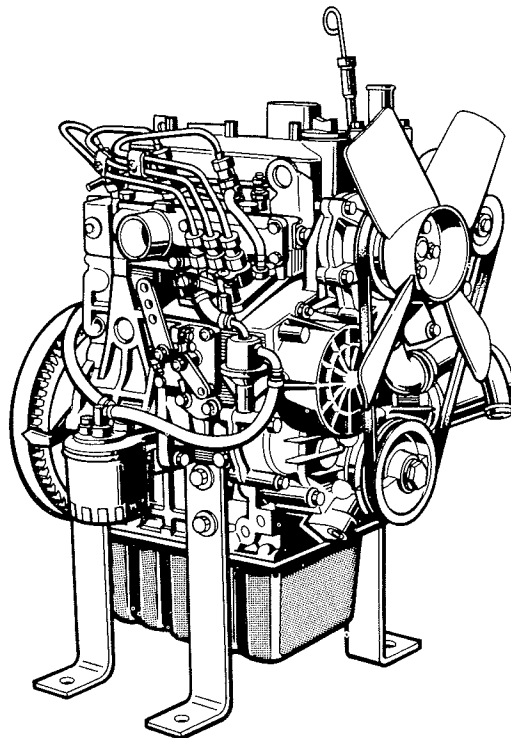


# OPERATOR'S MANUAL

# KUBOTA DIESEL ENGINE

**MODELS** D905-E·V1205-E·V1505-E  
D1005-E·V1205-TE·V1505-TE  
D1105-E·V1305-E



D-2107

*READ AND SAVE THIS BOOK*

**Kubota**

California Proposition 65

**▲ WARNING ▲**

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

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# 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 The immediate use of new techniques in the manufacture of products may cause some small parts of this manual to be outdated.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.



## 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.



**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, **MAY** result in minor or moderate injury.

**IMPORTANT :** Indicates that equipment or property damage could result if instructions are not followed.

**NOTE :** Gives helpful information.



# SAFE OPERATION

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

Be sure to observe the following for safe operation.

## 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 equipments 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 by yourself. UNAUTHORIZED MODIFICATIONS to the engine may impair the function and/or safety and affect engine life.



F-8822

## WEAR SAFETY CLOTHING

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



B-1501 改

## CHECK BEFORE OPERATION & STARTING THE ENGINE

- Be sure to check the engine before operation. If something is wrong with the engine, do not fail to repair it quickly.
- Keep all guards and shields in place before operating the engine. Replace any that are damaged or missing.
- Check to see if there is 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. The machine may start in gear and move.



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## KEEP AROUND THE ENGINE CLEAN

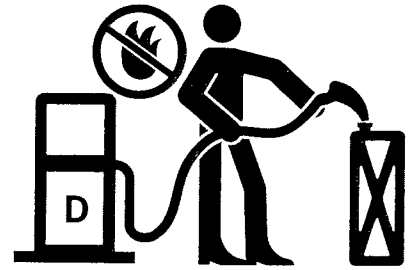
- Be sure to stop the engine before cleaning.
- Keep the engine clean and free of accumulated dirt, grease and trash to avoid a fire. Store flammable fluids away from sparks and fire.
- DO NOT stop the engine without idling; Temperatures around the engine rise suddenly. Keep the engine idling for over about 5 minutes before stopping.



B-1500

### SAFE HANDLING OF FUEL AND LUBRICANTS —KEEP OFF FIRE—

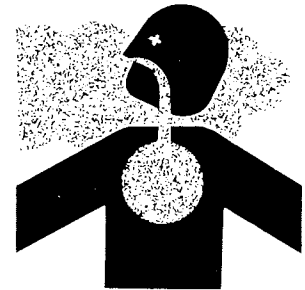
- Always stop the engine before refueling or/and lubricating.
- DO NOT smoke or allow flames or sparks in your working area. Fuel is extremely flammable and explosive under certain conditions.
- Refuel at a well ventilated and open place. When fuel and lubricants are spilled, refuel after letting engine cool off.
- DO NOT mix gasoline or alcohol with diesel fuel. The mixture can cause a fire.



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### EXHAUST GASES & FIRE PREVENTION

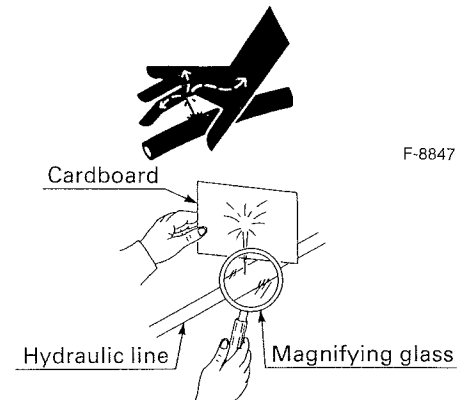
- Engine exhaust fumes can be very harmful if allowed to accumulate. Be sure to run the engine in a well ventilated place and where there are no people or livestock near the engine.
- The exhaust gas from the muffler is very hot. To prevent a fire, do not expose dry grass, mowed grass, oil and any other combustible materials to exhaust gas. Also, keep the engine and muffler clean all the time.
- To avoid a fire, be alert for leaks of flammables from hoses and lines. Be sure to check for leaks from hoses or pipes, such as fuel and hydraulic 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 power connections clean. Bare wire or frayed insulation can cause a dangerous electrical shock and personal injury.



F-8842

### ESCAPING FLUID

- Relieve all pressure in the air, the oil and the cooling systems before any lines, fittings or related items are removed or disconnected.
- Be alert for possible pressure when disconnecting any device from a system that utilizes pressure. DO NOT check for pressure leaks with your hand. High pressure oil or fuel can cause personal injury.
- Escaping hydraulic 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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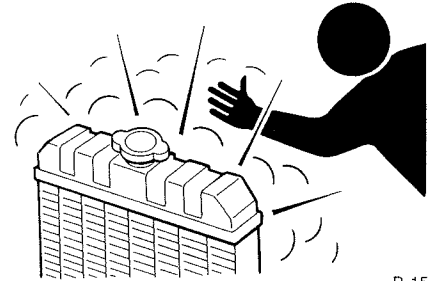
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### CAUTIONS AGAINST BURNS & BATTERY EXPLOSION

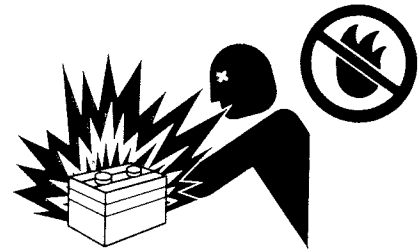
- To avoid burns, be alert for hot components, e.g. muffler, muffler cover, radiator, pipings, engine body, coolants, engine oil, etc. during operation and just after the engine has been shut off.
- DO NOT remove the radiator cap while the engine is running or immediately after stopping. Otherwise hot water will spout out from radiator. Wait for more than ten minutes to cool the radiator, before removing the cap.
- Make sure to shut the drain valve of coolant and oil to close pressure cap, to fasten pipe band before operating. If those parts are taken off, or loosen, it will result in serious personal injury.
- The battery presents an explosive hazard. When the battery is being activated, hydrogen and oxygen gases are extremely explosive.
- Keep sparks and open flames away from the battery, especially when charging the battery. DO NOT strike a match near the battery.
- DO NOT check battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.
- DO NOT charge battery if frozen. It can be explosive. When frozen, warm the battery up more than 16°C ( 61°F ).



B-1502



B-1503



F-8836

### HANDS AND BODY AWAY FROM THE ROTATING PARTS

- Be sure to stop the engine before checking or adjusting belt tension and cooling fan.
- Keep your hands and body away from the rotating parts, such as cooling fan, V-belt, fan drive V-belt pulley or flywheel causing personal injury.
- DO NOT run the engine with installed safety guards detached. Install safety guards securely during operation.



B-1505



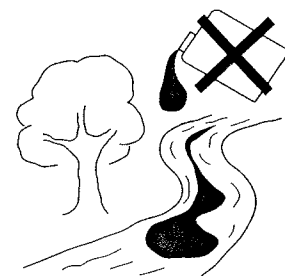
B-1506

### ANTI-FREEZE & DISPOSAL OF FLUIDS

- Anti-freeze contains poison. Wear rubber gloves to avoid personal injury. In case of contact with skin, wash it off immediately.
- DO NOT mix different types of Anti-freeze. The mixture can produce chemical reaction causing harmful substances. Use approved or genuine KUBOTA Anti-freeze.
- Be mindful of the environment and the ecology. Before draining any fluids, find out the correct way of disposing 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 some container underneath the engine body.
- DO NOT pour waste onto the grounds, down a drain, or into any water source.



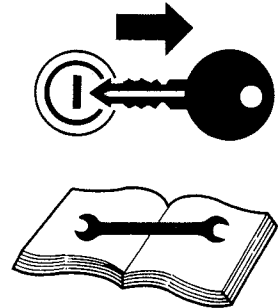
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B-1507

### CONDUCTING SAFETY CHECKS & MAINTENANCE

- When checking engine or servicing, place the engine on a wide and level ground. DO NOT work on anything that is supported ONLY by lift jacks or a hoist. Always use blocks or correct stands to support the engine before servicing.
- Detach the battery from the engine before conducting service. Put a "DO NOT OPERATE!" tag in the key switch to avoid accidental starting.
- To avoid sparks from an accidental short circuit always disconnect the battery's ground cable ⊖ first and connect it last.
- Be sure to stop the engine and remove the key when conducting daily and periodic maintenance, servicing and cleaning.
- Check or conduct maintenance after the engine, coolant, muffler, or muffler cover have been cooled off completely.
- Always use the appropriate tools and jig-fixture in good condition when 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 practise can cause serious personal injury or premature machine damage to the cooling fan.
- 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 are aged gradually.
- When servicing is performed together by two or more persons, take care to perform all work safely.
- Keep first aid kit and fire extinguisher handy at all times.



B-1509

### WARNING AND CAUTION LABELS

① Part No. 9077-8724-1 or 16667-8724-1  
(55mm in diameter)      (37mm in diameter)

② Part No. TA040-4957-1  
Stay clear of engine fan and fan belt.

### CARE OF WARNING AND CAUTION LABELS

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



# SERVICING OF THE ENGINE

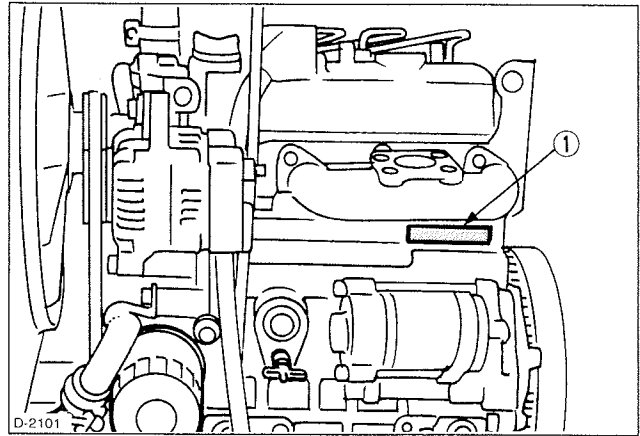
Your dealer is interested in your new engine and has the desire to help you get the most value from it. After reading this manual thoroughly, you will find that you can do some of the regular maintenance yourself. However, when in need of parts or major service, be sure to see your KUBOTA dealer.

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.

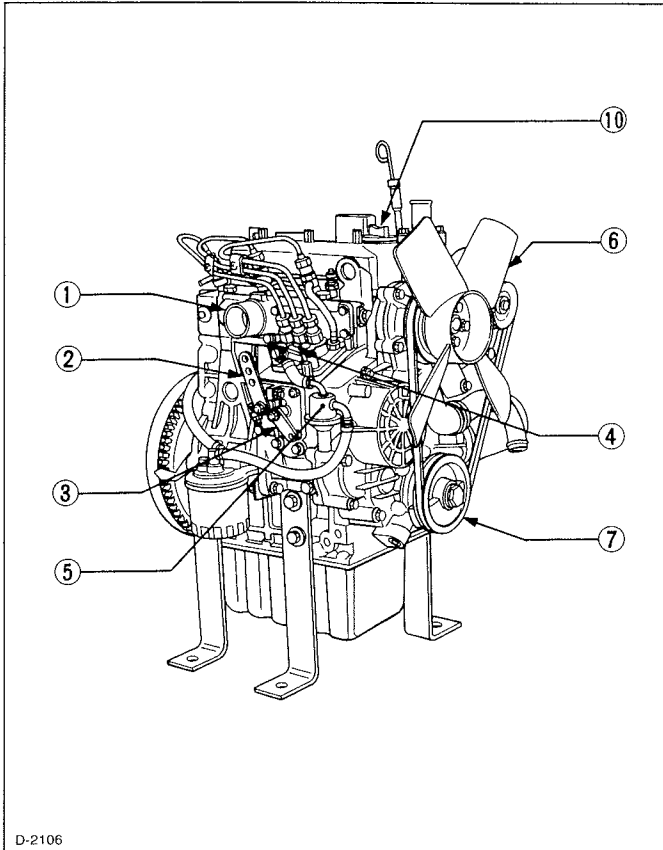
Locate the serial number now and record them in the space provided.

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

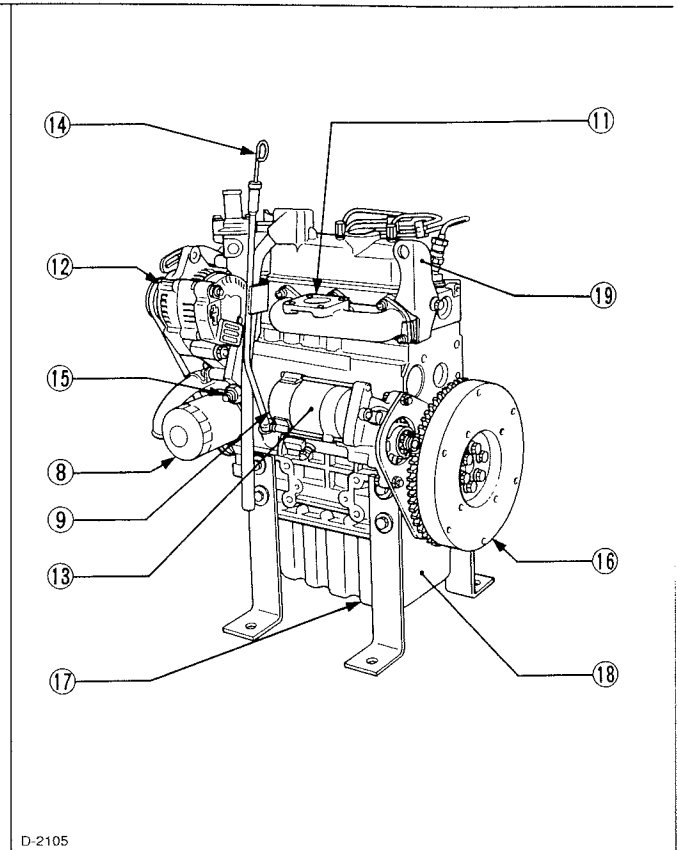


(1) Engine serial number

# NAMES OF PARTS



- (1) Intake manifold
- (2) Speed control lever
- (3) Engine stop lever
- (4) Injection pump
- (5) Fuel feed pump
- (6) Cooling fan
- (7) Fan drive pulley
- (8) Oil filter cartridge
- (9) Water drain cock



- (10) Oil filler plug
- (11) Exhaust manifold
- (12) Alternator
- (13) Starter
- (14) Oil level gauge
- (15) Oil pressure switch
- (16) Flywheel
- (17) Oil drain plug
- (18) Oil pan
- (19) Engine hook

# 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.



### CAUTION

To avoid personal injury:

- Be sure to 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	13 to 18
	(2) Engine oil level and contamination	13, 14
	(3) Amount of fuel	10
	(4) Amount of coolant	15 to 18
	(5) Dust in air cleaner dust cup	19, 20
	(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	-
	(2) Proper functions of glow lamp timer	-
4. By starting the engine	(1) Color of exhaust fumes	7
	(2) Unusual engine noise	7

# OPERATING THE ENGINE

## STARTING THE ENGINE (NORMAL)



### CAUTION

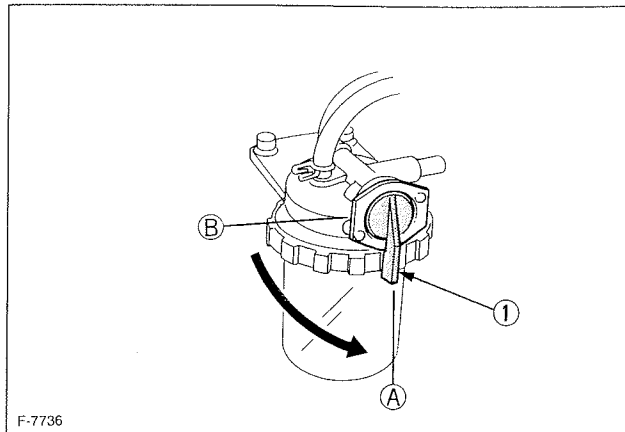
To avoid personal injury:

- Do not allow children to approach the machine while the engine is running.
- Be sure to 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:

- Do not use ether or any starting fluid for starting the engine, or a severe damage will occur.
- When starting the engine after a long storage (of more than 3 months), first set the stop lever to the "STOP" position and then activate the starter for about 10 seconds to allow oil to reach every engine part.

### 1. Set the fuel lever to "ON".



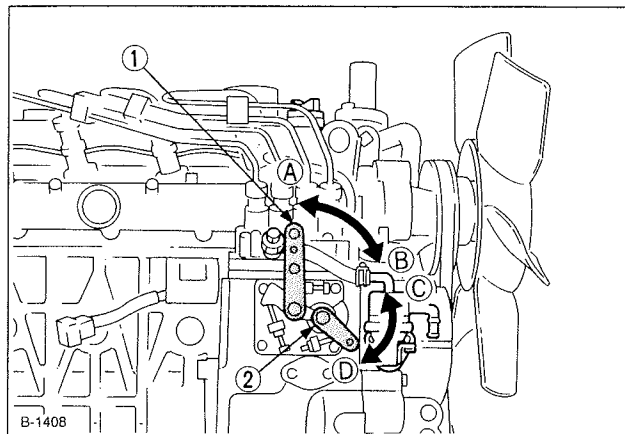
(1) Fuel lever

(A) "ON"

(B) "OFF"

### 2. Place the engine stop lever in the "START" position.

### 3. Place the speed control lever at more than half "OPERATION".



(1) Speed control lever

(A) "IDLING"

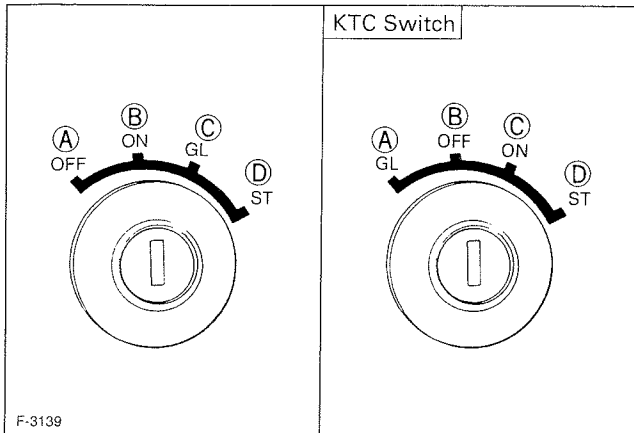
(2) Engine stop lever

(B) "OPERATION"

(C) "START"

(D) "STOP"

4. Insert the key into the key switch and turn it "ON".



- |                    |                    |
|--------------------|--------------------|
| (A) "SWITCHED OFF" | (A) "PREHEATING"   |
| (B) "OPERATION"    | (B) "SWITCHED OFF" |
| (C) "PREHEATING"   | (C) "OPERATION"    |
| (D) "STARTING"     | (D) "STARTING"     |

5. Turn the starter switch to the "PREHEATING" position to allow the glow lamp to redden.

6. Turn the key to the "STARTING" position and the engine should start. Release the key immediately when the engine starts.

7. Check to see that the oil pressure lamp and charge lamp are off. If the lamps are still on, immediately stop the engine, and determine the cause.

(See "CHECKS DURING OPERATION" in OPERATING THE ENGINE Section)

**NOTE:**

- If the oil pressure lamp should be still on, immediately stop the engine and check;
  - if there is enough engine oil.
  - if the engine oil has dirt in it.
  - if the wiring is faulty.

8. Warm up the engine at medium speed without load.

**IMPORTANT:**

- If the glow lamp should redden too quickly or too slowly, immediately ask your KUBOTA dealer to check and repair it.
- If the engine does not catch or start at 10 seconds after the starter switch is set at "STARTING", wait for another 30 seconds and then begin the engine starting sequence again. Do not allow the starter motor to run continuously for more than 20 seconds.

**COLD WEATHER STARTING**

If the ambient temperature is below\* -5°C(23°F) and the engine is very cold, start it in the following manner:

Take steps (1) through (4) left.

5. Turn the key to "PREHEATING(GLOW)" position and keep it there for a certain period mentioned below.

**IMPORTANT:**

- Shown below are the standard preheating times for various temperatures. This operation, however, is not required, when the engine is warmed up.

Ambient temperature	Preheating time	
	Ordinary heat type	With glow lamp timer
Above 10°C (50°F)	NO NEED	
10°C (50°F) to -5°C (23°F)	Approx. 5 seconds	See NOTE:
*Below -5°C (23°F)	Approx. 10 seconds	
Limit of continuous use	20 seconds	

**NOTE:**

- In case of installing standard glow lamp, glow lamp goes off after about 6 seconds, when the starter switch key is turned to preheating position. However if necessary, keep the starter switch key at preheating position for longer time, according to the left recommendation.

6. Turn the key to "ST (STARTING)" position and the engine should start.

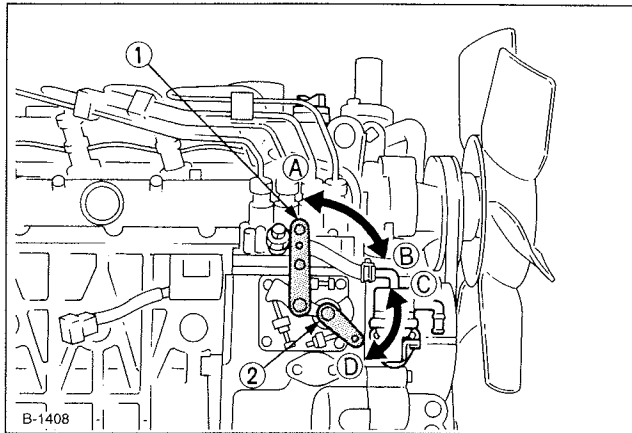
(If the engine fails to start after 10 seconds, turn off the key for 5 to 30 seconds. Then repeat steps (5) and (6).)

**IMPORTANT:**

- Do not allow the starter motor to run continuously for more than 20 seconds.

## STOPPING THE ENGINE

1. Return the speed control lever to low idle, and run the engine under idling conditions.
2. Set the engine stop lever to the "STOP" position.
3. With the starter switch placed at the "OFF" position, remove the key. (Be sure to return the engine stop lever to the "START" position to be ready for the next start.)



- |                         |                 |
|-------------------------|-----------------|
| (1) Speed control lever | (A) "IDLING"    |
| (2) Engine stop lever   | (B) "OPERATION" |
|                         | (C) "START"     |
|                         | (D) "STOP"      |

### IMPORTANT

- If equipped with a turbo-charger, allow the engine to idle for 5 minutes before shutting it off after a full load operation. Failure to do so may lead to turbo-charger trouble.

## 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:

- 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.

When the engine overheats and hot coolant overflows through the radiator and hoses, stop the engine immediately and make the following checks to determine the cause of trouble:

### Check item

1. Check to see 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; and
6. Check to see if anti-freeze is mixed to a 50/50% mix of water and anti-freeze.

### ■ 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 MAINTENANCE Section).
2. Lubricant system (See "ENGINE OIL" in MAINTENANCE Section).

## ■ Fuel



### CAUTION

To avoid personal injury:

- Fluid escaping from pinholes may be invisible. Do not use hands to search for suspected leaks; Use a piece of cardboard or wood, instead. If injured by escaping fluid, see a medical doctor at once. This fluid can produce gangrene or a severe allergic reaction.
- Check any leaks from fuel pipes or fuel injection pipes. Use eye protection when checking for leaks.

Be careful not to empty the fuel tank. Otherwise air may enter the fuel system, requiring fuel system bleeding. (See "FUEL" in MAINTENANCE Section).

## ■ Color of exhaust

While the engine is run within the rated output range:

- The color of exhaust remains colorless.
- If the output slightly exceeds the rated level, exhaust may become a little colored with the output level kept constant.
- If the engine is run continuously with dark exhaust emission, it may lead to trouble with the engine.

## ■ Immediately stop the engine if;

- The engine suddenly slow down or accelerates.
- Unusual noises suddenly appear.
- Exhaust fumes suddenly become very dark.
- The oil pressure lamp or the water temperature alarm lamp lights up.

## REVERSED ENGINE REVOLUTION AND REMEDIES



### CAUTION

To avoid personal injury:

- Reversed engine operation can make the machine reverse and run it backwards. It may lead to serious trouble.
- Reversed engine operation may make exhaust gas gush out into the intake side and ignite the air cleaner; It could catch fire.

Reversed engine revolution must be stopped immediately since engine oil circulation is cut quickly, leading to serious trouble.

## ■ How to tell when the engine starts running backwards

1. Lubricating oil pressure drops sharply. Oil pressure warning light, if used, will light.
2. Since the intake and exhaust sides are reversed, the sound of the engine changes, and exhaust gas will come out of the air cleaner.
3. A louder knocking sound will be heard when the engine starts running backwards.

## ■ Remedies

1. Immediately set the engine stop lever to the "STOP" position to stop the engine.
2. After stopping the engine, check the air cleaner, intake rubber tube and other parts and replace parts as needed.

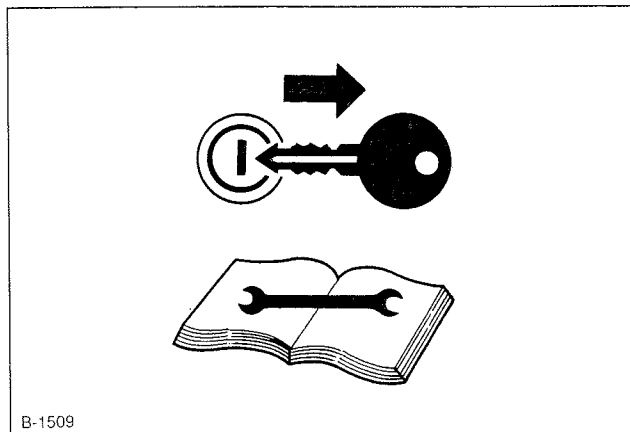
# MAINTENANCE



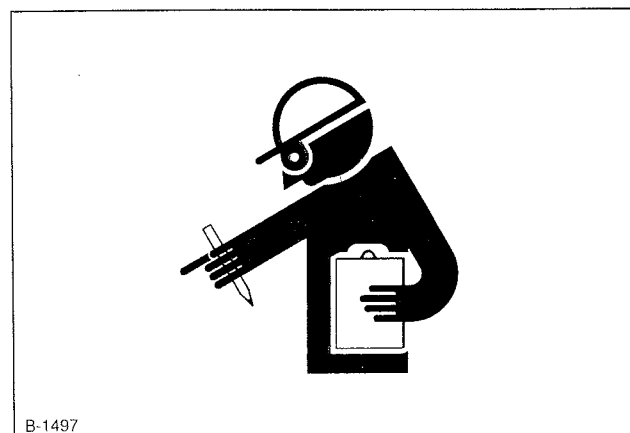
**CAUTION**

To avoid personal injury:

- Be sure to 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.
- When cleaning any parts, do not use gasoline but use regular cleanser.
- Always use proper tools, that are in good condition. Make sure you understand how to use them, before performing any service work.
- When installing, be sure to 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.



B-1509



B-1497

## SERVICE INTERVALS

Observe the following for service and maintenance.

The lubricating oil change intervals listed in the table below are for Classes CF, CE and CD lubricating oils of API classification with a low-sulfur fuel in use. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals than recommended in the table below depending on the operating condition.

Interval	Item	Ref. Page		
Every 50 hours	Check of fuel pipes and clamp bands	12		@
See NOTE:	Change of engine oil	13, 14	◎	
Every 100 hours	Cleaning of air cleaner element	19, 20	*1	@
	Cleaning of fuel filter	12		
	Check of battery electrolyte level	20		
	Check of fan belt tightness	22		
Every 200 hours	Check of radiator hoses and clamp bands	17		
	Replacement of oil filter cartridge	15	◎	
	Check of intake air line	—		@



Interval	Item	Ref. Page		
Every 400 hours	Replacement of fuel filter cartridge	13		@
Every 500 hours	Removal of sediment in fuel tank	—		
	Cleaning of water jacket (radiator interior)	15 to 18		
	Replacement of fan belt	22		
Every one or two months	Recharging of battery	20		
Every year	Replacement of air cleaner element	19, 20	*2	@
	Check of damage in electric wiring and loose connections	—		
Every 800 hours	Check of valve clearance	24		
Every 1500 hours	Check of fuel injection nozzle injection pressure	—	*3	@
Every 3000 hours	Check of turbo charger	—	*3	@
	Check of injection pump	—	*3	@
	Check of fuel injection timer	—	*3	@
Every two years	Change of radiator coolant (L.L.C.)	17		
	Replacement of battery	20		
	Replacement of radiator hoses and clamp bands	18		
	Replacement of fuel pipes and clamp bands	12	*3	@
	Replacement of intake air line	—	*4	@

**IMPORTANT**

- The jobs indicated by © must be done after the first 50 hours of operation.
- \*1 Air cleaner should be cleaned more often in dusty conditions than in normal conditions.
- \*2 After 6 times of cleaning.
- \*3 Consult your local KUBOTA Dealer for this service.
- \*4 Replace only if necessary.
- The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S. EPA nonroad emission regulation. As the engine owner, you are responsible for the performance of the required maintenance on the engine according to the above instruction.  
Please see the Warranty Statement in detail.

**NOTE:**

- Changing interval of engine oil depends on the conditions below.

Models	Oil pan depth	
	Above 125 mm (4.9 in.)	※below 101 mm (4.0 in.)
All models	200 Hrs	150 Hrs
Initial	50 Hrs	

- ※ 101mm oil pan depth is optional.
- ※※ Standard replacement interval
  - API service classification: above CD grade
  - Ambient temperature: below 35 °C (95 °F)

**NOTE:**

**Lubricating oil**

With the emission control now in effect, the CF-4 and CG-4 lubricating oils have been developed for use of a low-sulfur fuel on on-road vehicle engines. When an

off-road vehicle engine runs on a high-sulfur fuel, it is advisable to employ the CF, CD or CE lubricating oil with a high total base number. If the CF-4 or CG-4 lubricating oil is used with a high-sulfur fuel, change the lubricating oil at shorter intervals.

- **Lubricating oil recommended when a low-sulfur or high-sulfur fuel is employed.**

○ : Recommendable × : Not recommendable

Lubricating oil class	Fuel		Remarks
	Low sulfur	High sulfur	
CF	○	○	TBN ≥ 10
CF-4	○	×	
CG-4	○	×	

# PERIODIC SERVICE

## FUEL

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



### CAUTION

To avoid personal injury:

- Do not mix gasoline or alcohol with diesel fuel. This mixture can cause an explosion.
- Be careful not to spill fuel during refueling. If fuel should spill, wipe it off at once, or it may cause a fire.
- Do not fail to stop the engine before refueling. Keep the engine away from the fire.
- Be sure to stop the engine while refueling or bleeding and when cleaning or changing fuel filter or fuel pipes. Do not smoke when working around the battery or when refueling.
- Check the above fuel systems at a well ventilated and wide place.
- When fuel and lubricant are spilled, refuel after letting the engine cool off.
- Always keep spilled fuel and lubricant away from engine.

### 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.

No.2-D is a distillate fuel oil of lower volatility for engines in industrial and heavy mobile service. (SAE J313 JUN87)

Grade of Diesel Fuel Oil According to ASTM D975

Flash Point, °C (°F)	Water and Sediment, volume %	Carbon Residue on, 10 percent Residuum, %	Ash, weight %
Min	Max	Max	Max
52 (125)	0.05	0.35	0.01

Distillation Temperatures, °C (°F) 90% Point		Viscosity Kinematic cSt or mm <sup>2</sup> /s at 40°C		Viscosity Sayboit, SUS at 100°F		Sulfur, weight %	Copper strip Corrosion	Cetane Number
Min	Max	Min	Max	Min	Max	Max	Max	Min
282 (540)	338 (640)	1.9	4.1	32.6	40.1	0.50	No.3	40

The cetane number is required not to be less than 45.

### IMPORTANT:

- Be sure to use a strainer when filling the fuel tank, or dirt or sand in the fuel may cause trouble in the fuel injection pump.
- For fuel, always use diesel fuel. You are required not to use alternative fuel, because its quality is unknown or it may be inferior in quality. Kerosene, which is very low in cetane rating, adversely affects the engine. Diesel fuel differs in grades depending on the temperature.
- Be careful not to let the fuel tank become empty, or air can enter the fuel system, necessitating bleeding before next engine start.

## ■ Air bleeding the fuel system



### CAUTION

To avoid personal injury;

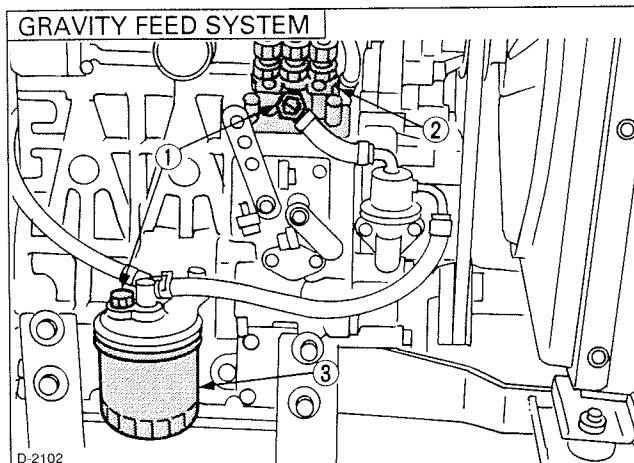
- Do not bleed a hot engine as this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.

Air bleeding of the fuel system is required if;

- after the fuel filter and pipes have been detached and refitted;
- after the fuel tank has become empty; or
- before the engine is to be used after a long storage.

### [PROCEDURE (A)] (gravity feed fuel tanks only)

1. Fill the fuel tank to the fullest extent. Open the fuel filter lever.
2. Loosen air vent plug of the fuel filter a few turns.
3. Screw back the plug when bubbles do not come up any more.
4. Open the air vent plug on top of the fuel injection pump.
5. Retighten the plug when bubbles do not come up any more.



- (1) Air vent plug
- (2) Injection pump
- (3) Fuel filter

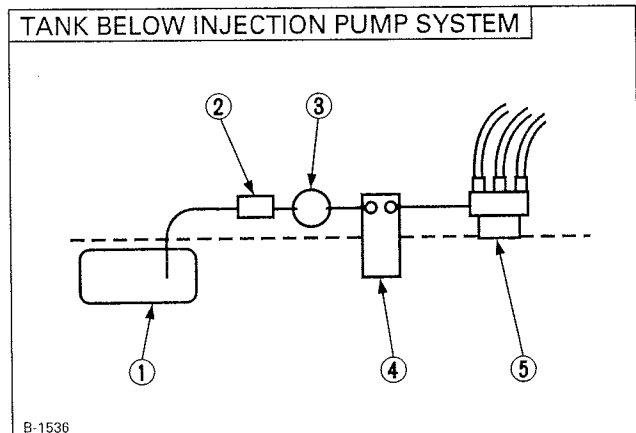
### [PROCEDURE (B)]

(fuel tanks lower than injection pump)

1. For fuel tanks that are lower than the injection pump. The fuel system must be pressurized by the fuel system electric fuel pump.
2. If an electric fuel pump is not used, you must manually actuate the pump by lever to bleed.
3. The primary fuel filter (3) must be on the pressure side of the pump if the fuel tank is lower than the injection pump.
4. To bleed follow (2) through (5) above.

### IMPORTANT:

- Tighten air vent plug of the fuel injection pump except when bleeding, or it may stop the engine suddenly.



- (1) Fuel tank below injection pump
- (2) Pre-filter
- (3) Electric or Mechanical pump
- (4) Main Filter
- (5) Injection pump

■ Checking the fuel pipes



**CAUTION**

To avoid personal injury:

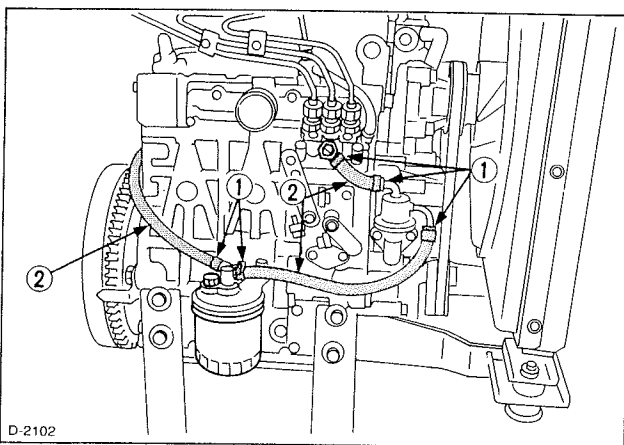
- Check or replace the fuel pipes after stopping the engine. Broken fuel pipes can cause fires.

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 the clamp bands every two years.
3. If the fuel pipes and clamp bands are found worn or damaged before two years'time, replace or repair them at once.
4. After replacement of the pipes and bands, air-bleed the fuel system.

**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 injection pump malfunction.



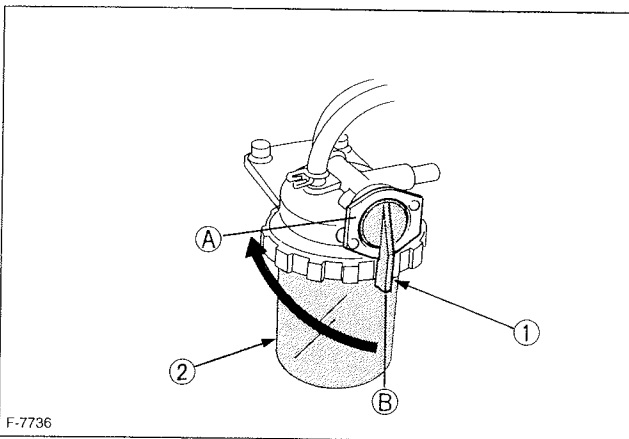
D-2102

- (1) Clamp band  
(2) Fuel pipe

■ Cleaning the fuel filter pot

Every 100 hours of operation, clean the fuel filter in a clean place to prevent dust intrusion.

1. Close the fuel filter lever.



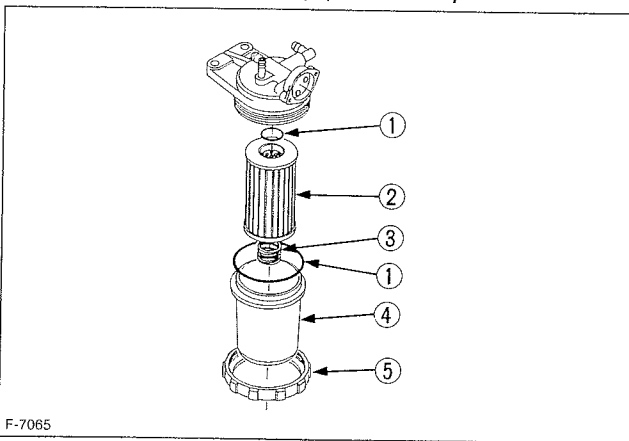
F-7736

- (1) Fuel filter lever (A) "OFF"  
(2) Fuel filter pot (B) "ON"

2. Remove the top cap, and rinse the inside with diesel fuel.
3. Take out the element, and rinse it with diesel fuel.
4. After cleaning, reinstall the fuel filter, keeping out of dust and dirt.
5. Air-bleed the injection pump.

**IMPORTANT:**

- Entrance of dust and dirt can cause a malfunction of the fuel injection pump and the injection nozzle. Wash the fuel filter cup periodically.



F-7065

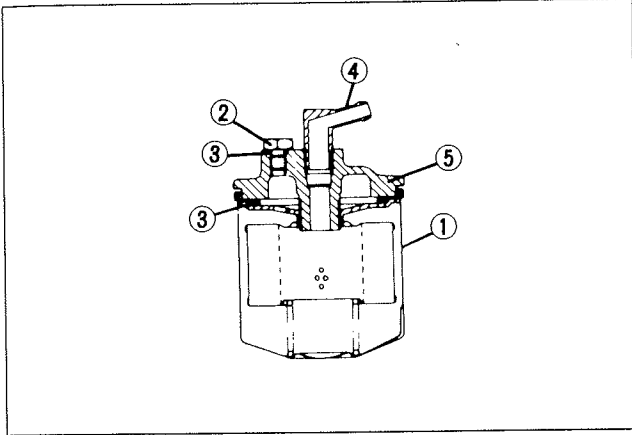
- (1) O ring  
(2) Filter element  
(3) Spring  
(4) Filter bowl  
(5) Screw ring

## ■ Fuel filter cartridge replacement

1. Replace the fuel filter cartridge with a new one every 400 operating hours.
2. Apply fuel oil thinly over the gasket and tighten the cartridge into position by hand-tightening only.
3. Finally, vent the air.

### IMPORTANT:

- Replace the fuel filter cartridge periodically to prevent wear of the fuel injection pump plunger or the injection nozzle, due to dirt in the fuel.



- (1) Fuel filter cartridge  
 (2) Air vent plug  
 (3) O ring  
 (4) Pipe joint  
 (5) Cover

## ENGINE OIL



### CAUTION

To avoid personal injury:

- Be sure to stop the engine before checking and changing the engine oil and the oil filter cartridge.
- Do not touch muffler or exhaust pipes while they are hot; Severe burns could result. Always stop the engine and allow it to cool before conducting inspections, maintenance, or for a cleaning procedure.
- Contact with engine oil can damage your skin.

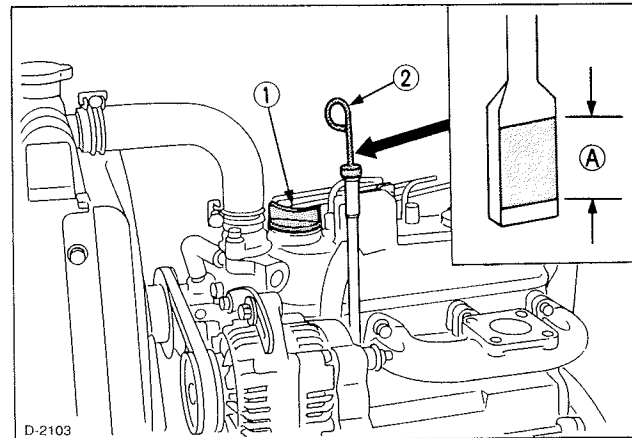
Put on gloves when using engine oil. If you come in contact with engine oil, wash it off immediately.

### NOTE:

- Be sure to inspect the engine, locating it on a level place. If placed on gradients accurately, oil quantity may not be measured.

## ■ 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 [Lower end of oil level gauge]  
 (2) 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

Model	Quantity
D905-E, D1005-E, D1105-E	5.1 L (1.35 U.S.gals.)
V1205-E, V1305-E, V1505-E	6.0 L (1.59 U.S.gals.)
V1205-TE, V1505-TE	6.7 L (1.77 U.S.gals.)

Oil quantities shown are for standard oil pans.

#### IMPORTANT:

- Engine oil should be MIL-L-2104C or have properties of API classification CD grades or higher.

Change the type of engine oil according to the ambient temperature.

above 25°C (77°F)	SAE30 or	SAE10W-30 SAE10W-40
0 to 25°C (32 to 77°F)	SAE20 or	SAE10W-30 SAE10W-40
below 0°C (32°F)	SAE10W or	SAE10W-30 SAE10W-40

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

## Changing engine oil

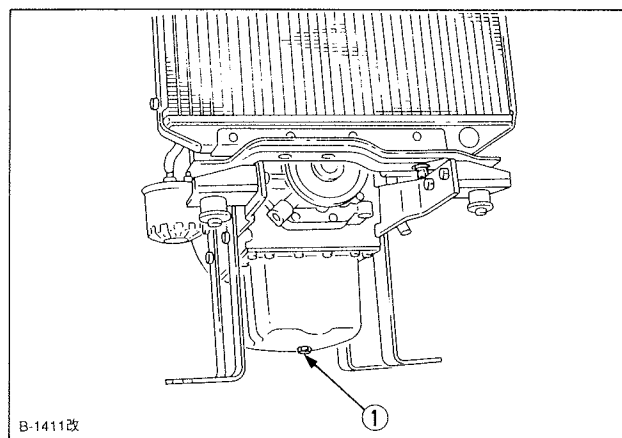


#### CAUTION

To avoid personal injury:

- Be sure to 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.



(1) Oil drain plug

3. Add new engine oil up to the upper limit of the oil level gauge.

## ■ Replacing the oil filter cartridge

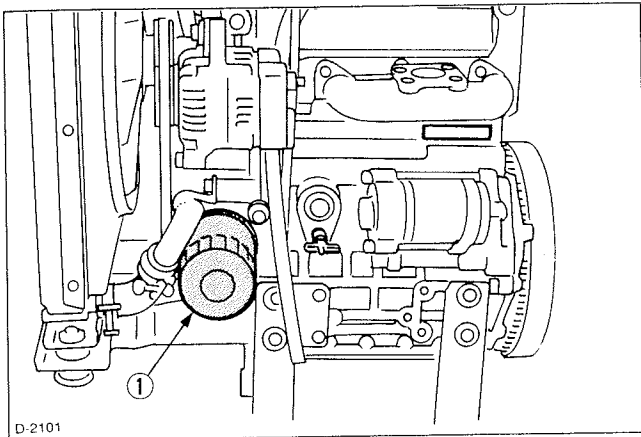


### CAUTION

To avoid personal injury:

- Be sure to 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 every 200 hours of operation.
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.



(1) Oil filter cartridge

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. Make it a rule to check the coolant level before every operation.



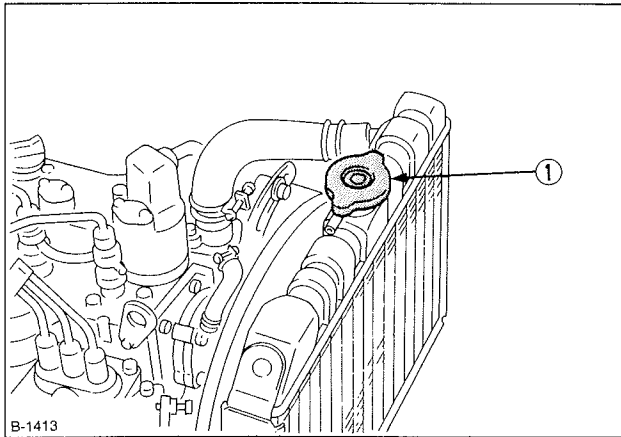
### WARNING

To avoid personal injury:

- 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 reserve tank; Severe burns could result.

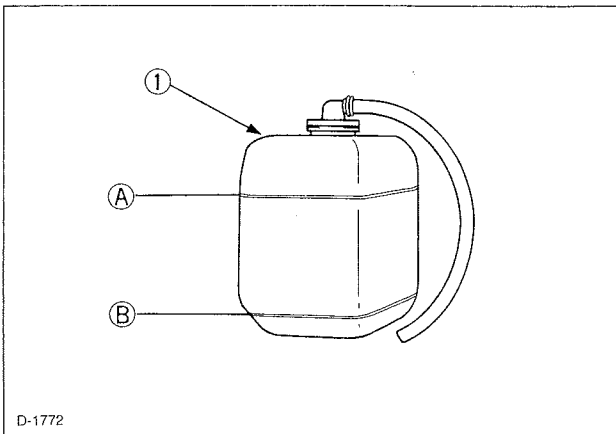
### ■ Checking coolant level, adding coolant

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 reserve tank, check the coolant level of the reserve tank. When it is between the "FULL" and "LOW" marks, the coolant will last for one day's work.

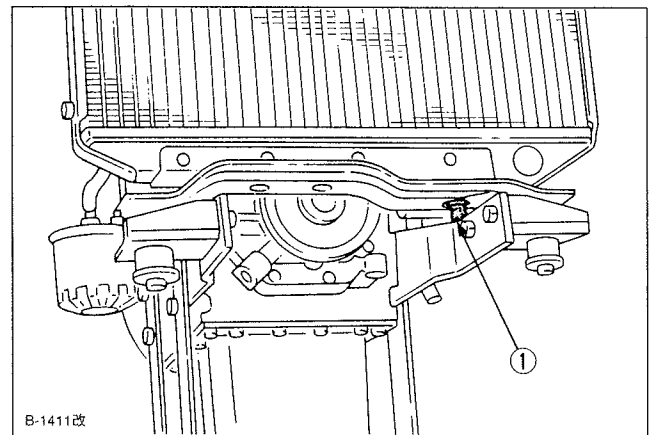
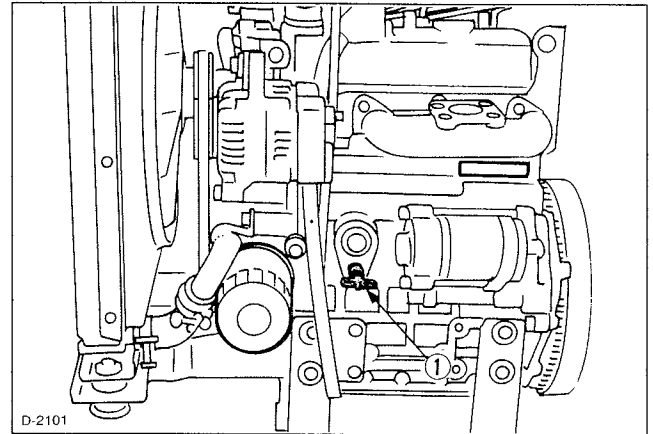


(1) Reserve tank

(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 cocks; one is at the crankcase side and the other is at the lower part of the radiator as figures below.



(1) Coolant drain cock

#### 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 reserve tank with coolant over the "FULL" level mark.
- Be sure to 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 cocks 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 reserve tank.
3. Prescribed coolant volume (U.S.gallons)

Models	Quantity
D905-E, D1005-E, D1105-E	3.1 L (0.82 U.S.gals.)
V1205-E, V1305-E, V1505-E	4.0 L (1.06 U.S.gals.)
V1205-TE, V1505-TE	5.0 L (1.32 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
Summer	Pure water and radiator cleaner
Winter (When temperature drops below 0°C (32°F)) or all season	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**



**CAUTION**

To avoid personal injury:

- Be sure to check radiator hoses and hose clamps 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 clamps 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**

Take the following actions in the event the coolant temperature is nearly or more than the boiling point, what is called "Overheating". Take these actions if the engine's alarm buzzer sounds or the alarm lamp lights up.

1. Stop the engine operation in a safe place and keep the engine unloaded idling.
2. Do not stop the engine suddenly. Stop it after about 5 minutes of unloaded idling.
3. If the engine stalls within about 5 minutes of running under no load, immediately leave and keep yourself away from the machine. Do not open the hood and any other part.
4. Keep yourself and others well away from the engine for further 10 minutes or while the steam blown out.
5. Checking that there gets no danger such as burn, get rid of the causes of overheating according to the manual, see "TROUBLESHOOTING" section. And then, start again the engine.

**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 coolings performance.

## ■ Anti-freeze



### CAUTION

To avoid personal injury:

- When using anti-freeze, put on some protection such as rubber gloves.
- If should drink anti-freeze, throw up at once and take medical attention.
- When anti-freeze comes in contact with the skin or clothing, wash it off immediately.
- Do not mix different types of anti-freeze.
- Keep fire and children away from anti-freeze.
- Be mindful of the environment and ecology. Before draining any fluids, find out the correct way of disposing by checking with local codes.
- Also, observe the relevant environmental protection regulations when disposing of oil, fuel, coolant, brake fluid, filters and batteries.

If it freezes, coolant can damage the cylinders and radiator. It is necessary, if the ambient temperature falls below 0°C (32°F), to remove coolant after operating or to add anti-freeze to it.

1. There are two types of anti-freeze available; use the permanent type (PT) for this engine.
2. Before adding anti-freeze for the first time, clean the radiator and engine interior by pouring fresh water, and draining it a few times.
3. The procedure for the mixing of water and anti-freeze differs according to the make of the anti-freeze and the ambient temperature. Refer to SAE J1034 standard, more specifically also to SAE J814c.
4. Mix the anti-freeze with water, and then fill into the radiator.

### IMPORTANT:

- When the anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50%.

Vol % Anti-freeze	Freezing Point		Boiling Point ※	
	°C	°F	°C	°F
40	-24	-12	106	222
50	-37	-34	108	226

※ At 1.013×10<sup>5</sup>Pa (760mmHg) pressure (atmospheric). A higher boiling point is obtained by using a radiator pressure cap which permits the development of pressure within the cooling system.

### NOTE:

- The above data represents industry standards that necessitate a minimum glycol content in the concentrated anti-freeze.
- When the coolant level drops due to evaporation, add water only to keep the anti-freeze mixing ratio less than 50%. In case of leakage, add anti-freeze and water in the specified mixing ratio before filling into the radiator.
- Anti-freeze absorbs moisture. Keep unused anti-freeze in a tightly sealed container.
- Do not use radiator cleaning agents when anti-freeze has been added to the coolant. (Anti-freeze contains an anti-corrosive agent, which will react with the radiator cleaning agent forming sludge which will affect the engine parts.)

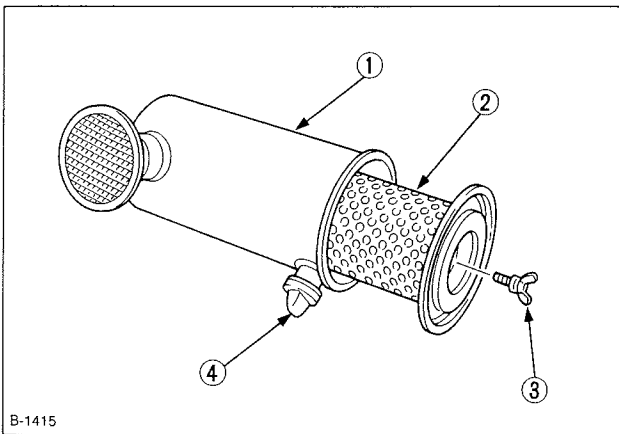
## ■ Radiator cement

As the radiator is solidly constructed, there is little possibility of water leakage. Should this happen, however, radiator cement can easily fix it. If leakage is serious, contact your local KUBOTA dealer.

## 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 686kPa (7kgf/cm<sup>2</sup>, 99psi).
5. When carbon or oil adheres to the element, soak the element in detergent for 15 minutes, then wash it several times in water, rinse with clean water and dry it naturally.
6. After the element is fully dried, inspect the inside of the element with a light, and check if it is damaged or not. (referring to the instructions on the label attached to the element.)
7. Replace the element every year or every 6 cleanings.



- B-1415
- (1) Air cleaner body
  - (2) Element
  - (3) Wing bolt
  - (4) Evacuator valve

### IMPORTANT:

- Make sure the wing bolt 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.

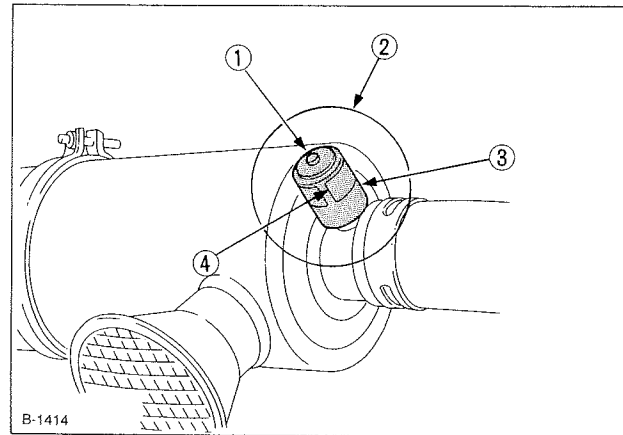
### ■ Evacuator valve

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.

### ■ 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.



- B-1414
- (1) "RESET" button
  - (2) Dust indicator
  - (3) Service level
  - (4) Signal

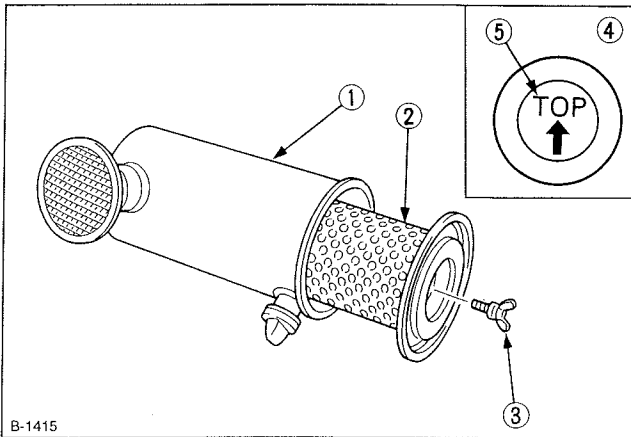
### ■ For the air cleaner with a dust cup (optional)

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 attachment of the dust to the element will cause its lifetime to shorten to a great extent.



- (1) Air cleaner body  
 (2) Element  
 (3) Wing bolt  
 (4) Dust cup  
 (5) "TOP" mark

## BATTERY

Mishandling of the battery shortens the service life and adds to maintenance costs. Obtain the maximum performance and the longest life of the battery by handling properly and with care.



#### CAUTION

To avoid personal injury:

- Be careful not to let the battery electrolyte contact your body or clothing.
- Wear eye protection and rubber gloves, since the diluted sulfuric acid solution burns skin and eats holes in clothing. Should this occur, immediately wash it off with running water and get medical attention.

Engine starting will be more difficult, if the battery charge is low. Be careful to recharge it at an early occasion before it is too late.

### ■ Battery charging

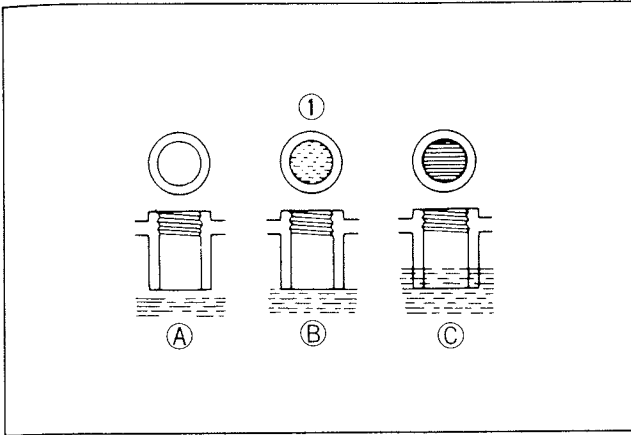


#### CAUTION

To avoid personal injury:

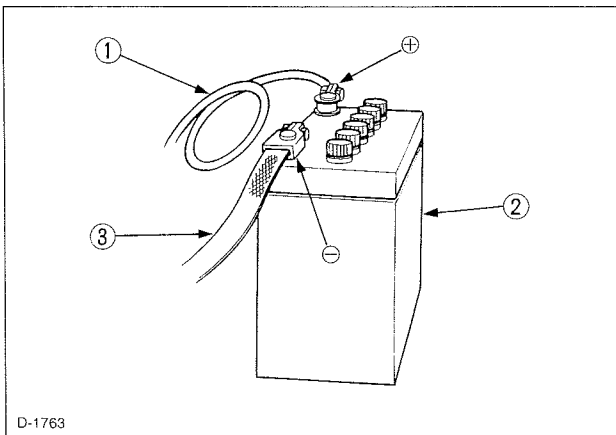
- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.
- When charging the battery, remove the battery vent plugs.
- When disconnecting the cable from the battery, start with the negative terminal, and when connecting them, start with the positive terminal first.
- DO NOT check the battery charge by placing a metal object across the terminals. Use a voltmeter or hydrometer.

1. Make sure each electrolyte level is to the bottom of vent wells, if necessary, add only distilled water in a well-ventilated place.

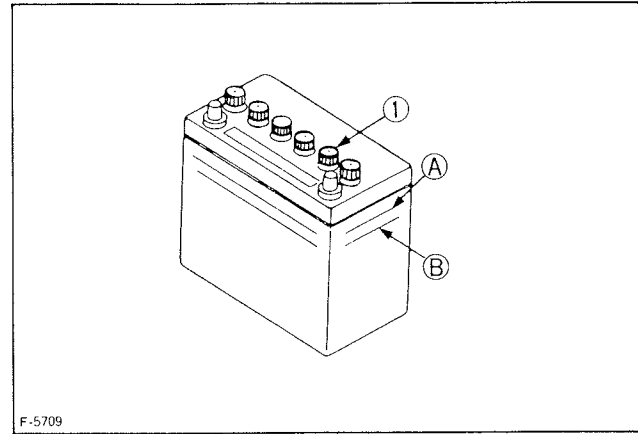


(1) Battery electrolyte level  
 (A) "TOO LOW"  
 (B) "PROPER"  
 (C) "TOO HIGH"

2. To slow charge the battery, connect the charger positive terminal to the battery positive terminal, and the negative to the negative, then recharge in the standard fashion.
3. Quick recharging charges the battery at a high rate in a short time. This is only for emergencies.
4. Recharge the battery as early as possible, or battery life will be extremely shortened.
5. When exchanging an old battery for a new one, use a battery of equal specifications shown in page 26, 27.



(1) Thick cable red (+)  
 (2) Battery case  
 (3) Earth cable black (-)



(1) Plug  
 (A) "HIGHEST LEVEL"  
 (B) "LOWEST LEVEL"

**IMPORTANT:**

- Connect the charger positive terminal to the battery positive terminal, and negative to the negative.
- 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. If reversed, the contact of tools on the battery may cause a short.

**Direction for long term storage**

1. When storing the engine for long periods of time, remove the battery, adjust the electrolyte to the proper level, and store in a dry and dark place.
2. The battery naturally discharges while it is stored. Recharge it once a month in summer, and every 2 months in winter.

## ELECTRIC WIRING



### CAUTION

To avoid personal injury:

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. Be sure to 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



### CAUTION

To avoid personal injury:

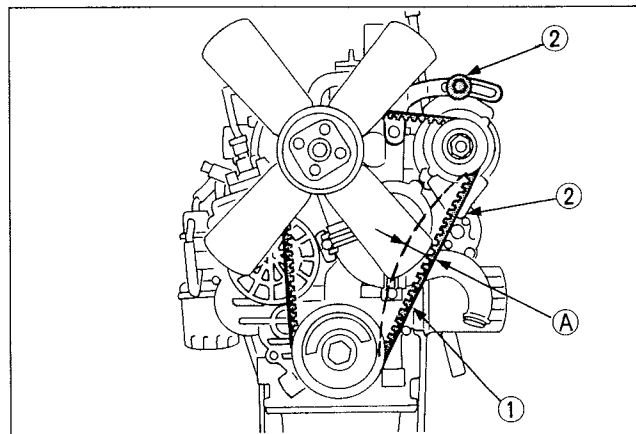
- Be sure to stop the engine and remove the key before checking the belt tension.
- Be sure to reinstall the detached safety shield after maintenance or checking.

Proper fan belt tension	A deflection of between 7 to 9 mm (0.28 to 0.35 in.) when the belt is pressed in the middle of the span.
-------------------------	--

1. Stop the engine and remove the key.
2. Apply moderate thumb pressure to belt between 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 deflection of the belt falls within acceptable limits.
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.



(1) Fan belt

(2) Bolt and nut

(A) 7 to 9 mm (0.28 to 0.35 in.)

(under load of 10 kgf (22.1 lbs))

# CARRIAGE AND STORAGE

## CARRIAGE



### CAUTION

To avoid personal injury:

- 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 crane when carrying the engine, or hurt your waist and yourself. Support the engine securely with rope not to fall while carrying it.
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



### CAUTION

To avoid personal injury:

- 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. Drain the coolant in the radiator. Open the cock at the bottom of the radiator, and remove the pressure cap to drain water completely. Leave the cock open. Hang a note written "No water" 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.
2. 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.
3. Check all the bolts and nuts, and tighten if necessary.
4. Remove the battery from the engine, adjust the electrolyte level, and recharge it. Store the battery in a dry and dark place.
5. When the engine is not used for a long period of time, run it for about 5 minutes under no load every 2-3 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.
6. If you forget to run the engine for longer than 5-6 months, apply enough engine oil to the valve guide and valve stem seal and make sure the valve works smoothly before starting the engine.
7. Store the engine in a flat place and remove the key from engine.
8. Do not store the engine in a place where has flammable materials such as dry grass or straw.
9. When covering the engine for storage, let engine and muffler cool off completely.
10. Operate the engine after checking and repairing damaged wirings or pipes, and clearing flammable materials carried by mouse.

# TROUBLESHOOTING

If the engine does not function properly, use the following chart to identify and correct the cause.

## ■ When it is difficult to start the engine.

Cause	Countermeasures
Fuel is thick and doesn't flow.	<ul style="list-style-type: none"> <li>* Check the fuel tank and fuel filter. Remove water, dirt and other impurities.</li> <li>* As all fuel will be filtered by the filter, if there should be water or other foreign matters on the filter, clean the filter with kerosene.</li> </ul>
Air or water mixed in fuel system	<ul style="list-style-type: none"> <li>* If air is in the fuel filter or injection lines, the fuel pump will not work properly. To attain proper fuel injection pressure, check carefully for loosened fuel line coupling, loose cap nut, etc.</li> <li>* Loosen joint bolt atop fuel filter and air vent screws of fuel injection pump to eliminate all the air in the fuel system.</li> </ul>
Thick carbon deposits on orifice of injection nozzle.	<ul style="list-style-type: none"> <li>* This is caused when water or dirt is mixed in the fuel. Clean the nozzle injection piece, being careful not to damage the orifice.</li> <li>* Check to see if nozzle is working properly or not. If not, install a new nozzle.</li> </ul>
Valve clearance is wrong.	* Adjust valve clearance to 0.145 to 0.185 mm (0.0057 to 0.0072 in.) when the engine is cold.
Leaking valves	* Grind valves.
Fuel injection timing is wrong.	<ul style="list-style-type: none"> <li>* Adjust injection timing</li> <li>* The injection timing 0.3 rad (18°) before top dead center.</li> </ul>
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.	<ul style="list-style-type: none"> <li>* Charge battery.</li> <li>* In winter, always remove battery from machine, charge fully and keep indoors.</li> <li>Install in machine at time of use.</li> </ul>

## ■ When output is insufficient

Cause	Countermeasures
Carbon stuck around orifice of nozzle piece	<ul style="list-style-type: none"> <li>* Clean orifice and needle valve, being very careful not to damage the nozzle orifice.</li> <li>* Check nozzle to see if good. If not, replace with new parts.</li> </ul>
Compression is insufficient. Leaking valves	<ul style="list-style-type: none"> <li>* Bad valve and excessive wear of rings, pistons and liners cause insufficient compression. Replace with new parts.</li> <li>* Grind valves.</li> </ul>
Fuel is insufficient.	* Check fuel system.
Overheating of moving parts	<ul style="list-style-type: none"> <li>* Check lubricating oil system.</li> <li>* Check to see if lubricating oil filter is working properly.</li> <li>* Filter element deposited with impurities would cause poor lubrication. Change element.</li> <li>* Check the clearance of bearing are within factory specs.</li> <li>* Check injection timing.</li> </ul>
Valve clearance is wrong.	* Adjust to proper valve clearance of 0.145 to 0.185 mm (0.0057 to 0.0072 in.) with engine cold.
Air cleaner is dirty	* Clean the element every 100 hours of operation.
Fuel injection pressure is wrong.	* Adjust to proper pressure. 13.7 Mpa (140kgf/cm <sup>2</sup> , 1991psi)
Injection pump wear	<ul style="list-style-type: none"> <li>* Do not use poor quality fuel as it will cause wear of the pump. Only use No.2-D diesel fuel.</li> <li>* Check the fuel injection pump element and delivery valve assembly and replace as necessary.</li> </ul>

### NOTE:

- If the cause of trouble can not be found, contact your KUBOTA dealer.



### ■ 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.
Bad nozzle	* If necessary, replace with a new nozzle.
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. * At every 2 times of oil change, oil filter cartridge should be replaced. * Check to see if the engine bearing clearances is within factory specs.

#### NOTE:

- When the engine has suddenly stopped, decompress the engine by the decomp and turn the engine lightly by pulling on the fan belt. If the engine turns easily without abnormalities, the cause of the trouble is usually lack of fuel or bad nozzle.

### ■ When color of exhaust is especially bad

Cause	Countermeasures
Fuel governing device bad	* Contact dealer for repairs.
Fuel is of extremely poor quality.	* Select good quality fuel Use No. 2-D diesel fuel only.
Nozzle is bad.	* If necessary, replace with new nozzle.
Combustion is incomplete.	* Cause is poor atomization, improper injection timing, etc. Because of trouble in injection system or in poor valve adjustment, or compression leakage, poor compression, etc. Check for the cause.

### ■ When engine must be stopped immediately

Cause	Countermeasures
Engine revolution suddenly decreases or increases.	* Check the adjustments, injection timing and the fuel system.
Unusual sound is heard suddenly.	* Check all moving parts carefully.
Color of exhaust suddenly turns dark.	* Check the fuel injection system, especially the fuel injection nozzle.
Bearing parts are overheated.	* Check the lubricating system.
Oil lamp lights up during operation.	* Check lubricating system. * Check, if the engine bearing clearances are within factory specs. * Check the function of the relieve valve in the lubricating system. * Check pressure switch. * Check filter base gasket.

### ■ 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.
Fan or radiator or radiator cap defective	* Replace defective part.
Thermostat defective	* Check thermostat and replace if necessary.
Temperature gauge or sensor defective	* Check temperature with thermometer and replace if necessary.
Overload running	* Reduce load.
Head gasket defective or water leakage	* Replace parts.
Incorrect injection timing	* Adjust to proper timing.
Unsuitable fuel used	* Use the specified fuel.

# SPECIFICATIONS

Model	D905-E		D1005-E		D1105-E	
Type	Vertical, water-cooled, 4-cycle diesel engine					
Number of cylinders	3					
Bore and atroke mm (in.)	72×73.6 (2.83×2.90)		76×73.6 (2.99×2.90)		78×78.4 (3.07×3.09)	
Total displacement cm <sup>3</sup> (cu. in)	898 (54.80)		1001 (61.08)		1123 (68.53)	
Combustion chamber	Spherical Type (E-TVCS)					
SAE NET Intermittent H.P. (SAEJ1349)	kW/min <sup>-1</sup> (rpm) (HP/min <sup>-1</sup> (rpm))	14.9/3000 (20.0/3000)	17.5/3600 (23.5/3600)	16.8/3000 (22.5/3000)	19.4/3600 (26.0/3600)	18.7/3000 (25.0/3000)
SAE NET Continuous H.P. (SAEJ1349)	kW/min <sup>-1</sup> (rpm) (HP/min <sup>-1</sup> (rpm))	12.7/3000 (17.0/3999)	15.3/3600 (20.5/3600)	14.2/3000 (19.0/3000)	16.8/3600 (22.5/3600)	16.4/3000 (22.0/3000)
Maximum bare speed	min <sup>-1</sup> (rpm)	3200	3800	3200	3800	3200
Minimum bare idling speed	min <sup>-1</sup> (rpm)	850~950				
Order of firing	1-2-3					
Direction of rotation	Counter-clockwise (viewed from flywheel side)					
Injection pump	Bosch MD Type Mini Pump					
Injection pressure	13.73 MPa (140kgf/cm <sup>2</sup> , 1991 psi)					
Injection timing (Before T.D.C.)	19°	22°	19°	22°	19°	
Compression ratio	23 : 1					
Fuel	Diesel Fuel No.2-D (ASTM D975)					
Lubricant (API classification)	above CD grade					
Dimensions (length×width×height)	mm (in.)	497.8×396×608.7 (19.60×15.59×23.96)				
Dry weight	kg (lbs.)	93 (205.0)				
Starting system	Cell starter (with glow plug)					
Starting motor	12 V, 1,0 kW					
Chargine generator	12V, 360 W					
Recommended battery capacity	12V, 65 AH, equivalent					

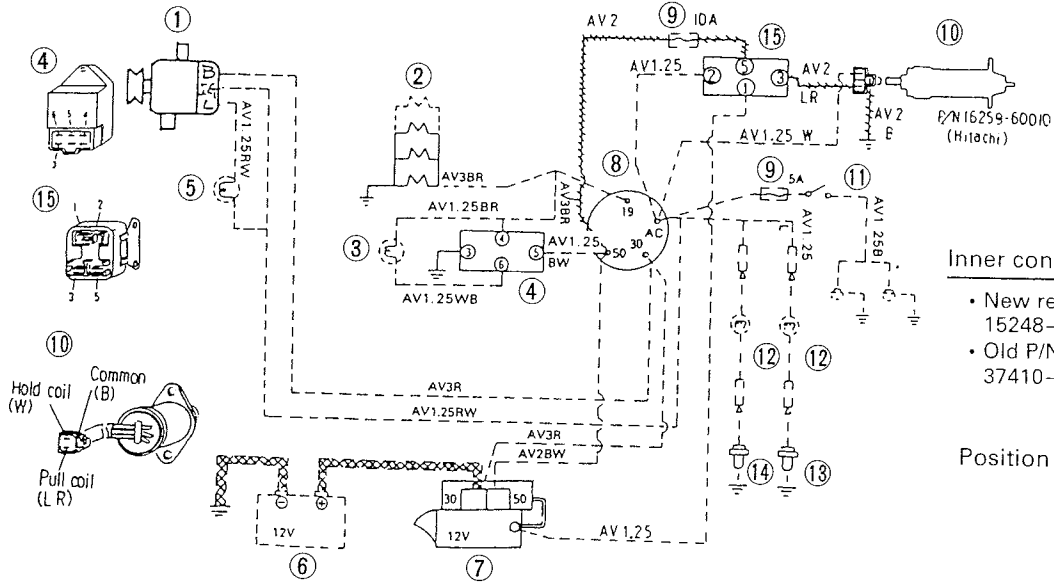
**NOTE:**

- Specifications are subject to change without notice.

V1205-E		V1205-TE		V1305-E		V1505-E		V1505-TE	
Vertical, water-cooled, 4-cycle diesel engine									
4									
72×73.6 (2.83×2.90)				76×73.6 (2.99×2.90)			74×78.4 (3.07×3.09)		
1198 (73.11)				1335 (81.47)			1498 (91.41)		
Spherical Type (E-TVCS)									
20.1/3000 (27.0/3000)	23.5/3600 (31.5/3600)	25.4/3000 (34.0/3000)	29.8/3600 (40.0/3600)	22.4/3000 (30.0/3000)	25.7/3600 (34.5/3600)	25.0/3000 (33.5/3000)		31.3/3000 (42.0/3000)	
17.2/3000 (23.0/3000)	20.1/3600 (27.0/3600)	21.6/3000 (29.0/3000)	25.7/3600 (34.5/3600)	19.0/3000 (25.5/3000)	22.4/3600 (30.0/3600)	21.6/3000 (29.0/3000)		27.2/3000 (36.5/3000)	
3200	3800	3200	3800	3200	3800	3200			
800~900									
1-3-4-2									
Counter-clockwise (viewed from flywheel side)									
Bosch MD Type Mini Pump									
13,73 MPa (140kgf/cm <sup>2</sup> , 1991 psi)									
19°	22°	19°	22°	19°	22°	19°			
23 : 1		22.5 : 1		23 : 1			22.5 : 1		
Diesel Fuel No.2-D (ASTM D975)									
above CD grade									
583.8×396×613.7 (22.98×15.59×24.16)		591.3×439.2×613.7 (23.28×17.29×24.16)		583.8×396×613.7 (22.98×15.59×24.16)		591.3×396×613.7 (23.28×15.59×24.16)		591.3×439.2×613.3 (23.18×17.29×24.16)	
110 (242.5)		114 (251.3)		110 (242.5)			114 (251.3)		
Cell starter (with glow plug)									
12 V, 1.2 kW									
12V, 360 W									
12V, 70AH, equivalent									

# WIRING DIAGRAMS

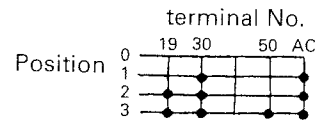
## EC standard



	COLOR CORD
B	Black
L	Blue
R	Red
W	White

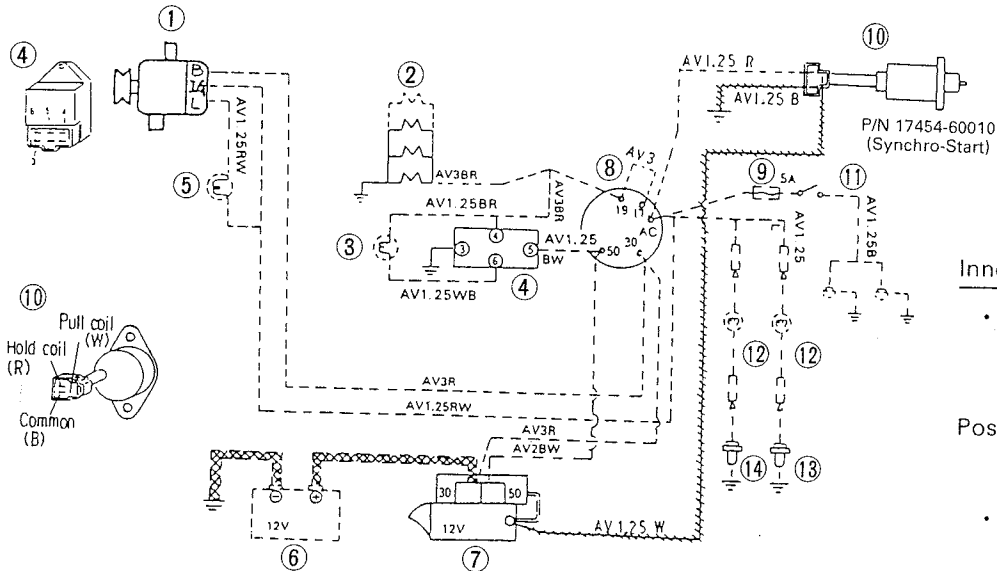
Inner connection of key switch (8):

- New recommended P/N 15248-63592
- Old P/N 37410-59113



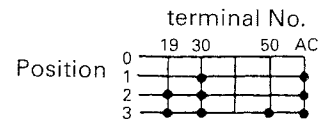
NOTE: Solenoid. Energize to run

## KTC/SAE standard

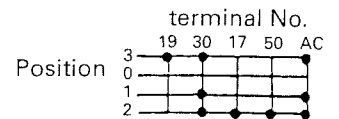


Inner connection of key switch (8):

- New recommended P/N 15248-63592



- Old P/N 66711-55132



- |                                |                        |                          |
|--------------------------------|------------------------|--------------------------|
| (1) Alternator                 | (6) Battery            | (11) Switch              |
| (2) Glow plug                  | (7) Starter            | (12) Lamp (3.4W or less) |
| (3) Lamp                       | (8) Key switch*        | (13) Oil switch          |
| (4) Lamp timer (Option)        | (9) Fuse               | (14) Water temp. switch  |
| (5) Charge lamp (3.4W or less) | (10) Solenoid (Option) | (15) Relay               |

NOTE: Solenoid. Energize to run.

NOTE: " " Total length is 1 m or less.

**CALIFORNIA & EPA EMISSION CONTROL  
SYSTEM WARRANTY**

**DIESEL ENGINE  
SPARK-IGNITION ENGINE  
KUBOTA ENGINE**

**Kubota**

**KUBOTA  
FEDERAL AND CALIFORNIA EMISSION CONTROL SYSTEMS  
LIMITED WARRANTY  
UTILITY AND LAWN AND GARDEN ENGINES**

The U.S. Environmental Protection Agency (EPA), the California Air Resources Board (CARB), and KUBOTA Corporation are pleased to explain the Federal and California Emission Control Systems Warranty on your utility and lawn and garden equipment/ engine. In California, new 1995 and later engines must be designed, built and equipped to meet the State's stringent anti-smog standards. In other states, new 1997 and later model year spark-ignition engines must be designed, built and equipped, at the time of sale, to meet the U.S. EPA regulations for small nonroad engines. The engines must be free from defects in materials and workmanship which cause it to fail to conform with U.S. EPA standards for the first two years of engine use from the date of original sale to the ultimate purchaser. KUBOTA must warrant the emission control system on your engine for the period of time listed above provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor or fuel injection system, the ignition system, and catalytic converter. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, KUBOTA will repair your engine at no cost to you, including diagnosis (if the diagnostic work is performed at authorized dealer), parts and labors.

*In an emergency, repairs may be performed at any engine repair facility or by the owner.*

### **Manufacturer's Warranty Coverage**

The 1995 and later engines are warranted for two years in California. In other states, 1997 and later model year spark-ignition engines are also warranted for two years.

If any emission related parts on your engine is defective, the part will be repaired or replaced by KUBOTA free of charge.

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## **aintenance Requirements**

The owner is responsible for the performance of the required maintenance as defined by KUBOTA in the operator's manual.

## **mitations**

This Emission Control System Warranty shall not cover any of the following;

- (a) Repair or replacement required because of misuse or neglect, lack of required maintenance, repairs improperly performed or replacements not conforming to KUBOTA specifications that adversely affect performance and/ or durability, and alteration or modifications not recommended or approved in writing by KUBOTA.
  
- (b) Replacement of parts and other services and adjustments necessary for required maintenance at and after the first scheduled replacement point.

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# KUBOTA

(英語)

Code No. IG220-8980-4