SEAM046100T

Operation & Maintenance Manual

PC78US-5

HYDRAULIC EXCAVATOR

SERIAL NUMBERS PC78US-5 –1001 and up

It is out policy to improve our products whenever it is possible and practical to do so. We reserve the right to make changes or improvements at any time without incurring any obligation to install such changes on products sold previously.

Due to this continuous program of research and development, revisions may be made to this publication. It is recommended that customers contact their distributor for information on the latest revision.

November 2001

CONTENTS

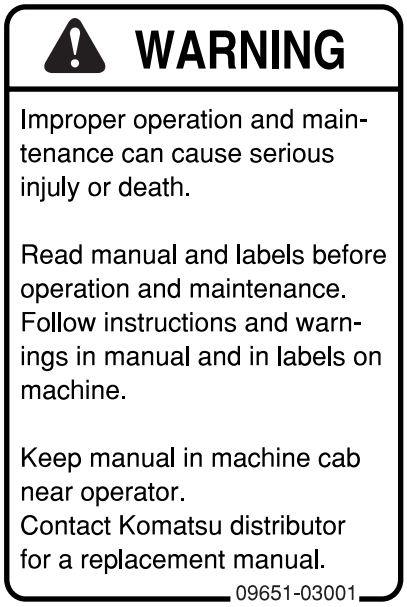
FOREWORD

SAFETY

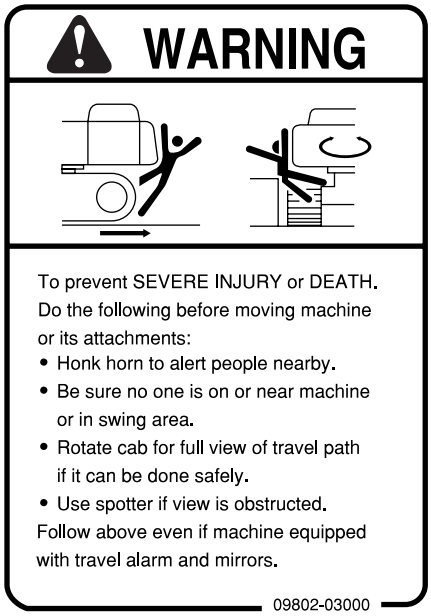
OPERATION

SAFETY LABELS

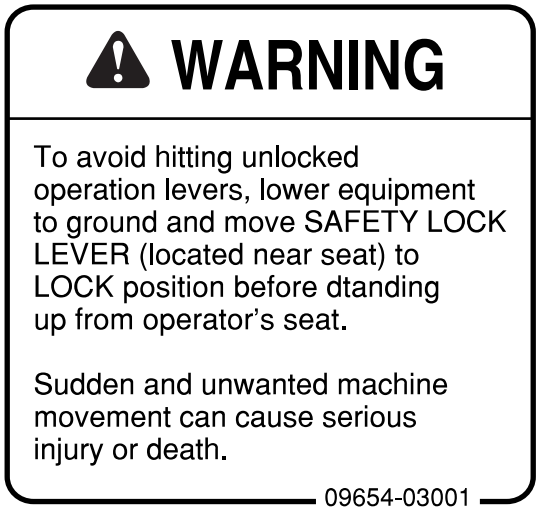
(1) Precautions for operation, inspection and maintenance (09651-03001)



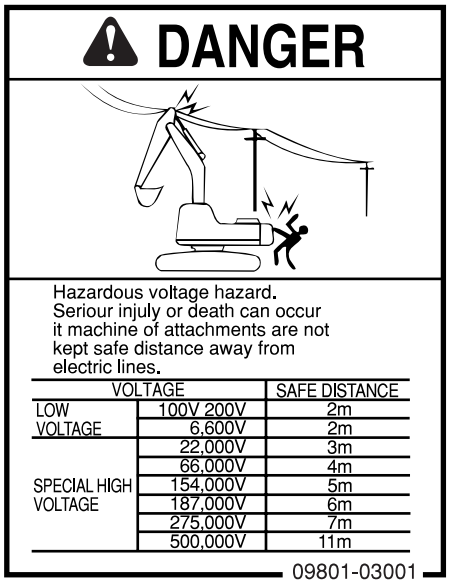
(2) Precautions for before operation (09802-03000)



(3) Precautions for leaving the operator's seat (09654-03001)



(4) Precautions for going close to electric cables (09801-03001)



ATTACHMENT COMBINATIONS

Depending on the type or combination of work equipment, there is a hazard that the work equipment may hit the cab or other parts of the machine. Before using unfamiliar work equipment, check if there is any hazard of interference, and operate with caution.

CAB WIDOW GLASSES

If the cab glass on the work equipment side is broken, there is a hazard that the work equipment may contact the operator's body directly. Stop operation immediately and replace the glass.

UNAUTHORIZED MODIFICATIONS

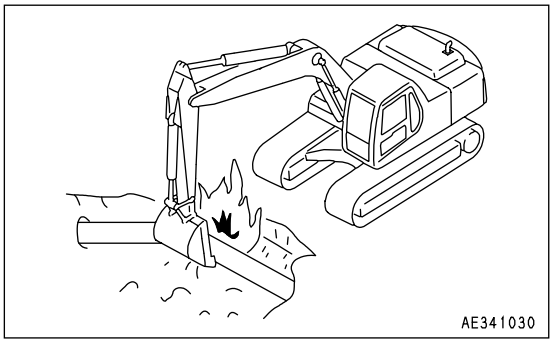
Any modification mode without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

- Komatsu will not be responsible for any injuries, accidents, or product failures resulting from modifications made without authorization from Komatsu.

SAFETY AT JOBSITE

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- When carrying out operations near combustable materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take necessary measures to prevent any unauthorized person from entering the operating area.
- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.



WORKING ON LOOSE GROUND

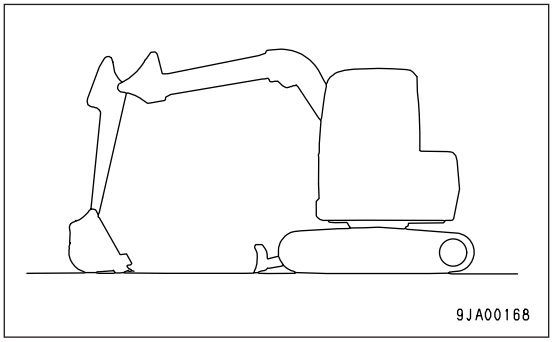
- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

OPERATIONS ON SNOW

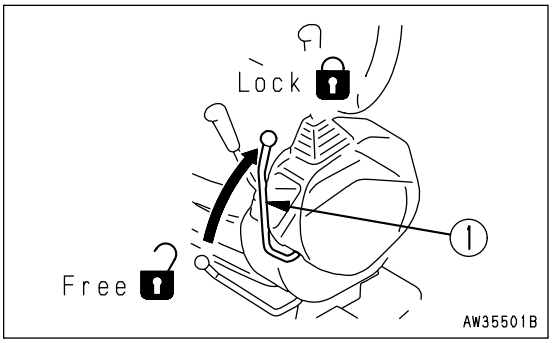
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.

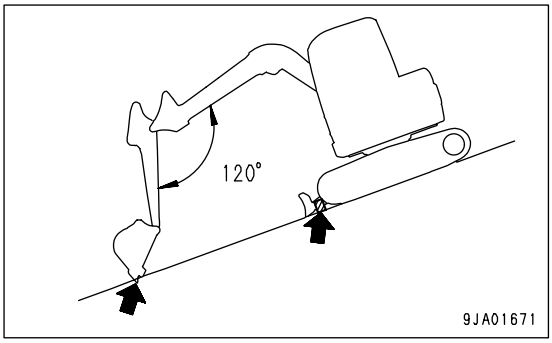
PARKING MACHINE

- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



- When leaving the machine, set safety lock lever (1) to the LOCK position, then stop the engine.
- Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.
- If it is necessary to park the machine on a slope, always do as follows.
  - Set the bucket on the downhill side, then dig it into the ground.
  - Put blocks under the tracks to prevent the machine from moving.





ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Place attachments that have been removed from the machine in a stable condition so that they do not fall. And take steps to prevent unauthorized persons from entering the storage area.

WORK UNDER THE MACHINE

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are off the ground and the machine is supported only by the work equipment. If the control levers are touched by mistake, or there is a hazard to the hydraulicline, the work equipment or the machine may suddenly descend. This is extremely dangerous. Never work under the machine if the machine is not properly supported by blocks or stands.

NOISE

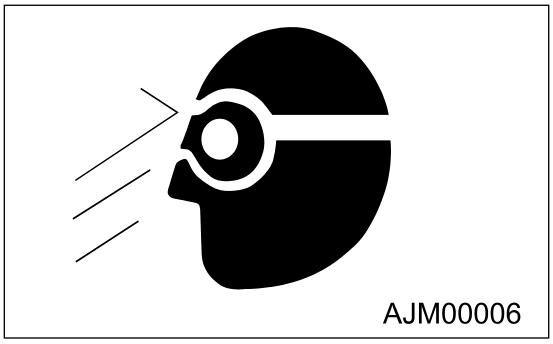
If the noise from the machine is too loud, it may cause temporary or permanent hearing problems.

When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

WHEN USING HAMMER

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury. Always do as follows.

- If hard metal parts such as pins, bucket teeth, cutting edges, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause injury. Always wear safety goggles and gloves.
- When hitting pins or bucket teeth, there is a hazard that broken pieces might be sent flying and injure people in the surrounding area. Always check that there is no one in the surrounding area.



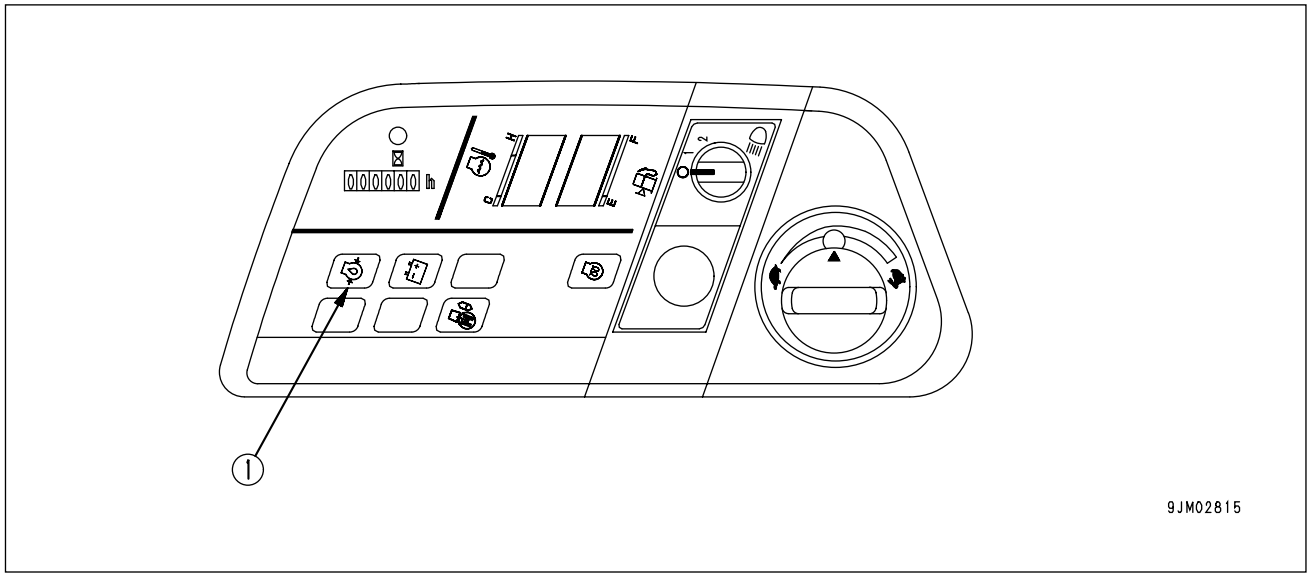
- If pins are hit with strong force, there is a hazard that the pin may fly out and injure people in the surrounding area.

EMERGENCY STOP ITEMS

⚠ CAUTION

If the monitor flashes, stop the engine immediately or run at low idling, then inspect the problem point immediately and repair the problem.

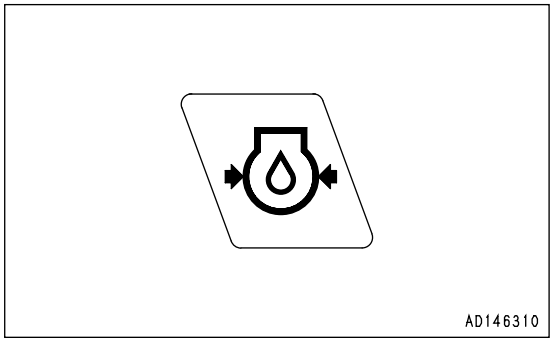
These are items which need to be observed when the engine is running. If there is any abnormality, the abnormal location on the monitor will flash and the buzzer will sound. Carry out the necessary repairs immediately.



(1) Engine oil pressure monitor

ENGINE OIL PRESSURE MONITOR

If the engine lubricating pressure is below the normal value, this monitor (1) lights up and the buzzer sounds. If it lights up, stop the engine, and check the oil level in the oil pan and lubricating system.

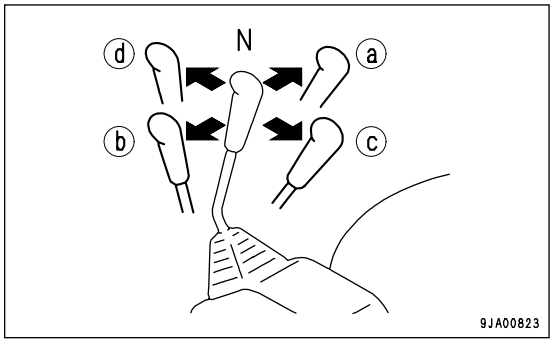


REMARK

- While the starting switch is ON, the lamp will remain lit and will go off once the engine is started.
- When the engine is started or stopped with the starting switch at the ON position, the lamp may light up and the buzzer may sound momentarily, but this does not indicate any abnormality.

WORK EQUIPMENT CONTROL LEVER

This Left work equipment control lever (2) is used to operate the arm and upper structure.

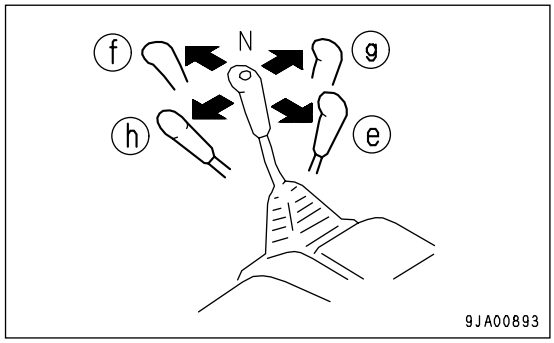


Arm operation Swing operation

(a) Swing to right
(b) Swing to left
(c) Arm IN
(d) Arm OUT

N (Neutral): The upper structure and arm are held in position and do not move.

This Right work equipment control lever(3) is used to operate the arm and upper structure.



Boom operation Bucket operation

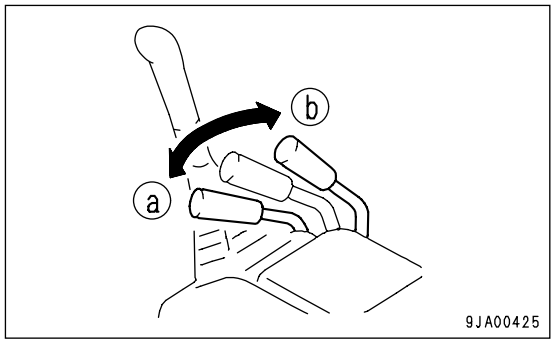
(e) RAISE
(f) LOWER
(g) DUMP
(h) CURL

N (Neutral): The boom and bucket are held in position and do not move.

BLADE CONTROL LEVER

(Only machines with blade specification)

This lever (4) is used to control the blade.



(a): LOWER
(b): RAISE

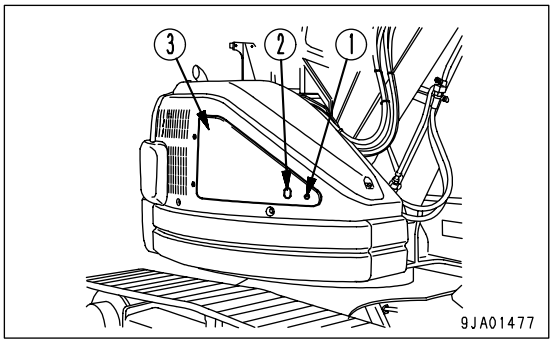
RIGHT SIDE INSPECTION COVER

⚠ CAUTION

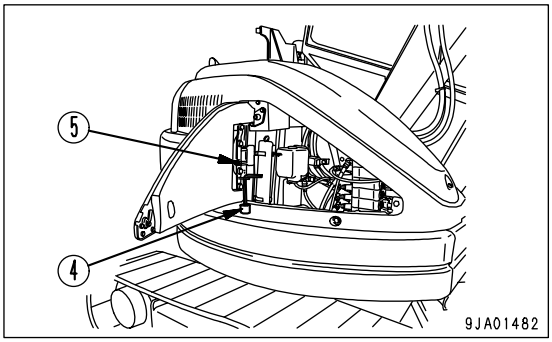
When carrying out inspection and maintenance inside the cover, always use the support lever to hold the cover open.

NOTICE
Always keep the cover locked except when opening it.

1. Release lock (1) of the cover.
   For details, see "CAP, COVER WITH LOCK (PAGE 3-24)".
2. Hook your finger in catch (2) and open cover (3).

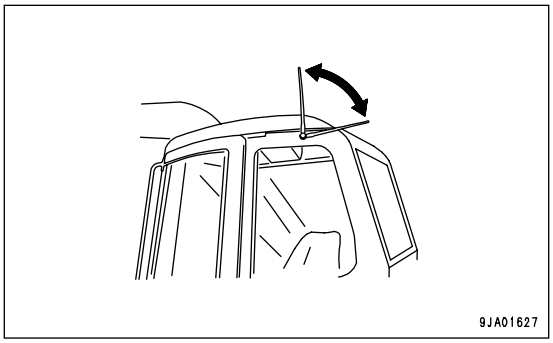


3. Remove stopper (4) from spring catcher (5).
4. Lower stopper (4) so that the cushion of stopper (4) contacts the outside circumference of the machine.
5. When closing cover (3), fix stopper (4) to the spring catcher (5) and close cover (3), and lower the cover slowly.
6. Lock the cover.



ANTENNA

If the receiving wave is weak or generates noise, extend the antenna. If the wave is too strong, adjust the sensitivity by retracting the antenna.



NOTICE
When transporting the machine or parking it in a garage, always fully retract the antenna to avoid the possibility of breakage.

PRECAUTIONS WHEN USING

- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- If water gets into the speaker case or radio, it may lead to an unexpected failure, so be careful not to get water on the equipment.
- Do not wipe the scales or buttons with benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.
- When the battery is replaced, the settings for the preset buttons are all cleared, so set them again.

ADJUST BEFORE OPERATION

⚠ WARNING

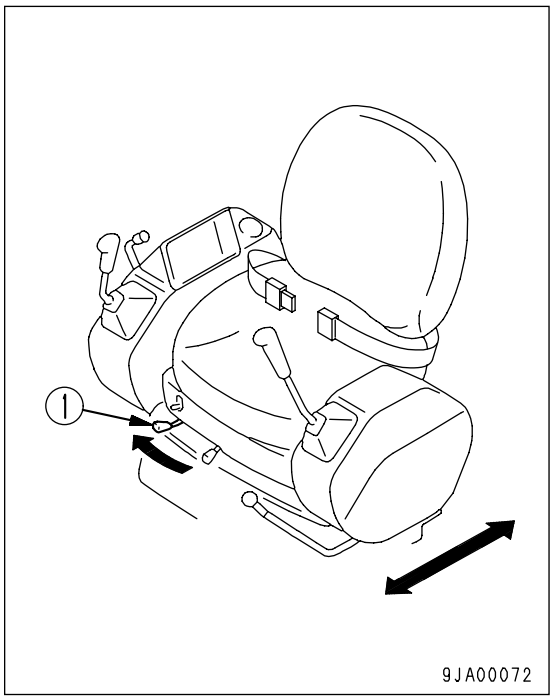
- **Adjust the seat position before starting operations or after changing the operator.**
- **Adjust the seat so that the brake pedal can be depressed fully with the operator's back against the backrest.**

OPERATOR'S SEAT

The seat and console box can move forward and backward. Move lever (1) to the right, set the seat in a position that is easy to operate, then release the lever.

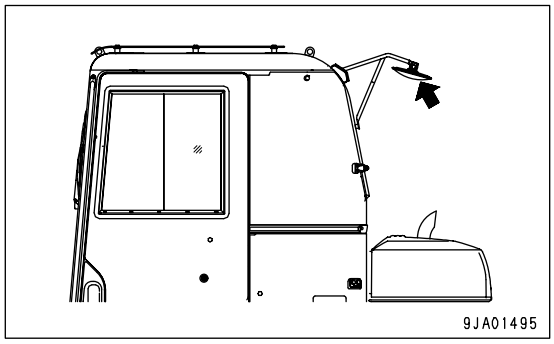
Fore-and-aft adjustment: 160 mm (6.3 in) (8 stages)

Adjust the position of the operator's seat to match the operation. For example, when carrying out deep digging operations, the view below the front of the machine is improved if you slide it to the front.

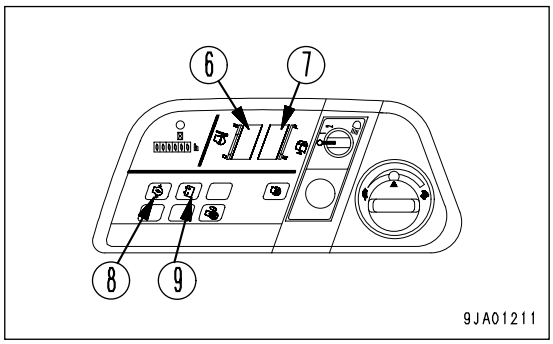


REARVIEW MIRRORS

Adjust the mirror so that it is possible to see clearly the area to the bottom rear of the machine (the area hidden by the engine hood).

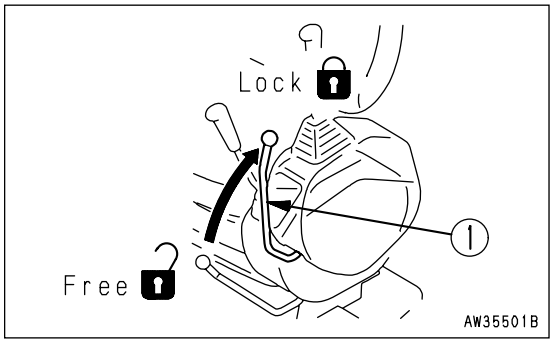


5. After carrying out the warming-up operation, check that each gauge and monitor lamp is in the following condition.
   - Engine water temperature gauge (6): Inside green range
   - Fuel gauge (7): Inside green range
   - Engine oil pressure monitor (8): OUT
   - Charge level monitor (9): OUT



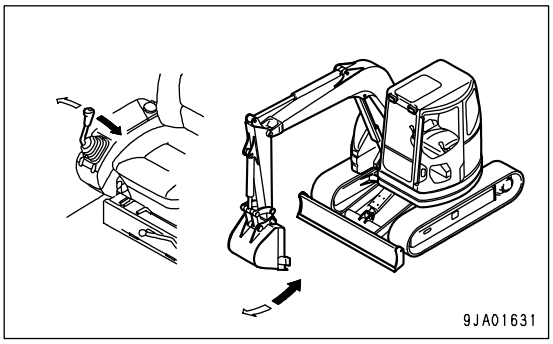
6. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, repair it.

7. Set lock lever (2) to the LOCK position and check that it is impossible to operate the swing and work equipment with the left and right work equipment control levers.



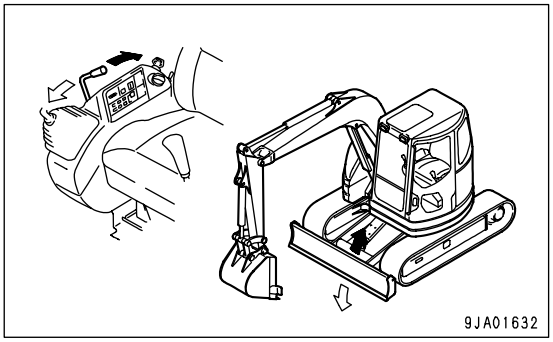
- Bucket control

  Move the right work equipment control lever to the left or right to operate the bucket.



- Blade control (blade specification)

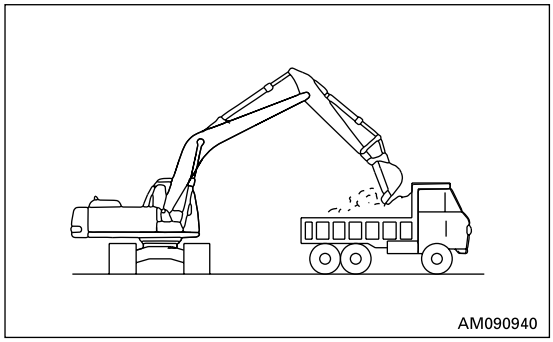
  Move the lever on the right side of the operator’s seat to the front or rear to operate the blade.



LOADING WORK

In places where the swing angle is small, work efficiency can be enhanced by locating the dump truck in a place easily visible to the operator.

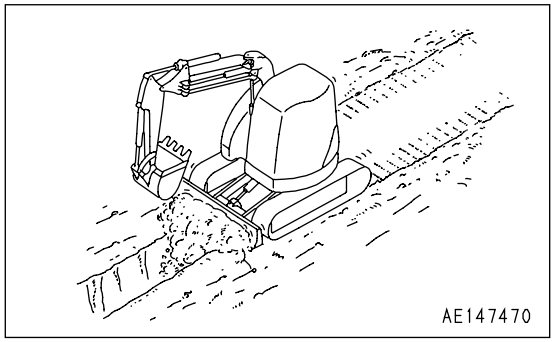
Loading is easier and capacity greater if you begin from the front of the dump truck body than if loading is done from the side.



SMOOTHING WORK

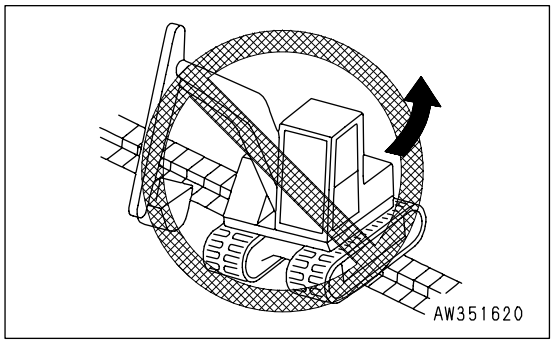
(Only machines with blade specification)

When refilling after excavation and when smoothing the ground surface, use the blade.

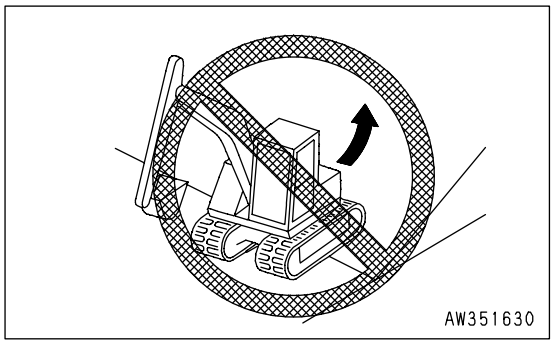


- Always maintain the rubber shoes at the proper tension to prevent them from coming off.
  If the tension is low, the rubber shoes will come off under the following conditions.
  Even if the tension is correct, be extremely careful when carrying out operations.

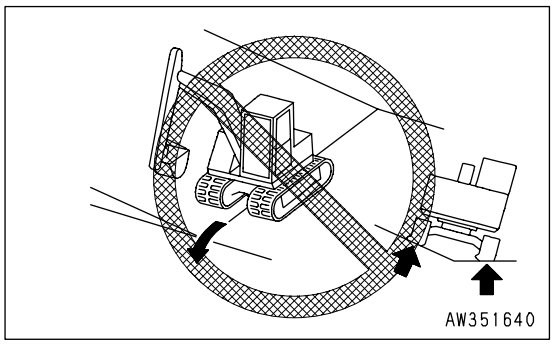
1. Avoid operating the steering when traveling over curbs, rocks, or places where there is a big difference in height (more than approx. 20 cm (8 in)). When traveling over such objects, always travel at right angles to the object.



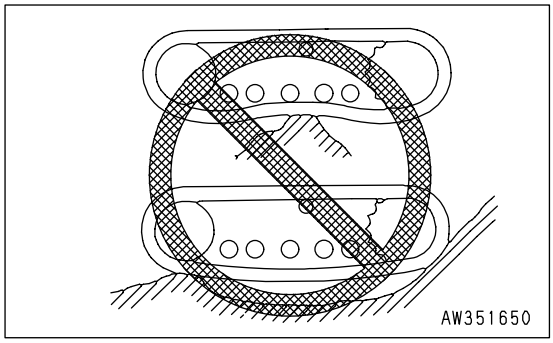
2. When traveling in reverse up a slope, do not turn when moving from flat ground onto the slope.
   If it is necessary to turn on slopes, be sure to turn gradually.



3. Avoid traveling along the edge of slopes or on rough ground with the track on one side raised (with the machine tilting at an angel of more than approx. 10º) and with the track on the other side on flat ground. To avoid damage to the road liners and rubber shoes, travel with the tracks on both sides on flat ground.



4. If the machine is operated as explained in 1 to 3 above, the rubber shoes is slackened. Do not steer the machine in the positions shown in the figure.



LIFTING MACHINE

⚠ WARNING

- **Never raise the machine with any worker on it.**
- **Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.**
- **Never try to lift the machine in any posture other than the posture given in the procedure below. There is a hazard that the machine may lose its balance.**
- **Never lift the machine with the upper structure swung to the side. Swing the work equipment so that it is at the sprocket end and set the undercarriage and upper structure parallel before lifting.**
- **When lifting, keep the machine horizontal.**
- **It is dangerous to go under the machine when it is raised. Never go under the machine in such cases.**

STANDARD SPECIFICATION MACHINE

NOTICE
The lifting procedure applies to machines with standard specifications.
The method of lifting differs according to the attachments and options actually installed. In such cases, please contact your Komatsu distributor for information.

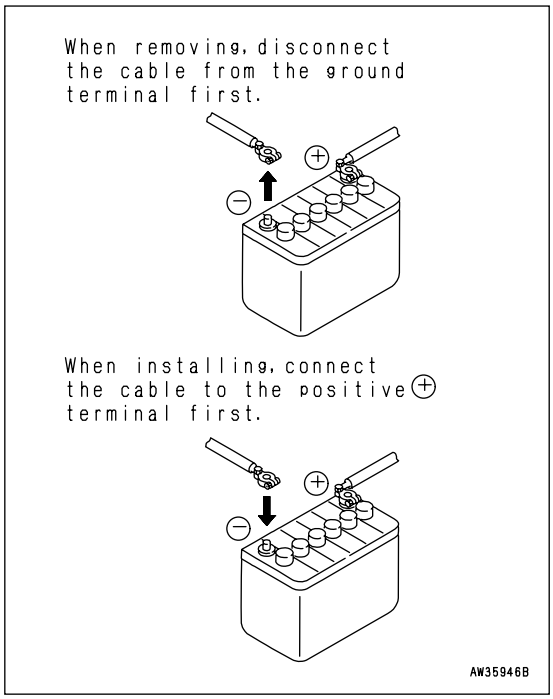
When lifting the machine, carry out the operation on flat ground as follows.

For details of the weight, see SPECIFICATIONS (PAGE 5-2).

DISCHARGED BATTERY

⚠ WARNING

- **It is dangerous to charge the battery while it is still mounted on the machine. Always remove the battery before charging it.**
- **When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.**
- **The battery generates hydrogen gas, so there is a hazard of explosion.**
  Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
- **Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.**
- **When handling batteries, always wear protective goggles and rubber gloves.**
- **When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first. If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.**
- **If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.**
- **When installing the terminals, install them tightly. When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.**
- **Green rust around the terminals is a cause of self-discharge of the battery. Polish the terminals with sandpaper. After removing the rust, coat the terminals thinly with grease before installing.**



MAINTENANCE INFORMATION

Do not carry out any inspection and maintenance operation that is not found in this manual.

SERVICE METER READING

Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

KOMATSU GENUINE REPLACEMENT PARTS

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

KOMATSU GENUINE LUBRICANTS

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

WINDSHIELD WASHER FLUID

Use automobile windshield washer fluid, and be sure not to let any dirt get into it.

FRESH AND CLEAN LUBRICANTS

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

CHECK DRAINED OIL AND USED FILTER

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantities of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

FUEL STRAINER

If your machine is equipped with a fuel strainer, do not remove it while fueling.

WELDING INSTRUCTIONS

- Turn off the engine starting switch.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1m (3.3 ft) from the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may have troubles.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

No.	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT(Winter, one season type)
2	AGIP	Diesel sigma S super dieselmulti- grade *Sigma turbo	Rotra MP	GR MU/EP	-
3	AMOCO	*Amoco 300	Multi-purpose gear oil	PYKON premium grease	-
4	ARCO	*Arcofleet S3 pius	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine coolant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifeeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgrease 77 Mobilgrease special	-
14	PENNZOIL	*Superme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White-bearing grease	Anti-freeze and summer coolant
15	PETROFINA	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor

CLEAN INSIDE OF COOLING SYSTEM

⚠ WARNING

- **Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure.**
  If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.
- **Cleaning is carried out with the engine running. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position.**
- **For details of starting the engine, see "BEFORE STARTING ENGINE (PAGE 3-38)" and "STARTING ENGINE (PAGE 3-51)" in the OPERATION section.**
- **There is danger of touching the fan if the undercover is left removed.**
  Never enter behind the machine when the engine is running.

Clean the inside of the cooling system, change the coolant and replace the corrosion resistor agent KI according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Adding corrosion resistor agent KI
Permanent type antifreeze (All season type)	Every year (autumn)or every 2000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant.
Non permanent type antifreeze containing ethylene glycol (winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours whichever comes first	

Stop the machine on level ground when cleaning or changing the coolant.

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol.

Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect.

The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.

In areas where the water is hard, always add Komatsu genuine corrosion resistor agent KI. One packet of corrosion resistor agent contains 100g (0.22 lb). The standard density of the mixture should be 7g/liters (0.065 oz/US gal).

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.

It is actually better to estimate a temperature about 10°C (50°F) lower when deciding the mixing rate.

CHECK AND ADJUST RUBBER SHOES TENSION

(Machine equipped with rubber shoes)

⚠ WARNING

- **The rubber shoes tension is checked with the machine raised, so it is extremely dangerous if the machine comes down by mistake during the inspection. Stop the engine and set the safety lock lever to the LOCK position to prevent the machine from moving.**
  Never put any part of your body under the track or track frame while measuring, and be extremely careful when taking the measurements.
- **For details of starting the engine and operating the work equipment, see "BEFORE STARTING ENGINE (PAGE 3-38)", "STARTING ENGINE (PAGE 3-51)", "AFTER STARTING ENGINE (PAGE 3-54)", and "WORK EQUIPMENT CONTROLS AND OPERATIONS (PAGE 3-65)" in the OPERATION section.**

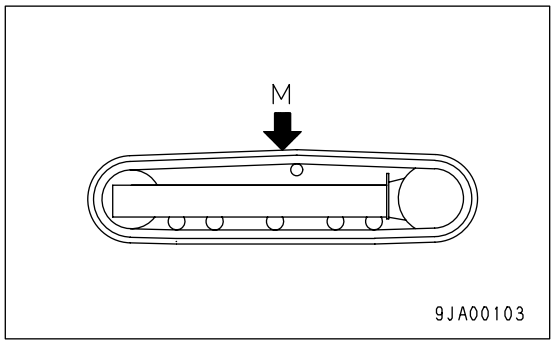
The wear of the rubber shoe will vary with the work conditions and type of soil, so inspect the wear and track tension whenever necessary.

In particular, on new machines or after new tracks have been installed and the tension has been set to the specified value, the track tension will become loose in the first 5 to 30 hours when the machine has been used for a certain amount of repeated travel. If the track tension is adjusted frequently until the initial loosening no longer occurs, this will prevent the shoes from coming off due to insufficient track tension.

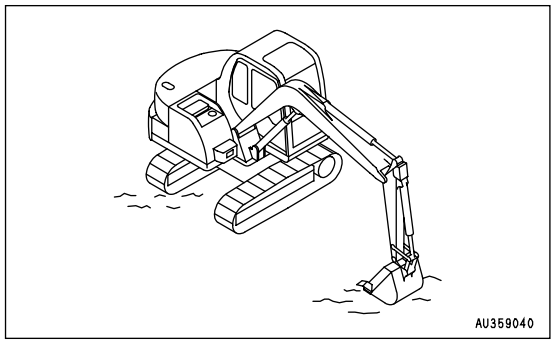
If operations are carried out when the rubber shoe is loose (rubber shoe tension: Min.40 mm (1.6 in)), the track will come off and it will cause premature wear of the core.

Inspection

1. Set the connection (M mark) of the rubber shoe at the top midway between the two axles.



2. Raise the chassis with the boom and arm.
   When doing this, operate the levers slowly.

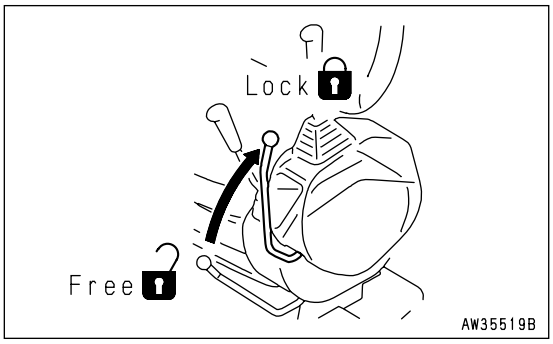


ADJUST BUCKET CLEARANCE

⚠ WARNING

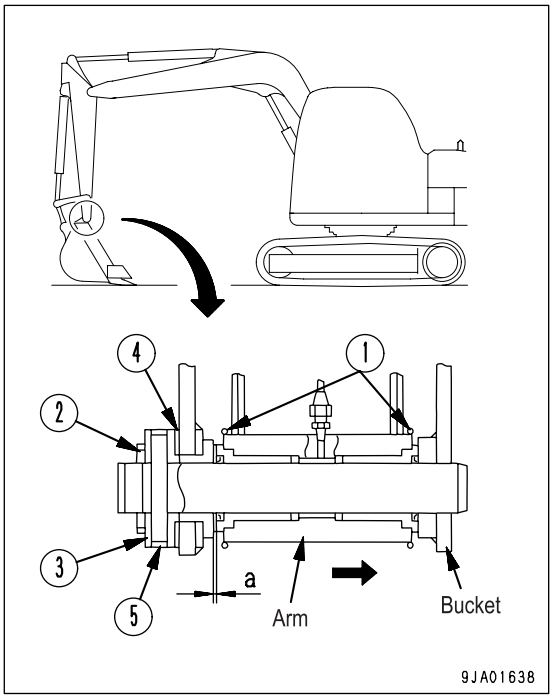
It is dangerous if the work equipment moves by mistake when the clearance is being adjusted.

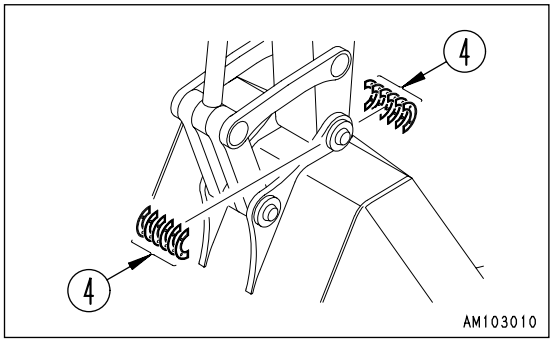
Set the work equipment in a stable condition, then stop the engine and lock the safety lock lever securely.



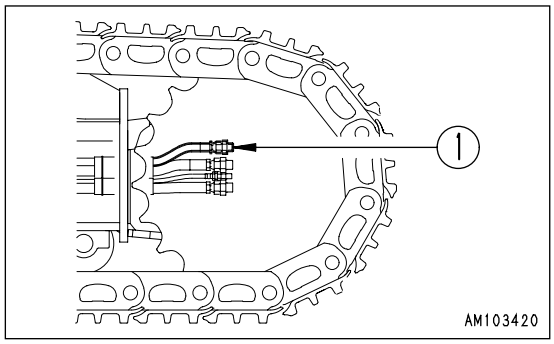
1. Set the work equipment to the position shown in the diagram at right, stop the engine and set the lock lever to the locked position.
2. Shift O-ring (1) of the linkage and measure the amount of play "a".
   Measurement is easier of you move the bucket to one side or the other so all the play can be measured in one place.

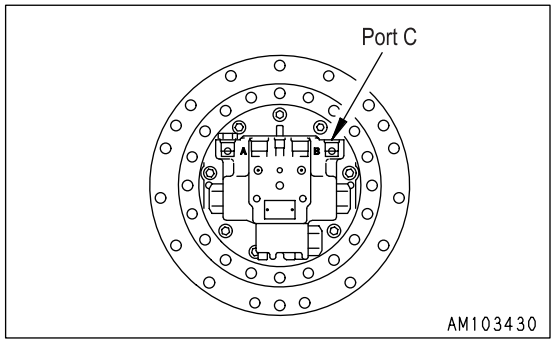
   Use a gap (clearance) gauge for easy and accurate measurement.
3. Loosen the four plate fixing bolts (2) and loosen plate (3). Because it uses split shims, you can carry out the operation without removing the bolts entirely.
4. Remove shim (4) corresponding to the amount of play "a" measured above.
   A set of shims is composed of two pieces and the thickness of each shim (4) is 0.5 mm (0.020 in).
5. Tighten the four bolts (2).
   If the bolts (2) are too stiff to tighten, pull out ring plate (5) for easier tightening.





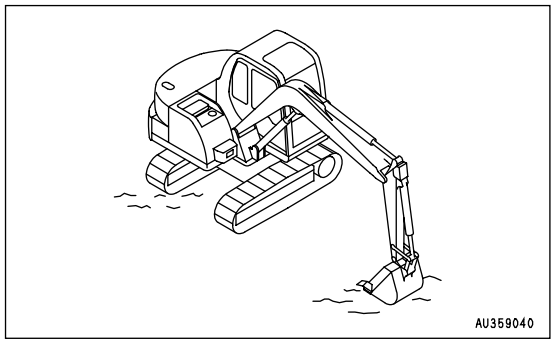
6. Bleeding air from travel motor (only when oil inside travel motor case has been drained)
   1) Run the engine at low idling, remove hose (1) from port C, then when the oil has flowed out, tighten it again.





   2) Run the engine at low idling and swing the work equipment 90º to bring it to the side of the track.

   3) Jack up the machine until the track is raised slightly from the ground.Rotate the track under no load for 2 minutes.
   Repeat this procedure on both the left and right sides, and rotate the track equally both forward and in reverse.



7. Bleeding air from attachment (when installed)
   If a breaker or other attachment has been installed, run the engine at low idling and operate the attachment pedal repeatedly (approx. 10 times) until the air has been bled from the attachment circuit.

NOTICE
- **If the method of bleeding the air from the attachment itself is specified by the manufacturer, bleed the air according to the specified procedure.**
- **After completing the air bleeding operation, stop the engine, and leave the machine for 5 minutes before starting operations. This will remove the air bubbles in the oil inside the hydraulic cylinders.**
- **Check that there is no leakage of oil and wipe off any oil that has been spilled.**

EVERY 500 HOURS MAINTENANCE

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

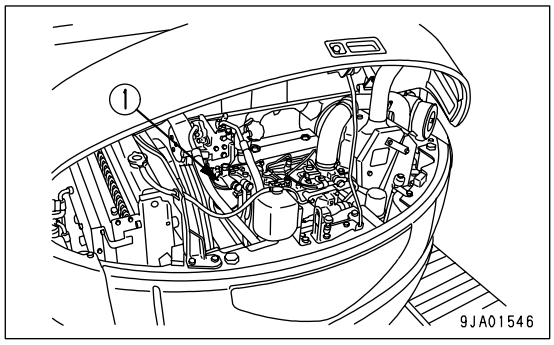
REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

- **The parts are at high temperature immediately after the engine has been operated. Wait for all parts to cool down before replacing the filter.**
- **Do not bring fire or sparks near the fuel.**

Prepare a filter wrench and a container to catch the fuel.

1. Set the container to catch the fuel under the filter cartridge.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
4. After bringing the packing surface into contact with the seal surface of the filter holder, tighten it a further 2/3 turns.



NOTICE
If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.

5. After replacing the fuel filter cartridge, bleed the air from the system. Bleed the air.
   See "PROCEDURE FOR BLEEDING AIR (PAGE 4-63)".
6. After replacement of the filter cartridge, start the engine and check it for possible oil seepage from the filter seal. If oil leaks, check the filter cartridge tightening condition and retighten it. Should oil still leak, remove the filter cartridge again in the sequence of item 1 and 2 above, and check the packing surface for any damage or whether some foreign material has got caught.
   If any of the cases is noticed, replace the packing with new one and repeat the step in item 3 through 6 above.

EVERY 2000 HOURS MAINTENANCE

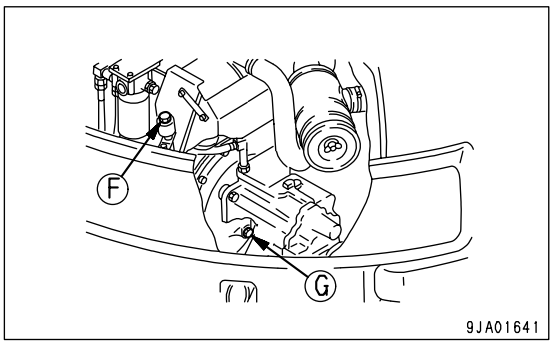
Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

CHECK OIL LEVEL IN PTO GEAR CASE, ADD OIL

⚠ WARNING

- **The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.**
- **If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.**

1. Remove oil inspection plug (G) and check that the oil is near the bottom of the check hole. If the oil level is low, add oil through oil filler (F) until the oil level is close to the bottom of the hole of plug hole.
2. Install plug (G).



CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn, or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

As special tool is required for removing and adjusting the parts, you shall request Komatsu distributor for service.

GENERAL PRECAUTIONS

PRECAUTIONS RELATED TO SAFETY

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.

⚠ WARNING

General precautions

- **Read the instruction manual for the attachment thoroughly, and do not use this attachment unless you are sure that you have understood the guides completely.**
  If you lose the instruction manual, always ask the manufacturer or attachment sales company for a new copy.
- **Depending on the attachment, install the necessary front guard to the machine.**
- **Depending on the attachment, the impact noise may make it difficult for fellow workers to transmit instructions for the operation. Before starting operation, decide a leader and determine the signals to be used.**
- **Do not carry out swinging operations to the side with a heavy load on the attachment. This is particularly dangerous on slopes.**
- **Compared with a machine equipped with a bucket, a machine equipped with a breaker has a heavy load at the front of the work equipment and is unstable. To avoid the danger of tipping over, do not carry out operations with the attachment swung to the side.**
- **When an attachment is installed, the swing range and center of gravity of the machine are different, and the machine may move in an unexpected way. Be sure that you understand the condition of the machine properly.**
- **Before starting operations, set up a fence around the machine to prevent people from entering.**
  Never operate the machine when there are people near the machine.
- **To prevent serious accidents caused by misoperation, do not put your foot on the pedal except when operating the pedal.**

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.

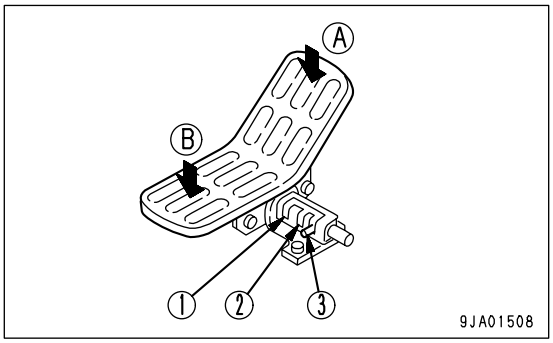
If the pedal is operated when there is no breaker or general attachment installed, it will cause overheating and other problems.

SPECIFICATIONS

Hydraulic specifications

- Flow

Lock pin position		Flow	
		A	B
1	Pedal lock	—	—
2	Half stroke	55 liters (14.52 US gal)/min	45 liters (11.88 US gal)/min
3	Full stroke	110 liters (29.04 US gal)/min	90 liters (23.76 US gal)/min



- Safety valve cracking pressure

When using breaker: 17.17 MPa (175 kg/cm^2, 2485 PSI)

When using other attachments: 25.51 MPa (260 kg/cm^2, 3692 PSI)