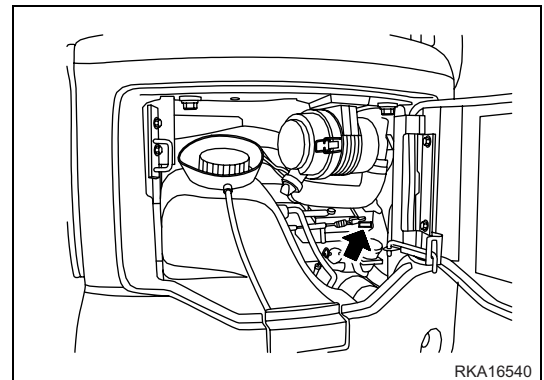
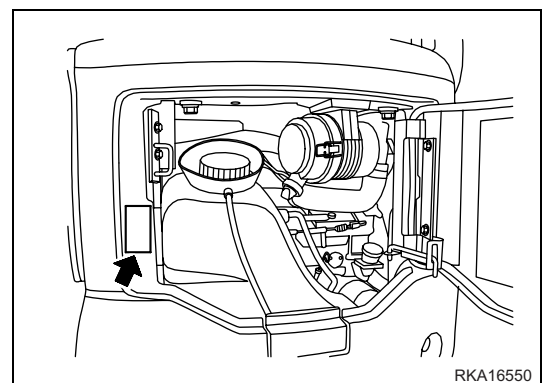


1.4.3 ENGINE SERIAL NUMBER AND EXHAUST GAS EMISSION PLATE

The engine serial number is stamped on the plate positioned on the engine itself.

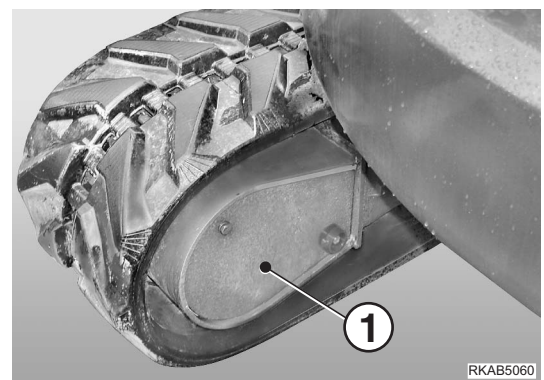


The exhaust gas emission plate is applied to the counterweight.



1.4.4 TRAVEL REDUCTION GEAR SERIAL NUMBER

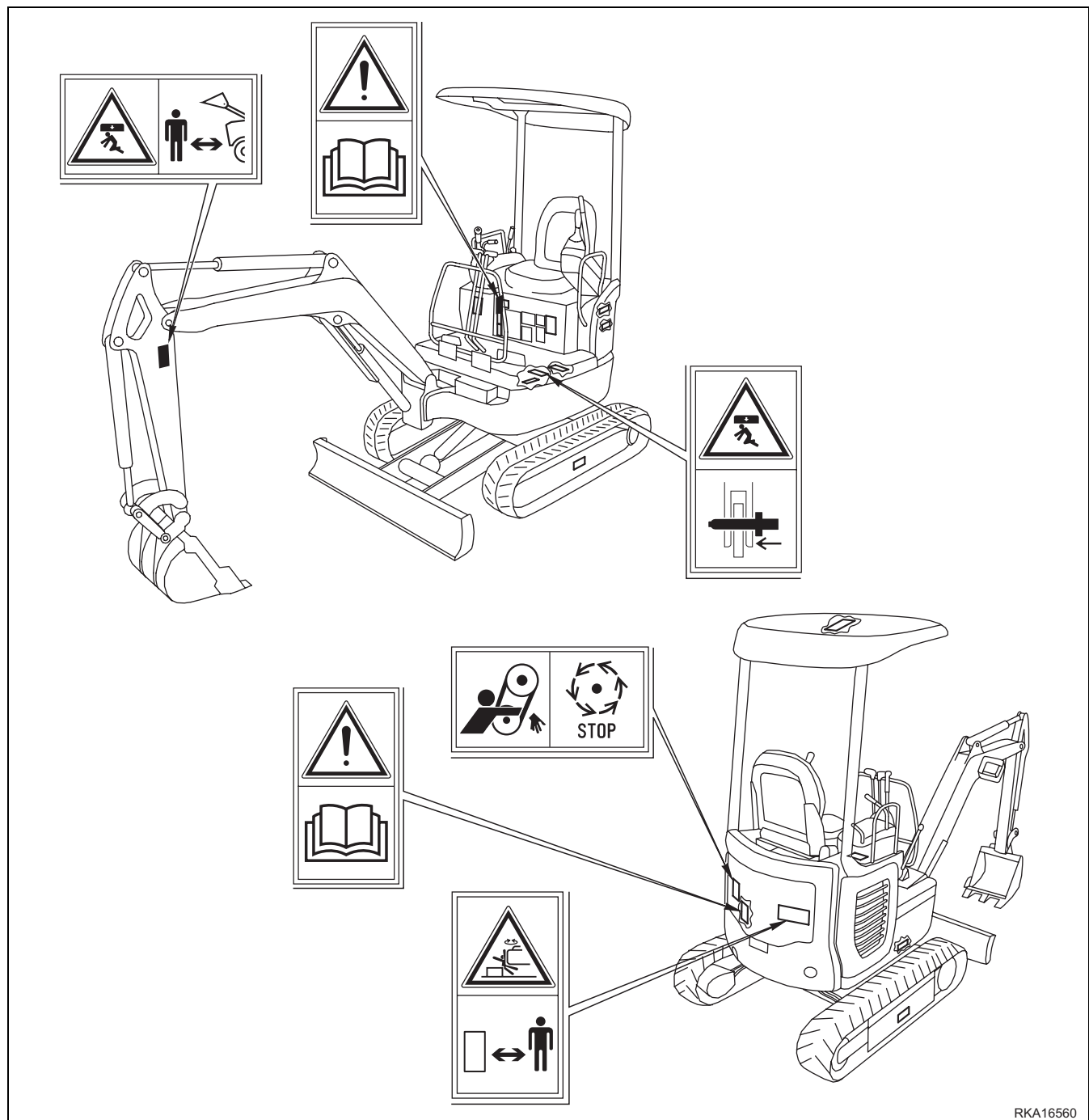
The serial number is stamped on the plate positioned inside the travel reduction gear and can be seen after removing the cover (1).



2.1 SAFETY, NOISE AND VIBRATION PLATES

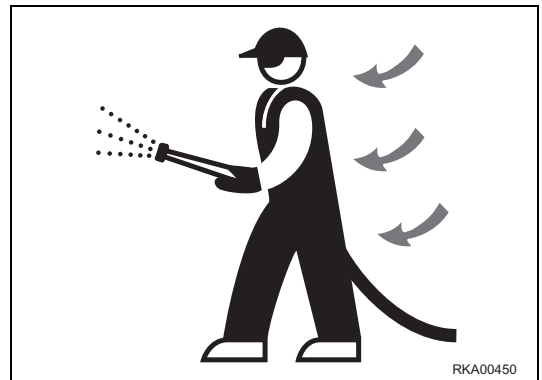
2.1.1 POSITION OF THE SAFETY PLATES

- 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 such a plate is applied also to the new part.
- 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.



2.2.9 PREVENTING DAMAGE DUE TO ASBESTOS POWDER

- Inhaling asbestos powder is very dangerous.
- If it is necessary to handle materials containing asbestos fibers, keep to the instructions given below:
 - 1 - **Do not use** compressed air, but **only aspirators** to clean the machine and make sure that this operation is performed in a properly ventilated place.
 - 2 - Use low-pressure water to abate dust when cleaning.
 - 3 - If there is danger due to the possible presence of asbestos powder in the air, operate the machine with the wind to your back whenever possible.
 - 4 - Even if the cab provides suitable protection, use an approved and homologated respirator.
 - 5 - The powder gathered during the cleaning operations must be dampened and put in a sealed and marked container, so that it can be safely disposed of according to the regulations in force.



2.2.10 PREVENTING DAMAGE CAUSED BY THE WORK EQUIPMENT

- Do not stand within or approach the operating range of the work equipment, even when the operator is on board the machine and the engine is running.
- Do not stand or work under the arms or the articulations when the arms are lifted, if you are not sure that the safety locks have been duly engaged.
- Do not carry out any operation requiring the arms to be lifted, if you are not sure that the locks are correctly positioned and connected to the arms.



7. Boom swing control pedal locking device

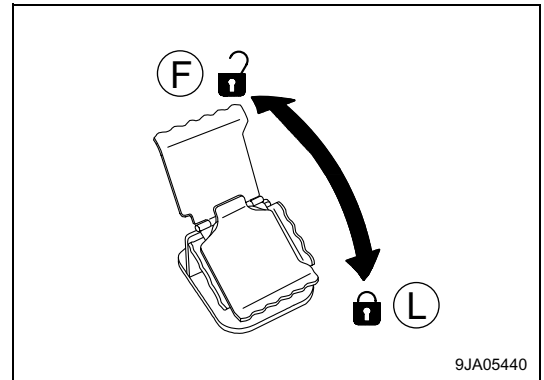
WARNING

- Always shift the safety lever to position (L) when the boom swing is not required, during travel and when parking the machine. If the control pedal is inadvertently pressed, this may cause serious accidents.

This device is used to lock the movements of the boom swing control pedal and has two positions.

(F): free

(L): locked



8. Boom swing control pedal

This pedal controls the boom swing to the right and to the left, according to the movements indicated below.

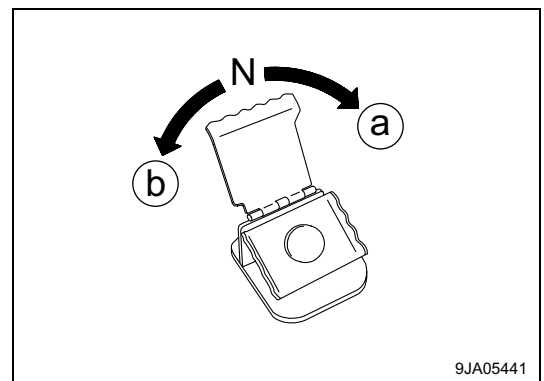
(a): swing to the right

(b): swing to the left

N (Neutral): boom at rest.

IMPORTANT

- When the safety lever is in the “locked” position, all the movements are inhibited (see "3.2.3 pos: 1. Safety lever (control locking lever)").
- The boom swing is useful to displace the digging line beyond the track outline; do not use this function during the work cycle.



9. Cab floor locking lever

WARNING

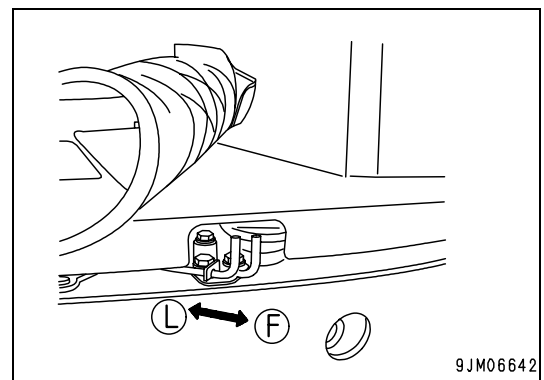
- Always keep to the warnings when tilting or closing the cab floor. Any operation carried out incorrectly may cause serious injury. Do not tilt or close the cab floor on slopes or if there is a strong wind.

To tilt or close the cab floor, pull the lever to the “free” position (F). After tilting or closing the cab floor, release the lever, which will automatically return to the “locked” position (L).

(F): free

(L): locked

For further details on how to tilt the cab floor, see "3.2.8 TILTING THE CAB FLOOR".



3.3.2.2 STARTING WITH COLD ENGINE OR IN COLD CLIMATES

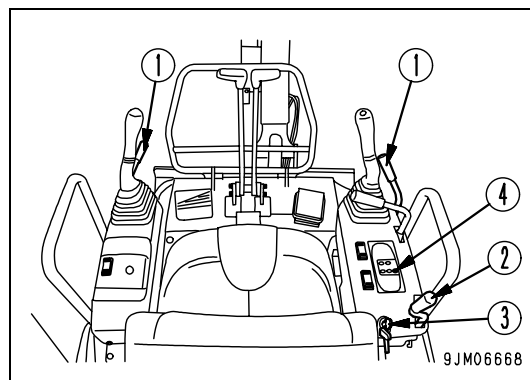
WARNING

- Before starting the engine, carefully read the instructions and information regarding safety contained in this manual and make sure that you know the controls. From the moment at which the engine is started, the operator is directly responsible for any damage that may be caused by wrong manoeuvres and non-compliance with the safety regulations and the rule of the road..
- Do not attempt to start the engine by causing a short-circuit with the terminals of the starter. This may cause serious injury or even fires.
- Start the engine only while seated with fastened seat belt.
- Before starting the engine, make sure that there is no one within the operating range of the machine and sound the horn.
- Never use starting aid fluids, as they may cause explosions.
- Exhaust gas is toxic. When starting the engine in closed places, make sure that there is sufficient ventilation.

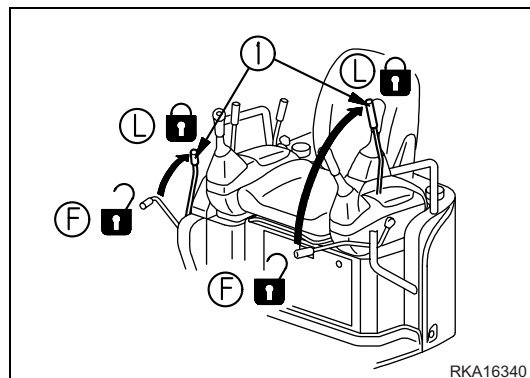
IMPORTANT

- Do not make the starter run for more than 20 seconds without interruption. If the engine does not start, wait at least 2 minutes before trying again.

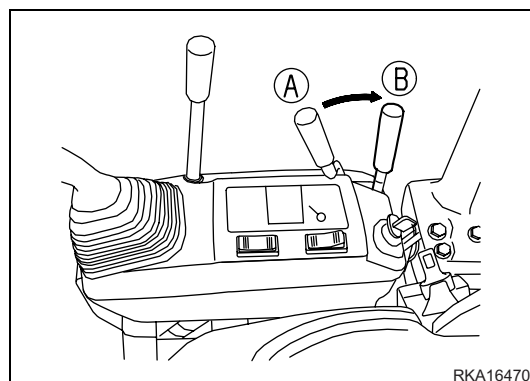
When starting the engine in cold climates, proceed as indicated below.



1. Make sure that the safety lever (1) is in the "locked" position (L). If the safety lever is in the "free" position (F), the engine cannot be started.



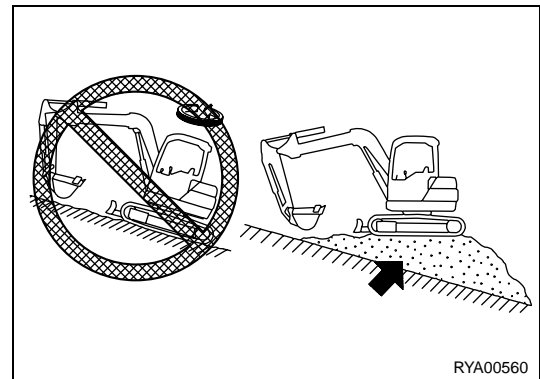
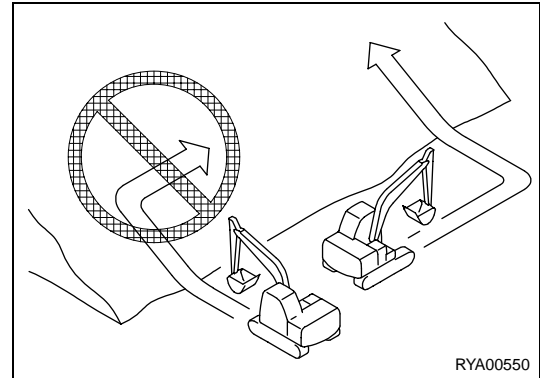
2. Pull the accelerator lever (2) completely, from the idling position (A) to the maximum speed position (B).



3.3.11 PRECAUTIONS TO BE TAKEN WHEN TRAVELLING ON SLOPES

WARNING

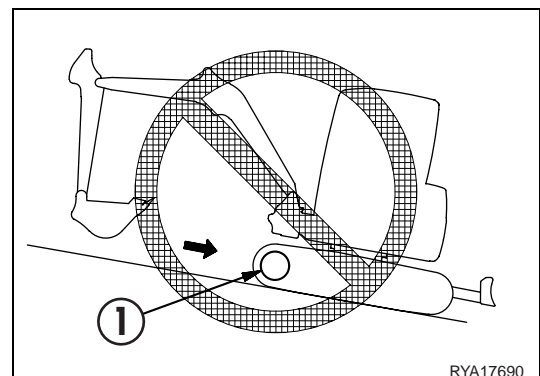
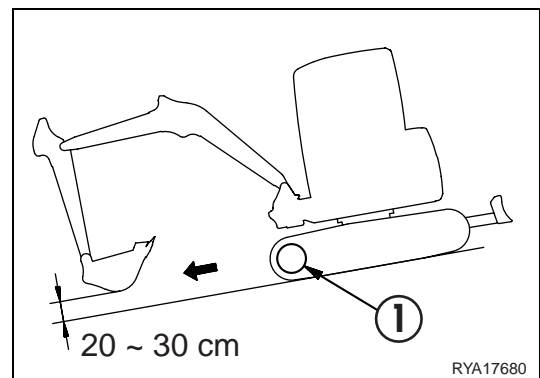
- Swinging or using the work equipment on slopes may cause the machine to lose stability and overturn, therefore it is advisable to avoid these operations. It is particularly dangerous to swing the turret when the machine is travelling downhill with full bucket. If these operations cannot be avoided, create a sort of platform by heaping some ground, so that the machine can work in horizontal position.
- Do not travel up or down steep slopes, since the machine may overturn.
- During travel, lift the machine at about 20-30 cm from the ground. Do not travel downhill in reverse.
- Do not steer or move transversally on slopes. Always position the machine on a level surface before changing direction. This may take longer, but is certainly safer.
- Always operate the machine or travel in such a way as to be able to stop it safely at any time if it slips or becomes unstable.
- When travelling uphill, if the tracks slip or it is impossible to move the machine using only the force of the tracks, do not use the pulling force of the arm to help the machine move forward. The machine runs the risk of overturning.
- Avoid adjusting the track gauge when the machine is working on a slope: the machine may lose stability and overturn.



1. When travelling downhill on steep slopes, lower the speed using the travel levers and the hand accelerator.
When moving downwards on a slope whose inclination exceeds 15°, position the work equipment as indicated in the diagram on the right and reduce the engine speed.

NOTE

- When the machine travels downhill, the sprocket (1) must be facing downhill.
If the machine travels downhill with the sprocket (1) positioned uphill, the tracks tend to slacken and this may cause the machine to slip.



3.4.3 LIFTING THE MACHINE

WARNING

- Do not lift the machine if the operator is still on board.
- Always make sure that the metal cable used to lift the machine is sufficiently strong for the weight being lifted.
- Do not lift the machine with the turret swung laterally. Before lifting the machine, swing the work equipment to the sprocket side, then position the undercarriage and the turret parallel to each other.
- Always keep the machine in horizontal position during the lifting operations.
- Do not stand under the machine when this is suspended.
- Do not attempt to lift the machine in any position different from that illustrated below, since it may lose stability.

CAUTION

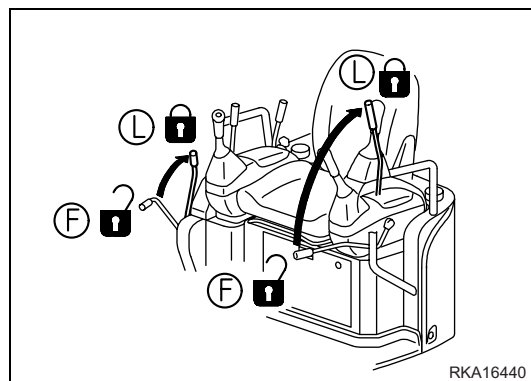
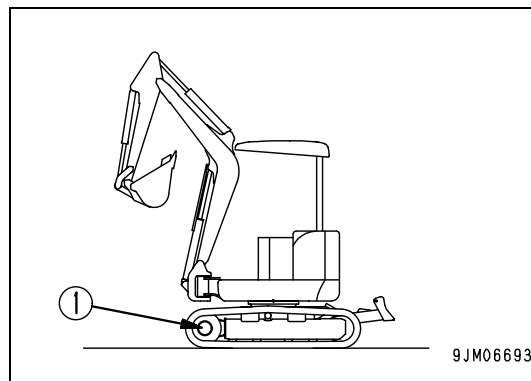
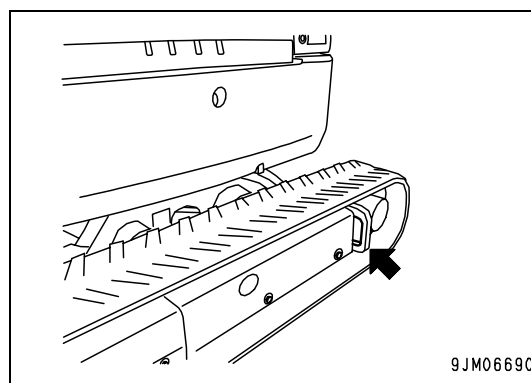
- It is prohibited to lift the machine using the holes provided in the undercarriage, since these must be used only for transporting the machine. This would damage the undercarriage.

IMPORTANT

- For details on the weight of the machine, see paragraph "5.1 TECHNICAL DATA".
- The lifting procedure described must be considered valid only for machines with standard specifications. The lifting method varies according to the equipment and attachments installed. In these cases, contact your Komatsu Dealer, who can supply you with more precise information.

The lifting operation must be carried out on a level surface, by proceeding as indicated below.

1. Start the engine, then swing the turret so that the work equipment is above the sprockets (1) with the undercarriage and the turret parallel to each other.
2. Lift the blade completely.
3. Extend the bucket cylinder, the arm cylinder and the boom cylinder completely.
4. If the boom is swung to the left or to the right, operate the boom swing pedal to position the boom parallel to the undercarriage, then lock the pedal safety device.
5. Shift the safety lever to the "locked" position (L).
6. Stop the engine, make sure that the space around the operator seat is clear, then get off the machine.



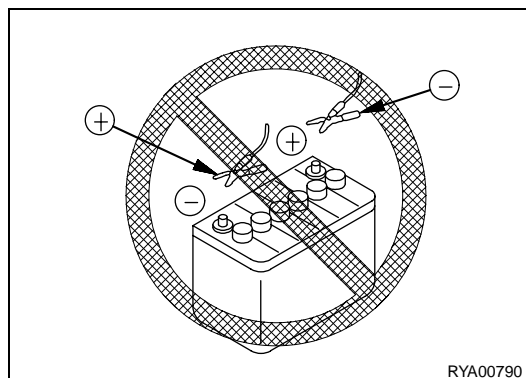
3.7.5.3 STARTING WITH BOOSTER CABLES

When starting the engine with booster cables, proceed as indicated below.

CONNECTING AND DISCONNECTING THE BOOSTER CABLES

WARNING

- When connecting the cables, avoid any contact between the positive cable (+) and the negative cable (-).
- When starting the engine with booster cables, always wear safety goggles.
- Take care to avoid any contact between the machine to be started and the machine used as starting aid, in order to avoid sparks and therefore the explosion of the hydrogen produced by the batteries. The explosion of hydrogen causes serious damage and injury.
- Take care not to make any mistake when connecting the booster cables. In the last connection (to the turret frame) a spark is generated, therefore it is advisable to connect the cable as far from the battery as possible. (In any case, avoid the attachments, since they are poor conductors).
- When removing the booster cables, take care to avoid any contact of the clamps with each other or with the machine frame.



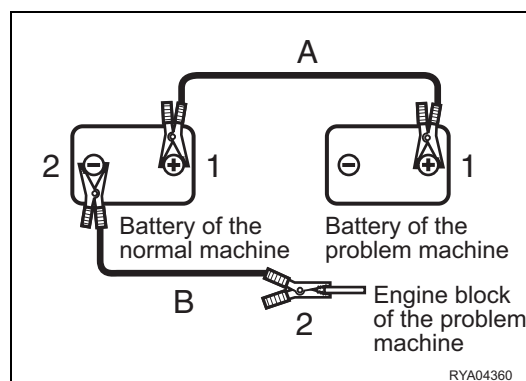
RYA00790

IMPORTANT

- The booster cables and the clamps must be sized according to the dimensions of the battery.
- The battery to be used to start the engine must have greater capacity or at least the same capacity as the battery of the machine to be started.
- Make sure that cables and clamps are neither corroded, nor damaged.
- Make sure that cables and clamps are secured firmly.
- Make sure that the safety levers of both machines are in the “locked” position.
- Make sure that all the levers are in neutral.

CONNECTING THE BOOSTER CABLES

1. Make sure that the ignition key of both machines is in position OFF.
2. Connect one clamp of booster cable (A) to the positive (+) terminal of the machine to be started.
3. Connect the other clamp of booster cable (A) to the positive (+) terminal of the machine to be used as starting aid.
4. Connect one clamp of booster cable (B) to the negative (-) terminal of the machine to be used as starting aid.
5. Connect the other clamp of booster cable (B) to the engine block of the machine to be started.



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3.7.6.2 FRAME

TROUBLE	CAUSE	SOLUTION
Travel speed, swing, boom, arm, bucket slow.	<ul style="list-style-type: none"> No hydraulic oil. 	<ul style="list-style-type: none"> Restore level. See "CHECKS TO BE CARRIED OUT BEFORE STARTING THE ENGINE".
Pump does not work correctly.	<ul style="list-style-type: none"> Foreign body in the hydraulic tank filter. 	<ul style="list-style-type: none"> Clean. See "Every 2000 hours OF OPERATION".
Hydraulic oil temperature increases excessively.	<ul style="list-style-type: none"> No hydraulic oil. Fan belt slack. Radiator or exchanger fins clogged. 	<ul style="list-style-type: none"> Restore level. See "CHECKS TO BE CARRIED OUT BEFORE STARTING THE ENGINE". Adjust fan belt tension. See "EVERY 500 HOURS OF OPERATION". Clean or repair. See "EVERY 500 HOURS OF OPERATION".
Tracks come off.	<ul style="list-style-type: none"> Slack tracks. 	<ul style="list-style-type: none"> Adjust track tension. See "WHEN REQUIRED".
Sprocket excessively worn.		

3.7.6.3 ENGINE

TROUBLE	CAUSE	SOLUTION
Engine oil pressure warning light comes on.	<ul style="list-style-type: none"> Oil level in oil pan too low (air sucked in). Oil filter clogged. Oil leakage due to damage or incorrect tightening of oil pipes or joints. Engine oil pressure sensor faulty. 	<ul style="list-style-type: none"> Restore level. See "CHECKS TO BE CARRIED OUT BEFORE STARTING THE ENGINE". Replace cartridge. See "Every 500 hours OF OPERATION". (•) Check and repair. (•) Change.
Steam comes out of radiator top (pressure valve).	<ul style="list-style-type: none"> Fluid level low, fluid leakages. Fan belt slack. Mud or limestone accumulated in cooling system. Radiator fins damaged or closed. 	<ul style="list-style-type: none"> Add fluid, repair. See "CHECKS TO BE CARRIED OUT BEFORE STARTING THE ENGINE". Adjust fan belt tension. See "EVERY 500 HOURS OF OPERATION". Change fluid and clean cooling system. See "WHEN REQUIRED" Clean or repair. See "EVERY 500 HOURS OF OPERATION". (•) Change. Tighten cap or change unit.
Engine coolant temperature warning light comes on.	<ul style="list-style-type: none"> Faulty thermostat. Radiator cap loose (work at considerable heights). Fluid level sensor faulty. 	<ul style="list-style-type: none"> (•) Change. (•) Change.

4.2 MAINTENANCE NOTES

- Use only Komatsu genuine spare parts.
- Do not mix different types of oil.
- Unless specified otherwise, the oils and the coolant used by Komatsu to fill the tanks before the delivery of the machine are the following:

ITEM / TANK / SYSTEM	SPECIFICATIONS
• Engine oil	SAE 10W-30 Specifications: API CF - CF2 - CD
• Hydraulic system oil	SAE 10W Specifications: API CD
• Biodegradable hydraulic system oil (Only for machines in which synthetic biodegradable oil type HEES not of plant origin is used)	SHELL NATURELLE HFX-32
• Travel reduction gears oil	SAE 30 Specifications: API CD
• Fuel	With ambient temperature over -10° C, use: Diesel oil ASTM D975 N°2 With ambient temperature below -10°C, use: Diesel oil ASTM D975 N°1
• Radiator	Special permanent antifreeze, biodegradable, ethylene glycol based with corrosion inhibitor and with no silicates, borates, nitrates, phosphates and amines. Red antifreeze suitable for aluminium radiators, diluted with water (50%) to ensure protection down to -36°C.

4.2.1 OIL, FUEL AND COOLANT

4.2.1.1 OIL

- The oil used for the engine and the work equipment is subjected to demanding conditions (high temperature, high pressure) and deteriorates with use. Always use oil suitable for the characteristics and temperatures indicated in the use and maintenance manual. Change the oil after the prescribed interval, even if it is not dirty.
- The engine oil must be selected very carefully, since it lubricates the engine, which is the machine's heart; the main maintenance operations required for the engine oil are the following:
 1. daily check of the oil level;
 2. check of the degree of pollution of the oil;
 3. periodical change.
- When changing the oil, change also the filters.
- It is advisable to have the oil periodically analysed in order to check the conditions of the machine. The analysis must be carried out by specialized personnel at Komatsu Dealers.

4.5 TIGHTENING TORQUES

4.5.1 STANDARD TIGHTENING TORQUES FOR SCREWS AND NUTS

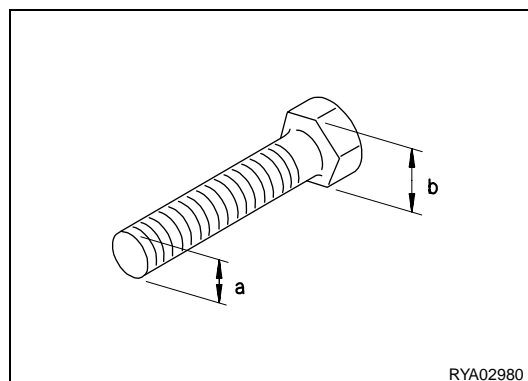


CAUTION

- If screws, nuts or other parts are not tightened with the required torque, they may become loose or damage the components with which they cooperate, and this may cause machine failures or operation problems. Always pay the utmost attention when carrying out tightening operations.

If not specified otherwise, tighten the screws and nuts applying the torques specified in the table.

If it is necessary to replace a screw or a nut, always use Komatsu original spare parts having the same size of the part to be replaced.



RYA02980

★ Nm (Newton metre): 1 Nm = 0.102 kgm

Thread diameter (a) (mm)	Pitch (mm)	Wrench size (b) (mm)	8.8		10.9	
			kgm	Nm	kgm	Nm
6	1	10	0,96 ± 0,1	9,5 ± 1	1,3 ± 0,15	13,5 ± 1,5
8	1,25	13	2,3 ± 0,2	23 ± 2	3,2 ± 0,3	32,2 ± 3,5
10	1,5	17	4,6 ± 0,5	45 ± 4,9	6,5 ± 0,6	63 ± 6,5
12	1,75	19	7,8 ± 0,8	77 ± 8	11 ± 1	108 ± 11
14	2	22	12,5 ± 1	122 ± 13	17,5 ± 2	172 ± 18
16	2	24	19,5 ± 2	191 ± 21	27 ± 3	268 ± 29
18	2,5	27	27 ± 3	262 ± 28	37 ± 4	366 ± 36
20	2,5	30	38 ± 4	372 ± 40	53 ± 6	524 ± 57
22	2,5	32	52 ± 6	511 ± 57	73 ± 8	719 ± 80
24	3	36	66 ± 7	644 ± 70	92 ± 10	905 ± 98
27	3	41	96 ± 10	945 ± 100	135 ± 15	1329 ± 140
30	3,5	46	131 ± 14	1287 ± 140	184 ± 20	1810 ± 190
33	3,5	50	177 ± 20	1740 ± 200	250 ± 27	2455 ± 270
36	4	55	230 ± 25	2250 ± 250	320 ± 35	3150 ± 350
39	4	60	295 ± 33	2900 ± 330	410 ± 45	4050 ± 450

IMPORTANT

- This tightening torque table is not valid for screws or nuts that must fasten parts made of nylon or similar materials onto washers or components made of nylon or nonferrous metals or requiring specific tightening torques.

4.9.1.c CLEANING THE WATER SEPARATOR FILTER

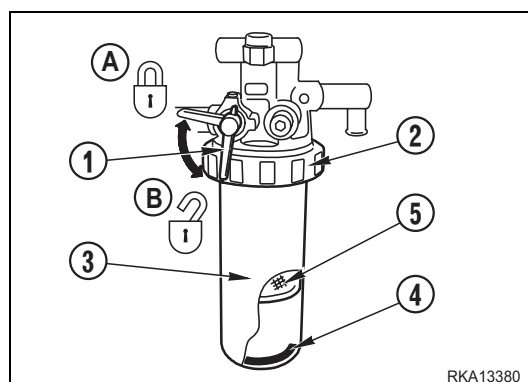
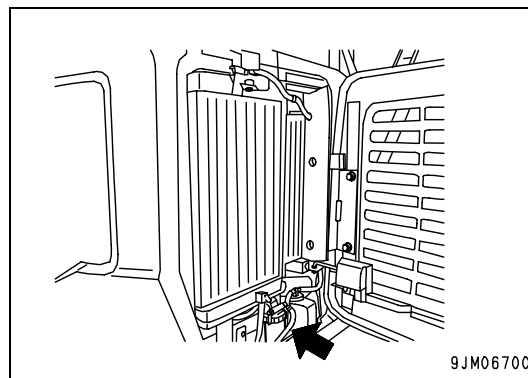
! WARNING

- Change the filter after work, when the engine has cooled down to 40÷45°C.
- During these operations some fuel may be spilled; clean the dirty areas immediately, in order to prevent any risk of slipping or fire.

1. Open the radiator cover. For further details, see "3.2.6 RADIATOR COVER".
2. Turn the valve (1) of the water separator to the closed position (A).
3. Loosen the metal ring (2) with a filter wrench and remove the casing (3) and the filtering element (5). Take care not to lose the red ring (4) that is positioned inside the casing.
4. Wash the inside of the casing (3) and the filtering element (5) with diesel or flushing oil.
5. After washing, install the filtering element (5).
6. Place the red ring (4) in the casing (3) and fill it with fuel, then put back the casing and tighten the metal ring (2).
7. Turn the valve (1) of the water separator to the open position (B) and bleed the air by proceeding as indicated below.

IMPORTANT

- When removing the water separator, take care not to lose the red ring contained in the casing.
- If the filtering element is excessively clogged or damaged, change it.

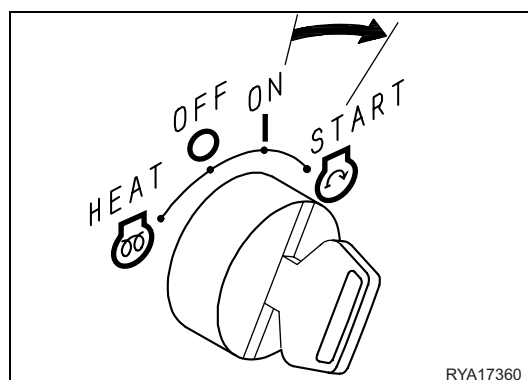
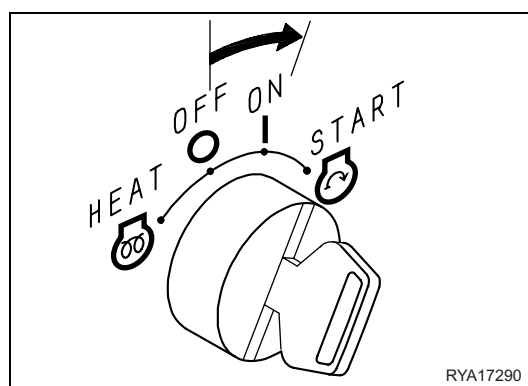


BLEEDING THE FUEL CIRCUIT

1. After filling the fuel tank, make sure that the valve (1) of the water separator is in open position (B).
2. Turn the ignition key to position ON and wait approximately 15-20 seconds, in such a way as to allow the fuel system to be automatically bled.
3. Turn the ignition key to position START and start the engine.

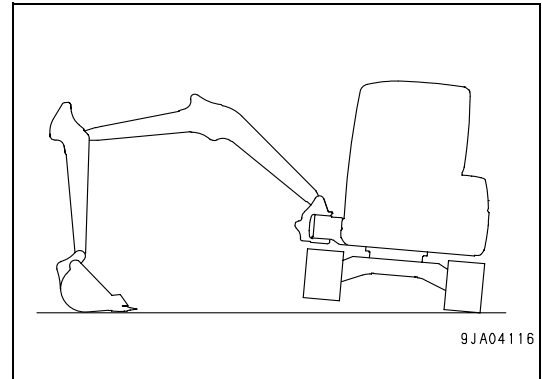
IMPORTANT

- If the engine starts regularly and then stops or functions irregularly, check if there is air in the circuit; in this case, check the tightness of the fuel filter and of the fuel pump prefilter.
- When all the fuel in the tank has run out, bleed the circuit by proceeding as described above and repeat the operation at least twice.

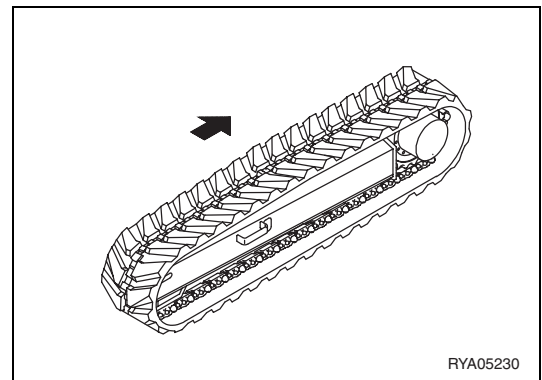


INSTALLING THE RUBBER TRACKS

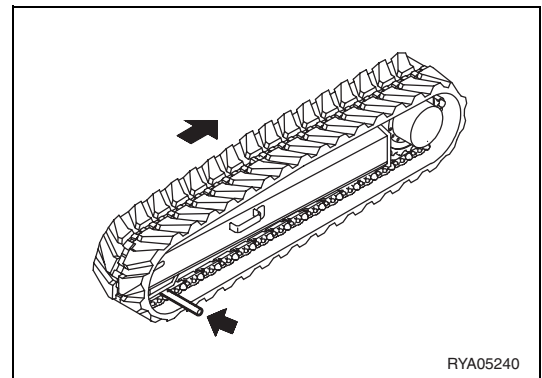
1. Raise the undercarriage using boom and arm and make sure that the grease contained in the cylinder has been eliminated.
Carry out this operation shifting the control levers very slowly.



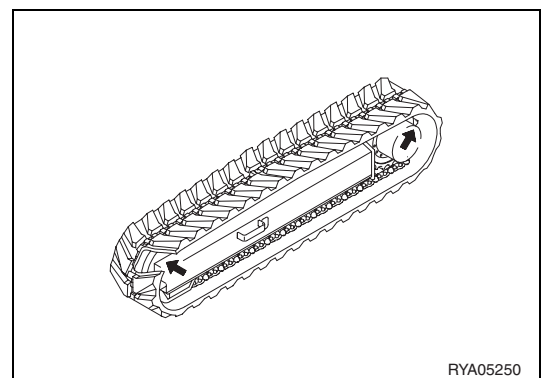
2. Install the rubber tracks on the sprocket by fitting the driving blocks.
3. Turn the sprocket (1) as if in reverse, then push the track towards the turret.



4. Using a steel tube (2), position the track and turn the sprocket again.
5. Make sure that the track is correctly installed on the sprocket and the idler roller.
6. Adjust the track tension. For details, see "4.9.1.g CHECKING AND ADJUSTING THE RUBBER TRACK TENSION").



7. Make sure that the track tension is correct, that the track is correctly fitted in the sprocket and the idler roller, then rest the machine on the ground.



4.9.7 MAINTENANCE EVERY 2000 HOURS OF OPERATION

Carry out these operations together with those to be performed every 500 HOURS and every 1000 HOURS.

4.9.7.a CHANGING THE OIL IN THE HYDRAULIC TANK AND CLEANING THE FILTER

WARNING

- To carry out this maintenance operation it is necessary to tilt the cab floor. Carefully follow the instructions given in paragraph "3.2.8 TILTING THE CAB FLOOR" or have this operation carried out by your Komatsu Dealer.
- Retract the arm and bucket cylinders completely, rest the bucket teeth on the ground and, after stopping the engine, eliminate the residual pressures from the equipment (by shifting the controls more than once) and from the tank (by slowly loosening the filler cap).
- Soon after the machine has been stopped, the hydraulic oil is very hot and may cause burns; let it cool down to 40÷45° C before carrying out this maintenance operation.
- Immediately clean any area dirty with oil.
- Oils, filters, the coolant and the battery are considered special waste and must be collected and disposed of according to the regulations in force.

CAUTION

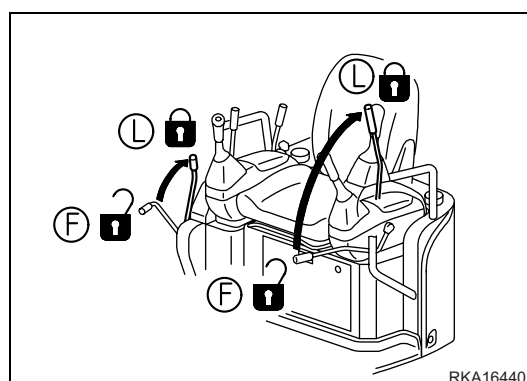
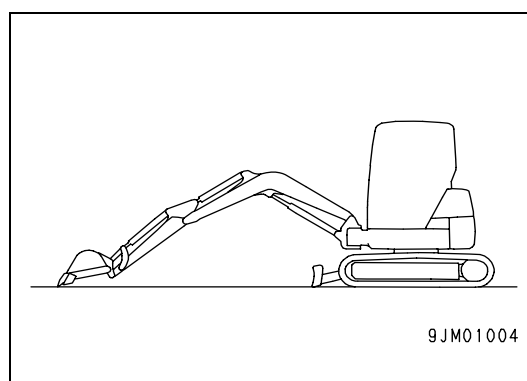
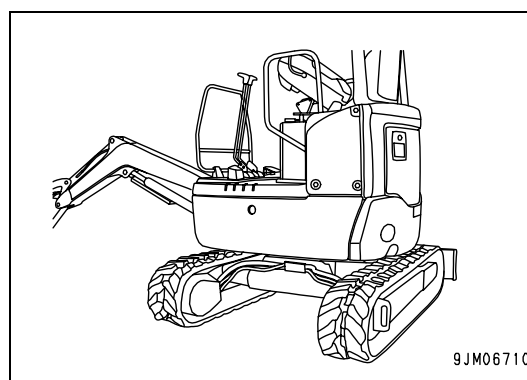
- On machines containing synthetic biodegradable hydraulic oil type HEES, this must be changed after the first 500 hours of operation and successively every 2000 hours, and in any case at least once a year.

1. Turn the turret so that the lower part of the hydraulic oil tank is not covered by the tracks.

Retract the arm and bucket cylinders completely and lower the boom until the bucket teeth rest on the ground.

3. Lower the blade to the ground.
4. Stop the engine and eliminate the residual pressure from the work equipment (by shifting the controls more than once).

5. Shift the safety lever to the "locked" position (L).
6. Tilt the cab floor (see "3.2.8 TILTING THE CAB FLOOR").



6.2.2 HYDRAULIC CIRCUIT

6.2.2.1 INSTALLING AND CONNECTING THE EQUIPMENT

WARNING

- The machine must be parked on a level surface, with the equipment resting on the ground.
- When the connecting pins are removed or installed, chips may come off; always wear gloves, safety goggles and helmet.
- The change of the equipment must be carried out by two operators, who must decide together the words and signals to be used during work.
- Avoid using your fingers to align the holes, since they may be injured or even cut off.
- Before carrying out any operation on the hydraulic circuit, stop the engine and completely drain the residual pressure from the pipes.

For the installation of the equipment it is necessary to connect the mechanical constraints of the bucket as described in "3.3.14 CHANGING THE BUCKET" and to carry out the hydraulic connections using the pipes provided.

After connecting the mechanical constraints, carry out the hydraulic connections by proceeding as follows:

1. Stop the engine and move the hydraulic controls in all directions, in order to release the residual pressures present in the circuits of the machine.
2. Press the optional equipment control pedal to release the residual pressure from the delivery pipe.
3. Slowly loosen the hydraulic oil filling cap, in such a way as to release the residual pressure from the tank.
4. Remove the plugs of the quick couplers of both the machine and the equipment.
5. Connect the right (1) and left (2) pipes.

CAUTION

- When connecting the pipes, pay the utmost attention, in order to prevent any impurities from getting into them, then extend the bucket completely to avoid any interference with the lever (A).

6. Start the machine and perform several manoeuvres with the equipment control pedal, in order to check the seals.

WARNING

- Wear thick gloves and safety goggles during this check.
- To check the system for leakages, use a piece of cardboard or a wooden board.

6.2.2.2 MAINTENANCE

The hydraulic system does not require any operation and inspection other than those prescribed for the routine maintenance of the machine. Regarding the maintenance operations required for the equipment, see the specific operation manuals.

