# 3. INTRODUCTION

## 3.1 INTENDED USE

This Komatsu HYDRAULIC EXCAVATOR is designed to be used mainly for the following work:

- Digging
- Smoothing work
- Ditching work
- Loading work

See the section 12.14 "WORK POSSIBLE USING HYDRAULIC EXCAVATOR" for futher details

## 3.2 FEATURES

- This Komatsu HYDRAULIC EXCAVATOR is equipped with various controls based on an advanced electronics system.
- The monitor panel greatly facilitates daily maintenance and self-diagnosis.
- Working mode, travel speed and swing priority are selectable.
- Digging and lifting force can be increased by light-touch control. (For details, see operation section.)
- Adjustable wrist control levers make operations smooth and easy.
- Fresh filtered air heater assures comfortable operation. (Air conditioner option)
- Low noise level and smart urban style design and colouring.
- Superb operation performance provided by powerful engine and high-performance hydraulic pump.
- Low fuel consumption controlled by an electronic control system provides an environment-friendly machine.

## 3.3 BREAKING IN YOUR NEW MACHINE

Your Komatsu machine has been thoroughly adjusted and tested before shipment.

However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to break in the machine for the initial 100 hours (as indicated by the hour meter.)

During breaking in:

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Sudden starting or acceleration, unnecessarily abrupt braking and sharp turning should be avoided except in cases of emergency.

Additionally for the first 20 hours

- Avoid operating engine for prolonged periods at constant speed (including idle.)
- Avoid high speed travelling for periods of more than 5 minutes.

Pay particular attention to oil pressure and temperature indicators & check coolant and oil levels frequently during breaking in.

The precautions given in this manual for operating, maintenance, and safety procedures are only those that apply when this product is used for the specified purpose. If the machine is used for a purpose that is not listed in this manual, Komatsu cannot bear any responsibility for safety. All consideration of safety in such operations is the responsibility of the user.

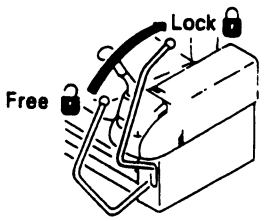
Operations that are prohibited in this manual must never be carried out under any circumstances.

## UNAUTHORISED MODIFICATION

- Any modification made without authorisation from Komatsu can create hazards.
- Before making a modification, consult your Komatsu distributor. Komatsu will not be responsible for any injury or damage caused by any unauthorised modification.

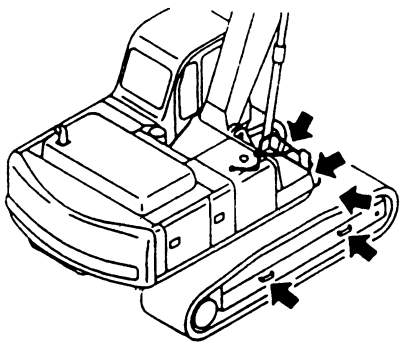
## ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

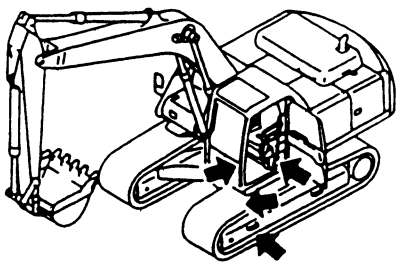
- When standing up from the operator's seat, always place the safety lock lever securely in the LOCK position. If you accidentally touch the travel or swing lever when they are not locked, the work equipment may suddenly move and cause serious injury or damage.
- When leaving the machine, lower the work equipment completely to the ground, set the safety lock lever to the LOCK position, then stop the engine and use the key to lock all the equipment. Always take the key with you. Work equipment posture **See → 12.16 "PARKING THE MACHINE."**




## MOUNTING AND DISMOUNTING

- NEVER jump on or off the machine. NEVER get on or off a moving machine.
- When mounting or dismounting, always face the machine and use the handrails, machine or track frame steps, and track shoes.
- Do not hold any control levers when getting on or off the machine.
- Ensure safety by always maintaining at least three-point contact of hands and feet with the handrails, steps or track shoes.
- Always remove any oil or mud from the handrails, steps and track shoes. If they are damaged, repair them and tighten any loose bolts.
- If grasping the door handrail when mounting or dismounting or moving on the track, open and lock the door securely in the open position. Otherwise, the door may move suddenly, causing you to lose balance and fall.

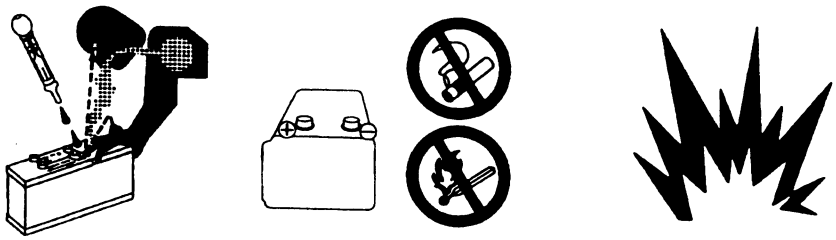




# 7.4 BATTERY

## BATTERY HAZARD PREVENTION

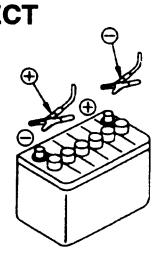
- Battery electrolyte contains sulphuric acid and can quickly burn the skin and eat holes in clothing. If you spill acid on yourself, immediately flush the area with water.
- Battery acid could cause blindness if splashed into the eyes. If acid gets into the eyes, flush them immediately with large quantities of water and see a doctor at once.
- If you accidentally drink acid, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention centre immediately.
- When working with batteries. ALWAYS wear safety glasses or goggles.
- Batteries generate hydrogen gas. Hydrogen gas is very EXPLOSIVE, and is easily ignited with a small spark or flame.
- Before working with batteries, stop the engine and turn the starting switch to the OFF position.
- Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.
- When removing or installing, check which is the positive (+) terminal and negative (-) terminal.
- Tighten the battery cap securely.
- Tighten the battery terminals securely. Loosened terminals can generate sparks and lead to an explosion.
- When removing battery cap wear rubber groves to prevent electrolyte contact with skin.



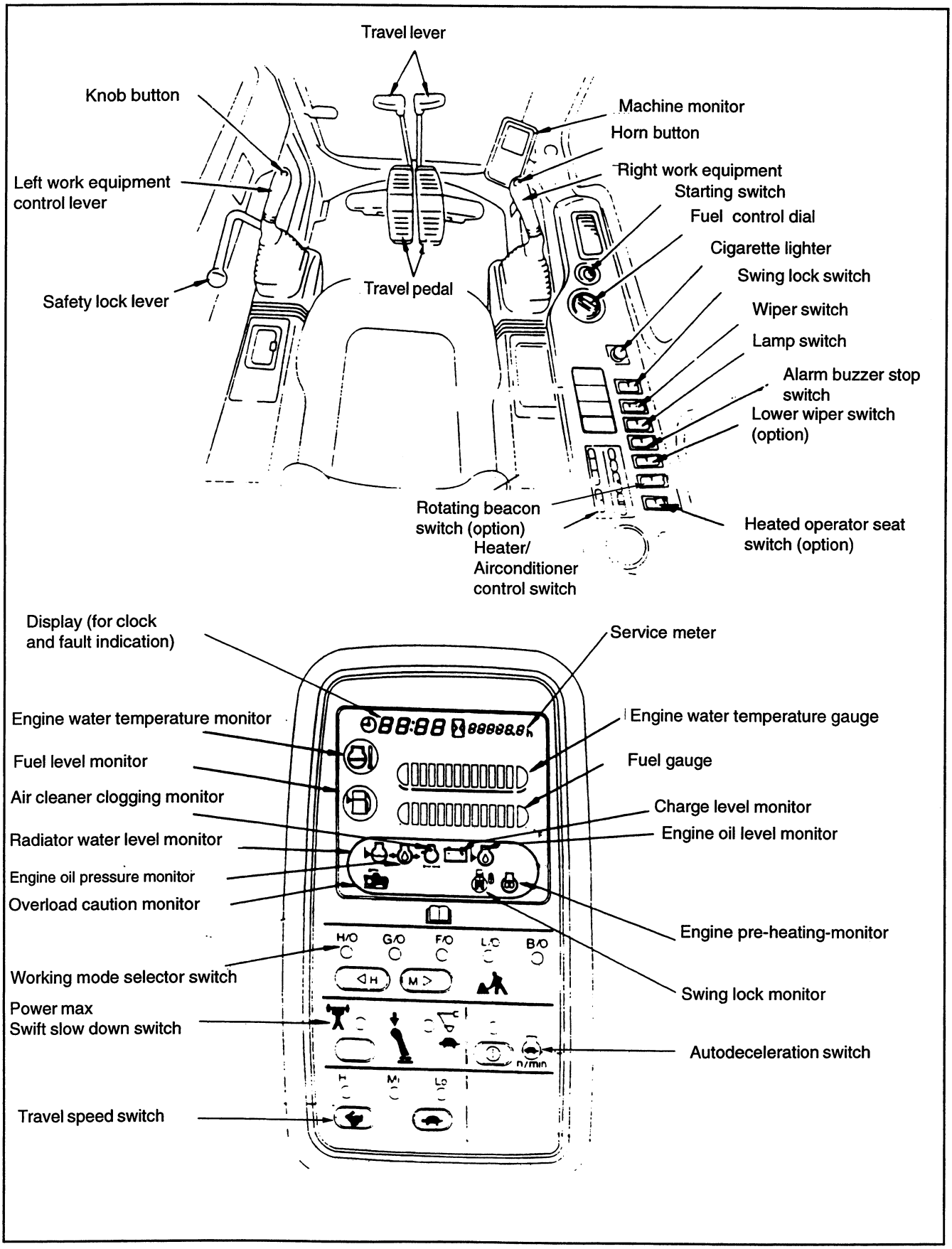
## STARTING WITH BOOSTER CABLES

- ALWAYS wear safety glasses or goggles when starting the machine with booster cables.
- When starting from another machine, do not allow the two machines to touch.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the ground or negative (-) cable first when removing them.
- If any tool touches between the positive (+) terminal and the chassis, it will cause sparks. This is dangerous, so be sure to work carefully.
- Connect the batteries in parallel: positive to positive and negative to negative.
- When connecting the ground cable to the frame of the machine to be started, be sure to connect it as far as possible from the battery.
  **Starting with booster cables → See 16.5 "IF BATTERY IS DISCHARGED."**

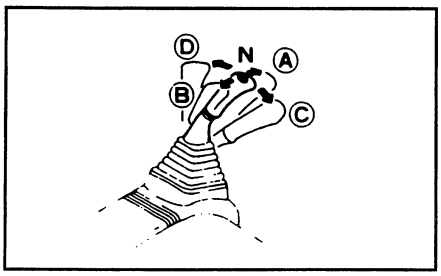
**INCORRECT**



# 10.2 GENERAL VIEW OF CONTROLS AND GAUGES



### 3. LEFT WORK EQUIPMENT CONTROL LEVER (with auto-deceleration device)




**⚠ WARNING**

**If any lever is operated when in the deceleration range, the engine speed will suddenly increase, so be careful when operating the levers.**

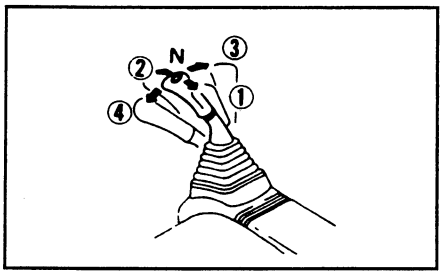
This lever is used to operate the arm and upper structure.

| Arm operation | | Swing operation | |
|---|---|---|---|
| Ⓐ | Arm OUT | © | Swing to right |
| Ⓑ | Arm IN | Ⓓ | Swing to left |

N (Neutral)

When the lever in this position, the upper structure and the arm will be retained in the position in which they stop.

### 4. RIGHT WORK EQUIPMENT CONTROL LEVER (with auto-deceleration device)




**⚠ WARNING**

**If an lever is operated when in the deceleration range, the engine speed will suddenly increase, so be careful when operating the levers.**

This lever is used to operate the boom and bucket.

| Boom operation | | Bucket operation | |
|---|---|---|---|
| ① | RAISE | ③ | DUMP |
| ② | LOWER | ④ | CURL |

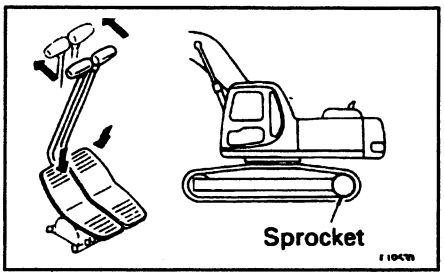
N (Neutral)

When the lever in this position, the boom and the bucket will be retained in the position in which they stop.

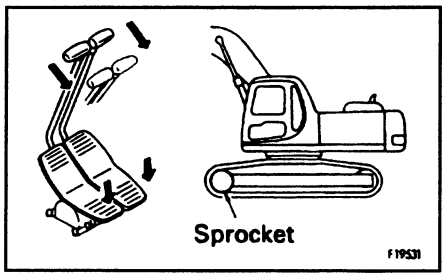
For levers ②, ③ and ④, the engine speed changes as follows because of the auto-deceleration mechanism.

- When the travel lever and work equipment control levers are at neutral, even if the fuel control dial is above the mid-range position, the engine speed will drop to a mid-range speed. If any of the levers are operated, the engine speed will rise to the speed set by the fuel control dial.
- If all control levers are set to neutral, the engine speed will drop by approx. 100 rpm, and after approx. 4 seconds, the engine speed will drop to the deceleration speed (approx. 1400 rpm).

4. Operate right and left travel levers ⑤ or right and left travel pedals ⑥ as follows.




- When the sprocket is at the rear of the machine.
  Push levers ⑤ forward slowly or depress the front part of pedals ⑥ slowly to move the machine off.




- When the sprocket is at the front of the machine.
  Pull levers ⑤ backward slowly or depress the rear part of pedals ⑥ slowly to move the machine off.

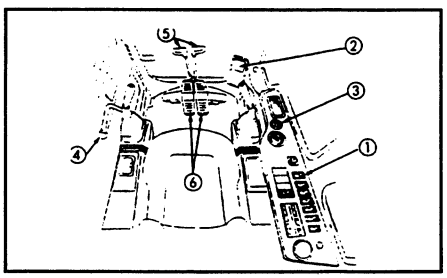
**REMARK**

Each time the travel levers are operated on machines equipped with the travel alarm, the alarm sounds to warn people in the machine vicinity.

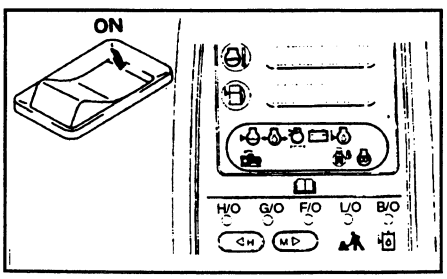
## 12.4.2 MOVING MACHINE BACKWARD

**⚠ WARNING**

- **Before operating the travel levers, check the direction of the track frame. If the sprocket is at front, the operation of the track levers is reversed.**
- **When moving off, check that the area around the machine is safe, and sound the horn before moving.**
- **Clear all personnel from the machine and the area.**
- **Clear all obstacles from the path of the machine.**
- **Use extreme care when reversing the machine. Note there is a blind spot behind the machine.**
- **If the lever is moved inside the deceleration range, engine speed will rise suddenly. Operate the levers carefully.**




1. Set swing lock switch ① to the ON (actuated) position and confirm that swing lock monitor lamp ② lights up.

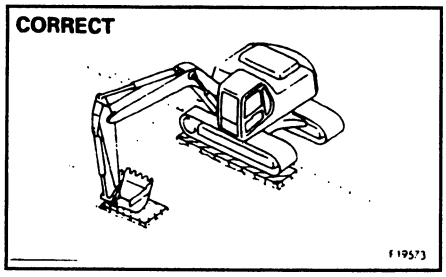


# 12.13 HOW TO ESCAPE FROM MUD

Always operate carefully to avoid getting stuck in mud. If the machine does get stuck in mud, use the following procedures to get the machine out.

## 12.13.1 WHEN ONE SIDE IS STUCK

When only one side is stuck in mud, use the bucket to raise the track then lay boards or logs and drive the machine out. If necessary, put a board under the bucket also.

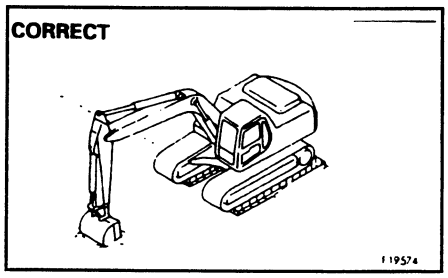



**NOTICE**

**When using the boom or arm to raise the machine, always have the bottom of the bucket in contact with the ground. (Never push with the teeth). The angle between the boom and arm should be 90 to 110 . The same applies when using the inverting bucket.**

## 12.13.2 WHEN BOTH SIDES ARE STUCK

When both tracks are stuck in mud and the machine will not move, lay boards as explained above, and dig the bucket into the ground in front. Then pull in the arm as in normal digging operations and put the travel levers in the FORWARD position to pull the machine out.



# 16.6 OTHER TROUBLE

## 16.6.1 ELECTRICAL SYSTEM

- ( ): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

| Problem | Main causes | Remedy |
|---|---|---|
| Lamp does not glow brightly even when the engine runs at height speed | • Defective wiring<br>• Defective adjustment of fan belt tension | • (Check, repair loose terminals, disconnections)<br>• Adjust fan belt tension For details, see "EVERY 250 HOURS SERVICE" |
| Lamp flickers while engine is running | | |
| Charge level monitor does not go out even when engine is running | • Defective alternator<br>• Defective wiring | (• Replace)<br>(• Check, repair) |
| Abnormal noise is generated from alternator | • Defective alternator | (• Replace) |
| Starting motor does not turn when starting switch is turned to ON. | • Defective wiring<br>• Insufficient battery charge | (• Check, repair)<br>• Charge |
| Pinion of starting motor keeps going in and out | • Insufficient battery charge | • Charge |
| Starting motor turns engine sluggishly | • Insufficient battery charge<br>• Defective starting motor | • Charge<br>(• Replace) |
| Starting motor disengages before engine starts | • Defective wiring<br>• Insufficient battery charge | (• Check, repair)<br>• Charge |
| Pre-heating monitor does not light | • Defective wiring<br>• Defective heater relay<br>• Defective monitor | (• Check, repair)<br>(• Replace)<br>(• Replace) |
| Oil pressure monitor does not light up when engine is stopped (starting switch at ON position) | • Defective monitor<br>• Defective caution lamp switch | (•Replace)<br>(•Replace) |
| Outside of electrical heater is not warm when touched by hand | • Defective wiring<br>• Disconnection in electric heater<br>• Defective operation of heater switch | (• Check, repair)<br>(• Replace)<br>(• Replace) |

- When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.
  If is actually better to estimate a temperature about 10°C lower when deciding the mixing rate.

**Mixing rat of water and antifreeze**
**(For PC160, PC180)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Min. atmospheric temperature | °C | -5 | -10 | -15 | -20 | -25 | -30 |
| | °F | 23 | 14 | 5 | -4 | -13 | -22 |
| Amount of antifreeze | ℓ | 4.6 | 6.0 | 7.2 | 8.2 | 9.2 | 9.95 |
| Amount of water | ℓ | 15.4 | 14.0 | 12.8 | 11.8 | 10.8 | 10.05 |

**(For PC200)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Min. atmospheric temperature | °C | -5 | -10 | -15 | -20 | -25 | -30 |
| | °F | 23 | 14 | 5 | -4 | -13 | -22 |
| Amount of antifreeze | ℓ | 5.8 | 7.6 | 91. | 10.3 | 11.6 | 12.6 |
| Amount of water | ℓ | 19.3 | 17.5 | 16.0 | 14.8 | 13.5 | 12.5 |

**⚠ WARNING**

**Antifreeze is flammable, so keep it away from any flame.**

- Use city water for the cooling water.
  If river water, well water or other such water supply must be used, contact your Komatsu distributor.
- We recommend use of an antifreeze density gauge to control the mixing proportions.

**⚠ WARNING**

**When removing drain plug, avoid pouring coolant on yourself.**

# 24.6 EVERY 1000 HOURS SERVICE

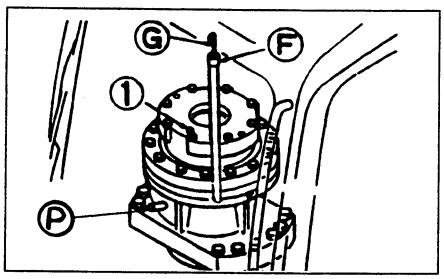
**Maintenance for every 50, 100, 250 and 500 hours should be carried out at the same time.**

## 24.6.1 CHANGE OIL IN SWING MACHINERY CASE

**⚠ WARNING**

**The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before carrying out maintenance.**

- Container to catch drained oil: Min. 4 ℓ capacity.
- Refill capacity: 4 ℓ (1.05 US gal, 0.9 UK gal).




1. Set an oil container under drain plug Ⓟ under the machine body.
2. Loosen drain valve Ⓟ under the body, drain the oil, then tighten the drain valve again.
3. Remove dipstick Ⓖ and bleeding plug ①.
   Add the specified amount of engine oil through gauge hole Ⓕ.

For details of the oil to use, see 20. "USE OF FUEL, COOLANT AND LUBRICANTS ACCORDING TO AMBIENT TEMPERATURE", page 3-12.

4. After refilling, install bleeding plug ①.
5. Wipe off oil on the dipstick with a cloth.
6. Insert dipstick Ⓖ into the gauge pipe thoroughly and then pull out it again.
7. When the oil level is between the H and L marks, on dipstick Ⓖ, it is normal. If the oil does not reach the L mark, add more oil through oil filler Ⓕ.
8. If the oil level exceeds the H mark, drain the excess engine oil from drain plug Ⓟ, and check the oil level again.

# 24.8 EVERY 4000 HOURS SERVICE

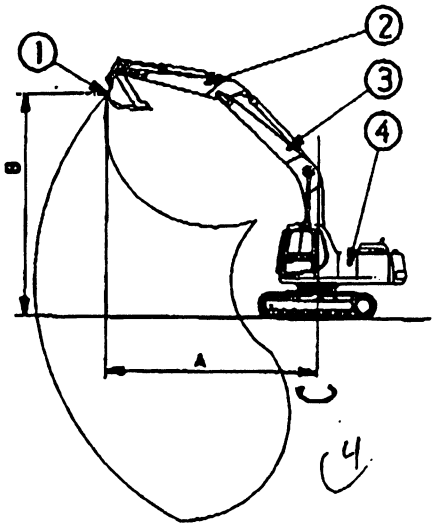
**Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours should be carried out at the same time.**

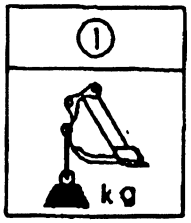
## 24.8.1 CHECK WATER PUMP

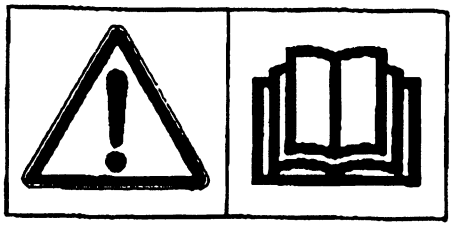
Check that there is oil leakage, water leakage, or clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.

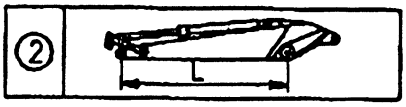
## Lifting capacities PC160-6k

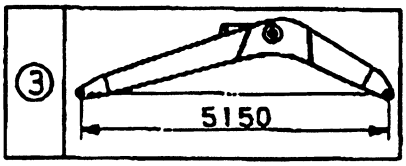
PC160-6K

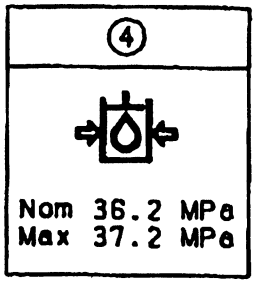




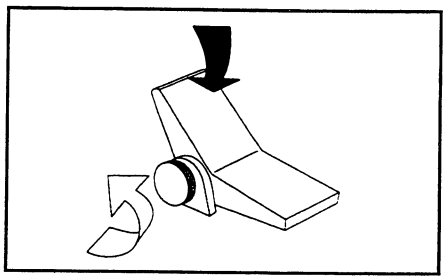




| PC160 L | A / B | MAX | | 7.5m | | 6.0m | | 4.5m | | 3.0m | | 1.5m | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ▲ kg | | | | | | | | | | | |
| 2.5m | 6.0m | •1500 | •1500 | | | •3050 | 2850 | | | | | | |
| | 4.5m | •1450 | •1450 | •2200 | 1750 | •3350 | 2750 | | | | | | |
| | 3.0m | •1500 | 1400 | 2500 | 1700 | 3800 | 2800 | •5000 | 4250 | •7150 | •7150 | | |
| | 1.5m | •1650 | 1300 | 2450 | 1600 | 3550 | 2400 | 5750 | 3800 | •8750 | 7100 | | |
| | 0.0m | •1900 | 1300 | 2350 | 1500 | 3400 | 2250 | 5350 | 3600 | •8750 | 6900 | | |
| | -1.5m | 2250 | 1450 | 2300 | 1600 | 3300 | 2150 | 5200 | 3350 | •8750 | 8400 | •4750 | •4750 |
| | -3.0m | 2750 | 1800 | | | 3300 | 2150 | 5200 | 3350 | •10350 | 8500 | •7800 | •7800 |
| | -4.5m | 4050 | 2700 | | | | | 5300 | 3450 | •8000 | 68000 | | |
| 2.8m | 6.0m | •1700 | •1700 | | | •3150 | 2750 | | | | | | |
| | 4.5m | •1650 | •1650 | | | •3700 | 2700 | | | | | | |
| | 3.0m | •1700 | 1800 | 2500 | 1650 | 3750 | 2550 | •5300 | 4200 | •7750 | •7750 | | |
| | 1.5m | •1900 | 1400 | 2400 | 1550 | 3550 | 2350 | 5550 | 3700 | •8750 | •8750 | | |
| | 0.0m | 2200 | 1400 | 2350 | 1500 | 3400 | 2200 | 5350 | 3500 | •8400 | •8400 | | |
| | -1.5m | 2400 | 1650 | | | 3300 | 2150 | 5200 | 3350 | •9100 | 8450 | •5050 | •5050 |
| | -3.0m | 3000 | 1950 | | | 3350 | 2200 | 5250 | 3400 | •9950 | 6800 | •8300 | •8300 |
| | -4.5m | •4150 | 3100 | | | | | •4900 | 3600 | •7300 | 6950 | | |
| 2.2m | 6.0m | •2100 | •2100 | | | •3200 | 2700 | | | | | | |
| | 4.5m | •2050 | 1850 | | | 3850 | 2700 | •4500 | 4500 | | | | |
| | 3.0m | •2100 | 1800 | 2450 | 1650 | 3700 | 2550 | •5850 | 4100 | •8750 | 7850 | | |
| | 1.5m | •2300 | 1500 | 2400 | 1600 | 3500 | 2350 | 6800 | 3700 | | | | |
| | 0.0m | 2350 | 1550 | 2350 | 1550 | 3400 | 2250 | 5300 | 3450 | •6700 | •5700 | | |
| | -1.5m | 2850 | 1700 | | | 3300 | 2200 | 5250 | 3400 | •9350 | 8480 | •5300 | •5300 |
| | -3.0m | 3350 | 2200 | | | 3400 | 2250 | 6300 | 3450 | •9400 | 6850 | •9250 | •9250 |
| | -4.5m | •4000 | 3750 | | | | | | | •8250 | •6250 | | |
| 1.8m | 6.0m | •3850 | 2750 | | | | | | | | | | |
| | 4.5m | 3050 | 2100 | | | 3850 | 2700 | •5000 | 4450 | | | | |
| | 3.0m | 2850 | 1800 | | | 3700 | 2550 | 8000 | 4050 | | | | |
| | 1.5m | 2550 | 1700 | | | 3550 | 2400 | 6800 | 3700 | | | | |
| | 0.0m | 2600 | 1750 | | | 3450 | 2300 | 5350 | 3500 | | | | |
| | -1.5m | 2950 | 1950 | | | 3400 | 2250 | 5350 | 3500 | •9450 | 6850 | | |
| | -3.0m | 3850 | 2800 | | | | | 5480 | 3600 | •8700 | 6850 | | |
| | -4.5m | | | | | | | | | | | | |

**WHEN USING GENERAL ATTACHMENT SUCH AS CRUSHER**

When the lock pin is set to the free position and the pedal is depressed at the front or rear portions, the attachment is actuated.



**Precautions when using**

- Check that the stop valve is at the FREE position.
- Confirm that the selector valve is set to the position for general attachments such as the crusher.

  For details of the oil path, see 28.2 "HYDRAULIC CIRCUIT".
- For other precautions when using the attachment, see the instruction manual provided by the attachment manufacturer.

## 28.5 LONG TERM STORAGE

If the equipment is not to be used for a long period, do as follows.

- Set the stop valve to the LOCK position.
- Install the blind plugs and O-rings to the valves.
- Set the selector valve to the "when not use" position.
- Lock the lock pin to the lock position.

If the pedal is operated when there is no breaker or general attachment installed, it will cause overheating and other problems.

## 28.6 SPECIFICATIONS

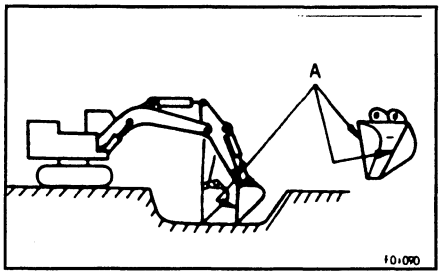
**Hydraulic specifications**

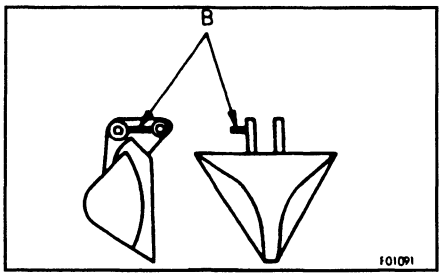
- Max. oil flow: 206 l/min.
- Relief set pressure of service valve safety valve: (365 kg/cm$^2$)
- Cracking pressure of service valve safety valve: (385 kg/cm$^2$)

# 29.5 HANDLING TRAPEZOIDAL BUCKET

This bucket is used to dig trapezoidal ditches on paddy fields, farmland ect. and can dig 3 types of ditch gradients ( 45°, 40° and 38°) when a movable plate is attached.

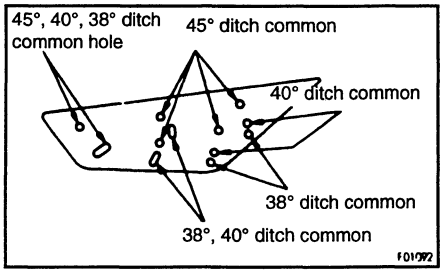
- The mounting position of the movable plate varies depending on whether the ditch gradient is 45°, 40° or 38°.



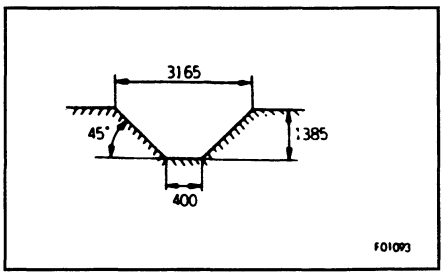

**How to perform excavation**

Operate the boom, the arm and the bucket to make the line Ⓐ of the side-plate of the bucket vertical.
The guide plate Ⓑ to check this position is installed beside the bucket pins. Accordingly, hold this plate horizontal when digging.



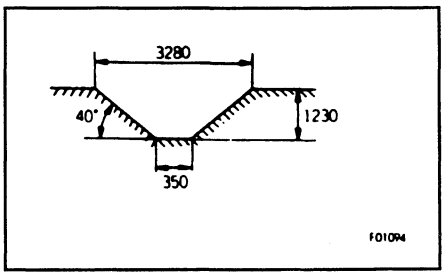

**Ditch gradient of 45°**

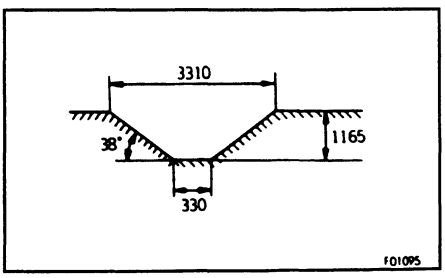
Attached the bucket only or the movable plate by selecting the related ditch holes. Perform digging by the above method.



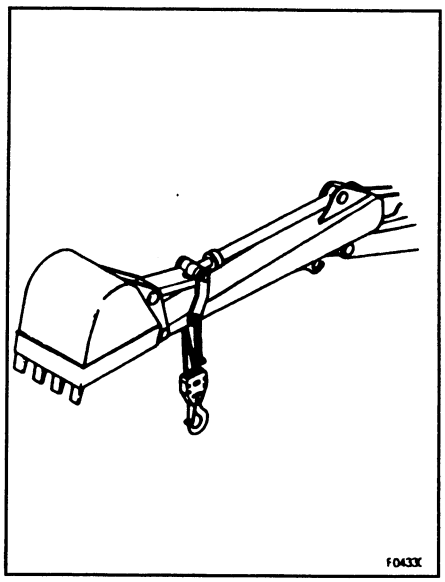

**Ditch gradient of 40° or 38°**

Attached the bucket only or the movable plate by selecting the related ditch holes. Perform digging by the above method.
Even if the trapezoidal bucket is provided with the movable plate, always perform digging with the bucket side face perpendicular to the ground.



# 30.8 HYDRAULIC EXCAVATOR WITH MULTIPURPOSE CRANE



### MAIN FIELDS OF APPLICATION

- Site preparation
- Water supply and sewerage
- River work
- Agricultural, civil engineering work

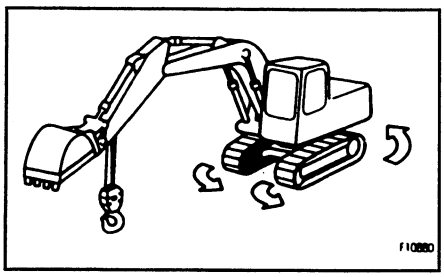
Crane operation can be carried out without removing the bucket. This machine is used for laying U section gutters and pipes for water supply and sewerage as well as river and canal work, agricultural, civil engineering work and site preparation.

### MISTAKEN METHODS OF USE

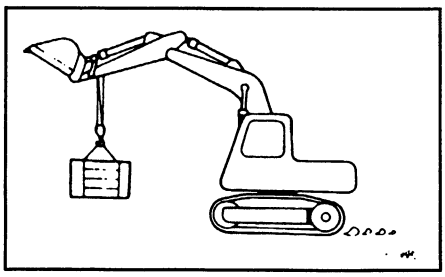
To ensure that the machine has a long life, and to ensure that operations are carried out in safety, do not operate the machine in any of the following ways.

- Do not operate the cylinder to the end of its stroke. Always leave approx. 5 cm (2 in) to spare.

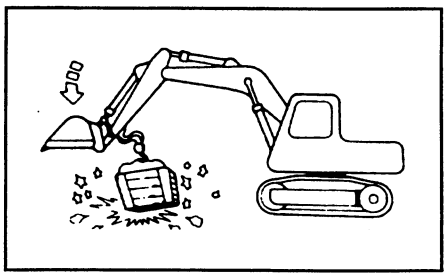
Abrupt lever operation



Travelling with a suspended load



Operating other work equipment during crane operation



Excessive lengthening of wire rope