1.1 FOREWORD

- This manual has been carried out by Komatsu Utility in order to supply their customers with all the necessary information on the machine and the safety regulations related to it, together with the use and maintenance instructions that enable the operator to exploit the capacity of the machine with optimal results and to keep the machine efficient over time.
- The operation manual, together with the spare parts catalogue, is an integral part of the machine and must accompany it, even when it is resold, until its final disposal.
- The manual must be handled with the greatest care and always kept on board the machine, so that it can be consulted at any moment; it must be placed in the appropriate compartment inside the seat support, where also the ownership documents and the logbook are usually kept.
- This manual must be given to the persons who have to use the machine and carry out the routine maintenance operations; they must read the contents carefully more than once, in such a way as to clearly understand what are the correct operating conditions and the dangerous conditions that must be avoided.
  In case of loss or damage, request a new copy to Komatsu or your Komatsu Dealer.
- The illustrations contained in this manual may represent machine configurations available on request.
  Komatsu machines are constantly improved in order to increase their efficiency and reliability; this manual sums up all the information regarding the most recent techniques applied at the moment in which the machine is marketed.
  For any further and/or updated information, contact your Komatsu Dealer.
- Punctual periodic annotations regarding the maintenance operations that have been carried out are important to have a clear prospect of the situation and to know exactly what has been done and what has to be done after the next maintenance interval. Therefore, it is advisable to consult either the hour meter and the maintenance plan frequently.
- Over the years Komatsu Dealers have gathered considerable experience in customer service.
  If more information is needed, do not hesitate to contact your Komatsu Dealer: he always knows how to get the best performance from the machine, he can suggest the use of the equipment that is most suitable for specific needs and can provide the technical assistance necessary for any change that may be required to conform the machine to the safety standards and traffic rules.
  Furthermore, Komatsu Dealers also ensure their assistance for the supply of Komatsu genuine spare parts, which alone guarantee safety and interchangeability.
- The table included in this manual must be filled in with the machine data, which are the data that must always be indicated to the Dealer when requiring assistance and ordering spare parts.

⚠ CAUTION

- **The incorrect use of the machine and inappropriate maintenance operations may cause serious injuries and even death.**
- **Operators and maintenance personnel must carefully read this manual before using the machine or performing maintenance operations.**
- **Any serious accident that may occur during the use of the machine or during maintenance operations is due to failure to comply with the instructions given herein.**
- **The procedures and precautions described in this manual are valid for application to the machine only when it is used correctly.**
  If the machine is used for any purpose or in any way other than those described herein, the operator shall be responsible for his own safety and for the safety of any other person involved.

1.3.4 RUNNING-IN

Every machine is scrupulously adjusted and tested before delivery.
A new machine, however, must be used carefully for the first 100 hours, in order to ensure proper running-in of the various components.
If the machine is subjected to excessive work load at the beginning of operation, its potential yield and its functionality will be shortly and untimely reduced.
Every new machine must be used carefully, paying special attention to the following indications:

- After the start, let the engine idle for 5 minutes, in such a way as to warm it up gradually before actual operation.
- Avoid operating the machine with the limit loads allowed or at high speed.
- Avoid abrupt starts or accelerations, useless sudden decelerations and abrupt reversals.

SYNTHETIC BIODEGRADABLE OIL TYPE HEES

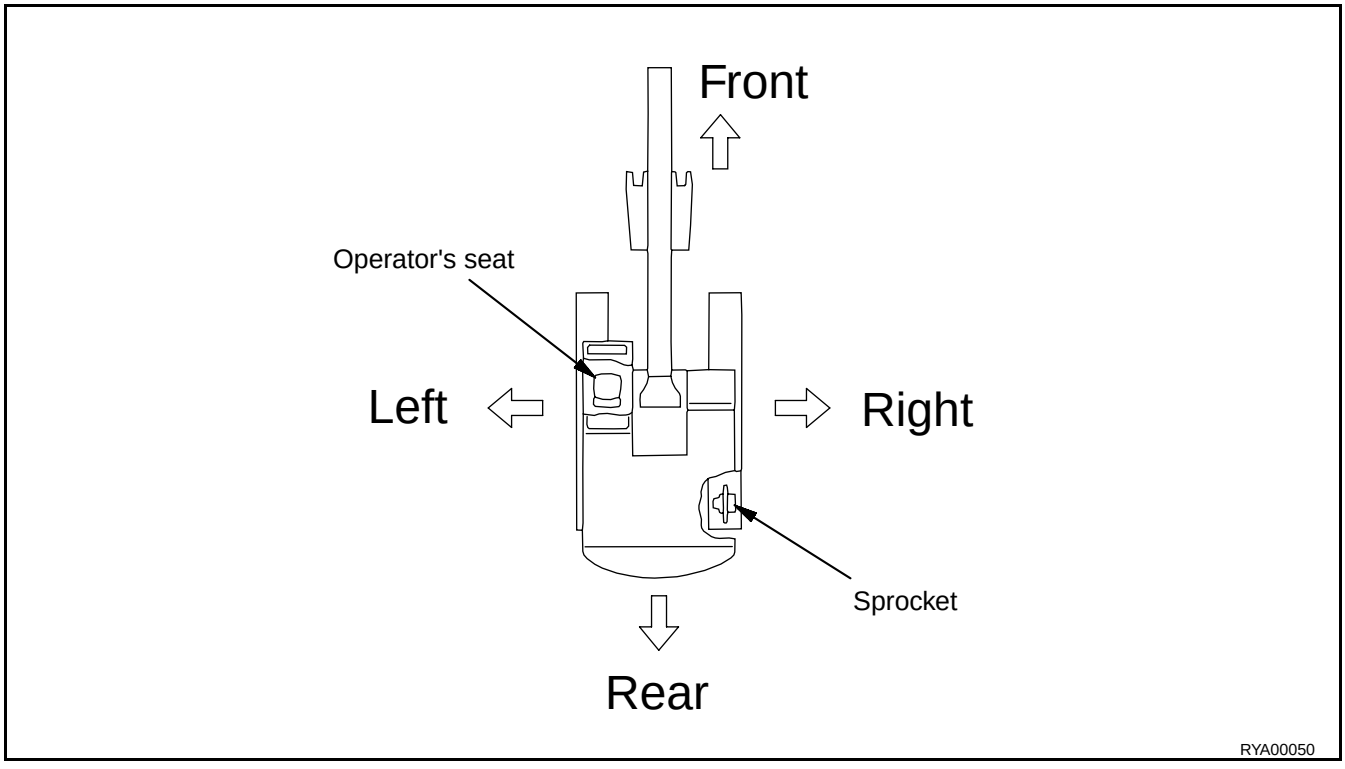
On machines in which the synthetic biodegradable oil type HEES is used, the following operations are to be performed besides the standard maintenance operations:

- After the first 50 hours of operation, change the hydraulic circuit drain filter.
- After the first 500 hours of operation, change the hydraulic circuit oil.

IMPORTANT

- **When changing the oil filters (cartridges), check their inner part to make sure that there are no deposits. If considerable deposits are observed, find out what may have caused them before starting the machine.**
- **The number of operating hours is indicated by the hour meter.**

1.3.5 DIRECTIONS OF MACHINE

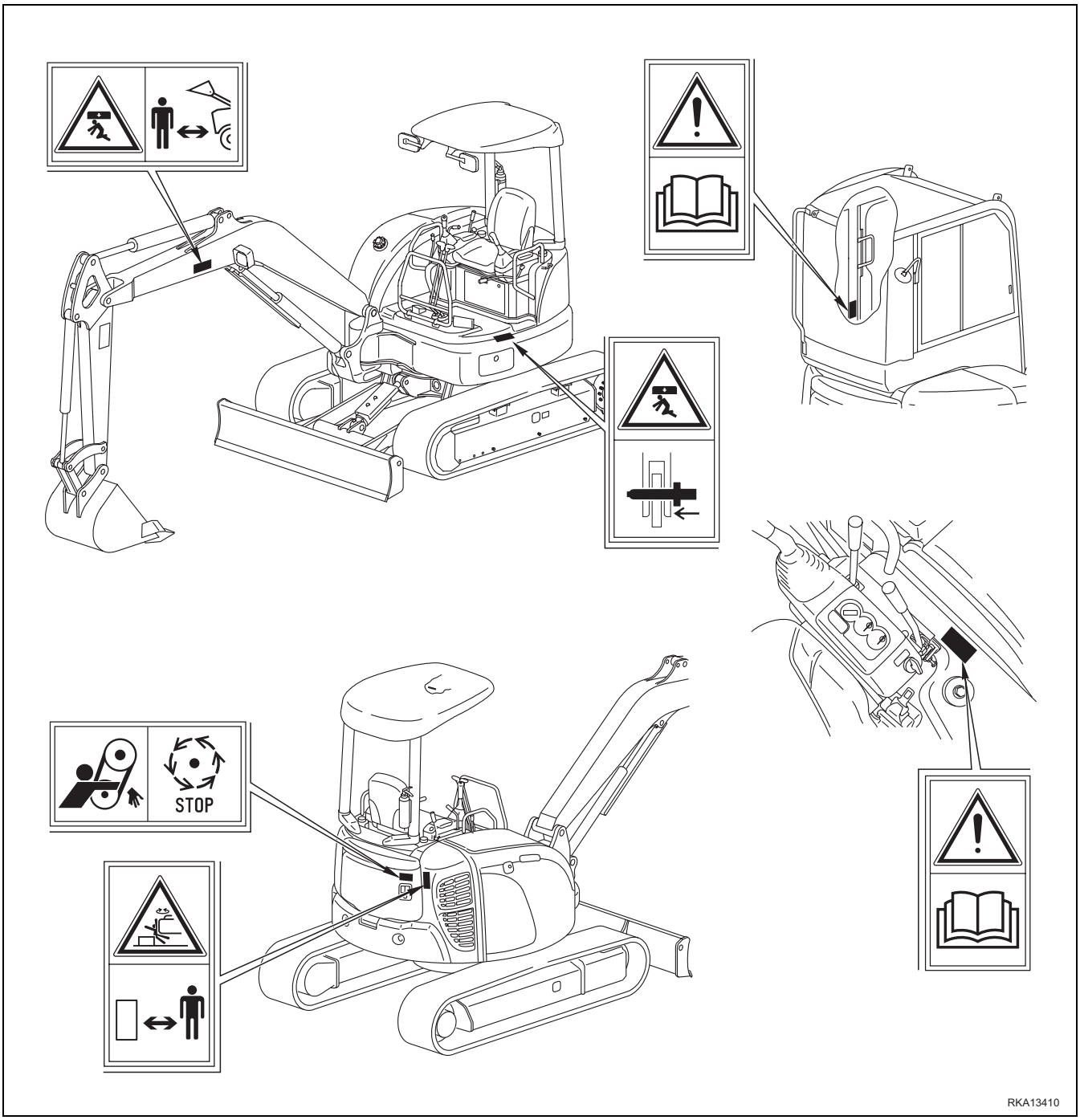


In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's seat when the operator's seat is facing the front and the sprocket is at the rear of the machine.

2.1 SAFETY, NOISE AND VIBRATION PLATES

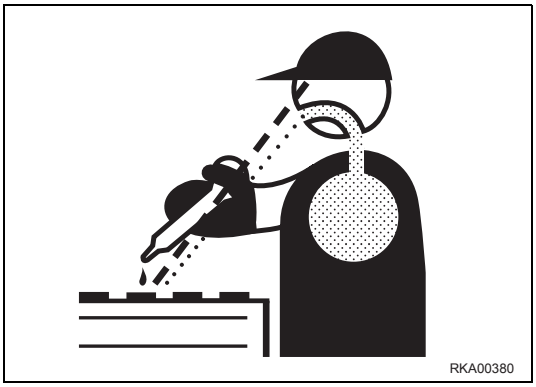
2.1.1 POSITION OF THE SAFETY PLATES

- The safety plates must always be legible and in good conditions; for this reason, if they are dirty with dust, oil or grease, it is necessary to clean them with a solution made of water and detergent.
  Do not use fuel, petrol or solvents.
- If the plates are damaged, ask for new ones to Komatsu or to your Komatsu Dealer.
- In case of replacement of a component provided with a safety plate, make sure that this plate is applied also on the new piece.
- The machine can be provided with other plates in addition to those indicated below; keep also to the instructions given in the additional plates, in any case.

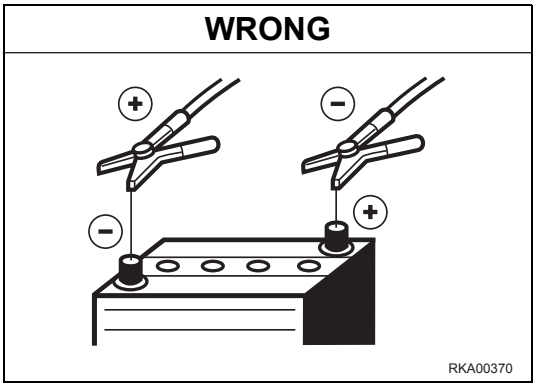


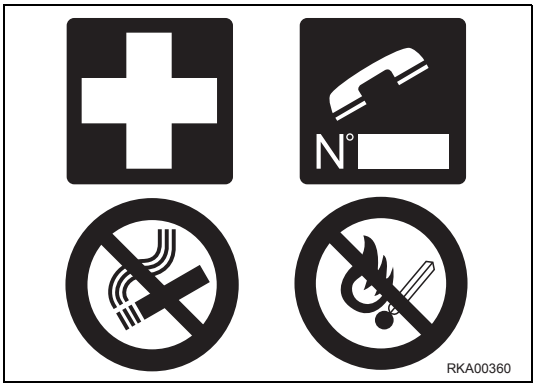
2.6 BATTERY

2.6.1 PREVENTING RISKS THAT MAY BE DUE TO THE BATTERY

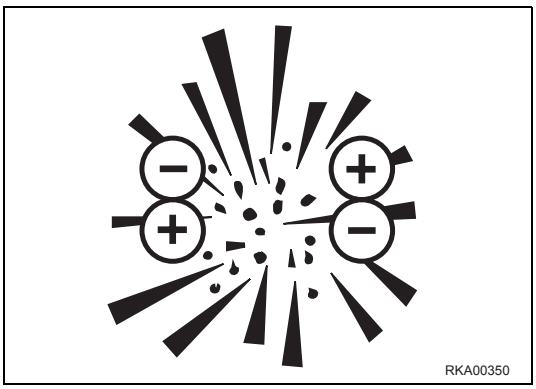


- Electrolytic batteries contain sulphuric acid that can quickly burn the skin and corrode clothes making holes in the fabric. If you spill acid on yourself, immediately rinse the involved area with plenty of water.
- Battery acid may cause blindness if splashed into the eyes. If acid gets accidentally into your eyes, flush them immediately with plenty of water and consult a doctor without delay.
- If you accidentally swallow some acid, drink a large quantity of water or milk, beaten egg white or vegetable oil and in any case antiacid substances like magnesia, bicarbonate, etc. call a doctor or a poisoning prevention center immediately.
- When handling batteries, always wear safety goggles.
- Batteries generate hydrogen. Hydrogen is highly explosive and can be easily ignited with small sparks or naked flames.
- Before working with batteries, stop the engine and remove the ignition key.
- Avoid short-circuiting the battery terminals through accidental contact with metal objects or tools or through the inversion of the terminals.
- Tighten the battery terminals securely. Loose terminals may generate sparks and even cause the explosion of the battery.





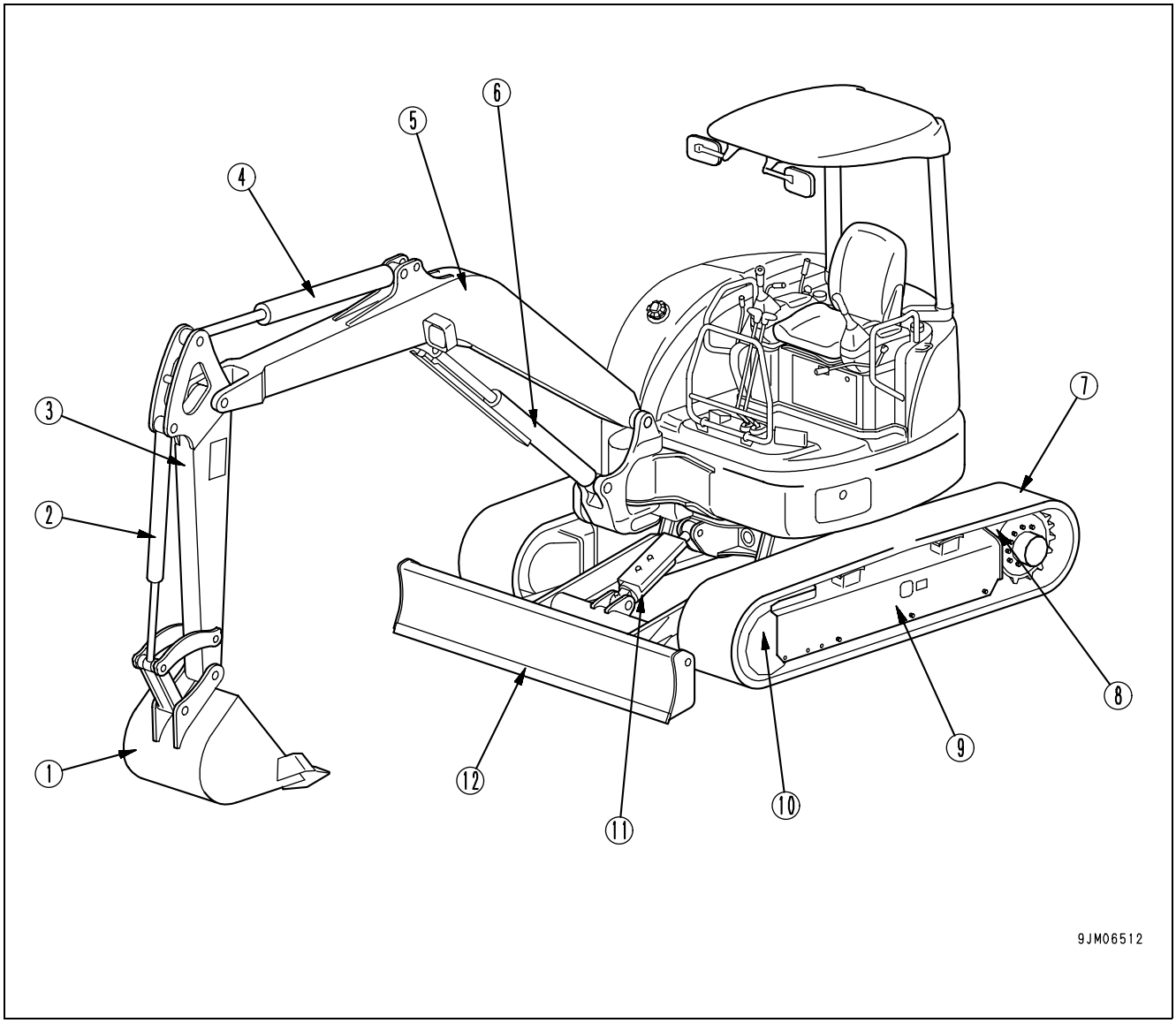
2.6.2 STARTING WITH BOOSTER CABLES



- When starting the machine with booster cables, always wear safety goggles.
- When starting the engine by means of another machine, avoid any contact between the two machines.
- Be sure to connect the positive cable (+) first and then the negative or earth cable (–) when connecting the booster cables. Disconnect first the negative or earth (–) cable and then the positive cable (+) after the start.
- Connect the batteries in parallel: positive to positive and negative to negative.
- When connecting the earth cable to the frame of the machine to be started, operate as far as possible from the battery. (See "3.7.5 DISCHARGED BATTERY").

3.1 MACHINE VIEW ILLUSTRATIONS

3.1.1 OVERALL MACHINE VIEW

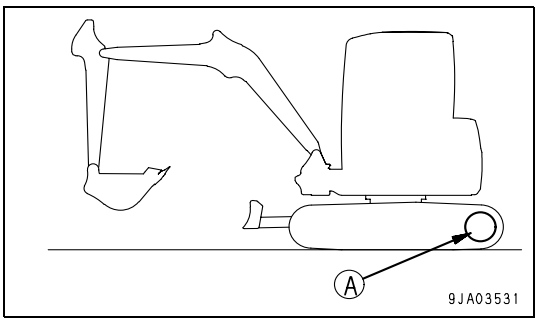


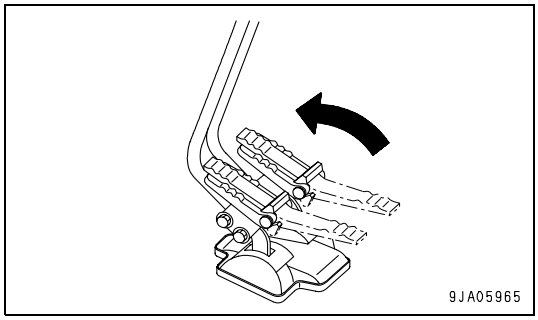
(1) Bucket
(2) Bucket cylinder
(3) Arm
(4) Arm cylinder
(5) Boom
(6) Boom cylinder
(7) Track shoe
(8) Sprocket
(9) Track frame
(10) Idler
(11) Blade cylinder
(12) Blade

6. Travel Levers (with pedals)

⚠ WARNING

- **Do not put your foot on the pedal unless the machine is traveling. If you leave your foot on the pedal and press it by mistake, the machine will move suddenly, and this may lead to a serious accident. Do not rest a foot on the pedal except when traveling or steering the machine, using the pedal.**
- **If the track frame is facing the rear, the direction of travel operations will be reversed.**
  When operating the travel levers, check if the track frame is facing the front or the rear.
  (If sprocket (A) is at the rear, the track frame is facing the front.)
- **Take good care when traveling or steering the machine, using the pedal.**
- **When getting in or out of the operator's compartment, there is danger that your toes may catch on the travel pedal, so always fold back the pedal so that it cannot be operated.**





This lever (6) is used to change the direction of travel.

( ): This indicates operation of the pedal.

(a) FORWARD: This lever is pushed forward
(The pedal is angled forward)

(b) REVERSE: The lever is pulled back
(The pedal is angled back)

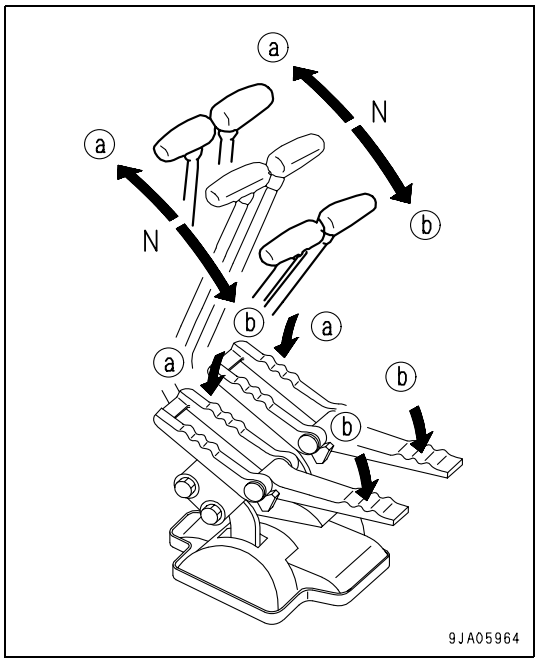
N (Neutral): The machine stops

When operating the pedal, first sit in the operator's seat, then fold out the pedal.

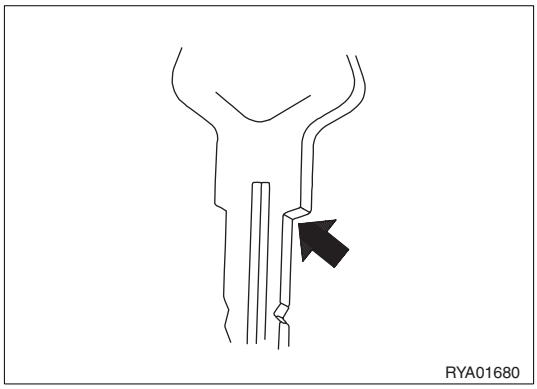
After finishing pedal operations, fold back the pedal while still seated in the operator's seat.

NOTE

- If the lever is shifted to the advance or reverse position from the neutral position, the alarm sounds to warm that the machine is starting to advance.



3.2.8 CAPS AND COVERS WITH LOCK



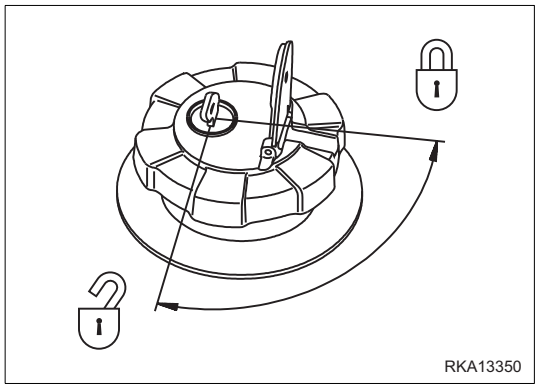
Opening and closing covers with lock

Use the ignition key to open and close the caps and covers with lock.

For details on the position of the caps and covers with lock, see "3.3.17 LOCKING".

Insert the key completely (6 mm from the point where the key narrows), then turn it. If the key is turned when it is inserted only partially into the lock, it may break.

OPENING AND CLOSING CAPS WITH LOCK



Opening

1 - Insert the key in the lock.

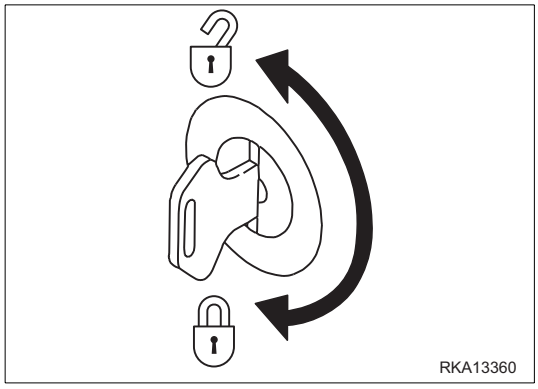
2 - Turn the key clockwise then open the cap.

Closing

1 - Tighten the cap thoroughly, then insert the key in the lock.

2 - Turn the key counterclockwise and then extract it.

OPENING AND CLOSING COVERS WITH LOCK



Opening

1 - Insert the key in the lock.

2 - Turn the key counterclockwise and open the cover by pulling the grip.

Closing

1 - Close the cover and insert the key in the lock.

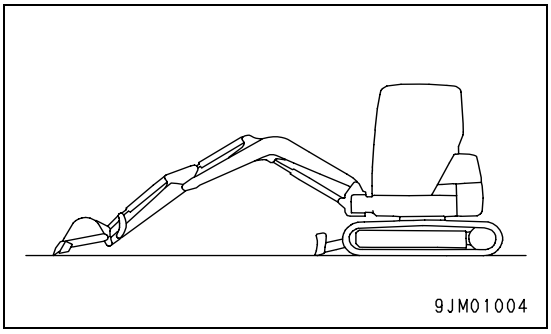
2 - Turn the key clockwise and then extract it.

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

⚠ WARNING

- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

1. If the work equipment is not in the condition shown in the diagram on the right, start the engine, run the engine at low speed, retract the arm and bucket cylinder rods fully, then lower the boom, set the bucket teeth in contact with the ground, and stop the engine.
2. Open the engine rear cover and cooling cover. For details, see Section "3.2.10 COOLING COVER".



3. Confirm that the oil level is between the H and L marks of sight gauge (G).

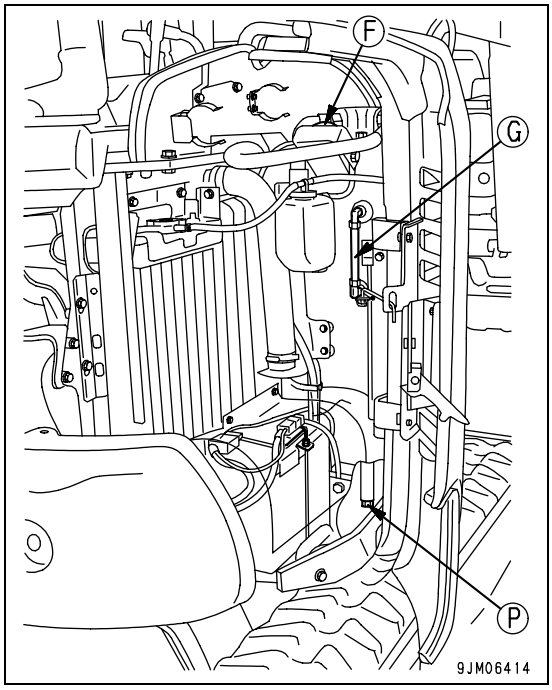
IMPORTANT

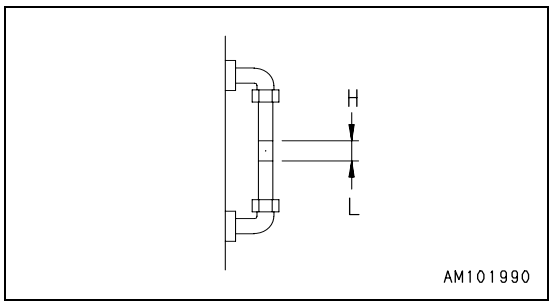
- **Do not add oil above the H line. This will damage the hydraulic circuit or cause the oil to spurt out.**
  If oil has been added above the H level, stop the upper structure so that the drain plug (P) under the hydraulic tank will be between both tracks, and stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from drain plug (P).

4. If the oil level is below the L mark, remove the filler cap (F), then top up and close.

NOTE

- The oil level will vary depending upon the oil temperature.
  Accordingly, use the following as the guide:
  Before operation: around L level
  (Oil temperature 10 to 30°C (50 to 86°F))
  Normal operation: around H level
  (Oil temperature 50 to 80°C (122 to 176°F))





3.3.5 STEERING THE MACHINE

3.3.5.1 STEERING

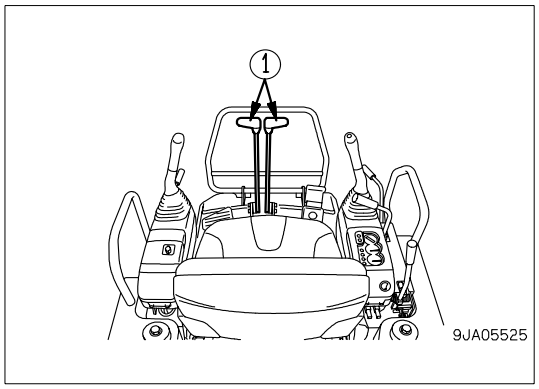
⚠ WARNING

- **Before operating the travel control levers, check the direction of the track frame (i.e. position of the sprocket) first. If the sprocket is at the front, the machine moves in the reverse direction to the operation of the travel lever.**

NOTE
- When traveling at high speed, if the load increases, the automatic travel speed shifting function automatically shifts the transmission to low speed and the machine travels slowly. When the load decreases, it automatically returns the transmission to high speed travel.

Use the travel levers to change direction.

Avoid sudden changes of direction as far as possible. In particular, when carrying out counter-rotation (spin turn), stop the machine first before turning.
Operate two travel levers (1) as follows.

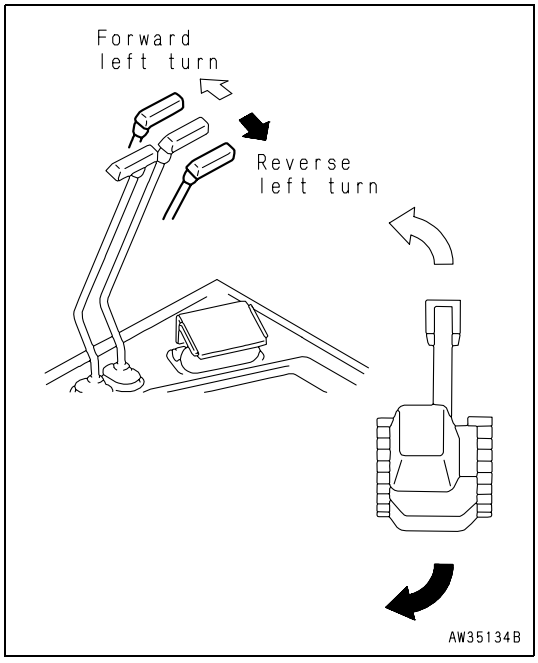


STEERING THE MACHINE WHEN STOPPED

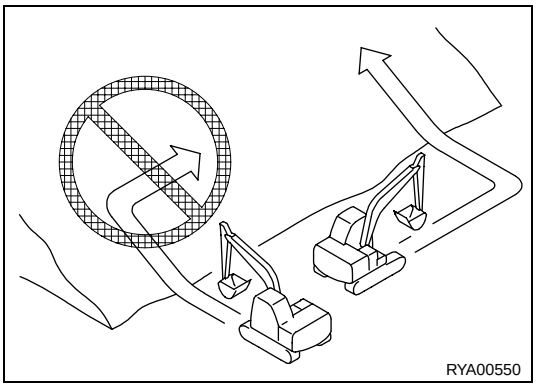
When turning to the left:

Push the right travel lever forward to travel left when traveling forward; and pull it back to turn left when traveling in reverse.

NOTE
- When turning to the right, operate the left travel lever in the same way.

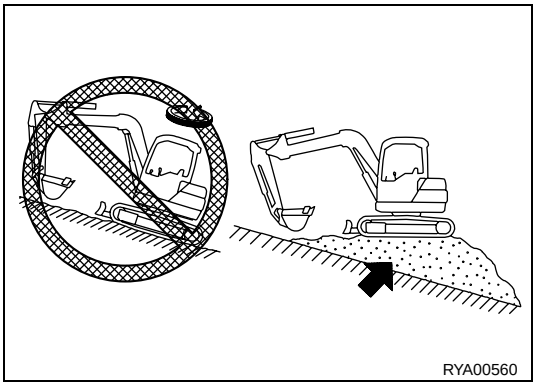


3.3.10 TRAVELING ON SLOPES

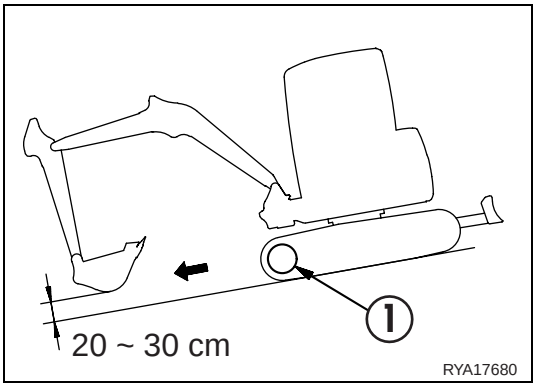


⚠ WARNING

- **Turning or operating the work equipment when working on slopes may cause the machine to lose it balance and turn over, so avoid such operations.**
  It is particularly dangerous to swing downhill when the bucket is loaded.
  If such operations have to be carried out, pile soil to make a platform on the slope so that the machine can be kept horizontal when operating.
- **Do not travel up or down steep slopes. There is danger that the machine may turn over.**
- **When traveling, raise the bucket approx. 20 to 30 cm (8 to 12 in) from the ground.**
  Do not travel downhill in reverse.
- **Never turn on slopes or travel across slopes.**
  Always go down to a flat place to perform these operations. It may be longer, but it will ensure safety.
- **Always operate or travel in such a way that it is possible to stop safely at any time if the machine slips or becomes unstable.**
- **When traveling uphill, if the shoes slip or it is impossible to travel uphill using only the force of the tracks, do not use the pulling force of the arm to help the machine travel uphill. There is danger that the machine may turn over.**

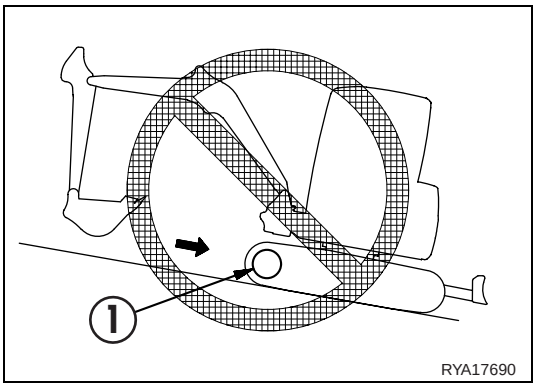


1. When traveling down steep hills, use the travel lever and fuel control lever to keep the travel speed low.
   When traveling down a steep hill of more than 15°, set the work equipment to the posture shown in the diagram on the right, and lower the engine speed.

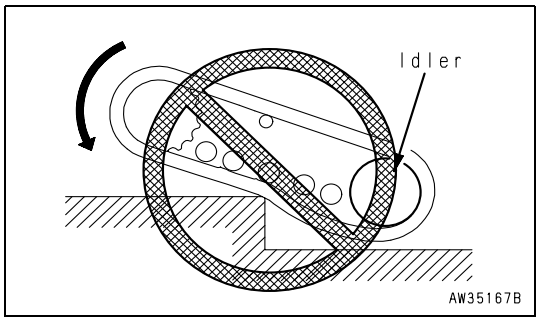


NOTE

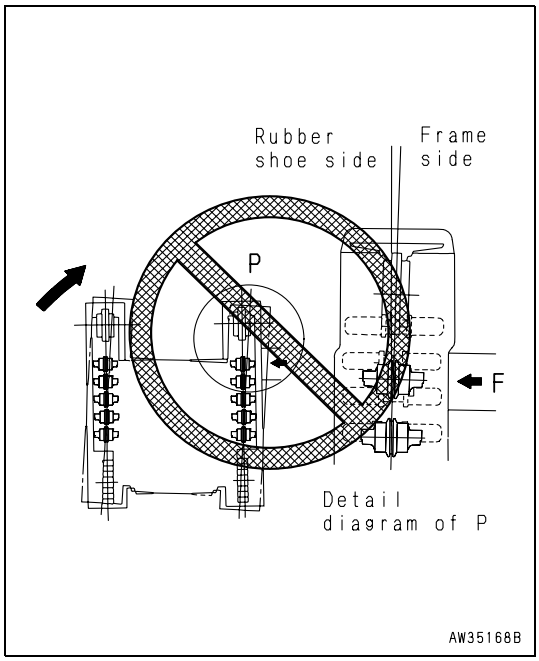
- When the machine moves downwards, the sprocket (1) must be positioned on the downward side of the machine.
  If the machine moves downward with the sprocket (1) on the upward side, the tracks tend to loosen and the machine may slip.



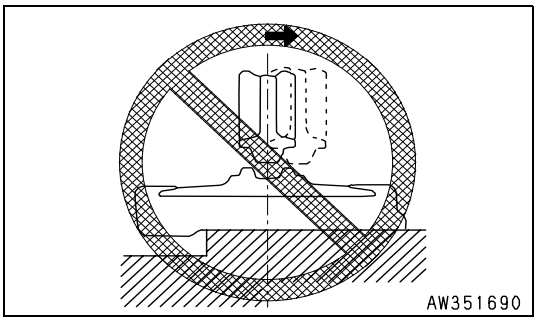
6. Furthermore, if the machine travels in reverse, a gap is formed between the track roller, idler, and rubber shoe.



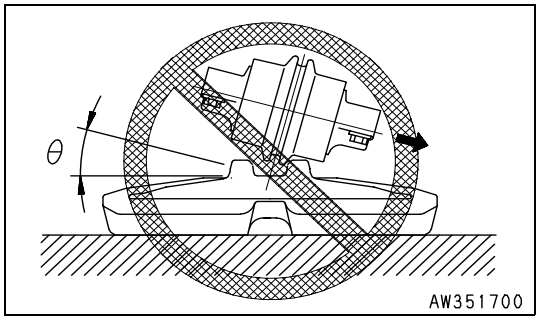
- When turning in a condition where the rubber shoe cannot move to the side because of the object it is passing over, or because of some other object.
- When the rubber shoe has moved out of alignment and the idler or track roller are not aligned with the core.



- If the machine travels in reverse in this condition, the rubber shoe will come off.



- If the machine is turned in this condition, the rubber shoe will come off.



Problem	Main causes	Remedy
Even when water temperature gauge indicator is in correct range, pilot lamp flashes	• Defective thermostat	(•) Replace thermostat
Engine does not start when starting motor is turned	• Lack of fuel • Air in fuel system • Water in fuel system • Defective fuel injection pump or nozzle • Staring motor cracks engine sluggishly • Engine pre-heating monitor does not lights up • Defective compression • Defective valve clearance	• Add fuel, see CHECK BEFORE STARTING • Repair place where air is sucked in, see EVERY 500 HOURS SERVICE • Drain water from system, see WHEN REQUIRED and CHECK BEFORE STARTING (•) Replace pump or nozzle • See ELECTRICAL SYSTEM • See ELECTRICAL SYSTEM (•) Adjust valve clearance
Exhaust gas is whiter or blue	• Too mach oil in oil pan • Improper fuel	• Add oil specified level, see CHECK BEFORE STARTING • Change to specified fuel
Exhaust gas occasionally turns black	• Clogging air cleaner element • Defective nozzle • Defective compression	• Clean or repalce, see WHEN REQUIRED (•) Replace nozzles (•) See defective compression above
Combustion noise occasionally makes bresthing sound	• Defective nozzle	(•) Replace nozzle
Abnornal noise generated (combustion or mechanical)	• Low grade fuel being used • Overheating • Damage inside muffler • Excessive valve clearnce	• Change to specified fuel • See “Engine water temperature gauge indicator is in red range” • Replace muffler (•) Adjust valve clearance)

4.5 TIGHTENING TORQUE SPECIFICATIONS

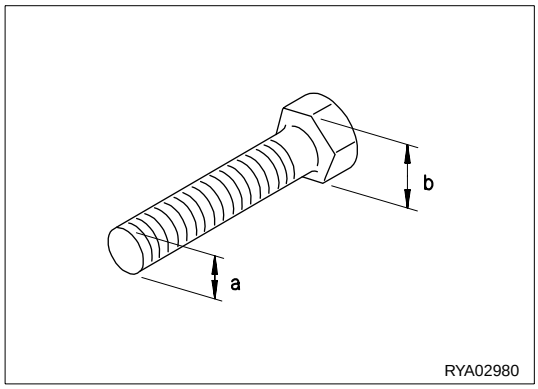
4.5.1 TIGHTENING TORQUE LIST

⚠ CAUTION

- **If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation. Always pay careful attention when tightening parts.**

Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below.

If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.



Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque			
		Target value		Service limit	
		Nm	kgm	Nm	kgm
	10	13.2	1.35	11.8-14.7	11.8-14.7
8	13	31	3.2	27-34	27-34
10	17	66	6.7	59-74	59-74
12	19	113	11.5	98-123	98-123
14	22	172	17.5	153-190	153-190
16	24	260	26.5	235-285	23.5-29.5
18	27	360	37	320-400	33.0-41.0
20	30	510	52.3	455-565	46.5-58.0
22	32	688	70.3	610-765	62.5-78.0
24	36	883	90	785-980	80.0-100.0
27	41	1295	132.5	1150-1440	118.0-147.0
30	46	1720	175.0	1520-1910	155.0-195.0
33	50	2210	225.0	1960-2450	200.0-250.0
36	55	2750	280.0	2450-3040	250.0-310.0
39	60	3280	335.0	2890-3630	295.0-370.0

IMPORTANT

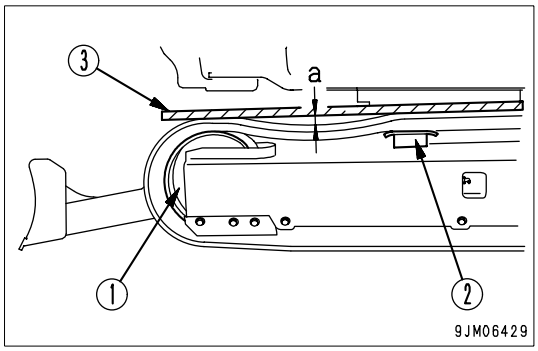
- **This driving torque table is not valid for screws or nuts that must lock parts made of nylon or similar materials on to washers or components made of nylon or nonferrous materials.**

4.9.1.h CHECK AND ADJUST RUBBER SHOE TENSION (Machine equipped with rubber shoes)

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. Stop the machine on firm, horizontal ground when carrying out the inspection and maintenance.
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, the track will come off and it will cause premature wear of the core.

CHECKING

1. Run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
2. Choose a wooden block (3) long enough to cover the distance between the idler roller (1) and the track sliding plate (2), then position it on the track.
3. Measure the maximum deflection between the top surface of the rubber shoe and the bottom surface of the wooden block.
   - Standard deflection
     Deflection “a“ should be 1 to 3 mm (0.039 to 0.118 in.).

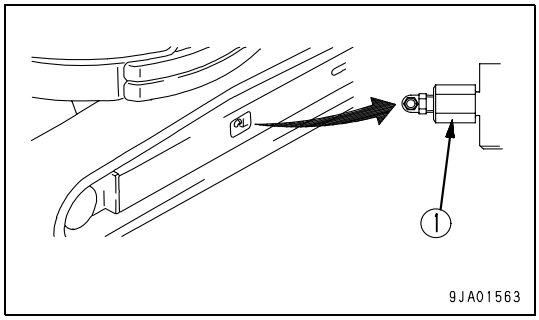


If the track tension is not at the standard value, adjust it in the following manner.

ADJUSTMENT

⚠ WARNING

- **There is danger of the plug flying out under the high internal pressure of the grease. When loosening plug (1), never loosen it more than one turn.**
  Never loosen any part other than plug (1). Never put your face in line with the mount of plug (1).
  If the Rubber shoe tension is not relieved by this procedure, please contact your Komatsu Dealer.



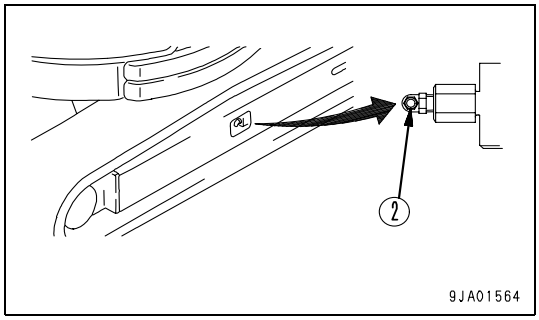
INCREASING TRACK TENSION

IMPORTANT

- **The standard value is low, so be careful not to tighten the rubber shoe too much.**

Prepare a grease gun.

1. Pump in grease through grease fitting (2) with a grease pump.
2. To check if the tension is correct, run the engine at low idling, move the machine slowly forward (by an amount equal to the length of track on ground), then stop the machine.
3. Check the rubber shoe tension again, and if the tension is not correct, adjust it again.
4. If the tension is still low after supplied grease, the rubber shoe needs to be replaced or the seal in the cylinder needs to be replaced. Ask your Komatsu Dealer for replacement.



	Working ranges		Unit	PC20MR-2
A	Max. digging reach		mm	4300
B	Max. digging depth		mm	2350
C	Max. digging height	Canopy specified	mm	4100
		Cab specified	mm	4100
D	Max. vertical wall depth		mm	1950
E	Max. dumping height	Canopy specified	mm	2820
		Cab specified	mm	2820
F	Min. swing radius of work equipment		mm	1790
	Min. swing radius of work equipment (At boom swing)		mm	1450
G	Max. reach at ground level		mm	4170
H	Max. blade lifting height		mm	340
I	Max. blade lowering depth		mm	230