YANMAR

# OPERATION & MAINTENANCE MANUAL

# EXCAVATOR

## ViO27-5

## ViO35-5

ViO27-5 : S/N 50501 & Above
ViO35-5 : S/N 50501 & Above

# 13. Operating Instructions

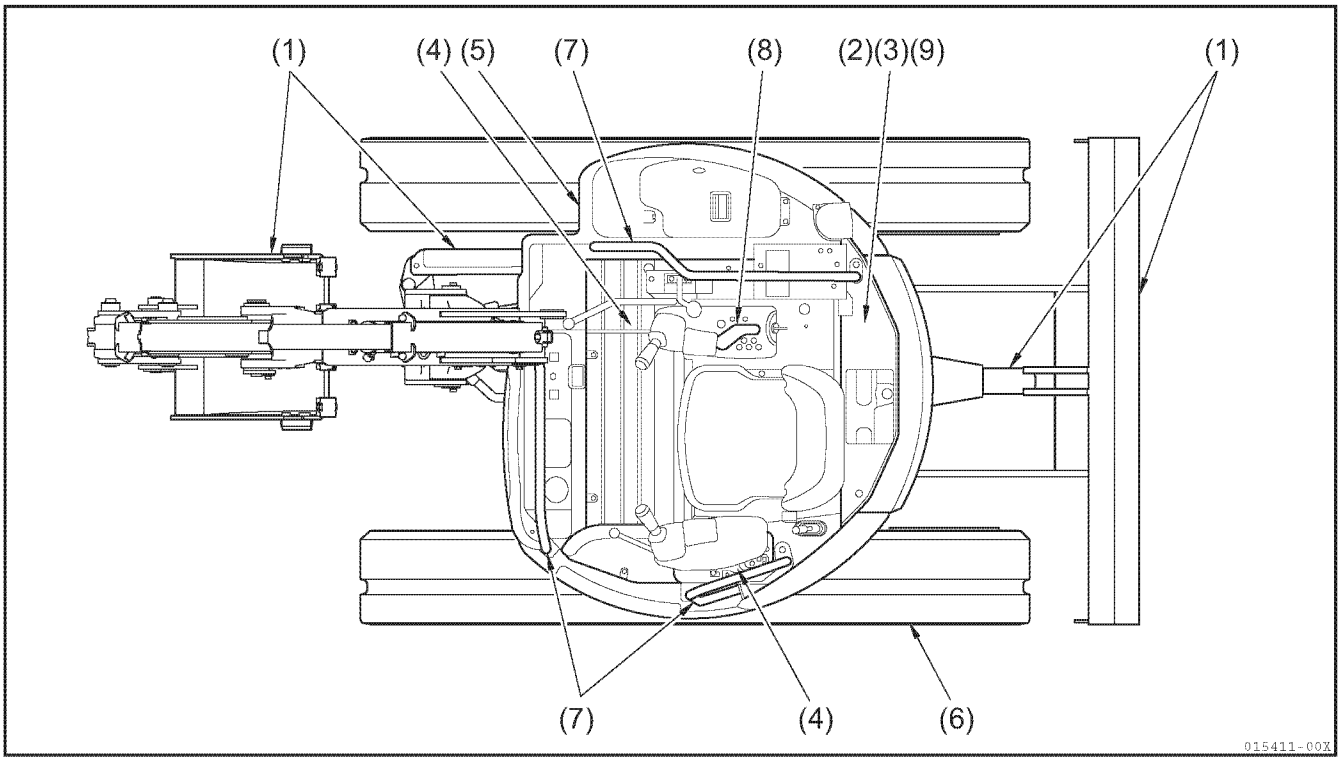
## 13-1. Checking before starting the engine

### 13-1-1. Walking check (visual inspection) around the machine

**⚠ WARNING**

- **If there are any combustibles in any heat build-up areas, or if there are any fuel and/or oil leaks, a fire can result.**
- **Check for possible fire causes carefully. If there is anything abnormal, be sure to take corrective action or contact your dealer.**

Before starting the engine, visually check the outside and underside of the machine as follows:
Check bolts and nuts for loose connections; check the fuel, oil, and water for leaks; and also check the implement and the hydraulic system to see that they are operating properly. In addition, check the electrical wiring for loose connections and for dust deposits in the heat build-up areas.
Check the following points before initial start-up for the day.




**(1) Checking the implement, hydraulic cylinders, linkages, and hoses for damage, wear and loose connections**

Check the implement, hydraulic cylinders, linkages, and hoses for damage, wear and loose connections. If any abnormality is found, take corrective action.

**(2) Removing dust deposits from around the engine, battery, and radiator**

Check that there are no dust deposits around the engine or on the radiator, and that there are no combustibles (dead leaves, twigs, etc.) in the heat build-up areas, such as the engine muffler, or around the battery. If there are any, remove them.

**(3) Checking the engine and its accessories for oil or water leakage**

Check the engine for oil leakage and the cooling water system for water leakage.
If oil or water leakage is found, take a corrective action.

**(4) Checking the hydraulic system, hydraulic oil tank, hoses, and joints for oil leakage**

Check for oil leakage. If oil leakage is found, take corrective action.

**(5) Checking the grease piping for grease leakage**

Check for grease leakage or ooze. If grease leakage or ooze is found, take corrective action.

**(6) Checking the undercarriage (tracks, sprockets, and idlers) for breakage, wear, loose bolts, and oil leakage around the rollers**

If any breakage or wear is found, correct it. Retighten the bolts if necessary.
If oil leakage is found, take corrective action.

**(7) Checking the handrails and steps for breakage and loose bolts.**

If any breakage is found, take corrective action. Retighten the bolts if necessary.

**(8) Checking the gauges and the monitor for breakage and loose bolts**

Check the gauges and the monitor for breakage and loose bolts. If any abnormality is found, replace the gauge or the monitor with a new one, or retighten the bolts if necessary. Clean the surfaces of the gauges and monitor.

**(9) Checking the fuel filter to see whether the red ring has sunk down at the cup bottom**

If the red ring has sunk down at the cup bottom, no water has mixed into the oil; if the red ring is floating in the cup, water is mixed into the oil under the red ring. In this case, take out the cup to remove the water.

### 13-1-2. Checking before start-up

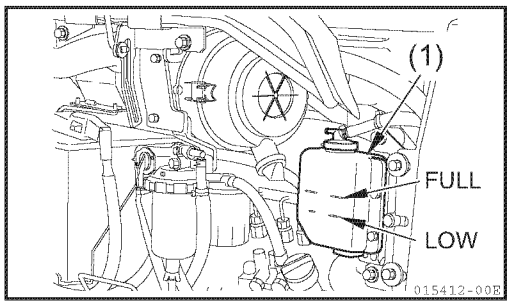
Check the following points before initial start-up for the day.

■ **Checking and replenishing the cooling water**

**⚠ WARNING**

- **Do not remove the fill cap from the radiator unless refilling the coolant.**
- **Check the coolant water level in the sub-tank when the engine is cool.**

1) Open the engine hood rear cover. Then check that the cooling water lever in the sub-tank (1) (illustrated in the right figure) is between the FULL and LOW marks. If the water level is below the LOW mark, refill the sub-tank up to the FULL mark through the water supply port of the sub-tank (1).
   For the quality of cooling water to be used, refer to Section "21. Fueling, Oiling and Greasing Based on Temperature Range".
2) After replenishing, securely tighten the radiator cap.
3) If the sub-tank is empty, check it for water leakage, and then, check the water level in the radiator.
   If the water level is low, refill the radiator first, then refill the sub-tank.
4) If the cooling water level is appropriate, close the engine hood rear cover.



## ■ Checking and replenishing the engine oil

**⚠ WARNING**

- **At operating temperature, oil and dipstick areas are hot.**
  **Do not allow hot oil or components to contact skin to prevent bodily injury.**
- **Check oil level and refill oil after engine has cooled down.**

1) Open the engine hood rear cover and securely lock it with the stopper.

2) Pick up the dipstick (G) and wipe it with a rag to remove oil deposits.

3) Insert the dipstick (G) into the dipstick tube fully, then draw it out.

4) If the dipstick (G) is wet above the midpoint between the H and L marks, the engine oil level is appropriate. If the oil level is below the midpoint between the H and L marks, supply engine oil through the oil supply port (F). For the quality of the engine oil to be used, refer to Section "21. Fueling, Oiling and Greasing Based on Temperature Range".

5) If the engine oil level is above the H mark, remove the excessive amount of oil through the drain plug (P), then recheck the engine oil level.

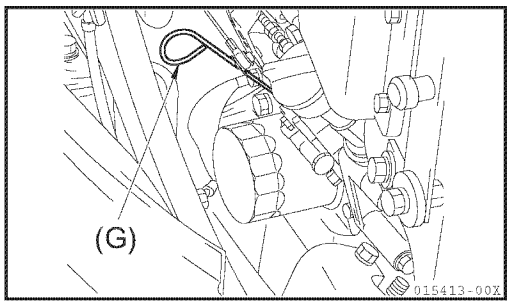
6) After verifying that the amount of engine oil is appropriate, securely retighten the oil supply port cap and close the engine hood rear cover.

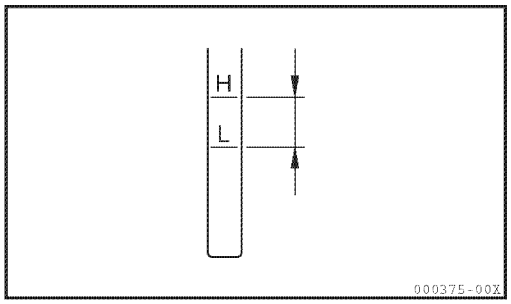
***Note :***

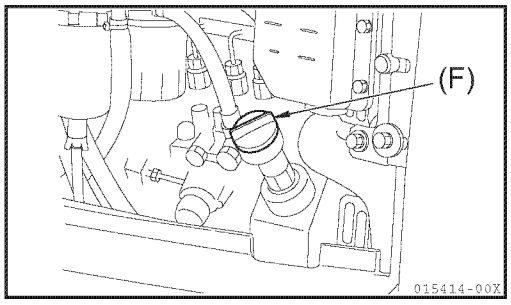
*When checking the engine oil level after starting up the engine, stop the engine and allow more than 15 minutes for the engine to cool down.*

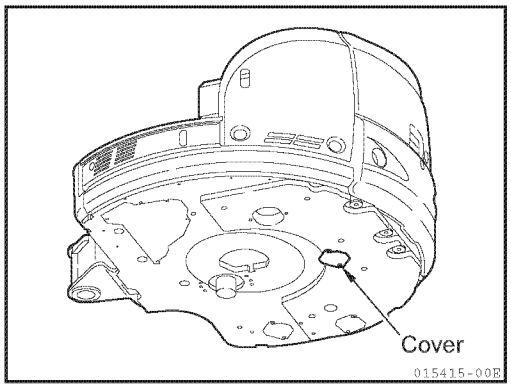
*If the machine is slanted, reposition the machine to ensure it is level before checking the engine oil level.*

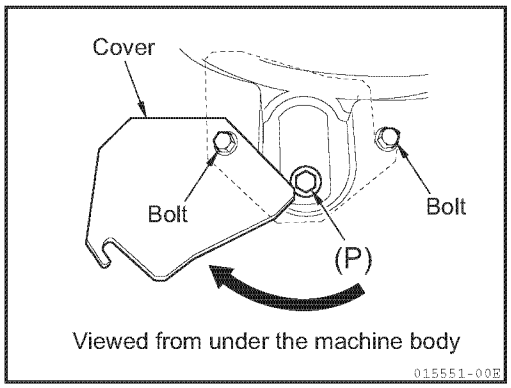
*Keep in mind that the excess engine oil must not be disposed of on the ground or the road.*



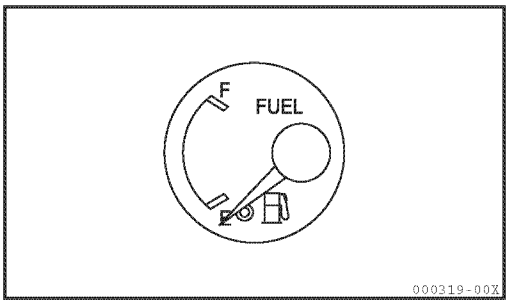



■ **Checking the fuel level in the fuel tank and refueling**



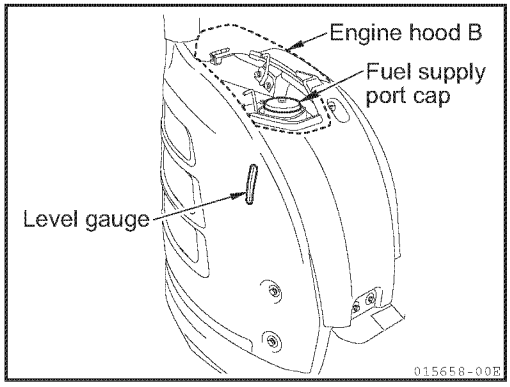

**⚠ WARNING**

**Be careful not to overfill the fuel tank because it could cause a fire. If the tank is overfilled, completely wipe off the spilled fuel.**

**⚠ CAUTION**

- **Do not remove the strainer from the fuel supply port of the fuel tank to refill the tank.**
- **Be careful not to allow water settled at the bottom of the fuel container or dirt on refueling equipment to enter into the fuel tank.**

1) Turn the starter switch to the “ON” position, and check the fuel level with the fuel gauge. Open the engine hood B, and supply fuel from the fuel supply port while checking the level gauge.

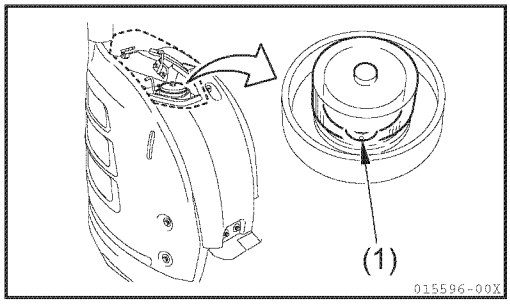



When the fuel gauge pointer indicates “E”, approximately 2 Gals. (8 L) of fuel is left in the tank.

Capacity : 11 Gals. (42 L)

For the quality of the fuel to be used, refer to Section "21. Fueling, Oiling and Greasing Based on Temperature Range".

2) After refueling, securely retighten the fuel supply port cap, and close the engine hood B.




***Note :***

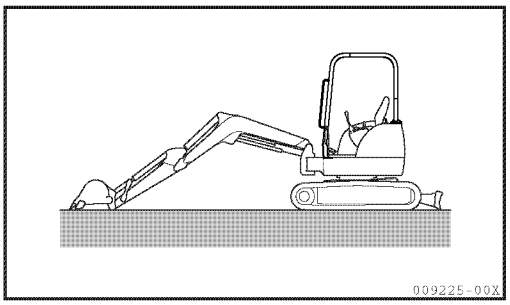
*If the breather hole (1) in the cap is clogged, the pressure in the tank may decrease and the fuel may not be supplied adequately to the engine. Clean the engine breather hole from time to time.*

## ■ Checking and replenishing the hydraulic oil tank

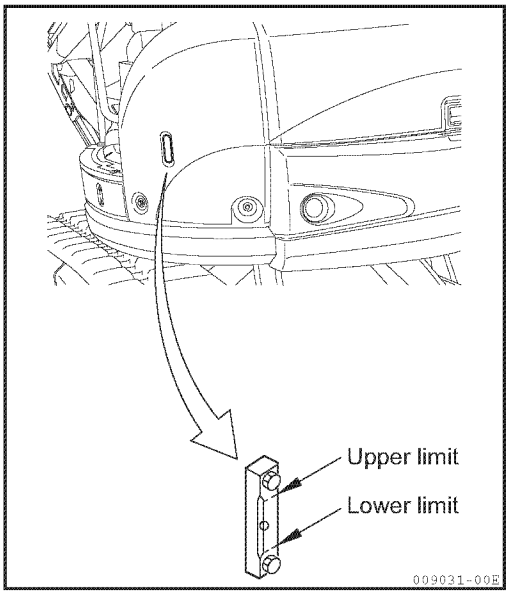
**⚠ WARNING**

**When removing the plug of the oil supply port, slowly loosen it to release the pressure in the tank to prevent a dangerous high-pressure leak.**

1) Park the machine as illustrated in the right figure.
   When the machine is not in the posture in the right figure, start the engine, retract the bucket and arm cylinders to their stroke ends at low speed, lower the boom until the bucket teeth is placed on the ground, lower the blade to the ground, and stop the engine.




2) Check the oil level with the oil level gauge on the left side of the machine. The oil level must be between the upper and lower limit marks on the gauge.

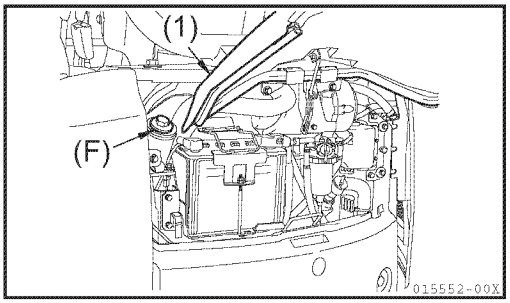



**IMPORTANT**

**Do not replenish hydraulic oil above the upper limit mark on the oil level gauge. An excessive amount of hydraulic oil may damage the hydraulic system by placing stress on its components, causing a dangerous high-pressure leak.**

3) Open the engine hood rear cover (1) to replenish oil from the oil supply port (F) if the oil level is below the lower limit.

   For the quality of the oil to be used, refer to Section "21. Fueling, Oiling and Greasing Based on Temperature Range".




***Note :***

*Note that the oil level varies with the oil temperature. When reading the oil level, follow these guidelines:*

- *Before start-up, the oil level gauge should read the level around the midpoint of the gauge scale [oil temperature : 50 to 86°F (10 to 30°C)].*
- *During normal operation, the oil level gauge should read the level around the upper limit mark of the gauge scale [oil temperature : 122 to 176°F (50 to 80°C)].*

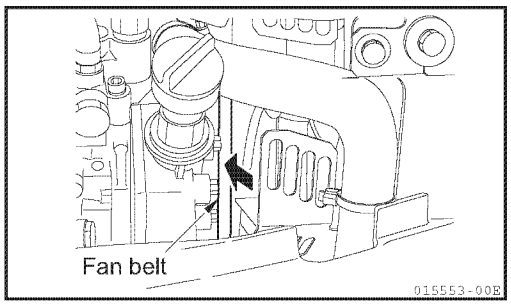
### ■ Checking the fan belt tension

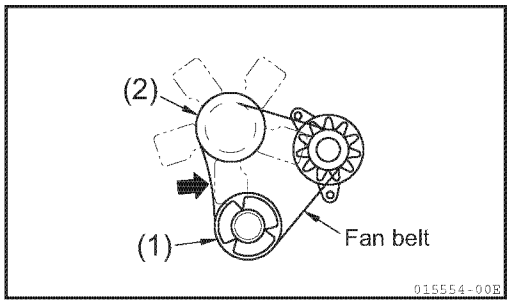
1) Open the engine hood rear cover.

2) Press down the fan belt between the crankshaft pulley (1) and the fan pulley (2) with a finger to check the fan belt tension.
   Pressing load : Approximately 22.1 lbs. (10 kgf)
   Adequate slack : 0.39 to 0.59 in. (10 to 15 mm)

3) Adjust the tension if necessary.
   Refer to Section "25-6. Maintenance every 250 service hours" for the adjustment procedure.

4) When the tension is proper, close the engine hood rear cover.



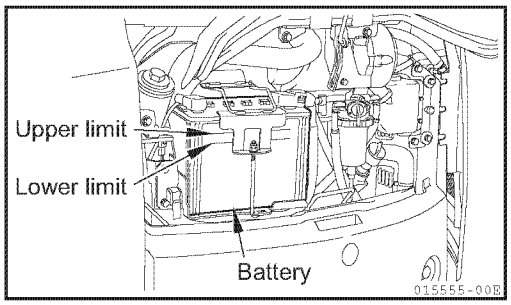

### ■ Checking and replenishing the battery electrolyte

**⚠ DANGER**

- **The battery generates flammable gas and can cause a fire and an explosion.**
  **Keep sparks, flames and lit cigarettes away from the battery.**
- **Battery electrolyte is strong acid. To avoid serious injury, do not allow the electrolyte to contact your skin or splash into your eyes.**
- **Always wear safety goggles and protective clothing, when adding electrolyte.**
- **Do not use the machine with the battery which is short of battery electrolyte. The shortage of battery electrolyte not only will reduce the life of the battery but also could cause an explosion.**

1) Open the engine hood rear cover to check the electrolyte level. The level must be between the upper and lower level marks.

2) If the electrolyte level is lower than the lower level mark, replenish it.



## ■ Greasing

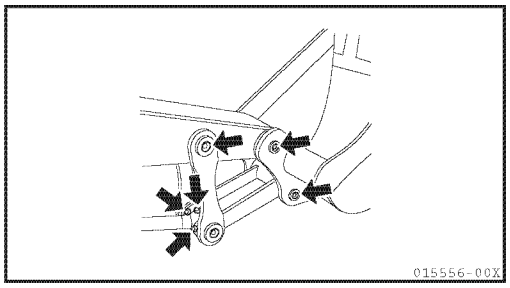
**IMPORTANT**

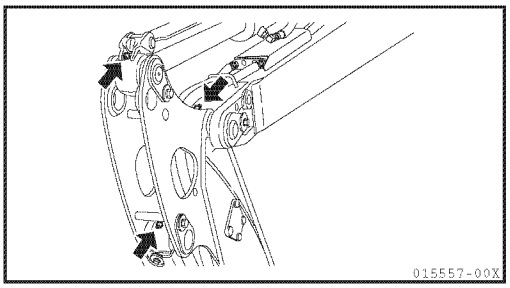
**Grease the fittings thoroughly after washing the machine or after operation in rain, on soft ground, or in muddy water.**

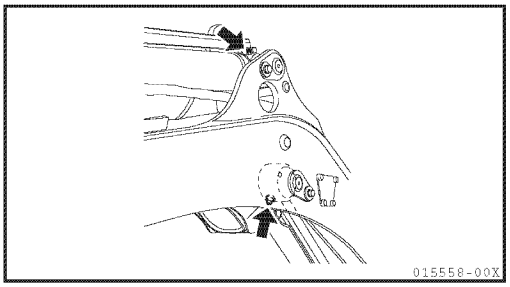
1) Put the bucket and the blade on the ground and stop the engine.
2) Clean the grease nipples indicated with the arrows in the right figures and grease them using a grease gun.
3) After greasing, wipe off the excessive grease with waste cloth or the like.

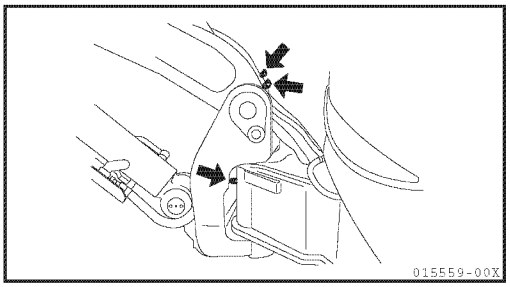
Refer to Section "13-14-10. Maintenance" for the quick coupler.

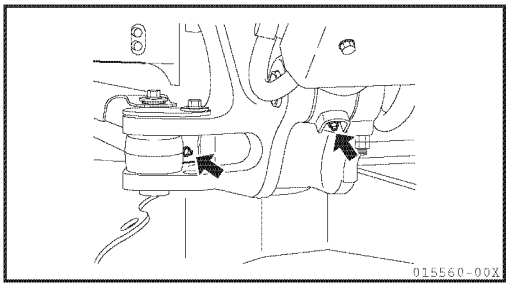
## ■ Implement



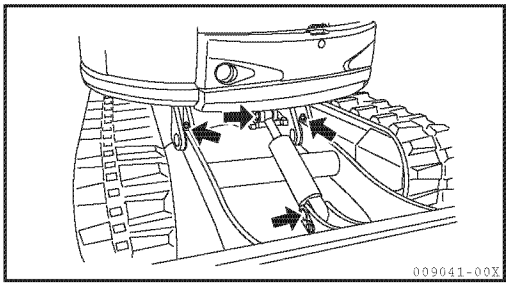




## ■ Blade



## ■ Checking the electrical equipment

**⚠ CAUTION**

**If a fuse blows out frequently, contact your dealer for assistance.**

Check fuses for damage, wiring for poor connections or short circuits, and battery terminals for corrosion or loose fits. Take corrective action.

Check the following items after the starter switch is turned to the "ON" position.

1) Check the monitor functions
- Check the fuel gauge, the water temp. meter and the hourmeter function.
- Check engine oil pressure alarm lamp, battery charge alarm lamp and water temperature alarm lamp for lighting.

2) Check that all switches function correctly and lamps light correctly.
- Check the headlight and the boom light.
- Check the wiper function. (for cabin)
- Check the room lamp for lighting. (for cabin)
- Check the heater function. (for cabin)

3) Check the travel alarm function.
- To check the travel alarm function, push or pull the travel levers after the lock levers are unlocked.

### 13-1-3. Operating and checking instructions before starting up the engine

**⚠ WARNING**

- **Accidentally operating a control lever can cause the machine to move suddenly, possibly causing a serious accident.**
- **When leaving the operator's seat, be sure to place the lock levers securely in the lock position.**

1) Check that the lock levers (1) are in the lock position.

***Note :***

*When both the lock levers are in the unlock position, the engine cannot be started. Pull either lock lever up to start the engine.*

2) Check that all other levers are in their appropriate positions.

3) Fasten the seatbelt snugly.

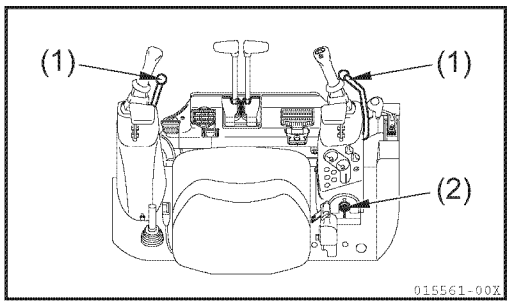
4) Insert the key into the starter switch (2) and set it to the "ON" position. Then check the following points:

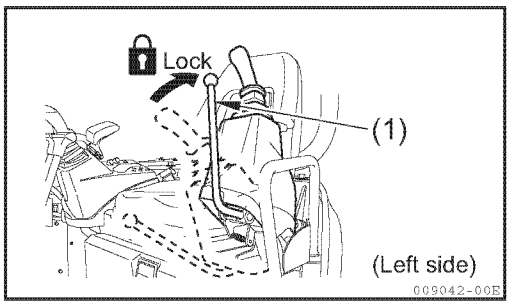
[1] The buzzer will sound, and the following alarm lamps will go on.

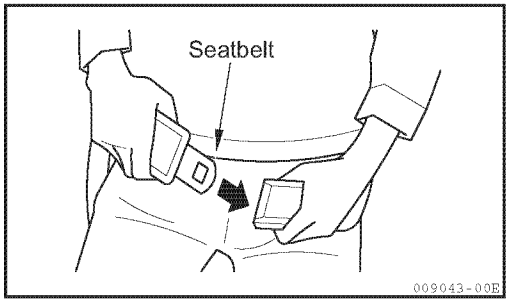
- Engine oil pressure alarm lamp (3)
- Battery charge alarm lamp (4)
- Water temp. alarm lamp (5) (turns off in 2 to 3 seconds)

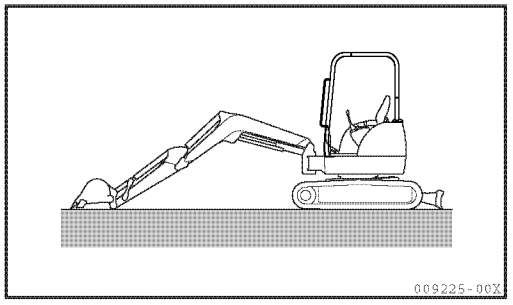
If any of the alarm lamps does not go on or the buzzer does not sound, it may mean that the alarm lamp has blown out or the wire is broken. In this event, ask the dealer for repair.

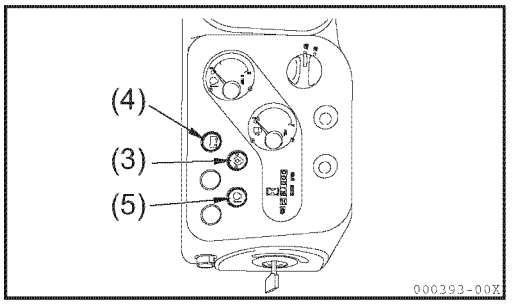
[2] Position the light switch to "ON" whether the head light and boom light will go on. If they do not go on, the lamp might have blown out or the wire might be broken. In this event, ask the dealer for repair.

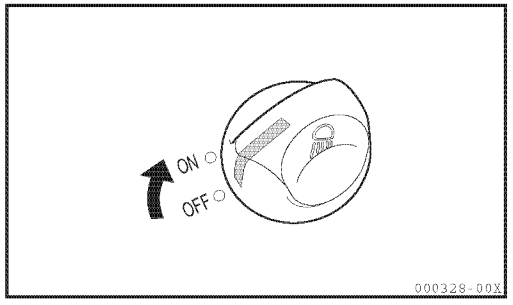


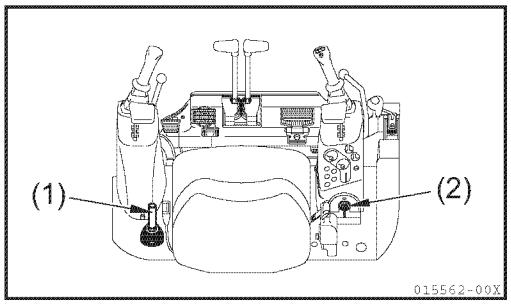



## 13-2. Starting up the engine

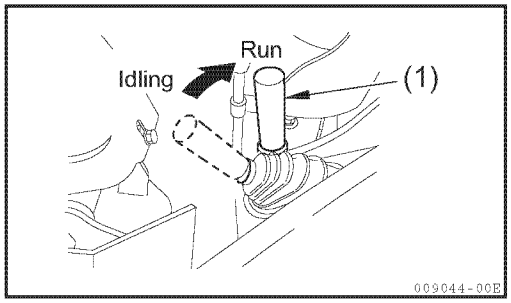
### 13-2-1. Normal start-up

**⚠ WARNING**

- **First check that there are no people or obstacles around the machine.**
  **Then sound the horn and start the engine.**
- **Be sure that you are seated in the operator's seat when starting the engine.**
- **When starting the engine in an enclosed place, be sure that there is adequate ventilation so that the exhaust gases can escape.**

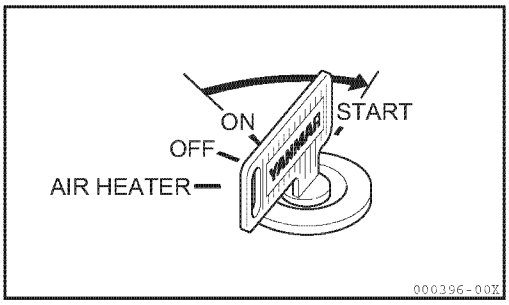



1) Pull the accelerator lever (1) back to the "RUN" position.

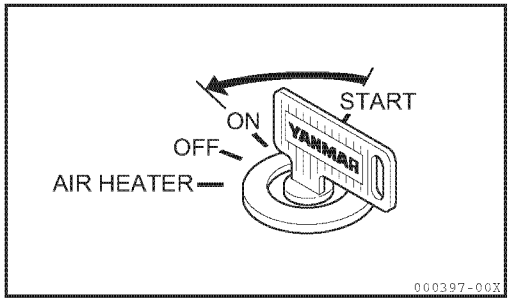



2) Set the key in the starter switch (2) to the "START" position. The engine will start.

3) After the engine has started, let go of the starter switch key.
   The starter switch key will return to the "ON" position by itself.

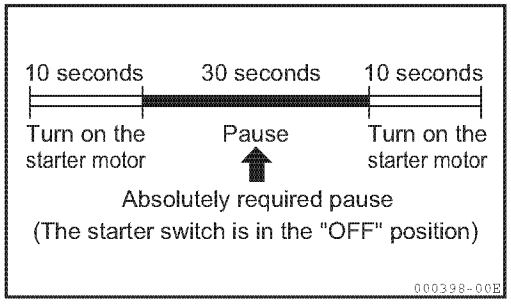



***Note :***
*When the engine is warm, the engine can start up even if the accelerator lever is left in the "IDLING" position.*




**IMPORTANT**
**To protect the starter motor and the battery:**

- **Do not keep the key in the "START" position for more than 10 seconds.**
- **If the engine fails to start, do not attempt to start the engine immediately again, but set the switch to the "OFF" position and wait for approximately 30 seconds, then start the engine again.**

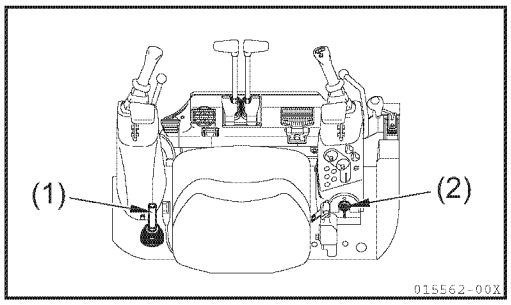



The swing motor with a brake is used. The brake of the swing motor is released when the engine starts.

### 13-2-2. Starting the engine in cold weather

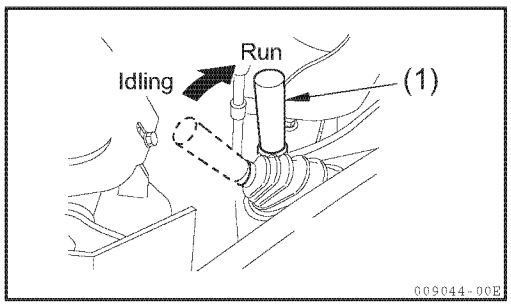
**⚠ WARNING**

- **First check to see that there are no people or obstacles around the machine.**
  **Then sound the horn and start the engine.**
- **Be sure that you are seated in the operator's seat when starting the engine.**
- **When starting the engine in an enclosed place, be sure that there is adequate ventilation so that the exhaust gases can escape.**

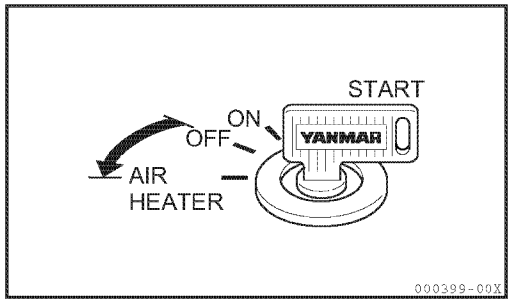



To start the engine at a low outside air temperature, follow the steps below:

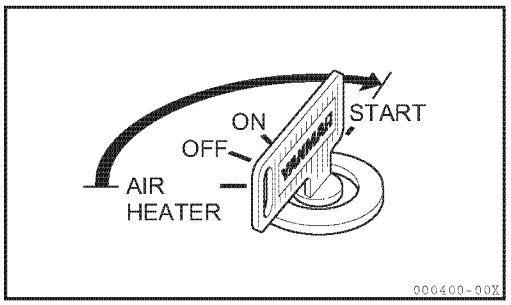
1) Pull the accelerator lever (1) back to the "RUN" position.



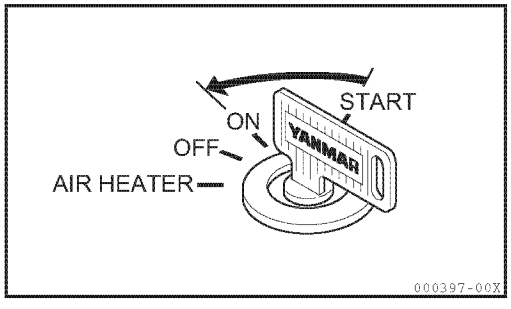

2) Turn the key in the starter switch (2) to the "AIR HEATER" position and keep it there for approximately 10 to 15 seconds to preheat the intake air of the engine.



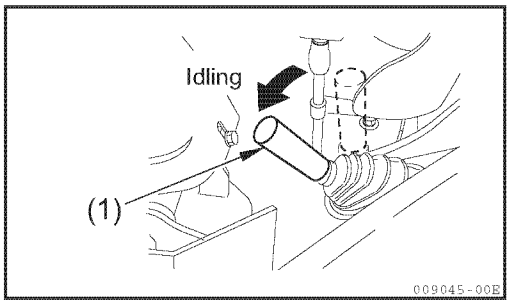

3) Turn the key in the starter switch (2) to the "START" position to start the engine.




4) After the engine has started, let go of the starter switch key.
   The starter switch key will return to the "ON" position by itself.



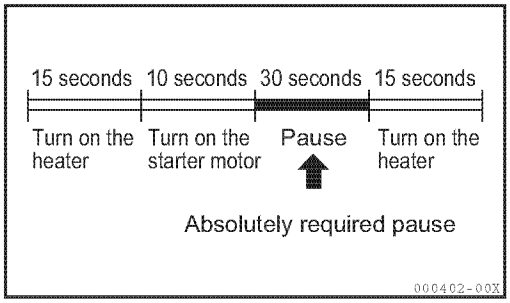
5) When the engine speed has increased, push the accelerator (1) forward to the "IDLING" position immediately.




**IMPORTANT**

**To protect the starter motor and the battery:**

- **Do not keep the key in the "START" position for more than 10 seconds.**
- **If the engine fails to start, do not start the engine immediately again, but set the switch to the "OFF" position and wait for approximately 30 seconds, than start the engine again.**
- **Traveling or operating the machine without adequate warming up in cold weather may adversely affect the machine performance, which causes low operating speed or traveling with deviation.**



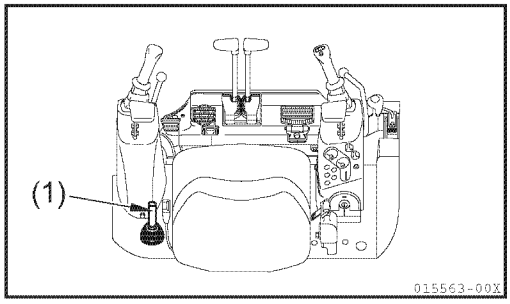
## 13-3. Operating and checking instructions after starting the engine

**⚠ WARNING**

- **Emergency stop.**
  **If abnormal operation occurs, turn the starter switch key to the "OFF" position, to stop the electrical system and the engine. Then ask your dealer to check the machine.**
- **Be sure to warm up the engine. If you operate the implement without full warm-up, the machine may not respond or operate properly.**
  **Especially in cold weather, fully warm up the engine.**

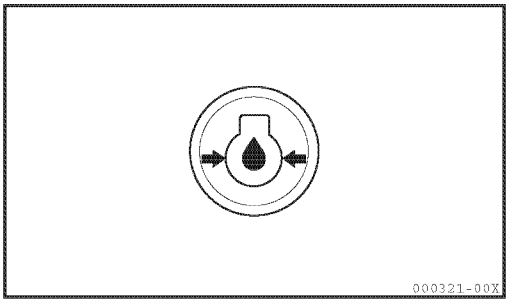
**IMPORTANT**

- **The proper hydraulic oil temperature is between 122°F and 176°F (50°C and 80°C).**
  **If you have to operate the machine at a low hydraulic oil temperature, increase the hydraulic oil temperature to about 68°F (20°C) before operating the implement.**
- **In the event that you have to operate any control lever at a temperature of lower than 68°F (20°C), operate it gently.**
- **Do not accelerate the engine rapidly until the engine warms up.**

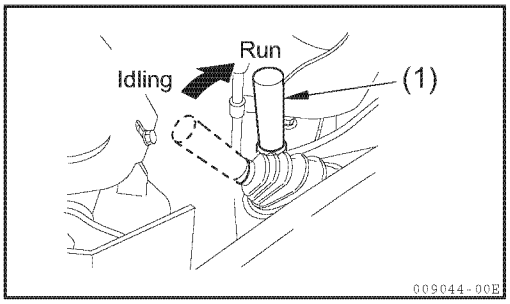



After starting the engine, do not start operating the machine immediately but follow this procedure:

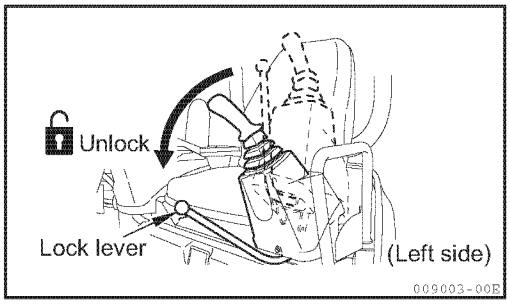
1) Idle the engine to check that the engine oil pressure alarm lamp is off.




2) Pull the accelerator lever (1) to the midpoint between the "IDLING" and "RUN" positions, and run the engine with no load at medium speed for approximately five minutes.



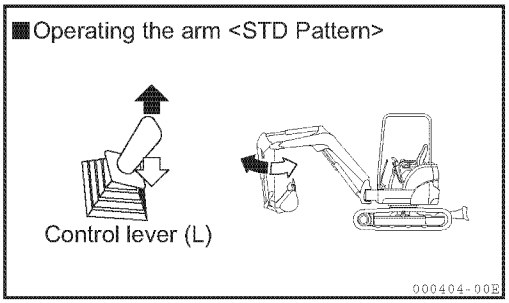
3) Unlock the lock levers, and lift the bucket from the ground.




4) Operate the bucket and arm control levers slowly to move the bucket and arm cylinders to their stroke ends. Operate the bucket for thirty seconds and the arm for thirty seconds alternately for approximately five minutes to increase the hydraulic oil temperature to 70°F (20°C) or more.

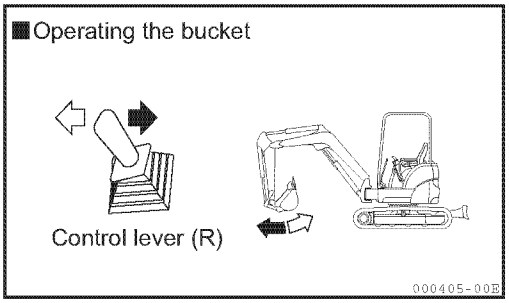
**IMPORTANT**

**When moving the implement, be careful not to bump it against the machine or the ground.**

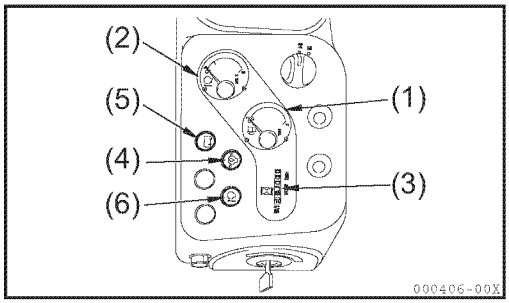



5) After warming up the engine, check that the gauges and the monitor are in the following status. If there is anything abnormal, take corrective action.

- Fuel gauge (1) ..... Normal
- Water temp. meter (2) ..... Normal
- Hourmeter (3) ..... Normal
- Engine oil pressure alarm lamp (4) ..... Off
- Battery charge alarm lamp (5) ..... Off
- Water temperature alarm lamp (6) ..... Off

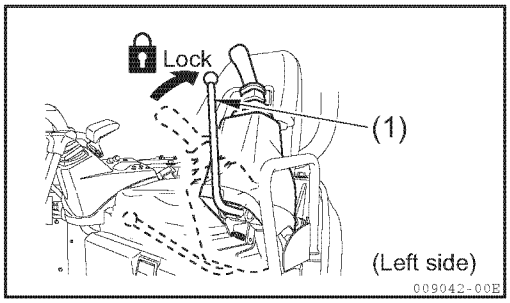



6) Check the exhaust gas color, the machine noise, and the vibration level for abnormality. If something is abnormal, take corrective action.




7) Set the lock levers to the "LOCK" position to check that the implement cannot be operated and the upperstructure cannot be swung with the left and right control levers.

8) Unlock the lock levers and operate the control levers to check that the implement can be operated and the upperstructure can be swung normally with the control levers. If something is abnormal, take corrective action.




9) Check to see that the swing brake valve operates normally. If something is abnormal, take corrective action.

10) Check that no abnormal noise is heard from the hydraulic system. If any abnormal noise is heard, take corrective action.

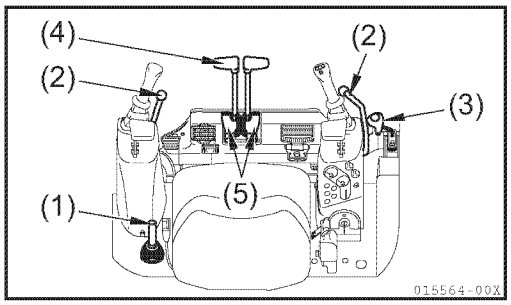
Ask your dealer to resolve the problems described in the steps 1) to 10) above.

## 13-4. Traveling

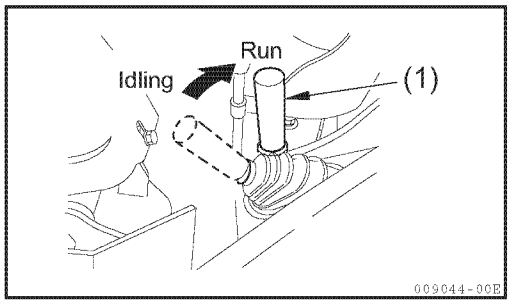
### 13-4-1. Traveling forward

**⚠ WARNING**

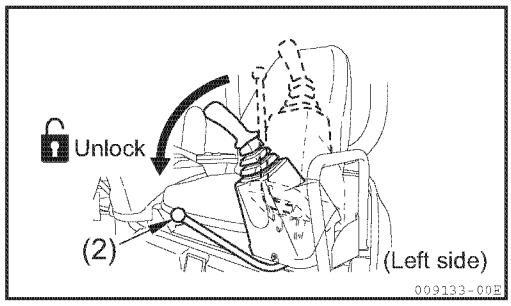
- **Always check the position of the blade before operating the travel levers and pedals.**
  **When the blade is in the rear, the travel levers and pedals operate in the reverse of the normal operation.**
- **A signal person should be in attendance to give signals at sites which are dangerous or not clearly in view of the operator.**
- **Clear all people from the working area.**
- **Sound the horn before beginning travel, to alert the people near the machine.**
- **Clear obstacles from the path of the machine.**
- **Do not operate the travel levers and pedals rapidly while the engine is running at high speed. Otherwise, the machine may move unexpectedly, causing a serious accident.**



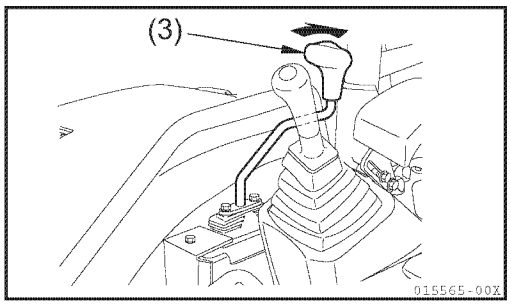

1) Pull the accelerator lever (1) back to the "RUN" position to increase the engine speed.




2) Unlock the lock levers (2), and retract the implement to lift it 16 to 20 in. (40 to 50 cm) above the ground.

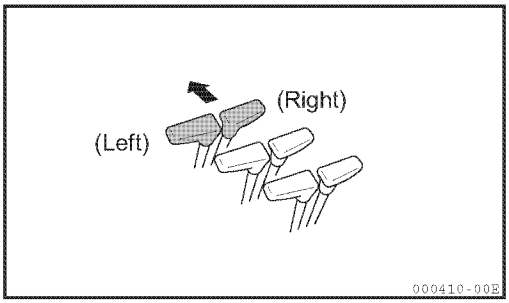


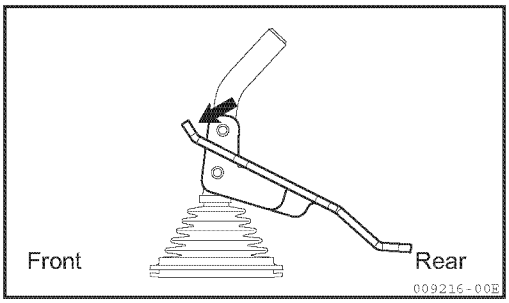
3) Pull back the blade lever (3) to lift the blade.



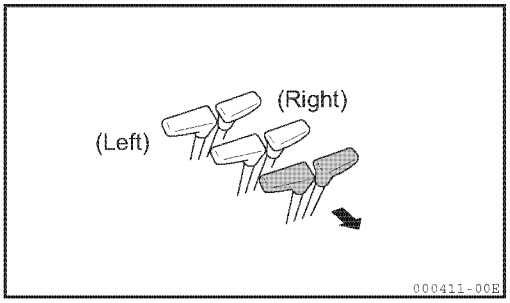

4) Operate the left and right travel levers (4) or pedals (5) as follows:

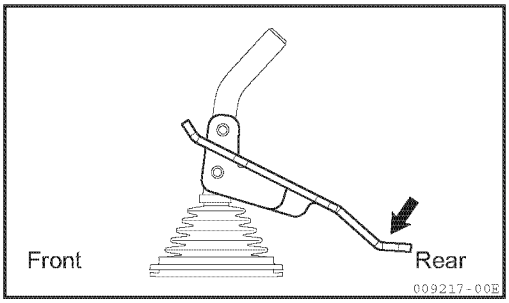
• When the blade is in the front of the machine;
Slowly push the travel levers (4) forward or step on the front of the pedals (5) to move the machine forward.




• When the blade is in the rear of the machine;
Slowly pull the travel levers (4) back or step on the rear of the pedals in order to move the machine forward.

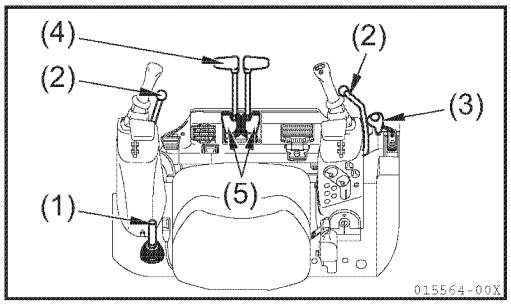


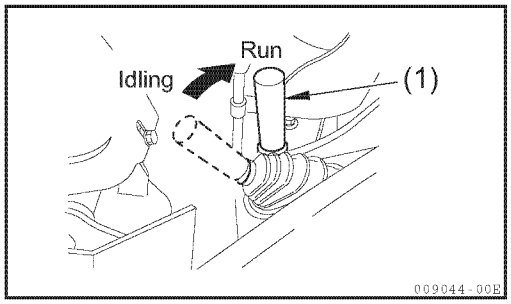
### 13-4-2. Traveling in reverse

**⚠ WARNING**

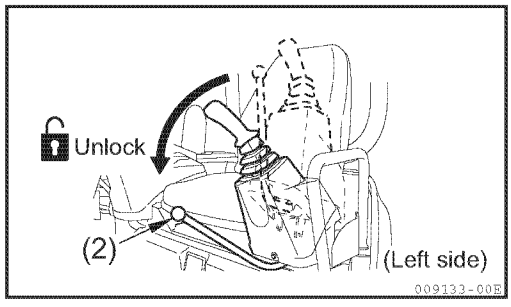
- **Always check the position of the blade before operating the travel levers and pedals.**
  **When the blade is in the rear, the travel levers and pedals operate in the reverse of the normal operation.**
- **A signal person should be in attendance to give signals at sites which are dangerous or not clearly in view of the operator.**
- **Clear all people from the working area.**
- **Sound the horn before beginning travel, to alert the people near the machine.**
- **Clear obstacles from the path of the machine.**
- **There is a blind spot behind the machine. Make sure that no people are in the blind spot before traveling backwards.**
- **Do not operate the travel levers and pedals rapidly while the engine is running at high speed. Otherwise, the machine may move unexpectedly, causing a serious accident.**



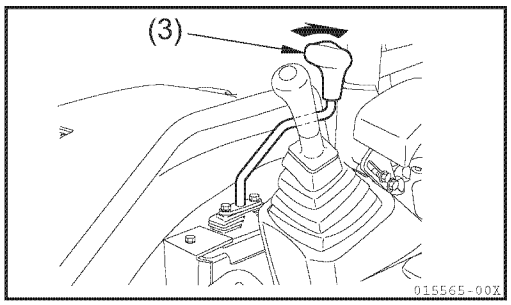

1) Pull the accelerator lever (1) back to the "RUN" position to increase the engine speed.




2) Unlock the lock levers (2), and retract the implement to lift it 16 to 20 in. (40 to 50 cm) above the ground.

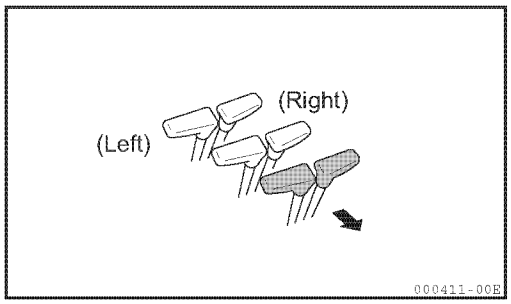


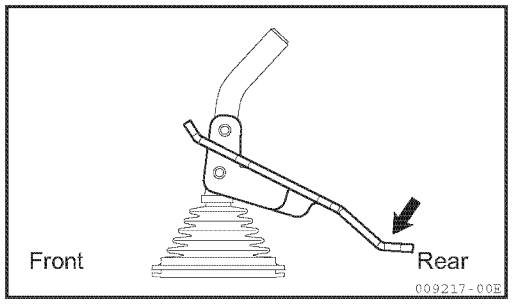
3) Pull back the blade lever (3) to lift the blade.



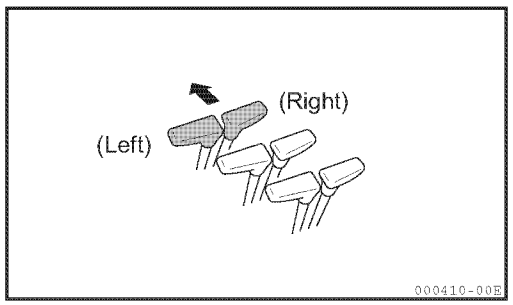

4) Operate the left and right travel levers (4) or pedals (5) as follows:

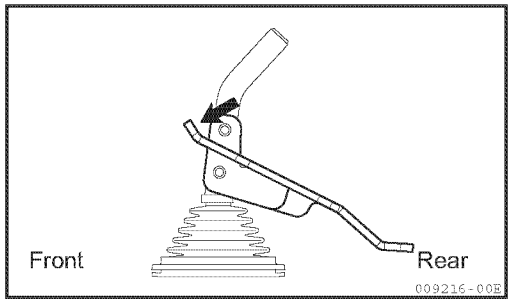
• When the blade is in the front of the machine;
Slowly pull the travel levers (4) back or step on the rear of the pedals in order to move the machine backward.




• When the blade is in the rear of the machine;
Slowly push the travel levers (4) forward or step on the front of the pedals (5) to move the machine backward.



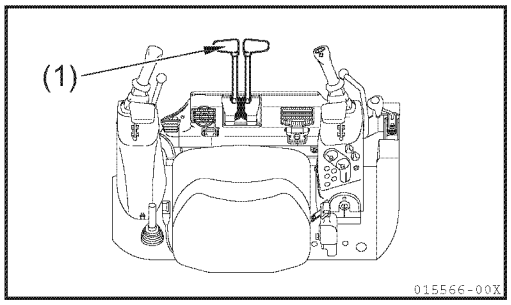
## 13-5. Steering

### 13-5-1. Steering (Turning the machine)

**⚠ WARNING**

**Always check the position of the blade before operating the travel levers.**
**When the blade is in the rear, the travel levers operate in the reverse of the normal operation.**
**Do not use the travel pedals to steer the machine, or the machine may not be controlled expectedly, causing a serious accident.**

To steer the machine, operate the travel levers only.
Do not turn the machine too sharply. Before spin-turning, stop the machine.
Operate the two travel levers (1) as follows:

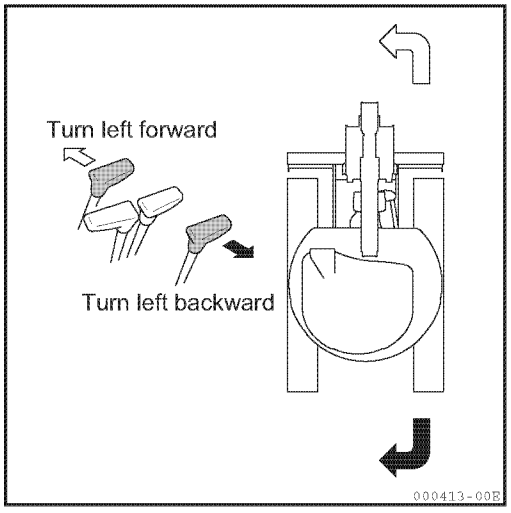



■ **Steering the machine when it is not traveling**

To turn left, push the right travel lever forward and start traveling forward on the left. Pull the right travel lever back and start traveling in reverse on the left.

***Note :***

*To turn right, operate the left travel lever in the same manner as above.*

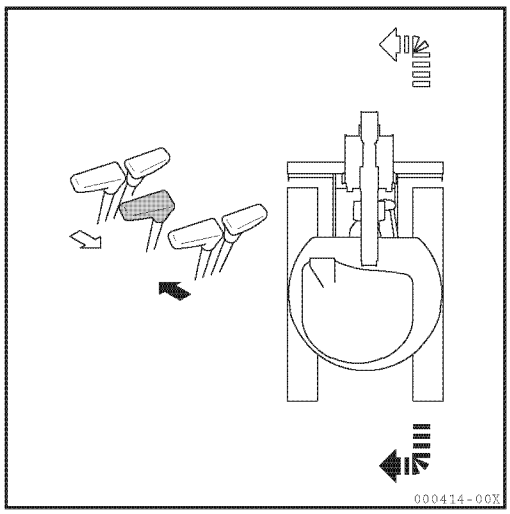


■ **Steering the machine while traveling (the left and right travel levers are both tilted in the same direction)**

To turn left, return the left travel lever to the neutral position.

***Note :***

*To turn right, operate the right travel lever in the same manner as above.*

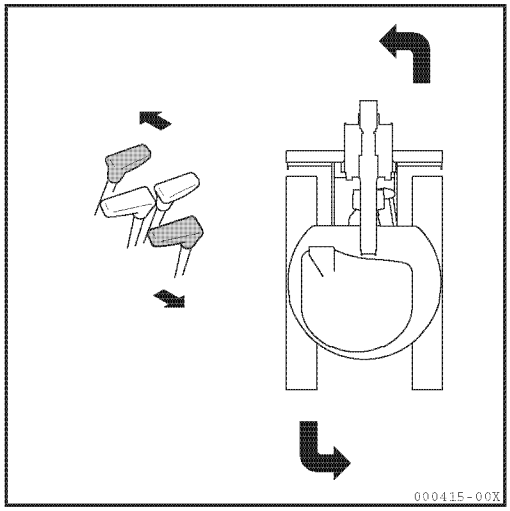



■ **Spin-turning the machine when it is not traveling**

To spin-turn left, push the right travel lever forward while pulling the left travel lever back.

***Note :***

*To spin-turn right, push the left travel lever forward while pulling the right travel lever back.*



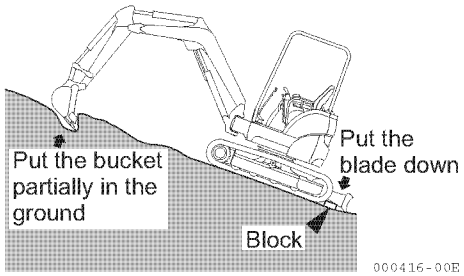
## 13-6. Stopping the machine

**⚠ CAUTION**

**Do not stop the machine suddenly but provide a safety margin.**

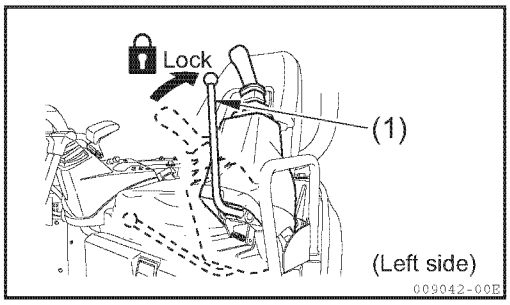
**⚠ WARNING**

- **Park on solid, level ground.**
- **Do not park on a slope. If it is unavoidable to park on a slope, put solid pieces of wood under the track as blocks, place the blade on the ground, and dig the bucket into the ground.**

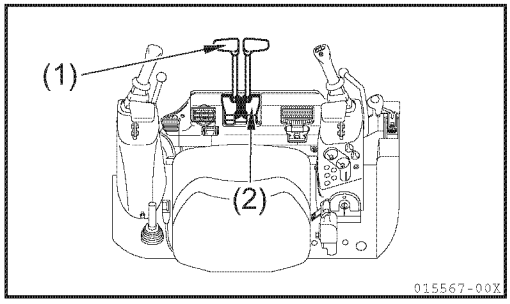


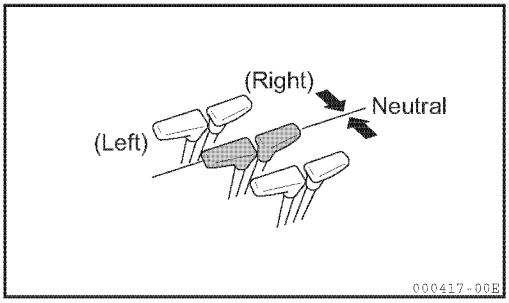

**⚠ WARNING**

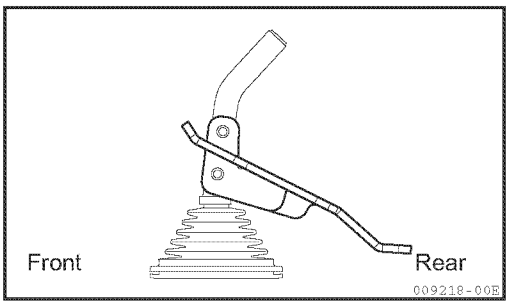
- **Do not touch the control levers and pedals accidentally. Otherwise, the implement or the machine may move unexpectedly, causing serious bodily injury.**
- **Whenever leaving the operator's seat, be sure to place the lock levers securely in the lock position and remove the starter switch key.**




1) Set the right and left travel levers (1) or pedals (2) to the neutral position to stop the machine.



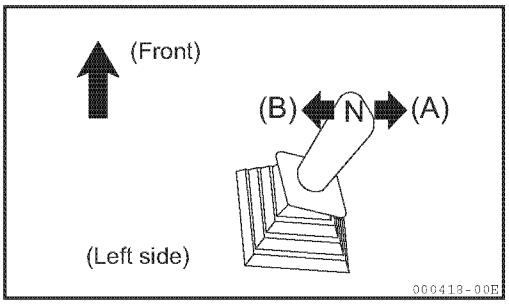



## 13-7. Swinging the upperstructure

**⚠ WARNING**

**Before swinging, make sure that there are no people or obstacles within the swing range of the implement or the machine tail.**

1) To swing the upperstructure, operate the left control lever as illustrated in the right figure.
   (A) : Swing right
   (B) : Swing left



## 13-8. Operating the implements

**⚠ WARNING**

- **Check the area around the machine for safety and sound the horn before beginning to operate the machine.**
- **According to the switching of pattern change lever, control lever operation can be chosen in two patterns.**
- **To prevent accidental injury, never operate Excavator before confirming location of pattern change lever.**

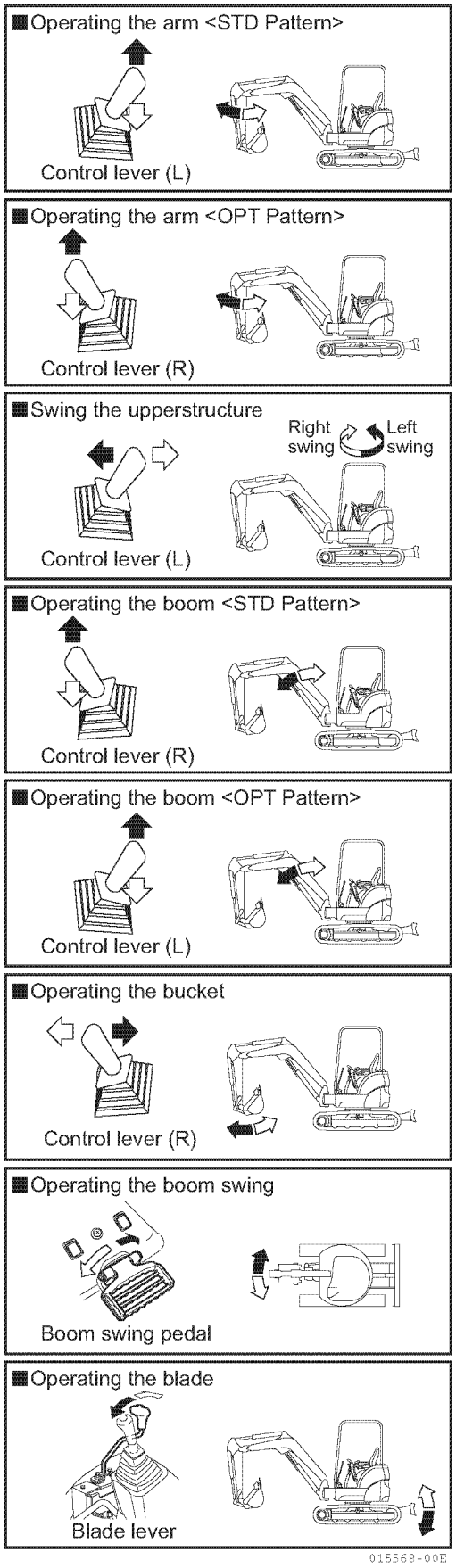
Operate the machine using the right and left control levers, the boom swing pedal and the blade lever.

<STD Pattern>
- Control lever (L) : Operates arm and upperstructure swing.
- Control lever (R) : Operates boom and bucket.

<OPT Pattern>
- Control lever (L) : Operates boom and upperstructure swing.
- Control lever (R) : Operates arm and bucket.

- Boom swing pedal : Operates boom swing.
- Blade lever : Operates blade.

The relation between the operation of the levers and the boom swing pedal, and the movement of the implement are shown in the illustrations on the right.
On releasing the levers and the boom swing pedal, they return to the neutral position and the implement will stop as they are.



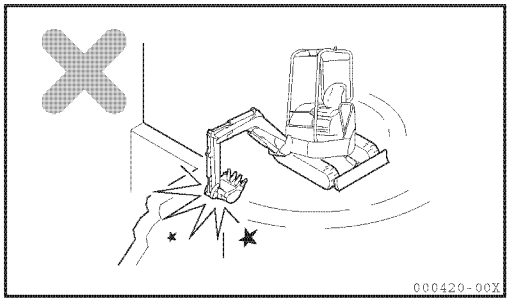
## 13-9. Precautions for operating the implement

**⚠ WARNING**

- **Do not operate the implement control levers while traveling. Stop traveling first and then operate the implement.**
- **Do not operate the implement on a rocky surface (on hard and soft rocks).**

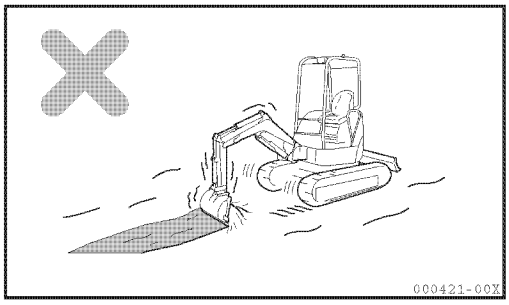
### ■ Do not use the implement's swing force

Do not level the ground or break down a wall by the use of swing force, and do not dig the bucket teeth into the ground while swinging. Doing these may cause the implement to be damaged.



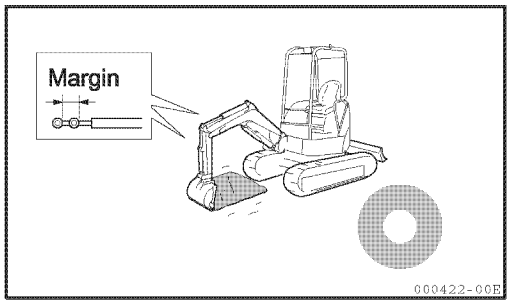

### ■ Do not use the implement's travel force

Do not excavate the ground by the use of travel force with the bucket teeth in contact with the ground. Doing this may cause excessive force to be imposed on the rear of the machine, shortening the machine life.



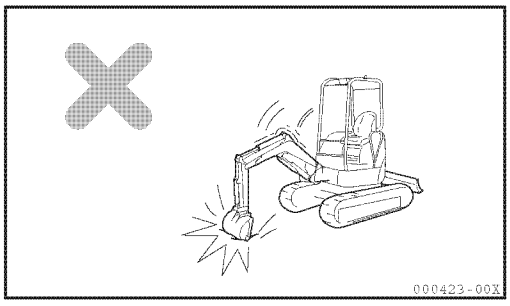

### ■ Take care not to operate the hydraulic cylinder to the stroke end.

Operating the hydraulic cylinder to the stroke end may impose an undue force on the stopper in the hydraulic cylinder, shortening the implement life. Operate with a small safety margin.



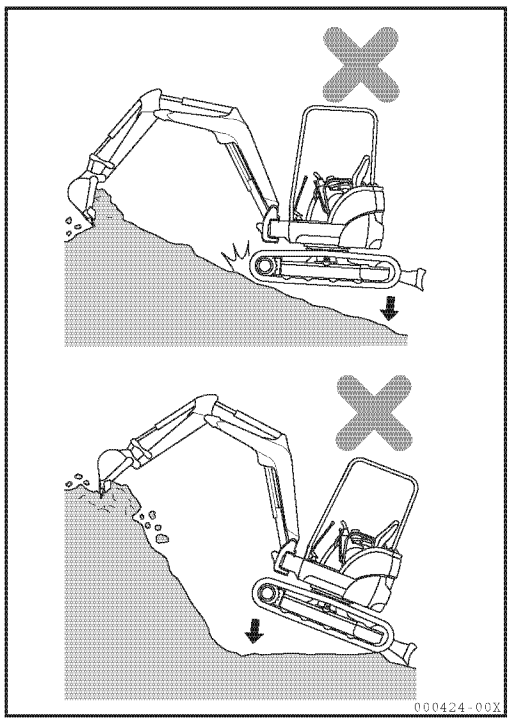

### ■ Do not operate the implement by the using the dropping force of the bucket

Do not excavate the ground by using the dropping force of the bucket as a pickaxe or pile driver. Doing this may cause excessive force to be imposed on the rear of the machine, shortening the machine life and possibly causing a serious accident.



■ **Do not operate the implement by using the dropping force of the machine**

Do not excavate the ground by using the dropping force of the machine.

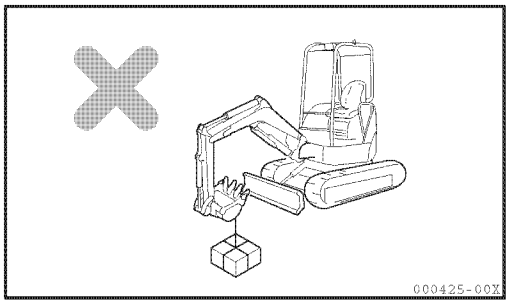



■ **Excavating a hard rock**

It is recommended that a hard rock first be broken into small pieces by other means. Doing so will prevent damage to the machine and will increase economy.

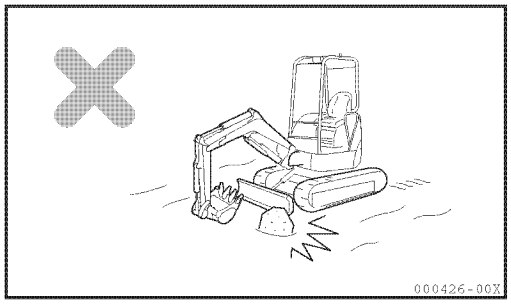
■ **Do not suspend a load unless you use a hooked bucket**

Suspending a load safety requires the use of a hooked bucket. Refer to Section "28. Handling the Hooked Bucket".



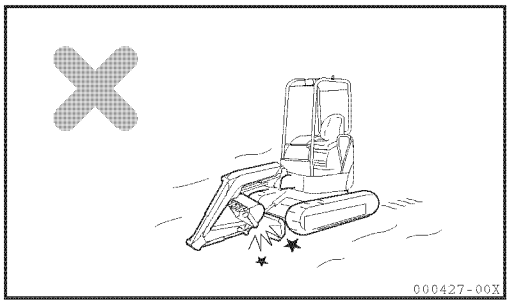
■ **Do not bump the blade against a large rock or boulder**

Do not bump the blade against a large rock or boulder. Doing so may cause the blade or the hydraulic cylinder to be damaged.



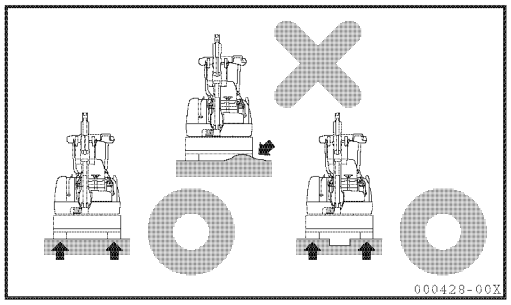

■ **Be careful when retracting the implement**

When retracting the implement for travel or transport, be careful that the bucket and the blade never bump against each other.



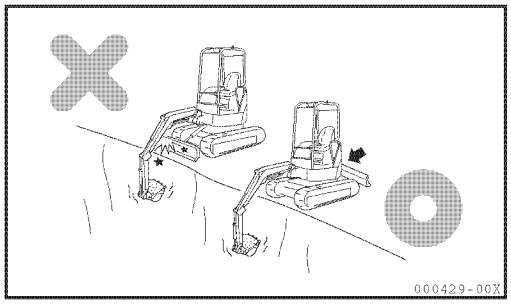

■ **Support the blade on both sides**

When you use the blade as an outrigger, support the blade on both sides.



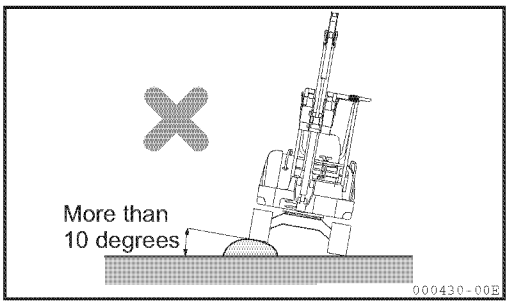

■ **Be careful not to bump the blade when excavating**

When excavating the ground with the blade in front, never let the blade bump against the boom cylinder.
Place the blade in rear, if it is not being used.



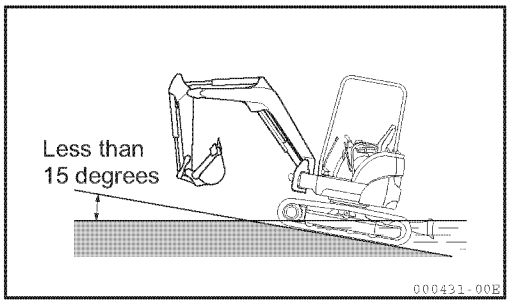
## 13-10. Precautions for working

### ■ Precautions for traveling




Driving over a stone or a stump subjects the machine (especially undercarriage) to a shock, which may cause damage to the machine.
Avoid such obstacles by driving around them, or removing them.
If driving over them is unavoidable, reduce speed, hold the implement close to the ground, and drive over the obstacles with the center of the track shoes.

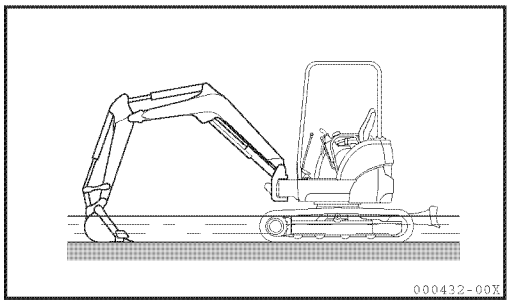
### ■ Allowable water depth




**IMPORTANT**

**When driving out of water, if the machine climbs a slope at an angle of more than 15 degrees, the rear of the upperstructure may submerge too deeply in the water, which may damage the radiator fan since the radiator fan paddles the water. Avoid this if possible when driving out of water.**

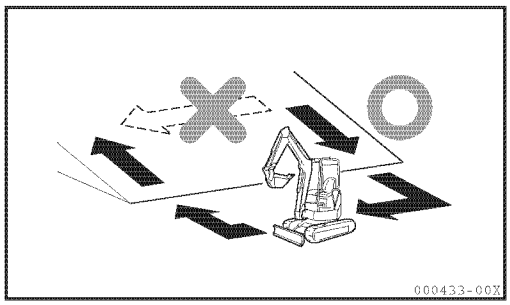
The limit of the water depth in which the machine can be used in is up to the center of the carrier roller.
Apply a generous amount of grease to the moving parts (especially bucket pin) that have been submerged in the water for a long time until the used grease is extruded out of the bearings.
Wipe the extruded used grease off with a waste cloth.

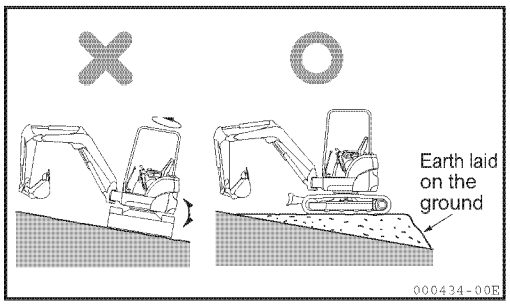


## 13-11. Precautions for going up and down a slope

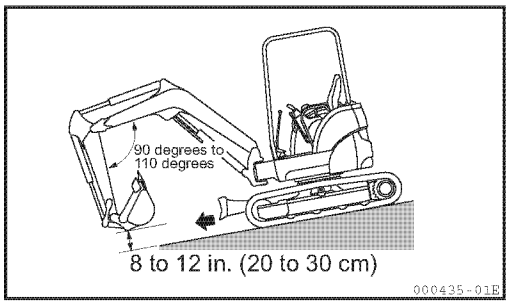
**⚠ WARNING**

- **When traveling on a slope, place the implement in the direction of travel and raise the bucket 8 to 12 in. (20 to 30 cm) above the ground.**
- **When driving over obstacles such as foot paths, hold the implement close to the ground and drive the machine slowly.**
- **Never turn on or traverse a slope.**
  **Descend to flat ground to make a course change.**
- **If the machine is starting to slip or you feel that the machine is unstable, place the bucket on the ground and stop the machine at once.**
- **Recognize that the machine may roll over when swinging the upperstructure or operating the implement on a slope.**
  **Do not swing the upperstructure toward the downward side of the slope with a load in the bucket.**
  **If swinging is unavoidable, first lay earth on the slope to maintain the machine as horizontal as possible, then swing the upperstructure.**
- **Do not travel on a slope of 20 degrees or more, as the machine may upset.**

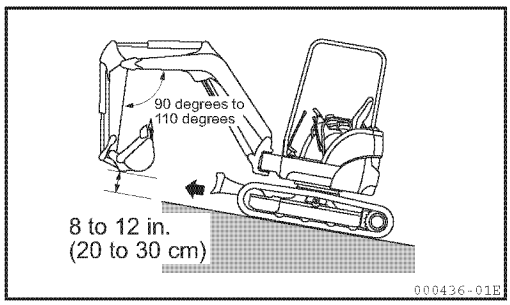



1) Go down slopes at low speed, using the travel levers and accelerator lever to control your speed.
   When going down a slope, drive the machine at low engine speed and position the implement as shown in the right figure.




2) When climbing a slope, drive the machine with the implement positioned as shown in the right figure.



### ■ Braking when going down a slope

When going down a slope, you can automatically brake the machine by setting the travel levers to the neutral position.

### ■ When the tracks are slipping

If you cannot climb a slope by operating the travel levers because the tracks are slipping, retract the arm and make use of the pull-back power of the implement to climb the slope.

### ■ When the engine stops

If the engine stops while climbing a slope, set the travel levers to the neutral position, stop the machine, and restart the engine.

### ■ Precautions for traveling on a slope.

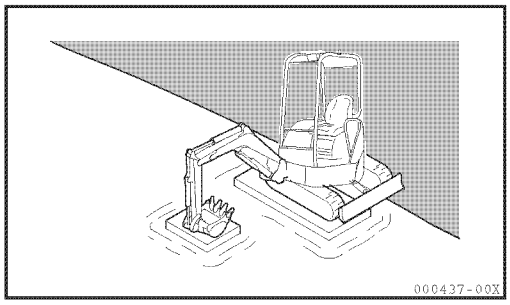
Do not open or close the cabin side door on a slope.
Doing this may cause the door to swing open or closed very rapidly.
Be sure to lock the cabin side door in either the open or closed position.

## 13-12. Escaping from the mud

Carefully operate the machine not to allow it to get mired in mud. If the machine is mired in mud, the machine can escape as follows:

### 13-12-1. If only one track is mired in the mud

If only one track is mired in the mud, place the bucket on the muddy side, lift the track above the ground, lay a log or a wood block under the track shoe, and raise the bucket to escape.




**IMPORTANT**

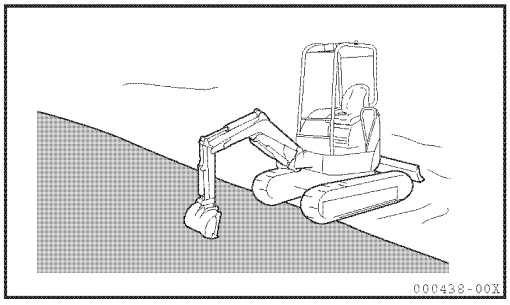
**When lifting the machine above the ground with the boom or the arm, press on the ground with the bottom of the bucket. (Do not press on the ground with the bucket teeth.)**

**In doing this, the angle between the boom and the arm should be 90 degrees to 110 degrees.**

**The same manner as above should be applied when the bucket is in the reverse position.**

### 13-12-2. If both tracks are mired in the mud

If both tracks are mired in the mud, lay a log or a wood block under the track shoes in the same manner as mentioned above, dig the bucket into the solid ground, retract the arm just as when excavating, and set the travel lever to the "FORWARD" position to escape from the mud.



## 13-13. Operations using the bucket

You can greatly widen the range of work described here by using optional attachments.

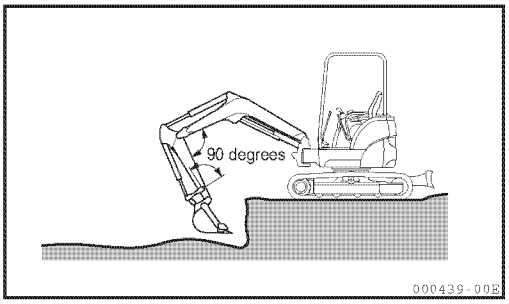
### 13-13-1. Backhoe operation

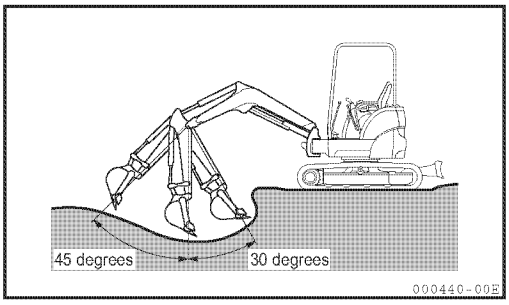
Backhoe operation is suitable for digging the ground below the machine.

Suppose that the machine is operating as illustrated in the right figure : a maximum digging force of each cylinder can be obtained when the angle between the bucket cylinder and the bucket arm as well as between the arm cylinder and the arm is maintained at 90 degrees.

When digging, make good use of this angle to increase the operating efficiency.

To excavate the ground efficiently by manipulating the arm, the arm needs to be operated within a range of angles between 45 degrees forward and 30 degrees backwards, as illustrated in the right figure. Though the range differs according to the depth of the work, do not move the implement to the cylinder stroke end.

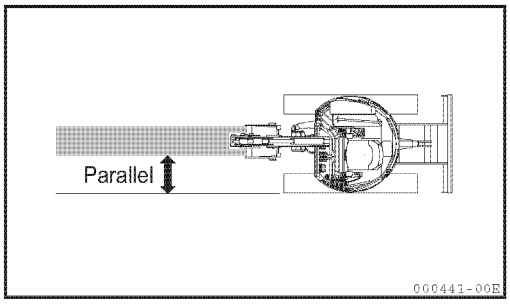



### 13-13-2. Ditching

To increase work efficiency, install a suitable bucket for ditching and position the tracks in parallel with the ditch to be made.

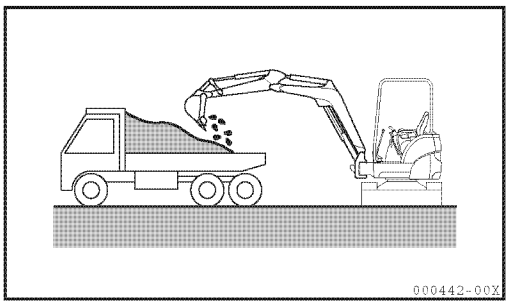
To make a wide ditch, first dig the two sides, and then dig the center.




### 13-13-3. Loading

To increase work efficiency, locate the dump truck at a position where the swing angle of the machine will be minimized and the operator can clearly view the dump truck.

Load earth from the rear of the dump truck, because it can be loaded more easily and in larger amount than from the side.

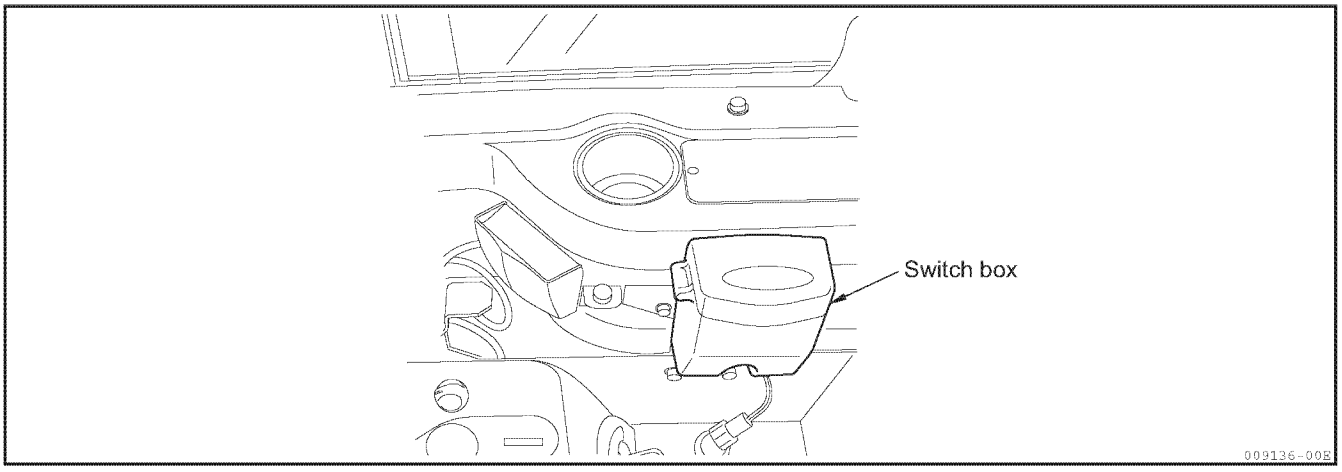


## 13-14. Handling quick coupler

### 13-14-1. Features of quick coupler

The quick coupler is the device to simplify the replacement of a variety of attachments for hydraulic implement. The distance between pins is adjustable so that the attachments with different distances between pins are available.

### 13-14-2. Description of switches



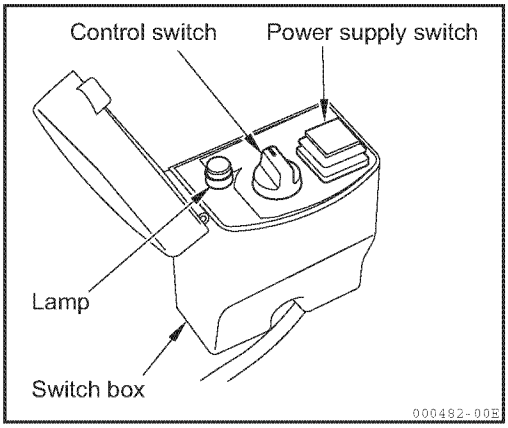

**⚠ WARNING**

**Never open the Switch Box cover except when mounting or dismounting the Attachment to prevent accidental activation of the Quick Coupler. This may cause breakdown or sudden operation of the Attachment, causing serious accident.**

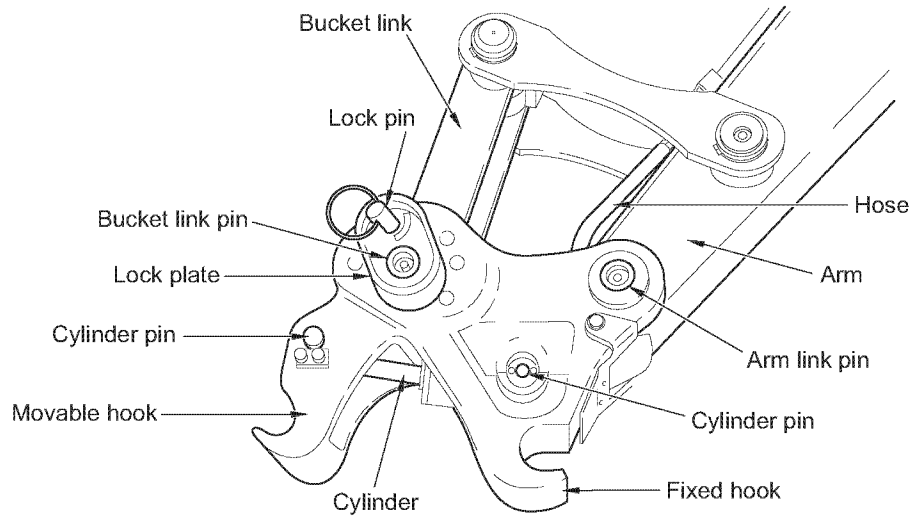
1) Control switch of quick coupler

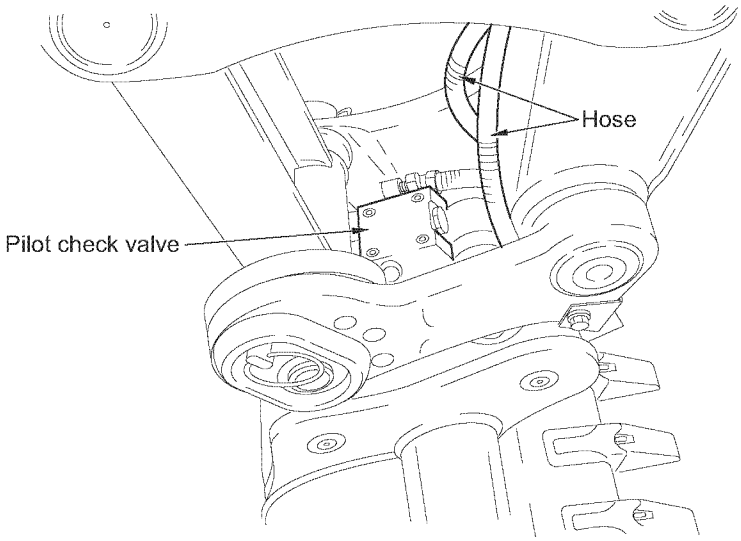
Use this switch to dismount or mount the attachment.

| Operating control switch to dismount or mount the attachment | |
|---|---|
| Dismounting of attachment | Mounting of attachment |
| (1) Press (2) Turn to the left<br>Power supply switch goes on, and beeps sound. Lamp goes on.<br>000483-00E | (1) Turn to the right (2) Press<br>000484-00E |



### 13-14-3. Structure of quick coupler



### 13-14-4. Attachment types

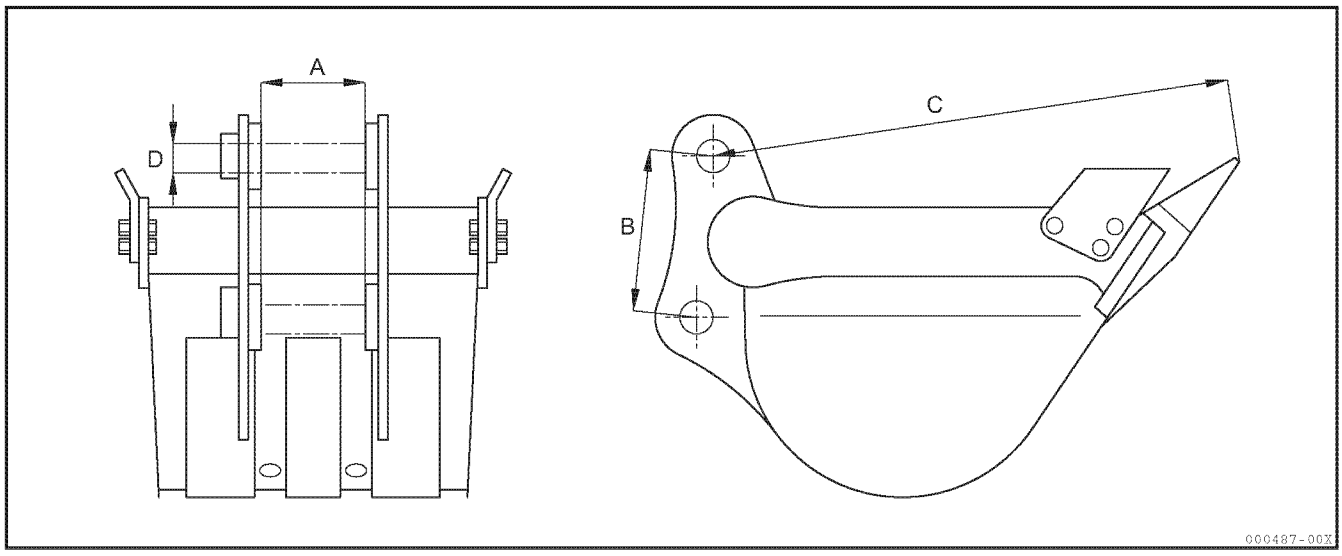
1) The attachments, which can be mounted on the machine with quick coupler, are only the same 2-pin type as the bucket. The 1-pin type such as clamshell cannot be mounted in the quick coupler.
2) The following 2-pin type of attachments exceptionally cannot be mounted in the quick coupler.
   (1) Attachments much different from the standard bucket in shape of mounting part
   (2) Attachments with excessively long or short pin pitch
3) Do not use any attachments improper for the machine with the quick coupler.

### 13-14-5. Allowable size of bucket

Allowable size of bucket to be mounted in the quick coupler

Unit : in. (mm)

| Mark | Part | ViO27-5 / ViO35-5 | |
|---|---|---|---|
| A | Attachment width | 4.72 (120) or more | |
| B | Distance between pins | Pin diameter Ø1.38 (35) | 6.22 to 10.5 (158 to 266) |
| | | Pin diameter Ø1.50 (38) | 6.50 to 10.9 (165 to 276) |
| | | Pin diameter Ø1.57 (40) | 6.61 to 11.1 (168 to 282) |
| C | Operating radius of bucket | 29.5 (750) or less | |
| D | Pin diameter | Ø1.38 to 1.57 (35 to 40) | |



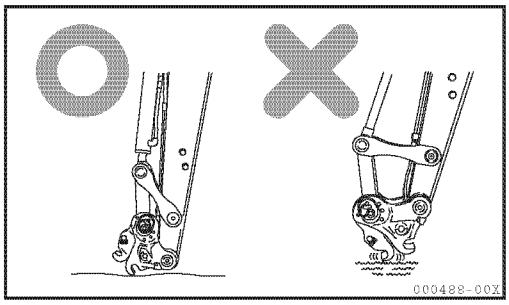
### 13-14-6. Phenomena that are not breakdowns

While setting the control switch of the quick coupler in the dismounting mode, stop the engine and then restart it to open the hook of the quick coupler.

### 13-14-7. Posture for storing the machine without attachment

Place the quick coupler on the ground as illustrated in the right figure for a long-term storage.

If the quick coupler is placed on the ground when the control switch is in the dismounting mode, the hook will open when the engine is restarted, causing the floor surface scratches or the machine breakdown.

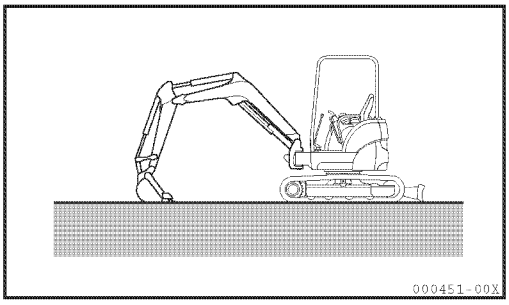


### 13-14-8. Dismounting attachment

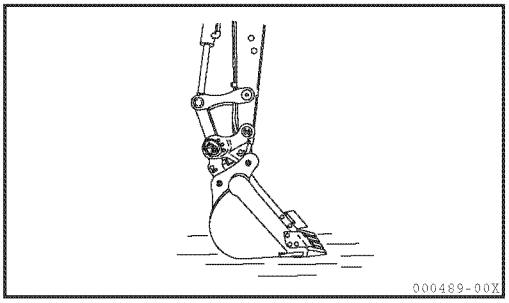
**⚠ WARNING**

- **Never dismount the Attachment while it is still elevated, as it will drop to the ground and could cause bodily injury.**
- **Never dismount the Attachment unless it is resting on stable level ground, as it could otherwise fall over.**

1) Park the machine on stable level ground.

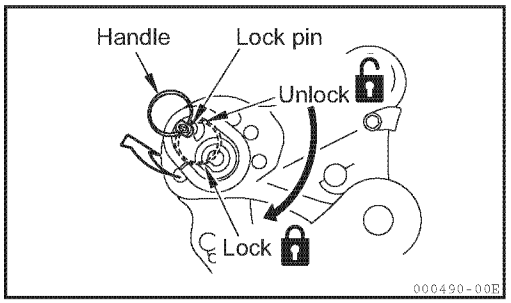



2) Lower the attachment onto the ground.




3) Set up the handle of the lock pin.

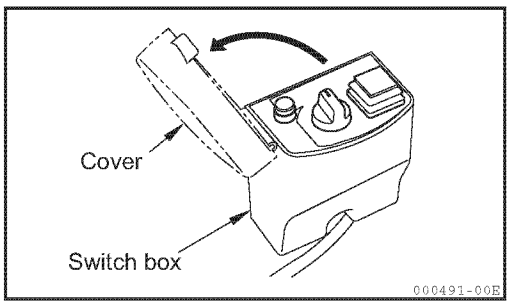
4) Turn the arrow on the head of the lock pin from the lock position to the unlock position, and then pull it up.



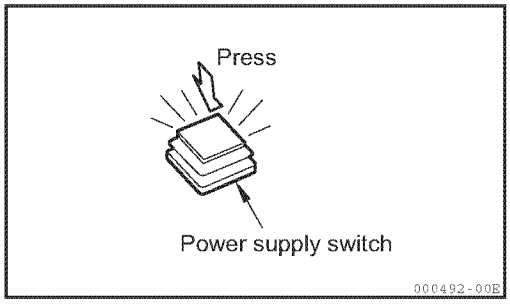

**IMPORTANT**

**The lock pin cannot be removed from the body.**

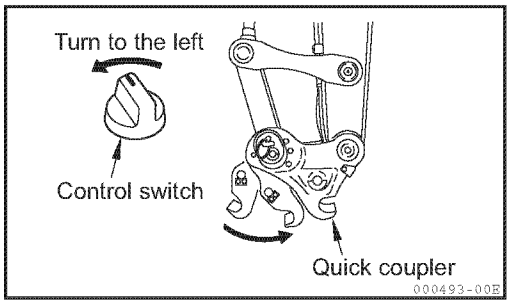
5) Open the switch box cover.



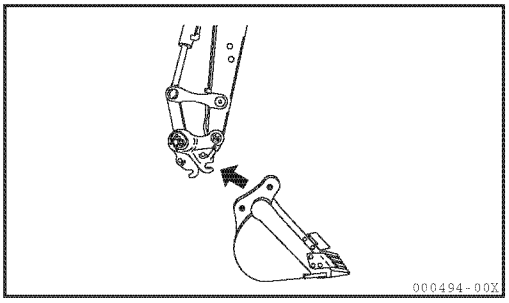

6) Press the power supply switch.
Then, beeps sound and the power supply switch blinks.




7) Turn the control switch to the dismounting position on the left side, and the attachment is dismounted.




8) Remove the quick coupler from the attachment.

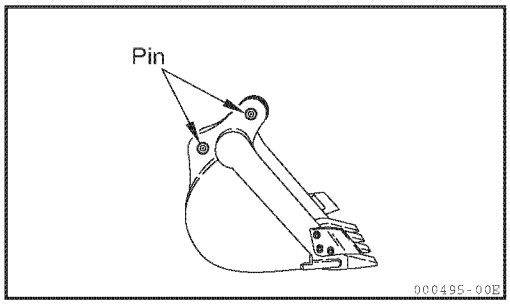


### 13-14-9. Mounting attachment

**⚠ WARNING**

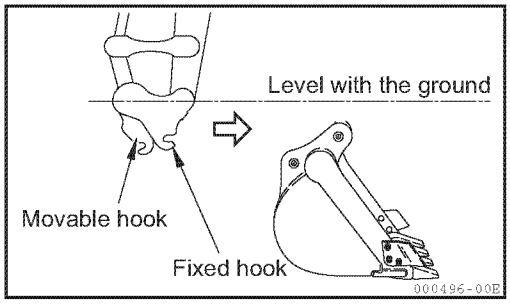
- **Never place your hands or any other part of your body between the Quick Coupler and the Attachment to prevent bodily injury.**
- **Never stand near the Attachment unless it is resting on stable level ground to avoid bodily injury.**
- **Never use a newly mounted Attachment before confirming that it has been properly secured to the Quick Coupler, and that the Lock Pin has been correctly installed, as accidental detachment could otherwise result.**
- **Always replace the Lock Pin if damaged or lost. Failure to do so could result in death or serious injury.**

1) Place the attachment on stable level ground.
   Be sure to install the pins into the attachment.

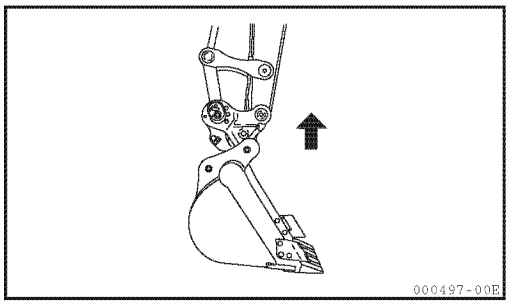



2) Close the movable hook.

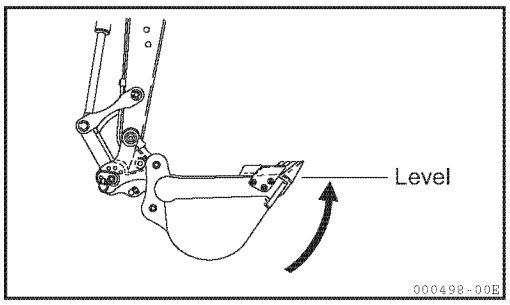
3) Put the fixed hook onto the pin of the attachment on the arm side and set the quick hitch level with the ground as illustrated in the right figure.



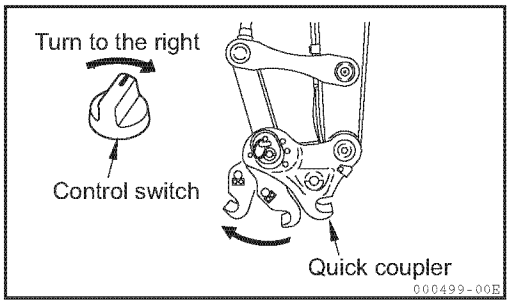

4) Lift the attachment up in that state.



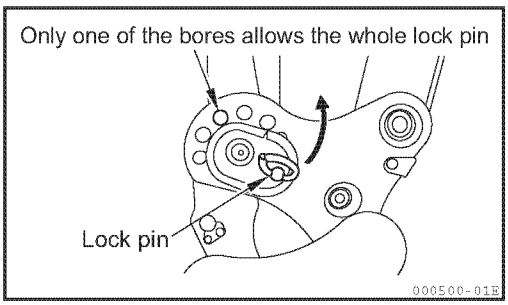
5) Curl the attachment so that it is level.




6) Turn the control switch to the mounting position on the right side, and the attachment is mounted.

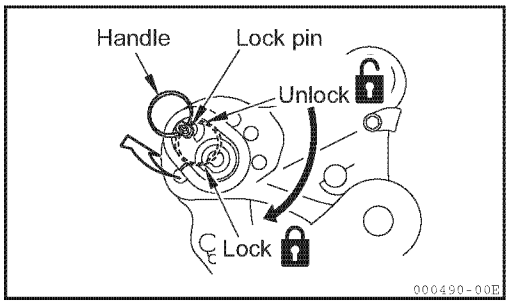



7) Only one of the bores allows the whole lock pin. Install the lock pin to that bore.



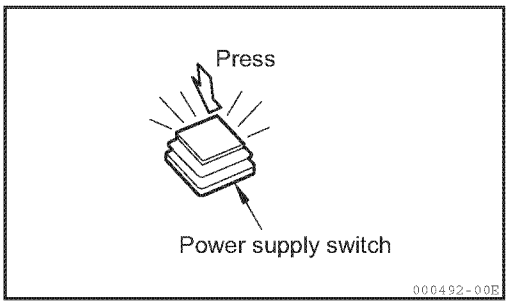

8) Turn the arrow on the lock pin to the lock side.

9) Put the handle of the lock pin down to the arrowed side.




10) Make sure the attachment is securely mounted in the quick coupler before pressing the power supply switch on. The beeps stop sounding and the red lamp goes off.

11) Close the switch box cover.



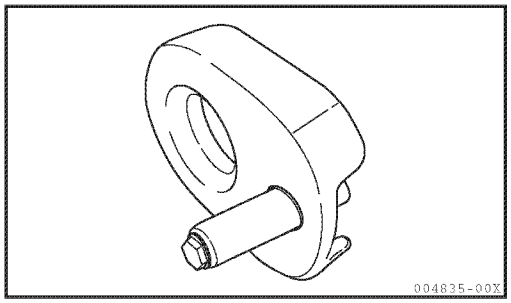
### 13-14-10. Maintenance

1) Checking specifications

- Check there are no cracks and plays.
- Check the bolts and nuts for looseness.
- Check the hydraulic piping for oil leak.

2) Installation instruction of the Lock Pin

(1) Remove the damaged lock pin if any, and clean the bore of the lock plate.

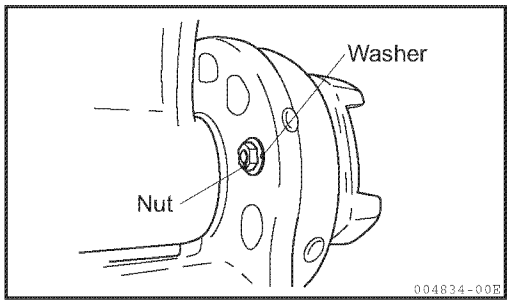



***Note:***

*Replace the lock plate with a new one if it is damaged.*

(2) Put a new lock pin into the bore of the lock plate.

(3) Install the washer and nut onto the lock pin from the back side of the lock plate.




***Note:***

*Apply a lock agent ThreeBond 1324 on the thread.*

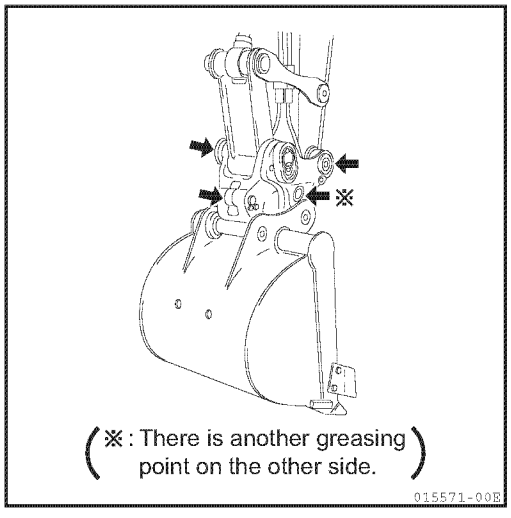
(4) Tighten the nut (M6, Hex 10 mm) to 7.5 to 8.5 ft•lb.

(5) Confirm if the new lock pin can smoothly move to the lock and unlock positions.

3) Greasing

**IMPORTANT**

**Grease the fittings thoroughly after washing the machine or after operation in rain, on soft ground, or in muddy water.**




(1) Put the bucket and the blade on the ground and stop the engine.

(2) Clean the grease nipples indicated with the arrows in the right figures and grease them using a grease gun.

(3) After greasing, wipe off the excessive grease with waste cloth or the like.

4) Nonperiodic inspection

- The pins in the attachment are free from rotation and cannot be worn.
  Apply antirust solvent or grease to them to prevent rust.

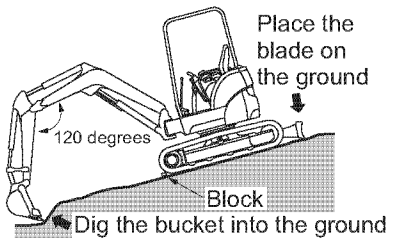
## 13-15. Parking the machine

**⚠ CAUTION**

**Do not stop the machine suddenly, but try to stop with a safety margin.**

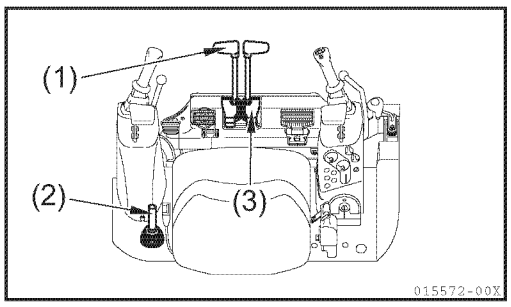
**⚠ WARNING**

- **Park on solid, level ground.**
- **Do not park on a slope. If parking on a slope is unavoidable, block the tracks with solid pieces of wood, place the blade on the ground, and dig the bucket into the ground.**

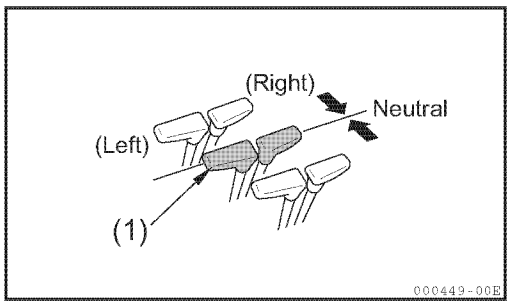



**⚠ WARNING**

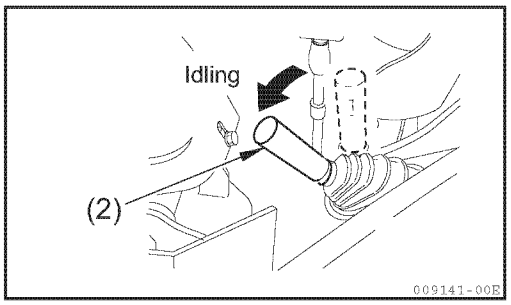
- **Do not touch the control levers and pedals accidentally. Otherwise, the implement or the machine may move unexpectedly, causing a serious accident.**
- **When leaving the operator's seat, be sure to place the lock levers securely in the lock position and remove the starter switch key.**




1) Set the left and right travel levers (1) or pedals (3) to the neutral position to stop the machine.

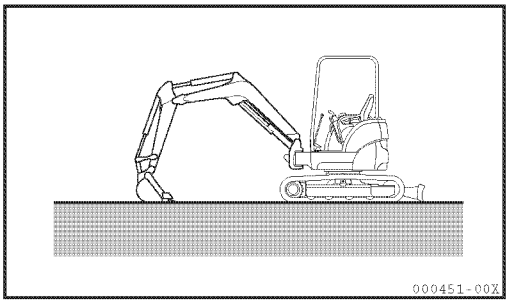



2) Idle the engine with the accelerator lever (2).

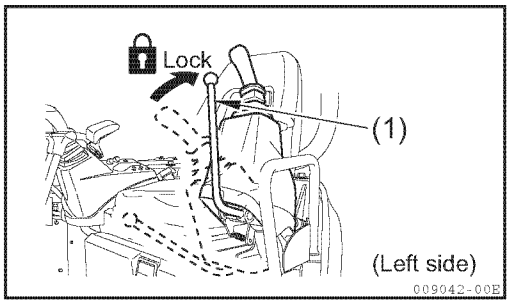


3) Place the bucket on the ground with its bottom surface in contact with the ground.

4) Place the blade on the ground.

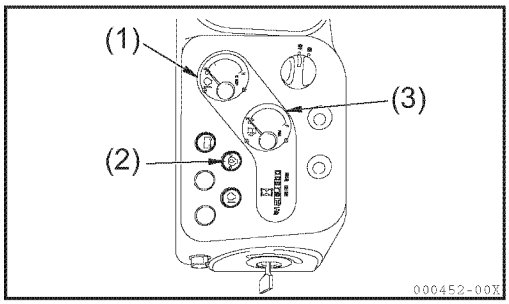



5) Set the lock levers to the "LOCK" position.




## 13-16. Inspection requirements after completing operation

Check the water temp. meter (1) and the engine oil pressure alarm lamp (2), and also check the residual quantity of fuel with the fuel level gauge (3).

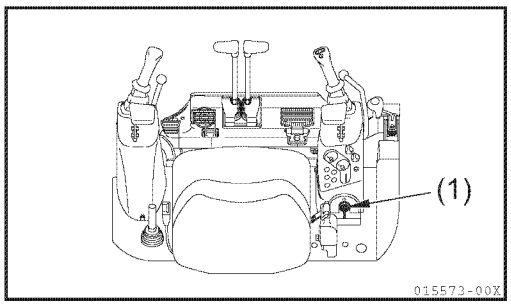


## 13-17. Stopping the engine

**IMPORTANT**

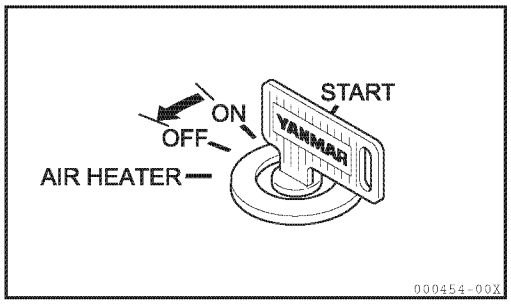
- **Stopping the engine after rotation at high speed may shorten the engine life. Do not stop the engine suddenly except in case of emergency.**
- **If the engine is overheated, do not stop the engine immediately. Gradually lower the engine temperature by rotating the engine at medium rotational speed before stopping the engine.**

1) Idle the engine for approximately five minutes with no load.
   (The engine temperature gradually lowers.)




2) To stop the engine, turn the starter switch key (1) to the "OFF" position.

3) Take the key out of the starter switch (1).




***Note :***

*As long as the starter switch key is in "ON" position and the lock lever(s) is(are) in unlock position, each implement can be moved by its own weight when respective control levers are operated soon after the engine is stopped.*

## 13-18. Inspection requirements after stopping the engine

1) Check oil and water for leaks, and visually inspect the implement, the machine, and the undercarriage by walking around them.
   If there are any leaks of oil or water, or any observed abnormality, take corrective action.

2) Completely fill the fuel oil tank.

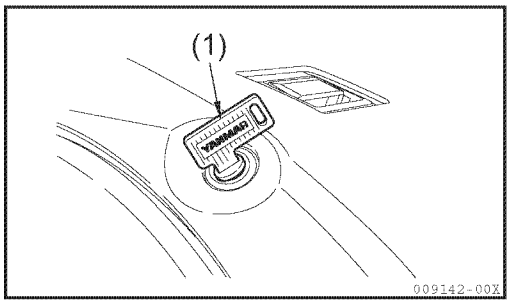
3) Confirm that the engine room compartment is free of any foreign matter.
   Paper or dust in the engine room may cause fire. Remove them if any.

4) Remove mud adhering to the undercarriage of the machine.

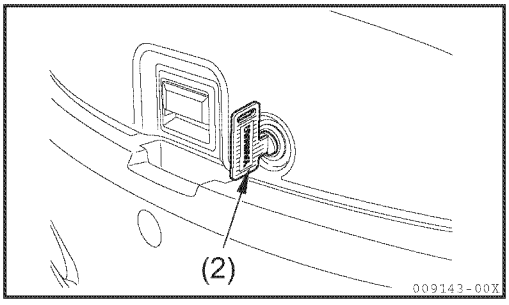
## 13-19. Locking

Make sure to lock up the following parts :

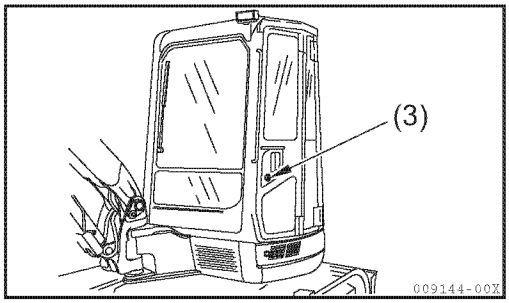
(1) Engine hood B




(2) Engine hood rear cover




(3) Side door (for cabin)




***Note :***

*The starter switch key (1) is used to lock all of the parts mentioned above.*

## 13-20. Handling the rubber track (for rubber track type)

### 13-20-1. Using the rubber track properly

The rubber track has some advantages over the steel track.

However, you cannot take full advantage of it if you use it in the same manner as for the steel one. Take care in operating with the rubber track according to the conditions of the work site and the type of work.

**Comparison Table of Rubber and Steel Tracks**

| | Rubber | Steel |
|---|---|---|
| Low vibration | ◇ | □ |
| Smooth travel (with no creak) | ◇ | ○ |
| Silent travel | ◇ | □ |
| Less damage to paved roads | ◇ | □ |
| Simple handling | ◇ | □ |
| Susceptibility to damage (strength) | □ | ◇ |
| Tractive force | ◇ | ◇ |

◇ : Excellent

○ : Good

□ : Ordinary

Rubber track has many advantages inherent in the unique properties of the material. On the other hand, however, it is low in strength. It is essential that you fully understand the properties of rubber track, and observe the precautions for operating and handling it to prolong its life and get the most out of it. Sure to read Section "13-20-3. Precautions for using the rubber track" before using it.

### 13-20-2. Warranty for rubber track

The rubber track is not warranted for free repair or replacement if it is damaged because of careless misuse by the customer, including the failure to comply with the prohibitions and the instructions for safe operation; for example, failure to check the tension of the rubber track or service the rubber track properly, or "operation of the rubber track on the edge of a steel plate, a U groove, a block or sharp rubbles and rocks, or on reinforcing bars or iron scraps, which could physically damage the rubber track".

### 13-20-3. Precautions for using the rubber track

#### ■ Prohibitions

Observe the following prohibitions:

- Do not operate or swing on sharp stones, a hard, uneven rock base, or around steel rods, scrap iron, or edges of iron plates. Failure to observe these prohibitions may damage the rubber track.

- Do not operate the machine on a stony surface like a riverbed. Doing this may damage the rubber track by catching gravel in the track or may cause the track to come off. Forcibly pushing obstacles with the track slipped will shorten the life of the rubber track.

- Prevent the rubber from getting exposed to oil, fuel, or chemical solvents. If it is exposed, immediately wipe it. Also, do not travel on a road which has an oil pool.

- When storing the rubber track for a long time period (more than three months), avoid placing it in a place subject to direct exposure to sunlight or rain.

- Do not operate the machine on heated places such as in an open-air fire, on a steel plate exposed to the blazing sun, or on a hot asphalt road.

- Never run on one rubber track while the other is held above the ground with the implement. Doing this may damage the rubber track or cause it to come off.

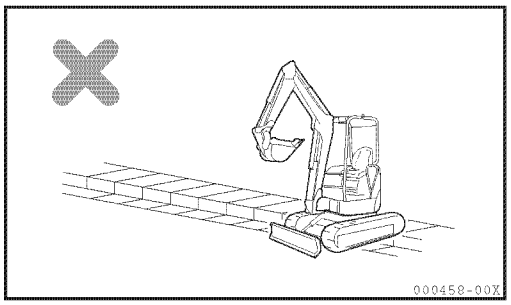
### 13-20-4. Other precautions for using the rubber track

Observe the following precautions when operating the machine:

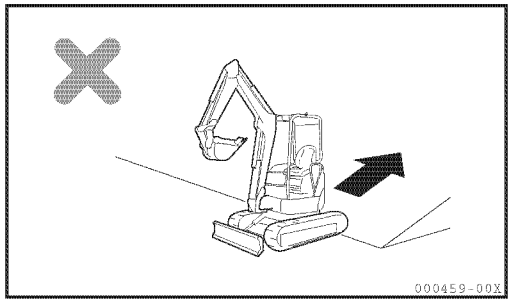
- Never spin-turn on concrete or asphalt roads.
- Do not change course suddenly. Doing this will cause the rubber track to wear early or be damaged.
- Do not swing on the ground over a large level gap. Remember that running over a level gap at a right angle will prevent the track from coming off.
- Slowly lower the machine after it has been lifted above the ground with the implement.
- It is not recommended that the machine be used to handle any materials that become oily after being crushed (e.g., soybeans, corn, rapeseed oil seeds, etc.). After unavoidably using the machine to handle such materials, fully clean the machine with water.
- It is not recommended that the machine is used to handle materials such as salt, ammonium sulfate, potassium chloride, potassium sulfate, or superbiphosphate of lime. Handling these materials may affect the core metal adversely. After using the machine to handle such materials, fully clean with water.
- Do not operate the machine at the seashore. Doing this may affect the core metal adversely due to the salt content.
- If the rubber track is cracked, it could be easily damaged when handling salt, sugar, wheat, or soybeans. Be sure to repair any cracks in the rubber track to prevent rubber chips from getting into the materials being handled.
- Do not allow the rubber track to rub against a concrete wall.
- The rubber track is prone to slipping on snow or on a frozen road. Be careful of skidding when traveling or operating on a slope in cold weather.
- Operating the machine in extremely cold weather will deteriorate the rubber track, shortening its life.
- Use the rubber track between -13°F to +131°F (-25°C to +55°C) because of the physical characteristics of rubber.
- Be careful not to damage the rubber track with the bucket while operating the machine.

- Keep the track in appropriate tension to prevent it from coming off.
  If the tension is too low, the rubber track may come off under the following conditions.
  Even if the tension is adequate, take care when operating the track.

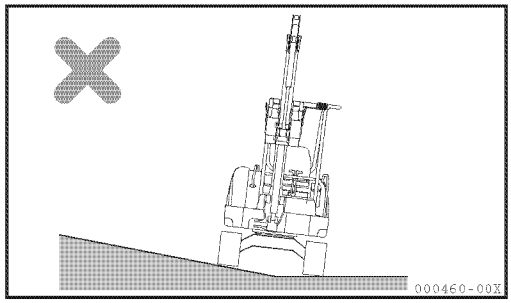
  - Do not steer the machine on a large level gap created by a curbstone or a rock [approximately more than 7.87 in. (20 cm)]. Run over a level gap at a right angle to prevent the track from coming off.



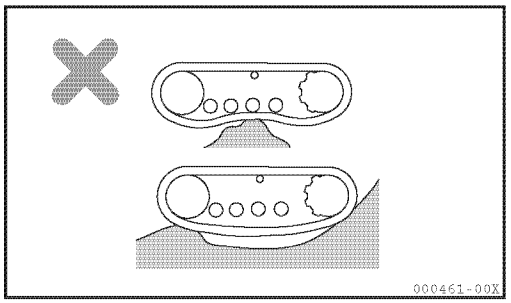

  - Do not steer the machine to a boundary between the flat ground and a slope while moving backward.
    If such steering is not avoidable, slow down the speed.




  - Do not travel with the track at one end on a slope or on convex ground (at a machine inclination angle of approximately more than 10 degrees), with the track at the other end on flat ground, to prevent the rubber track from being damaged. Be sure to travel with the track at both ends on the same level surface.

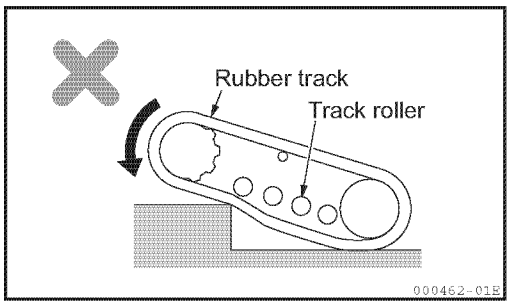



  - The three cases illustrated above are those which could cause the rubber track to loosen. In addition, do not steer the machine under such ground conditions as illustrated in the right figure.

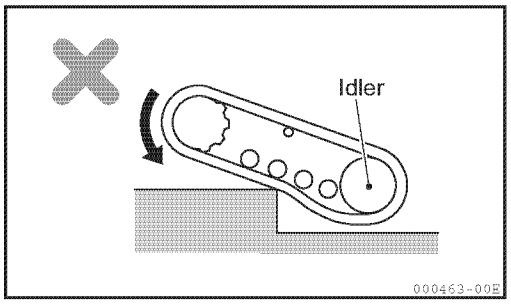



**[How the rubber track comes off]**

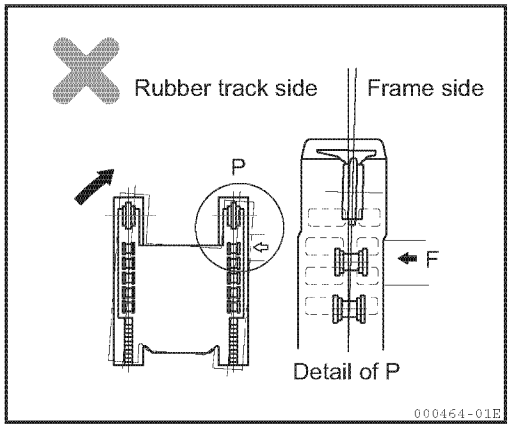
1) When running over a level gap, a clearance is created between the track and the track rollers. At this point, the track tends to come off.



2) If the machine further travels in reverse, clearance may also be created between the track rollers and the idler and, the rubber track, causing the rubber track to easily come off.

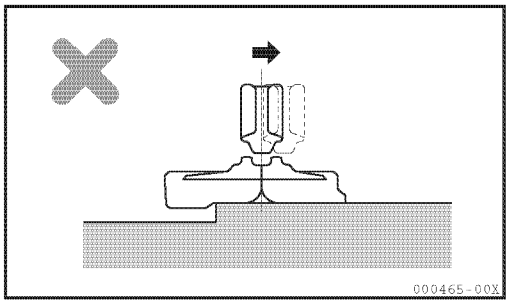



- When the machine is steered while the rubber track is blocked in the transverse direction by an obstacle or the like.

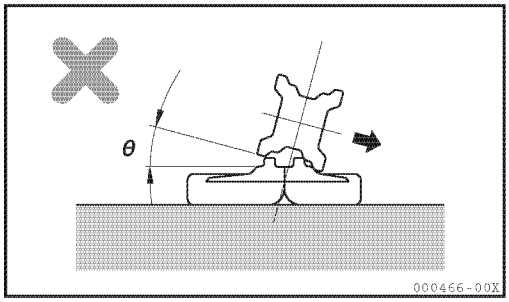



- When the idler and the track rollers are misaligned from the core metal due to rubber track misalignment.

- Traveling in reverse under this condition will cause the rubber track to come off.




- Steering the machine under this condition will cause the rubber track to come off.

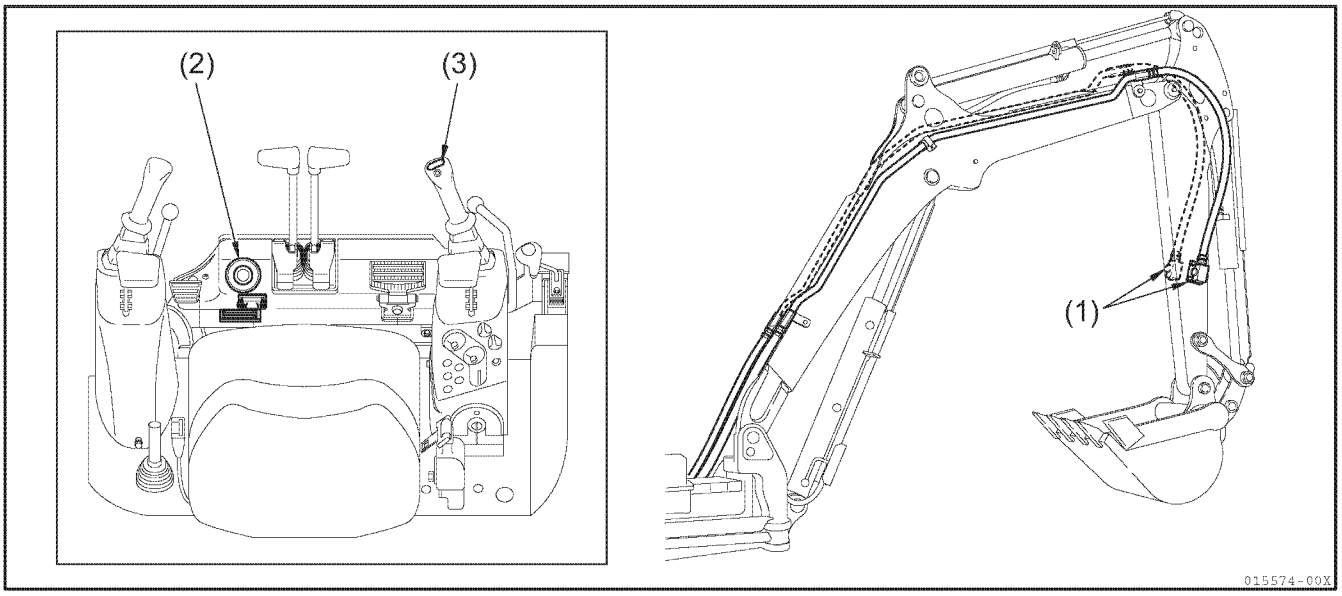



**13-20-5. Checking and servicing the machine with rubber track**

To check and service the machine with rubber track, refer to and follow Section "24-1. Table of service time intervals".

## 13-21. Handling hydraulic P.T.O.

### 13-21-1. Description of stop valve, P.T.O. selector valve, P.T.O. pedal and pedal lock



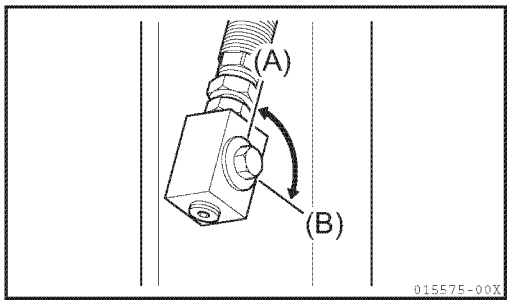

**(1) Stop valve**

This valve can stop the flow of the hydraulic oil.

(A) Open : The hydraulic oil flows

(B) Close: The hydraulic oil stops.

Set this valve at the closed position when removing and installing an attachment.




**P.T.O. selector valve**

**(2) Foot switch**

Unfold the foot rest and press the foot switch to operate a single acting attachment.

**(3) Lever switch**

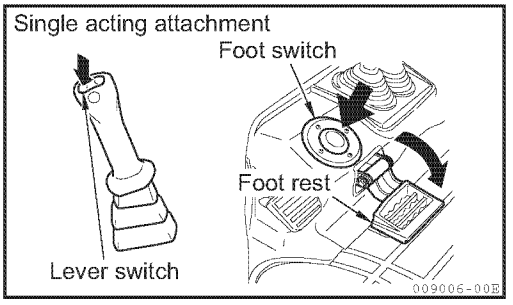
Use the right hand lever switch to control attachments.

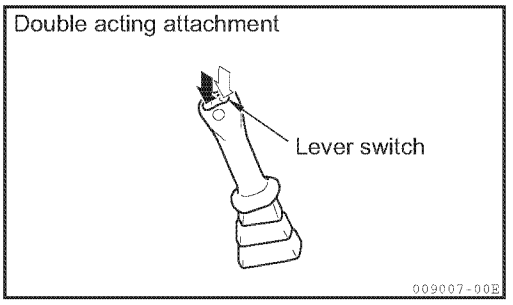
• Single acting attachment (hammer)

Operate the lever switch to the left side only (or operate the foot switch).

• Double acting attachment (tilt bucket, auger, etc.)

Operate the lever switch to right and left sides.

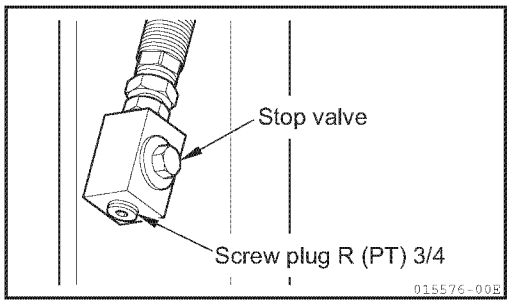


### 13-21-2. Hydraulic circuit

1) When mounting any attachment, follow the procedure below to connect the circuit.

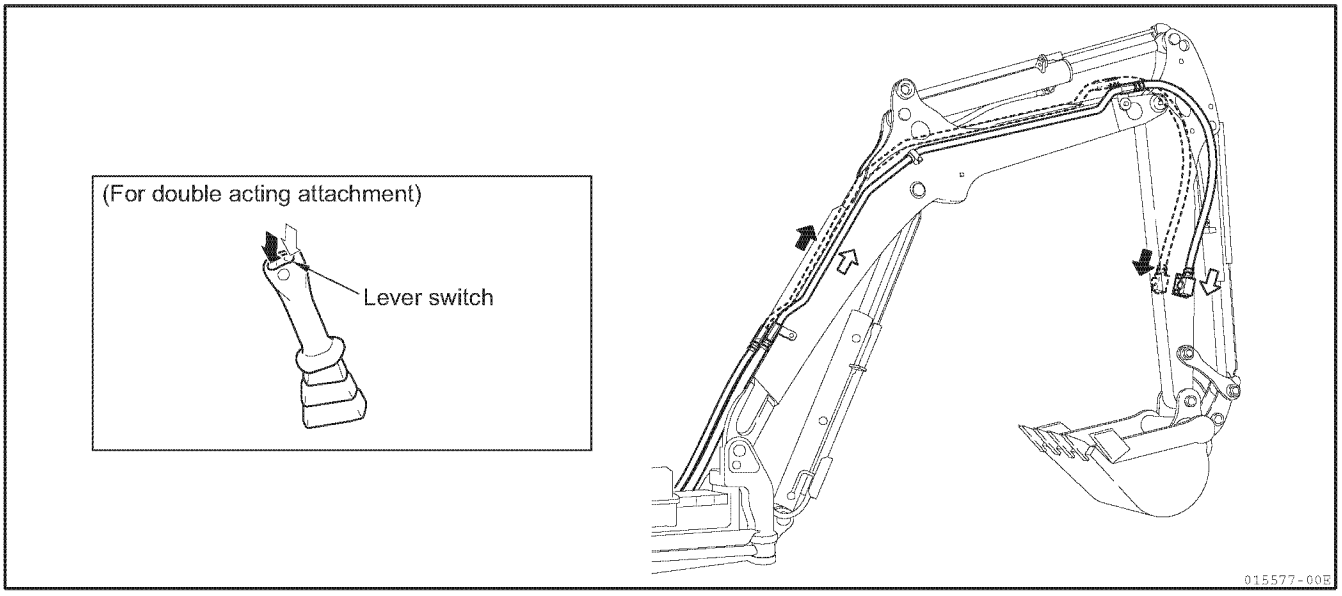
(1) Make sure the stop valves are in the closed position and remove the screw plugs. Take care not to loose or damage the removed parts.




(2) Install the connectors supplied by the manufacturer of the attachment and connect the hoses.

### ■ Oil flow system

The directions of lever switch operation and the oil flow system are described in the figure below.




2) Before disconnecting the hydraulic piping to remove an attachment, relieve the hydraulic oil pressure in the circuit according to the following procedure.

(1) Stop the engine.

(2) Turn the starter key to "ON" position.

(3) Push the lock lever forward to set it in unlock position.

(4) Alternatively press the right and left sides of the lever switch several times.

### 13-21-3. Operating attachment

**⚠ WARNING**

**When changing the hydraulic piping connection, stop the engine and slowly loosen the connection to release the inner pressure.**

If you use the oil pressure for other hydraulic devices as the power source, connect the piping by using the following procedure after the engine has stopped.

1) Close the stop valve.
2) Remove the screw plugs.
3) Connect the hose for the hydraulic tool.
4) Open the stop valve.

Operate the attachment as follows:

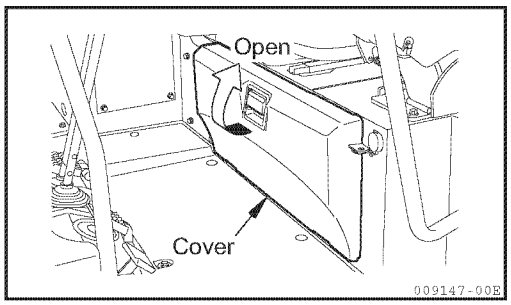
■ **Precautions**

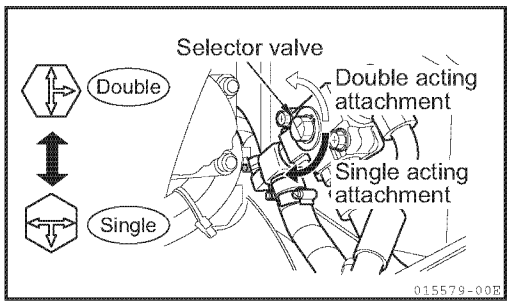
- Make sure the stop valves are in the open position. Refer to Section "13-21-2. Hydraulic circuit" for oil flow system.

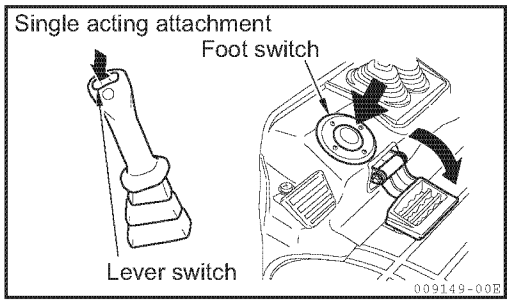
1) When using the breaker (single acting attachment)
Set the return line selector valve inside of the cover to the single acting attachment position.
The breaker works when the lever switch or foot switch is operated.

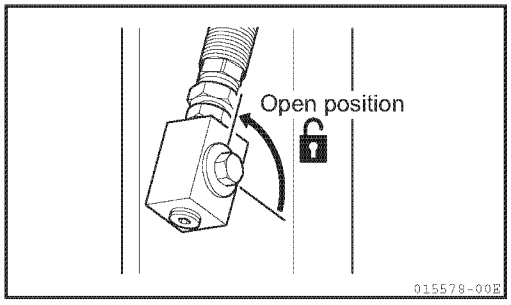
- Make proper use of the breaker following the handling instructions in the operation manual provided by the manufacturer of the breaker.

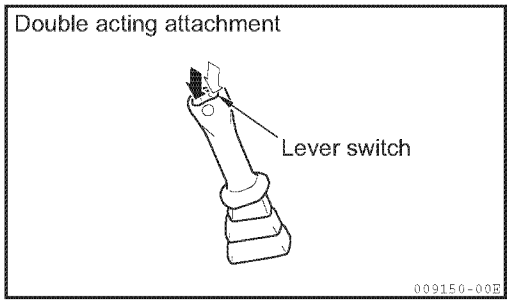
2) When using general attachments such as tilt bucket
Set the return line selector valve to the double acting attachment position.
Move the lever switch to operate the attachment.

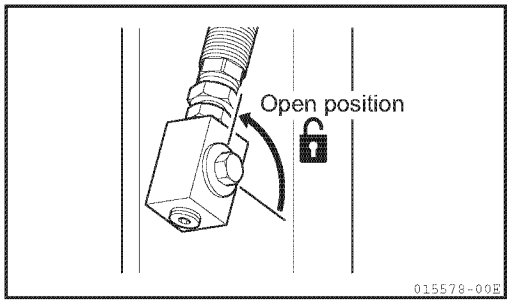


■ **Precautions**

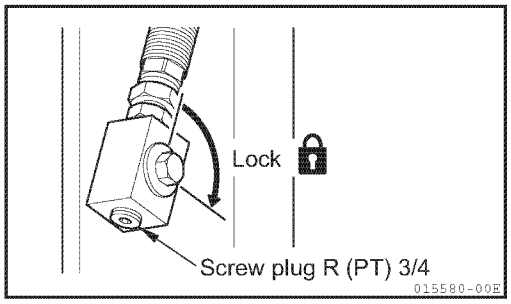
- Make proper use of the general attachments following the handling instructions in the operation manual provided by the manufacturer of the general attachments.

### 13-21-4. Long-term storage

If the hydraulic tool is not used, do the followings:

- Close the stop valves.

- Disconnect the hoses for the hydraulic tool. Wind the screw plug R (PT) 3/4 with seal tape and tighten them to the stop valve.




**⚠ CAUTION**

**Operating the P.T.O. switches when the breaker or general attachment is not mounted may cause overheating.**

### 13-21-5. Specification

Approximate hydraulic oil flow at the rated engine speed.
ViO27-5 : 14.0 GPM (53 L / m)
ViO35-5 : 17.4 GPM (66 L / m)

## 13-22. Replacing the bucket without the quick coupler

**⚠ WARNING**

- **When driving pins into the bucket with a hammer, metal chips may fly. If metal chips should get into your eyes, they can cause serious injury. Use goggles, a hard hat, and gloves for safety when replacing the bucket.**
- **After removing the bucket, place it on solid ground in a stable position.**
- **When aligning the holes for pin A and pin B, be careful not to insert your fingers into those holes to prevent serious injury to your fingers. Visually check the alignment of the holes.**

Work on level ground with good footing. If two or more persons work together, communicate with signals selected beforehand for safety.

### ■ Replacement procedure

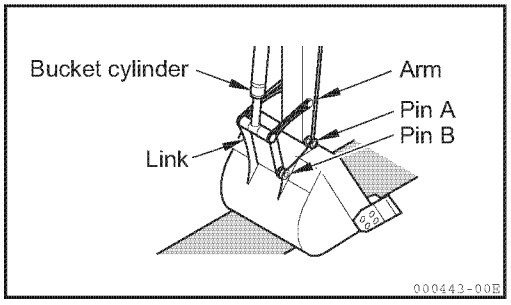
Replace the bucket according to the following procedure:

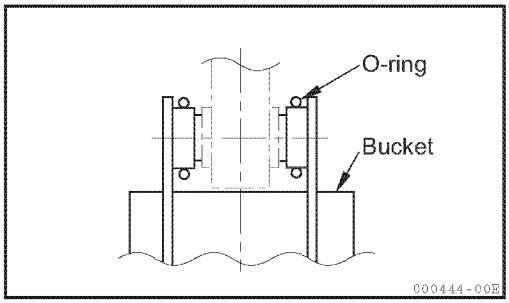
1) Park the machine on level, flat ground, and lower the bucket onto the ground.

2) Stop the engine.

3) Clean around the bucket pin to prevent foreign material from entering the pin holes.

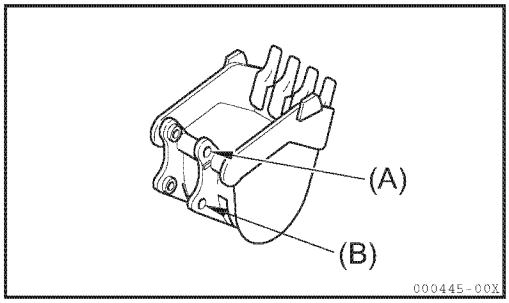
4) Remove pins A and B.



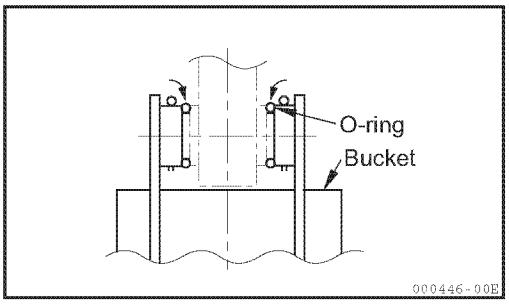




**IMPORTANT**

- **Keep the pins away from dirt or mud.**
- **The machines have dust seals on either end of the bushing. Be careful not to damage them.**



5) Clean the bucket boss section and install the O-ring.

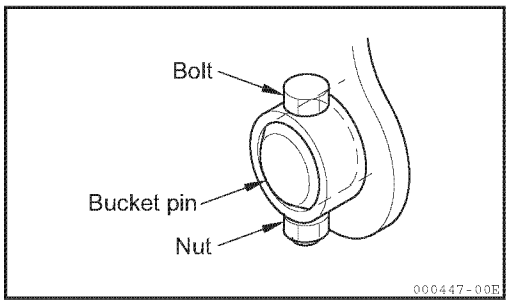



**IMPORTANT**

- **Check that the O-ring is not damaged. If it is damaged, replace it.**
- **We recommend that you replace the O-ring when you replace the bucket.**

6) Connect the arm to hole (A), and then connect the link to hole (B).

7) Install the O-ring in position.




**IMPORTANT**

**Before mounting the bucket, clean the arm pin hole and grease it.**

8) Install the bolt into the bucket pins A and B.

9) Grease the connecting parts.

# 14. Transportation

## 14-1. Loading and unloading the machine

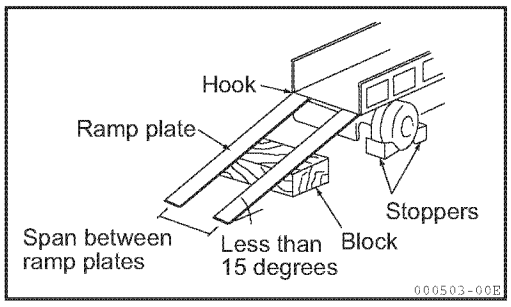
For safety in transporting the machine, comply with all applicable regulations and laws.

**⚠ WARNING**

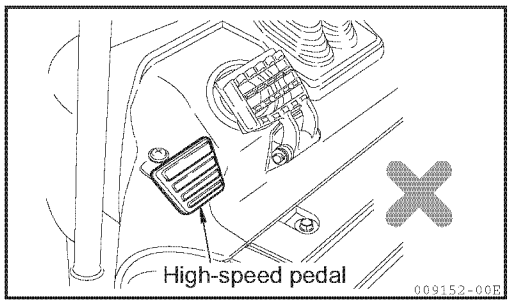
- **Be careful when loading and unloading the machine, because it is a job of high hazard potential.**
- **Load or unload the machine on level, solid ground far away from the shoulder of the road.**
- **Load or unload the machine at a low engine speed.**
- **Use ramp plates of adequate strength having hooks. Check to see that the ramp plates are wide, long, and thick enough to safely sustain the machine so that you can load or unload safely. To prevent the ramp plates from bending too much, support them with blocks.**
- **Securely hook the ramp plates to the deck of the truck so that they will not come off.**
- **Remove mud, grease, and other slippery deposits from the track shoes, and grease, oil, and ice deposits from the ramp plates to prevent the machine from skidding.**
- **Never change the travel direction on the ramp plates. If you need to change the travel direction, go back down on the ramp plates, then do this.**
- **Swing slowly on the truck bed if necessary since the foothold is unstable.**
- **Make sure that the side door of the cabin is locked, whether in the open or closed position. Never open or close the side door on the ramp plates, to prevent it from swinging violently.**

To load or unload the machine, be sure to use the ramp plates and follow the procedure below:

1) Firmly brake the truck and apply wheel stoppers to the tires. Securely install the ramp plates on the bed of the truck in a position where the center of the truck aligns with the center of the machine. Make sure that the left and right ramp plates are at the same level.

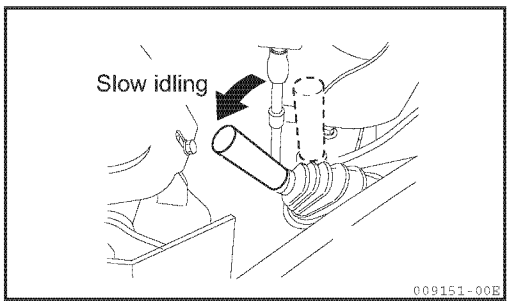



The ramp plates should be set at an angle of less than 15 degrees.
Determine the span between the ramp plates on the basis of the centers of the track shoes.
Do not operate the high-speed pedal.




2) Return the accelerator lever to reduce engine speed.

3) Travel toward the ramp plates at a low speed, and load or unload the machine with the implement lowered as close as possible to the deck of the truck.
Do not operate any levers other than the travel levers while driving on the ramp plates.



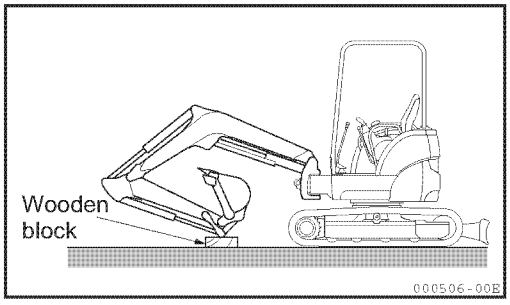

4) Load the machine in a safe position on the truck.

## 14-2. Precautions for loading the machine

**⚠ WARNING**

**Load or unload the machine on level, solid ground far away from the shoulder of the road.**

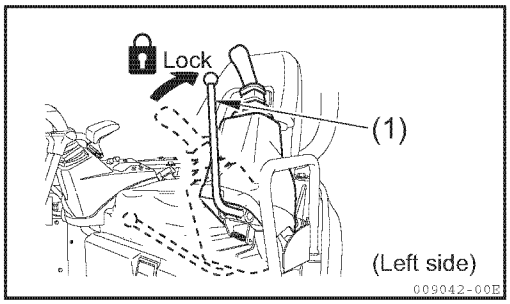
After loading the machine in a safe position on the truck, secure the machine as follows:




1) Place the blade down on the ground.

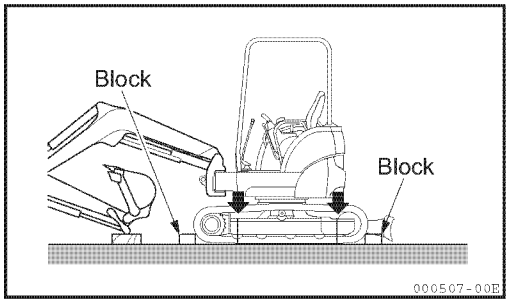
2) Extend the bucket and arm cylinders to the maximum limit, and slowly lower the boom down on a block of wood.

3) Stop the engine to take the key out of the starter switch. (The brake works to lock the swing motor.)




4) Be sure to lock the control levers with the lock levers.

5) Provide wood blocks in the front and back of the track and secure the machine with a chain or a wire rope so that the machine will not move during shipping. In particular, be sure to secure it to prevent skidding.




**IMPORTANT**

**To protect the bucket cylinder from being damaged during shipping, place a wooden block under one end of the bucket to prevent it from directly touching the deck of the truck.**

## 14-3. Precautions for transporting the machine

**⚠ WARNING**

- **Select a route for transporting the machine based on the road width and clearance, and the height and weight of the machine.**
- **Make sure that the side door of the cabin is closed and locked before shipping.**

For safer transportation, comply with all local regulations and laws.

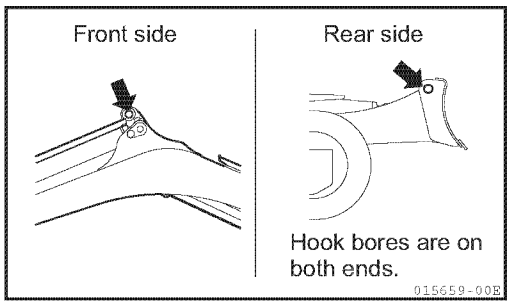
## 14-4. Suspending the machine

**⚠ WARNING**

- **Never suspend the machine if any person is on the machine or the implement.**
- **Use wire ropes strong enough for the weight of the machine.**
- **Do not suspend the machine in any way other than that explained on the following page.**
  **Failure to suspend the machine as prescribed will throw the machine off balance.**
- **Do not swing the machine being suspended.**
- **When suspending the machine, keep the machine in balance taking care on the center of gravity of the machine.**
- **Never stand near or under the suspended machine.**

For safety in suspending the machine, comply with all applicable regulations.

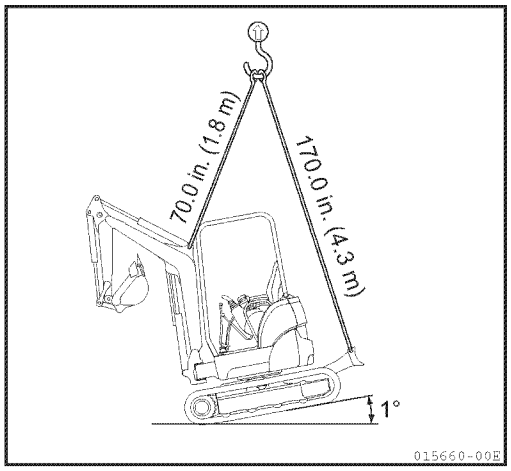
Suspend the machine on the level ground as follows:




1) Swing the upperstructure so that the blade is behind the operator's seat.

2) Raise the blade to the highest limit.

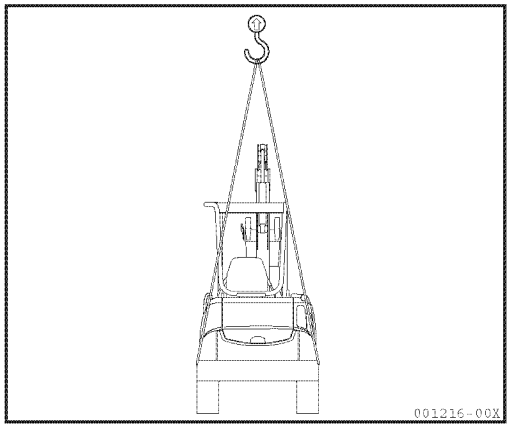
3) Extend the hydraulic cylinders of the front implement (except for the swing cylinder) to the maximum.




4) Stop the engine, and make sure that nothing is left around the operator's seat before leaving the machine.

5) Fit the shackles to the suspending hooks on the front side (one point) and the rear side (two points), and securely fasten a sling belt (or a wire rope) to the shackles.

6) Suspend the machine above the ground, wait until the machine is stable and then suspend it slowly.




Approximate shipping weight:

lbs. (kg)

| Items | | | ViO27-5 | ViO35-5 |
|---|---|---|---|---|
| Quick coupler | Canopy | Steel track | 6730 (3050) | 7850 (3560) |
| | | Rubber track | 6460 (2930) | 7580 (3440) |
| | Cabin | Steel track | 7010 (3180) | 8310 (3770) |
| | | Rubber track | 6750 (3060) | 8140 (3690) |