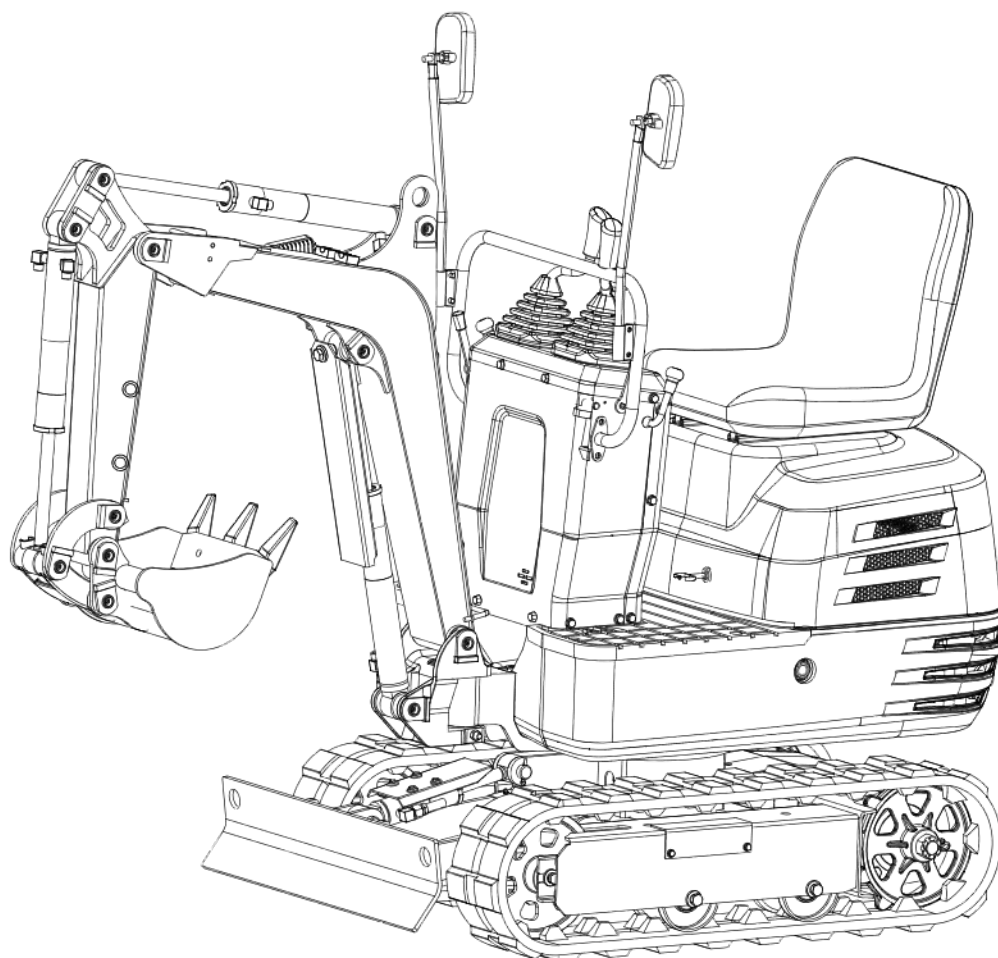


LITTLE BEAVER



Excavator Operator's Manual

MODEL NUMBER : DUEEXCAV-28

SERIAL NUMBER :

Both model number and serial number may be found on the main label.
You should record both of them in a safe place for future use.

FOR YOUR SAFETY

**READ AND UNDERSTAND THE ENTIRE MANUAL BEFORE
OPERATING MACHINE**

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INTRODUCTION

You are now the proud owner of a excavator. This excavator is a product of quality engineering and manufacturing. It is made of quickly fine materials and under rigid quality control systems. It will give you long, satisfactory service. To obtain the best use of your excavator, please read this manual carefully. It will help you become familiar with the operation of the excavator and contains many helpful hints about excavator maintenance. It is policy to utilize as quick as possible every advance in our research. The immediate use of new techniques in the manufacture of products may cause some small parts of this manual to be outdated. Distributors and dealers will have the most up-to-date information. Please do not hesitate to consult with them.



NOTE

Carefully read through this entire operator's manual before using this unit. Take special care to heed the cautions and warnings.

Specifications

Item No.		DUEEXCAV-28
Operating Weight		562 kg
Standard bucket	Volume	0.011 m ³
	Width	290 mm
Digging Force (Arm)		4.2 kN (485 kgf)
Digging Force (Bucket)		8.8 kN (815 kgf)
Engine		306 cc, Gas
Starting		Key-type Starter Switch and Shutdown
Swing speed		9.3 rpm
Travel speed		1.7 km/h
Gradeability		15°
Ground Contact Pressure		26.5 kPa (0.27 kgf/cm ²)
Boom Swing	Left	70° (L)
	Right	70° (R)
Track Shoe type		Rubber Crawler
Pump Capacity		9x2 L/min
Hydraulic reservoir		12 L
Hydraulic Pressure		17.5 Mpa
Parking Brake		Hydraulic Lock Type
Sound pressure level at the operator's station (LpA)		82.5dB, K=4dB
Vibration value	Arm	2.17 m/s ² , K=0.5
	Whole body	7.65 m/s ² , K=0.5

RECYCLING AND DISPOSAL



This marking indicates that this product should not be disposed with other household wastes. To prevent possible harm to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. To return your used device, please use the return and collection systems or check with your local authority or local stores for advice of environmental safe recycling.

SYMBOLS

The instruments and operation elements have been marked with a series of symbols in order to simplify the operation of your excavator. These symbols represent important information about the production or instructions on its use.

Recognize Safety Information
This is the safety alert symbol. When you see this symbol on your machine or in this manual, be alert for the potential of personal injury. Follow the precautions and safe operating practices highlighted by this symbol. A signal word – DANGER, WARNING, or CAUTION – is used with the safety alert symbol. DANGER identifies the most serious hazards. DANGER and WARNING signs are located near specific hazards. General precautions are on CAUTION labels.



Read these instructions carefully.



Wear eye protection.



Wear hearing protection.



Wear safety helmet



Keep your hands away!



No smoking, sparks, or flames



Do not start engine by shorting across starter terminals



Do not touch parts that are hot from operation. Serious burns may result.



Keep out of this area to avoid serious personal injury or death.



Be careful with your hands.



Be aware, objects may be thrown while in use.



Do not use the bare hand for checking on possible leakages.



Keep away from rotating parts.



Keep away from fan



Keep hands away from moving parts. Moving parts can crush or cut.



Keep bystanders away.



Pay attention to safety when working in front of the machine



Tipping hazard!



When leaving the excavator, please put the bucket close to the ground and remove the key.



Shut off the engine, disconnect spark plug wire, and make certain all moving parts have stopped before cleaning, repairing, or inspecting the unit.



Beware of fan heating



Gasoline and its vapors are extremely flammable and explosive.



Do not touch hot parts such as exhaust etc.



The exhaust fumes are dangerous, containing carbon monoxide. Staying in the environment can lead to unconsciousness and death.



3-Point Lifting



Alarm lamp "Battery charge"



Ground wire disconnect switch (Negative switch)



Tie down the excavator



Grease



Gas



Hydraulic Oil



Cooling Fans



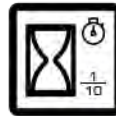
Lamp



Horn Button



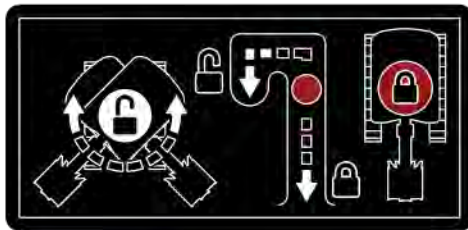
Horn Position



Hours



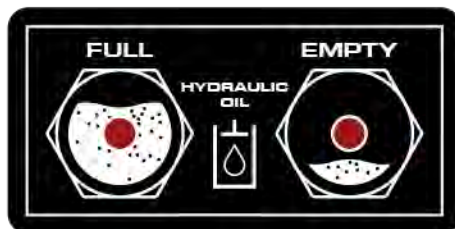
Power Indicator



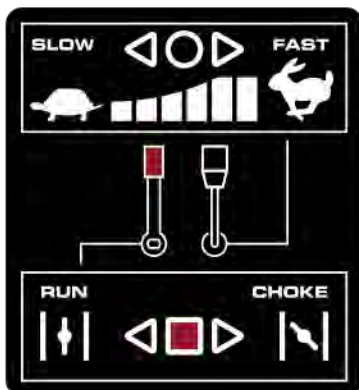
Instruct user to lock or unlock the swing frame with the swing lock pin.



Machine parameter label



Always check the hydraulic oil lever before using the machine



THROTTLE CONTROL The throttle control regulates the speed of the engine. The throttle control moves between Slow and Fast positions

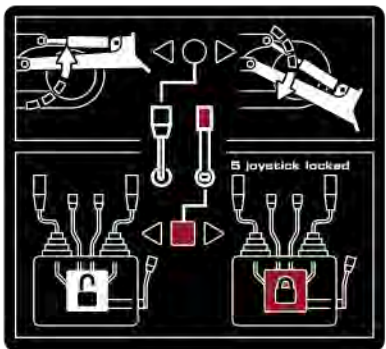
POWER OUTLET

12V- 15A

Power Outlet 12V,15A



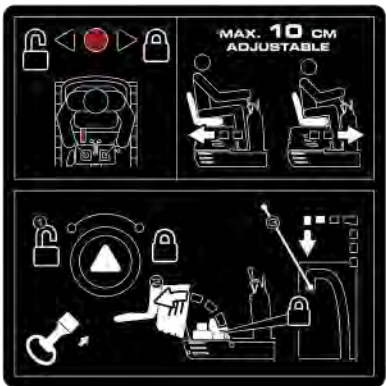
ENGINE ON/OFF/START SWITCH The engine switch has three positions. OFF - engine will not start or run. ON - engine will run. Start - engine will ignite



Pull back the black control lever to raise the dozer. Pushing the lever forward to lower the dozer.



Step on the front of the pedal to swing the boom to left. Step on the rear of the pedal to swing the boom to the right.



Hold the lever towards to right side to unlock the seat, then do adjustment.

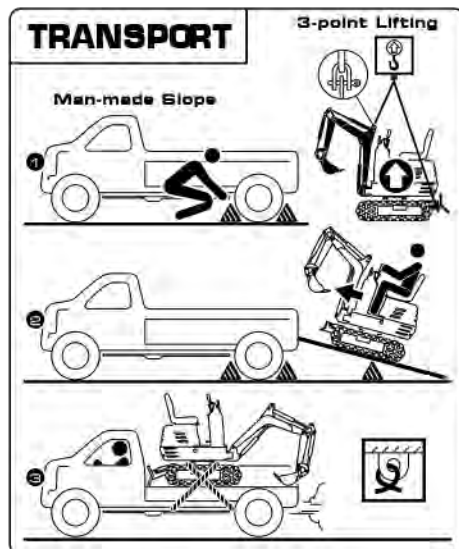


Manual Tube



Avoid Work Site Hazards Avoid contact with gas lines, buried cables and water lines. Call utility line location services to identify all underground utilities before you dig. Prepare work site properly. Avoid operating near structures or objects that could fall onto the machine. Clear away debris that could move unexpectedly if run over. Avoid boom or arm contact with overhead obstacles or overhead electrical lines. Never move any part of machine or load closer than 3 m (10 ft) plus twice the line insulator length to overhead wires.

Keep bystanders clear at all times. Keep bystanders away from raised booms, attachments, and unsupported loads. Avoid swinging or raising booms, attachments, or loads over or near personnel. Use barricades or a signal person to keep vehicles and pedestrians away. Use a signal person if moving machine in congested areas or where visibility is restricted. Always keep signal person in view. Coordinate hand signals before starting machine. Operate only on solid footing with strength sufficient to support machine. When working close to an excavation, position travel motors away from the hole. Reduce machine speed when operating tool on or near ground when obstacles may be hidden (e.g., during snow removal or clearing mud, dirt, etc.).



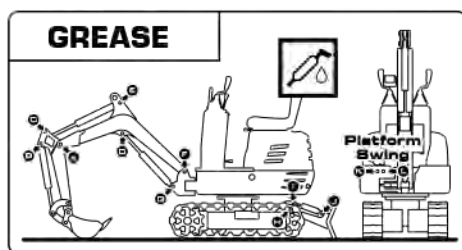
Using 3-point Lifting way or ramp to load or unload the excavator.

Warning: Apply the parking brakes of the truck, and block the drive wheels from both sides.

Warning: use blocks or struts under the ramps and the truck bed.

Warning: Block the crawlers and tie down the excavator.

Warning: To avoid personal injury or death: After loading the machine on the truck, swivel the upper body around to the back of the truck and lock the swing frame with the swing lock pin. Lower the bucket and dozer onto the truck bed and then lock the boom with the lever before getting off. It is prohibited to operate the machine when operator stands on the ground.



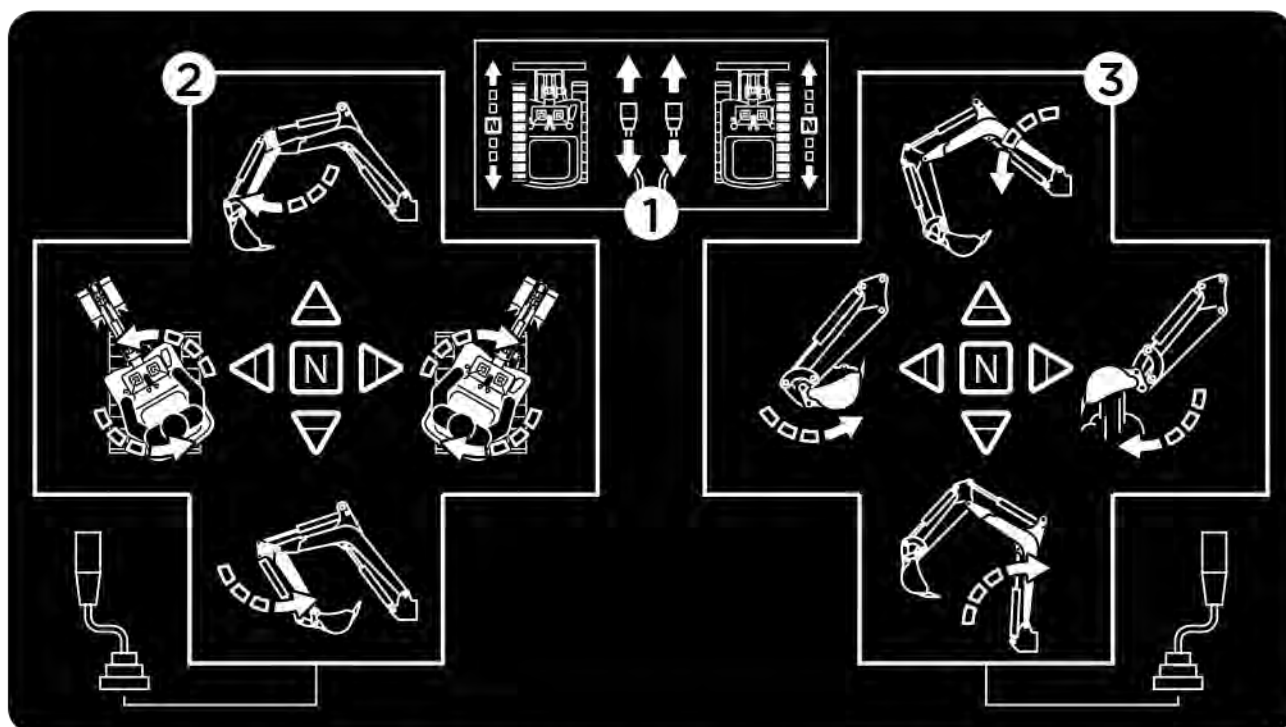
Periodically grease the excavator



Avoid Machine Tip Over

-Do not jump if the machine tips. You will be unlikely to jump clear and the machine may crush you.

- Load and unload from trucks or trailers carefully. Be sure truck is wide enough and on a firm level surface. Use loading ramps and attach them properly to truck bed. Avoid trucks with steel beds because tracks slip more easily on steel.
- Be careful on slopes. Use extra care on soft, rocky or frozen ground. Machine may slip sideways in these conditions. When traveling up or down slopes, keep the bucket on uphill side and just above ground level.
- Be careful with heavy loads. Using oversize buckets or lifting heavy objects reduces machine stability. Extending a heavy load or swinging it over side of undercarriage may cause machine to tip.
- Ensure solid footing. Use extra care when operating near banks or excavations that may cave-in and cause machine to tip or fall.



1. Pushing the both drive levers forward, moves the excavator forward, and vice-versa. The front of the excavator is the direction where the dozer is present. Only operate one side drive lever to change the direction when the excavator is stationary or travelling; Operate the left and right drive lever in opposite directions to achieve left and right spin turn.
2. Operation of the Arm and Unit Swing.
3. Operation of the Boom and Bucket.

SAFETY

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use this unit.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠ IMPORTANT Indicates that equipment or property damage could result if instructions are not followed.

📌 NOTE Gives helpful information.

The best insurance against accidents is to abide by the safety regulations.

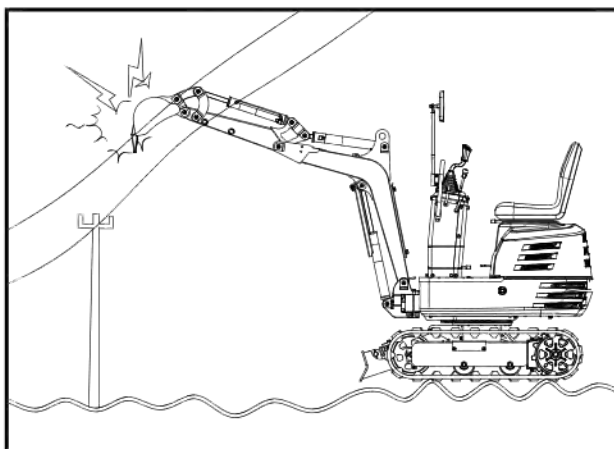
Read and understand this section carefully, before operating the excavator.

Every user, however experienced, should carefully read and understand this section and those of the attachments and accessories before taking the excavator into operation. The owner is obliged to inform the operators of these instructions in detail.

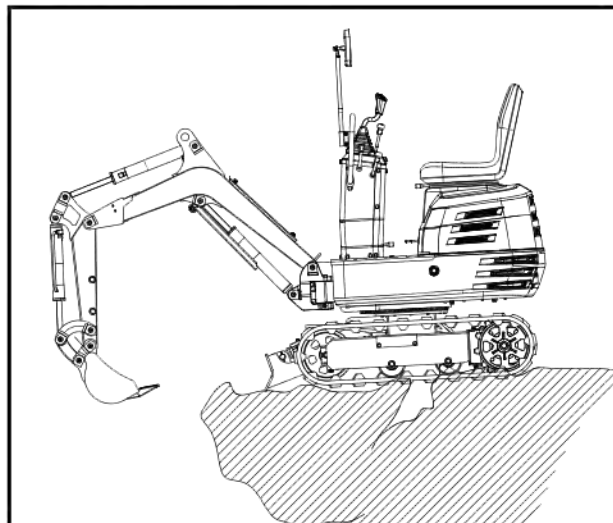
Keep this manual in the toolbox.

1. BEFORE OPERATION

1. Make yourself acquainted with the excavator and be aware of its limits. Read this operator's manual carefully before starting the excavator.
 2. Obey the danger, warning and caution labels on the machine.
 3. Track width 690mm. Operate in the correct track.
 4. Do not use the excavator under the influence of alcohol, medication or other substances. Fatigue is also dangerous.
 5. Check the surroundings carefully before using the excavator or when attachments are being attached.
- The excavator is not intended to be used in a contaminated environment.
 - Neither the excavator as a whole nor its internal components are intended for use in potential explosive atmospheres.
 - Pay attention to the overhead clearance with electric wires.



- Check for pipes and buried cables.
- Check for hidden holes, hindrances, soft ground and overhangs.



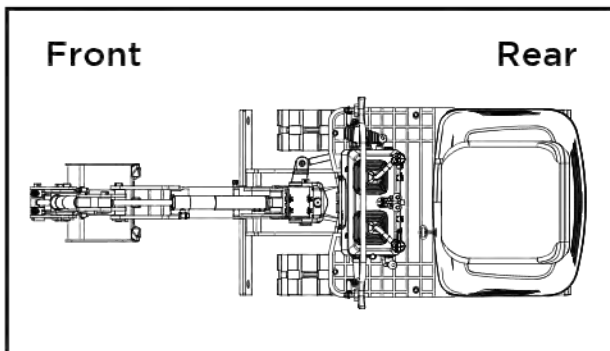
- During excavator use do not allow any persons within the working range.
6. Do not allow other persons to use the machine before having informed him on the exact operation and work instructions, and be assured that the operator's manual has been read and understood.
 7. Do not wear baggy, torn or too large clothing when working with the excavator. Clothing can get caught in rotating parts or control elements which can cause accidents or injuries. Wear adequate safety clothing, e.g. safety helmet, safety shoes, eye protection, ear protection, working gloves, etc., as necessary and as prescribed by laws or statutes.
 8. Do not allow passengers to get on any part of the excavator seat during operation.
 9. Check mechanical parts for correct adjustments and wear. Exchange worn or damaged parts immediately. Check nuts and bolts regularly for tight fitment. (for details see "Care and Maintenance").
 10. Keep your excavator clean. Heavy soiling, grease, dust and grass can inflame and cause accidents or injuries.
 11. Use only authorized attachments.
 12. Before starting the excavator, be absolutely sure that the excavator has been filled with

fuel, lubricated, greased and undergone other maintenance work.

13. Do not modify the excavator, otherwise it could lead to unforeseen safety problems.

2. STARTING OF THE EXCAVATOR

1. Get into and out of the machine safely. Always face the machine. Always use handrails and available steps and keep yourself well balanced. Do not hold any of the control levers and switches. Do not jump on or off the machine, whether stationary or in motion.
2. Start and control the excavator only from the operator's seat. The driver should not lean out of his seat when the engine is running.
3. Before starting the engine, make sure that all control levers are in their neutral positions.
4. Do not start the engine by jumping the starter connections. Do not try to circumvent using the starter switch, otherwise the engine could start suddenly and the excavator could move.
5. Make sure that the dozer is on the front side. (The dozer must be raised.) If the swing frame has been turned 180°, i.e. the dozer is, seen from the operator, "behind", then the travel direction is opposite to the drive direction of the levers (when activating the drive lever forwards, the excavator, seen from the operator, will move backwards).



6. Do not run the engine in closed or badly ventilated rooms. Carbon monoxide is colourless, odourless and deadly.
7. Keep all safety equipment and covers in place. Replace damaged or missing safety devices.
8. Precautions against tipping over. In order to secure safe operation, keep away from steep slopes and embankments. Do not swing the bucket downwards. Lower the dozer during digging. Keep the bucket as low as possible

while driving upwards. Turn slowly on slopes. Do not keep the excavator near the edges of trenches and banks, as the earth can give way due to the weight of the excavator.

9. Watch out at all times where the excavator is being moved to. Keep an eye out for hindrances.
10. Keep enough distance from trench and bank edges.

Safety for children

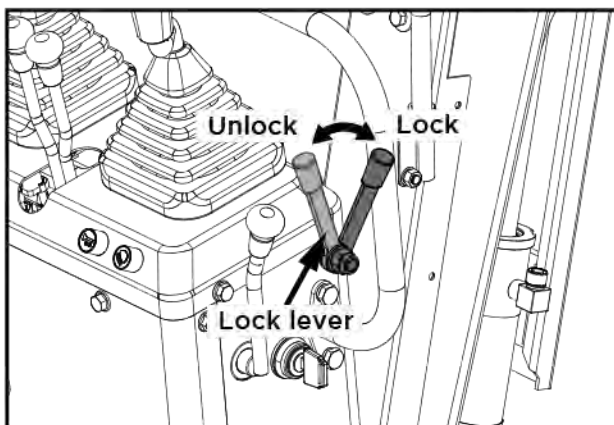
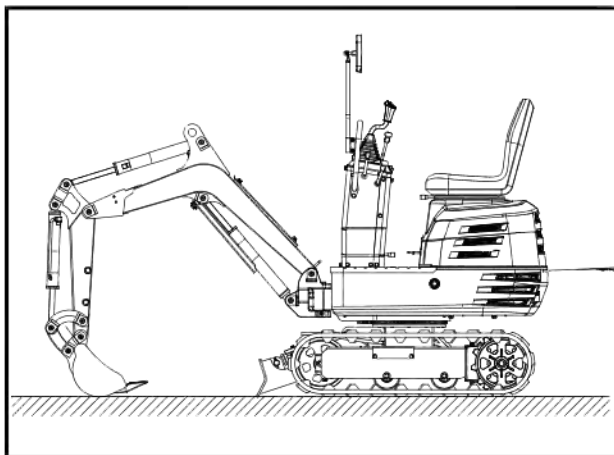
Tragedy can occur if the operator is not alert to the presence of children. Children generally are attached to machines and the work they do.

11. Never assume that children will remain where you last saw them.
12. Keep children out of the work area and under the watchful eye of another responsible adult.
13. Be alert and shut your machine down if children enter the work area.
14. Never carry children on your machine. There is no safe place for them to ride. They may fall off and be run over or interfere with your control of the machine.
15. Never allow children to operate the machine even under adult supervision.
16. Never allow children to play on the machine or on the implement.
17. Use extra caution when backing up, look behind and down-make sure area is clear before moving.
18. When parking your machine if at all possible park on a firm, flat and level surface. Lower the implements to the ground, remove the key from the ignition and chock the crawlers.

3. AFTER OPERATION

Before leaving the machine,

- Bring the excavator to hard even ground.
- Lower the attachments and the dozer blade on the ground.
- Stop the engine.
- Lock all control levers.
- Remove the key.

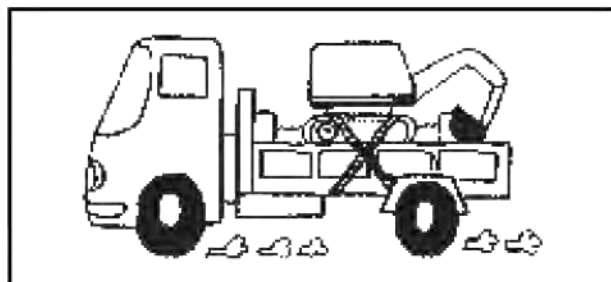
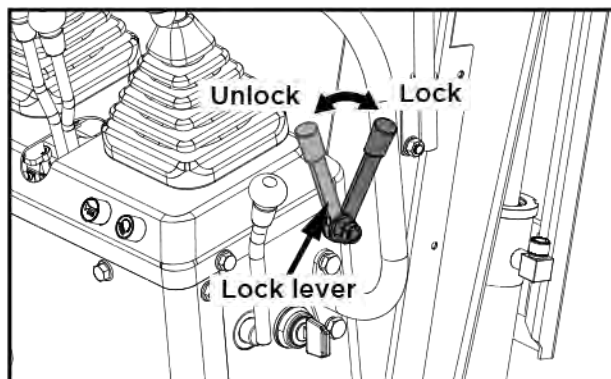
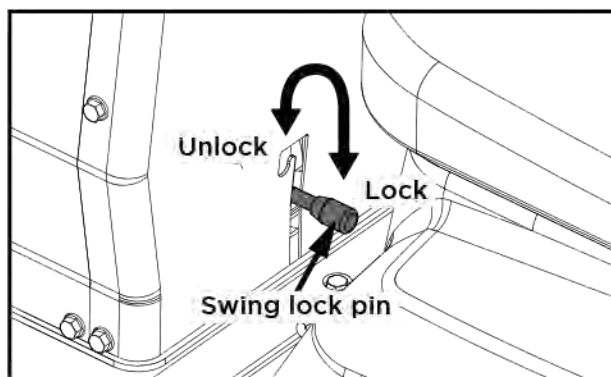


4. SAFE LOADING AND TRANSPORT OF THE EXCAVATOR

1. Observe all regulations concerning the transport of excavators on public roads.
2. Use adequately long and robust ramps when loading on a truck. (for details see "TRANSPORTING THE EXCAVATOR ON A TRUCK"); You can also lift the machine onto the truck. (for details see "LIFTING OF THE EXCAVATOR").
3. Do not change the running direction and to avoid a tipping over, do not try to swing the attachment crosswise to the loading ramps.
4. After loading of the excavator on a truck, swivel the upper body around to the back of the truck and engage the swing lock pin.

Lower the attachment on the loading plane, release the pressure from the hydraulic system and lock the boom with the lever.

Block the crawlers with blocks and wire down the excavator. After loading the excavator on a truck, tie down the undercarriage of the excavator with a strong steel wire on the truck.



5. Do not brake abruptly with the excavator loaded. Fatal accidents could happen.

5. MAINTENANCE

Before doing maintenance work on the excavator, place the machine on even solid ground, lower the attachments on the ground, stop the engine and release the cylinder pressure by actuating the levers. When dismantling hydraulic parts, make sure that the hydraulic oil has cooled down sufficiently to avoid burns.

Start maintenance work carefully, e.g. loosen screws slowly so that oil will not squirt out.

1. Before doing work on the engine, the exhaust system, the heat protection shield and the hydraulics, let the excavator cool down sufficiently.
2. Turn off the engine at all times when filling with fuel. Avoid spilling and over-filling of fuel.

3. Smoking is prohibited while fuelling and handling the battery! Keep sparks and fire away from the fuel tank and battery. Flammable gases escape from the battery.
4. When the battery is dead, it can be started by pull the recoil starter.
5. To avoid short-circuiting the battery, always remove the earth cable first and attach the plus cable first.
6. Keep a first-aid box and a fire extinguisher at hand at all times.
7. Leaking hydraulic fluid has enough pressure to penetrate the skin and cause serious injuries. Leakages from pin holes can be totally invisible. Do not use the bare hand for checking on possible leakages. Always use a piece of wood or cardboard. It is strongly recommended you use a face mask or eye protection.

Should injuries occur with leaking hydraulic fluid, contact a doctor immediately. This fluid can cause gangrene or serious allergic reactions.



8. To avoid leakage of battery acid which contains heavy metals, do not throw the battery away.
9. Observe all laws and regulations concerning the disposal of used oil, coolants, solvents, hydraulic fluids, battery acids and batteries.
10. To avoid fire, do not heat the hydraulic components (tanks, pipes, hoses, cylinders) before they have been drained and washed.
11. Use a face mask or eye protection to protect the eyes and respiratory system against dust and other foreign particles.



12. Do not crawl under the excavator if the excavator is only supported by the boom and arm or the dozer. The excavator can tip over or lower itself due to hydraulic pressure loss. Always use safety struts or other appropriate supports.
13. Use no parts which are lined with asbestos. Do not use these kind of parts even if they can be installed.

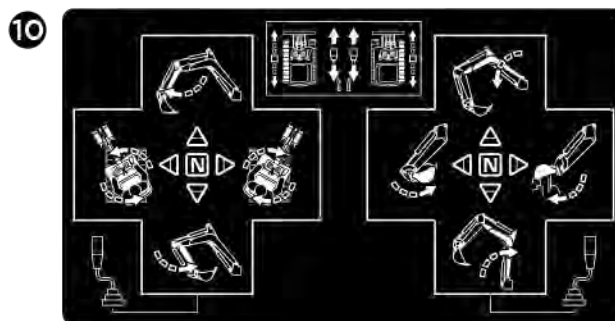
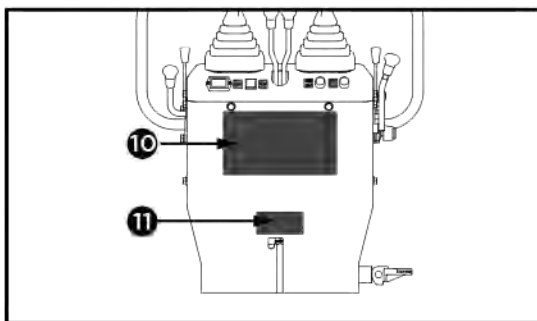
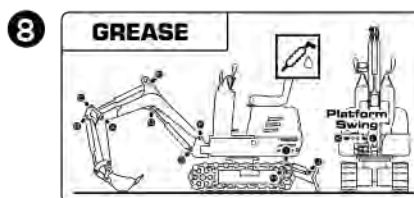
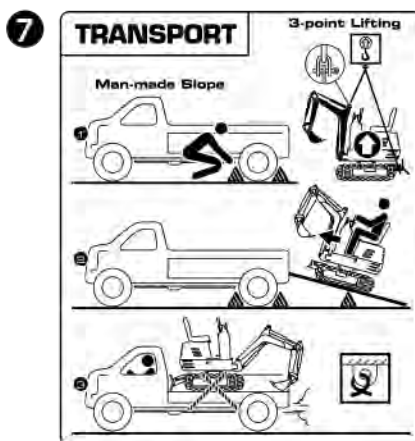
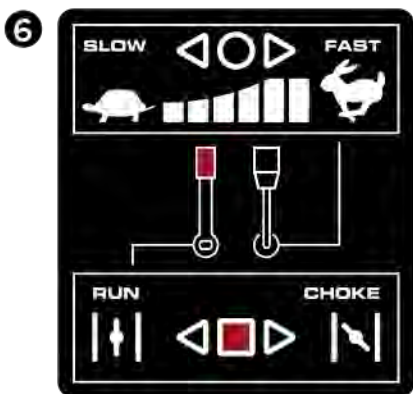
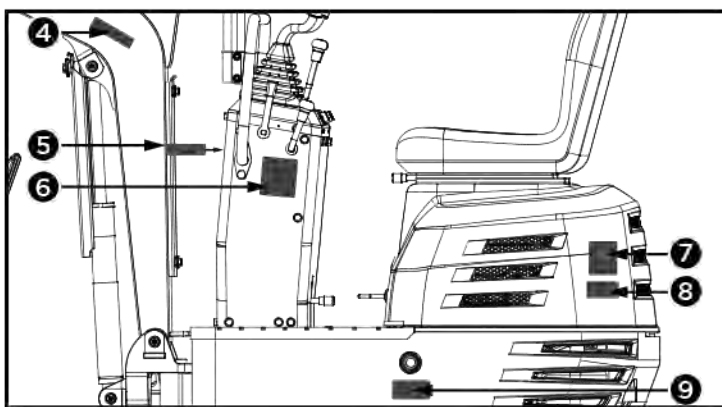
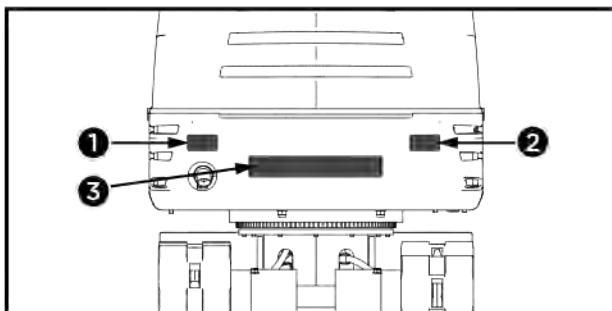
14. Fire prevention

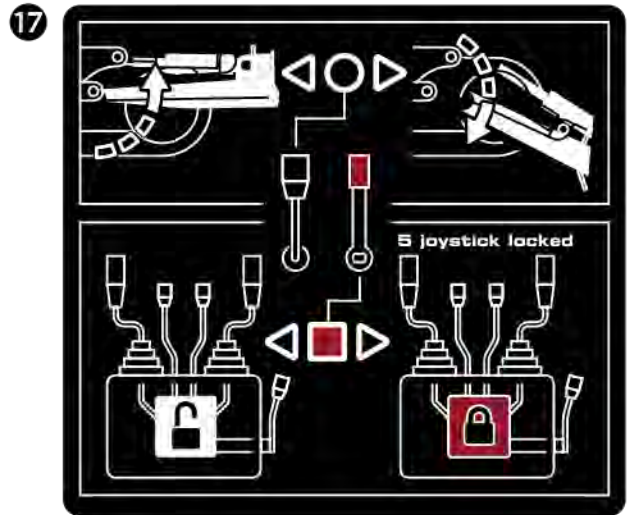
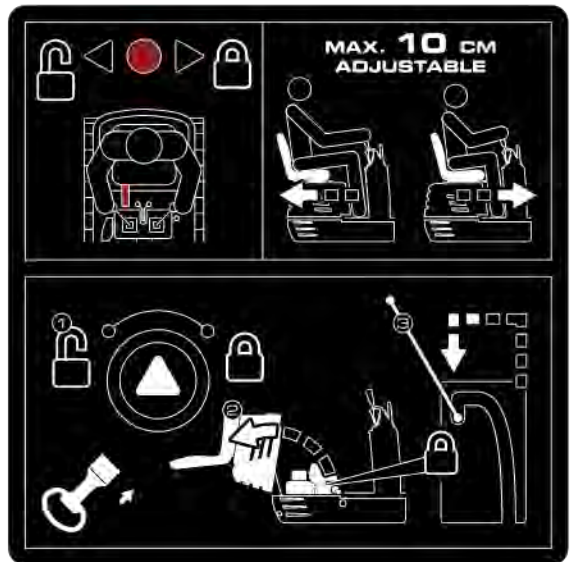
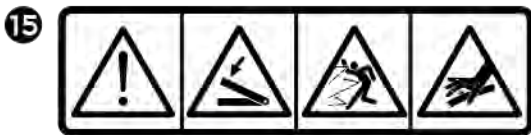
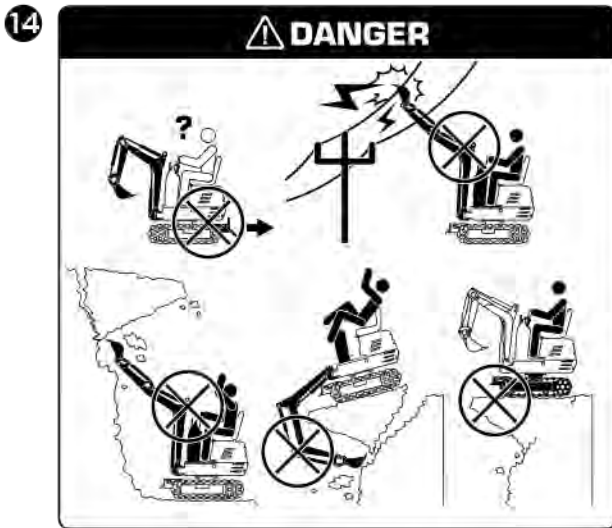
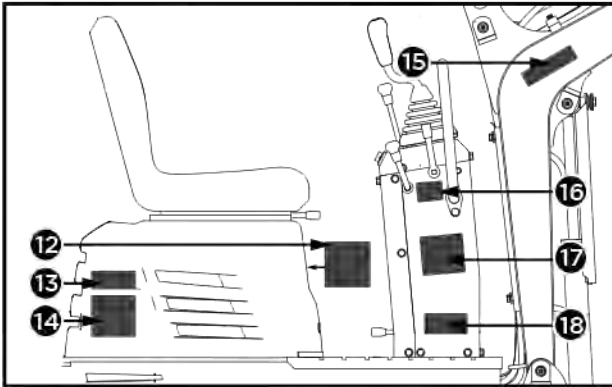
Excavator and some attachments have components that are at high temperatures under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcing or sparks.

The following fire prevention guidelines will help to keep your equipment up and running efficiently and keep the risk of fire to a minimum.

- Blow off all accumulated debris near hot engine exhaust components such as cylinder head of gasoline engine and exhaust manifold as well as exhaust pipes and muffler more frequently when working in severe conditions.
- Clean out all accumulated flammable debris such as leaves, straw, pine needles, branches, bark, small wood chips and any other combustible materials from inside the machine belly pans or lower unit structures as well as from area in proximity to the engine.
- Inspect all fuel lines and hydraulic hoses for wear or for deterioration. Replace them immediately if they begin to leak.
- Examine electrical wiring and connectors frequently for damage. Repair any wires that are loose or frayed before operating the machine. Clean all electrical connections and tighten all electrical connections as necessary.
- Inspect the exhaust system daily for any signs of leakage. Check for broken pipes and muffler and also for loose or missing bolts, nuts and clamps. If any exhaust leaks or fractured parts are found, repairs must be completed prior to operation.
- Always keep a multipurpose fire extinguisher on or near the machine. Be familiar with the operation of the fire extinguisher.

6. DANGER, WARNING AND CAUTION LABELS





7. CARE OF DANGER, WARNING AND CAUTION LABELS

- (1) Keep danger, warning and caution labels, clean and free from obstructing material.
- (2) Clean danger, warning and caution labels with soap and water, dry with a soft cloth.
- (3) Replace damaged or missing danger, warning and caution labels with new labels from your dealer.

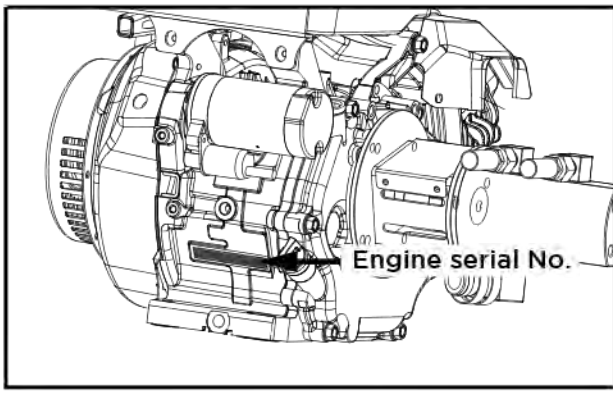
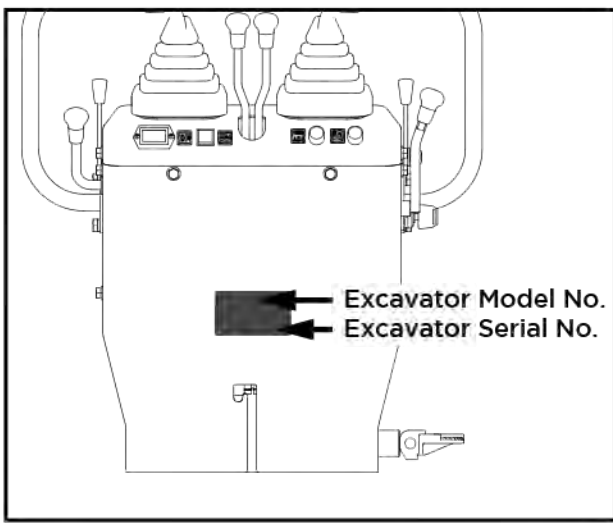
- (4) If a component with danger, warning and caution label(s) affixed is replaced with new part, make sure new label(s) is (are) attached in the same location(s) as the replaced component.
- (5) Mount new danger, warning and caution labels by applying on a clean dry surface and pressing any bubbles to outside edge.

DEALER SERVICE

Your dealer is always ready to help so that your excavator offers the best performance. After having carefully read this manual, you will realize that much of the routine maintenance can be done by yourself. Your dealer is responsible for servicing and the delivery of spare parts. When ordering spare parts from your dealer, always mention the serial number of the excavator and the engine.

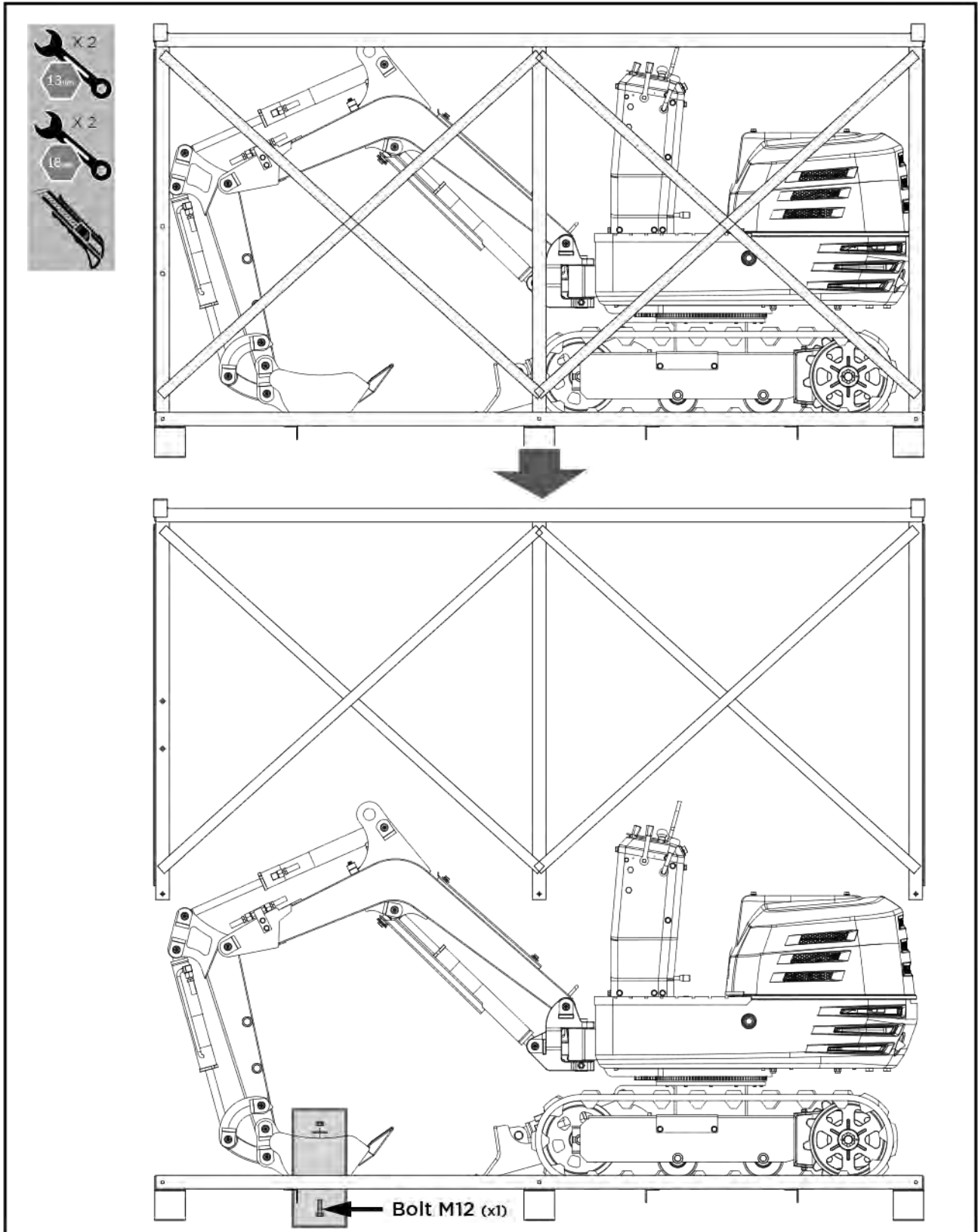
Note these numbers right away in the supplied lines.

Excavator Model No. _____
 Excavator Serial No. _____
 Engine Serial No. _____



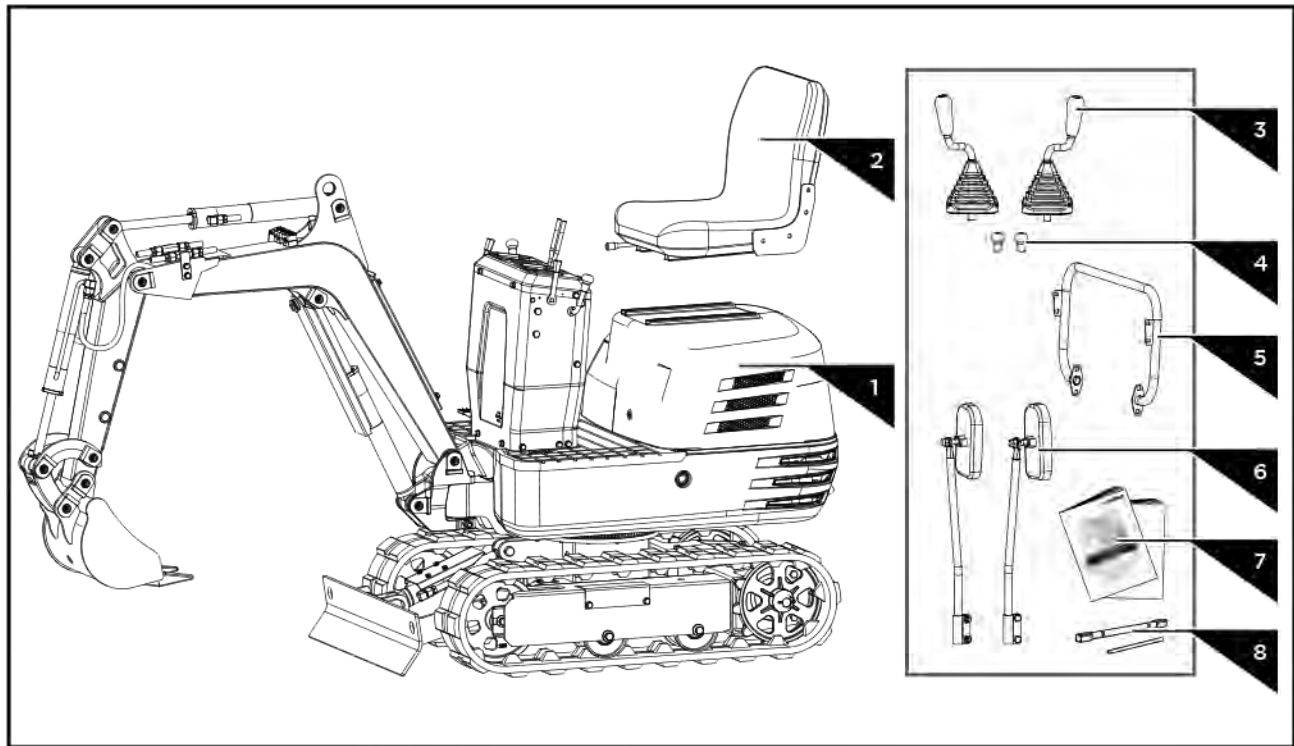
UNPACKING THE CONTAINER

Remove the M8 fixing bolts that fix the iron frame and take off the iron frame. Loosen the M12 fixing bolt to release the bucket and remove the straps securing the machine. Lift the machine down.



CONTENTS SUPPLIED

The excavator comes partially assembled and is shipped in carefully packed package. After all the parts have been removed from the package, you should have:



- 1. Main Body
- 2. Operator's Seat
- 3. Control Levers for Front Attachments
- 4. Drive Lever Knobs
- 5. Handlebar
- 6. Rearview Mirror
- 7. Operator's Manual & Engine Manual
- 8. Tools for Spark Plug Assembly

ASSEMBLY

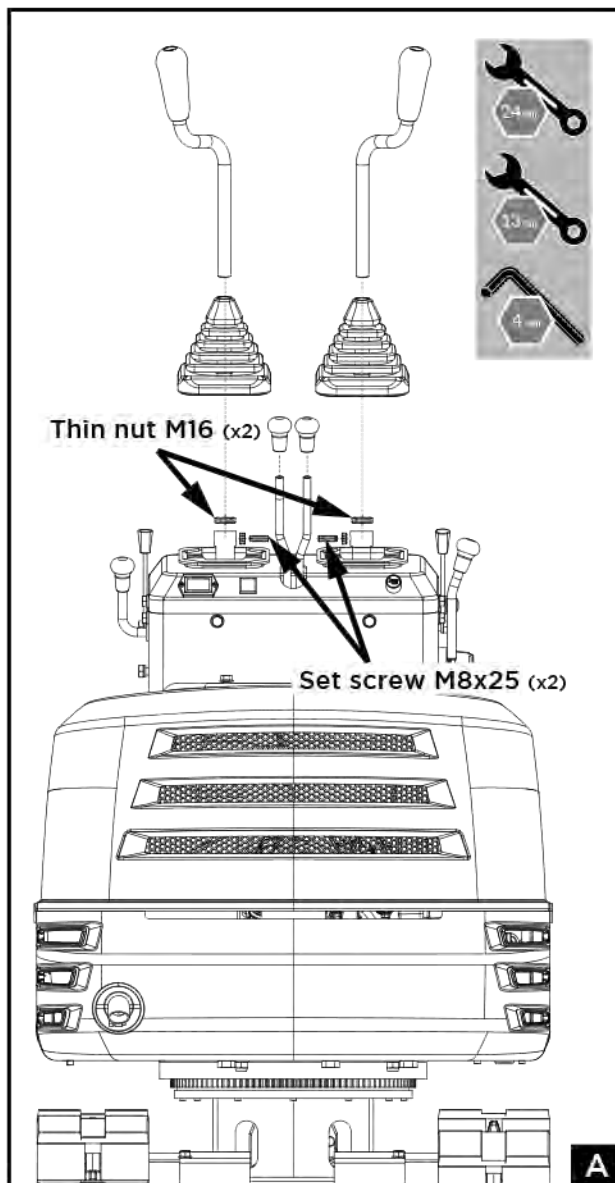
Following the assembly directions below, you will assemble the machine in a few minutes.

Control Levers Assembly

1. Take off the thin nut M16 from the control lever and loosen the set screw M8x25 and the nut on the side of the fixing hole.

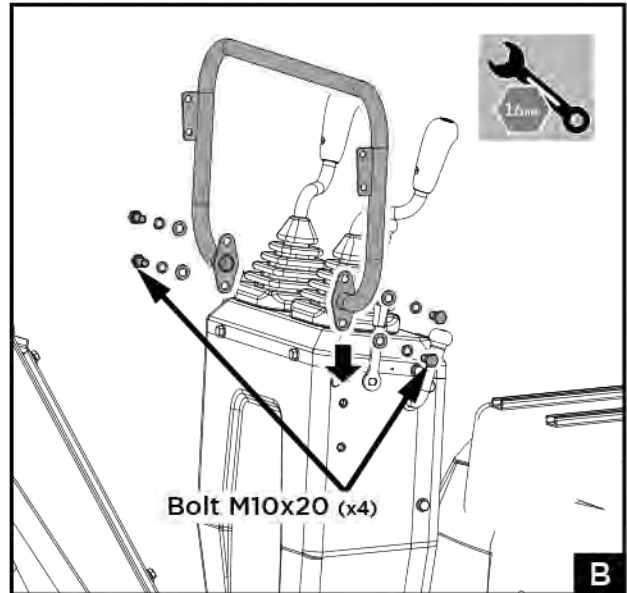
Slide the control lever through the rubber sleeve and the thin nut M16 into the fixing hole on the control cabinet. Rotate it to an angle suitable for operation and lock the thin nut M16 to secure it. Tighten the set screw M8x25 and nut from the side. Repeat the same steps to mount the other lever.

2. Screw the knobs to the drive levers.



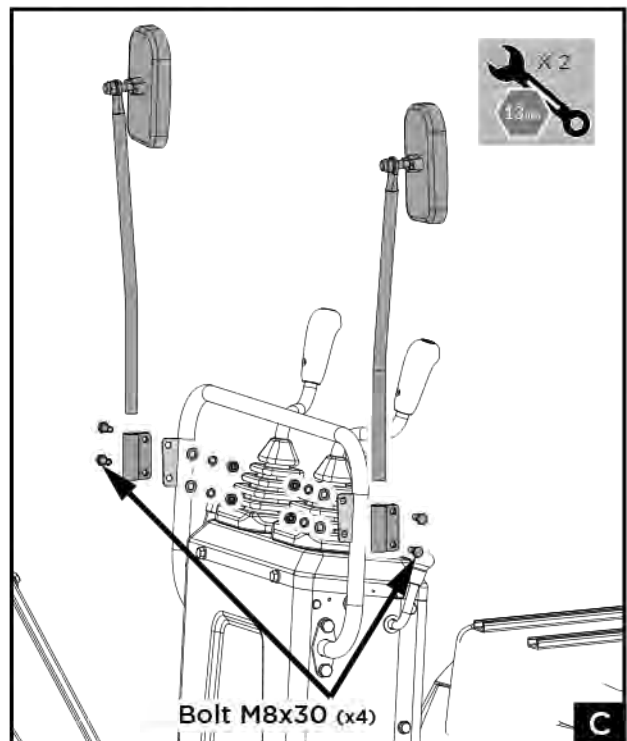
Handlebar Assembly

Screw out the M10x20 bolts, flat washers and spring washers from the control cabinet. Attach the handlebar to the sides of the control cabinet. Align the holes and secure the connection with the bolts and washers.



Rearview Mirror Assembly

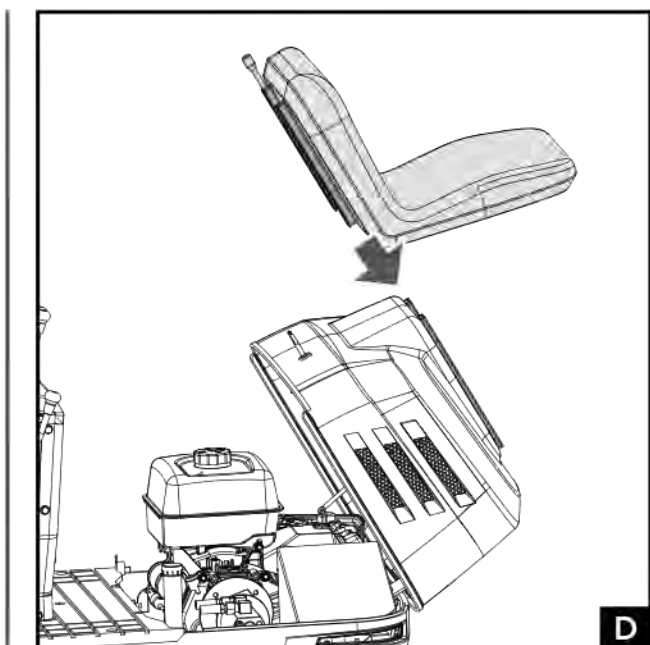
Screw out the M8x30 bolts, washers and nuts from the mirror connectors. Fasten the connector to the brackets on the handlebar with the bolts, washers and nuts, making sure the mirrors face backwards as shown in the Fig. C.



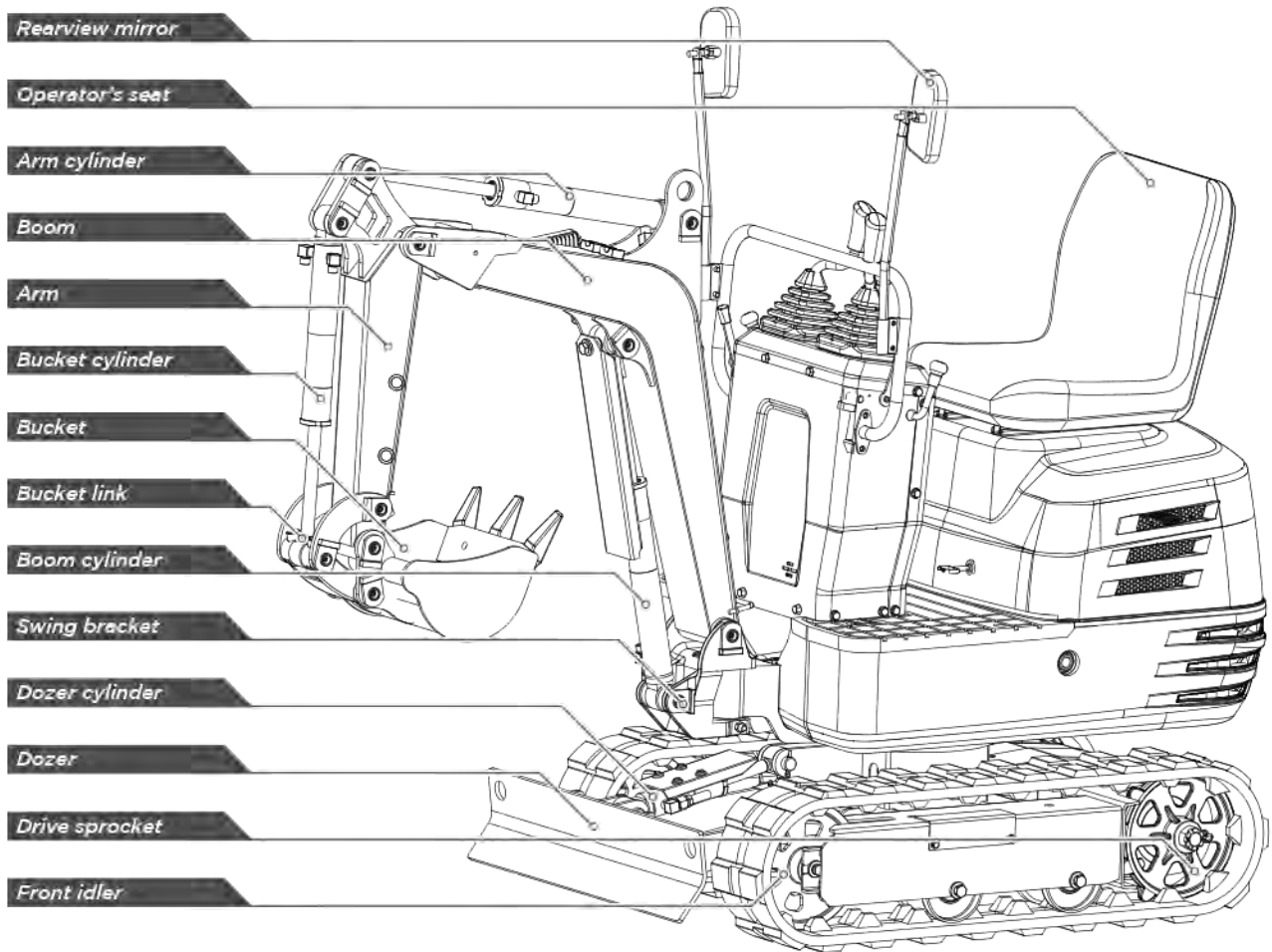
Operator's Seat Assembly

Open the engine hood and install the seat from front to rear.

Adjust it to a suitable position by sliding it back and forth.

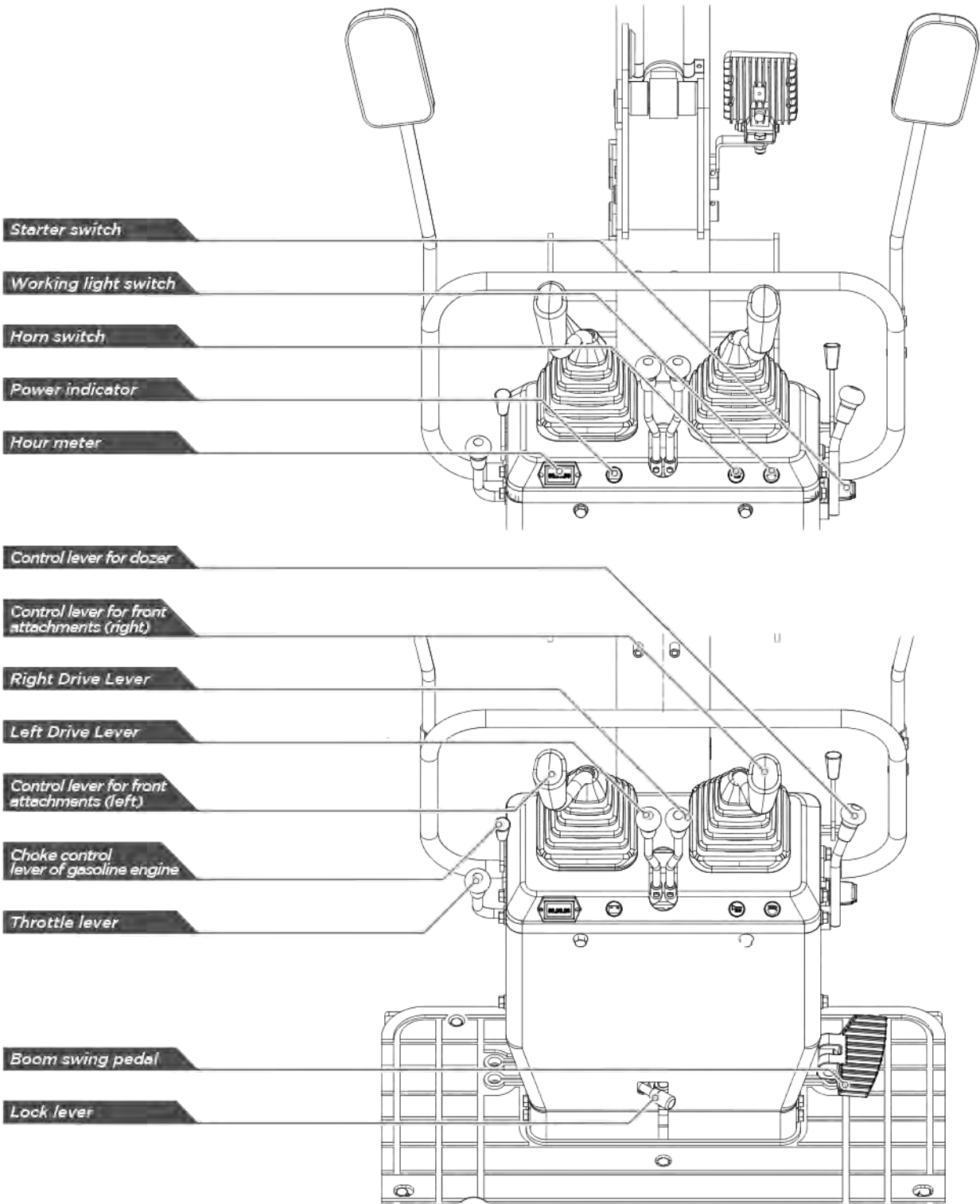


DESCRIPTION OF MACHINE PARTS



INSTRUMENT PANEL AND CONTROL ELEMENTS

GB



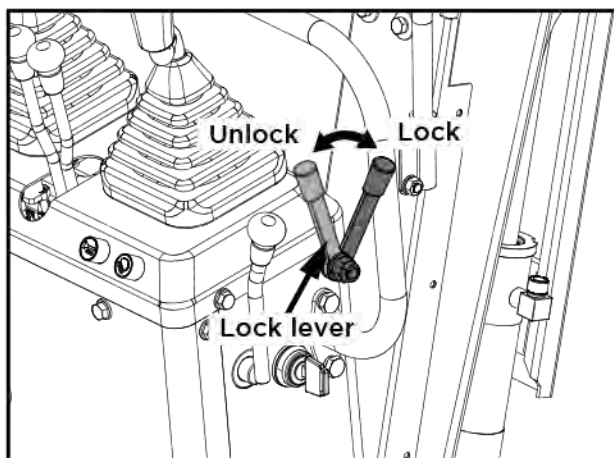
BEFORE START

HANDLING THE SAFETY DEVICES

Control lever lock

⚠ CAUTION *When the excavator is not used or left unattended, be sure to place the bucket on the ground and lock the control levers. The front attachment may fall : it's dangerous. Also remove the key.*

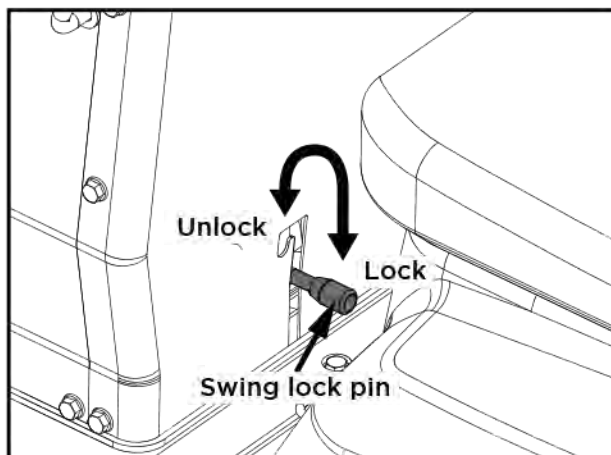
The attachment control lever lock is located on the right side alike.



Swing lock pin

This pin is used to lock the swing frame. Set the lock pin to the "Lock" position and the swing frame gets locked to the track frame.

⚠ IMPORTANT *Before locking the lock pin, be sure to place the swing frame and the track frame parallel with each other.*



DAILY CHECKS

In order to avoid damage, it is important to check the condition of the excavator before starting.

⚠ CAUTION *Do maintenance work on the excavator only on even ground with the engine off and the safety devices in the "Lock" position.*

Checks

Walk around the excavator and check for visual damage and wear.

Check fuel level.

Check engine oil level.

Check hydraulic fluid level.

Check air filter for clogging.

Check hour meter.

Check the light system.

Check the condition of the danger, warning and caution labels. (See "DANGER, WARNING AND CAUTION LABELS" in "SAFE OPERATION" .)

OPERATION OF THE ENGINE

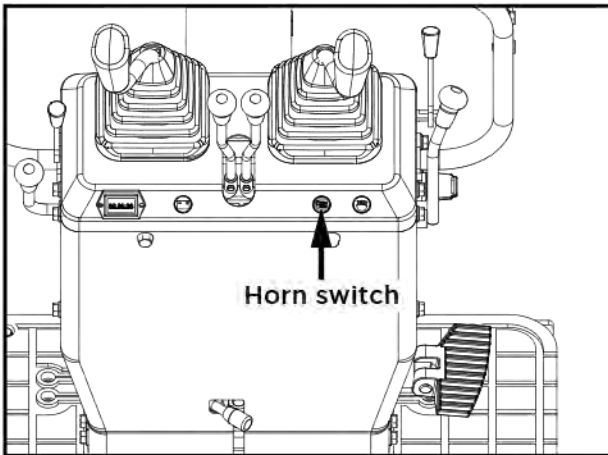
GB

⚠ CAUTION Read "SAFE OPERATION" at the beginning of this operator's manual.

Obey the danger, warning and caution labels on the excavator.

Exhaust gases are poisonous. Do not let the engine run in closed quarters without sufficient and adequate ventilation.

Always start the engine from the operator's seat. Do not start the engine while standing next to the excavator. Before starting the engine, sound the horn to get the attention of persons standing nearby.



⚠ IMPORTANT Do not use start help spray or similar fluids.

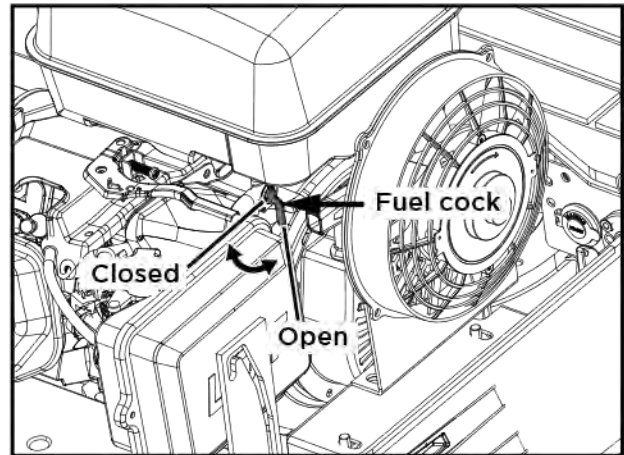
In order not to overload the battery and starter, avoid start-ups of more than 10 sec.

When the engine does not start in 10 sec., please set the interval to 20 sec. or more, and restart.

STARTING THE ENGINE

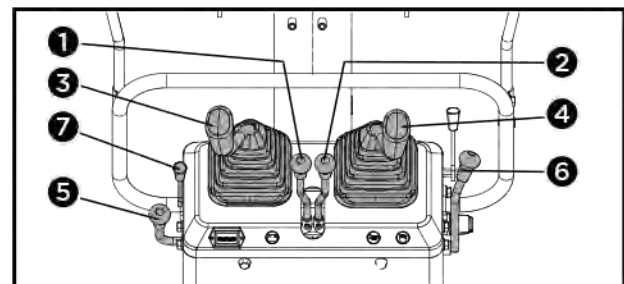
⚠ CAUTION The operator should always conduct the routine checks (see "MAINTENANCE").

📌 NOTE The engine fuel cock was set at "Open" position before leaving factory. No need to move the fuel cock lever when starting the engine. Only when the engine failed to be started, open the engine hood, check and make sure that the fuel cock is in the "Open" position.



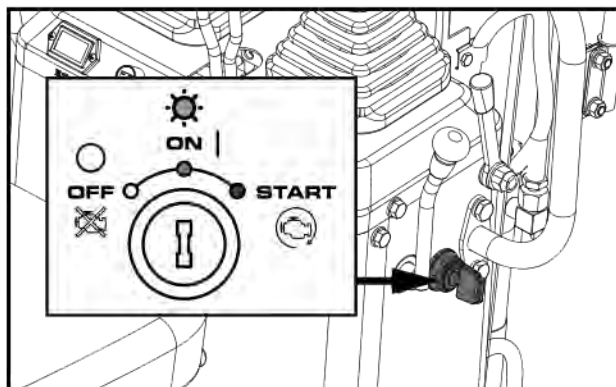
Start the engine in the following manner:

1. Before starting the engine, make sure that all control levers are in the neutral positions.

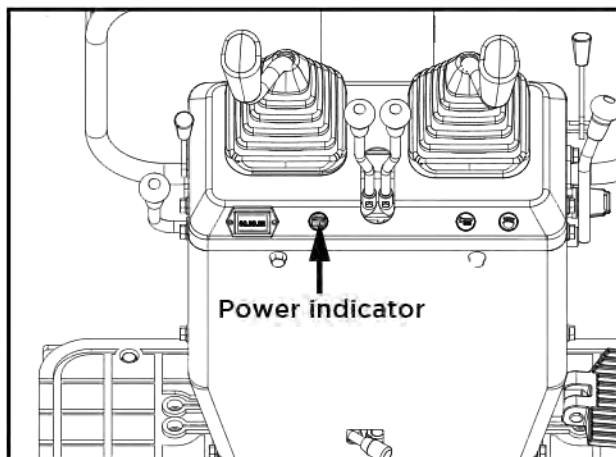


- (1) Left drive lever
- (2) Right drive lever
- (3) Attachment control lever (left)
- (4) Attachment control lever (right)
- (5) Throttle lever
- (6) Control lever for dozer
- (7) Choke control lever of gasoline engine

2. To start a cold engine, move the choke control lever to the CHOKE position. To restart a warm engine, leave the choke lever in the RUN position.
3. Move the throttle lever away from the SLOW position, about 1/3 of the way toward the FAST position.
4. Active the Key Ignition Switch by turning it fully clockwise toward "START". Release the key as soon as the engine starts, it will automatically return to the Run "ON" position. Do not active the key continuously for more than 5 to 10 seconds at a time.



5. If the choke lever has been moved to the CLOSE position to start the engine, gradually move it to the RUN position as the engine warms up.
6. Check if power indicator have gone out. If the power indicator does not go out, stop the engine and check for the cause.



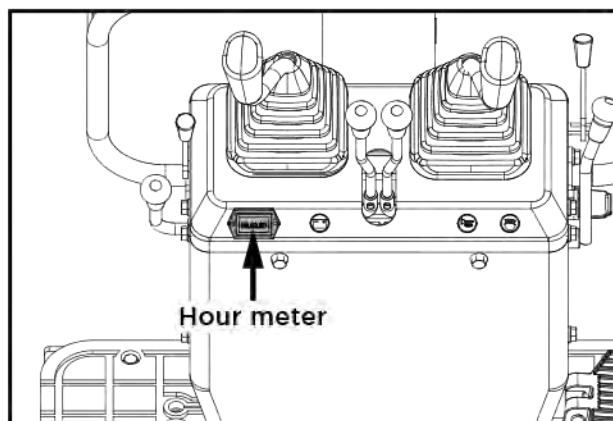
When the power indicator light is off, first check whether the fuse is blown. After the fuse is replaced, the fuse is normal, indicating that the battery is dead and needs to be charged; If the fuse is still blown after replacement, it is necessary to find professional maintenance personnel to repair the circuit.

Hour meter

The hour meter shows the total operating hours of the excavator.

Meter reading

The meter counts up 1 for one operating hour. The electric meter is still counting if the engine stops but the key is in the "ON" position.



Checkpoints after Starting the Engine

After starting the engine, but before starting operation, check following points:

1. Put the throttle lever in the "LOW" position and let the engine idle for approx. 5 minutes. This allows the engine lubricant to warm up and penetrate every part of the engine.

NOTE This idling is usually called "Warm-up".

2. Once the engine has warmed up, check:
 - the alarm lamp "Battery charge" goes out when accelerating the engine.
 - the colour of the exhaust gas is normal and no abnormal noises or vibrations are heard or felt.
 - no fluid is leaking from pipes or hoses.

Should any following conditions arise, stop the engine immediately.

- The engine revolution increases or decreases suddenly.
- Sudden abnormal noises.
- Exhaust gas is black.

IMPORTANT In these cases, the excavator must be checked and serviced according to the directions of the dealer.

⚠ IMPORTANT *Let the engine warm up after start-up.*

Let the engine warm up after start-up for approx. 10 minutes under no load conditions. If the hydraulic fluid temperature is too low, the operation will be affected.

Do not operate the excavator under full load before the engine is warmed up enough.

STOPPING THE ENGINE

⚠ WARNING *Do not keep the bucket or dozer in the lifted position, as a person could accidentally touch the levers and cause serious accidents.*

Lower all work attachments on to the ground, otherwise accidents could occur.

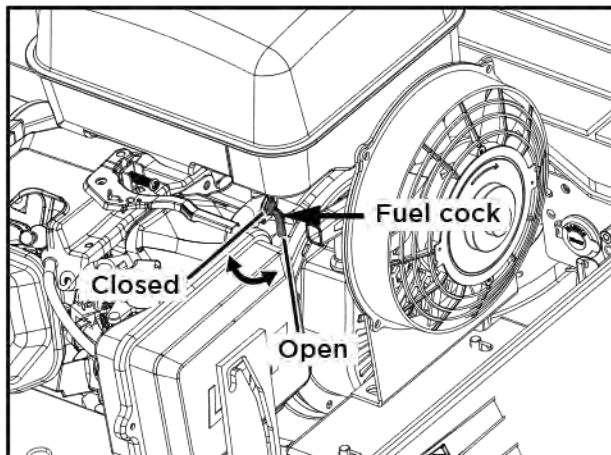
Let the engine idle for approx. 5 minutes to let it cool down.

1. Put the throttle lever in idle position.
2. Lower the work attachments carefully on the ground by activating the levers.
3. To stop the engine, turn the key to the "OFF" position and remove the key.

Stop fuel cock

⚠ CAUTION *In the case of an emergency, or should the engine in idle position and key in the off position, still run, do like as below.*

Open the engine hood and push the stop lever back and hold until the engine stops.



⚠ IMPORTANT *If the engine does not stop with the key, contact your dealer.*

EXCAVATOR OPERATION

CONTROL OBSERVATIONS DURING OPERATION

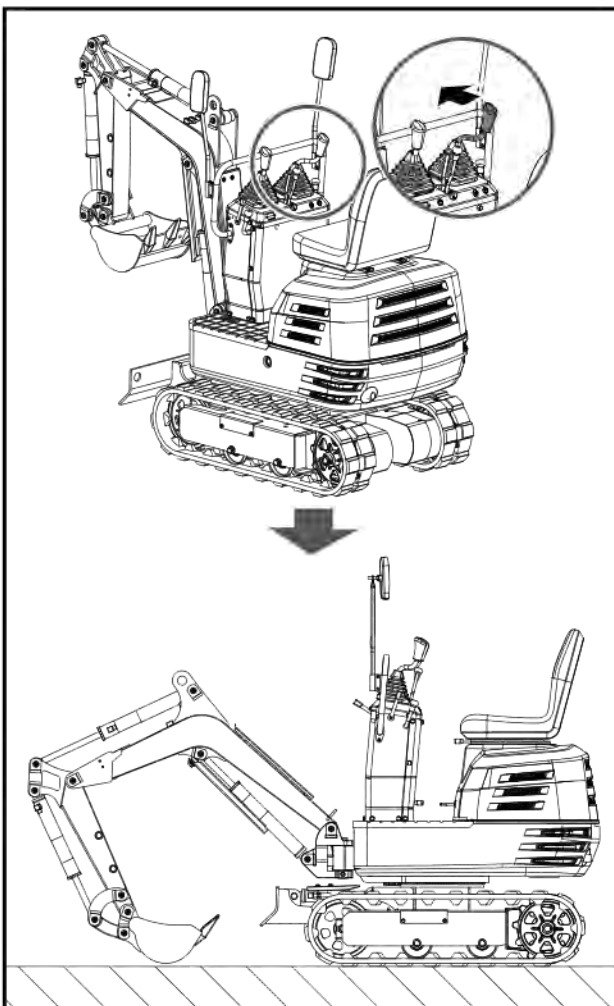
Stop the Engine immediately if:

After starting the engine, but before starting operation, check following points:

- Sudden increase or decrease in engine revolution occurs.
- Sudden abnormal noises occur.
- Exhaust gases turn suddenly very dark.

Make following control observations during operation to be sure that everything functions normally.

⚠ WARNING *When the engine stops suddenly, push forward the right handrail to let the bucket fall down, so as not to cause misoperation, resulting in injury due to the bucket fall.*



RUNNING-IN OF THE NEW EXCAVATOR

The operation and care of the new excavator influences its life span. Your new excavator has been carefully checked and tested before leaving the factory. In spite of this, all movable components must run-in during the first 50 work hours. Do not work with full revolution and full loads during this period. It is most important to run-in your excavator properly in order to achieve its full performance and longevity. During the running-in, the following points should be adhered to in all cases.

Do not Work with Full Revolutions or Full Loads during the First 50 Working Hours.

- Let the engine warm up sufficiently in the cold season.
- Do not let the engine rev-up more than necessary.

Oil Change in the Run-in Stage.

The lubrication oil plays a specially important role during the run-in phase of the excavator. The numerous movable parts are not yet run-in, so that many fine metal particles can develop and cause damage or shorten the lifetime of many components. Pay attention to the oilchange intervals and execute them sooner rather than later as necessary. See the subject "Care and Maintenance" for more details on the oil-change intervals.

STARTING

⚠ CAUTION *No persons, other than those familiar with the excavator, are allowed to use the excavator.*

Do not allow any person other than the operator to ride on the excavator.

Adjusting the Operator's Seat

1. Adjusting the Operator's Seat

⚠ CAUTION *Before adjusting the operator's seat, make sure that no one puts hands on the engine bonnet behind the seat.*

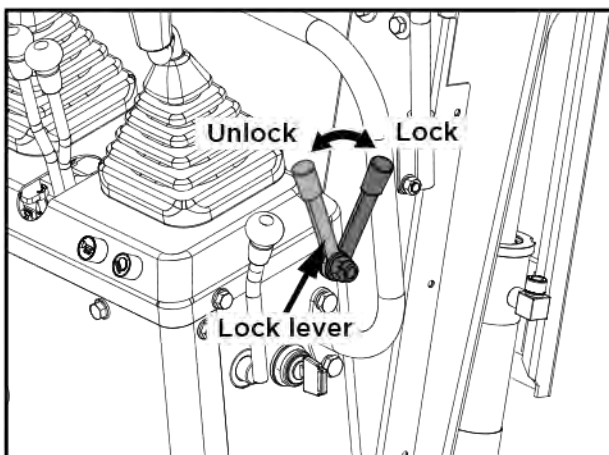
After having adjusted the seat, make sure that the seat adjuster has clicked into position.

To and fro : While holding up the to-and-fro adjustment lever, reposition the seat to and fro.

2. Bring the lock lever into the "Unlock" position.

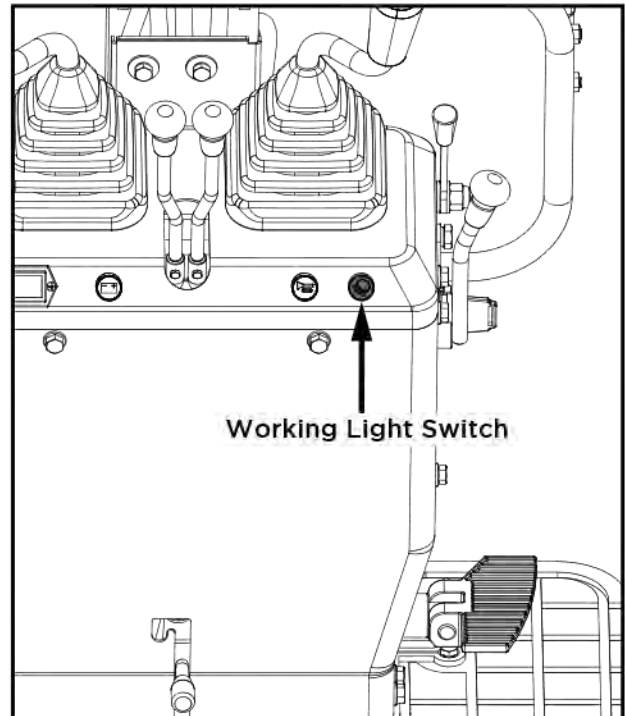
⚠ CAUTION *Check safety aspects all around the excavator.*

Please bring the lock lever into the "Unlock" position, and raise the lower side of the bucket from the ground by 20 to 40 cm.



Working Light Switch

If the key is in the "ON" position, the lights will be switched on by tipping the switch.

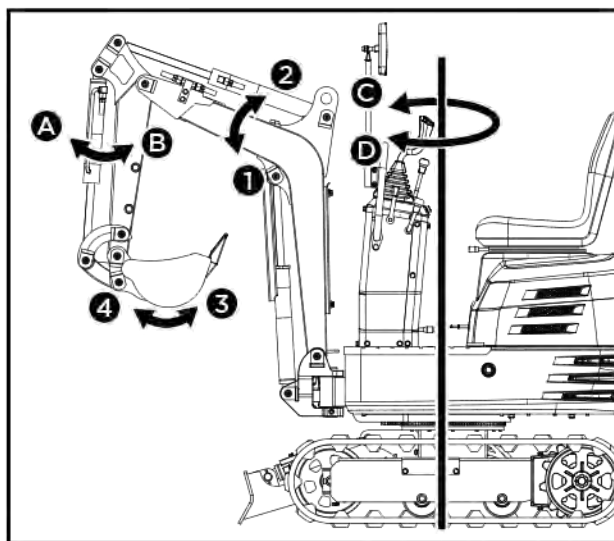
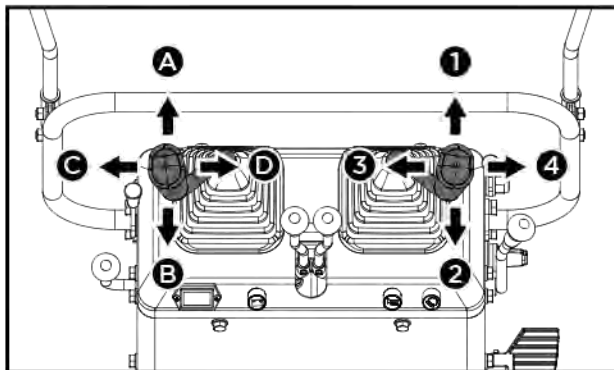


⚠ IMPORTANT *The ambient lighting of the machine must be above 500Lux.*

Night operation

⚠ CAUTION *Visibility is reduced in darkness, so that the working light alone is not enough. Prepare additional lighting, observe safety rules as well as special regulations for night work.*

Drive lever



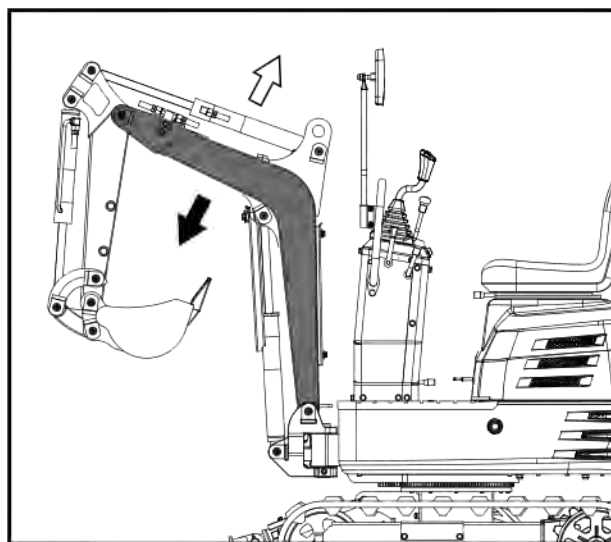
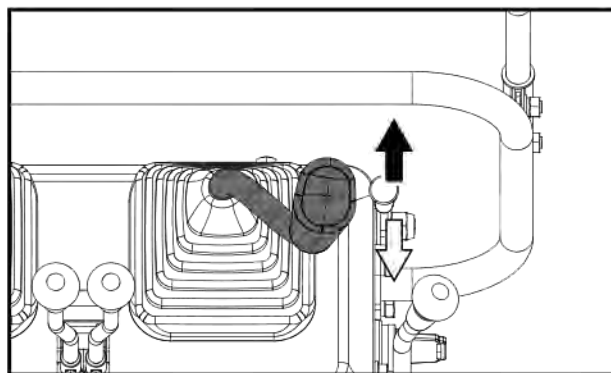
Lever position		Movement
Left Front Attachment Control Lever	A	Arm out
	B	Arm in
	C	Swivel to left
	D	Swivel to right
Right Front Attachment Control Lever	1	Boom lower
	2	Boom raise
	3	Bucket dig
	4	Bucket dump

NOTE See "SWIVEL MOVEMENT AND SWING MOVEMENT".

OPERATION OF THE BOOM

To raise the boom, pull the attachment control lever back.

The boom is equipped with a cushion cylinder which prevents excavated material in the bucket from fall-in out. By low hydraulic oil temperature, (e.g. right after starting the engine) the cushioning function will only be effected after a certain delay (approx. 3 to 5 seconds). This condition results from the viscosity of the hydraulic oil and is no sign of a malfunction.

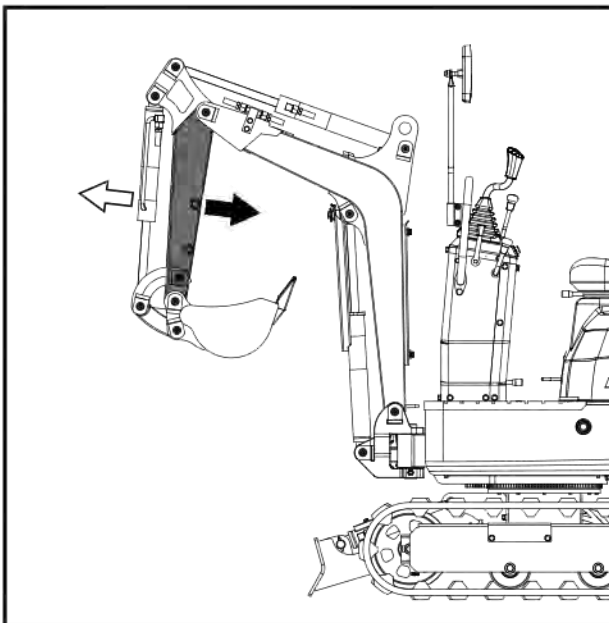
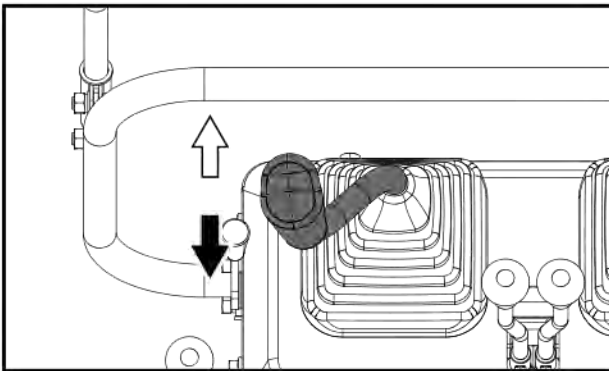


IMPORTANT When lowering the boom, make sure that it does not hit the dozer and that the bucket teeth do not touch the dozer.

OPERATION OF THE ARM

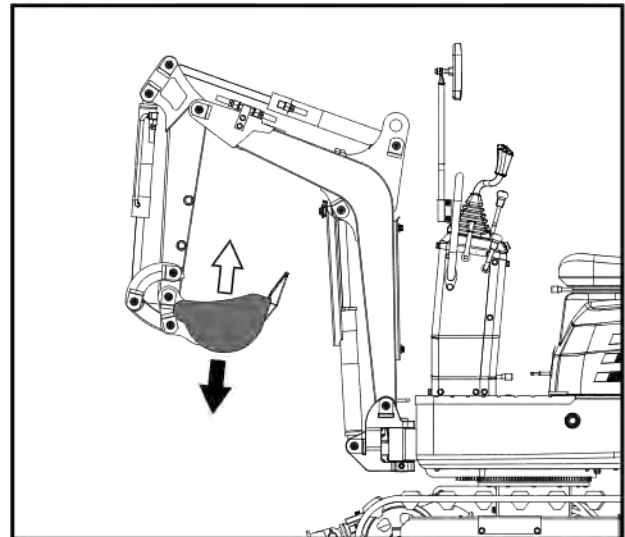
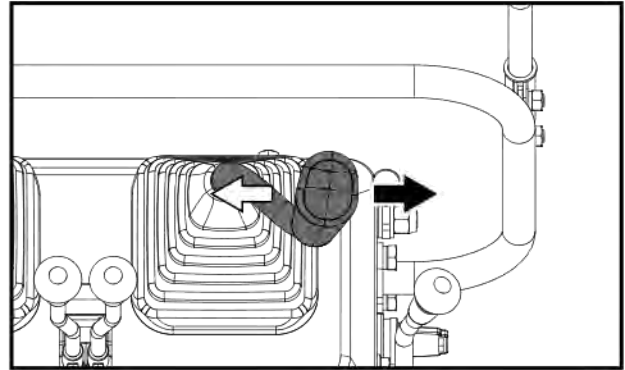
Pull back the left attachment control lever and the arm will be pulled in. To move the arm out, push the control lever towards the front.

⚠ IMPORTANT *When pulling in the arm, the movement may stop for a short moment when the arm is in its vertical position. This is caused by the fact that at this position the maximum load for the arm and bucket is reached, and the hydraulic pressure in the cylinder is not high enough. This is a characteristic of the hydraulic system and is not a sign of a malfunction.*



OPERATION OF BUCKET

To dig with the bucket, move the right attachment control lever from the neutral position towards the left. Moving the control lever towards the right pushes the bucket outwards and dumps its contents.



SWIVEL (UNIT SWING) OPERATION

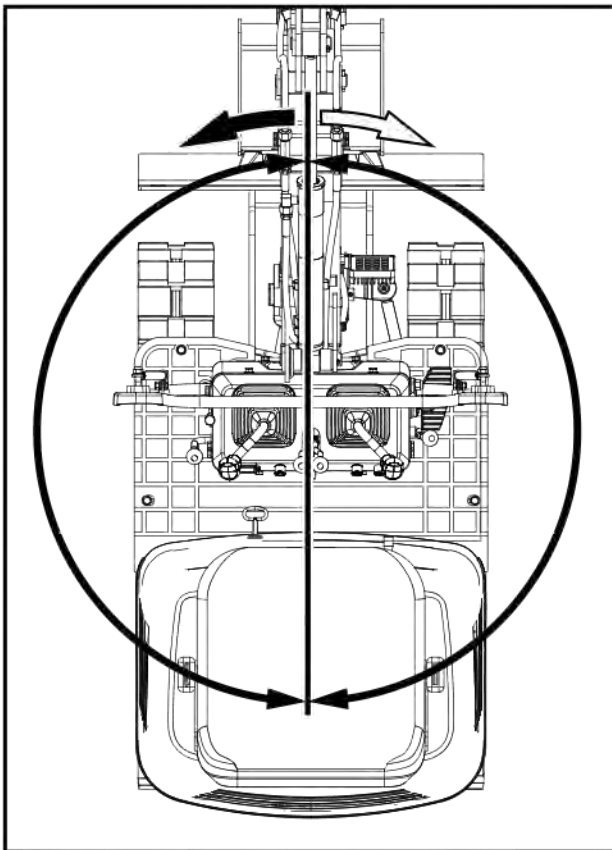
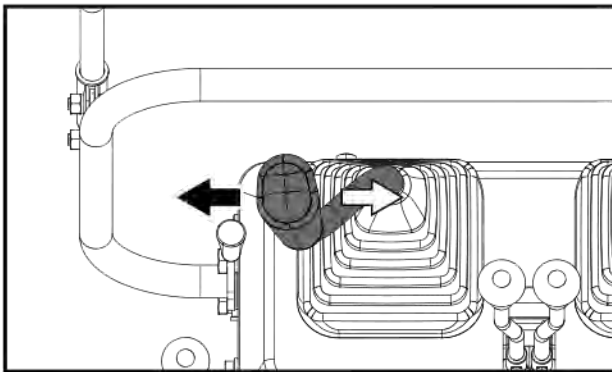
⚠ CAUTION *When working in groups, always let the others know what you are going to do before you do it.*

Keep away from the working area.

⚠ IMPORTANT *Do not operate the left attachment control lever abruptly from the right to the left (or vice versa). Because of the law of inertia, this causes an impact load on the swing gear and the swing motor. Additionally, the lifetime of the excavator will be shortened.*

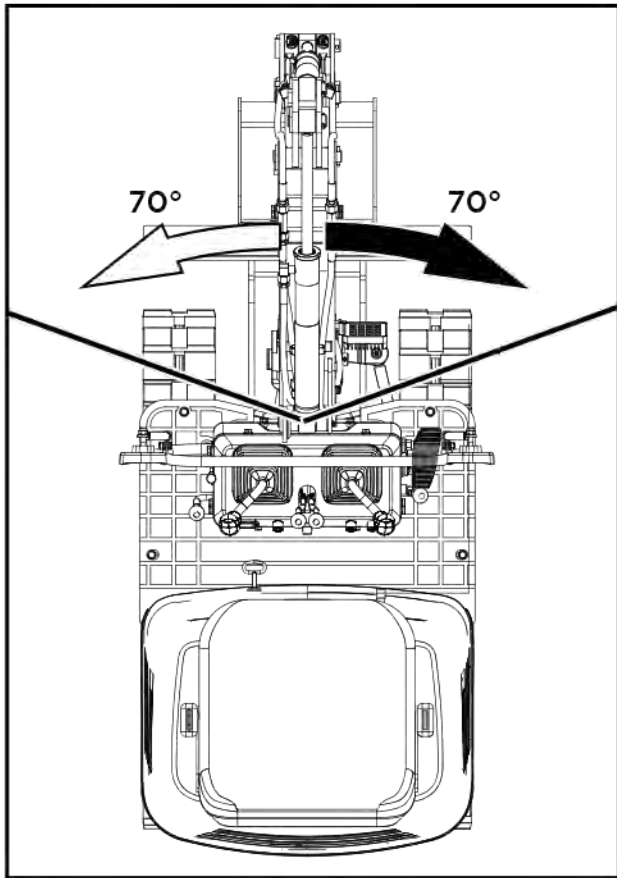
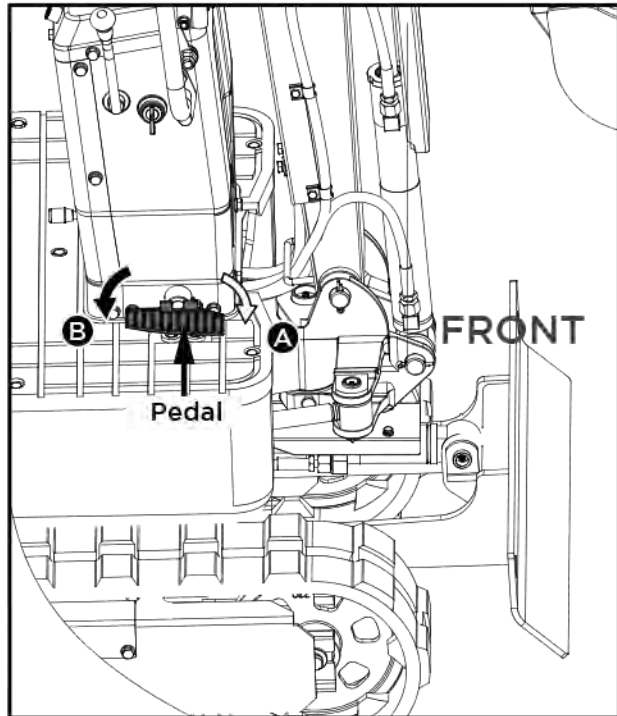
Unlock the swing lock pin before carrying out swivel operations.

1. Tilt the control lever to the left and the upper structure will turn to the left.
2. Tilt the control lever to the right and the upper structure will turn to the right.



BOOM SWING OPERATION

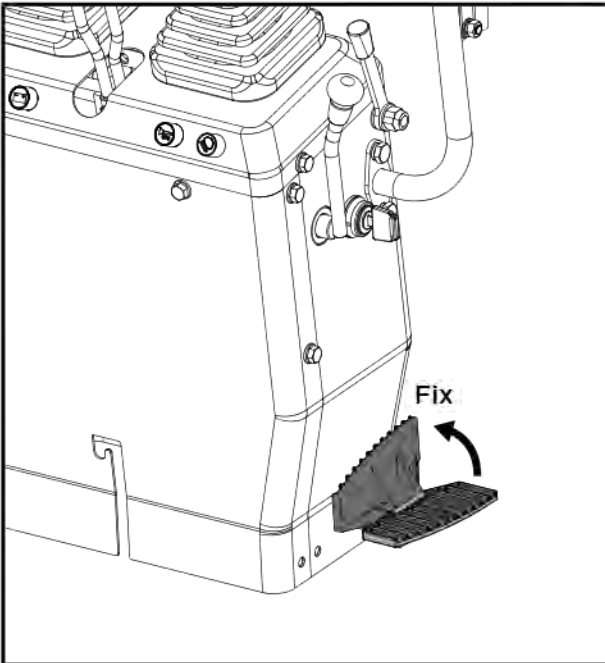
1. Step on the front of the pedal to swing the boom to the left.
2. Step on the rear of the pedal to swing the boom to the right.



BOOM SWING PEDAL

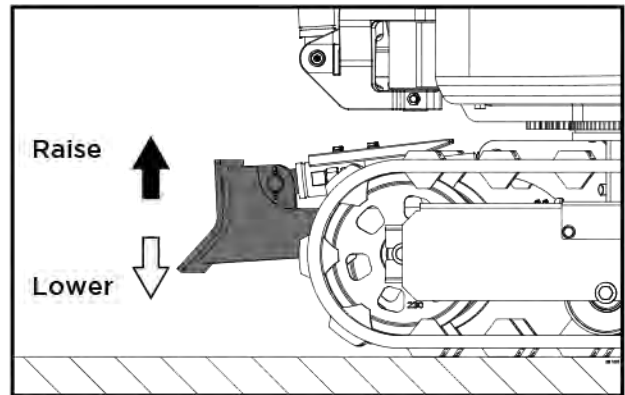
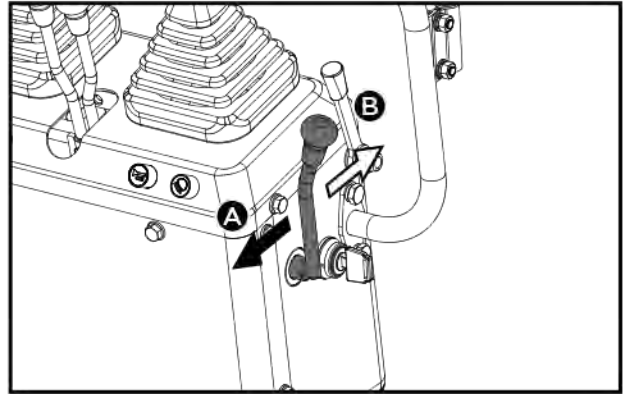
⚠ WARNING Always keep your toes within the edge of foot step; otherwise there is a possibility that your toes will be caught between swing frame and boom or boom cylinder.

⚠ CAUTION When boom swing operation is not in use, fold the boom swing pedal forward to fix the pedal from unexpected moves.



OPERATION OF DOZER

1. To lift the dozer, pull control lever for dozer backward. Push the control lever forward to lower the dozer.



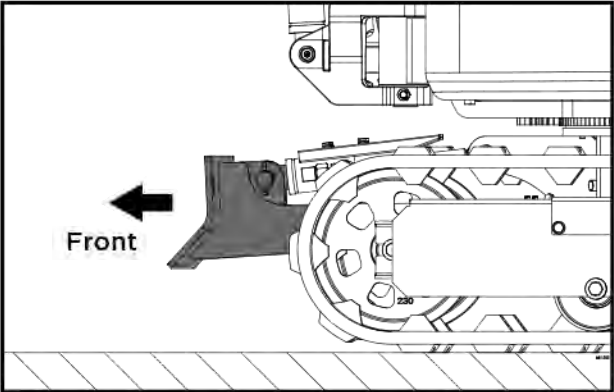
2. While undertaking earth moving work, control both drive levers with the left hand and the control lever for dozer with the right hand.

DRIVING

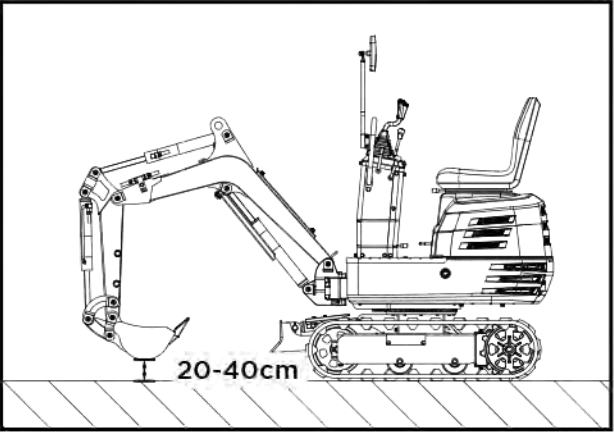
⚠ WARNING Before starting the engine, make sure that no further persons are in the excavator surroundings.

Before operating the excavator, check the crawler direction. (Idler and dozer to the front of the excavator).

Avoid travelling across a slope or working sideways on a slope.

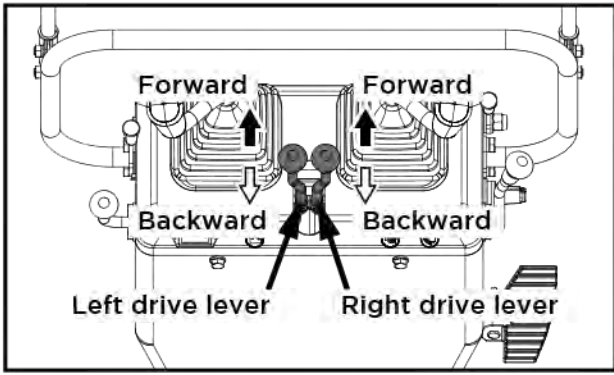


1. Adjust the engine speed from idling to an intermediate speed.
2. Raise the dozer and hold the bucket about 20 to 40 cm off the ground.

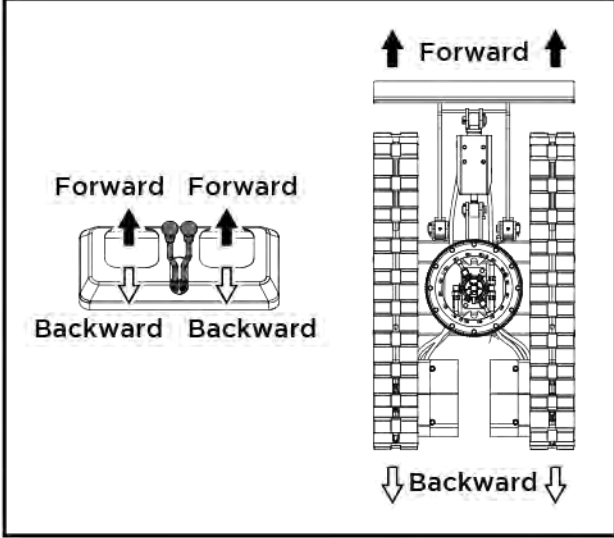


Drive Levers (Right, Left)

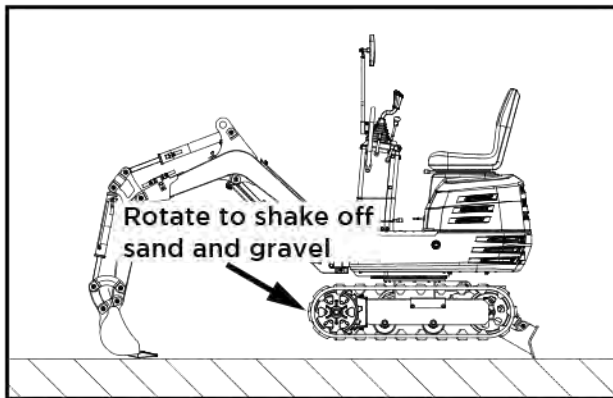
⚠ WARNING If the swing frame has been turned 180, i.e. the dozer is, seen by the operator, "behind", then the travel direction is opposite to the drive direction of the levers (when activating the drive lever forwards, the excavator, seen by the operator, will move backwards).



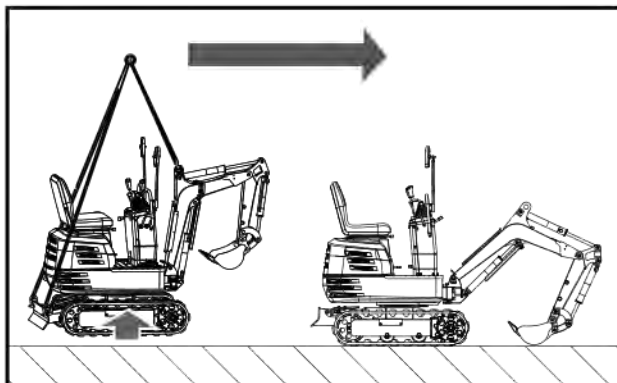
Pushing both drive control levers forward simultaneously, moves the excavator forward. Similarly, pulling both drive control levers backward simultaneously, moves the excavator backward. The front of the excavator is the direction where the dozer is present.



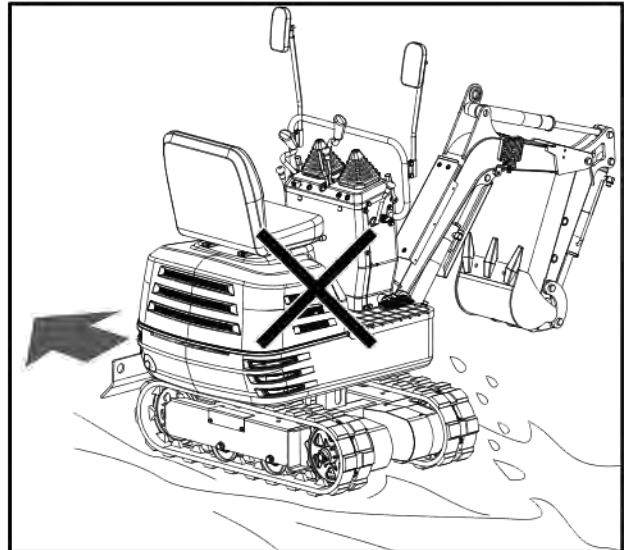
⚠ IMPORTANT If the crawler is clogged with sand or gravel while working on soft ground, lift up one crawler with the help of the boom, arm and bucket and let the crawler rotate to shake off the sand and gravel.



⚠ IMPORTANT When driving in the muddy ground, if the excavator is stuck in the mud and cannot move, it should be lifted to a safety zone with the hoisting belt as shown in the drawing below.



⚠ IMPORTANT The excavator cannot travel on the muddy road with the slewing platform perpendicular to the tracks, so as to prevent the tracks from being involved in the mud.



TURNS

⚠ CAUTION Do not change direction on steep slopes, or the excavator could tip over.

Before changing direction, beware of persons in the working area.

Pivot Turn

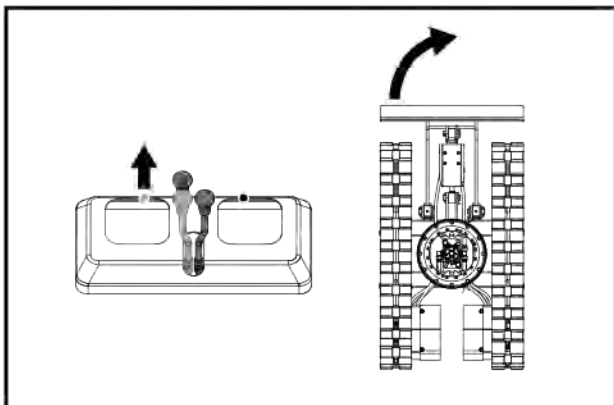
📌 NOTE Movement as illustrated shows turning motion with the dozer positioned facing the front.

When the dozer is facing the back, the turning direction is reversed.

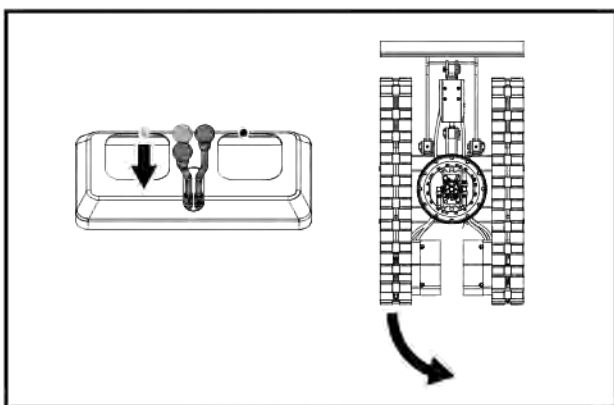
(For example, push the left (right) drive lever forward; right (left) crawler, seen by the operator, will move backward from the operator.)

Change of Direction while Stationary

1. Push the left drive lever forward; the excavator will turn to the right.

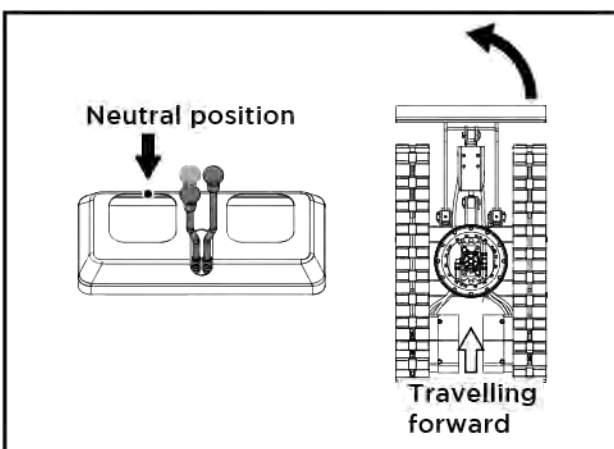


2. Pull the left drive lever backward, back of the excavator will turn to the right.

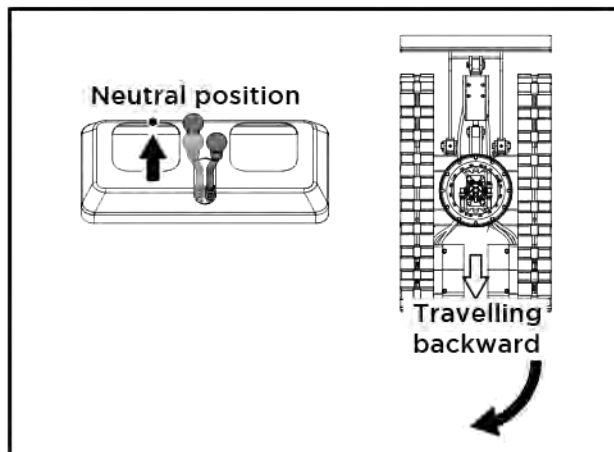


Change of Direction while Travelling

1. While travelling forward, pull back the left drive lever into the neutral position, and keep pushing the right lever in the forward position, the excavator will turn to the left.

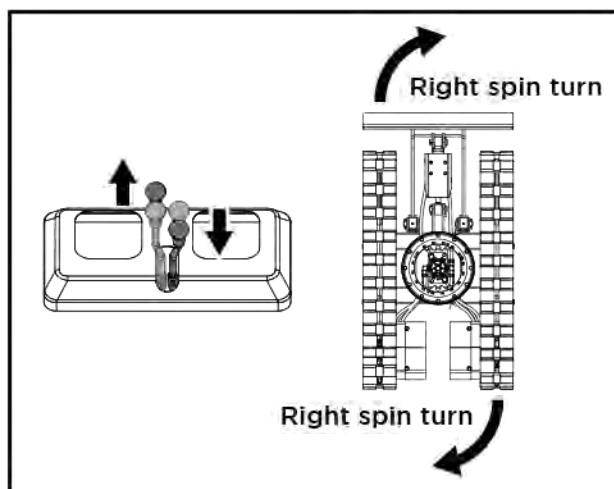
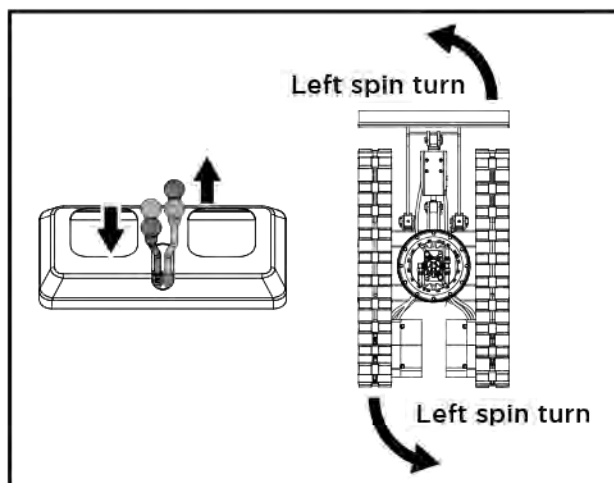


2. While travelling backward, push back the left drive lever into the neutral position, and keep pulling the right lever in the backward position, back of the excavator will turn to the right.



Pivot Turn

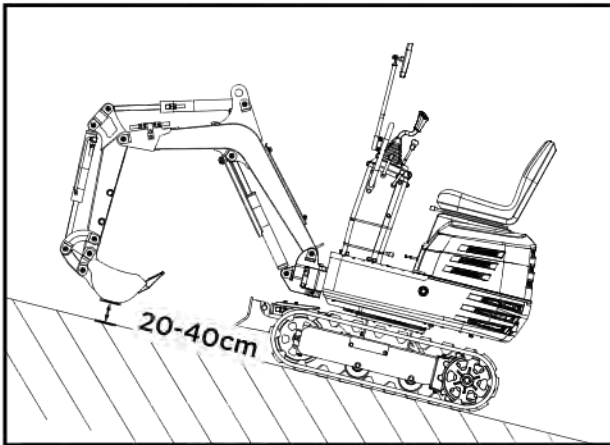
When both drive levers are activated in the opposite directions, both crawlers will rotate with the same speed but in opposite directions, the excavator will rotate in place. Centre of rotation is the centre of the excavator.



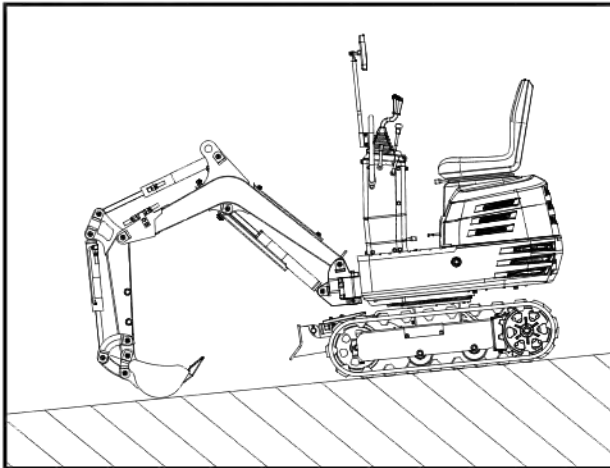
UP AND DOWNHILL TRAVELLING

While travelling uphill, keep the lower edge of the bucket approx. 20 to 40cm above the ground. Although the excavator will not slip easily because of the crawlers, it is safer to let the bucket slide over the ground while travelling downhill. Always choose slow speed for uphill and downhill travelling.

[UPHILL TRAVELLING]

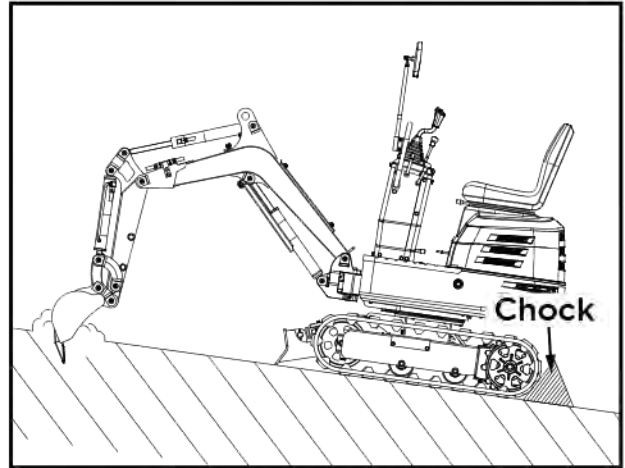


[DOWNHILL TRAVELLING]



PARKING ON A SLOPE

⚠ WARNING When the excavator is parked or left unattended on a slope, be sure to put the bucket on the ground and place all control levers in neutral position, then brace the crawlers with chocks.



IMPORTANT INFORMATION ON EXCAVATOR OPERATION

⚠ CAUTION After work, clean the machine and lubricate all movable parts.

Check oil level.

⚠ IMPORTANT **IMPORTANT:** Do not try to crush concrete or boulders using side swings with the bucket. Also avoid using side sweeps of the bucket to move earth piles.

Under all circumstances avoid the following operations:

- Excavation using the gravitational impact of the machine.
- Compacting of gravel or soil using the dropping action of the bucket.
- Excavation using the travelling power of the machine.

Do not try to drop or shake of soil adhering to the bucket in the manner shown in the explanation below. This can cause damage to the machine.

Adhering soil can be shaken off when the bucket is being emptied by moving the bucket out to the maximum stroke of the cylinder. Should this not suffice, swing out the arm as far as possible and operate the bucket back and forth.

Do not hit the dozer with the boom cylinder! Make sure that the boom cylinder does not hit the dozer when carrying out deep excavation. If necessary swivel the upper structure so that the dozer is at the back of the machine.

Pay attention when pulling in the bucket! When pulling in the bucket (for driving or transportation) avoid hitting the dozer.

Avoid collisions!

When moving the excavator, pay attention so that the dozer does not collide with obstructions such as boulders etc..

Such collisions substantially shorten the life

span of the dozer and the cylinder.

Support the machine correctly!

When stabilizing the machine with the dozer, lower the whole dozer fully on to the ground.

If the water or mud level reaches higher than the top of the tracks, the swivel bearing, swivel motor gear and ring gear may be exposed to mud, water and other foreign objects.

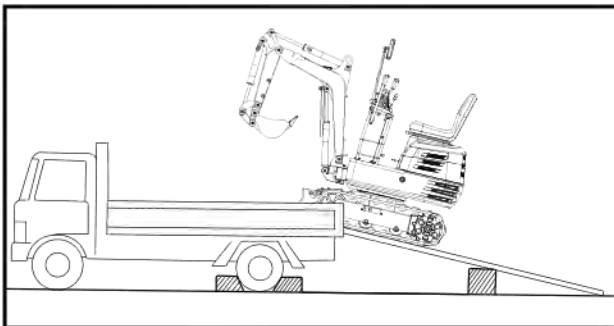
The excavator must be properly pressure washed after each use.

- Thoroughly clean the area around the swivel bearing, swivel motor gear and ring gear to remove foreign objects.
- Refer to operator's manual for proper swivel bearing, swivel motor gear and ring gear lubrication procedures.
- Reinstall any protective covering if removed earlier.

TRANSPORTING THE EXCAVATOR ON A TRUCK

⚠ DANGER No directional changes should be made when the excavator is on the ramp. Should a change of direction be necessary, drive off the ramp completely and make the turn.

⚠ DANGER When driving forwards or backwards onto the truck, or when swinging the upper body, make sure that neither the cabin or the gates of the truck will be damaged.



⚠ DANGER When the excavator reaches the point between the ramps and the truck bed, halt and then move very slowly until the excavator reaches the horizontal position.

⚠ DANGER Move the excavator onto the truck only with the arm completely pulled in. Otherwise the truck cabin could be damaged when swinging the upper body around.

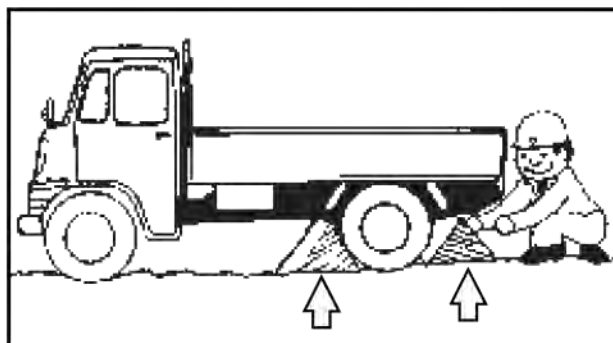
⚠ DANGER Do not jack up the machine using its boom to load or unload the excavator from the truck. Dangerous situation could arise.

Transporting on a Truck

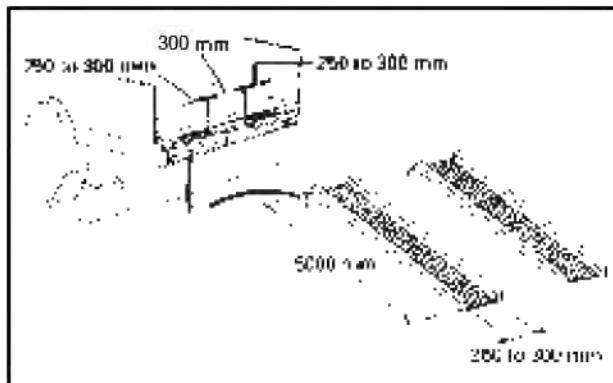
⚠ WARNING After loading the machine on the truck, lower the bucket and dozer onto the truck bed. Lock the swing frame with the swing lock pin.

Prepare a platform to load or unload the excavator. Take following steps when using ramps.

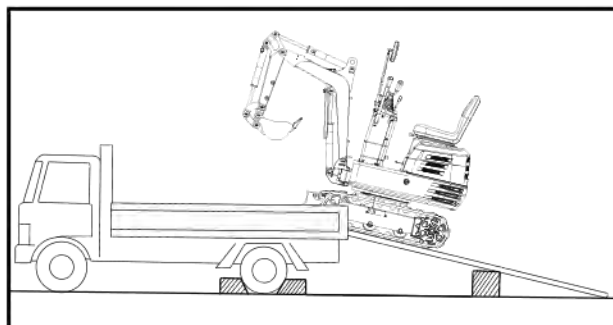
1. Apply the parking brakes of the truck, and block the drive wheels from both sides.



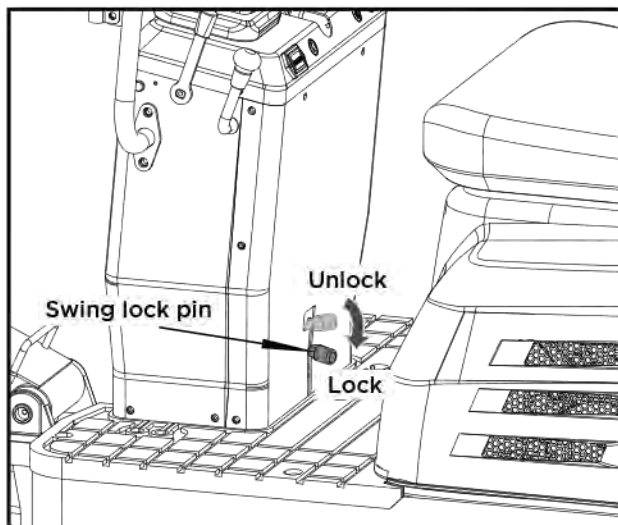
2. Use fixing plates to secure the ramp properly. Connect the ramps directly with the truck bed.



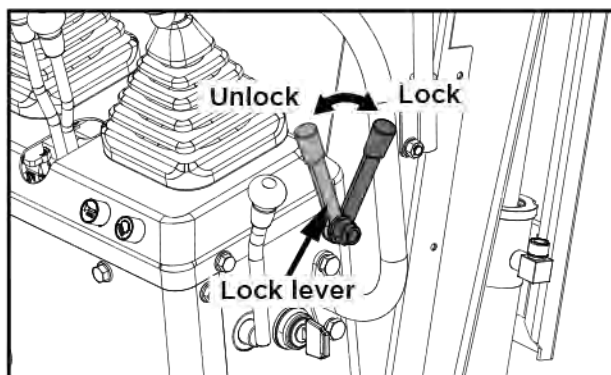
3. For additional safety, use blocks or struts under the ramps and the truck bed.



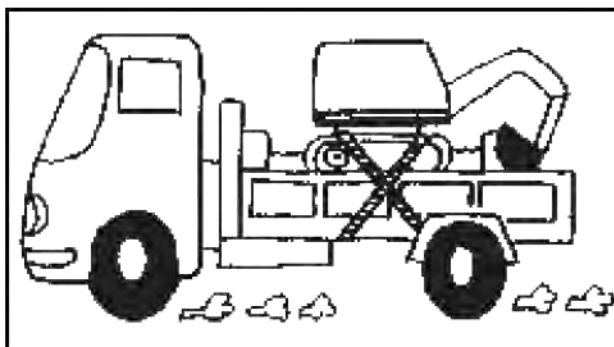
4. Completely align the ramps and the crawlers and then drive the excavator slowly up the ramps with the dozer in the front. After ensuring that the crawlers are completely on the truck bed, swivel the upper body around to the back of the truck.
5. Lock the swing frame with the swing lock pin.



6. Lower the bucket and dozer onto the truck bed and then lock the boom with the lever before getting off.



7. Block the crawlers and tie down the excavator.



8. Before unloading, remove the swing lock pin and then raise the dozer and bucket from the truck bed.

LIFTING OF THE EXCAVATOR

⚠ DANGER *The correct instructions for safe handling are described here. Read these carefully before moving the machine. Make sure that the operating personnel read the operator's manual carefully.*

Basics when Lifting with Chains / Straps

1. The lifting and crane operation is to be undertaken according to the guidelines described.
2. As the accessories for lifting mentioned in this instruction are only given as reference, the standards concerning strength, control and other details are based on the respective applicable guidelines.

Safety Aspects when Lifting with Chains / Straps

1. Do not lift loads that exceed the maximum load capacity of the crane.
2. Choose correct tackle suitable to the weight, size and form of the load.
3. First assess the centre of gravity of the load, position the hook directly over the load and lift the load so that the centre of gravity of the load lies as low as possible.
4. The steel wires must be fixed in the middle of the hook.
5. The load must be lifted vertically from the ground.
6. Do not enter the working area under suspended loads and do not move the load over other persons. The load must be moved in an area where the equilibrium can be balanced out easily.

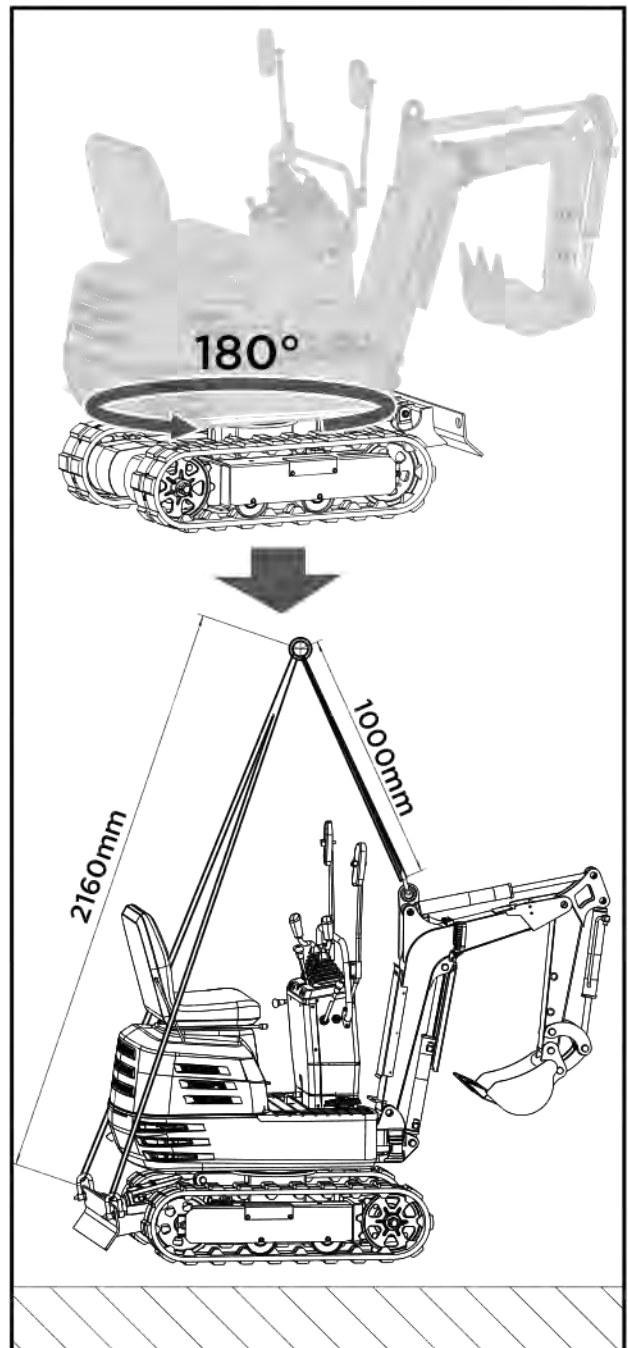
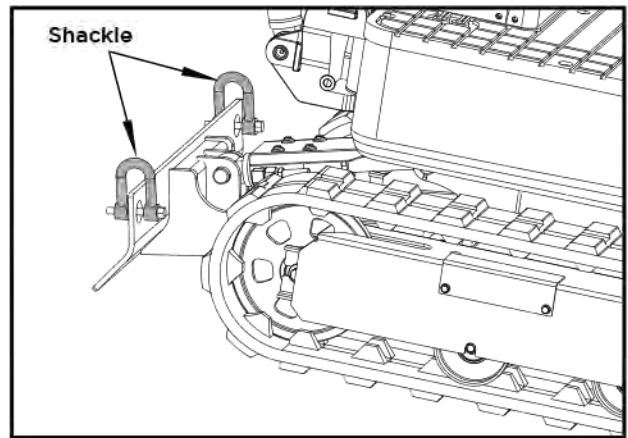
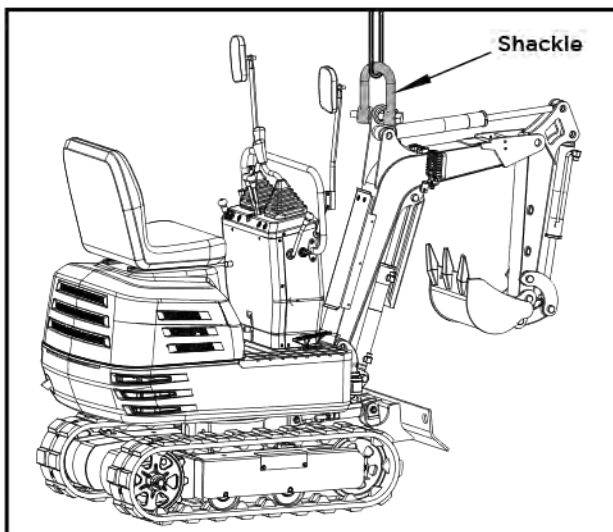
General guidelines for lifting

⚠ WARNING Do not lift the excavator other than at the 3 points as illustrated.

1. Lifting position. (see below illustration)
 - (1) Pull in the boom completely towards rear.
 - (2) Pull in the arm completely.
 - (3) Pull in the bucket completely.
 - (4) Swing the boom in the central position.
 - (5) Swing the upper body 180° to make sure the dozer is seen from the operator behind.
 - (6) Insert the swing lock pin.
2. Attaching the chains / straps.
 - (1) Always hook the excavator at three points. (one on the boom and right and left of the dozer blade)

⚠ WARNING The dozer must be raised.

- (2) Always use a shackle on each lifting hole when attaching the straps.
 - (3) Use cushioning material at all places where the straps contact the machine.
3. Tackle
Choose components with enough strength.
 4. Lifting
 - (1) Lift slowly and safely
 - (2) Do not enter the excavator area when lifting.
 - (3) Lift the excavator horizontally. (Modify connections according to needs)



MAINTENANCE

MAINTENANCE INTERVALS

No.	Check points	Intervals	Hour meter indicator													Consequently	Ref. page	
			50	100	150	200	250	300	350	400	450	500	550	600	1000			2000
1.	Fuel	Check	Daily check														41	
2.	Engine oil	Check	Daily check														42	
		Change	○	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 hrs	45
3.	Hydraulic oil	Check	Daily check														43	
		Change													○	○	every 1000 hrs	51
4.	Lubrication points	Check	Daily check														43	
5.	Cooling Fan	Check	Daily check														44	
6.	Electrical lines	Check	Daily check														45	
7.	Air Cylinder / Cooling fin	Clean	Daily check														45	
8.	The Whole Machine	Clean	Daily check														45	
9.	Battery condition	Check	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 hrs	46	
10.	Greasing of swing bearing teeth	Check	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 hrs	47	
11.	*Air filter element	Clean	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 hrs	48	
		Change				○				○				○	○	○	every 200 hrs	50
12.	Greasing of swing ball bearings	Check		○		○		○		○			○	○	○	every 100 hrs	50	
13.	Fuel pipes and hoses	Check				○				○				○	○	○	every 200 hrs	50
		Change															every 2 years	52
14.	Hydraulic return filter element	Change												○	○	every 1000 hrs	51	
15.	Hydraulic suction filter element	Change												○	○	every 1000 hrs	51	
16.	Spark Plug	Check	○	○	○	○	○	○	○	○	○	○	○	○	○	every 50 hrs	49	
		Change										○			○	○	every 500 hrs	52

* Clean the air filter more frequently if used in dusty conditions.

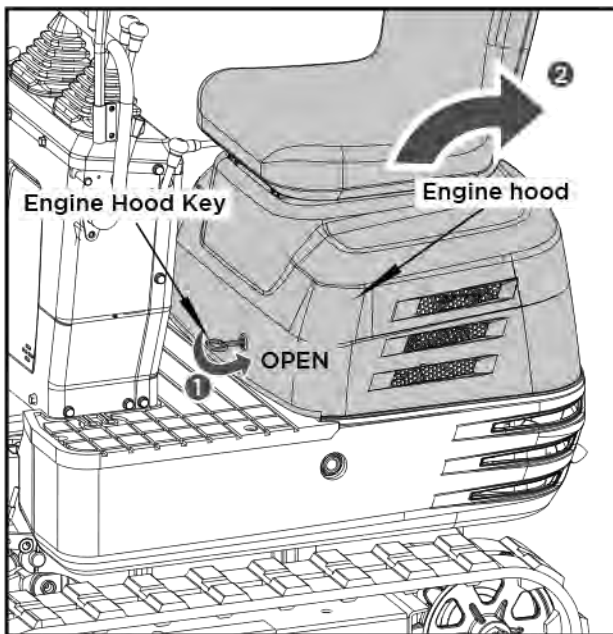
OPENING AND CLOSING OF PARTS

Opening/Closing of the Engine Hood

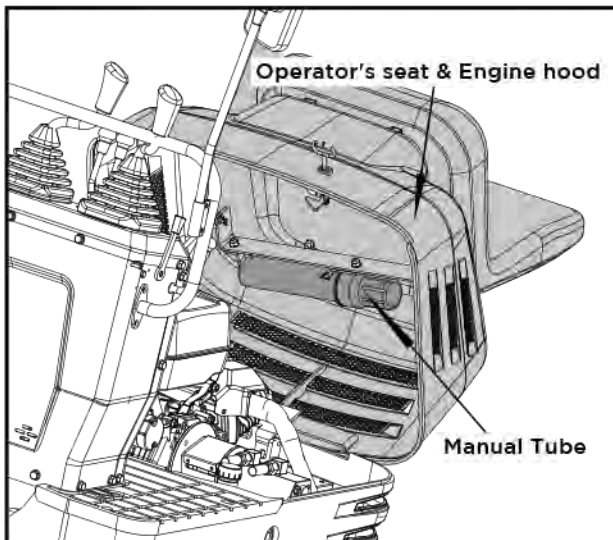
⚠ CAUTION Do not open the engine hood before stopping engine.

⚠ CAUTION Do not touch the exhaust muffler or the exhaust pipe; serious burns can occur.

Turn the key in the direction indicated by the arrow as shown in the below Figure to open the engine hood.



Keep the Tools and Operator's Manual in the Manual Tube



DAILY CHECKS

For your own safety and to assure the long life span of your machine, a careful check should be made before each operation.

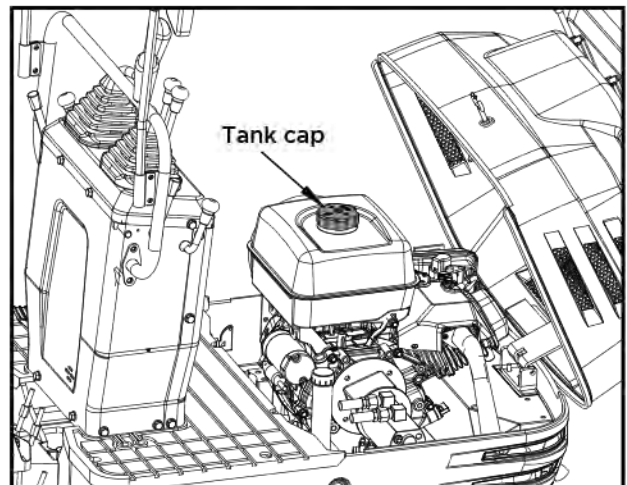
Check Fuel Level

⚠ CAUTION Stop the engine before fuelling.

⚠ CAUTION Do not smoke while fuelling.

⚠ IMPORTANT Use unleaded gasoline with a pump octane rating of 86 or higher.

1. Check the fuel level in fuel tank.
2. Open the tank cap, and fill with fuel.



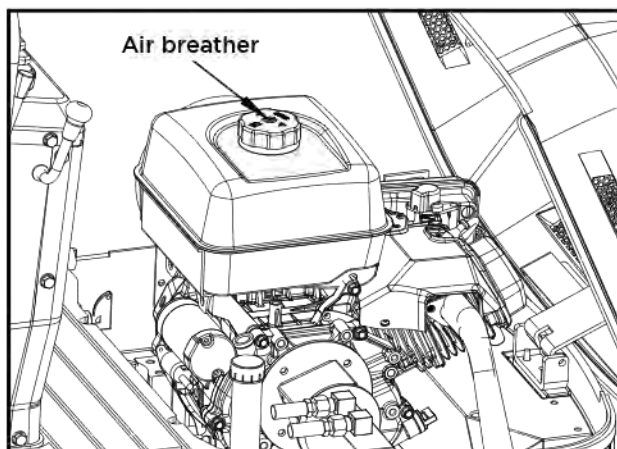
Fuel tank capacity 6 L

⚠ IMPORTANT Always fill up fuel after a day's work.

⚠ IMPORTANT See "PURGING OF THE FUEL SYSTEM" in "OTHER ADJUSTMENTS AND REPLACEMENTS".

⚠ IMPORTANT Fuel tank cap has an air breather. Make sure to clean the air breather when filling up with fuel.

If the air breather is clogged with mud, the fuel tank becomes under-pressurized.

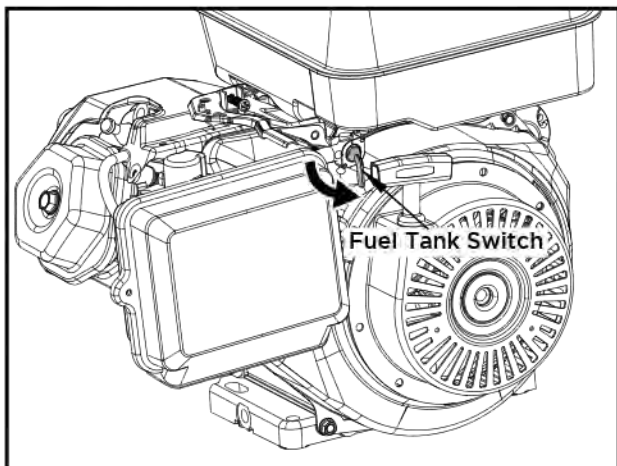


Draining the Water or Air from the Fuel Tank

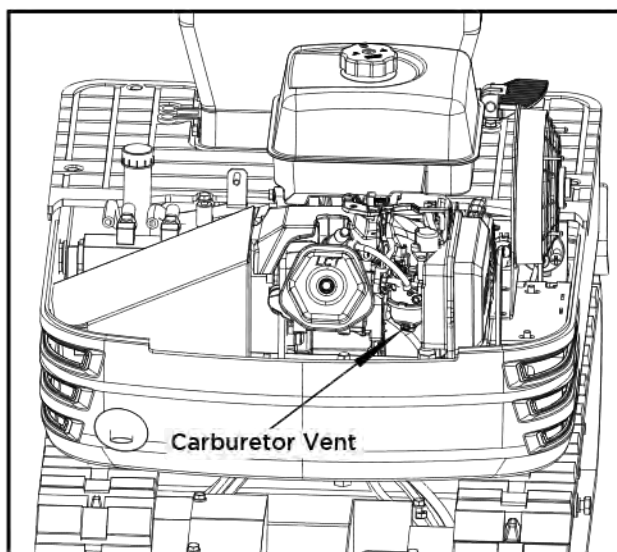
⚠ DANGER When draining water or air from the fuel, always keep away from flames.

If the gasoline engine is not used for a long time, the problem that the engine cannot be started may occur when the engine is just started. The following operations are required:

1. Close the fuel tank switch.



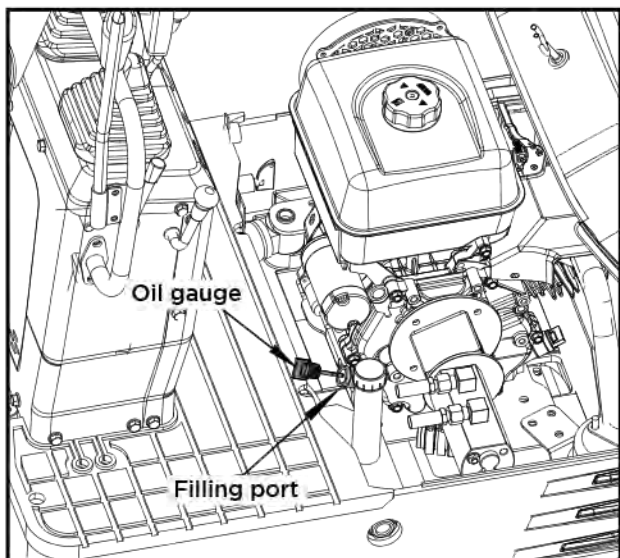
2. Unscrew the bolt at the carburetor vent port to drain the water or gas from the fuel.
3. Close the bolt at the carburetor vent.
4. Turn on the fuel tank switch.
5. Start the engine.



Check Engine Oil Level

⚠ CAUTION Stop the engine before checking the oil level.

Insert the oil gauge rod fully into the prepared opening, remove again and check the oil level; if necessary fill with oil. The machine must be on level ground when checking the oil level.



⚠ IMPORTANT Use engine oil with the correct viscosity. (according the outside temperature)

⚠ IMPORTANT After stopping the engine, wait five minutes, then check oil level. (Excavator must be on level ground.)

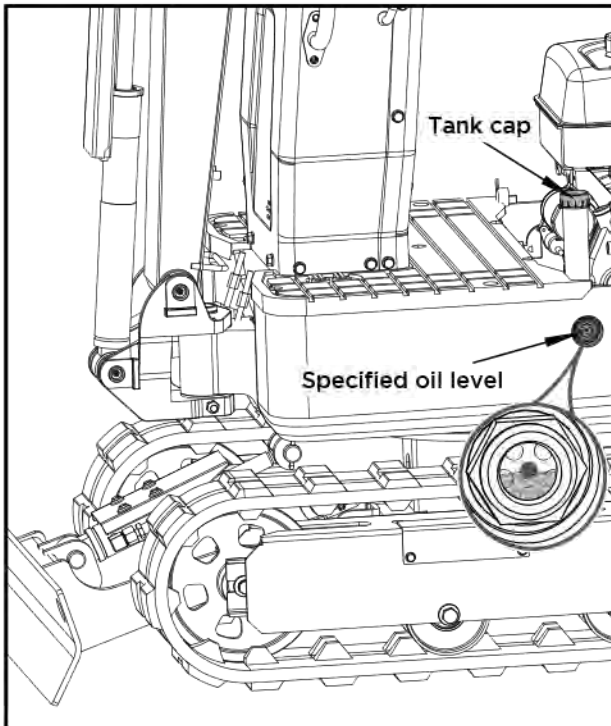
Check Hydraulic Oil Level

⚠ CAUTION First lower all attachments on the ground then stop the engine.

⚠ IMPORTANT Before filling with oil, wipe away all sand and dust from around the oil port. Make sure you use an identical type of hydraulic fluid.

⚠ IMPORTANT The excavator has been filled with hydraulic fluid before delivery. See "RECOMMENDED OILS". (Do not mix different makes!)

1. Move the excavator on to level ground. Extend every cylinder rod up to its centre position, place the bucket in contact with the ground.
2. Check the oil level as to whether it lies on the centre mark under normal temperature 10 to 30 C.
3. Enough oil is present if the oil level lies between the markings.
4. Should the oil level be too low, add enough oil through the oil port before starting the engine. This step is important for the protection of the hydraulic system.



Lubrication Points

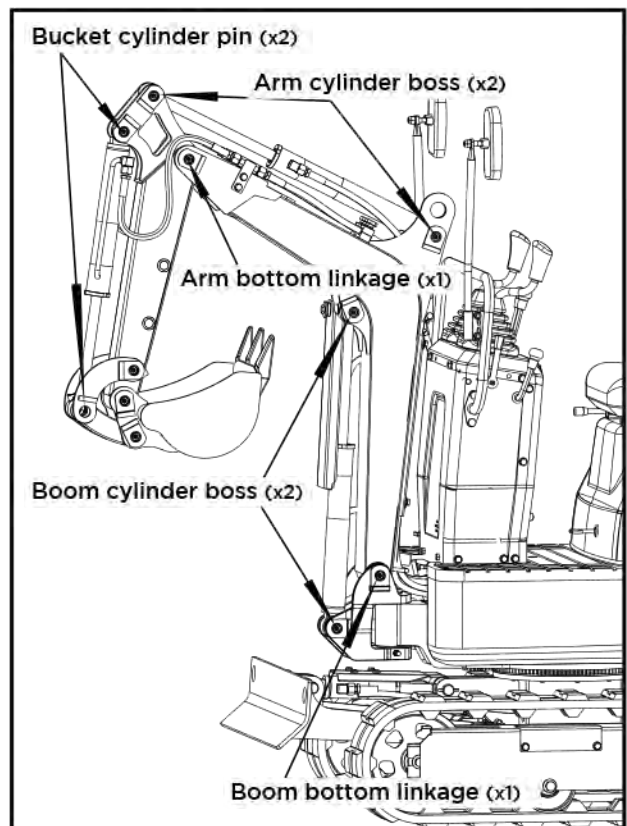
⚠ CAUTION First lower all attachments on the ground then stop the engine.

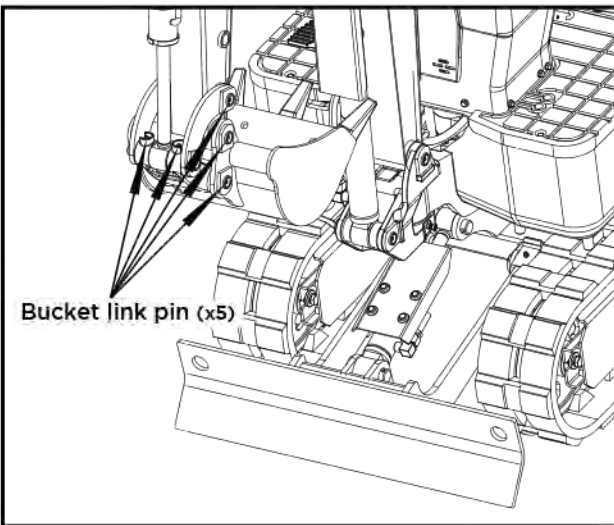
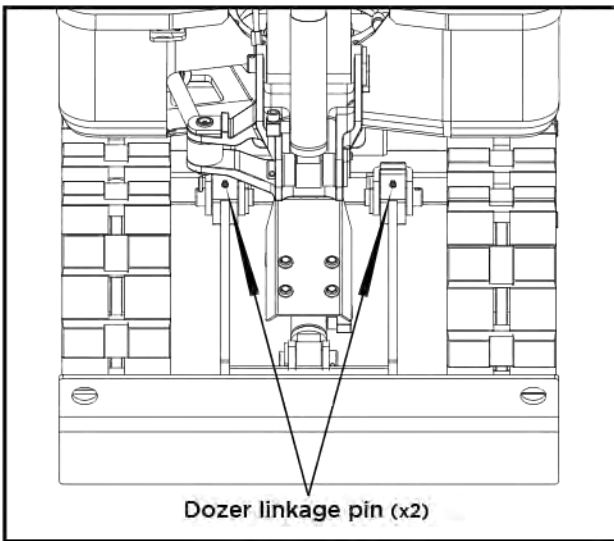
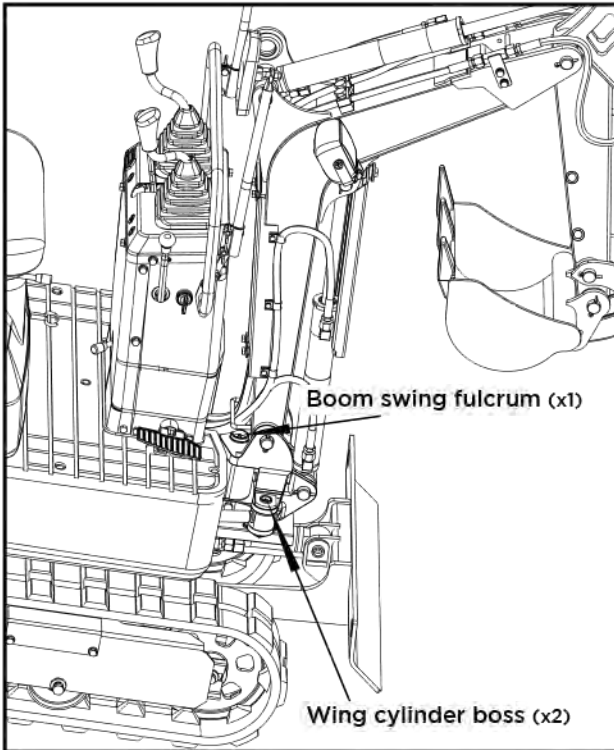
⚠ CAUTION While greasing, take care not to step on the bucket teeth.

⚠ CAUTION When doing excavation work in water, generously grease the following points. After finishing work, grease again.

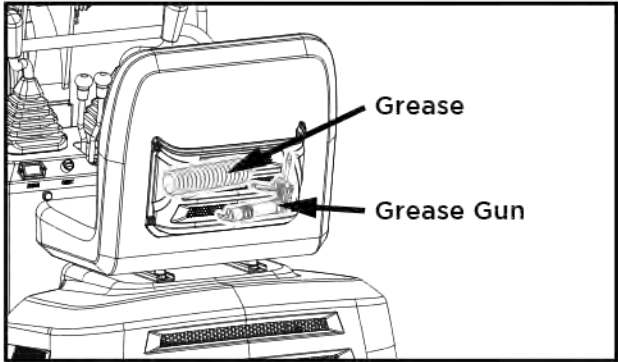
Grease the marked grease nipples shown by arrows in the illustration below:

1. Boom bottom linkage 1 place
2. Arm bottom linkage 1 place
3. Boom cylinder boss 2 places
4. Arm cylinder boss 2 places
5. Bucket cylinder pin 2 place
6. Boom swing fulcrum 1 places
7. Wing cylinder boss 2 place
8. Dozer linkage pin 2 places
9. Bucket link pin 5 places





NOTE The grease gun and grease are stored in the tool box on the back of the driver's seat.

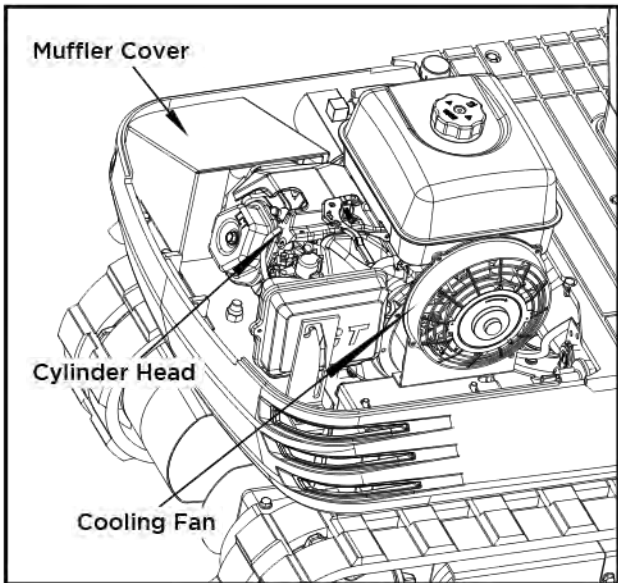


Check Cooling Fan

CAUTION Always stop the engine before checking the Cooling Fan.

CAUTION Wear eye protection when cleaning with compressed air.

1. When the weather is hot, check the cooling fan more frequently whether the operation is normal; Check the dust on the cooling fan of the gasoline engine cylinder head. If there is a lot of dust, please use compressed air to clean it.
2. Check whether the muffler chimney and muffler cover have oxidation. Check whether the insulation layer of muffler cover is complete.



⚠ IMPORTANT *Cooling fan must be clean in order not to overheat the engine and allow free flow of air through the system.*

Cleaning of Engine and Electrical Wiring

⚠ CAUTION *Always stop the engine before cleaning the wiring, cables and engine.*

Before starting, check whether flammable substances have gathered on the battery, the cables and wiring, the muffler or on the engine. Remove thoroughly.

Checking the Electrical Circuit

Check the electrical circuitry for disconnections, shorts or loose terminals.

Washing the Whole Machine

⚠ IMPORTANT *Do not wash the excavator with the engine running. Water could enter the air filter and damage the engine. Make sure that the air filter is kept dry.*

REGULAR CHECKS AND MAINTENANCE WORK EVERY 50 SERVICE HOURS

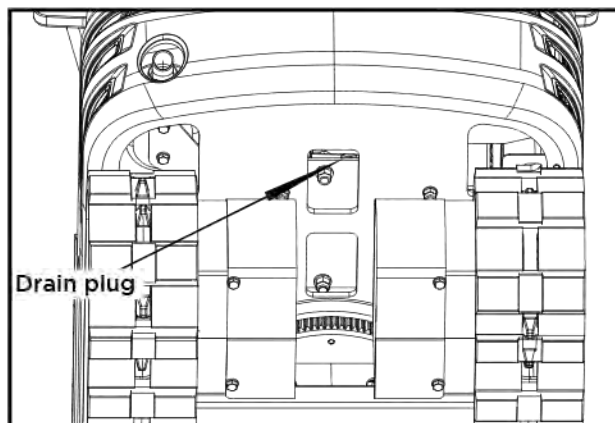
Engine Oil Change

⚠ CAUTION *First stop the engine and wait long enough for the oil to cool down.*

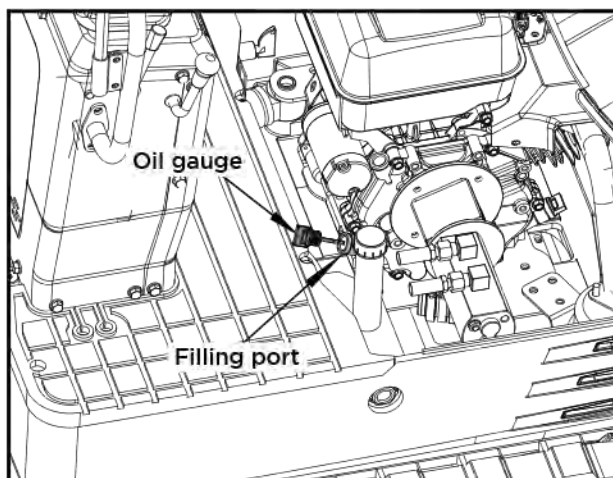
1. Remove the drain plug on the underside of the engine and drain all oil.

⚠ IMPORTANT *Place a suitable container below the engine to catch the used oil. Dispose of used engine oil according to local laws. We suggest you take used oil in a sealed container to your local recycling center or service station for reclamation.*

2. Re-tighten the drain plug.



3. Fill with new oil up to the required level.



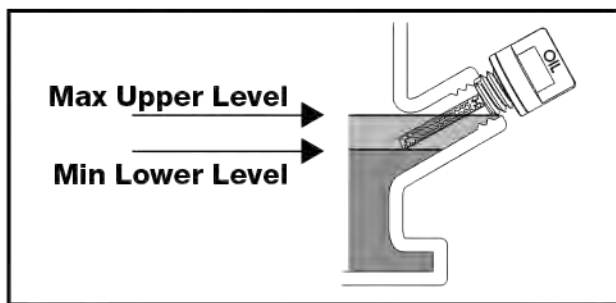
4. Let the engine idle for approx. 5 min. Check the engine oil level. To check the engine oil level, insert the oil gauge completely into the respective port opening and pull out again. If the oil level lies between both markings, no oil must be added.

⚠ IMPORTANT *Regardless of the service hours, an engine oil change is due every 1 year.*

Engine oil volumes	1.1 L
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Engine Oil Capacities:

306cc - 37.2 oz (1.1 liter)



Note: Total oil capacity could be as much as 4 additional ounces over volumes above due to engine mounting angle and proper draining.

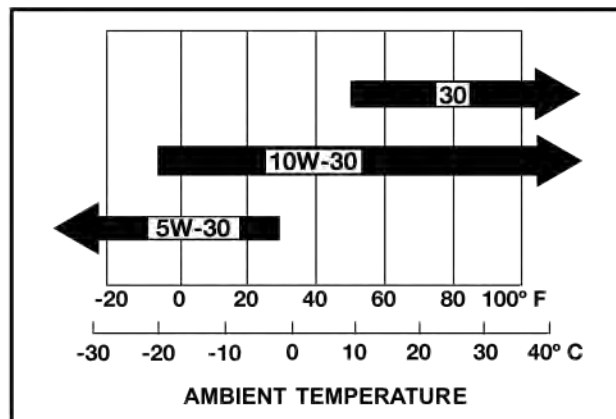
NOTE *Running the engine with a low oil level can cause engine damage.*

Engine Oil Recommendations

Engine oil affects performance and service life. Use 4-stroke automotive detergent oil.

SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area warrants.

The SAE oil viscosity and service classification are in the API label on the oil container. Use API SERVICE category SJ engine oil, or higher.



Battery Service

CAUTION *Batteries contain sulphuric acid which can cause severe burns. Avoid all contact with skin, eyes or clothing. Antidote - External: Rinse with plenty of water. Internal: Drink large quantities of water or milk.*

Call a physician immediately. Eyes: Rinse with plenty of water for 15 minutes and get prompt medical attention. Keep batteries out of the reach of children.

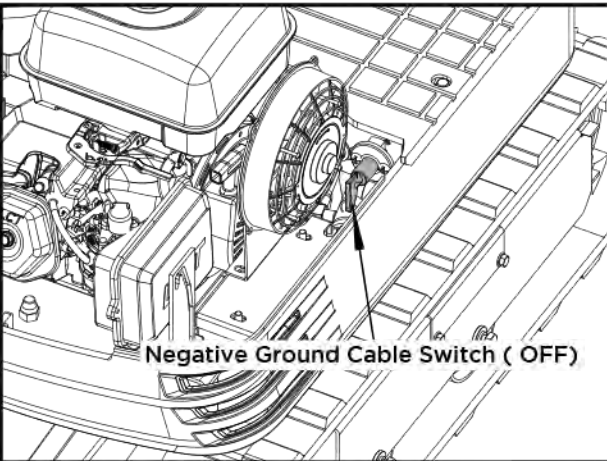
CAUTION *Before inspection or dismantling the battery, be sure to turn off the engine and turn the starter switch to the "OFF" position.*

CAUTION *When removing the battery, always disconnect the negative ground cable first. The reverse when installing a battery, always connect the ground cable last. This prevents a possible explosion caused by sparks.*

CAUTION *Always wear eye protection when working with the battery.*

1. Check whether the battery appearance is deformed.
2. If the battery is deformed, replace it.
3. Clean the battery cover (ventilation hole) without dust.
4. Check whether the battery terminal connection is loose. If it is loose, retighten it. Pay attention to tightening the positive screw, and make sure that the tool that used do not touch the cover.

WARNING *Before tightening the positive screw, make sure to turn off the negative ground cable switch first.*



Battery Charging

⚠ CAUTION When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.

⚠ CAUTION When disconnecting the cable from the battery, start with the negative terminal first.

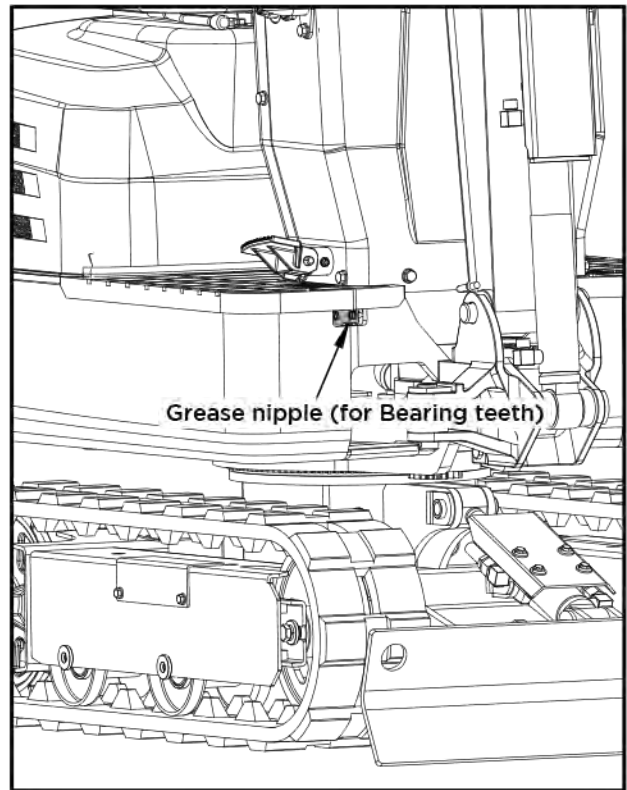
When connecting the cable to the battery, start with the positive terminal first.

⚠ CAUTION Do not check battery charge by placing a metal object across the terminals.

1. To slow charge the battery, connect the battery positive terminal to the charge positive terminal and the negative to the negative, then recharge in the standard fashion.
2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time.
When using a boost-charged battery, it is necessary to recharge the battery as early as possible.
Failure to do this will shorten the battery's service life.
3. When exchanging an old battery for new one, use battery of equal specification.

Greasing of Swing Bearing Teeth

1. Fill with grease through the grease nipple (at the right end side).
2. Grease at each 90 (1.58 rad.) position of the swing frame.
3. Fill with approx. 50g of grease (approx. 20 pumps with the grease gun). Distribute the grease over the teeth.



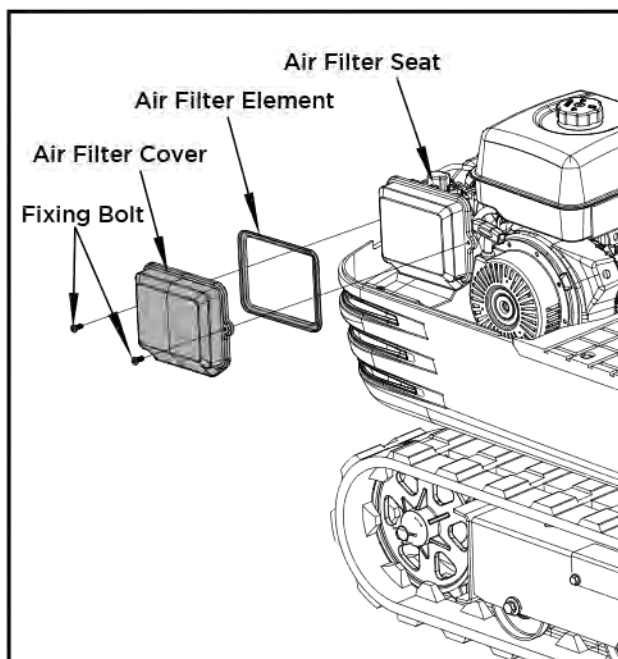
Inspection and Cleaning of the Air Filter Element

Open the engine hood and remove the dustcover. Take out only outer element, clean the element, case interior and reassemble. During reassembly, take care to install the dust-cover so that its TOP mark (arrow) faces upwards. Do not remove the inner element.

⚠ IMPORTANT *Should the machine be used in extremely dusty areas, the air filter element must be inspected and cleaned more frequently than in the specified maintenance periods.*

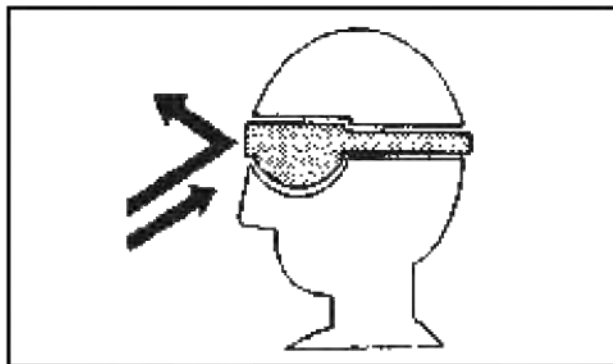
⚠ IMPORTANT *The air filter has a dry element, keep free from oil.*

⚠ IMPORTANT *Do not run the engine without the air filter.*



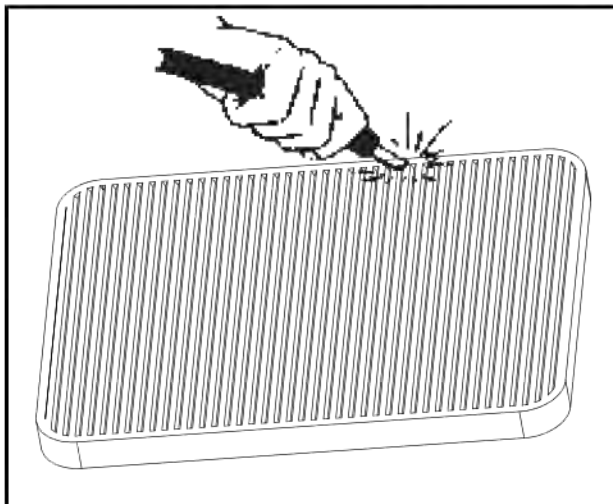
Air Filter Maintenance

⚠ CAUTION *Wear eye protection.*



Cleaning with compressed air

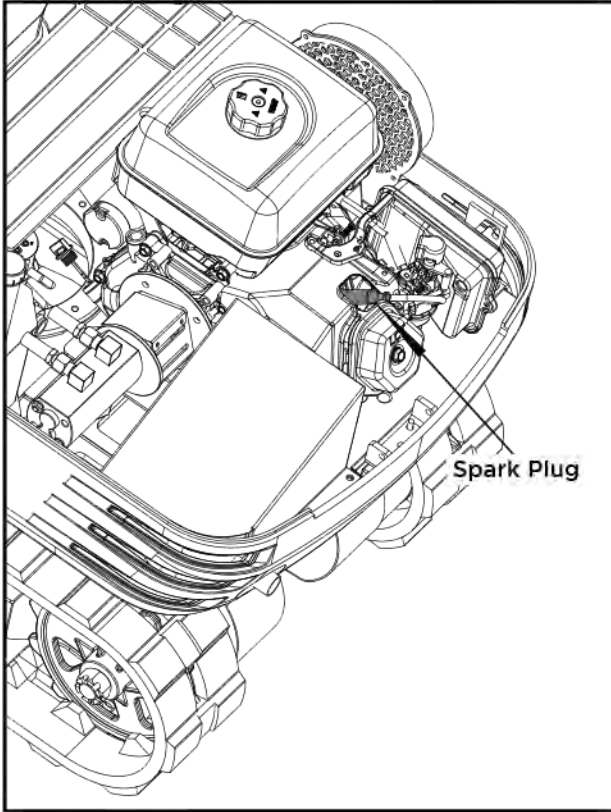
Pressure of compressed air must be under 205 kPa (2.1 kgf/cm²), and the cartridge should be blown clean from the inside to the outside until the dust deposits are completely clear.



⚠ IMPORTANT *If the air suction is still inadequate, or the colour of the exhaust gases is abnormal even after the cleaning, the air filter element must be replaced.*

Checking Spark Plug

Use the special spark plug socket to remove the spark plug and check whether the ignition needle has carbon deposits. If yes, clean the carbon deposits. Replace if defective.



Spark Plug Service

- E6TC (Torch) and E6RTC (Torch) recommended for 79cc and 98cc engines only
- F6TC, F6RTC or F6RTP (Torch) plug recommended

Cross References:

- Champion plug cross reference is: RN9YC (some tables show RN9YCC)
- NGK plug cross reference: BPR6ES
- BOSCH plug cross reference is: WR6DC

⚠ CAUTION *Using an incorrect spark plug may cause engine damage.*

1. When engine is cool, disconnect the spark plug cap and remove any debris from the spark plug area with high pressure air.
2. Remove the spark plug with a 13/16-inch spark plug wrench.
3. Inspect the spark plug. Replace it if the electrodes are worn or if the insulator is cracked or chipped. Spark plug gap should be set to 0.027 - 0.030 inches.
4. Install the spark plug carefully to avoid cross threading. Screw in spark plug by hand until it stops turning.
5. Tighten the spark plug with a 13/16-inch spark plug wrench. Tighten 1/4 turn after the spark plug seats.

⚠ CAUTION *A loose spark plug can overheat and damage the engine. Over-tightening the spark plug can damage the threads in the cylinder head.*

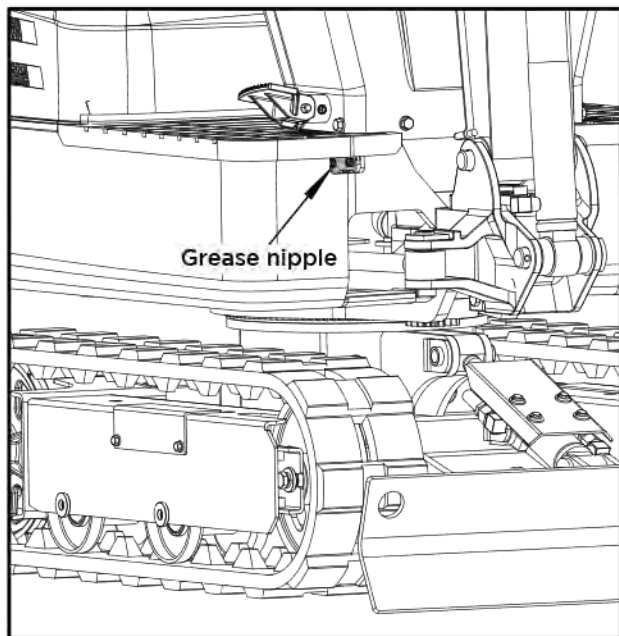
6. Attach the spark plug cap. Ensure spark plug cap snaps into place securely.

EVERY 100 SERVICE HOURS

Do all 50 hour servicing at the same time.

Greasing of the Swing Bearing

1. Grease through the respective grease nipple.
2. Grease at each 90° (1.58 rad.) position of the swing frame.
3. Using the grease gun, apply 5 shots at every position.

**EVERY 200 SERVICE HOURS**

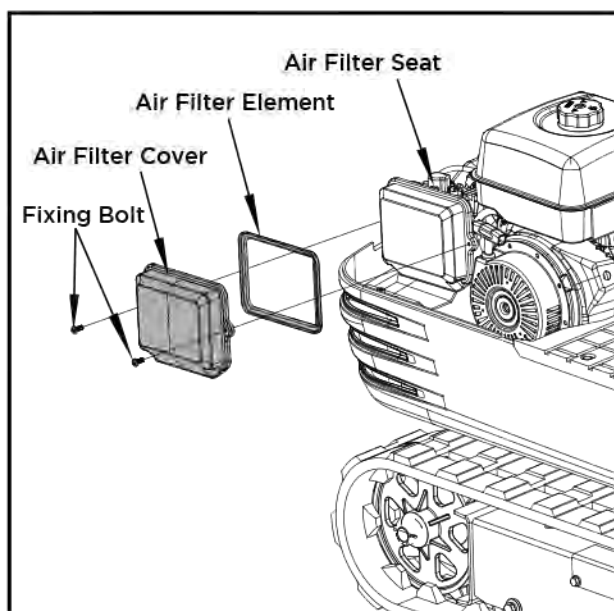
Do all 50 hour and 100 hour servicing at the same time.

Replacing Air Filter Element

Open the engine hood and remove the dustcover.

Remove and replace the outer element and inner element with new elements.

When reassembling, install the dust-cover so that its TOP mark (arrow) faces up-wards.



▲ IMPORTANT *Shorten the replacement period if using in lots of dust or sandy areas.*

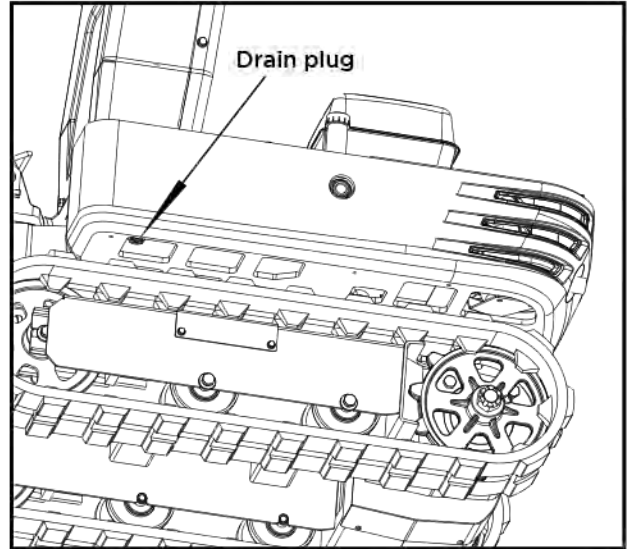
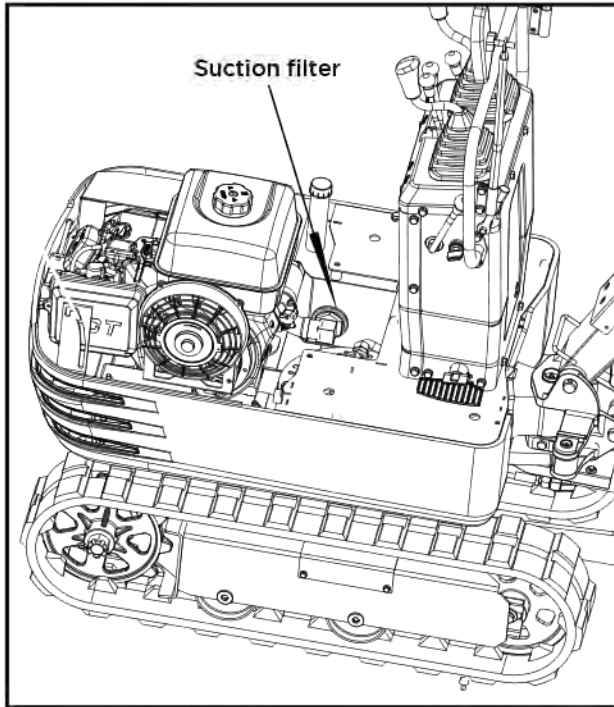
Checking Fuel Line

1. Check to see that all lines and hose clamps are tight and not damaged.
2. If hoses and clamps are found worn or damaged, replace or repair them at once.

EVERY 1000 SERVICE HOURS

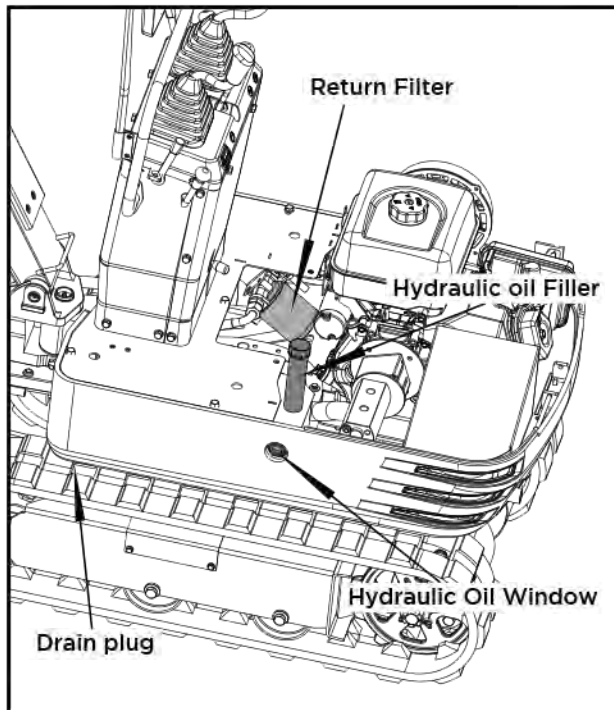
Do all 50, 100, 200 and 500 hour servicing at the same time.

Hydraulic Oil Change (Including Replacing of the Suction Filter and the Return Filter in the Hydraulic Tank)



Check the oil window position of hydraulic oil. If it is lower than 1/3 of the oil window position, add oil.

Hydraulic oil volumes	Hydraulic tank	approx. 10.8 L
	Whole oil volumes	approx. 14.0 L



Hydraulic Oil Check

- Changing and filling up of hydraulic oil
 - Use only the recommended oils mentioned in the operator's manual when changing or topping up oil.
 - When filling up oil, do not mix oils of different makes.
- Changing the return filter and oil
 - The filter must be changed more often because of contamination resulting from the frequent assembly and disassembly of the hoses.
 - Use the correct replacement filter.
 - Oil change according to operating hours.

	Hydraulic oil Return Filter	Suction Filter
Normal excavator work	every 1000 Hrs.	1000 Hrs.

ANNUAL SERVICING**Electrical Wiring and Fuses**

Check the terminals periodically for proper connections. Loose wiring or damaged cables can cause improper functioning of the electrical system. Short circuiting, electrical leaks and other expensive problems could arise. Check wiring and replace damaged components immediately. If a fuse blows out soon after having been replaced, contact your nearest dealer. Never use a fuse other than specified.

Replacing Spark Plug

Do replacement after 1 year or 500 hours of use.

BIENNIAL SERVICING**Replacing Fuel Hose**

Replace the hoses and clamps.

(See "Checking Fuel Line" every 200 hours maintenance.)

OTHER ADJUSTMENTS AND REPLACEMENTS

ADJUSTMENT OF CRAWLERS

To loosen the crawlers, follow the following procedure:

⚠ CAUTION Do not crawl under the excavator.

1. Remove the side plate cover and loosen the nut M20 inside with a 30mm plum wrench.
2. Adjust the hexagonal bolt M20x120 and rotate it clockwise to tighten the track; The track becomes loose when it rotates counterclockwise.
3. After adjustment, fix the nut M20 with a plum spanner.

📌 NOTE Tighten torque must be between 98 to 108 Nm (10 to 11 kgf-m)

4. Install the side plate cover.

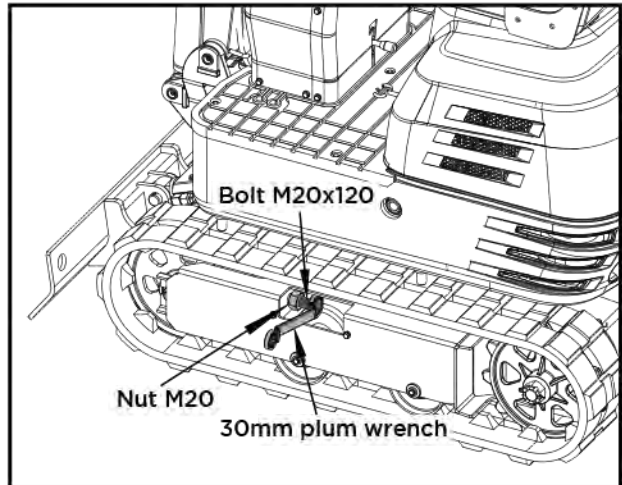
⚠ IMPORTANT If the crawlers are too tight, wear is increased.

⚠ IMPORTANT If the crawlers are too loose, the crawler shoes may collide with the sprocket, and wear is increased.
The crawler may dislocate or come off.

⚠ IMPORTANT Clean the crawler after every use.

⚠ IMPORTANT Should the crawler tension be heightened due to mud sticking, lift the crawler with the help of the boom, arm and bucket, idle the engine and remove the mud from the crawler, especially from the openings of the link plate, carefully.

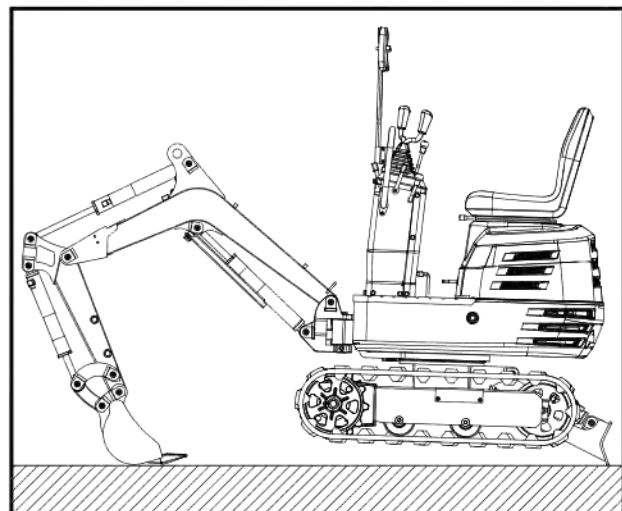
Tension the crawlers as specified:

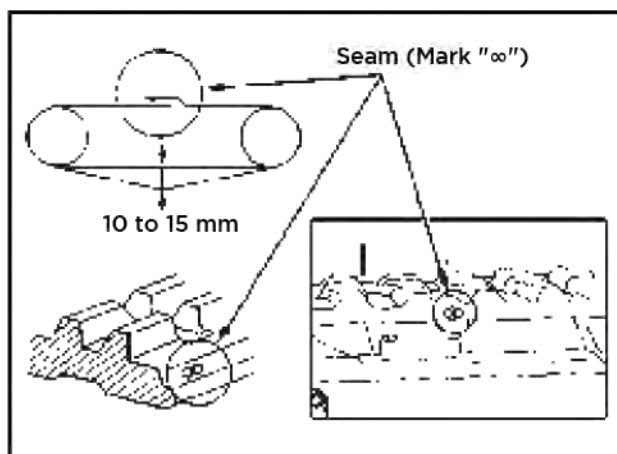


1. Tension the crawler in the lifted position, so that the distance (clearance between the track roller and the inside surface of the crawler) is 10 to 15 mm (see illustration), (In this case, the crawler seam is positioned on the top centre between the idler and the sprocket.

⚠ DANGER Do not work under the machine in this condition.

⚠ DANGER For your safety do not rely on hydraulically supported devices, they may leak down suddenly drop or be accidentally lowered.





⚠ IMPORTANT *Make sure that no obstacles, such as stones, are caught in the crawler. Remove such obstacles before adjusting the crawler tension.*

⚠ IMPORTANT *Crawler seam*

The ends of the rubber crawler are joined with a seam. When adjusting the crawlers, the seam must be positioned on the top centre between the idler and the sprocket.

If the seam is positioned incorrectly, the crawlers will be tensioned too loosely, and a further readjustment will be necessary.

⚠ IMPORTANT *Rotate the crawler after adjustment one to two times to check the tension.*

⚠ IMPORTANT *Additionally the following points are to be observed when adjusting rubber crawlers.*

(1) If the crawler slackens more than 0.98 in. (25 mm), readjust them.

(2) Check crawler tension 30 hours after initial use and readjust if necessary. Check and adjust thereafter every 50 service hours.

Special Information when Using Rubber Crawlers

1. When turning, preferably make a slow swing turn. Avoid spin turns to lessen lug wear and ingress of dirt.
2. If too much dirt and sand clog the crawlers. In this case move the machine for a short distance straight backwards to let the earth and sand fall off, then a turn can be made.
3. Avoid using rubber crawler on riverbeds, stony underground, ferro-concrete and iron plates. The rubber can be damaged as well as crawler wear increasing.

CHANGING THE BUCKET

⚠ CAUTION *When the coupling pins are removed or installed, chips may come off. Always use gloves, goggles and a helmet.*

⚠ CAUTION *When the change of the equipment must be performed with the engine running, always work as a 2-person team.*

One person sits in the operator's seat and the other works on the machine.

⚠ CAUTION *Do not use your fingers to center the holes, since they may be injured or even cut in case of sudden or uncontrolled movements.*

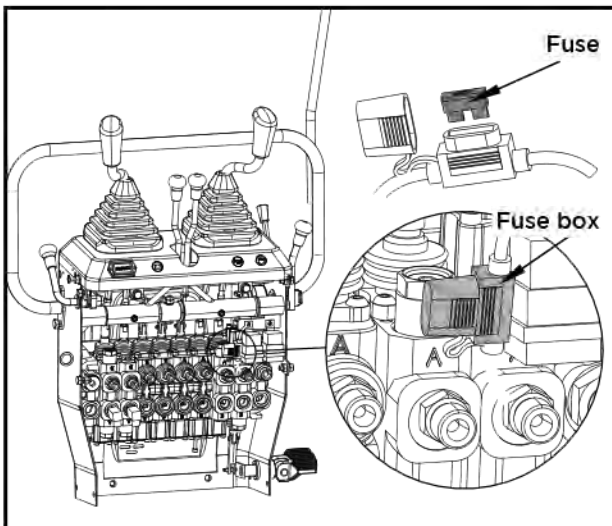
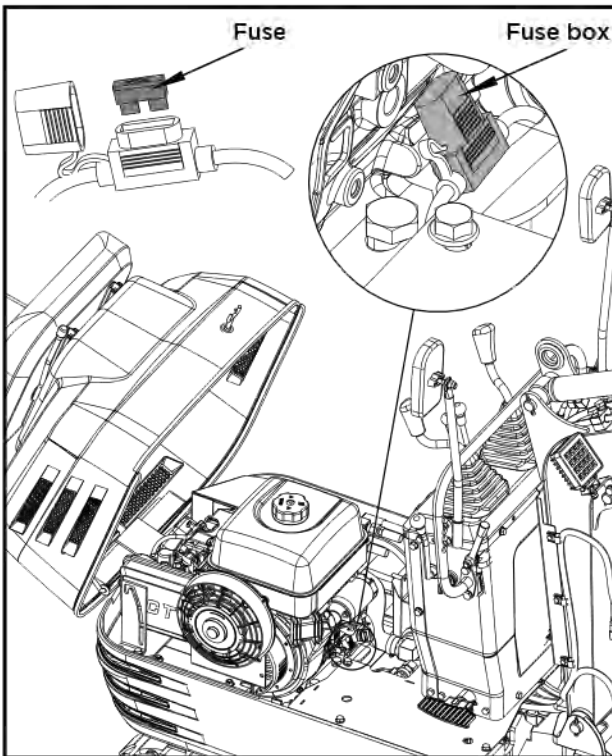
⚠ CAUTION *Read the manual of the attachment to do a correct operation safely when other attachments are installed.*

FUSES

Replacing Fuses

Slow blow fuse is provided to protect the electrical circuits. If the fusible link is blown, check the electrical circuits for problems and then replace with a new compatible slow blow fuse.

1. Remove the cover of the fuse box.
2. Replace the burn out fuse with the new fuse having the same capacity



Fuse Capacities and Circuits

No.	Capacity	Circuit
1.	10A	Working relay fuse
2.	10A	Working lamp, Horn, Hour meter fuse

TROUBLESHOOTING

If the excavator does not give the desired performance, or when problems arise, refer to the table below and take appropriate measures.

Trouble		Cause	Countermeasure
Engine	Starting difficulties	The fuel cock closed	Make sure that the fuel cock is in the "Open" position.
		Air or water in the fuel system	See the instruction in section "Draining the water or air from the fuel tank" to remove the water and air.
		Oil viscosity is too high so that the engine runs sluggishly in winter	Use the engine oil for Winter use.
		Battery is almost dead; Starter motor doesn't work	Do recoil start to recharge the battery
		The spark plug doesn't ignite.	Replace the spark plug
		Low Engine oil level	Add the engine oil
	Insufficient engine power	Low fuel level	Check fuel and add if necessary
		Clogged air cleaner	Clean the air filter element
	Engine suddenly stops	Low fuel level	Check fuel and add if necessary Purge the fuel system
	Abnormal exhaust gas colour	Poor fuel	Use high quality fuel
		Too much engine oil	Drain engine oil to prescribed oil level
		Choke lever closes the choke valve in the carburetor	Open the choke valve
Hydraulic system	Boom, arm, bucket, drive, swing and dozer power is too low	Hydraulic oil level too low	Add oil
		Leakages of hoses and / or joints	Replace hose or joint
	Non- function of swing motor	Swing lock pin is in lock position	Remove swing lock pin in unlock position
Drive system	Deviation of drive direction	Blocked through stones	Remove
		Crawler too loose or too tight	Adjust accordingly

PREPARATION FOR OPERATION IN COLD WEATHER

1. Replace engine oil and hydraulic oil with those of viscosities suitable for cold weather.
2. In cold weather, battery power drops, and the battery fluid may freeze if the battery is not sufficiently charged. To prevent the battery fluid from freezing, be sure to keep the battery charged at least 75% or more of its capacity after operation. To ease next starting, it is recommended to keep the battery stored in closed or heated rooms.

PROCEDURE AFTER WORK CARRIED OUT

Clean the excavator thoroughly after work and wipe dry. Otherwise mud and earth on the crawlers could freeze if the temperature drops below the 0 C mark. Operation of the excavator is then not possible. Store the excavator in a dry place; if not possible, store on wooden planks or on mats. If the excavator is kept on damp or muddy ground, the crawlers could freeze overnight. Operation of the excavator is then not possible.

Additionally, the hydraulic cylinders piston rods must be rubbed dry. Otherwise severe damage could occur if dirty water seeps through the seals.

LONG STORAGE

⚠ CAUTION *Do not clean the excavator with the engine running.*

⚠ CAUTION *To avoid the danger of exhaust fume poisoning, do not operate the engine in a closed building without proper ventilation.*

⚠ CAUTION *When storing, remove the key from the starter switch to avoid unauthorized persons from operating the excavator and getting injured.*

Should the Excavator be Stored for a Longer Period of Time, Observe Following Procedures:

1. The whole excavator should be cleaned thoroughly and in all cases stored indoors. If the excavator has to be kept outdoors, lay out wooden planks on even ground, place the excavator on the planks and cover completely.
2. Do an oil change and grease the excavator.
3. Heavily grease the visible sections of the piston rods.
4. Remove the battery and store indoors.

⚠ IMPORTANT *Wash the excavator after stopping the engine.*

If you wash the excavator while running the engine, water may get into the air cleaner through the intakes causing engine problems.

Carefully, wash but do not splash water over the air cleaner.

Observe Following Procedures when the Machine is to be Operated after Long Storage.

1. Wipe off the grease from the hydraulic cylinder rods.
2. Turn on the engine and activate the attachments and the drive mechanisms without load in order to circulate the hydraulic oil . (If the machine is stored for longer than one month, undertake steps (1) and (2) once every month)

Periodic replacement of important component parts

To ensure safety in operation, you are strongly requested to inspect and service the machine at regular intervals. For added safety, ask your dealer to replace the following important component parts.

These parts are prone to degradation in material or subject to wear and tear with time. It is difficult to judge how much they have been affected at regular inspection. It is therefore necessary to replace them with new ones, whether wear is visible or not after a specified time of use.

If any of them is found worn even before the specified use, it must be repaired or replaced the same way as other parts.

If any of the hose clamps is found deformed or cracked, the hose clamp must also be replaced.

For the hydraulic hoses other than the ones to be replaced periodically, inspect them for the following points. If found unusual, tighten them up, replace them.

When replacing the hydraulic hoses, change their O rings and sealings with new ones.

For replacement of the important parts, contact your dealer.

At the following periodic inspections, check the fuel hoses and hydraulic hoses as well.

Inspection Interval	Check Points
Daily Checks	Oil leak at fuel and hydraulic hose connections and points
Every month	Oil leak at fuel and hydraulic hose connections and points Damages at fuel and hydraulic hose (cracks, chafing)
Every year	Oil leak at fuel and hydraulic hose connections and points Interference, deformation, degradation, twist and other damages (cracks, chafing) of fuel and hydraulic hoses

List of important component parts

No.	Component Parts	Used Place	Q'ty	Period
1	Hydraulic hose (suction)	Main pump	1	Every 2 years or 4000 hours
2	Hydraulic hose (delivery)	Main pump-Control valve	2	
3	Hydraulic hose (Boom cylinder)	Control valve-Boom cylinder	2	
4	Hydraulic hose (Arm cylinder)	Control valve-Arm cylinder	2	
5	Hydraulic hose (Bucket cylinder)	Control valve-Bucket cylinder	2	
6	Hydraulic hose (Swing cylinder)	Control valve-Swing cylinder	2	
7	Hydraulic hose (Dozer cylinder & Track cylinder)	Control valve-Rotary joint	4	
		Rotary joint-Dozer cylinder	4	
		Rotary joint-Tank cylinder	2	
8	Hydraulic hose	Control valve-Joint	1	
		Joint-Return pipe	1	
9	Hydraulic hose (Swivel motor)	Control valve-Swivel motor	2	

To prevent serious damage to the hydraulic system, to use only a hydraulic hose approved by dealer.

RECOMMENDED OILS

FUEL RECOMMENDATIONS

Use unleaded gasoline with a pump octane rating of 86 or higher. These engines operate best on unleaded gasoline.

Do NOT use stale or contaminated gasoline or an oil/gasoline mixture. Avoid getting dirt or water in the fuel tank. Use only proper fuel containers that are properly marked.

Maximum recommended ethanol content: 10%.

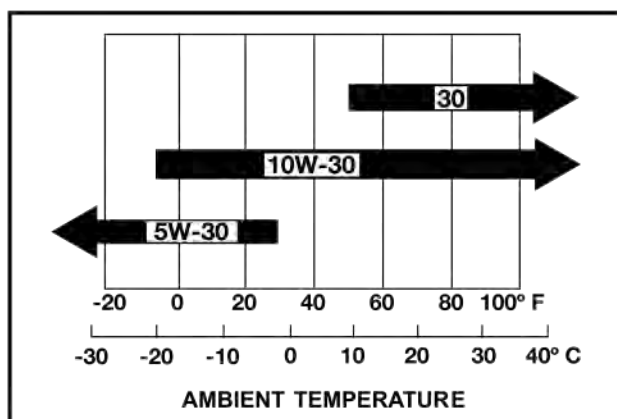
This is not compatible with E15.

ENGINE OIL RECOMMENDATIONS

Engine oil affects performance and service life. Use 4-stroke automotive detergent oil.

SAE 10W-30 is recommended for general use. Other viscosities shown in the chart may be used when the average temperature in your area warrants.

The SAE oil viscosity and service classification are in the API label on the oil container. Use API SERVICE category SJ engine oil, or higher.



HYDRAULIC OIL RECOMMENDATIONS

⚠ IMPORTANT Before delivery, the hydraulic oil used was an ISO 32 viscosity grade.

The recommended hydraulic oil type:

10W AW32

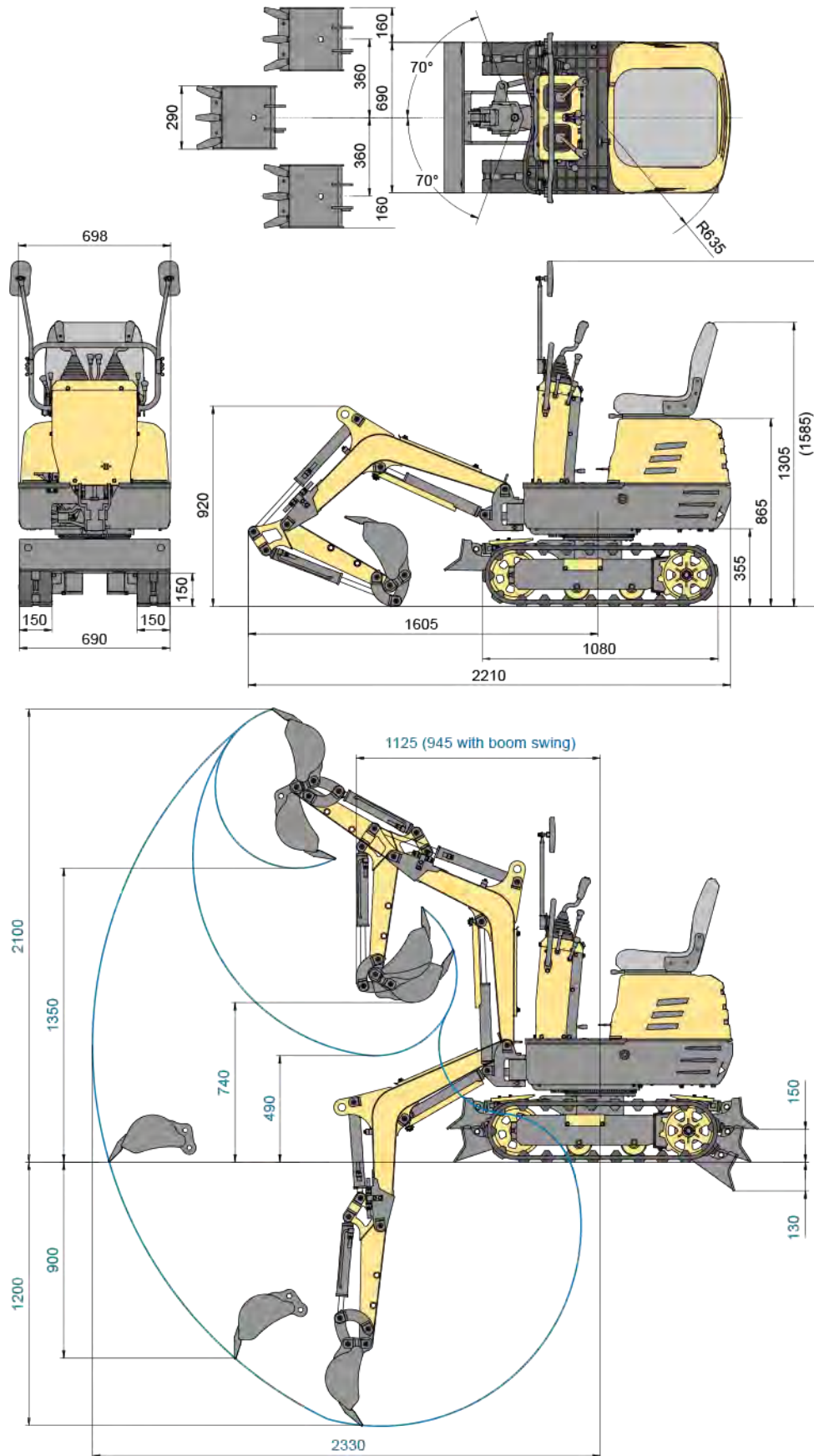
ASLE H-150

ISO 32

GREASE RECOMMENDATIONS

Application	Shell	Mobil	Exxon
Grease	Shell Alvania EP2	Mobilux EP2	BEACON Q2

MAIN DIMENSIONS



LIFTING CAPACITY

- The lifting capacities are based on ISO 10567 and do not exceed 75% of the static tilt load of the machine or 87% of the hydraulic lifting capacity of the machine.
- The strokes are as follows.
 - The load point corresponds to the front bolt part of the arm.
 - The machine positions are (i) over-front (Blade up), (ii) over-front (Blade down), and (iii) overside.
 - The operating cylinder is the boom cylinder.
- The bucket of the excavator, the hook, the sling and other lifting accessories are taken into consideration for the loads.

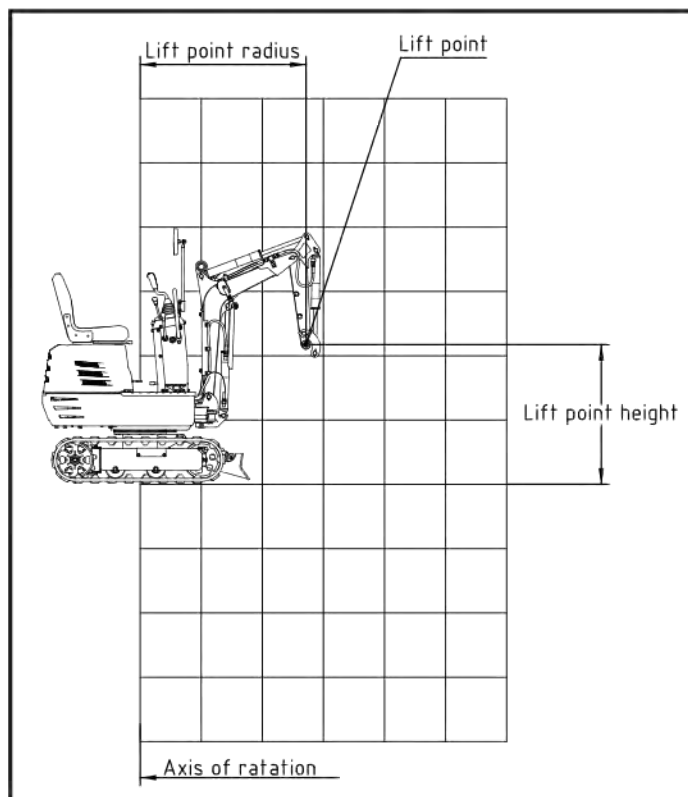
Machine conditions:

No bucket, all others according to standard regulations.

⚠ WARNING *It is forbidden to lift loads greater than those values mentioned in the lifting capacity tables.*

⚠ WARNING *A The values mentioned in the table are valid only on even, hard ground. When lifting on soft ground, the machine can tilt over due to the fact that the load is concentrated only on one side of the machine.*

The table values are calculated at the end of the arm without the bucket. In order to find the allowable loads for machines with bucket, the bucket weight must be subtracted from the values in the table.



LIFTING CAPACITY

MODEL EXCAV-28

(i) OVER FRONT (BLADE UP)

kN(kg)

HEIGHT (mm)	LOAD RADIUS (mm)						
	0	380	760	1140	1520	1900	2280
2400							
2000							
1600					1.1(110)		
1200					1.1(110)		
800				1.7(170)	1.1(110)	0.8(80)	
400				1.7(170)	1.1(110)	0.8(80)	
0				1.7(170)	1.1(110)		
400			3.2(320)	1.7(170)	1.1(110)		
800				1.3(130)			
1200							

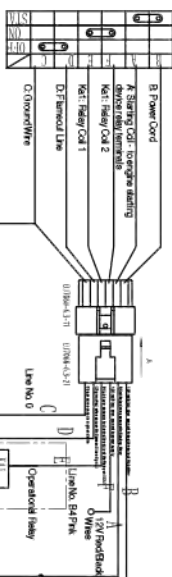
(ii) OVER FRONT (BLADE DOWN)

kN(kg)

HEIGHT (mm)	LOAD RADIUS (mm)						
	0	380	760	1140	1520	1900	2280
2400							
2000							
1600					1.4(140)		
1200					1.4(140)		
800				2.2(220)	1.6(160)	1.4(140)	
400				3.0(300)	1.9(190)	1.5(150)	
0				3.1(310)	2.0(200)		
400			3.2(320)	2.7(270)	1.7(170)		
800				1.3(130)			
1200							

WIRING DIAGRAM

Electric Lock Switch



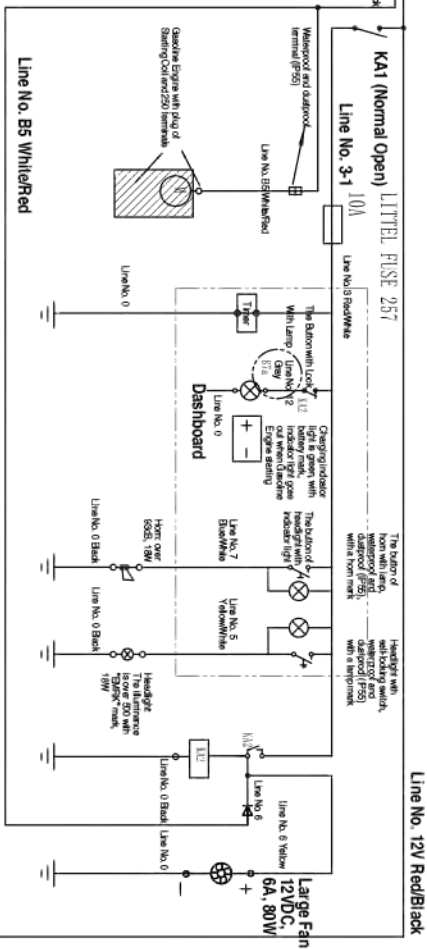
Electric Lock Switch

OFF Gear: Oil Drive ground we'll connect to terminal cable - Engine of ON/Gear: The terminal EF identified, Field K01, power on, normal open contact K01, closing when 3V and 4V power on.

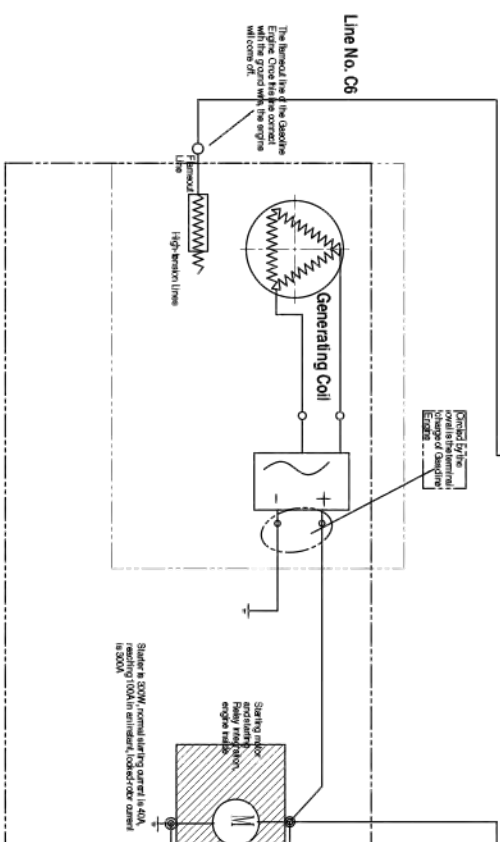
The horn and headlight buttons are identified, the buttons are ready to advance the horn and head light by being depressed.

START: electric starting gear: None of terminals are connected except A4, B1 terminals, starting coil is identified.

Electro starting station



Line No. C6

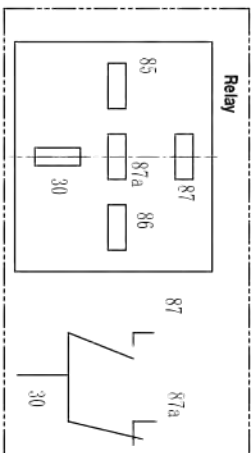


The length of red positive line is 700 with 6 rounded terminals at both ends of the line

The length of red and black negative line is 350, with 6 rounded terminals at one end and 8 rounded terminals at the other end

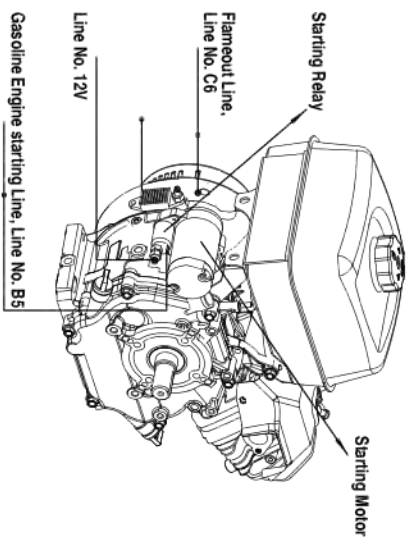
The length of red and black negative line is 350, with 6 rounded terminals at one end and 8 rounded terminals at the other end

Relay

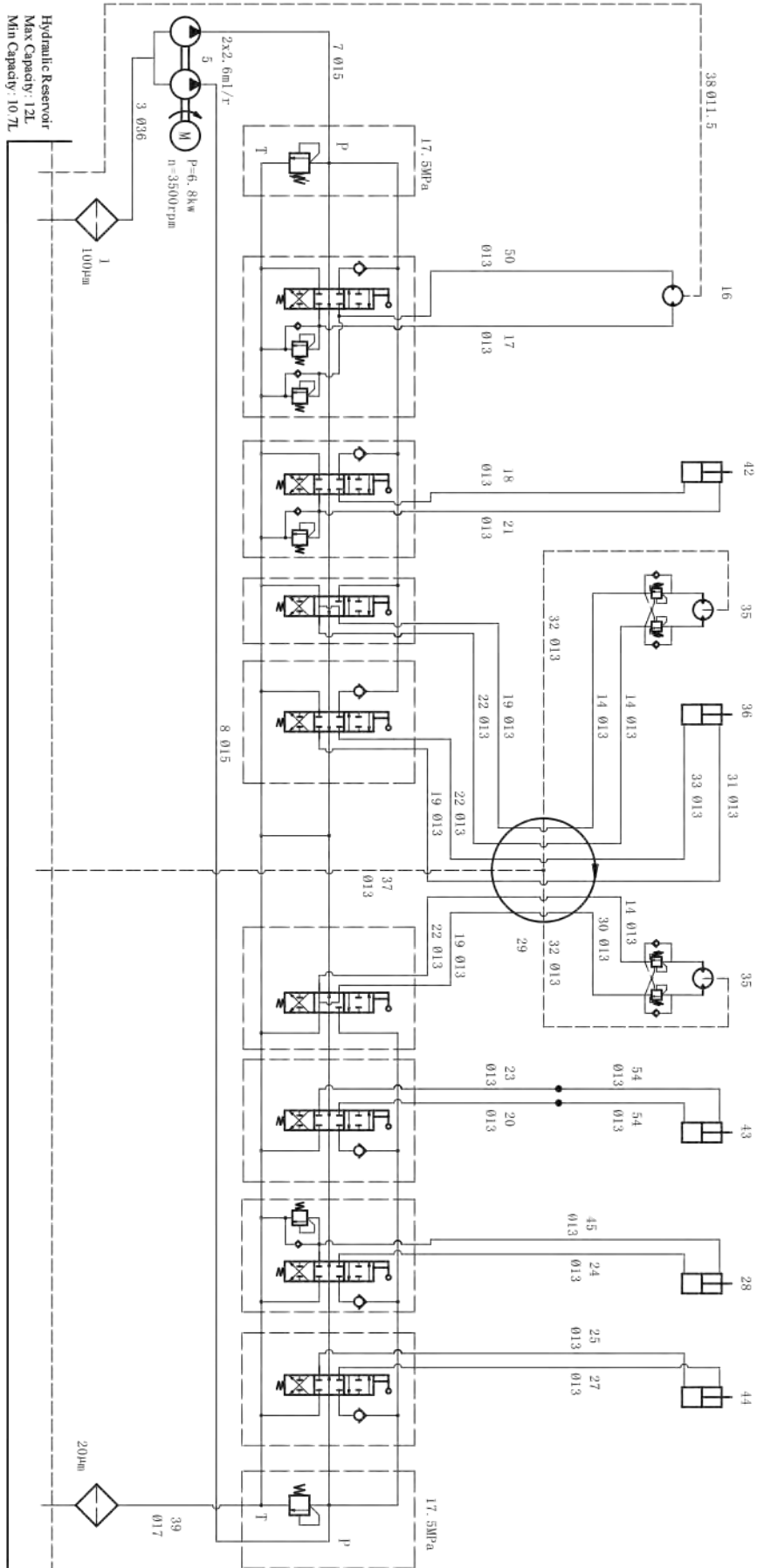


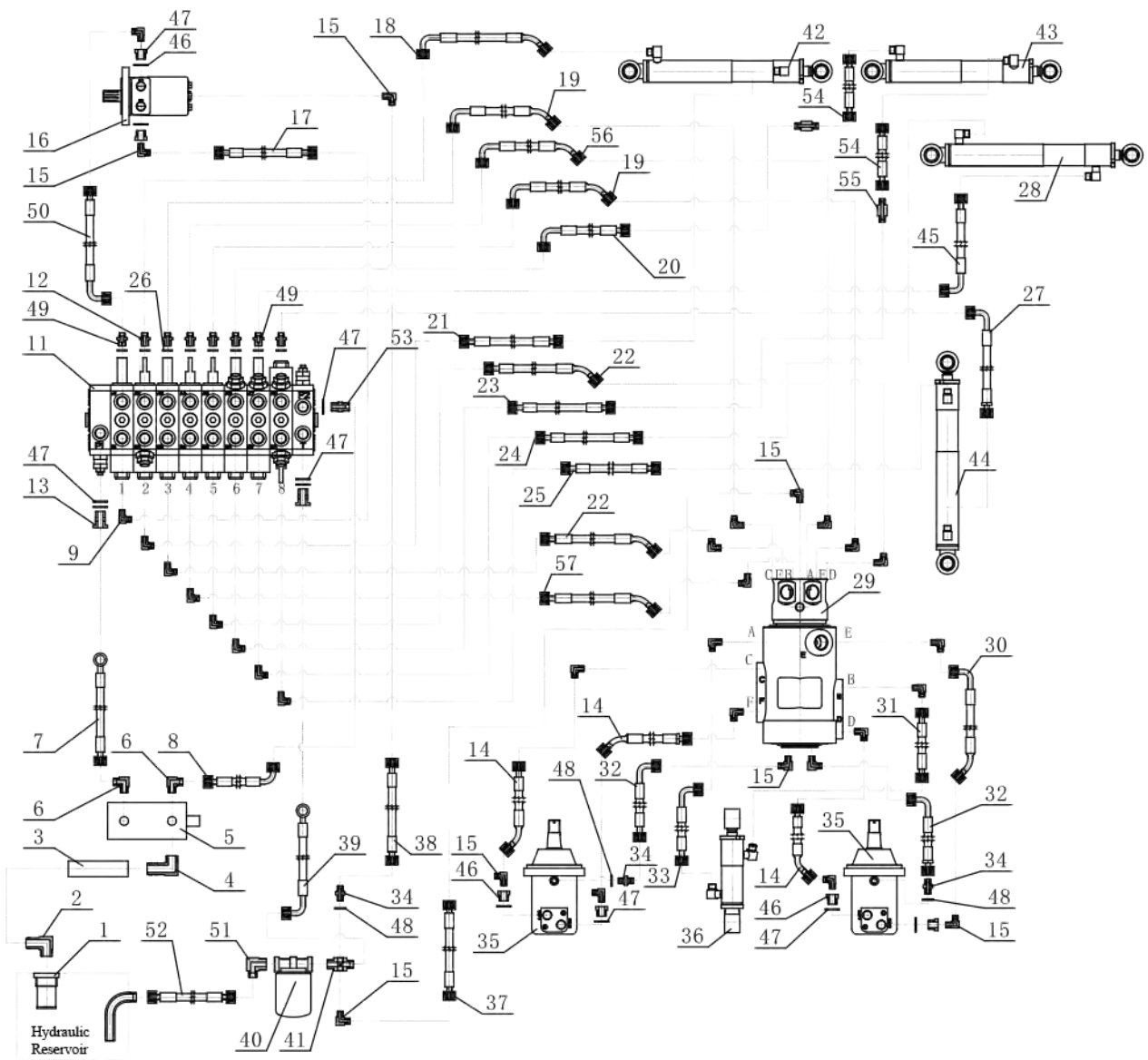
No.	Color	Denominator	No.	Color	Denominator
0	Black	1.5mm ²	12	Gray	1.0mm ²
3	Red/White	1.0mm ²	17	Red/Blue	1.5mm ²
5	Yellow/White	1.0mm ²	18	White/Red	1.5mm ²
6	Yellow	1.0mm ²	20	Orange/Red	1.5mm ²
7	Blue/White	1.0mm ²	24	Pink	1.5mm ²

Line No. B5 White/Red



HYDRAULIC SYSTEM DIAGRAM



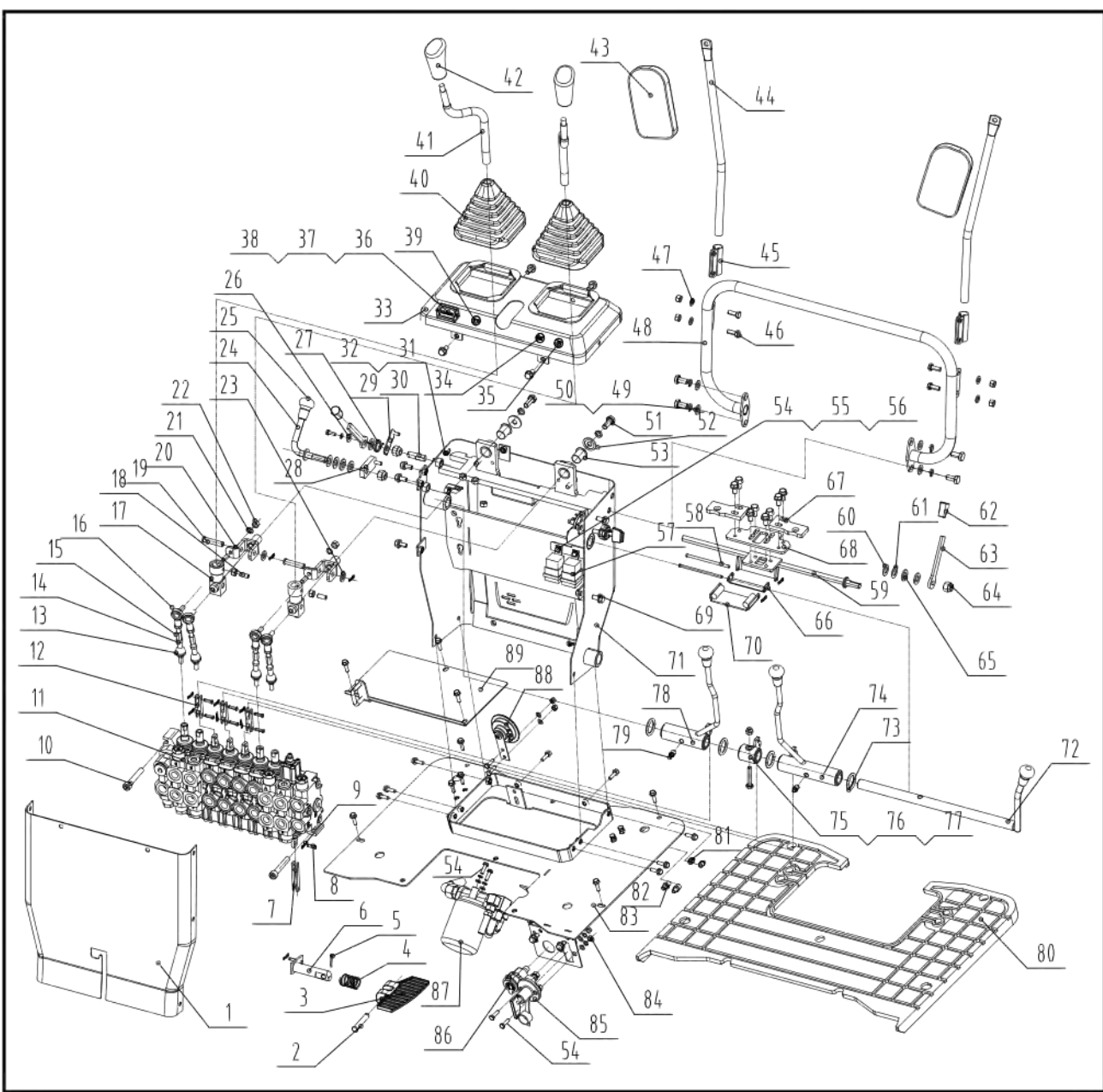


Parts List

No.	Description	Q'ty
1	Oil Filter	1
2	Oil Suction Angle Connector	1
3	Oil Suction Pipe	1
4	Pump Inlet Angle Connector	1
5	Double Gear Pump	1
6	Angle Connector	2
7	Pump Front Outlet Hose	1
8	Pump Rear Outlet Hose	1
9	Transition Joint G3/8-M14x1.5	8
10	Angle Connector	2
11	Multi-way Valve Assembly	1
12	Straight Connector	6
13	G1/2 Hollow Bolt	2
14	Travel Motors Oil Hose	3
15	Angle Connector	20
16	Rotary Motor	1
17	Rotary Motor Oil Hose	1
18	Oil Hose 1 for Bucket Arm Cylinder	1
19	Valve-Swivel Joint Oil Hose (C,E)	2
20	Bucket Cylinder Oil Hose 1	1
21	Oil Hose 2 for Bucket Arm Cylinder	1
22	Valve-Swivel Joint Oil Hose (D,F)	2
23	Bucket Cylinder Oil Hose 2	1
24	Boom Cylinder Oil Hose 2	1
25	Side Swing Cylinder Oil Hose 2	1
26	Bonded Washer	8
27	Side Swing Cylinder Oil Hose 1	1
28	Boom Cylinder	1

No.	Description	Q'ty
29	Centre Swival Joint	1
30	Right Travel Motor Oil Hose	1
31	Dozer Cylinder Oil Hose 2	1
32	Travel Motor Oil Drain Hose	2
33	Dozer Cylinder Oil Hose 1	1
34	Straight Connector	3
35	Hydraulic Motor	2
36	Dozer Cylinder	1
37	Swival Joint Oil Drain Hose	1
38	Rotary Motor Oil Drain Hose	1
39	Oil Return Hose	1
40	Oil Return Filter	1
41	Four-way Joint	1
42	Bucket Arm Cylinder	1
43	Bucket Cylinder	1
44	Side Swing Cylinder	1
45	Boom Cylinder Oil Hose 1	1
46	G1/2-G1/4 Through-core connector	6
47	Bonded Washer	11
48	Bonded Washer	3
49	Straight Connector (with shutoff)	2
50	Rotary Motor Oil Hose	1
51	Angle Connector	1
52	Oil Return Hose	1
53	Straight Connector	1
54	Bucket Cylinder Oil Hose	2
55	Extended Nipple	2
56	Valve-Swivel Joint Oil Hose (A)	1
57	Valve-Swivel Joint Oil Hose (B)	1

PARTS DIAGRAM



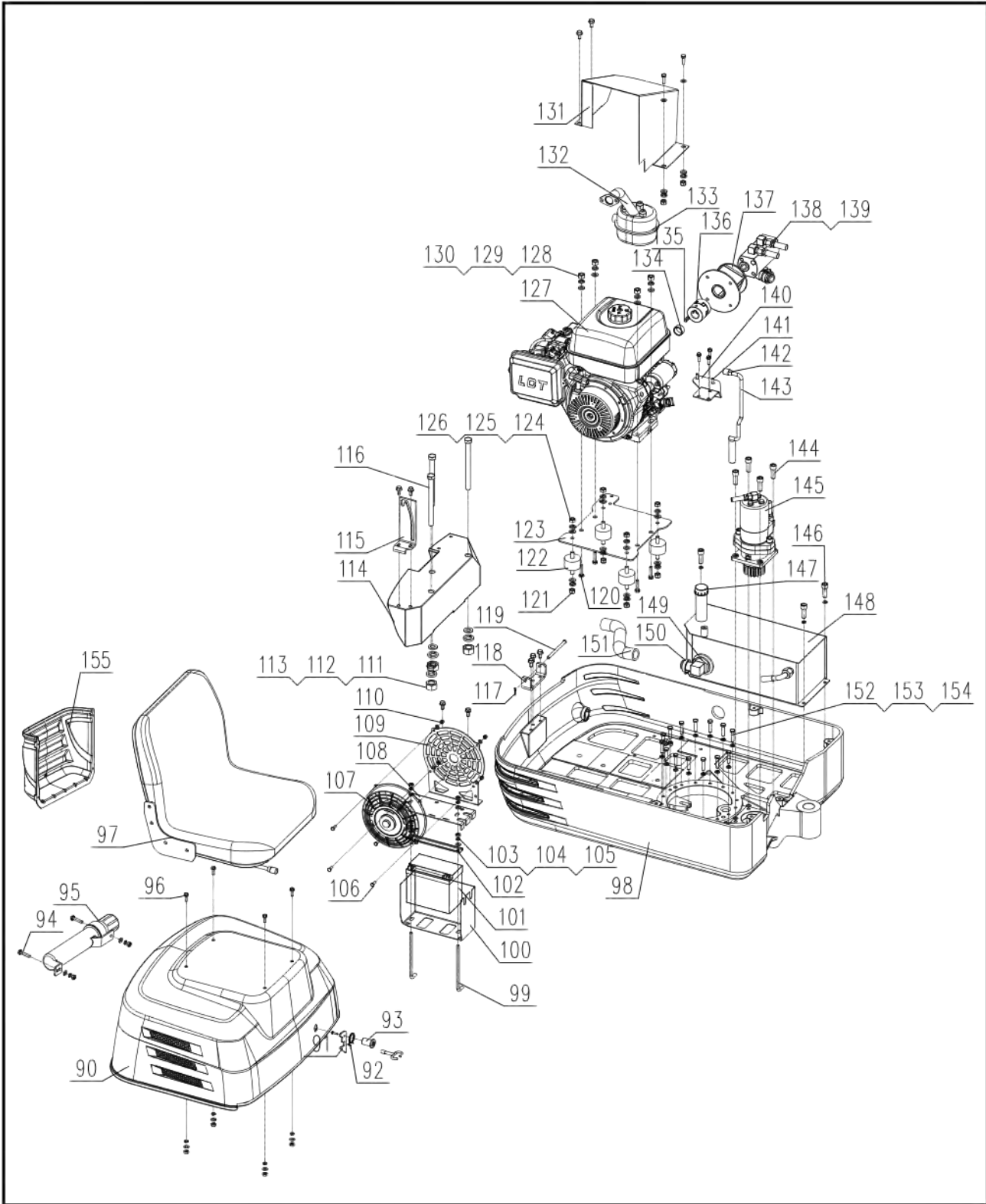
Parts List

No.	Description	Q'ty
1	Control Cabinet- Rear Plate	1
2	Pedal Pin Shaft D10x55	1
3	Boom Swing Pedal	1
4	Pedal Shaft Spring	1
5	Pedal Pin Shaft - Cotter Pin D2x16	1
6	Boom Swing Pedal-Shaft Weldment	1

No.	Description	Q'ty
7	Valve Bottom Connecting Rod	1
8	Connecting Rod- Shaft Pin D5x18	7
9	Connecting Rod- Cotter Pin D1.5x16	11
10	Screw M10x60	2
11	Multi-Way Valve Assembly	1
12	Connecting Rod	3

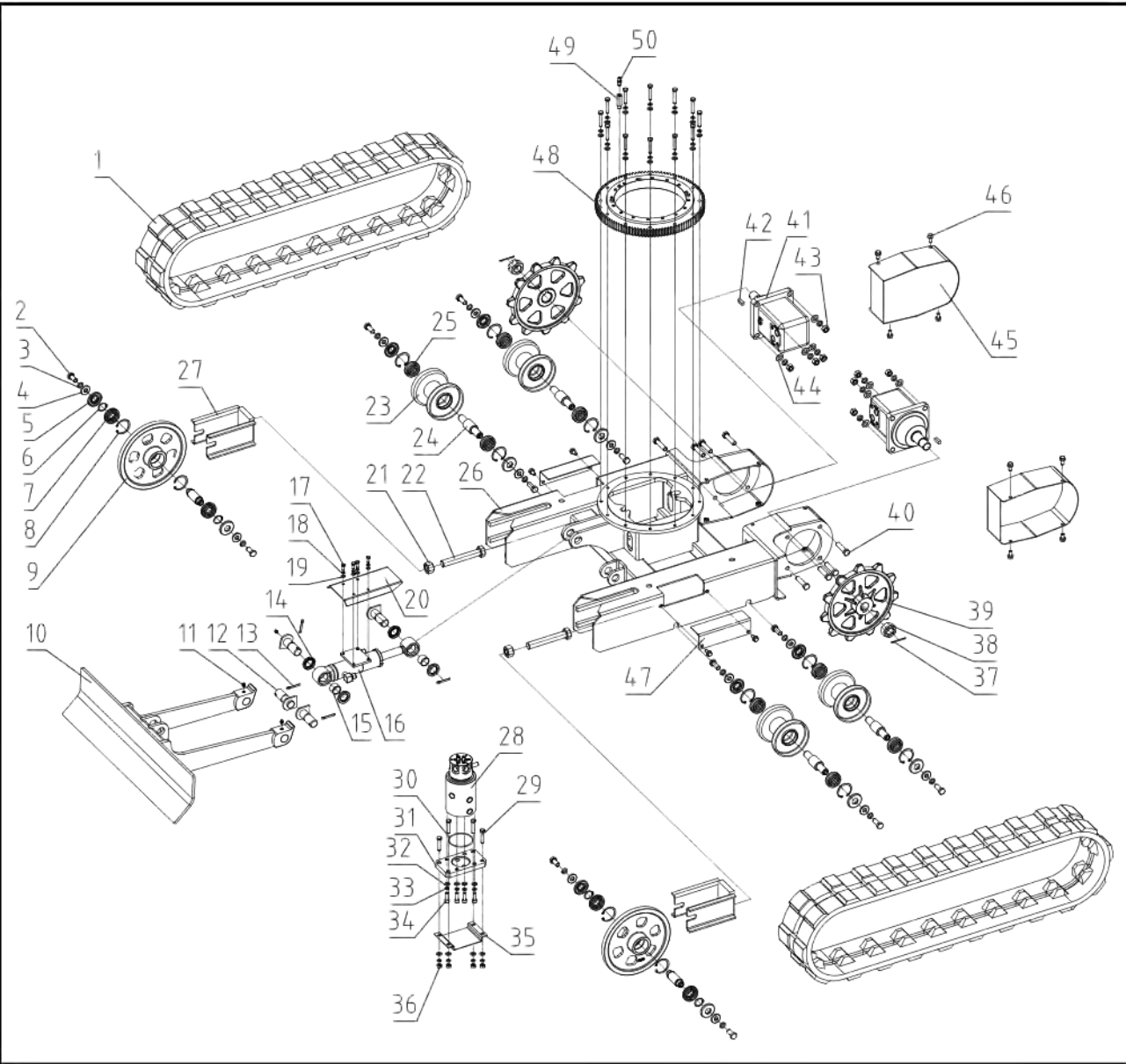
No.	Description	Q'ty
13	Straight Joint Bearing M8	2
14	Nut M8	4
15	Connecting Rod M8x80	4
16	Elbow Lever Knob Joint Bearing SQ8-RS JB/T5306	2
17	Operating Control Lever-Direction Block	2
18	Screw M8x25	4
19	Universal Support Pin Shaft 10x45	2
20	Operating Control Lever-Universal Joint Weldment	2
21	Spring Washer D8	12
22	Nut M8	8
23	Flat Washer D10	6
24	Cable Lever Weldment	1
25	Dozer Ball Knob	4
26	Big Washer D6	1
27	Choke Torsion Spring	1
28	Throttle Cable Plate Weldment	1
29	Choke Cable Plate Weldment	1
30	Choke Lever Shaft	1
31	Lock Nut M5	1
32	Bolt M5x10	1
33	Control Cabinet- Top Plate Wedment	1
34	Horn Button	1
35	Headlamp Button	1
36	Timer	1
37	Screw M4x14	2
38	Lock Nut M4	2
39	Power Indicator Light	1
40	Drive Lever Sleeve	2
41	Left/Right Drive Lever	2
42	Operating Ball Knob	2
43	Rearview Mirror	2
44	Rearview Mirror- Supporting Tube	2
45	Rearview Mirror- Frame	2
46	Bolt M8x25	6
47	Flat Washer D8	4
48	Handle Weldment	1
49	Flat Washer D10	4
50	Spring Washer D10	6
51	Bolt M10-20	6

No.	Description	Q'ty
52	Large Washer A4	2
53	Copper Sleeve	2
54	Bolt M6x16	9
55	Spring Washer D6	9
56	Flat Washer D6	9
57	Electric Relay	2
58	Pin D5x100	2
59	Lever Lock Rotating Shaft Weldment	1
60	Anti-Slip Wear Washer	4
61	Washer D12	4
62	Locking Handle	2
63	Locking Lever	2
64	Lock Nut M12	3
65	Wave Spring Washer D12	2
66	Lock Plugboard-MiddleConnecting Plate	1
67	Left/Right Lock Plugboard	2
68	Locking Plate for Operating Lever	1
69	Flange Bolt M8x16	37
70	Lock Plugboard Weldment	1
71	Operation Dashboard- Front Guard Plate	1
72	Rotating Shaft Weldment	1
73	O-Ring 34x4	4
74	Right Handle Weldment	1
75	Dozer Shaft Sleeve Weldment	1
76	Bolt M8x45	1
77	Lock Nut M8	1
78	Left Handle Weldment	1
79	Grease Cup M6X1	2
80	Rubber Pads	1
81	Grease Cup M10	2
82	PD610 Straight Fitting	2
83	Control Cabinet- End Plate Wedment	1
84	Nut M6	2
85	Battery Negative Switch	1
86	Cigarette Lighter Socket	1
87	Oil Filter	1
88	Horn (DC12V 105dB high)	1
89	Engine Cover Plate Weldment	1



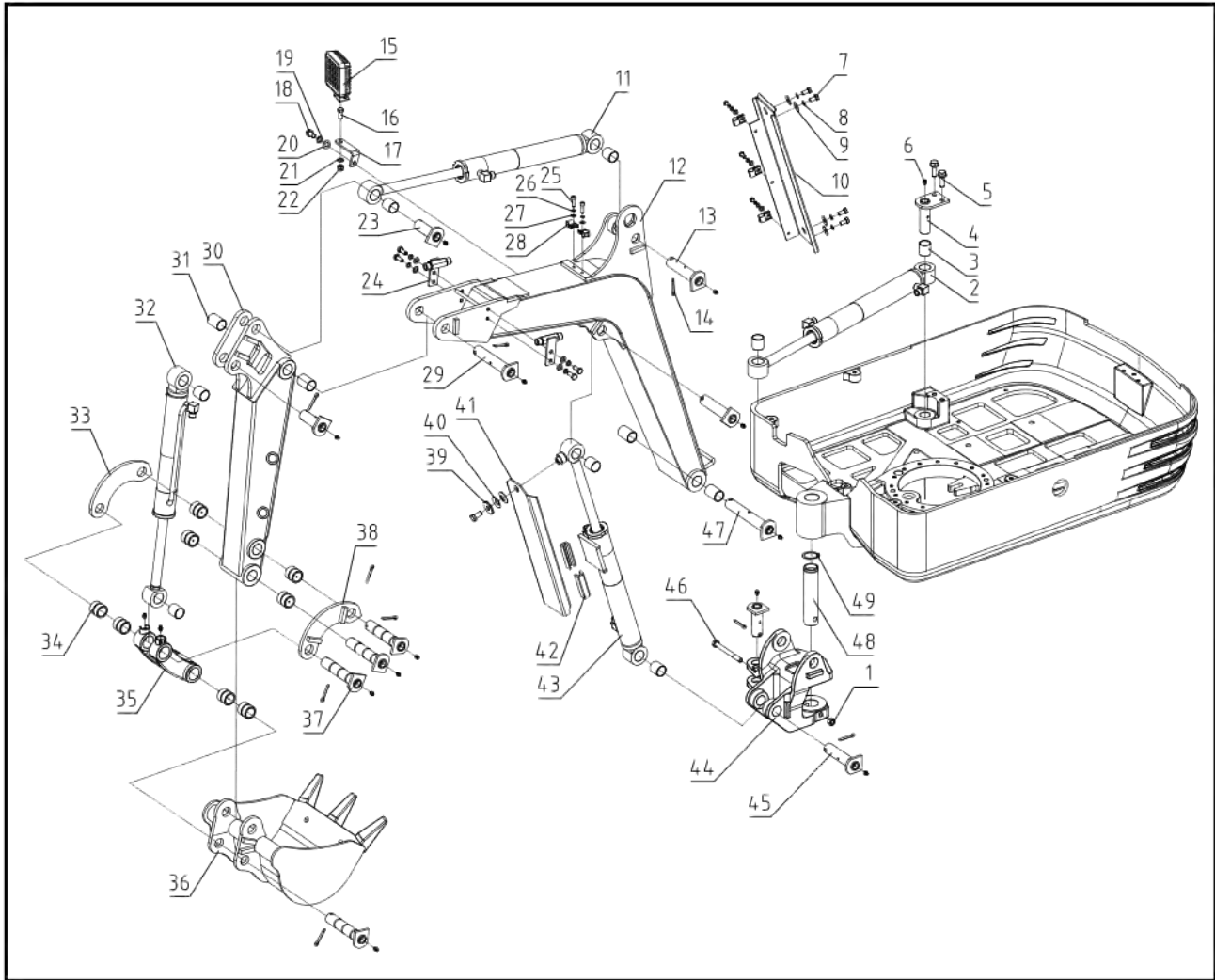
No.	Description	Q'ty
90	Engine Cover Weldment	1
91	Lock Hook	1
92	Torsion Spring	1
93	40mm Triangle-Lock Core With Key	1
94	Bolt M8x25	2
95	Manual Storage Cylinder	1
96	Bolt M8x16	16
97	Excavator integrated seat (with slide)	1
98	Swing Unit Platform	1
99	Battery Lock Hook	2
100	Battery Mounting plate	1
101	Battery	1
102	Battery Fixing Plate	1
103	Spring Washer 8	31
104	Flat Washer 8	33
105	Nut M8	15
106	Screw M6x14	4
107	Fan	1
108	Battery Cover Wedment	1
109	Cooling Fan Mounting Frame	1
110	Lock Nut M6	4
111	Nut M14	3
112	Flat Washer 14	3
113	Spring Washer 14	3
114	Counter Weight	1
115	Motor Cover Turnover Support	1
116	Bolt M14x170	3
117	Cotter Pin 2x16	1
118	Motor Cover Mounting Base	1
119	Pin 8x110	1
120	Bolt M12x35	4
121	All Metal Lock Nut M10	4

No.	Description	Q'ty
122	Shock Absorber	4
123	Engine Mounting Plate Wedment	1
124	Nut M10	4
125	Flat Washer 10	8
126	Spring Washer 10	12
127	Engine	1
128	Nut M12	4
129	Spring Washer 12	4
130	Spring Washer 12	4
131	Engine Guard Plate	1
132	Connecting Hose Wedment For Muffler	1
133	Muffler - Inside Tank	1
134	Coupler Sleeve	1
135	Key 7x7x23	1
136	Coupler KSP24	1
137	Gear Pump Frame	1
138	Gear Pump	1
139	Bolt M8x150	2
140	Muffler Frame	1
141	Bolt M6x16	2
142	Locking Pin Handlebar sleeve	1
143	Locking Pin Weldment	1
144	Screw M10x35	4
145	Rotary Motor Assy	1
146	Screw M8x25	3
147	Hydraulic Oil Tank Cover	3
148	Hydraulic Oil Tank Wedment	1
149	Oil suction filter	1
150	Hose Clamp	2
151	Suction Hose	1
152	Flat Washer 8	16
153	Spring Washer 8	16
154	Bolt M8x55	16
155	Tool Box	1



No.	Description	Q'ty
1	Rubber Track 150x72x32	2
2	Bolt M12x30	12
3	Spring Washer 12	28
4	Washer	12
5	Seal B20x47x7	12
6	Circlip A25	4
7	Bearing 6005-2Rs	4
8	Circlip A47	12
9	Front Idler	2
10	Dozer	1
11	Oil Cup M6x1	2
12	Dozer Pin Shaft Weldment	4
13	Cotter Pin 5x35	4
14	Seal B25x40x7	4
15	RCB-20 Boundary Lubricating Bearing	2
16	Dozer Cylinder	1
17	Bolt M6x16	17
18	Spring Washer 6	26
19	Flat Washer 6	20
20	Dozer Cylinder Guard Plate	1
21	Nut M20	2
22	Hex Bolt M20x130	2
23	Supporting Roller	4
24	Supporting Roller Axle	4
25	Bearing 6204-2Rs	8

No.	Description	Q'ty
26	Base Weldment	1
27	Front Idler Fixing Frame	2
28	Central Swivel	1
29	Bolt M8x45	32
30	O-Ring D72x3.1	1
31	Central Swivel Mounting Plate	1
32	Flat Washer 8	58
33	Spring Washer 8	58
34	Screw M8x25	11
35	Central Swivel Guard Plate	1
36	Nut M8	28
37	Cotter Pin 4x45	2
38	Axle Nut 1-20UNEF	2
39	Drive Sprocket	2
40	Bolt M12x45	8
41	Hydraulic Motor	2
42	Arch Key $\phi 25.4 \times 7$	2
43	Hexagon Lock Nut M12	8
44	Flat Washer 12	23
45	Motor Cover Weldment	2
46	Flange Bolt M8x16	69
47	Track-tension Adjusting Hole Cover	2
48	Central Swing Circular Support	1
49	Central Swing Circular Support-Lubricating Joint	1
50	Straight Fitting PD610(With Neck Bush)	4



No.	Description	Q'ty
1	Lock Nut M10	1
2	Boom Swing Cylinder	1
3	RCB-20 Boundary Lubricating Bearing 28x25x35	8
4	Boom Swing Cylinder-Rear Pin Weldment	1
5	Flange Bolt M8x16	2
6	Oil Cup M6	16
7	Blot 8x16	4
8	Spring Washer 8	8
9	Flat Washer 8	4
10	Boom Upper-hose Cover-Plate Weldment	1
11	Arm Cylinder	1
12	Boom Weldment	1
13	Boom Pin Shaft Weldment	2
14	Cotter Pin 5x35	12
15	Work Light	1
16	Bolt M8x20	7
17	Light Mounting Plate	1
18	Bolt M10x20	2
19	Spring Washer 10	1
20	Flat Washer 10	1
21	Flat Washer 8	5
22	Lock Nut M8	1
23	Arm Cylinder Pin Shaft Weldment	3
24	Transition Fitting	2
25	Bolt M6x20	5

No.	Description	Q'ty
26	Spring Washer 6	5
27	Flat Washer 6	5
28	Connecting Pipe Clamp R-type	5
29	Arm Cylinder Pin Shaft Weldment	1
30	Arm Weldment	1
31	RCB-20 Boundary Lubricating Bearing 28x25x40	4
32	Bucket Cylinder	1
33	Arm Rocker-Right	1
34	Bucket Shaft Sleeve	8
35	Connecting Rod	1
36	Shovel Weldment	1
37	Shovel Pin Weldment	4
38	Arm Rocker-Left	1
39	Flat Washer 10	1
40	Wing Spring	2
41	Boom Cylinder-Guide Plate	1
42	Guide Plastic Block	2
43	Boom Up&Down Cylinder	1
44	Boom Swing Frame	1
45	Boom Swing Frame- Pin Shaft Weldment II	1
46	Bolt M10x100	1
47	Boom Swing Frame- Pin Shaft Weldment I	1
48	Boom Swing Frame Pin Shaft 35x155	1
49	Circlip A35	1

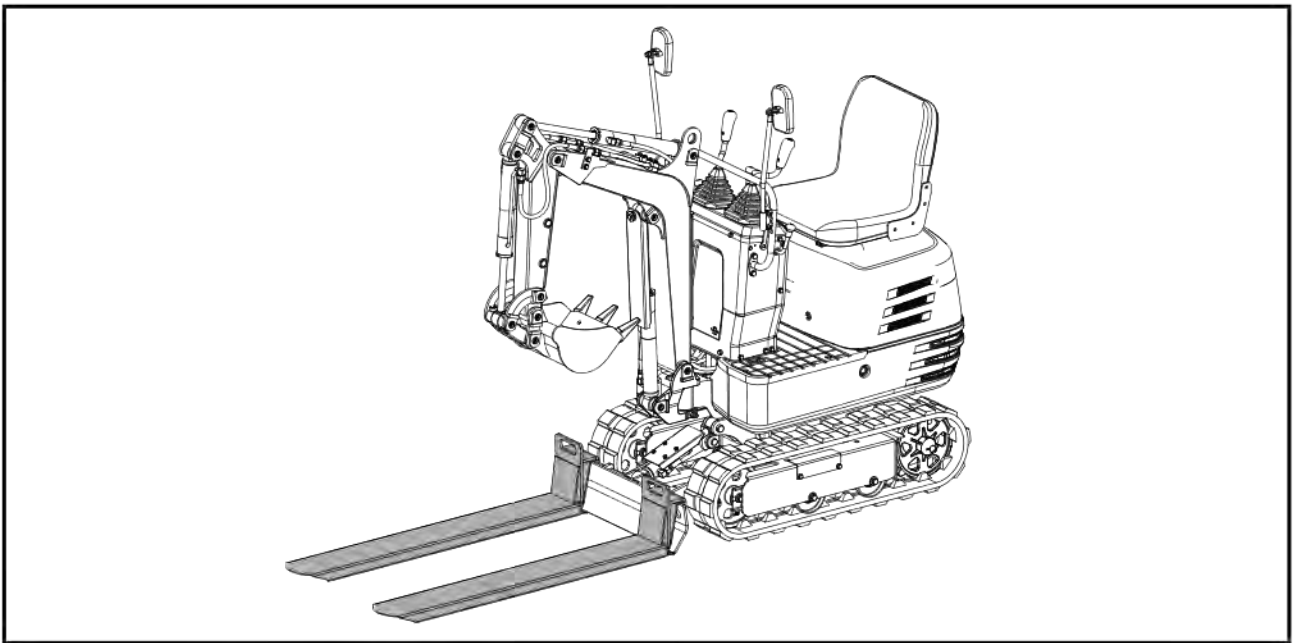
ATTACHMENTS (SOLD SEPARATELY)

The simple construction of these attachments allows one person to install them on excavators for quick job changeovers.

With the help of attachments, your excavator can become many additional tools for a wider variety of jobs, which makes the machine more efficient.

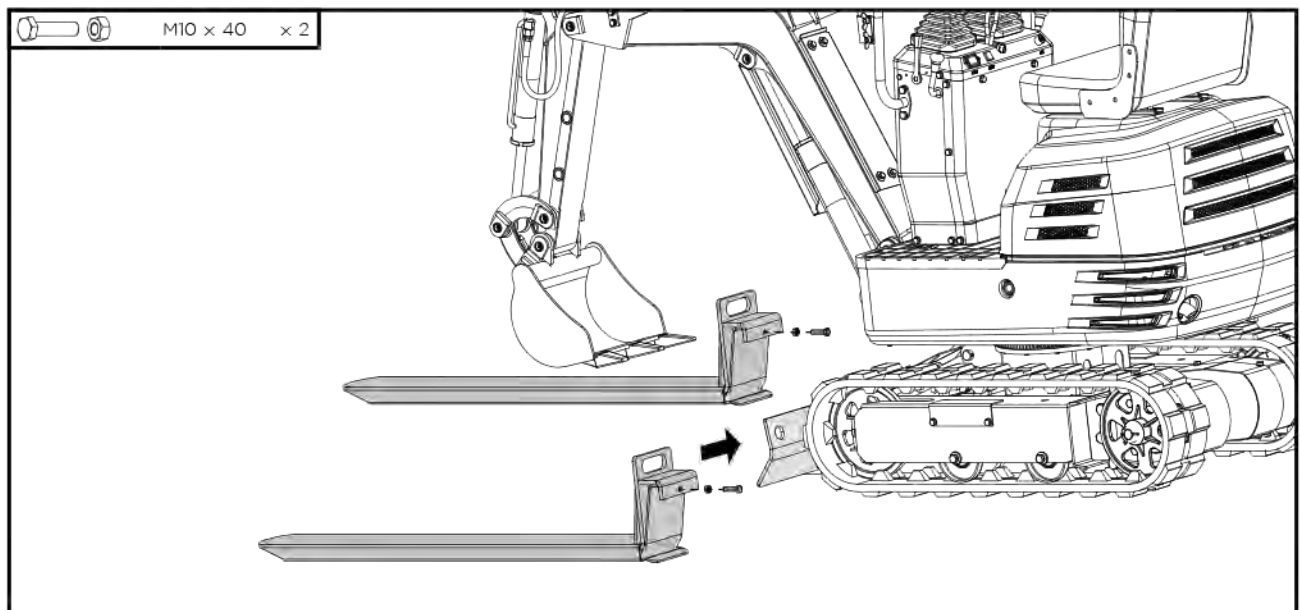
PALLET FORKS DUAFRK-48 (SOLD SEPARATELY)

The pallet forks are connected to the dozer blade, which can transport, load and unload various materials with pallets.



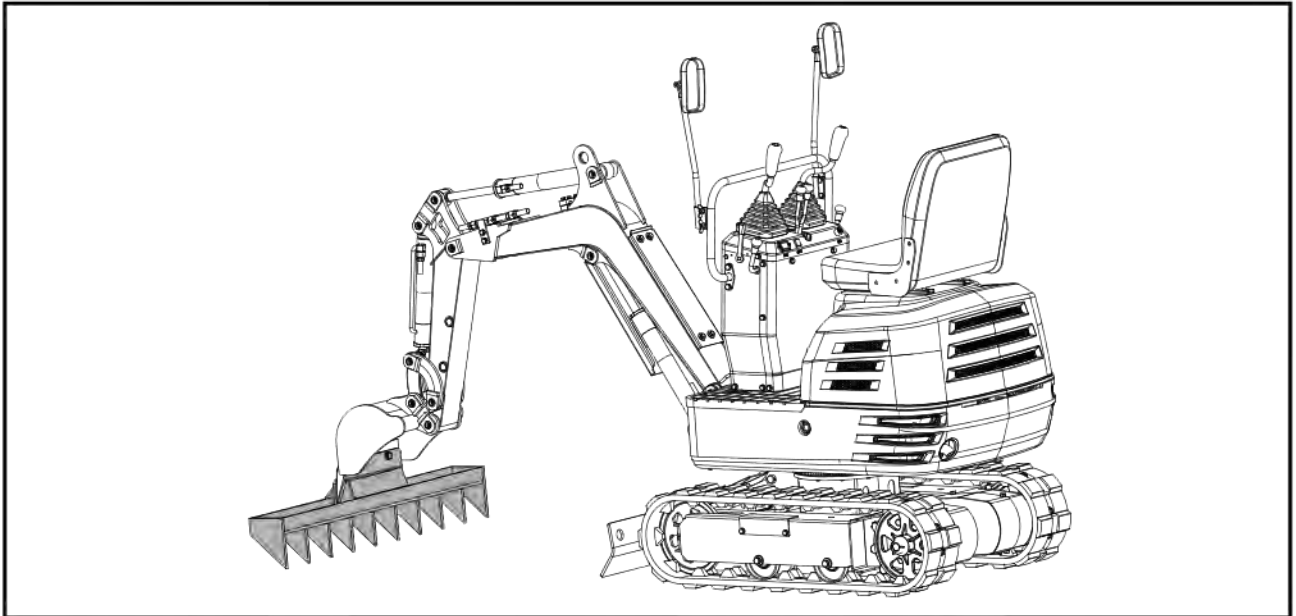
Pallet Forks Installation

Stop the machine and lower the bucket to the ground. Slightly loosen the bolts M10x40 and nuts attached to the pallet forks. Lift the dozer blade a little and hook the two pallet forks to it. Tighten the bolts to secure the connection.



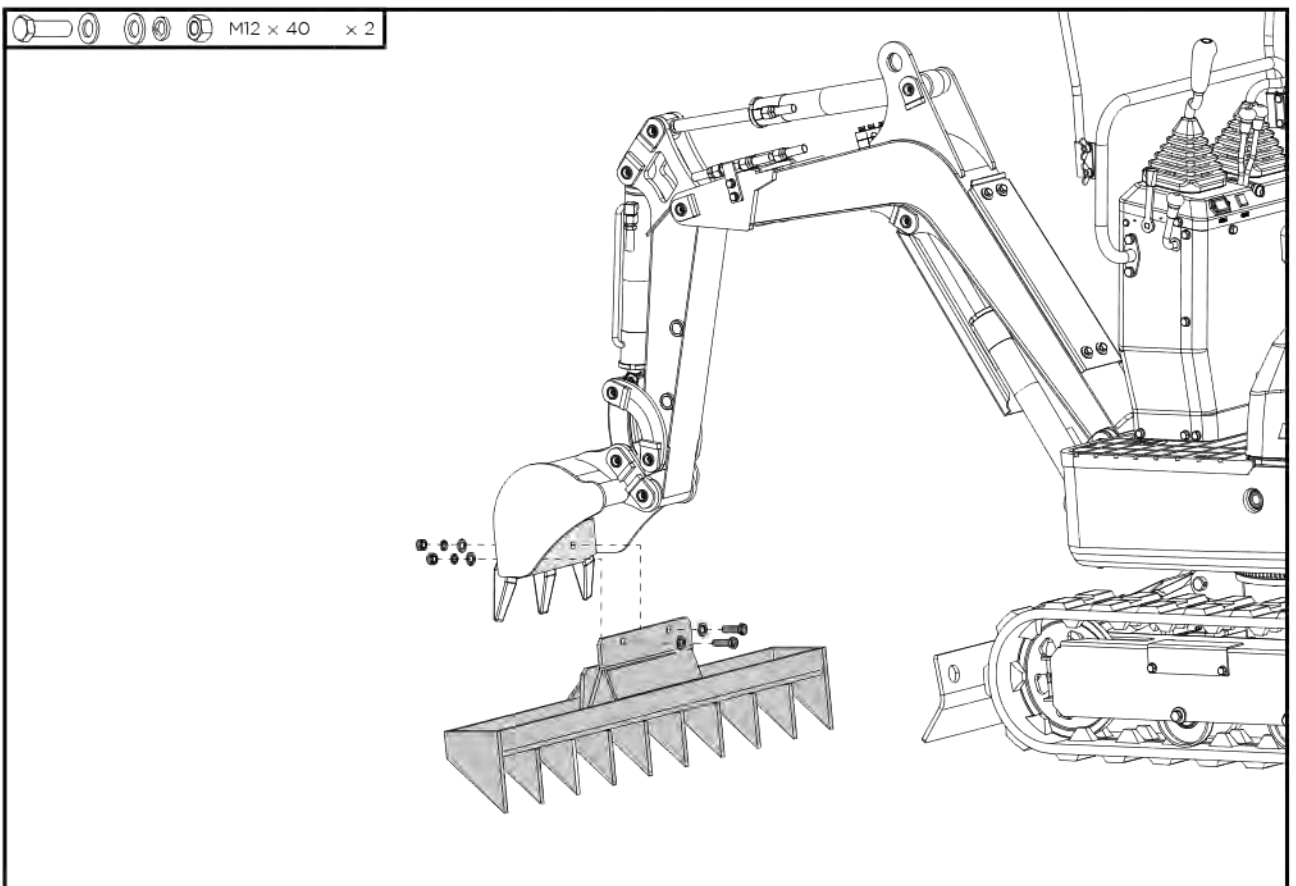
RAKE DUARAK-39 (SOLD SEPARATELY)

The rake is connected to the end of bucket, which is ideal for collecting straw, screening debris or flattening the ground.



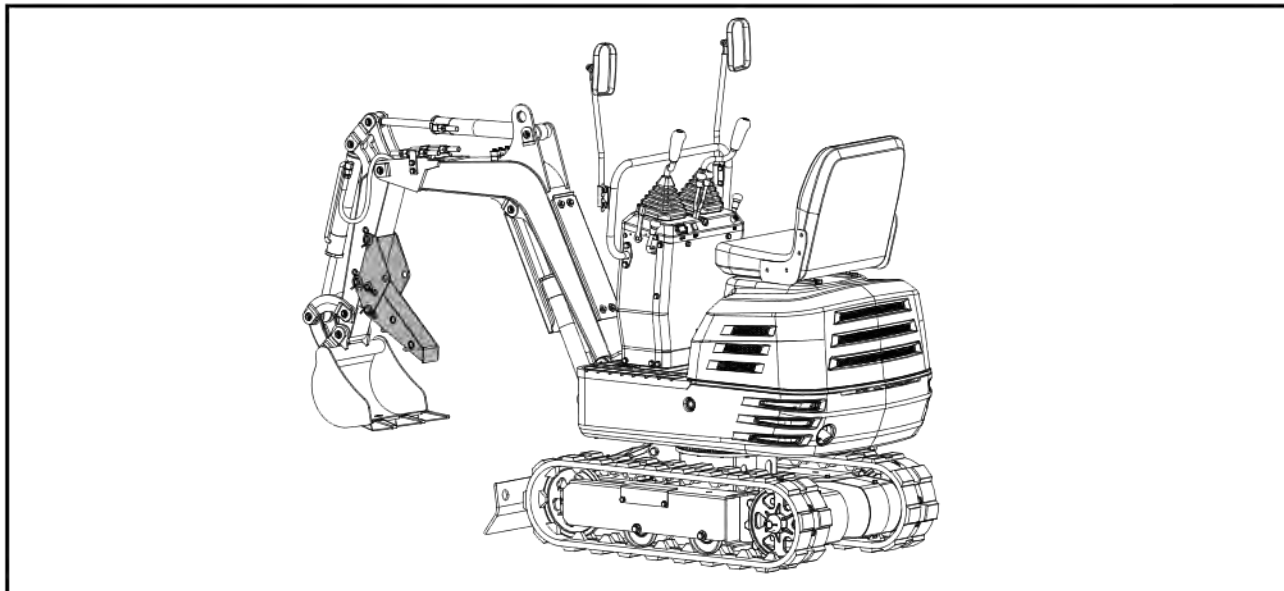
Rake Installation

Stop the machine and lift the bucket off the ground to a certain height. Remove the bolts M12x40, washers and nuts preinstalled on the rake. Mount the rake to the bucket with these standard parts.



THUMB DUATMB-15 (SOLD SEPARATELY)

The thumb can hold materials in place in the bucket. It can be used together with the bucket to grip regularly or irregularly shaped materials, such as rocks, timbers or demolition debris.



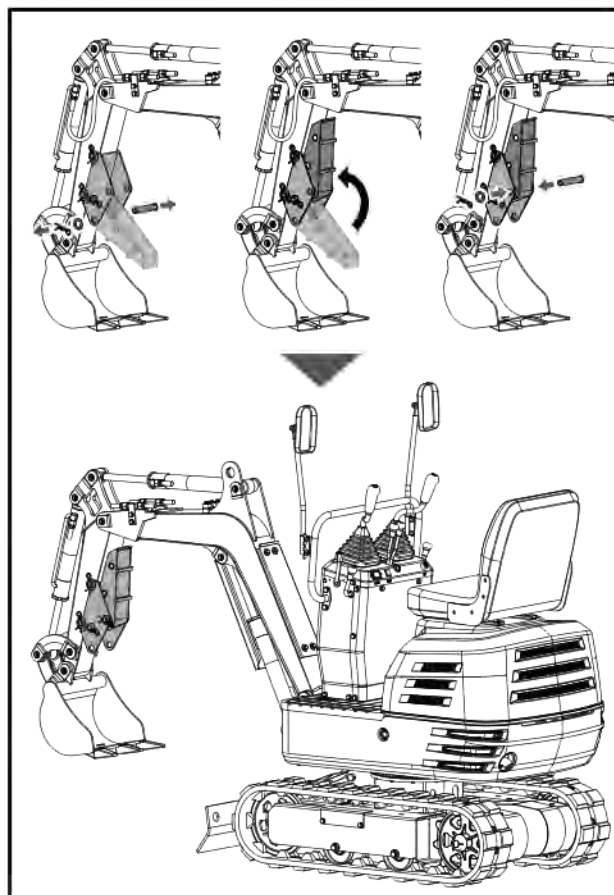
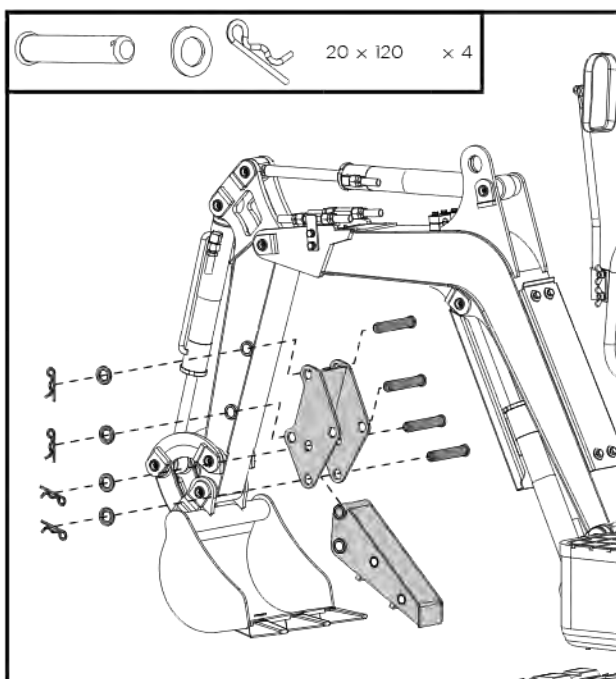
Thumb Installation

Demount the pin shafts 20x120, washers and R-pins from the thumb bracket.

Attach the bracket to the arm and align the holes. Pass two pin shafts through the holes, put on the washers and fix with R-pins.

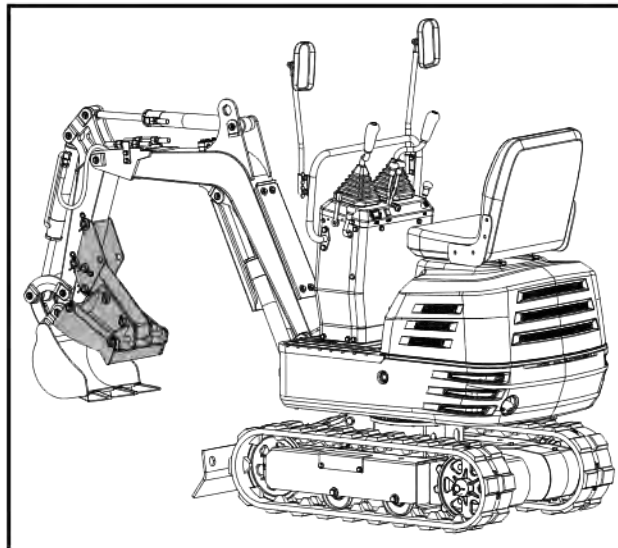
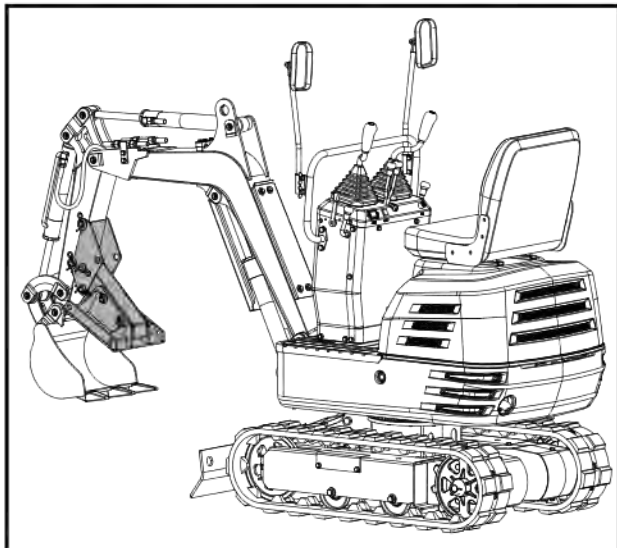
Insert the bigger end of the thumb into the bracket, align the holes and fasten with the other two pin shafts, washers and R-pins.

When the thumb is not in use, pull out the lower R-pin and the pin shaft, fold up the thumb into the bracket and fix it in the upper position with the previously pulled out parts.



CLAW DUACLW-11 (SOLD SEPARATELY)

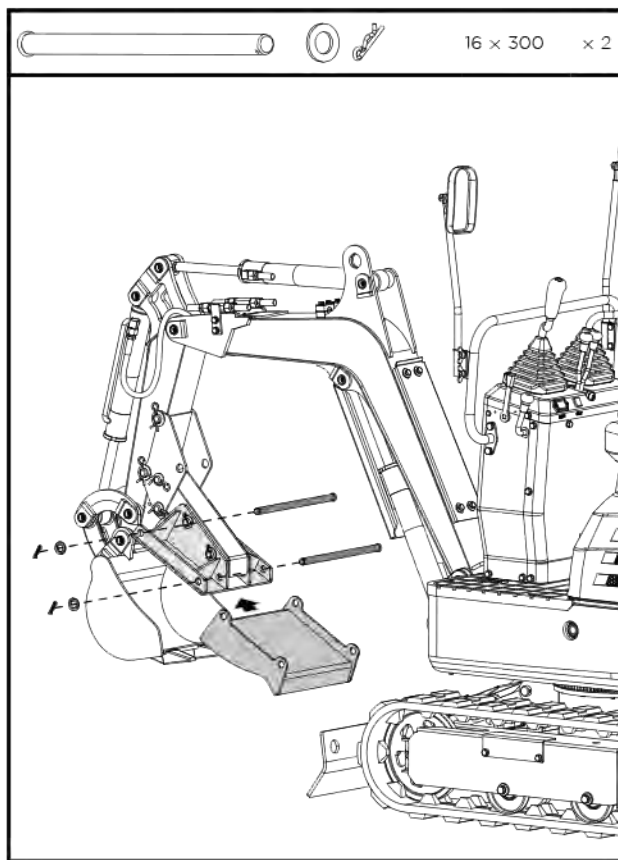
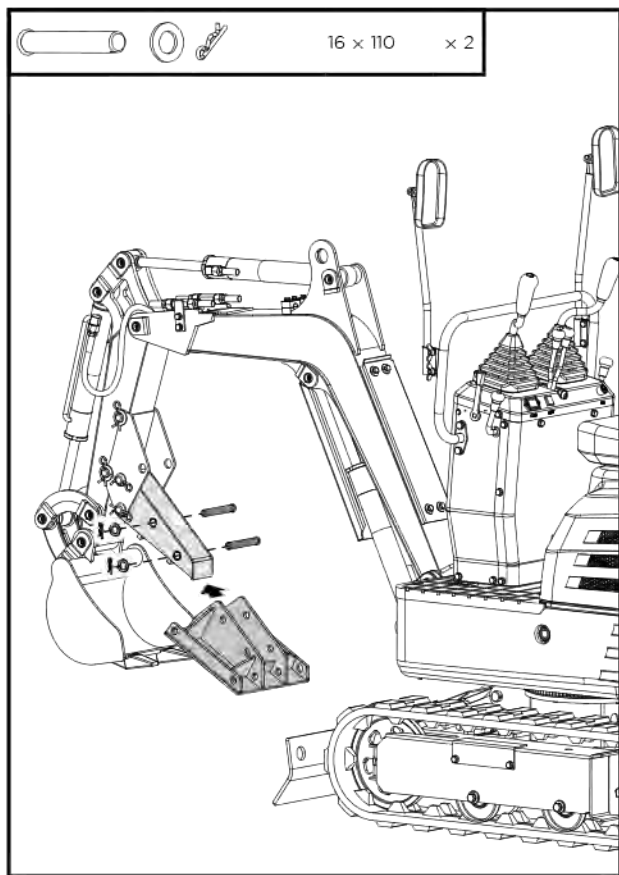
The clamp without cover can be used to collect leaves, gravel and straw. The complete claw with cover is ideal for material of small particles like sand and soil.



Claw Installation

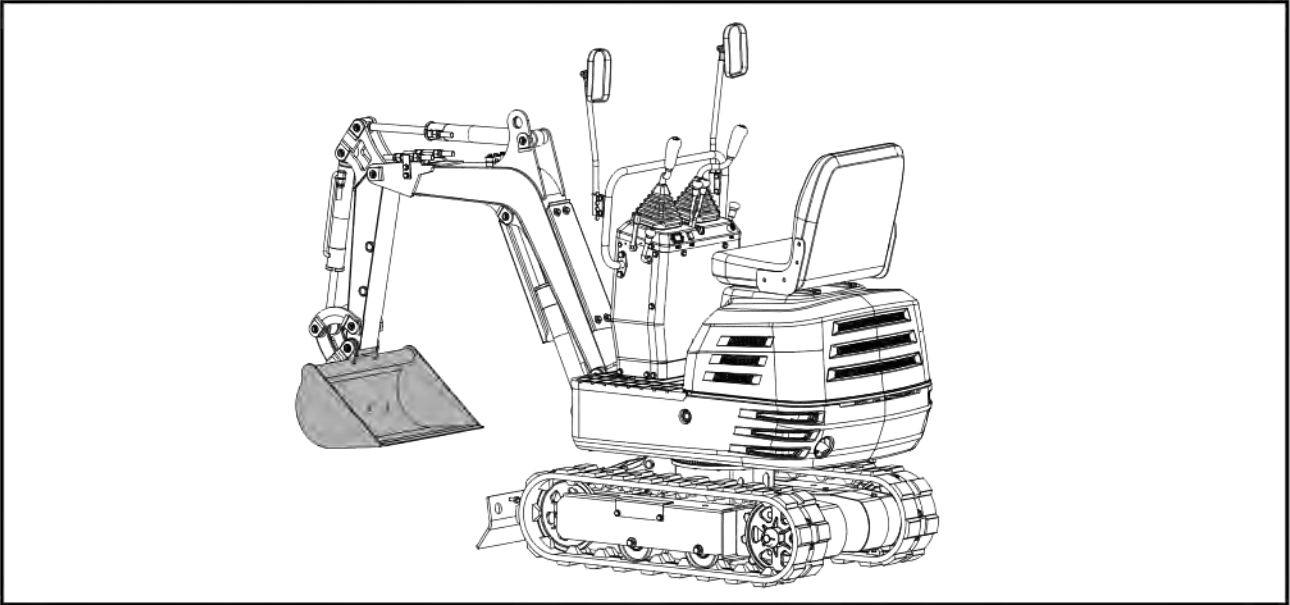
1. Demount the pin shafts 16x110, washers and R-pins from the clamp. Install the clamp to the thumb, align the holes and secure with the pin shafts, washers and R-pins.

2. Demount the pin shafts 16x300, washers and R-pins from the claw cover. Attach the cover to the clamp from outer side and align the holes. Pass the pin shafts 16x300 through the holes, put on the washers and fix with R-pins.



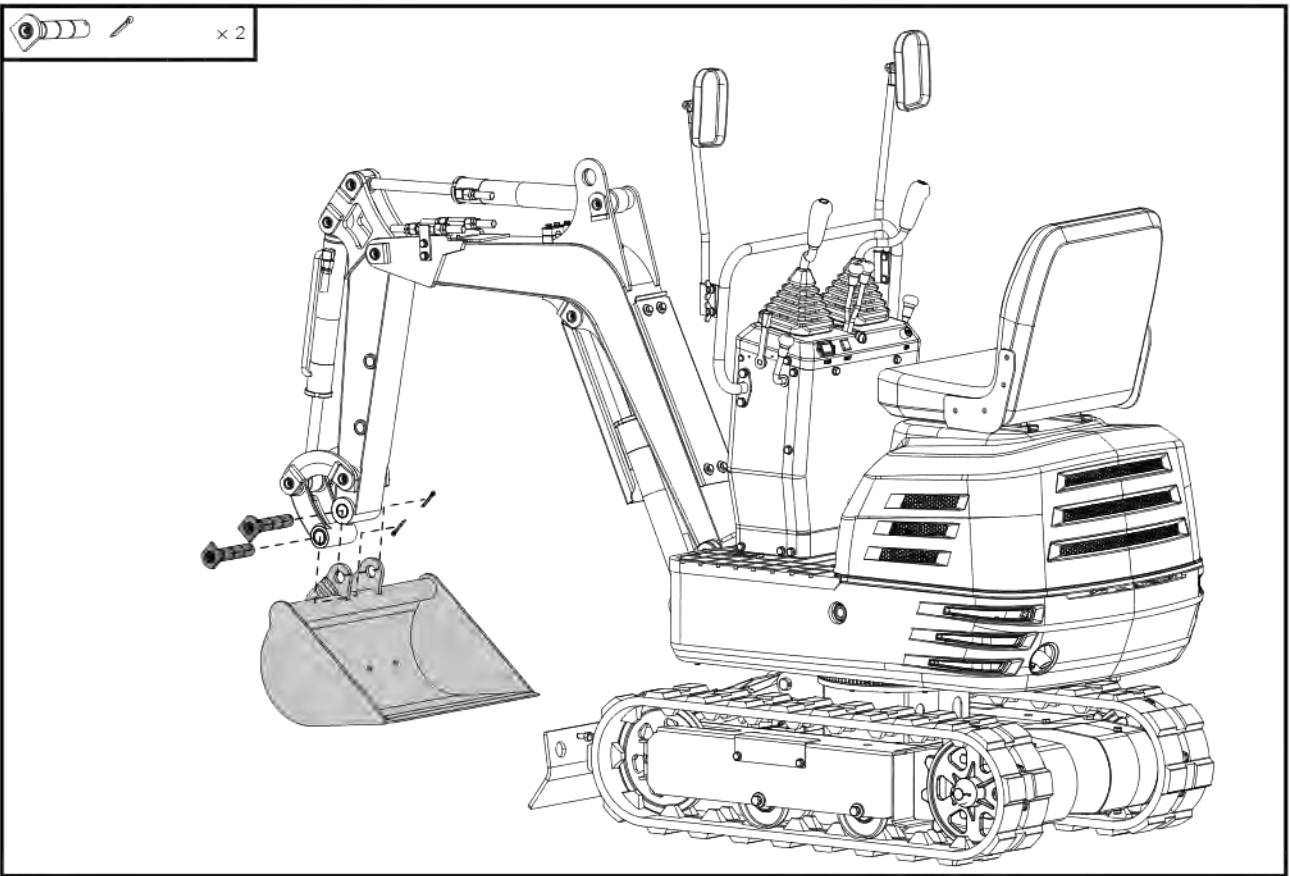
GRADING BUCKET DUAGBK-20 (SOLD SEPARATELY)

The grading bucket is for replacing the standard bucket on the machine. With bigger capacity, it can double the working efficiency when digging loose materials.



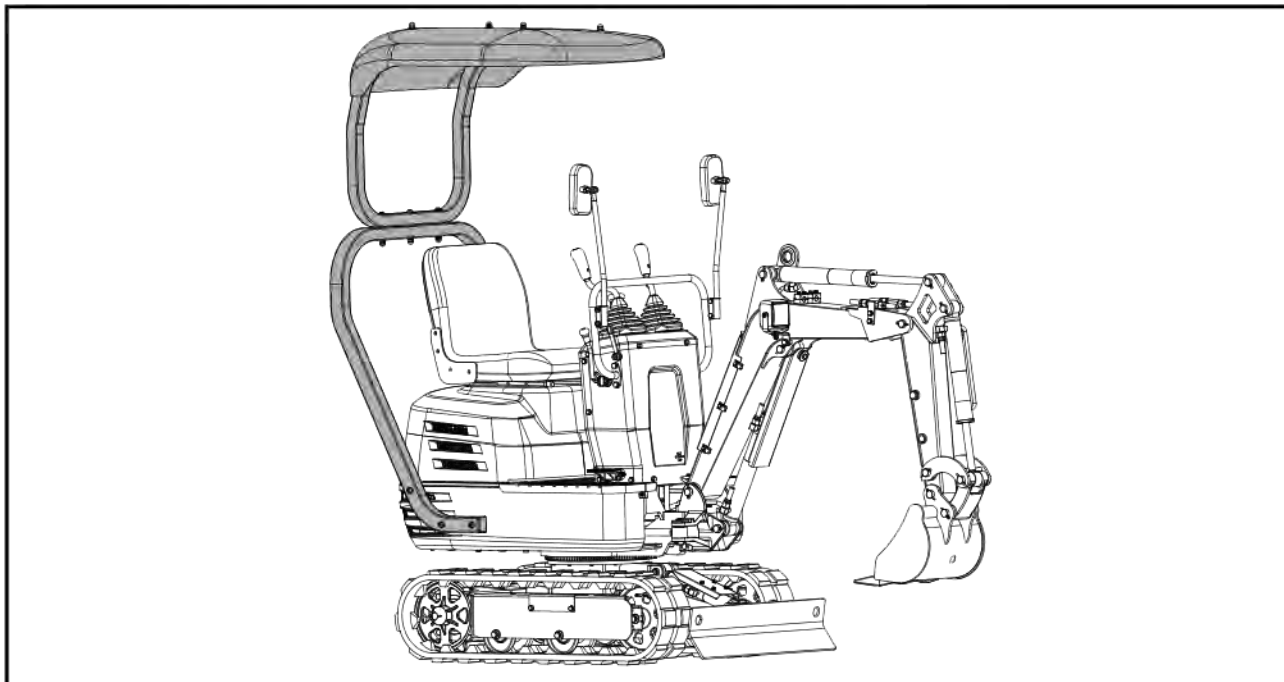
Grading Bucket Installation

Stop the machine and rest the bucket on the ground. Remove the shovel pin weldment, then remove the standard bucket off the machine. Mount the grading bucket onto the machine with the removed pins from the first step.



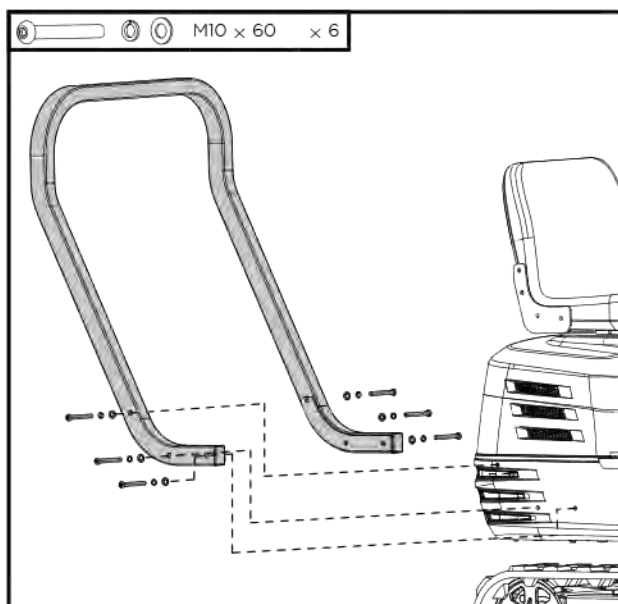
CANOPY DUACPY-28 (SOLD SEPARATELY)

The canopy is connected to the swing unit platform. It is ideal for offering protections from sunlight, rain and other precipitations. It is easy to be installed and disassembled.

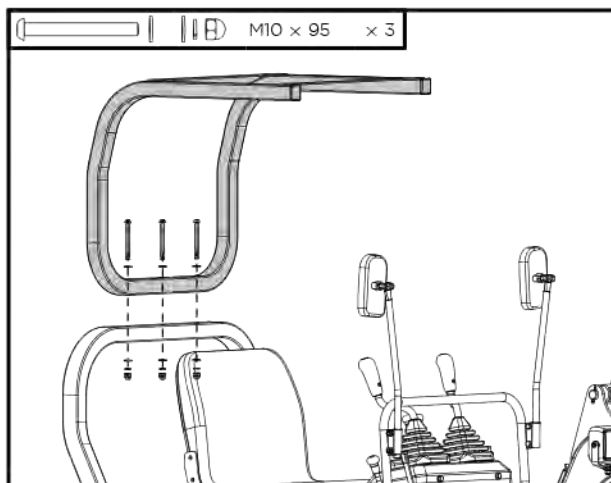


Canopy Installation

Align the holes in the lower frame of the canopy with the holes in the swing unit platform as shown. Fasten the lower frame in place with the provided M10x60 bolts and washers.



Align the holes in the upper frame with the holes in the lower frame of the canopy as shown. Secure the connection with the provided M10x95 bolts, washers and nuts.



Align the holes in the canopy top with the holes in the upper frame of the canopy as shown. Fasten the canopy top in place with the provided M8x25 bolts, washers and nuts.

