

OPERATOR'S MANUAL



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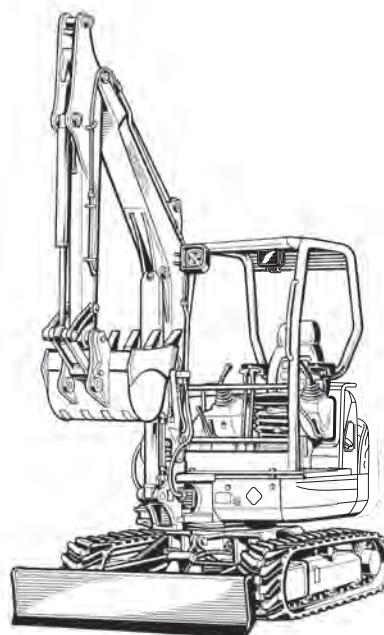
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KUBOTA EXCAVATORS

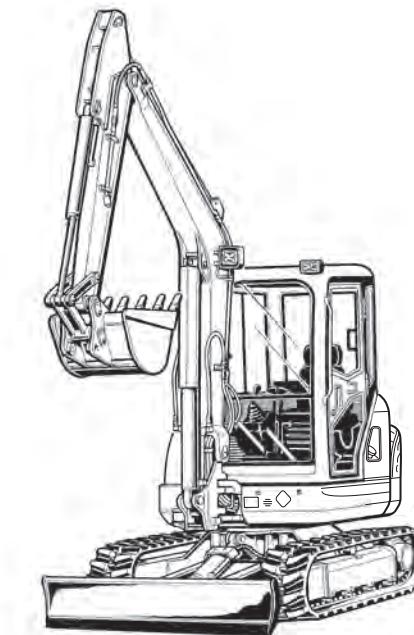
Super Series 2

MODELS

KX₉₁₋₃ • U₃₅₋₃



1BAAGABAP0280



1BAAGABAP0290

READ AND SAVE THIS MANUAL

LIST OF ABBREVIATION

Abbreviations	Description
API	American Petroleum Institute
ASTM	American Society for Testing and Materials, USA
CECE	Committee for European Construction Equipment
DIN	German Institute for Standards, Federal Republic of Germany
EN	European Standard
FOPS	Falling Object Protective Structures
FRONT	"Front" means the front view towards the boom and dozer
Hi	High speed
ISO	International Standardization Organization
JIS	Japanese Industrial Standard
L	Volume (Liter)
L/min	Liter per minute
Lo	Low speed
MIL	Military Standards
rpm	Revolutions Per Minute
ROPS	Roll-Over Protective Structures
SAE	Society of Automotive Engineers, USA
TPSS	Two Pattern Selection System
AI	Auto Idle

KUBOTA Corporation is ...

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

To achieve this status, the company has through the years diversified the range of its products and services to a remarkable extent, until today, 19 plants and 16,000 employees produce over 1,000 different items, large and small.

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

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

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

GENERAL SYMBOLS

The instruments and operation elements have been marked with a series of symbols in order to simplify the operation of excavator. These symbols are listed below with the respective descriptions.

- | | | | |
|--|--|--|--------------------------------------|
| | Safety alert Symbol | | Boom swing (left) |
| | Warning lamp "Fuel level too low" | | Boom swing (Right) |
| | System lamp | | Dozer raise |
| | Warning lamp "Engine Oil pressure" | | Dozer lower |
| | Warning lamp "Battery charge" | | Operation direction of control lever |
| | Warning lamp "Auto Idle (AI) Lamp" | | Operation direction of control lever |
| | Indicator lamp "Glow" | | Read operator's manual |
| | Working light switch | | Engine stop control lamp |
| | Horn | | |
| | Wiper/Washer switch | | |
| | Diesel | | |
| | Hydraulic fluid | | |
| | Gear oil | | |
| | Grease | | |
| | Fast | | |
| | Slow | | |
| | Excavator - Overhead movement toward the front | | |
| | Excavator - Overhead movement toward the rear | | |
| | Boom up | | |
| | Boom down | | |
| | Arm up | | |
| | Arm crowd | | |
| | Bucket crowd | | |
| | Bucket dump | | |

FOREWORD

You are now the proud owner of a KUBOTA Excavator. This excavator 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 excavator, please read this manual carefully. It will help you become familiar with the operation of the excavator and contains many helpful hints about excavator 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.

Please note that there may be some differences between your actual machine and the illustration in the instructions.



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, 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.

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SAFE OPERATION

The best insurance against accidents is to abide by the safety regulations.

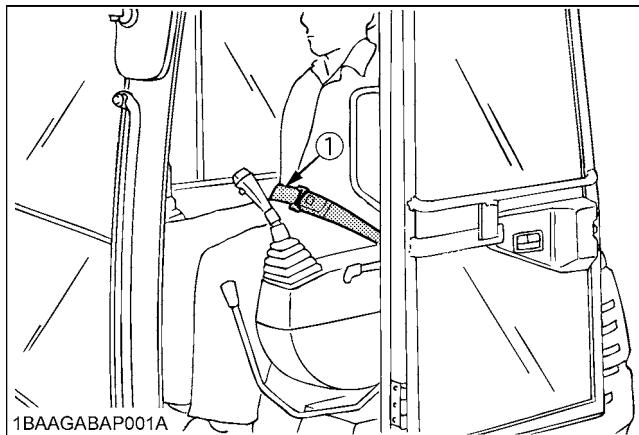
Read and understand this manual carefully before operating the excavator.

Every user, however experienced, should carefully read and understand this manual and those of the attachments and accessories before taking the excavator into operation. The owner is obliged to inform the operators of these instructions in detail.

Keep this manual in the pocket under the seat.

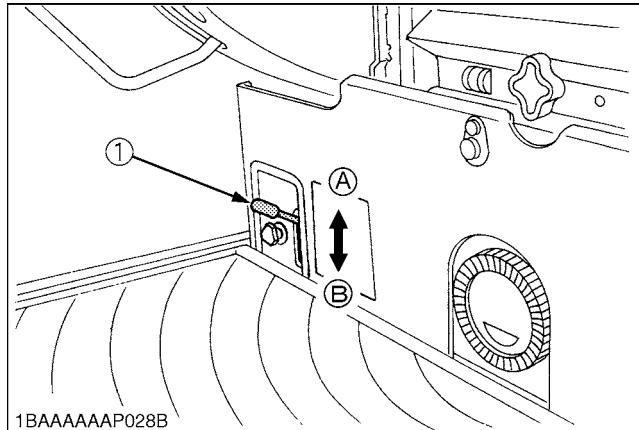
1. BEFORE OPERATION

1. Make yourself acquainted with the excavator and be aware of its limits. Read the operating instructions carefully before starting the excavator.
2. Obey the danger, warning and caution labels on the machine.
3. For your safety, ROPS/FOPS (Roll-Over Protective Structures, Falling Objects Protective Structures.) with a seat belt is installed by KUBOTA. Always use the seat belt when the machine is equipped with a ROPS/FOPS. Do not modify structural members of ROPS by welding, drilling, bending, grinding or cutting, as this may weaken the structure. If any component is damaged, replace it. Do not attempt repairs. If ROPS is loosened or removed for any reason, make sure all parts are reinstalled correctly. Tighten mounting bolts to proper torque.
4. The seat belt must be inspected regularly and replaced if damaged.



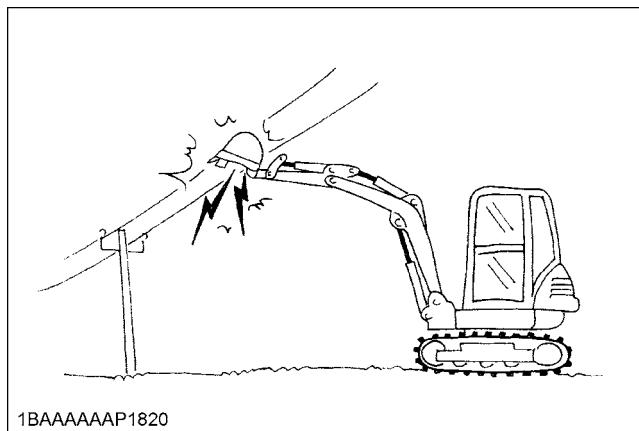
(1) Seat belt

5. Study control lever pattern A and pattern B. Then choose the one which is most familiar. Familiarize yourself with the pattern selected by operation slowly at low engine speed.



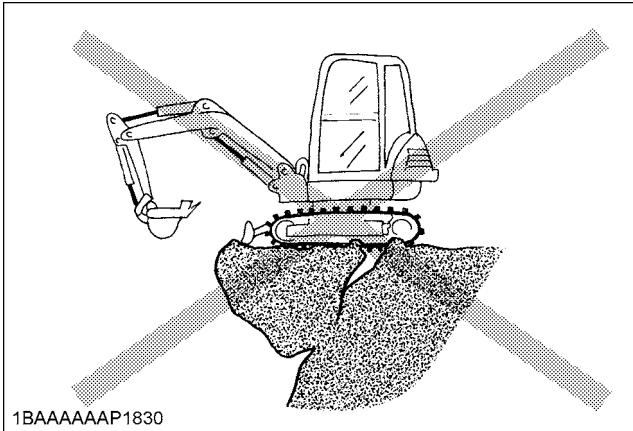
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(1) Pattern selector lever (Two Pattern Selection System: TPSS)

6. Do not operate the excavator while under the influence of alcohol, medication, controlled substances or while fatigued.
7. Check the surroundings carefully before using the excavator or when attachments are being attached.
- Pay attention to the overhead clearance with electric wires.

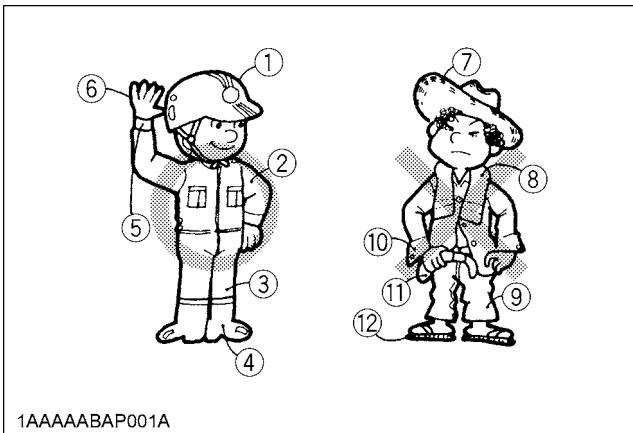


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- Check for pipes and buried cables before digging.
- Check for hidden holes, hindrances, soft underground, and overhangs.



- During excavator use, do not allow any persons within the working range.
- 8. Do not allow other persons to use the machine before having informed him on the exact operation and work instructions, and be assured that the operator's manual has been read and completely understood.
- 9. Do not wear baggy, torn or oversized clothing when working with the excavator. Clothing can get caught in rotating parts or control elements which can cause accidents or injuries. Wear adequate safety clothing, e.g. safety helmet, safety shoes, eye protection, ear protection, working gloves, etc., as necessary and as prescribed by law or statutes.



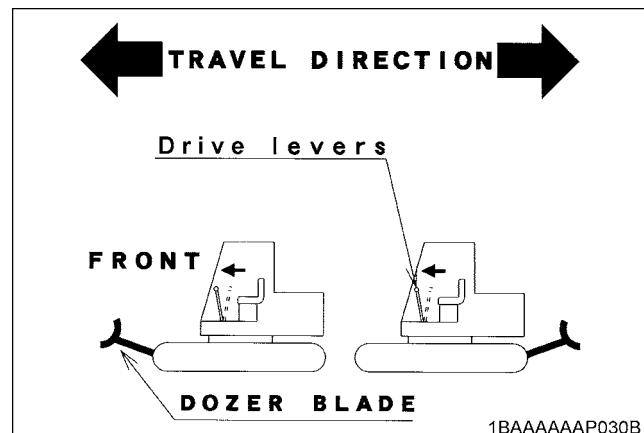
- | | |
|---------------------------|-------------------------------|
| (1) Helmet | (7) Straw hat |
| (2) Clothing fit for work | (8) Towel |
| (3) Tight seams | (9) Baggy trousers |
| (4) Good grip footwear | (10) Loose cuffs of the shirt |
| (5) Well fitting cuffs | (11) Baggy shirt |
| (6) Working gloves | (12) Rubber sandals |

10. Do not allow passengers to ride on any part of the excavator at anytime. The operator must remain in the excavator seat during operation.
11. Check mechanical parts for correct adjustments and wear. Replace worn or damaged parts immediately.
12. Keep your excavator clean. Heavy soiling, grease, dust and grass can cause fires, accidents or injuries.
13. Use only KUBOTA authorized attachments.

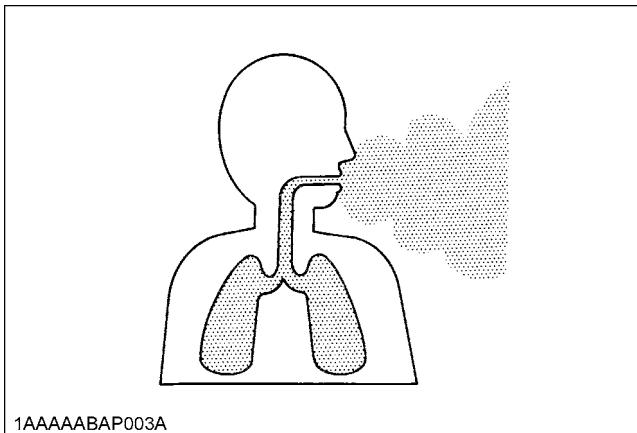
14. Before starting the excavator, be absolutely sure that the excavator has been filled with fuel, lubricated, greased and undergone all necessary maintenance.
15. Do not modify the excavator, otherwise it could lead to unforeseen safety problems.
16. Make sure attachments, particularly those utilizing quick attach systems, are securely mounted.

2. STARTING OF THE EXCAVATOR

1. Get into and out of the machine safely. Always face the machine. Always use handrails and available steps and keep yourself well balanced. Do not hold any of the control levers and switches. Do not jump on or off the machine, whether stationary or in motion.
2. Start and control the excavator only from the operator's seat. The driver should not lean out of his seat when the engine is running.
3. Before starting the engine, make sure that lock levers are in position "Lock" and all control levers and pedals are in their neutral positions and the seat belt is fastened correctly.
4. Make sure that the dozer blade is in front of you. (The dozer must be raised.) If the levers are activated with the dozer blade at the rear, the tracks will move in the opposite direction of the drive levers.



5. Do not operate or idle engine in a non-ventilated area. Carbon monoxide gas is colorless, odorless, and deadly.



6. Keep all safety equipment and covers in place. Replace damaged or missing safety devices.
7. Precautions against tipping over. Keep away from steep slopes and embankments. Do not swing the bucket downhill. Lower the dozer during digging. Keep the bucket as low as possible while driving uphill. Turn slowly on slopes (at reduced speed). Do not place the excavator near the edges of trenches and banks, as the earth can give away due to the weight of the excavator.
8. Watch out at all times for the area to which the excavator is being moved.
Pay attention to any hindrances.

◆ Safety for children

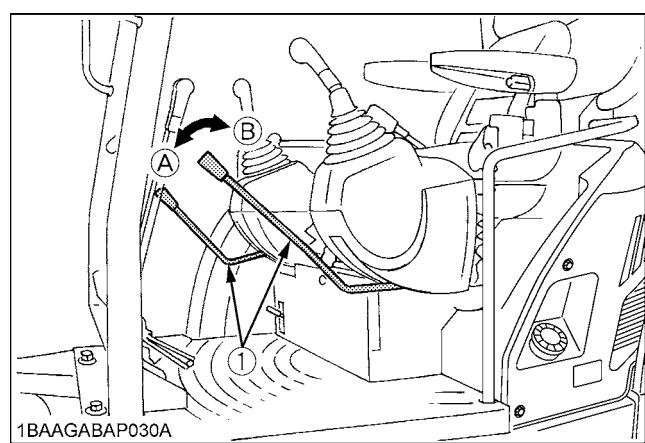
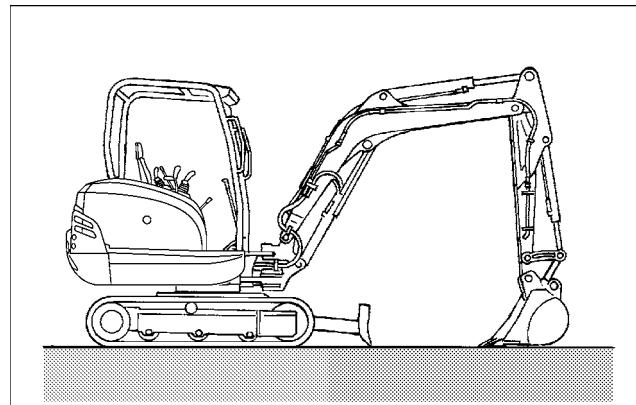
Tragedy can occur if the operator is not alert to the presence of children. Children generally are attracted to machines and the work they do.

1. Never assume that children will remain where you last saw them.
2. Keep children out of the work area and under the watchful eye of another responsible adult.
3. Be alert and shut your machine down if children enter the work area.
4. Never carry children on your machine. There is no safe place for them to ride. They may fall off and be run over or interfere with your control of the machine.
5. Never allow children to operate the machine even under adult supervision.
6. Never allow children to play on the machine or on the attachments.
7. Use extra caution when backing up. Look behind and down to make sure the area clear before moving.
8. When parking your machine, if at all possible, park on a firm, flat and level surface; if not, park across a slope. Lower the bucket and dozer to the ground, remove the key, place the control lock levers in the locked position from the ignition and lock the cab door (if equipped), before you leave.

3. AFTER OPERATION

Before leaving the machine,

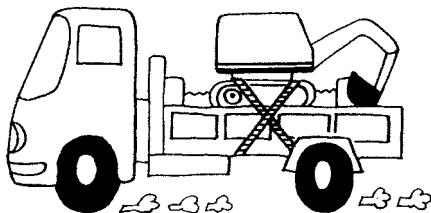
- Park the excavator on a firm, flat and level surface.
- Lower the attachments and the dozer blade to the ground.
- Stop the engine.
- Release pressure trapped in the hydraulic system.
- Lock all control levers.
- Remove the key.



(1) Lock lever for control lever (A) "Unlock"
(B) "Lock"

4. SAFE LOADING AND TRANSPORT OF THE EXCAVATOR

1. Observe all regulations concerning the transport of excavators on public roads.
2. Use adequately long and robust ramps when loading on a vehicle. (for details see "TRANSPORTING THE EXCAVATOR ON A VEHICLE")
3. Do not change the running direction and to avoid a tipping over, do not try to swing the attachment crosswise to the loading ramps.
4. Lower the attachment on the loading plane and release the pressure from the hydraulic system.
Block the tracks with blocks and tie down the excavator. After loading the excavator on the vehicle, securely tie down the undercarriage of the excavator using suitable chains, tensioners and approved methods.



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5. Avoid abrupt braking of the vehicle with the excavator loaded. The excavator may shift causing an accident.
6. If the excavator is to tow another machine, make sure the load is smaller than the strength of the hook, tow chain or cable.

Max. drawbar pull at coupling hook	70450 N (7183 kgf)
Max. vertical load at coupling hook	7210 N (735 kgf)

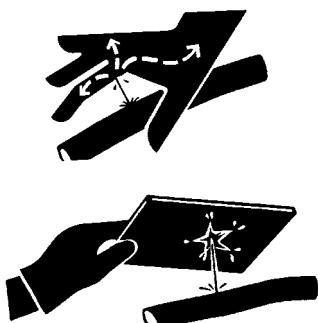
7. Do not use hooks on the roof of canopy or cabin for lifting the excavator.

5. MAINTENANCE

Before doing maintenance work on the excavator, place the machine on even solid ground, lower the attachments to the ground, stop the engine, release pressure trapped in the hydraulic system and remove the key. When dismantling hydraulic parts, make sure that the hydraulic oil has cooled down sufficiently to avoid burns.

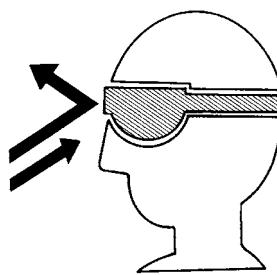
Start maintenance work carefully, e.g. loosen plug slowly so that oil will not squirt out.

1. Before doing work on the engine, the exhaust system, the radiator and the hydraulics, let the excavator cool down sufficiently.
2. Turn off the engine at all times when filling with fuel. Avoid spilling and over-filling of fuel.
3. Smoking is prohibited while refueling or handling the battery! Keep sparks and fire away from the fuel tank and battery. Flammable gases escape from the battery, especially during charging.
4. Do not use or charge the refillable type battery if the fluid level is below the LOWER (lower limit level) mark. Otherwise, the battery component parts may be prematurely deteriorated, which may shorten the battery's service life or cause an explosion. Check the fluid level regularly and add distilled water as required so that the fluid level is between the UPPER and LOWER levels.
5. Read and follow the directions "STARTING WITH AN AUXILIARY BATTERY" in "OPERATION OF THE ENGINE", when starting with an auxiliary battery.
6. Keep a first-aid box and a fire extinguisher at hand at all times.
7. Do not open the radiator cap before the radiator has cooled down sufficiently
First loosen the cap to the first stop and allow the system enough time to release the remaining pressure. Then loosen the cap completely.
8. To avoid short-circuiting the battery, always remove the ground cable first and attach the plus cable first.
9. Leaking hydraulic fluid has enough pressure to penetrate the skin and cause serious injuries. Leakages from pin holes can be totally invisible. Do not use hands for checking for leaks. Always use a piece of wood or cardboard. It is strongly recommended to use a face mask or eye protection. Should injuries occur with leaking hydraulic fluid, contact a doctor immediately. This fluid can cause gangrene or serious allergic reactions.



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10. To avoid environmental damage from acid and heavy metals, do not throw the battery away.
11. Observe all laws and regulations concerning the disposal of used oil, coolants, solvents, hydraulic fluids, battery acids and batteries.
12. To avoid fire, do not heat the hydraulic components (tanks, pipes, hoses, cylinders) before they have been drained and washed.
13. Use a face mask or eye protection to protect the eyes and respiratory system against dust and other foreign particles.

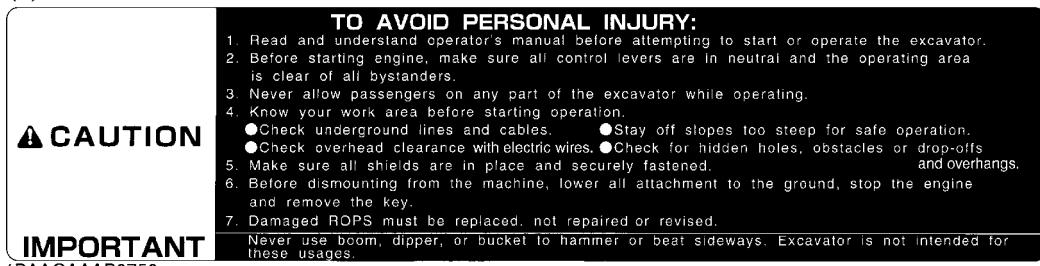


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14. Securely support excavator with stands or suitable blocking before working underneath. For your safety, do not work under any hydraulically supported devices. They can settle, suddenly leak down, or be accidentally lowered.
15. Do not dismantle the spring of the track tensioner. If dismantling is necessary, contact your KUBOTA dealer where the machine was purchased, or competent service shop. The assembly must be done according to the work shop manual of KUBOTA (W.S.M.) for the product involved.
16. KUBOTA uses no parts which are lined with asbestos. Do not use these kind of parts even if they are available and can be installed.

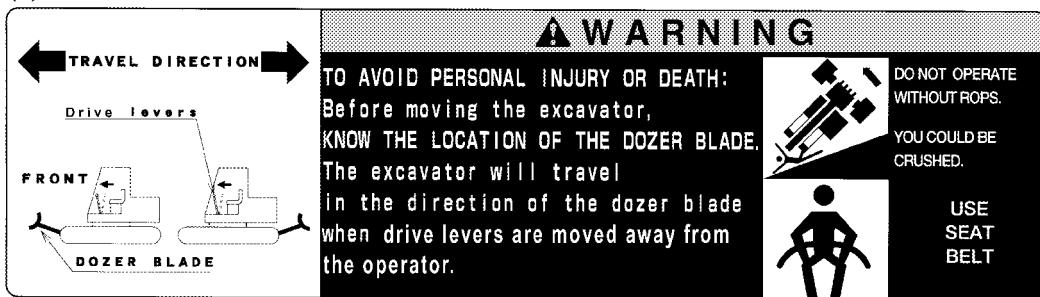
6. DANGER, WARNING AND CAUTION LABELS

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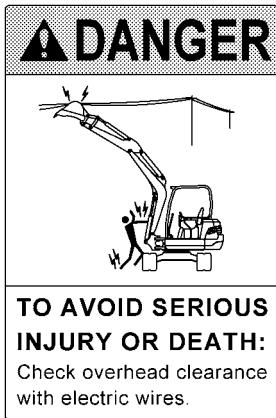
1BAAGAAAP0750

(2) Part No. RC418-5727-4

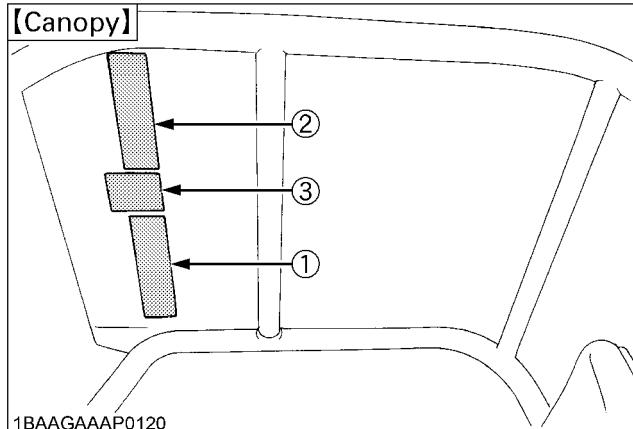


1BAAGAAAP0100

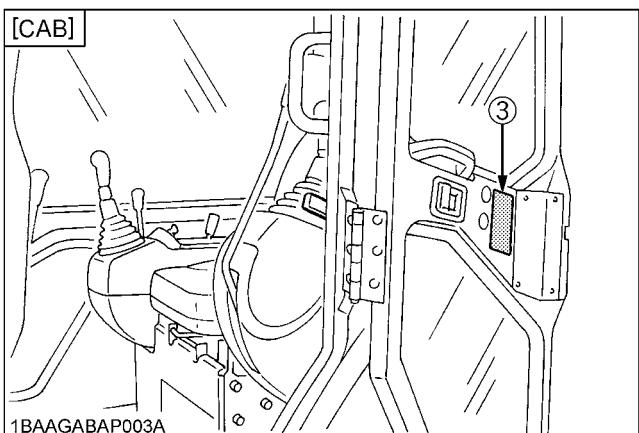
(3) Part No. RC418-5733-5



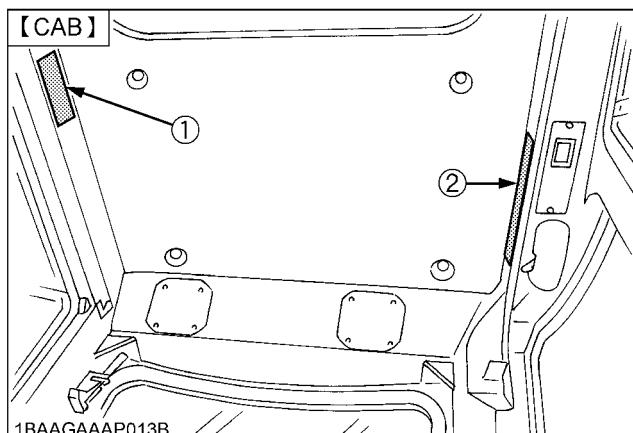
1BAAGAAAP1330



1BAAGAAAP0120



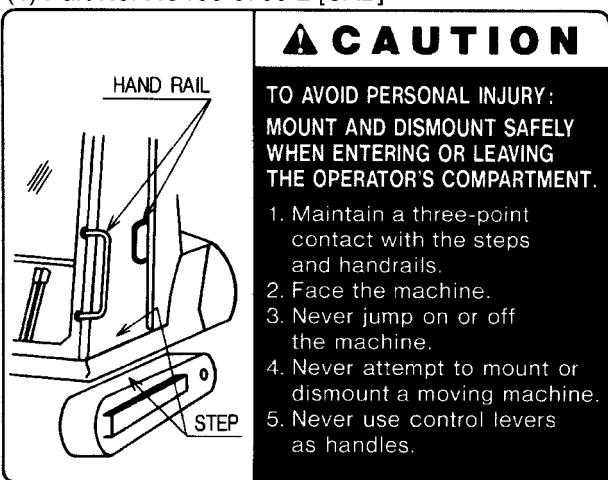
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1BAAGAAAP013B

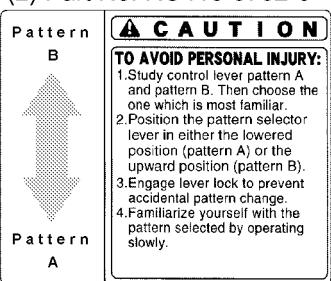
1BAAGABAP0500

(1) Part No. RC108-5765-2 [CAB]



1BAAGAAAP0140

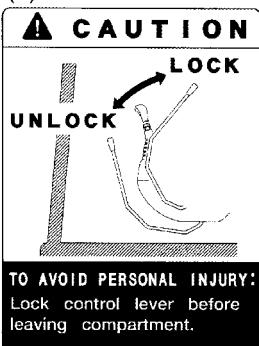
(2) Part No. RC418-5732-3



1BAAGAAAP0170

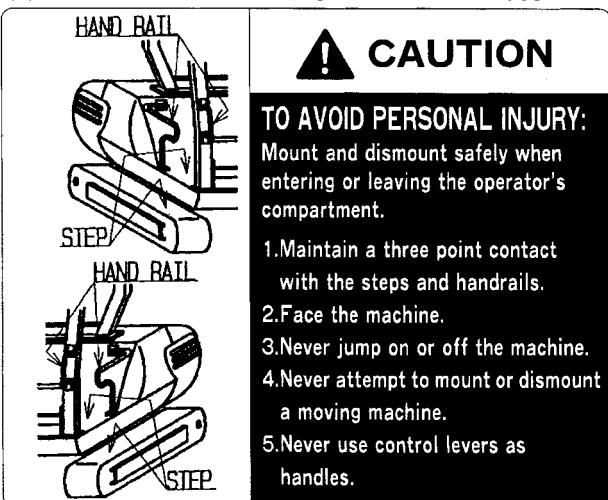
(3) Part No. RC418-5753-1

(4) Part No. RC418-5753-1 [Canopy]

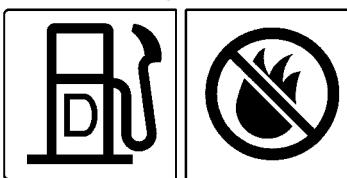
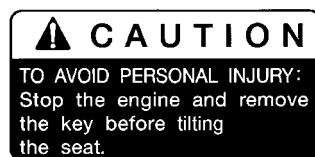


1BAAGAAAP0180

(1) Part No. RB208-5762-1 [KX91-3S2 Canopy]



1BAAGAAAP0150

(5) Part No. RD148-5736-1
Diesel fuel only No fire(6) Part No. RC718-5736-1
[U35-3S2]

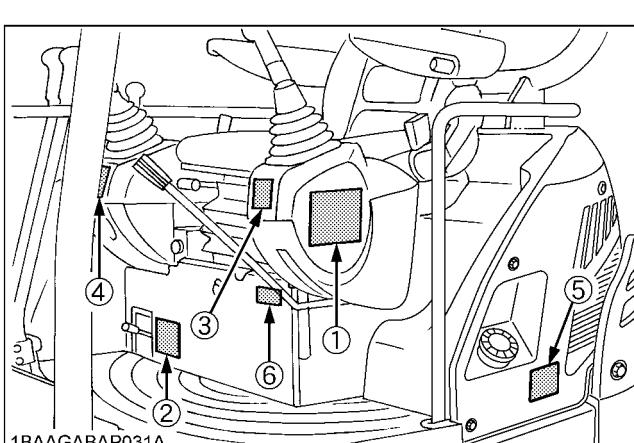
1BAAGAAAP0200

(1) Part No. RD118-5763-1 [U35-3S2 Canopy]



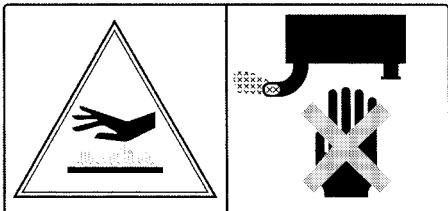
1BAAGAAAP0150

1BAAGABAP0080



1BAAGABAP031A

- (1) Part No. RC418-5738-1
Do not touch hot parts such as exhaust etc.



1BAAGAAAP0210

- (2) Part No. RC108-5754-1



1BAAGAAAP0220

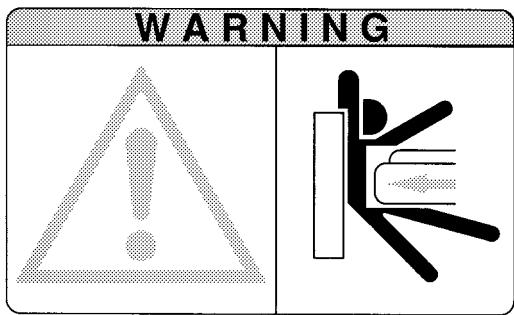
- (3) Part No. RC418-5737-2
Do not get your hands close to engine fan and fan belt.



1BAAGAAAP0230

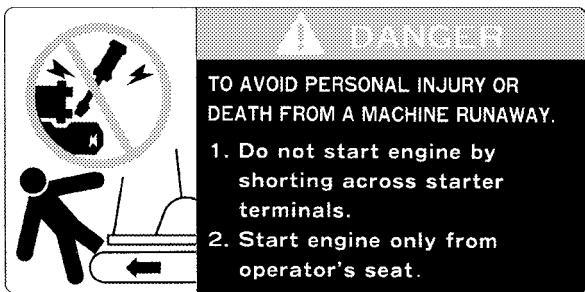
- (4) Part No. RC418-5725-1

Do not allow any persons within the working range.



1BAAGAAAP0240

- (5) Part No. RC108-5718-1

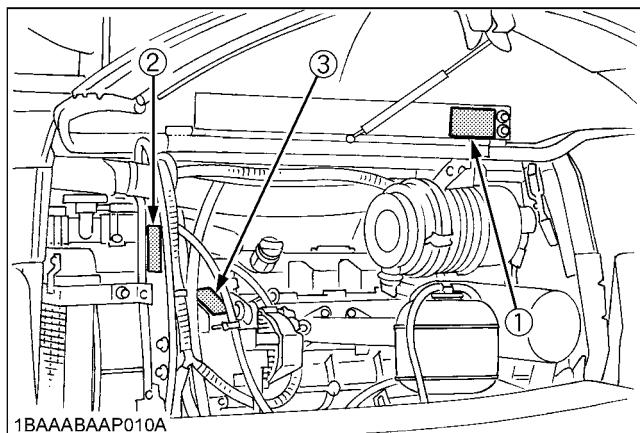


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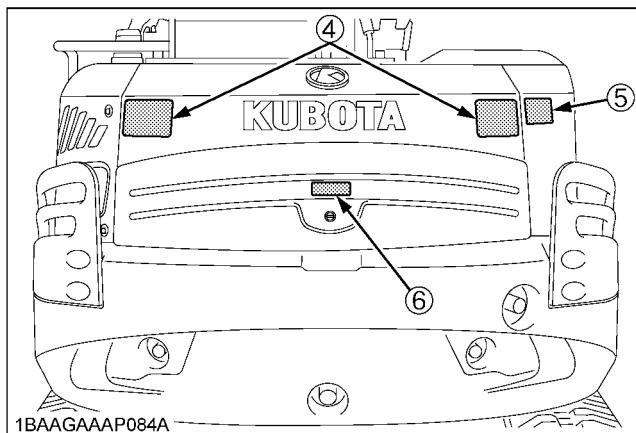
- (6) Part No. RC108-5714-1



1BAAGAAAP0260

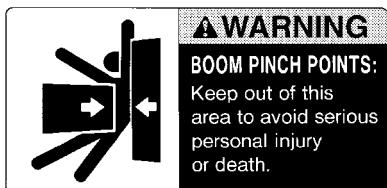


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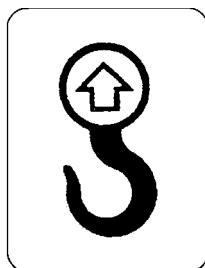
1BAAGAAAP084A

(1) Part No. 68328-5735-1 [Both sides]



1BAAGAAAP0270

(2) Part No. RC108-5796-1 [Both sides]



1BAAGAAAP0290

(3) Part No. RD118-5764-1 [U35-3S2 Canopy]

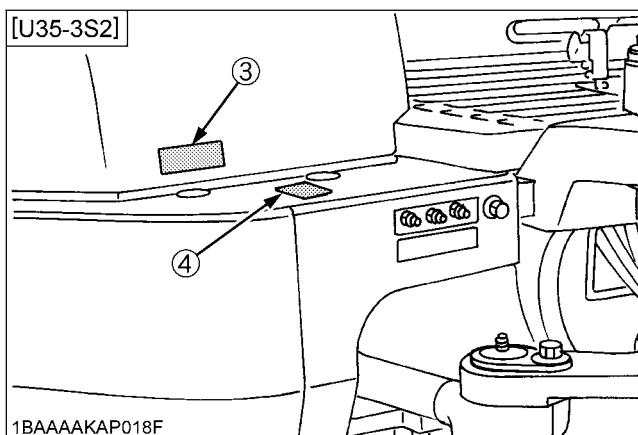
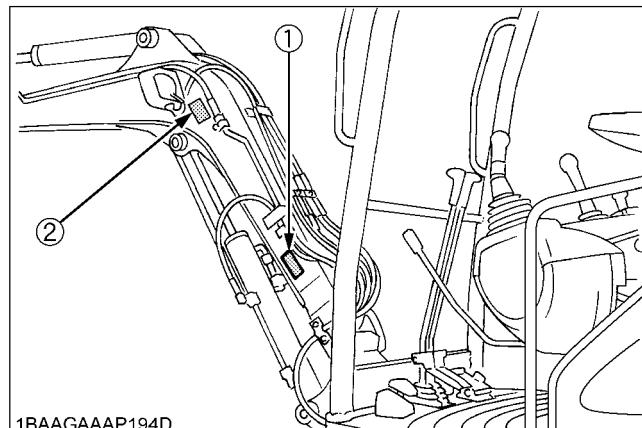
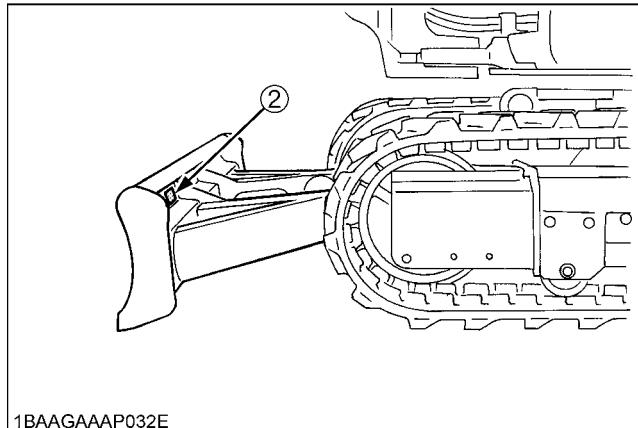


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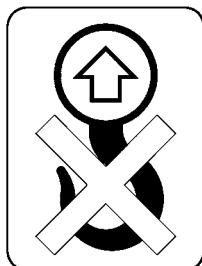
(4) Part No. RD118-5765-2 [U35-3S2]



1BAAGAAAP0310

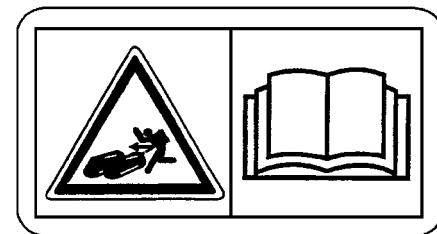


(1) Part No. RB419-5796-1 [Both sides]



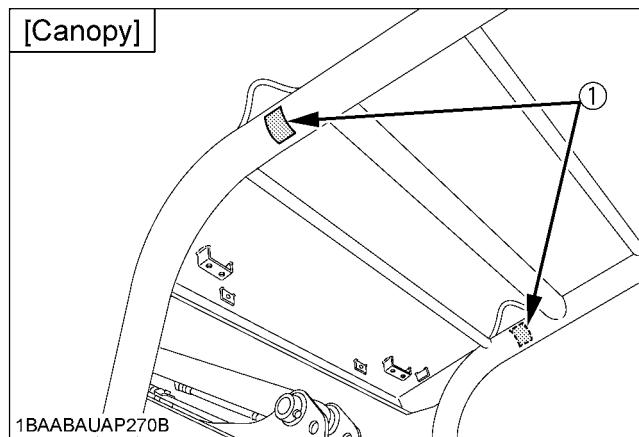
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(2) Part No. RD517-5795-1 [Both sides]



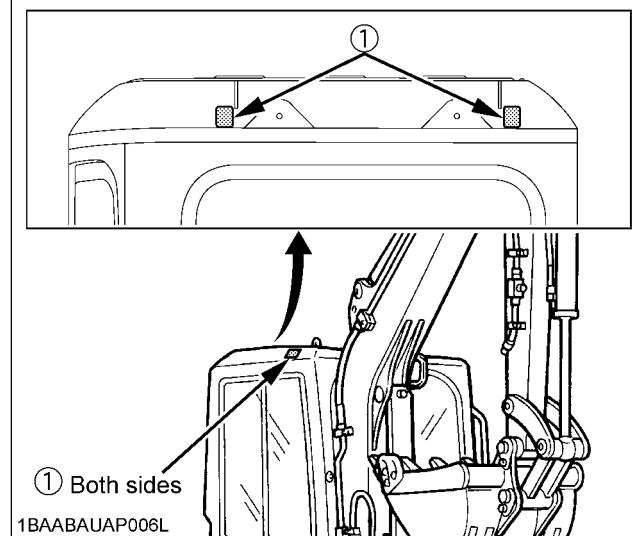
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[Canopy]



1BAABAUAP270B

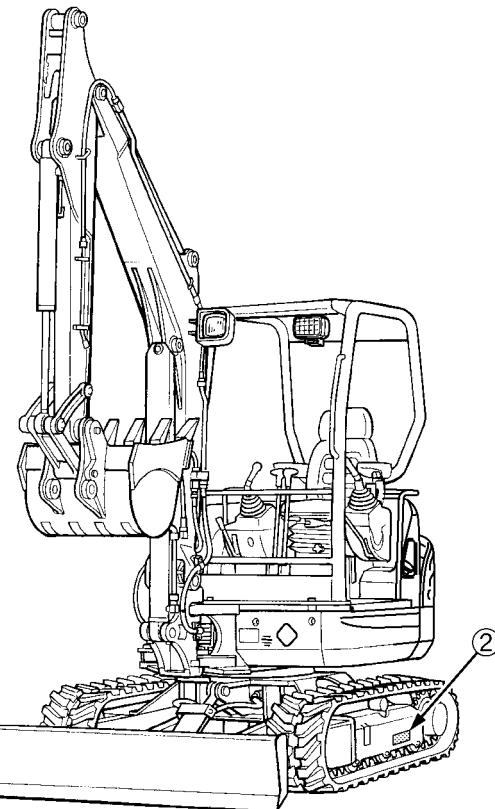
[CAB]



① Both sides

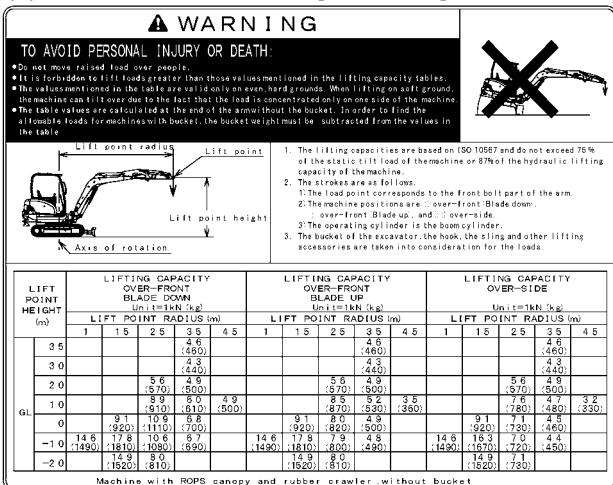
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1BAAGABAP0590



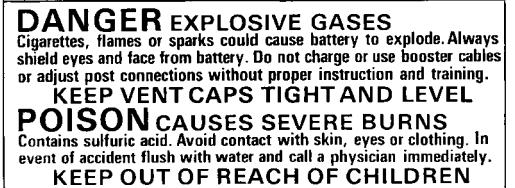
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(1) Part No. RC468-5754-3 [KX91-3S2]

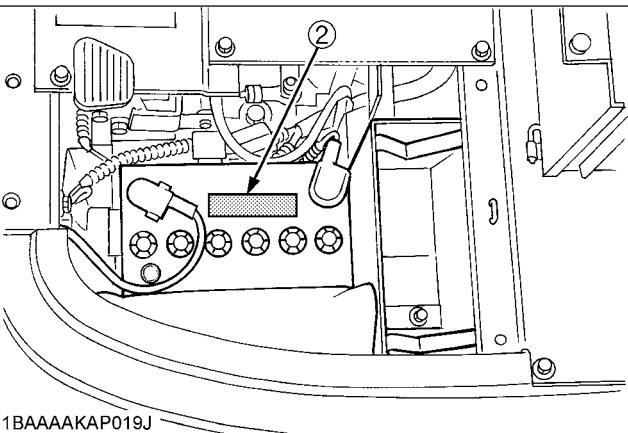


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(2) Part No. 6C040-5559-1



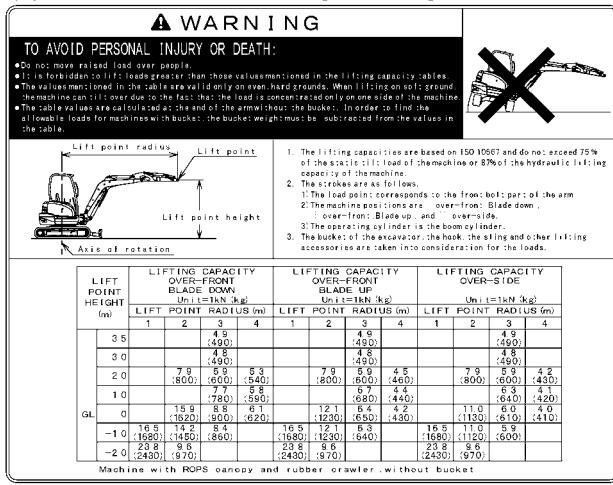
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1BAAGABAP0520

(1) Part No. RC768-5754-3 [U35-3S2]

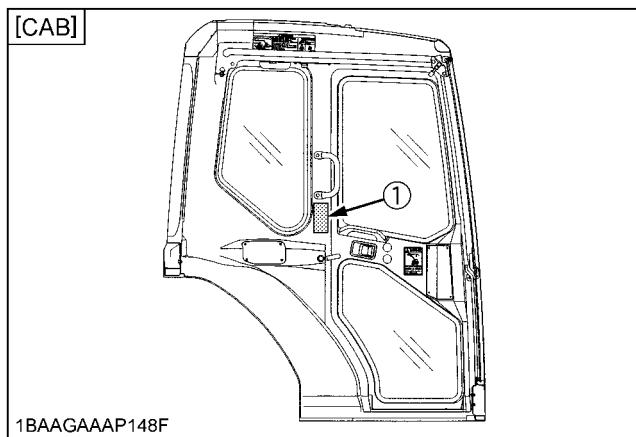
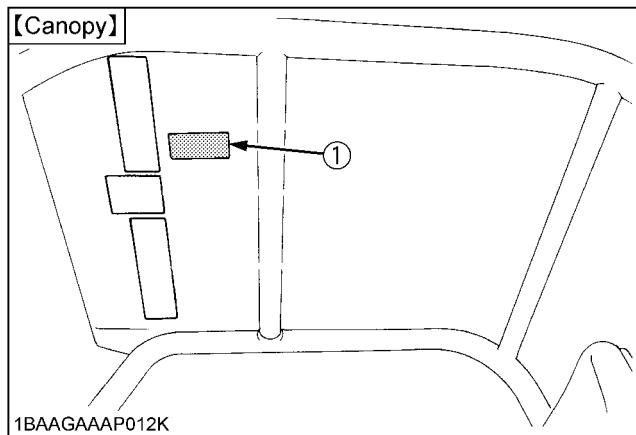


1BAAGABAP0630

(1) Part No. RD809-5738-2



1BAAAARAP1000



7. CARE OF DANGER, WARNING AND CAUTION LABELS

1. Keep danger, warning and caution labels, clean and free from obstructing material.
2. Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
3. Replace damaged or missing danger, warning and caution labels with new labels from your KUBOTA dealer.
4. If a component with danger, 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 danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

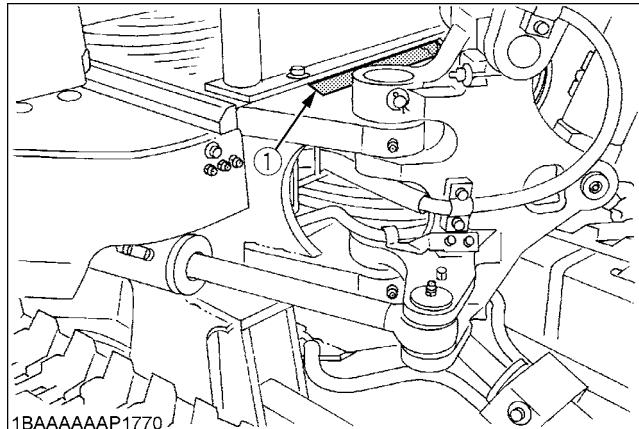
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DEALER SERVICE

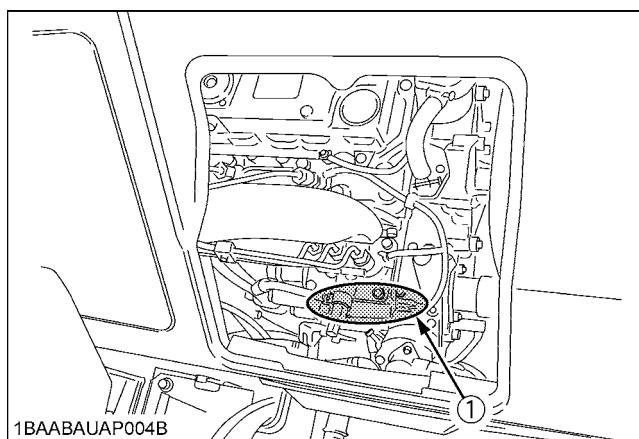
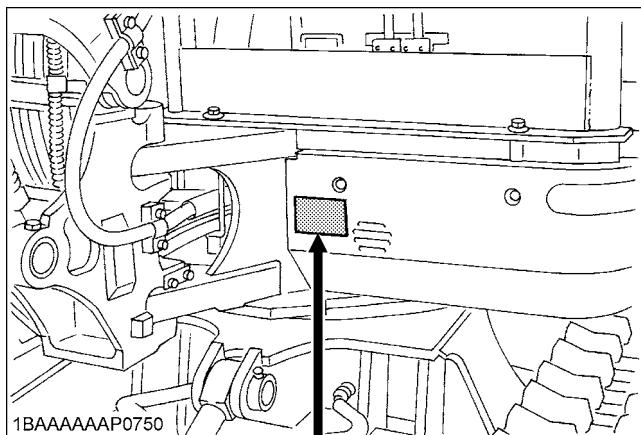
Your KUBOTA dealer is always ready to help so that your excavator offers the best performance. After having carefully read these instruction, you will realize that much of the routine maintenance can be done by yourself. Your KUBOTA dealer is responsible for servicing and the delivery of spare parts. When ordering spare parts from your KUBOTA dealer, always mention the serial number of the excavator and the engine.

Note these numbers right away in the supplied lines.

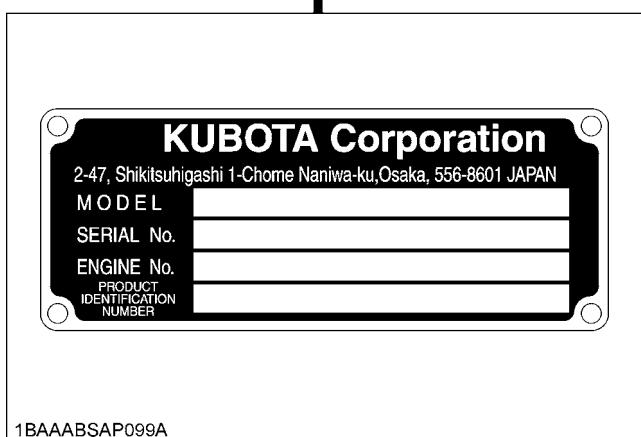
	Model	Serial No.
Excavator		
Engine		
Dealer's name (To be filled in through the owner)		



(1) Serial No.



(1) Engine serial No.



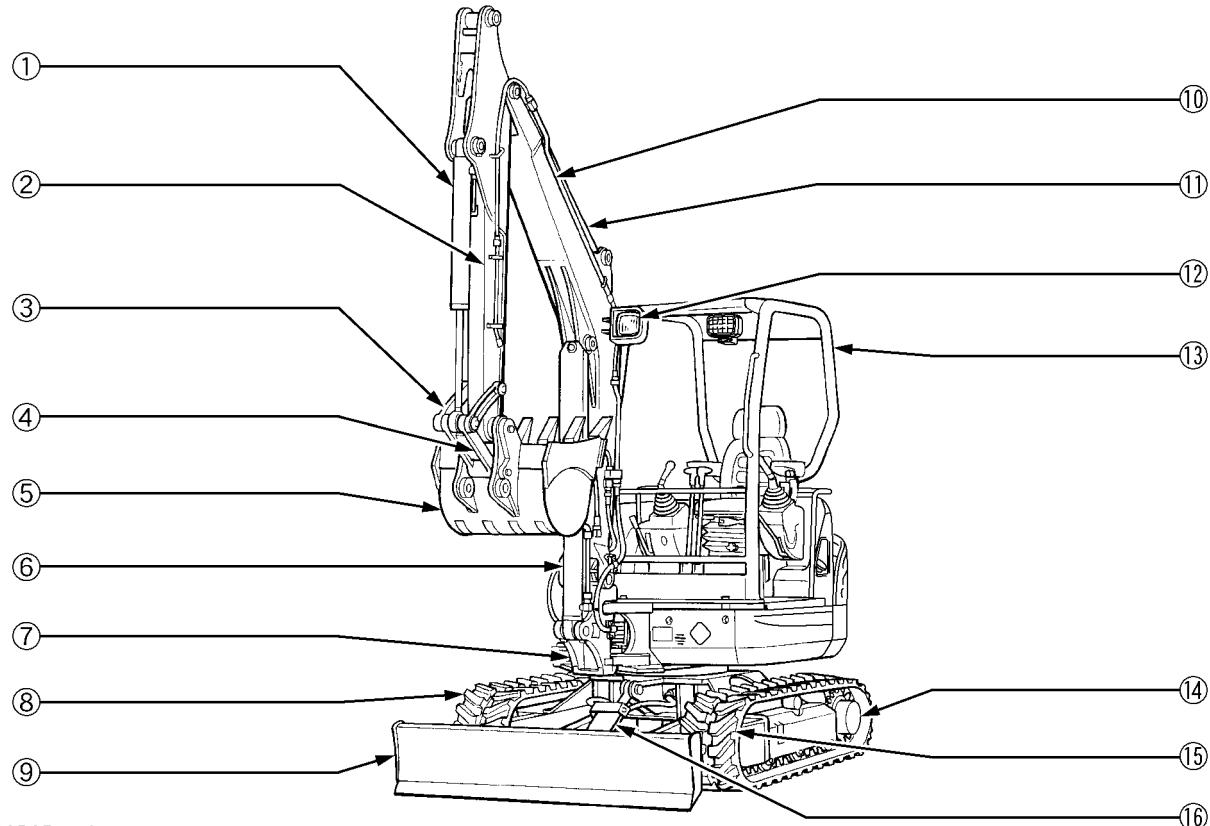
TECHNICAL DATA

			KUBOTA EXCAVATOR					
Model name			KX91-3S2		U35-3S2			
Type			Canopy		CAB			
Operating weight (including operator's)		kg	3225	3325	3640	3750		
Engine	Type		Water cooled 4 cycle diesel engine with 3 cylinder					
	Model name		KUBOTA D1703-M-E3-BH-US2		KUBOTA D1703-M-E3-BH-US1			
	Total displacement	cc	1647					
	Engine power SAE J1955 gross	kW	22.1					
	Rated speed	rpm	2250					
Performance	Unit swing speed		rpm	9.4	8.9			
	Travel speed	Fast	km/h	4.8	4.6			
		Slow	km/h	3.1	3.0			
	Ground pressure (With operator)		kPa (kgf/cm ²)	31.8 (0.32)	32.8 (0.33)	32.7 (0.33)		
	Climbing angle		% (deg)	*36 (20)				
Dozer	Angle in case of crossing slope		% (deg)	*27 (15)				
	Width x Height		mm	1550 x 335	1700 x 335			
Boom swing angle	Left	rad (deg)	1.40 (80)		1.22 (70)			
	Right	rad (deg)	0.87 (50)					
Pressure connection for attachments	Max.displacement (Theoretical)		L/min	63.0	60.0			
	Max. pressure		Mpa (kgf/cm ²)	23.5 (240)	24.5 (250)			
Fuel tank capacity			L	50	40			

NOTE :

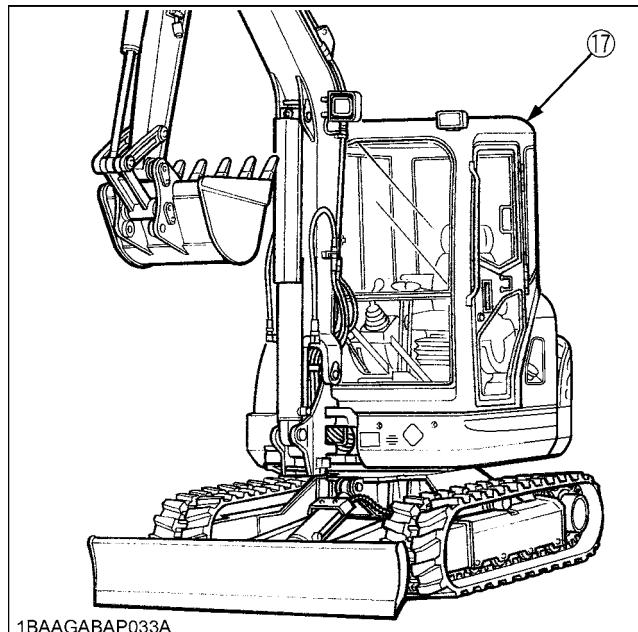
- Above dimensions are based on the machine with rubber trucks.
- Specifications subject to change without notice.
- * With unloaded digging bucket.
- * Firm compacted soil.
- * Operators must exercise extra caution and follow instructions in the operator's manual.
- * Worse condition or heavier attachment to the above will decrease climbing angle.

DESCRIPTION OF MACHINE PARTS



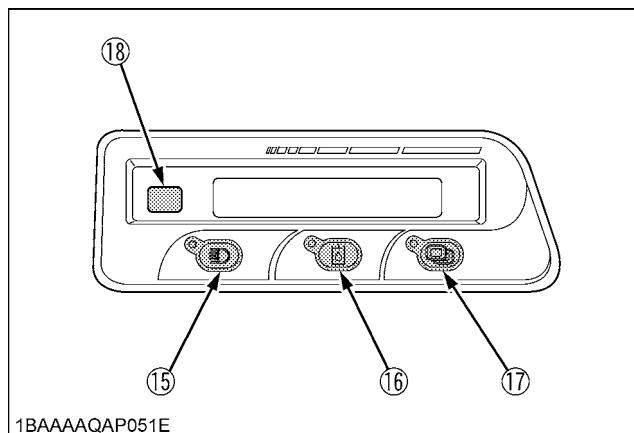
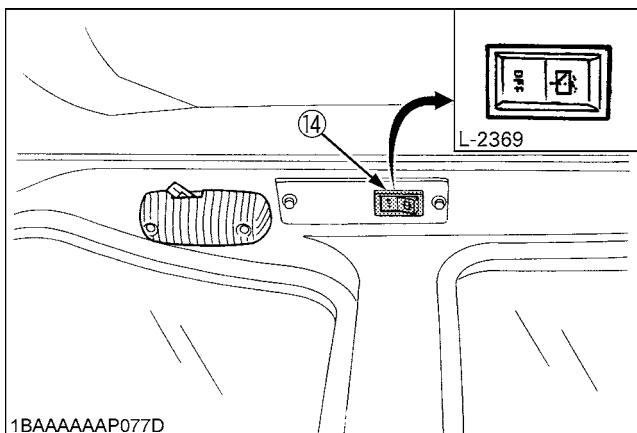
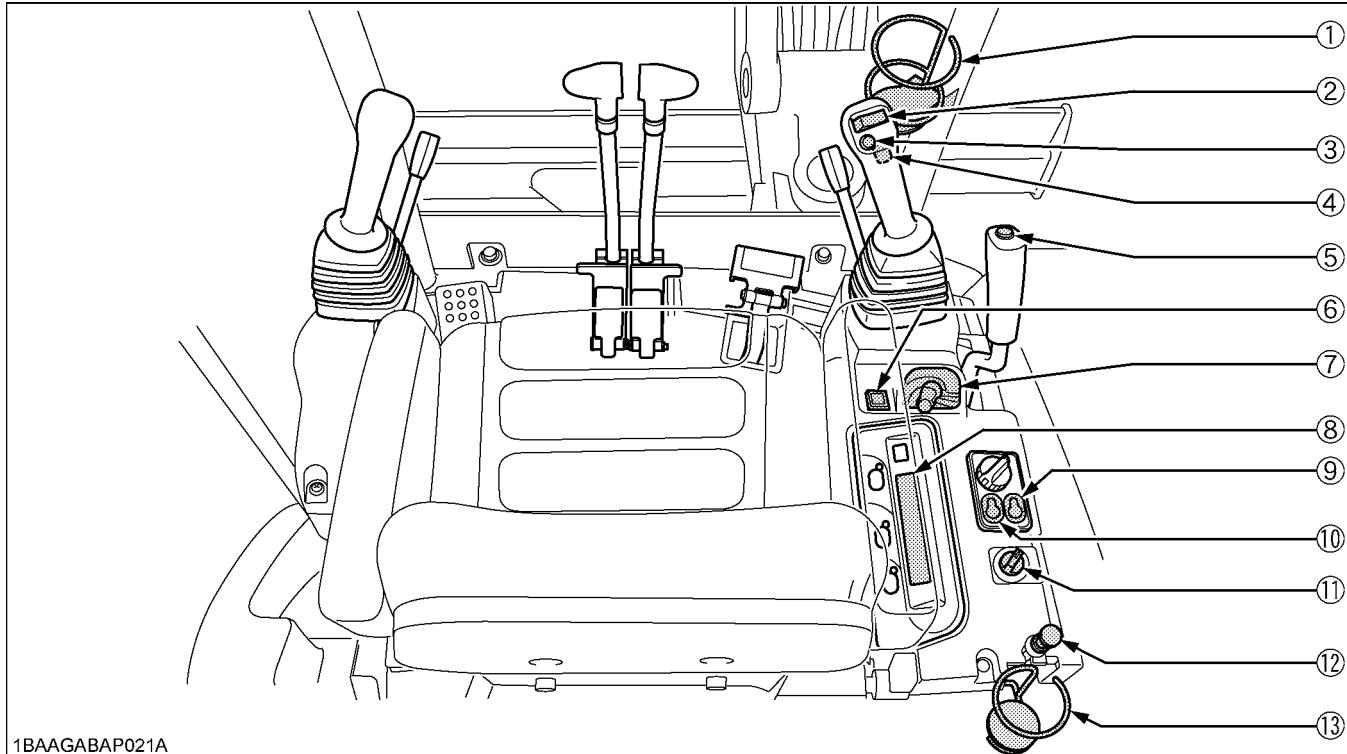
DEPICTED CONTENTS

- | | |
|-------------------------|---------------------|
| (1) Bucket cylinder | (10) Boom |
| (2) Arm | (11) Arm cylinder |
| (3) Bucket link 2 and 3 | (12) Working light |
| (4) Bucket link 1 | (13) Canopy |
| (5) Bucket | (14) Drive sprocket |
| (6) Boom cylinder | (15) Front idler |
| (7) Swing bracket | (16) Dozer cylinder |
| (8) Track | (17) Cabin |
| (9) Dozer blade | |



INSTRUMENT PANEL AND CONTROL ELEMENTS

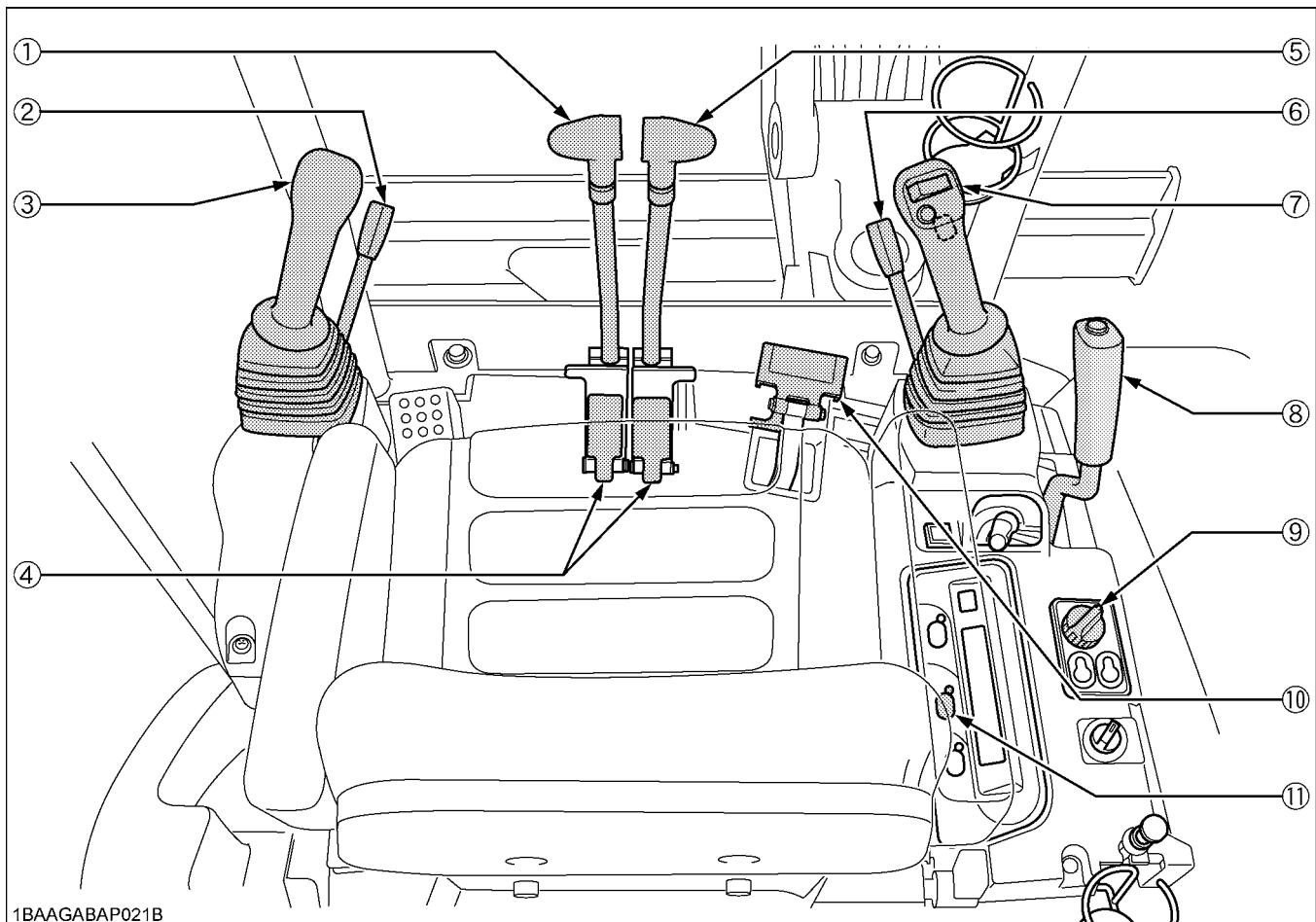
■ Instrument Panel, Switches



DEPICTED CONTENTS

- (1) Cup holder (U35-3S2)
- (2) Service port switch
- (3) Horn switch
- (4) Breaker lock switch
- (5) Travel speed switch
- (6) Speed indicator light
- (7) Starter switch
- (8) LCD display
- (9) Flow volume setting switch
- (10) Switch for Auto idle control
- (11) Heater switch (CAB type only)
- (12) Emergency engine stop knob
- (13) Cup holder (KX91-3S2)
- (14) Wiper / Washer switch (CAB type only)
- (15) Working Light switch
- (16) Service port activation switch
- (17) Display selector switch
- (18) Warning lamp

■ Control Pedals and Levers



DEPICTED CONTENTS

- (1) Drive lever (left)
- (2) Lock lever (left)*
- (3) Control lever for front attachments (left)
- (4) Drive pedal
- (5) Drive lever (right)
- (6) Lock lever (right) [Only Canopy type]*
- (7) Control lever for front attachments (right)
- (8) Dozer control lever
- (9) Throttle potentiometer
- (10) Boom swing pedal
- (11) Service port activation switch

IMPORTANT :

* To prevent inadvertent machine movement, pull the lock lever.

CHECKS BEFORE START

DAILY CHECKS

In order to avoid damage, it is important to check the condition of the excavator before starting.



CAUTION

To avoid personal injury:

- Do maintenance work on the excavator only on level ground with the engine off and the lock lever in the "Lock" position.

Checks

Go around the excavator and check for visual damage and wear.

Check coolant level. (See regular checkpoints in the chapter on maintenance.)

Check fuel level.

Check engine oil level.

Check hydraulic fluid level.

Check air filter for clogging.

Check all control lamps, indicators, tachometer and hour meter.

Check the light system.

Check the seat belt and the ROPS/FOPS safety device.

Check the condition of the safety and warning labels.

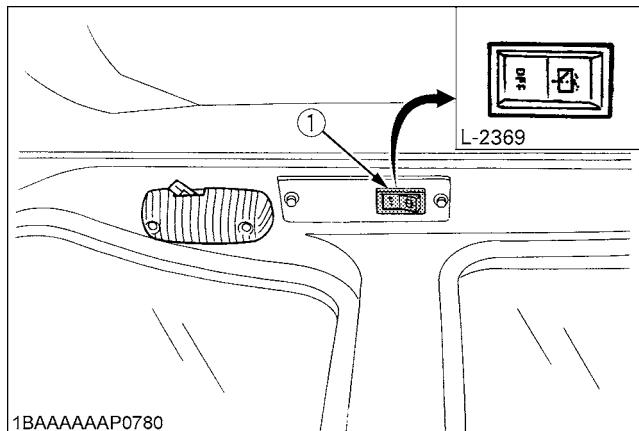
(See "DANGER, WARNING AND CAUTION LABELS" in "SAFE OPERATION".)

CAB TYPE MACHINES

■Wiper/Washer Switch(CAB type only)

Turn the starter switch to position "RUN" and push the switch for the wiper and washer system; the wiper will begin to move. A further push on the switch will activate the washer system.

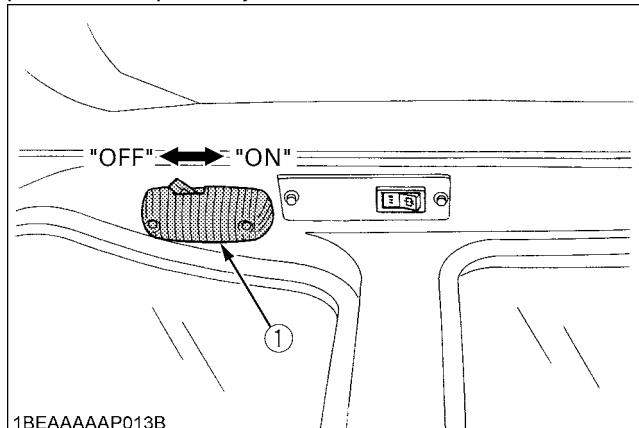
- Do not activate the switch if the tank for the cleaning fluid is empty; the pump can be damaged.
- This can also be the case if the wiper is moved on a dry window. In this case, make sure that cleaning fluid is applied to the pane before activating the wiper.
- In frosty conditions, make sure that the wiper blade is not frozen to the glass before switching-on. The motor can be damaged if the wiper system is used under such conditions.



(1) Wiper switch

■Interior Lamp(CAB type only)

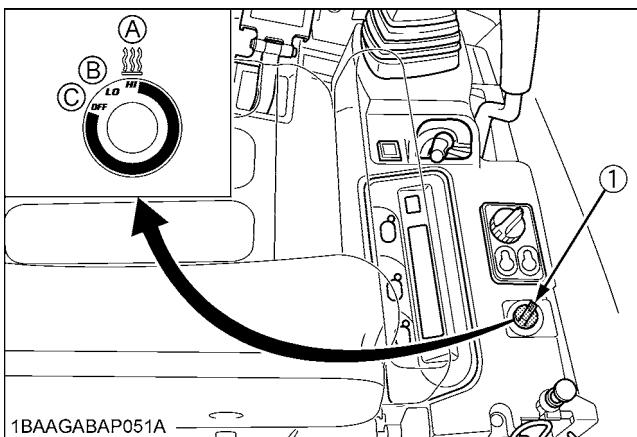
To turn on the interior lamp, set the starter switch to the "RUN" and then the interior lamp switch to the "ON" positions, respectively.



(1) Interior lamp

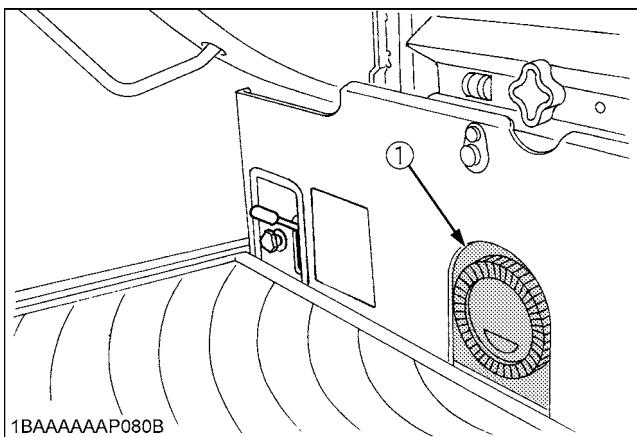
■ Heater Switch(CAB type)

Turn the starter switch to position "RUN" and turn the heater switch clockwise, the heater fan will be activated and the CAB will start to warm up. The heater has two positions - "Low" and "High" -.



(1) Heater switch

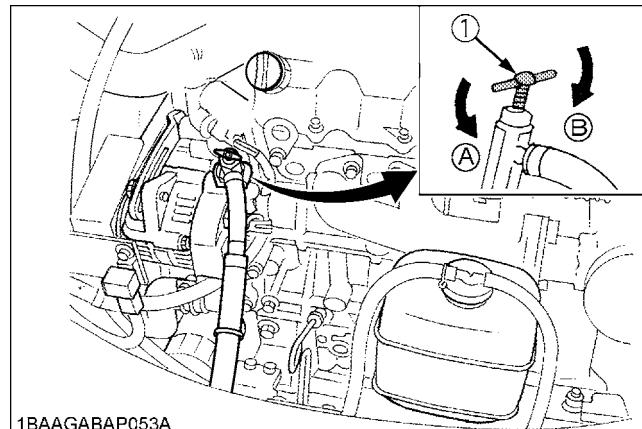
- (A) Pos. "High"
- (B) Pos. "Low"
- (C) Pos. "Off"



(1) Heater outlet

IMPORTANT :

- During the summer, turn the heater valve clockwise to close the valve.

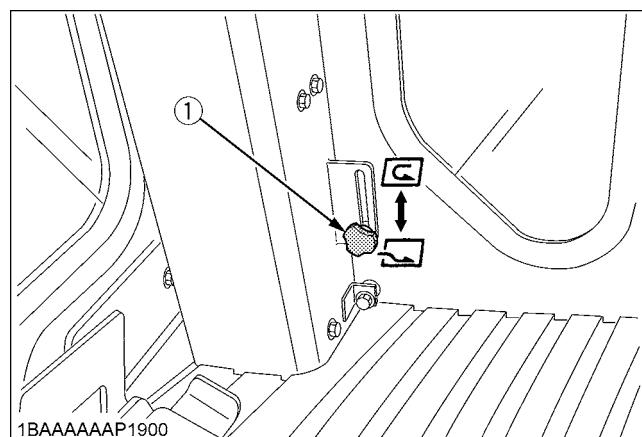


(1) Heater valve

- (A) Open
- (B) Close

◆ Recirculation / Fresh Air Selection knob

- FRESH AIR: Set the knob to the  position, and fresh air will flow into the CAB. This is helpful when you work in a dusty conditions or if the glass windows get foggy.
- RECIRCULATION: Set the knob to the  position, and the in-CAB air will be recirculated. This is useful for heating the CAB quickly or keeping it extra warm.



- (1) Recirculation/
fresh air selection knob

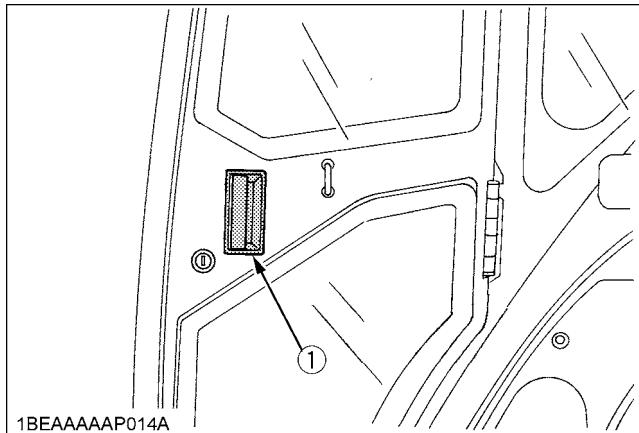
-  "FRESH AIR"
-  "RECIRCULATION"

NOTE :

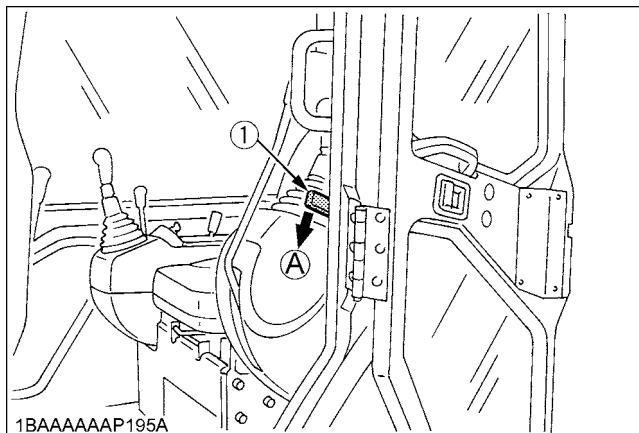
- When heating, do not keep the knob at the "RECIRCULATION" position for a long time. The windshield easily gets foggy.
- While working in a dusty conditions, keep the knob at the "FRESH AIR" position. This increases the pressure in the CAB, which helps prevent dust from coming into the CAB.

■Opening/Closing of CAB Door(CAB type only)

1. Unlock the CAB door and pull the knob. Open the CAB door fully until fixed into place.
2. To close the CAB door, push the release lever down and close the door.



(1) Door knob



- When leaving the excavator, always lock the door.

■Opening/Closing of Front CAB Window(CAB type only)

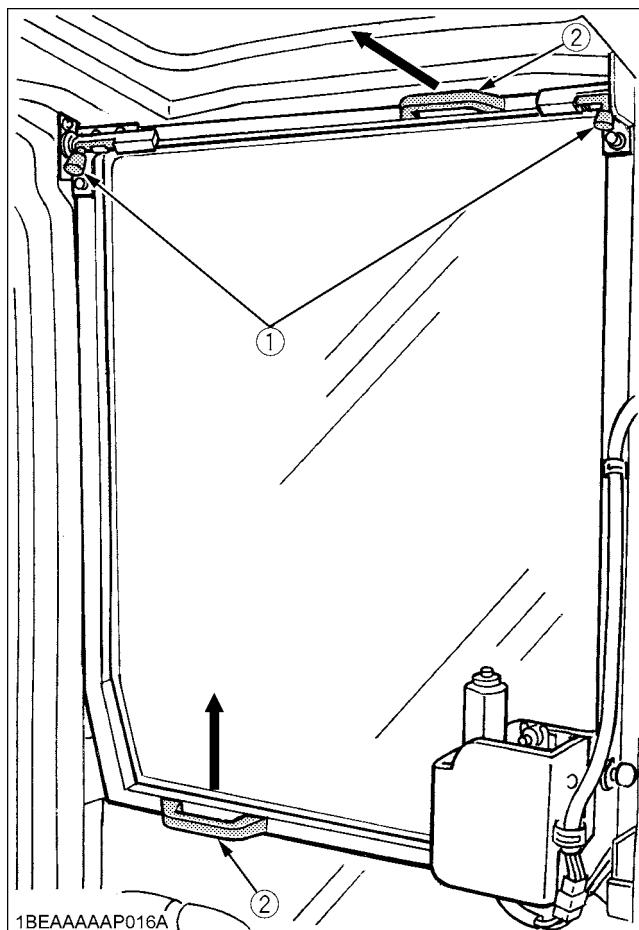
CAUTION

To avoid personal injury:

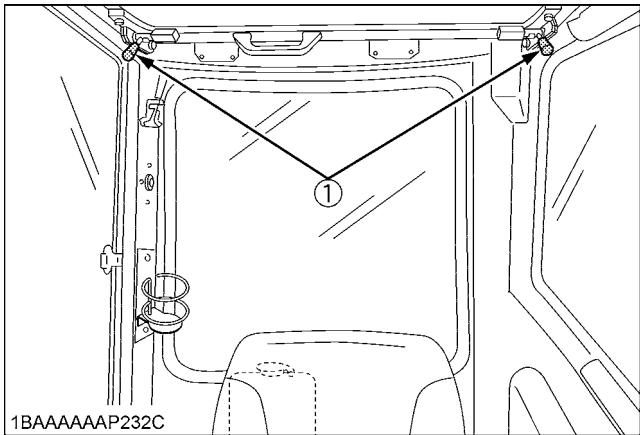
- Keep hands and feet away from the area between front window and CAB frame. Otherwise the operator risks serious injuries by pinching or crushing.
- Other persons should stay away when opening the window.

To open and close the front window, take the steps below.

1. Release the lock levers on the top of the front window.



2. Hold the top and bottom grips tightly with both hands. Pull the top grip slightly upward and toward yourself to let the windshield slide inward.
3. Pull the windshield all the way to the rubber at the back of the CAB. Tighten up the lock levers.

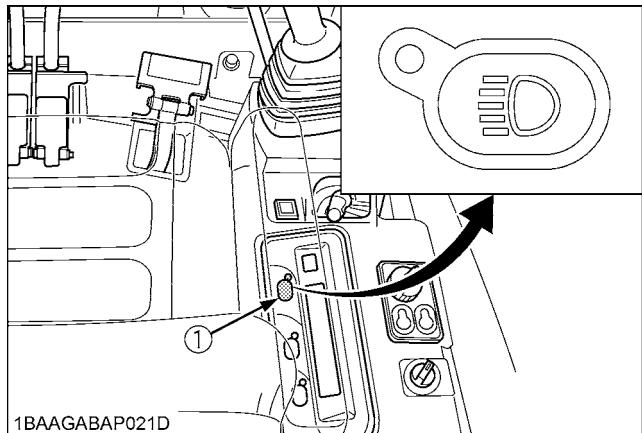


(1) Lock lever

4. To close the window, take the reverse steps 3, 2 and 1.

■Working Light Switch

To turn on the working light, set the starter switch to the "RUN" position and press the working light switch.



(1) Working light switch

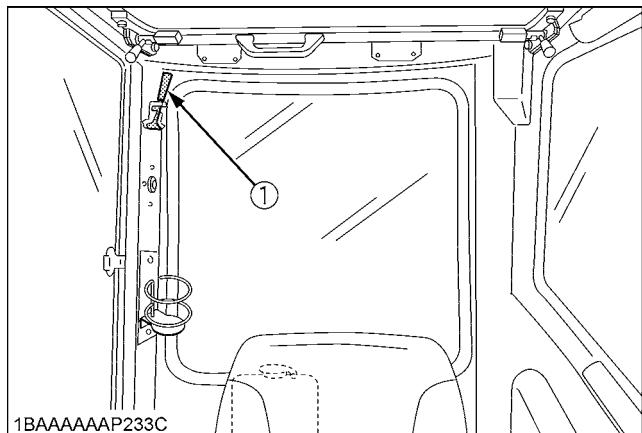
■Emergency Hammer(CAB type only)



To avoid personal injury:

- When breaking the window pane, close your eyes and cover them with an arm.

Emergency hammer is for breaking window pane to escape urgently away from excavator as a result of window rail locking mechanism failure.



(1) Emergency hammer

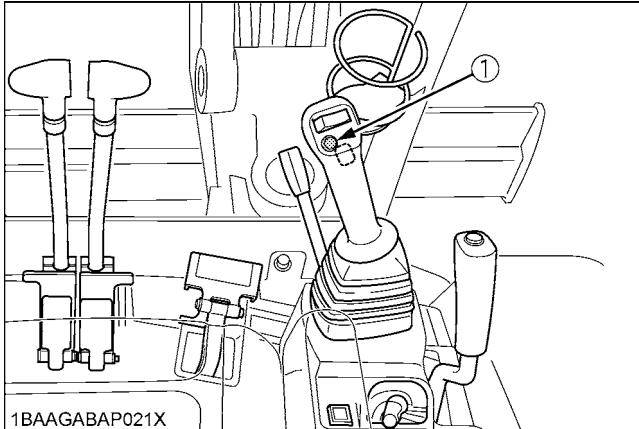
OPERATION OF THE ENGINE



CAUTION

To avoid personal injury:

- Read "SAFE OPERATION" at the beginning of this operator's manual.
- Obey the danger, warning and caution labels on the excavator.
- To avoid the danger of exhaust fume poisoning, do not operate the machine in a closed building without proper ventilation.
- Always start the engine from the operator's seat. Do not start the engine while standing next to the excavator. Before starting the engine, sound the horn to get the attention of persons standing nearby.



(1) Horn switch

IMPORTANT :

- Do not use starting fluid or ether.
- In order not to overload the battery and starter, avoid start-ups of more than 10 sec.
- When engine does not start in 10 sec., please wait 20 sec. or more, before attempting to restart.

STARTING THE ENGINE



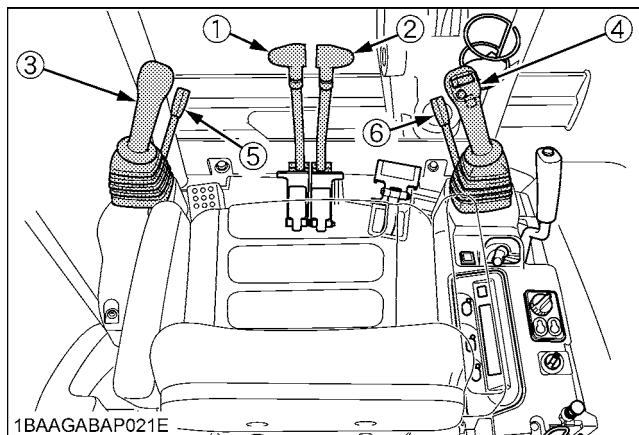
CAUTION

To avoid personal injury:

- The operator should not depend solely on the warning lamps, but should always conduct the routine checks (see "MAINTENANCE").

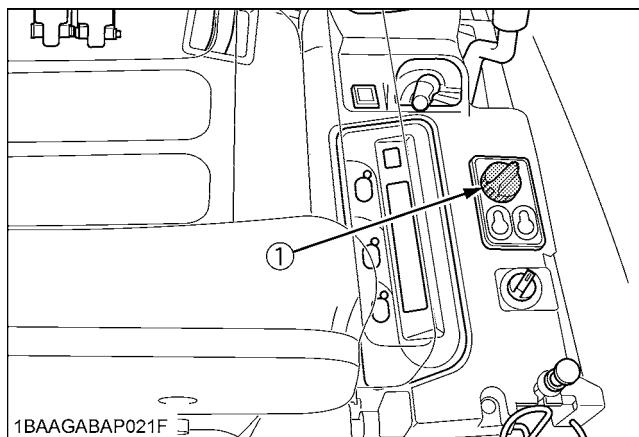
Start the engine in the following manner:

1. Before starting the engine, make sure that all control levers are in the neutral positions.



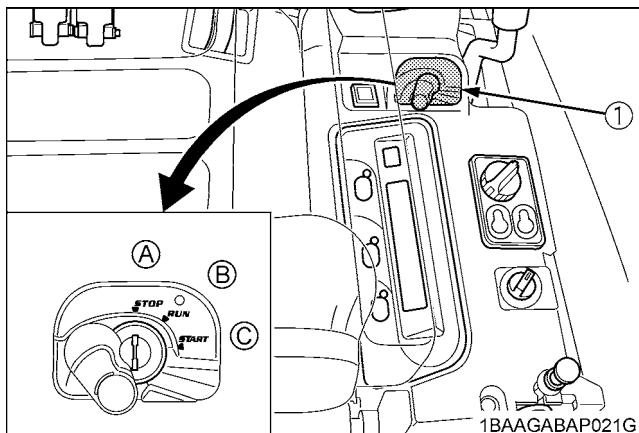
- (1) Drive lever (left)
- (2) Drive lever (right)
- (3) Attachment control lever (left)
- (4) Attachment control lever (right)
- (5) Lock lever (left)
- (6) Lock lever (right) (Only Canopy type)

2. Pull the lock levers all the way back. (lock position)
3. Turn the throttle potentiometer towards the symbol.

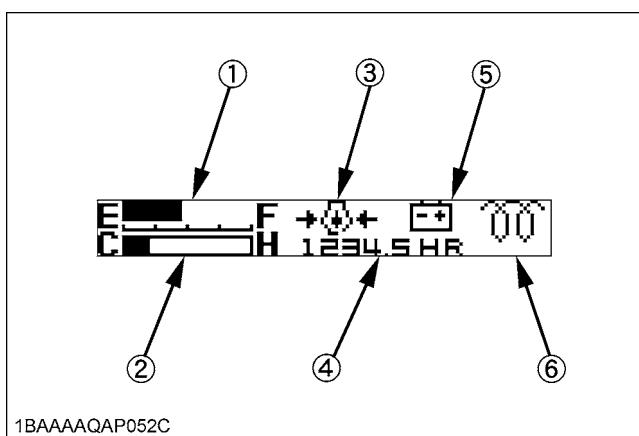


(1) Throttle potentiometer

4. Insert the key into the starter switch and turn it to the position "RUN". The LCD display shows the figure below. The glow lamp will light up while the engine is preheated and will go out automatically after preheating is finished.



(1) Starter switch

(A) "STOP"
(B) "RUN"
(C) "START"

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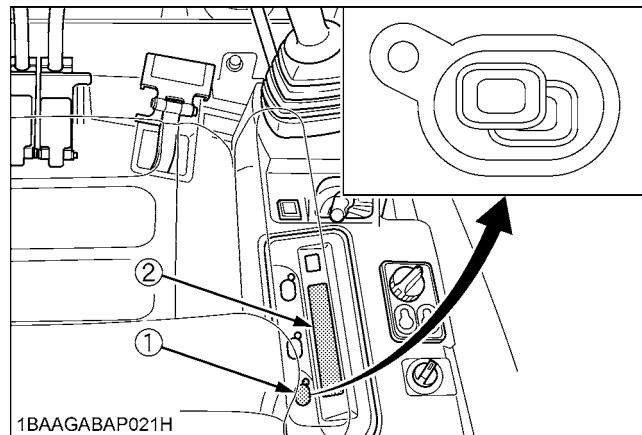
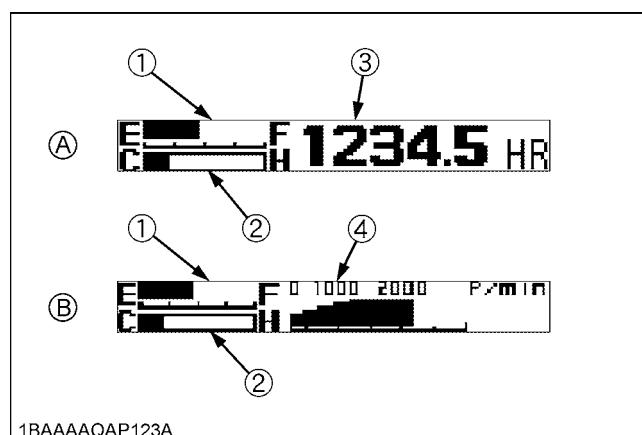
(1) Fuel gauge
(2) Water temperature gauge
(3) Oil lamp
(4) Hour meter
(5) Charge lamp
(6) Glow lamp

5. Turn the key to the position "START" and release after the engine has started.
6. Check if all warning lamps have gone out. Should a warning lamp still be lit up, stop the engine then remove the key and check for the cause.

■Display Selector Switch

Press the display selector switch while the engine is running. The LCD meter display will change from one indication mode to the other.

Change the two-mode display according to your jobs.

(1) Display selector switch
(2) LCD meter display

1BAAAAQAP123A

(1) Fuel gauge
(2) Water temperature gauge
(3) Hour meter
(4) Engine tachometer
(A) "INDICATION MODE 1"
(B) "INDICATION MODE 2"

NOTE :

- With the starter key at the "STOP" position, press the electronic meter's display selector switch or the working light switch, and the LCD display shows the hour meter, fuel gauge and water temperature gauge for 10 seconds.



1BAAAAQAP0530

■ Charge Lamp

This warning lamp lights up if the charging system fails while the engine is running. When the starter switch is turned "ON" with the engine off, the lamp lights up, and when the engine gets started, the lamp goes out.

NOTE :

- If there is disconnection or failure in the charging system when the key is turned to "RUN", the following symbol will appear.



■ Oil Lamp

The engine oil pressure warning lamp lights up due to failure of the lubricating system with the engine running. When the starter switch is turned "ON" with the engine off, this lamp lights up, and when the engine starts, the lamp goes out. If the lamp stays on with the engine running, stop the engine and check the engine oil level.

NOTE :

- If there is disconnection, failure or breakdown in the lubricating system when the key is turned to "RUN", the following symbol will appear.



■ Glow Lamp

With the starter key at the "RUN" position, the engine's preheat status is indicated.

NOTE :

- When the starter switch is turned to the "RUN" position, the engine will be preheated for a given period of time and the lamp will turn on.
- The above indication appears momentarily when the engine is started, but it does not mean any trouble. (This is because the oil charge sensor output becomes unstable when the engine is started.)
- The symbol appears momentarily as the engine starts. This is not an error.

■ LCD Display for Normal Operation

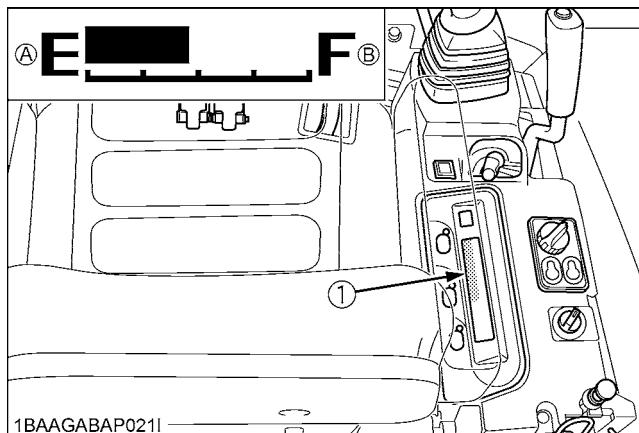
◆ Fuel gauge



To avoid personal injury:

- Before adding fuel, be sure to stop the engine.
- Be sure to keep open flame away from the machine. Otherwise a fire may be caused.

With the starter key at the "RUN" position, the fuel remaining in the fuel tank is indicated in the block.



(1) Fuel gauge

(A) "Empty"

(B) "Full"

IMPORTANT :

- If the fuel gauge indicator is near the "E" or the "FUEL" message appears, add fuel as soon as possible. If the indicator is near "E" and the machine runs on a slope, the engine may run out of fuel and get interrupted.

◆ Fuel supply

The following functions are helpful when adding the fuel. The fueling progress can be monitored by a buzzer sound.

Procedure

1. Press the work light switch or the display selector switch on the meter with the key OFF. (Keep the key at OFF.)



2. The message shown above appears.

3. Add fuel.

4. The buzzer sound interval changes according to the amount fuel added. As the fuel amount becomes close to full, the buzzer sound changes to continuous beeping.



CAUTION

To avoid personal injury:

- If the fuel is poured too fast, the buzzer may not sound according to the fueling process.
- The moment when the fuel tank is nearly full, the buzzer starts beeping.
- Look into the fuel tank when pouring the fuel. Listen to the buzzer sound for a rough estimate of the fill-up progress.

◆ Water Temperature Gauge



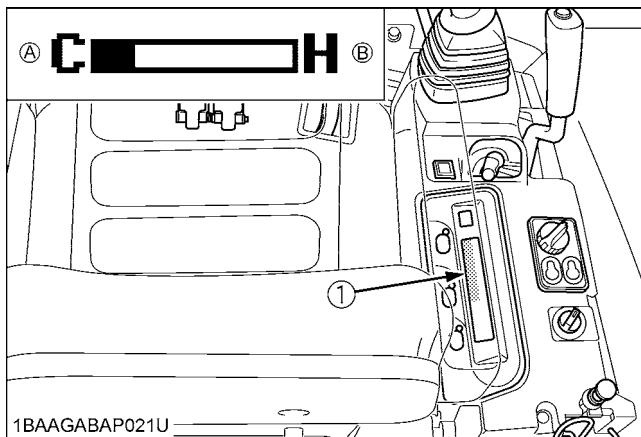
CAUTION

To avoid personal injury:

- Do not open the radiator cap during or just after operation. Hot water may gush out and scald you. Wait for the water to cool down before opening the cap.

With the starter key at the "RUN" position, the cooling water temperature is indicated. If the water temperature indicator is near "H", take the steps below.

1. Discontinue the job.
2. Reduce engine rpm's to idle and keep it at idle for 5 minutes.
3. Stop the engine and check the following points (1)-(3).
 - (1) Low coolant level or leak
 - (2) Fan belt tension
 - (3) Mud or dust deposits on radiator



(1) Water temperature gauge

- (A) "WATER TEMP LOW"
(B) "WATER TEMP HIGH"

◆ Hour-meter

Indicates the total operating hours of the machine.

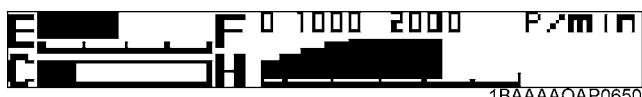
How the indicator works

- The meter advances one hour after an hour of operation regardless of the engine rpm.



◆ Engine tachometer

Indicates the current rpm of the engine.



NOTE :

- The LCD display may be illegible when viewed from a certain angle. This is not a display failure.

■ LCD Display for Warning

◆ Remaining fuel warning

When the fuel level is very low, the lamp (yellow) starts flashing and the following message appears in the display.



◆ Battery charge warning

If the charging system fails, the lamp (red) starts flashing and the following message appears in the display.



◆ Engine oil pressure low warning

When the engine oil pressure drops too low, the **▲** lamp (red) starts flashing and the following message appears in the meter:

Immediately stop the engine and check the engine oil level.



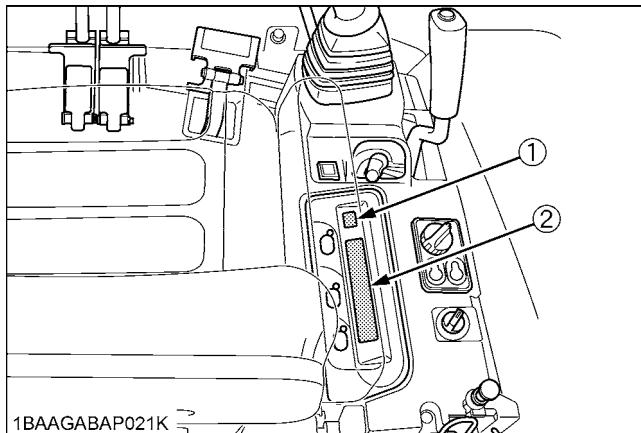
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■ Warning Lamp

- The warning lamp is used to indicate broken wire, short-circuit, fuel shortage and other problems.

NOTE :

- Warnings and errors are displayed and an alarm buzzer beeps.
- The warning lamp starts flashing in red if any trouble occurs. If the system gets in warning signal, the warning lamp starts flashing in yellow.



(1) Warning lamp (red, yellow)

(2) LCD display

IMPORTANT :

- Do not just look at the meter, but also carry out the inspection and correction accordingly.

NOTE :

- Let your KUBOTA dealer inform you of details concerning care and maintenance.

■ Checkpoints after Starting the Engine

After starting the engine, but before starting operation, check the following points:

- Turn the throttle potentiometer down and let the engine idle for approx. five minutes. This allows the engine lubricant to warm up and penetrate every part of the engine.

NOTE :

- This idling is usually called "Warm-up".

- Once the engine has warmed up, check:
 - the warning lamp "Engine oil pressure" has gone out.
 - the warning lamp "Battery charge" goes out when engine speed is increased.
 - the color of the exhaust is normal and no abnormal noises or vibrations are heard or felt.
 - no fluid is leaking from pipes or hoses.

◆ Should any following conditions occur, stop the engine immediately.

- The engine rpm's increases or decreases suddenly.
- Sudden abnormal noises are heard.
- Exhaust is black.
- Warning lamp for engine oil lights up during operation.

IMPORTANT :

- In these cases, the excavator must be checked and serviced by your local KUBOTA dealer.

STARTING THE ENGINE UNDER COLD CONDITIONS



CAUTION

To avoid personal injury:

- Make sure that the lock lever is in the lock position during warm up.

Start the engine in the following manner;

1. Pull the lock levers all the way back (lock position).
2. Turn the starter switch to the position "RUN" (glow position) and keep until the indicator lamp has gone out.
3. Move the starter switch to the position "START"; to crank and start engine.
4. Release the starter switch after the engine has started; it will automatically return to the position "RUN".

IMPORTANT :

- Let the engine warm up after start-up.
- Let the engine warm up after start-up for approx. 10 minutes under no load conditions. If the hydraulic fluid temperature is too low, the operations will be affected. Do not operate the excavator under full load before the engine has warmed up enough.

STOPPING THE ENGINE



WARNING

To avoid personal injury or death:

- Do not keep the bucket or dozer in the lifted position, as a person could accidentally touch the levers and cause serious accidents.

1. After slowing the engine to idle, turn the key to "STOP".
2. Remove the key.

■Emergency Engine Stop Knob

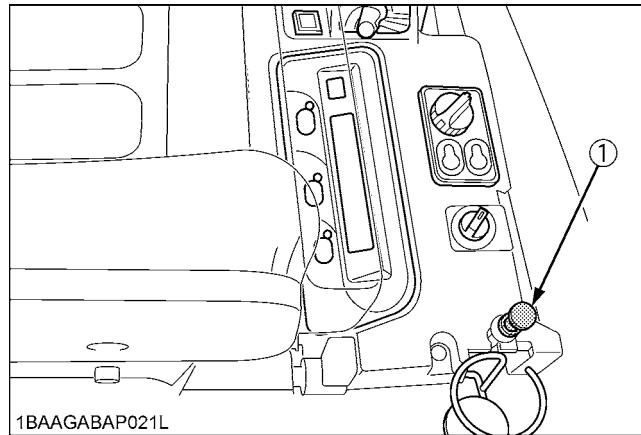


CAUTION

To avoid personal injury:

- Pull the engine stop knob up and hold it until the engine stops in case of emergency.

The engine stops when the key is turned off. If the engine does not stop, pull the engine stop knob up and hold it until the engine stops. After the engine has stopped, be sure to push the engine stop knob back in, or the engine will not start next time.



(1) Emergency engine stop knob

NOTE :

- If the engine does not stop with the key, contact your KUBOTA dealer.

STARTING WITH AN AUXILIARY BATTERY



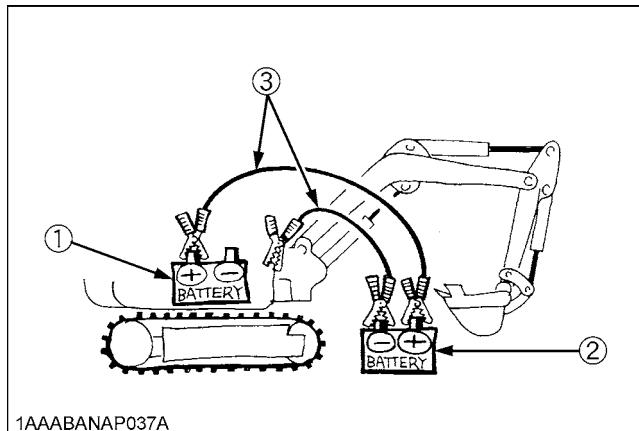
CAUTION

To avoid personal injury:

- Battery gases can explode.
Do not smoke and keep sparks and flames away.
- Do not start the engine with an auxiliary battery if excavator battery is frozen.
- Do not connect the black jumper cable to the negative (-) terminal of the excavator battery.

■ Observe Following Guidelines when Starting with an Auxiliary Battery

1. Bring the helping machine with the same battery voltage as near as possible to the machine.
THE MACHINES MUST NOT COME IN CONTACT WITH EACH OTHER.
2. Bring the levers and pedal of both machines in the neutral position.
3. Wear eye protection and rubber gloves.
4. Ensure the vent caps are securely in place (if equipped).
5. Connect the terminal of the red jumper cable with the plus (+) terminal of the low battery and connect the other end of the cable to the plus (+) terminal of the auxiliary battery.
6. Connect the black negative cable to the minus (-) terminal of the auxiliary battery.
7. Connect the other end of the black cable (coming from the auxiliary battery) to the machine frame as far away as possible from the low battery.
8. Start the engine of the helping machine and let it run for a while. Start the machine with the low battery.
9. Disconnect the jumper cables in the reverse sequence.



1AAABANAP037A

- (1) Low battery
- (2) Auxiliary battery
- (3) Jumper cables

IMPORTANT :

- This excavator has a negative (-) earthed 12 Volt starting system.
- Only use the same voltage when using an auxiliary battery.
- Using a higher voltage will cause serious damage to the electrical system. When using an auxiliary battery, only the compatible (same) voltage is permissible.

EXCAVATOR OPERATION

RUNNING-IN OF THE NEW EXCAVATOR

The operation and care of the new excavator influences its life span. Your new excavator has been carefully checked and tested before leaving the factory. In spite of this, all movable components must run-in during the first 50 work hours. Do not work with full rpm's and full loads during this period. It is most important to run-in your excavator properly in order to achieve its full performance and longevity. During the running-in, the following points should be adhered to in all cases.

■Do not Work with Full Engine Rpm's or Full Loads during the First 50 Working Hours

- Let the engine warm up sufficiently in the cold season.
- Do not let the engine rev-up more than necessary.

■Oil Change in the Run-in Stage

The lubrication oil plays a specific and important role during the run-in phase of the excavator. The numerous movable parts are not yet run-in, so many fine metal particles are generated and cause damage and shorten the life of many components. Pay attention to the oil-change intervals and complete them sooner than later. See "REGULAR CHECKS AND MAINTENANCE WORK" section for more details on the oil-change intervals.

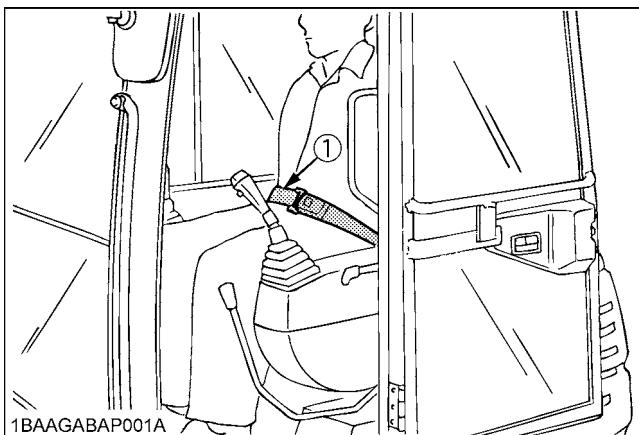
■Seat Belt



WARNING

To avoid personal injury or death:

- Always use the seat belt with a ROPS/FOPS protection structure. Adjust the seat to the optimal position and buckle up.



(1) Seat belt

STARTING

1. Adjusting the Operator's Position.

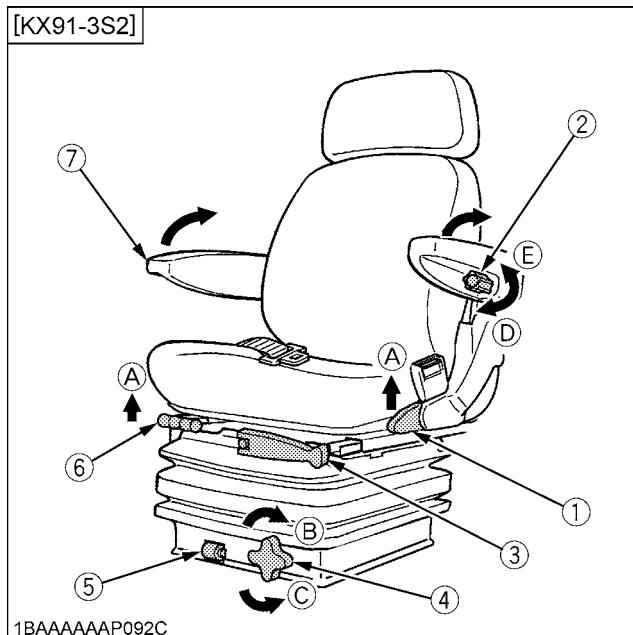
■Operator's Seat



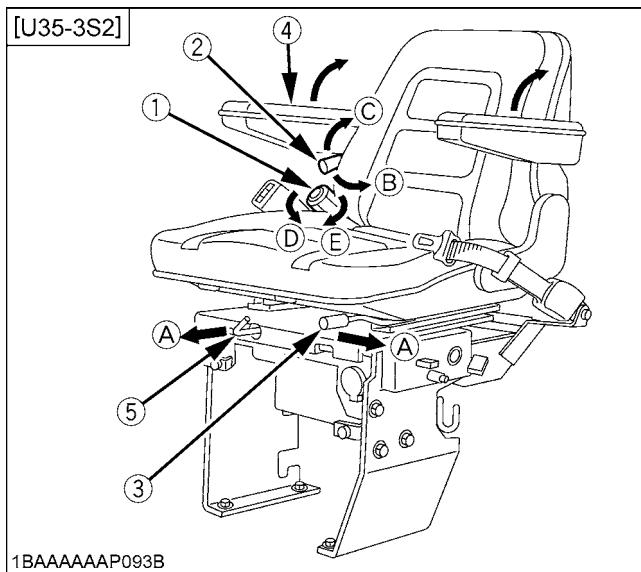
CAUTION

To avoid personal injury:

- Make sure that the seat is completely secured after each adjustment.
- Do not allow any person other than the driver to ride on the excavator.



- | | |
|---------------------------------|---------------------------|
| (1) Backrest tilt adjust lever | (A) "UNLOCK" |
| (2) Arm rest angle adjust knob | (B) "TO INCREASE TENSION" |
| (3) Weight adjust lever | (C) "TO DECREASE TENSION" |
| (4) Height adjust knob | (D) "TO INCREASE ANGLE" |
| (5) Weight and height indicator | (E) "TO DECREASE ANGLE" |
| (6) Travel adjust lever | |
| (7) Arm rest | |



- | | |
|-------------------------------|---------------------------|
| (1) Backrest tilt adjust knob | (A) "UNLOCK" |
| (2) Weight adjust lever | (B) "TO INCREASE TENSION" |
| (3) Travel adjust lever | (C) "TO DECREASE TENSION" |
| (4) Arm rest | (D) "TO INCREASE ANGLE" |
| (5) Seat lock lever | (E) "TO DECREASE ANGLE" |

◆ Travel adjustment

Pull the travel adjust lever in the direction of [A] and slide the seat backward or forward, as required. The seat will lock in position when the lever is released.

◆ Weight adjustment

Turn the weight adjust lever to achieve the optimum suspension setting.

◆ Tilt adjustment

Pull the backrest tilt adjust lever in the direction of [A] and move the backrest to the desired angle.

◆ Height adjustment [KX91-3S2]

Pull up with your hands the seat pan in front of seat belt to the desired height of the three available positions.

Once it has reached the highest level, it will return to the lowest level.

◆ Arm rest

Arm rest may be set at upright position if desired.

◆ Arm rest angle adjustment

Turn the arm rest angle adjust knob to the desired angle.

2. After starting the engine, bring the lock levers into the "Unlock" position to use drive lever or control lever for front attachments.

■ Lock Lever



CAUTION

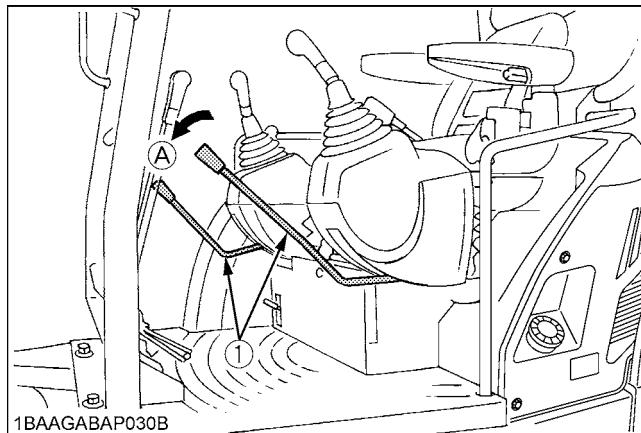
To avoid personal injury:

- To avoid injuries, check safety features all around the excavator.
- With the lock lever pulled down, the engine fails to start.

If you try to start the engine with the key with the lock lever down, the following message appears momentarily on the meter display.

E1 Lift up
unload lever

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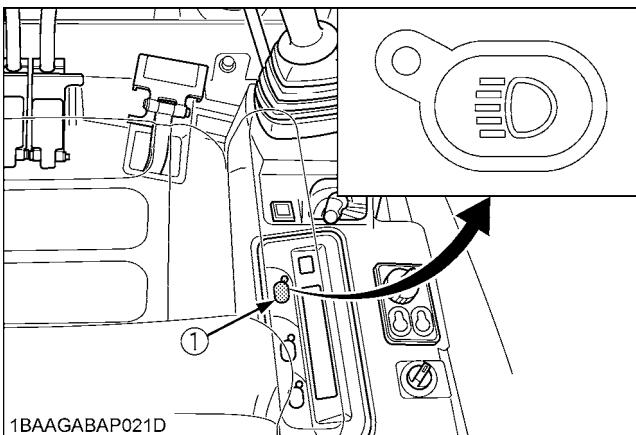


(1) Lock levers

(A) "Unlock"

■ Working Light Switch

When the starter switch is in position "RUN", the light(s) can be switched on by pressing the switch.



(1) Working light switch

◆ Night operation



CAUTION

To avoid personal injury:

- Visibility is reduced in darkness, therefore the work light alone may not be enough. In which case, prepare additional stationary artificial lighting, observe safety rules as well as special regulations for night work.

■ Travel Buzzer

When you handle the drive levers, the buzzer sounds at the same time or before the excavator starts to run.

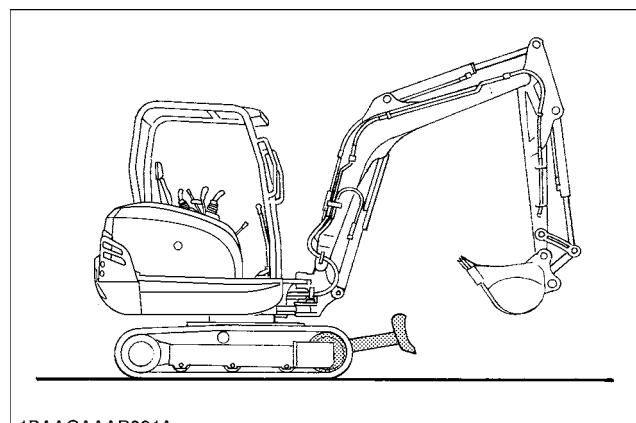
DRIVING



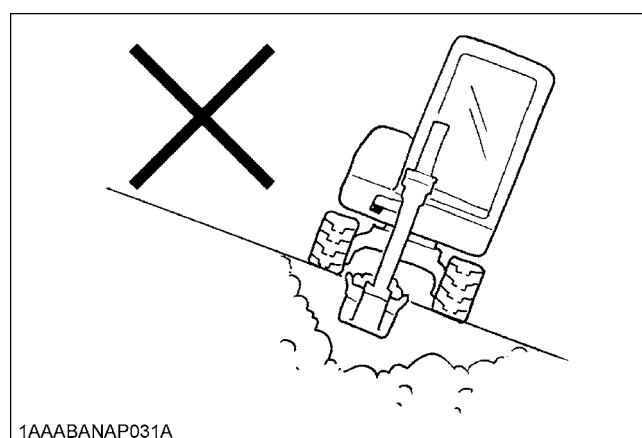
WARNING

To avoid personal injury or death:

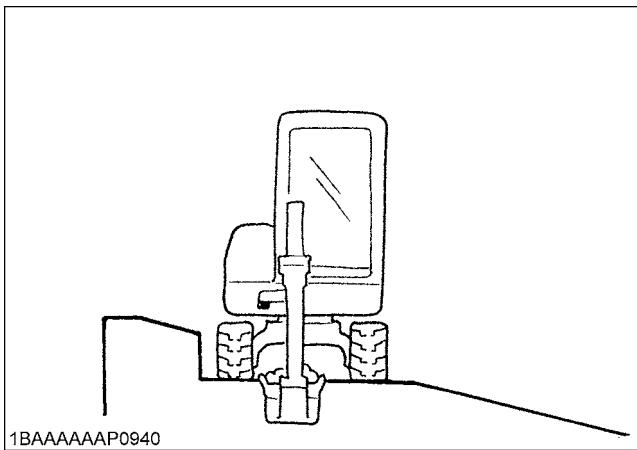
- Before starting the engine, make sure that no one is near the excavator.
- Before operating the excavator, check the track direction. (Front idler and dozer blade to the front of the excavator).



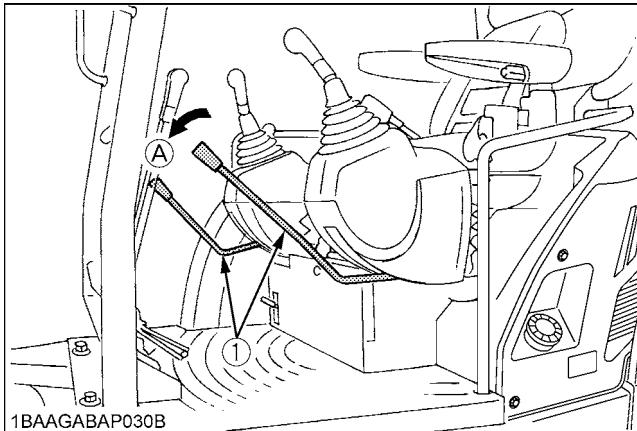
- Use extra caution when traveling across a slope or working sideways on a slope.



- Recommended technique for working on a slope.



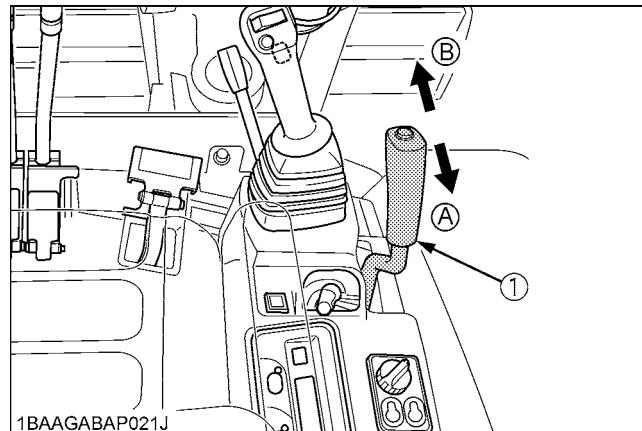
1. Adjust the engine speed from idling to an intermediate speed.
2. Unlock the lock levers and pull in the bucket and hold the bucket about 20 to 40cm above the ground.



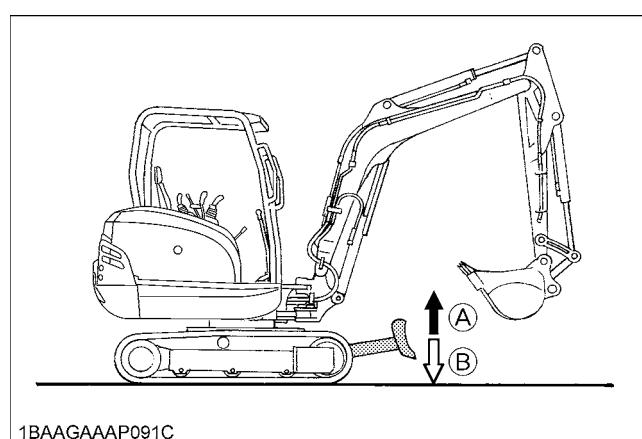
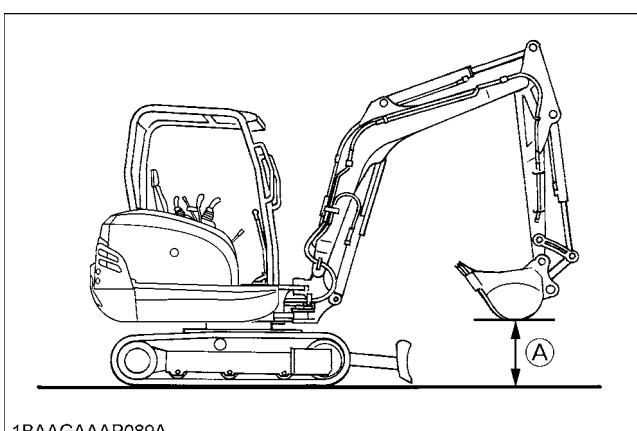
(1) Lock lever

(A) "Unlock"

3. Activate the dozer control lever to raise the dozer.



(1) Dozer control lever

(A) "Raise"
(B) "Lower"(A) "Raise"
(B) "Lower"

1BAAGAAAP089A

(A) 20 to 40 cm

■ Drive Levers(Right,Left)

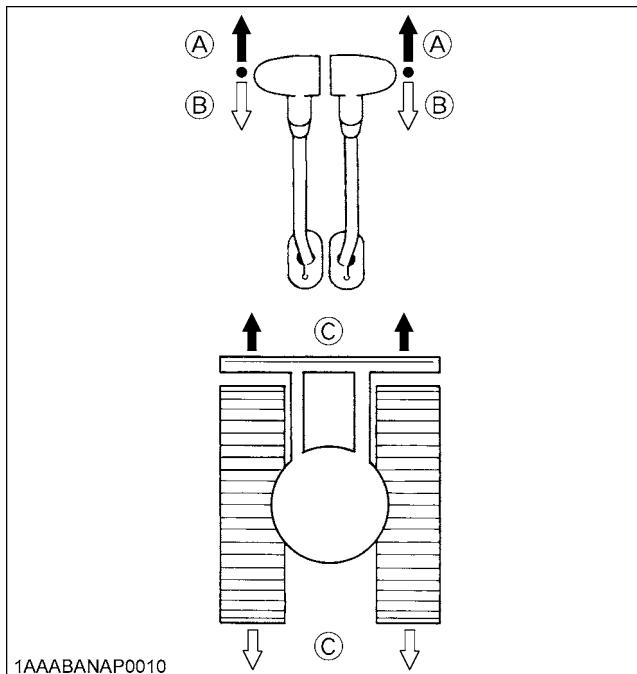


WARNING

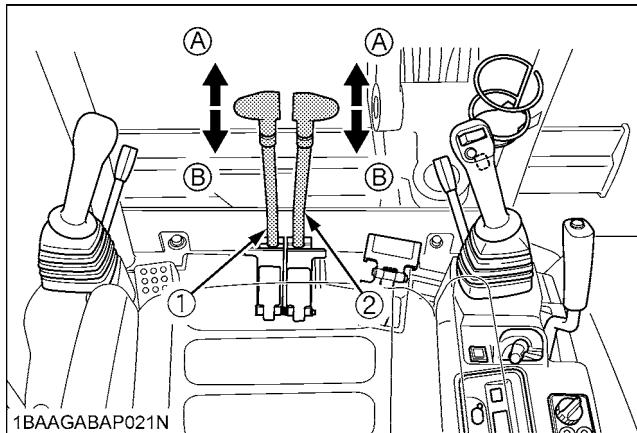
To avoid personal injury or death:

- If the swing frame has been turn 180deg, i.e. the dozer in relation to the operator's seat is "behind", then the travel direction is opposite to the drive direction of the levers (when activating the drive lever forwards, the machine, in relation to the operator's seat, will move backwards).

Pushing the drive lever forwards, moves the excavator forwards, and vice-versa. The front of the excavator is the side where the dozer is located; the drive sprocket is in the rear of the excavator.



(A) "Forward"
(B) "Backward"
(C) "Straight"



(1) Drive lever (left) (A) "Forward"
(2) Drive lever (right) (B) "Backward"

■Travel Speed Switch



CAUTION

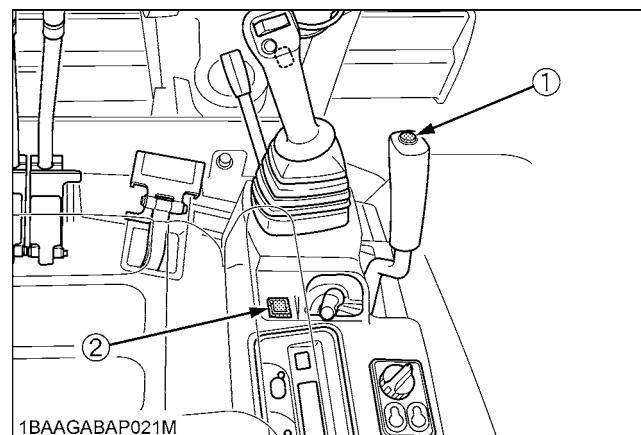
To avoid personal injury:

- When activating the travel speed switch, it must be pushed down completely.

Travel speed will increase when this switch is pushed down.

Switching the dual travel speed:

1. Press the travel speed switch. The buzzer beeps and the travel speed changes from first speed to second. The  symbol lights up.
2. Press the travel speed switch again, and the buzzer beeps and the travel speed changes from second speed to first. The  symbol light goes out.



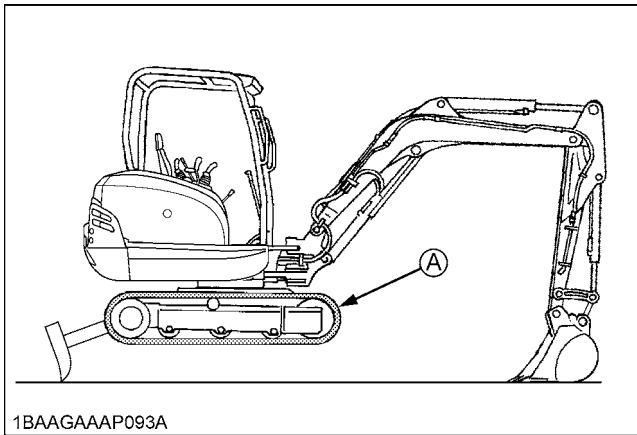
(1) Travel speed switch
(2) Speed indicator light

NOTE :

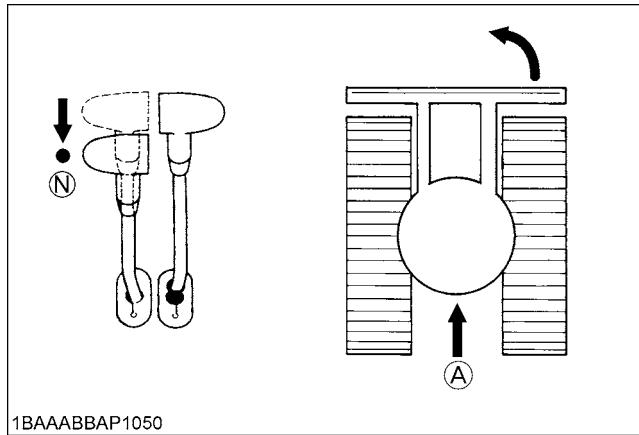
- Each time the travel speed switch is pressed, the travel speed is switched between first and second.

IMPORTANT :

- Do not activate the travel speed switch when there is increased drive resistance (e.g. driving on inclines or on uneven grounds).
- If the tracks are clogged with sand or gravel while working on soft ground, lift up both tracks with the help of the boom, arm, dozer blade and bucket and let the track rotate to remove the sand and gravel.



(A) "Rotate to remove sand and gravel"



(A) "Travelling forward" (N) "Neutral position"

2. While travelling backwards, bring the left drive lever into the neutral position; the excavator will turn to the right.

DANGER

To avoid serious injury or death:

- Do not work under the machine in this condition.

TURNS

CAUTION

To avoid personal injury:

- Do not change direction on steep slopes, or the excavator could tip over.
- Before changing direction, beware of people in the work area.

Pivot Turn

NOTE :

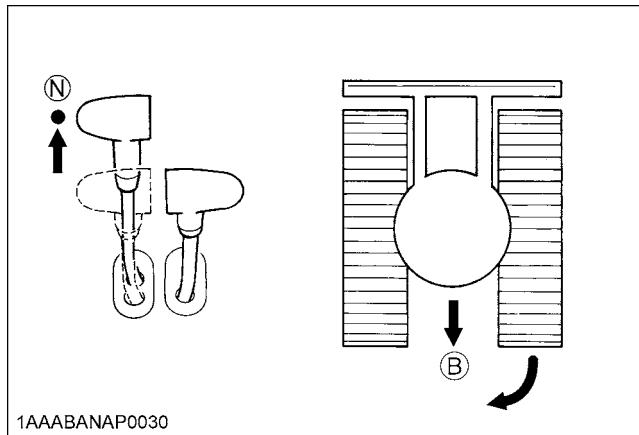
- Movement as illustrated is done with the dozer blade in front of the operator.

When the dozer is in the back, the steering direction is reversed.

(For example, push the left drive lever forward the excavator turns right; the left track, seen from the operator, will move backward from the operator.)

◆ Change of Direction while Travelling

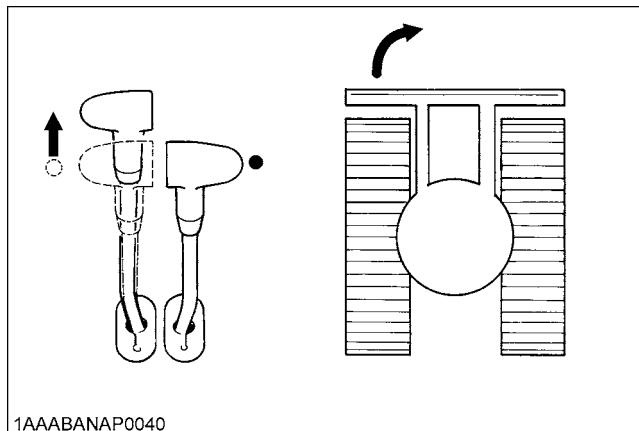
1. While travelling forwards, bring the left drive lever into the neutral position; the excavator will turn to the left.



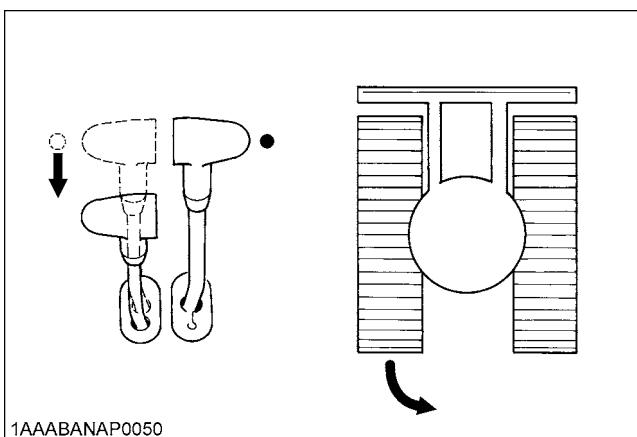
(B) "Travelling backward" (N) "Neutral position"

◆ Change of Direction while Stationary

1. Push the left drive lever forward; the excavator will turn to the right.

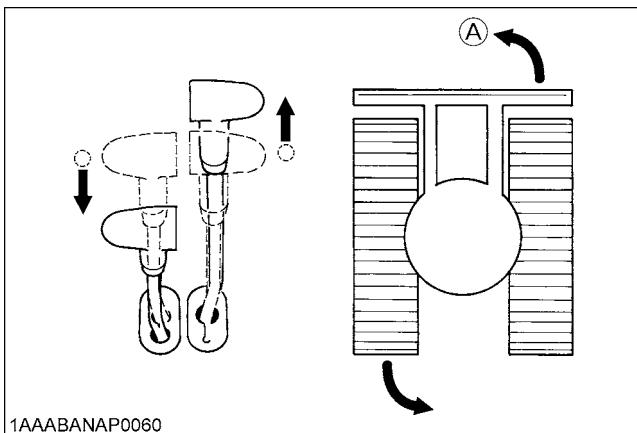


2. Pull the left drive lever backward; the excavator will turn to the left.

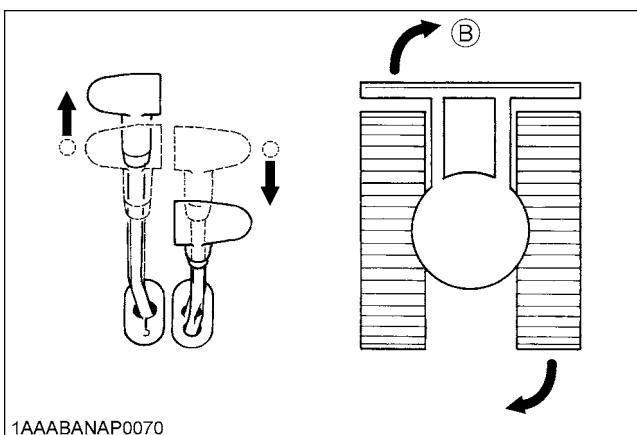


■ Spin Turn

When both drive levers are activated in the opposite directions, both tracks will rotate with the same speed but in opposite directions. The center of rotation is the center of the excavator.



(A) "Left spin turn"



(B) "Right spin turn"

UP AND DOWNSHILL DRIVING



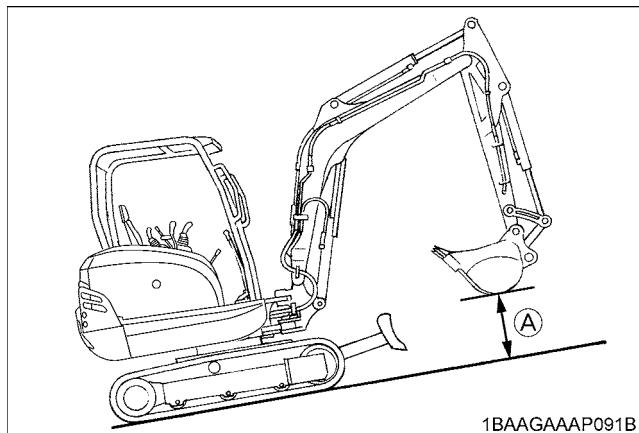
CAUTION

To avoid personal injury:

- When traveling up or down a slope, use extra caution and follow the instructions below.

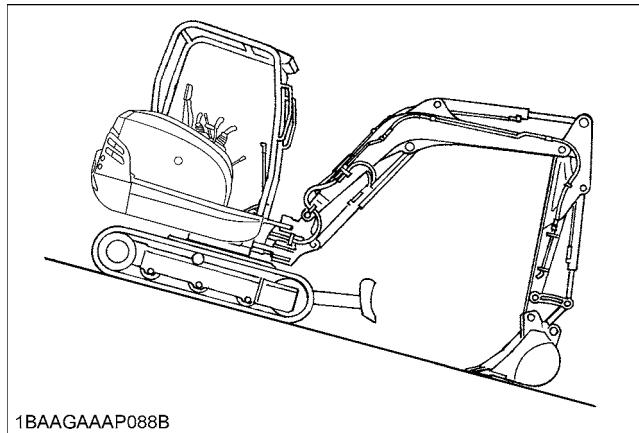
While traveling uphill, keep the lower edge of the bucket approx. 20 to 40cm above the ground. Although the KUBOTA excavator will not slip easily because of the tracks, it is safer to let the bucket slide over the ground while traveling downhill. Always choose slow speed for uphill and downhill traveling.

[UPHILL TRAVELING]



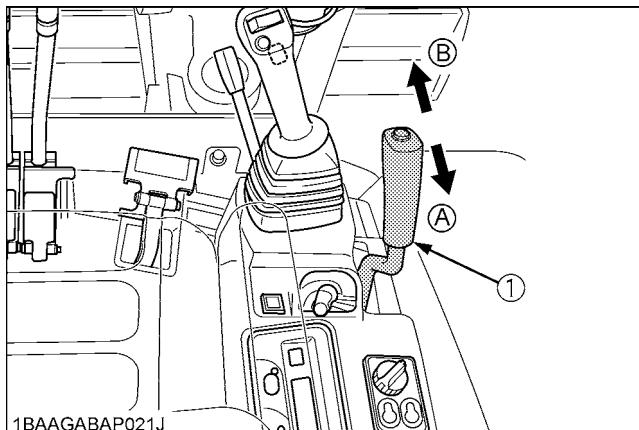
(A) 20 to 40 cm

[DOWNSHILL TRAVELING]

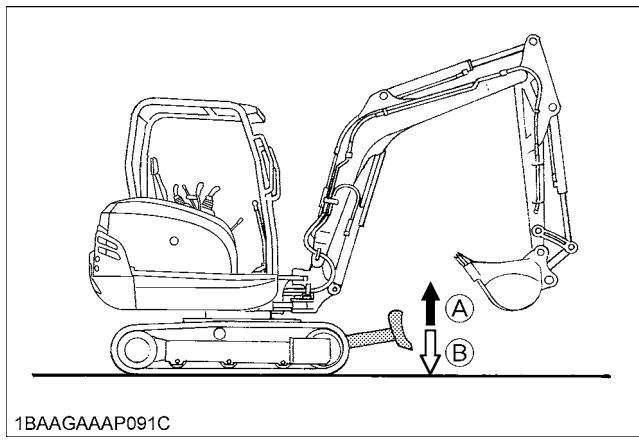


OPERATION OF THE DOZER

- To raise the dozer, pull back the control lever. Pushing the control lever forwards, lowers the dozer.



(1) Dozer control lever

(A) "Raise"
(B) "Lower"

(A) "Raise"

(B) "Lower"

- While undertaking earth moving work, control both drive levers with the left hand and the dozer control lever with the right hand.

TWO PATTERN SELECTION SYSTEM(TPSS)



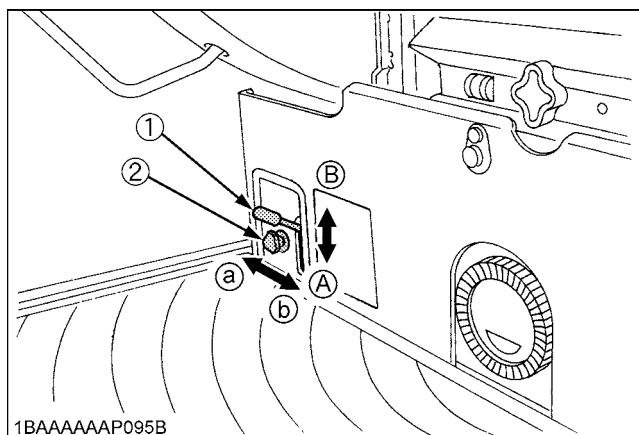
CAUTION

To avoid personal injury:

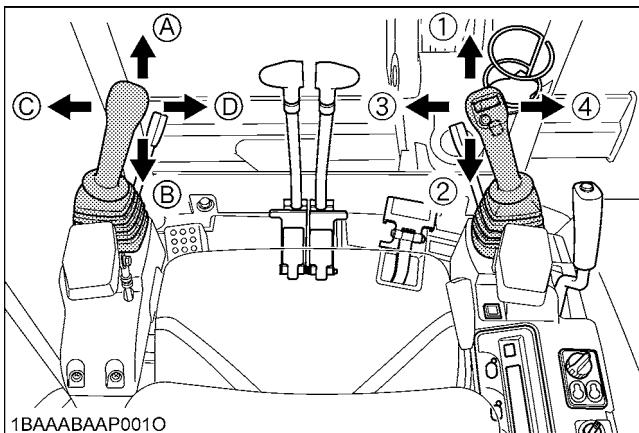
- Study control lever pattern A and pattern B. Then choose the one which is most familiar
- Position the pattern selector lever (located on the right side of operator's seat) in either the lower position (pattern A) or the upper position (pattern B).
- Engage the lock lever to prevent accidental pattern change.
- Familiarize yourself with the pattern selected by operating slowly.

■ Pattern Change

- Loosen the lock lever knob and slide it to the direction (a), and position the pattern selector lever to the desired position.
- Slide the lock lever knob to the direction (b) and tighten it.



(1) Pattern selector lever (Two Pattern Selection System: TPSS)
(2) Lock lever knob

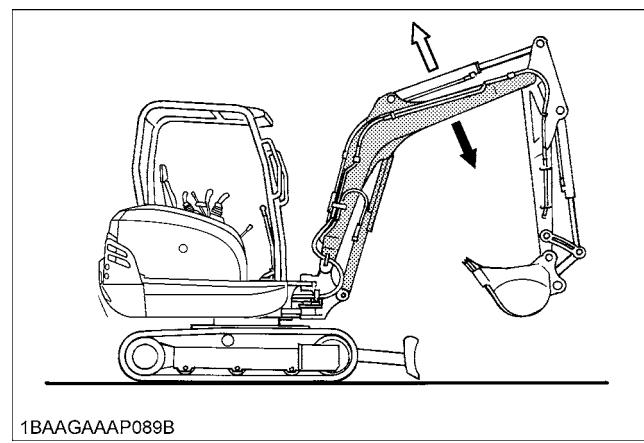
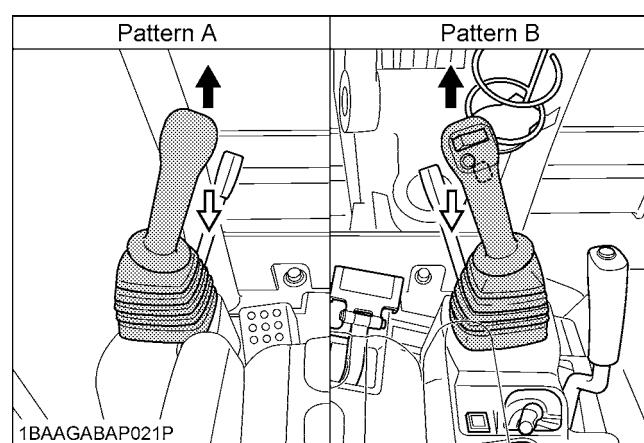


Lever Position		Pattern A	Pattern B
Attachment Control Lever (Left)	A B C D	Boom down Boom up Swing left Swing right	Arm up Arm crowd Swing left Swing right
Attachment Control Lever (Right)	1 2 3 4	Arm up Arm crowd Bucket crowd Bucket dump	Boom down Boom up Bucket crowd Bucket dump

OPERATION OF THE BOOM

To raise the boom, pull the attachment control lever back. The boom is equipped with a cushion cylinder which helps prevent excavated material in the bucket from falling out. Low hydraulic oil temperature, (e.g. after starting the engine in cold weather) the cushioning function will be effected for a short period of time (approx. 3 to 5 seconds). This condition results from the viscosity of the hydraulic oil and is not a sign of malfunction.

The cushion cylinder will operate normally as the oil warms up.



IMPORTANT :

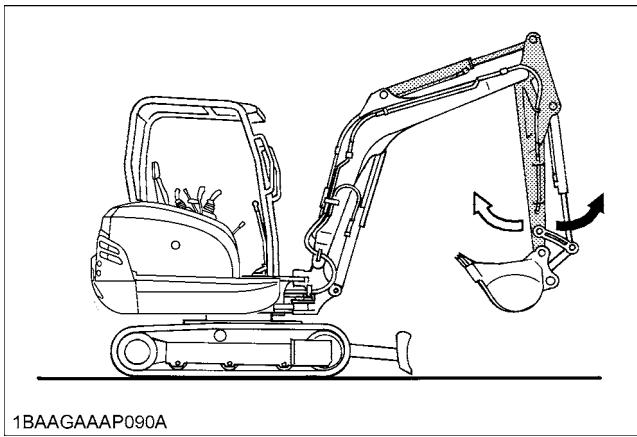
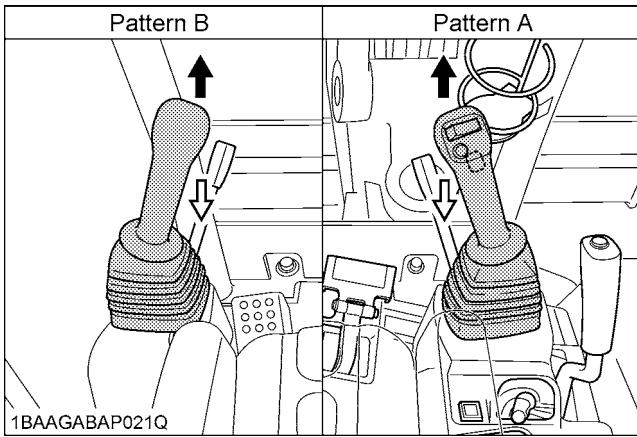
- When lowering the boom, make sure that it does not hit the dozer and that the bucket teeth do not touch the dozer.

OPERATION OF THE ARM

Pull back the attachment control lever and the arm will be pulled in. To move the arm out, push the control lever towards the front.

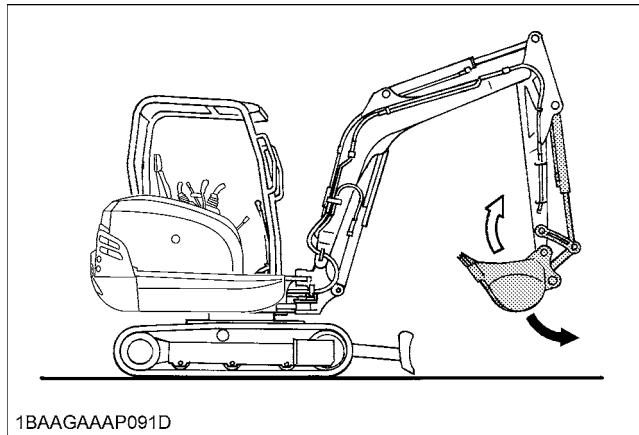
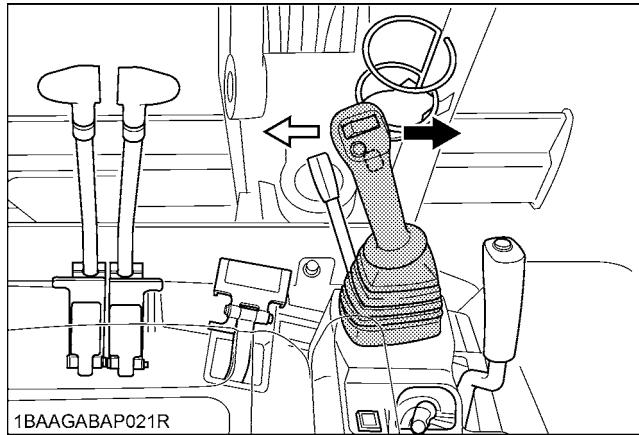
NOTE :

- When pulling in the arm, the movement may stop for a short moment when the arm is in its vertical position. This is caused by the combined load of the arm and bucket moving the cylinder piston away from the hydraulic flow causing a delay in the cylinder action, until the flow catches up with cylinder piston. This is a characteristic of the hydraulic system and is no sign of a malfunction.



OPERATION OF THE BUCKET

To dig using the bucket, move the right attachment control lever from the neutral position, left. Moving the control lever right, moves the bucket outwards and empties its contents.



UNIT SWING AND BOOM SWING OPERATION



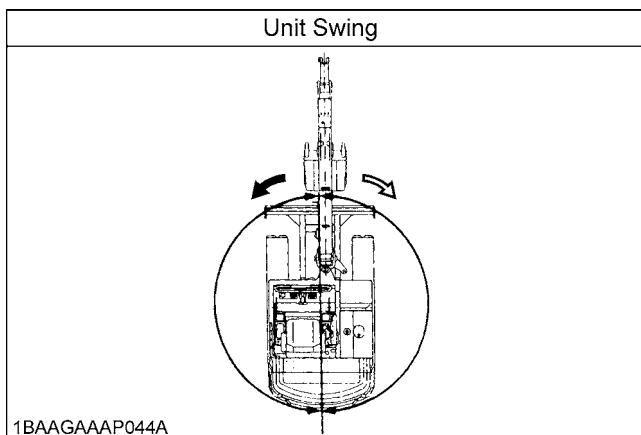
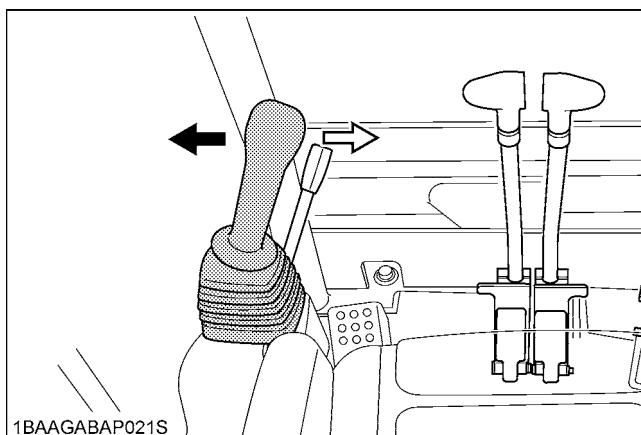
CAUTION

To avoid personal injury:

- When working in groups, always let the others know what you are going to do before you do it.
- Keep others away from the machine working area.
- Be sure to lock the boom swing pedal when the boom swing function is not used.

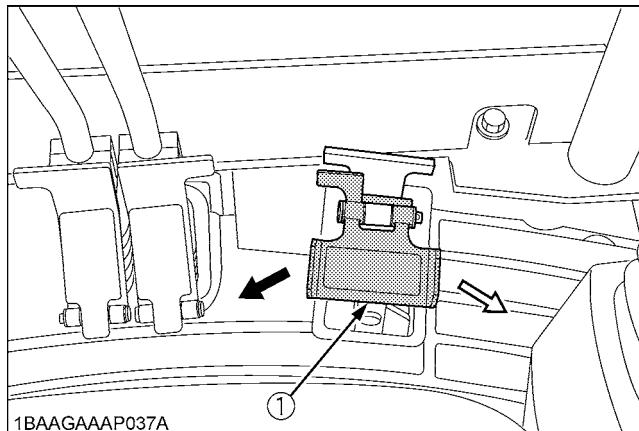
Unit Swing Operation

1. Move the control lever to the left and the upper structure will turn to the left.
2. Move the control lever to the right and the upper structure will turn to the right.

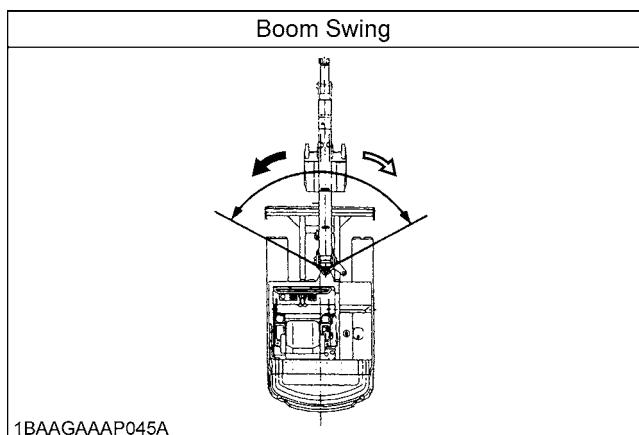


Boom Swing Operation

1. Tilt the pedal rearward.
2. Step on the left side of the pedal to swing the boom to the left.
3. Step on the right side of the pedal to swing the boom to the right.



(1) Boom swing operation pedal



IMPORTANT :

- Do not operate the left attachment control lever abruptly from right to left (or vice versa). Because the low of inertia cause high impact load on the swing gear and the swing motor, shortening the life of the excavator.

SERVICE PORT OPERATION



CAUTION

To avoid personal injury:

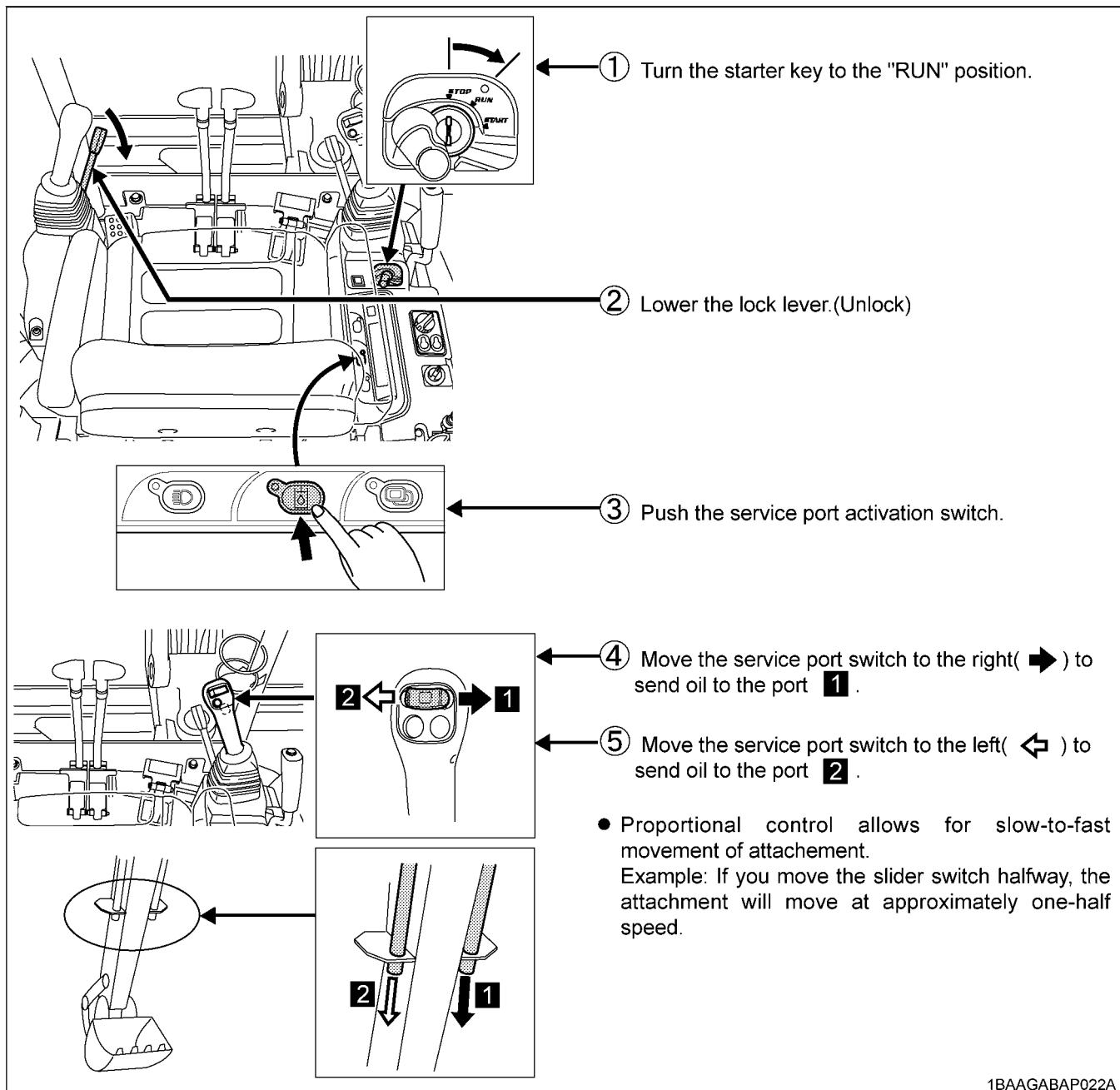
- In the limited flow volume mode, be careful not to get the arm relieved. The service port will otherwise get fully open.

NOTE :

- When the lock lever is raised, the service port activation switch is off.
- Let the engine warm up after start-up for approx. 10 minutes under no load conditions.

■Service Port Operation

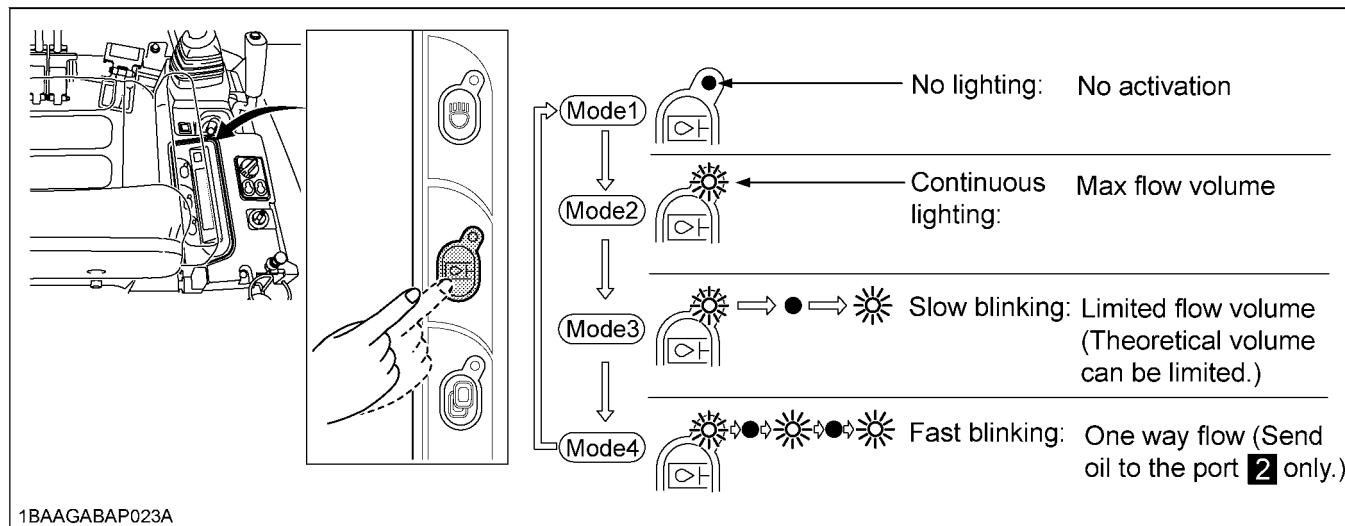
This knob is used to operate hydraulic attachment such as breakers.



◆ Usual settings

● Action mode of service port operation

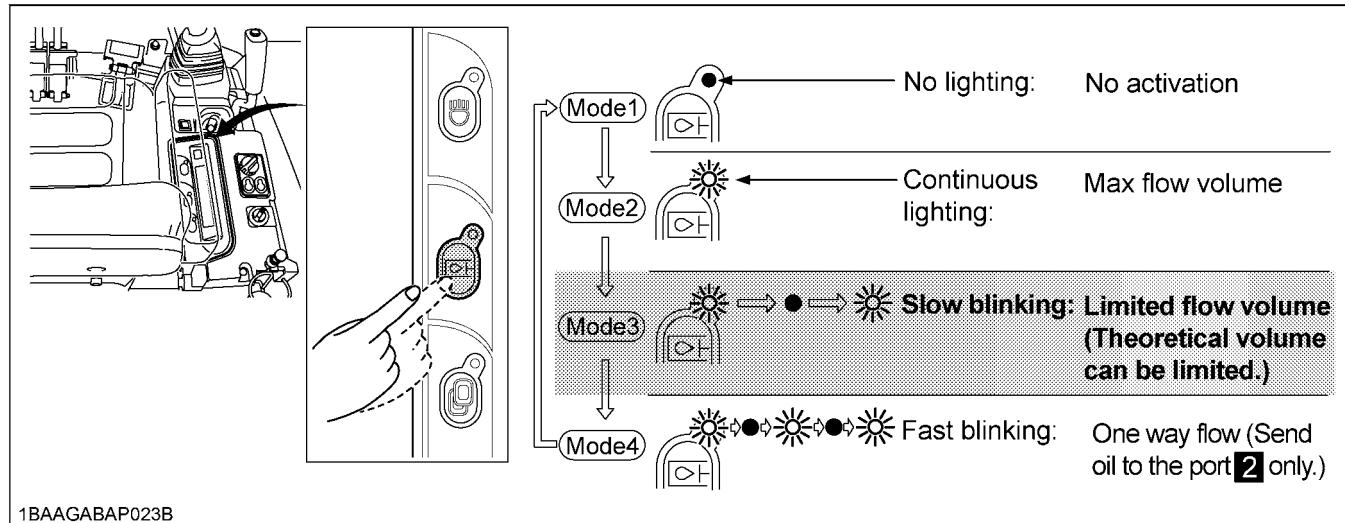
It is possible to select from four action modes of the service port operation by pushing the service port activation switch. Each time the service port activation switch is pushed, the action mode changes from 1 through 4.



NOTE :

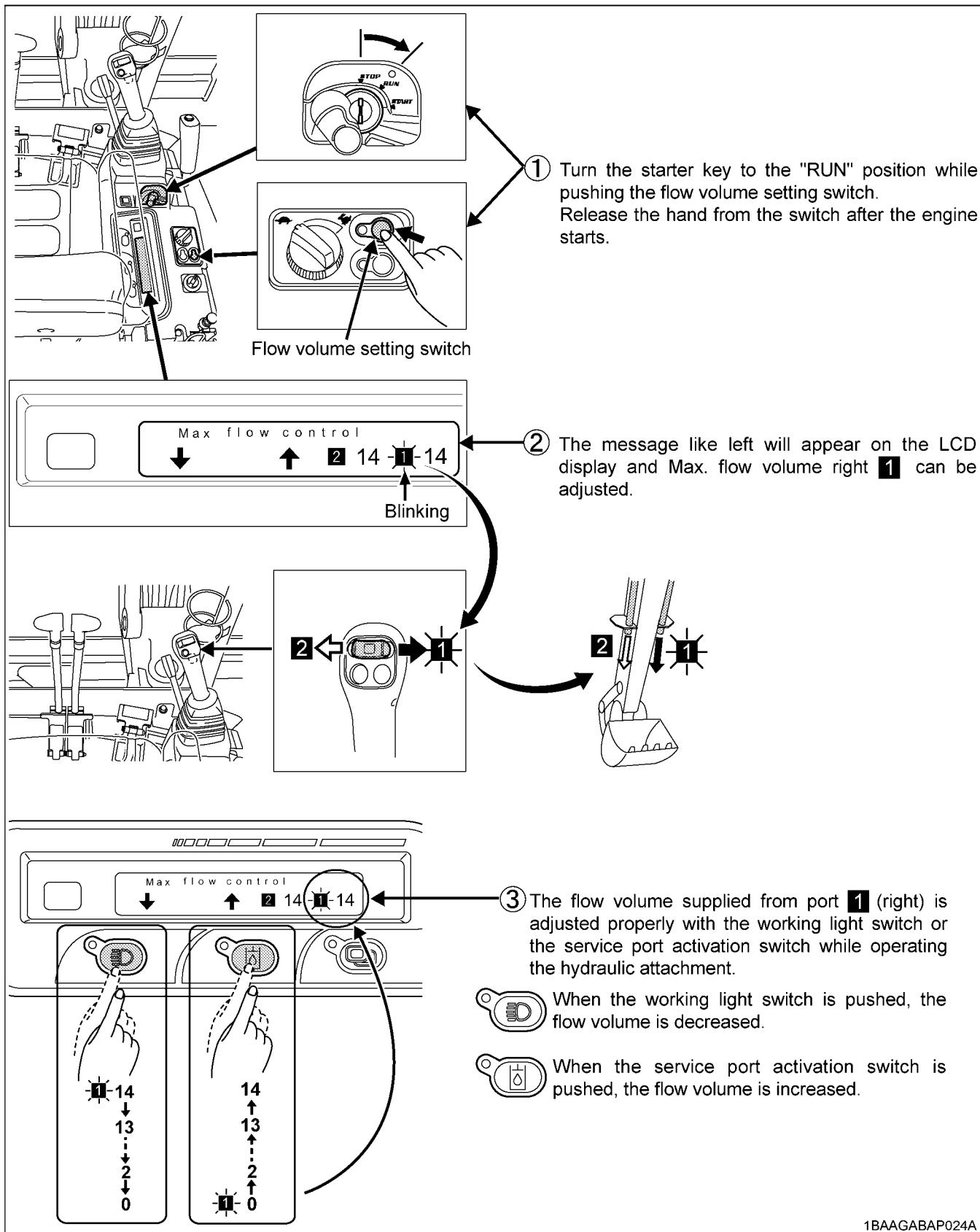
- When turning the starter key to the "RUN" position, the action mode will return to the last action mode used.

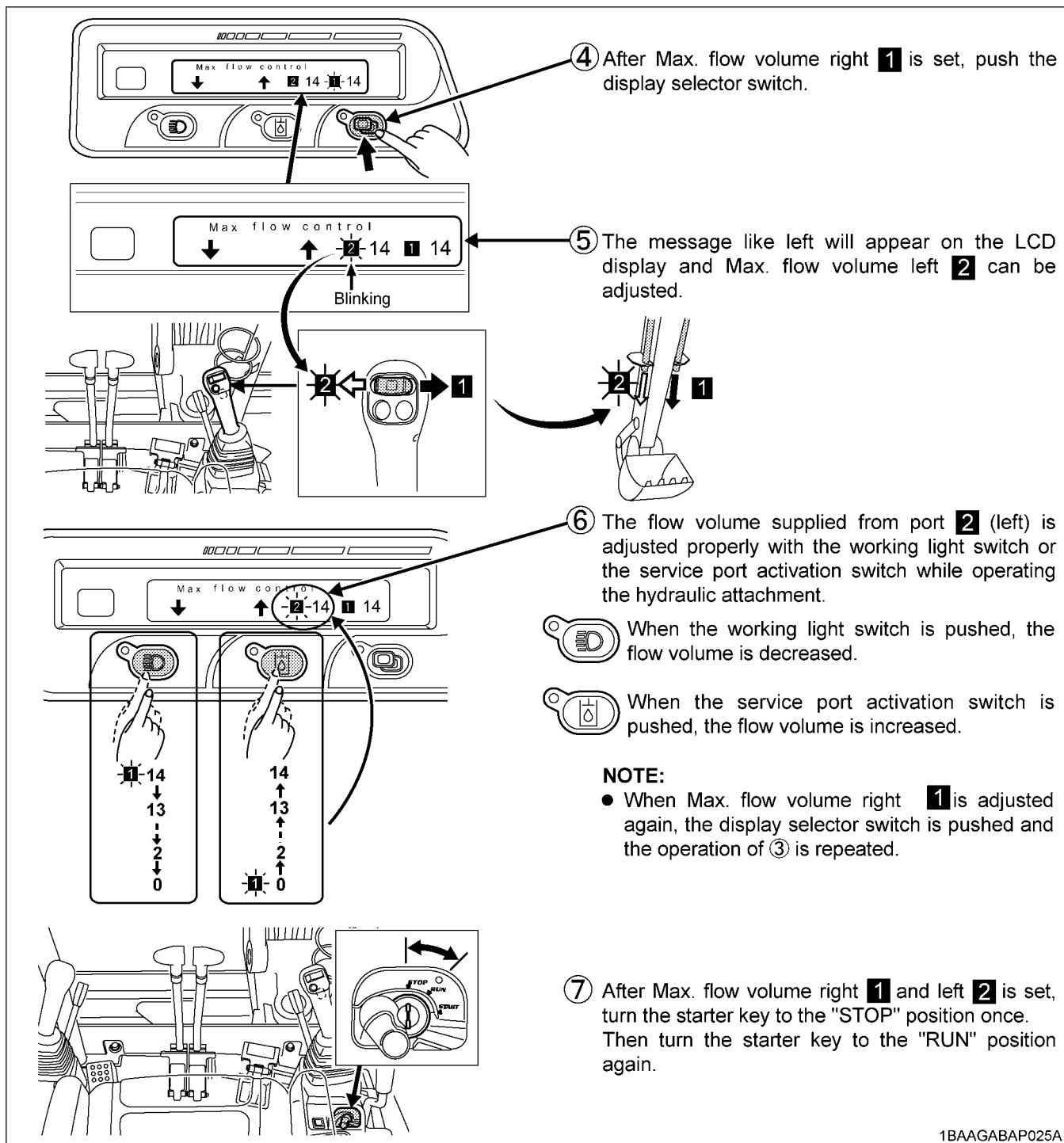
◆ Initial setting of limited service port flow volume (Make this setting first.)



● Setting of limited flow volume

Max. flow volume right ① and left ② can be adjusted in 15 stages independently.





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● Service Port Max. Flow Volume

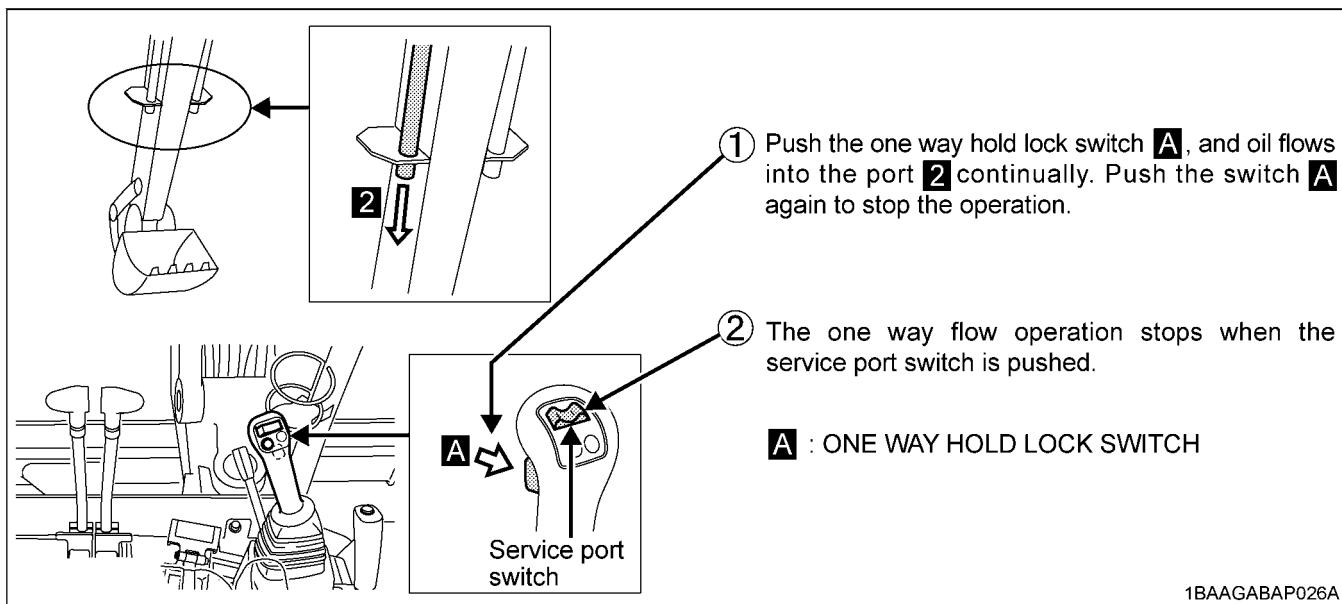
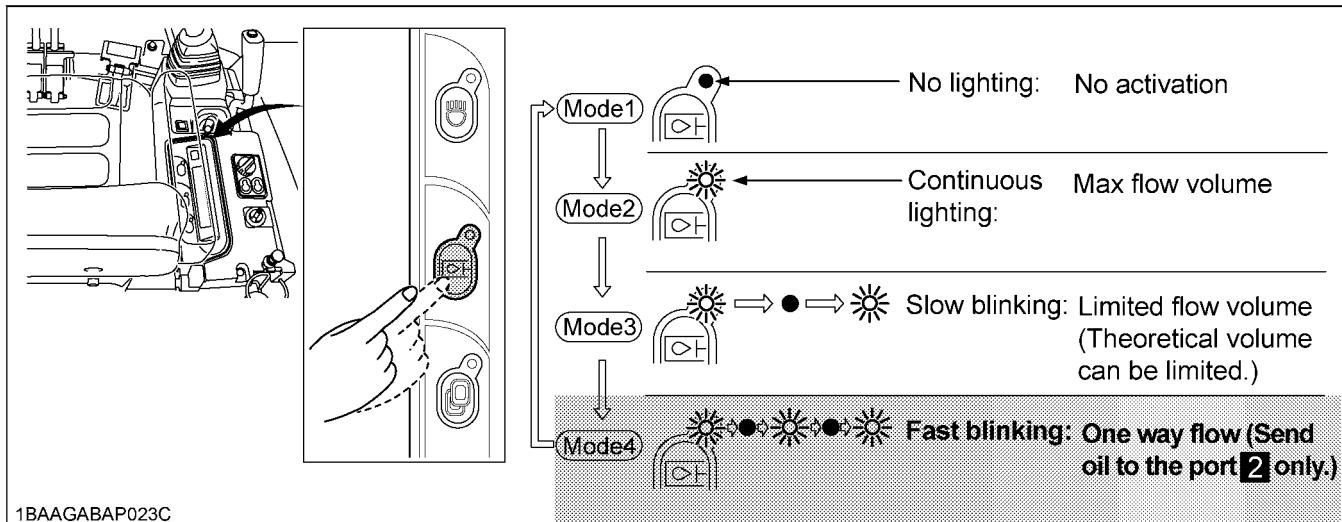
Max. Flow Volume (Theoretical L/min.)	KX91-3S2	63.0
	U35-3S2	60.0
Max. Pressure MPa (kgf/cm ²)	KX91-3S2	23.5 (240)
	U35-3S2	24.5 (250)

IMPORTANT :

- When the service port is not used for a long period, dirt particles can settle in the lower part of the service port lines. When the plugs on the service port lines are removed to connect attachments, drain approx. 100 cc (3.4 oz) of oil per side before making connections.
- For breaker choices, contact your dealer.

NOTE :

- Do not change the engine rpm using the limited flow volume setting. The service port speed will be otherwise lower, by which the attachment may get interrupted. In making the limited flow volume setting, find an optimum setting while varying the engine rpm.
- Suppose that the same attachment is mounted on another machine. Even if the same limit setting is made, the same speed cannot be achieved. Make an optimum setting on each machine.

■One Way Flow Operation

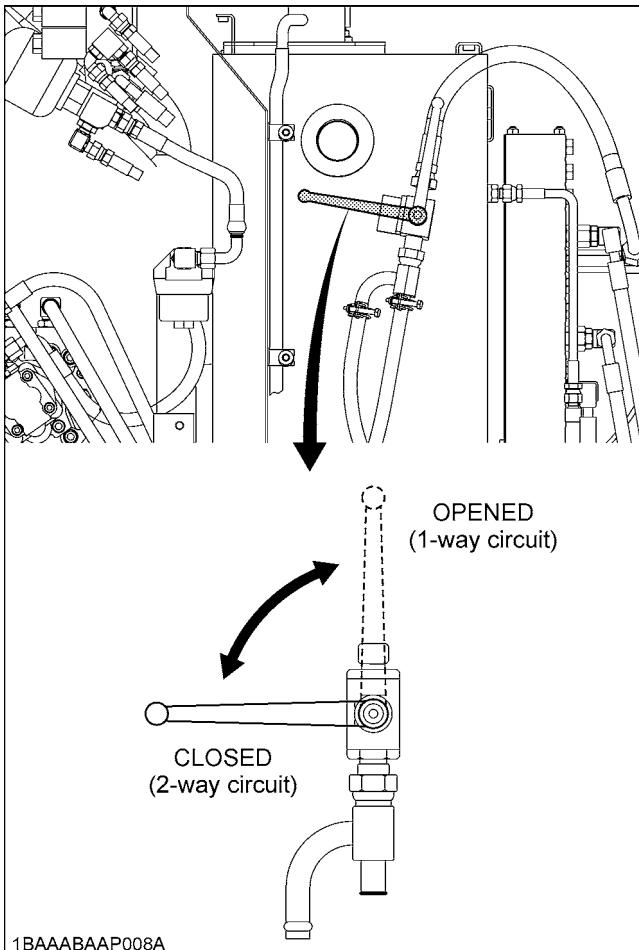
1-way or 2-way CIRCUIT SELECTION VALVE OPERATION

A selection valve which selects 1-way or 2-way circuit of service port has been installed on the hydraulic tank.

- When equipment which needs a 1-way circuit will be used, position the arrow, by using the supplied lever, on the axis of the selection valve to the 1-way circuit position, to reduce the back pressure.
- When equipment which needs a 2-way circuit will be used, position the arrow on the axis of the selection valve to the 2-way circuit position.

NOTE:

- 1-way circuit..... HAMMER etc.
- 2-way circuit..... THUMB, TILT BUCKET, AUGER, GRAPPLE etc.



CAUTION

To avoid personal injury:

- Stop the engine before removing/changing the equipment.
- Release pressure in the hydraulic system before removing/chaging the equipment. (See "HOW TO RELEASE PRESSURE TRAPPED IN THE HYDRAULIC SYSTEM".)
- Position the selection valve to the correct position (either 1-way or 2-way circuit selection) before mounting the equipment.
- Always select the correct valve position (1-way or 2-way circuit selection) to avoid sudden movement of the equipment.

NOTE :

- Leaving the selection valve to 1-way circuit selection and attaching 2-way circuit equipment may cause the equipment to move (drop) suddenly due to its own weight, as the tank line remains open, even with the engine off.

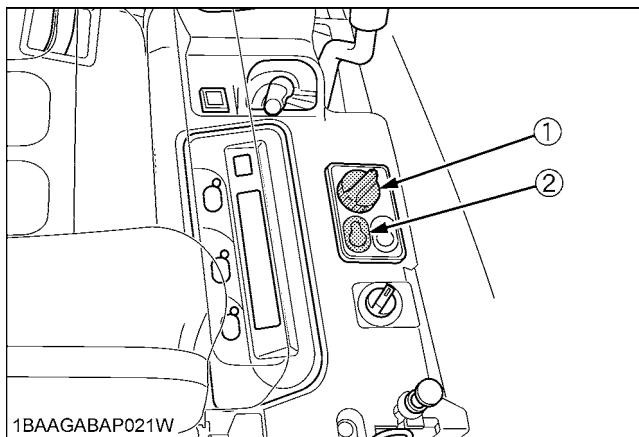
AUTO IDLE (AI) OPERATION

1. Throttle Potentiometer

With this potentiometer the operator can adjust the engine speed when the Auto Idle control is activated.

2. Switch for Auto Idle (AI) Control

With this switch the Auto Idle control is turned on or off. The Auto Idle control allows the engine speed to drop to the engine speed preselected with the potentiometer after about 4 seconds. If the control activated, the engine speed rises immediately to the preset rpm. If the Auto Idle is not activated the throttle potentiometer can be utilized to control engine speed similar way to a conventional throttle control lever.



(1) Throttle potentiometer
(2) Switch for Auto Idle control

IMPORTANT :

- It is possible that the Auto Idle may not function until hydraulic oil warms up in the cold weather. Therefore it is not recommended that the Auto Idle be activated until the machine is completely warmed up.

NOTE :

- Before operating the control lever, check the Auto Idle Indicator Lamp.
- When operating in confined spaces or when loading onto a vehicle, turn the Auto Idle switch off (Light off). This is to prevent unwanted engine speed increases when control levers are activated.
- The Auto Idle control, when selected by a switch, provides the operator with a way to control engine speed without a Throttle Potentiometer, simply by not activating any control levers for about four seconds after stopping work, and then to simply restore a preset (by potentiometer) engine speed by activating any control lever to return to work.
- The purpose of system is to reduce fuel consumption, noise and operator fatigue.

IMPORTANT INFORMATION ON EXCAVATOR OPERATION

- Do not try to crush concrete or boulders using side swings with the bucket. Also avoid using side sweeps of the bucket to move earth piles.
- Under all circumstances avoid the following operations:
 - Excavation using the gravitational impact of the machine.
 - Compacting of gravel or soil using the dropping action of the bucket.
 - Excavation using the traveling power of the machine.
- Do not try to drop or shake off soil adhering to the bucket in the manner given in the points below. This can cause damage to the machine.
Adhering soil can be shaken off when the bucket is being emptied by moving the bucket out to the maximum stroke of the cylinder. Should this not suffice, swing out the arm as far as possible and operate the bucket back and forth.
- Do not hit the dozer with the boom cylinder!
Make sure that the boom cylinder does not hit the dozer when doing deep excavation. If necessary swing around so that the dozer is in the back of the machine.
- Pay attention when pulling in the bucket!
When pulling in the bucket (for driving or transportation) avoid hitting the dozer.
- Avoid collisions!
When moving the excavator, pay attention that the dozer does not collide with obstructions such as boulders etc..
Such collisions shorten the life of the dozer and the cylinder substantially.
- Support the machine correctly!
When stabilizing the machine with the dozer, lower the dozer to engage the full width on the ground.
- If the water or mud level reaches higher than the top of the tracks, the swivel bearing, swivel motor gear and ring gear may be exposed to mud, water and other foreign objects.
The excavator must be properly pressure washed after each use.
 - Thoroughly clean the area around the swivel bearing, swivel motor gear and ring gear to remove foreign objects.
 - Inspect the swivel motor oil sump (if equipped) for water contamination. If water is present, refer to operator's manual for lubricant replacement procedure.
 - Refer to operator's manual for proper swivel bearing, swivel motor gear and ring gear lubrication procedures.
 - Reinstall any protective covering if removed earlier.

HOW TO RELEASE PRESSURE TRAPPED IN THE HYDRAULIC SYSTEM

- Lower the attachments and the dozer blade to the ground.
- Turn the key to "STOP" position and shut off the engine.
- After stopping the engine, turn the key to "RUN" position.
- Release pressure in the hydraulic system by operating levers with lever lock pulled down.

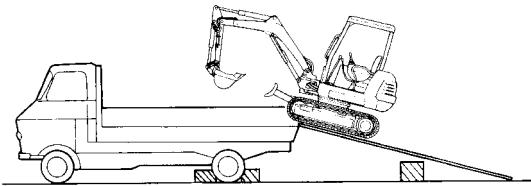
TRANSPORTING THE EXCAVATOR ON A VEHICLE



DANGER

To avoid personal injury or death:

- No directional changes should be made when the excavator is on the ramp. Should a change of direction be necessary, drive off the ramp completely and make the turn.
- When driving forwards or backwards onto the vehicle, or when swinging the upper body, make sure that neither the CAB or the gates of the vehicle will be damaged.



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- When the excavator reaches the point between the ramps and the bed, halt and then move very slowly until the excavator reaches the horizontal position.
- Move the excavator onto the vehicle only with the arm completely pulled in. Otherwise the CAB of the vehicle could be damaged when swinging around the upper body.
- Do not jack up the machine using its boom to load or unload the excavator from the vehicle. Doing this is dangerous.
- Make sure the ramp are of sufficient capacity and securely connected to the vehicle to safely support the machine throughout the loading / unloading operation.

■ Transporting on a truck



WARNING

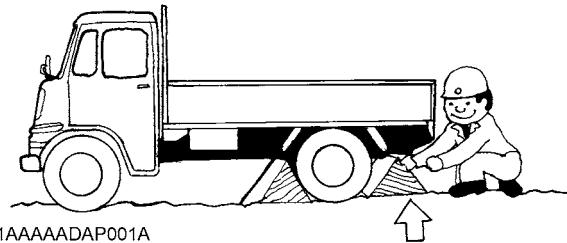
To avoid personal injury or death:

- After loading the machine on the truck, lower the bucket and dozer onto the truck bed. Lock the swing frame with the swing lock pin.

Prepare a platform to load or unload the excavator.

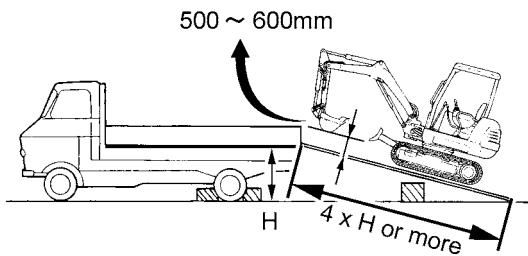
Take following steps when using ramps.

1. Apply the parking brakes of the vehicle, and block the drive wheels from both sides.



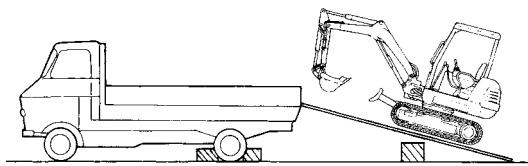
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2. Use mounting brackets secure the ramp properly. Connect the ramps directly to the bed.



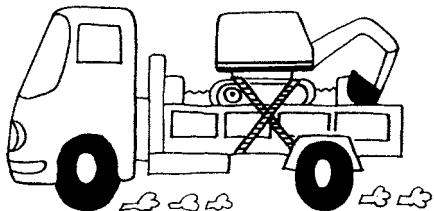
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3. For additional safety, use blocks or supports under the ramps and the bed.



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4. Completely align the ramps and the tracks and then drive the excavator slowly up the ramps with the dozer in the front. After ensuring that the tracks are completely on the bed, swing the upper body around to the back of the vehicle.
5. Block the tracks and chain down the excavator with suitable chains and approved method (check appropriate state regulation).



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6. Before unloading, raise the dozer and bucket from the bed.

LIFTING OF THE EXCAVATOR



DANGER

To avoid serious injury or death:

- The correct instructions for safe handling are described here. Read these instructions carefully before moving the machine. Make sure that the operating personnel read the operator's manual carefully.

■ Basics when Lifting with Cables or Straps

1. The lifting and crane operation is to be undertaken according to the safe operation guidelines described.
2. The equipment used for lifting mentioned in these instructions are only given as reference, the standards concerning strength, control and other details are based on the respective applicable guidelines.

■ Safety Aspects when Lifting with Cables or Straps

Abide by following steps when lifting:

1. Do not lift loads that exceed the maximum load capacity of the crane.
2. Choose correct equipment suitable to the weight, size and form of the load.
3. First assess the center of gravity of the load, position the hook directly over the load and lift the load so that the center of gravity of the load is as low as possible.
4. The steel cables or straps must be fixed in the middle of the hook.
5. The load must be lifted vertically from the ground.
6. Do not enter the working area under suspended loads and do not move the load over people. The load must only be moved in an area where the balance can be easily maintained.

■ Lifting Procedure for the Excavator



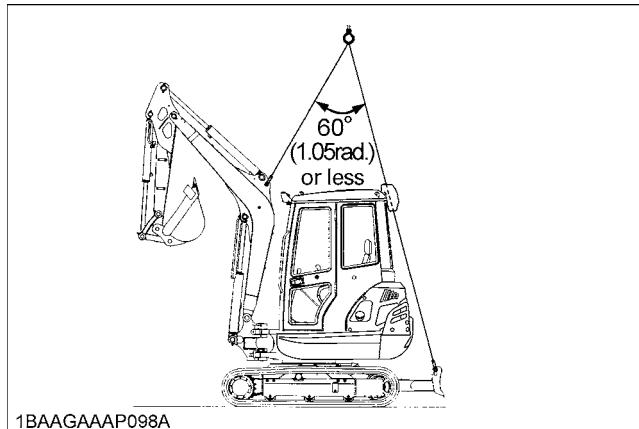
WARNING

To avoid personal injury or death:

- Do not use the hooks on the roof of canopy and CAB for lifting the excavator.

◆ General guidelines for lifting

1. Lifting position. (see the following illustration.)
 - (1) Pull in the boom completely towards the CAB.
 - (2) Pull in the arm completely.
 - (3) Pull in the bucket completely.
 - (4) Adjust the swing angle to the center. (to bring the boom in a position parallel to the machine frame)
 - (5) Swing frame so that dozer blade is to the rear and frame is parallel with tracks.
 - (6) Raise the dozer blade fully.
2. Attaching the steel cables or straps.
 - (1) Always hook the excavator at three points. (one on the boom and left and right of the dozer)
 - (2) Always use a shackle on each lifting hole when attaching the cables or straps.
 - (3) Using protective material at all places where the cables or straps contact the machine.
 - (4) Keep the angle between the front and rear cables or straps within 60° (1.05 rad.).



WARNING

To avoid personal injury or death:

- Never lift the excavator by hooking the hole of the boom only.

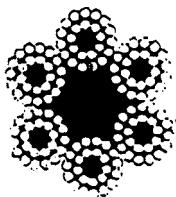
3. Tackle

The weights of the excavators and the recommended tackle for lifting these loads are mentioned in the following table. Choose components having enough strength.

	KX91-3S2	U35-3S2
Excavator Weight*	kg	3330 3750
Load / Cable N (kgf)	(12560 (1286)	11174 (1139)
Minimum Cable Diameter (Safety factor=6) mm	14 (9/16) or more	14 (9/16) or more

*Excavator Weight: With CAB, steel tracks, and long arm.

Steel cable: 6 x 24



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4. Lifting

- (1) Lift slowly and safely
- (2) Do not enter the excavator area when lifting.
- (3) Lift the excavator horizontally. (Modify wire connections according to needs)

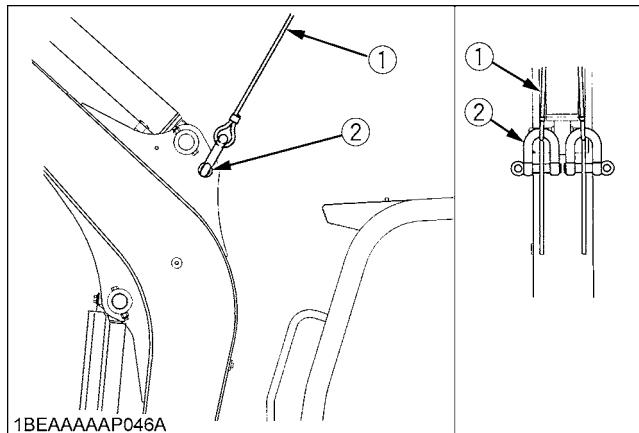
Maximum strength

for example : (JIS G 35 25) - "6 x24"

Diameter	zinc-plated	not zinc-plated
10 mm KN (3/8) (kgf)	45.8 (4670)	49.3 (5027)
12.5 mm KN (1/2) (kgf)	71.5 (7291)	77 (7852)
14 mm KN (9/16) (kgf)	89.7 (9147)	96.6 (9850)
16 mm KN (5/8) (kgf)	117 (11931)	126 (12848)
18 mm KN (45/64) (kgf)	148 (15092)	160 (16315)

1. Boom side

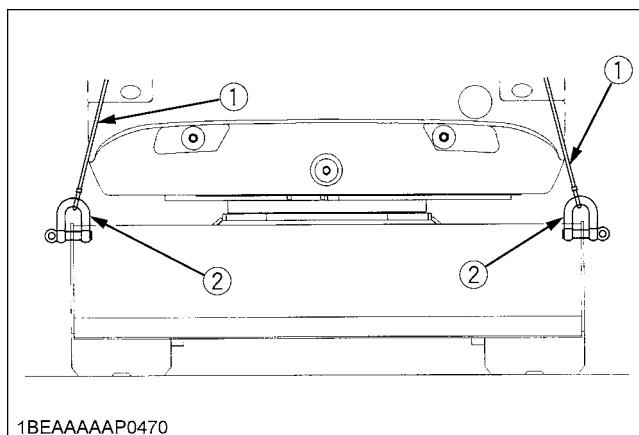
Hook in the steel cable with a shackle into the lifting hole.



(1) Steel cable
(2) Shackle

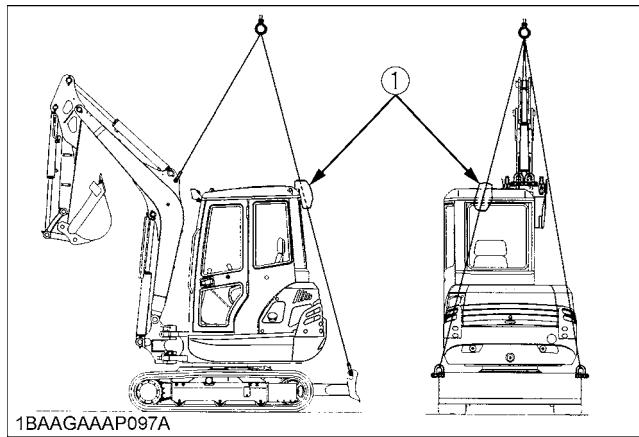
2. Dozer side

Hook in the steel cable with a shackle into the lifting hole around the CAB or canopy.



(1) Steel cable
(2) Shackle

3. Lifting



(1) Protective material

MAINTENANCE

MAINTENANCE INTERVALS

No.	Check points	Measures	Hour meter indicator									Interval	Ref. page				
			50	100	150	200	250	300	350	400	450						
1	Coolant	check	Daily check									every 2 years	45				
		change															
2	Fuel	check	Daily check									every 250 hrs or every 1 year	46				
3	Engine oil	check	Daily check														
		change	●					○									
4	Hydraulic oil	check	Daily check									every 1000 hrs	46	*1			
		change															
5	Lubrication points	-	Daily check									every 50 hrs	47				
6	Radiator and oil cooler	check	Daily check														
7	Washer liquid (CAB type)	check	Daily check									every 200 hrs	48				
8	Engine and electrical wiring	check	Daily check														
9	Fuel tank, Water separator	drain	○	○	○	○	○	○	○	○	○	every 50 hrs	49, 49				
10	Battery condition	check	○	○	○	○	○	○	○	○	○						
11	Greasing swing bearing teeth	-	○	○	○	○	○	○	○	○	○	every 200 hrs	51				
12	Fan belt tension	adjust			○				○								
13	Radiator hoses and clamps	check			○			○				every 2 years	51				
		replace															
14	Air filter element	Outer element	clean			○			○			every 200 hrs	52	*2			
			replace														
		Inner element	replace									every 1000 hrs	58	*2			
15	Greasing swing ball bearings	-			○				○			every 200 hrs	53				
16	Fuel filter cartridge	replace															
17	Engine oil filter	replace	●									every 500 hrs or every 1 year	55				
18	Drive unit oil	change		●													
19	Hydraulic return filter element	replace				●						every 1000 hrs	56				
20	Hydraulic breather filter element	replace															
21	Hydraulic suction filter element	replace										every 1000 hrs	57				
22	Filter in the pilot hydraulic system	replace															
23	Fuel injection nozzle injection pressure	check										every 1500 hrs	58	*4			
24	Front idler and track roller oil	change															
25	Alternator and starter motor	check										every 2000 hrs	58				
26	Injection pump	check															
27	Radiator system	rinse										every 2 years	59	*4			
28	Fuel line and Intake air line	check			○				○								
		replace										every 2 years	60	*3			

* 500 thru 1000 continued to the following table.

No.	Check points	Measures	Hour meter indicator								Interval	Ref. page	
			500	550	600	650	700	750	800	1000			
1	Coolant	check	Daily check								every 2 years	45	
		change											
2	Fuel	check	Daily check									45	
3	Engine oil	check	Daily check								every 250 hrs or every 1 year	46	
		change		O					O				
4	Hydraulic oil	check	Daily check								every 1000 hrs	46	
		change							O				
5	Lubrication points	-	Daily check									47	
6	Radiator and oil cooler	check	Daily check									48	
7	Washer liquid (CAB type)	check	Daily check									48	
8	Engine and electrical wiring	check	Daily check									48	
9	Fuel tank, Water separator	drain	O	O	O	O	O	O	O	O	every 50 hrs	49, 49	
10	Battery condition	check	O	O	O	O	O	O	O	O	every 50 hrs	49	
11	Greasing swing bearing teeth	-	O	O	O	O	O	O	O	O	every 50 hrs	51	
12	Fan belt tension	adjust			O				O	O	every 200 hrs	51	
13	Radiator hoses and clamps	check			O				O	O	every 200 hrs	51	
		replace									every 2 years	59	
14	Air filter element	clean			O				O	O	every 200 hrs	52	*2
		replace								O	every 1000 hrs	58	*2
		Inner element	replace							O	every 1000 hrs	58	*2
15	Greasing swing ball bearings	-			O				O	O	every 200 hrs	53	
16	Fuel filter cartridge	replace	O							O	every 500 hrs	56	@
17	Engine oil filter	replace		O						O	every 500 hrs or every 1 year	55	
18	Drive unit oil	change			O						every 500 hrs	55	
19	Hydraulic return filter element	replace						O			every 500 hrs	56	
20	Hydraulic breather filter element	replace								O	every 1000 hrs	57	
21	Hydraulic suction filter element	replace								O	every 1000 hrs	57	
22	Filter in the pilot hydraulic system	replace								O	every 1000 hrs	58	
23	Fuel injection nozzle injection pressure	check									every 1500 hrs	58	*4 @
24	Front idler and track roller oil	change									every 2000 hrs	58	
25	Alternator and starter motor	check									every 2000 hrs	58	
26	Injection pump	check									every 3000 hrs	59	*4 @
27	Radiator system	rinse									every 2 years	59	
28	Fuel line and Intake air line	check			O				O	O	every 200 hrs	54	
		replace									every 2 years	60	*3 @

* The engine oil is gradually consumed and reduced with engine operation. The consumption depends on the type of job and the model of engine. Before operation, make sure that the oil level is between the upper and lower limits of the oil level gauge. Add oil as required. To avoid a shortened service life or burn-out of the engine, use a Kubota-specified oil and genuine Kubota filter. Keep their specified replacement intervals in mind.

IMPORTANT :

● First operation

*1 When using a hydraulic breaker, change hydraulic oil and return filter according to the table on "Hydraulic Oil Change (Including Exchange of the Suction Filter in the Hydraulic Tank) under "EVERY 1000 SERVICE HOURS" in the chapter "REGULAR CHECKS AND MAINTENANCE WORK".

*2 Clean and replace the air filter more frequently if used under dusty conditions. When the filter is very dirty from dusty conditions, replace the filter.

*3 Replace only if necessary.

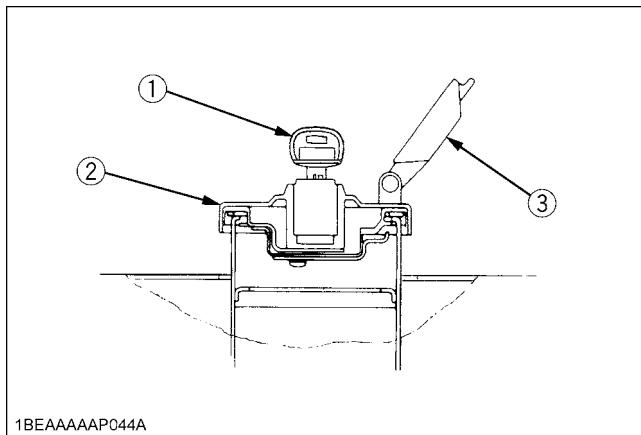
*4 Consult your local KUBOTA Dealer for this service.

● The items listed above (@ marked) are registered as emission related critical parts by KUBOTA in the U.S.EPA non-road 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.

OPENING AND CLOSING OF PARTS

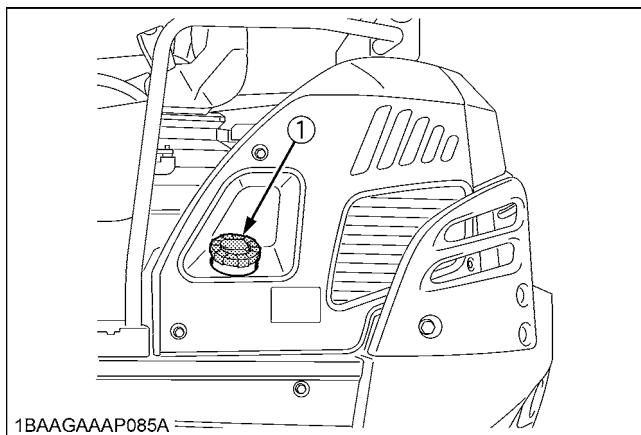
■ Opening and Closing of the Fuel Tank Cap

1. Open the tank cap cover, insert the starter key and turn counterclockwise. Then turn the tank cap counterclockwise to open.



- (1) Starter key
 (2) Fuel tank cap
 (3) Tank cap cover

2. To close the tank cap, turn clockwise and turn clockwise the starter key. Then close the tank cap cover.



- (1) Fuel tank cap

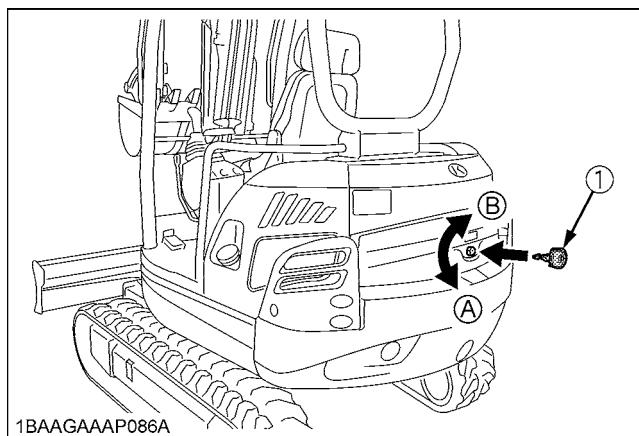
■ Opening/Closing of the Engine Hood



To avoid personal injury:

- Do not open the engine hood with the engine running unless in an emergency.
- Do not touch the exhaust muffler or the exhaust pipe; serious burns can occur.

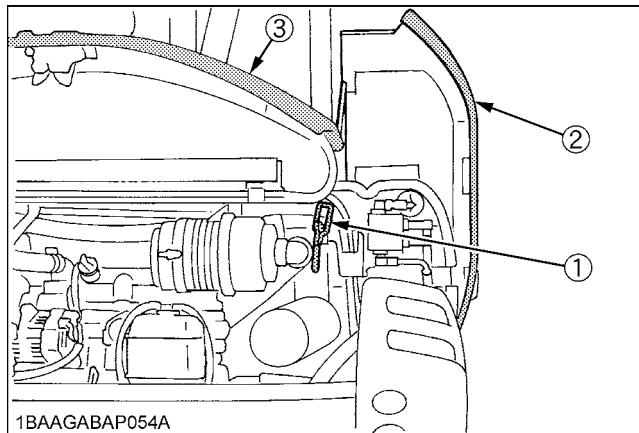
Insert the key into the key hole and turn it clockwise to open the hood. To close it, lower the bonnet and hold it down tightly. Turn the key counter-clockwise to lock the hood.



- (1) Key
 (A) Unlock
 (B) Lock

■ Opening/Closing of the Side Hood

1. Raise the catch lever to unlock the side hood.
2. Push the side hood all the way forward, and it will be held by a restraint cable.
3. For closing pull the side hood all the way back, and pull down the catch lever to lock the side hood.

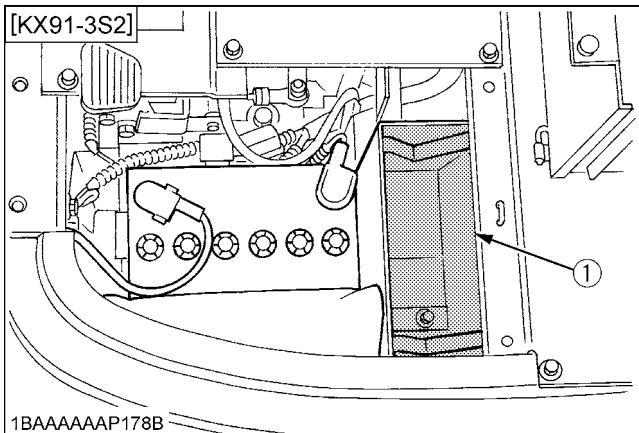


- (1) Catch lever
 (2) Side hood
 (3) Rear Hood

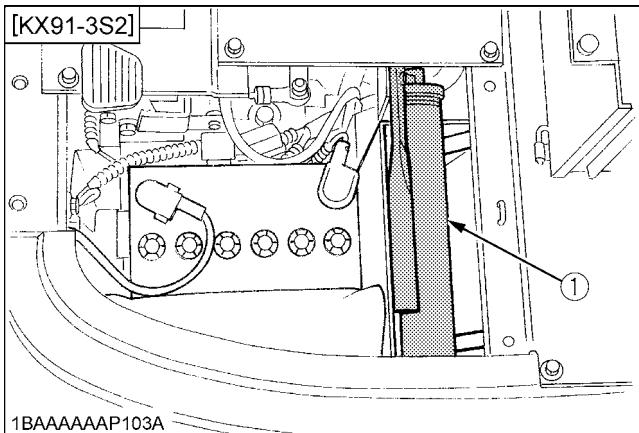
■Where to store the Tool and the Grease Gun

[KX91-3S2]

1. Remove the mat and the cover of left side step.
2. Store the tools or grease gun in the storage box.



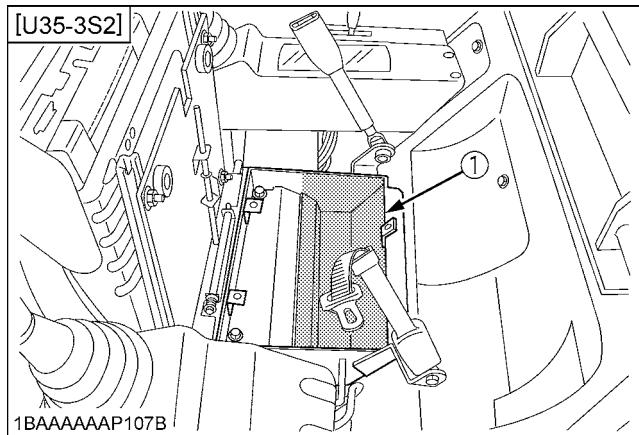
(1) Box for storage



(1) Grease gun (Option)

[U35-3S2]

1. Pull the seat lock lever and tilt over the seat forward.
2. Store the tools in the storage box.



(1) Tool box

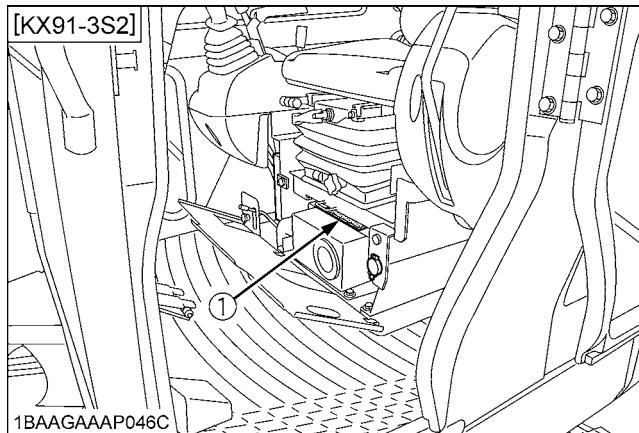


CAUTION

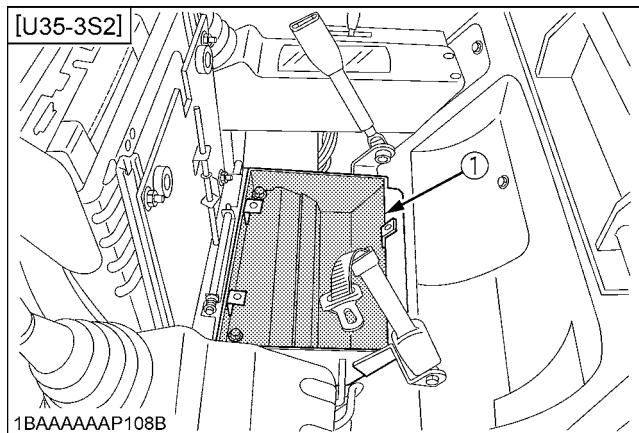
To avoid personal injury:

- Stop the engine and remove the key before tilting the seat.

■Where to keep Operators Manual



(1) Operator's manual storage



(1) Operator's manual storage

DAILY CHECKS

For your own safety and to assure the long life of your machine, a careful check should be made before each operation.

■ Checking Coolant Level

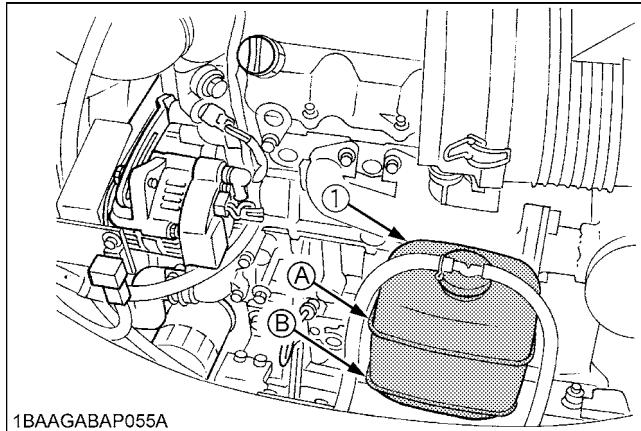


CAUTION

To avoid personal injury:

- Move the excavator to even ground.
- Make sure that the engine is turned off.
- Do not open the radiator cap right after the engine has been stopped; Serious burns can occur from contact with escaping hot coolant fluid.
- Check the coolant level in the reserve tank only after the engine has cooled down.
- Remove the radiator cap only if absolutely necessary.

1. Check to see that the coolant level is between the "FULL" and "LOW" marks of a reserve tank.
2. When the coolant level drops due to evaporation, add water only up to the full level.
In case of leakage, add anti-freeze and water in the specified mixing ratio up to the full level.
(See "Changing Radiator Coolant" in every 2 years maintenance.)



(1) Reserve tank

(A) "FULL"

(B) "LOW"

IMPORTANT :

- Do not fill the reserve tank over the "FULL" marking.
- Do not fill with dirty or salty water.

■ Checking Fuel Level



CAUTION

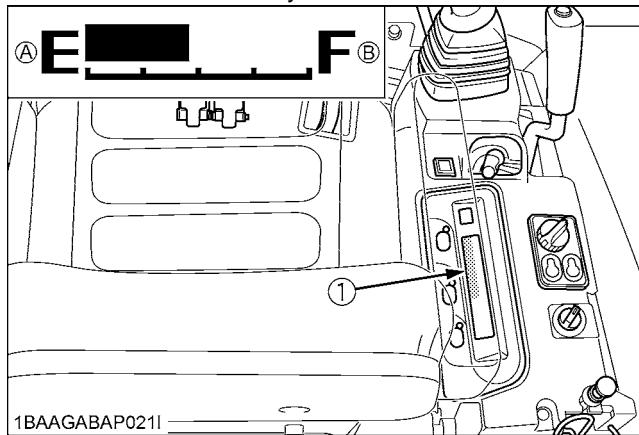
To avoid personal injury:

- Stop the engine and remove the key before fuelling.
- Do not smoke while fuelling.

IMPORTANT :

- By temperatures over -5°C (23°F), use No.2-D diesel fuel, when temperatures are under -5°C (23°F), use No.1-D diesel fuel.
- Make sure that the fuel tank is not run empty. Air will enter the fuel system, and must be purged before restarting.
- To prevent condensation (water) accumulations in the fuel tank, fill the fuel into the tank before parking overnight.
- Always fill up the fuel after a day's work.
- See "PURGING OF THE FUEL SYSTEM" in "OTHER ADJUSTMENTS AND REPLACEMENTS".

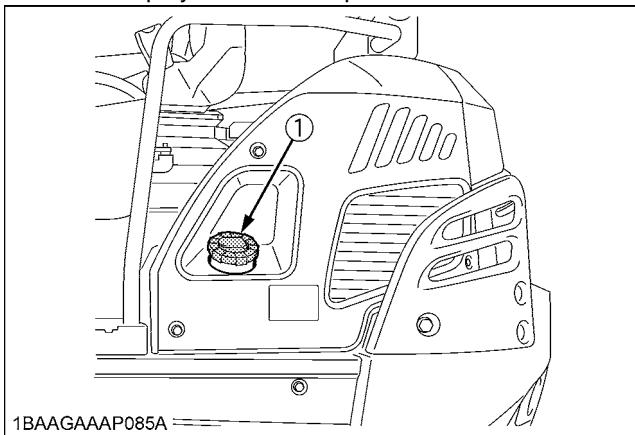
1. Check the fuel level by the fuel level indicator.



(1) Fuel level indicator

2. Open the tank cap with the starter key, and add fuel.

- See "Opening and Closing of the Fuel Tank Cap" and "LCD Display for Normal Operation."



(1) Fuel tank cap

■ Checking Engine Oil Level

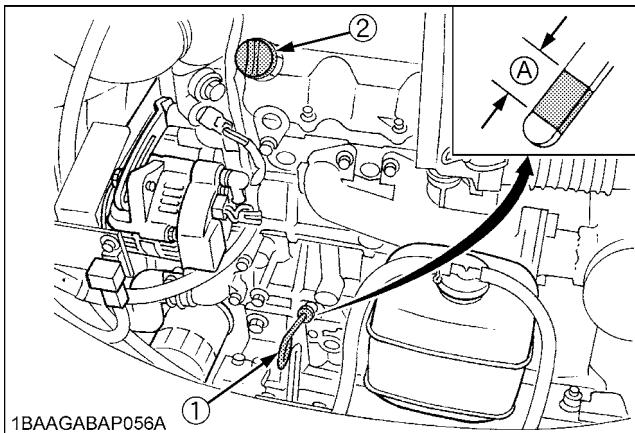


CAUTION

To avoid personal injury:

- Stop the engine and remove the key before checking the oil level.

Insert the engine oil dipstick fully into the respective port opening, remove again and check the oil level; if necessary fill with oil. The machine must be on level ground when checking the oil level.



(1) Engine oil dipstick
(2) Filling port

(A) Oil level is acceptable
within this range.

IMPORTANT :

- Use engine oil with the correct viscosity. (according the outside temperature.)
- After stopping the engine and removing the key, wait five minutes and then check oil level. The excavator must be on level ground.

■ Checking Hydraulic Oil Level



CAUTION

To avoid personal injury:

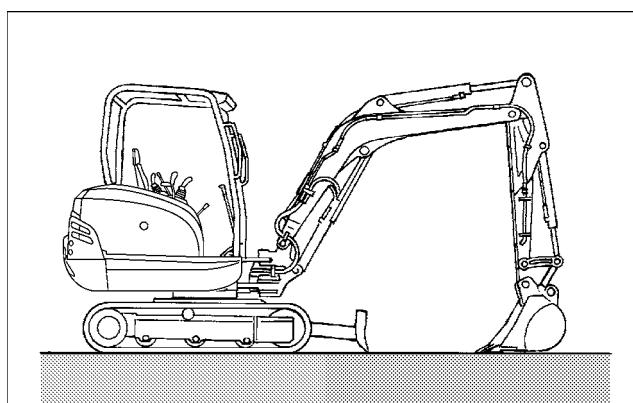
- Stop the engine and remove the key before checking the oil level.

IMPORTANT :

- Before filling oil, wipe away all sand and dust from around the oil port. Make sure to use an identical type of hydraulic fluid.

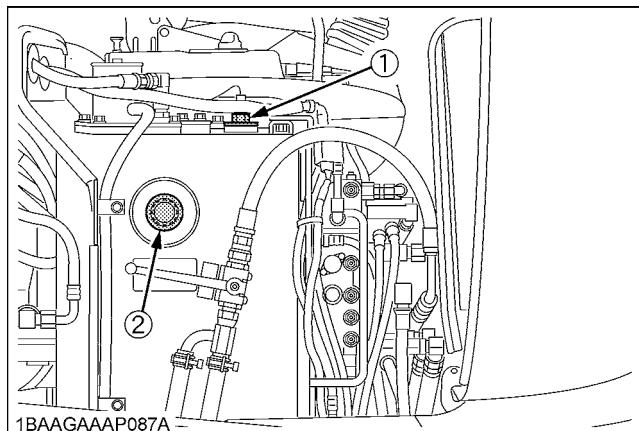
- The excavator has been filled with hydraulic fluid before delivery. See "RECOMMENDED OILS".
(Do not mix different oils.)

1. Park the excavator on a firm, flat and level surface. Lower the attachments and dozer blade to the ground and stop the engine.



1BAAGAAAP088A

2. Check the oil level as to whether it lies on the center of the gauge at normal temperature (10 to 30°C (50 to 80°F)).
3. Enough oil is present if the oil level lies near the center of the gauge.
4. Should the oil level be too low, fill oil through the oil port before starting the engine. This step is important for the protection of the hydraulic system.



(1) Tank cap

(2) Gauge

■ Lubrication Points



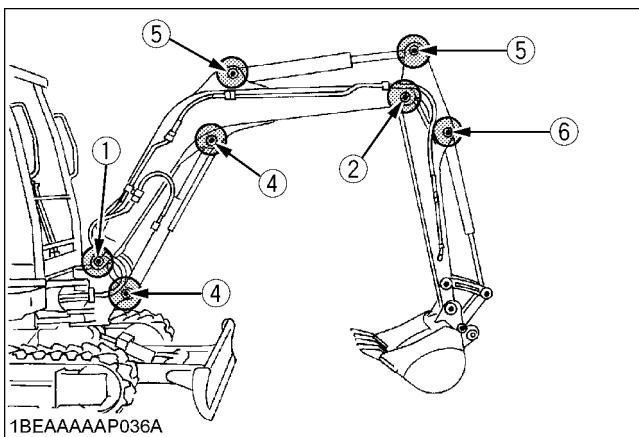
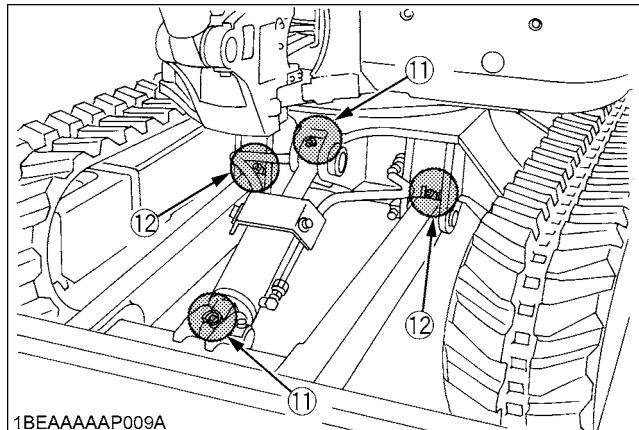
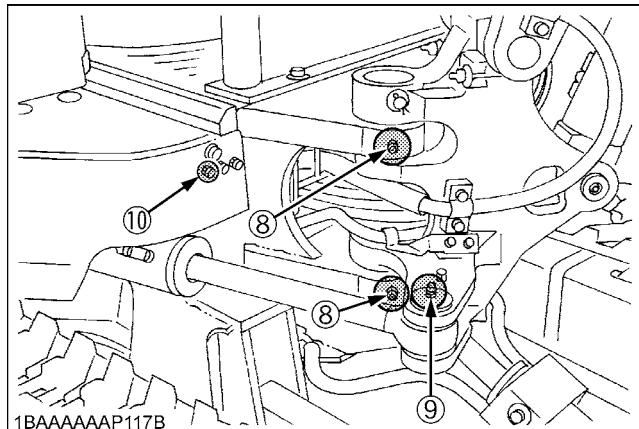
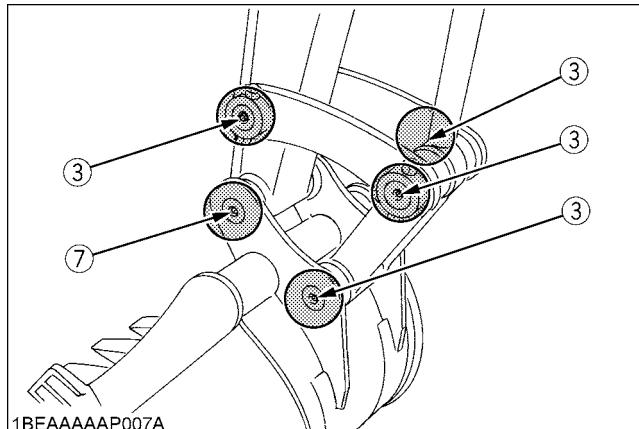
CAUTION

To avoid personal injury:

- First lower all attachments to the ground then stop the engine and remove the key.
- While greasing, take caution not to step on the bucket teeth.
- When doing excavation work in water, generously grease the following points. After ending work, grease again.

Grease the marked grease nipples shown by arrows in the illustration below.

1. Boom bottom linkage..... 1 place
2. Arm bottom linkage..... 1 place
3. Bucket link pin..... 4 places
4. Boom cylinder boss..... 2 places
5. Arm cylinder boss..... 2 places
6. Bucket cylinder boss..... 1 place
7. Fixing pin between arm and bucket..... 1 place
8. Boom swing fulcrum..... 2 places
9. Swing cylinder boss..... 1 place
10. Swing cylinder pin..... 1 place
11. Dozer cylinder boss..... 2 places
12. Dozer linkage pin..... 2 places



■ Checking Radiator and Oil Cooler

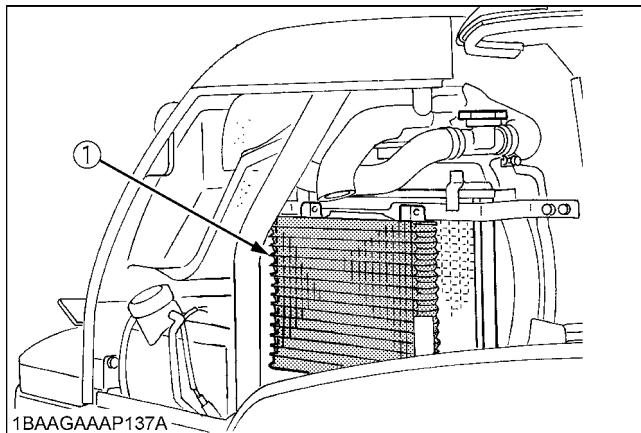


CAUTION

To avoid personal injury:

- Always stop the engine and remove the key before checking the radiator.
- Wear eye protection when cleaning with compressed air.

1. Check if the fins and ribs are clogged. If so clean with compressed air or steam.
2. Check the rubber hoses for damage and replace if cracked or old. Check if the hose clamps are tight enough.



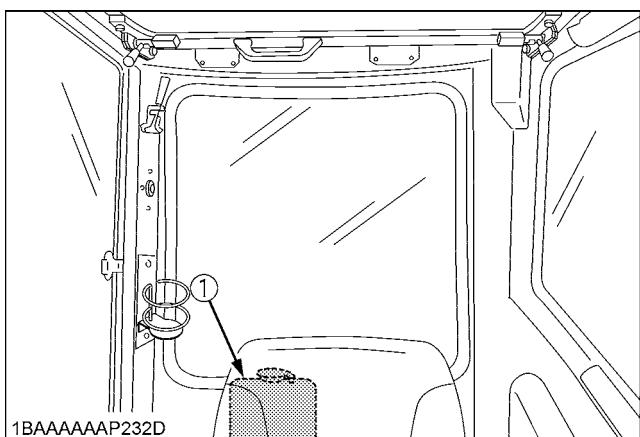
(1) Radiator and oil cooler

IMPORTANT :

- Radiator and oil cooler fins and ribs must be clean in order not to overheat the engine and allow free flow of air through the cooling elements.

■ Checking Washer Liquid(only for CAB type)

If the windows washer is switched on with the washer liquid tank empty, the motor may be damaged. Always keep the tank filled.



(1) Washer liquid tank

■ Checking and Cleaning Engine and Electrical Wiring



CAUTION

To avoid personal injury:

- Always stop the engine and remove the key before cleaning the wiring, cables and engine.

Before starting, check whether flammable substances have gathered on the battery, the cables and wiring, the muffler or on the engine. Remove thoroughly.

Check the electrical circuitry for disconnections, shorts or loose terminals.

■ Washing Whole Machine

IMPORTANT :

- Do not wash the excavator with the engine running. Water could enter the air filter and damage the engine. Make sure that the air filter is kept dry.
- Remove the mud before washing the machine.

REGULAR CHECKS AND MAINTENANCE WORK

EVERY 50 SERVICE HOURS

■Draining Fuel Tank

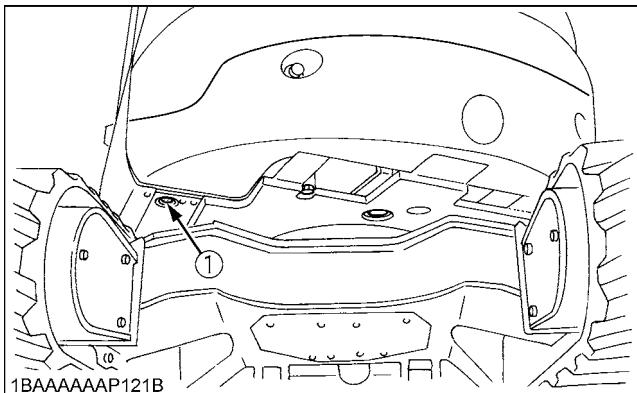


CAUTION

To avoid personal injury:

- Before draining the fuel tank, be sure to stop the engine and remove the key.
- Do not smoke during inspection.

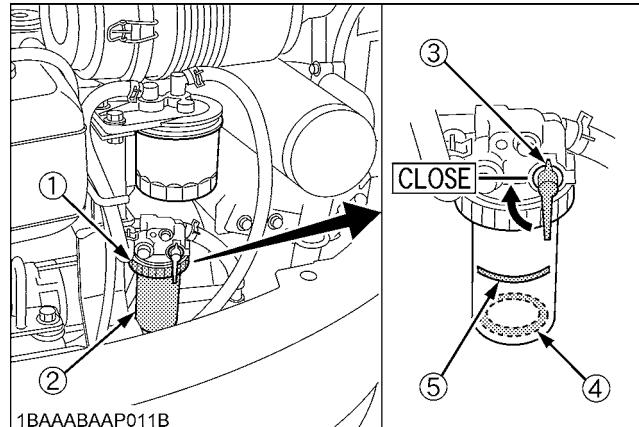
1. Remove the drain plug on the underside of the body and drain water.
2. Re-tighten the drain plug.



(1) Drain plug

■Draining Water Separator

1. Open the hood.
2. When the separated water enters the cup, the red float moves upwards.
When the float reaches the line, close the cock so that no fuel can run out. Now loosen the ring nut, and remove the cup and empty completely.
3. Finally, do not forget to open the cock and replace the left side cover.



(1) Ring nut

(2) Cup

(3) Cock

(4) Float

(5) Line

■Battery



DANGER

To avoid the possibility of a battery explosion:
For refillable type battery, follow the instructions below.

- Do not use or charge the refillable type battery if the fluid level is below the LOWER (lower limit level) mark. Otherwise, the battery component parts may prematurely deteriorate, which may shorten the battery's service life or cause an explosion. Check the fluid level regularly and add distilled water as required so that the fluid level is between the UPPER and LOWER levels.



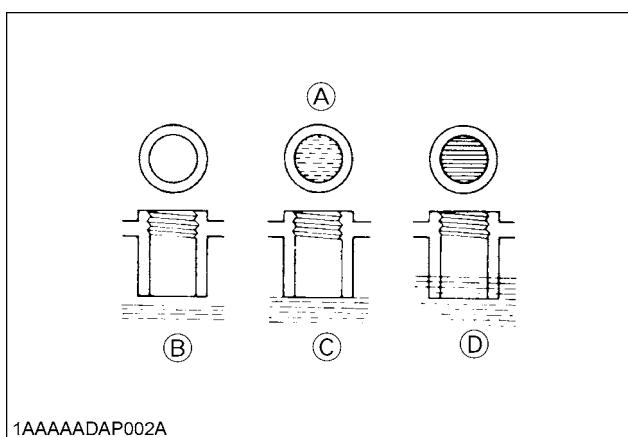
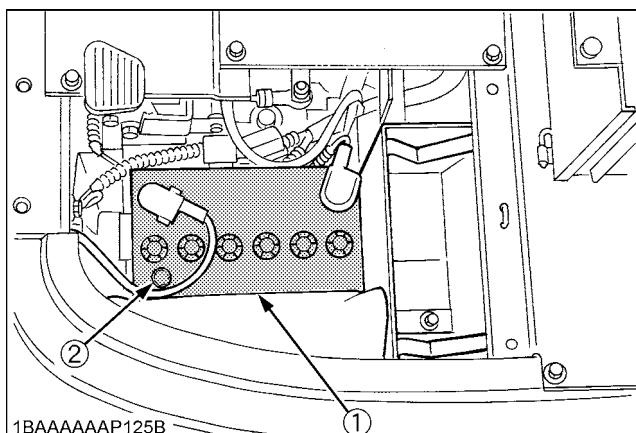
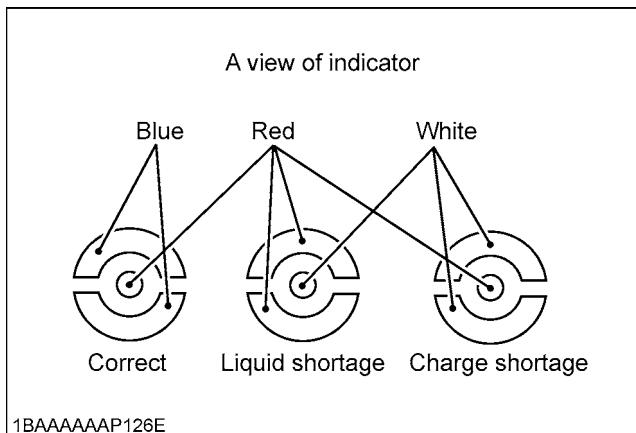
CAUTION

To avoid personal injury:

- Never remove the vent caps while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately and get medical attention.
- Wear eye protection and rubber gloves when working around the battery.
- Before inspection or dismounting the battery, be sure to turn off the engine and turn the starter switch to the "OFF" position.
- When removing the battery, always disconnect the negative ground cable first. When installing a battery, always connect the ground cable last. This prevents a possible explosion caused by sparks.

- Always wear eye protection when working with the battery.

1. Remove the mat and cover of left side step, check the battery fluid level and add distilled water if necessary.
2. If battery fluid be spilt, fill with sulfuric acid solution of the same concentration.
3. Clean the battery caps (ventilation holes) also.



(A) Battery fluid level
(B) "Too low"

(C) "Correct"
(D) "Too high"

NOTE :

- When filling battery fluid or distilled water, clean trash, dust, etc off the top of battery before opening the battery cap.

■ Battery Charging



CAUTION

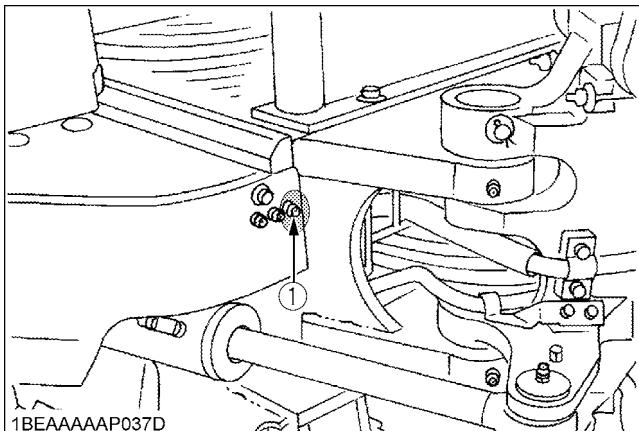
To avoid personal injury:

- 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 battery, make sure battery vent plugs are securely.
- 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.
- Do not check 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 distilled water in a well-ventilated area.
2. The water in the electrolyte evaporates during recharging. Liquid shortage damages the battery. Excess liquid spillage damages the excavator.
3. To slow charge the battery, connect the battery positive terminal to the charge positive terminal and the negative to the negative, then recharge in the standard fashion.
4. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time. When using a boost-charged battery, it is necessary to recharge the battery as early as possible. Failure to do this will shorten the battery's service life.
5. When the specific gravity of electrolyte falls between 1.27 and 1.29 charge has completed.
6. When exchanging an old battery for a new one, use a battery of equal specification.

■ Greasing Swing Bearing Teeth

1. Pump grease with grease gun through the grease nipple (at the right end side).
2. Grease at each 90° (1.58 rad.) position of the swing frame.
3. Fill with approx. 50g of grease (approx. 20 to 30 pumps with the grease gun at each position).



(1) Grease nipple

EVERY 200 SERVICE HOURS

Do all 50-hour servicing at the same time.

■ Checking Fan Belt Tension

- ◆ Check and adjustment of the fan belt tension

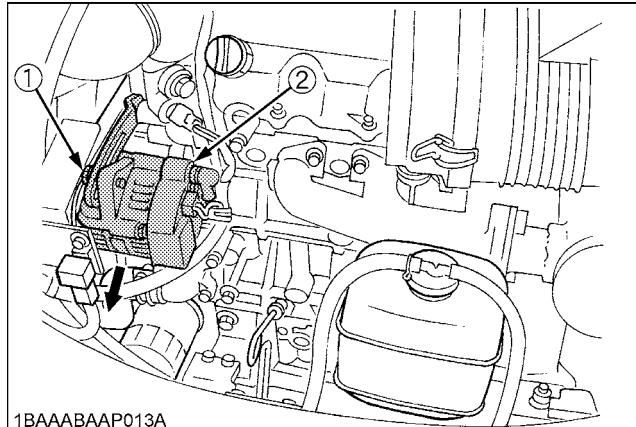


CAUTION

To avoid personal injury:

- First stop the engine and remove the key.
- After servicing, make sure to replace the belt cover in its original position.

1. Press the fan belt down in the middle, with a force of approx. 7 kg. The belt tension is correct if it deflects about 8 mm. If otherwise, loosen bolt (1) shift the alternator (2) in the direction shown by the arrow.
2. Replace the fan belt if worn out, cracked or torn.



(1) Bolt
(2) Alternator

IMPORTANT :

- If the engine is run with a loose fan belt, the belt could slip and cause overheating of the engine or insufficient battery charging. Check fan belt tension regularly.
- Should the fan belt break or jump off, the indicator light for battery charge will light up. Stop the engine and remove the key immediately.

■ Checking Radiator Hoses and Clamps



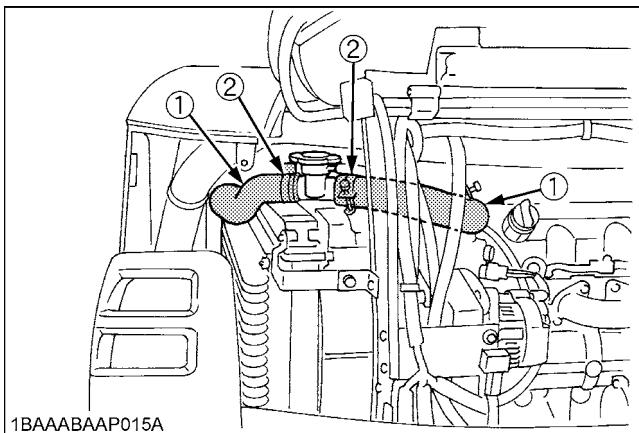
CAUTION

To avoid personal injury:

- Wait long enough for the radiator coolant to cool down.

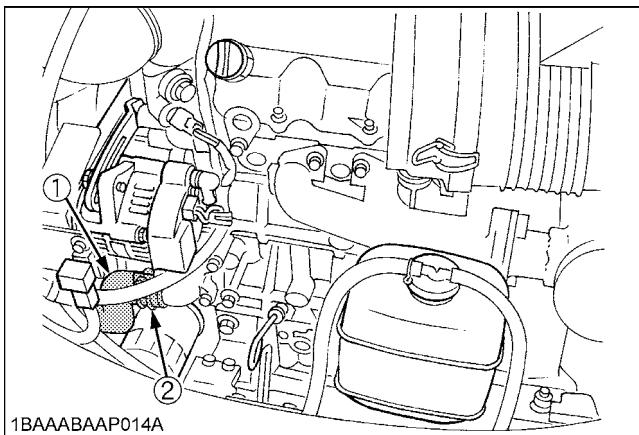
Check the water hoses for proper connection. This check should be carried out every 200 hours or every 6 months, whichever comes first.

1. Should the hose clamps become loose or water leaks, tighten the hose clamps properly.
2. Should the radiator hoses become swollen, aged or cracked, they must be replaced and the hose clamps tightened again properly.



(1) Radiator hoses

(2) Hose clamps



(1) Radiator hoses

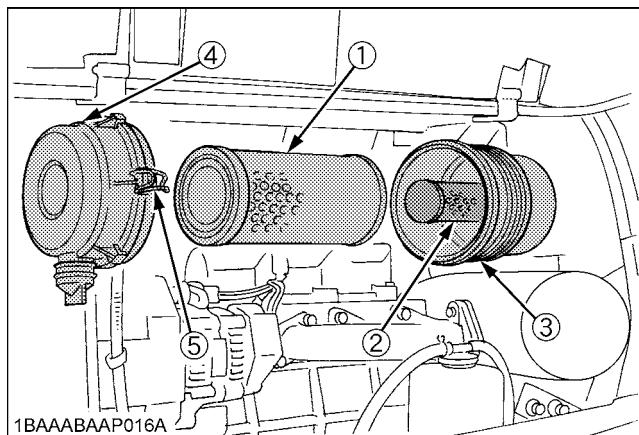
(2) Hose clamps

■ Inspection and Cleaning Air Filter Element

Open the engine cover and remove the dust cover. Take out only outer element, clean the element, case interior and reassemble. During reassembly, take care to install the dust cover with facing the TOP mark upwards. Do not remove the inner element (safety element).

IMPORTANT :

- Should the machine be used in extreme dusty areas, the air filter element must be inspected and cleaned more frequently than in the specified maintenance periods.
- The air filter has a dry element, keep free from oil.
- Do not run the engine without the air filter.



(1) Outer element

(2) Inner element (safety element)

(3) Case

(4) Dust cover

(5) Clamps

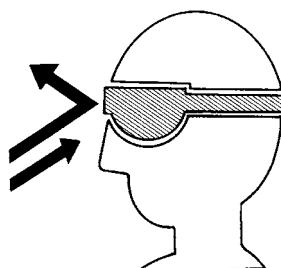
■ Air Filter Maintenance



CAUTION

To avoid personal injury:

- Wear eye protection.

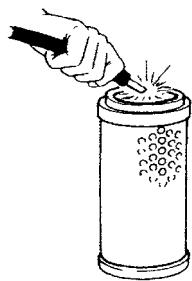


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The quickest and safest method of maintenance is the exchange of the paper cartridge. Furthermore there are different methods of cleaning the cartridge.

◆ Cleaning with compressed air

Pressure of compressed air must be under 205 kPa (2.1 kgf/cm²), and the cartridge should be blown clean from the inside to the outside until the dust deposits are noticeably reduced.



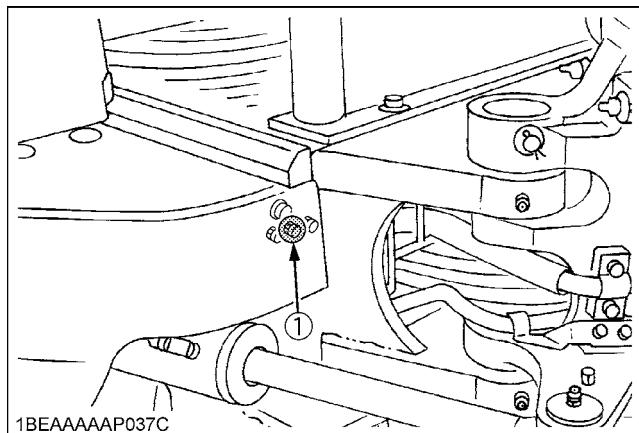
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IMPORTANT :

- If the air suction is still inadequate, or the color of the exhaust gases is abnormal even after the cleaning, the air filter cartridge must be replaced.

■ Greasing Swing Bearing

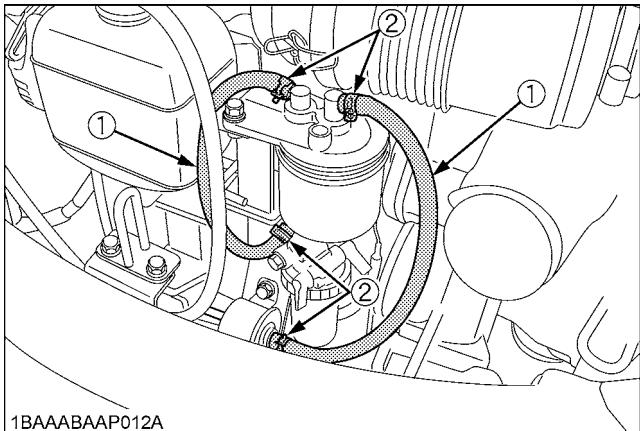
1. Fill with grease through the respective grease nipple.
2. Grease at each 90°(1.58 rad.) position of the swing frame.



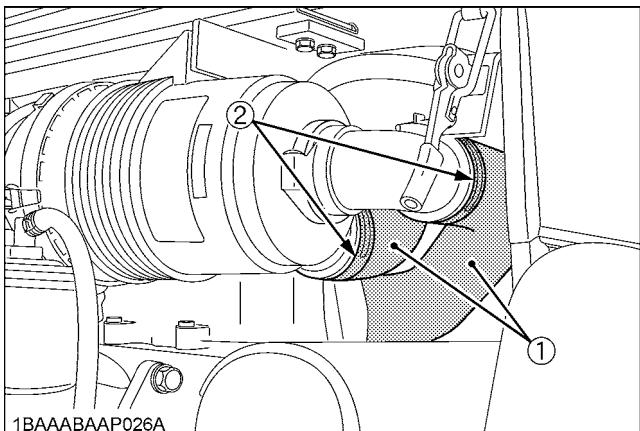
(1) Grease nipple

■ Checking Fuel Line and Intake Air Line

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



(1) Fuel lines
(2) Clamp bands



(1) Hoses
(2) Hose clamps

EVERY 250 SERVICE HOURS

Do all 50 hour servicing at the same time.

■ Changing Engine Oil(First Engine Oil Change after 50 Service Hours)

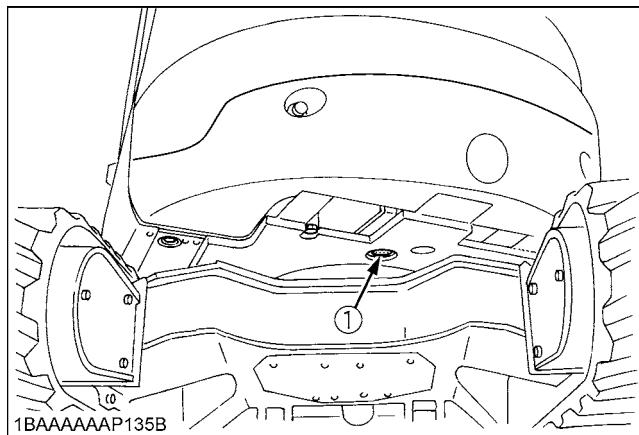


CAUTION

To avoid personal injury:

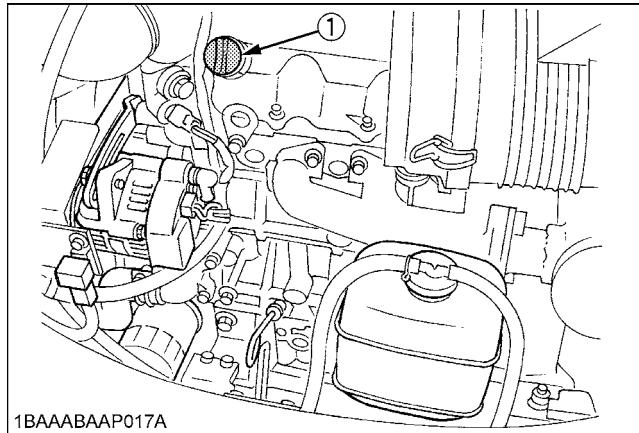
- First stop the engine then remove the key and wait long enough for the oil to cool down.

1. Remove the drain plug on the underside of the engine and drain all oil.
2. Re-tighten the drain plug.



(1) Drain plug

3. Fill through the filling port up the specified level.



(1) Oil filling port

4. Let the engine idle for approx. 5 min. Check the engine oil level. To check the engine oil level, insert the engine oil dipstick completely into the respective port opening and pull out again. If the oil level lies between both markings, no oil must be added.

IMPORTANT :

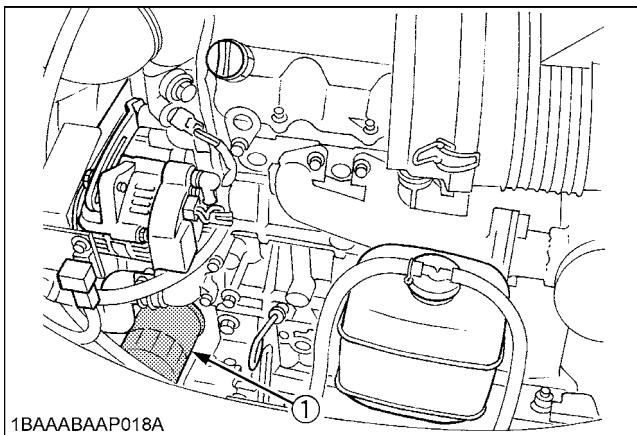
- Regardless of the service hours, an engine oil change is due every six months.

EVERY 500 SERVICE HOURS

Do all 50 and 250 hour servicing at the same time.

■Replacing Engine Oil Filter(Replace the engine oil filter every 500 hours,or every 1 year in the case that service hour is less than 500 hours)

1. Replace the oil filter cartridge at the same time as doing the engine oil change.
2. Remove the cartridge with the supplied filter wrench.



(1) Oil filter

3. Oil the O-ring of the new oil filter cartridge lightly. Then tighten the oil filter cartridge by hand.
4. Fill engine oil to the specified level.
5. Let the engine run for approx. 5 min. and make sure that the engine oil indicator lamp does not light up. Then stop the engine and remove the key.
6. The engine oil level is reduced by the amount of the filter capacity after the engine is started. It is necessary to add oil.

IMPORTANT :

- Always check the oil level after having exchanged the filter.

Engine oil volumes (with engine oil filter)	5.9 L
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■Drive unit Oil Change(First Oil Change at 100 hours)

CAUTION

To avoid personal injury:

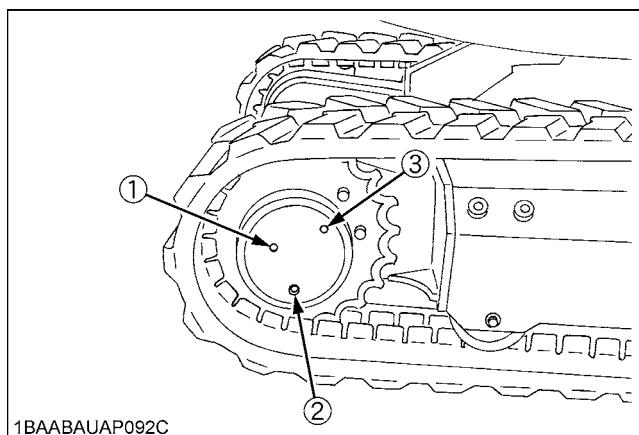
- Lower to the ground, stop the engine and remove the key before undertaking the oil change.

1. Rotate the track so that the drain plug of the drive unit is in the bottom position.
2. Remove the drain plug to let the oil run out. Screw in and tighten the drain plug again and fill with gear oil through the oil check port.
3. Fill oil until it overflows out of the oil check port.

Oil change

- first oil change after 100 hrs
- then every 500 hrs
- or at least once a year

4. Use prescribed gear oil SAE 90.



(1) Oil check port
(2) Drain plug
(3) Oil filling port

Gear oil volume	approx. 0.6 L
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■Replacing Fuel Filter Cartridge

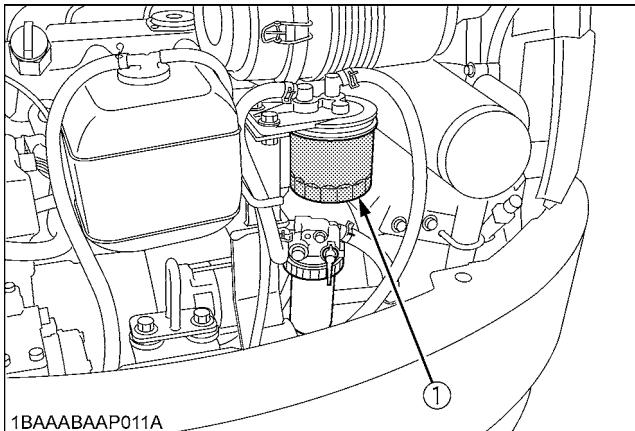


CAUTION

To avoid personal injury:

- Keep fire away.

1. Remove the filter with the supplied filter wrench.
2. Add fuel to a new filter before installing.
3. Apply a light film of fuel to the seal of the new filter and turn in tightly by hand.
4. Open the cock of the fuel filter again.



(1) Fuel filter cartridge

IMPORTANT :

- After exchange of the filter, the fuel system must be purged of air.

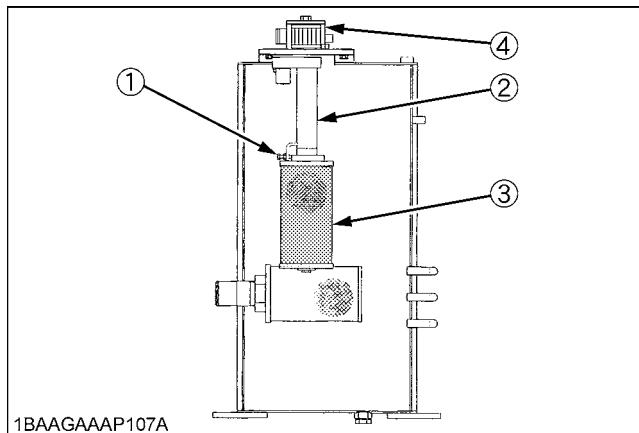
■Replacing Hydraulic Return Filter Element(first replacement after 250 service hours)



CAUTION

To avoid personal injury:

- Remove the oil filter only after the oil in the hydraulic tank has cooled down.



(1) Set bolt
(2) Filter support

(3) Return filter
(4) Cover

1. Remove the cover of the hydraulic tank.
2. Pull out the filter support by the top plate from the hydraulic tank.
3. Remove the return filter from the filter support with a fork wrench and exchange the filter.

IMPORTANT :

- Always check the oil level when replacing the filter.

EVERY 1000 SERVICE HOURS

Do all 50, 100, 200, 250 and 500 hour servicing at the same time.

■ Hydraulic Oil Check for Machines with Hydraulic Breakers

The hydraulic oil change after 1000 operating hours in the operator's manual is based on the type of work done. Following inspection measures are valid when hydraulic breakers are used:

1. Changing and filling up of hydraulic oil
 - (1) The hydraulic oil must be changed more often when breakers are used because the machine is subject to harder conditions than normal excavating work.
 - (2) Use only the recommended oils mentioned in the operator's manual when changing or filling with oil.
 - (3) When filling up oil, never mix oils of different makes.
2. Changing the return filter and oil
 - (1) The filter must be changed more often because of contamination resulting from the frequent assembly and disassembly of the hoses.
 - (2) Use the correct replacement filter.
 - (3) Oil change according to operating hours.

	Hydraulic oil	Return Filter	Suction Filter
Normal excavator work	every 1000 Hrs.	500Hrs. (250Hrs. after first operation)	
Breaker work portion	20%	evry 800 Hrs.	1000 Hrs.
	40%	evry 400 Hrs.	
	60%	evry 300 Hrs.	
	More than 80%	evry 200 Hrs.	100 Hrs.

■ Hydraulic Oil Change (Including Replacing Suction Filter and Breather Filter Element in Hydraulic Tank)

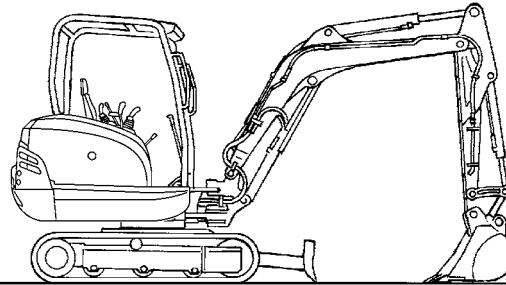


CAUTION

To avoid personal injury:

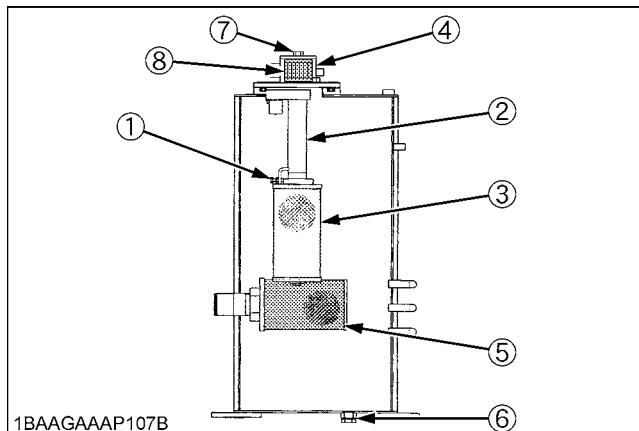
- Wait long enough for the hydraulic fluid to cool down. Then begin with the change of the hydraulic fluid.

1. Park the excavator on a firm, flat and level surface. Lower the attachments and dozer blade to the ground and stop the engine.



1BAAGAAAP088A

2. Remove the drain plug on the underside of the hydraulic tank and drain the oil.



- | | |
|--------------------|---------------------|
| (1) Set bolt | (5) Suction filter |
| (2) Filter support | (6) Drain plug |
| (3) Return filter | (7) Bolt |
| (4) Cover | (8) Breather filter |

3. Remove the cover of the hydraulic tank.
4. With a fork wrench or similar, remove and replace the filter with new one.
5. Retighten the drain plug, and remove iron powder adhering to the magnet.

6. Fill oil through the oil filling opening on the top side of the tank.
7. Let the engine run for approx. 5 min. and check the oil level again.

IMPORTANT :

- Should dirt deposits be in the hydraulic tank, remove with the help of a clean cloth and light oil.

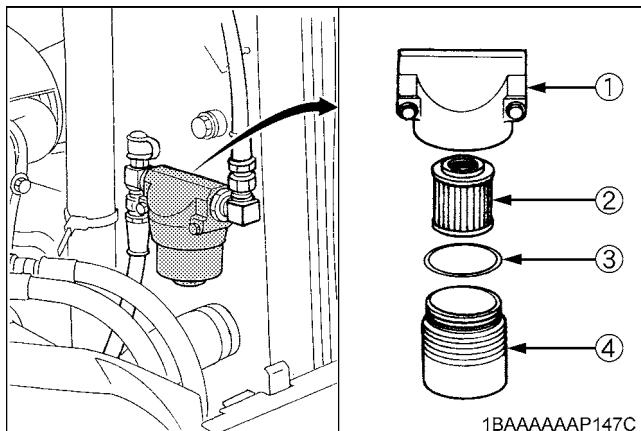
Hydraulic oil volumes	55 L
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■Replacing Hydraulic Pilot Filter Element**CAUTION**

To avoid personal injury:

- Before replacing the element, wait long enough for the hydraulic fluid to cool down.

1. Remove the arch cover.
2. Remove the hydraulic oil tank cover.
3. Remove the pilot filter case from the head cover.
4. Wrench and pull out the element downward.
5. Replace the O-ring with a new one.
6. Apply a light coating of clean hydraulic oil to the O-ring and fit it to the case firmly. Be careful not to scratch the O-ring.
7. Install the case to the head cover firmly.
8. Let the engine run for approx. 3 minutes.
9. Check the oil level of hydraulic oil tank.



- (1) Head cover
- (2) Element
- (3) O-ring
- (4) Case

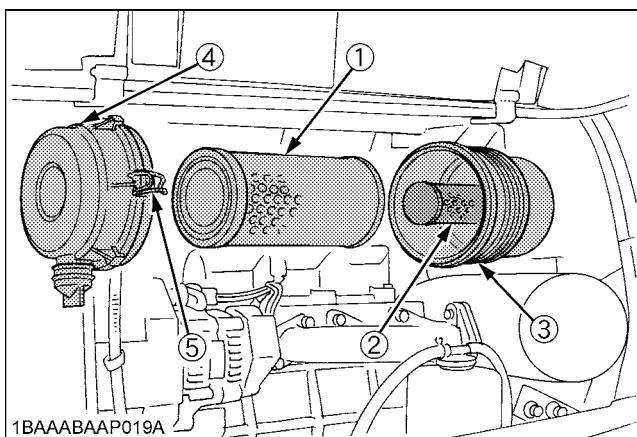
EVERY 1000 SERVICE HOURS OR ONCE A YEAR**■Replacing Air Filter Element**

Open the engine cover and remove the dust cover.

Take out outer element and inner element (safety element).

Replace inner and outer element.

Installing the dust cover, be sure to its TOP mark (arrow) faces upwards.



- (1) Outer element
- (2) Inner element (Safety element)
- (3) Case
- (4) Dust cover
- (5) Clamps

IMPORTANT :

- Shorten the replacement period if using in a place exposed to lots of dust or sandy areas.

EVERY 1500 SERVICE HOURS**■Checking Fuel Injection Nozzle(Injection Pressure)**

Consult your local KUBOTA Dealer for this service.

EVERY 2000 SERVICE HOURS

Do all 50, 200, 250, 500 and 1000 hour servicing at the same time.

■Changing Front Idler and Track Roller Oil**NOTE :**

- Contact your KUBOTA dealer for details.

■Checking Alternator and Starter Motor**NOTE :**

- Contact your KUBOTA dealer for details.

EVERY 3000 SERVICE HOURS

■ Checking Injection Pump

Consult your local KUBOTA Dealer for this service.

ANNUAL SERVICE

■ Electrical Wiring and Fuses

Check the terminals periodically for proper connections. Loose wiring or damaged cables can cause improper functioning or short circuiting of the electrical system. Check wiring and replace damaged components immediately. If a fuse blows out soon after having been replaced, contact your nearest KUBOTA dealer. Do not use a fuse other than specified.

BIENNIAL SERVICING



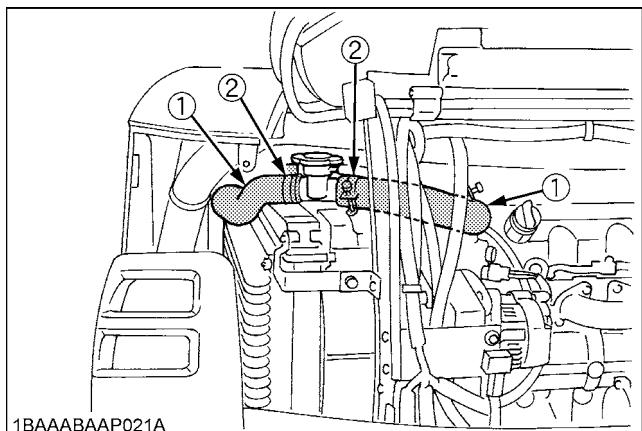
CAUTION

To avoid personal injury:

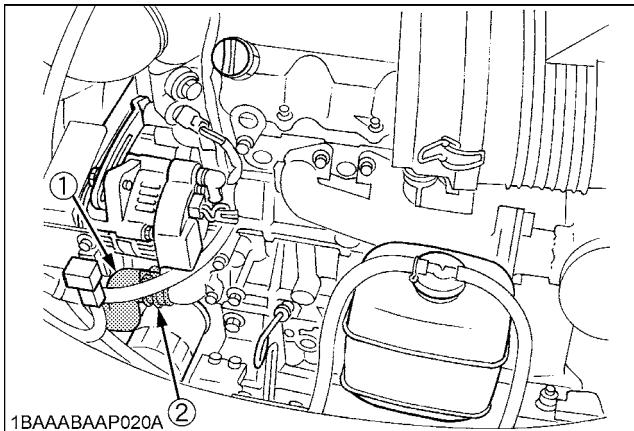
- Do not loosen the radiator cap before the radiator has cooled down sufficiently. Then only loosen the cap and allow enough time for the pressure in the system to be released. Now remove the cap completely.

■ Replacing of Radiator Hoses

Replace radiator hoses and hose clamps every two years. If the hoses are swollen, hard or cracked, they must be replaced earlier.



(1) Radiator hoses
(2) Hose clamps



(1) Radiator hoses
(2) Hose clamps

■ Changing Radiator Coolant



CAUTION

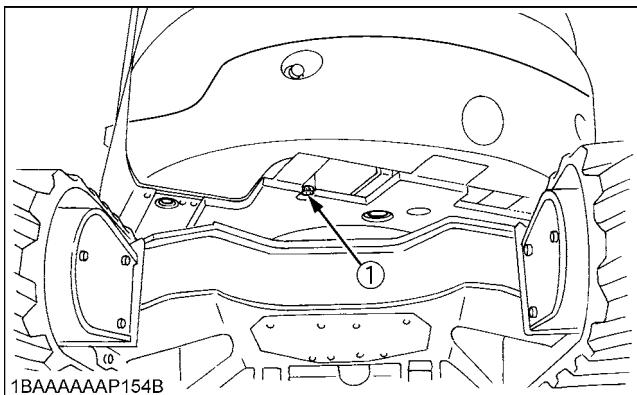
To avoid personal injury:

- When using anti-freeze, put on some protection such as rubber gloves (Anti-freeze contains poison.).
- If anti-freeze has been swallowed, seek medical attention at once.
- 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.
- Anti-freeze if swallowed is poison to people, animals and birds.

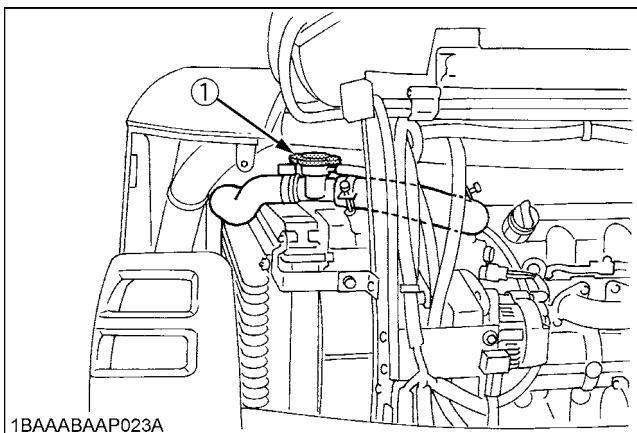
Stop the engine then remove the key and wait until it has cooled down completely.

1. Open the drain plug on the bottom of the radiator and drain coolant completely, Should a reserve tank be equipped, disconnect the line from the tank floor and then open the drain cock.
2. To clean, rinse the radiator with water.
3. Close the drain plug and fill the radiator and the reserve tank with coolant fluid. Let the engine idle for about 5 min., stop the engine and remove the key then check the coolant level.

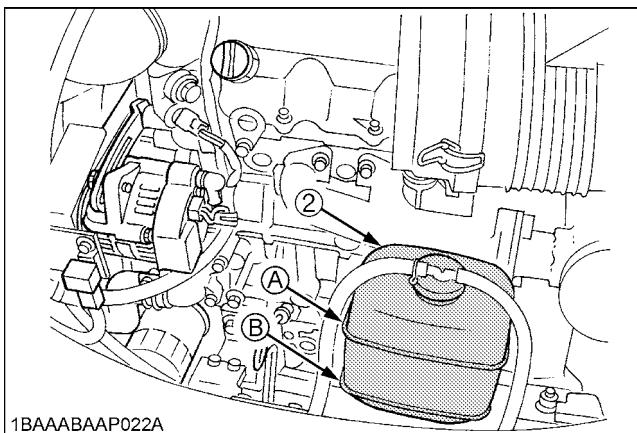
4. The machine has been shipped filled with 50% anti-freeze solution.



(1) Drain plug



(1) Radiator cap



(2) Reserve tank

(A) Full
(B) Low

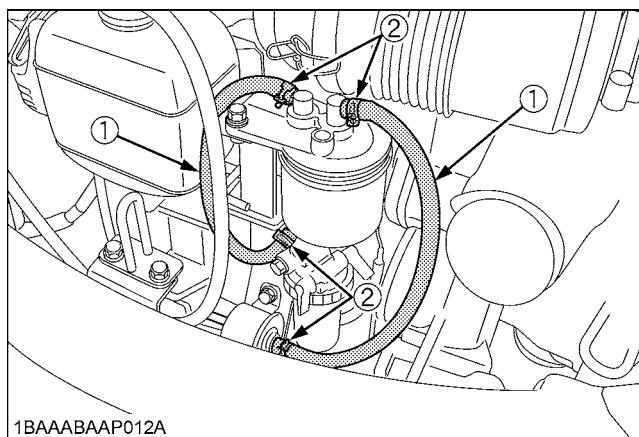
Radiator	approx. 4.0 L
Reserve tank	approx. 1.6 L

- To fill the radiator system and the reserve tank, use fresh water and anti-freeze fluid.
- When the anti-freeze is mixed with water, the anti-freeze mixing ratio must be less than 50%
- Tighten the radiator cap properly. If the cap is loosely or not properly fitted, overheating of the engine can result due to coolant fluid loss.

■Replacing Fuel Hose

Replace the hoses and clamps.

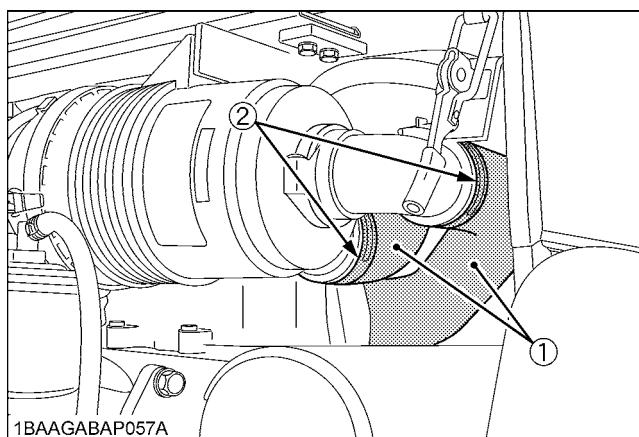
(See "Checking Fuel and Intake Air Line" every 200 hours maintenance.)

(1) Fuel lines
(2) Clamp bands

■Replacing Intake Air line

Replace the hoses and clamps, if necessary.

(See "Checking Fuel and Intake Air Line" every 200 hours maintenance.)

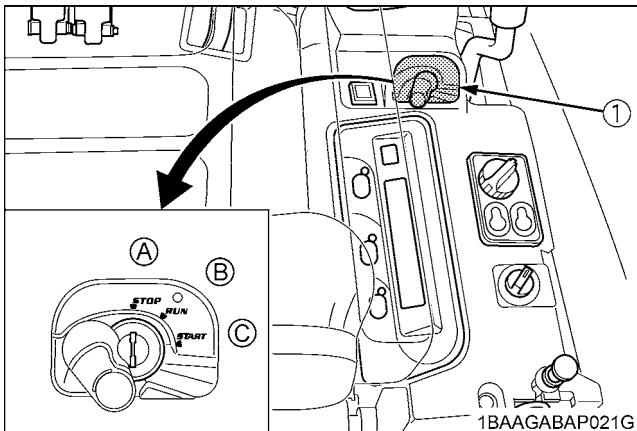
(1) Hoses
(2) Hose clamps
IMPORTANT :

- Do not operate the engine without coolant.

OTHER ADJUSTMENTS AND REPLACEMENTS

PURGING FUEL SYSTEM

1. Fill up the excavator with fuel.
2. Turn the starter key to the position "RUN".
3. The air in the fuel system will automatically be purged within one minute.



(1) Starter switch

(A) "STOP"
(B) "RUN"
(C) "START"

IMPORTANT :

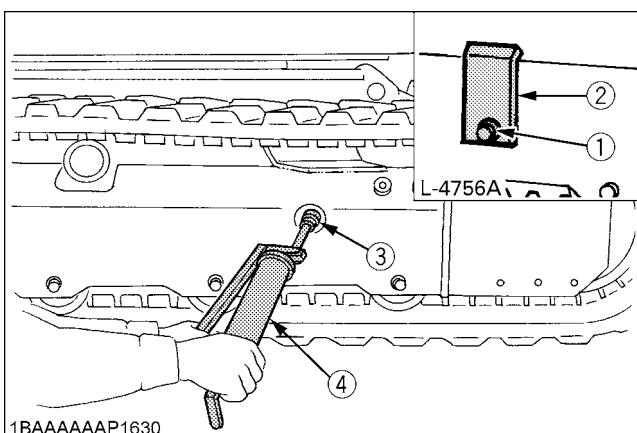
- If the purging was insufficient, the engine dies right after starting. In this case repeat steps (2) to (3) again.

ADJUSTMENT OF TRACKS

Rubber Tracks

Tension the tracks as specified:

1. Loosen the bolt (1) and remove the cover (2).
2. Apply grease (4) to the grease nipple (3).



(1) Bolt
(2) Cover

(3) Grease nipple
(4) Grease gun (Option)

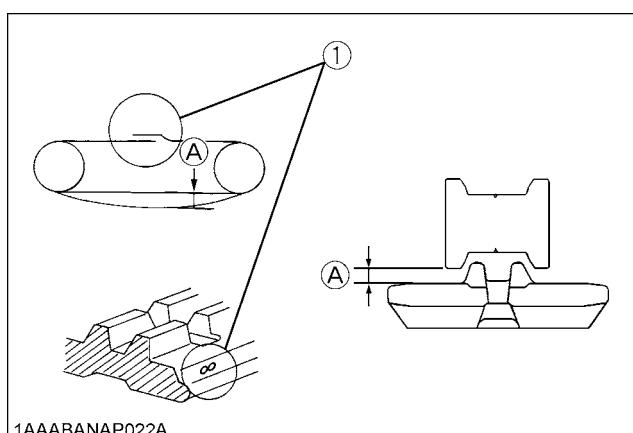
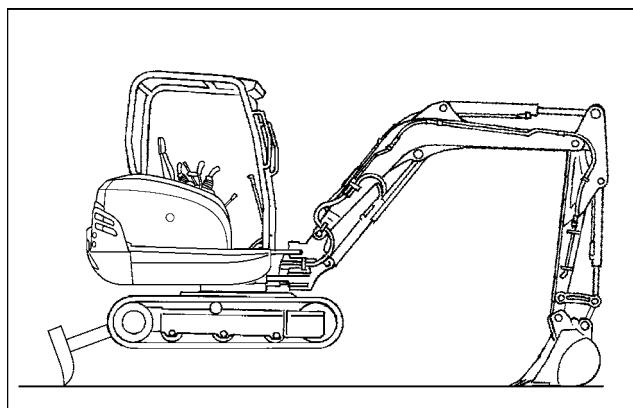
3. Tension the track in the lifted position, so that the distance "A" (clearance between the center track roller and the track surface of the track) is 10 to 15 mm (see illustration) In this case, the track seam is positioned on the top center between the idler and the sprocket.



DANGER

To avoid serious injury or death:

- Do not work under the machine in this condition.
- For your safety do not rely on hydraulically supported devices, they may leak down and suddenly drop or be accidentally lowered.



(1) Seam (Mark "∞")

(A)	10 to 15 mm
-----	-------------

IMPORTANT :

- Track seam

The ends of the rubber track are joined with a seam. When adjusting the tracks, the seam must be positioned on the top midway between the idler and the sprocket. By machines equipped with an upper roller, the seam mark should be positioned over the upper roller.

If the seam is positioned incorrectly, the tracks will be tensed too loosely, and a further readjustment will be necessary.

- Rotate the track after adjustment one to two times to check the tension. To loosen the rubber tracks, follow the same method as for steel tracks.
- Additionally following points are to be observed when adjusting rubber tracks.
 - (1) If the track slackens more than 25 mm, readjust them.
 - (2) Check track tension 30 hours after initial use and readjust if necessary. Check and adjust thereafter every 50 service hours.

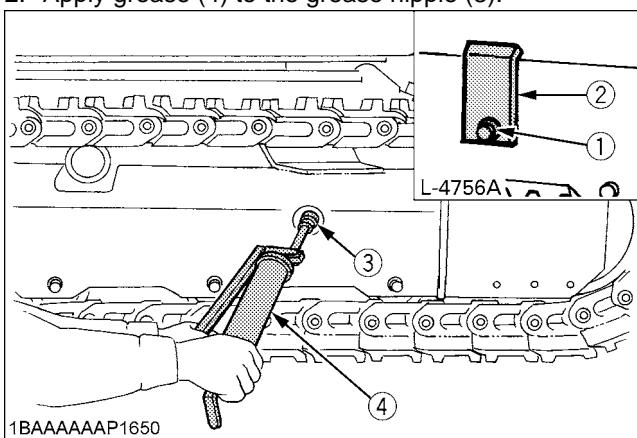
■ Special Information when Using Rubber Tracks

1. When turning, make a slow swing turn. Avoid spin turns to reduce lug wear and entry of dirt.
2. The relief valve may be activated if too much dirt and sand clog the tracks. In this case move the machine for a short distance straight backwards to let the earth and sand fall off, then a turn can be made.
3. Avoid using rubber track on riverbeds, stony underground, ferro-concrete and on iron plates. The rubber can damage as well as increase wear on the tracks.

■ Steel Tracks

◆ Track shoe plate tension

1. Loosen bolt (1) and remove the cover (2).
2. Apply grease (4) to the grease nipple (3).



(1) Bolt
(2) Cover

(3) Grease nipple
(4) Grease gun (Option)

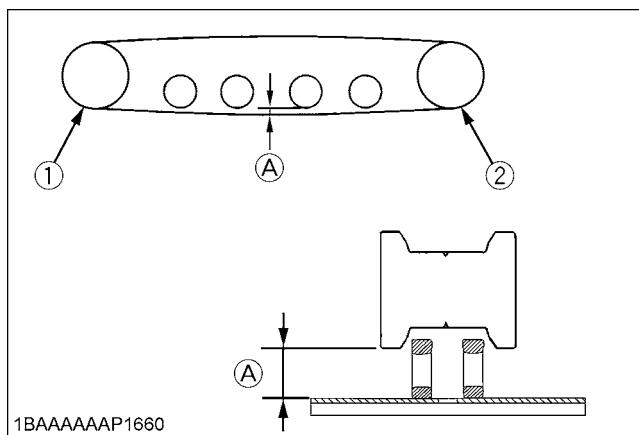
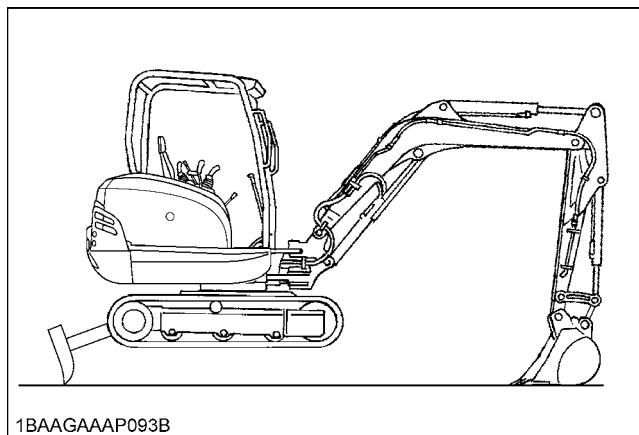
3. To check the track tension, the track must be lifted from the ground as shown. The track tension is correct if the clearance between the outer end of the track roller and the track interior surface corresponds to the dimension specified in the table below.



DANGER

To avoid serious injury or death:

- Do not work under the machine in this condition.
- For your safety do not rely on hydraulically supported devices, they may leak down and suddenly drop or be accidentally lowered.



(1) Drive sprocket
(2) Idler

(A)

75 to 80 mm

◆ To loosen the tracks, follow following procedure:



CAUTION

To avoid personal injury:

- Do not loosen the grease nipple completely or too quickly. Otherwise grease under high pressure in the tension cylinder could squirt out.
- Make sure that no obstacles, such as stones are caught in the track. Remove such obstacles before adjusting the track tension.

1. Loosen the bolt of the cover and remove the cover.
2. Using a socket wrench, loosen the grease nipple a few turns.
3. When grease oozes out from the thread, rotate the track and loosen the track in the lifted position (see illustration).

After adjustment is completed:

Using the socket wrench, tighten the grease nipple.

Tightening torque must be between 1000 to 1100 kgf-cm.

IMPORTANT :

- If the tracks are too tight, wear is increased.
- If the tracks are too loose, the track pads may collide with the sprocket, wear is increased.
The track may dislocate or come off.
- Clean the track after every use.
- Should the track tension be high due to sticking mud, lift the track with the help of the boom, arm and bucket, idle the engine and remove mud from the track, especially from the openings of the link plate carefully.

CHANGING THE BUCKET



CAUTION

To avoid personal injury:

- When the coupling pins are removed or installed, chips may come off. Always use gloves, goggles and a helmet.
- When the change of the equipment must be performed with the engine running, always work as a 2-person team.
One person sits in the operator's seat and the other works on the machine.
- Do not use your fingers to center the holes, since they may be injured or even cut in case of sudden or uncontrolled movements.
- Read the manual of the attachment to do a correct operation safely when other attachments are installed instead of Kubota specified bucket.

FUSES



CAUTION

To avoid personal injury:

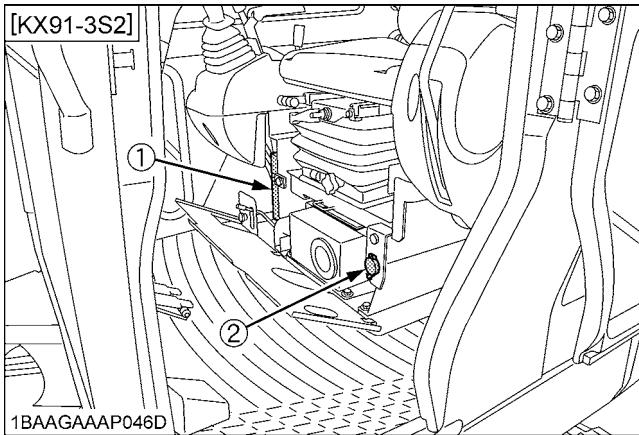
- When changing fuse, stop the engine and turn the key in position "STOP".

■Replacing Fuses

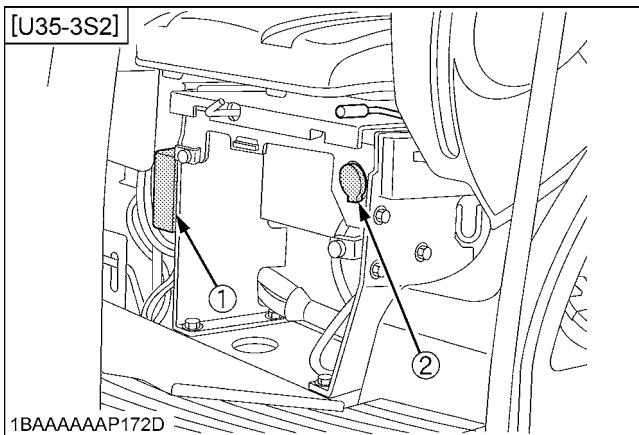
1. Remove the cover of the fuse box.
2. Replace the burnt out fuse with a fuse having the same capacity.

■Fuse Capacities and Circuits

5A Room Light	10A Heater Fan
20A Work Light	15A AI Motor
5A Meter Sub	
	10A Alternator
	5A Lock Lever
	10A Horn
15A Cigarette Lighter	10A Meter Main
15A Auxiliary	5A Travel Hi-Low
15A Wiper / Washer	5A Relay Source



(1) Fuse box
(2) Auxiliary electric A



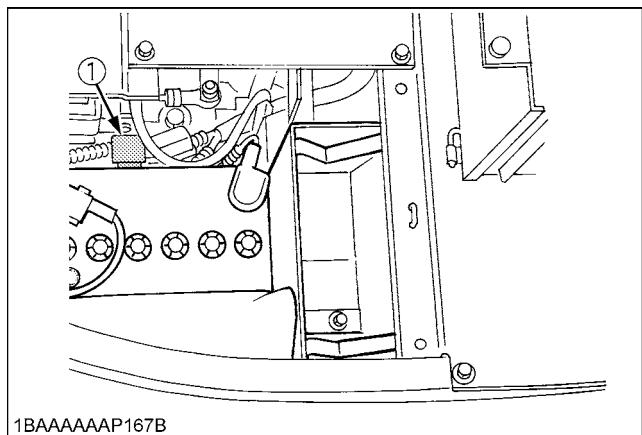
(1) Fuse box
(2) Auxiliary electric A

■Auxiliary Electric

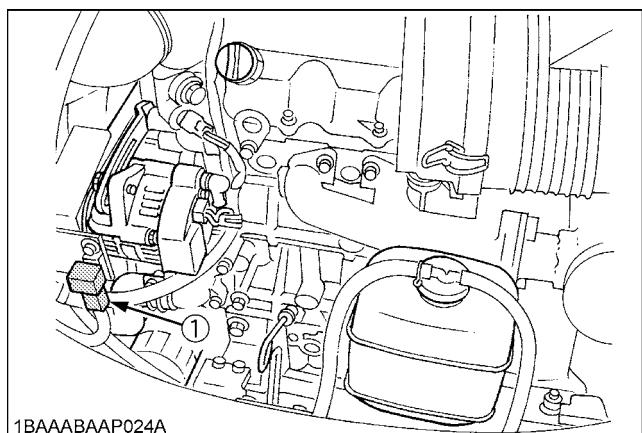
Max power is less than 110 W including the equipped light
55 W.

■Slow Blow Fuse

Slow blow fuse is provided to protect the electrical circuits. If the fusible link is blown, check the electrical circuits for trouble and then replace with a new compatible slow blow fuse.



(1) Slow blow fuse (50 A)



(1) Slow blow fuse (60 A)

TROUBLESHOOTING

If the mini-excavator does not show the desired performance, or when trouble arises, refer to the table below and undertake appropriate measures.

Trouble		Cause	Countermeasure
Engine	Starting difficulties	Lock levers in "UNLOCK" position	* Bring lock lever into "LOCK" position.
		Fuel is too viscous.	* Check fuel tank and filter. * Remove impurities and water. * If necessary, replace filter.
		Air or water in the fuel system	* Remove water from the fuel tank. * Check fuel pipe joint bolts and nuts for looseness. * Purging of the fuel system (for fuel filter and injection pump, see "PURGING FUEL SYSTEM" in the chapter "OTHER ADJUSTMENTS AND REPLACEMENTS".)
		Oil viscosity is so high that the engine runs sluggishly in winter.	* Pour hot water over the radiator.
		Battery is almost dead; insufficient compression.	* Recharge battery.
	Insufficient engine power	Low fuel level	* Check fuel and add if necessary.
		Clogged air cleaner	* Clean the air filter element.
	Engine suddenly stops.	Low fuel level	* Check fuel and add if necessary. * Purge the fuel system.
	Abnormal exhaust gas color	Poor fuel	* Use high quality fuel.
		Too much engine oil	* Drain engine oil to prescribed oil level.
Water temperature in red zone (Overheating)		Defective seal of the water pump	* Replace.
		Worn or torn fan belt	* Adjust or replace.
		Thermostat is defect.	* Replace.
		Coolant level too low	* Fill to prescribed level.
		Radiator grill or fins are clogged.	* Clean.
		Coolant is contaminated with rust from the cylinder head or crank case.	* Replace coolant fluid and add anti-rust.
		Defective radiator cap (Evaporation)	* Replace.
		Corroded coolant pipes	* Clean.
		Continuous operation under full load	* Reduce load.

Trouble		Cause	Countermeasure
Engine	Water temperature in red zone (Overheating)	Cylinder head gasket is damaged (Coolant loss).	* Replace.
		Engine oil level too low	* Fill to prescribed level.
		Maladjustment of fuel injection	* Readjust ignition timing.
		Use of poor fuel	* Use prescribed fuel.
Hydraulic System	Boom, arm, bucket, drive, swing and dozer power is too low.	Hydraulic oil level too low	* Add oil.
		Leakages of hoses and / or joints	* Replace hose or joint.
	Swing motor and front attachment does not work.	Lock lever in "LOCK" position	* Bring lock lever into "UNLOCK" position.
Drive System	Deviation of drive direction	Blocked through stones	* Remove.
		Track too loose or too tight	* Adjust accordingly.
	Drive lever does not move.	Lock lever in "LOCK" position	* Bring lock lever into "UNLOCK" position.

KUBOTA I.C.S. NAVIGATION LIST OF MESSAGES

If an error occurs with the machine, one of the following messages appears in the LCD display.
In case of a trouble, immediately contact your local dealer for inspection and repair.

Message	Warning lamp Color	Problem or failure (what happened)	Machine behavior (provisional measure)	Correction
1 Fuel  1BAAAAAQAP054A	yellow	Fuel running out.	-	Add fuel.
2 Engine oil  1BAAAAAQAP055A	red	Engine oil circuit error (clogged) or engine oil shortage.	Immediately stop the engine.	The engine may be seized, failing to restart the engine. Immediately contact your local dealer for repair.
3 Charge  1BAAAAAQAP056A	red	Charging line in trouble. Charging failure.	Check the fan belt. (When the belt is in good condition, keep running until the battery becomes dead.)	Immediately contact your local dealer for repair.
4 High Voltage  1BAAAAAQAP058A	red	24V line engine startup alternator defective.	[Do not start the engine on 24V line. Get it restarted to see if there is the message again.]	If the message does not reappear, no repair is needed. If the message stays on, contact your local dealer for repair.
31 Lift up unload lever  1BAAAAAQAP057A	yellow	The engine has been started with the lock lever down.	The engine fails to start.	Pull up the lock lever and start the engine.
32  1500 HR service 1BAAAAAQAP059A	yellow	The hour meter has reached the specified count-up. Carry out the maintenance job.	-	Carry out the specified maintenance job.
No message (warning lamp flashing)	red	Sensor power line short circuited.	The work light lights up.	Immediately contact your local dealer for repair.

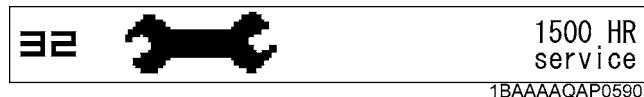
◆ Service hour meter

When the hour meter has counted up to the hours circled in the maintenance list below, the message appears. The message shows up as follows.

No.	Check points	Measures	Hour meter indicator										Interval
			50	100	250	300	500	550	600	750	800	1000	
1	Engine oil	change	<input type="radio"/>			<input type="radio"/>		<input type="radio"/>			<input type="radio"/>		every 250 hrs or every 1 year
2	Hydraulic oil										<input type="radio"/>		every 1000 hrs
3	Air filter element	replace										<input type="radio"/>	every 1000 hrs
	Inner element											<input type="radio"/>	every 1000 hrs
4	Drive unit oil	change		<input checked="" type="radio"/>					<input type="radio"/>				every 500 hrs
5	Engine oil filter	replace	<input type="radio"/>				<input type="radio"/>						every 500 hrs or every 1 year
6	Hydraulic return filter element				<input type="radio"/>					<input type="radio"/>			every 500 hrs
7	Hydraulic breather filter element										<input type="radio"/>		every 1000 hrs
8	Hydraulic suction filter element										<input type="radio"/>		every 1000 hrs

First operation

The message appears. The message shows up as follows.



(The message reappears on the hour meter designated next.)

NOTE :

- The maintenance message disappears automatically in about 10 seconds.
- When the key is turned from OFF to RUN, the maintenance message reappears and disappears again automatically in about 10 seconds.
- When the key is turned from OFF to RUN repeatedly 10 times, the message disappears.

- ◆ In case the service hour meter replaced due to any trouble with it, the meter is set to "0". Contact your KUBOTA dealer for details.

OPERATION UNDER COLD WEATHER CONDITIONS

PREPARATION FOR OPERATION IN COLD WEATHER

1. Replace engine oil and hydraulic oil with those of viscosities suitable for cold weather.
2. In cold weather, battery power drops, and the battery fluid may freeze if the battery is not sufficiently charged. To prevent the battery fluid from freezing, be sure to keep the battery charged at least 75% or more of its capacity after operation. To ease next starting, it is recommended to keep the battery stored in closed or heated rooms. If the battery fluid level is too low, do not add after operation, but add with the engine running before the next operation.
3. Add anti-freeze to coolant in the radiator and reserve tank, if the ambient temperature is expected to drop below 0°C (32°F). Mixing ratio of water and anti-freeze depends on the expected ambient temperature.

- Mixing ratio between water and anti-freeze

Ambient Temperature °C (°F)	-5 (+23)	-10 (+14)	-15 (+5)	-20 (-4)	-25 (-13)	-30 (-22)	-35 (-31)
Antifreeze %	30	30	30	35	40	45	50
Water %	70	70	70	65	60	55	50

IMPORTANT :

- Use permanent anti-freeze or long-life coolant.
- Drain the coolant completely and clean the inside of the radiator, then fill with the water and anti-freeze mixture.
- The anti-freeze acts as an anti-corrosive, it is not necessary to add an additive to the water and anti-freeze mixture.
- See "Coolant check" under "DAILY CHECKS" in "MAINTENANCE" for radiator fill volumes.

PROCEDURE AFTER DONE WORK

Clean the excavator thoroughly after work and wipe dry. Otherwise mud and earth on the tracks could freeze if the temperature drops below the 0°C (32°F) mark. Operation of the excavator is then not possible. Store the excavator in a dry place; if not possible, store on wooden planks or on mats. If the excavator is kept on damp or muddy ground, the tracks could freeze overnight. Operation of the excavator is then not possible. Furthermore the reduction gear may be damaged. Additionally, the piston rods of the hydraulic cylinders must be rubbed dry. Otherwise severe damage could occur if dirty water seeps through the seals.

LONG STORAGE



CAUTION

To avoid personal injury:

- Do not clean the excavator with the engine running.
- To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.
- When storing, remove the key from the starter switch to avoid unauthorized persons from operating the excavator and getting injured.

■ Should the Excavator be Stored for a Longer Period of Time, Observe Following Procedures:

1. The whole excavator should be cleaned thoroughly and in all cases stored indoors. If the excavator has to be kept outdoors, lay out wooden planks on even ground, place the excavator on the planks and cover completely.
2. Do an oil change and grease the excavator.
3. Heavily grease the visible section of the cylinder rods.
4. Remove the battery and store indoors.
5. If it is expected that the temperature will sink below the 0°C (32°F) mark, add anti-freeze or drain coolant completely.

IMPORTANT :

- Wash the excavator after stopping the engine.

If you wash the excavator while running the engine, splashing water gets into the air cleaner through its intake and cause engine damage.

Carefully, wash and do not splash water over the air cleaner while the engine is running.

■ Observe Following Procedures when the Machine is to be Operated after Long Storage.

1. Wipe off the grease from the hydraulic cylinder rods.
2. Turn on the engine and operate the attachments and the drive mechanisms under no load in order to circulate the hydraulic oil.
(If the machine is stored for longer than one month, do steps 1 and 2 once every month.)

Periodic replacement of important component parts

To ensure safety in operation, you are strongly requested to inspect and service the machine at regular intervals. For added safety, ask your KUBOTA dealer to replace the following important component parts.

These parts are prone to degradation in material or subject to wear and tear with time. It is difficult to judge how much they have been affected at regular inspection. It is therefore necessary to replace them with new ones, whether wear is visible or not after a specified time of use.

If any of them is found to be worn before the specified use, they must be repaired or replaced the same as other parts.

If any of the hose clamps are found deformed or cracked, the hose clamps must also be replaced.

For the hydraulic hoses other than the ones to be replaced periodically, inspect them for the following points. If found loose or very worn, tighten and / or replace the hose.

When replacing the hydraulic hoses, change their O rings and sealing components with new ones.

For replacement of the important parts, contact your KUBOTA dealer.

- At the following periodic inspections, check the fuel hoses and hydraulic hoses as well.

Inspection Interval	Check points
Daily Checks	Oil leak at fuel and hydraulic hose connections and points
Every month	Oil leak at fuel and hydraulic hose connections and points Damages at fuel and hydraulic hose (cracks, chafing)
Every year	Oil leak at fuel and hydraulic hose connections and points Interference, deformation, degradation, twist and other damages (cracks, chafing) of fuel and hydraulic hoses

List of important component parts

No.	Component parts	Used place	Q'ty	Period
1	Fuel hose	Fuel tank - Fuel filter	1	Every 2 years or 4000 hours
		Fuel filter - Fuel pump	1	
		Fuel pump - Fuel nozzle	1	
		Fuel nozzle - Fuel tank	2	
2	Hydraulic hose (suction)	Tank - Pipe	1	
		Pipe - Main pump	1	
3	Hydraulic hose (delivery)	Main pump - Control valve	3	
		Main pump - Pilot filter	1	
		Pilot filter - Change valve	1	
4	Hydraulic hose (Boom cylinder)	Control valve - Adapter	2	Every 2 years or 4000 hours
		Adapter - Boom cylinder	2	
5	Hydraulic hose (Arm cylinder)	Control valve - Pipe, Boom	2	Every 2 years or 4000 hours
		Pipe, Boom - Arm cylinder	2	
6	Hydraulic hose (Bucket cylinder)	Control valve - Pipe, Boom	2	Every 2 years or 4000 hours
		Pipe, Boom - Bucket cylinder	2	
7	Hydraulic hose (Swing cylinder)	Control valve - Swing cylinder	2	
8	Hydraulic hose (Dozer cylinder)	Control valve - Rotary joint	2	
		Rotary joint - Pipe	2	
		Pipe - Dozer cylinder	2	
9	Hydraulic hose (Service port)	Control valve - Pipe, Boom	2	
		Pipe, Boom - Pipe, Boom	2	
		Pipe, Boom - Pipe, Arm	2	
10	Hydraulic hose (Swivel motor)	Control valve - Swivel motor	2	

To prevent serious damage to the hydraulic system, use only a KUBOTA genuine hydraulic hose.

RECOMMENDED OILS

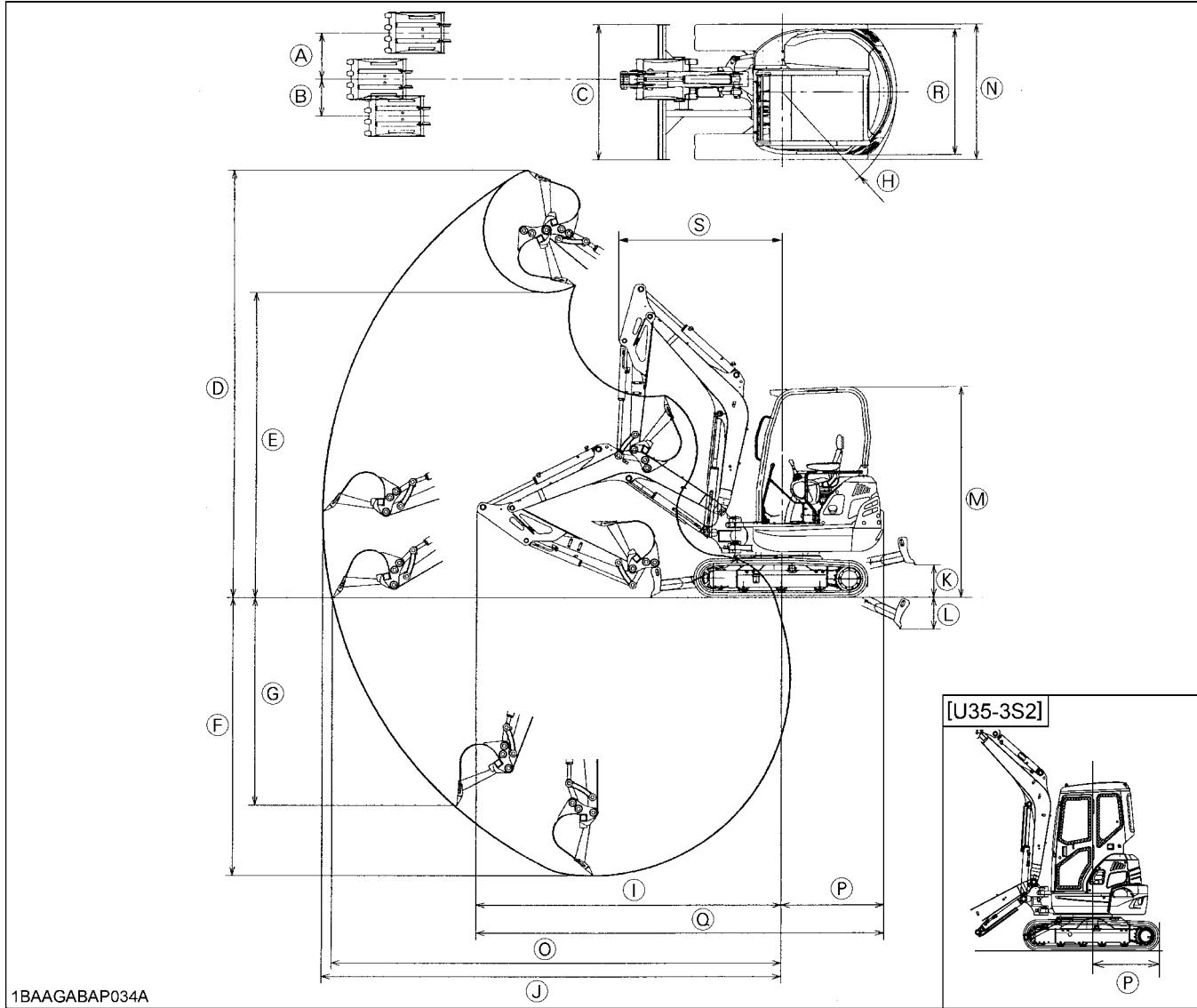
IMPORTANT :

1. Before delivery the hydraulic oil used was an ISO 46 viscosity grade.
2. Use engine oil API service classification CF.
3. Use SAE 90 (API, CLA/GL5) as drive unit oil for all seasons.

	Application	Viscosity	Shell	Mobil	Exxon	MIL-Standard
Engine oil	In winter or by low temperatures	SAE 10W	Shell Rotella T10W Shell Rimula 10W	Mobil Delvac 1310	XD-3 10W XD-3 Extra 10W	MIL-L-2104C MIL-L-2104D
		SAE 20W	Shell Rotella T20W-2 Shell Rimula 20W-2	Mobil Delvac 1320	XD-3 20W-20 XD-3 Extra 20W-20	
	In summer or by high ambient temperatures	SAE 30	Shell Rotella T30 Shell Rimula 30	Mobil Delvac 1330	XD-3 30 XD-3 Extra 30	
		SAE 40	Shell Rotella T40 Shell Rimula 40	Mobil Delvac 1340	XD-3 40 XD-3 Extra 40	
		SAE 50	Shell Rimula 50	Mobil Delvac 1350		
	All- Season engine oil	Multi-purpose	Shell Rotella T15W-40		XD-3 15W-40 XD-3 Extra 15W-40	
Gear oil	In winter or by low temperatures	SAE 75		Mobilube HD80W-90		MIL-L-2105C
			Shell Oil S8643			
		SAE 80		Mobilube HD80W-90		
	In summer or by high ambient temperatures	SAE 90		Shell Spirax HD80W		MIL-L-2105
			Shell Spirax HD90	Mobilube 46		
		SAE 140		Mobilube HD80W-90		
	All-weather gear oil	Multi-purpose	Shell Spirax HD85W	Mobilube HD85W-140		MIL-L-2105C
			Shell Spirax HD140	Mobilube HD80W-140		MIL-L-2105C
			Shell Spirax HD80W	Mobilube HD80W-90	GX80W-90	MIL-L-2105C
Hydraulic oil	In winter or by low temperatures	ISO 32	Shell Tellus T32	Mobil DTE-Oil 13	NUTO H32	
		ISO 46	Shell Tellus T46	Mobil DTE-Oil 15	NUTO H46	
	In summer or by high ambient temperatures	ISO 68	Shell Tellus T68	Mobil DTE-Oil 16	NUTO H68	
Grease			Shell Alvania EP2	Mobilux EP2	BEACON Q2	
Fuel			Light oil No. 2-D (ASTM D975)			
Fuel under -5°C (+23°F)			Light oil No. 1-D (ASTM D975)			

APPENDICES

MAIN DIMENSIONS



With rubber track.

Dimensions in parentheses: CAB type models mm

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
KX91-3S2	410	475	1550	4940	3530	3185	2390	1310	3485	5245
U35-3S2	600	635	1700	4945 [4720]	3525 [3315]	3140	2230	850	3665	5260
	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)	(S)	
KX91-3S2	370	370	2440	1550	5135	1310	4795	1440	1900	
U35-3S2	370	370	2440	1700	5145	1030*	4965	1440	2015 [2145]	

*until the end of the track.

LIFTING CAPACITY

1. The lifting capacities are based on ISO 10567 and do not exceed 75% of the static tilt load of the machine or 87% of the hydraulic lifting capacity of the machine.
2. The strokes are as follows.
 - (1) The load point corresponds to the front bolt part of the arm.
 - (2) The machine positions are (i) over - front (Blade down), (ii) over - front (Blade up), and (iii) over - side.
 - (3) The operating cylinder is the boom cylinder.
3. The bucket of the excavator, the hook, the sling and other lifting accessories are taken into consideration for the loads.

Machine conditions:

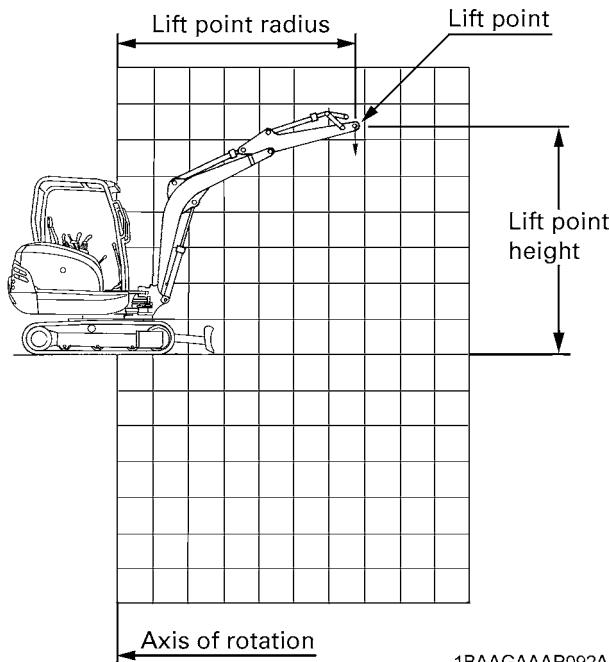
No bucket, all others according to the standard regulations.



WARNING

To avoid personal injury or death:

- No loads greater than those values mentioned in the lifting capacity tables are to be lifted.
- The values mentioned in the table are valid only on even, hard grounds. When lifting on soft ground, the machine can tip over due to the load being concentrated only on one side of the machine.
- The table values are calculated at the end of the arm without the bucket. In order to find the allowable loads for machines with bucket, the bucket weight must be subtracted from the values in the table.



1BAAGAAAP092A

KX91-3S2 LONG ARM
RUBBER TRACK
ROPS CANOPY

LIFTING CAPACITY OVER-FRONT BLADE DOWN

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)											
	0.5	1	1.5	2	2.5	3	3.5	4	4.5			
GL	4					4.7 (480)						
	3.5					4.6 (460)						
	3					4.3 (440)						
	2.5					4.5 (460)	4.5 (460)	4.6 (470)				
	2					5.6 (570)	5.2 (530)	4.9 (500)	4.7 (480)			
	1.5					9.7 (990)	7.2 (740)	6.1 (620)	5.4 (550)	5.0 (510)		
	1					13.1 (1330)	8.9 (910)	7.0 (720)	6.0 (610)	5.4 (550)	4.9 (500)	
	0.5					14.9 (1520)	10.2 (1040)	7.8 (800)	6.5 (660)	5.6 (580)		
	0					9.1 (920)	15.4 (1570)	10.9 (1110)	8.4 (850)	6.8 (700)	5.8 (590)	
	-0.5					10.8 (1100)	13.1 (1340)	15.2 (1550)	11.0 (1120)	8.5 (870)	6.9 (710)	5.8 (590)
	-1					14.6 (1490)	17.8 (1810)	14.3 (1460)	10.6 (1080)	8.3 (850)	6.7 (690)	
	-1.5					19.0 (1940)	18.7 (1910)	12.9 (1310)	9.7 (990)	7.6 (780)	5.9 (600)	
	-2					14.9 (1520)	10.5 (1070)	8.0 (810)	5.9 (610)			

LIFTING CAPACITY OVER-FRONT BLADE UP

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)											
	0.5	1	1.5	2	2.5	3	3.5	4	4.5			
GL	4					4.7 (480)						
	3.5					4.6 (460)						
	3					4.3 (440)						
	2.5					4.5 (460)	4.5 (460)	4.4 (450)				
	2					5.6 (570)	5.2 (530)	4.9 (500)	4.4 (450)			
	1.5					9.7 (990)	7.2 (740)	6.1 (620)	5.3 (540)	4.3 (440)		
	1					12.0 (1230)	8.5 (870)	6.5 (660)	5.2 (530)	4.2 (430)	3.5 (360)	
	0.5					11.6 (1180)	8.2 (840)	6.3 (640)	5.0 (510)	4.1 (420)		
	0					9.1 (920)	11.4 (1160)	8.0 (820)	6.1 (630)	4.9 (500)	4.1 (420)	
	-0.5					10.8 (1100)	13.1 (1340)	11.3 (1150)	7.9 (810)	6.0 (620)	4.9 (500)	4.0 (410)
	-1					14.6 (1490)	17.8 (1810)	11.3 (1150)	7.9 (800)	6.0 (610)	4.8 (490)	
	-1.5					19.0 (1940)	18.7 (1910)	11.4 (1160)	7.9 (810)	6.0 (610)	4.9 (500)	
	-2					14.9 (1520)	10.5 (1070)	8.0 (810)	5.9 (610)			

LIFTING CAPACITY OVER-SIDE

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)											
	0.5	1	1.5	2	2.5	3	3.5	4	4.5			
GL	4					4.7 (480)						
	3.5					4.6 (460)						
	3					4.3 (440)						
	2.5					4.5 (460)	4.5 (460)	4.1 (410)				
	2					5.6 (570)	5.2 (530)	4.9 (500)	4.0 (450)			
	1.5					9.7 (990)	7.2 (740)	6.1 (620)	4.8 (490)	3.9 (400)		
	1					10.5 (1080)	7.6 (780)	5.9 (600)	4.7 (480)	3.9 (390)	3.2 (330)	
	0.5					10.1 (1030)	7.3 (750)	5.7 (580)	4.6 (470)	3.8 (390)		
	0					9.1 (920)	9.9 (1010)	7.1 (730)	5.5 (570)	4.6 (460)	3.7 (380)	
	-0.5					10.8 (1100)	13.1 (1340)	9.9 (1010)	7.1 (720)	5.5 (560)	4.4 (450)	3.7 (380)
	-1					14.6 (1490)	16.3 (1670)	9.9 (1010)	7.0 (720)	5.4 (550)	4.4 (450)	
	-1.5					19.0 (1940)	16.5 (1680)	9.9 (1010)	7.0 (720)	5.4 (550)	4.4 (450)	
	-2					14.9 (1520)	10.1 (1030)	7.1 (730)	5.5 (560)			

KX91-3S2 LONG ARM
RUBBER TRACK
ROPS CAB

LIFTING CAPACITY OVER-FRONT BLADE DOWN

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)											
	0.5	1	1.5	2	2.5	3	3.5	4	4.5			
GL	4					4.7 (480)						
	3.5					4.6 (460)						
	3					4.3 (440)						
	2.5					4.5 (460)	4.5 (460)	4.6 (470)				
	2					5.6 (570)	5.2 (530)	4.9 (500)	4.6 (470)			
	1.5					9.7 (990)	7.2 (740)	6.1 (620)	5.4 (550)	5.0 (510)		
	1					13.1 (1330)	8.9 (910)	7.0 (720)	6.0 (610)	5.4 (550)	4.9 (500)	
	0.5					14.9 (1520)	10.2 (1040)	7.8 (800)	6.5 (660)	5.6 (580)		
	0					9.1 (920)	15.4 (1570)	10.9 (1110)	8.4 (850)	6.8 (700)	5.8 (590)	
	-0.5					10.8 (1100)	13.1 (1340)	15.2 (1550)	11.0 (1120)	8.5 (870)	6.9 (710)	5.8 (590)
	-1					14.6 (1490)	17.8 (1810)	14.3 (1460)	10.6 (1080)	8.3 (850)	6.7 (690)	
	-1.5					19.0 (1940)	18.7 (1910)	12.9 (1310)	9.7 (990)	7.6 (780)	5.9 (600)	
	-2					14.9 (1520)	10.5 (1070)	8.0 (810)	5.9 (610)			

LIFTING CAPACITY OVER-FRONT BLADE UP

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)											
	0.5	1	1.5	2	2.5	3	3.5	4	4.5			
GL	4					4.7 (480)						
	3.5					4.6 (460)						
	3					4.3 (440)						
	2.5					4.5 (460)	4.5 (460)	4.6 (470)				
	2					5.6 (570)	5.2 (530)	4.9 (500)	4.6 (470)			
	1.5					9.7 (990)	7.2 (740)	6.1 (620)	5.4 (550)	4.5 (460)		
	1					12.7 (1290)	8.9 (910)	6.8 (690)	5.4 (550)	4.5 (460)	3.7 (380)	
	0.5					12.2 (1240)	8.6 (880)	6.6 (670)	5.3 (540)	4.4 (450)		
	0					9.1 (920)	12.0 (1260)	8.4 (860)	6.5 (660)	5.2 (530)	4.3 (440)	
	-0.5					10.8 (1100)	13.1 (1340)	11.9 (1150)	8.3 (850)	6.4 (650)	5.1 (520)	4.3 (440)
	-1					14.6 (1490)	17.8 (1810)	11.9 (1150)	8.3 (850)	6.4 (650)	5.1 (520)	
	-1.5					19.0 (1940)	18.7 (1910)	12.0 (1220)	8.3 (850)	6.4 (650)	5.1 (530)	
	-2					14.9 (1520)	10.5 (1070)	8.0 (810)	5.9 (610)			

LIFTING CAPACITY OVER-SIDE

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)											
	0.5	1	1.5	2	2.5	3	3.5	4	4.5			
GL	4					4.7 (480)						
	3.5					4.6 (460)						
	3					4.3 (440)						
	2.5					4.5 (460)	4.5 (460)	4.3 (440)				
	2					5.6 (570)	5.2 (530)	4.9 (500)	4.2 (430)			
	1.5					9.7 (990)	7.2 (740)	6.1 (620)	5.1 (520)	4.2 (420)		
	1					11.1 (1130)	8.0 (820)	6.2 (630)	4.9 (500)	4.1 (420)	3.4 (350)	
	0.5					10.7 (1090)	7.7 (790)	6.0 (610)	4.8 (490)	4.0 (410)		
	0					9.1 (920)	10.5 (1070)	7.5 (770)	5.8 (600)	4.7 (480)	3.9 (400)	
	-0.5					10.8 (1100)	13.1 (1340)	10.4 (1060)	7.4 (760)	5.8 (590)	4.7 (480)	3.9 (400)
	-1					14.6<br/						

KX91-3S2 LONG ARM
STEEL TRACK
ROPS CANOPY

LIFTING CAPACITY OVER-FRONT BLADE DOWN Unit=1kN (1kg)

LIFT POINT		LIFT POINT RADIUS (m)								
HEIGHT(m)		0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4						4.7 (480)			
	3.5							4.6 (460)		
	3							4.3 (440)		
	2.5						4.5 (460)	4.5 (460)	4.6 (470)	
	2						5.6 (570)	5.2 (530)	4.9 (500)	4.7 (480)
	1.5						9.7 (990)	7.2 (740)	6.1 (620)	5.4 (550)
	1						13.1 (1330)	8.9 (910)	7.0 (720)	6.0 (610)
	0.5						14.9 (1520)	10.2 (1040)	7.8 (800)	5.4 (660)
	0						9.1 (920)	15.4 (1570)	10.9 (850)	6.8 (700)
	-0.5						10.8 (1100)	13.1 (1340)	15.2 (1550)	11.0 (1120)
	-1						14.6 (1490)	17.8 (1810)	14.3 (1460)	10.6 (1080)
	-1.5						19.0 (1940)	18.7 (1910)	12.9 (1310)	9.7 (990)
	-2						14.9 (1520)	10.5 (1070)	8.0 (810)	5.9 (610)

KX91-3S2 LONG ARM
STEEL TRACK
ROPS CAB

LIFTING CAPACITY OVER-FRONT BLADE DOWN Unit=1kN (1kg)

LIFT POINT		LIFT POINT RADIUS (m)								
HEIGHT(m)		0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4							4.7 (480)		
	3.5								4.6 (460)	
	3								4.3 (440)	
	2.5								4.5 (460)	4.5 (460)
	2							5.6 (570)	5.2 (530)	4.9 (500)
	1.5							9.7 (990)	7.2 (740)	6.1 (620)
	1							13.1 (1330)	8.9 (910)	7.0 (720)
	0.5							14.9 (1520)	10.2 (1040)	7.8 (800)
	0							9.1 (920)	15.4 (1570)	10.9 (850)
	-0.5							10.8 (1100)	13.1 (1340)	15.2 (1550)
	-1							14.6 (1490)	17.8 (1810)	14.3 (1460)
	-1.5							19.0 (1940)	18.7 (1910)	12.9 (1310)
	-2							14.9 (1520)	10.5 (1070)	8.0 (810)

LIFTING CAPACITY OVER-FRONT BLADE UP Unit=1kN (1kg)

LIFT POINT		LIFT POINT RADIUS (m)								
HEIGHT(m)		0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4						4.7 (480)			
	3.5							4.6 (460)		
	3							4.3 (440)		
	2.5						4.5 (460)	4.5 (460)	4.5 (460)	
	2						5.6 (570)	5.2 (530)	4.9 (500)	4.4 (450)
	1.5						9.7 (990)	7.2 (740)	6.1 (620)	5.4 (550)
	1						12.2 (1240)	8.6 (880)	6.6 (670)	5.2 (530)
	0.5						11.7 (1200)	8.3 (850)	6.4 (650)	5.1 (520)
	0						9.1 (920)	11.5 (1180)	8.1 (830)	6.2 (630)
	-0.5						10.8 (1100)	13.1 (1340)	11.4 (1170)	8.0 (820)
	-1						14.6 (1490)	17.8 (1810)	11.4 (1170)	8.0 (810)
	-1.5						19.0 (1940)	18.7 (1910)	11.5 (1170)	8.0 (820)
	-2						14.9 (1520)	10.5 (1070)	8.0 (810)	5.9 (610)

LIFTING CAPACITY OVER-FRONT BLADE UP Unit=1kN (1kg)

LIFT POINT		LIFT POINT RADIUS (m)								
HEIGHT(m)		0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4							4.7 (480)		
	3.5								4.6 (460)	
	3								4.3 (440)	
	2.5								4.5 (460)	4.5 (460)
	2							5.6 (570)	5.2 (530)	4.9 (500)
	1.5							9.7 (990)	7.2 (740)	6.1 (620)
	1							12.8 (1310)	8.9 (910)	6.9 (700)
	0.5							12.4 (1260)	8.8 (890)	6.7 (680)
	0							9.1 (920)	12.1 (1240)	8.6 (870)
	-0.5							10.8 (1100)	13.1 (1340)	12.1 (1230)
	-1							14.6 (1490)	17.8 (1810)	12.1 (1230)
	-1.5							19.0 (1940)	18.7 (1910)	12.1 (1240)
	-2							14.9 (1520)	10.5 (1070)	8.0 (810)

LIFTING CAPACITY OVER-SIDE Unit=1kN (1kg)

LIFT POINT		LIFT POINT RADIUS (m)								
HEIGHT(m)		0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4						4.7 (480)			
	3.5							4.6 (460)		
	3							4.3 (440)		
	2.5						4.5 (460)	4.5 (460)	4.1 (420)	
	2						5.6 (570)	5.2 (530)	4.9 (500)	4.1 (420)
	1.5						9.7 (990)	7.2 (740)	6.1 (620)	4.9 (410)
	1						10.7 (1090)	7.7 (790)	5.9 (610)	4.8 (490)
	0.5						10.3 (1050)	7.4 (760)	5.8 (590)	4.7 (470)
	0						9.1 (920)	10.1 (1030)	7.3 (740)	5.6 (570)
	-0.5						10.8 (1100)	13.1 (1340)	10.0 (1020)	7.2 (730)
	-1						14.6 (1490)	16.6 (1690)	10.0 (1020)	7.1 (730)
	-1.5						19.0 (1940)	16.7 (1710)	10.1 (1030)	7.2 (730)
	-2						14.9 (1520)	10.2 (1040)	7.3 (740)	5.6 (570)

LIFTING CAPACITY OVER-SIDE Unit=1kN (1kg)

LIFT POINT		LIFT POINT RADIUS (m)								
HEIGHT(m)		0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4							4.7 (480)		
	3.5								4.6 (460)	
	3								4.3 (440)	
	2.5								4.5 (460)	4.5 (460)
	2							5.6 (570)	5.2 (530)	4.9 (500)
	1.5							9.7 (990)	7.2 (740)	6.1 (620)
	1							11.2 (1150)	8.1 (830)	6.3 (640)
	0.5							10.8 (1100)	7.8 (800)	6.1 (620)
	0							9.1 (920)	10.6 (1080)	7.7 (780)
	-0.5							10.8 (1100)	13.1 (1340)	10.6 (1080)
	-1							14.6 (1490)	17.5 (1780)	10.6 (1080)
	-1.5							19.0 (1940)	16.7 (1800)	10.6 (1080)
	-2							14.9 (1520)	10.5 (1070)	7.6 (780)

U35S2

STANDARD ARM
RUBBER TRACK
ROPS CANOPY

LIFTING CAPACITY OVER-FRONT BLADE DOWN

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5					4.9 (490)			
	3					4.8 (490)	5.0 (510)		
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	5.2 (530)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	5.3 (540)	
	1.5			11.6 (1180)	8.3 (840)	6.8 (690)	6.0 (610)	5.5 (560)	
	1				9.9 (1010)	7.7 (780)	6.5 (660)	5.8 (590)	
	0.5				13.0 (1330)	11.0 (1120)	8.4 (860)	6.9 (710)	6.0 (610)
	0				15.9 (1620)	11.4 (1170)	8.8 (900)	7.2 (730)	6.1 (620)
	-0.5				12.1 (1230)	14.0 (1430)	15.3 (1560)	11.3 (1160)	8.8 (900)
	-1				16.5 (1680)	19.6 (2000)	14.2 (1450)	10.7 (1090)	8.4 (860)
	-1.5				21.7 (2210)	17.5 (1780)	12.4 (1270)	9.5 (970)	6.8 (690)
	-2				23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)	

U35S2

STANDARD ARM
RUBBER TRACK
ROPS CAB

LIFTING CAPACITY OVER-FRONT BLADE DOWN

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3					4.8 (490)	5.0 (510)		
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	5.2 (530)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.5 (460)	
	1.5			11.6 (1180)	8.3 (840)	6.8 (690)	5.4 (550)	4.4 (450)	
	1				8.8 (900)	6.7 (680)	5.3 (540)	4.4 (440)	
	0.5				12.2 (1250)	8.6 (870)	6.5 (660)	5.2 (530)	4.3 (440)
	0				12.1 (1230)	8.4 (860)	6.4 (650)	5.1 (520)	4.2 (430)
	-0.5				12.1 (1230)	14.0 (1430)	12.1 (1230)	8.3 (850)	6.3 (650)
	-1				16.5 (1680)	19.6 (2000)	12.1 (1230)	8.3 (850)	6.3 (640)
	-1.5				21.7 (2210)	17.5 (1780)	12.2 (1240)	8.4 (850)	6.3 (650)
	-2				23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)	

LIFTING CAPACITY OVER-FRONT BLADE UP

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5						4.9 (490)		
	3						4.8 (490)	5.0 (510)	
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	4.5 (460)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.5 (460)	
	1.5			11.6 (1180)	8.3 (840)	6.8 (690)	5.4 (550)	4.4 (450)	
	1				8.8 (900)	6.7 (680)	5.3 (540)	4.4 (440)	
	0.5				12.2 (1250)	8.6 (870)	6.5 (660)	5.2 (530)	4.3 (440)
	0				12.1 (1230)	8.4 (860)	6.4 (650)	5.1 (520)	4.2 (430)
	-0.5				12.1 (1230)	14.0 (1430)	12.1 (1230)	8.3 (850)	6.3 (650)
	-1				16.5 (1680)	19.6 (2000)	12.1 (1230)	8.3 (850)	6.3 (640)
	-1.5				21.7 (2210)	17.5 (1780)	12.2 (1240)	8.4 (850)	6.3 (650)
	-2				23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)	

LIFTING CAPACITY OVER-FRONT BLADE UP

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3							4.8 (490)	5.0 (510)
	2.5							5.2 (530)	5.1 (520)
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.5 (460)	
	1.5			11.6 (1180)	8.3 (840)	6.8 (690)	5.4 (550)	4.4 (450)	
	1				8.8 (900)	6.7 (680)	5.3 (540)	4.4 (440)	
	0.5				12.2 (1250)	8.6 (870)	6.5 (660)	5.2 (530)	4.3 (440)
	0				12.1 (1230)	8.4 (860)	6.4 (650)	5.1 (520)	4.2 (430)
	-0.5				12.1 (1230)	14.0 (1430)	12.1 (1230)	8.3 (850)	6.3 (650)
	-1				16.5 (1680)	19.6 (2000)	12.1 (1230)	8.3 (850)	6.3 (640)
	-1.5				21.7 (2210)	17.5 (1780)	12.2 (1240)	8.4 (850)	6.3 (650)
	-2				23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)	

LIFTING CAPACITY OVER-SIDE

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3							4.8 (490)	5.0 (510)
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	4.3 (440)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.2 (530)	4.2 (430)	
	1.5			11.6 (1180)	8.3 (840)	6.4 (690)	5.1 (550)	4.2 (430)	
	1				8.2 (830)	6.3 (640)	5.0 (510)	4.1 (420)	
	0.5				11.2 (1140)	7.9 (810)	6.1 (620)	4.9 (500)	4.1 (410)
	0				11.0 (1130)	7.8 (800)	6.0 (610)	4.8 (490)	4.0 (410)
	-0.5				12.1 (1230)	14.0 (1430)	11.0 (1220)	7.7 (790)	5.9 (510)
	-1				16.5 (1680)	19.0 (1940)	11.0 (1120)	7.7 (790)	5.9 (510)
	-1.5				21.7 (2210)	17.5 (1780)	11.1 (1130)	7.8 (790)	5.9 (510)
	-2				23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)	

LIFTING CAPACITY OVER-SIDE

Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3							4.8 (490)	5.0 (510)
	2.5							5.2 (530)	5.1 (520)
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.4 (450)	
	1.5			11.6 (1180)	8.3 (840)	6.8 (690)	5.4 (550)	4.4 (450)	
	1				8.2 (830)	6.3 (640)	5.0 (510)	4.1 (420)	
	0.5				11.7 (1190)	8.3 (850)	6.4 (650)	5.1 (520)	4.3 (430)
	0				11.6 (1180)	8.2 (830)	6.3 (640)	5.1 (520)	4.2 (430)
	-0.5				12.1 (1230)	14.0 (1430)	11.5 (1180)	8.1 (830)	6.2 (510)
	-1				16.5 (1680)	19.6 (2000)	11.5 (1180)	8.1 (820)	6.2 (510)
	-1.5				21.7 (2210)	17.5 (1780)	11.6 (1180)	8.1 (830)	6.2 (510)
	-2				23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)	

U35S2 STANDARD ARM
STEEL TRACK
ROPS CANOPY

LIFTING CAPACITY OVER-FRONT BLADE DOWN Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5					4.9 (490)			
	3					4.8 (490)	5.0 (510)		
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	5.2 (530)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	5.3 (540)	
	1.5		11.6 (1180)	8.3 (840)	6.8 (690)	6.0 (610)	5.5 (560)		
	1				9.9 (1010)	7.7 (780)	6.5 (660)	5.8 (590)	
	0.5			13.0 (1330)	11.0 (1120)	8.4 (860)	6.9 (710)	6.0 (610)	
	0			15.9 (1620)	11.4 (1170)	8.8 (900)	7.2 (730)	6.1 (620)	
	-0.5	12.1 (1230)	14.0 (1430)	15.3 (1560)	11.3 (1160)	8.8 (900)	7.2 (730)	5.9 (600)	
	-1	16.5 (1680)	19.6 (2000)	14.2 (1450)	10.7 (1090)	8.4 (860)	6.8 (690)		
	-1.5	21.7 (2210)	17.5 (1780)	12.4 (1270)	9.5 (970)	7.4 (760)			
	-2	23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)				

U35S2 STANDARD ARM
STEEL TRACK
ROPS CAB

LIFTING CAPACITY OVER-FRONT BLADE DOWN Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3					4.8 (490)	5.0 (510)		
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	4.8 (490)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.8 (490)	
	1.5		11.6 (1180)	8.3 (840)	6.8 (690)	5.8 (610)	4.7 (480)		
	1				9.3 (950)	7.1 (720)	5.6 (580)	4.6 (470)	
	0.5			13.0 (1330)	9.1 (930)	6.9 (710)	5.5 (570)	4.6 (470)	
	0			12.9 (1310)	8.9 (910)	6.8 (690)	5.5 (560)	4.5 (460)	
	-0.5	12.1 (1230)	14.0 (1430)	12.8 (1310)	8.9 (900)	6.7 (690)	5.4 (550)	4.5 (460)	
	-1	16.5 (1680)	19.6 (2000)	12.9 (1310)	8.9 (900)	6.7 (690)	5.4 (550)		
	-1.5	21.7 (2210)	17.5 (1780)	12.4 (1270)	8.9 (910)	6.8 (690)			
	-2	23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)				

LIFTING CAPACITY OVER-FRONT BLADE UP Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5					4.9 (490)			
	3					4.8 (490)	5.0 (510)		
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	4.8 (490)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.8 (490)	
	1.5		11.6 (1180)	8.3 (840)	6.8 (690)	5.8 (610)	4.7 (480)		
	1				9.3 (950)	7.1 (720)	5.6 (580)	4.6 (470)	
	0.5			13.0 (1330)	9.1 (930)	6.9 (710)	5.5 (570)	4.6 (470)	
	0			12.9 (1310)	8.9 (910)	6.8 (690)	5.5 (560)	4.5 (460)	
	-0.5	12.1 (1230)	14.0 (1430)	12.8 (1310)	8.9 (900)	6.7 (690)	5.4 (550)	4.5 (460)	
	-1	16.5 (1680)	19.6 (2000)	12.9 (1310)	8.9 (900)	6.7 (690)	5.4 (550)		
	-1.5	21.7 (2210)	17.5 (1780)	12.4 (1270)	8.9 (910)	6.8 (690)			
	-2	23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)				

LIFTING CAPACITY OVER-FRONT BLADE UP Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3							4.8 (490)	5.0 (510)
	2.5					5.2 (530)	5.1 (520)	5.1 (520)	5.0 (510)
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	5.0 (510)	
	1.5		11.6 (1180)	8.3 (840)	6.8 (690)	5.8 (610)	4.7 (480)		
	1				9.3 (950)	7.1 (720)	5.6 (580)	4.6 (470)	
	0.5			13.0 (1330)	9.1 (930)	6.9 (710)	5.5 (570)	4.6 (470)	
	0			12.9 (1310)	8.9 (910)	6.8 (690)	5.5 (560)	4.5 (460)	
	-0.5	12.1 (1230)	14.0 (1430)	12.8 (1310)	8.9 (900)	6.7 (690)	5.4 (550)	4.5 (460)	
	-1	16.5 (1680)	19.6 (2000)	12.9 (1310)	8.9 (900)	6.7 (690)	5.4 (550)		
	-1.5	21.7 (2210)	17.5 (1780)	12.4 (1270)	8.9 (910)	6.8 (690)			
	-2	23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)				

LIFTING CAPACITY OVER-SIDE Unit=1kN (1kg)

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5					4.9 (490)			
	3					4.8 (490)	5.0 (510)		
	2.5				5.2 (530)	5.1 (520)	5.1 (520)	4.5 (460)	
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.5 (460)	
	1.5		11.6 (1180)	8.3 (840)	6.8 (690)	5.4 (550)	4.4 (450)		
	1				8.7 (880)	6.6 (680)	5.3 (540)	4.4 (450)	
	0.5			11.8 (1210)	8.4 (860)	6.5 (660)	5.2 (530)	4.3 (440)	
	0			11.7 (1190)	8.3 (840)	6.4 (650)	5.1 (520)	4.3 (440)	
	-0.5	12.1 (1230)	14.0 (1430)	11.7 (1190)	8.2 (840)	6.3 (640)	5.1 (520)	4.2 (430)	
	-1	16.5 (1680)	19.6 (2000)	11.7 (1190)	8.2 (840)	6.3 (640)	5.1 (520)		
	-1.5	21.7 (2210)	17.5 (1780)	11.8 (1200)	8.2 (840)	6.3 (640)			
	-2	23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)				

LIFT POINT HEIGHT(m)	LIFT POINT RADIUS (m)								
	0.5	1	1.5	2	2.5	3	3.5	4	4.5
GL	4								
	3.5							4.9 (490)	
	3							4.8 (490)	5.0 (510)
	2.5					5.2 (530)	5.1 (520)	5.1 (520)	4.7 (480)
	2			7.9 (800)	6.6 (670)	5.9 (600)	5.5 (560)	4.7 (480)	
	1.5		11.6 (1180)	8.3 (840)	6.8 (690)	5.4 (550)	4.4 (450)		
	1				8.7 (880)	6.6 (680)	5.3 (540)	4.4 (450)	
	0.5			12.3 (1260)	8.8 (890)	6.8 (690)	5.4 (560)	4.5 (460)	
	0			12.2 (1250)	8.6 (880)	6.7 (680)	5.4 (550)	4.5 (460)	
	-0.5	12.1 (1230)	14.0 (1430)	12.2 (1240)	8.6 (870)	6.6 (670)	5.3 (540)	4.4 (450)	
	-1	16.5 (1680)	19.6 (2000)	12.2 (1250)	8.6 (870)	6.6 (670)	5.3 (540)		
	-1.5	21.7 (2210)	17.5 (1780)	12.3 (1250)	8.6 (880)	6.6 (670)	5.3 (540)		
	-2	23.8 (2430)	13.1 (1330)	9.6 (970)	7.2 (730)				