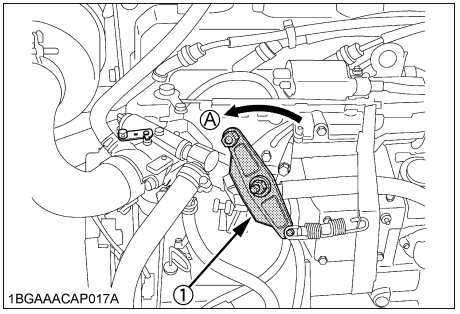
LPG

1. Open the liquid withdrawal valve of the LPG fuel tank.

2*. Turn the fuel selector switch* to the "LPG" position.

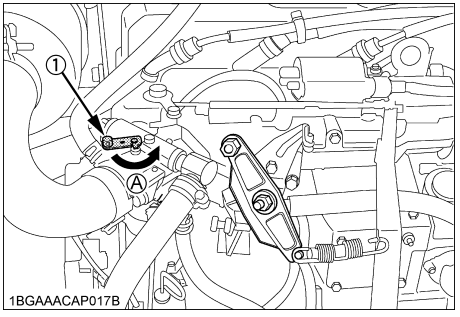
NOTE:
*The step "2" above is for GL type only.
*The fuel selector switch is not provided by KUBOTA.

3. Set the speed control lever to "Low idling".
[Electron governor]
Set the engine speed control to "Low idling".



(1) Speed control lever (A) "LOW IDLING"

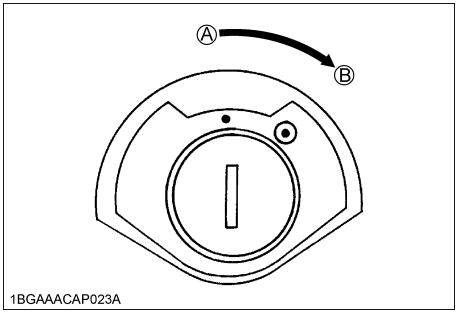
4. Move the choke lever to the "CLOSED" position.



(1) Choke lever (A) "CLOSED"

4. DO NOT move the choke lever, when LPG starting.

5. Insert the key into the starter switch and turn it to the "ON" (◉) position.



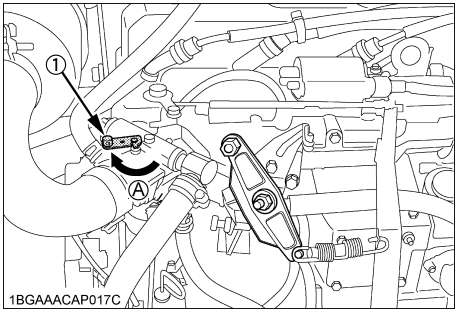
(A) “OFF“
(B) “ON”

6. Check to see that the oil pressure lamp and charge lamp are ON.

7. Turn the key to the "START" position and the starter will begin turning. Release the key immediately, when the engine starts.

8. If the engine is started, open the choke lever gradually (move the lever to the "OPEN" position).

8. Do not move the choke lever, when LPG starting.



(1) Choke lever (A) "OPEN"

9. Check to see that the oil pressure lamp and charge lamp are OFF. If not, immediately stop the engine and check the cause.

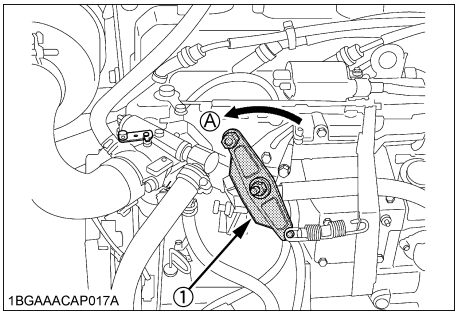
10. Warm up the engine at medium speed running for 3 to 5 minutes.

IMPORTANT :
- NEVER turn the starter switch while the engine is running.
- Warm up the engine not only in winter but also in other warmer seasons.
- In case of converting the fuel (gasoline ⟷ LPG) while running the engine, the engine should be operated with the engine speed high and no-loaded. If you convert the fuel with the engine speed low, the engine will stop.

STOPPING THE ENGINE

Gasoline

1. **Disengage the engine drive power and set the speed control lever to "low idling".**

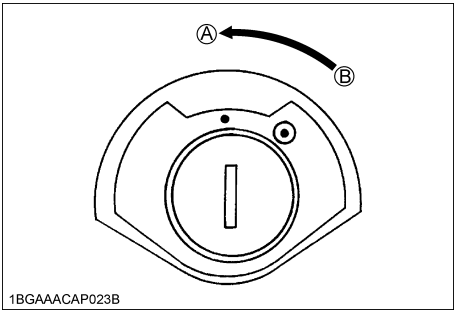


(1) Speed control lever (A) "LOW IDLING"

2. **Close the fuel valve of the gasoline line.**
3. **Cool down the engine for 2 to 3 minutes.**
4. **Turn the starter switch to the "OFF" (●) position.**
5. **Remove the key at the "OFF" position.**

LPG

1. **Cool down the engine for 2 to 3 minutes.**
2. **Turn the starter switch to the "OFF" (●) position.**
3. **Close the liquid withdrawal valve of the LPG fuel tank.**
4. **Remove the key at the "OFF" position.**



(A) “OFF“
(B) “ON”

CHECKS DURING OPERATION

While running, make the following checks to see that all parts are working correctly.

■Radiator cooling water (Coolant)

WARNING

To avoid personal injury or death:

- **Do not remove radiator cap until coolant temperature is well below its boiling point. Then loosen cap slightly to the stop position, to relieve any pressure, before removing cap completely.**

If the coolant temperature warning lamp lights up or if steam or coolant does not stop squirting from the radiator overflow pipe, turn off the load and **keep the engine idling (COOLING-DOWN) for at least 5 minutes** to let it cool down gradually. Then stop the engine and take the following inspection and servicing.

1. Check to see if the coolant runs short or if there is any coolant leak;
2. Check to see if there is any obstacle around the cooling air inlet or outlet;
3. Check to see if there is any dirt or dust between radiator fins and tube;
4. Check to see if the fan belt is too loose; and
5. Check to see if radiator water pipe is clogged.

■Oil pressure lamp

The lamp lights up to warn the operator that the engine oil pressure has dropped below the prescribed level. If this should happen during operation or should not go off even after the engine is accelerated more than 1000rpm, immediately stop the engine and check the following:

1. Engine oil level (See "ENGINE OIL" in "PERIODIC SERVICE" section.)

■Immediately stop the engine if;

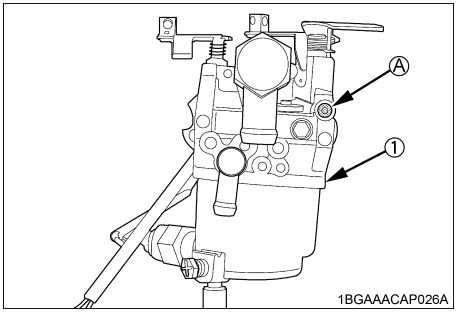
- The engine suddenly slows down or accelerates.
- Unusual noises are suddenly heard.
- The oil pressure lamp or the water temperature alarm lamp lights up.

TAMPER RESISTANCE

If service or repair is needed, contact your local KUBOTA dealer.

■Carburetor [WG972-E2], Dual fuel carburetor [DF972-E2]

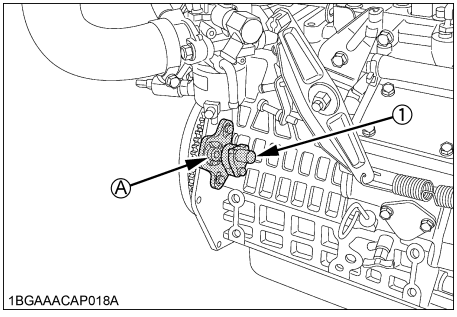
The carburetor is tamper resistant; the idle mixture screw has been covered by tamper plug after adjustment at the factory.
You **CANNOT** adjust this screw.



(1) Carburetor (A) Tamper resistance

■Sensor (crank angle)

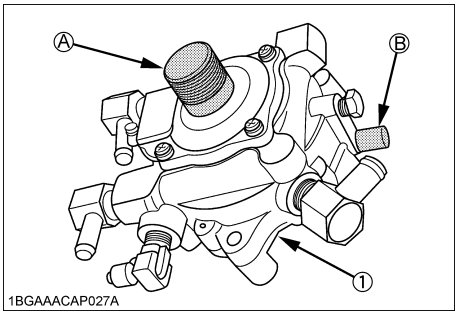
The sensor is tamper resistant; the ignition timing adjustment screw has been covered after adjustment at the factory.
You **CANNOT** adjust the ignition timing.



(1) Sensor (A) Tamper resistance

■LPG regulator [DF972-E2]

LPG regulator is tamper resistant; the main and idle pressure adjustment screws have been covered by tamper caps after adjustment at the factory.
You **CANNOT** adjust the above 2 screws.



(1) LPG regulator

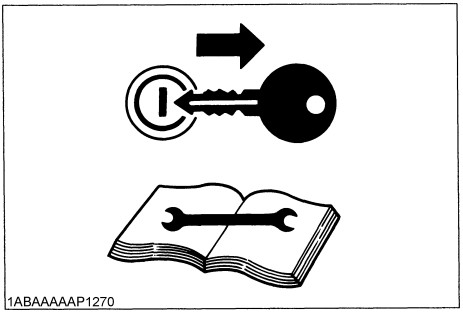
(A) For main pressure resistance
(B) For idle pressure resistance

MAINTENANCE

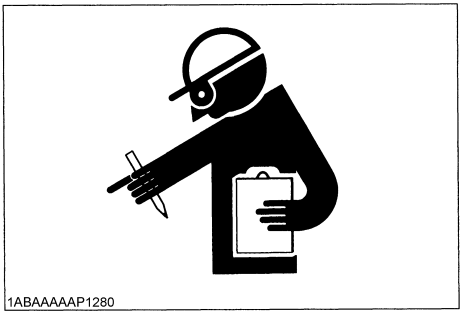
WARNING

To avoid personal injury or death:

- **Conduct daily checks, periodic maintenance, refueling or cleaning on a level surface with the engine shut off and remove the key.**
- **Before allowing other people to use your engine, explain how to operate, and have them read this manual before operation.**
- **Always use proper tools, that are in good condition. Make sure you understand how to use them, before performing any service work.**
- **When installing, tighten all bolts lest they should be loose. Tighten the bolts by the specified torque.**
- **Do not put any tools on the battery, or battery terminals may short out. Severe burns or fire could result. Detach the battery from the engine before maintenance.**
- **Do not touch muffler or exhaust pipes while they are hot; Severe burns could result.**



1ABAAAAAP1270



1ABAAAAAP1280

SERVICE INTERVALS

Non-warranty maintenance, repair, or replacement of the emission control devices and systems should be performed by a qualified repair establishment or individual which has the experience and equipment to perform such work.
See the Emission Warranty Statement.

In order to keep your engine in good working conditions, follow the maintenance / checking schedule given in the table below. (The schedule applies to an engine in use under normal conditions.)

Items		Interval				Remarks	Ref. Page
		Every 8 hours (daily)	Every 50 hours (weekly)	Every 100 hours	Every 200 hours		
Each part	Check / Clean	●					-
Engine oil	Check / Replenish	●					17
	Change		(Initial change)		●		18
Oil filter cartridge	Change		(Initial change)		●		18
Spark plug	Change						-
Ignition wires	Change						-
Air cleaner element	Check	▲					22
	Clean	▲	●				22
	Change						22
Intake pipe / clamp bands	Change						-
Breather tube	Change						-
Fuel filter	Check			●			-
	Change			▲			-
Fuel tank	Clean					Gasoline line	-
	Check setting	▲			●	LPG line	16
Fuel pipe / clamps (Gasoline line)	Check		●				16
	Change						16
Fuel pipe / clamps (LPG line: LPG tank to Dual carburetor)	Check the connector	●					-
	Check fuel leakage		●				16
	Change						-

▲: If necessary

IMPORTANT:

*1 Change more often when operating under dusty conditions.

*2 If you do not have the proper tools and/or are not mechanically proficient, contact your local KUBOTA dealer.

To ensure the best quality and reliability, use new KUBOTA Genuine parts or their equivalents for repair and replacement, whenever you have maintenance done.

Items		Interval				Remarks	Ref. Page
		Every 1000 hours	Every after 1000 hours	Yearly	Each 2 years		
Each part	Check / Clean						-
Engine oil	Check / Replenish						17
	Change						18
Oil filter cartridge	Change						18
Spark plug	Change	●					-
Ignition wires	Change				●		-
Air cleaner element	Check						22
	Clean						22
	Change			●*1			22
Intake pipe / clamp bands	Change				●		-
Breather tube	Change				●		-
Fuel filter	Check						-
	Change			●			-
Fuel tank	Clean			●		Gasoline line	-
	Check setting					LPG line	16
Fuel pipe / clamps (Gasoline line)	Check						16
	Change			●			16
Fuel pipe / clamps (LPG line: LPG tank to Dual carburetor)	Check the connector						-
	Check fuel leakage						16
	Change				●		-

▲: If necessary

IMPORTANT:

*1 Change more often when operating under dusty conditions.

*2 If you do not have the proper tools and/or are not mechanically proficient, contact your local KUBOTA dealer.

To ensure the best quality and reliability, use new KUBOTA Genuine parts or their equivalents for repair and replacement, whenever you have maintenance done.

Items		Interval				Remarks	Ref. Page
		Every 8 hours (daily)	Every 50 hours (weekly)	Every 100 hours	Every 200 hours		
LPG vaporizer regulator	Check					Hot water line / vacuum lock pipe	17
	Change					Hot water line / vacuum lock pipe	-
	Check inner parts*2						-
Battery	Check		●				-
	Change						-
Radiator coolant	Check	●					19
	Change						20
Radiator hoses and clamp bands	Check				●		20
	Change						20
Radiator and water jacket	Clean						20
Fan belt tension	Check			●			26
	Adjust			▲			26
Valve clearance	Adjust						-
Combustion chamber	Clean						-

▲: If necessary

IMPORTANT:

*1 Change more often when operating under dusty conditions.

*2 If you do not have the proper tools and/or are not mechanically proficient, contact your local KUBOTA dealer.

To ensure the best quality and reliability, use new KUBOTA Genuine parts or their equivalents for repair and replacement, whenever you have maintenance done.

Items		Interval				Remarks	Ref. Page
		Every 1000 hours	Every after 1000 hours	Yearly	Each 2 years		
LPG vaporizer regulator	Check	●				Hot water line / vacuum lock pipe	17
	Change				●	Hot water line / vacuum lock pipe	-
	Check inner parts*2				●		-
Battery	Check						-
	Change				●		-
Radiator coolant	Check						19
	Change				●		20
Radiator hoses and clamp bands	Check						20
	Change				●		20
Radiator and water jacket	Clean			●			20
Fan belt tension	Check						26
	Adjust						26
Valve clearance	Adjust	●*2					-
Combustion chamber	Clean		▲*2				-

▲: If necessary

IMPORTANT:

*1 Change more often when operating under dusty conditions.

*2 If you do not have the proper tools and/or are not mechanically proficient, contact your local KUBOTA dealer.

To ensure the best quality and reliability, use new KUBOTA Genuine parts or their equivalents for repair and replacement, whenever you have maintenance done.

ENGLISH

PERIODIC SERVICE

FUEL

Fuel is flammable and can be dangerous. You should handle fuel with care.

■Gasoline

1. Use unleaded gasoline only.

IMPORTANT :
- DO NOT use gasoline blended with methyl alcohol.

■Fuel level check and refueling

1. Check to see that the fuel level is above the lower limit of the fuel level gauge.
2. If the fuel is too low, add fuel to the upper limit. Do not overfill.

■Checking the fuel pipes

WARNING

To avoid personal injury or death:
- **Stop the engine before checking or replacing the fuel pipes. Broken fuel pipes can cause fires.**

Check the fuel pipes every 50 hours of operation. When if;

1. If the clamp band is loose, apply oil to the screw of the band, and tighten the band securely.
2. If the fuel pipes, made of rubber, become worn out, replace them and clamp bands every year.
3. If the fuel pipes and clamp bands are found worn or damaged before one year passes, replace or repair them at once.

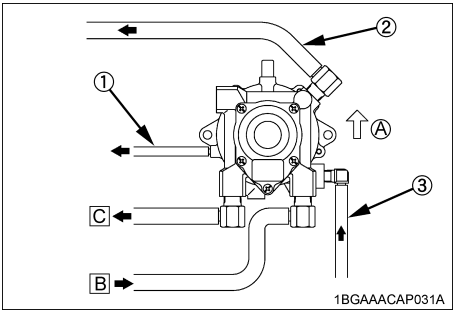
IMPORTANT :
- When the fuel pipes are not installed, plug them at both ends with clean cloth or paper to prevent dirt from entering. Dirt in the pipes can cause fuel injector malfunction.

NOTE :
- For the locations of fuel pipes, see "Fuel system diagrams" in "FUEL SYSTEM AND DIAGRAMS" section.

■LPG

[DF972-E2]

1. Use Commercial LPG only.
2. Fuel tank is liquid withdrawal type.



(1) Boost lock pipe
(2) Gaseous hose
(3) Liquid hose
(A) UPRIGHT
(B) Hot water IN
(C) Hot water OUT

IMPORTANT :
- Be sure that the fill up valve and the liquid withdrawal valve are closed.
- Be sure that LPG hose is connected with the liquid withdrawal valve.
- Be sure that LPG tank is placed firmly not to move by machine vibration.
  (See "FUEL SYSTEM AND DIAGRAMS" section.)

■LPG leakage check

[DF972-E2]

WARNING

To avoid personal injury or death:
- **Never test for gas leaks with a flame.**

Turn on the gas at low idling rpm and use a soap solution or equivalent to check all connections for leaks between the fuel tank and dual fuel carburetor.
Bubbles will indicate a loose connection.

■LPG fuel tank check

[DF972-E2]

Check that LPG fuel tank is installed firmly.
Be sure that the fill up valve and liquid withdrawal valve of the LPG fuel tank can be opened and closed easily.

■LPG regulator check

[DF972-E2]

Check that the hot water lines are not leaking.
Check that the vacuum lock pipe is not damaged.

ENGINE OIL

⚠ WARNING

To avoid personal injury or death:

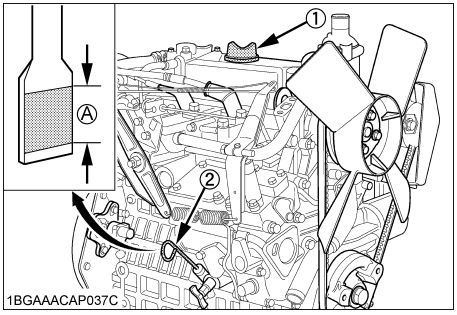
- **Stop the engine before checking and changing the engine oil and the oil filter cartridge.**
- **Contact with engine oil can damage your skin. Put on gloves when using engine oil. If you come in contact with engine oil, wash it off immediately.**

NOTE :

- Always place the engine on a level surface before inspecting it. If placed on gradients, oil quantity may not be measured accurately.

■Checking oil level and adding engine oil

1. Check the engine oil level before starting or more than 5 minutes after stopping the engine.
2. Remove the oil level gauge, wipe it clean and reinstall it.
3. Take the oil level gauge out again, and check the oil level.



(1) Oil filler plug
(2) Oil level gauge
[Lower end of oil level gauge]
(A) Engine oil level within this range is proper.

4. If the oil level is too low, remove the oil filler plug, and add new oil to the prescribed level.
5. After adding oil, wait more than 5 minutes and check the oil level again. It takes some time for the oil to drain down to the oil pan.

Engine oil quantity	3.4 L (0.90 U.S.gals.)

IMPORTANT :

- Engine oil should meet as a minimum SAE viscosity and SH class grades (API classification).
- Change the type of engine oil according to the ambient temperature.

Above 25°C (77°F)	SAE30 or SAE10W-30 SAE15W-40
0°C to 25°C (32°F to 77°F)	SAE20 or SAE10W-30
0°C to -20°C (32°F to -4°F)	SAE10W or SAE10W-30

- When using oil of different brands from the previous one, drain all the previous oil before adding the new engine oil.

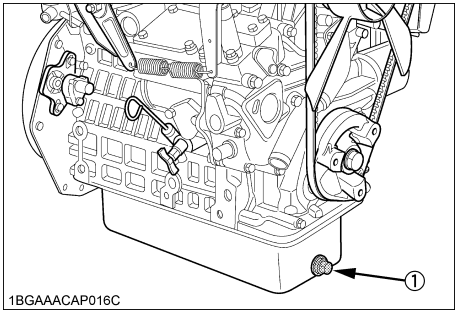
■**Changing engine oil**

WARNING

To avoid personal injury or death:

- **Stop the engine before draining engine oil.**
- **When draining engine oil, place some container underneath the engine and dispose it according to local regulations.**
- **Do not drain oil after running the engine. Allow engine to cool down sufficiently.**

1. Change oil after the initial 50 hours of operation and every 200 hours thereafter.
2. Remove the drain plug at the bottom of the engine, and drain all the old oil. Drain oil will drain easier when the oil is warm.



1BGAAACAP016C

(1) Oil drain plug

3. Replace the drain plug gasket.
4. Add new engine oil up to the upper limit of the oil level gauge.

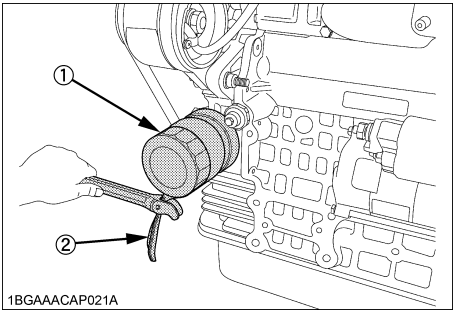
■**Replacing the oil filter cartridge**

WARNING

To avoid personal injury or death:

- **Stop the engine before changing the oil filter cartridge.**
- **Allow engine to cool down sufficiently, oil can be hot and cause burns.**

1. Replace the oil filter cartridge after the initial 50 hours of operation and every 200 hours thereafter.
2. Remove the old oil filter cartridge with a filter wrench.
3. Apply a film of oil to the gasket for the new cartridge.
4. Screw in the cartridge by hand. When the gasket contacts the seal surface, tighten the cartridge enough by hand. Because, if you tighten the cartridge with a wrench, it will be tightened too much.



1BGAAACAP021A

(1) Oil filter cartridge
(2) Remove with a filter wrench
(Tighten with your hand)

5. After the new cartridge has been replaced, the engine oil level normally decreases a little. Thus, run the engine for a while and check for oil leaks through the seal before checking the engine oil level. Add oil if necessary.

NOTE :

- Wipe off any oil sticking to the machine completely.

RADIATOR

Coolant will last for one day's work if filled all the way up before operation start. Make it a rule to check the coolant level before every operation.

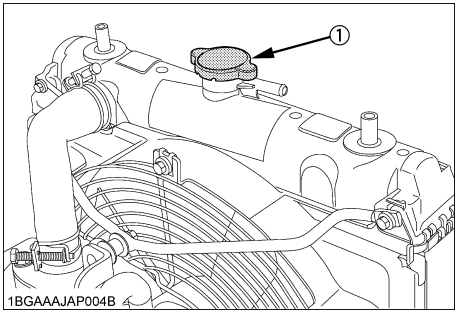
⚠ WARNING

To avoid personal injury or death:

- **Do not stop the engine suddenly, stop it after about 5 minutes of unloaded idling.**
- **Work only after letting the engine and radiator cool off completely (more than 30 minutes after it has been stopped).**
- **Do not remove the radiator cap while coolant is hot. When cool to the touch, rotate cap to the first stop to allow excess pressure to escape. Then remove cap completely.**
  If overheats should occur, steam may gush out from the radiator or recovery tank; Severe burns could result.

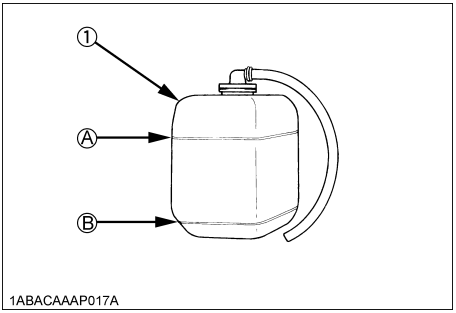
■Checking coolant level, adding coolant

1. Remove the radiator cap, after the engine has completely cooled, and check to see that coolant reaches the supply port.



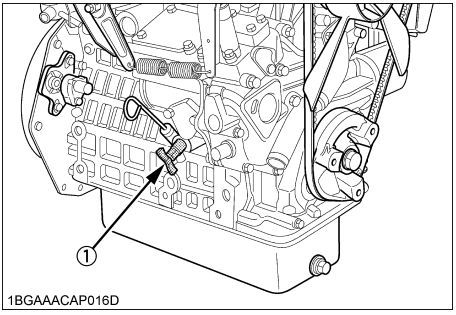
(1) Radiator pressure cap

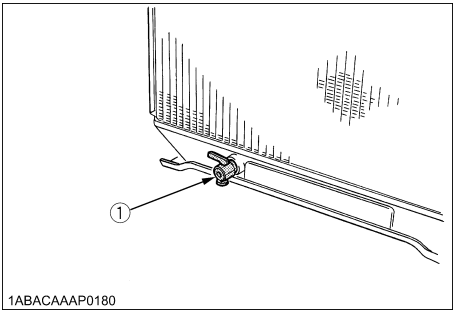
2. If the radiator is provided with a recovery tank, check the coolant level of the recovery tank. When it is between the "FULL" and "LOW" marks, the coolant will last for one day's work.



(1) Recovery tank
(A) "FULL"
(B) "LOW"

3. When the coolant level drops due to evaporation, add water only up to the full level.
4. Check to see that two drain plags; one is at the crankcase side and the other is at the lower part of the radiator as figures below.





(1) Coolant drain plag

IMPORTANT :
- If the radiator cap has to be removed, follow the caution and securely retighten the cap.
- If coolant should be leak, consult your local KUBOTA dealer.
- Make sure that muddy or sea water does not enter the radiator.
- Use clean, fresh water and 50% anti-freeze to fill the recovery tank.
- Do not refill recovery tank with coolant over the "FULL" level mark.
- Close the radiator cap securely. If the cap is loose or improperly closed, coolant may leak out and decrease quickly.

■Changing coolant

1. To drain coolant, always open both drain plags and simultaneously open the radiator cap as well. With the radiator cap kept closed, a complete drain of water is impossible.
2. Remove the overflow pipe of the radiator pressure cap to drain the recovery tank.
3. Prescribed coolant volume (U.S.gallons)

Quantity	3.1 L (0.82 U.S.gals.)

NOTE :
- Coolant quantities shown are for standard radiators.

4. An improperly tightened radiator cap or a gap between the cap and the seat quickens loss of coolant.
5. Coolant (Radiator cleaner and anti-freeze)

Season	Coolant
All seasons	Pure water and anti-freeze (See "Anti-freeze" in "RADIATOR" section.)

■Remedies for quick decrease of coolant

1. Check any dust and dirt between the radiator fins and tube. If any, remove them from the fins and the tube.
2. Check the tightness of the fan belt. If loose, tighten it securely.
3. Check the internal blockage in the radiator hose. If scale forms in the hose, clean with the scale inhibitor or its equivalent.

■Checking radiator hoses and clamp bands

⚠ WARNING

To avoid personal injury or death:

- **Check radiator hoses and clamp bands periodically. If radiator hose is damaged or coolant leaks, overheats or severe burns could occur.**

Check to see if radiator hoses are properly fixed every 200 hours of operation or 6 months, whichever comes first.

1. If hose clamps are loose or water leaks, tighten hose clamp securely.
2. Replace hoses and tighten hose clamps securely, if radiator hoses are swollen, hardened or cracked.

Replace hoses and hose clamps every 2 years or earlier, if checked and found that hoses are swollen, hardened or cracked.

■Precaution at overheating

The event that the coolant temperature is nearly or more than the boiling point is called **"OVERHEATING"**.
While running, make the following checks to see that all parts are working correctly. **If anything is unusual, inspect it, referring to the relevant description in "MAINTENANCE" and "PERIODIC SERVICE" section**.

◆ Coolant

If the coolant temperature warning lamp lights up or if steam or coolant does not stop squirting from the radiator overflow pipe, turn off the load and **keep the engine idling (COOLING-DOWN) for at least 5 minutes** to let it cool down gradually. Then stop the engine and take the following inspection and servicing.

1. Check to see if the coolant runs short or if there is any coolant leak.
2. Check to see if there is any obstacle around the cooling air inlet or outlet.
3. Check to see if there is any dirt or dust between radiator fins and tube.
4. Check to see if the fan belt is too loose.
5. Check to see if radiator water pipe is clogged.

■Cleaning radiator core (outside)

If dust is between the fin and tube, wash it away with running water.

IMPORTANT :
- Do not clean radiator with firm tools such as spatulas or screwdrivers. They may damage specified fin or tube. It can cause coolant leaks or decrease cooling performance.

■**Anti-freeze**

WARNING

To avoid personal injury or death:

- **When using anti-freeze, put on some protection such as rubber gloves. (Anti-freeze is poisonous.)**
- **If it is swallowed, seek immediate medical help. Do NOT make a person throw up unless told to do so by poison control or a health care professional. Use standard first aid and CPR for signs of shock or cardiac arrest. Call your local Poison Control Center or your local emergency number for further assistance.**
- **When anti-freeze comes in contact with the skin or clothing, wash it off immediately.**
- **Do not mix different types of anti-freeze. The mixture can produce chemical reaction causing harmful substances.**
- **Anti-freeze is extremely flammable and explosive under certain conditions. Keep fire and children away from anti-freeze.**
- **When draining fluids from the engine, place some container underneath the engine body.**
- **Do not pour waste onto the grounds, down a drain, or into any water source.**
- **Also, observe the relevant environmental protection regulations when disposing of anti-freeze.**

Always use a 50/50 mix of long-life coolant and clean soft water in KUBOTA engines.

Contact KUBOTA concerning coolant for extreme conditions.

1. Long-life coolant (hereafter LLC) comes in several types. Use ethylene glycol (EG) type for this engine.
2. Before employing LLC-mixed cooling water, flush the radiator with fresh water. Repeat this procedure 2 or 3 times to clean up the radiator and engine block from inside.
3. Mixing the LLC
   Premix 50% LLC with 50% clean soft water. When mixing, stir it up well, and then fill into the radiator.
4. The procedure for the mixing of water and anti-freeze differs according to the make of the anti-freeze. Refer to SAE J1034 standard, more specifically also to SAE J814c.

Vol % Anti-freeze	Freezing Point		Boiling Point *	
	℃	℉	℃	℉
50	-37	-34	108	226

*At 1.013 x 10^5Pa (760 mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

5. Adding the LLC
   (1) Add only water if the coolant level reduces in the cooling system by evaporation.
   (2) If there is a coolant leak, add the LLC of the same manufacturer and type in the same coolant percentage.
   *Never add any long-life coolant of different manufacturer. (Different brands may have different additive components, and the engine may fail to perform as specified.)
6. When the LLC is mixed, do not employ any radiator cleaning agent. The LLC contains anti-corrosive agent. If mixed with the cleaning agent, sludge may build up, adversely affecting the engine parts.
7. Kubota's genuine long-life coolant has a service life of 2 years. Change the coolant every 2 years.

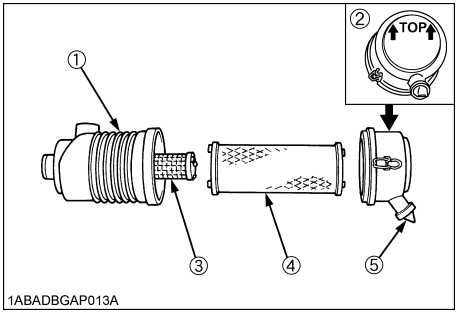
NOTE :

- The above data represents industry standards that necessitate minimum glycol content in the concentrated anti-freeze.

AIR CLEANER

Since the air cleaner employed on this engine is a dry type, never apply oil to it.

1. Open the evacuator valve once a week under ordinary conditions - or daily when used in a dusty place. This will get rid of large particles of dust and dirt.
2. Wipe the inside air cleaner clean with cloth if it is dirty or wet.
3. Avoid touching the element except when cleaning.
4. When dry dust adheres to the element, blow compressed air from the inside turning the element. Pressure of compressed air must be under 205 kPa (2.1 kgf/cm^2, 30 psi).
5. Replace the primary element every year or every 6 cleanings.
   If the primary element is stained heavily, replace it soon. At this time, replace the secondary element too.
6. The secondary element should be removed only if it is to be replaced.
7. To protect the engine, do not remove the secondary element in servicing the primary element.



(1) Air cleaner body
(2) Cover
(3) Secondary element
(4) Primary element
(5) Evacuator valve

IMPORTANT :

- Make sure that the hooking clip for cover for the element is tight enough. If it is loose, dust and dirt may be sucked in, wearing down the cylinder liner and piston ring earlier and thereby resulting in poor power output.
- Do not overservice the air cleaner element. Overservicing may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.

■Cleaning primary air cleaner element

1. To clean the element, use clean dry compressed air on the inside of the element.
   Air pressure at the nozzle must not exceed 205 kPa (2.1kgf/cm^2, 30psi).
   Maintain reasonable distance between the nozzle and the filter.

■Evacuator valve

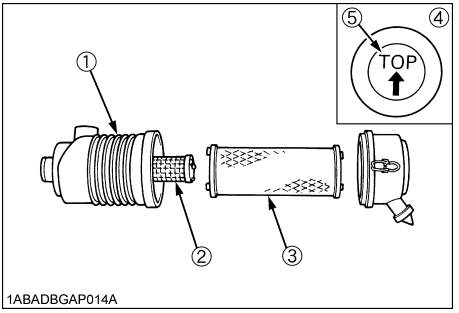
Open the evacuator valve once a week under ordinary conditions - or daily when used in a dusty place - to get rid of large particles of dust and dirt.

■For the air cleaner with a dust cup (optional)

Remove and clean out the dust cup before it becomes half full with dust; usually once a week, or even every day if the working surroundings are dusty.
Install the air cleaner dust cup with "TOP" indicated on the rear of the cup in the up position. (However, it may be installed in either direction when the cover is placed at the lower part.)

IMPORTANT :

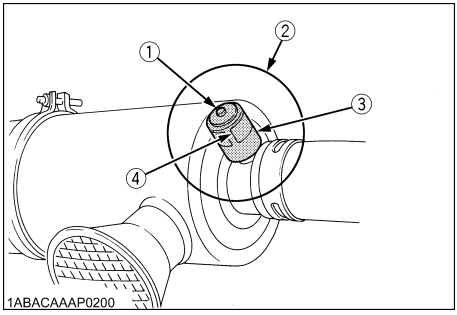
- If the dust cup is mounted incorrectly, dust or dirt does not collect in the cup, and direct attachments of the dust to the element will cause its lifetime to shorten to a great extent.



(1) Air cleaner body
(2) Secondary element
(3) Primary element
(4) Dust cup
(5) "TOP" mark

■Dust indicator (optional)

If the red signal on the dust indicator attached to the air cleaner is visible, the air cleaner has reached the service level.
Clean the element immediately, and reset the signal with the "RESET" button.



(1) "RESET" button
(2) Dust indicator
(3) Service level
(4) Signal

FUEL SYSTEM AND DIAGRAMS
[DF972-E2]

■LPG fuel system

Never use LPG fuel on the WG972-E2 engine. Otherwise severe damage will occur.

- All fuel connections added to this engine must be installed by qualified personnel and utilizing recognized procedures and standards.
- These non-KUBOTA installed parts, such as hoses, fittings, piping and shut off solenoid valve should be approved for LPG use and conform to UL, CSA, NFPA, MSHA and all other applicable standards.
- An approved, listed fuel filter and shut off solenoid valve must be installed between the LPG tank and KUBOTA LPG regulator with vaporizer.

■Tightening torques and leak check for LPG regulator with vaporizer

1. Each fitting must be sealed with approved joint sealant compound, and be tightened to the specified torque using a wrench and leak check must be performed as shown in the below table.

			Tightening torque			Leak check pressure		
FITTING	Q'ty	SIZE	N-m	kgf-m	ft-lbs	kPa	Kgf/cm²	psi
LPG OUT (VAPOR)	1	PT-3/8	29.4 to 58.8	3.0 to 6.0	21.7 to 43.4	>9.8	>0.1	>1.42
LPG IN (LIQUID)*	1	PT-1/4	19.6 to 39.2	2.0 to 4.0	14.5 to 28.9	>1471	>15	>213
WATER IN/OUT	2	PT-3/8	29.4 to 58.8	3.0 to 6.0	21.7 to 43.4	>245	>2.5	>35.6

*NOT KUBOTA supplied

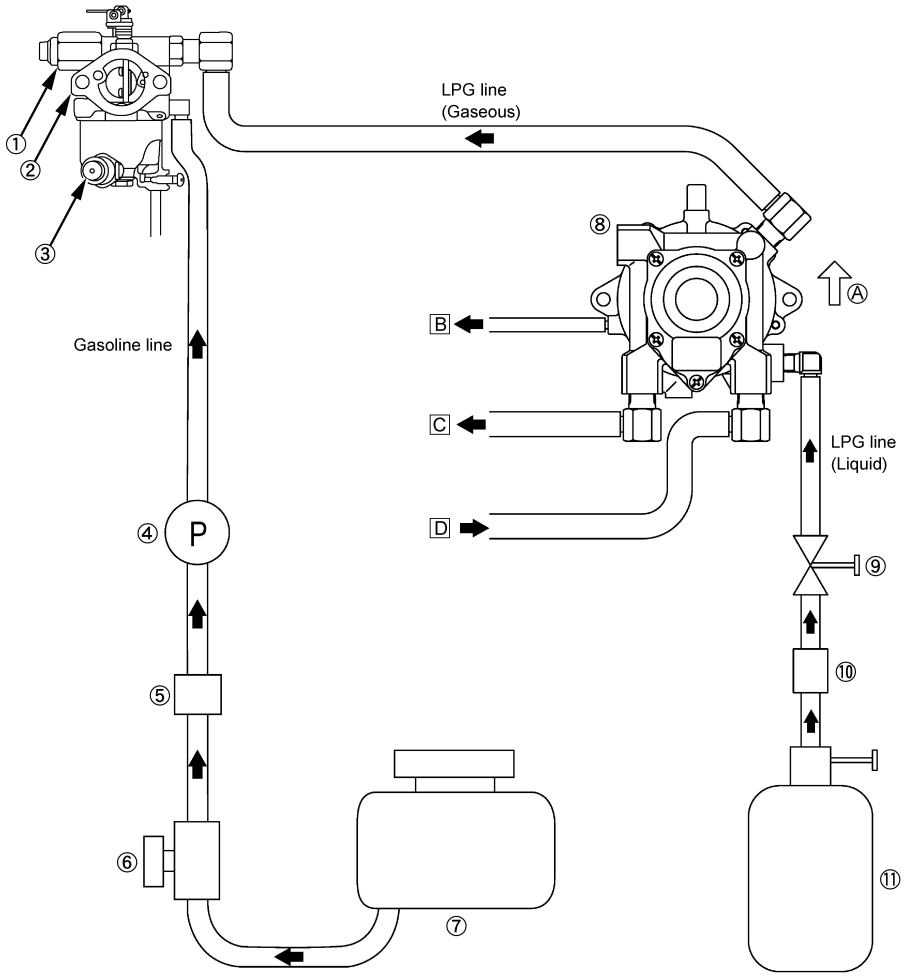
2. CHANGE THE ANGLE OF LPG FITTING OF DUAL FUEL CARBURETOR
   The fitting on the dual fuel carburetor may be mounted on any position since is not sealed.
   The nut may be loosened using a wrench.
   LPG fitting may be changed to any specified angle.
   The nut should be tightened to the specified torque using a wrench as shown in the below table.

			Tightening torque			Leak check
FITTING	Q'ty	SIZE	N-m	kgf-m	ft-lbs	Soap solution or its equivalent
LPG IN (VAPOR)	1	M12 x 1.25	11.8 to 26.5	1.2 to 2.7	8.7 to 19.5	

■Fuel system diagrams

◆ Setting of LPG regulator and vibration limits

Install the LPG regulator in UPRIGHT position as shown in below (A) marking figure.
It must be installed within 4G vibration level. If not, it may not supply necessary LPG fuel to the engine.
(See "LPG" in FUEL" section.)



1BGAAACAP031B

(1) LPG cut off solenoid
(2) Dual-Fuel carburetor
(3) Gasoline cut off solenoid
(4) Fuel pump
(5) Fuel filter
(6) Valve
(7) Gasoline tank
(8) LPG regulator
(9) Shut off solenoid valve
(10) Fuel filter
(11) LPG tank
(A) UPRIGHT
(B) To intake manifold
(C) Hot water OUT
(D) Hot water IN

ELECTRIC WIRING

WARNING

To avoid personal injury or death:

- **◆ Shorting of electric cable or wiring may cause a fire.**
  - **● Check to see if electric cables and wiring are swollen, hardened or cracked.**
  - **● Keep dust and water away from all power connections.**
    Loose wiring terminal parts, make bad connections. Repair them before starting the engine.

Damaged wiring reduces the capacity of electrical parts. Change or repair damaged wiring immediately.

FAN BELT

■Adjusting fan belt tension

WARNING

To avoid personal injury or death:

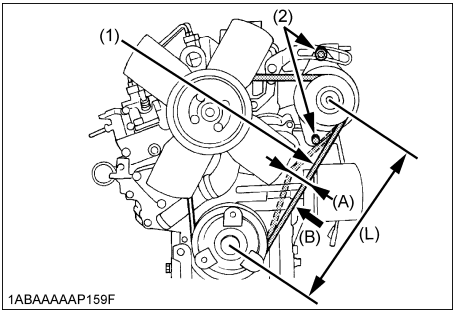
- **● Stop the engine and remove the key before checking the belt tension.**
- **● Reinstall the detached safety shield after maintenance or checking.**

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between the pulleys.
3. If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the tension reaches the proper range.
4. Replace fan belt if it is damaged.

IMPORTANT :

- If belt is loosen or damaged and the fan is damaged, it could result in overheats or insufficient charging. Correct or replace belt.
- Use a sonic tension meter to measure tension. Always measure properly according to the operation manual of the device being used.
- Measure immediately after installing the belt without rotating the pulleys.
  Measure at location (B) in the figure with (L) as the distance between the pulleys.
- For the belt specifications, contact your KUBOTA dealer.
- If a tension meter cannot be used, adjust based on the deflection.
  The deflection must be as indicated by (A) in the figure, when pressing the middle of the belt between the pulleys.

Proper fan belt tension		
Adjustment	Replacement	(A)
200 to 300 N	344 to 441 N	7 to 9 mm (0.28 to 0.35 in.) (under load of 10 kgf (22.1 lbs))



(1) Fan belt
(2) Bolt and nut

CARRIAGE AND STORAGE

CARRIAGE

WARNING

To avoid personal injury or death:

- **Fix the engine securely not to fall during operation.**
- **Do not stand near or under the engine while carrying it.**
- **The engine is heavy. In handling it, be very alert not to get your hands and body caught in.**

1. Use carrier such as a crane when moving the engine to avoid bodily injury. Support the engine securely to avoid injury or damage.
2. When lifting the engine, put the hook securely to metal fittings attached to the engine. Use strong hook and fittings enough to hang the engine.

STORAGE

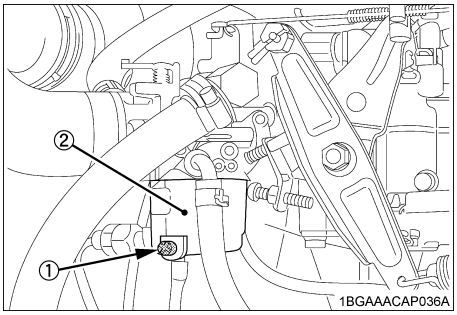
WARNING

To avoid personal injury or death:

- **Do not clean the machine with engine running.**
- **To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.**
- **When storing the engine just after running, let the engine cool off.**

Before storing the engine for more than a few months, remove any dirt on the machine, and:

1. Close the liquid withdrawal valve of the LPG fuel tank and start the engine to empty the fuels in fuel pipes. **[DF972-E2]**
2. Empty the gasoline fuel tank.
3. Loosen the drain screw of the carburetor float chamber using a screw driver to let gasoline out of the carburetor.



(1) Drain screw
(2) Carburetor

4. Drain the coolant in the radiator. Open the plug at the bottom of the radiator, and remove the pressure cap to drain coolant completely. Leave the plug open. Hang a note written "No coolant" on the pressure cap. Since water may freeze when the temperature drops below 0°C (32°F), it is very important that no water is left in the machine.

NOTE :

- When using anti-freeze, it is not necessary to take step "1" above.

5. Remove dirty engine oil, fill with new oil and run the engine for about 5 minutes to let the oil penetrate to all the parts.
6. Check all the bolts and nuts, and tighten if necessary.
7. Remove the battery from the engine, adjust the electrolyte level, and recharge it. Store the battery in a dry and dark place.
8. When the engine is not used for a long period of time, run it for about 5 minutes under no load every 2 to 3 months to keep it free from rust. If the engine is stored without any running, moisture in the air may condense into dew over the sliding parts of the engine, resulting in rust there.
9. If you forget to run the engine for longer than 5 to 6 months, apply enough engine oil to the valve guides and valve stem seals and make sure the valves work smoothly before starting the engine.
10. Store the engine in a flat place and remove the key from engine.
11. Do not store the engine in a place where has flammable materials such as dry grass or straw.
12. When covering the engine for storage, let engine and muffler cool off completely.
13. Operate the engine after checking and repairing damaged wirings or pipes, and clearing flammable materials carried by mouse.

TROUBLESHOOTING

The engine malfunctions can result from a large number of causes. The following describes symptoms that are encountered relatively more often than others, their major causes and remedies.

■ When it is difficult to start the engine

Cause	Countermeasures
Fuel doesn't flow.	* Check the fuel tank, fuel filter, fuel hoses and fuel pump. * As fuel will be filtered by the filter, if there should be water or other foreign matters on the filter, clean the filter.
Valve clearance is not as specified.	* Adjust valve clearance when the engine is cold.
Engine oil becomes thick in cold weather and engine cranks slow.	* Change grade of oil according to the weather (temperature).
Low compression	* Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
Battery is discharged and the engine will not crank.	* Charge battery. * In winter, always remove battery from machine, charge fully and keep indoors. Install in machine at time of use.
Clogged air cleaner	* Clean or replace.
Spark plug electrodes are wet with gasoline	* Dry electrode and restart.
Defective starter	* Repair or replace.
Defective main switch	* Repair or replace.
Defective vaporizer	* Replace.
Disconnection	* Check the wire harness.

■ When output is insufficient

Cause	Countermeasures
Compression is insufficient.	* Bad valve or excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.
Fuel is insufficient.	* Check fuel system.
Overheating of moving parts	* Check lubricating oil system. * Check to see if lubricating oil filter is working properly. * Filter element deposited with impurities would cause poor lubrication. Change element. * Check to see if the clearance of bearing is within factory specs.
Valve clearance is not as specified.	* Adjust valve clearance when the engine is cold.
Air cleaner is dirty.	* Clean or replace.
Defective spark plug	* Clean or replace.
Defective ignition coil	* Replace.
Disconnection	* Check the wire harness.

■ **When engine speed is insufficient**

Cause	Countermeasures
Improper or defective spark plug	* Clean or replace.
Defective ignition coil	* Replace.
Defective throttle body	* Replace.
Breather tube has separated.	* Attach correctly.
Disconnection	* Check the wire harness.

■ **When engine suddenly stops**

Cause	Countermeasures
Lack of fuel	* Check the fuel tank and refill the fuel, if necessary. * Also check the fuel system for air or leaks.
Moving parts are overheated due to shortage of lubrication oil or improper lubrication.	* Check amount of engine oil with oil level gauge. * Check lubricating oil system. * Replace oil filter cartridge.
Clogged air cleaner	* Clean or replace.
Disconnection	* Check the wire harness.

■ **When excessive black exhaust gas is observed**

Cause	Countermeasures
Fuel system is bad.	* Check the fuel system.
Fuel is extremely poor quality.	* Replace fuel.

■ **When white exhaust gas is observed**

Cause	Countermeasures
Excessive engine oil	* Reduce to specified level.
Piston ring and liner worn or stuck	* Replace.
Defective valve stem seal	* Replace.

■ **When lubricant oil consumption is excessive**

Cause	Countermeasures
Oil leaking from oil seal, gasket, etc.	* Replace.
Defective valve stem seal	* Replace.
Piston ring and liner worn or stuck	* Replace.

■ **When engine overheats**

Cause	Countermeasures
Engine oil insufficient	* Check oil level. Replenish oil as required.
Fan belt broken or elongated	* Change belt or adjust belt tension.
Coolant insufficient	* Replenish coolant.
Excessive concentration of antifreeze	* Add water only or change to coolant with the specified mixing ratio.
Radiator net or radiator fin clogged with dust	* Clean net or fin carefully.
Inside of radiator or coolant flow route corroded	* Clean or replace radiator and parts.
Defective fan or radiator or radiator cap	* Replace defective parts.
Defective thermostat	* Check thermostat and replace if necessary.
Defective temperature sensor	* Check temperature with thermometer and replace if necessary.
Overload running	* Reduce load.
Head gasket defective or water leakage	* Replace parts.

NOTE :
- If the cause of trouble can not be found, consult your KUBOTA dealer.

SPECIFICATIONS

Model			WG972-E2	DF972-E2	
			Gasoline	Gasoline	LPG
Type			Vertical, Water-cooled 4 cycle		
No. of cylinders - bore x stroke		mm (in.)	3-ϕ74.5 x 73.6 (2.93 x 2.90)		
Total displacement		L (cu-in.)	0.962 (58.7)		
Brake horse power	SAE Gross intermittent	kW(HP) / min^{-1}(rpm)	24.2 (32.5) / 3600		23.1 (31.0) / 3600
	SAE net intermittent	kW(HP) / min^{-1}(rpm)	23.1 (31.0) / 3600		22.0 (29.5) / 3600
	SAE net continuous	kW(HP) / min^{-1}(rpm)	18.7 (25.0) / 3600		17.5 (23.5) / 3600
Max. torque	SAE net intermittent	N-m(ft-lbs) / min^{-1}(rpm)	68.6 (50.6) / 2400		64.6 (47.7) / 2400
Governor type			Centrifugal ball mechanical type		
Ignition system			Distributor-less solid stage type		
Fuel used			Unleaded gasoline		Commercial LPG
Lubricating oil capacity		L (US gals.)	3.4 (0.9)		
Starter			12 V x 1.0 kW		
Total dimensions (L x W x H)		mm (in.)	448 (17.6) x 402 (15.8) x 497 (19.6)		
Weight (Dry)		kg (lbs)	72 (159)		
Common tune up specification					
Adjustment of idle speed		min^{-1} (rpm)	1500 ± 100		
High idle setting		min^{-1} (rpm)	3850 to 3950		
Ignition timing		deg. BTDC	21° ± 2		
Spark plug type / Spark plug gap		mm (in.)	NGK BKR4E-11 0.6 to 0.7 (0.024 to 0.028)		
Intake / Exhaust valve clearance Check when engine is cold.		mm (in.)	0.165 ± 0.02 (0.0065 ± 0.00079)		

NOTE :
- Specifications are subject to change without notice.
- LPG regulator with vaporizer operates on a liquid withdrawal type system.