IHI Construction Machinery Limited

OPERATION MANUAL 45V4 55V4 60V4

0988405EN-01

OPERATION MANUAL

45V4
55V4
60V4

IHI

SERIAL NUMBER
WG010001~
WY010001~
WZ010001~

0988405EN-01

CONTENTS

INTRODUCTION

This manual contains the safety, operation, maintenance and adjustment procedures of this machine.

Read it and have good understanding before using the machine.

Contact our dealer immediately if you lose or damage this manual.

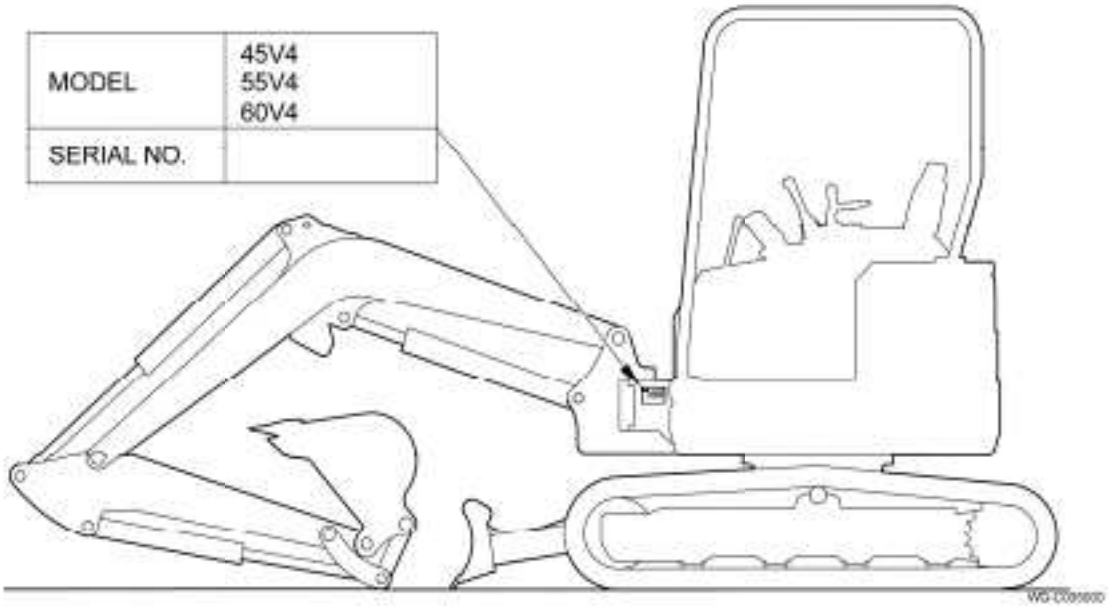
See the "Operation Manual of the Engine" for the engine.

If you hand over this machine to any third party, this manual should also be handed over to it.

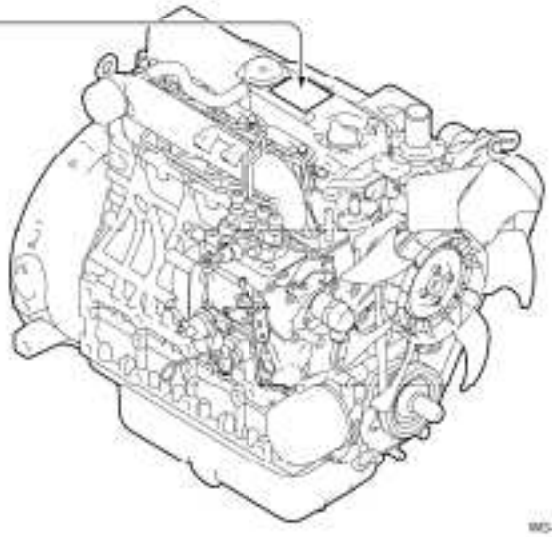
The specifications of the machine may be improved and differ from descriptions of this manual. Please contact our dealer if you have some problems or questions.

MACHINE NUMBER

The machine No. and engine No. are marked at the positions shown below.

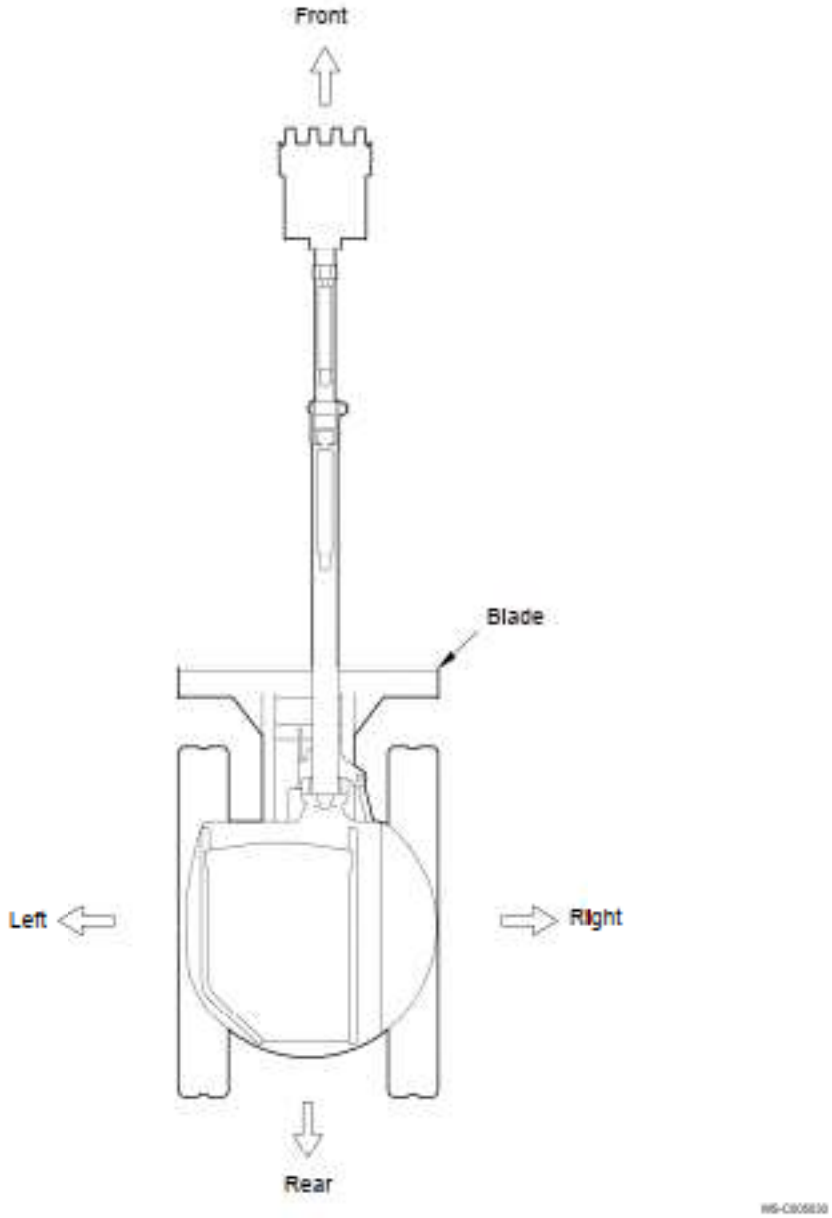


MODEL	V2403-DI-EDM
ENGINE NO.	



MACHINE DIRECTION

The front, rear, right and left directions of the machine are determined based on the orientation when the operator is seated on the operator's seat with the blade frontward, as shown below.



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SAFETY

Most accidents occur during works when preventive measures against danger are neglected or basic safety instructions are not observed.
Such accidents may be avoided by paying careful attention in advance.
This manual describes the basic safety instructions to be observed in daily operation, inspection and maintenance of the machine.
Observe these instructions carefully for safety.
Check the safety with great care for any other matters not described in this manual.

SAFETY INFORMATION

Read and understand the operation manual, safety signs and labels before using or maintaining this machine.

The safety alert symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
The signal words used with the safety alert symbol indicate a specific level of severity of the potential hazard. All are used as attention-getting devices throughout this manual as well as on labels fixed to the machine to assist in potential hazard recognition and prevention.

⚠ DANGER	This safety alert symbol and signal word indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	This safety alert symbol and signal word indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	This safety alert symbol and signal word indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or serious damages of the machine.
NOTICE	This signal word indicates a potentially hazardous situation which, if not avoided, could result in damages of the machine or reduction of the service life.

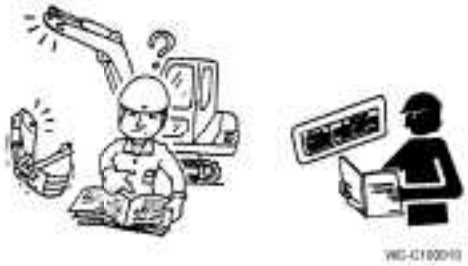
We have made every effort for you to prevent accidents during operation; however, we cannot be held responsible for predicting every kind of danger in all operating conditions.
It is the owner or user of the machine who is responsible for always paying attention to operate the machine, as well as reading and understanding this manual enough to obtain the essential knowledge and skills fundamental to correct machine operation.

SAFETY PRECAUTIONS

PRECAUTIONS BEFORE OPERATION

Read and understand the safety signs and labels

- There are several specific safety signs on your machine.
  Please read and understand the safety signs and labels.
- You must replace a label if it is damaged, missing or cannot be read.

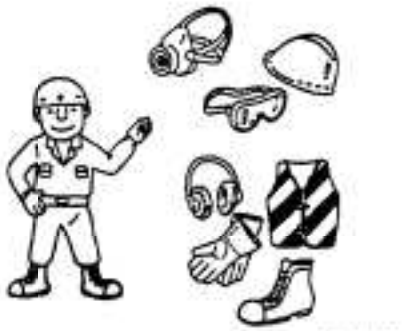


Make a work plan

Start the work only after discussing with the person in charge at the site.

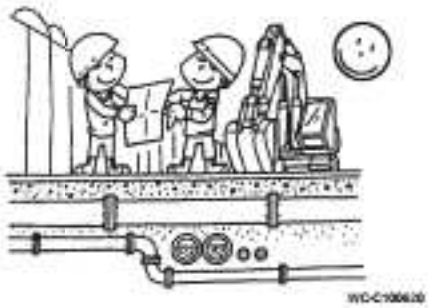
Wear proper working clothes

For the sake of safety during working, wear clothes that match your body.
Always wear required protective items such as protective cap, protective goggles, reflective clothing, safety shoes, and ear protection as required.



Watch for underground utilities

Mark the location of underground utilities such as gas lines, sewers, and power lines before any digging operations. If necessary, the utilities should be temporarily discontinued.



Perform "walk-around" inspection

Be sure to walk around the machine and inspect it before starting work. If some defects are found, repair them without fail.

Prevent a fire

- Do not leave oiled waste cloth, dead leaves, paper trash or other flammable objects around the engine. Such matters may cause a fire. Always inspect and remove such matters.
- Stop the engine and do not bring fire close to it while refilling fuel.
- Check if fuel, oil or hydraulic oil does not leak. If some defects are found, repair them and wipe off leaked oil.
- Check the installation position and usage of the fire extinguisher.

Install the ROPS canopy

We recommend that the ROPS canopy should be installed to avoid accidents, which may result in injury, if a machine with a canopy should fall down.

Carefully mount and dismount the machine

Always use steps and handholds to mount and dismount the machine.

Hold the handholds with both hands and face the machine keeping a contact with at least three points of the steps and handrails.

Never hold control levers at mounting and dismounting.

Start the engine at the operator's seat

If the engine is started from a position other than sitting in the operator's seat, there is the danger that the machine starts moving suddenly.

Start the engine only after carrying out checks while sitting in the operator's seat.

PRECAUTIONS DURING OPERATION

Stay seated while operating

Never attempt to operate the excavator from any position except the operator's seat. If you operate the machine from any other position, such as standing by the window or door, you may operate the machine inaccurately, which can cause serious injury. Remember that you should not get on or off the moving machine to be seated or to leave the machine.

Fasten the seat belt

If the machine falls down, you may be thrown out of the operator's seat or pressed under the machine. Such an accident may result in serious injury or death.
Sit on the operator's seat and fasten the seat belt all the time while operating the machine.

Clear all personnel from the machine and area

Be sure to barricade the job site to prevent entry of the unauthorized. Confirm that there is no one around the machine before starting the engine or operating the machine.

Prevent accidents while moving

Always sound the horn to signal others nearby that you are moving the machine. Check that no one is within the working area of the machine before attempting to move it.

Never swing over personnel

Be sure that no personnel are working around the machine before swinging.

Pay attention to invisible workers in a trench or pit in particular. Follow the signal person's direction not to swing over such workers.

WC-C180130

Never leave the bucket in the raised position

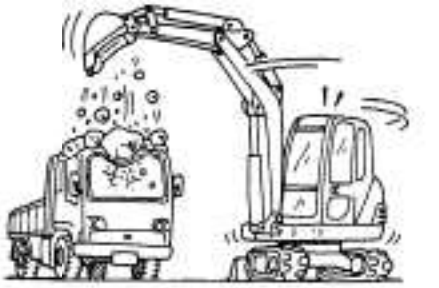
Never leave the load suspended in mid air, when the machine is out of service, or you have to leave the machine. Always put down the bucket of load onto the ground. Should a malfunction occur, it could fall, striking equipment or personnel.

WC-C180140

Do not swing above the truck cab

If you swing the bucket above the truck cab, the driver may be injured by dropped soil and sand or the bucket contacting the truck cab.

Do not swing the bucket above the truck cab when loading soil and sand.

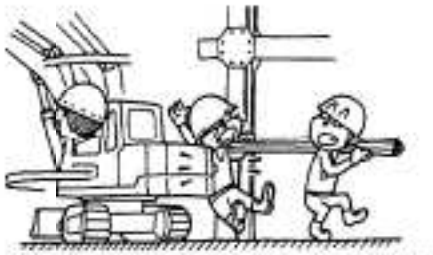


WC-C180150

Provide adequate tailswing clearance

Confirm that there is a sufficient clearance around the machine for swinging operation.

The operator tends to be unconscious of the area behind the machine. Before tailswing, make sure that there are no personnel or objects in such area.



WC-C180160

Always observe the bucket and load

Always watch the moving bucket or load carefully.

Moving bucket or load without care may cause injury to personnel or materials.

If you have to look away from it, stop the machine.

WC-C180170

Never allow unauthorized personnel to ride on the machine

Only operator is authorized to be on the machine during operation. Never let unauthorized personnel ride on the machine. Any person riding as a passenger can fall off and suffer injury.

Danger for electric power line

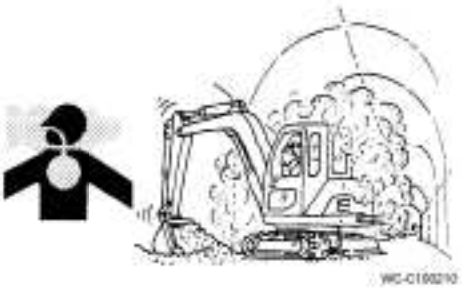
If the machine should contact with an electric power line, move the machine apart from the cable.

If it is impossible to move the machine, shout "Never touch the shovel" to give a warning to the workers around the machine.

Do not put on the step when you get off the shovel. Jump down onto the ground.

Do not operate the engine in an enclosed area without adequate ventilation

Diesel engine exhaust contains products of combustion which may be harmful to your health. Always start and operate the engine in a well ventilated area. If in an enclosed area, vent the exhaust to the outside.



Do not dig near the machine

Do not dig the ground deep near the machine to prevent falling due to collapse of the ground.

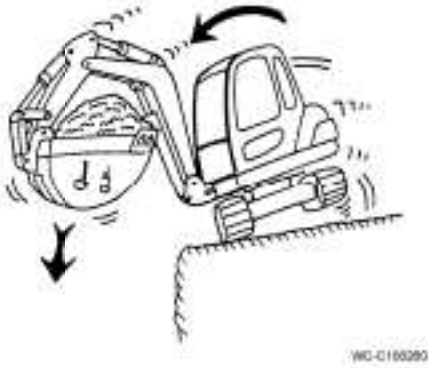
Do not dig at the base of a cliff

If you dig at the base of a cliff, it may collapse or stones may drop, causing a danger. Do not dig a cliff.

Never exceed the machine performance

If you use a large bucket that exceeds the machine performance, the machine may be broken or injury or death may result.

Be sure to use a bucket or attachment that meets the specifications.



Never lean out of the window

Do not lean out of the window, enter between the attachment and cylinder or put your hand or arm between them.

If the attachment moves, you may be caught by the attachment, resulting in serious injury or death.

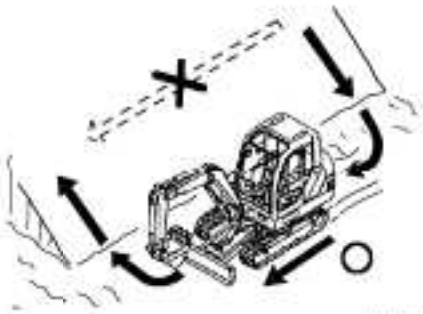
PRECAUTIONS FOR TRAVELING

Check the direction

If forward movement and backward movement are mistaken in operation with the travel lever, serious accidents may result.
Check the blade position before traveling. If the blade is behind the machine, operations of the travel levers are reversed.

Travel up and down the slope

Traveling sideways or parallel to a slope while on it may cause the machine to slide and fall over.
To prevent such accidents, only travel up and down the slope at a right angle.



Do not steer on the slope

Avoid changing the direction on a slope, which could result in tipping or side slipping of the machine.
When it is inevitable to change the direction, carry it out in a hard ground where the slope is gradual.

Travel on the slope

- Keep the bucket at as low position as 20 to 30 cm from the ground and travel the machine at low speed when traveling on a slope.
- Lower the bucket onto the ground and stop traveling if the machine becomes unstable.

PRECAUTIONS FOR TRANSPORTING

Load and unload the machine

- Always load and unload the machine on the level ground.
- Use a ramp board that has sufficient strength, width, length, and thickness.
- Remove ice, snow, or slippery material from the ramp board and truck deck before loading.
- Never swing the machine on a ramp board. Otherwise, it may fall down.

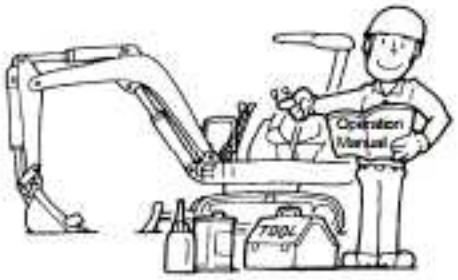
Never load or unload the machine without ramp board

Never load or unload the machine by jacking up the attachment. Otherwise, the machine may fall down.

Precautions at transportation

Apply stoppers in front of and behind the crawlers.
Apply wire ropes to the machine body and attachment and fix them firmly to the load carrying platform.

PRECAUTIONS FOR MAINTENANCE



WC-C100450

Keep routine maintenance

You must read and understand the warnings and instructions contained in this manual, before performing any operation or maintenance procedures.

WC-C100590

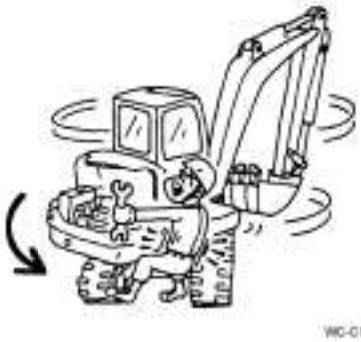
Wear protective tools

In grinding or when detaching the pin or tooth, fragments may be put in eyes, resulting in injury.
Wear protective goggles and protective cap before starting work.

WC-C100460

Put the "maintenance signboard"

Put the "Maintenance signboard" on an easy-to-see position of the operation lever in order to prevent any other person from touching the machine carelessly.



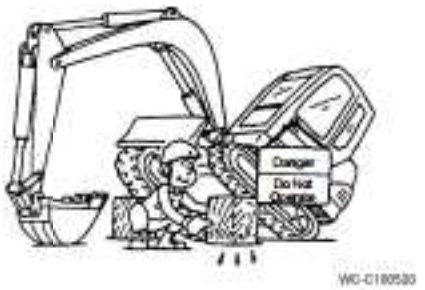
WC-C100580

Never perform maintenance of the moving machine

Lower the bucket onto the ground and stop the engine to prevent an accident of being crushed or caught by the machine.
Keep in good contact with the operator if it is necessary to perform maintenance of the moving machine.

When working under tracks

If the machine is merely jacked up with the attachment, you may be caught by the machine when it lowers.
Place the supporting blocks under the crawler and make sure that it is supported firmly.



WC-C100530

Hold the attachment

If the hydraulic hose is disconnected or the pin is drawn out in the condition where the attachment is raised in the air, oil may spout out or the attachment may drop.
Be sure to lower the attachment onto the ground or keep it with safety supports, blocks, etc.

WC-C100540

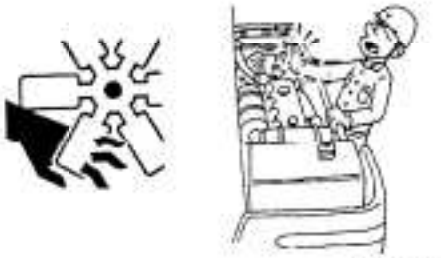
Never watch the check valve when adjusting crawler tracks

Never watch the check valve when servicing the crawler tracks. Position yourself not to be splashed with grease.
Grease used to adjust the crawler tracks is highly pressurized and can cause serious injury or death.
Carefully read and understand the maintenance procedure for track adjustment.

WC-C100550

Never perform maintenance with engine running

Touching rotating parts such as the fan belt, etc., can get your hand crushed and there is the danger of your hand being cut off.
Always perform maintenance with the engine shut off.



WC-C100510

Be careful with hot engine

Never touch the engine or muffler right after the machine is stopped. It is very hot and causes burns.

WC-C100520

Never open a radiator cap when it is hot

Never try to open the radiator cap while the engine is running or right after the engine is stopped. If the cap is open the very hot steam will blow out, which causes serious burns.

Wait until the coolant temperature goes down.

Slowly open the cap to release the pressure.

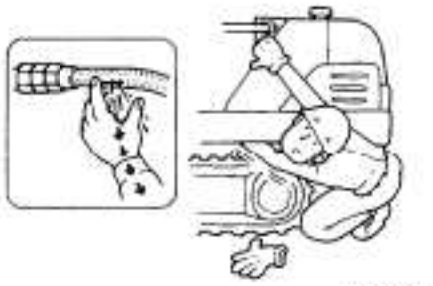
Always release inner pressure from hydraulic system

Pressurized oil may spout out if the hydraulic line is disconnected without releasing the inner pressure of the hydraulic system. Release the inner pressure before disconnecting a hydraulic line.

Precautions for high pressure oil

It is very dangerous if the high pressure oil enters your skin or eyes.

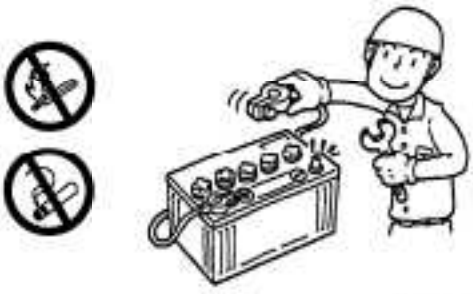
If oil enters your skin, immediately go to the doctor and get medical attention.



Precautions for battery

When maintaining the electrical system or carrying out welding, remove the lead connected to the negative terminal (-) of the battery.

The battery can generate flammable gases and there is the danger of the gases catching fire and exploding. Also, dilute sulfuric acid is used for the battery liquid. Take sufficient care while handling.



Prevent fire or explosions

Keep away fuel, lubricant and coolant from any fire or heat. Most of them are very flammable.

Never place flammable materials or objects close to fire or heat.

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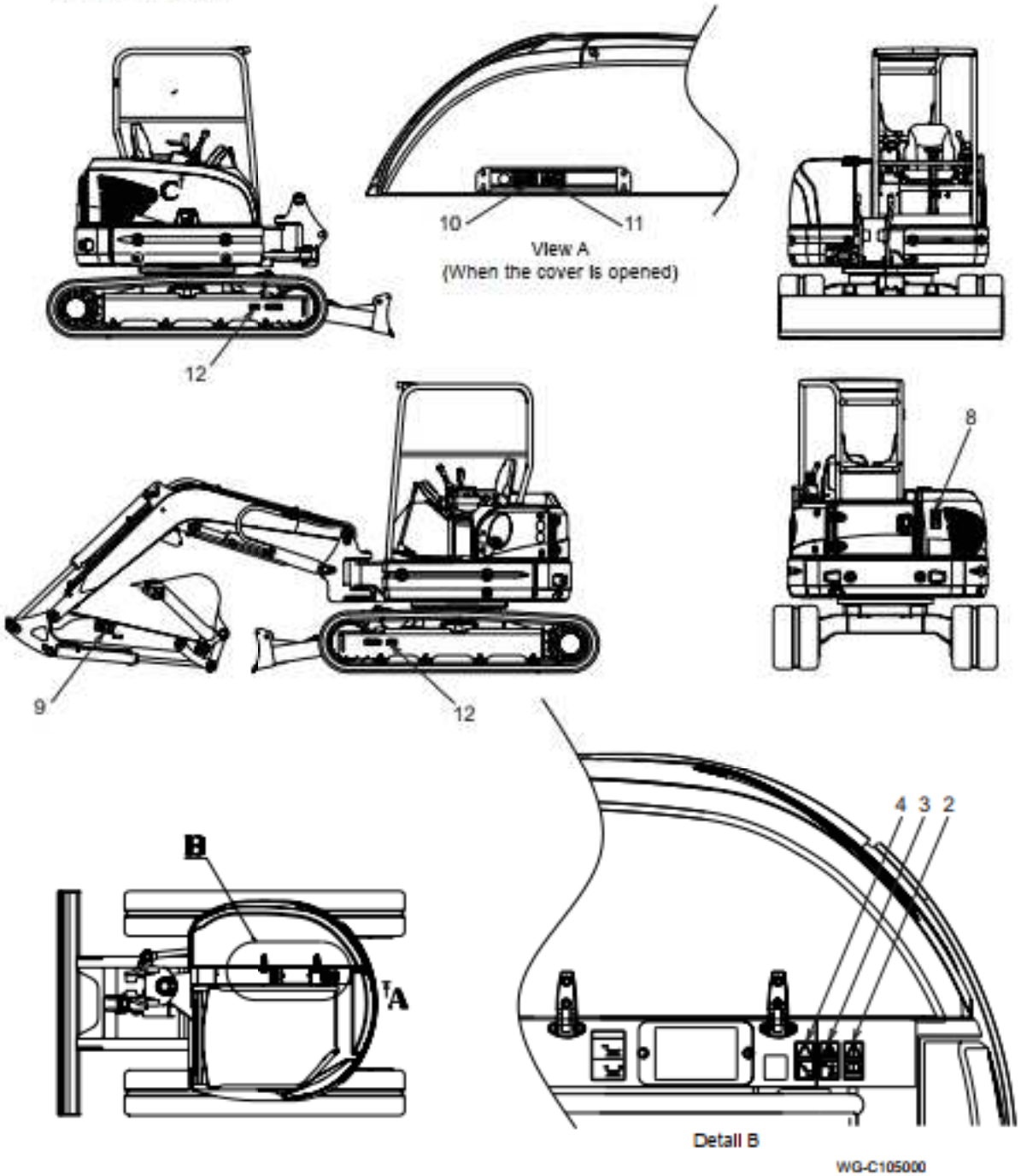
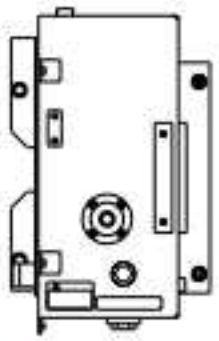
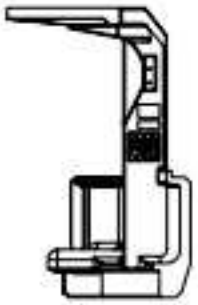
SAFETY SIGNS AND LABELS

There are several specific safety signs ⚠ on your machine.
Following is a listing of Safety Decals and locations. Clean or replace these if you cannot read the words.
Check the part number for the safety sign against this manual or the actual object before placing an order.

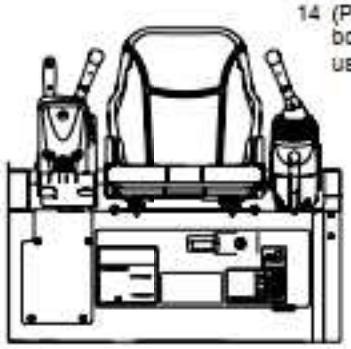




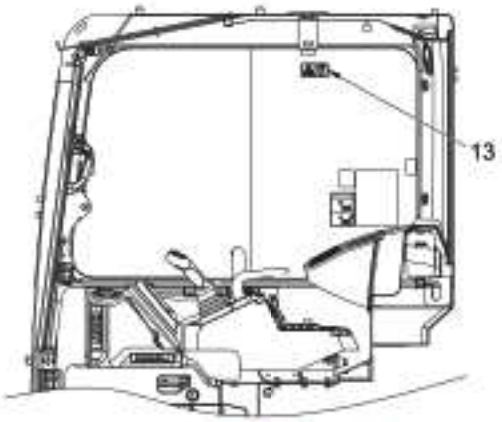
(Side view of hydraulic oil tank)



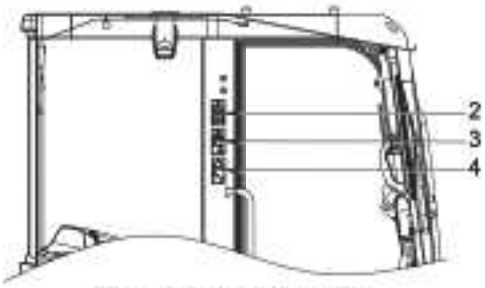
View C
(Detail of counterweight section)



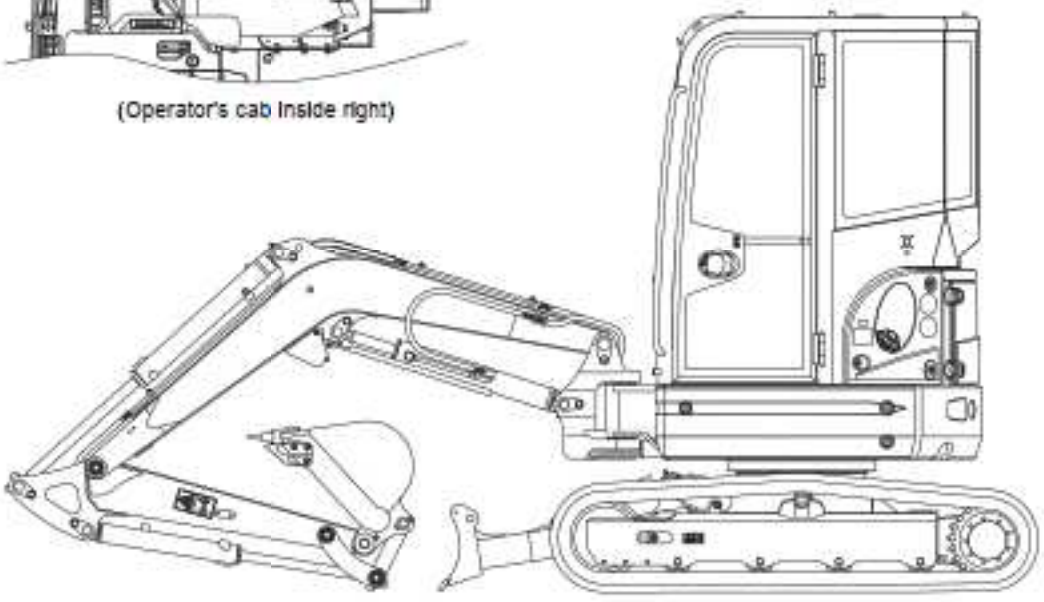
(Detail of operator's seat)



(Operator's cab inside right)

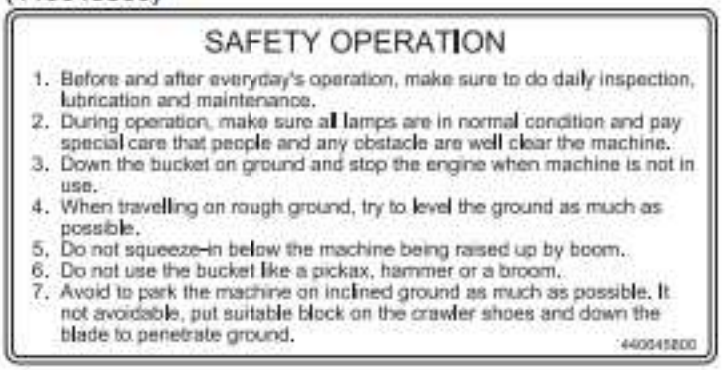


(Operator's cab inside left)



Cabin specification

1. Safety operation
(440645800)

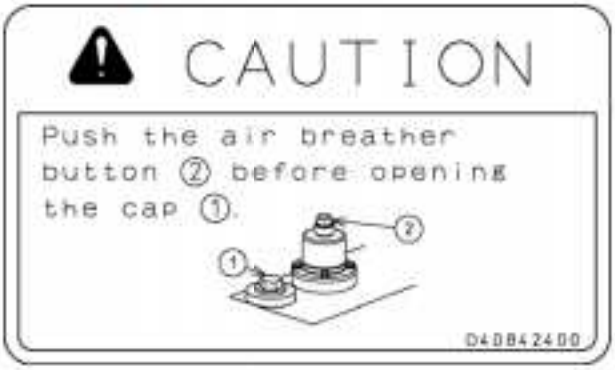


2. Read manual!
(D405 359 00)
Read manual before operation, maintenance, disassembly, assembly and transportation.

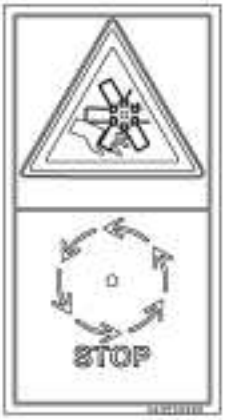
3. Crush hazard
(D405 508 00)
Sign indicates a hazard of being crushed or run over by unexpected moving of stopped machine.
Lower working device to ground, move safety lever to lock position and take engine key with you before leaving machine.

4. Electric power lines
(D405 506 00)
Sign indicates an electrocution hazard if machine is brought too near electric power lines.
Keep a safe distance from electric power lines.

5. Precautions during adjustment of the hydraulic circuit
(D408 424 00)

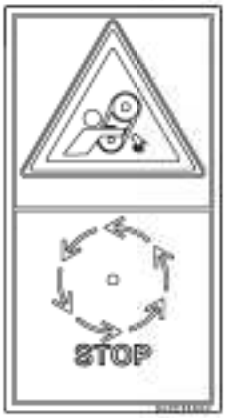


6. Hazard of rotating parts
(D405 509 00)



Sign indicates a hazard of rotating parts, such as fan.
Turn off before inspection and maintenance.

7. Hazard of rotating parts
(D405 366 00)



Sign indicates a hazard of rotating parts, such as belt.
Turn off before inspection and maintenance.

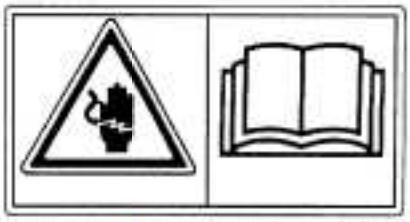
8. Keep away from swing area
(D405 507 00)
Sign indicates a crush hazard by rotation of upper structure of the machine.
Keep away from swinging area of machine.

9. Keep away from machine
(D405 511 00)
Sign indicates a hazard of being hit by the working device of the machine.

10. Burn hazard
(D405 503 00)

Sign indicates a burn hazard from spurting hot water or oil if radiator or hydraulic tank is uncapped while hot.
Allow radiator or hydraulic tank to cool before removing cap.

11. Electrical hazard
(D405 504 00)



Sign indicates an electrical hazard from handling the cable.
Read manual for safe and proper handling.

12. Warning for track adjuster
(D405 505 00)

Sign indicates a hazard of flying plug from track adjuster that could cause injury.
Read manual before adjusting track for safe and proper handling.

13. Hazard from falling window
(D405 510 00)

Sign indicates a hazard from falling window.
After raising window, be sure to lock it in place with lock pins.

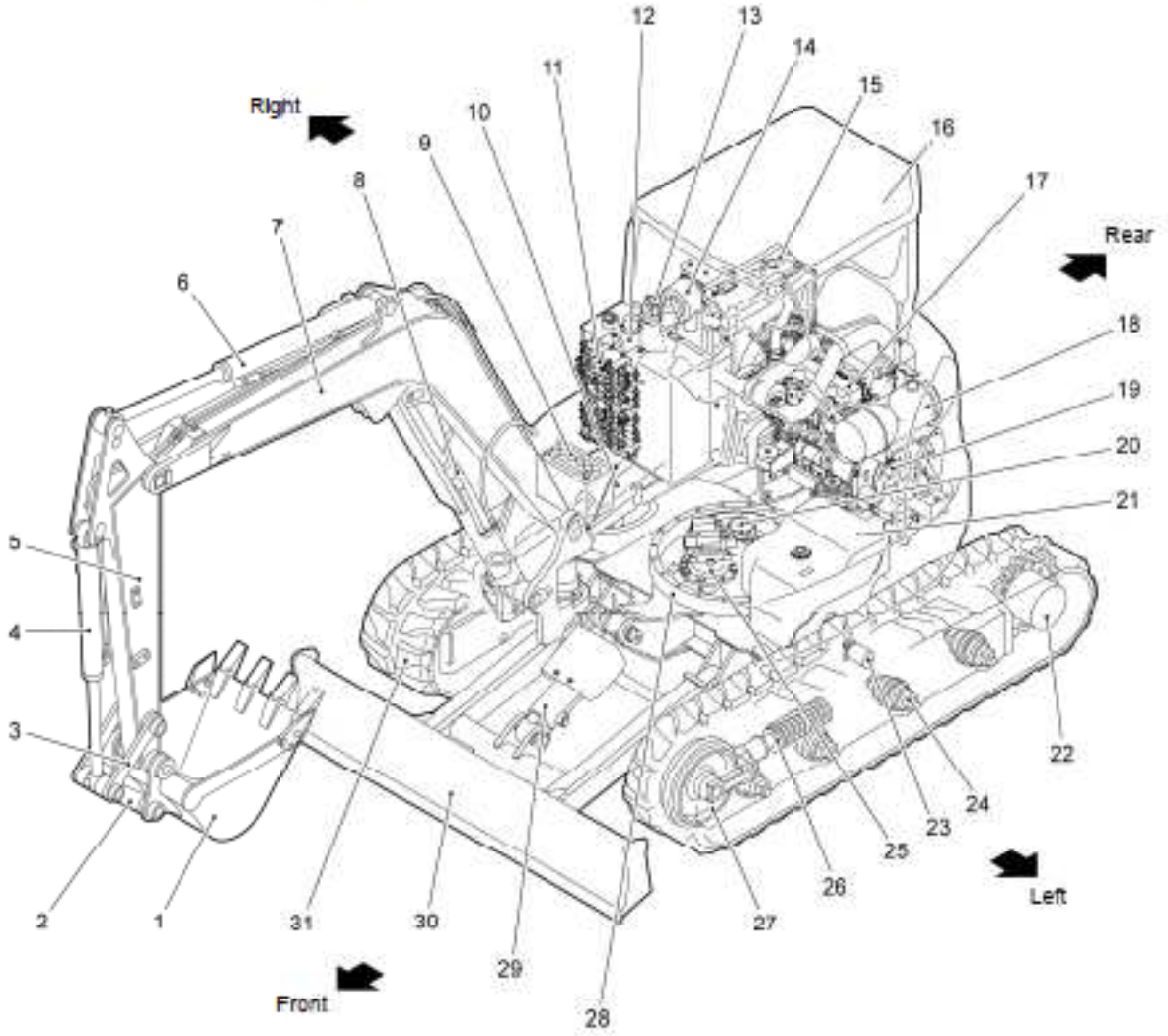
14. Do not operate
(D405 323 00)

Operation prohibition during inspection and servicing.
Hang this sign on the control lever during inspection and servicing not to allow any other worker to start the engine or operate the machine.

OPERATION

This section describes the proper operation procedures of this machine.
Always look to the safety and observe the given operation instructions and cautions to carry out works safely.

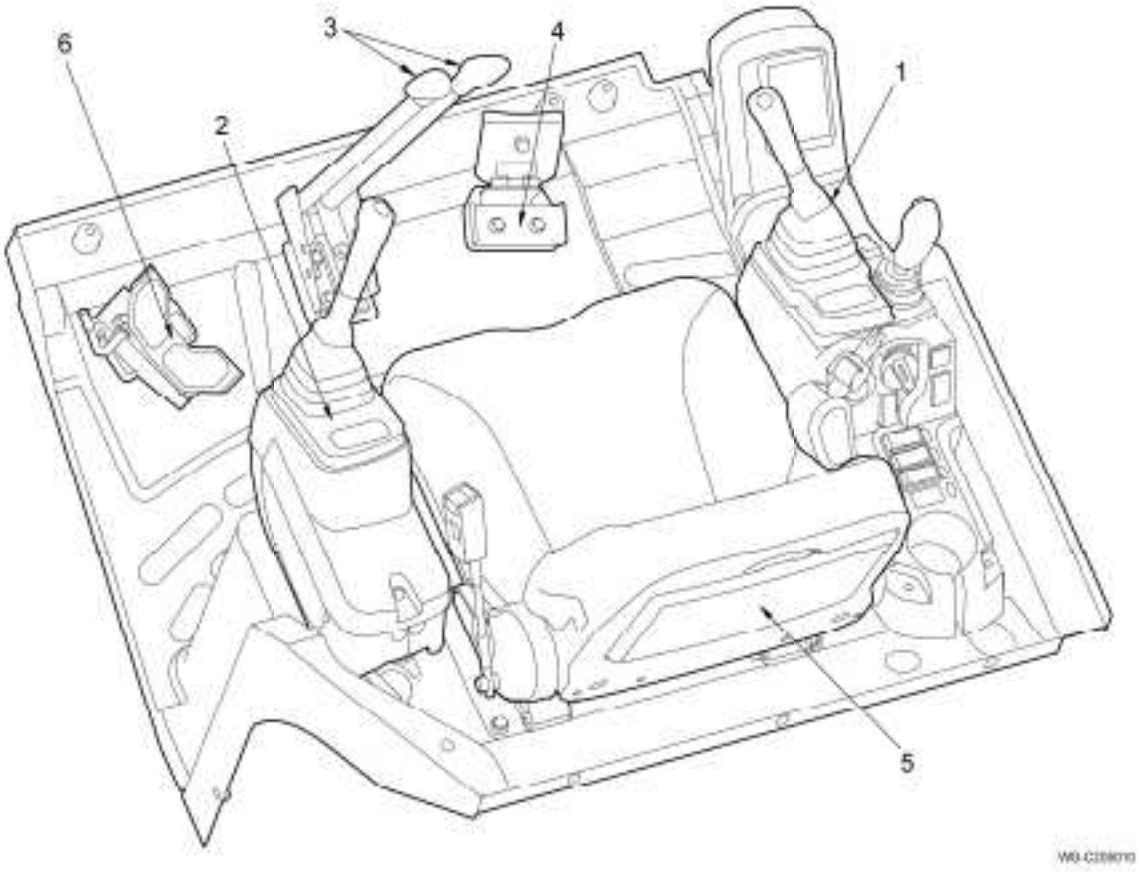
NAMES OF COMPONENTS



WG-C295000

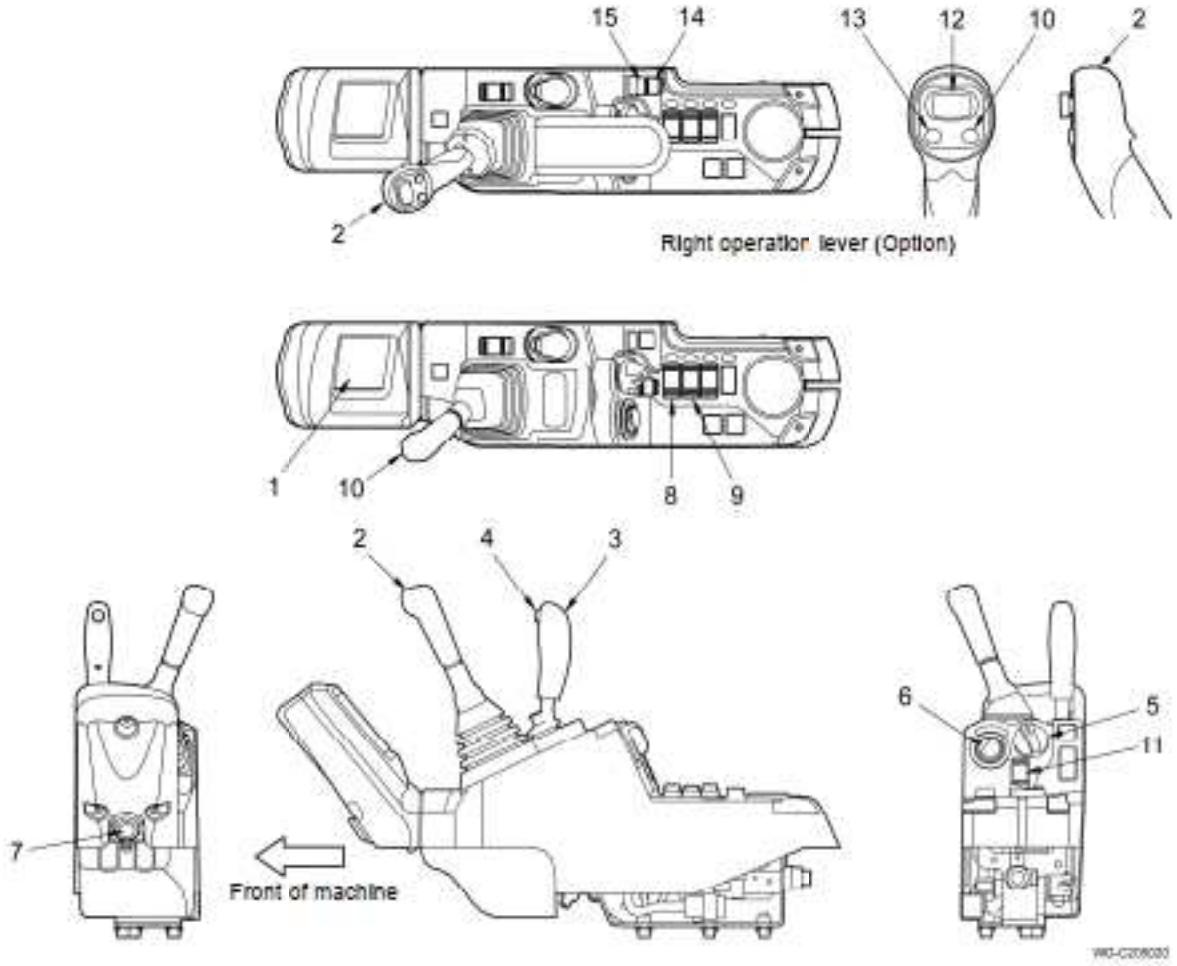
No.	Name	No.	Name	No.	Name
1	Bucket	12	Battery	23	Travel unit
2	Bucket link	13	Return filter	24	Upper roller
3	Arm link	14	Radiator and oil cooler	25	Lower roller
4	Bucket cylinder	15	Canopy	26	Track adjusting device
5	Arm	16	Air cleaner	27	Swing bearing
6	Arm cylinder	17	Engine	28	Front idler
7	Boom	18	Muffler	29	Blade cylinder
8	Boom cylinder	19	Swing unit	30	Blade
9	Boom swing cylinder	20	Rotary joint	31	Crawler track
10	Fuel tank	21	Hydraulic pump		
11	Hydraulic oil tank	22	Control valve		

CONTROLS AND INSTRUMENTS



No.	Name	No.	Name
1	Right control box	4	Boom swing pedal
2	Left control box	5	Operator's seat
3	Travel lever	6	No. 1 AUX. pedal (Option)

Right Control Box



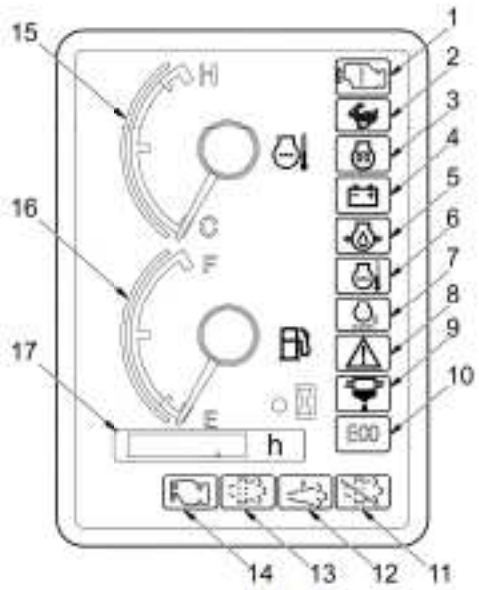
No.	Name	No.	Name
1	OK monitor	9	Mode select switch
2	Right operation lever	10	Horn switch
3	Blade lever	11	Auto idle selector
4	Travel speed select switch	12	No. 1 AUX. proportional lever (E Grip)
5	Throttle dial	13	No. 1 AUX. bottum (E Grip)
6	Engine key switch	14	No. 1 AUX. flow limit switch (E Grip)
7	Power outlet	15	No. 1 AUX. hold switch (E Grip)
8	Light switch		

* The switches of the No. 2 AUX and No. 3 AUX hydraulic power are shown in the section "AUX WHEN USING SPECIAL ATTACHMENT".

1. OK monitor

When the engine key switch is set to the ON position, the engine oil pressure warning indicator and battery charge warning indicator turn on. Make sure, after the engine starts, that all warning indicators are off before starting work.

No.	Name
1	No use
2	Travel speed indicator
3	Glow indicator
4	Battery charge warning indicator
5	Engine oil pressure warning indicator
6	Water temperature warning indicator
7	Auto idle indicator
8	Control lock warning indicator
9	Water separator warning indicator
10	ECO mode indicator
11-14	No use
15	Water temperature gauge
16	Fuel gauge
17	Hour meter



OK monitor

WS-C208028

NOTICE

- If some trouble occurs in the machine, the corresponding warning indicator turns on to indicate the trouble. If a warning indicator turns on during work, stop the engine immediately and check and repair the abnormal position.
- The OK monitor does not always warrant the machine condition. Take indication of the OK monitor and carry out startup inspection and daily inspection.
- Be sure to check the levels and contamination of the engine oil, cooling water, fuel tank and hydraulic oil tank visually.
- If the engine oil temperature is low, the hydraulic pressure becomes higher and the engine oil pressure warning indicator may turn on. It turns off when the engine is warmed up. Stop the engine and carry out inspection and repair work if the indicator does not turn off even after warming up.

Travel speed indicator

This indicator turns on, when the high speed is selected. When the switch is pressed again, the travel speed is changed into the low speed and the indicator turns off.

Glow indicator

This indicator turns on when the engine key switch is set to the ON position, indicating that preheat. The indicator turns off after preheat completion.

Battery charge warning indicator

This indicator turns on if some trouble occurs in the charging system while the engine is running. If it turns on while the engine is running, the fan belt may be slack. Stop the engine and check it.

Engine oil pressure warning indicator

This indicator turns on if the lubricating oil pressure lowers while the engine is running. Stop the engine and check the lubrication system and lubricating oil quantity if this indicator turns on while the engine is running.

Water temperature warning indicator

This indicator turns on if the water temperature is higher abnormally. Stop the engine and check the cooling system if this indicator turns on while the engine is running.

Auto idle indicator

This indicator turns on when the Auto idle switch is on and turns off when the Auto idle switch is off.

Control lock warning indicator

This indicator turns on if the engine key switch is set to the START position though the control lock lever is not at its locked position. The engine cannot be started in such a condition. Put the gate lock lever in its locked position to start the engine.

Water separator warning indicator

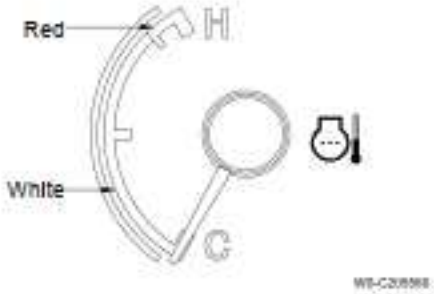
This indicator turns on if water is collected up to the specified level in the water separator. Stop the engine and discharge water from the water separator when this indicator turns on.

Eco mode indicator

This indicator lights up when the Eco switch is ON and goes OFF when the Eco switch is OFF.

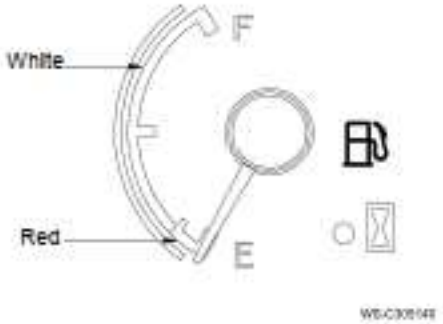
Water temperature gauge

- This gauge indicates the temperature of engine cooling water.
- It is proper if the pointer indicates a temperature in the white range during operation.
- After starting the engine, carry out warming up operation of the engine until the needle points in the horizontal direction.
- Idle the engine and wait until the temperature lowers to the white range if the pointer indicates a temperature in the red range during operation. Check the water level in the subtank, water leak from the engine and radiator and fan belt.



Fuel gauge

- This gauge indicates the fuel level in the fuel tank.
  F: The fuel tank is full.
  E: Fuel is insufficient. Refill the tank with fuel.



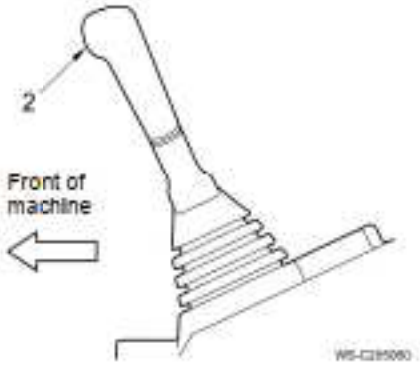
Hour meter

This meter indicates the accumulative running time in units of 1/10 hour (six minutes).
It advances as long as the engine is running, even if the machine is not working.

2. Right operation lever

Use this lever to operate the boom and bucket.
The standard pattern at the time of shipment from the factory is the pattern A.

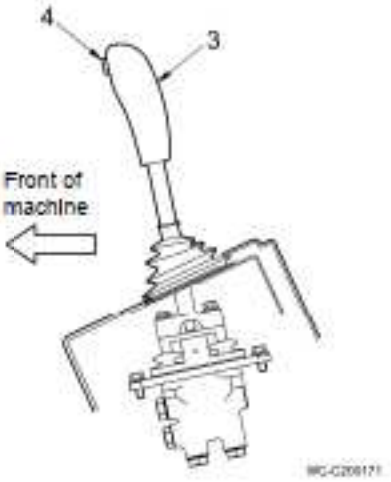
- Boom raise: Pull the lever backward.
- Boom lower: Push the lever forward.
- Bucket dig: Turn the lever to the left.
- Bucket dump: Turn the lever to the right.
- Stop: Release your hand from the lever. The lever returns to the neutral position automatically and operation stops.
- Simultaneous operation: Turn the lever diagonally to operate the boom and bucket simultaneously.



3. Blade lever

Use this lever to raise and lower the blade.

- Raising the blade: Pull the lever backward.
- Lowering the blade: Push the lever forward.



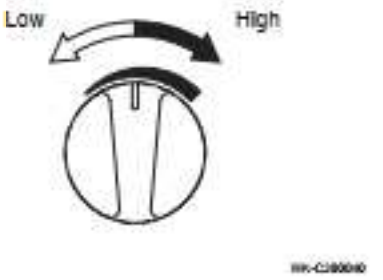
4. Travel speed select switch

Use this switch to select the low and high travel speeds.
Press the switch during traveling at the low speed to change it into the high speed. Press the switch again to change the high speed into the low speed.
Every time this switch is pressed, the travel speed changes from high into low, and vice versa, alternately.
A selected speed is maintained.
Becomes low speed when the engine is stopped.

5. Throttle dial

Use this dial to adjust the engine speed.

- Low speed: Turn the dial to the left.
- High speed: Turn the dial to the right.



6. Engine key switch

Use this switch to start and stop the engine.

HEAT (preheat)

Set the switch to this position to preheat the engine if the engine is cold in cold seasons.

Keep the switch at the HEAT position for maximum 10 seconds. Preheating is complete and the glow indicator turns off. Turn the key to the START position to start the engine when the glow indicator turns off.

OFF (stop)

The key may be inserted and removed at this position. Power of all electrical systems is cut off and the engine stops.

ON (run)

Power is supplied to the electrical systems and the OK monitor indicator turns on.

START (start)

Set the switch to this position to start the engine. Release the fingers from the key immediately after the engine starts.

The key returns to the ON position automatically.

7. Power outlet

This is a power socket for standby power source. Use it within the following capacity.

Capacity: 12 V, 120 W

Always keep the cap closed when this socket is not used.

8. Light switch

Use this switch to turn on and off the front light of the boom.

- Turning on: Press the ON side of the switch.
- Turning off: Press the OFF side of the switch.

9. Mode select switch

Change the operation mode

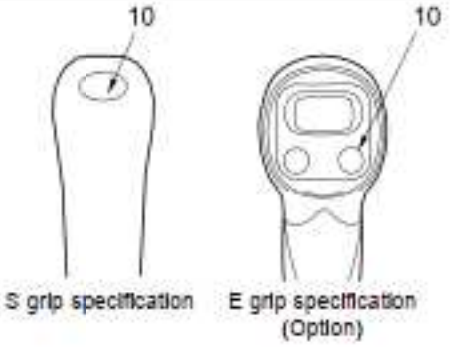
- "ECO" Mode: This is a mode in which fuel consumption is suppressed.

  The ECO mode is started by putting the selector to the ECO side.
- "Vmax" Mode: This is a mode specialized to speed of work.

  The Vmax mode is started by putting the selector to the Vmax side.

10. Horn switch

Press this switch to turn on the horn.



11. Auto idle switch

When the Auto idle. switch is set to the ON position, the engine revolution changes into low automatically to reduce fuel consumption approximately four seconds after the operation lever is returned to the neutral position. The previous engine revolution is restored when some operation lever is moved again.

Every time this switch is pressed, the auto idle indicator on the OK monitor turns on and off alternately.

⚠ WARNING

If the lever is operated in the condition where the Auto idle. switch is set to the ON position and the engine revolution is reduced, the engine revolution increases quickly, the operation speed changes suddenly, and a serious accident may occur. Set the Auto idle. switch to the OFF position in works that may cause dangerous accidents if the operation speed changes suddenly such as loading or unloading of the machine, turning, etc.

12. No. 1 AUX. proportional lever (E Grip)

Sliding to left: Pressurized oil is supplied to the left AUX pipe of the arm.

Sliding to right: Pressurized oil is supplied to the right AUX pipe of the arm.

13. No. 1 AUX. botton (E Grip)

When this switch is pressed, pressurized oil is supplied to the left AUX pipe of the arm. Supply of pressurized oil stops when the finger is released from the switch.

14. No. 1 AUX. flow limit switches (E Grip)

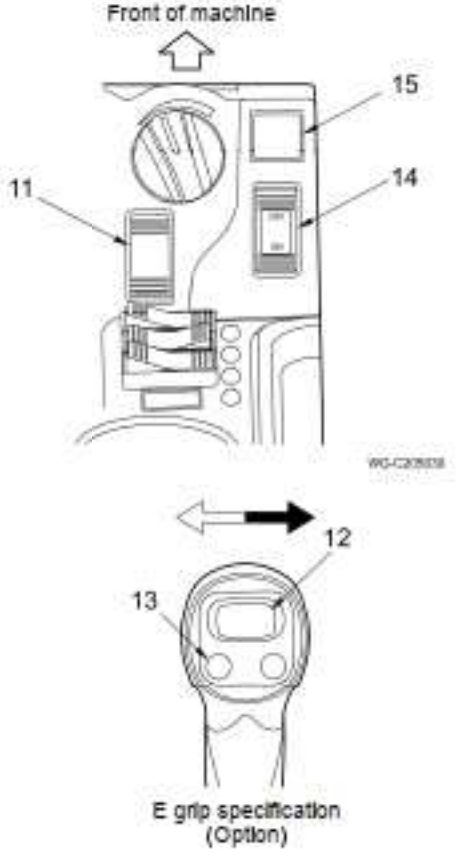
Use this switch to operate the No. 1 AUX. proportional lever.

ON: The supply flow is reduced to approximately half.

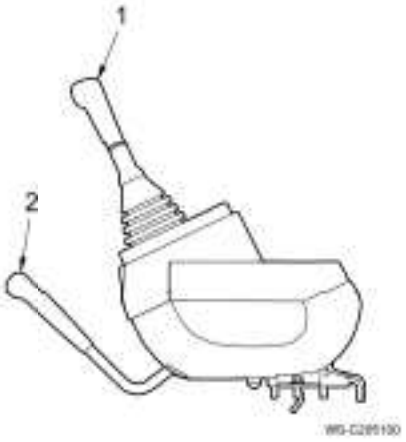
OFF: The switch is reset.

15. No. 1 AUX. hold switch (E Grip)

When this switch is made ON (the indicator lights up) and the No. 1 AUX. botton is operated, it will be possible to continue to supply compressed oil to the left side spare piping.



Left Control Box

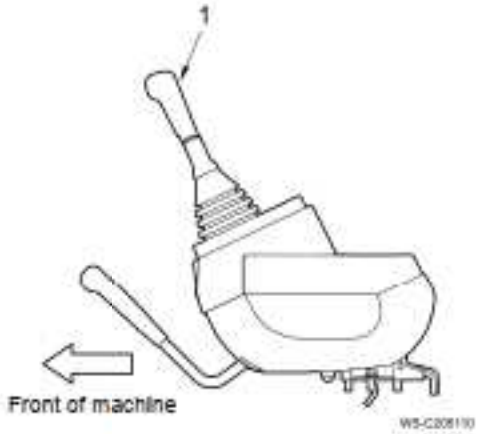


1. Left operation lever

Use this lever to operate the arm and swing.

The standard pattern at the time of shipment from the factory is the pattern A.

- Arm in: Pull the lever backward.
- Arm out: Push the lever forward.
- Swing left: Turn the lever to the left.
- Swing right: Turn the lever to the right.
- Stop: Release your hand from the lever. The lever returns to the neutral position automatically and operation stops.
- Simultaneous operation: Turn the lever diagonally to operate the arm and swing simultaneously.

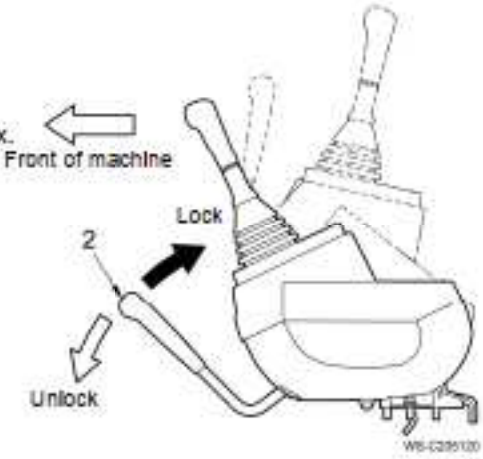


2. Control lock lever

Use this lever to lock all operations.

The control lock lever moves together with the control box.

- Lock: Pull up the control lock lever.
- Unlock: Push down the control lock lever.

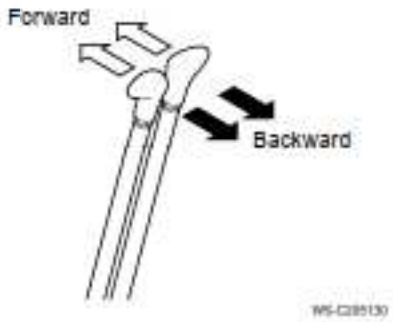


⚠ WARNING

- If the operation lever is touched carelessly in the condition where the control lock lever is not at the locked position, the machine may move unexpectedly, resulting in a dangerous accident.
- Stop the engine and put the control lock lever in its locked position when you leave the operator's cabin.
- Be careful not to touch the left operation lever when using the control lock lever.

Travel Levers

Use these levers to control traveling.



Forward: Push the right and left travel levers forward.
Backward: Pull the right and left travel levers backward.
Stop: Release your hands from the levers. The levers return to the neutral positions automatically and operation stops.

⚠ WARNING

- If forward movement and backward movement are mistaken during traveling, a serious accident may result.
- Forward movement means forward movement with the blade in the front position. If the blade is at the rear position, the traveling directions are contrary to the lever operations.
- Check if the blade is in the front or rear position before operating the travel levers.

Boom Swing Pedal

Use this pedal to swing the boom.
Open the pedal cover to the unlocked position.
Left boom swinging: Step on the left side of the pedal.
Right boom swinging: Step on the right side of the pedal.

⚠ CAUTION

Put the pedal cover over the pedal to disable pedaling when boom swinging is not carried out.

Operator's Seat

Sit on the operator's seat and adjust it to the condition where the operation levers and pedals may be used smoothly.

Back and forth adjustment:

Move the seat back and forth while pulling the slide lever (1) to adjust the seat position.

Reclining adjustment:

Move the back seat (3) back and forth while pulling the reclining lever (2) to adjust the back seat angle.

Suspension adjustment:

Adjust the hardness of suspension according to the body weight with the suspension lever (4). The applicable body weight is displayed in the display panel (5).

⚠ CAUTION

Lower the bucket onto the ground and stop the engine before adjusting the operator's seat.

Seat belt

Hold the grip (1), insert the tongue plate (2) into the buckle (3) to the end, and make sure that it is locked.

⚠ CAUTION

- Fasten the seat belt during operating.
- Be sure to check the belt, tongue plate, buckle, etc. before starting operating. Replace the damaged belt, tongue plate and/or buckle with new one(s).

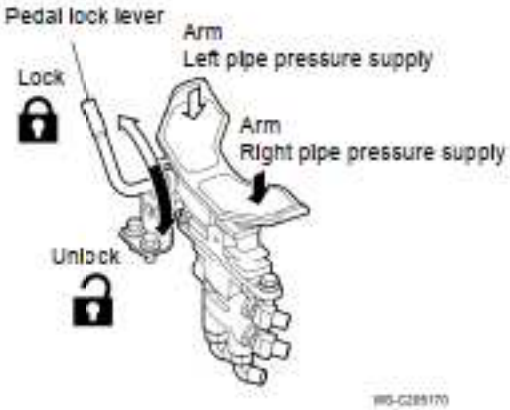
AUX Pedal (Option)

Use this for making the No. 1 AUX hydraulic operation.

Put the pedal lock lever in the unlock position.

Supply of pressure to the left side of the arm: Step on the front side of the pedal.

Supply of pressure to the right side of the arm: Step on the rear side of the pedal.



⚠ CAUTION

When the No. 1 AUX hydraulic operation is not to be made, move the pedal lock lever to the lock position and put it in a state in which it cannot be operated.

Operator's Cabin

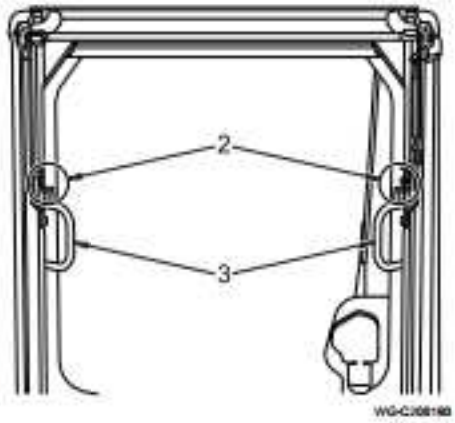
Door lock

- The door may be locked at the fully opened or closed position.
  Push the door until it is locked completely.
- Press the Unlock lever (1) to unlock the door. The door is unlocked and may be opened and closed.

Opening and Closing the Front Window of the Cabin

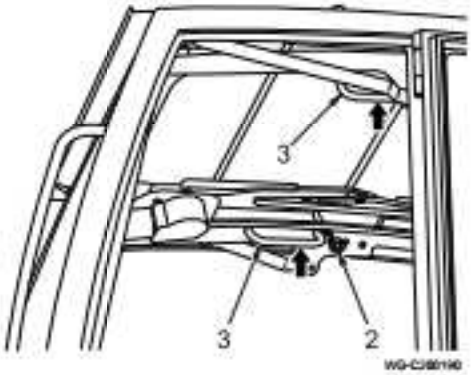
⚠ CAUTION

- Move down the front window slowly, when closing it, with care not to pinch your hand, etc.
- Be sure to fix the front window with the right and left lock pins (2), in addition to the automatic lock (4), when opening and storing it on the ceiling.



Opening

1. Release the locking device by pressing down the left and right locking device release levers (2).
2. Pull and push up the front window by holding the right and left handles (3) and move the window to the ceiling.
3. When pushing up the front window by holding the handles, the window can be completely locked by the locking device. Push it up until completely locked.



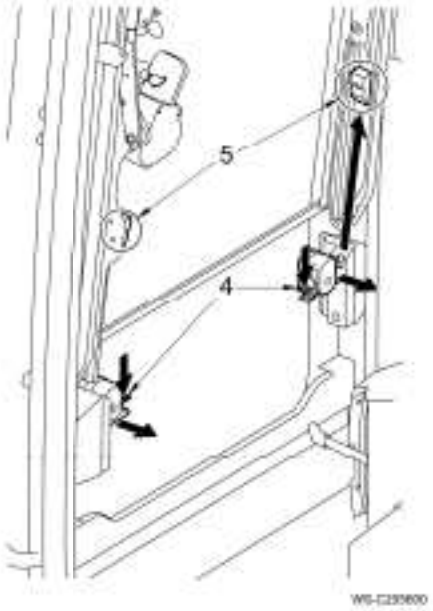
Closing

1. Push down the left and right lock releasing levers and release the locking device.
2. Gradually lower the bottom window with the locking device maintained in the released state.
3. If the bottom window is pressed inward while the locking device is maintained in the released state, since it butts against the locking device (6), always release the locking releasing leaver and put it back in the locked state.

Opening and Closing the Bottom Window of the Cabin

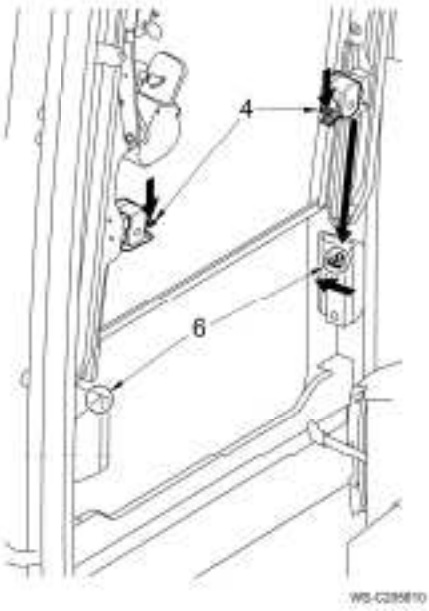
⚠ CAUTION

- Move down the bottom window slowly, when closing it, with care not to pinch your hand, etc.
- Be sure to fix the bottom window with the right and left lock pins (4), in addition to the automatic lock, when opening and storing it on the ceiling.



Opening

1. Release the locking device by pressing down the left and right locking device release levers (4).
2. Pull to the front the locking device still in the released state and move the bottom window.
3. Lift up the bottom window while the locking device is still in the released state, and release the locking lever when it touches the locking device of the front window (5) and be sure to put that lever back in the locking position.
   When the front window is at the roof, it will be possible to remove the bottom window by lifting it up.



Closing

1. Push down the left and right lock releasing levers and release the locking device.
2. Gradually lower the bottom window with the locking device maintained in the released state.
3. If the bottom window is pressed inward while the locking device is maintained in the released state, since it butts against the locking device (6), always release the locking releasing leaver and put it back in the locked state.

Wiper switch

Press the mark side to activate the wiper.

NOTICE
• Do not start the wiper in the condition where the window is dry, muddy or snowy. • Never turn on the wiper switch when the cabin front window (upper) is stored on the ceiling.

Window washer switch

Press the mark side further. Washer liquid spouts out of the nozzle while the mark side is kept depressed.

NOTICE
Do not operate the switch if window washer liquid is lacking. If the window washer liquid is exhausted, put washer liquid in the washer liquid tank.

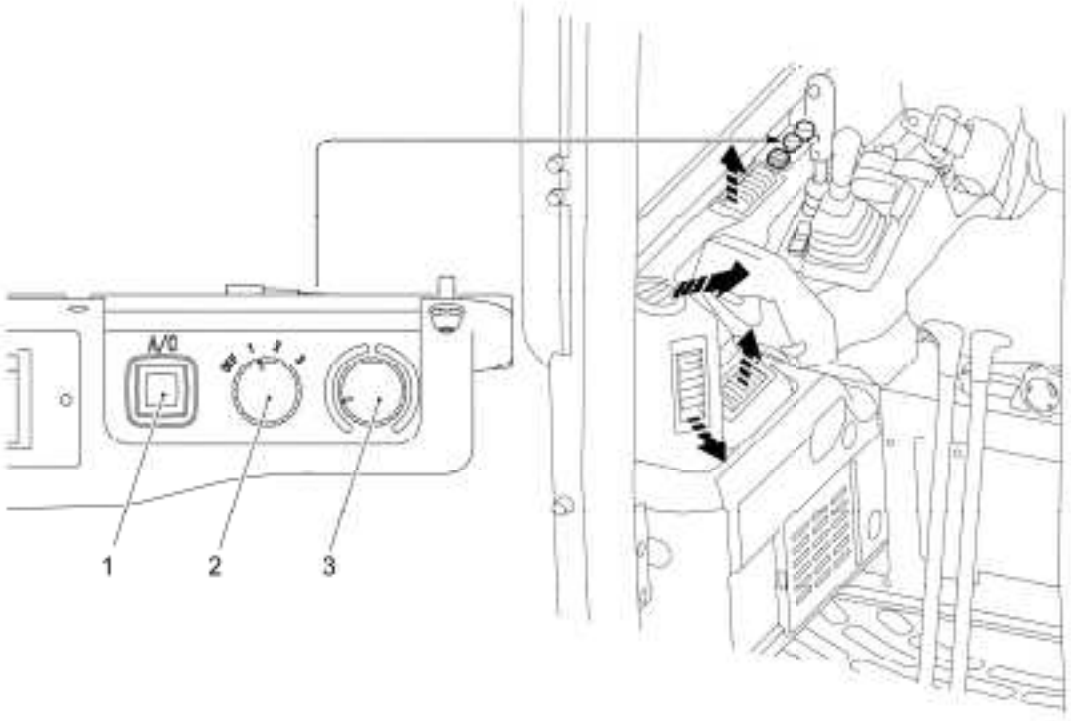
Air conditioner (Option)

The air conditioner is on the right side of the operator's seat inside the cabin.
Operate this for adjusting the temperature inside the cabin.

1. **Air conditioner switch**
   Pressing the switch starts the air conditioner. The indicator blinks when this switch is ON.

2. **Fan speed controlling knob**
   This knob is for switching ON or OFF the fan and for adjusting the air flow speed.
   The air flow rate is controlled by three levels

3. **Temperature control knob**
   This knob is for controlling the temperature of the air coming out of the air blow outlets.

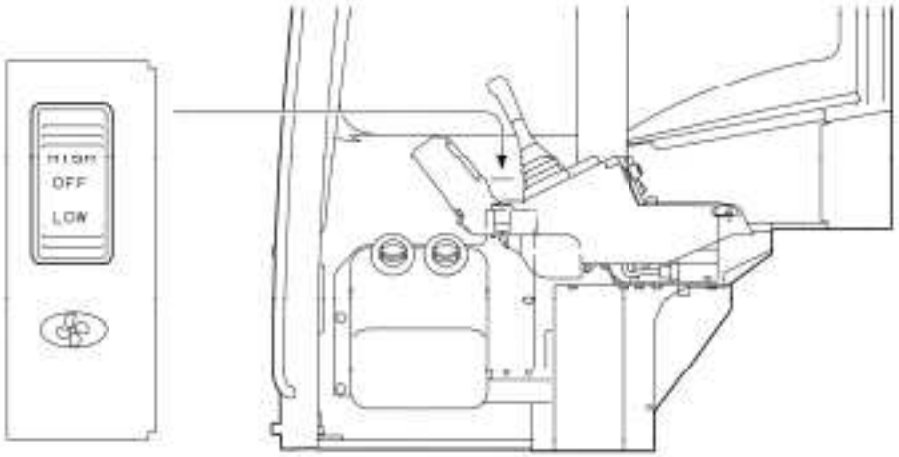


Heater (Option)

The heater is on the right side of the operator's seat inside the cabin.
Operate this for heating inside the cabin.

- "LOW" or "HIGH"
  Starts the fan and blows warm air into the cabin.
  The air flow rate of the fan can be selected by putting this switch to the "LOW" or the "HIGH" side.

- "OFF"
  Stops the fan.

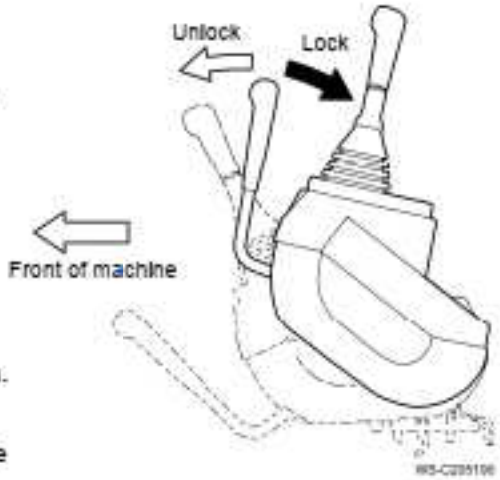


STARTING ENGINE

Check before Starting Engine

1. Sit on the operator's seat and adjust it to the condition where the operation levers and pedals may be used smoothly.

2. Make sure that the control lock lever is set at the locked position.



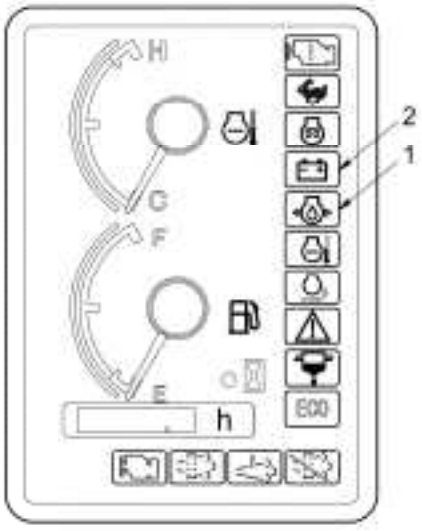
3. Make sure that each lever is set at the neutral position.

4. Insert the key into the engine key switch. Turn it to the ON (run) position and make sure of the following.

   - The engine oil pressure warning indicator (1) and battery charge warning indicator (2) are lit continuously.
     (It is normal if the engine oil pressure warning indicator and battery charge warning indicator turn off when the engine starts.)

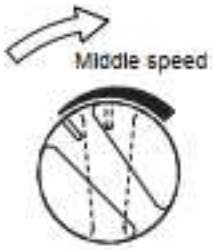
   - Push the light switch and make sure that the front lights are turned on.

   - Push the horn switch and make sure that the horn sounds.



Normal Starting

1. Set the throttle dial to the middle speed.
2. Turn the key to the START position to start the engine.
3. Release your fingers from the key when the engine starts.
   The key returns to the ON (run) position automatically.
4. Push the control lock lever down to the release position to start work.



⚠ CAUTION

- Check if there are no persons or obstacles around the machine, turn on the horn, and start then.
- Be sure to sit on the operator's seat and start the engine.
- Set the control lock lever to the lock position and restart the engine, if the engine stops with the gate lock lever set at the release position.

NOTICE

Do not turn the starting motor for 15 seconds or more. If the engine fails to start, return the key to the OFF position, wait for 30 seconds, and try to start the engine again.

Starting in Cold Seasons

Preheat the engine in cold seasons to make it easy to start the engine.

1. Set the throttle dial to the middle speed.
2. Turn the key counterclockwise and keep it at the ON (run) position. Preheating starts and the glow indicator (3) turns on. Wait until it turns off (10 seconds at the maximum, the value of which depends on the cooling water temperature).
   The engine oil pressure warning indicator (1) and battery charge warning indicator (2) also turn on when the key is set at the ON (run) position. However, this does not imply any abnormality.
3. Turn the key to the START position to start the engine after the glow indicator turns off.
4. Release your fingers from the key after the engine starts.
   The key returns to the ON (run) position automatically.

Starting Engine with Booster Cables

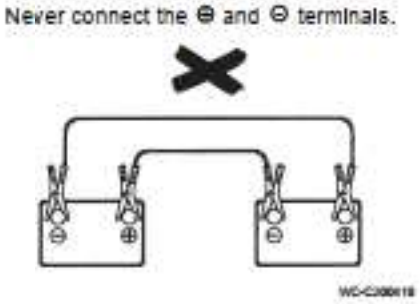
Follow the instructions shown below to start the engine using the booster cables.

⚠ WARNING

- If the booster cables are connected improperly, the battery will be shorted, resulting in a dangerous accident. Never connect the + and ⊖ terminals.
- The battery produces flammable hydrogen gas, which is explosive. Do not bring fire close to it or produce sparks near it.

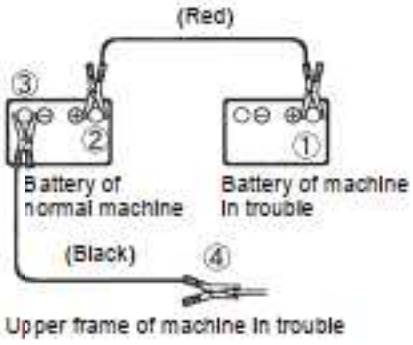
NOTICE

The electrical circuits of this machine run on 12 V. Use a 12 V auxiliary battery.



Order of connecting booster cables

1. Set the engine key switches of the normal machine and machine in trouble to the OFF positions.
2. Connect the clip of the booster cable (red) to the ⊕ terminal of the machine in trouble. Connect the other clip to the ⊕ terminal of the normal machine.
3. Connect the clip of the booster cable (black) to the ⊖ terminal of the normal machine. Connect the other clip to the upper frame of the machine in trouble.



Order of connecting booster cables

① → ② → ③ → ④

Starting engine

1. Make sure that the cable clips are connected to the battery terminals and upper frame firmly.
2. Start the engine of the normal machine and keep the engine running at high revolution.
3. Start the engine of the machine in trouble.

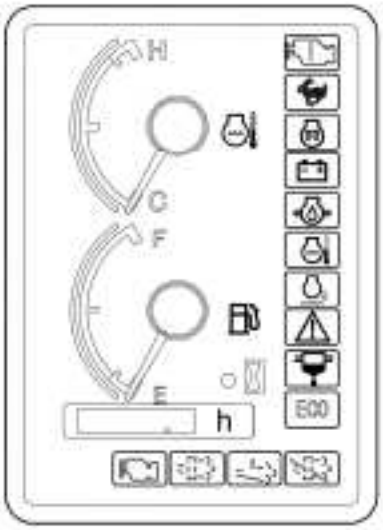
Disconnecting booster cables

1. Disconnect the clip of the black cable from the upper frame first. Then, disconnect the clip from the ⊖ terminal of the normal machine.
2. Disconnect the clip of the red cable from the ⊕ terminal of the normal machine first. Then, disconnect the clip from the ⊕ terminal of the machine in trouble.

Order of disconnecting booster cables

④ → ③ → ② → ①

Check after Starting Engine



1. Checking operation of the OK monitor
   Make sure that all indicators on the OK monitor are off.

2. Check if the engine exhaust color, sound and vibrations are proper.

NOTICE
• Do not accelerate the engine or apply loads to it quickly when the cooling water temperature is low. • Stop the engine immediately, find the cause and repair troubles, if some troubles are found.

Warming Up Engine

1. Idle the engine to warm it up for approximately 10 minutes after the engine starts.

2. Lift the bucket from the ground and repeat cycles of moving the bucket lever to the digging or dumping position for 10 to 15 seconds and keeping it at the neutral position for about 10 seconds for five minutes to raise the hydraulic oil temperature, if the hydraulic oil temperature is low.

3. Then, repeat all operations, including turning, traveling and moving the attachment, three to five times to warm up all devices.

NOTICE
Do not carry out high-speed operation quickly when the hydraulic oil temperature is low (below 20°C). The proper hydraulic oil temperature is 50°C to 80°C. Warm up hydraulic oil up to 20°C or so and then carry out operation, if it is necessary to start operation at low temperature.

STOPPING ENGINE

⚠ WARNING

If you touch the operation lever by mistake without locking the control lock lever, the machine may move unexpectedly, resulting in a dangerous accident.

Lower the attachment onto the ground, stop the engine and set the control lock lever to the lock position before you leave the operator's seat.

• Stopping machine

1. Park the machine on a safe, flat and rigid ground not in danger of stone dropping, landslide, etc.
2. Raise the arm and lower the bucket onto the ground with its bottom horizontal.
3. Lower the blade onto the ground.
4. Set the control lock lever to the locked position.

• Stopping engine

1. Idle the engine for five minutes or so to lower the engine temperature.
2. Set the engine key switch to the OFF (stop) position to stop the engine.
3. Pull out the key from the engine key switch.

• Inspection and locking after engine stops

1. Check each part for oil leak, water leak and damages. Carry out repair work if leak or some abnormality is found.
2. Refill the fuel tank fully.
3. Remove soil and sand from around the crawlers and bucket.
4. Lock all the lockable parts such as the fuel port, engine cover, etc.
   Lock the front and rear windows, if the machine has a cabin. Lock the door.

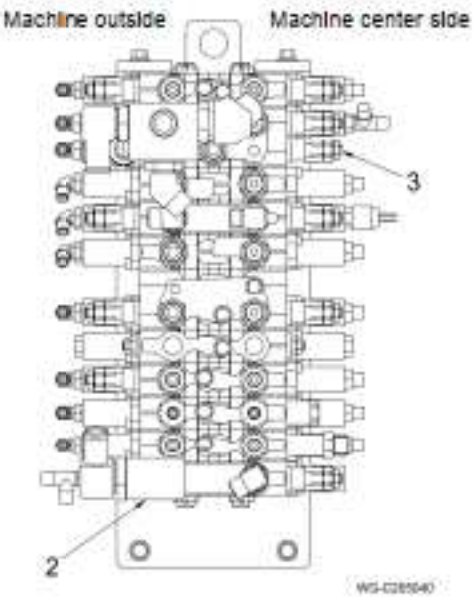
EMERGENCY ACTIONS IF ENGINE STOPS

If the machine stops due to an engine trouble in the condition where the boom is raised, the boom will not lower even though the boom operation lever is set to the low position. If the machine is left in this condition, the boom is in danger of dropping. Lower the boom by one of the methods shown below.

- **If the starting motor runs though the engine does not start**

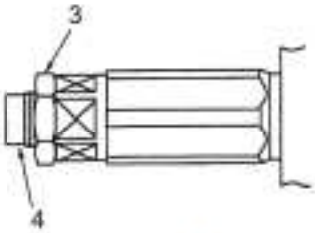
In the state in which the operation lock lever is pressed down, push down the boom operation lever and retain it in that state, and put the START switch to the START position, and lower the boom while rotating the engine by the starter motor.

NOTICE
Do not rotate the starting motor for 15 seconds or more. Wait two minutes or so and restart the motor then.



- **If the engine does not rotate at all**

1. Open the cover (1).
2. Loosen the lock nut (3) of the overload relief valve (2) for lifting the boom above the control valves (1). Loosen the adjust screw (4) gradually.
3. Stop loosening the adjust screw when the boom begins to lower. Wait until the bucket moves down to the ground.



Overload relief valve

NOTICE
Do not turn back the adjust screw. It requires special adjustment technique accompanied by pressure measurement. Ask our service office to repair the engine and adjust the screw.

(In the case of the accumulator specification – Option)

If it is within about 30 seconds, if the starter switch is put to the "ON" (ACC) position, and the boom operation lever is lowered while the operation lock lever is kept pushed down, then the boom can be lowered.

If the boom does not come down, lower the boom using the above method.

RUNNING IN NEW MACHINE

NOTICE
If a new machine is used by force, the performances may be deteriorated earlier and the service life may be shortened. Run in the machine for the initial 50 hours.

Follow the instructions below and run in the new machine.

1. Warm up the machine sufficiently.

2. Do not run the machine with heavy loads or at high speed.
   Run the machine at about 80% of the maximum engine revolution.

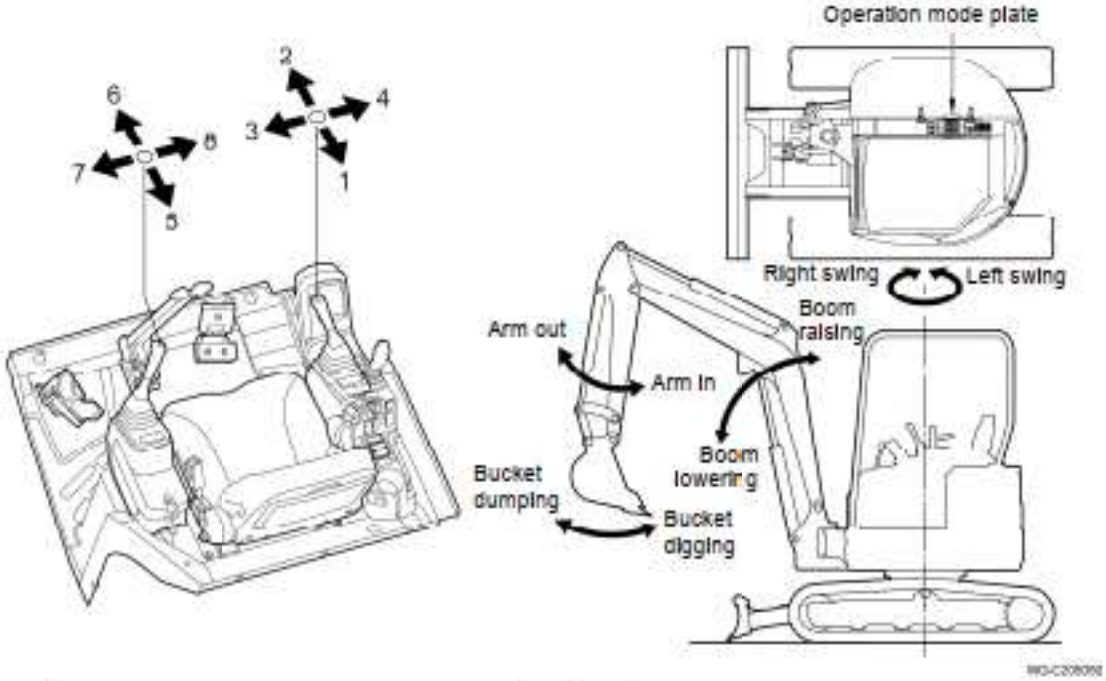
3. Do not apply the full load to the machine. The adequate load is 80% or so.
   Do not run the machine by force.
4. Do not start, accelerate or stop the machine quickly or change the direction quickly.
5. Do not apply shocks such as quick stopping of the boom when lowering it to the machine.
6. Grease the pins of the attachment everyday.

LEVER OPERATIONS

Operation Mode

Six operation patterns are available. The handling methods of the operation levers and machine movements differ with these patterns.

Check the operation mode before using the levers. The operation mode plate is stuck on the right of the operator's seat. The standard pattern at the time of shipment from the factory is the pattern A.



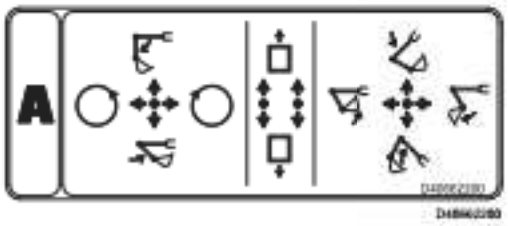
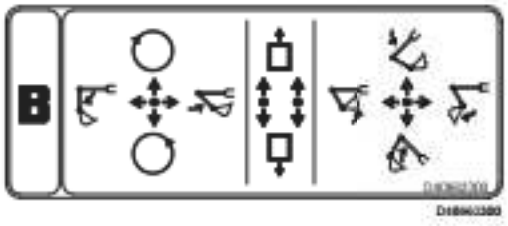
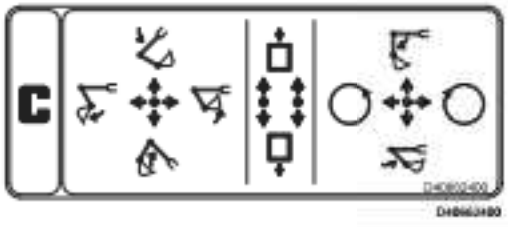
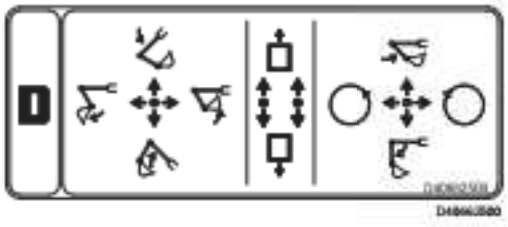
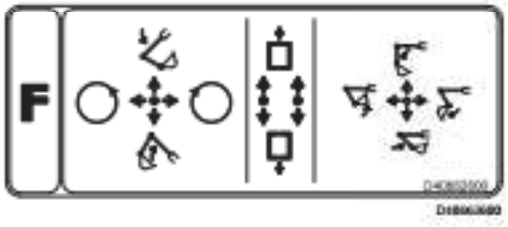
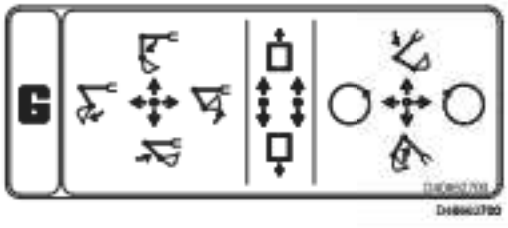
Operation direction	Operation mode					
	Pattern A	Pattern B	Pattern C	Pattern D	Pattern F	Pattern G
1	Boom raising	Boom raising	Arm in	Arm out	Arm in	Boom raising
2	Boom lowering	Boom lowering	Arm out	Arm in	Arm out	Boom lowering
3	Bucket digging	Bucket digging	Left swing	Left swing	Bucket digging	Left swing
4	Bucket dumping	Bucket dumping	Right swing	Right swing	Bucket dumping	Right swing
5	Arm in	Left swing	Boom raising	Boom raising	Boom raising	Arm in
6	Arm out	Right swing	Boom lowering	Boom lowering	Boom lowering	Arm out
7	Left swing	Arm out	Bucket dumping	Bucket dumping	Left swing	Bucket dumping
8	Right swing	Arm in	Bucket digging	Bucket digging	Right swing	Bucket digging

⚠ WARNING

Check the action of each operation lever and movement of the machine before starting work in order to prevent accidents, which may result in injury or death, due to improper operations.

Operation Mode Plate

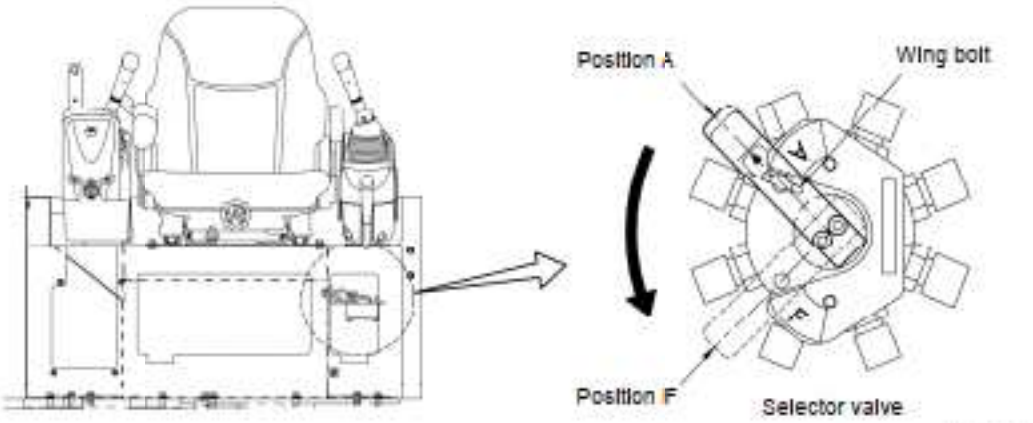
The corresponding operation mode plate shown below is stuck on the right of the operator's seat.

Operation mode	Operation mode plate
Pattern A	
Pattern B	
Pattern C	
Pattern D	
Pattern F	
Pattern G	

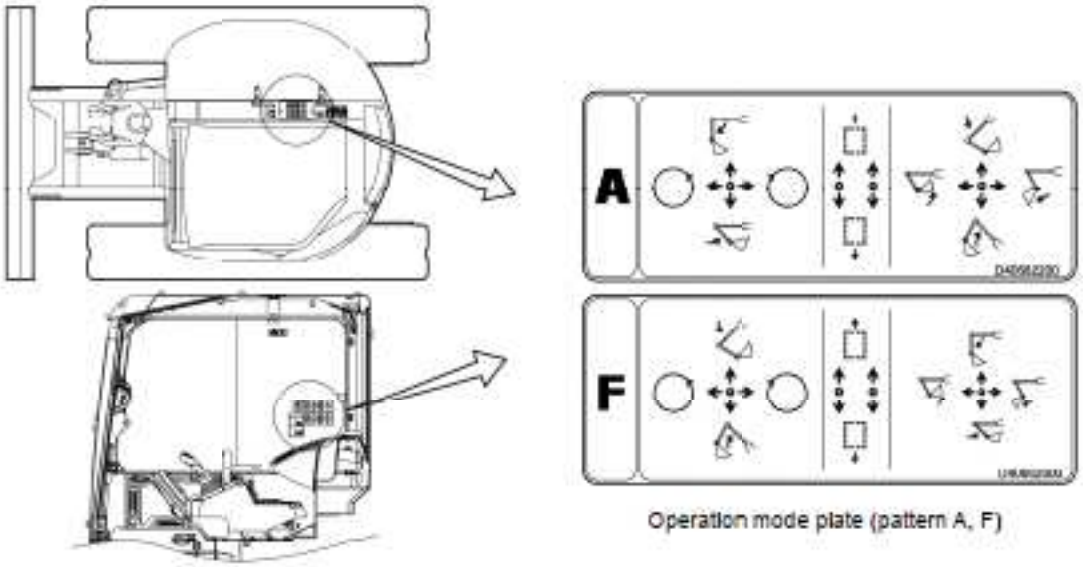
AF Multi-selection Method (for Machine with AF Multi-selector Valve)

Two operation patterns A and F can be changed with the selector valve.

Lower the attachment onto the ground and stop the engine before changing the operation mode.



1. The selector valve is inside the front left cover.
2. Loosen the wing bolt that fixes the selector valve lever. Set the lever to the intended position.
3. Fix the selector valve lever with the wing bolt after changing the operation mode.



Cabin model

Operation mode plate (pattern A, F)

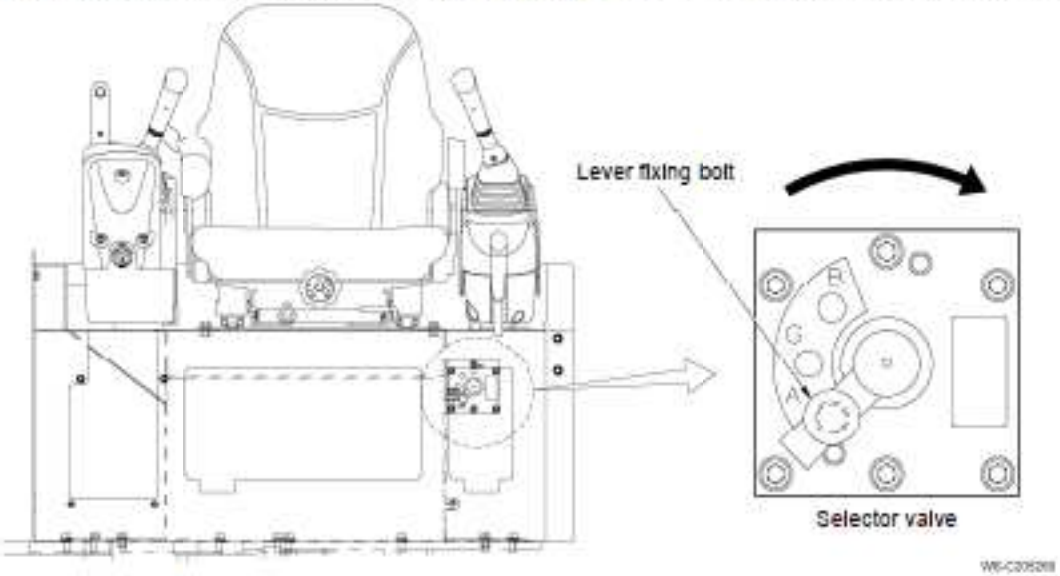
⚠ WARNING

When changing the operation mode, a serious accident may occur due to improper operations. Check the action of each operation lever and movement of the machine before starting work.

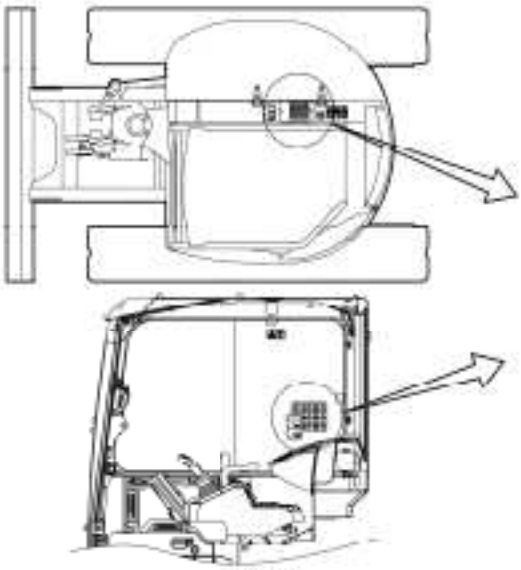
ABG Multi-selection Method (for Machine with ABG Selector Valve)

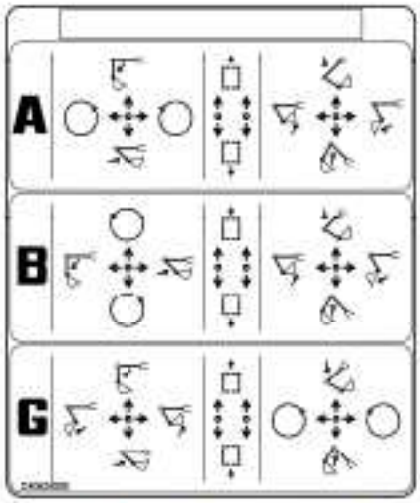
Three operation patterns A, B and G can be changed with the selector valve.

Lower the attachment onto the ground and stop the engine before changing the operation mode.



1. The selector valve is inside the front left cover.
2. Remove the bolt that fixes the selector valve lever. Set the lever to the intended position.
3. Fix the selector valve lever with the bolt after changing the operation mode.


Cabin model



Operation mode plate (patterns A, B, G)

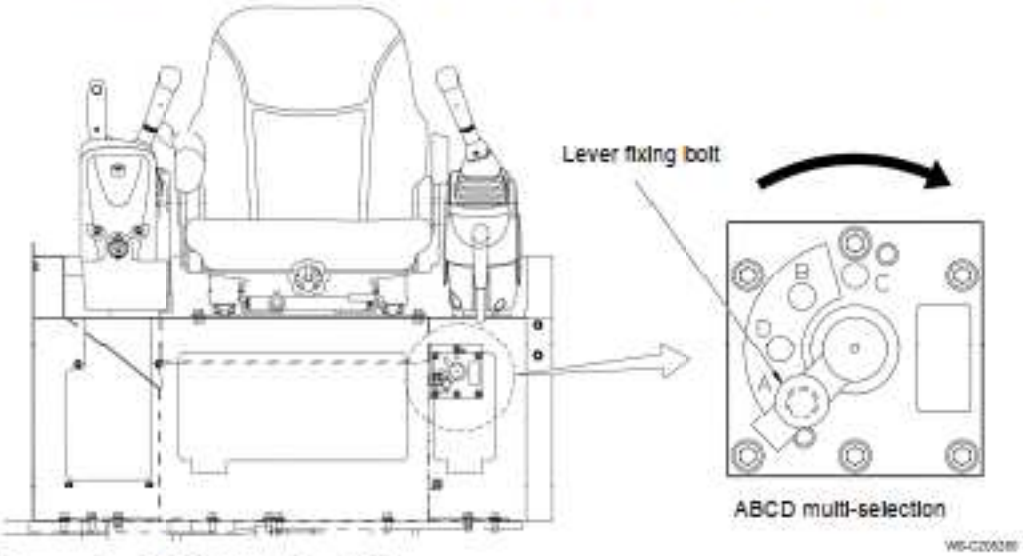
⚠ WARNING

When changing the operation mode, a serious accident may occur due to improper operations. Check the action of each operation lever and movement of the machine before starting work.

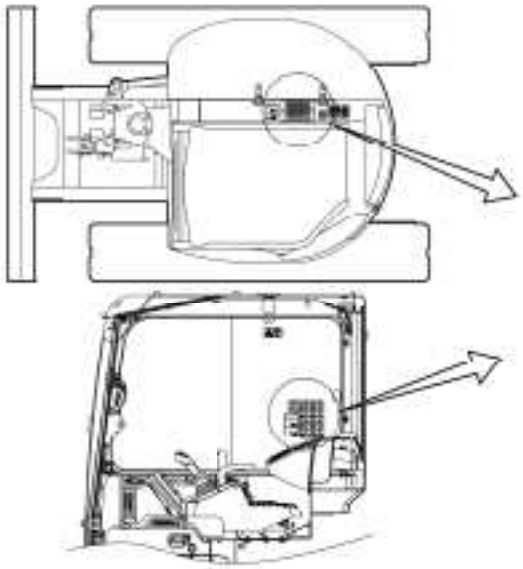
ABCD Multi-selection Method (for Machine with ABCD Selector Valve)

Four operation patterns A, B, C and D can be changed with the selector valve.

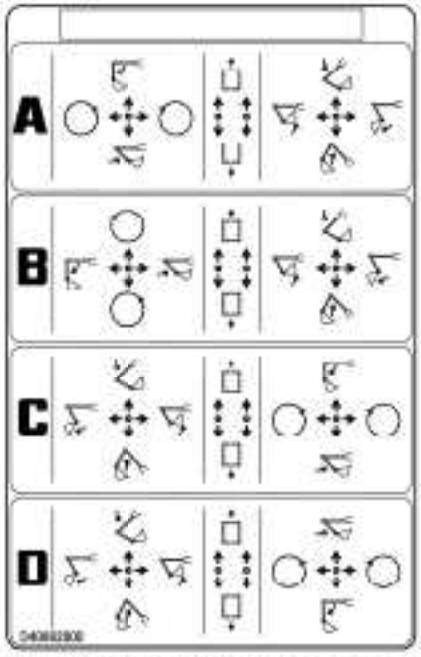
Lower the attachment onto the ground and stop the engine before changing the operation mode.



1. The selector valve is inside the front left cover.
2. Remove the bolt that fixes the selector valve lever. Set the lever to the intended position.
3. Fix the selector valve lever with the bolt after changing the operation mode.



Cabin model



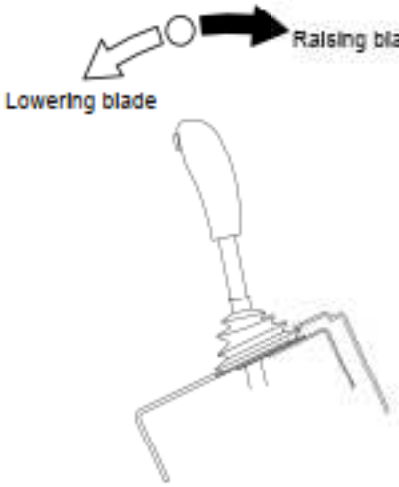
Operation mode plate (patterns A, B, C, D)

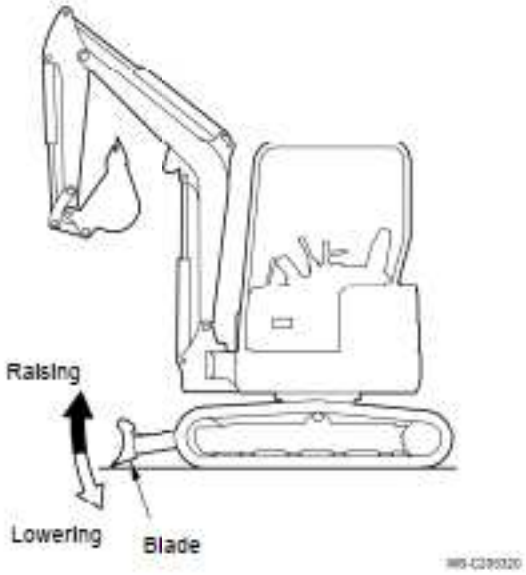
⚠ WARNING

When changing the operation mode, a serious accident may occur due to improper operations. Check the action of each operation lever and movement of the machine before starting work.

BLADE OPERATION

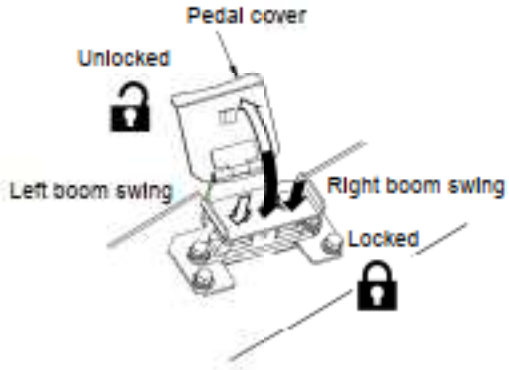
Move the blade lever forward or backward.

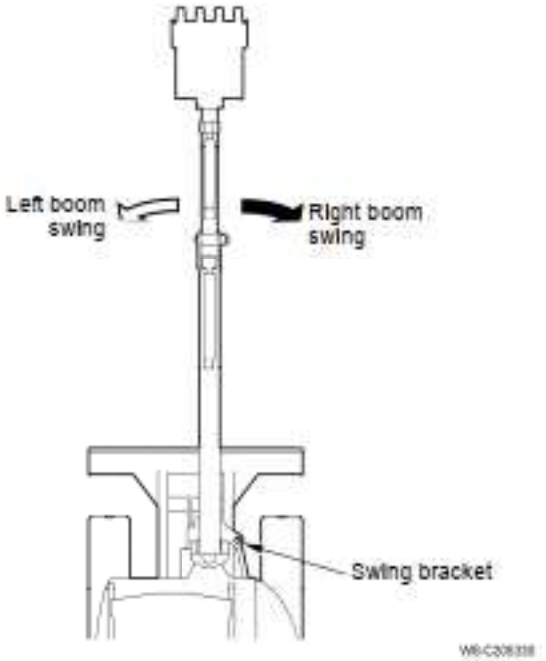




BOOM SWING OPERATION

Set the pedal cover to the unlocked position before swinging the boom. Step on the right or left side of the boom swing pedal to swing the boom.



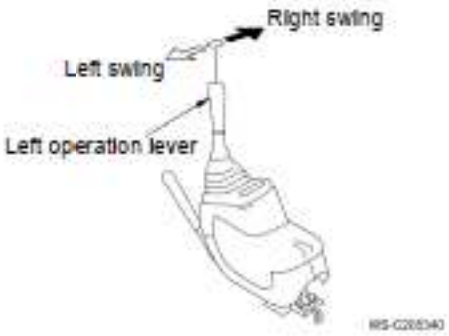


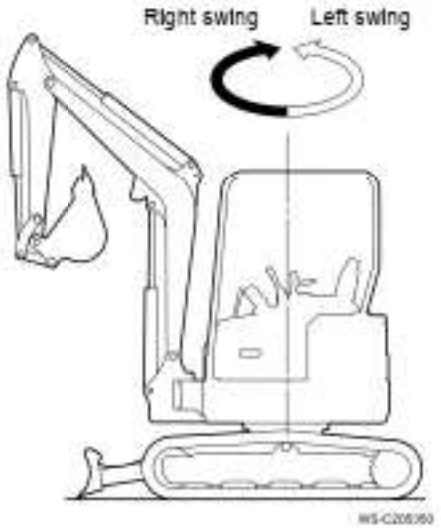
⚠ CAUTION

When boom swing is not carried out, put the pedal cover on the pedal and lock it to prevent an improper operation.

SWING OPERATION

Use the left operation lever to swing.
Turn the lever to the right to swing to the right.
Turn the lever to the left to swing to the left.
Return the lever to the neutral position to stop swinging.



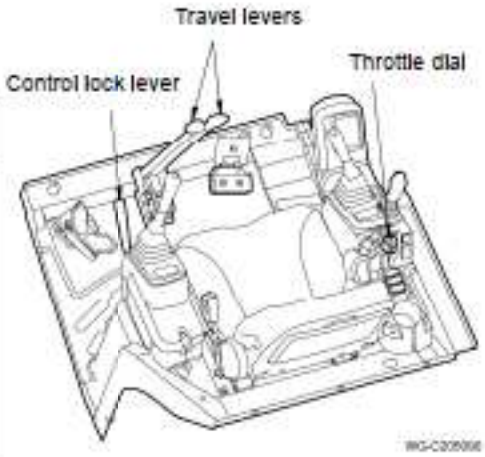


⚠ WARNING

Do not let any persons enter the swinging operation range.
Check the safety around the machine before swinging.

TRAVELING

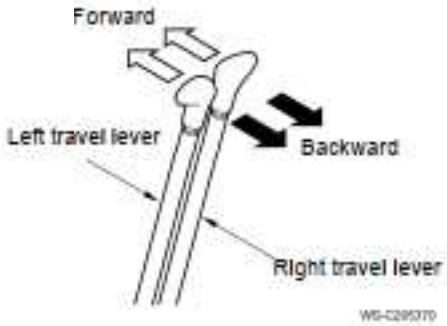
Starting, Traveling and Stopping



⚠ WARNING

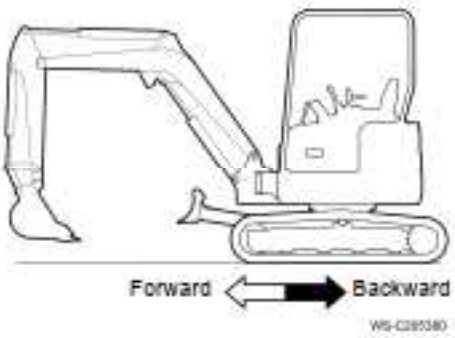
- If forward movement and backward movement are mistaken in operation with the travel lever, serious accidents may result.
- Check the blade position before traveling. If the blade is behind the machine, operations of the travel levers are reversed.
- Make sure that there are no people around the machine and turn on the horn before starting.

1. Pull the throttle dial tc raise the engine speed to the proper speed to traveling.
2. Lower the control lock lever to unlock it.
3. Raise the bucket and blade to certain height that allow smooth traveling without hitting them.
4. Operate the right and left travel levers as shown below.



• Forward

Push both travel levers forward to move the machine forward.
(The machine always moves toward the blade when the travel levers are pushed forward.)



• Backward

Pull back both travel levers to move the machine backward.
(The machine always moves toward the sprocket when the travel levers are pulled back.)
The traveling speed of the machine can be controlled by the amount of turning the travel levers.

• Stopping

Set both travel levers to the neutral positions to stop the machine. When the machine stops, the parking brake is applied automatically.

Changing Direction

Turning during traveling

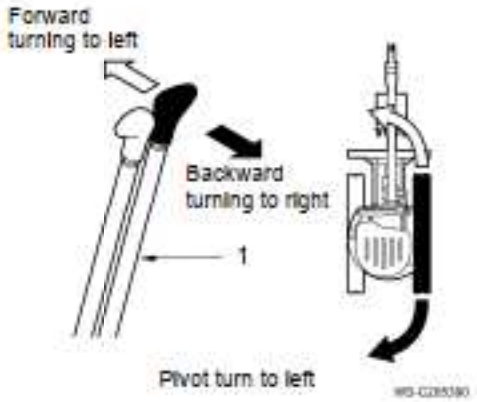
Return the travel lever toward the neutral position a little to change the direction during forward (or backward) traveling.

When the lever of the intended turning direction is returned a little, the machine turns slowly in that direction.

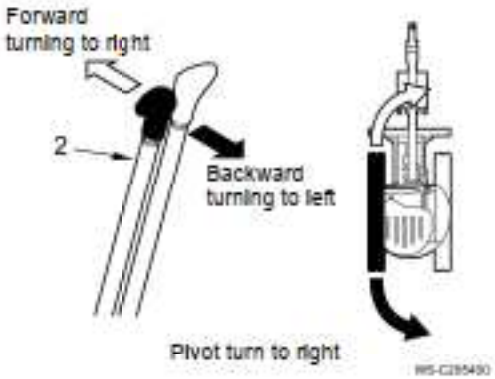
Pivot turning (when blade is in front of machine)

Drive a single crawler to change the direction.

1. Pivot turn to the left
   Push the right travel lever (1) to turn the machine forward. Pull it back to turn the machine backward.



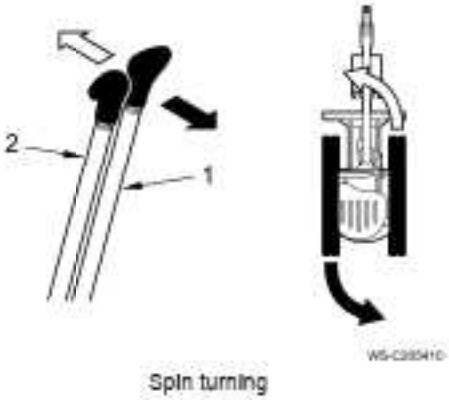
2. Pivot turn to the right
   Use the left travel lever (2) in the same way.



Spin turning (when blade is in front of machine)

Drive the right and left crawlers in the reverse directions to change the direction without traveling the machine.

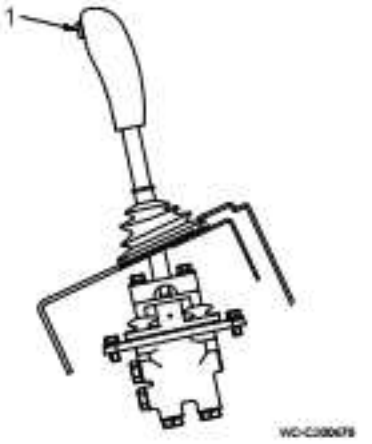
1. Spin turning to the left
   Push the right travel lever forward and pull back the left lever.
2. Spin turning to the right
   Pull back the right travel lever and push the left lever forward.



Spin turning

High Speed Traveling

Push the travel speed select switch (1) of the blade lever to change the travel speed into the high speed. Push it again to change the high speed into the low speed.

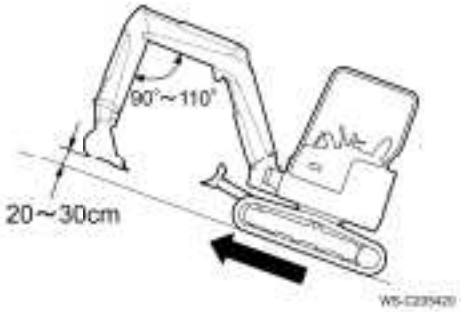


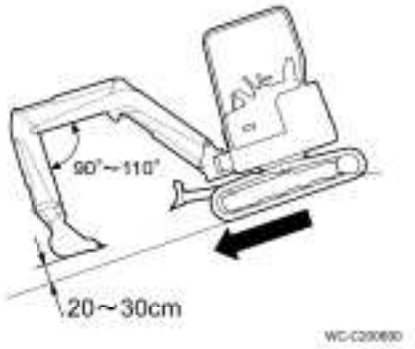
⚠ WARNING

Do not change the travel speed into the high speed while unloading from a truck or traveling down a slope. It is very dangerous if the travel speed changes during traveling.

Precautions While Traveling on Slope

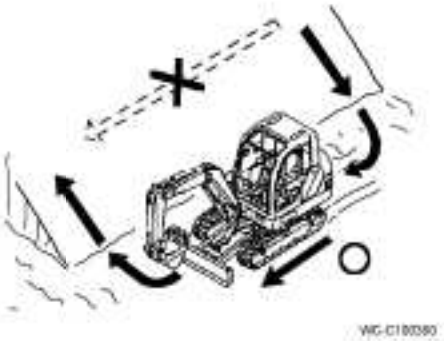
1. The gradeability of this machine is 30° (58%).
2. Travel up or down a slope at the low speed.
3. Travel up a 15° or more slope in the posture shown on the right.
4. Reduce the engine speed and operate the travel levers slowly when traveling down a 15° or more slope.
   Move down the slope in the forward traveling posture as shown on the right.
   Lower the bucket onto the ground to stabilize the machine if it becomes unstable.





⚠ WARNING

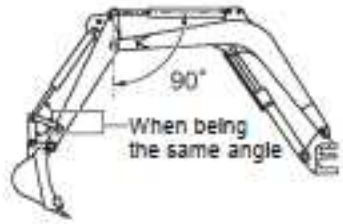
- Do not change the direction on a slope. Otherwise, the machine may slide sideways.
- When the machine moves across a slope, it may slide sideways. Move down the slope onto a flat ground, turn the machine, and travel safely.
- Do not travel on a 30° or more slope.

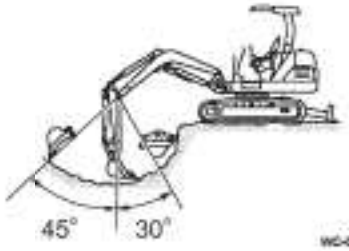


WORK INSTRUCTIONS

Digging

The digging force of the arm cylinder is maximized when the angle between the arm cylinder and arm is 90 degrees.
The digging force of the bucket cylinder is maximized when the angle between the bucket cylinder and the arm link is the same as the angle between the arm link and bucket link.
Improve the digging work efficiency, making use of these angles properly.
In digging, pull the arm to dig with the bucket.
Raise and lower the boom to adjust the depth.





Ditching

Place the machine along the ditch direction and travel it backward with the progress of ditching.

Loading

After digging, raise the boom, swing and load soil onto the dump truck.

Gutter Digging

It is possible to dig gutters in narrow spaces by swinging the boom.

PRECAUTIONS FOR WORKS

Never stop swinging by hitting

Never stop swinging by hitting or pressing the bucket against the wall of the ditch. Otherwise, strong impacts are applied to the machine and the service life is shortened.

WC-C200770

Never sweep with the bucket

Avoid sweeping the bucket like a broom in order to level off ahead of machine. This causes side strains and wear on the boom, arm, and bucket.

WC-C200780

Precautions for works at the cylinder stroke end

At the stroke end of the cylinder, the bucket moves faster. Thus, operate the bucket slowly with care not to allow soil and sand to drop.

When the cylinder is moved to the stroke end, large forces are applied to the cylinder piston and the service life is shortened. Give some margins to the cylinder in works.

WC-C200790

Hammering is prohibited

Never use the bucket instead of picks or for hammering or piling. Otherwise, excessive forces are applied to the machine, resulting in dangerous accidents.

WC-C200800

Do not overload to cylinder

Do not forcefully conduct digging operation beyond the capacity, which may overload any cylinder and open its relief valves. This causes damage to the hydraulic system and machine.

WC-C200810

Do not crawl with the bucket

Do not drag the bucket on the ground by crawling. Level the ground with proper equipments in a correct way.

Bring both sides of the blade into contact with the ground

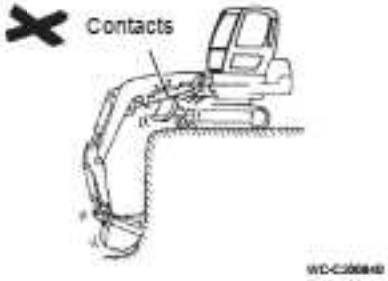
Bring both sides of the blade into firm contact with the flat ground when using the blade as a stabilizing plate in digging work.

If a single side of the blade contacts the ground, the blade may be damaged.

Pay attention to the blade when digging deep ditches

The cylinder may hit against the blade. Thus, the boom cylinder may contact with the blade when digging a deep ditch.

Be very careful in operation.



Works in damp grounds

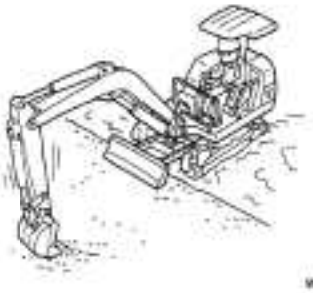
Place mats or the like to protect the footing in advance when carrying out works in damp grounds or muddy places.

Drive the machine with great care not to enter muddy places.

Escape from a muddy place

If a single side enters a muddy place, lower the bucket onto that muddy ground to lift the crawler, place logs, wood. under the crawler and escape from that place.

If both sides enter a muddy place and the machine cannot be driven, place logs or wood under crawlers one by one in the same way as shown above, bite the front ground with the bucket, pull the arm in the same way as digging to move the machine, and escape from that place.



Works in water

- The allowable water depth is up to the center of the upper roller or the top of the slide pad.
  Check the water depth and ground before working in water or traveling the machine across the river. Do not go into water deeper than the allowable water depth.
  The machine may sink little by little if the ground is soft. Pay great attention to the footing in work.
  If the bucket is dipped in water for long, grease the pins around the bucket sufficiently until used grease oozes out.
- The engine may get wet with water and the radiator fan may be broken if the machine climbs a steep slope when going out of water. Be very careful.

Countermeasures if the machine is buried up to the super structure

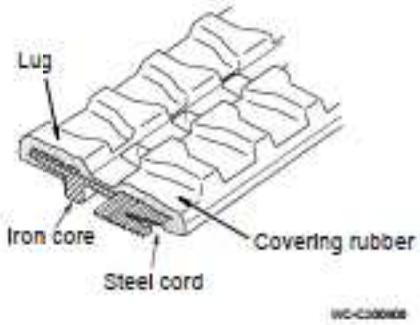
If the machine is buried with water, soil or sand up to the super structure by mistake the swing bearing may wear abnormally. It is necessary to change grease in the turning structure or overhaul and repair the turning structure immediately. Stop operation and ask greasing, overhaul or repair works from the nearest service office.

PRECAUTION ON USE OF RUBBER TRACK

The rubber track may be damaged or worn faster depending on working conditions. Be sure to observe the prohibitions and instructions shown below.

Structure of Rubber Track

As shown in the figure to the right, the rubber track consists of steel cord to sustain tension, iron core to support it, and covering rubber to them.

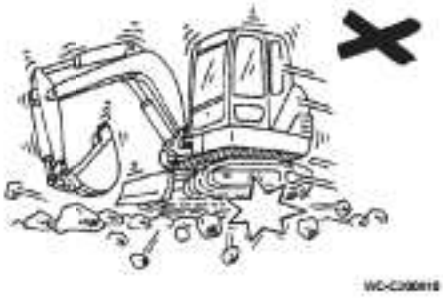


NOTICE
If a crack reaches the steel cord, it may be rusted and cut off by moisture. When any crack is detected, immediate repair is essential. Please contact your local IHI distributor.

Cautions while working and traveling

Do not travel or work on rocky site

This causes damage of the lug and breakage of the steel cord.



Do not travel or work on riverbed

This causes damage and slipping off of the track.

Do not travel or work on steel or scrap material

This causes damage of the lug and breakage of the steel cord.

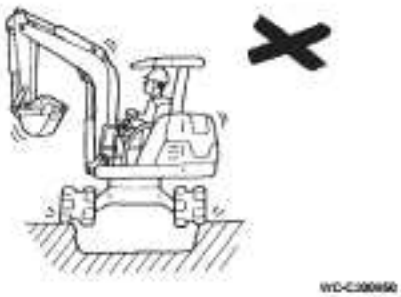
Do not travel on large step

While traveling up the large step, do not change the course.

Otherwise, the tracks may be slipped off.

Do not travel or work while spanning a ditch

This causes damage of the lug and breakage of the steel cord.



Do not forcibly press soil while rubber tracks are slipping

Slipping of the rubber tracks promotes wear of the lugs.

Do not travel over high heat locations

Do not travel over place subjected to high heat such as bonfires or steel plate under scorching heat.

This causes serious abrasion or damage and breakage of the lug.

Do not hit the bucket

Be careful not to damage the rubber tracks with the bucket.

Otherwise, the iron cores may be broken or the steel cords may be cut off.

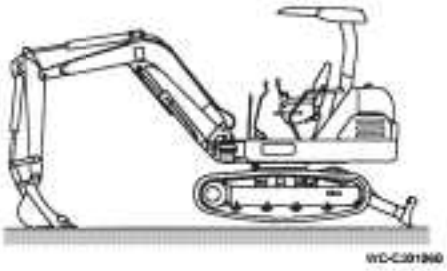
Do not let oil, solvents and salt adhere to the rubber tracks

- If fuel, hydraulic oil and paint should adhere to the rubber tracks, wipe it away quickly.
- Wash away with water after working in locations with a large salt content. Salt can cause the iron core to rust or peel.

Always keep proper tension on the track

If the rubber track is slack, it may damage the rubber track or cause them to come off the rollers.

This causes damage and slipping off of the track.

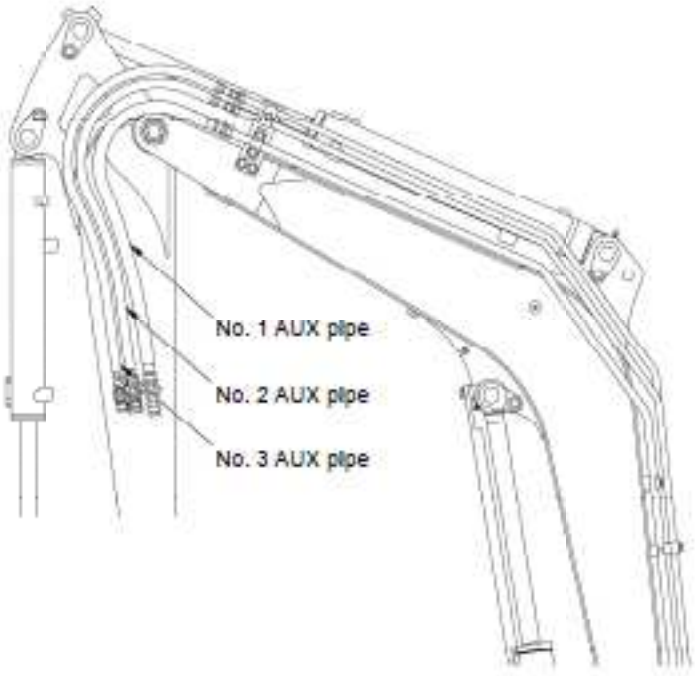


AUX WHEN USING SPECIAL ATTACHMENT

It is possible to provide the machine with three spare pipe systems as the AUX hydraulic power for the special attachment.

NOTICE

- Select the proper special attachments such as hydraulic breakers, iron forks, special hydraulic devices and so forth that fit the capability of this machine.
- Some special attachments require reinforcement of the arm. Inquire our dealer about reinforcement.
- Be sure to read the manuals issued by the manufacturers and have good understanding before using special attachments.
- When a special attachment is attached to the machine, the stability, transport dimensions, etc. of the machine may change. Be careful.

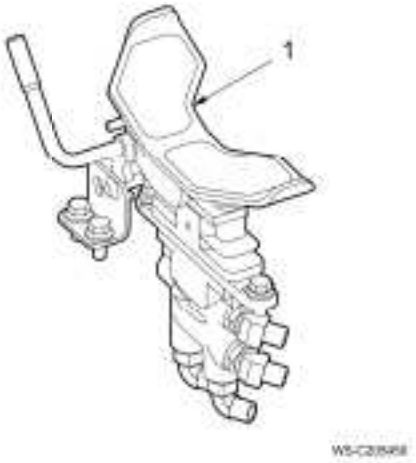


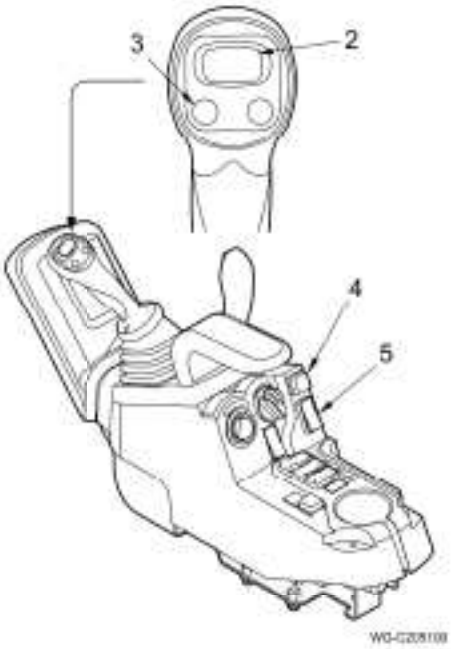
No. 1 AUX

Names of Switches and Applicable Works

Operating lever Specifications	No.	Name	Work	
			Breaker	Iron fork
S Grip	1	No. 1 AUX. pedal	O	O
E Grip (Option)	2	No. 1 AUX. proportional lever	O	O
	3	No. 1 AUX. button	O	O
	4	No. 1 AUX. flow limit switch	O	-
	5	No. 1 AUX. hold switch	-	O

Be sure to set the hold switch and slow mode switch to the OFF positions when they are not used.

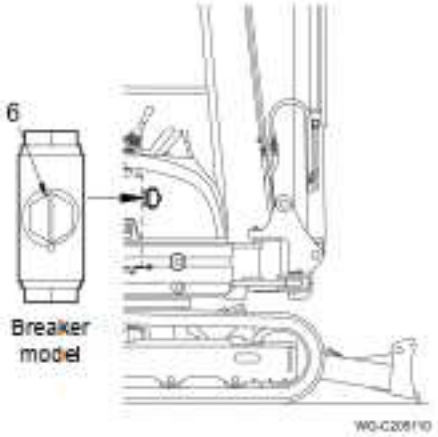




When Using Breaker

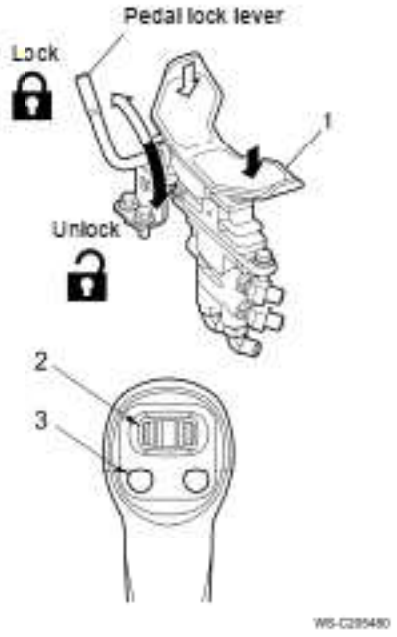
• S Grip specification (standard)

1. Connect the supply side hose to the pipe on the left side of the arm and the return side hose to the pipe on the right side.
2. Set the selection valve so that the mark (6) is vertical.
3. Put the pedal lock lever to the free position.
4. Press on the front side of the No. 1 AUX. pedal (1) thereby activating the breaker.
5. The breaker stops when the foot is removed.
6. If the pedal lock lever is put in the locked position while pressing the spare pedal towards the front, the hydraulic pressure is supplied continuously.



• E Grip specification (option)

1. Connect the supply side hose to the pipe on the left side of the arm and the return side hose to the pipe on the right side.
2. Set the selection valve so that the mark (6) is vertical.
3. Press the No. 1 AUX. button (3) and operate the breaker.
   It is also possible to operate the breaker by sliding the No. 1 AUX. proportional lever (2) to the left.
4. The breaker stops when the hand is released.
5. The No. 1 AUX. flow limit switch (4) is used when supplying the hydraulic pressure continuously.
   ON (Lamp lit up): Continuous operation becomes possible, if the No. 1 AUX one-touch button is pressed once, it is possible to continue to supply compressed oil to the left side spare piping.
   OFF (lamp is off): Released.



NOTICE
Be sure to set the mark on the selector valve as described above. If it is set improperly, the machine and/or breaker may be damaged.

When Using Iron Fork

• S Grip specification

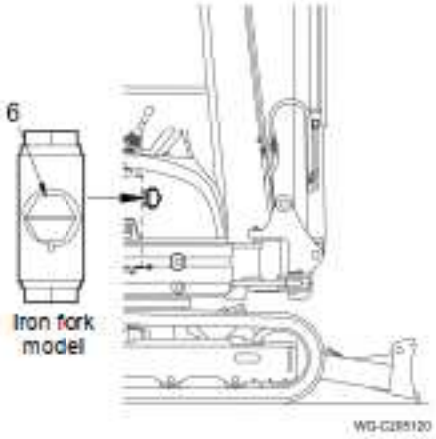
1. Connect the hoses to the left and right piping of the arm.
2. Set the mark (6) of the selection valve to the horizontal position.
3. Step on the front and back of the spare pedal (1) and operate the dismantling fork.

   When stepped on the front side:

   Compressed oil is fed to the arm left side piping.

   When stepped on the rear side:

   Compressed oil is fed to the arm right side piping.



• E Grip (Option)

1. Connect the hoses to the left and right pipes of the arm.
2. Set the mark (6) of the selection valve to the horizontal position.
3. Operate the dismantling fork by sliding to the left or right the No. 1 AUX. proportional lever (2).

   Sliding to the left:

   Compressed oil is supplied to the arm left side pipe.

   Sliding to the right:

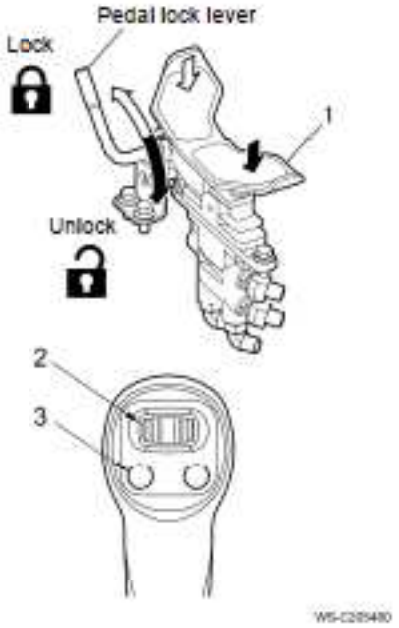
   Compressed oil is supplied to the arm right side pipe.

   The flow rate changes according to the amount of sliding.

   It is also possible to operate the dismantling fork by pressing the No. 1 AUX. button (3).

4. When making fine operations

   After pressing the "ON" side of the No. 1 AUX. hold switch (5), operate the No. 1 AUX proportional lever. The lever returns to the original position when the "OFF" side is pressed.

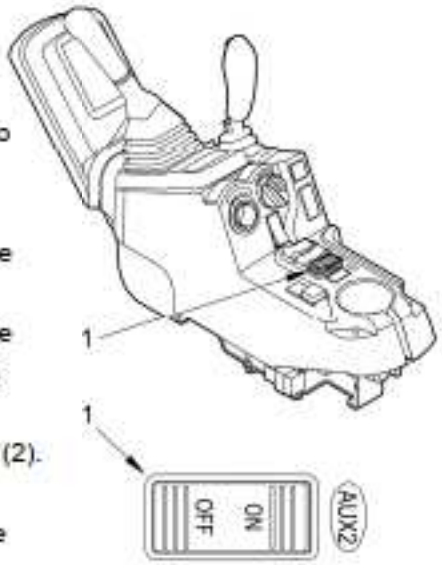


NOTICE
Be sure to set the mark on the selector valve as described above. If it is set improperly, pressurized oil is not supplied to the pipe on the right of the arm.

No. 2 AUX

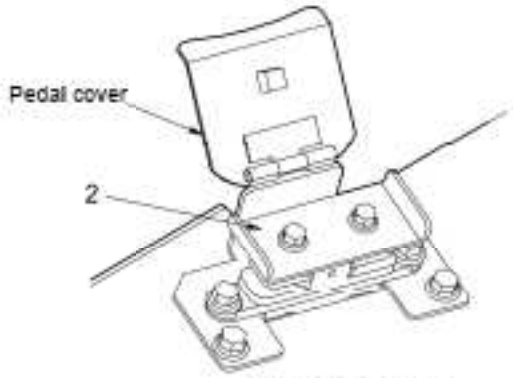
Use the No. 2 AUX select switch (1) to change oil flowing toward the boom swing cylinder to the No. 2 AUX pipe, which is a spare pipe of the double-action circuit operated with the boom swing pedal (2).

1. Connect the special attachment hose to the No. 2 AUX pipes on the right and left of the arm.
2. Push the ON position of the No. 2 AUX select switch (1) to change the circuit into the No. 2 AUX pipe.
   2nd PTO select switch
   - Pushing the ON position: The circuit is changed into the No. 2 AUX pipe.
   - Pushing the OFF position: The circuit is changed into the boom swing cylinder. This is the normal position.
3. Open the pedal cover and operate the boom swing pedal (2).
   Pedal operations
   - Stepping on the left side: Pressure oil is supplied to the AUX pipe on the left of the arm.
   - Stepping on the right side: Pressure oil is supplied to the AUX pipe on the right of the arm.



No. 2 AUX select switch

WG-C206138



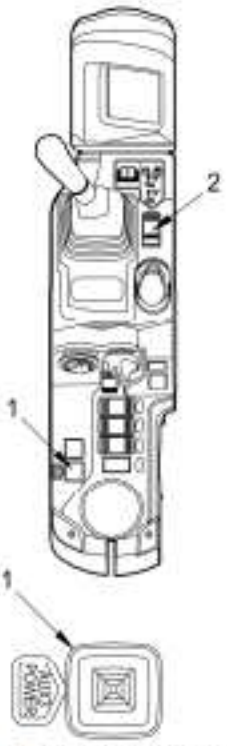
Boom swing pedal

WG-C206820

No. 3 AUX

Use the No. 3 AUX hydraulic power for the detachable quick hitching device such as a bucket.

1. Connect the bucket releasing hose of the quick hitching device to the No. 3 AUX pipe on the right of the arm.
   Connect the bucket grasping hose of the quick hitching device to the No. 3 AUX pipe on the left of the arm.
2. Turn on the No. 3 AUX power switch (1).
   No. 3 AUX power switch
   ON: Once the switch is pushed, it is depressed, the switch lamp goes on, and the buzzer sounds. Operation is possible in this case.
   OFF: When the switch is pushed again, it is pushed back, the switch lamp goes out, and the buzzer stops. Operation is not possible in this case.
3. Operate the quick hitching device with the No. 3 AUX operation switch (2).
   No. 3 AUX operation switch
   Pushing the FREE position: Pressure oil is supplied to the pipe on the right of the arm and the quick hitching device releases the bucket.
   Pushing the LOCK position: Pressure oil is supplied to the pipe on the left of the arm and the quick hitching device grasps the bucket.
4. Be sure to set the No. 3 AUX operation switch to the LOCK position after operating the quick hitching device, now matter how the bucket is released or grasped.
5. Turn off the No. 3 AUX power switch (1). The switch lamp goes out and the buzzer stops.



No. 3 AUX power switch

No. 3 AUX operation switch

⚠ WARNING

- Do not touch the No. 3 AUX power switch or No. 3 AUX operation switch if the quick hitching device is not used. If you touch the switch by mistake, the quick hitching device may move during work and release the bucket.
- Keep the No. 3 AUX operation switch at the LOCK position all the time when the quick hitching device is not used.
- If No. 3 AUX power switch is turned on by mistake and the buzzer sounds, turn it off immediately.
- Read thoroughly the instruction manual of quick hitch.

TOWING

⚠ CAUTION

- It is very dangerous if the wire rope is disentangled during towing. Do not stand between the towing machine and the towed machine.
- Use wire ropes and shackles for towing that are strong enough for the towing weight.
- The machine is provided with a pulling hook at the back of the lower frame to pull light objects. Never pull the machine itself or other heavy objects using this pulling hook.

Towing the machine or heavy objects

Apply a wire rope to the rear frame and pull the machine by another machine if it enters a muddy place and cannot escape from it by itself.
Never use the pulling hook for light objects to pull the machine itself.

1. Start the engine.
2. Select the low speed mode with the travel speed select switch.
3. Move the travel lever in the travel direction slowly when towing starts.

NOTICE

Put a patch at the corner in contact with the wire rope to prevent the wire rope from being damaged.

NOTICE

When the engine is defective and does not start, the crawler tracks do not rotate and pulling is disabled.

Pulling light objects

Apply a wire rope to the pulling hook at the back of the lower frame using a shackle.

NOTICE

- The maximum pulling load should be 500 kg or less.
- Do not pull diagonally.

TRANSPORT

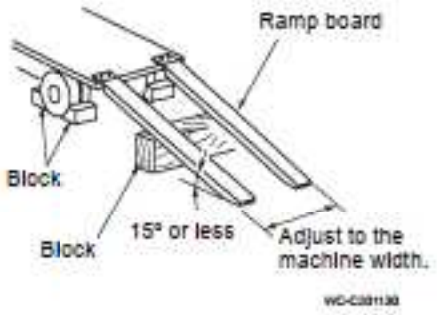
Observe the loading and unloading methods and the anchoring method for transportation as well as the laws and regulations concerned when transporting the machine.

Loading and Unloading the Machine

⚠ WARNING

- Carry out operation on a flat and firm ground.
- Set the travel speed select switch to the low speed mode and load or unloading the machine at low engine speed.
- Be sure to use ramp boards or loading platform for loading and unloading. Never use the attachment to load or unload the machine. It is very dangerous.
- Use wide, long and thick enough ramp board that ensures safe loading and unloading.
- Remove mud from the crawlers and grease, oil, water and other adhered matters from the ramp boards to prevent slipping.
- Never change the direction on the ramp boards. It is very dangerous. Move down from the ramp boards once and change the direction.
- The center of gravity moves quickly at the border of the truck and the ramp boards. Travel the machine slowly.
- Warm up the machine sufficiently before loading or unloading it in cold seasons.

1. Apply the brake of the truck securely. Apply blocks to the tires to fix the tires.
2. Adjust the center line of the machine to the center line of the truck. Adjust the ramps boards to the crawler width.
3. The angle of the ramp boards should be 15° or less.
4. Load the machine from the front if it has an attachment. Load it from the rear if no attachment is mounted.
5. Adjust the machine to the ramp board direction, raise the blade and travel the machine slowly with care not to hit the attachment against the truck.
6. Load the machine properly in the designated position on the truck.



Fixation at Transport

⚠ WARNING

If the machine falls down during transportation, it can cause personal injury or death.
Fix the machine firmly on the platform of the truck with wheel blocks and wire ropes.

1. Lower the blade onto the platform of the truck.
2. Fold the arm and bucket fully. Lower the attachment onto a wooden block, etc.
3. Stop the engine and pull out the key from the engine key switch.
4. Apply stopper blocks to the front and rear positions of the crawlers.
5. Apply wires to the crawler frame and bucket and fasten them to the platform of the truck.

NOTICE

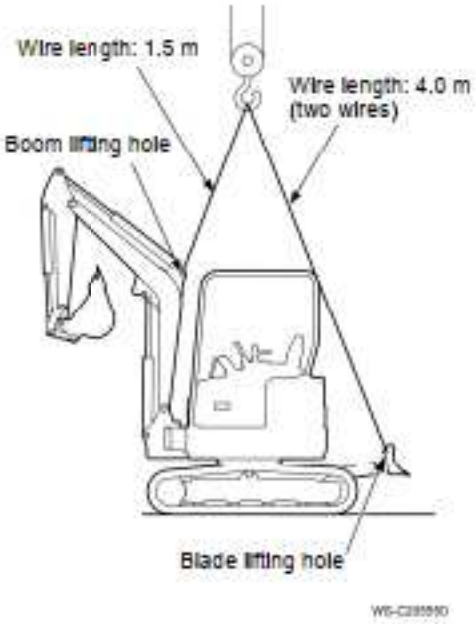
If wire ropes are applied to the rubber tracks directly when fixing the machine, the rubber tracks may be damaged. Put patches on the front and rear positions of the crawler frame and fix with the wire ropes.

LIFTING THE MACHINE

⚠ CAUTION

- Always lift the machine on a flat and firm ground.
- Never lift the machine loaded with any personnel.
- Make sure the lifting cables and other lifting devices are strong enough to support the machine.
- Do not perform crane operation including slinging work unless you are not qualified.

1. Set the blade at the rear position.
2. Raise the blade to the highest position.
3. Raise the boom to the highest position and fold the arm and bucket fully.
4. Make the boom straight if it has swung to the right or left.
5. Fasten wire ropes to the lifting holes at the back of the boom using the shackle.
6. Stop the engine and get off the machine.
7. Fasten the wire ropes to the lifting holes at both ends of the blade using shackles.
8. Apply the wire ropes from the boom and blade to the hook of the crane. Apply patches to the positions where the wires contact with the machine when tensioning the wires.
9. Lift the machine slowly until it is lifted slightly apart from the ground, stop lifting once, check the machine balance, and lift the machine to the intended height.



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MAINTENANCE

Proper maintenance is needed to maintain the machine performances for long and prevent damages and troubles in advance.
This section describes the proper maintenance procedures of this machine. Carry out maintenance safely and properly in accordance with the instructions described below.

PERIODIC REPLACEMENT OF THE IMPORTANT PARTS

Replace the following parts, which are related to the safety and a fire, periodically.
These parts are subject to aged deterioration and wear, and it is hard to judge the service life by means of appearance inspection. Replace them periodically even though they have no apparent defects, in particular.

Type	Parts to be replaced periodically	Qty	Replacement interval
Fuel hose	Fuel tank - Water separator	1	Every 2 years
	Water separator - Fuel pump	1	
	Fuel pump - Fuel filter	1	
	Fuel filter - Engine	1	
	Engine - Fuel cooler	2	
	Fuel cooler - Fuel tank	1	
Coolant hose	Radiator hose (upper)	1	Every 2 years
	Radiator hose (lower)	1	
	Radiator - Sub tank	1	
Hydraulic hose	Hydraulic pump - Control valve	6	Every 2 years
	C/V - Boom cylinder	4	
	C/V - Arm cylinder	4	
	C/V - Bucket cylinder	4	
	C/V - Boom swing cylinder	2	
	C/V - Blade cylinder	6	
	C/V - Swing motor	3	
	C/V - Travel motor	8	

Repair or replace these parts immediately if some abnormalities or defects are found in them even before the replacement interval.
Also check the fuel hoses, cooling water hoses and hydraulic hoses in daily check, monthly check and yearly check.

MAINTENANCE INTERVALS

Periodic maintenance is most important to operate the machine safely and demonstrate its performances fully.

Take special care when using the machine under severe condition.

Δ: Check. O: Replace.

	Maintenance point	Maintenance work	Maintenance interval								
			Daily	50h	100h	250h	500h	1000h	1500h	2000h	Irregular
Greasing	Attachment	Grease		Δ							
	Boom swing			Δ							
	Blade			Δ							
	Swing bearing			Δ							
	Ring gear						Δ				
Bucket	Bucket tooth	Check wear		Δ							O
	Bucket	Check damage		Δ							O
	Clearance	Adjust		Δ							
Crawler	Rubber track	Check wear & deterioration	Δ								O
	Track tension	Check and adjust									Δ
Reduction gear	Travel reduction gear	Check oil leak	Δ								
		Check oil qty & refill					Δ				
		Change oil		O First time				O			

	Maintenance point	Maintenance work	Maintenance interval								
			Daily	50h	100h	250h	500h	1000h	1500h	2000h	Irregular
Hydraulic system	Hydraulic oil tank	Check oil qty & refill	Δ								
		Drain water		Δ							
		Change hydraulic oil Clean the tank						O (Breaker specification 600h)			
	Suction strainer	Clean						Δ			
	Return filter	Replace cartridge		O First time			O (Breaker specification 100h)				
	Air breather	Element replacement						O			
	Hydraulic devices	Check oil leak	Δ								
	Hydraulic equipment	Check oil leak	Δ								
Lubrication system	Engine oil	Check oil qty & refill	Δ								
		Change		O First time		O					
	Oil filter	Replace		O First time		O					
Fuel system	Fuel tank	Check oil qty & refill	Δ								
	Water separator	Check & drain water	Δ								
		Clean Replace element					Δ				O
	Fuel filter	Replace					O				

	Maintenance point	Maintenance work	Maintenance interval								
			Daily	50h	100h	250h	500h	1000h	1500h	2000h	Irregular
Cooling system	Sub tank	Check coolant qty & refill	Δ								
	Radiator	Clean						Δ			
		Change coolant						O or 1 year			
	Radiator fins Oil cooler fins	Check & clean				Δ					
	Fan belt	Check tension & adjust		Δ First time	Δ						
		Check cracks		Δ First time	Δ						O
Intake system	Air cleaner	Check dust indicator	Δ								
		Check element & clean		Δ First time	Δ						
		Replace element					O				
Hoses	Fuel hose Radiator hose Hydraulic hose	Leak inspection, replacement	Δ							O or 2 years	
Engine	Intake valve & exhaust valve head	Adjust clearance	● At every 800 hours								
	Fuel injection system	Check, clean & check functioning	● At every 3000 hours								

●: Contact our dealer.

	Maintenance point	Maintenance work	Maintenance interval								
			Daily	50h	100h	250h	500h	1000h	1500h	2000h	Irregular
Electric system	Fuse	Replace									O
	Fusible link	Replace									O
	Battery	Check battery liquid qty & refill		Δ							
		Clean terminals					Δ				
Bolt tightening		Retightening		Δ First time							Δ

RECOMMENDED LUBRICATION TABLE

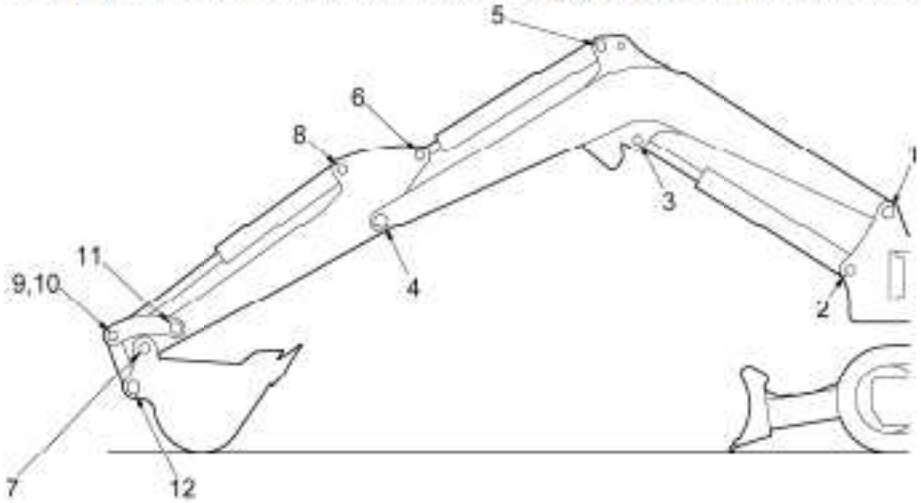
Lubrication points	Oil type	Grade	Temp. & application (°C) -30 -20 -10 0 10 20 30 40	Qty required
Engine oil pan	Engine oil	API-CF	* SAE10W-30 * SAE15W-40	H: 9.7 L L: 6.7 L
Hydraulic oil tank	Hydraulic oil	Abrasion-resistant	* ISO-VG46 ISO-VG32	System: 75 L Tank level: 56 L
Travel reduction gear	Gear oil	API-GL-4	* SAE90	0.9 L
Fuel tank	Diesel fuel	–		66 L
Cooling system	Coolant	–	Long-life coolant (LLC) added	Total qty: 10.1 L
Greasing	Grease	–	Lithium grease EP2	Proper qty

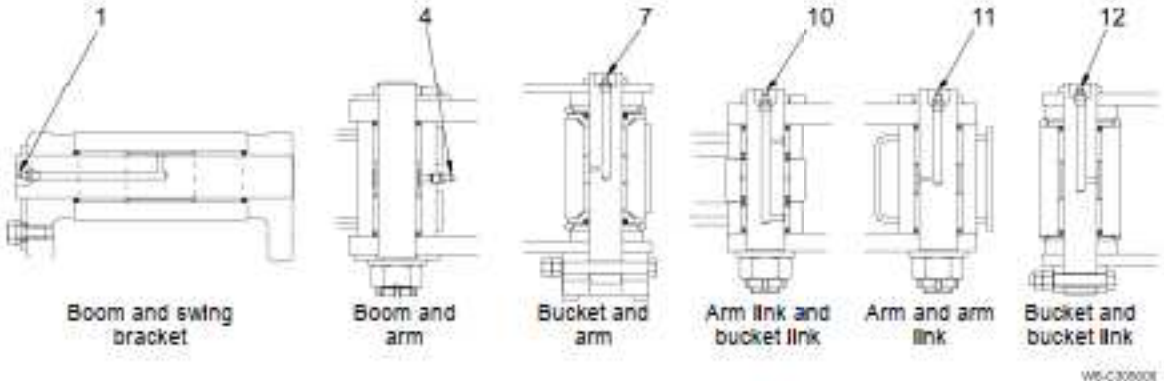
• The oil with the * marks is used for the machine before shipment.

LUBRICATE THE GREASE

Attachment

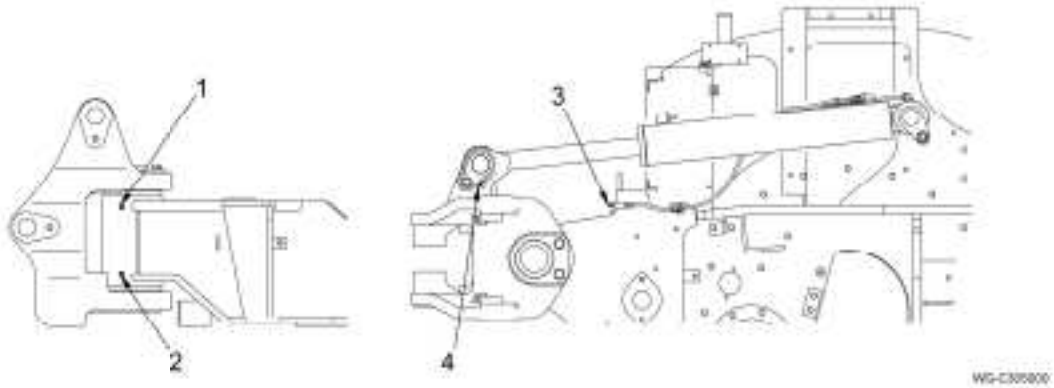
1. Lower the attachment in the greasing posture onto the ground and stop the engine.
2. Fill grease using a grease gun through all grease nipples.
3. Wipe off old grease that oozes out of the grease nipples completely after greasing.





No.	Name	Qty
1	Boom foot pin	1
2	Boom cylinder foot pin	1
3	Boom cylinder rod pin	1
4	Arm foot pin	1
5	Arm cylinder foot pin	1
6	Arm cylinder rod pin	1
7	Bucket pin	1
8	Bucket cylinder foot pin	1
9	Bucket cylinder rod pin	1
10	Arm link and bucket link pin	1
11	Arm link pin	1
12	Bucket link pin	1

Boom Swing



No.	Name	Qty
1	Boom swing vertical shaft (upper)	1
2	Boom swing vertical shaft (lower)	1
3	Swing cylinder foot pin	1
4	Swing cylinder rod pin	1

Blade

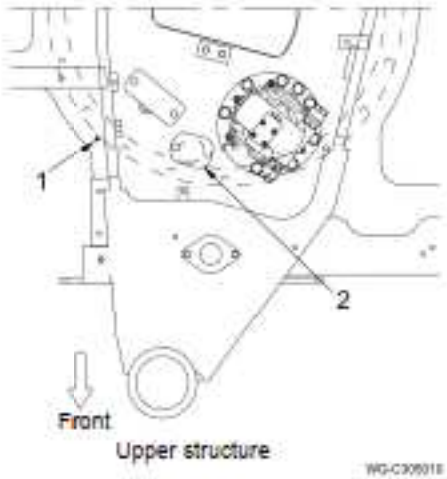
No.	Name	Qty
1	Blade foot pin	2
2	Blade cylinder rod pin	1
3	Blade cylinder foot pin	1

NOTICE

- Carry out greasing, regardless of the greasing interval, if abnormal noises are generated from a greasing point.
- Be sure to grease the pins around the bucket before starting in-water digging.

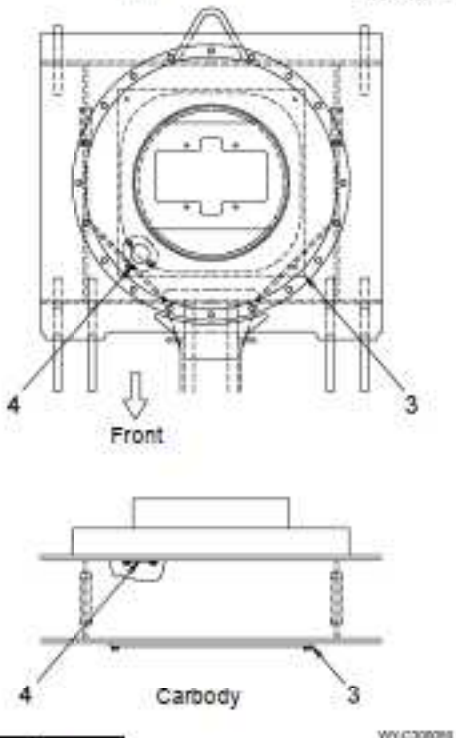
Swing Bearing

1. Lower the bucket onto the ground and stop the engine.
2. Fill three to five strokes of grease using a grease gun into the grease nipple (1).
3. Fill grease every time the upper structure is swung by approximately 90 degrees until it swings by 360 degrees.



Ring Gear

1. Lower the bucket onto the ground and stop the engine.
2. Remove the greasing cover (2) from the upper structure.
   Make sure that grease is sufficiently provided for the swing gear.
   If grease on the gear surface is insufficient, add grease (approximately 0.5 kg).
3. Change old grease with fresh grease completely if water or mud is mixed in grease and grease looks cloudy.
   Remove the cover (3) of the carbody and the discharge port cover (4) and discharge old grease when changing it.
4. Attach the discharge port cover and fill fresh grease through the greasing cover. (Total grease qty: 11 kg)
5. Swing two or three times, make sure that grease is spread over the ring gear, and attach the cover of the carbody and greasing cover.



No.	Name	Qty
1	Swing bearing	1
2	Ring gear	1

⚠ WARNING

If you carry out greasing while the machine is swinging, you may be caught by it. Do not swing the machine when greasing.

NOTICE

If greasing is carried out in the same position, grease is not spread all over the swing bearing. Be sure to swing the machine by approximately 90 degrees and grease the bearing at different points.

MAINTENANCE OF BUCKET

Replace the Tooth

⚠ CAUTION

- It is dangerous if the bucket moves when replacing the bucket tooth.
  Fix the bucket firmly, stop the engine, and set the gate lock lever to the lock position.
- Fragment may scatter, resulting in injury. Put on protective goggles, protective cap and protective gloves.

NOTICE

- Replace the tooth when the wear hole appears.
- Replace the tooth before it wears up to the adapter.

1. Remove the lock pin.
   Remove the tooth.

2. Clean the adapter.

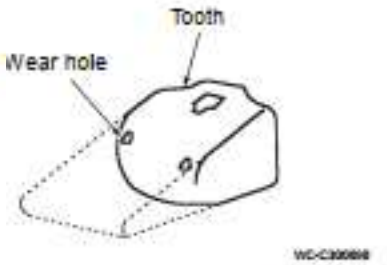
It is recommended that the rubber lock pin should be replaced every time the tooth is replaced.

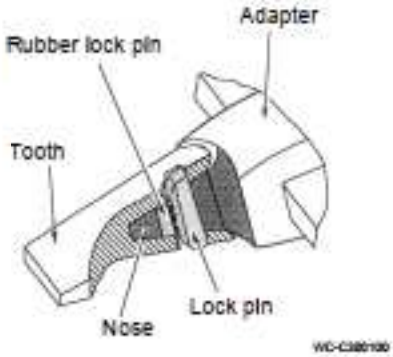
4. Attach the rubber lock pin to the nose.

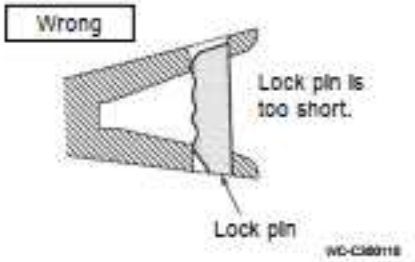
5. Insert the tooth into the nose.

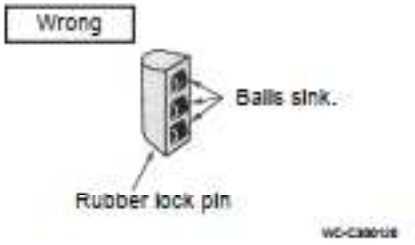
6. Drive the lock pin until it becomes flush with the tooth surface with a hammer.
   If the lock pin is not driven sufficiently, the tooth may be dislocated.

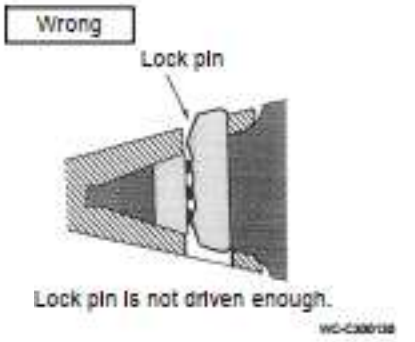
7. Make sure that the tooth is fixed firmly.











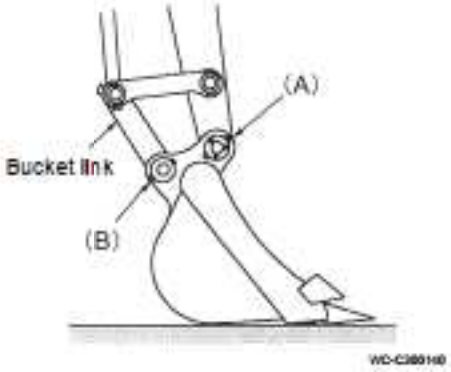
Change the Bucket

⚠ CAUTION

- When the pin is driven with a hammer, fragments may scatter, resulting in injury. Put on protective goggles, protective cap and protective gloves in work.
- Never insert your finger into the pin holes when adjusting the pin holes.

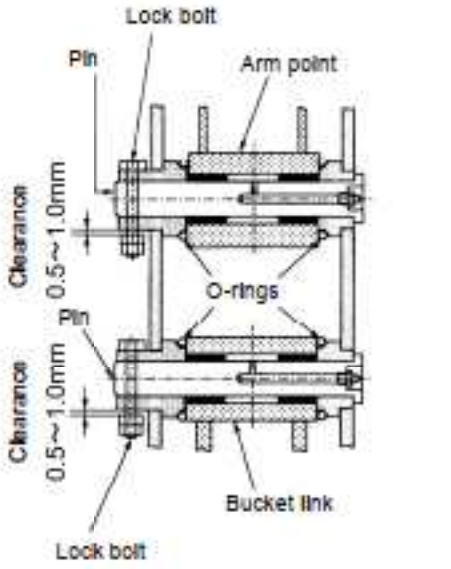
Remove the bucket

1. Place the back of the bucket completely on the ground.
2. Remove the lock bolt from the portion (A). Remove the arm point pin.
3. Remove the lock bolt from the portion (B). Remove the bucket link pin.
4. Raise the arm slowly. Then remove the arm and the bucket.



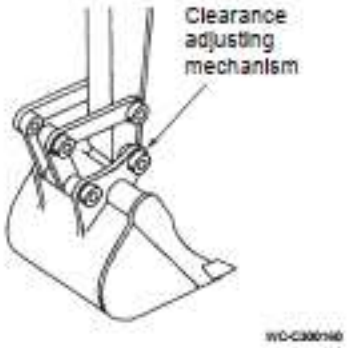
Install the bucket

1. Clean the pin holes in the arm and bucket link and the removed pins. Apply grease to the holes and pins.
2. Replace the O-rings if they are damaged or worn. Attach new O-rings to the bosses of the bucket temporarily.
3. Lower the arm slowly, fit the pin holes in the arm and bucket, and drive the arm point pin. Adjust the positions of the lock bolt and lock hole at this time.
4. Raise the boom to move the bucket apart from the ground and make it free.
5. Extend or contract the bucket cylinder to adjust the pin hole in the bucket link and bucket. Drive the bucket link pin into the holes.
6. Attach the lock bolt. Leave the clearance shown on the right when tightening the nut.
7. Move the O-rings to the proper grooves.
8. Grease the arm point pin and bucket link pin.

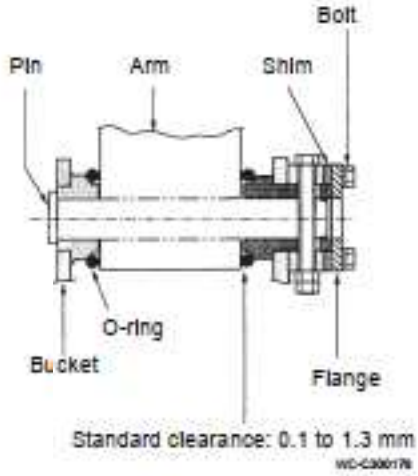


Adjust the Bucket Clearance

The standard bucket has a bucket clearance adjusting mechanism to prevent backlash.



1. Bring the back of the bucket into slight contact with the ground, and swing the machine a little to the right to make the condition where the top of the arm is pressed against the inside of the clearance adjusting mechanism.
2. Stop the engine.
3. Move the O-ring to above the boss and measure the clearance of the bucket and arm.
4. Remove the shim to adjust the clearance if the clearance is 1 mm or more.
   The thickness of the shim is 0.8 mm. Do not remove the shim if the clearance is 0.8 mm or less.
5. Remove the four bolts. Remove as much shims as the amount of backlash (wear amount) from inside the flange.
6. Attach the flange. Tighten the four bolts.
7. Measure the clearance.
   The standard clearance is 0.1 to 1.3 mm.



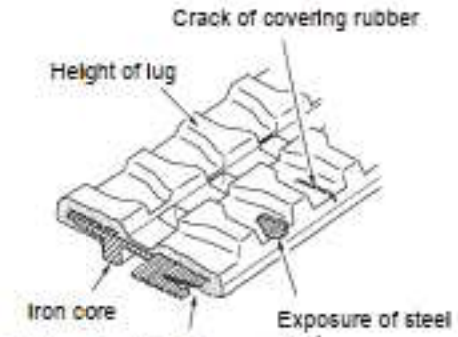
CRAWLER TRACK

Rubber Track Maintenance

Rubber track should be repaired or exchanged if goes into any of the conditions described below.
If it is necessary to repair or replace it, contact your IHI dealer.

Height of Lug

The rubber track can be used even if it is worn, however, if it is excessively worn, the rubber track is likely to be slippery and more travel force is required. If the remaining lug is less than 5 mm high, exchange it with brand-new one.



Damages of rubber track

Exposure of Steel Cord

If steel cord is exposed because of weary rubber or damage, exchange it with brand-new one.

Cutting of Steel Cord

Replace immediately if more than half of the steel cord layer on one side has been cut.
If this is left as it is, the rubber tracks breaks suddenly during operation, thereby leading to a serious accident.

Crack of Covering Rubber

If a crack is 30 mm or more long and 8 mm or more deep, repair the covering rubber immediately. If steel cord appears even if a crack is small, repair it immediately. Otherwise, water may come into a crack, which rusts steel cords and cuts off the rubber track.

Dislocation of the iron core

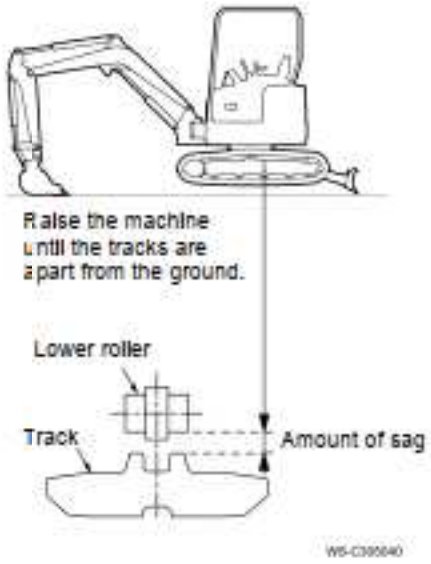
Exchange the rubber track with a new one if one or more iron cores are dislocated from it.

Inspection of Crawler Track

⚠ WARNING

The machine needs to be raised to inspect the track tension. If the machine drops by mistake during inspection, a serious injury may result. Be very careful when the machine is raised.

The conditions of wear and sag of the crawler tracks differ with the conditions of the work sites. If the slack crawler tracks are used, they may be slipped off. Inspect and adjust their tension as the necessity requires.



Inspection

1. Raise the machine using the attachment and blade until the crawler tracks become apart from the ground. Support the crawler frame securely with blocks, etc.

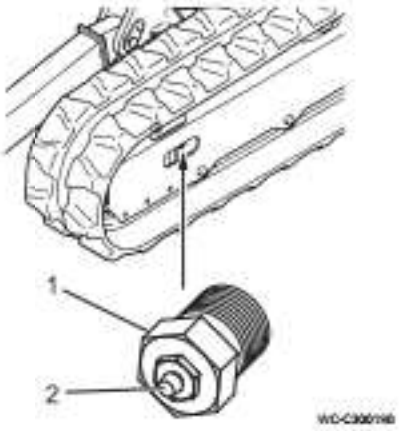
2. Measure the clearance between the tread of the lower roller near the center and the tread of the crawler track.
   The tension is proper if the clearance is as shown below.

   10 to 20 mm (Rubber track)
   30 to 50 mm (Steel track)

Adjustment of Crawler Track

Tension the crawler track

1. Fill grease through the grease nipple (2) of the check valve (1) until the crawler track is tensioned properly.
2. Rotate the crawler forward and backward and check tension. Re-adjust it if necessary.



NOTICE
• Adjust the right and left crawler tracks evenly. • If the tracks are not tensioned properly, the cylinders may be defective. Ask IHI's service dealer for repair services.

Loosen the crawler track

1. Remove dirt and soil from around the front idlers.
2. Loosen the check valve until grease is discharged (by a maximum of one turn) little by little. Do not loosen it when grease is discharged.
3. Rotate the crawler track forward and backward slightly if grease is hardly discharged.
4. Tighten the check valve when the crawler tracks are tensioned properly.
   Tightening torque: 59 to 69 N·m (6 to 7 kgf·m)

NOTICE
Be careful not to over-tighten the check valve.

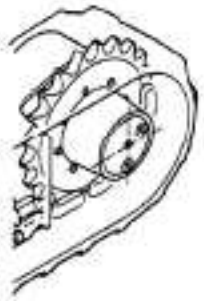
5. Rotate the crawler track forward and backward and check tension. Re-adjust it if necessary.

⚠ WARNING
• When the crawler track is tensioned intensely, the internal pressure in the grease cylinder is very high. Grease may spout out or the check valve may spring out, causing a serious accident. • To relief the pressure, loosen the check valve gradually. Do not loosen it when grease is discharged. (It should be loosened by a maximum of one turn.) • Grease may spout out at high pressure. Never loosen the grease nipple. • Do not bring your face or hand close to the check valve during adjustment.

TRAVEL REDUCTION GEAR

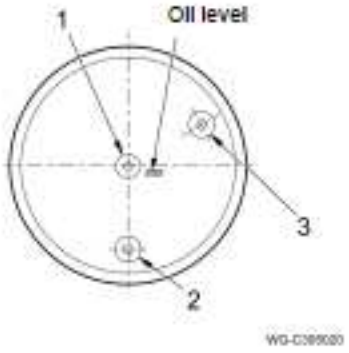
Check Oil Level and Refilling

1. Stop the engine so that the filler port is located at the upper position.
2. Place the container under the drain port.
3. Remove the level plug (1). If the oil surface reaches the level part, the oil level is proper.
4. If oil is insufficient, remove the oil filler plug (2) and refill oil up to the lower limit.
5. Clean the level plug and oil filler plug, then attach them.



Change Oil

1. Locate the drain port to the lower position and stop the engine.
2. Place the container under the drain port.
3. Remove the filler plug and level plug.
4. Remove the drain plug (3) to discharge oil.
5. Clean the drain plug and attach it.
6. Fill oil through the filler port until oil flows out of the level port.
7. Clean the filler plug and level plug, then attach them.



Specified oil	Qty
Gear oil API GL-4, SAE90	0.9 L

⚠ CAUTION

The gear case and oil are hot immediately after stopping the engine. Wait until the temperature lowers.

HYDRAULIC SYSTEM

Place the machine in a horizontal place, bring the blade in contact with the ground, retract the arm cylinder and bucket cylinder fully, and move down the boom to lower the bucket onto the ground when executing inspection and/or maintenance of the hydraulic system.

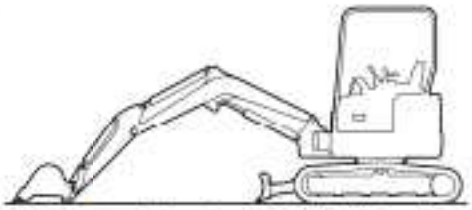
⚠ CAUTION

- Oil is hot immediately after stopping the engine.
  Wait until the temperature lowers and start operation then.
- Hydraulic oil is compressed. If the filter cartridge is taken out in such a condition, oil spouts out, resulting in a dangerous accident. Be sure to stop the engine and lower the internal pressure.

Hydraulic Oil Level and Refilling

1. Check the oil level gauge (1). If the oil level is between H and L, it is proper.
   The oil level differs with the oil temperature. The following shows the standard.

   - Near the L level before starting operation
     (Oil temperature: 10°C to 30°C)
   - Near the H level during operation
     (Oil temperature: 50°C to 80°C)



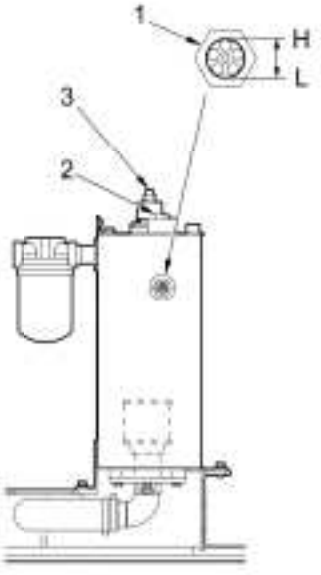
Posture of checking hydraulic oil level

WS-C005850

2. If the oil level is below the L level, refill hydraulic oil through the filler port (2).
   When removing the oil filling plug, remove it only after first releasing the pressure inside the tank by pressing the button of the air breather (3).

NOTICE

- Do not operate the machine if the oil level is below the "L" level.
- Loosen the drain plug and discharge excess oil if oil is filled over the "H" level.



WS-C005838

Replace Return Filter Cartridge

1. Release the pressure inside the tank by pressing the air breather button (1).

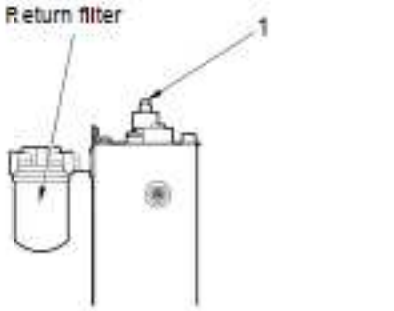
2. Turn the filter cartridge (2) counterclockwise with the filter wrench.

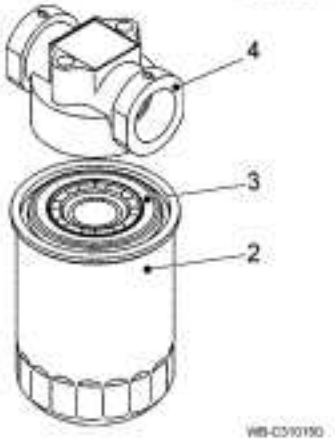
3. Apply hydraulic oil thinly to the gasket (3) of a new cartridge and tighten it with the filter wrench. When the gasket is crushed and the top surface of the cartridge is brought into contact with the head (4), it is the limit of tightening.

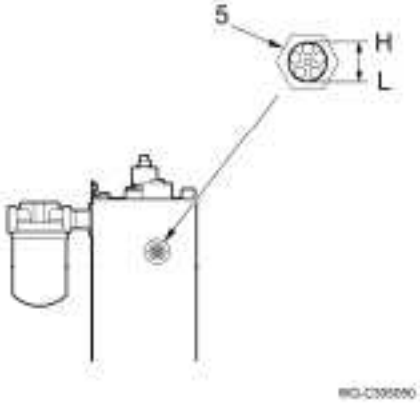
4. Start the engine and make sure that no oil leaks from the gasket of the cartridge.

5. Bring the machine into the posture of checking the oil level and check the level.
   The oil level is proper if it is between H and L of the level gauge (5). Refill hydraulic oil if insufficient.

NOTICE
When the breaker work is done, hydraulic oil is deteriorated more than normal digging works. Replace the filter cartridge every 100 hours.







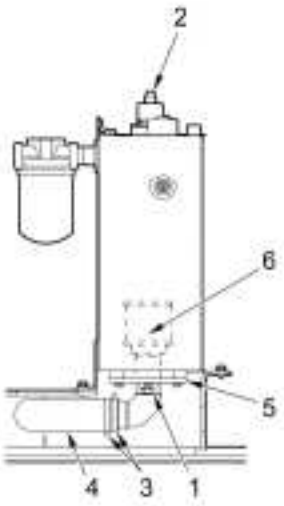
Change the Hydraulic Oil and Clean the Strainer

1. Swing the upper structure until the drain plug (1) of the hydraulic oil tank is in the center of the right and left crawlers.

Posture of discharging hydraulic oil

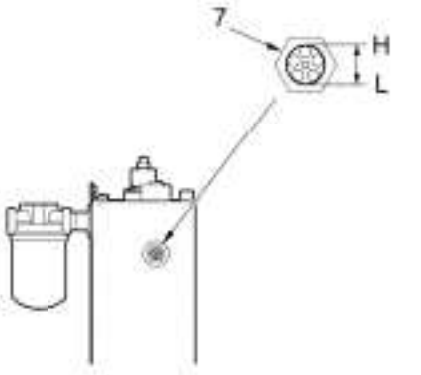
WB-C395080

2. Lower the boom to lower the bucket onto the ground.
3. Stop the engine.
4. Remove the oil supply plug of the hydraulic oil tank after first releasing the air inside the tank by pressing the air breather button (2).
5. Place the container under the drain plug.
   Remove the drain plug to discharge oil.
   Tighten the drain plug after discharging oil.
6. Loosen the hose clamp (3), disconnect the hose (4), and remove the strainer cover (5).
7. Clean the strainer (6) and attach it.
8. Attach the strainer cover, hose, and hose clamp.



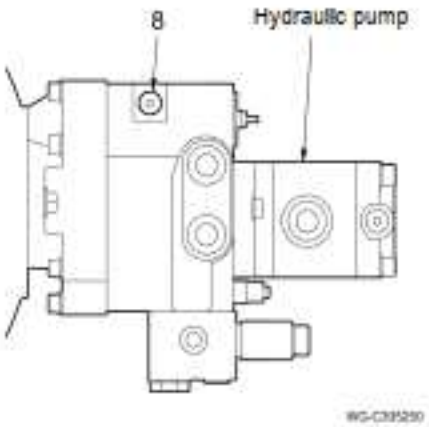
WB-C395060

9. Pour the specified amount of hydraulic oil from the inlet hole, and tightly close the supply plug.
   Make sure that the amount of oil inside the tank is between the H and L markers in the level gauge (7).



WB-C395070

10. Discharge air from the hydraulic pump.
    Remove the air vent plug (8) and make sure that air is discharged and oil flows out through the plug hole.



NOTICE
The hydraulic pump may be broken unless air is discharged. Be sure to discharge air from the hydraulic pump after changing hydraulic oil or replacing the hydraulic pump.

11. Idle the engine for approximately two to three minutes at low speed. Bring the machine into the level checking posture and check the oil level. Refill hydraulic oil if insufficient.

NOTICE
Breaker work is done in severer conditions than normal digging works and hydraulic oil is deteriorated earlier. If the machine is used with deteriorated hydraulic oil, the hydraulic devices and the whole hydraulic circuit may become defective.

Air Breather Element Replacement

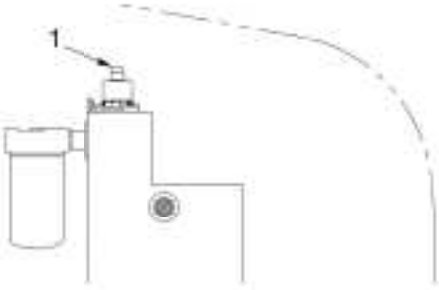
1. Press the button (1) of the air breather in the top surface of the working oil tank, and bleed the air inside the tank.

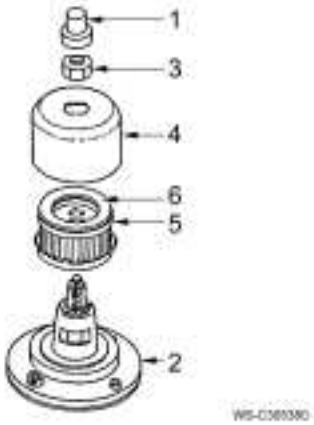
2. Remove the button, nut (3), and the cover (4) from the body (2).

3. Remove the filter element (5).

4. Place a packing (6) on a new element and attach to the body.

5. Affix the cover, nut, and button.



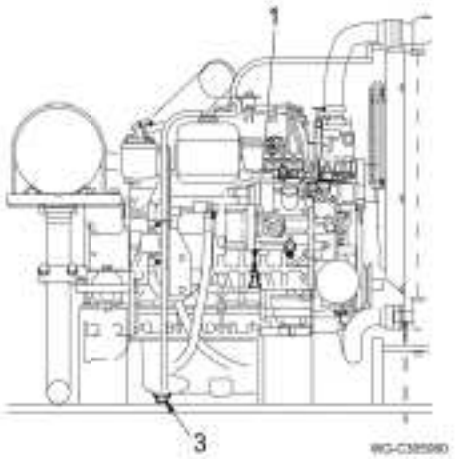


ENGINE OIL

Place the machine in a horizontal place, bring the blade in contact with the ground, retract the arm cylinder and bucket cylinder fully, and move down the boom to lower the bucket onto the ground when executing inspection and/or maintenance of the lubrication system.

⚠ CAUTION

- Oil is hot immediately after stopping the engine. You may get burnt if you touch oil. Start work after oil has cooled down.
- Wipe off spilt oil completely. If it is left as is, it may cause a fire.

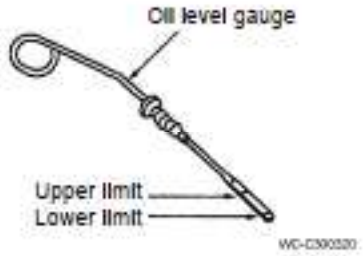


Check the Engine Oil Level and Refill

1. Pull out the oil level gauge (1), clean it with cloth, insert it fully again, and pull it out slowly.

2. The oil level is proper if it is between the marks of the upper and lower limits.
   Refill the engine with engine oil through the oil filler port (2) if the oil level is below the lower limit.

3. Discharge excess oil through the drain port (3) if the oil level is over the upper limit. Check the oil level again.

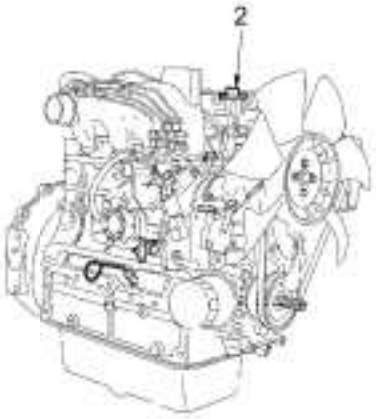


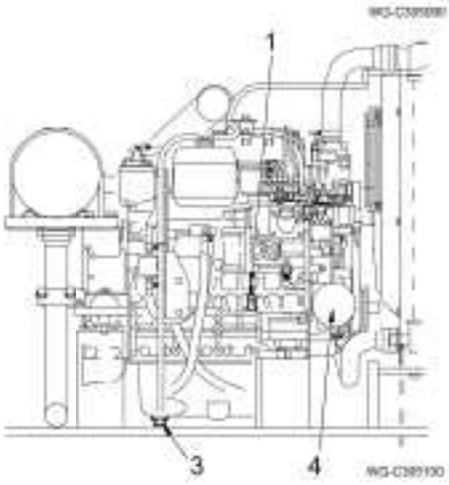
NOTICE

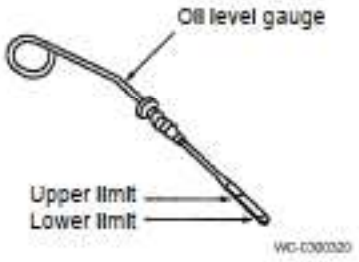
- Make the machine horizontal before checking the oil level.
- Check the oil level 10 minutes or more after stopping the engine, if the engine has started.
- Do not start the engine if the oil level exceeds the upper limit or below the lower limit.

Replace the Engine Oil and Engine Oil Filter

1. Place the container just under the drain port of the engine.
2. Clean the oil filler cap (2) and around it in order not to let in foreign matters. Remove the oil filler cap.
3. Remove the drain plug (3) slowly so that oil will not splash on you. Discharge oil.
4. Check waste oil. If you find a lot of metallic powder, foreign matters, etc., contact our service office.
5. Turn the filter (4) counterclockwise to detach it using the filter wrench.
6. Clean dust and foreign matters from the filter mounting surface.
7. Apply engine oil thinly onto the gasket of a new filter.
8. Attach the filter by rotating towards the right side, and after the gasket contacts the sealing surface, tighten sufficiently by hand.
9. Attach the drain plug.
10. Fill the engine with engine oil until the oil level becomes between the upper limit and lower limit of the level gauge (1).
11. Idle the engine for several minutes, stop the engine, and check the level of engine oil 10 to 20 minutes later. Refill the engine with engine oil up to the specified level if the oil level is low.





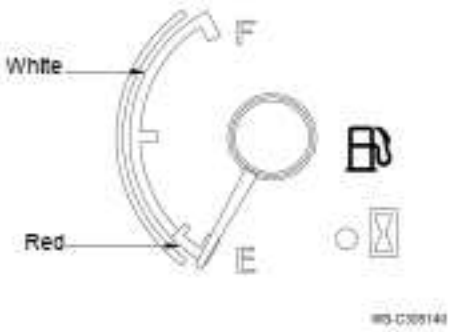


FUEL SYSTEM

Check Fuel Quantity and Refilling

1. Turn the engine key switch key to the ON position and check the quantity of remaining fuel on the fuel gauge.

   Fuel tank capacity: 65 L

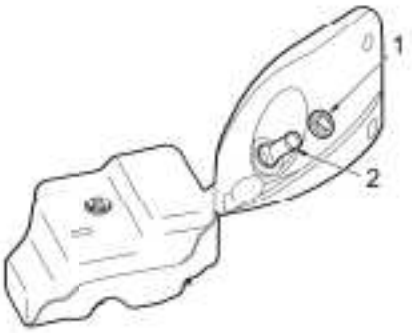


2. Refill the tank with fuel through the filler port (1) if remaining fuel is insufficient.
   Clean the strainer (2) of the filler port (1) if it is dirty.

3. Tighten the cap after refilling. Lock it with the engine key.

⚠ CAUTION

- If fuel overflows or spills, it may cause a fire. Wipe off spilt fuel completely.
- If the strainer is dismounted and fuel is refilled, the engine may become defective. Do not dismount it.
- Do not bring fire close to the engine.
- If any other fuel than light oil, bad influences are caused upon the engine, which may be incapable of demonstrating its functions and performances sufficiently. In addition, using such fuel may cause engine failures or accidents. Never use any other fuel than light oil.
  Defects caused by using any other fuel than light oil is exempted from warranty.



Check and Clean Water Separator and Replace Element

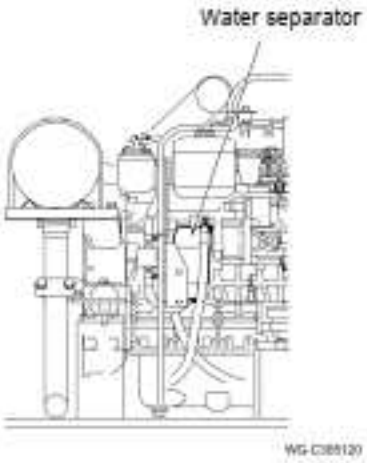
Check and Discharging Water

If the float (1) of the water separator is floating, water reaches the bottom of the float.

When the water separator warning indicator on the OK monitor turns on, the water separator contains the specified amount of water.

Discharge the water.

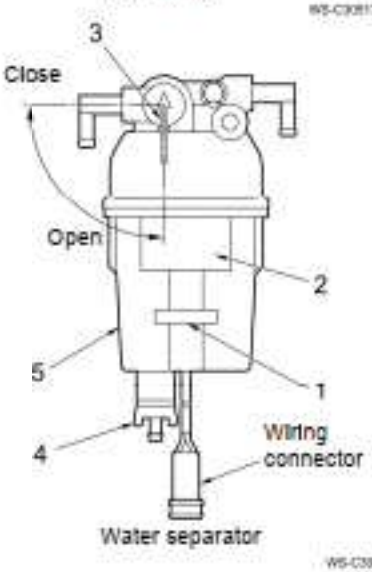
1. Close the fuel cock (3).
2. Open the drain plug (4) to discharge water and foreign matters to the container.
3. Close the drain plug.
4. Open the fuel cock as before.
5. Discharge air from the water separator.
6. Make sure that no fuel leaks.



Cleaning and Replacing

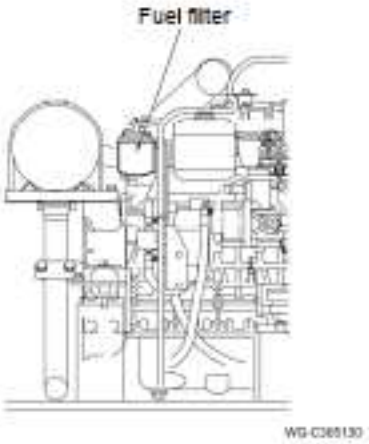
1. Close the fuel cock.
2. Disconnect the wiring connector.
3. Open the drain plug to discharge water and foreign matters to the container.
4. Turn the cup (5) counterclockwise to detach it.
5. Take out the float (1) from inside of the cup.
6. Discharge water and sediment from inside of the cup into the container.
7. Clean the element (2) and inside of the cup completely with fresh fuel. Replace the element if it is flawed or damaged.
8. Attach the element and O-ring to the body.

   If the O-ring is damaged, replace it with a new one.
9. Put the float in the cup.
10. Turn the cup clockwise to attach it to the body. Be sure to tighten it by hand.
11. Close the drain plug.
12. Connect the wiring connector.
13. Open the fuel cock as before.
14. Discharge air from the water separator.
15. Make sure that no fuel leaks.



Replace Fuel Filter

1. Turn the filter (1) counterclockwise with the filter wrench to detach it.
2. Thinly cost fuel oil on the gasket (2) of the new filter, and tighten sufficiently by hand without using a filter wrench.
3. Discharge air after replacing the filter.
4. Make sure that no fuel leaks.



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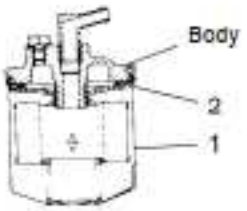

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How To Discharge Air

Discharge air after maintenance of the fuel filter or water separator is carried out or the fuel tank is emptied.

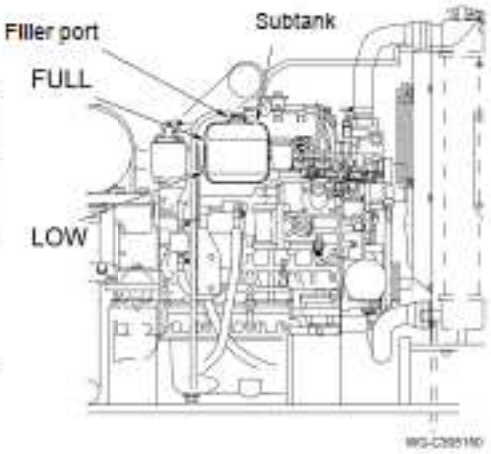
1. Fill the fuel tank full with fuel.
2. Turn the engine key switch to the ON position and keep it at that position for approximately 20 seconds. When this is done, the air is automatically bled, and it becomes possible to start the engine.

⚠ CAUTION

- Fuel is hot immediately after stopping the engine. Carry out the work after the fuel temperature has become lower.
- Do not bring fire close to the engine.
- Wipe off spilt fuel completely. If it is left as is, it may cause a fire.

COOLING SYSTEM

Check the Coolant Level and Refill



⚠ CAUTION

Do not open the radiator cap normally. Check coolant in the subtank when the engine is cool.

1. Open the right cover and check if the coolant level in the subtank is between the LOW and FULL levels. Refill the subtank with coolant through the filler port up to the FULL level.
   Close the cap firmly after refilling.
2. If the subtank is empty, stop the engine, check for water leak, check the water level in the radiator, and refill the radiator and subtank with coolant.

Change the Coolant

⚠ WARNING

- Coolant is hot immediately after stopping the engine. If coolant is discharged immediately, you may get burnt. Change coolant after the engine cools down.
- Do not remove the cap when the coolant is hot. Hot water may spout out. Rotate the cap slowly to relief the pressure after the coolant temperature lowers.

1. **Coolant**
   - A new machine is filled with coolant containing long life coolant (LLC). This coolant has effects of preventing freezing and corrosion.
     It effects for long and may be used all over the year.
   - Change coolant every year (in autumn every year).
   - Use LLC when changing coolant.
   - Change coolant at the shorter interval of 6 months or 250 hours if LLC is not used.

⚠ WARNING

- The long life coolant is toxic.
- Vomit it immediately and consult a doctor, if you swallow it by mistake.
- Wash your eyes completely with water immediately and consult a doctor, if it is put into the eyes.
- Use a container with an antifreeze mark to store long life coolant. Cap the container and store it in a place not accessible by children.

2. Mixing ratio of coolant

The freezing temperature of the long life coolant varied depending on the ratio of mixing it with water.

In this machine, irrespective of the outdoor temperature, the long life coolant is mixed with water with a mixing ratio of 49% at the time of shipment in order to maintain the rust prevention effect of the cooling system.

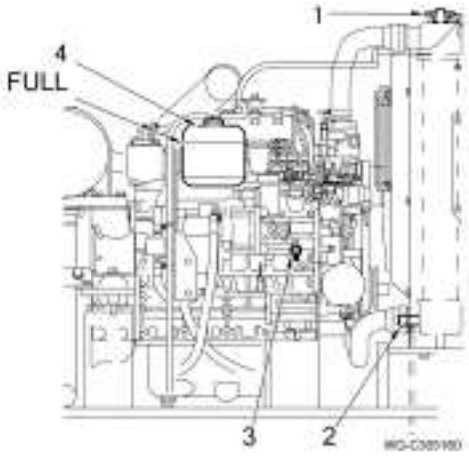
In all areas and throughout the year, keep the mixing ratio of the long life coolant at 49%.

Further, use commercial tap water for mixing.

Minimum outdoor temperature (°C)		-35
Mixing ratio (%)		49
Mixing volume (L)	Amount of LLC (L)	5.0
	Amount of water (L)	5.1
Total amount of coolant: 10.1L		Engine: 3.7 L Radiator, etc.: 5.6 L Reserve tank: 0.8 L

3. Coolant Replacement Instructions

1) Lower the attachment on to the ground, and stop the engine.
2) Remove the radiator cap (1).
3) Open the drain cock (2) at the bottom of the radiator and drain the water.
   Next, open the drain cock (3) of the cylinder block and drain the water.
4) Close the drain cocks at the two locations, pour tap water and cleaning agent (radiator cleaner), and run the engine for about 10 minutes at slightly higher speed than low idling.
5) Stop the engine, open the drain cocks at the two locations, and drain the water.
6) After draining the water completely, pour tap water and clean until the drained water becomes clean.
7) Close the drain cocks at the two locations, pour the coolant which is a mixture of tap water and LLC up to the mouth of the radiator water inlet opening.
8) Run the engine at low idling for about 5 minutes and stop the engine.
   Since the water level decreases because the air inside gets released, replenish coolant up to the mouth of the radiator water inlet opening, and close the cap.
9) Drain the cooling water in the supplementary tank (4), clean the inside of the tank, and pour the coolant up to the "FULL" mark.



Check the Fan Belt

⚠ WARNING

- The engine is hot immediately after stopping it. You may get burnt if you touch the engine. Wait until each part cools down.
- Stop the engine and keep the key of the starter switch in safe.

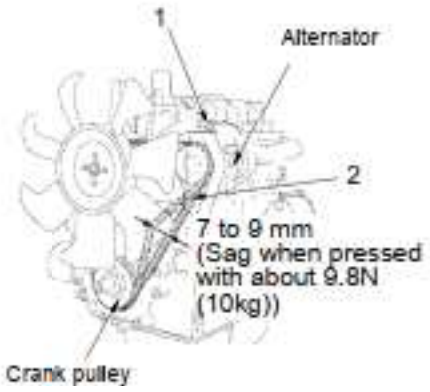
NOTICE

- If belt tension is excessive, the bearings and belt will be damaged earlier.
- Replace the bolt if it has elongated and the adjustment margin is lost.
- Run the engine at high speed for 30 minutes after the belt is replaced. Check and adjust belt tension then.

1. Check

1) Push a point in the middle of the clank pulley and alternator pulley at approximately 98 N (10 kg). The belt tension is proper if the belt slacks by approximately 7 to 9 mm.

2) Replace the belt if the belt has cracks.



2. Adjustment

1) Loosen the bolts (1) and (2).

2) Turn the adjust bolt to move the alternator (3) so that the belt slackens by approximately 7 to 9 mm.

3) Tighten the bolts.

4) Replace the bolt if it has elongated and the adjustment margin is lost.

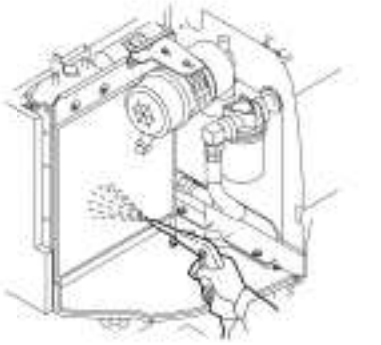
Inspect and Clean Radiator Fins and Oil Cooler Fins

⚠ CAUTION

Be sure to put on protective goggles when handling compressed air or high-pressure water in inspection of the engine. Otherwise, your eyes may be hurt by dust, scattered matters, compressed air, high-pressure water or steam.

1. Blow out dust with compressed air (at 0.2 MPa or less) from the fins.
   Be careful not to damage the fins with compressed air.

2. Clean the fins with neutral detergent and city water if a lot of dust adheres to the fins.



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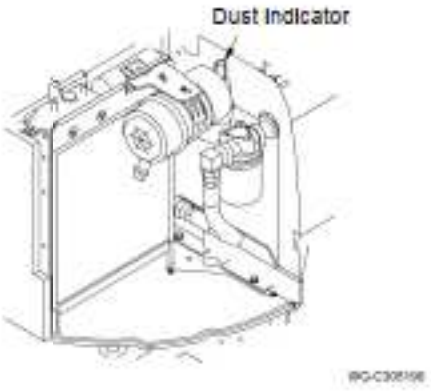
NOTICE

Use high-pressure water and compressed air at as low pressure (0.2 MPa) as possible. Do not use a wire brush to clean the fins. A wire brush may damage the fins.

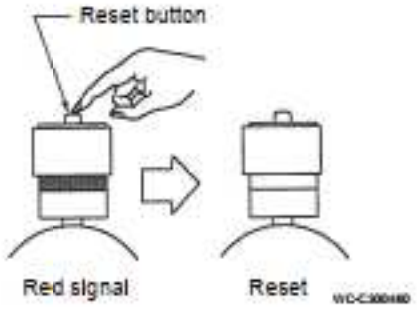
INTAKE AIR SYSTEM

Inspect Dust Indicator

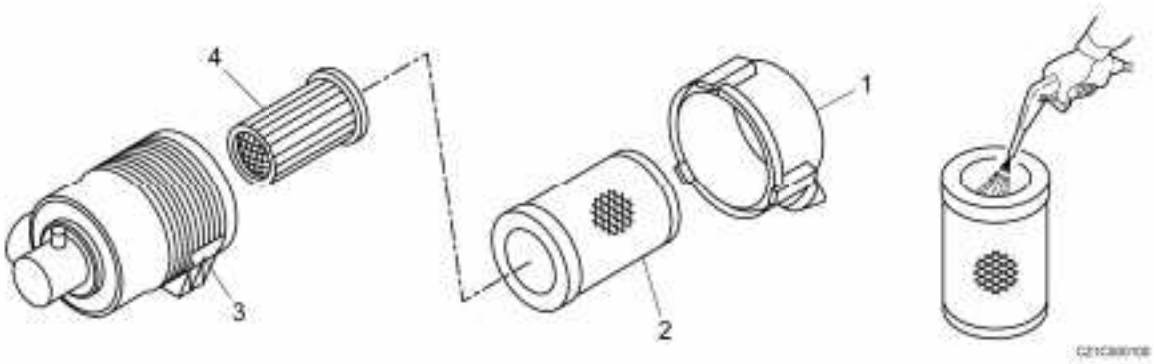
1. Check if the red signal is indicated on the dust indicator of the air cleaner.
2. Clean or replace the element immediately if the red signal is indicated.
3. Push the reset button of the dust indicator to reset the red signal after cleaning or replacing the element.



NOTICE
Clean or replace the element of the air cleaner if the red signal is found in daily inspection, regardless of the maintenance interval.



Inspect and Clean Air Cleaner Element



1. Stop the engine.
2. Remove the cover (1), and take out the outer element (2).
   Do not remove the inner element (4).
3. Clean the inside of the cover and the body (3).
4. From the inside of the element, directly blow dry compressed air (0.29 to 0.49 MPa (3 to 5 kgf/cm^2)) above and below along the crimp of the filter. Maintain an appropriate spacing (about 50 cm) between the tip of the nozzle and the filter.
5. Emit light (white light) from the inside of the element and inspect for damage to the filter. Do not use the filter if the filter is damaged, or has pin holes, or has particularly thin portions, or if the seal portion is damaged.
6. After the cleaning is completed, affix the element again.
7. Attach with the arrow mark (↑) is towards the up direction, and fix with a fixing metal catch.

NOTICE

- Replace the element with a new one, regardless of the replacement interval, if it is dirty with lamp soot, soot or oil.
- Do not pat, hit or drop the element.

Replace Air Cleaner Element

Disassemble the air cleaner in the same manner as inspection and cleaning procedures and replace the element with a new one.

⚠ CAUTION

- Be sure to stop the engine when carrying out maintenance of the air cleaner.
  If it is carried out while the engine is running, dust is sucked and the engine may be damaged.
- Put on protective goggles when cleaning the element using compressed air.
  Otherwise, dust may be put in your eyes, which is dangerous.

ENGINE

Adjust Intake Valve and Exhaust Valve Clearance

Proper adjustment is necessary to maintain the correct timing for opening and closing the valves. Improper adjustment will cause the engine to run noisily, resulting in poor engine performance and engine damage.

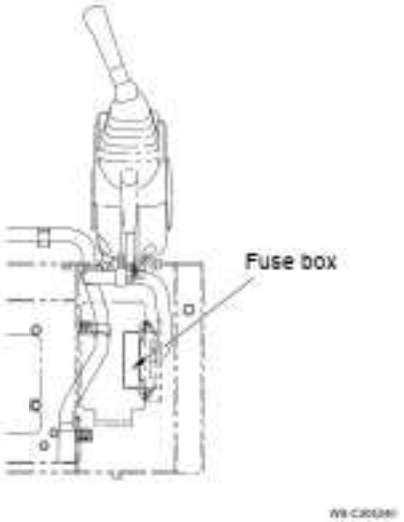
Check of Fuel Injection System

Proper operation of the fuel injectors is required to obtain the optimum injection pattern for full engine performance. The EPA/ARB requires that you have the injectors inspected, cleaned and tested every 1500 hours.

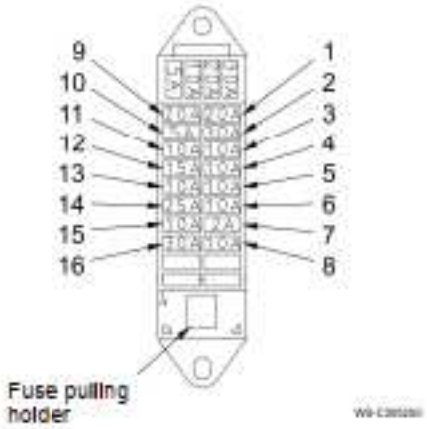
ELECTRIC SYSTEM

Replace the Fuses

NOTICE
• Be sure to set the engine key switch to the OFF position before replacing the fuses. • Do not use wires, silver foils, etc. instead of fuses. If such materials are used, the wires may overheat and burn, resulting in a fire.



1. Set the engine key switch key to the OFF position.
2. Take off the fuse cover.
3. Replace the blown fuse with a new fuse of the same capacity by using the fuse pulling holder installed in the fuse box.



	Fuse capacity	Circuit name
1	20 A	Cabin (working lamp)
2	30 A	Cabin (wiper)
3	10 A	No. 3 AUX
4	10 A	Heater
5	10 A	No. 2 AUX
6	10 A	Working lamp
7	2 A	Backup
8	10 A	Main relay Throttle controller
9	20 A	Horn High/Low speed No. 1 AUX
10	5 A	CK monitor
11	10 A	Crane model
12	15 A	Power supply socket
13	10 A	Cperation lock lever
14	25 A	Glow relay Safety relay
15	10 A	Fuel pump
16	30 A	Air conditioner

Replace the Fusible Link

If power is not turned on even though the engine key switch is set to the ON position, the fusible link between the battery and the engine key switch circuit may have blown out. Detach and inspect the fusible link, and replace it if it is broken.

Check the Battery

⚠ WARNING

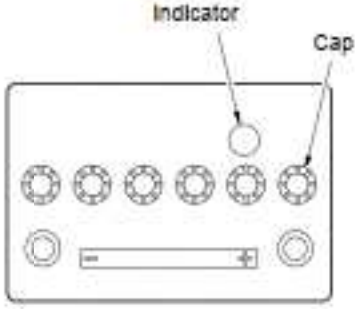
- The battery produces inflammable hydrogen gas. It ignites or explodes if fire is nearby. Never bring fire close to the battery or strike a spark near it.
- Never place any tool, metallic object or inflammable matter on or near the battery. The battery may possibly ignite and explode if it short-circuits.
- The battery liquid (diluted sulfuric acid) may cause loss of eyesight or burning. If it is put into the eyes or on the skin or clothes, wash with much water immediately and consult a doctor.
- Be sure to put on protective goggles when handing the battery.
- Be sure to confirm that the battery handles and handle mounting positions are firm before moving up the battery.

Refill battery liquid

Inspect the electrolyte level look at the indicator or sight level line on the battery.

Maintain the level to the upper level of the sight level line with distilled water when required.

Level of electrolyte must never fall below tops of plates.



Clean the battery terminals

NOTICE

- Be sure to keep the engine stopping during work.
- Be careful during work not to short-circuit the positive and negative terminals of the battery with a tool, etc.
- Disconnect the battery cable from the negative terminal first. Connect it to the negative terminal last.
- Tighten the terminals firmly.

1. Clean the terminals if they are dirty or corroded. (Pour warm water onto the terminals and wipe them if they are corroded and white powder sticks on them.)
2. Detach the terminals and polish them with a wire brush or sandpaper if they are corroded remarkably.
3. Apply grease, etc. thinly to the terminals after cleaning and tightening.

Indication of Indicator

The standard recharging conditions and liquid levels are as shown below.

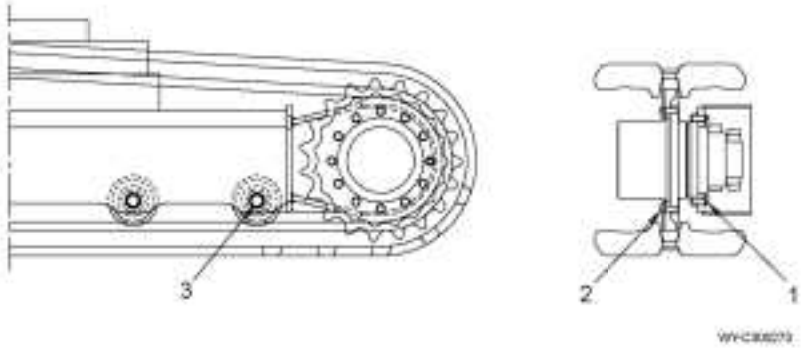
TIGHTEN BOLTS

Retighten loose bolts in daily inspection. Be sure to make up for lacking bolts. Check and retighten the bolts after the first 50 hours if a new machine is used.

Special Tightening Positions

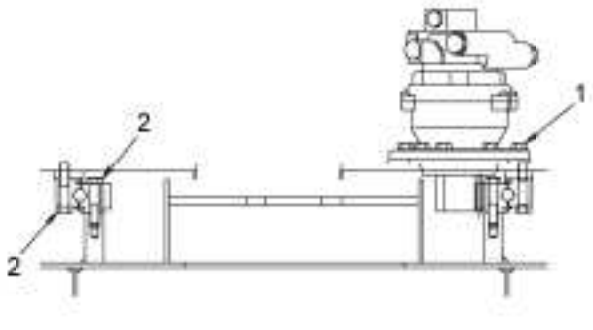
The bolts shown below bear large forces. Tighten them at the torque shown in the table below. When replacing the bolts in these positions, apply molybdenum disulfide grease to the threads and the bearing surfaces of the nuts and tighten at the specified torque.
As for the travel reduction gear and drive sprocket of the travel unit, apply thread lock cement to the threads of the bolts

1. Travel unit



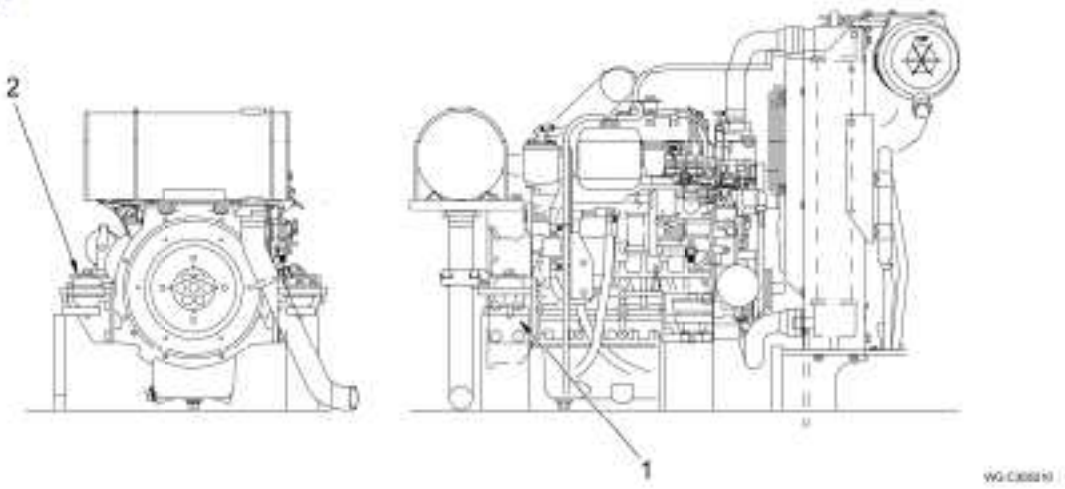
No.	Tightening position	Bolt size	Wrench size (mm)	Tightening torque	
				(N·m)	(kgf·m)
1	Travel reduction gear	M14	22	157	16.0
2	Drive sprocket	M14	22	157	16.0
3	Lower roller	M20	30	490	50.0

2. Swing unit



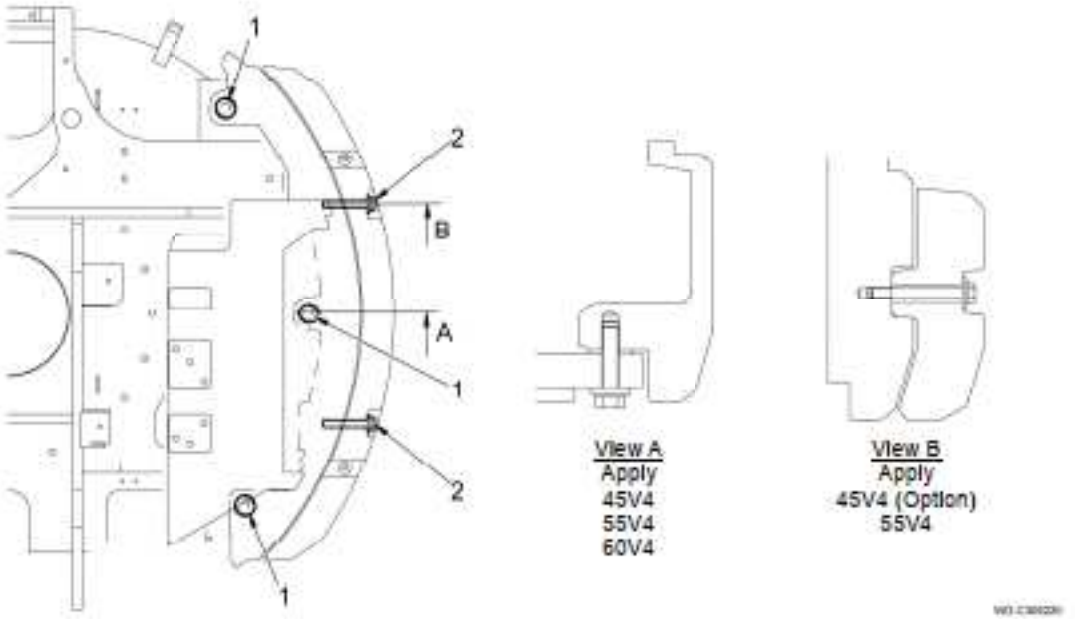
No.	Tightening position	Bolt size	Wrench size (mm)	Tightening torque	
				(N·m)	(kgf·m)
1	Swing motor	M16	24	245	25.0
2	Swing bearing	M16	24	245	25.0

3. Engine



No.	Tightening position	Bolt size	Wrench size (mm)	Tightening torque	
				(N·m)	(kgf·m)
1	Engine bracket	M12	19	106	10.8
2	Vibration-proof bracket	M12	17	106	10.8

4. Counterweight



No.	Tightening position	Bolt size	Wrench size (mm)	Tightening torque	
				(N·m)	(kgf·m)
1	Counterweight	M24	36	826	84.2
2	Additional counterweight	M24	24	241	24.6

Standard Tightening Torques

Tighten bolts and nuts not shown above at the torques shown in the tables below.

10T Heat-treatment bolts					
Bolt size	Wrench size (mm)	Coarse thread		Fine thread	
		(N·m)	(kgf·m)	(N·m)	(kgf·m)
M8	13	23	2.3	25	2.5
M10	17	47	4.8	50	5.1
M12	19	83	8.5	91	9.3
M14	22	134	13.7	135	13.8
M16	24	208	21.2	221	22.5
M20	30	411	41.9	452	46.1
M24	36	715	72.9	811	82.7

High-pressure hose union nut		
Hose size (inch)	(N·m)	(kgf·m)
1/4"	25	2.5
3/8"	49	5.0
1/2"	59	6.0
3/4"	118	12.0
1"	137	14.0
1-1/4"	167	17.0

HANDLING IN COLD WEATHER

At low temperature, the engine hardly starts and coolant is subject to freezing. Make preparation for cold weather as shown below.

Fuel

In cold weather, fuel may be frozen and it may be difficult to start the engine.
Use fuel (light oil) appropriate for the temperature.

Coolant

At the time of shipping this machine, a long life coolant (LLC) mixed with water at a mixing ratio of 49% would have been filled in the coolant tank. The freezing temperature would have been indicated by placing a circle mark around the appropriate freezing temperature in the seal affixed to the radiator.
In all areas and throughout the year, keep the mixing ratio of the long life coolant at 49%.

CJ-C409431

Lubricant and grease

Exchange engine oil and hydraulic oil with proper oil having viscosity appropriate for the outer temperature. Refer to RECOMMENDED LUBRICATION TABLE for the specified viscosity.

Battery

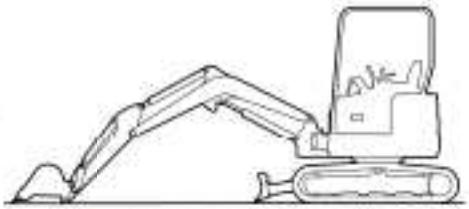
In cold weather, larger discharge current flows when starting the engine and the battery performance is also reduced. If the battery is almost discharged, battery liquid may be frozen. Recharge the battery almost fully and keep it warm to start the engine free from troubles next morning.

Precautions when finishing work

- Remove mud and water from the cylinder rod to prevent the cylinder rod seals from being damaged.
- Put plates on dry and firm ground and park the machine on them in order to prevent the crawlers from freezing.
- Discharge water from the water separator to prevent fuel from freezing.

LONG TERM STORAGE

NOTICE
To protect the cylinder rod from rust, set the machine to the posture for long term storage.



Posture for long term storage

WS-C08330

Before storage

- Clean the machine.
- Carry out lubrication, greasing and oil changing of each part.
- Apply grease to the exposed piston rods of the hydraulic cylinders.
- Dismount the batteries, recharge them fully, and store them. Alternatively, disconnect the negative terminals.

During storage

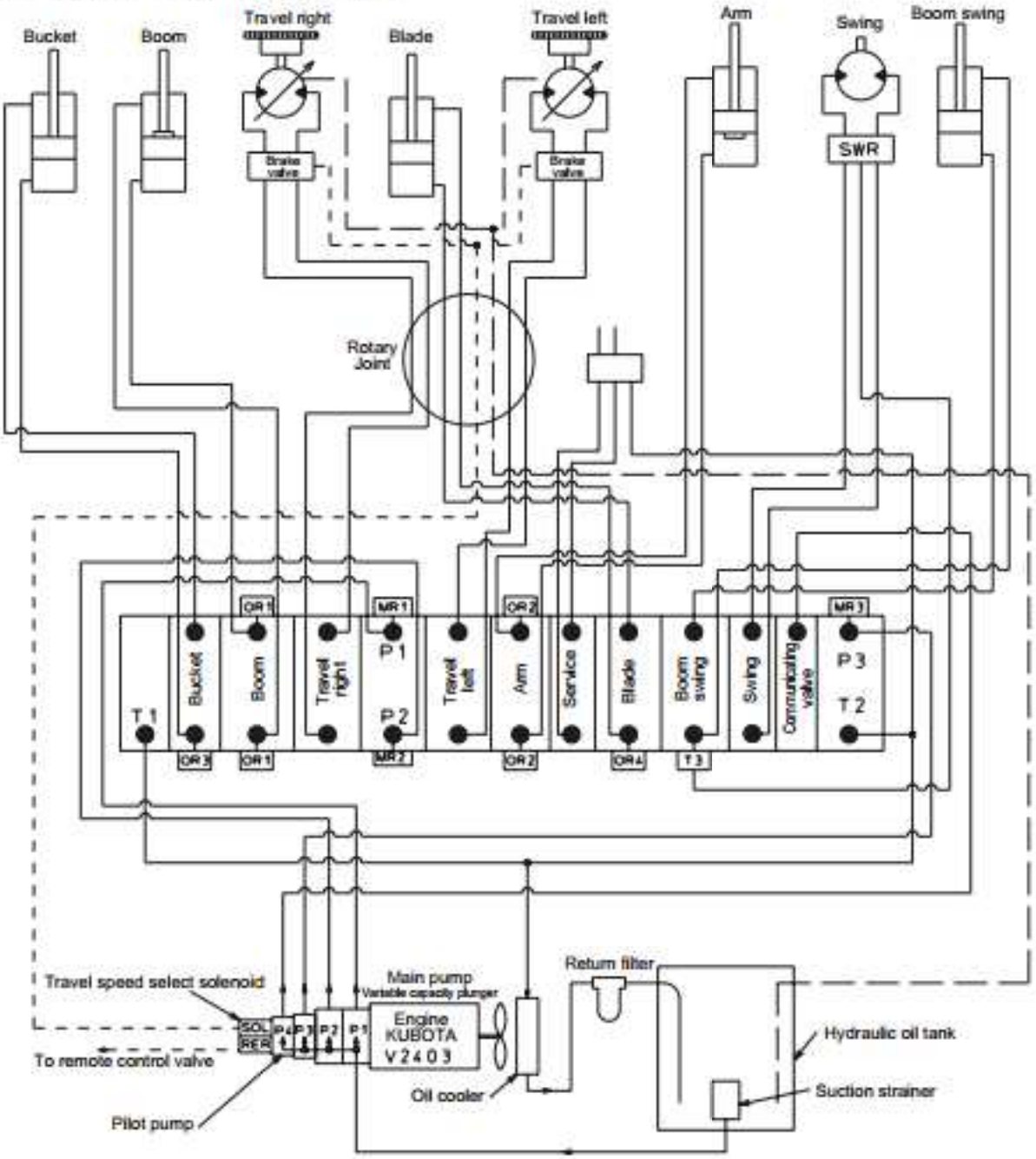
⚠ CAUTION
If you have to operate the machine indoors to prevent rust, keep good ventilation and gas poisoning by window or entrance.

- Warm up the machine and carry out traveling, swinging and a series of operations, including attachment operations, once every month to prevent rust and keep lubrication condition while the machine is not used for long.
- Wipe off grease from the hydraulic cylinder before moving the attachment.

After storage

- Check the lubrication and greasing conditions of each part and the coolant level.
- Wipe off grease from the hydraulic cylinder.
- Start the engine, warm it up, and carry out traveling, swinging and attachment operations several times repeatedly to run in each part.

HYDRAULIC SYSTEM DIAGRAM



Code	Name	Pressure	
		MPa	kgf/cm²
MR1	Main relief valve P1 Pump	24.5	250
MR2	Main relief valve P2 Pump	24.5	250
MR3	Main relief valve P3 Pump	20.6	210
OR1	Overload relief valve (Boom)	27.4	280
OR2	Overload relief valve (Arm)	27.4	280
OR3	Overload relief valve (Bucket)	27.4	280
OR4	Overload relief valve (Blade)	24.5	250
SWR	Swing relief valve	16.7	170
RER	Remote control relief valve	2.9	30

Pump flow rate (Max.):
P1: 60 liter/min
P2: 60 liter/min
P3: 44.2 liter/min

The service ports use the flow shared by the P2 and P3 pumps.
P2 + P3; 104 liter/min

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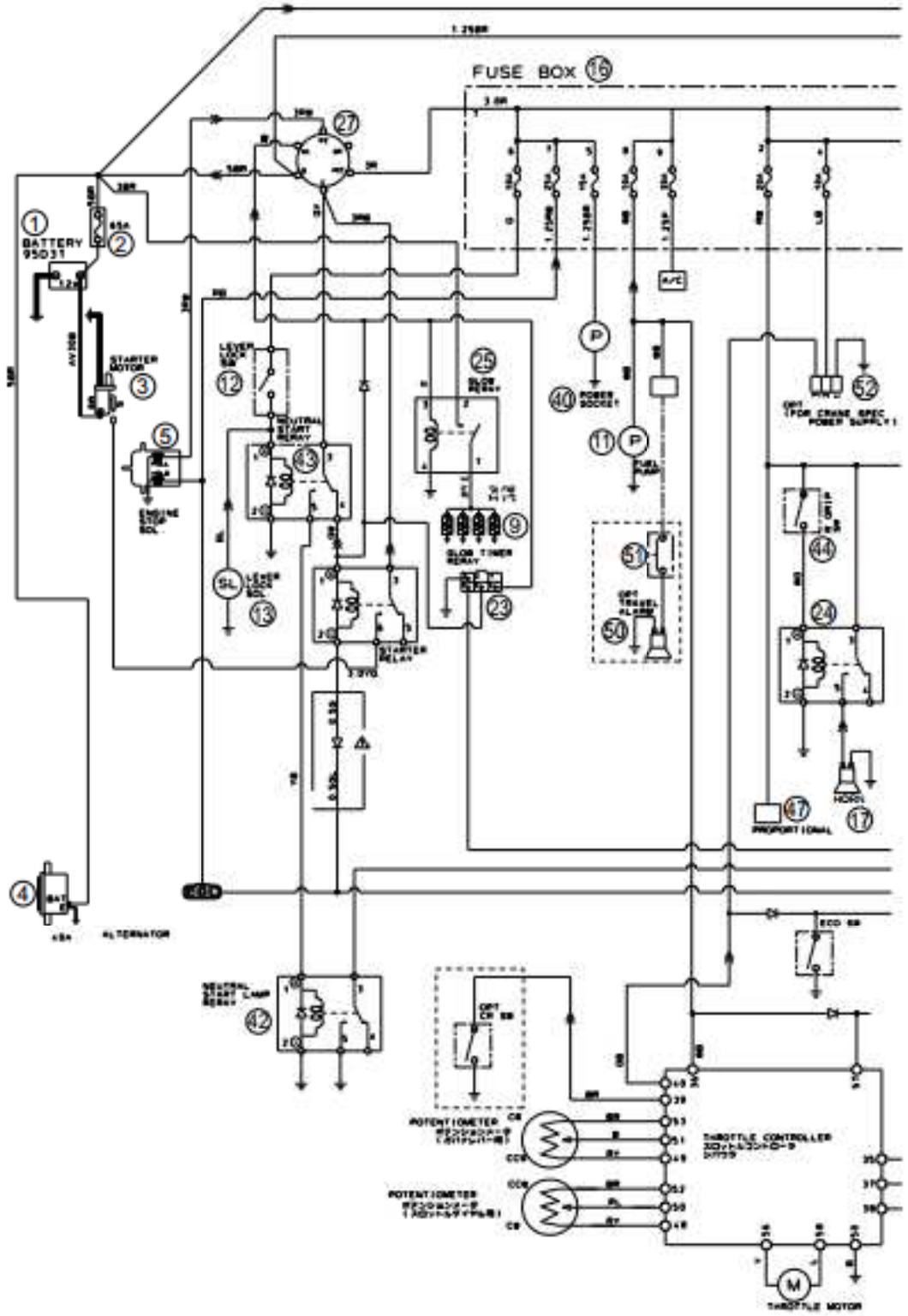
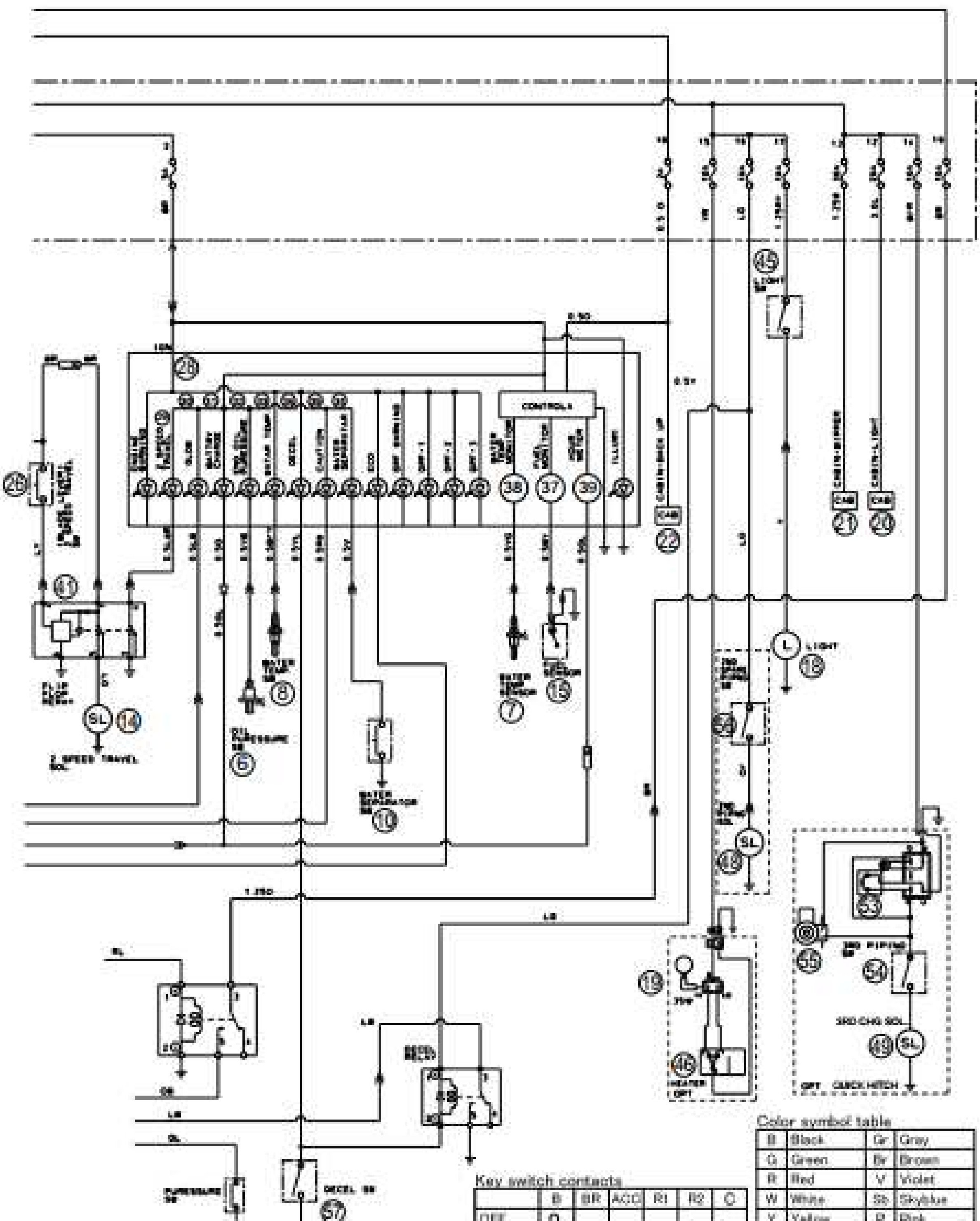
ELECTRIC SYSTEM DIAGRAM





Key switch contacts

	B	BR	ACC	R1	R2	C
OFF	O					
ON	O	O	O			
Start	O	O	O		O	O

Color symbol table

B	Black	Gr	Gray
G	Green	Br	Brown
R	Red	V	Violet
W	White	Sb	Skyblue
Y	Yellow	P	Pink
L	Blue	Lg	Light green
Or	Orange		

No.	Name	No.	Name
1	Battery	30	Glow indicator
2	Fusible link (65A)	31	Battery charge warning indicator
3	Starting motor	32	Engine oil pressure warning indicator
4	Alternator	33	Coolant temperature warning indicator
5	Engine stop solenoid	34	Water separator warning indicator
6	Engine oil pressure switch	35	Control lock indicator
7	Water temperature sensor (gauge)	36	Auto idol indicator
8	Water temperature switch	37	Fuel gauge
9	Glow plug	38	Water temperature gauge
10	Water separator switch	39	Hour meter
11	Fuel pump	40	Power outlet
12	Control lock limit switch	41	Flip-flop relay
13	Control lock solenoid	42	Neutral start lamp relay
14	Travel speed select solenoid	43	Neutral start relay
15	Fuel level senscr	44	Horn switch
16	Fuse box	45	Light switch
17	Horn	*46	Heater switch
18	Boom light	*47	No 1 AUX solenoid
*19	Heater	*48	No 2 AUX solenoid
*20	Cab light	*49	No 3 AUX solenoid
*21	Cab wiper	*50	Travel alarm buzzer
*22	Cab back up	*51	Travel alarm limit switch
23	Glow timer (10sec)	*52	Power source (Crane specification)
24	Horn relay	*53	No 3 AUX power switch
25	Glow relay	*54	No 3 AUX operation switch
26	Travel speed select switch	*55	No 3 AUX alarm buzzer
27	Engine key switch	*56	No 2 AUX select switch
28	OK monitor	57	Auto idol switch
29	Travel speed indicator		

The devices with the * marks are optional devices.

SPECIFICATIONS

SPEED AND GRADEABILITY

Swing speed	9.3 min^{-1}
Travel speed (low/high)	2.9/4.6 km/h
Gradeability	58% (30 degrees)

ENGINE

Engine model	Kubota V2403-DI-EDM
Type	Vertical in-line, water cooled, 4-cycle diesel engine (Direct injection)
No. of cyl. - bore x stroke	4-ϕ87 mm × 102.4 mm
Displacement	2.434 L
Max. rated output	32.4 kW/2400 min^{-1}

MASS

45V4		4-post ROPS	Cabin
Machine mass (kg)	Rubber track	4630	4780
	Steel track	4670	4820
Base machinery mass(kg)	Rubber track	3500	3650
	Steel track	3540	3690
Average ground bearing pressure(kg)	Rubber track	27 kPa	28 kPa
	Steel track	27 kPa	28 kPa

55V4		4-post ROPS	Cabin
Machine mass (kg)	Rubber track	4990	5140
	Steel track	5030	5180
Base machinery mass(kg)	Rubber track	3840	3990
	Steel track	3880	4030
Average ground bearing pressure(kg)	Rubber track	29 kPa	30 kPa
	Steel track	29 kPa	30 kPa

60V4		4-post ROPS	Cabin
Machine mass (kg)	Rubber track	5350	5500
	Steel track	5390	5540
Base machinery mass(kg)	Rubber track	4150	4300
	Steel track	4190	4340
Average ground bearing pressure(kg)	Rubber track	31 kPa	32 kPa
	Steel track	31 kPa	32 kPa

CAPACITY

Fuel		65 L
Hydraulic oil	Tank level	55 L
	Total quantity	72 L
Engine oil	Maximum	9.7 L
	Minimum	3.0 L
Coolant	Engine only	3.7 L
	Total quantity	10.1 L

BUCKET

45V4

◎: Standard, O: compatible, ×: not compatible

Bucket capacity (m^3)	Bucket width (mm)		No. of teeth	Mass (kg)	Compatibility		Applied	Specification
Heaped	With side cutter	Without side cutter			Standard arm	Long arm		
0.14	600	550	4	113	◎	×	Standard	General digging
0.08	400	350	3	89	O	O	OPT	Ditching
0.11	500	450	3	100	O	◎	OPT	(Long arm)
0.14	600	450	4	118	O	×	OPT	(Reinforced)
0.14	600	550	4	115	O	×	OPT	With hook
0.16	650	600	4	119	O	×	OPT	Loading

55V4

◎: Standard, O: compatible, ×: not compatible

Bucket capacity (m^3)	Bucket width (mm)		No. of teeth	Mass (kg)	Compatibility		Applied	Specification
Heaped	With side cutter	Without side cutter			Standard arm	Long arm		
0.16	650	600	4	119	◎	×	Standard	General digging
0.08	400	350	3	89	O	O	OPT	Ditching
0.11	500	450	3	100	O	O	OPT	Ditching
0.14	600	550	4	113	O	◎	OPT	(Long arm)
0.16	650	600	4	124	O	×	OPT	(Reinforced)
0.16	650	600	4	120	O	×	OPT	With hook
0.18	700	650	4	123	O	×	OPT	Loading

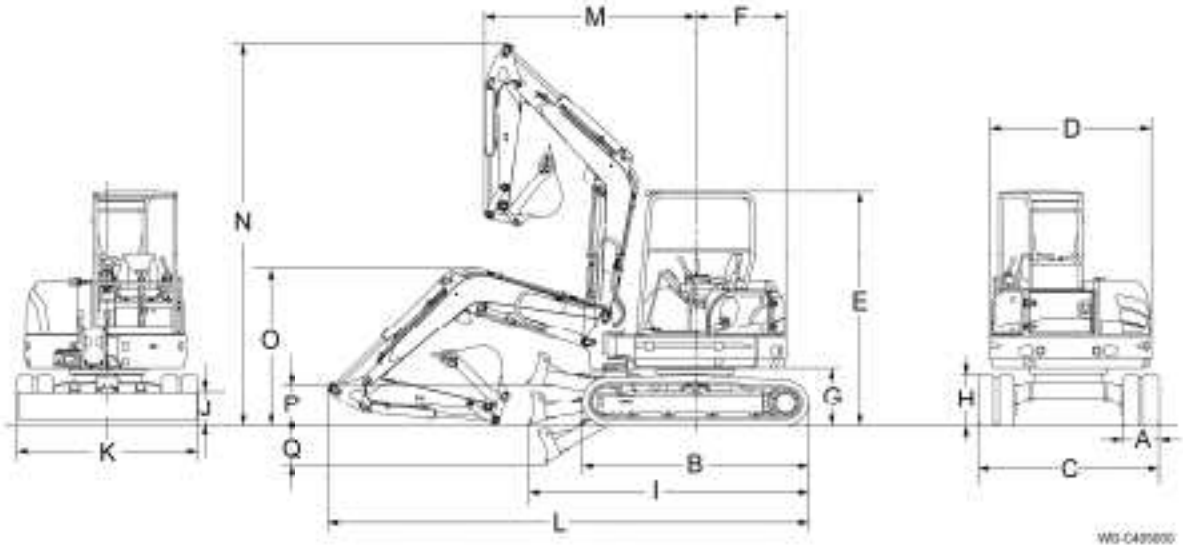
60V4

◎: Standard, O: compatible, ×: not compatible

Bucket capacity (m^3)	Bucket width (mm)		No. of teeth	Mass (kg)	Compatibility		Applied	Specification
Heaped	With side cutter	Without side cutter			Standard arm	Long arm		
0.16	700	650	4	123	◎	×	Standard	General digging
0.08	400	350	3	89	O	O	OPT	Ditching
0.11	500	450	3	100	O	O	OPT	Ditching
0.14	600	550	4	113	O	◎	OPT	(Long arm)
0.16	650	600	4	124	O	×	OPT	(Reinforced)
0.16	650	600	4	120	O	×	OPT	(With hook)

DIMENSIONS

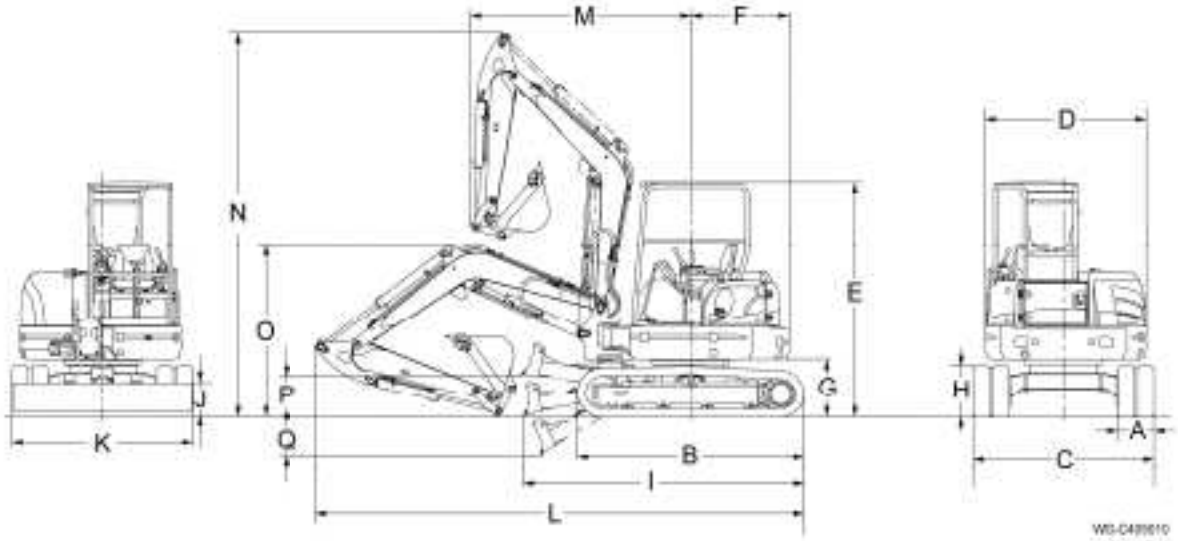
45V4



Unit: mm

Symbol	Name		4-post ROPS	Cabin
A	Crawler track width		400	400
B	Crawler overall length		2490	2490
C	Crawler overall width		1990	1990
D	Upper structure overall width		1780	1790
E	Overall height of base machine		2570	2570
F	Swing radius		995	995
G	Clearance height under upper structure		640	640
H	Ground clearance of undercarriage		320	320
I	Undercarriage overall length		3090	3090
J	Blade height		385	385
K	Blade width		1990	1990
L	Overall length	Blade forward	5280	5280
		Blade backward	5890	5890
M	Minimum radius of equipment and attachment		2320	2320
N	Overall height at minimum radius of equipment and attachment		4180	4180
O	Attachment height in transport posture		1720	1720
P	Blade maximum lifting		460	460
Q	Blade maximum lowering		430	430

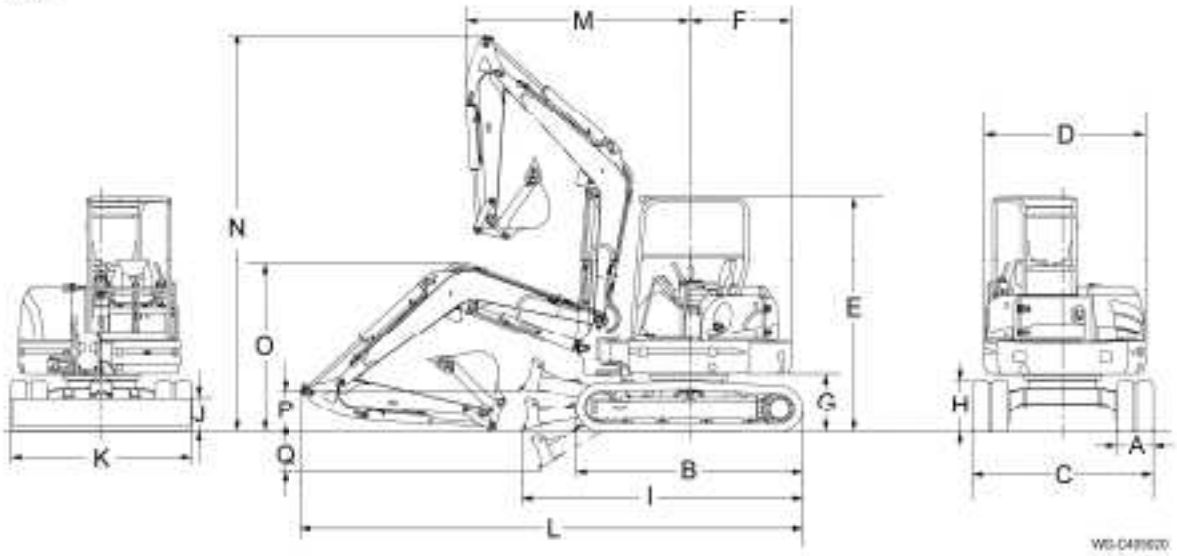
55V4



Unit: mm

Symbol	Name		4-post ROPS	Cabin
A	Crawler track width		400	400
B	Crawler overall length		2490	2490
C	Crawler overall width		1990	1990
D	Upper structure overall width		1780	1790
E	Overall height of base machine		2570	2570
F	Swing radius		1090	1090
G	Clearance height under upper structure		640	640
H	Ground clearance of undercarriage		320	320
I	Undercarriage overall length		3090	3090
J	Blade height		385	385
K	Blade width		1990	1990
L	Overall length	Blade forward	5370	5370
		Blade backward	5970	5970
M	Minimum radius of equipment and attachment		2420	2420
N	Overall height at minimum radius of equipment and attachment		4210	4210
O	Attachment height in transport posture		1875	1875
P	Blade maximum lifting		460	460
Q	Blade maximum lowering		430	430

60V4



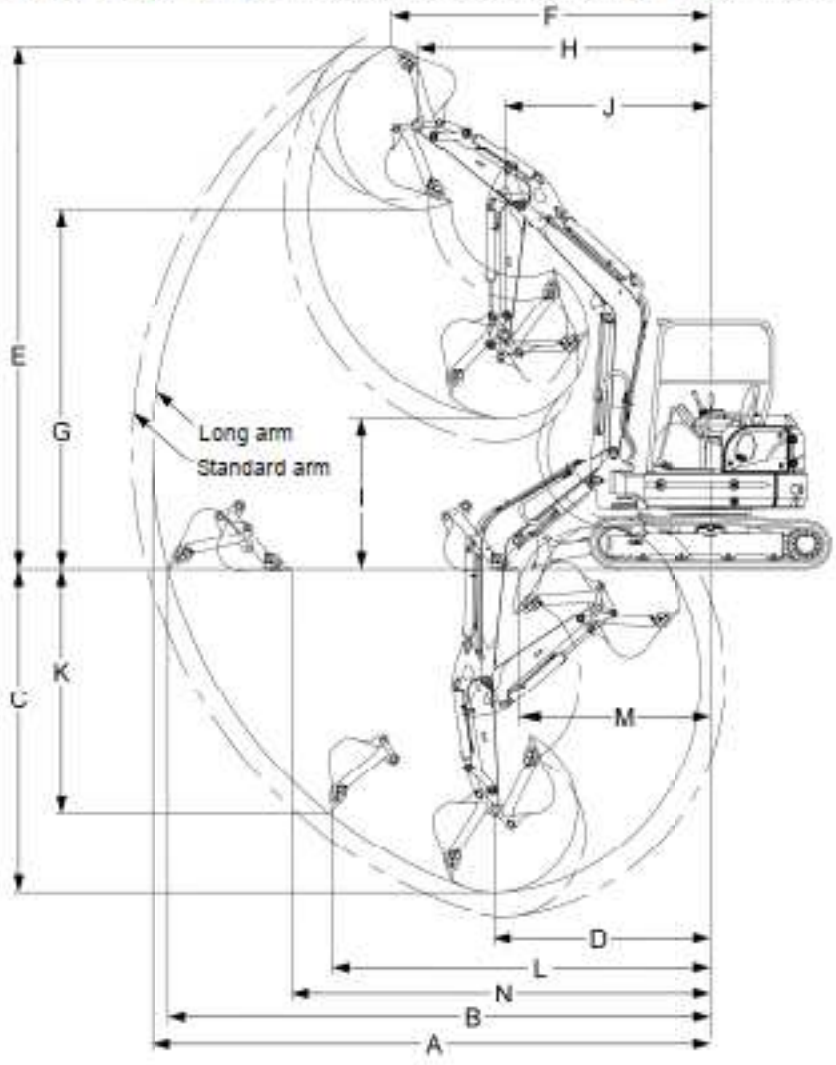
Unit: mm

Symbol	Name		4-post ROPS	Cabin
A	Crawler track width		400	400
B	Crawler overall length		2490	2490
C	Crawler overall width		1990	1990
D	Upper structure overall width		1780	1790
E	Overall height of base machine		2570	2570
F	Swing radius		1120	1120
G	Clearance height under upper structure		640	640
H	Ground clearance of undercarriage		320	320
I	Undercarriage overall length		3090	3090
J	Blade height		385	385
K	Blade width		1990	1990
L	Overall length	Blade forward	5510	5510
		Blade backward	6120	6120
M	Minimum radius of equipment and attachment		2450	2450
N	Overall height at minimum radius of equipment and attachment		4360	4360
O	Attachment height in transport posture		1835	1835
P	Blade maximum lifting		460	460
Q	Blade maximum lowering		430	430

WORKING RANGE

The operating range is common to 4-post canopy, 2-post canopy, and cabin models.

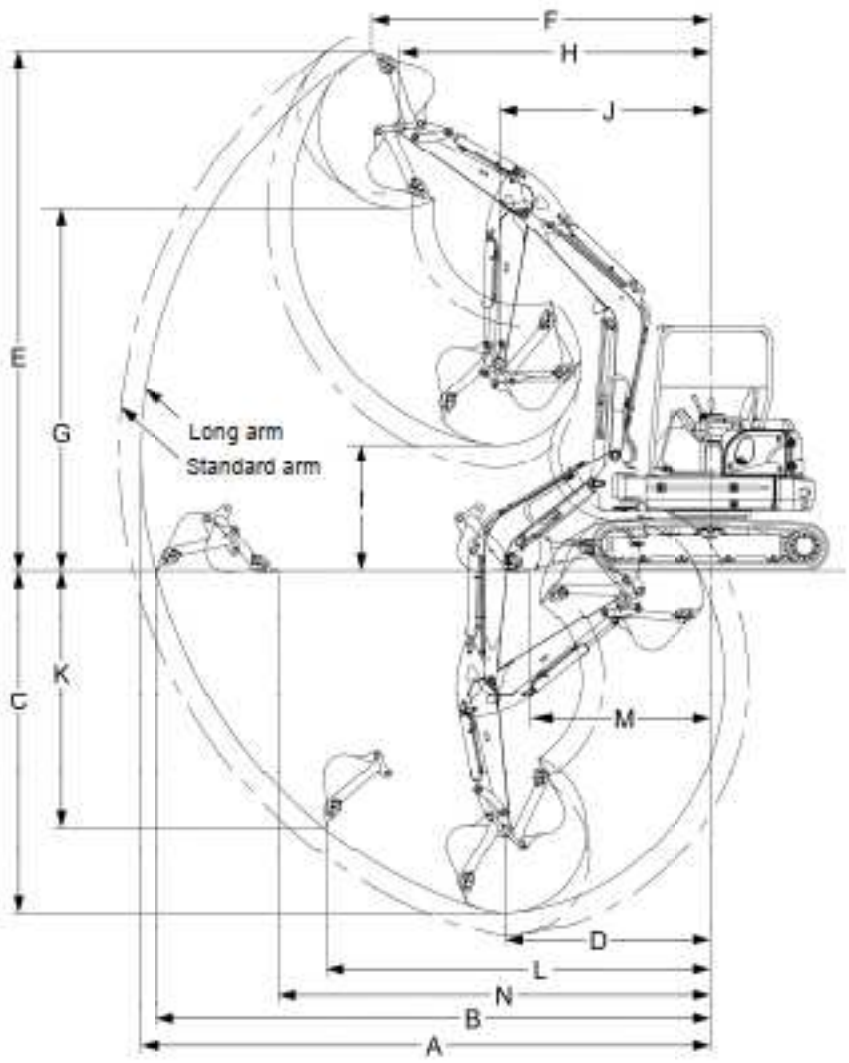
45V4



Unit: mm

Symbol	Name	Standard arm	Long arm
A	Maximum reach	5760	5970
B	Maximum reach at ground reference plane	5600	5810
C	Maximum digging depth	3340	3590
D	Reach at maximum digging depth	2190	2140
E	Maximum height of cutting edge	5380	5470
F	Reach at maximum height	3290	3560
G	Maximum dumping height	3720	3820
H	Reach at maximum dumping height	3020	3260
I	Minimum dumping height	1560	1330
J	Reach at minimum dumping height	2120	2210
K	Maximum vertical digging depth	2520	2690
L	Reach at maximum vertical digging depth	3910	4020
M	Minimum level floor radius	1980	1880
N	Maximum level floor radius	4320	4520

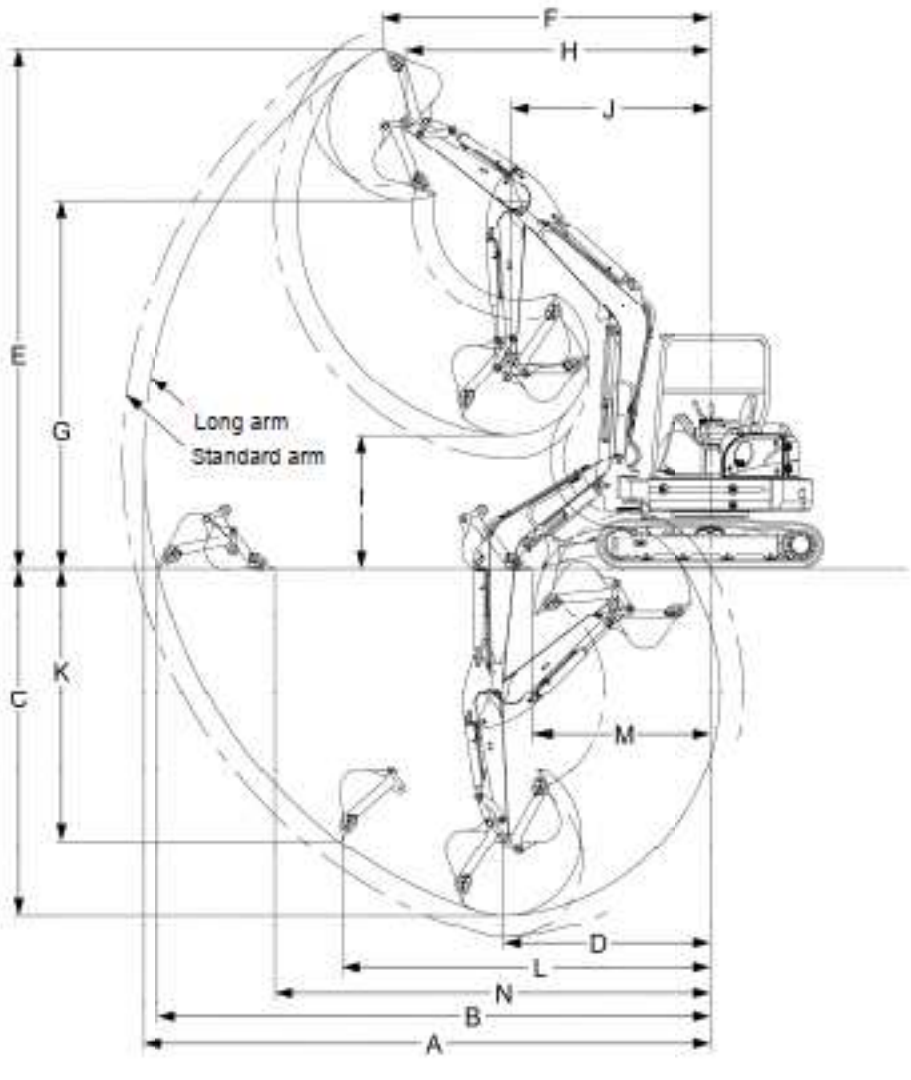
55V4



Unit: mm

Symbol	Name	Standard arm	Long arm
A	Maximum reach	5970	6200
B	Maximum reach at ground reference plane	5810	6050
C	Maximum digging depth	3590	3830
D	Reach at maximum digging depth	2140	2120
E	Maximum height of cutting edge	5470	5610
F	Reach at maximum height	3560	3760
G	Maximum dumping height	3820	3960
H	Reach at maximum dumping height	3260	3460
I	Minimum dumping height	1330	1080
J	Reach at minimum dumping height	2210	2250
K	Maximum vertical digging depth	2690	2930
L	Reach at maximum vertical digging depth	4020	4080
M	Minimum level floor radius	1880	1770
N	Maximum level floor radius	4520	4760

60V4

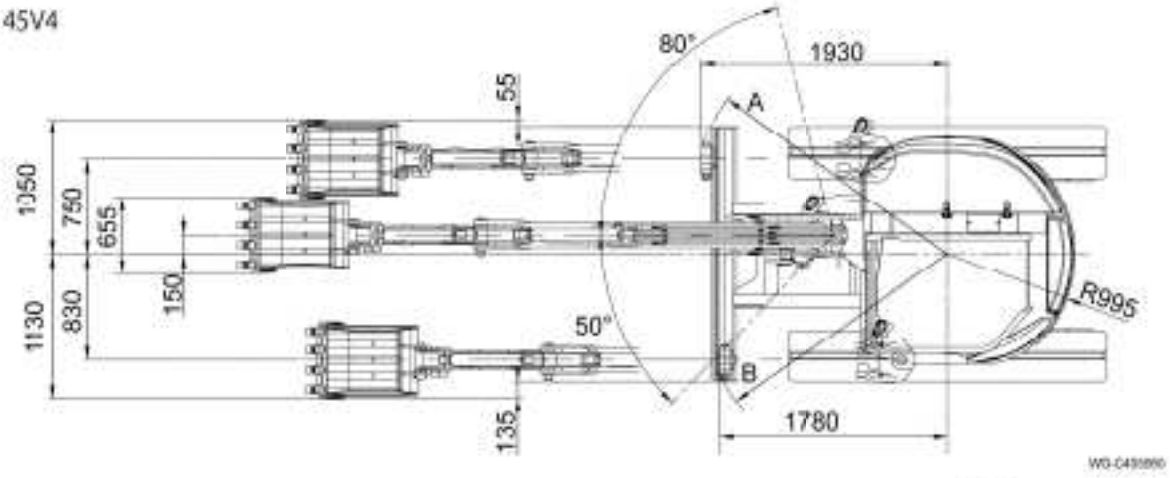


Unit: mm

Symbol	Name	Standard arm	Long arm
A	Maximum reach	6200	6440
B	Maximum reach at ground reference plane	6060	6300
C	Maximum digging depth	3800	4040
D	Reach at maximum digging depth	1960	2250
E	Maximum height of cutting edge	5710	5860
F	Reach at maximum height	3590	3790
G	Maximum dumping height	4050	4200
H	Reach at maximum dumping height	3340	3530
I	Minimum dumping height	1470	1220
J	Reach at minimum dumping height	2180	2190
K	Maximum vertical digging depth	2980	3220
L	Reach at maximum vertical digging depth	4030	4090
M	Minimum level floor radius	1960	1800
N	Maximum level floor radius	4770	5010

WORKING RANGE FOR OFFSET DIGGING

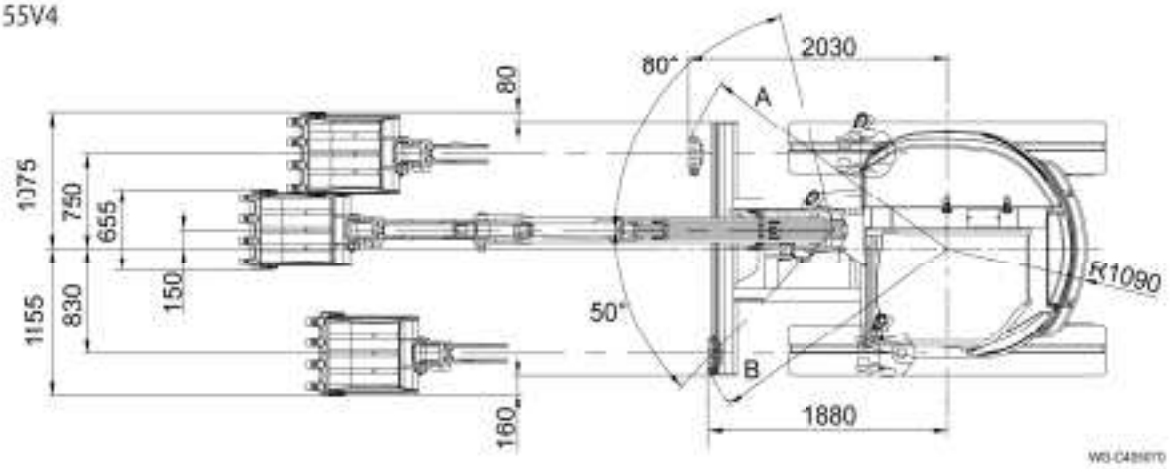
45V4



Unit: mm

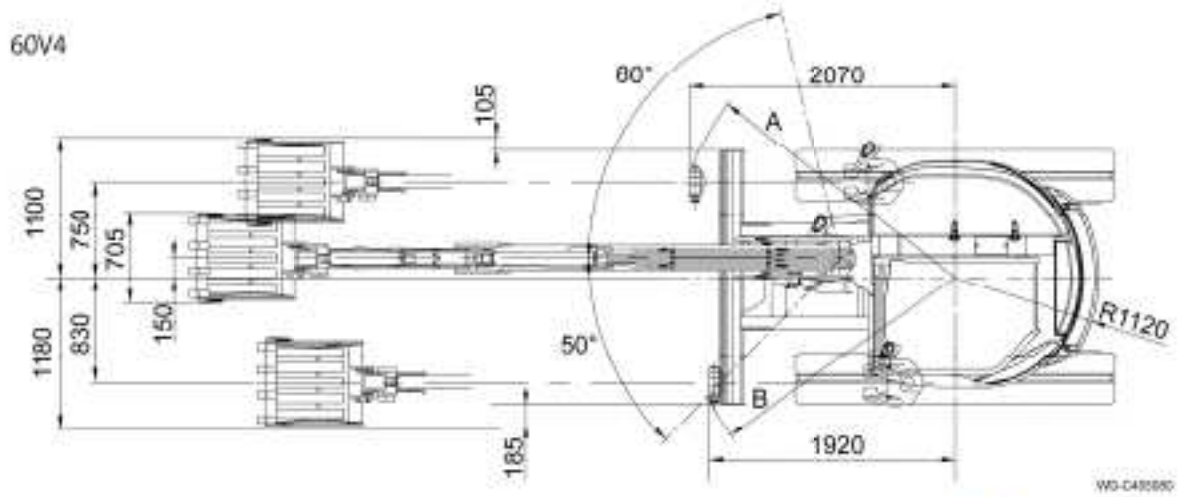
		45V4	
		Standard arm	Long arm
Minimum radius of equipment at maximum front offset	A	2100	2190
	B	2010	2100

55V4



Unit: mm

		55V4	
		Standard arm	Long arm
Minimum radius of equipment at maximum front offset	A	2190	2230
	B	2100	2130

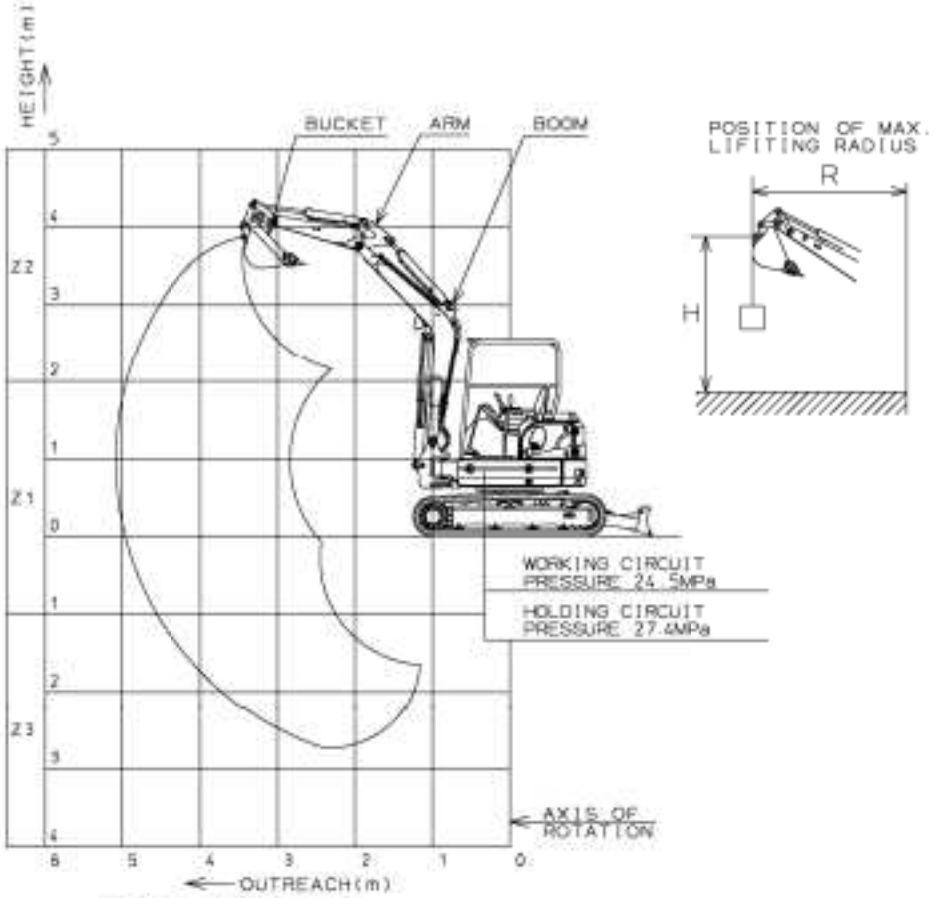


Unit: mm

		60V4	
		Standard arm	Long arm
Minimum radius of equipment at maximum front offset	A	2230	2250
	B	2130	2150

RATED OBJECT HANDLING CAPACITIES TABLE

45V4



WORKING CONDITIONS:
-WITH BUCKET.
-ON A COMPACT HORIZONTAL LEVEL GROUND
-IN COMPLETE SWING OF THE UPPERSTRUCTURE
THESE LOADS ARE VALUE FOR THE HEIGHT OF THE CONSIDERED ZONE(Z.) FOR THE INTENDED OUTREACH

OUTREACH EN m - LOADS EN kg		STANDARD							
OUTREACH(m)		5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0
BOOM LENGTH 2.70m	Z2			600	700	800			
	Z1		400	600	700	800	1100	1400	
ARM RENGTH 1.35/1.60m	Z3			500	600	800	1000	1300	1900

OUTREACH EN m - LOADS EN kg		ADDITIONAL							
OUTREACH(m)		5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0
BOOM LENGTH 2.70m	Z2			700	800	900			
	Z1		500	700	800	1000	1200	1600	
ARM RENGTH 1.35/1.60m	Z3			600	700	900	1100	1500	1900

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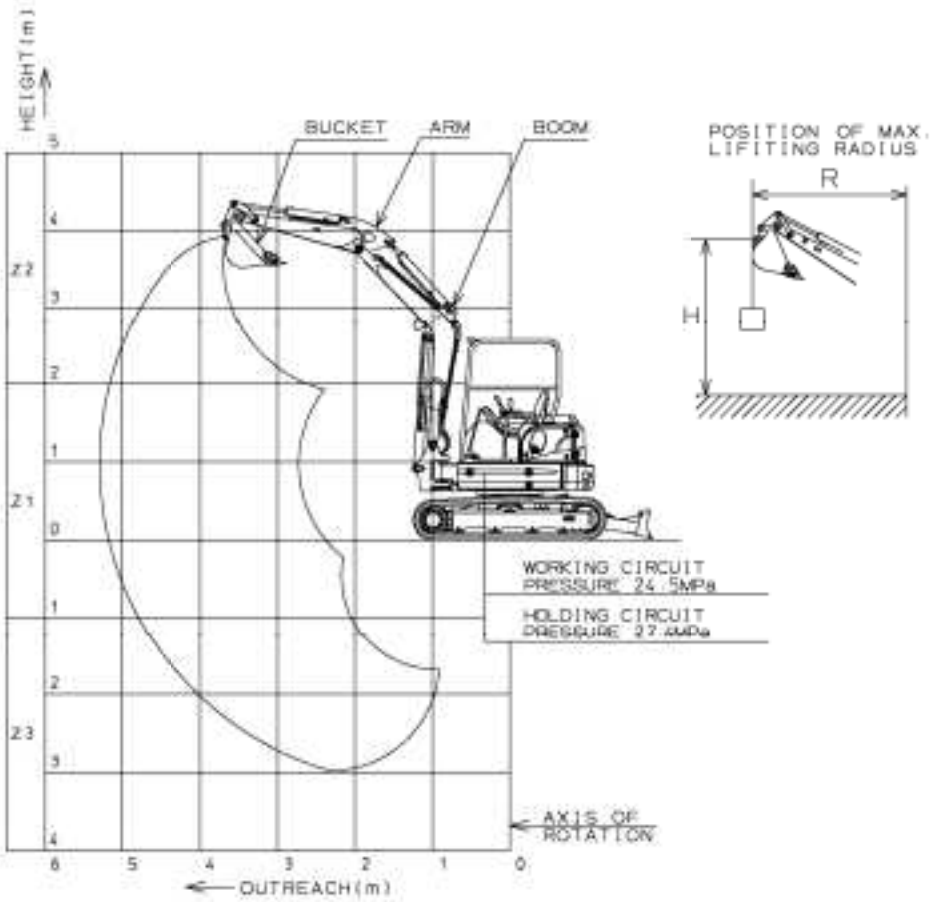
55V4



WORKING CONDITIONS:
-WITH BUCKET
-ON A COMPACT HORIZONTAL LEVEL GROUND
-IN COMPLETE SWING OF THE UPPERSTRUCTURE
THESE LOADS ARE VALUE FOR THE HEIGHT OF THE CONSIDERED ZONE(Z.) FOR THE INTENDED OUTREACH

OUTREACH EN m - LOADS EN kg		STANDARD							
OUTREACH(m)		5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0
BOOM LENGTH 2.70m	Z2		500	700	800	900			
	Z1		500	700	800	1000	1200	1600	
ARM RENGTH 1.60/1.85m	Z3			600	700	900	1100	1500	

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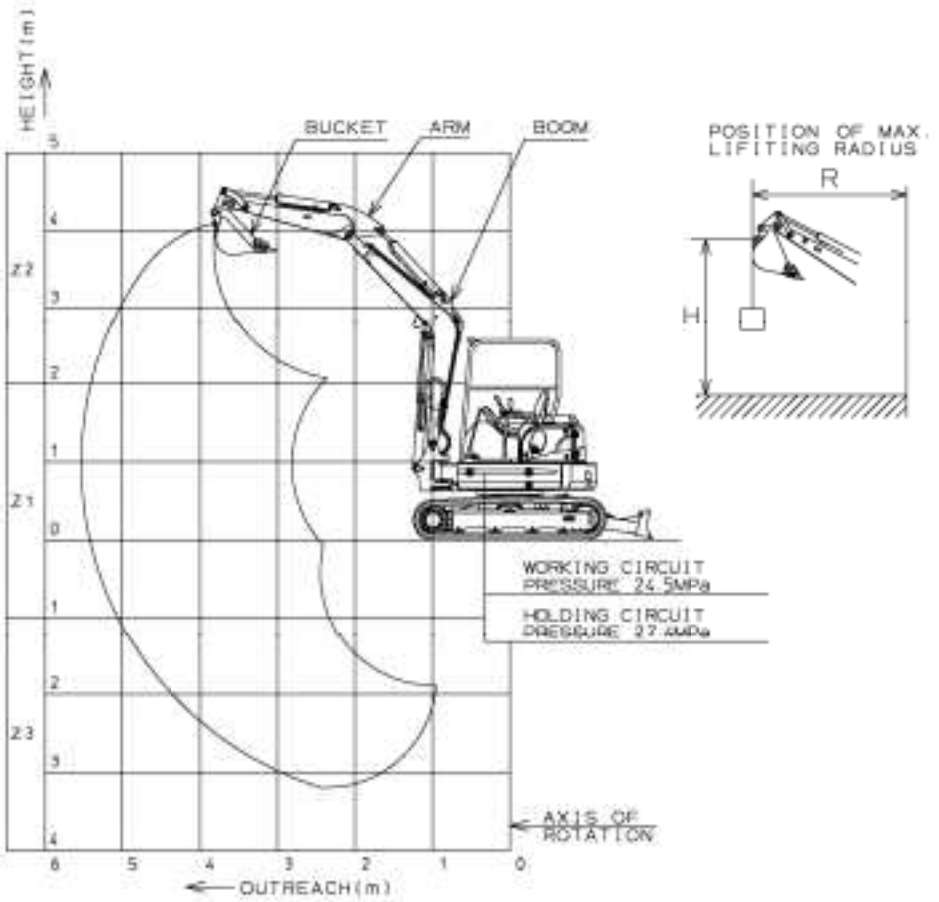
60V4



WORKING CONDITIONS:
-WITH BUCKET
-ON A COMPACT HORIZONTAL LEVEL GROUND
-IN COMPLETE SWING OF THE UPPERSTRUCTURE
THESE LOADS ARE VALUE FOR THE HEIGHT OF THE CONSIDERED ZONE(Z.) FOR THE INTENDED OUTREACH

OUTREACH EN m - LOADS EN kg		STANDARD							
OUTREACH(m)		5.5	5.0	4.5	4.0	3.5	3.0	2.5	2.0
BOOM LENGTH 2.90m	Z2		600	800	800	1000			
	Z1	500	600	800	900	1100	1400	1900	
ARM RENGTH 1.60/1.85m	Z3		600	700	800	1000	1300	1700	1900

D40844400

Original Instructions

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取　扱　説　明　書
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